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SENT VIA ELECTRONIC MAIL and OVERNIGHT COURIER

October 5, 2017

Mr. James M. DiLorenzo
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Subject: Focused Remedial Investigation Report – Dense Aqueous Phase Liquid (DAPL)
Olin Chemicals Superfund Site
Wilmington, MA

Dear Mr. DiLorenzo:

Enclosed herewith is the Focused Remedial Investigation Report for Dense Aqueous Phase Liquid (DAPL) for the Olin Chemicals Superfund Site in Wilmington, MA.

Feel free to contact me at the number or email shown above should you wish to discuss this further.
Very truly yours,

OLIN CORPORATION

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DRAFT
FOCUSED REMEDIAL INVESTIGATION REPORT
DENSE AQUEOUS PHASE LIQUID - OPERABLE UNIT 3

OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

Prepared for:

Olin Corporation
3855 North Ocoee Street; Suite 200
Cleveland, TN 37312

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
271 Mill Road
Chelmsford, MA 01824

Project No. 6107170016.008

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DRAFT	*DRAFT*
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AMEC	AMEC Environment & Infrastructure, Inc.
Amec Foster Wheeler	Amec Foster Wheeler Environment and Infrastructure, Inc.
AOC	Administrative Order on Consent
BEHP	bis(2-ethylhexyl)phthalate
bgs	below ground surface
BRTP	Butters Row Treatment Plant
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm/sec	centimeters per second
COI	chemical of interest
CRA	Conestoga Rovers Associates
C-RAM	construction-related release abatement measure
CSA	Comprehensive Site Assessment
CSL	Calcium Sulfate Landfill
CSM	conceptual site model
cy	cubic yards
DAPL	dense aqueous phase liquid
DMA	dimethylamine
EJ	Environmental Justice
EOEA	Executive Office of Environmental Affairs
F	Fahrenheit
FRI	Focused Remedial Investigation Report
FS	Feasibility Study
ft	feet
GEI	Geotechnical Engineers, Inc.
Gpm	gallons per minute
HPIT	hydraulic pulse interference testing
HHRA	Human Health Risk Assessment
IRA	Immediate Response Action
IRSWP	Interim Response Steps Work Plan
LNAPL	light non-aqueous phase liquid
µmhos/cm	micromhos per centimeter
MACTEC	MACTEC Engineering and Consulting, Inc.
MassDEP	Massachusetts Department of Environmental Protection
MBTA	Massachusetts Bay Transportation Authority
MCP	Massachusetts Contingency Plan
MDC	Metropolitan District Commission
mg/L	milligrams per liter

MMB	Maple Meadow Brook
MMBA	Maple Meadow Brook Aquifer
MMBW	Maple Meadow Brook Wetland
MSL	mean sea level
MWRA	Massachusetts Water Resource Authority
MWSW	Municipal Water Supply Wells
NCP	National Oil and Hazardous Contingency Plan
NDMA	N-nitrosodimethylamine
NDPA	N-nitrosodiphenylamine
NEPCO	New England Pollution Control Company
ng/L	nanograms per liter
NPI	National Polychemicals, Inc.
NPL	National Priorities List
OCSS	Olin Chemical Superfund Site
off-PWD	off-Property West Ditch
Olin	Olin Corporation
on-PWD	on-Property West Ditch
OU	Operable Unit
PCMP	post-construction monitoring plan
Property	Olin Property
PVC	polyvinyl chloride
RAM	Release Abatement Measure
RGP	Remediation General Permit
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
SMB	Sawmill Brook
SOW	Statement of Work
SVOC	Semi-volatile organic compounds
SWMU	Solid Waste Management Units
the Site	Olin Chemical Superfund Site
TDS	total dissolved solids
TMPs	trimethylpentenes
WBV	Western Bedrock Valley
WSL	Woburn Sanitary Landfill
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compounds

EXECUTIVE SUMMARY

This Executive Summary describes the Focused Remedial Investigation (RI) Report and associated Human Health Risk Assessments for the Operable Unit 3 (OU3) Dense Aqueous Phase Liquid (DAPL) pools at the Olin Chemical Superfund Site (the Site or OCSS) at 51 Eames Street in Wilmington, Massachusetts prepared on behalf of Olin Corporation (Olin) by Amec Foster Wheeler Environment and Infrastructure, Inc. (Amec Foster Wheeler) (**Figure ES-1**). OU3 is the groundwater Operable Unit.

This document is intended to be a focused RI report specific to the DAPL pools and at the request of the United States Environmental Protection Agency (USEPA) will not discuss the interaction of DAPL pools with overburden and bedrock groundwater which constitute the primary exposure and migration pathways for dissolved constituents present in DAPL. DAPL is a dense, colored, low pH aqueous phase liquid waste material with high dissolved solids that contains several inorganics and metals (sodium, chloride, calcium, sulfate, magnesium, chromium, and ammonia) and lower levels of some organics such as trimethylpentenes, phthalates, and N-nitrosodimethylamine (NDMA) and it has come to be located in bedrock depressions and in fractured bedrock both on-property and off-Property. The DAPL pools formed in bedrock depressions as a result of the disposal of process waste waters into unlined lagoons. The processes that resulted in the formation of DAPL and the DAPL pools is discussed later in this executive summary. The report will provide abbreviated background information that has already been presented in detail in the Final OU1 OU2 RI Report (AMEC, 2014), which was approved by USEPA previously. This abbreviated information is provided for the context of readers who are not familiar with that previously submitted and approved RI report and the site history. The understanding of DAPL and its role at the site has evolved over many years of study that pre-dated the recent remedial investigations. To assist the reader, several of these studies are summarized and included in their original format in a compact disk in **Attachment A**.

The Site is comprised of the Olin Property (Property), an approximately 50-acre parcel (**Figure ES-1**), and adjoining off-Property areas impacted by manufacturing and waste disposal activities at the Property. The northern part of this property was formerly the site of a chemical manufacturing facility.

The Site was listed on the National Priorities List (NPL) pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 105, 42 U.S.C. 9605 on April 19, 2006 (71 FR 20,016). The primary substance used by USEPA to score the Site as a Proposed Site for the NPL was N-nitrosodimethylamine (NDMA) in groundwater (USEPA, 2005). The Site was the subject of many years of investigations and response activities under Chapter 21E of the General Laws of Massachusetts and the Massachusetts Contingency Plan (MCP) prior to the NPL listing. Prior to that the Site has been a Priority site under the MCP since 1993, and a Tier I site since 1994. The site is currently classified as Otherwise Adequately Regulated under the MCP.

Olin Corporation, American Biltrite Inc., and Stepan Company, as Co-Respondents, have voluntarily entered into an Administrative Settlement Agreement and Order on Consent (AOC)

with the USEPA to conduct a Remedial Investigation and Feasibility Study (RI/FS) for the Site (USEPA, 2007a). The effective date of the AOC is July 3, 2007. The Scope of the RI/FS is described in the Statement of Work (SOW), Remedial Investigation and Feasibility Study, Olin Chemical Superfund Site, prepared by the USEPA Region I – New England and dated June 28, 2007 (USEPA, 2007b).

USEPA has subdivided the Site into three OUs described as follows:

OU1: defined in the SOW as the approximately 50-acre Olin Property including the former facility area, the established conservation area, the on-Property ditch system, the Calcium Sulfate Landfill, and the Slurry Wall Containment Area. Soils in the vadose zone are evaluated under OU1, while soils located within the water table will be evaluated under OU3.

OU2: defined in the SOW as off-Property surface water and sediment areas, including the off-Property East Ditch, a small portion of the South Ditch, the off-Property West Ditch (off-PWD), portions of the Maple Meadow Brook Wetland (MMBW), and North Pond. Landfill Brook was investigated as part of OU2 and was found to be impacted by the Woburn Sanitary Landfill, (WSL) rather than the OCSS.

OU3: defined in the SOW as all on- and off-Property groundwater areas including Maple Meadow Brook Aquifer, groundwater beneath the Olin Property, and groundwater located south and east of the Olin Property. Soils located within the water table are evaluated under OU3.

Site Description and Site History

The following subsections provide a summary of the Site Description and History.

Site Description

The Site encompasses the Property and surrounding areas to the west, east and south, where contaminants have migrated by surface water, sediment, and/or groundwater transport. The Property is bounded on the east by the Massachusetts Bay Transit Authority tracks, on the south by the Woburn/Wilmington Town Line and WSL, on the west by an inactive Boston and Maine Railroad spur, and on the north by Eames Street (**Figure ES-2**). The Property is located in an industrialized area of Wilmington within a General Industrial zone. Intensive industrial land use occurs on the eastern, northern, and western sides of the Property. The southern side of the property is bounded by the WSL, a former municipal solid waste landfill that has been closed. Another landfill, constructed and owned by the Spinazzola Trust, is located northwest of the WSL. Residential properties are located along Main Street, Cook Avenue and Border Avenue to the west of the Property, and along Eames Street immediately before it intersects with Woburn Street. Farther west, surrounding the MMBW, residences are located along Chestnut Street, and Butters Row and intersecting roads including Hillside Way, Mill Road, and Elizabeth Drive. Eighteen of these residences and are included within a quarterly residential well monitoring program. The nature and extent of groundwater impacts will be discussed in a future OU3 Remedial Investigation report.

The former facility was located on the northern half of the Property, which is currently unused and contains a vacated office building, a small metal butler building, a former guard shack, and two vacant warehouses, paved and grassed areas, and concrete slabs from other former buildings (**Figure ES-3**). A groundwater recovery/treatment system has been in operation since 1981 with continued operation from 1997 to present as an Immediate Response Action (IRA) under the MCP. The system was installed to prevent seepage of a light non-aqueous phase liquid (LNAPL) into the East Ditch, which is located along the eastern perimeter of the former facility property. The LNAPL, a processing oil, was released during operations of former property owners prior to Olin's ownership. Groundwater extracted by the system is treated to remove iron and ammonia, as well as dissolved organic compounds. The treated groundwater is discharged to surface water on-Property in compliance with a Remediation General Permit (RGP). These operations are independent of issues associated with DAPL.

The Site also contains an on-Property Slurry Wall/Cap containment structure that was constructed in 2000/2001 as a Release Abatement Measure (RAM) approved by MassDEP while the site was regulated under the MCP. The intent of this source control action was to eliminate, to the extent feasible, the on-Property DAPL source material as a source of dissolved constituents to overburden groundwater. The containment structure is comprised of a perimeter slurry wall installed into the weathered bedrock surface, and a temporary cap to minimize infiltration of precipitation into the containment area. Prior to slurry wall placement, weathered bedrock in the excavation was removed to the extent possible with an excavator, and the slurry wall was installed by continuous mud-wave methods as excavation progressed. The temporary cap is a scrim-reinforced polyethylene sheet cover held in place by sandbags and gravel ballast along the edges. A water table equalization window within the slurry wall, but above the elevation of DAPL, allows the groundwater surface within and outside the slurry wall to equilibrate.

The southern half of the Property is forested, except in the southwestern corner where the closed Calcium Sulfate Landfill (CSL) is located. The CSL location and construction plans were approved by the Massachusetts Department of Public Health and the Town of Wilmington Board of Health in 1974. The CSL is approximately 2.5 acres in size, was capped in 1988, and has received final closure certification in accordance with the Massachusetts Solid Waste Management Regulations (310 CMR 19.000). The CSL is considered part of OU1, as defined by the SOW and has no association with DAPL.

Approximately 20 acres within this forested area is subject to the terms of an Environmental and Open Space Restriction that restricts future commercial development activities on that portion of the Property.

The Site also contains both on-Property and off-Property surface water bodies. The on-Property surface water includes a ditch system of natural drainages that were modified in the early 1950s (the on-Property West Ditch and the on-Property South Ditch), and a natural wetland drainage complex (Ephemeral Drainage). A surface water body, known as the Central Pond, and a wetland area known as the Central Wetland, are located north of, and adjacent to, the Lower South Ditch. A storm water retention basin is present between the Containment Area and South Ditch. The on-Property ditch system is connected with two other off-Property ditches (the off-Property West Ditch and the East Ditch). These drainages are all part of the Aberjona River watershed. South

Ditch is a gaining stream and is affected by discharge of groundwater impacted by dissolved constituents that are present in DAPL.

Other surface water bodies at the Site include the Maple Meadow Brook (MMB) and Sawmill Brook (SMB) to the west, which are located on the other side of a groundwater/surface water divide, and are within the Ipswich River watershed. The MMB and SMB are not impacted from releases at the Site.

Site History

Manufacturing activities were conducted at the Site from 1953 until 1986. Olin purchased and began operating the property in 1980. From 1953 onward, the facility expanded incrementally as additional products and processes were added and or modified. The facility produced chemical products for use in the rubber and plastics industries (particularly nitrogen blowing agents Opex® (dinitrosopenta-methylenetetramine) and Kempore® (azodicarbonamide), Nitropore OT, and Nitropore 5PT), but also included blowing agent activators, polymerization initiators, antioxidants/stabilizers (dioctyldiphenylamine or Wytox ADP, trisnonylphenyl phosphite or Wytox 312, alkylated phenol or Wytox Pap), retarders (N-nitrosodiphenylamine), processing aids, phthalate plasticizers (di-n-octylphthalate and dibutyl phthalate), and chemical intermediates (such as hydrazine) and phenolic resins (phenol-formaldehyde resin). Available information indicates that the latter products were not associated with any substantial amounts of liquid waste materials. Two particular nitrogen blowing agents, Opex® and Kempore®, were the largest volume products manufactured at the facility; both products were manufactured from the 1950s through 1986.

Raw materials utilized during the operating history of the Property included diphenylamine, di-n-octylphthalate, bis(2-ethylhexyl)phthalate (BEHP), diisobutylene (trimethylpentene (TMP) mixture used at Plant B in the manufacture of dioctyldiphenylamine or Wytox ADP), #415 Process Oil, nonylphenol, formaldehyde (formalin), dimethylformamide, dinonylphenol, sodium nitrite, 2-ethylhexoic acid, butanol, ammonia (likely anhydrous), hydrazine, sodium dichromate, chlorosulfonic acid, diphenyl oxide, and ammonium hydroxide, benzonitrile, sodium nitrite, hydrochloric acid, sulfuric acid, phenol, and nonylphenol. Sodium dichromate was used as a catalyst in the manufacture of Kempore® until 1967, when its use was discontinued.

Constituents in liquid waste streams and unintentional releases included chromium, bis(2-ethylhexyl)phthalate, N-Nitrosodiphenylamine (NDPA), N-nitrosodipropylamine, diisobutylene (mixture of 2,4,4,-trimethyl-1-pentene and 2,4,4,-trimethyl-2-pentene), formaldehyde, dimethylformamide, Opex, Kempore, sulfuric acid, hydrochloric acid, and numerous salts of sodium and ammonium (sulfates, chlorides, nitrates, and nitrites). Calcium sulfate (gypsum) was produced and precipitated when wastewaters were neutralized with lime (calcium hydroxide) after the use of sodium dichromate had been discontinued. Polychlorinated biphenyls (PCBs) were used in electrical transformers at OU1 and some release to soil has been documented. The OU1 OU2 RI report, as approved by USEPA, concluded that PCB impacts identified near the transformers do not pose any unacceptable human health or ecological risk. Processing oil was released to soil and the subsurface in the area of the Plant B Tank Farm.

The chemicals identified in the preceding paragraphs are considered primary chemicals of interest (COIs) for the Site, or chemicals that have been associated with the former facility (as a raw material, product, or a constituent of waste streams or accidental releases), and that have been released to one or more environmental media.

The Town of Wilmington operated a municipal well field consisting of five wells in the MMBA. In April 2003, the use of this well field was suspended by the Town of Wilmington Water Department due to the detection of NDMA in samples from four of the five municipal water supply wells (MWSWs). NDMA was not detected in the Town Park Well sample. Olin and the other respondents funded construction of a new pipeline to the Massachusetts Water Resources Authority (MWRA) system in 2008.

The Site was listed on the NPL primarily due to the presence of NDMA in groundwater within the MMB aquifer in proximity to the municipal water supply wells. However, NDMA has not been identified as a raw material, a manufactured product, or a waste stream constituent in any of the operational history documentation. NDMA has been identified in DAPL, groundwater, and surface water samples. The formation mechanism for NDMA for this site has not been identified. Experts who have published articles concerning NDMA formation in wastewaters and disinfected drinking waters have been consulted by Olin. Since the conditions within the chemical manufacturing processes that occurred over the history of operations at the facility cannot be replicated, it is unknown whether NDMA could have formed in those processes. Nonetheless, NDMA is, in addition to those chemicals identified in the preceding paragraphs, a COI for the Site.

Summary of Historical Investigations and Monitoring Pertaining to DAPL

Investigations have been conducted at the Site by several parties since the mid-1970s, including media currently considered part of OU1, OU2, and OU3. Olin became involved in the investigation and remedial activities at the Site after its purchase of the facility in 1980. Earlier investigations and associated reports included groundwater and surface water investigations along the eastern boundary of the facility concerning the LNAPL release in that area, and a USEPA's Site Inspection Report for the Facility in December 1980 which focused on water pollution control and RCRA compliance. A Phase I Site Inspection Report for the Facility was prepared for the Massachusetts Department of Environmental Quality Engineering in 1986. Olin conducted response actions to mitigate and control migration of LNAPL at the Plant B area in response to the 1980 Site Inspection Report, including the installation of the Plant B groundwater recovery/treatment system for LNAPL in 1981.

The Site was officially identified as a site subject to the MCP in a Notice of Responsibility letter from MassDEP on May 28, 1992 (MassDEP Release Tracking Number 3-0471). Prior to CERCLA, investigations and response actions at the Site have been conducted per the requirements of the MCP including investigation of the location and extent of the DAPL. A Comprehensive Site Assessment (CSA) Report for the Site was prepared in 1993, by Conestoga-Rovers & Associates (CRA) and was focused on potential sources or release areas identified as Solid Waste Management Units (SWMUs) (CRA, 1993). This CSA was referred to as the "Phase II Comprehensive Site Assessment". This MCP submittal was subsequently augmented by supplemental investigations intended to further delineate the nature and extent of contamination to support risk characterizations and evaluation of remedial requirements. These supplemental

investigations were conducted in a manner that is in substantive compliance with both the National Contingency Plan (NCP) and the MCP.

The 1997 Supplemental Phase II Report was a comprehensive report of the supplemental investigations conducted in accordance with the MCP at the Site (Smith, 1997). Supplemental Phase II investigations were also conducted after the 1997 Supplemental Phase II Report. During that time, a number of response actions (including investigations, risk assessments, removal actions, and other remedial activities) were conducted. These actions consisted of two types of MCP interim response actions: 1) Immediate Response Actions (IRAs), and 2) Release Abatement Measures (RAMs). A number of monitoring programs were also implemented in conjunction with these IRAs. The MCP investigations and response actions were directed by MassDEP Licensed Site Professionals and the work was performed consistent with scopes of work that were approved by MassDEP.

Previous investigations have included the following:

- Characterization of surface features;
- Contaminant source investigations and removal actions;
- Meteorological investigations;
- Surface water and sediment investigations;
- Geological investigations; soil and vadose zone investigations;
- Groundwater investigations;
- Indoor air investigations;
- Biota sampling and analysis; and
- Ecological surveys.

The historical investigations were comprehensive and were conducted using techniques and procedures that were and are consistent with standard practice in the environmental investigation industry. Samples were analyzed using USEPA and MassDEP chemical analytical methods applied by certified laboratories, and the analytical data have undergone chemist reviews and data validation.

Response Actions and Remedial Pilot Studies

Olin and the other respondents to the Administrative Settlement Agreement and Order on Consent have taken appropriate measures to remediate on-site source areas that significantly reduced overall Site risks and have funded the installation of a municipal water supply line to replace the reduction in local water supply following shutdown of the Town Wells. These response actions resulted in removal of impacted soils, waste materials, oil and volatiles from soils and sediment, and have resulted in a positive impact with respect to nature and extent of soil

contamination at the Property as discussed in the USEPA-approved OU1 OU2 RI Report (AMEC, 2014). IRAs and RAMs completed under the MCP to reduce site-related risks in addition to the Massachusetts Water Resource Authority water line include:

1. Removal and management of drums disposed of on site,
2. Removal and management of impacted soils within Lake Poly, the acid pits, and the drum disposal area,
3. Construction of a soil-bentonite slurry wall as a containment wall around for the former acid pit and drum disposal area,
4. Non-destructive testing of containment wall integrity,
5. Installation of the south ditch weir system,
6. Remediation of the upper reach of south ditch,
7. Construction and continued operation of the Plant B groundwater treatment system,
8. Installation and historic operation of a soil vapor extraction system,
9. Installation and historic operation of an in-situ bioremediation system near Plant B,
10. Installation and continued voluntary operation of the off-PWD DAPL extraction system,
11. Closure of the Calcium Sulfate Landfill followed by continued post-closure monitoring,
12. Continued monitoring of specific private residential wells in the Town of Wilmington, and
13. Continued provision of bottled water to residents of the two homes on Cook Avenue

The response actions and remedial pilot studies that involved the on-Property DAPL pool and the off-PWD DAPL pool, which are shown in **Figure ES-4,** are discussed in greater detail below:

- 2000 and 2001: The Slurry Wall/Temporary Cap containment structure was constructed. The remedial objective for the containment structure was to eliminate, to the extent feasible, the on-Property DAPL as a continuing source of the dissolved plume that was contributing constituents in the ditches through overburden groundwater discharge. Stormwater from above the temporary cap is collected and flows to the Storm Water Detention Basin.
- 2005: Planning for a DAPL extraction pilot study including additional geophysical investigations (seismic) to refine the depth to bedrock within the off-PWD DAPL pool area.
- 2008-2010: Access negotiation and design of a DAPL Pilot extraction system
- 2011-2014: Construction and operation of the Off-PWS DAPL extraction pilot test.
- 2014-Date: Completion of the DAPL pilot study with final reports being submitted to USEPA in 2015. Since 2015 to present Olin has continued operation of the Pilot

System voluntarily to remove additional DAPL. To date the system has removed approximately 950,000 gallons of what is estimated to be 2.5 million gallons of DAPL within the OPWD DAPL pool.

CERCLA Remedial Investigation and Monitoring

The CERCLA Remedial Investigation has been conducted per the USEPA-approved RI/FS Work Plan (MACTEC, 2009a), Addenda I, III, and V of that Work Plan, and the Supplemental Remedial Investigation Work Plan (Olin, 2012), which was revised and finalized in 2013 (Olin, 2013). Additional characterization of the bedrock surface at one of the off-Property DAPL pools (the Main Street Pool) has been conducted per the USEPA-approved OU3 Data Gaps Work plan (Amec Foster Wheeler, 2015). In addition, Olin conducted investigations at the Containment Area to evaluate hydraulic pulse interference testing (HPIT) as a method to assess the hydraulic integrity of the Slurry Wall. The HPIT testing was largely inconclusive due to complications caused by local geology, but subsequent hydrogeologic evaluation within and around the slurry wall clearly indicates that the Slurry Wall containment system is functioning as designed. The aforementioned hydrogeologic evaluation has been reviewed and approved by the USEPA.

Physical Characteristics of the Study Area and Land Use

The northern portion of the Property was formerly the site of a chemical manufacturing facility. The former administration office building and laboratory, a small butler building, a guard shack, the East and West warehouses, the Plant B Treatment Building and a temporary office trailer are currently present on the property. All of these structures except for Plant B and the office trailer are unoccupied with Do Not Enter signs posted. Most of the former plant buildings and other structures (Plant A, Plant B, Plant C, and Plant D) have previously been demolished and removed from the Property, with only concrete slabs remaining at these locations.

The southern portion of the Property is undeveloped, consists largely of wetlands and mature forest lands, and has slightly more topographic relief as compared to the more developed northern portion. The topographic features include an east-west trending, low-lying area that forms the South Ditch and Ephemeral Drainage and includes Central Pond, as well as a storm water detention pond located between the Containment Area and South Ditch. This low-lying area is intersected at the Property boundaries by the East and West Ditches. These features are part of the interconnected drainage system that border two sides of the Property and that cross the center of the Property.

The topography adjacent to the Property ranges from low-lying wetlands to flat paved industrial areas. The land north of the Property is developed and is generally flat. The Massachusetts Bay Transportation Authority (MBTA) rail line creates and occupies a topographic low along the eastern side of the Property. A low ridge runs along the southern boundary of the Property where the CSL was constructed. The WSL is located immediately south of the property, beyond which

the land becomes lower in elevation, and flatter, draining to wetlands to the southwest, toward Landfill Brook and Halls Brook.

The area immediately west of the northern portion of the Property includes commercially developed lots along Jewel Drive and Eames Street, and residential lots along Main Street that are all relatively flat. The area immediately west of the southern portion of the Property includes a small hill or knoll that includes several residences along Cook Avenue and Border Avenue in Wilmington. Additional residential development is present further to the southwest in North Woburn. To the northwest of the Property, on the western side of Main Street in Wilmington, the topography drops to lower elevations near, and within, the MMB wetland. The MMB wetland is bordered by upland areas to the west of Chestnut Street, and to the north by a broad ridge that runs parallel to Butters Row.

The Property is not in any current active commercial or industrial use. Two full-time employees maintain the Property, operate the Plant B treatment system, and participate in investigation and remedial activities. The Property land uses are controlled by two legally-binding documents: the 2006 Environmental and Open Space Restriction, and the 2012 Notice and Declaration of Restrictive Covenant, as described below.

The 2006 Environmental and Open Space Restriction was recorded with the land records of Middlesex County on November 7, 2006. That restriction, negotiated between Olin and the Town of Wilmington through its Conservation Commission, requires that the portion of the Property located south of the South Ditch be preserved in its natural, undeveloped condition, subject to rights reserved to perform and maintain response actions required by MassDEP and/or USEPA. The restriction prohibits construction or placement of any building, tennis court, landing strip, mobile home, swimming pool, fences, asphalt or concrete pavement, sign, billboard or other advertising display, antenna, utility pole, tower, conduit, line or other temporary or permanent structure or facility in, on, under, through or above the restricted area unless such construction or placement is required in connection with response actions. The restriction also prohibits agricultural activity or cultivation of fruits, vegetables or other plants destined for human consumption. The restriction also prohibits use of groundwater or surface water for private water supply, or any other potable or non-potable use, without prior written approvals from MassDEP, USEPA or other cognizant government agency.

The Notice and Declaration of Restrictive Covenant was filed in the land records of Middlesex County on October 9, 2012 and will run with the property, and be binding upon all parties having any right, title, or interest in the Property currently or in the future. The deed restriction indicates that “the Property, or any portion thereof, shall not be used for any residential, school, child day care center, playground, or public recreation purposes. The Property shall be used solely for commercial or industrial purposes.” Further, the deed indicates that no excavation of any kind shall occur within the Containment Area or the Calcium Sulfate Landfill except such excavation necessary to maintain the contours of the existing cap on the CSL, and shaping and grading as required to install a cap on the Containment Area. The current Containment Area cap is internally sloped to drain to a central collection sump rather than positively graded for run-off. This cap was constructed by adding fill, not excavating, resulting in acceptable grades for drainage. Excavation in other areas of the site is permitted only: 1) consistent with the Environmental and Open Space Restriction (October 2006), where applicable, and 2) in conformance with an appropriate soil

management plan to address construction worker safety and soil management. The Restrictive Covenant also prohibits extraction of groundwater from beneath the Property for any purpose, except to monitor the groundwater, or as part of an action to address groundwater conditions. This Declaration of Restrictive Covenant was filed as a perpetual covenant.

Nature and Extent of DAPL Pools

OU-3 DAPL Pools

The locations of DAPL pools are shown in **Figure ES-4**. The nature and extent of DAPL has been defined by investigation and monitoring activities completed at the Site since 2000 under the MCP and which continued through 2017. The extent of DAPL is defined by determining the elevation of the DAPL interface and intersection with bedrock topography. The definition of DAPL is based on having a specific gravity greater than 1.025 which can be estimated by an empirical relationship of it primary constituents, and by threshold concentrations as follows:

- Ammonia concentration greater than 1,250 mg/L;
- Chloride concentration greater than 2,800 mg/L;
- Magnesium concentration greater than 270 mg/L;
- Sodium concentration greater than 1,700 mg/L;
- Sulfate concentration greater than 16,000 mg/L; and
- Specific conductance greater than 20,600 micromhos/cm (µmhos/cm).

Specific conductance has been used frequently in the absence of specific gravity data, to discriminate DAPL samples from diffuse layer groundwater samples.

A predictive equation was developed for calculating specific gravity based on concentration data for multiple chemicals, rather than on a concentration data for a single parameter (Geomega, 1999). The equation is:

$$SG = 2.6 \times 10^{-7} \times SO_4^{2-} + 1.3 \times 10^{-6} \times Na^{+} + 3.7 \times 10^{-6} \times Cl^{-} + 7.4 \times 10^{-7} \times NH_3 + 1.01$$

Concentrations of sulfate, sodium, chloride, and ammonia are in dimensions of mg/L.

The stability of the DAPL pools (i.e., the elevation of DAPL over time) has also been evaluated by geophysical methods (induction logging) and direct measurement of the above parameters in multilevel wells installed within each DAPL pool. The DAPL pools likely formed in the mid to late 1950s up until the early 1970s and the elevations of the DAPL over the approximate 50 to 60 year period since then have not changed more than a foot from the saddle overflow elevation. This indicates the DAPL pools are stable within measurement sensitivity and are not mobile.

DAPL Conceptual Site Model

The following text summarizes a conceptual site model for DAPL. The available information has been utilized to conceptualize the historical liquid waste discharges and the historical fate and

transport of DAPL in the subsurface. The DAPL formed ex-situ in response to release of acid process waste waters with high dissolved total solids content (i.e., higher density liquids) to unlined ponds on the Property including Lake Poly, the East and West Acid Pits and the three Acid Pits south of the East and West Warehouses. These various pits were subsequently covered by the Lined Lagoons. This DAPL then migrated by gravity through the water column settling or pooling on the bedrock surface that underlies the Site. DAPL continued to accumulate on the bedrock surface during facility operations until the early 1970's, and migrated down slope within the Western Bedrock Valley. Because the density of the DAPL is greater than water, migration is governed and limited by bedrock topography, and overlying glacial geology, gravity, and density gradients and not driven solely by groundwater flow directions. The advance of the DAPL down the Western Bedrock Valley was arrested by a series of bedrock saddles aligned across the valley floor, including the Jewel Drive Saddle that forms the western limit of the off-PWD portion of the Upper DAPL Pool, and the Main Street Saddle which forms the western limit of the Main Street DAPL Pool. As DAPL moved down the bedrock valley it flowed over the Jewel Drive Saddle and formed the Main Street Pool, where the majority of DAPL material remains. DAPL also flowed over the Main Street Saddle down along the WBV into the MMBA. The bedrock underlying the MMBA is heavily faulted and it is believed that any DAPL that there would have migrated vertically into the bedrock and did not form a stable DAPL pool. Where DAPL migrated over bedrock, it also migrated vertically into the shallow weathered bedrock. This CSM is depicted schematically in **Figure ES-5**

The inorganic constituents detected in DAPL in order of decreasing concentration include: sulfate; sodium; chloride; ammonia; chromium; iron; aluminum; and manganese. Organic compounds detected in DAPL, in order of decreasing concentrations include: phenol; acetone; 2-hexanone; bromoform; 2-butanone methyl ethyl ketone; BEHP; toluene; trimethylpentenes; 4-bromophenyl-phenylether; naphthalene; benzoic acid; NDMA; and NDPA.

These inorganic constituents are also detected in groundwater immediately overlying DAPL which have migrated there by chemical diffusion. This zone of groundwater, which immediately overlies the DAPL pools has historically been termed the "diffuse layer" is typically several feet thick, and has a very sharp concentration gradient contact with overlying groundwater. Lateral transport of this material by groundwater advection, dispersion and diffusion has resulted in a broader region of groundwater with diffuse characteristics (specific conductance within the range of 20,600 to 3,000 µmhos/cm and is referred to as "diffuse groundwater". This material is not directly associated with the DAPL pools spatially and does not have DAPL characteristics but is an important component in the distributed contaminant mass within the aquifer. Based on existing information, emplacement of the DAPL pools was also associated with extensive convective mixing of DAPL with groundwater forming diffuse groundwater. Owing to its density characteristics, this material migrated in response to both hydraulic gradients and its greater fluid density, and occupied the deeper portions of overburden aquifers.

As mentioned previously, three DAPL pools have been characterized and are identified as the on-Property DAPL pool and off-PWD DAPL (comprising the original Upper DAPL Pool) and the Main Street DAPL Pool (originally referred to as the Lower DAPL pool). The on-Property DAPL pool is within the on-Property containment structure and contains an estimated 160,000 gallons of DAPL. The off-PWD DAPL pool contained an estimated volume of approximately 2.5 million gallons of DAPL prior to initiation of the DAPL pilot program. It now contains an estimated volume

of 1.55 million gallons. The estimated volume of the Main Street DAPL Pool is approximately 13.5 million gallons. The DAPL identified at monitoring well GW-83D is not considered to represent a DAPL pool of any substantial volume above the bedrock surface within overburden, rather it is believed to represent DAPL residing within the weathered bedrock. The potential presence and volume of DAPL within bedrock underlying the Western Bedrock Valley (WBV) is expected to be substantial but uncertain.

These DAPL pools contribute dissolved constituents by chemical diffusion to the diffuse layer. Based on the physical and chemical characteristics determined from chemical monitoring of multilevel piezometers and inductance logging of wells in the DAPL pools, the DAPL within these pools is stratified, with the densest material concentrating at the bottom of the bedrock depressions. The nature and extent of DAPL related constituents detected in groundwater will be discussed further in the OU3 RI report. Analytical data collected from wells screened within the DAPL in discussed in Section 4 of this report.

The current understanding of historical release and migration of DAPL at and from the facility is described below. The DAPL material was introduced into the environment from 1953 to the 1970s when the Facility was active and using the lagoons and/or unlined pits for management of process waters. During infiltration of these dense fluids through the water column, convective mixing with groundwater resulted in the dispersion of the site-related compounds within the local aquifer. Once the DAPL reached the bedrock, it continued to flow via gravity to lower lying areas along the bedrock surface. Before the DAPL eventually settled to the present locations, the momentum from the initial release allowed some of the DAPL and diffuse material to convectively overflow the bedrock saddles and migrate to the bottom of the WBV. Based on existing knowledge, the front of convective mixing associated with DAPL migration initially resulted in a broader, dispersed area of dissolved phase contamination deep within the Maple Meadow Brook Aquifer (MMBA). Although not DAPL, the more highly concentrated dissolved plume has density characteristics that allowed it to occupy the deeper regions within the MMBA. Over time the DAPL stopped migrating down slope due to the presence of flow barriers (bedrock saddles) and has remained stable within the bedrock depressions. A more detailed description of each area or DAPL pool is provided below.

Investigations conducted in the bedrock down slope of the Main Street DAPL pool (MP-4, MP-5, GW-83, GW-65BR, and GW-68BR) indicate potentially extensive impacts to bedrock groundwater underlying the WBV and MMBA. Current vertical gradients between bedrock and deep overburden groundwater are neutral to slightly downward within the deepest well pairs in the WBV/MMBA area.

Summary of Human Health Risk Assessment

A focused human health risk assessment of ingestion of NDMA through hypothetical consumption of DAPL was previously conducted at the request of USEPA. While this exposure scenario is unrealistic and highly improbable, the cancer risk and non-cancer hazard index associated with that hypothetical exposure scenario are well above the upper end of the CERCLA risk range (10^{-6} to 10^{-4}) and the threshold hazard index of 1.

RI Report Recommendations and Conclusions

Conclusions

The extent, nature and distribution of the DAPL pools has been well established and documented. The current estimates of the extent, volume and topographic interpretation of the bedrock depressions that contain the DAPL are adequately delineated for the purposes of a feasibility study.

The current elevation of the DAPL pools are close to the elevations that would have existed when they were formed (within 1 to 1.5 feet) sometime between the early 1950s to the 1970s. These conditions indicate that the DAPL pools themselves have been stable over timeframes measured in decades and are not mobile. Migration of dissolved constituents from DAPL occurs primarily by diffusion and subsequent advection and dispersion with groundwater transport. Where they are in contact with bedrock or fine grain soils, these dissolved constituents will also be subject to matrix diffusion. Some constituents such as chromium, iron and aluminum, will be susceptible to precipitation reactions in the aquifer forming oxy-hydroxide and acid sulfate minerals.

Extraction of DAPL at the off-PWD DAPL pool during the Pilot Test and continuing operations demonstrated DAPL can be removed by pumping so long as the gravity drainage rate to replenish the DAPL to the well is not exceeded. This rate is dependent on the bedrock slope and the density and density stratification of the DAPL. Initial modeling by Geomega predicted the gravity drainage rate as radial flow to a single well screen has an upper limit of approximately 0.5 -1.0 gallons per minute (gpm). Pilot testing affirmed that 0.5 gpm was not sustainable and that the gravity drainage rate was < 0.5 gpm, probably closer to 0.25 gpm. The drainage rate of density-driven flow cannot be increased by increasing the rate of DAPL extraction, as this will merely result in vertical drawdown of DAPL above and surrounding the extraction well, and downward intrusion of overlying groundwater. Intrusion of groundwater dilutes the DAPL entering the well screen and alters the density of DAPL surrounding the well screen, in addition to altering water chemistry by increasing pH and introducing oxygenated water. Both column studies by Geomega (Geomega, 2004a) and fouling of ML 1 Port 2 during the pilot extraction demonstrate that these water quality changes can result in extensive precipitation of iron and Al/Cr oxides within the soil pores. In simple terms the time frame to remove DAPL by pumping is governed by the distance DAPL must travel down slope by gravity drainage from the top of the DAPL pool to the bottom of the DAPL pool.

During post extraction monitoring during the Pilot test, it was noted that as DAPL levels continued to rebound around the extraction well EW-1, DAPL levels continued to decline at MP-2 over a several month period. MP-2 and EW-1 are located approximately 100 feet apart, and these responses indicate the measurable radial influence of DAPL movement to a single well is in excess of that distance, and theoretically extends to the DAPL boundary.

Extraction strategies that exceed gravity drainage rates will result in inefficient DAPL removal, stranding of and loss of dissolved constituents by precipitation, and potential clogging of the soil pores. Excessive drawdown in vicinity of the extraction well could result in convective mixing as the DAPL surface collapses inward toward the point of extraction. Successful DAPL extraction strategies will necessarily avoid these conditions.

DAPL as it stands currently is not mobile as it is maintained in bedrock depressions and there is no longer a source of DAPL to groundwater. The primary limiting factor to groundwater restoration at the Site will be the underlying bedrock aquifer that is believed to be heavily impacted by diffuse groundwater and matrix diffusion. Those impacts will be discussed in the OU3 RI report.

Recommendations

Based on the results of the Focused HHRA for NDMA, hypothetical ingestion of DAPL would be associated with health risks and hazards above CERCLA limits, however due to its physical characteristics (dark green/black color, odor and acidity) consumption of DAPL on a repeated basis, let alone even once, is an extremely unlikely scenario. Consumption of DAPL realistically would never occur and such an exposure is readily eliminated by institutional controls. Although there is no current exposure to DAPL, hypothetical future exposure to dissolved constituents of DAPL, in particular NDMA, via ingestion of DAPL, would be associated with cancer risk and hazard index values above CERCLA limits (Amec Foster Wheeler, 2017) and it is therefore recommended that further evaluation of the DAPL pools be carried forward to a Focused Feasibility Study.

1.0 INTRODUCTION

This Draft Focused Remedial Investigation (RI) Report for Dense Aqueous Phase Liquid (DAPL) in Operable Unit 3 (OU3) has been prepared for the Olin Chemical Superfund Site (OCSS or Site) located at 51 Eames Street in Wilmington, Massachusetts by Amec Foster Wheeler Environment and Infrastructure, Inc. (Amec Foster Wheeler) on behalf of Olin Corporation (Olin). The Site comprises the Olin Property (Property), an approximately 50-acre parcel, at 51 Eames Street and adjoining off-Property areas impacted by DAPL from this parcel. A Site location map, including the Olin Property, is shown as **Figure 1-1**.

This Draft Focused RI focuses on the DAPL Pools within OU3. DAPL is an aqueous phase, liquid waste material that has a specific gravity greater than that of water (1.025) and a low pH. DAPL contains chromium and a high concentration of dissolved solids. Typical DAPL constituents include ammonia (concentrations generally greater than 1,250 milligrams per Liter [mg/L]), chloride (concentrations generally greater than 2,800 mg/L), magnesium (concentrations generally greater than 270 mg/L), sodium (concentrations generally greater than 1,700 mg/L), sulfate (concentrations generally greater than 16,000 mg/L), and N-Nitrosodimethylamine (NDMA) at concentrations ranging from 120 ng/L to 64,000 ng/L. DAPL has specific conductance greater than 20,600 micromhos per centimeter (µmhos/cm). DAPL is also associated with two wells that are partially screened in shallow weathered bedrock and one interval in a deeper bedrock multi-level piezometer. These occurrences of DAPL will be discussed but are not the focus of this report.

The definition of OU3 is described in the Administrative Settlement Agreement and Order On Consent (AOC) dated July 3, 2007 (USEPA, 2007a), and in the Statement of Work (SOW) dated June 28, 2007 (USEPA], 2007b), as all on-Property and off-Property groundwater areas including Maple Meadow Brook Aquifer (MMBA), groundwater beneath the Olin Property, and groundwater located south and east of the Olin Property. DAPL is a waste material and is not groundwater, but is contained within OU3.

The Site was listed on the National Priorities List (NPL) pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 105, 42 U.S.C. 9605 on April 19, 2006 (71 FR 20,016). Prior to the NPL listing, the Site has been the subject of many years of investigations and remedial actions/response activities carried out by Olin and supervised by Massachusetts Department of Environmental Protection (MassDEP), and its predecessor agency, under Chapter 21E of the General Laws of Massachusetts and the Massachusetts Contingency Plan (MCP). The Site has been a Priority site under the MCP since 1993, and a Tier I site since 1994.

Olin, American Biltrite Inc., and Stepan Company (all Co-Respondents) have voluntarily entered into the AOC with the USEPA to conduct a Remedial Investigation/Feasibility Study (RI/FS) for the Site (USEPA, 2007a). The effective date of the AOC is July 3, 2007.

This Draft Focused RI for DAPL in OU3 incorporates relevant and appropriate historical information presented in the Focused Remedial Investigation Report (MACTEC, 2007a), in addition to more recent data and analysis collected in accordance with the approved RI Work Plan (MACTEC, 2009a); DAPL Pilot Extraction Report (AMEC, 2014); and OU3 Data Gap Work Plan (Amec Foster Wheeler, 2015).

This introduction (Section 1) describes the purpose of this Draft Focused RI DAPL report, provides Site background information, a Site description, describes the Site history, including ownership and former facility operations and discusses the organization of the remainder of this report. Details of the organization of the remainder of this report are provided in Section 1.5.

1.1 Objectives of Report

The objectives of the Draft Focused RI for DAPL in OU3 are to:

- Define nature, extent and volume of DAPL using historical data, and new investigation results from the 2010 through 2017 investigation period.
- Present historical monitoring results DAPL Pool elevations and other information that pertain to the stability of the DAPL pools,
- Present information from the DAPL Extraction Pilot Study that help explain the hydrologic processes and geochemical considerations related to successful DAPL extraction, and
- Assess potential human health risks associated with DAPL included in OU3 in a manner consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR 300) and relevant guidance.

The investigations of OU1 soils and former response actions at the Site confirm that there are no longer any active sources of DAPL and DAPL is no longer being formed. DAPL was formed historically as a consequence of disposal of process waters in unlined pits and lagoons.

1.2 Site Background

The OCSS includes the approximate 50-acre Olin Property (the Property) and off-Property areas that have been impacted by manufacturing and waste disposal activities at the Property. The Property is located in a heavily industrialized area within the southern portion of the Town of Wilmington and is the location of a former manufacturing facility that produced specialty chemicals for the rubber and plastics industry. The chemical manufacturing facility was constructed in 1953 and was operated by National Polychemicals, Inc. (NPI). From 1953 to 1968 the business conducted by NPI was owned by three different corporations: American Biltrite Rubber Co., Fisons Limited, and Fisons Corporation, now known as NOR-AM Agro LLC. In 1968 Stepan Chemical Company bought the business, and continued to operate the facility until 1980, when the facility was purchased by Olin. Olin submitted closure plans for the plant facilities to MassDEP and USEPA in April 1986 and closed the facility in the same year. Olin remains the current owner.

During past ownership, manufacturing and waste disposal activities resulted in environmental contamination to on-Property soil, groundwater, sediment, and surface water. Process waters and liquid wastes were discharged to unlined excavations in the native soil and percolated into the soil or overflowed into on-Property ditches until the early 1970's when a treatment plant was installed. The liquid wastes had high concentrations of dissolved inorganic constituents and fluid densities greater than water allowing these dense liquids (as DAPL) to penetrate the underlying overburden water table and migrate vertically downward to the bedrock surface, where the DAPL pooled in bedrock depressions. The DAPL material, which moved primarily in response to gravity,

migrated to the west and northwest within a sloping bedrock valley (the Western Bedrock Valley [WBV]) and remains as several isolated DAPL pools in bedrock depressions located both on- and off-Property. The initial migration of DAPL was accompanied by convective mixing with groundwater and an extensive area of dissolved DAPL-related constituents resulted in the contamination of the overburden aquifer. The primary constituents associated with these chemical releases include inorganic compounds, although specific volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) were also associated with chemical processes used at the Property. The DAPL is characterized by low pH, and high concentrations of total dissolved solids. Its principal constituents include sodium (Na), calcium (Ca), chloride (Cl), iron (Fe), manganese (Mn), sulfate (SO_4), ammonia (NH_3) or ammonium ion (NH_4^+), aluminum (Al), and chromium (Cr). The DAPL and groundwater that immediately overlies DAPL also contain low level concentrations of VOCs and SVOCs. VOCs that are most commonly detected include acetone, bromoform, 2-butanone, 2-hexanone, toluene and trimethylpentenes. Detected SVOCs most commonly include benzoic acid, bis-2-ethylhexlphathalate (BEHP), phenols, naphthalene, n-nitrosodiphenylamine (NDPA), and n-nitrosodimethylamine (NDMA). Environmental contamination has migrated by surface water and groundwater pathways to off-Property locations.

After Olin initiated closure of the site in 1986, the chemical manufacturing buildings were demolished and removed along with the closure of the lined lagoons and excavation of Lake Poly, which was a prominent disposal location that contributed to the formation of DAPL. Lake Poly was excavated to the full vertical extent of impacted soil and no indication of residual DAPL was identified there. A seismic survey along the western property boundary under OU3 north of the Containment Area confirmed the bedrock topographic conditions adjacent to that area did not indicate the presence of additional bedrock depressions that could contain DAPL. A detailed summary of prior environmental investigations and related to DAPL are presented in Section 2.1 of this document.

In 2000/2001, Olin constructed a slurry wall/ temporary cap around the on-Property portion of the Upper DAPL Pool as a Release Abatement Measure (RAM) consistent with the MCP. This area is referred to as the Containment Area. The intent of this source control action was to eliminate, to the extent feasible, the on-Property DAPL pool as a source of dissolved constituents to groundwater and surface water. The Containment Area is comprised of a perimeter slurry wall installed into the weathered bedrock and a temporary cap to minimize infiltration of precipitation.

The Olin Property is situated over glacial outwash deposits that overlie glacial till and igneous and metamorphic bedrock. The saturated thickness of these glacial deposits increases within a buried bedrock valley to the northwest of the Property, forming an aquifer underlying Maple Meadow Brook (MMB) and Sawmill Brook known as the MMBA. The Town of Wilmington operated a municipal water supply well field located over one-half mile northwest of the Property within the MMBA. During 2002, the Town wells were in use intermittently, with certain wells being taken off-line by the Town during different time periods in response to concerns of potentially exceeding nitrite standards in the distribution system. In October 2002, the Town ceased use of all the wells in the MMBA except the Town Park Well. In April 2003, the use of this well field was suspended by the Town of Wilmington Water Department due to the detection of NDMA in samples from four of the five MMBA municipal water supply wells (MWSWs). NDMA was not detected in the Town

Park Well sample. Olin and the other respondents funded construction of a new pipeline to the Massachusetts Water Resources Authority (MWRA) system in 2008.

In September 2005, USEPA identified the Site as a Proposed Site for the NPL. The primary hazardous substance used by USEPA to score the Site was NDMA (USEPA, 2005). The primary exposure pathway evaluated by USEPA was groundwater. Other principal contaminants noted in the NPL listing included chloride, sodium, sulfate and ammonia.

Currently, the Property is not in active use. Property access is controlled along the entire Property perimeter by an eight foot high fence and all access gates are locked when Olin employees are not on the Property.

1.3 Site Description

The Site encompasses the approximate 50 acre Olin Property and surrounding areas to the west, east and south, where contaminants have migrated by surface water and/or groundwater transport. Site features including the location of the Olin property, roads, streams, wetlands, and the former municipal water supply wells are shown in **Figure 1-2**. The current and historic Site features on the Olin Property are shown in **Figure 1-3** which identifies former disposal features, the location of former drain and sewer lines, location of former and current buildings, the Containment Area, and the location of the below and above ground conveyance piping associated with the DAPL pilot extraction system. The current activities at the Property are associated with site investigations, remedial actions, and property maintenance. The Plant B Groundwater treatment building is the only regularly occupied permanent structure at the Property. The Plant B operator is stationed in that building. There is a temporary, above-ground office trailer where the Site Manager is located. The Plant B treatment building and the office trailer have electric service and municipal water. The former guard shack is sometimes used as a staging area for site investigation activities. There are no active utilities in the other Site structures which are locked to control access. Most of the former plant buildings (manufacturing area) and other structures (former wastewater treatment plant) have previously been demolished and removed from the Property with only concrete slabs remaining at several of those locations.

The southern half of the Property is forested, except in the southwestern corner where the closed Calcium Sulfate Landfill is located. Approximately 20 acres within this forested area is subject to the terms of the Environmental and Open Space Restriction as described above.

The Site also contains both on-property and off-Property surface water bodies. On-Property surface water includes a ditch system: on-Property West Ditch and on-Property South Ditch. Other water bodies include the natural wetland drainage complex (Ephemeral Drainage), Central Pond, and Central Wetland (located within proximity of the South Ditch). A storm water retention basin is also present near the South Ditch (**Figure 1-3**). The on-Property ditch system is connected with two other off-Property ditches (the off-Property West Ditch and the East Ditch) and these drainages are all part of the Aberjona River watershed.

The Property is bounded on the east by the Massachusetts Bay Transit Authority rail tracks, on the south by the Woburn/Wilmington Town Line and Woburn Sanitary Landfill (WSL, currently closed), on the west by an inactive Boston and Maine Railroad spur (PanAM), and on the north by Eames Street. The Property is located in an industrialized area of Wilmington within a General

Industrial zone. Intensive industrial land use occurs on the eastern, northern and western sides of the Property. Residential properties are located along Main Street and Cook Avenue located to the west of the Property and along Eames Street immediately before it intersects with Woburn Street. A more detailed description of the surrounding land use and socioeconomic setting is provided in Section 3.0 of this report.

The following paragraphs describe previous and existing site features relevant to understanding site conditions and environmental setting of the Site. Discussion concerning several of these features have been abbreviated as they are not directly related to DAPL, but are included for completeness. More detailed discussion of these features is included in the OU1 OU2 RI Report. The discussions that have been abbreviated include Plant B, the Conservation Area, and off-Property Surface Water.

1.3.1 Plant B Groundwater Extraction and Treatment System

The Plant B groundwater recovery/treatment system has been in operation since 1981 with continued operation from 1997 to present as an Immediate Response Action (IRA) under the MCP. The system was installed in response to the seepage of a light non-aqueous phase liquid (LNAPL) into the East Ditch that is located at the eastern perimeter of the former facility property. The East Ditch runs along the base of the MBTA rail track. The LNAPL is a processing oil that contains BEHP, NDPA and trimethylpentenes (TMPs). The system was designed to create a groundwater cone of depression to prevent migration of the LNAPL and allow for mechanical LNAPL removal. The system operation includes three extraction wells operating at a combined rate of less than 10 gallons per minute. The treated groundwater is discharged to surface water (discharge location shown on **Figure 1-3**) on the former facility property in compliance with a Remediation General Permit. Treated groundwater is discharged to the South Ditch via the on-Property West Ditch (on-PWD) in batches daily between Monday and Friday during normal working hours. Groundwater extracted on weekends is stored in tanks on the Olin property for Monday discharge.

1.3.2 Slurry Wall / Temporary Cap Containment Area

The Slurry Wall/ Temporary Cap is a containment structure that was constructed in 2000/2001 as a RAM consistent with the MCP and approved by MassDEP. The Slurry Wall/ Temporary Cap is depicted on **Figure 1-3.** The design and construction of the slurry wall is described in greater detail in Section 2.1.1.1 and in the Focused RI Report (MACTEC, 2007) and the construction-related release abatement measure (C-RAM) Status Report No. 8 (GEI, 2004). The purpose of the Containment Area was to mitigate, to the extent possible, migration of dissolved constituents in DAPL to overburden groundwater that discharges to South Ditch.

A deed restriction has been placed on the property that prohibits disturbing the soils underlying the temporary cap, and thereby limits future exposure to those soils. A copy of the Declaration of Restrictive Covenant for the Containment Area and Calcium Sulfate Landfill (CSL) along with the Environmental and Open Space Restriction (environmental conservation deed restriction) are provided in **Attachment B**.

1.3.3 On-Property Ditch System and Other Surface Water Bodies

The on-Property ditch system and surface water bodies form an interconnected network of drainage ditches that flow onto and through the property, all of which are within the Aberjona River watershed. The on-Property ditch system consists of natural drainages that were modified in the early 1950s to improve drainage during site development (the on-PWD and the on-Property South Ditch). The South Ditch flows within a natural wetland drainage complex that includes an intermittent stream called the Ephemeral Drainage. The South Ditch is subdivided into the Upper South Ditch (the Delta Area and west of the Delta Area) and the Lower South Ditch (east of the Delta Area). The Ephemeral Drainage is a natural intermittent surface water feature that flows periodically in response to precipitation, and outlets into the Lower South Ditch. These features are shown in **Figure 1-3**. The on-PWD is also an intermittent drainage that originates in the northwest corner of the Olin property and flows along the western side of the property to the Upper South Ditch. The on-PWD flows through a culvert on the west side of the Containment Area which discharges to South Ditch just downstream of the broad-crested weir.

A storm water retention basin is located south of the Containment Area on the north side of South Ditch just east of the weir. The storm water retention basin was excavated into bedrock prior to construction of the Slurry Wall. A concrete retaining wall was constructed on the northern side of the basin and bounds the southern side of the Slurry Wall. The temporary cap in the Containment Area is sloped inwardly to a water collection sump that is connected to the basin by a subsurface gravity drain pipe that that exits through the retaining wall. Water collected from the temporary cap flows to the retention basin and is discharged to Upper South Ditch. The storm water retention basin has an outlet control structure that controls the water level (80.32 ft mean seal level [MSL]) and discharge from the basin.

A small pond, known as the Central Pond, and a large wetland area known as the Central Wetland are located north of and adjacent to the South Ditch. Central Pond does not have a surface water inlet or an outlet and the surface water elevation is that of surrounding groundwater.

The South Ditch receives surface water flow from the off-PWD and the on-PWD. Treated groundwater from Plant B is piped underground to an outfall located approximately 100 ft west of the West Warehouse. Treated water from the outfall flows into the on-PWD and then to the South Ditch. The on-PWD terminates in a concrete outlet structure that functions as a broad crested weir, allowing the water to flow out and over a gravel apron into the Upper South Ditch. This confluence is located immediately downstream of a concrete weir that was constructed in the Upper South Ditch in 2000. The weir controls water levels in the upstream off-PWD System, which flows into the on-Property South Ditch.

The on-PWD flows intermittently in response to precipitation events and spring run-off. Both the off-PWD and the South Ditch are perennial surface water features and both receive discharge from overburden groundwater.

1.3.4 Established Conservation Area

The southern half of the Property is forested, except in the southwestern corner where the closed CSL is located. The forested area and the formerly developed area are separated by the South Ditch and bordering wetland areas of the ephemeral drainage. Approximately 20 acres within this

forested area is subject to the terms of an Environmental and Open Space Restriction that restricts future commercial development activities on the portion of the Property.

1.3.5 Calcium Sulfate Landfill

The CSL location and closure plans were approved by the Massachusetts Department of Public Health and the Town of Wilmington Board of Health in 1974. The Site was operated as a mono-fill from 1975 to 1987, receiving fine-grained gypsum sediment removed from the former facility settling ponds. The CSL is approximately 2.5 acres in size with a volume of approximately 37,000 cubic yards (cy). In 1987 the CSL was capped, covered with top soil, and seeded with final closure status requested in 1988. Final closure certification of the CSL and approval of a Post Closure Monitoring Plan in accordance with the Massachusetts Solid Waste Management Regulations (310 CMR 19.000) was issued by MassDEP on January 9, 2009 (MassDEP, 2009). An approval of a modification of the Post Closure monitoring plan was issued by MassDEP on March 3, 2011 (MassDEP, 2011).

1.3.6 Off-Property Surface Water

Off-Property surface water bodies included within OU2 are located to the east and west of the Olin Property. Groundwater originating around the off-PWD DAPL pool flows east-southeast and is intercepted in part by the off-PWD and South Ditch. The off-PWD is located on the west side of the Property and flows into the on-Property South Ditch (**Figure 1-3**). The off-PWD drainage was constructed east of Jewel Drive as surface water drainage features behind and adjacent to several developed lots. This ditch system is connected by a culvert under Jewel Drive to several shallow storm water sedimentation ponds located immediately south of the former Sanmina property on the west side of Jewel Drive. The off-PWD is located west of the PanAM railway tail track which forms a topographic divide from the Olin Property which isolated the off-PWD from surface water run-off from the Olin Property. The off-PWD flows through a culvert under the PanAM property into South Ditch. The off-Property portion of the South Ditch (east of the Property) flows east and discharges to a railroad drainage ditch known as the East Ditch that flows along the eastern side of the Olin property and along the eastern side of the adjacent property. A topographic divide occurs in the East Ditch at or slightly north of the Eames Street Bridge. Surface water flows northwest, north of the divide and southeast, south of the divide. From here the East Ditch flows southeast and south into the New Boston Street Drainway. Further south, Landfill Brook joins the New Boston Street Drainway and continues to flow south.

A large wetland complex is located further to the west of the Olin property on the western side of Main Street and includes two named streams including Sawmill Brook which joins MMB and west of the former Middlesex canal (**Figure 1-2**). This wetland complex, called the MMB Wetland (MMBW) has its head waters farther to the west. The MMB continues to flow northeast from the confluence with Sawmill Brook and passes through a series of wetlands flowing toward the Ipswich River. Surface water within the MMBW is within the Ipswich watershed and is separated from the Aberjona watershed by topographic divides and a groundwater divide that has been mapped during the OU3 investigation and is discussed later in this report. Based on information and conclusions in the OU1 OU2 RI the hydrogeologic pathway between OU3 and the MMBW is largely incomplete since shallow groundwater, immediately underlying the streams, is un-impacted by the deeper groundwater.

1.3.7 Off-Property Groundwater and Wilmington Maple Meadow Brook Aquifer Municipal Well Field

Groundwater occurs in two primary geologic units within two water sheds including unconsolidated sand and gravel deposits and the underlying fractured crystalline bedrock. The unconsolidated overburden deposits are locally heterogeneous, however over the Site scale these sands and gravels are found to exhibit fairly uniform properties (Geomega, 2001a) typically with high porosity and permeability, and are capable of transmitting large quantities of water within the MMBA. Approximately 2,000 ft northwest of the Property under the MMBW, the unconsolidated deposits attain appreciable thicknesses and form a highly transmissive overburden aquifer above the Western Bedrock Valley. Under the Property and to the south east, these overburden deposits are thinner and comprised mostly of sands and silty sands with interbedded gravels and bedrock is more frequently exposed at ground surface. Groundwater in bedrock occurs principally in secondary porosity features (e.g., fractures). Where studied, the bedrock groundwater system has low permeability and low yield and transmits a small amount of groundwater compared to the overburden aquifer.

The MMB wetland overlies a buried bedrock valley in-filled with glacial till and outwash deposits, (**Figure 1-2**). The Town of Wilmington installed the Chestnut Street well No. 1 as a municipal water supply well in 1960. This well was installed at the northwestern end of the MMB wetland and was screened at shallow depth (40-55 feet below ground surface (bgs)). This well was supplemented by the Town Park Well in 1965 (screened from 29-39 feet bgs), the Butters Row No. 1 well in 1971 (screened at 39-52 feet bgs), and the Butters Row No. 2 well in 1979 (screened at 36-46 feet bgs). Wilmington built a treatment plant on the Butters Row Site in 1981 for treatment of groundwater extracted from the four wells referenced above. , the Chestnut Street well No. 2/1A was installed in 1991 and screened from 45 to 50 feet bgs. The Butters Row Treatment Plant also treats water from one other well designated as the Shawsheen Avenue Well. The average combined pumping rate from these wells historically was approximately 1,600 gallons per minute (2.35 million gallons per day). Except for the Shawsheen Avenue Well, these wells are not currently in use and have not been in active use since October 2002 and were formally discontinued in April 2003.

1.3.8 Dense Aqueous Phase Liquid (DAPL) Pools

DAPL is an aqueous phase, liquid waste material that has a specific gravity greater than that of water (1.025), with an acidic pH. The DAPL contains chromium and a high concentration of dissolved solids. Typical constituents associated with DAPL include:

- ammonia concentrations generally greater than 1,250 mg/L,
- chloride concentrations generally greater than 2,800 mg/L,
- magnesium concentrations generally greater than 270 mg/L,
- sodium concentrations generally greater than 1,700 mg/L, and
- sulfate concentrations generally greater than 16,000 mg/L.

Owing to these primary constituents and their respective concentrations, specific conductance greater than 20,600 micromhos per centimeter (µmhos/cm) is used as an indicator of DAPL presence, and subject to confirmation of a specific gravity of 1.025 or greater. DAPL also contains low and trace concentrations of other metals, TMPs, SVOCs (mostly phthalates) and NDMA with maximum historical detected concentrations up to 64 µg/L (64,000 nanograms per liter [ng/L]).

The primary transfer mechanism of constituents from DAPL to overlying groundwater is chemical diffusion. This diffusion results in the presence of a "Diffuse Layer" which is a three to five foot thick layer of groundwater that overlies the DAPL, and is defined by specific conductance between 20,600 and 3,000 µmhos/cm. The majority of existing dissolved phase contaminants in groundwater resulted from convective mixing during initial migration of the DAPL while the facility was being operated. The flux through the diffuse layer is likely small in comparison to those initial releases from convective mixing.

DAPL pools and associated monitoring wells are shown in **Figure 1-4** and summarized in Table 1.1. The nature and extent of groundwater impacts associated with DAPL and diffuse layer material along with the surface water interaction with impacted groundwater to the extent that such interaction has resulted in impacts to surface water will be discussed in Section 4.

1.3.9 Watershed Divides

The Site is bisected by a sub-regional watershed divide located south of and in proximity to Eames Street to the north and generally east of and along Main Street to the west of the Property. Since the streams in the Wilmington area are supported by discharge of shallow groundwater to them (IEP, 1990); the direction of surface water flow and that of shallow groundwater flow patterns are consistent. The earliest effort to identify groundwater divides was a water supply study prepared for the Town of Wilmington by IEP to identify the zone of contribution to the town water supply wells in the MMBA. Location of this divide has been refined by OU3 synoptic water level data. Surface water (and groundwater) to the north and west of this divide flows to the Ipswich River Watershed. Surface water (and groundwater) south and east of this divide flows to the Aberjona River Watershed. This information and interpreted groundwater potentiometric surfaces are discussed in Section 3.

1.4 Site History

1.4.1 Manufacturing, Products, Raw Materials, Wastes

The various historical configurations of the former manufacturing Facility and the activities conducted at the Facility are important understanding origin and nature and extent of contamination. Information summarized here is provided in greater detail in the Final OU1 OU2 RI report. This information is provided to explain the nature of chemical manufacturing facilities that contributed to releases to the environment including those that resulted in the formation of DAPL.

Manufacturing activities were conducted at the Site from 1953 until 1986 when manufacturing operations ceased. The facility expanded incrementally (additional buildings were constructed) as additional products and processes were added and as processes were modified. The facility produced chemical products for use in the rubber and plastics industries (particularly nitrogen

blowing agents, but also including blowing agent activators, polymerization initiators, antioxidants/stabilizers, retarders, processing aids, phthalate plasticizers, and chemical intermediates) and it also produced phenolic resins (phenol-formaldehyde resin). Available information indicates that the latter products were not associated with any substantial amounts of liquid waste materials. Two particular nitrogen blowing agents, Opex® and Kempore®, were by far the largest volume products manufactured at the facility. Both products were manufactured from the 1950s through 1986 when operations ceased.

1.4.2 Historic Site Structures and Physical Configuration

1.4.2.1. Buildings

The buildings at the facility included chemical manufacturing/processing buildings, warehousing/storage buildings, boiler plants, maintenance buildings, pump houses, office space, and laboratory space. The OU1 OU2 Final RI Report presented in detail the manufacturing/processing buildings which included Plants A through D and the Pilot Plant, in addition to locations of transformers and storage tanks and those discussions are not repeated here. With respect to DAPL, the surface disposal locations where liquid wastes were managed are important features.

1.4.2.2. Surface Waste Disposal Structures, Conveyances, and Other Disposal Features

Several of the former manufacturing processes generated liquid wastes which contained sulfuric acid, sodium chloride, sodium sulfate, ammonium chloride, ammonium sulfate, chromium sulfate, and other constituents. During the operation of the facility, there were four time frames with notable liquid waste disposal configurations.

- 1953 – 1958 liquid wastes to Lake Poly (Plants A, B, and C-1)
- 1958 – 1965 liquid wastes to Lake Poly and East and West Pits (Plants C-2 and C-3 added in 1962)
- 1965 – 1972 liquid wastes Lake Poly (through 1969) and Acid Pits (3) – Plant D added built 1968, operated 1969)
- 1972 – 1986 process liquid wastes to Pretreatment Plant (neutralization of acid), Lined Lagoons and Metropolitan District Commission (MDC) Sewer, Calcium Sulfate Landfill
    - MDC Sewer Connection 1972
    - Lined Lagoon I 1972
    - Lined Lagoon II 1973
    - Calcium Sulfate Landfill 1974

Between 1953 and approximately 1970, all liquid wastes generated at the facility were disposed of in unlined pits on the northern half of the property. These pits included Lake Poly, East and West Pits and the three Acid Pits **(Figure 1-3).** After 1972, liquid wastes were pretreated and sent to the MDC sewer connection. Therefore after this date, there was no longer liquid disposal that would have resulted in the formation of DAPL.

Lake Poly. Lake Poly was an unlined surface impoundment approximately one-fifth of an acre in size located near the on-PWD. It has been reported (Smith, 1997) that the liquid waste stream to Lake Poly included process wastes, cooling tower and boiler blow down waters, discharge from yard and floor drains, and the laboratory. Sodium dichromate was used in the Kempore® process and acidic wastes containing chromium were discharged to unlined pits until 1967. After 1967 sodium dichromate was no longer used. Most of these wastes percolated through the porous soil underlying the pits and some wastes overflowed into the ditch system. From Lake Poly, overflows entered the on-PWD and flowed into the South Ditch which traverses the property from west to east and flows into the East Ditch. Lake Poly was closed in 1969. Lake Poly has been the subject of several investigations and multiple soil removal actions as described in the 2007 Focused Remedial Investigation Report (MACTEC, 2007), and documented in several submittals to the MassDEP.

A drum storage area was located to the west of Lake Poly. Drums were stored on this asphalt paved upland area.

East and West Acid Pits. Prior to 1964, the West and East Pits also received the Kempore® process and acidic liquid wastes (Smith, 1997). These pits were filled in 1964 prior to construction of the West and East Warehouses. The three Acid Pits, located further to the south, replaced the East Pit and West Pit as waste disposal features in the 1964 – 1965 time frame and were used until their closure in 1971. The Acid Pits were three unlined pits located between the warehouses and the South Ditch. As shown on **Figure 1-3**, the west Acid Pit, the central Acid Pit, and most of the east Acid Pit are within the footprint of the slurry wall containment area. The slurry wall contains the on-property DAPL in the subsurface and there is a temporary cap in place to prevent direct contact with soils and to minimize infiltration of water into the containment structure. It is expected that the temporary cap is replaced in the future with a permanent cap.

In approximately 1972, two lined lagoons and an acid treatment and neutralization system were added to the facility to replace the unlined Acid Pits and Lake Poly. The lined lagoons received mainly acidic wastes that did not contain sodium dichromate wastes and were neutralized with lime. The acid treatment and neutralization system initially discharged to on-Property ditches. In approximately 1972 the system was connected to a municipal (MDC) sewer. The acid neutralization in the lined lagoons resulted in precipitation of calcium sulfate (gypsum) and the lagoons were periodically dredged of this material. The gypsum dredge spoils were managed at the Calcium Sulfate Landfill. According to monitoring data from the late 1970s, the lined lagoons were leaking. Upon purchase of the property in 1980, Olin made several improvements to the facility. The lagoons were re-lined in approximately 1981 and 1983. The original liners were polyvinyl chloride (PVC) and replaced by Olin with 36 mil thickness hypalon liners. Leaks in process sewer lines were also repaired in approximately 1983 and 1984.

The former facility also contained buried drum areas and a buried debris area that predated Olin's ownership of the facility (**Figure 1-3**), but were discovered by Olin during 1980 maintenance activities (relining of Lagoon II) and post closure environmental assessments. Drum Area A consisted of drums and miscellaneous waste containing NDPA, BEHP, TMPs, and chromium. Drum Area B consisted of drums, laboratory bottles, and miscellaneous wastes containing NDPA, BEHP, phthalates, and chlorobenzenes. The buried drum areas also contained Opex® and Kempore®. The Buried Debris Area contained materials similar to those disposed in Lake Poly

(Smith, 1997). The remedial activities for the Drum and Debris areas were summarized in the 2001 Drum Removal Release Abatement Measure Status Report No. 2 and Completion Statement (GEI, 2001a,b), and the 2004 Part 2 C-RAM Status Report No. 8 (GEI, 2004). Soils (4,350 cy excavated, 200 cy disposed), metal debris (54 tons), and 163 overpacks of old drums were excavated and shipped off-site for disposal. Confirmatory sampling of base and sidewalls of the excavations was conducted. The excavations were backfilled with suitable on-site borrow and excavated soil. Drum Area A and Drum Area B are located within the footprint of the current slurry wall containment area and associated temporary cap.

1.4.2.3. Sewer Systems

The first or "early" sewer system for facility operations included process wastes from Plant A and Plant B piped directly to Lake Poly through plant sewers. Beginning in 1957, process wastes were being piped to Lake Poly and the East and West Pits (GEI, 2004). In 1964, Lake Poly and the three acid pits were receiving piped process wastes and the East and West Pits had been closed. During some or all of this period, Plants A, B, and C were in operation. The sewers system was upgraded several times following closure of Lake Poly in 1969. Those later configurations were discussed as well in the Final OU1 OU2 RI Report (AMEC, 2014b).

1.5 Report Organization

As discussed previously, the purpose in preparing this Draft Focused RI for DAPL in OU3 is to combine new investigation results with previously compiled environmental reports, results, and relevant information regarding DAPL investigations in the OU3 area. The combination of information will be utilized to characterize the nature and extent of the DAPL pools and the human health associated with DAPL in OU3. This report is organized in accordance with the USEPA Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA Interim Final (USEPA, 1988), and is organized as follows:

Section 2 Study Area Investigations

Section 2 presents summaries of investigations pertinent to DAPL. This includes work over two decades that defined the topography of the bedrock depressions that contain the DAPL pools, geophysical and subsurface investigations including multi-level piezometer installations that define and monitored the stability of the DAPL surfaces. Previous work includes laboratory scale column leaching studies that were used to support the development design and implementation of a field scale DAPL Extraction Pilot Study. The removal actions for Lake Poly are also discussed.

These historical investigations and removal/remedial actions were discussed previously in detail in the 2007 Draft Focused RI Report (MACTEC, 2007), and the Final OU1 OU2 RI report (Amec Foster Wheeler 2015b).

Section 2 also presents the limited scope of investigation work conducted under OU3 related to DAPL. That work includes direct push confirmation of the depths to bedrock within the central portion of the Main Street DAPL pool completed in 2017. In addition, although not specific to DAPL, results of the Hydraulic Pulse Interference Testing (HPIT) at the Containment Area is also discussed since that work pertains to the integrity and performance of the slurry wall that

surrounds the on-Property portion of the Upper DAPL pool (also referred to as the on-Property DAPL pool)

The results and findings of the DAPL extraction pilot study that was conducted at the off-PWD DAPL Pool is also discussed.

Section 3 Physical Characteristics of the Study Areas and Land Use

Section 3 describes the physical characteristics of the Site and area including surface and bedrock topography, geology, hydrogeology, surface water, meteorology, demography, land use, and ecology.

Section 4 Nature and Extent of DAPL and Associated Contaminants

Section 4 presents the nature and distribution of chemical constituents and Site-related contaminants in DAPL. Tables of detected analytes and a brief discussion where appropriate are presented for each DAPL pool. The objective of this section is to present the analytical data that are representative of current conditions for DAPL. This section presents the location of each DAPL pool, bedrock topographic information, estimates of DAPL volumes, and discusses the stability of the DAPL interfaces.

Section 5 Contaminant Fate and Transport/Conceptual Site Model

Section 5 presents discussion of data related to the stability of the DAPL pools. At the request of USEPA this report does not discuss the nature of groundwater interaction with DAPL and therefore contaminant fate and transport of DAPL constituents is not discussed and will be deferred to conceptual site model (CSM) discussions in the OU3 RI Report. The discussion in this report does not relate the DAPL pools with specific or potential routes of contaminant migration and exposure within groundwater. The chemical and physical properties of contaminants in DAPL and their persistence and ultimate environmental fate is a groundwater related issue and will be discussed in OU3.

Section 6 Human Health Risk Assessment

Section 6 summarizes results from the focused human health risk assessment (HHRA) for NDMA which included a hypothetical DAPL ingestion scenario.

Section 7 Summary and Conclusions

The final section presents the summary and conclusions for the Draft Focused RI for DAPL.

2.0 STUDY AREA INVESTIGATIONS

This section discusses investigations conducted under the MCP and under OU3 related to DAPL. Response actions related to former Lake Poly and the on-Property DAPL pool under the MCP are also discussed.

Investigations have been conducted at the Site by several parties since the mid-1970s. Olin became involved in the investigation and remedial activities at the Site after its purchase of the facility in 1980. Most of the pre-1980 investigations were related to wastewater, groundwater, and surface water as well as the development and operation of the CSL. Earlier investigations and associated reports included groundwater and surface water investigations described in the document titled *Report on Groundwater and Surface Water Study, Stepan Chemical Company, Wilmington, Massachusetts* (GEI, 1978), soil and groundwater investigations along the eastern boundary of the facility concerning the LNAPL release in that area (New England Pollution Control Company, 1980), and the USEPA's Site Inspection Report for the Facility in December 1980 (Ecology & Environment, 1980) which focused on water pollution control and RCRA compliance. A Phase I Site Inspection Report for the Facility was prepared for the Massachusetts Department of Environmental Quality Engineering in 1986 (Wehran Engineering Corp., 1986). Olin conducted response actions to mitigate and control migration of LNAPL at the Plant B area in response to the 1980 Site Inspection Report. The Plant B groundwater recovery/treatment system for LNAPL was installed in 1981.

The Site was officially identified as a site subject to the MCP in a Notice of Responsibility letter from the MassDEP on May 28, 1992 (MassDEP Release Tracking Number 3-0471). Consequently, between that time and the listing of the Site on the NPL in 2006, investigations and response actions at the Site were conducted per the requirements of the MCP. The MCP requires a phased approach to site investigation and remediation that is modeled after the USEPA's NCP.

The 1993 Comprehensive Site Assessment Report, hereafter referred to as the 1993 CSA (Conestoga Rovers Associates [CRA], 1993), was focused on potential sources or release areas identified as Solid Waste Management Units (SWMUs). This report was not prepared in accordance with MCP requirements or terminology with respect to a Comprehensive Site Investigation Report (but more in line with a RCRA Facility Investigation Report). The associated investigations had been planned and initiated independent of the MCP Notice of Responsibility (NOR). The 1993 CSA was subsequently augmented by investigations intended to delineate nature and extent of release of oil and/or hazardous materials and to characterize the representative concentrations in environmental media to support risk characterizations and evaluation of remedial requirements. These supplemental investigations were conducted in a manner that is in substantive compliance with both the NCP and the MCP. In 1997, the *Supplemental Phase II Report; Wilmington Massachusetts, Olin Corporation. MassDEP RTN: 3-0471 (Smith, 1997)* was submitted to MassDEP per the MCP and approved. This Supplemental Phase II Report is referred to as the MCP "Phase II Comprehensive Site Assessment".

Additional MCP activities (including supplemental Phase Investigations, RAMs, Immediate Response Actions (IRAs), and monitoring activities associated with investigations, IRAs. and RAMs continued until the Site was listed on the NPL.

2.1 Previous Response Actions and Investigations

This subsection addresses those previous response actions and investigations that are pertinent to DAPL.

2.1.1 Response Actions

Response actions (primarily IRAs and RAMs) taken at the Site to date have focused on source areas, highly impacted media, and some localized contamination. These actions have had a substantial impact in reducing the amount of contamination in soil and sediment within OU1. The historical response actions pertaining to DAPL included construction of the Slurry Wall/Cap Containment Area as well as evaluation and excavation of the former Lake Poly. Currently Olin is continuing to extract DAPL from the off-PWD DAPL pool after completing the DAPL Extraction Pilot Study.

2.1.1.1. Dense Aqueous Phase Liquid Construction-Related Abatement Measure Remedial Action (Slurry Wall /Cap Containment Area)

The installation of a Containment Area was first evaluated in a Focused Feasibility Study in 2000, as one of several alternatives to achieve a permanent source control measure for on-Property DAPL, consistent with requirements of the MCP. The Containment Area was installed as a source control measure to contain on-Property DAPL and overlying contaminated groundwater in order to mitigate the discharge of contaminated groundwater to surface water and sediments in South Ditch The location of the containment area is shown on **Figure 1-3**.

The containment wall consists of a 3-foot wide soil-bentonite slurry that was installed from ground surface to the top of bedrock in the southwestern portion of the property. The maximum depth of the slurry wall is approximately 35 feet (ft) below ground surface. The slurry wall is comprised of a mixture of 65 percent excavated soil, 30 percent imported clayey glacial till, 3 percent processed attapulgite clay, and 2 percent bentonite clay. The excavation was supported by a bentonite slurry while the backfill material was placed using continuous mud wave techniques. Laboratory tests of backfill material indicate a permeability of 5.0×10^{-8} centimeters per second (cm/sec) using both water and DAPL as permeants.

Construction of the slurry wall was preceded by a pre-design boring program to determine the depth to bedrock, and completion of chemical compatibility testing of the DAPL and the design slurry mixture. The pre-design boring program is summarized in the C-RAM Status Report No. 8 (GEI, 2004). The compatibility testing indicated that the hydraulic conductivity of the design slurry mix decreased over a six month period while in contact with DAPL material. These results suggest that hydraulic performance of the design slurry mixture improves when in contact with DAPL. Along the northern, eastern and southern portions of the slurry wall, the DAPL surface elevation within the perimeter of the slurry wall is lower than the elevation of the intersection of the slurry wall and the bedrock surface. The slurry wall, working with the geometry of the bedrock depression, serves as a barrier to migration of dissolved DAPL constituents via overburden groundwater (diffuse layer).

The containment structure was constructed with an equalization window on its western side to allow movement of shallow groundwater in and out of the structure, and equalize hydraulic

pressure with surrounding groundwater. The equalization window is a gravel backfill section within the slurry wall located at an elevation corresponding to the water table. The equalization window is instrumented with two wells that allow measurement of water levels and collection of water quality samples to assess flux of groundwater and solutes through the window.

In 2000, a Post-Construction Monitoring Plan (PCMP) was prepared and monitoring was initiated to assess the performance of the subsurface containment structure in encompassing the DAPL and the temporary cap in minimizing the influx of precipitation and storm water into the containment structure. Under the CERCLA program, this sampling has been conducted under the USEPA-approved Interim Response Steps Work Plan (IRSWP) (MACTEC, 2008). Olin has prepared semi-annual status reports since 2001 to document the post-construction performance monitoring for the containment structure.

The temporary cap was completed in April 2001 over the entire Containment Area using 6-mil scrim-reinforced polyethylene sheeting. A gravel roadbed was installed around the eastern and southern perimeter of the temporary cap and slurry wall to allow vehicle access to the southwest area of the Site. The 6-mil sheeting was replaced in 2003 with an 8-mil scrim-reinforced polyethylene sheeting. The seams of the new sheeting were sewn with ultraviolet resistant thread to reduce potential leakage of precipitation. The new sheeting was ballasted with sandbags on a grid pattern to minimize potential wind uplift and damage. Olin conducts on-going routine inspections to monitor the integrity of the temporary cap material, evaluate the need for periodic maintenance and document maintenance activities and repairs. Details of the cap inspections are summarized in the Semi-Annual Status Reports.

At the request of USEPA, the use of hydraulic pulse interference testing was evaluated as a tool to assess the integrity of the slurry wall (AMEC, 2013). Although the testing protocol was shown not to be particularly effective for the hydrologic environment at the site, the body of hydrogeologic evidence developed and presented in the final report (Amec Foster Wheeler, 2016) and subsequent responses to comments indicated that the slurry wall is functioning as intended and designed.

2.1.1.2. Former Lake Poly

The former Lake Poly was a source area that had been the subject of several investigations and remedial actions. This area was an unlined pond that received acidic, chromium-containing liquid manufacturing wastes from manufacturing operations. Details of the investigation approvals and remedial actions are discussed in Section 2.1.2.1 of the Focused RI Report. The initial remedial action at Lake Poly was intended to remove soil impacted with chromium and was conducted on November 17, 2000. The excavation was 10 ft wide, 10 ft long and 10 ft deep. The post-excavation confirmatory sample results indicated that additional excavation was required for the Lake Poly area.

Pursuant to additional investigations, the MassDEP approved the final scope of work and extent of additional excavations in the Lake Poly area on April 28, 2004. Consistent with that approved scope of work for the C-RAM, between June 7 and June 15, 2004 approximately 600 cy of subsoil was excavated and disposed off-site in order to eliminate soil concentrations of ammonia and chromium above corresponding MCP soil upper confidence limits.

2.1.2 Previous Investigations

2.1.2.1. Groundwater Investigation Associated with Lake Poly

Consistent with the MassDEP's December 12, 2003 Final Conditional Approval for additional investigations in the area of the former Lake Poly, three borings were completed as monitoring wells (GW-LPB-40, GW-LPB-44, and GW-LPB-47) during the December 2003 soil boring program (MACTEC, 2004a). Figure 2.1-6 shows those monitoring well locations. Well completions were of methods and materials typical for Type 2 monitoring wells.

On December 18 and 19, 2003, groundwater samples were collected, per USEPA Region I 1996 low stress-low flow guidelines, from eight monitoring wells within and adjacent to the former Lake Poly area. Wells sampled included GW-28S, GW-28D, GW-29S, GW-29D, GW-LPB-11, GW-LPB-40, GW-LPB-44 (upgradient), and GW-LPB-47. These monitoring well locations are shown on Figure 2.1-6 All eight samples were analyzed by STL Laboratory for acetaldehyde and formaldehyde via method SW846 8315a, and hydrazine via method STL-DEN-WC-0048. These compounds were target analytes because they were considered by MassDEP to be potential precursors for NDMA formation in groundwater. In addition, groundwater samples from GW-LPB-40, GW-LPB-44, and GW-LPB-47 were analyzed for NDMA by a modified Method EPA 1625/625. The other five wells had recently been sampled and analyzed for NDMA on August 25 and 26, 2003. Hydrazine, formaldehyde, or acetaldehyde were not detected in any of the groundwater samples. NDMA was detected at concentrations ranging from 7.6 ng/l at well GW-LPB-47 to 130 ng/l at well GW-29D.

Results of these investigations indicate that the neither DAPL nor potential NDMA precursors of concern were present, and that this former disposal area was (and is) no longer an ongoing source of DAPL.

2.1.2.2. Main Street Bedrock Saddle Investigations

The Main Street Bedrock Saddle investigations were initiated to investigate the suspected presence of a bedrock saddle that formed a dam within the Western Bedrock Valley, arresting westward migration of DAPL. Subsequent investigations were designed to refine the geometry and hydraulic characteristics of that structure. Three borings (MB-1, MB-2, and MB-3) were advanced to at least five ft into bedrock (except at MB-2) on properties to the west of Main Street in October and November 1996. Three additional borings (CB-1, CB-2, and CB-3) were advanced to at least five ft into bedrock along the access road to the Chestnut Street pumping station in November 1996. Groundwater samples were collected from the top of bedrock upon completion of the boring. Boring locations are shown on Figure 2-1 of the 1997 Supplemental Phase II Report. These borings were advanced using a rotosonic drill rig. Aquifer materials and conditions were recorded during advancement of the borings and were documented in Appendix A of the 1997 Supplemental Phase II Report (Smith, 1997). Groundwater analytical results for the Main Street borings indicate that DAPL is not present at any of those locations. This information is the basis for the inferred presence of a subsurface geologic barrier to DAPL flow immediately west of Main Street (at the western boundary of the Main Street DAPL pool).

MassDEP conditionally approved (MassDEP, 1998a) the 1997 Supplemental Phase II Report on February 28, 1998 with the requirement that the existence of the subsurface barrier west of Main Street be confirmed by geophysical techniques and subsurface borings. GEI submitted a Work Plan on March 13, 1998 for conducting a seismic survey west of Main Street to collect additional information concerning the depth and orientation of bedrock or other geologic features which may affect the lateral extent and migration of DAPL (GEI, 1998c). MADEP approved the Seismic Survey work plan On April 3, 1998 with the condition that additional seismic lines beyond those proposed in the Work Plan would be required. MassDEP required that a soil boring program be conducted north of the intersection of Main Street and Eames Street to further define the Western Bedrock Valley and to define the downgradient extent of the DAPL (MassDEP, 1998b) in this area in its October 2, 1998 Conditional Approval of the Town Well and Sentinel Well Groundwater Program Recommendations.

Three seismic lines (1,2,5) were shot in the area of the inferred saddle and six borings (SB-1 through SB-6) were drilled between August 24, 1998 and September 4, 1998 (LAW, 2001d). The locations of these borings were based on the seismic investigation. The borings confirmed the existence of the bedrock saddle, which is roughly parallel to Main Street, and with a low elevation of approximately elevation 40 ft MSL. Groundwater samples were collected from top of bedrock from these borings. The groundwater sample from the deep boring east of the saddle (SB-4) had DAPL characteristics. Groundwater samples from locations nearer to the crest of the saddle (SB-2 and SB-3) had diluted concentrations of DAPL constituents, and the samples (SB-5 and SB-6) from outside the saddle-controlled reservoir exhibited ambient groundwater conditions (Geomega, 2001d).

Subsequently, three additional borings (SB-7, SB-8, and SB-9) were drilled in the saddle area to determine the lowest point within the bedrock saddle and to identify the location of an additional multilevel piezometer at that low point. The low point, at SB-8 was at an elevation of approximately 32 ft above MSL. SB-8 was cored from the top of bedrock at depth of approximately 65 ft bgs to approximately 176 ft bgs. Additional downhole investigations of the bedrock portion of SB-8 included hydraulic packer tests, Borehole Image Processing System logging, and hydrophysical logging. For comparison purposes, the same tests were conducted in monitoring wells GW-62BR and GW-62BRD (Geomega, 2001d).

Multilevel piezometer MP-4 was installed in the SB-8 boring to a depth of approximately 173 ft bgs (approximately 108 ft into bedrock). The soil boring investigation (SB-7 through SB-9) and installation of MP-4 (in SB-8) is documented in the January 8, 2001 report titled “Summary Report – Investigation Leading to the Installation of Multilevel Piezometer MP-4, Olin Corporation, Wilmington, Massachusetts” (LAW, 2001d).

2.1.2.3. Western Bedrock Valley – GW-83D DAPL

DAPL is present in monitoring well GW-83D. However, the setting of this boring does not suggest that a distinct DAPL pool is present at this location in the WBV. The screened interval for this well ranges from 120.7 to 110.7 ft bgs. The boring log for well GW-83D indicates this well is also partially screened in bedrock. Wells screened in the bottoms of DAPL pools are characterized by high specific conductance values and the most recent specific conductance measured at GW-83D is closer to the diffuse layer cut-off value than DAPL located at the bottom of the other DAPL pools. Therefore, the DAPL layer in the GW-83D well screen is expected to be thin. The

calculated specific gravity for GW-83D DAPL is approximately 1.03, which is only slightly above the statistically derived cut-off of 1.025 for DAPL.

As presented in the geophysical seismic reflection report in the Draft Focused RI (MACTEC, 2007); Reference Document CD: Smith Phase II Supplemental Report; Volume III Appendix D – Seismic Reflection Report (RAYPATH Inc., December 1996) and the OU3 Data Gaps Work Plan, the WBV that underlies MMB is extensively faulted along its axis by a series of vertical faults that parallel the Bloody Bluff Fault system located immediately to the west. The depth structural mapping presented in the RAYPATH seismic reflection report suggests vertical displacements on some faults may have occurred since deposition of the fluvio-glacial deposits that occupy the buried bedrock valley comprising the MMBA. This would indicate the continuity of lower transmissivity basal tills may be interrupted by some of these geologic structures. DAPL that may have overtopped the Main Street bedrock saddle would have flowed by gravity to the deeper portions of the bedrock depression along the bottom of the WBV. RAYPATH seismic reflection line SE-95-16 in the vicinity of GW-83D where DAPL is inferred shows the presence of several pronounced vertical faults that continue out along the WBV and become more frequent under the confluence of MMB and Sawmill Brook (Seismic line BCM-94-3). It is unlikely that the presence of these geologic structures allowed a stable pool of DAPL to persist within this portion of the WBV. Similar fault structures were not interpreted to exist in the vicinity of the Main Street DAPL pool where similar seismic investigations were conducted.

2.1.2.4. Dense Aqueous Phase Liquid Interface Investigations

As reported in the Supplemental Phase II Report (Smith, 1997), downhole specific conductance profiling was performed at selected monitoring wells between 1993 and 1995 to determine the extent of DAPL to the west, east, and southwest of the facility. The specific conductance (conductivity) of a fluid is directly related to total dissolved solids (TDS) and therefore is a good investigation and monitoring tool to define the presence and vertical limit of DAPL, which has high TDS characteristically. Electromagnetic inductance logging was used to characterize the vertical elevation of the top of DAPL and horizontal distribution of the DAPL using this physical property. Knowledge of each DAPL pool elevation, combined with knowledge of the bedrock topography greatly aids in establishing the horizontal limits of each discrete DAPL pool. Between February 1 and February 10, 1995, a terrain conductivity survey was conducted as an aid in the identification of the location of DAPL in the bedrock valleys at and around the Site (Smith, 1997).

A cone penetrometer testing (CPT) program was conducted at six locations (CPT-1 through CPT-6) within known DAPL areas to examine the interface between the DAPL and the overlying ground water (Smith, 1997) between September 19 and September 22, 1995. The CPT was conducted to determine if the interface is sharp or wide and gradational (thicker dispersive zone). The widespread occurrence of cobbles and boulders, however, made it difficult to collect data from the surface down to the bedrock surface by CPT drilling methods (Smith, 1997).

Electromagnetic inductance logging was conducted on a number of different wells between August 1992 and March 1997 to provide data on the location and depth of the DAPL. The wells where this inductance logging was implemented include: GW-22D, GW-27D, GW-30DR, GW-34D, GW-35D, GW-36, GW-40, GW-42D, GW-43D, GW-44D, GW-45D, GW-58D, GW-59D, GW-61BR, GW-62BR GW67D, GW-68BR, GW-69D, GW-70D, GW-71D, GW-82D, GW-83D, GW-84D, GW-85D, GW-86D, and GW-87D (Smith, 1997).

Inductance logging was conducted annually through 2005 following the 1997 logging events. Wells GW-103BR and GW-103D were included in the logging program in addition to the wells previously logged. It is stated in Geomega's report concerning the 2005 inductance logging event (Geomega, 2005a) that "the primary aim of the inductance-logging/multilevel piezometer sampling is to track the extent and thickness of the DAPL that resides on and near the Property, and to monitor other areas within the Western Bedrock Valley for any changes in the distribution of Site-related constituents that may not be apparent from routine water quality sampling and chemical analyses." A report for each of the annual inductance logging events was prepared and submitted to MassDEP (Geomega, 1998a, Geomega, 2000a, Geomega, 20001b, Geomega, 2002a, Geomega, 2002b, Geomega, 2003a, Geomega, 2004b, Geomega, 2005a). The most recent report is contained in **Attachment A.**

The physical characteristics and chemical data were used in a report titled Results of the August, 1998 Multilevel Piezometer Sampling Event and DAPL/Diffuse Layer Discrimination Analysis (Geomega, 1999) to derive a technical basis for discriminating DAPL from the diffuse layer and overlying groundwater. The term diffuse layer referred to the groundwater immediately above the DAPL, into which DAPL constituents diffuse prior to being transported with groundwater by advective processes, and diminished in concentration by dispersion and reaction with the aquifer matrix (reactive transport). Based on a comprehensive statistical analysis of data collected during the August 1998 MLP sampling event, groundwater samples with specific gravity greater than or equal to 1.025 represented a statistically distinguishable population compared to the groundwater samples from diffuse/ambient groundwater (Geomega, 1999). Therefore, the working definition of DAPL, used throughout the MCP investigations, identified samples with specific gravity greater than or equal to 1.025 as DAPL material. A number of DAPL parameters were correlated with specific gravity, and the following threshold concentrations that correspond to a specific gravity of 1.025 have been identified:

- Ammonia concentration greater than 1,250 mg/L;
- Chloride concentration greater than 2,800 mg/L;
- Magnesium concentration greater than 270 mg/L;
- Sodium concentration greater than 1,700 mg/L;
- Sulfate concentration greater than 16,000 mg/L; and
- Specific conductance greater than 20, 600 µmhos/cm.

Specific conductance has been used frequently in the absence of specific gravity data, to discriminate DAPL samples from diffuse layer groundwater samples.

A predictive equation was developed for calculating specific gravity based on concentration data for multiple chemicals, rather than on a concentration data for a single parameter (Geomega, 1999). The equation is:

$$SG = 2.6 \times 10^{-7} \times SO_4^{2-} + 1.3 \times 10^{-6} \times Na^{+} + 3.7 \times 10^{-6} \times Cl^{-} + 7.4 \times 10^{-7} \times NH_3 + 1.01$$

Concentrations of sulfate, sodium, chloride, and ammonia are in dimensions of mg/L.

Multilevel piezometers have been installed to obtain a vertical characterization of groundwater chemistry above and within the DAPL and (in some cases within the diffuse layer groundwater) to understand potential future transport of DAPL constituents of concern. The Waterloo System multilevel piezometers from Solinst Canada were installed with multiple sampling ports to provide more accurate characterization of vertical profiles of groundwater quality than had been accomplished previously.

A total of five multilevel piezometers (MP-1 through MP-5) have been installed and studied to characterize DAPL and groundwater quality and to monitor DAPL characteristics and groundwater quality over time. MP-1 (within the on-Property DAPL pool), MP-2 (within the of-PWD DAPL pool), and MP-3 (within the Main Street DAPL pool) were installed in March 1996. The boreholes were drilled with a Barber dual wall air rotary drill rig using a standard air rotary hammer, while simultaneously advancing an 8-inch (inner diameter) temporary steel casing. The boreholes for MP-1 and MP-2 were advanced to bedrock. The borehole for MP-3 did not encounter bedrock and was terminated at 67 ft bgs (which was at least 10 feet into the DAPL).

MP-4 was installed on the western side of Main Street further downgradient within the Western Bedrock Valley in March and April 2000. The MP-4 boring encountered bedrock at 65 ft bgs and the boring was terminated at 176 feet bgs. The boring was drilled with a rotosonic drill rig, advancing a temporary 6-inch diameter casing to 75 ft bgs. Bedrock was cored from 75 to 176 ft bgs using an HQ wire line coring rig. The HQ borehole was reamed to a diameter of 6 inches using a mud-rotary rig. MP-5 was installed in the WBV during September and October 2005 (MACTEC, 2005b). The MP-5 borehole was advanced to competent rock at 98 ft bgs by rotosonic methods using a temporary 7.5 inch diameter steel casing. The borehole was then terminated at 106.7 ft bgs. MP-5 was installed to the bottom of the boring. DAPL has not been observed in MP-5.

The sampling ports in the multilevel piezometers are located throughout the water column but clustered (spaced closer together) to be able to characterize concentration gradients across the DAPL and “diffuse layer” groundwater interface and the overlying groundwater above it. Sampling ports were located close together (1.5 ft) at depths where a sharp concentration gradient was expected (e.g., across the DAPL/diffuse interface) and further apart (up to 5.5 ft) at depths where lesser gradients were expected (e.g., overlying groundwater). The Waterloo Systems piezometers have a sampling port that is emplaced in a sand pack, thus, the smallest discreet screened interval is about 1.5 ft. Sampling ports were numbered sequentially from deepest to the most shallow (for example, in MP-5, ports 1 through 15 represent deepest to shallowest elevations, respectively).

The multi-level piezometers were typically sampled (multiple ports in each piezometer) on an annual basis and simultaneously with the inductance logging program and the groundwater samples were submitted to the laboratory for analysis of bicarbonate alkalinity, chloride, nitrate and nitrite (as nitrogen), ammonia nitrogen, sulfate, pH, and specific gravity. Measured field parameters included temperature, specific conductance, dissolved oxygen, pH and oxidation/reduction potential (Eh). Analysis for other metals including (filtered samples) for aluminum, calcium, chromium, iron, magnesium, and sodium have also been completed for the multilevel piezometer samples at selected times. The results of the annual multilevel piezometer

sampling and analysis were typically reported with the results of the annual inductance logging events when the site was regulated under the MCP. Therefore, the annual multilevel piezometer sampling and analysis events are documented in the annual Inductance Logging and Multilevel Piezometer Sampling reports that were submitted to MADEP (Geomega, 1998a, Geomega, 2000a, Geomega, 2001b, Geomega, 2002a, Geomega, 2002b, Geomega, 2003a, Geomega, 2004b, Geomega, 2005a). All of the investigations discussed above as well as the numerous groundwater investigations have been utilized to identify and map the locations of DAPL associated with the Site. The results are discussed in Section 4.0.

2.1.2.5. DAPL Laboratory Column Studies

An extensive laboratory column study and geochemical study designed to evaluate the efficacy of extracting DAPL from the subsurface was conducted (Geomega, 2004a) using samples collected from the off-PWD area. The geochemistry of the DAPL, its potential interaction with aquifer materials, and the potential reaction of DAPL with un-impacted groundwater raised questions concerning the possibility of aquifer clogging and the feasibility of DAPL extraction from the subsurface. Therefore, the objective of the column study was to evaluate the hypothesis that DAPL extraction via pumping is a viable remedial alternative.

The column study included: the collection of aquifer core samples from the DAPL-impacted subsurface near multilevel piezometer MP-2; the design of column tests to simulate DAPL extraction in the aquifer; sampling and analysis of DAPL indicator parameters of influent and effluent from the column tests; partitioning studies of DAPL constituents using the actual aquifer materials (from the cores), and extensive analysis of the data and extrapolation of that data to expected real-world conditions.

The column tests evaluated the likely requirements (in terms of pore volumes replaced) for a controlled extraction of DAPL material only (very limited mixing with un-impacted groundwater). The column studies concluded that:

- Pumping at least 1.5 pore volumes could potentially attain a condition where DAPL is no longer present;
- Plugging of the aquifer material by solids such as iron precipitates and metal sulfates could potentially adversely affect DAPL extraction;
- Some DAPL material may remain in the aquifer materials in the solid phase after removal of 1.5 pore volumes Due to partitioning of DAPL constituents between the DAPL and aquifer materials, and retention of DAPL ganglia;
- Acid sulfate solid phases could result in elevated dissolved phase concentrations for an unknown period of time After removal of 1.5 pore volumes;
- Lower pump rates would minimize release of DAPL constituents to the un-impacted overlying groundwater and also minimize the formation of precipitates during pumping;
- Mass removal would become much less efficient after removal of 1.5 pore volumes as reduction in mass remaining becomes asymptotic.

The reports concerning the column studies are included in **Attachment A**. The information generated and the conclusions of the DAPL column tests were used in the development of the plan to conduct a Pilot Test for DAPL Extraction in the off-PWD area. The pilot test was originally proposed as an MCP Release Abatement Measure (RAM) (GEI, 2004d). MADEP, in a letter dated June 22, 2005 (MADEP, 2005b) approved the intent to complete the DAPL Extraction Pilot Test as a RAM. The design of the DAPL Extraction Pilot test was conducted in accordance with the Final Interim Response Steps Work Plan prepared by MACTEC on behalf of Olin and submitted to USEPA in August 2008 (MACTEC, 2008 Final submittal). As described in the following subsection.

2.1.2.6. Dense Aqueous Phase Liquid Pilot Test

As referenced above, the origin of the DAPL extraction pilot test began under the MCP prior to the Site coming under jurisdiction of CERCLA and work to define the location of an extraction well had commenced by 2004. The initial pilot design included a rail car loading station for improved safety and environmental sustainability of the transportation of DAPL for off-site treatment/disposal and was prepared in June 2008 under the IRSWP and presented to USEPA. USEPA did not concur with the rail loading station due to concerns that delays would result in negotiating rail access with PanAM Railways. USEPA directed Olin to modify the design to include transfer tanks located on the private property on 8 Jewel Drive where the extraction well was to be located in an above ground pump house. A design revision to accommodate this requirement was prepared and submitted on September 9, 2008. The property owner rejected the design concept and required Olin to move the storage tanks to its property and to install all pumps and piping below grade. Olin then approached PanAM railways to obtain an agreement to excavate through the railroad grade to access its property with DAPL conveyance lines and the final design was issued on February 12, 2010. In March 2012, PanAM Railways approved the piping plan under their tail track which allowed construction to be completed in 2012. The final Operation, Maintenance and Performance Monitoring Plan for the Pilot Test was submitted to USEPA on October 5, 2012, approved by USEPA on October 25, 2012 and the Pilot Test commenced on November 6, 2012.

The DAPL extraction pilot test was conducted from 2012 to 2014. The overall goal of the pilot test was to 1) assess the feasibility of recovering DAPL from the subsurface in a manner that minimizes disturbance of the DAPL pool surface and mixing with overlying diffuse layer material and overlying groundwater and 2) develop information to be used in the OU3 Feasibility Study (FS) evaluation of remedial alternatives. The pilot test Design, which is included within the Operations Maintenance and Performance Monitoring Plan, and the final reports are all included electronically in **Attachment A**.

The underlying principal for the pilot test is that the movement of the DAPL is governed by density-driven, gravimetric flow mechanisms. The DAPL is contained within a shallow sloping bedrock depression, which forms a “bowl-shaped” sloping aquifer with a central low point, or bottom. Extraction of fluid from the low point of this depression will result in DAPL movement along this sloping boundary toward the central extraction point. The rate at which the DAPL is pumped should not exceed the density-driven flow rate towards the extraction point nor cause vertical migration and intrusion of overlying groundwater to the extraction well screen for a DAPL removal strategy to be effective and efficient,. Pumping at an excessive rate over an extended period of

time could create several conditions that would favor inefficiency or failure of the extraction strategy. Understanding the physical parameters that influence and constrain DAPL extraction provide insights to inherently important factors in determining the most efficient and cost effective means to successfully extract DAPL

These include:

- Avoiding the intrusion of Diffuse Layer and overlying groundwater into the DAPL material during extraction which results in mineralization (i.e., precipitation of aluminum, iron and chromium hydroxides, acid sulfates and other minerals) and increases potential for aquifer clogging;
- Developing monitoring approaches and operating decision frameworks that avoid excessive drawdown of the DAPL/Diffuse Layer interface in the vicinity of the pumping wells with similar potential detrimental effects;
- Avoiding pool scale disturbances of either the DAPL or the Diffuse Layer that could induce convective flow patterns and potentially cause impacts to spread over a broader area and/or increase concentrations of dissolved DAPL constituents at shallower depths in the aquifer; and
- Avoiding conditions that could create an expansion of the Diffuse Layer thickness.

The Pilot Test scope included collecting geophysical (induction logging) and chemical data to gauge how the DAPL pool responded to each pumping rate over time. The induction logging serves to map changes in the vertical profile of in-situ fluid conductivity within the DAPL near the extraction well. The chemical data collected from closely spaced multiport piezometers (ML-1 and ML-2) allows vertical tracking of changes in the DAPL/Diffuse layer interface based on field fluid conductivity measurements. The DAPL extraction rates tested were 0.5, 1.0 and 2.0 gallons per minute (gpm) for target durations of 90, 120, and 180 days, respectively. The third pumping step at 2.0 gpm could not be sustained for the entire target duration (180 days). Olin continued to monitor recovery of the DAPL /Diffuse Layer interface since the final pumping step was terminated on May 22, 2014 after discussion with USEPA.

During the execution of the Pilot Test, monitoring data was plotted and submitted to USEPA by Olin. USEPA was apprised on the progress of the Pilot Test and was aware the final pumping rate of 2.0 gpm was not sustainable due to excessive drawdown of the DAPL and intrusion of overlying groundwater into the extraction well.

At the time of test failure (i.e., drawdown of the DAPL/diffuse material interface into the extraction well screen) the mix of DAPL and diffuse material and/or overlying groundwater being extracted no longer possessed the characteristics of DAPL.

The test results indicated DAPL extraction from a single well at 0.5 gpm was in itself not sustainable and would not allow for continuous gravity-based DAPL recovery without unacceptable draw down, or potential for precipitation. DAPL recovery at extraction rates greater than 0.5 gpm causes a more pronounced drawdown that results in DAPL dilution and entrainment of overlying groundwater and diffuse material, and non-gravimetric DAPL recovery across a large portion of the DAPL pool. Based on hydraulic data collected, an estimate of 100 ft has been established for the hydraulic radius of influence of EW-1 when pumped at 2 gpm (i.e. the distance from the extraction well of groundwater contribution when pumping). Based on transportation and

disposal records, and dilution of DAPL observed in EW-1 during pumping steps with 1.0 and 2.0 gpm rates, it is estimated the Pilot Test removed approximately 477,000 gallons of in-place, un-diluted DAPL. Approximately 73% of this volume was from gravity drainage at a rate somewhere between 0.5 and 0.6 gpm, indicating that a sustainable pumping rate that would allow continuous operation was lower than these values. The additional DAPL volume recovered in response to pumping at a rate greater than gravity drainage is accounted for in the aquifer volume at the top of the DAPL interface outward to the hydraulic radius of influence of the extraction well. This volume represents material that was diluted by intrusion of overlying diffuse layer material and overlying groundwater into the DAPL surrounding the extraction well above the top of the well screen. The vertical and horizontal flow to the well screen at EW-1 controls the degree and extent of DAPL dilution which increases as the distance to the well decreases. Exceeding gravity flow of DAPL to the well by as much as a factor of 4 (2.0/0.5 gpm) does not appear to greatly increase the removal rate of in-place DAPL and comes with a penalty of dilution and, therefore, a situation where DAPL, diffuse material, and overlying groundwater are all being extracted and treated resulting in a much more inefficient and potentially damaging remedial process.

Olin restarted the DAPL recovery system voluntarily on November 18, 2015 and operated the system at a flow rate of 0.5 gpm until October 3, 2016. The extraction system operation was halted due to dilution of the DAPL that was being recovered. The extraction was subsequently re-started in July 2017 at 0.25 gpm following rebound of the DAPL/diffuse layer interface. When the DAPL extraction system is shut down to allow rebound and recovery of DAPL around the extraction well several noteworthy things occur.

1) DAPL drawdown continues after active extraction at distal locations within the DAPL pool (MP-2 in the case of the pilot study) until gradually the DAPL reaches a uniform elevation across the pool.
2) During rebound of DAPL, vertical displacement of intruded overlying groundwater in vicinity of the DAPL extraction well apparently caused geochemical changes that resulted in clogging of the second lowest port in one of the multi-level monitoring wells. This indicates that a broader clogging of the aquifer is possible if the pumping strategy is episodic or pulsed, allowing the DAPL interface to episodically move up and down, rather that continually downward, and uniformly across the pool.

Based on the duration of pumping and recovery times of the DAPL interface it is likely that a sustainable gravity drainage rate to a single well is less than 0.5 gpm. In theory, extraction from a single well will result in inducing gravity drainage flow over the entire DAPL pool. If the gravity drainage rate is exceeded, excessive drawdown of DAPL around the extraction well will result in vertical intrusion of less dense DAPL material from immediately above the well screen. The DAPL extraction well or wells should therefore be placed at or along the low point in the DAPL pool. Closely spaced wells will result in interference effects that promote vertical drawdown around the well, therefore multiple well placements should be spaced beyond the radius of influence of the combined pumping rate.

2.1.2.7. Other Geological Investigations

The shape of the bedrock surface at the Property and in the MMBA is an important control over gravity driven DAPL migration paths, locations where the migration of DAPL was arrested and

where DAPL material has accumulated. Information collected from installation of monitoring wells, seismic investigations, and boring programs has been used to characterize the shape of the bedrock surface over the Site. The monitoring well installation logs have provided extensive information concerning the depth to bedrock. In addition, several seismic investigations have been conducted, and those investigations have been augmented with boring programs designed specifically to determine the depth to bedrock in specific areas that are of special interest due to distinct bedrock features such as the WBV and protrusions that cut across the bedrock valley forming dams or saddles.

2.1.2.8. Seismic Investigations

Seismic work conducted prior to 1997 was summarized in the 1997 Supplemental Phase II Report (Smith, 1997). From November 1994, through November 1996, four seismic reflection studies completed a total 16,750 linear ft of seismic line. Fifteen lines were located in the WBV, four lines within the Eastern Bedrock Valley east of the Property, and two lines were shot southwest of the Property. Section 3.0 presents the seismic work and discusses it in greater detail.

Since 1997, four additional seismic studies were conducted. Two studies focused on the delineation of the WBV, one study was conducted as part of the Maine Street Saddle Investigation, and the most recent was completed in the vicinity of Jewel Drive in 2006. Since 1997, eight long seismic refraction lines have been completed within the MMBW, (Geomega, 2001c, Geomega, 2004d), three seismic reflection and three seismic refraction lines were completed in vicinity of the Main Street Saddle (LAW, 2001d), (Geomega 2001d), and two seismic reflection and four seismic refraction lines were conducted in vicinity of Jewel Drive (LAW, 2001d, and MACTEC, 2006d).

Section 3.0 provides the most current interpretation of the bedrock surface from seismic studies and bedrock depths determined from borings.

2.1.3 Operable Unit 3 Remedial Investigations

2.1.3.1. Main Street Dense Aqueous Phase Liquid Pool Bedrock Confirmation Investigations

In May 2017, a series of direct push borings were completed to refusal with a direct push Geoprobe to confirm prior seismically interpreted depths to bedrock in the central portion of the Main Street DAPL pool. In order to confirm that boring refusal was on bedrock, a second boring was completed several feet away allowing the refusal depth of the two adjacent boring to be compared as confirmation. In addition, the Geoprobe used had an SPF-15 slotted screen so that at the bottom of each boring the rods could be pulled back to allow water to enter the screen. The purpose of this was try to measure conductivity of the fluid in-situ with a conductivity probe to confirm the presence of DAPL. This data collection objective was not successful due to high turbidity and silt in the water that either prohibited lowering the probe to the bottom of the rods, or fouling of the probe with silt. The borings were successful in their primary objective of confirming and obtaining more accurate depth to bedrock information. The boring locations are shown on **Figure 2-1**. The depths to bedrock refusal are tabulated in **Table 2.1**

The direct push bedrock investigations allowed refinement of the bedrock contours in the central and deepest portions of the DAPL Pool. This new data indicated good correlation with the previously interpreted bedrock depression that was based largely on seismically interpreted bedrock depths. The revised DAPL volume resulting from this information is discussed in Section 4.

2.1.3.2. Slurry Wall Hydraulic Pulse Interference Testing

During development of the OCSS RI/FS Work Plan, the USEPA asked Olin to evaluate the structural integrity of the slurry wall due to public concerns that it might be leaking. USEPA requested that Olin implement HPIT, as implemented by GeoSierra Inc., as a non-intrusive technology to investigate the potential for imperfections in the slurry wall. HPIT is a demonstrated method for measuring hydraulic properties of an aquifer between pairs of wells under appropriate hydrogeologic conditions, and has typically been used to test the hydraulic properties across permeable reactive barriers. The HPIT technology had never been used to evaluate the hydrologic properties of an installed slurry wall. Although the method is best suited to confined aquifers, the overburden saturated zone surrounding the slurry wall is unconfined. Even so, Olin agreed to retain GeoSierra to field test the methodology. HPIT involves cyclic injection of water under pressure in a source well and measuring and interpreting the arrival characteristics of that pressure signal in a receiver well. The injection period is followed by a shut-in period which is a time interval with no injection and no source pulse signal. The source and observation wells are monitored throughout the active injection and shut-in periods for each test. The time delays and attenuation of each pulse enable the hydraulic properties of the formation to be computed.

The testing was conducted over two phases. The first phase was a baseline test using existing wells to evaluate what test scale (distance, degree of well screen saturation, injection parameters) could be implementable. The second phase included installation of additional wells for testing. The results of HPIT testing over Phase I and Phase II indicated the methodology was not appropriate for the shallow unconfined hydrologic setting at the Containment Area and therefore did not yield definitive in-situ information on the hydraulic properties of either the overburden groundwater system or the slurry wall. With the exception of one well pair in the first phase, the hydraulic pulse could not be transmitted and detected over a field scale that would be appropriate and necessary to test the slurry wall. Therefore it was necessary to assess other pertinent available information, which when considered collectively, do not indicate that existence of any sections of the slurry wall that may be compromised hydraulically. This additional information included water level data, groundwater flow direction and gradient information, the elevation of the impacted groundwater (Diffuse layer) and DAPL relative to the base elevation of the slurry wall, and groundwater quality data collected over the past 15 years.

The HPIT Final Evaluation report (Amec Foster Wheeler, 2016) that included as Appendix C GeoSierra's Phase II HPIT Report concluded that:

- a very consistent and stable hydrogeologic condition exists that is dominated by the presence of a vertical hydraulic barrier (e.g., the slurry wall) that diverts groundwater around the Containment Area, and isolates the groundwater within, and

- that the slurry wall associated with the Containment Area continues to serve its intended purpose and be structurally sound.

The USEPA accepted Olin's recommendation of no further testing related to the slurry wall.

3.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA AND LAND USE

The following subsections provide a general description of both the regional and local (i.e., site specific) physical features including topography, geology, hydrogeology, surface water, meteorology, land use and ecology. As noted in Section 2.0 of this report, a large number of investigations have been conducted at the Site primarily under regulatory authority of MassDEP and have contributed greatly to the current understanding of Site physical characteristics. Additional information is available in the 2007 Draft FRI (MACTEC, 2007).

3.1 Topography

The developed northern portion of the Property is essentially flat with the ground surface located at an elevation of approximately 85–95 ft above MSL. The undeveloped, southern portion of the Property consists largely of wetlands and mature forest lands and has slightly more topographic relief as compared to the more developed northern portion. The topographic features include an east-west trending low lying area that forms the South Ditch and Ephemeral Drainage and includes Central Pond, and a storm water detention pond located between the containment area and South Ditch. This low lying area is intersected at the Property boundaries by the East and West Ditches. These features are part of the interconnected drainage system that border two sides of the Property and that cross the center of the Property. Each of these surface water bodies occupies lower topographical areas and are shown on **Figure 3-1**. In the vicinity of the South Ditch and the Ephemeral Drainage, topography ranges in elevation from approximately 80 ft MSL in the west, sloping to an elevation of approximately 77 ft MSL to the east along the course of the East Ditch system. A small upland knoll is present between the South Ditch and the Ephemeral Drainage, and attains an elevation of 86 ft MSL.

The topography adjacent to the Property ranges from low lying wetlands to flat paved industrial areas. The land north of the Property is developed and is generally flat. The Massachusetts Bay Transportation Authority (MBTA) rail line creates and occupies a topographic low along the eastern side of the Property. Immediately east of the Property, across from the MBTA line the area is mostly commercially developed land that is paved or landscaped and generally flat but with a gradual topographic rise directly to the east attaining elevations approximately 115 ft above MSL. A low ridge runs along the southern boundary of the Property and reaches a maximum elevation of 108 ft MSL. The CSL was constructed on the western end of this ridge. The WSL is immediately south of the property beyond which the land becomes lower in elevation and flatter (80 ft MSL) draining to wetlands to the southwest, toward Landfill Brook and Halls Brook.

The area immediately west of the northern portion of the Property includes commercially developed lots along Jewel Drive, and Eames Street and then residential lots along Main Street that are all relatively flat. The area immediately west of the southern portion of the Property includes a small hill or knoll that extents to 140 ft MSL which includes several residences along Cook Avenue and Border Avenue in Wilmington. Additional residential development is present further to the southwest in North Woburn. To the northwest of the Property, on the western side of Main Street in Wilmington, the topography drops to lower elevations and is relatively flat at 80

ft MSL near and within the MMBW. The MMBW is bordered by upland areas to the west of Chestnut Street, and to the north by a broad ridge that runs parallel to Butters Row.

As described in the RI/FS Work Plan (MACTEC, 2009) an accurate delineation of the wetland boundary using the United States Army Corps of Engineers 1987 Wetlands Delineation Manual with N.E. Division Field Data Collection Sheets, and classification of the wetland types using the Classification of Wetlands and Deep-water Habitats of the United States (FWS/OBS-79/3I, US Fish and Wildlife Service, 1979) was completed. This included determination of the functions and values of the wetlands and an accurate description and delineation of the ten (10) year and hundred (100) year floodplain. The flood plains have been determined to be immediately adjacent to the streams within the areas of mapped wetlands. South Ditch flood plains are included on **Figure 3-1**.

3.2 Geology

This section summarizes the geology of the Site based on the available historical information and including data collected during the OU1 RI soil investigation. This section includes discussion of the backfill material in the former Lake Poly area. The reader is referred to the OU1 OU2 Final RI for additional detail including geologic cross sections.

3.2.1 Unconsolidated Overburden Deposits

The following paragraphs describe the overburden stratigraphy (from ground surface to bedrock) observed within the former facility areas of the Site during the 2009 and 2010 OU1 RI soil investigation. A total of 74 soil borings were advanced by sonic and direct-push methods to refusal and in November 2011, and December 2012 an additional 57 borings were advanced by direct-push methods for the purpose of collecting soil samples for chemical analysis and classifying the subsurface soils. Based on these borings, and information from existing borings, the native geologic sequence includes unconsolidated organic materials and quaternary glacial deposits (ice contact deposits, outwash deposits and glacial till) over igneous and metamorphic bedrock. These unconsolidated deposits are overlain by fill and the concrete foundation slabs. The observed thickness of the overburden at the former facility ranges from 6.5-37.5 ft from ground surface. The overburden ranges in thickness from 12-15 ft in the area of the former office building and the Plant B Production Area and thickens to 37.5 ft near the former wastewater treatment plant at the southern end of the East Warehouse. Additional detail on both overburden and bedrock geology for the Site in general is provided in the Draft FRI (MACTEC, 2007) The sections below review salient aspects of the overburden stratigraphy that are consistent with the geology found within and around the DAPL pools. Discussion of concrete slabs at the site, fill, organic /peat deposits are omitted since they have no bearing on the DAPL pools. Discussion of these materials can be found in the OU1 OU2 Final RI report.

Lake Poly Backfill. Soil boring SB-448 was drilled at the request of USEPA in the area of the Lake Poly soil excavation to confirm the depth and nature of the backfill that was placed as part of the remediation, to evaluate current soil conditions and to verify the area was no longer a source area for DAPL. The boring encountered geotextile fabric at 2.5 ft bgs, gravel rip-rap fill

from 2.5-9 ft bgs and another layer of geotextile fabric at 9 ft. Sand and more riprap fill were encountered under the geotextile to a depth of approximately 13 ft bgs. The fill materials were underlain by the native soils consisting of sandy till with varying amounts of fines. Bedrock was encountered at approximately 19 feet bgs. No indication of DAPL was present. The location of a cross section of former Lake Poly is presented on **Figure 3-2** and the section is presented in **Figure 3-3.** A seismic refraction line was also run at USEPA request parallel to the N-S property line from the Containment Area to a point north of Lake Poly which confirmed that there were no additional indications of bedrock depressions west of Lake Poly other than what was already known.

Ice Contact and Outwash Deposits. These units are present below the peat, and in the former facility areas directly below the fill. These deposits are described as yellow-orange, light brown, tan, and gray and consist of layers of fine, clean sand interbedded with sand, gravel and cobbles. Sandy deposits, where present above the peat, are probably alluvial in origin.

Generally, the deposits underlying the fill at the site were composed of 2-10 ft of uniform fine to coarse sand which grade into a coarser sandy gravel material with depth, although the nature of these transitions vary locally. As little as 5 ft of fill and outwash material was encountered in the central part of the Property in the vicinity the former Plant B Production Area and over thirty ft of outwash deposits were encountered at the south end of the Property.

Glacial Till. Both basal till and ablation till have been identified in the overburden soils within the site. Ablation till is deposited as stagnant ice melts through ablation or at the front or toe and sides of a glacier as it retreats (ablates), forming lateral and end moraines, which are often distinctive landforms. These ablation till deposits are generally loose and poorly sorted and consist of well graded sands and gravels with less silt and clay sized particles than basal tills.

The ablation till encountered at the site was characterized by the presence of cobbles and silt and was well graded compared to the relatively uniform gradation of the ice contact and outwash deposits. The depth to the top of the ablation till varied from 5-32 ft bgs across the former facility.

Basal, or lodgment till, is deposited at the base of a glacier through lodgment or melt-out processes, and tends to consist of well graded fine to coarse sand and gravel and may contain appreciable amounts of silt and clay-sized particles. Basal till is located directly over the bedrock and may have a lower transmissivity than the ablation till depending on its density and fines content.

The interpreted basal till encountered at the site was distinguished from the ablation till by the higher fines content, and, although it did not have the dense clay silt matrix typical of many basal tills, it generally had enough silt to appear as a cohesive soil. The distinction between basal till and ablation till at the site is often indistinct. The Rotosonic drilling method does not provide a relative measure of the density of the soils (such a penetration blow counts) and the classification of basal versus ablation till is subjective being based on the silt content and cohesive texture.

The basal till underlays the ablation till over much of the Property and was typically encountered in thicknesses of 1-6 ft, when present. Approximately two ft of a cohesive, denser till was identified above bedrock within the off-PWD DAPL pool at the location of the extractions well.

3.2.2 Bedrock Geology

Generally, bedrock below the Site is associated with the Composite Platform of Southeast New England or more specifically the Milford-Dedham Zone (Smith, 1997). This zone includes late Proterozoic and early Paleozoic rocks that lie between the Bloody Bluff Fault and the Northern Boundary Fault of the Boston Basin. The area northwest of the Bloody Bluff Fault is called the Nashoba Zone and is predominantly made up of late Proterozoic mafic meta-volcanic and metavolcaniclastics (i.e. Andover Granites). The area southwest of the Bloody Bluff Fault is called the Milford-Dedham Zone and is predominantly made up of gabbro-diorites. The Milford-Dedham Zone and the Nashoba Zone were separate tectonic plates that were joined together at the Bloody Bluff Fault, creating a mylonite fault zone. The Burlington Mylonite Zone has been characterized as a 3-mile wide zone around the Bloody Bluff Zone where the bedrock has been severely deformed.

Geologic mapping has identified two primary classes of bedrock: mylonites and intrusives. Both may very texturally and in composition and both are found within the Site. The mylonites are formed within fault zones and are metamorphosed by the pressure and heat generated along the fault zone and locally include hornblende-biotite schists. The intrusives are igneous rocks that are formed by the cooling of molten rocks, and include gabbrodiorites that formed later in dikes and fractures. However, in some areas they have been altered to metamorphic rocks, such as the hornblende-biotite schist identified in some rock cores (Smith, 1997).

The igneous rocks are predominantly gabbro and diorite complexes and include small intrusive bodies and dikes. The different gabbro-diorites include un-deformed or normal gabbro-diorites, gabbro-diorite cataclastics, and gabbro-diorite with granite intrusives. (Smith, 1997). The normal gabbro-diorites are fine-grained, weakly foliated and moderately resistant to weathering and erosion. The cataclastic gabbro-diorites are more easily weathered, and in turn are found in the topographically lower terrain with more gentle slopes. These rocks underlie the central portion of the facility and the South Ditch, as well as the area between Main Street and the east edge of the MMBW, both north and west of Eames Street. The gabbro-diorite with granitic intrusions is the most competent bedrock type within the study area. These rocks outcrop at the elevated areas near the CSL and near Cook Avenue, between Jewel Drive and Main Street.

Several studies have been conducted to characterize the underlying bedrock topography and to understand how the shape of the bedrock surface relates to both groundwater flow and the past migration of site-related contaminants. These studies, including the Supplemental Phase II investigation (Smith, 1977), which included completion of numerous borings and seismic reflection, and refraction surveys, additional seismic investigations of the MMB area, the Main Street Bedrock Saddle Investigations, and the off-Property West Ditch Seismic Investigation are described in Section 2.1.5.1 of the FRI Report.

The primary feature of the bedrock surface is the WBV that extends westward from the Property, and reaches depths of over 120 ft beneath the MMBWs. The slope of the bedrock valley is interrupted by two shallow transverse ridges or saddles that impeded the migration of DAPL within the WBV system and form two enclosed depressions in bedrock. The saddles include the Main Street Bedrock Saddle and the Jewel Drive Bedrock Saddle which form the down-slope perimeter of the Main Street DAPL pool located east of Main Street, and the Upper DAPL pool located east

of Jewel Drive, respectively. Bedrock surface topography based on boring and seismic investigations to date, is shown in **Figure 3-4.**

3.3 Overburden Groundwater and Surface Water Hydrogeology

The occurrence and movement of shallow groundwater underlying the site is based primarily on data collected during the OU3 synoptic groundwater level measurement events which took place in May and October 2011, and supplementary groundwater elevation data from OU3 groundwater sampling events. The groundwater conditions related to OU1 and OU2 were discussed in that RI report and not discussed in detail here. Some of the salient groundwater features are mentioned below, however additional discussion of groundwater will occur in the OU3 RI report.

The dominant hydrologic feature in the potentiometric surface is a groundwater divide that separates groundwater flow within two distinct watersheds, the Ipswich River watershed to the north and west, and the Aberjona River watershed to the south and east. Groundwater elevation changes in vicinity of the divide are very small (from 0.01 to 0.10 ft) and therefore the location of the divide is sensitive to seasonal differences in the groundwater surface and will shift laterally. The groundwater divide is influenced by both topography and the location of surface water drainage patterns. The overburden groundwater divide cuts across the northern portion of the Olin property, slightly south of and parallel to Eames Street, up to Jewel Drive. West of Jewel Drive the divide fluctuates in position seasonally. In May, 2011 the divide was located north of Eames Street and west of Main Street. In October 2011, the divide was positioned slightly south of Eames Street and east of Main Street.

The South Ditch which is in proximity to the Containment Area is predominantly a gaining surface water body that receives shallow discharging groundwater from OU3. In some cases the stream seasonally becomes a losing stream and sections of South Ditch have been noted to be dry or stagnant.

3.3.1 Bedrock Groundwater System

Based on extensive bedrock coring and mineralogical assessments (Smith, 1997), and borehole geophysical investigations (Smith, 1997, and Geomega, 2001c and Geomega, 2001d) the bulk movement of bedrock groundwater is dominated by secondary porosity features, such as fractures and in some areas faults. Locally, orientation of fractures is dominated by past tectonic deformation and the presence of structures such as the Bloody Bluff Fault Zone giving rise to a dominance of the northeast-southwest fractures within the bedrock fabric. Groundwater hydraulic conductivities measured in the bedrock in GW-62BR ranged from 0.04 to 0.06 ft/day. These values are representative of typical conditions found elsewhere in New England metamorphic sedimentary rock.

Spatial distribution of bedrock groundwater flow parallels overburden and is also divided between two water sheds as discussed earlier. Bedrock borehole GW-202BR installed adjacent to the Containment Area indicated very competent rock consist with the boring log from BR-1 drilled in the on-Property DAPL pool. Boreholes GW-405BR and GW-406BR at opposite ends of Jewel Drive had slightly more fracturing, but were consistent with and typical of bedrock boreholes drilled in similar metamorphosed rock in New England, where fractures are typically related to bedding

and axial plane fracturing/jointing. The top five to ten ft of bedrock in these wells typically exhibit the presence of a slightly weathered zone that is generally expected to have slightly higher transmissivities than the underlying competent bedrock.

3.3.2 Operable Unit 1 and Operable Unit 2 Surface Water

As discussed previously the Site contains a network of natural and manmade ditches, generally named for their physical location, relative to former operations. They include from upstream to downstream, the off-PWD (OU2), on-Property South Ditch and Ephemeral Drainage (OU1), on-PWD (OU1), the off-Property South Ditch (OU2) and East Ditch (OU2).

Off-Property West Ditch. The off-PWD is a small, well defined drainage that includes ditches constructed to manage storm water run-off at the time of the development of Jewel Drive. The storm water run-off ditches are perpendicular to Jewel Drive and are at the boundaries of adjacent private properties. A small culvert is present under Jewel Drive that allows surface water from a small storm water sedimentation pond to be conveyed to the ditch located on the south side of 8 Jewel Drive. These storm water run-off ditches connect to off-PWD which is parallel to and along the west side of the PanAm Railroad tail track that separates the Olin property from private properties along Jewel Drive. The off-PWD passes under the PanAM tail track in a stone culvert and becomes the headwater of the on-Property portion of South Ditch. The off-PWD is separated topographically from the Olin Property and did not receive run-off from the Olin Property.

On-Property West Ditch. The on-PWD begins along the northwest border of the Facility and drains to the south. The off-PWD collects surface runoff west of the Property boundary and flows into the South Ditch. The surface topography of the PanAM railroad bed prevents a direct connection of surface water between the on-PWD and off-PWD. Both on-PWD and off-PWD discharge into the South Ditch. As discussed in Draft FRI Report (MACTEC, 2007), sediment in much of the on-PWD and associated West Ditch Wetland has been remediated and the portion beneath the Slurry Wall/Temporary Cap has been reconstructed as a concrete culvert.

Ephemeral Drainage. The Ephemeral Drainage is an intermittent surface water feature located just south of and parallel to South Ditch and represents a low lying area that most likely represents the flood plain for South Ditch. During prolonged wet periods and following large precipitation events, flow in the drainage may develop and join the South Ditch in vicinity of the eastern Property boundary.

South Ditch. The South Ditch begins at the Property boundary along the west side, and receives surface flow from the off-PWD and the on-PWD. The South Ditch bisects the property flowing east across the center of the Property and discharging into the East Ditch. The hydrology of the ditch system was investigated and described by Smith (Smith, 1997) and conclusions from that study have changed little, although the hydrology has been modified slightly. These modifications include excavation and replacement of organic sediment from on-Property South Ditch, remediating, moving and culverting the on-PWD, and construction of the current weir, which replaced an earlier weir, similarly situated. During seasonal high groundwater conditions, there is constant base flow within the South Ditch indicating that it is a gaining stream that receives groundwater discharge. However during drier periods in summer months, the middle of the South

Ditch may go dry, indicating that stream reach seasonally becomes a losing stream that recharges groundwater during these periods.

Smith estimated annual flows of 1.6 million cubic ft per year for the South Ditch system (Smith, 1997). These measurements and observations are consistent with the piezometer measurements.

East Ditch. Surface water in the railroad ditch referred to as the East Ditch, located to the east of the Property, flows southeastward from the Eames Street overpass bridge, parallel to the MBTA Commuter Rail Line (and the eastern Property boundary). The East Ditch receives storm water runoff via sheet flow from abutting developed properties and adjacent wetlands. South of the Property, the East Ditch enters and exits a series of culverts eventually flowing into Halls Brook, which flows to Halls Brook Holding Area and eventually to the Aberjona River. The South Ditch (on-Property) surface water flows eastward into the East Ditch. The East Ditch is owned by or occupies right-of-ways controlled by the rail company and is regularly maintained to remove encroaching vegetation and debris from ballast that lines the ditches. Access to the East Ditch is restricted for protection of the public.

Central Pond. Central Pond is a shallow pond located north of South Ditch. The pond is generally round in shape and approximately 100 ft wide. The unconsolidated deposits in this portion of the property consist of fine to coarse sand and sand with gravel. Concurrent surface water elevation survey data and groundwater level data do not exist. Based on topographic and water table elevation information contained in the RI report, the elevation of the bank or land surface around the pond is approximately 80 ft MSL and the groundwater elevation in the vicinity of the pond is around 78 ft MSL. The water in the pond is typically several ft below the land surface. The nearby wells are water table wells (screened across the water table) and the pond elevation and the water table elevation appear to be the same. There is no indication geologically of silty material in the stratigraphy and the pond sediments were excavated to underlying soil (sandy unconsolidated deposits). Therefore, by all indications, the underlying aquifer is expected to be unconfined indicating that Central Pond is an expression of the shallow water table.

Stormwater Detention Basin. Detention Basin is a shallow pond located north of South Ditch. The pond is generally round in shape and approximately 50 ft wide. The Detention Basin receives drainage from Containment Area cap. The Detention Basin has an outlet control structure consisting of a 4-inch internal diameter vertical PVC pipe with an invert elevation of 80.32 that controls the surface water elevation. The opening of the outlet structure has a screen to keep it from clogging. The pipe has a 90 degree elbow that allows it to turn toward and run under the southern berm, where it outlets to South Ditch.

Maple Meadow Brook and Sawmill Brook. OU1 and OU2 RI determined that the MMBW which is located approximately 2,000 ft west and north of the Property and which contains Sawmill Brook and MMB, is not impacted by the Site and therefore will not be discussed further. The reader is referred to the OU1 OU2 Final RI report for additional information.

3.4 Meteorology

The climate in this area is described as humid and temperate with a fairly uniform monthly precipitation. Precipitation in the Wilmington area averaged 47 inches per year for the period from 1970 through 2000 (National Oceanic and Atmospheric Administration). In the nearby adjacent town of Reading, Massachusetts average annual precipitation data recorded at is in the range of 41 inches with October generally being the driest month and April being the wettest. It is estimated that approximately half of the precipitation leaves the Property as infiltration to groundwater or as surface water flows, and that the remaining half is lost to evapotranspiration (Geomega, 2001).

Mean January temperature is approximately 27 degrees Fahrenheit (F) and the mean July temperature is 74 degrees F. The mean annual temperature is 50 degrees F (CRA, 1993).

Prevailing wind direction is from the west northwest during the winter months and from the southwest during the summary months. The average wind speed is seven knots (CRA, 1993).

3.5 Demography and Land Use

This section presents the regional socio-economic conditions for the area surrounding the Site as well as the land use and groundwater classifications for areas within and around the Site.

3.5.1 Socioeconomic Setting

The Property is located in the southern part of Wilmington, Massachusetts and it lies on the border of The Town of Wilmington and the City of Woburn. Because of its proximity to Woburn, the demography of both municipalities is discussed in this Subsection.

The Town of Wilmington is a 16.98 square mile mixed residential, commercial and industrial community located 16 miles northwest of Boston. The town has a population of 22,325 (2010 U.S. Census estimate) and median family income in Wilmington is $100,861/year (2007-2011) with 35.8% of the population college educated. The Town of Wilmington has a poverty level of 1.8%, well below the national average of 10.7%.

The town has a Caucasian majority of 92.3% and a minority population of 7.7%. The dominant minority is Asian at 3.7% with the Hispanic population at 1.8%. African American persons represent 0.8% and various other minorities comprise the remaining 1.4%.

3.5.2 Surrounding Land Use

The property is immediately surrounded to the east, north, and west by industrial facilities and the Woburn Town Landfill abuts the Facility to the south. The MBTA Commuter Rail line immediately abuts the property to the east. Further to the west, along Main Street, Cook Avenue and Border Avenue, the primary land use is for single-family homes with some commercial and light industrial development.

There are schools located within 2 miles of the site, which include Woburn's Altavesta Elementary School, located less than one half of a mile to the south, Linscott Rumford Elementary School at

1.2 miles to the south and Wilmington's Wildwood Early Childhood Center at 1.3 miles to the north.

Public parks within 2 miles of the site include Ferullo Park in North Woburn and Wilmington's Town Park. Both are located on Route 38.

The MMBA is the location of one of several Town of Wilmington municipal well fields. Pumping of five of Wilmington's MWSWs was suspended in February 2003 subsequent to the detection of NDMA in the MMBA as discussed in Section 1. Olin and the respondents have funded construction of a new water line to the MWRA drinking water system built by the Town of Wilmington.

The areas around the property do not contain areas designated by the Massachusetts Executive Office of Environmental Affairs (EOEA) as "Environmental Justice Zones" (EJ). EJ zones were created by the EOEA to display neighborhoods across the state with high minority, non-English speaking and low-income populations (based on 2000 United States Census data). Such areas are identified and eligible to use state resources to ensure that EJ populations are represented in environmental decision-making.

3.6 Ecology

The ecology of the site including terrestrial and aquatic habitats, natural communities and potential wildlife which occur in the various on- and off-Property study areas related to the Site was discussed in detail in the OU1 and OU2 RI report. The reader is referred to that report specific information. In general, the terrestrial habitat within the 50-acre Property includes both developed and undeveloped areas. The developed areas of the Property include office buildings, paved parking lot, several non-operational plant buildings and foundations of several former plant buildings and structures. The Slurry Wall-Containment Area (approximately five acre area covered with a heavy plastic/fabric cover) is included in the developed portion of the Property. The developed area on site comprises approximately 21 acres and provides no significant habitat for ecological receptors. The remaining portion of the Site includes the central undeveloped portion of the property, which is comprised of a mix of forested upland and forested wetland habitats (ABB-ES, 1993) in addition to the CSL which is mowed semi-annually.

3.6.1 Threatened and Endangered Species

Consultations with the United States Fish and Wildlife Service (USFWS) have indicated that no federally-listed and proposed, endangered or threatened species are known to occur within the general vicinity of the site (MACTEC, 2002b; Smith, 1997; and MACTEC, 2004). The Mystic Valley Amphipod (*Crangonyx aberrans*) has historically been reported as occurring in a wetland near the Hall's Brook drainage; however this species was recently delisted by the Massachusetts Natural Heritage and Endangered Species Program.

On March 13, 2013, Amec Foster Wheeler reviewed the information available on the USFWS Information, Planning, and Conservation System and confirmed that there are currently no federally-listed rare, threatened or endangered species known to occur on or in the vicinity of OU1 or OU2. Amec Foster Wheeler also reviewed the information available on the MassDEP Natural

Heritage and Endangered Species Program Interactive Priority and Estimated Habitats Online Viewer and confirmed that there are no estimated or priority habitats of State-listed species on or in the vicinity of OU1 or OU2.

4.0 NATURE AND EXTENT OF CONTAMINATION

Seismic geophysical data, depth to bedrock from borings and ground surface data have been compiled and interpreted to develop bedrock topographic surfaces across the site. Multilevel piezometer sampling induction logging has been conducted to interpret the interfaces of DAPL, diffuse groundwater and overlying groundwater in each DAPL pool. These data establish the extent of the DAPL pools and chemical analysis of DAPL from multiple monitoring wells has established the stratified chemical nature of the DAPL. The known extent of the DAPL pools is presented on **Figure 4-1**.

4.1.1 Sources of Contamination

This RI Report is limited to addressing DAPL and the Diffuse Layer in overburden groundwater that immediately overlies the foot print of the DAPL pools. This section reviews the sources of releases that resulted in the formation of DAPL, and the process by which the DAPL pools formed.

As presented in Section 4 of the Draft FRI Report (MACTEC, 2007) and Section 2 of the Final OU1 OU2 RI Report (AMEC, 2015), potential contaminant source areas were historically identified and investigated, and remedial actions were successfully implemented to eliminate, control, or mitigate several of those sources. For DAPL, potential sources that have been the subject of remedial actions include the former Lake Poly, where process wastewater was released to the environment and the on-Property DAPL Pool where DAPL resides. Other potential source areas such as the East and West Pits, and the three Acid Pits located south of the East and West Warehouses were investigated historically. The former Drum Areas were remediated, and their historical footprint, like the acid pits, are located within the area surrounded by the slurry wall. These historic source areas where DAPL was initially released are identified on **Figure 1-3.**

Consistent with the current understanding of the CSM, during the time of facility operation until approximately 1972, process waters released to the unlined ponds provided an environment where the wastes could stratify according to density and denser fluids as DAPL percolated downward through the sandy soils and the water table, laterally displacing lighter, ambient groundwater. As waste loading continued a dense layer began accumulating along the top of the bedrock surface, and commenced flowing southerly along the sloping bedrock surface until it reached the bedrock depression identified as the Upper DAPL Pool. Base on available information, the displacement of ambient water also resulted in extensive convective mixing and formation of a larger plume of denser-than-water diffuse material that also migrated by a combination of advective and density driven mechanisms. Both the denser diffuse groundwater and DAPL would have been able to flow in a direction opposite of the groundwater gradients, to the west, following the WBV. After the DAPL breached the elevation of the Jewel Drive bedrock saddle (approximately 56 ft MSL), DAPL flowed over the saddle allowing DAPL to seep vertically into weathered bedrock between the off-PWD DAPL pool and the Main Street Pool, and subsequently into and filling the Main Street bedrock depression up to the elevation of the Main Street bedrock saddle (40 ft MSL). Once that saddle elevation was exceeded, DAPL, accompanied by a convectively and gravity driven diffuse plume, flowed downward along the WBV to the bottom of the MMBA. The WBV underlying the MMBA is a structurally controlled, buried bedrock valley that was not structurally competent and was readily and deeply eroded

during glaciation. Any DAPL that migrated to and accumulated within the WBV at the bottom of the MMBA would not have formed a stable DAPL pool due to the incompetent nature of the underlying bedrock. With time, this DAPL would have percolated vertically into the fractured bedrock and dissolved constituents would have diffused into intervening bedrock matrix.

When the Upper DAPL pool reached the elevation of the Jewel Drive saddle, it is reasonable that convectively driven, dense diffuse groundwater also overtopped the southern rim of the DAPL pool and flowed advectively along the bedrock surface under and along South Ditch. This is consistent with the presence of Diffuse groundwater in bedrock in GW-55D which is partially screened in bedrock on the east side of South Ditch. The long term presence of diffuse material there would have resulted in diffusion of high concentrations of dissolved solutes into the weathered bedrock matrix.

The on-Property DAPL pool has been isolated within the Containment Area to eliminate, to the extent practical, migration of DAPL and dissolved constituents in groundwater from within this area to surface water in the South Ditch. DAPL is not in contact with the slurry wall except along a very short segment of the western side of the Containment Area where the slurry wall separates the on-Property DAPL pool and the off-PWD DAPL pool. The off-PWD DAPL pool has been subject to ongoing DAPL extraction from the extraction well installed for the Pilot Study.

Based on an understanding of the general transport processes involved, the current DAPL pools are not the source of contamination noted in shallow bedrock in wells GW-43D and GW-83D as these areas of DAPL are attributed to the same time frame and processes that resulted in the formation of the DAPL pools. The current Upper DAPL pool is also not likely to be the source of diffuse groundwater in weathered bedrock underlying and located south of South Ditch. That diffuse groundwater is likely an artifact of the original releases and transport mechanisms from Lake Poly and the three acid pits. The off-PWD DAPL pool does contribute diffuse groundwater to the overburden groundwater system that underlies and discharges to the off-PWD and South Ditch.

The areas of impacted bedrock groundwater underlying the DAPL pools is attributable to the DAPL pools. As indicated previously, the region of impacted bedrock groundwater underlying the MMBA is attributed to releases that went directly into the WBV and are not principally the result of the Main Street DAPL Pool.

4.1.2 Extent of Dense Aqueous Phase Liquid Contamination

DAPL has been identified in three DAPL pools, monitoring wells GW-83D and GW-43D, and in additional monitoring wells in close proximity to the DAPL pools. Multilevel piezometer sampling induction logging has been conducted to interpret the interfaces of DAPL, diffuse groundwater and overlying groundwater in each DAPL pool. The DAPL pools are defined by the elevation of DAPL as measured by multi-level piezometers installed in each of the three DAPL pools. These include MP-1 in the on-Property DAPL Pool, MP-2, ML-1 and ML-2 in the off-PWD DAPL pool and MP-3 in the Main Street DAPL Pool. These data establish the extent of the DAPL pools and chemical analysis of DAPL from multiple monitoring wells has established the stratified chemical nature of the DAPL. The known extent of the on-Property and off-PWD DAPL pools is presented on **Figure 4-2** and the extent of the Main Street DAPL pool is provided in **Figure 4-3**.

The elevation of the Jewel Drive saddle that separates the Main Street and off-PWD DAPL pools is estimated to be at least 56.5 ft based on bedrock elevations encountered in GW-43D (destroyed). The DAPL elevation in the off-PWD DAPL pool was 55 ft MSL prior to the DAPL Extraction Pilot Test based on the two multiport wells installed for the DAPL Pilot test. The current elevation of that DAPL pool is closer to 50 ft MSL. The elevation of the DAPL interface in the on-Property DAPL pool is estimated to be 54.5 ft based on interpolation of specific conductivity values between MP-1 port 3 (49,060 µmhos/cm at 54.9 ft MSL) and port 4 (13,260 µmhos/cm at 54.9 ft MSL). The Main Street bedrock saddle the Main Street DAPL Pool is approximately 40 ft. The DAPL interface is inferred to reside between an elevation of 39 and 39.5 ft MSL in the Main Street DAPL pool.

Material with clear DAPL characteristics has been observed in GW-83D located within the WBV under the MMBW, but is more indicative of DAPL in weathered bedrock than an actual pool. This well is partially screened in bedrock and the DAPL is inferred, based upon several lines of evidence to reside within the weathered bedrock. This occurrence of DAPL is similar to that of GW-43D which was located between the Off-PWD and Main Street DAPL pools as described below.

The original GW-43D well was drilled into and screened across the overburden bedrock interface in 1991 and encountered DAPL. GW-43D was therefore previously interpreted to be within the edge of the off-PWD DAPL pool. The boring encountered bedrock at 56.6 ft MSL and the well was screened from 51.6 to 61.6 ft MSL. The replacement well was drilled for the DAPL Pilot test to bedrock refusal, but screened only in overburden immediately above bedrock. Based on the results of induction logging, this well did not encounter DAPL, which redefined the northerly extent of that DAPL pool.

DAPL was also encountered in MP-4 Port 5 in bedrock at the time of installation (2005) within the Main Street Bedrock Saddle. Port 5 was installed 110 ft below ground surface at an elevation of -13 to -15 ft MSL.

The stability of the DAPL interfaces in the DAPL pools was documented by induction logging through 2005 and multilevel piezometer sampling. The investigations conducted to define the DAPL pools also defined to the extent possible (given geologic variability) the elevations of the outlets represented by the low spot in the bedrock saddles where DAPL is presumed to have overflown into the next bedrock pool. The DAPL pools have resided at their current locations for at least fifty years or more. The current DAPL elevations are estimated to be within one to one and a half ft of the saddle elevations. Natural mechanisms that have acted to lower the DAPL elevations include loss of DAPL and gravity driven consolidation with time as the stratified DAPL becomes denser with depth. The Main Street DAPL pool is approximately 20 ft thick and loss of less than one foot of DAPL elevation in more than 50 years is the best indicator of the long term stability of that DAPL pool.

4.1.3 Nature of Dense Aqueous Phase Liquid Contamination

A summary of the analytical program for DAPL is provided in Table 4-1. Chemical data for analytes detected in DAPL are presented in Table 4-2 and represents all the data available since investigations of DAPL were initiated. The table is subdivided to indicate which wells represent

the on-Property, Off-PWD and Main Street DAPL pools. The tables are organized by organic analytes, inorganic analytes and specialty compounds /non-standard analyses. Table 4-3 presents summary statistics for detected analytes for each of these analyte groups and tabulates the frequency of detections, minimum, maximum and average concentrations detected and the range of quantitation limits for analytes that were not detected.

As described previously, DAPL is an acidic brine that is denser than water and composed principally of (in descending order of maximum dissolved concentrations) sulfate, chloride, sodium, ammonia, aluminum, chromium, iron, magnesium, potassium, manganese, and calcium. The liquid wastes that were disposed and resulted in the formation of DAPL contained sulfuric acid, sodium chloride, sodium sulfate, ammonium chloride, ammonium sulfate, chromium sulfate, and other constituents. Sodium dichromate was used in the Kempore® (azodicarbonamide) process. Other principal components include dissolved chromium, as well as aluminum, and iron.

The following paragraphs highlight some of the more frequently detected, though minor components, of DAPL according to chemical class.

Volatile Organic Compounds (VOCs). The most frequently detected VOCs include 1,1,1-Trichloroethane (1,1,1 TCA), 1,2-Dichloroethane (1,2 DCA), and Tricloroethene (TCE), are the most commonly detected chlorinated VOCs in DAPL. 2,4,4 Trimethyl-1-pentene and 2,4,4 Trimethyl-2-pentene were detected but at lower frequency (see Table 4-3). Other VOCs including bromodichloromethane, bromoform, chloroform, chloromethane, carbon disulfide, acetone, benzene and toluene were also frequently detected. The maximum concentration of each VOC was typically detected in tens of micro grams/liter (µg/L) range. Only bromodichloromethane, acetone, bromoform, and toluene were detected at concentrations in excess of 100 µg/L.

The maximum concentration of TCE (99 µg/L) was detected in GW-83D, and TCE was only detected at low estimated concentrations (< 5J µg/L) in the DAPL pools themselves.

The highest concentrations of 1,1,1 TCA were detected in GW-38 and GW-37 along the west side of the on-Property DAPL pool a decade prior to the construction of the slurry wall. These wells no longer exist as they were within the alignment of the slurry wall. Both were partially screened in fractured bedrock with screen elevations at (GW-38) and slightly below the current DAPL pool elevation. The highest detected concentrations for 1,2-DCA were reported for GW-37 and GW-36. GW-36 was located 100 feet north of GW-37. GW-37 was screened above the bedrock surface spanning an elevation across the DAPL interface. Based on the inorganic and metals concentration data (sodium, chloride, ammonia and sulfate), these wells would have contained DAPL.

The more elevated concentrations of bromodichloromethane, bromoform, chloroform, chloromethane, acetone, carbon disulfide, are all more or less equally distributed among all the DAPL pools. Benzene, and toluene are more consistently detected at higher concentrations in the Main Street DAPL pool. The maximum concentrations of benzene and toluene occur in GW-83D.

Semi-Volatile Organic Compounds (SVOCs). The most frequently detected SVOCs include phenols, multiple phenolic compounds (chloro-, nitro-, and alkyl), benzoic acid, benzyl alcohol, diphenyl ether, NDMA, and BEHP. Phenolic compounds include 2, 4-dichlorophenol, 2 chlorophenol, 2 and 4 methylphenol, and 2 and 4 nitrophenol and are distributed over a similar range of concentrations across each of the DAPL pools. The two highest concentrations of BEHP were detected in GW-22 and GW-27D in 1988 and 1992 respectively at the on-Property DAPL pool. These elevated results were not confirmed in later sampling events. Diphenyl ether was detected at a maximum concentration of 0.04 mg/L in GW-45D in 2010 and detection of this compound is almost entirely restricted to wells in the Main Street DAPL pool and GW-83D.

NDMA is detected in all DAPL pools at fairly consistent elevated concentrations. The frequency of detection is an artifact of the detection limit and the method of analysis. Prior to 2003, all NDMA analysis was conducted by USEPA method SW8270 which has an elevated detection limit. The low level method SW3510C has a low reporting limit (typically 1.9 ng/L) and this method is not selected if historical data indicates solute concentrations are with the range of the SW8270 method.

Metals and Inorganics. Being naturally occurring, most metals are frequently detected in DAPL and the inorganics that are analyzed are known to be important constituents in DAPL. Most frequently detected metals include aluminum, beryllium, cadmium, calcium, chromium, cobalt, copper, magnesium, mercury, nickel, potassium, sodium, vanadium and zinc. Both trivalent and hexavalent forms of chromium are present in DAPL though the predominant species is trivalent. Visual inspection of the metals data indicates metals are distributed within a similar range of concentrations in each DAPL pool.

Chloride, nitrogen as ammonia and sulfate are all frequently detected at high concentrations in all of the DAPL pools and are a principal component of DAPL. Nitrate is also a commonly detected form of nitrogen in DAPL and to a lesser extent nitrite.

Specialty Compounds The most frequently detected specialty compound is formaldehyde and to a lesser extent hydrazine. Pesticide Alpha-BHC is also frequently detected but at low concentrations and is distributed within similar concentration ranges in each DAPL pool.

5.0 CONTAMINANT FATE AND TRANSPORT/CONCEPTUAL SITE MODEL

The components of the CSM for DAPL (contaminant sources, migration pathways, and transport) have been introduced and discussed throughout this report. The major components of the CSM with respect to OU3 DAPL are again summarized below. At the request of USEPA, the scope of this document is limited to DAPL and does not consider interaction of DAPL with groundwater nor the fate and transport of dissolved DAPL constituents in groundwater. OU3 groundwater and its interaction with OU1 and OU2 surface water will be discussed in the OU3 RI report.

A figure depicting hydrogeologic, contaminant sources, and contaminant transport aspects of the DAPL CSM is presented in **Figure 5-1**. This figure depicts the historical importance of waste disposal practices at former Lake Poly and other disposal pits that resulted in the subsurface release of DAPL and the subsequent movement of DAPL along the sloping bedrock surface to its current locations in the DAPL pools. The principal migration pathway for DAPL was along the WBV. The figure also illustrates overburden and bedrock groundwater impacts related to DAPL and Diffuse material above DAPL to surface water discharge pathways. Groundwater impacts to surface water are primarily restricted to Off-PWD, South Ditch and East Ditch within the Aberjona watershed **(Figure 1-3)**. Groundwater impacts within the Ipswich river watershed are deep and within the buried valley underlying the MMBW complex. The aquifer is too thick to result in measurable impacts of any consequence to shallow groundwater and surface water located there. A more thorough discussion of groundwater will be provided at a later date in the OU3 RI/FS.

5.1 Contaminant Sources

Sources of contamination at the Property were related to former manufacturing operations and waste disposal practices. Currently, there are no sources of contaminants in unsaturated soil that are leachable and contribute to, and result in the formation of a groundwater plume in overburden or bedrock. The majority of the contaminant sources have been investigated and addressed through response actions under the MCP. These sources and other potential sources of contamination are identified below:

- Former Lake Poly, East and West Pits, and the three Acid Pits. Each of these unlined pits received liquid wastes during facility operations between 1953 and approximately 1970. The liquid wastes contained sulfuric acid, sodium chloride, sodium sulfate, ammonium chloride, ammonium sulfate, chromium sulfate, and other constituents. Sodium dichromate was used in the Kempore® (azodicarbonamide) process and acidic wastes containing chromium were discharged until 1967. The wastes included dense fluids that stratified according to density within the ponds and then penetrated the groundwater column below the ponds to the bedrock surface. The dense plume then moved by gravity down slope along the bedrock surface to its current location in the DAPL pools.
- The liquid waste disposal practices resulted in the formation of DAPL pools located within bedrock depressions. These include the Main Street DAPL pool and the Upper

DAPL pool, which is divided into an on-Property and off-PWD portion. The on-Property portion is largely within the Containment Area and the off-Property portion lies between the Containment Area and Jewel Drive. The Main Street DAPL pool is farther to the northwest. The DAPL pools are depicted on **Figure 1-4**.

The list of known chemicals, and chemical compounds, which were documented as having been used during previous manufacturing activities at the Site, but could not be analyzed during the RI process due to the absence of approved analytical methods, was discussed in detail in Section 5.0 of the Final OU1 OU2 RI Report. That list includes raw materials brought onto the Site, products that were manufactured at the Site, and constituents of waste streams. Twenty-two of these raw materials and components of liquid waste streams are inorganic compounds including salts (e.g., sodium chloride, sodium dichromate), acids (e.g., sulfuric acid), and bases (e.g., ammonium hydroxide). Although USEPA-approved analytical methodologies for these specific compounds do not exist, consistent with standard remedial investigation procedures and protocols, environmental media were analyzed for the individual components of these inorganic compounds such as aluminum, sodium, chloride, chromium, sulfate, ammonia, nitrate, nitrite, and zinc.

Other raw materials or potential components of liquid waste streams without USEPA-approved analytical methods include 2-ethylhexanol, 2-ethylhexanoic acid, hexamethylenetetramine, benzonitrile, butyl alcohol, paraformaldehyde (polymer of formaldehyde), and urea. Analysis of environmental media included methods for some components of these compounds (formaldehyde, ammonia, etc.). The alcohols likely have reacted in the environment and/or have degraded. Products without USEPA-approved analytical methods include Wytox ADP, Wytox 345/355/436 (polymeric phosphate), Nitropore OT, Wytox 312, Wytox Pap, Actafoam R-3, Nitropore 5PT, and Phenolic and Urea/Formaldehyde Resins. The facility would have focused on the production and shipment of commercial products and minimizing releases (or loss) of revenue-producing product. Reports of specific releases of products to the environment were not found in the records reviewed. The resins that were manufactured did not have any liquid waste streams associated with them. The lack of analytical methods for the resins is unlikely to have substantially underestimated releases of those products to the liquid waste stream.

As summarized in Section 2.1 of this report, and reported in the Final OU1 OU2 RI report, extensive investigations were completed at all of the liquid disposal area and soil removal actions were conducted at the former Lake Poly, and the location of soils remaining within the three former acid pits areas are contained within the Slurry Wall/Cap.

The Site was listed on the NPL based on the site scoring that was limited to the presence of NDMA in groundwater within the MMBA in proximity to the municipal water supply wells. Because this exposure pathway resulted in a score sufficient for listing, other pathways were not scored at that time. However, NDMA has not been identified as a raw material, a manufactured product, or a waste stream constituent in any of the operational history documentation. NDMA has been identified in DAPL, groundwater and surface water samples only. Activities have been conducted previously to identify the potential source(s) of NDMA detected in groundwater and surface water samples at the Site. These included conducting a detailed review of literature and facility records and evaluation of potential precursors in DAPL and diffuse groundwater. A thorough review of available manufacturing records did not identify any purchase, manufacture, storage, or use of

NDMA during manufacturing activities. A literature search was conducted to identify potential mechanisms for the formation of NDMA that might explain the presence of NDMA. Published articles in the literature in 2003 had identified the presence of NDMA in water samples collected from publicly owned wastewater treatment plants and water treatment plants that had been disinfected by chlorination or chloramination. The understanding of NDMA formation mechanisms in literature at that time is consistent with current literature.

In 2004, Olin submitted to MassDEP the "Report for the Initial Testing of the Proposed Test Method for NDMA Precursors, 51 Eames Street Site, Wilmington, MA, DEP RTN 3-0471". That report summarized a study that evaluated the utility of applying the Mitch et.al. precursor analytical method to DAPL and diffuse groundwater for the purpose of identifying groundwater locations where NDMA precursors might be present and, if present, to determine relative concentrations of precursors at various locations. As reported in pages 18 and 19 of that report, the study did not confirm, for the DAPL and diffuse groundwater samples, that the precursor analytical method was capable of detecting NDMA precursors such as DMA in those matrices. Therefore, the report recommended that the wide-scale application of the method should not be considered since it could not be confirmed that the method could reliably and consistently detect NDMA precursors in groundwater.

The information discussed above represents the available information concerning the potential formation of NDMA. It is not possible to reconstruct conditions associated with historical manufacturing operations in order to determine definitively if NDMA was formed during operations, in wastewaters, in groundwater, or if there is some other explanation for the presence of NDMA in groundwater and surface water samples collected from the Site. The Conceptual Site Models for each Site OU includes the nature and extent, fate and transport of NDMA in Site media, but however cannot definitively conclude upon the actual formation mechanism.

5.2 Migration Pathways

During the period of facility operation from 1953 until approximately 1970, liquid waste disposal practices resulted in direct discharge (overflow of pits and Lake Poly) to the on-Property ditch system and to groundwater. The majority of these impacts on-Property have been remediated. There is no longer a direct migration pathway from former source areas (disposal features) to current DAPL pools. DAPL is no longer being formed and the formation of DAPL ceased when operations ceased disposal of process waste water into Lake Poly and other unlined lagoons. DAPL is wholly contained within bedrock depressions and in weathered fractured bedrock and there is no indication that DAPL is currently or will in the future migrate within the overburden as DAPL.

DAPL has also been documented in shallow weathered fractured bedrock within GW-83D and GW-43D. These areas do not represent DAPL pools. The occurrence of DAPL in weathered bedrock outside the DAPL pools was believed to have been the result of transport processes that were ongoing when the DAPL pools were formed, and is not believed to be related to ongoing transport from the DAPL pools themselves. These areas of DAPL are present on relatively flat lying topography and there is no significant driving force (gravity or hydraulic gradients) to cause that material be mobile. DAPL was also encountered in MP-4 Port 5 in bedrock at the time of installation (2005) within the Main Street Bedrock Saddle. Port 5 was installed 110 ft below

ground surface at an elevation of -13 to -15 ft MSL. The limited occurrence in DAPL in bedrock and the stability of the DAPL pools, as discussed in Section 5.4, indicates any future DAPL migration pathway in bedrock is limited.

The primary transport mechanism of DAPL constituents is through diffusion and advective transport in groundwater. Diffuse groundwater is also transported advectively with groundwater according to groundwater gradients with some component of gravity flow. The dissolved constituents are subject to sorption, diffusion into fine grained soil material, precipitation within the aquifer matrix (aluminum, iron, chromium oxides and oxy-hydroxides, and acid sulfate minerals), and attenuation through dispersion and dilution.

The DAPL is one residual source of the dissolved constituents present in groundwater that is to be addressed in the overall OU3 RI/FS process. The soluble constituents in DAPL diffuse vertically and form a diffuse layer several ft thick above the DAPL. This diffuse layer is subject to further vertical mixing and advective transport with groundwater with subsequent attenuation of dissolved constituents through dispersion, precipitation reactions, and diffusion (from groundwater back into low permeability strata). The diffuse layer represents a geochemical continuum between the DAPL and overlying groundwater.

Site wide potentiometric surfaces have been presented in both the Final OU1 OU2 RI Report and the OU3 Data Gaps Analysis and Supplemental Work Plan. A groundwater divide is present that separates the Ipswich and Aberjona watersheds. This divide in general follows Eames Street from the Olin Property to Main Street hence south to the prominent ridge located between main Street and Jewel Drive. The divide fluctuates seasonally both east and west of the intersection of Eames and Main Street.

Diffuse groundwater above the Main Street DAPL pool occurs within the location of the groundwater divide that separates the Ipswich and Aberjona Watersheds. This divide shifts seasonally east to west across the DAPL pool. During portions of the year when the divide has shifted to the west most of the groundwater over the DAPL pool flows east towards and within the Aberjona Watershed. At other times of the year when the divide has shifted east, groundwater over about two thirds of the DAPL pool will flow west towards and within the Ipswich watershed. Groundwater gradients in this area of the Site are extremely flat (< 0.001 ft/ft) and groundwater advective velocities are expected to be low (0.1 to 0.05 ft/day). Therefore, groundwater above the Main Street DAPL pool is expected to oscillate back and forth over the pool which limits the amount of mass flux in diffuse groundwater that is advectively transported away from the DAPL pool.

Diffuse groundwater is present around the Upper DAPL pool, including the on-Property portion of the DAPL pool that is surrounded by the slurry wall. This diffuse groundwater flows entirely within the Aberjona watershed. Groundwater gradients in the area of the Site are slightly steeper (< 0.005 ft/ft) and groundwater advective velocities are expected to range from (< 0.1 to 0.5 ft/day). Groundwater discharges to OU1 surface water including the off-PWD, South Ditch, and is transported to East Ditch. This diffuse material and overburden groundwater will be the evaluated in the OU3 RI.

In summary, currently, due to these very flat gradients and oscillation of the groundwater divide that separates the Ipswich and Aberjona watersheds, the flux of dissolved constituents in Diffuse groundwater from the Main Street DAPL Pool to either watershed should be very limited. Within the Aberjona watershed, the flux of dissolved constituents within diffuse groundwater from the eastern half of the Main Street DAPL pool and the off-PWD DAPL pool is more important due to the presence of steeper hydraulic gradients, thinning of the overburden aquifer, and active discharge of impacted groundwater to surface water to the east. These groundwater migration pathways will be discussed in greater detail in the OU3 RI report.

Groundwater DAPL interaction also occurs within bedrock underlying the DAPL pools and an extensive region of diffuse groundwater is present in bedrock beneath the DAPL pools to unknown depths and under the MMBA within the WBV. Although these migration pathways are not the subject of this RI report and will be discussed under OU 3, an important migration pathway and fate and transport question that remains is to what extent the Main Street DAPL pool currently contributes to or is a source for groundwater impacts within overburden in the MMBA and in bedrock below the WBV under the MMBA.

Insight to this question can be obtained by comparing the volume of DAPL decline in the DAPL pool over the past 50 to 60 years to the volume of available groundwater porosity in bedrock under the DAPL pool. The DAPL pool surface area is 603,600 square ft and assuming a 30% porosity, a decline in the DAPL interface elevation from 40 ft to 39.5 ft represents approximately 670,000 gallons, and to 39 ft, approximately 1.3 million gallons of DAPL over the last 50-60 years. Assuming a slightly larger footprint (12%) of impacted bedrock under the pool (750,000 square ft) and a depth of impacted groundwater of 300 vertical ft, with a bulk fracture porosity of 0.5% for the bedrock, the volume of impacted groundwater under the Main Street DAPL pool at a minimum would be 8.4 million gallons. This represents a dilution factor ranging from 6 to 12 times simply by comparing the volume of DAPL decline to the available porosity volume in the underlying fracture network (fracture volume divided by DAPL volume). If it is assumed on average DAPL has a TDS that results in a field measured specific conductivity of 100,000 µmhos/cm, dilution of that material in the underlying bedrock fracture network, would result in average fluid conductivities ranging from approximately 8,000 to 16,000 µmhos/cm. This calculated result is consistent with the observed range of specific conductance in bedrock groundwater measured in the field. The implication is that the volumetric loss of DAPL from the Main Street DAPL pool over the last 50-60 years is only sufficient to account for or explain the volume of impacted bedrock groundwater directly below the DAPL pool. This strongly suggests that impacts located to the west and deeper in the WBV under the MMBA are most likely attributed to releases that occurred at the time the DAPL pools were formed and when DAPL and diffuse groundwater would have flowed over the Main Street Bedrock Saddle, and migrated into the WBV under the MMBA.

5.3 Receptors

Based on existing conditions, groundwater use restrictions and the nature of DAPL (color, odor, taste, acidity), it is considered extremely unlikely that exposure to DAPL is a realistic scenario. Consequently there is no current or foreseeable receptor for DAPL exposure. DAPL is stable within its current locations.

The exposure pathways associated with Site-wide groundwater will be evaluated in the RI/FS for OU3.

5.4 Environmental Fate and Transport

At the request of USEPA DAPL interaction with groundwater will be addressed in the OU3 RI Report. The environmental fate and transport of dissolved constituents from DAPL in groundwater is therefore the subject of the OU3 RI Report. DAPL is not being formed and is contained within bedrock depressions and therefore DAPL is not mobile and will not migrate as DAPL. DAPL has also been documented in shallow weathered bedrock within GW-83D and GW-43D. These areas do not represent DAPL pools. DAPL in these areas will continue to dissolve and diffuse into bedrock matrix. The significance of matrix diffusion for NDMA, the principal risk driver for the Site, will be discussed in the OU3 RI. The OU3 report will also discuss reactive transport of specific DAPL – related constituents in groundwater including chromium, aluminum and iron and transport of other soluble species including VOCs, SVOCs, metals and inorganics. The OU3 RI report will also discuss the potential for leaching of metals from bedrock and if there is any indication that process has occurred, which requires evaluation of groundwater data.

The stability of the DAPL interfaces in the DAPL pools was documented by induction logging and multilevel piezometer sampling through 2005. The investigations conducted to define the DAPL pools also defined to the extent possible (given geologic variability) the elevations of the outlets represented by the low spot in the bedrock saddles where DAPL is presumed to have overflown into the next bedrock pool. The elevations of the DAPL pools are, within measureable certainty, very close to the interpreted elevations of the saddles that contain them.

For the Main Street DAPL pool the saddle elevation is approximately 40 ft. The DAPL interface is inferred to reside at an elevation of 39-39.5 ft MSL (at or just below MP-3 Port 4). The Jewel Drive saddle the elevation is that separates the Main Street and off-PWD DAPL pools is estimated to be approximately 56.6 ft based on bedrock elevations encountered in GW-43D (destroyed). The DAPL interface was interpreted to reside at an elevation of 55 ft MSL based on the two multiport wells (ML-1 and ML-2 Ports 5) installed for the DAPL Pilot test and MP-2. The DAPL interface at the on-Property DAPL pool is 54.5 ft MSL. The DAPL pools were emplaced approximately 50 to 60 years ago or more. Given the thickness of the DAPL pools (approximately 20 ft for the Main Street Pool and 16 ft for the off-PWD Pool) and limited apparent decline of the DAPL interface, (some of which may be due to vertical consolidation), DAPL would be expected to reside in the pools at some level for the next 500 to 1000 years. Declines in DAPL elevations are therefore not measurable over the time scale of environmental studies that have been conducted at the Site. The multilevel monitoring and inductance logging conducted over many years provides a consistent data set to interpret the DAPL interfaces.

6.0 HUMAN HEALTH RISK ASSESSMENT

On August 7, 2017 Olin submitted at USEPA request a Focused Human Health Risk Assessment for OU3 that was based on ingestion of NDMA detected in DAPL samples and included long-term ingestion of DAPL as an exposure scenario as required by USEPA (Amec Foster Wheeler, 2017). Since the potential for exposure to DAPL by ingestion is extremely unlikely, a more detailed HHRA for DAPL has not been conducted.

6.1 Human Health Risk Conceptual Site Model

The exposure assessment for NDMA only (no other DAPL constituents were evaluated), including DAPL was provided in the August 7, 2017 submittal, noting that hypothetical ingestion of DAPL was an extremely improbable, if not impossible scenario. .

6.2 Hazard Identification

The hazard identification includes the evaluation, selection, and summarization of analytical data for the Baseline Human Health Risk Assessment and the selection of Chemicals of Potential Concern.

6.3 Exposure Assessment

The exposure assessment for NDMA, including DAPL was provided in the August 7, 2017 submittal, noting that hypothetical ingestion of DAPL was an extremely improbable, if not impossible scenario.

6.4 Toxicity Assessment

The toxicity assessment for NDMA was provided for in Section 5 of the Focused Risk Assessment.

6.5 Risk Characterization

Quantitative estimates of both carcinogenic and non-carcinogenic risks are calculated for each exposure to NDMA for ingestion of DAPL.

Calculated cancer risks for ingestion of DAPL is 2×10^{-2} and the hazard index for non-cancer risks 60 for a hypothetical future DAPL ingestion exposure scenario.

These risks exceed the upper USEPA cancer risk range of 10^{-4} and a non-cancer HI of 1 based solely on NDMA. Therefore calculation of cumulative risk for all constituents in DAPL is unwarranted at this time.

6.6 Risk Assessment Conclusions

Although exposure to DAPL under any circumstances is considered improbable, if not impossible, clearly ingestion of DAPL would present cancer risk and noncancer hazard above CERCLA limits.

7.0 SUMMARY AND CONCLUSIONS

This section provides a summary of the findings of the DAPL Draft RI and identifies the conclusions with respect to those findings. The summary of findings addresses the historical and RI investigations conducted to delineate the nature and extent of DAPL.

7.1 Summary

This section provides a summary of the nature and extent of contamination by DAPL, the fate and transport of DAPL as a discrete phase fluid, a summary of the potential for human health exposure to DAPL ingestion, and a focused risk characterization for a hypothetical long-term DAPL ingestion scenario (NDMA only).

7.1.1 Nature and Extent of Contamination

The location, extent and volume of all DAPL pools has been delineated and is sufficient for evaluation of alternatives in a Feasibility Study. Since the discharge of liquid waste ended more than forty years ago, DAPL is no longer being formed. DAPL has been identified outside of the DAPL pools in weathered bedrock and at one location in bedrock under the Main Street DAPL pool. These locations in weathered bedrock do not represent DAPL pools and do not warrant separate evaluations and should be considered along with the OU3 groundwater RI/FS process. The chemical and physical characteristics of DAPL are well documented.

7.1.2 Fate and Transport

DAPL pools are stable and DAPL is not migrating, therefore there are very limited fate and transport considerations for the DAPL itself. Current information indicates a very limited presence of DAPL in bedrock adjacent to or underlying the DAPL pools. DAPL constituents migrate by diffusion and advective transport with groundwater. The current DAPL elevations are slightly below the saddle elevations that enclose the bedrock depressions, and were responsible for forming the DAPL pools. Given that the DAPL was formed 50 – 60 years ago, it is expected that DAPL at some level will persist in the DAPL pools for a very long time, perhaps for the next 500 - 1,000 years. DAPL does interact with groundwater both above and below the DAPL pools resulting in groundwater impacts. The fate and transport of DAPL constituents in groundwater will be addressed in the OU3 RI process.

Evaluation of the volume of DAPL decline in the Main Street DAPL pool over the past 50-60 years suggests that the volume of DAPL lost is only sufficient to explain the extent of impacts directly below the DAPL pool in underlying fractured bedrock. This suggests the Main Street DAPL pool may not be the primary source of the groundwater impacts below the WBV underlying the MMBA. Based on available information, it is currently believed that those impacts resulted from DAPL and diffuse groundwater that migrated into the WBV and which now reside within bedrock underlying the MMBA and diffuse groundwater at depth within the MMBA. Historical water level data suggests operation of the Town Wells would induce vertical movement of impacted bedrock groundwater into the deep overburden groundwater system and also affect the location of the groundwater divide and could induce more advective movement of diffuse groundwater from

above the Main Street DAPL pool toward the Ipswich watershed. These aspects will need to be further refined and considered in the OU3 RI/FS process.

In either regard, actions to remove or isolate DAPL within the Main Street DAPL pool would have little, if any, short term effect or benefit in improvement of water quality in the MMBA that is accessed by the Town wells.

7.1.3 Human Health Risk Assessment

There is no current exposure to DAPL. Long-term ingestion of DAPL, focused on NDMA in DAPL, has been considered in a hypothetical future human health exposure scenario that is considered unrealistic. Ingestion of DAPL (using typical drinking water ingestion rates), based solely on NDMA, would be associated with cancer risk and noncancer hazard at levels more than ten times higher than CERCLA limits (10^{-4} cancer risk and hazard index of one). If other DAPL constituents were considered for this scenario, the cancer risk would be marginally increased and the hazard index would be increased as well. For this focused RI, the risk characterization based on NDMA only is sufficient to characterize the risks for the highly unlikely DAPL ingestion scenario. Exposure to DAPL can readily be managed through institutional controls.

7.2 Conclusions and Recommendations

DAPL is one, but not the only, current source of impacts to Site groundwater. Other sources will be addressed in the OU3 RI/FS process and include diffuse groundwater impacts to bedrock which through matrix diffusion over the last 60 years will significantly limit the future potential for aquifer restoration.

As discussed previously, the nature and extent of the DAPL pools has been adequately delineated, and the DAPL pool elevations have remained stable within measurement sensitivity. DAPL is not migrating and has not formed since the early 1970s, when liquid waste disposal practices that resulted in the formation of DAPL ceased.

There is no current exposure to DAPL. DAPL would be associated with health risk above CERCLA limits if ingested over the long-term, however such a scenario is deemed so unlikely as to be virtually impossible. No foreseeable human exposure scenarios for DAPL have been identified.

A DAPL extraction pilot study has been completed in the off-PWD DAPL pool. That body of work, along with historical characterization, indicates that it is feasible to remove DAPL by conventional pump and treat technology. The DAPL removal rate is governed by the gravity drainage rate of DAPL within the overall DAPL pool and efficient DAPL recovery requires slow pumping rates (approximately 0.5 gpm) to be sustainable from a single vertical well. Over pumping causes drawdown, intrusion of overlying groundwater and dilution of the extracted DAPL, is inefficient and can cause deleterious effects within the aquifer (precipitation, convective mixing, and plugging).

A Feasibility Study to address DAPL should proceed. If it is determined that DAPL extraction is warranted, the Feasibility Study should rely on DAPL pilot test study results to and the significant amount of past evaluation and modeling of DAPL dynamics to evaluate efficient approaches to

DAPL extraction. If should be clear however, that DAPL extraction is an inherently incomplete process, and all the DAPL in any DAPL pool cannot be completely removed. The isolation of DAPL in the on-Property DAPL pool has also been shown to be effective at eliminating migration of DAPL constituents in diffuse groundwater above the DAPL pool to the overburden groundwater adjacent to the DAPL pool.

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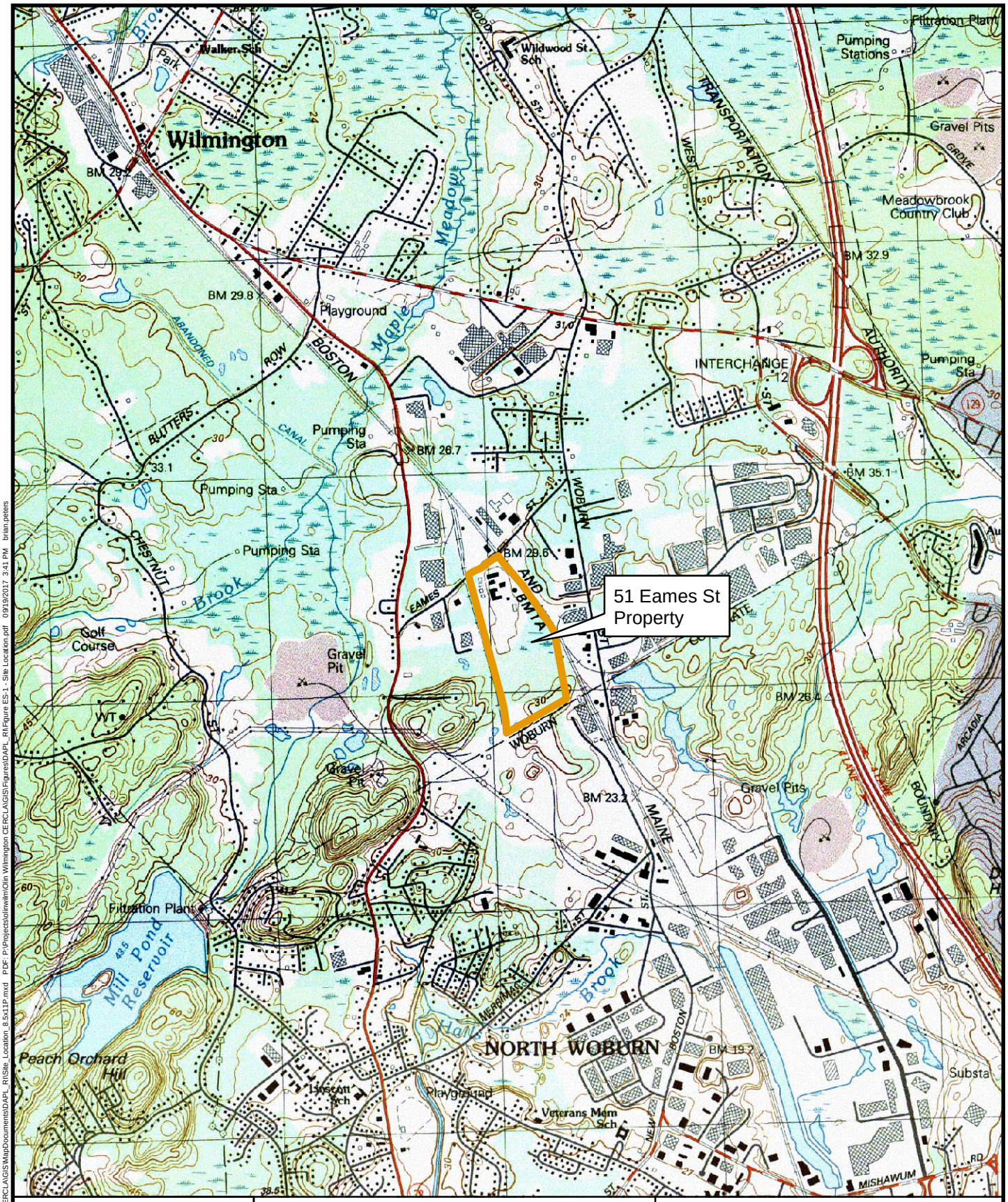
FIGURES



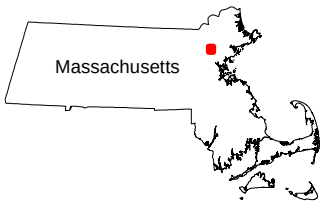


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Figure ES-1
Site Location

Focused DAPL RI Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

Prepared/Date: BRP 09/19/17 | Checked/Date: PHT 09/19/17

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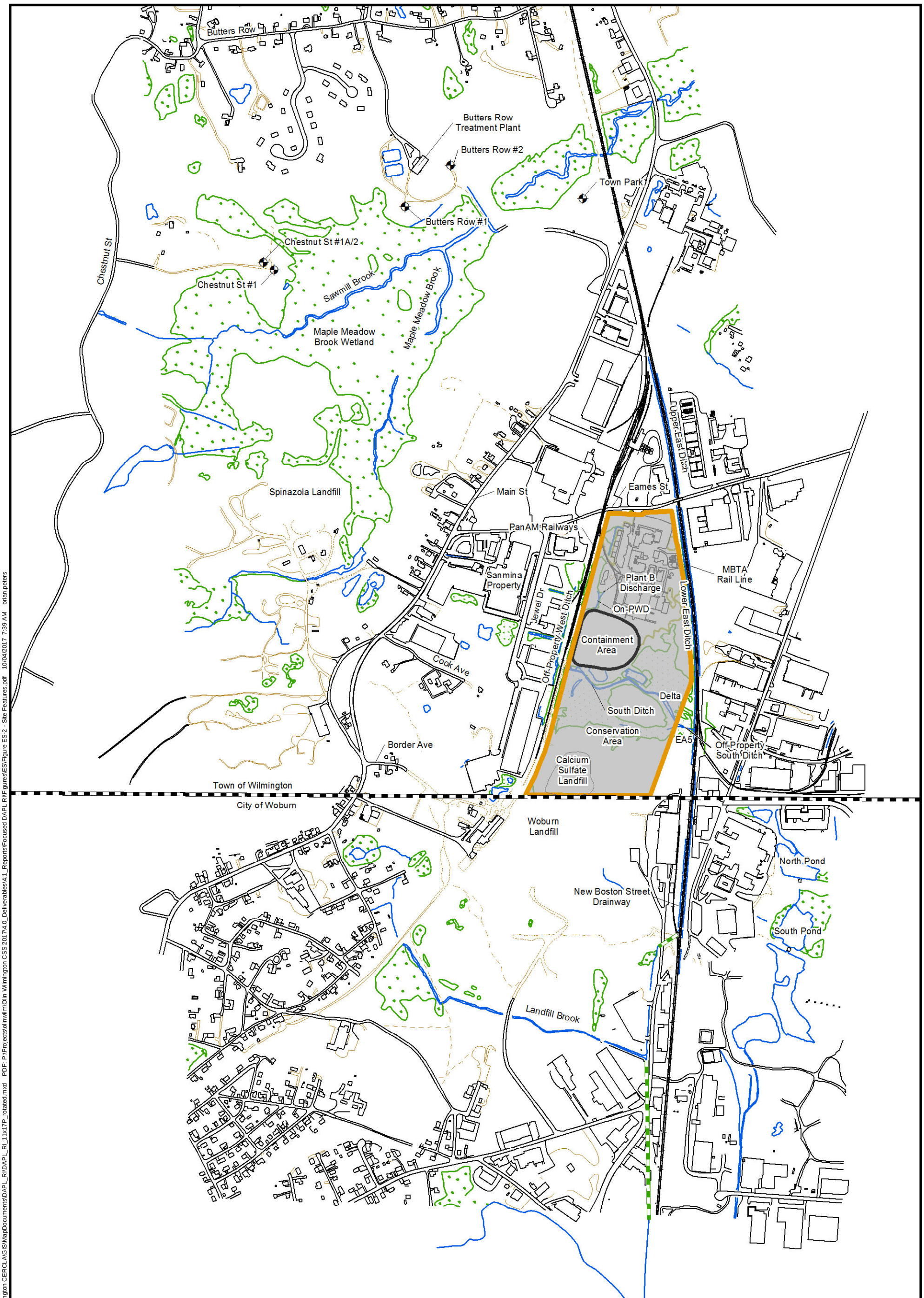

Legend

- Operable Unit 1
- Containment Area
- 51 Eames St. Property Boundary
- Town Wells
- Town Line
- Paved Road
- Unpaved Road
- Structure
- Surface Water
- Trails
- Wooded Areas
- Wetland Boundary
- Culvert

*Operable Unit 2 is portion shown outside of OU1.

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N

0 370 740 1,480 Feet

Figure ES-2
Site Features

Focused DAPL RI Report
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Wilmington, Massachusetts

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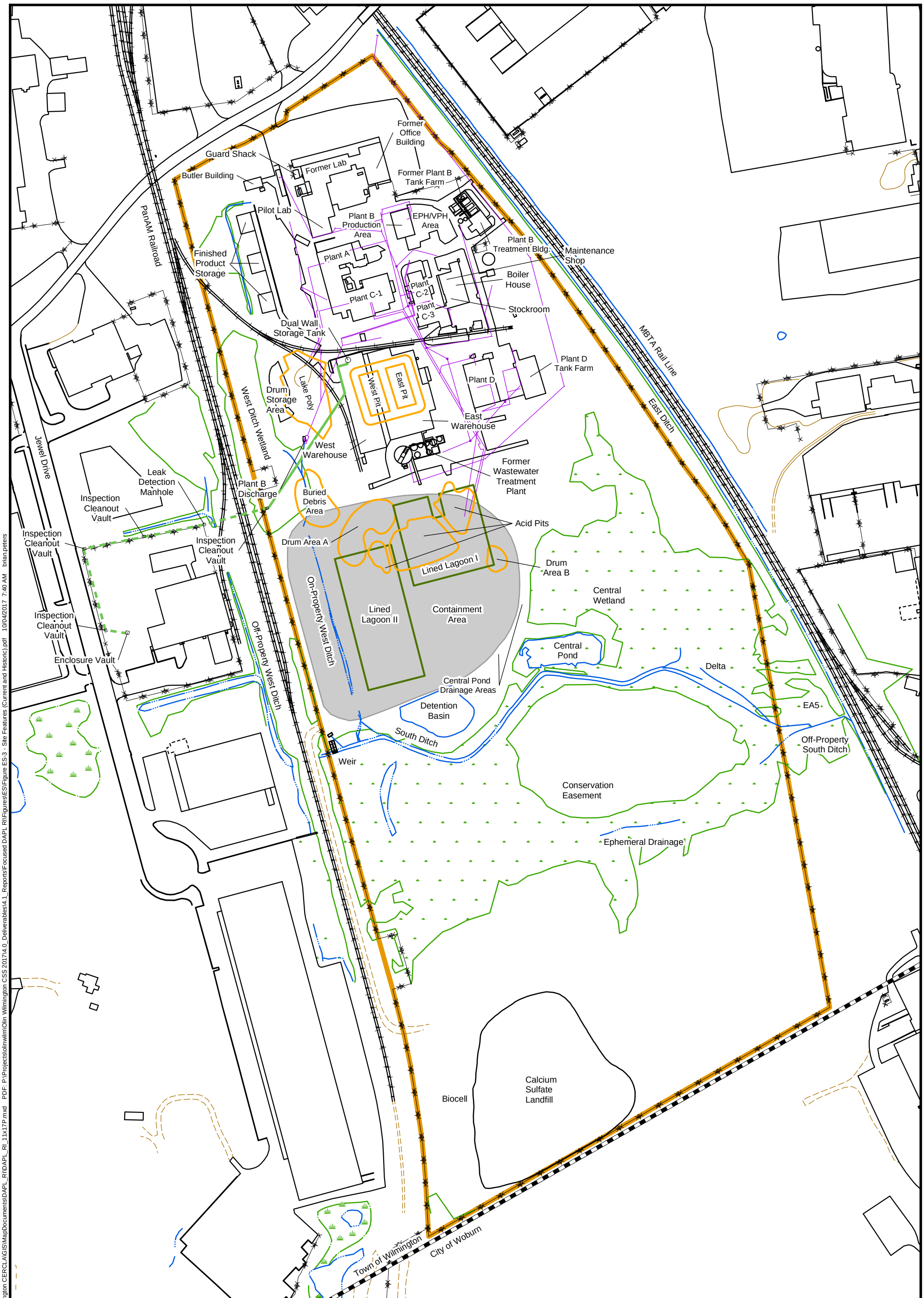

Legend

- Town Line
- Drain/Sewer Line
- Fence
- Trail
- Paved Road
- Unpaved Road
- Railroad
- Structure
- Surface Water
- Wetland Boundary
- 51 Eames St Property Boundary
- Containment Area
- Aboveground Conveyance Piping
- Underground Conveyance Piping

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Figure ES-3
Site Features (Current and Historic)

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Wilmington, Massachusetts

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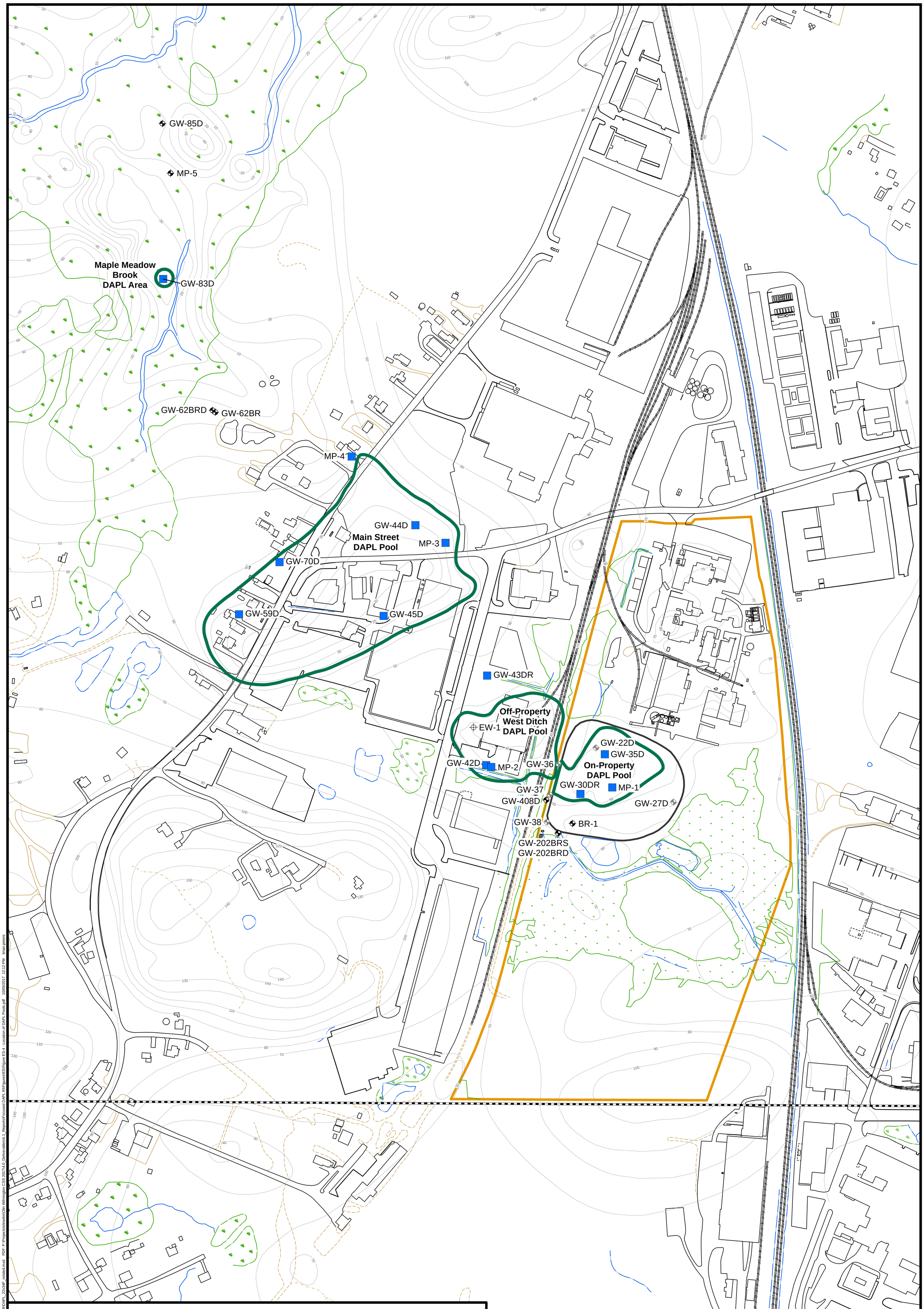

Legend

- Well is screened in DAPL at the time of installation
- Monitoring Well
- Abandoned Monitoring Well
- DAPL Pilot Pumping Well
- Approximate DAPL Boundary
- Containment Area
- 51 Eames St. Property Boundary
- Wilmington/Woburn Town Line
- Paved Road
- Unpaved Road
- Railroad
- Structure
- Surface Water
- Wetland Boundary

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Figure ES-4
Location of DAPL Pools

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Olin Chemical Superfund Site
Wilmington, Massachusetts

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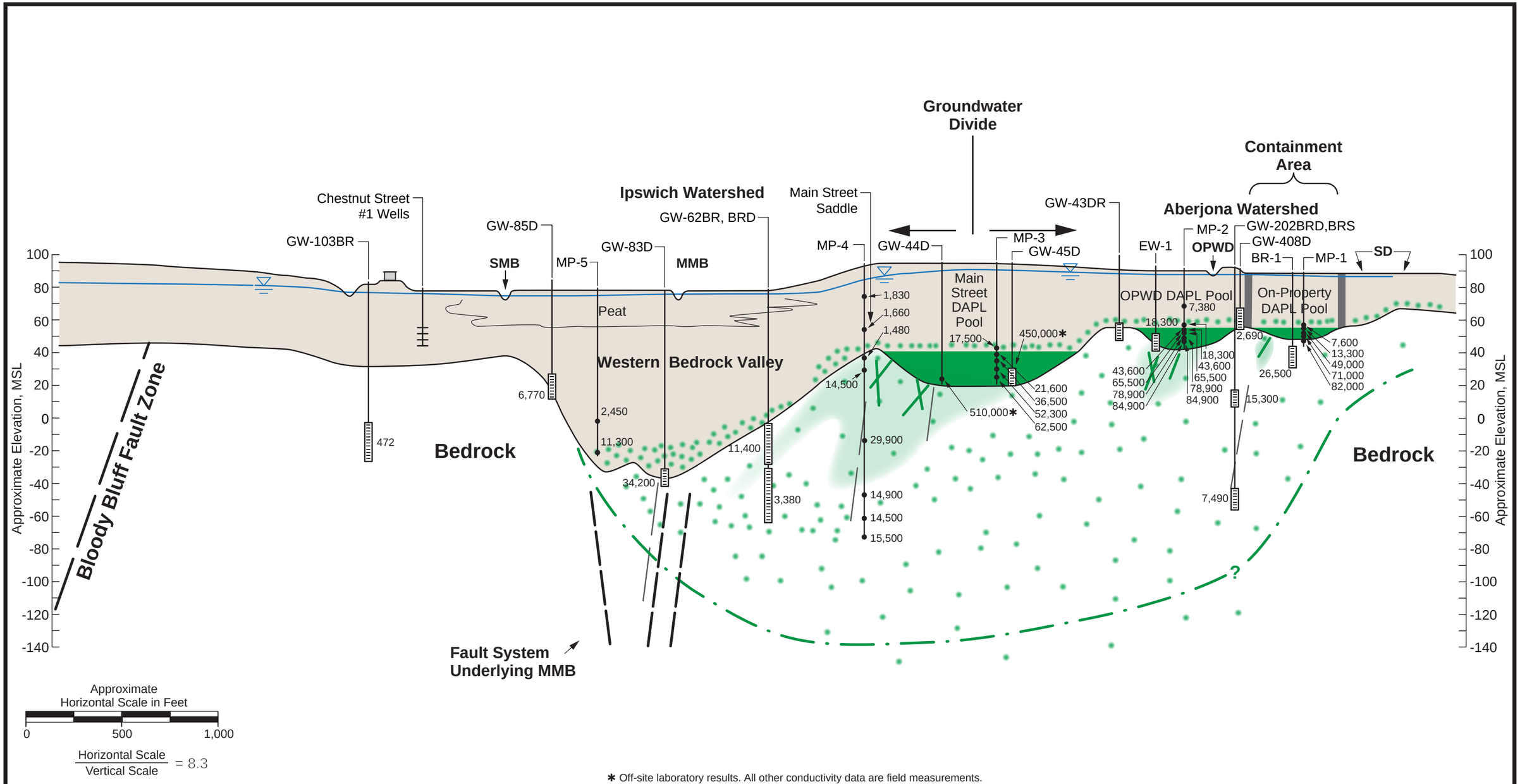

* Off-site laboratory results. All other conductivity data are field measurements.

Legend

- Approximate orientation of bedrock structure (foliation) based on borehole geophysics and bedrock mapping (corrected for vertical exaggeration)
- Groundwater Table
- Slurry Wall (Containment Area)
- ? >3,000 / <3,000 — Estimated Vertical Extent of Diffuse Groundwater
- DAPL Impacted Fractures with Bedrock Matrix Diffusion
- Diffuse Groundwater
- Fault
- SMB — Saw Mill Brook
- MMB — Maple Meadow Brook
- OPWD — Off-Property West Ditch
- SD — South Ditch
- 7,490 — Monitoring Well or Zone; Specific Conductance (umhos/cm)
- From (Amec 2010-2012, Geomega 2005)

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Figure ES-5
Conceptual Model of DAPL and Groundwater Interaction
Focused DAPL RI Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

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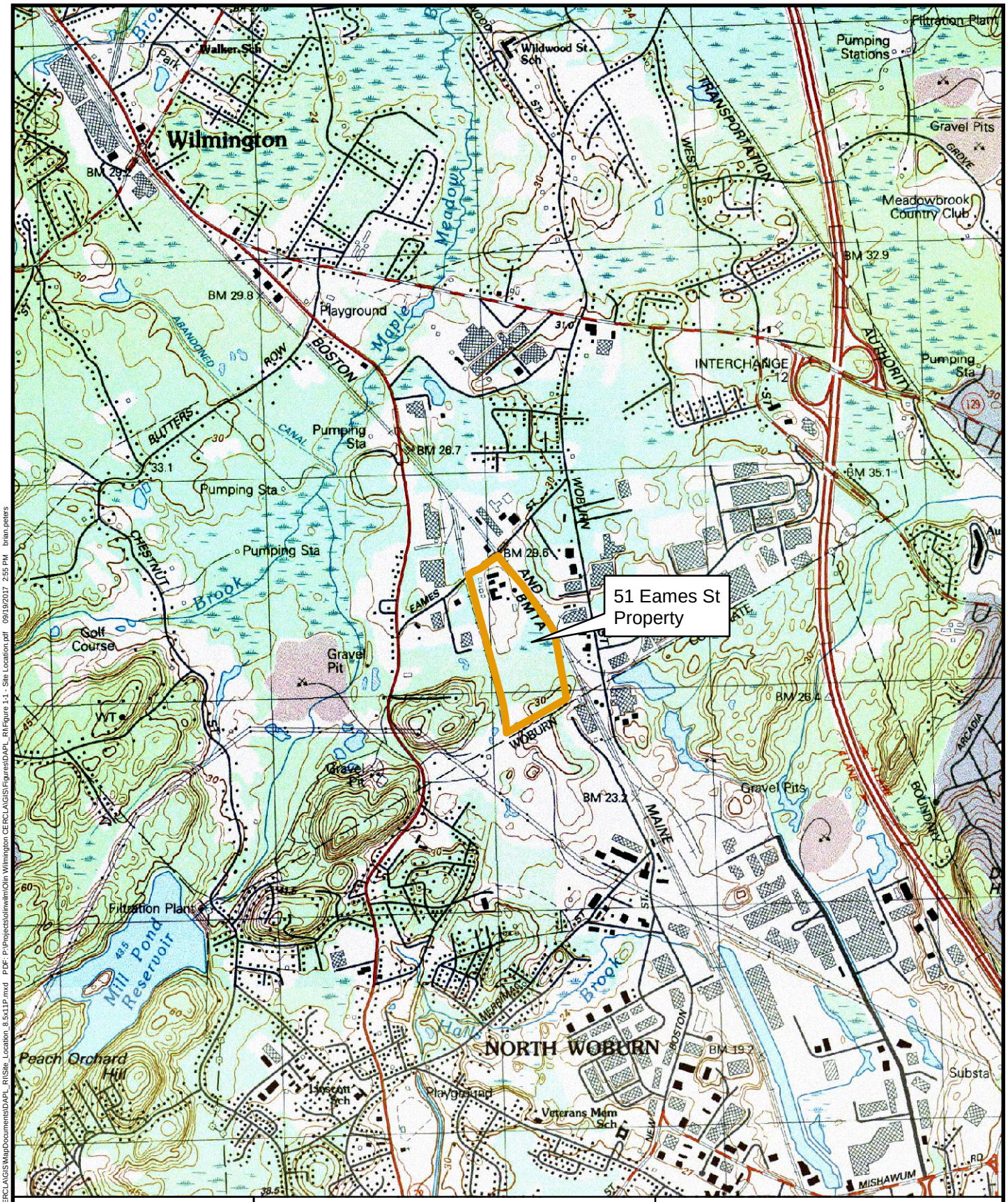

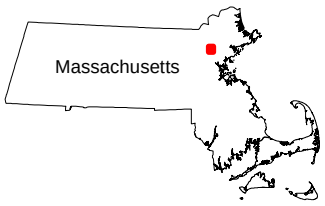

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Figure 1-1
Site Location

Focused DAPL RI Report
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Wilmington, Massachusetts

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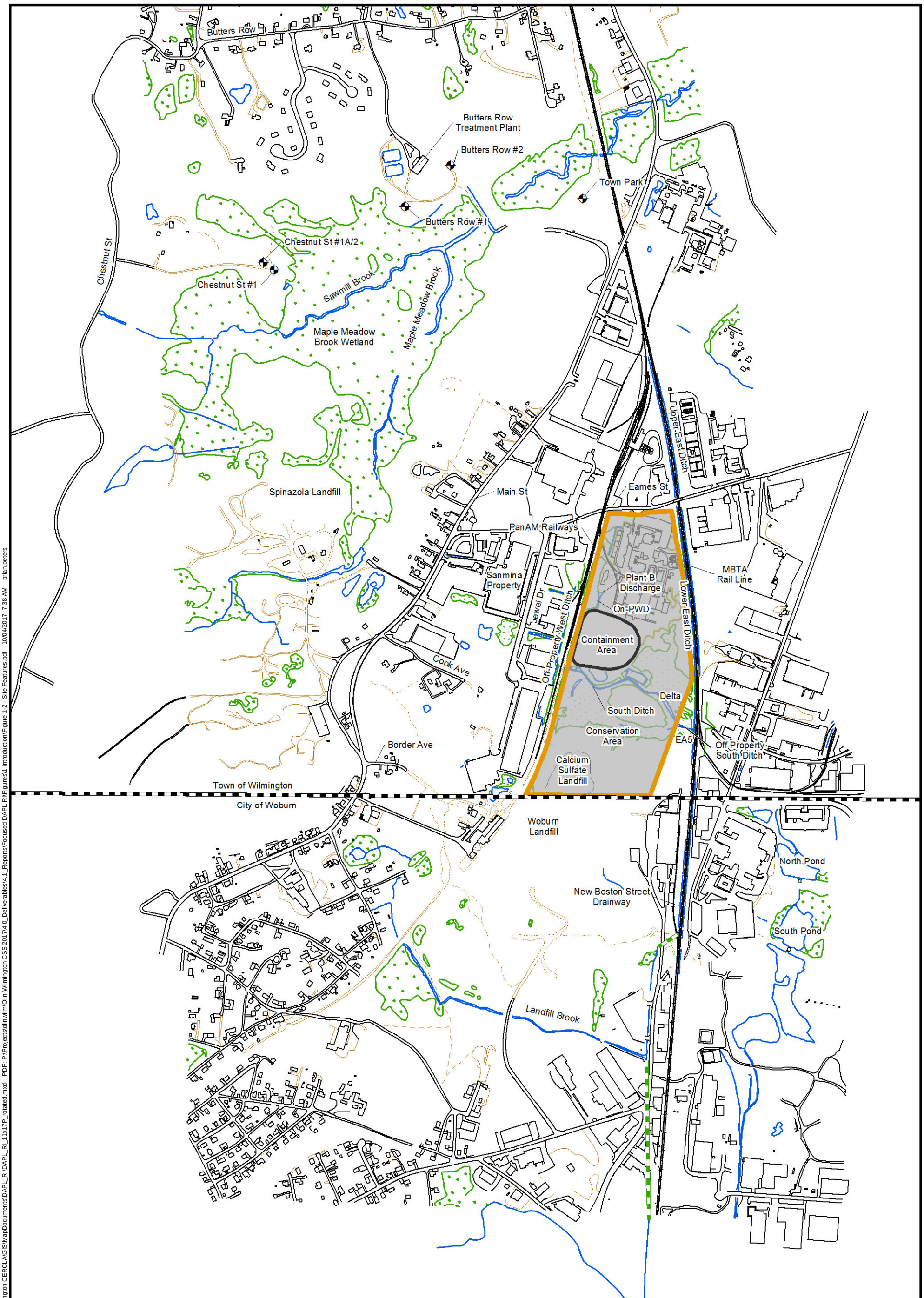

Legend

- Operable Unit 1
- Containment Area
- 51 Eames St. Property Boundary
- Town Wells
- Town Line
- Paved Road
- Unpaved Road
- Structure
- Surface Water
- Trails
- Wooded Areas
- Wetland Boundary
- Culvert

*Operable Unit 2 is portion shown outside of OU1.

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0 370 740 1,480 Feet

Figure 1-2
Site Features

Focused DAPL RI Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

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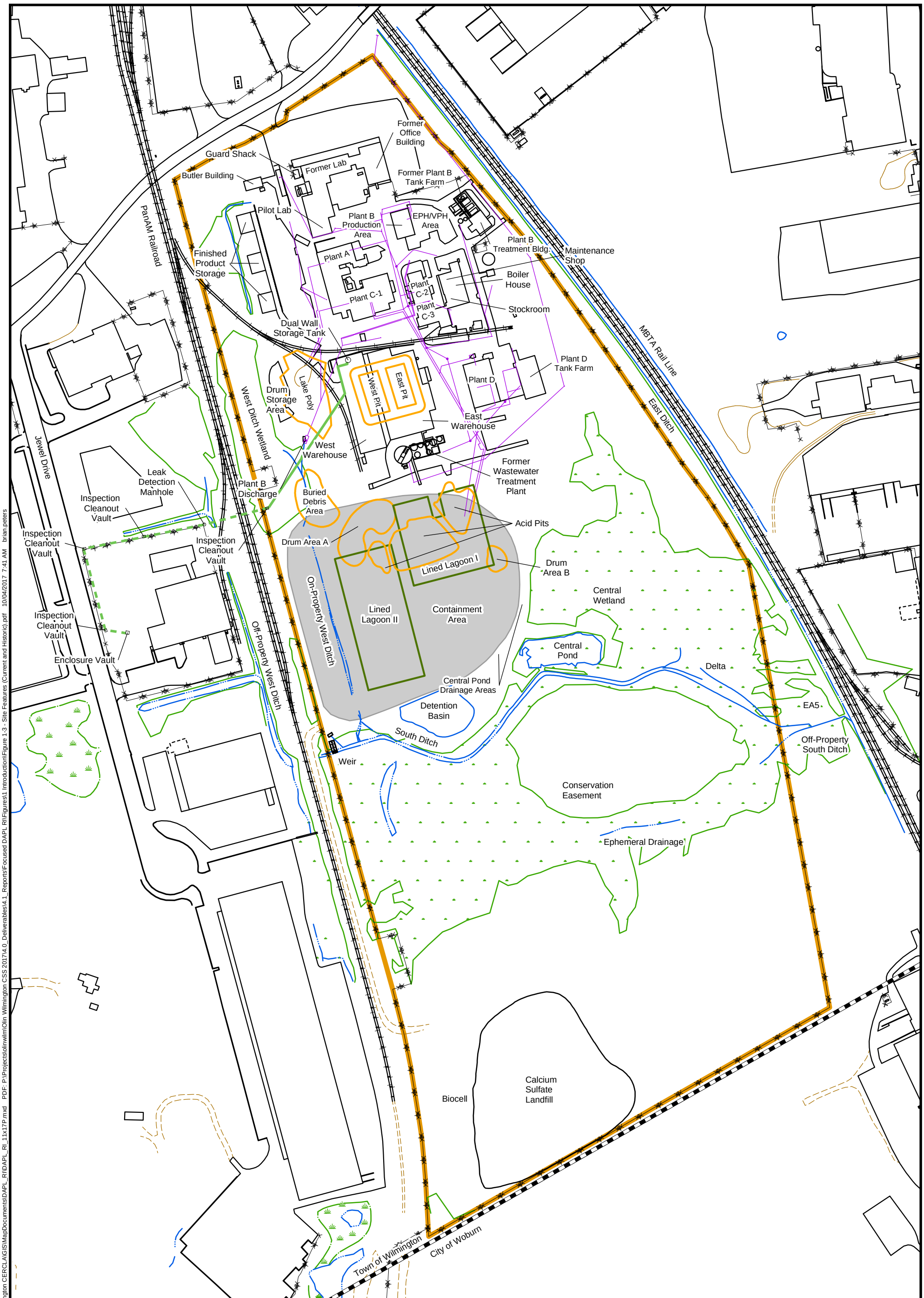

Legend

- Town Line
- Drain/Sewer Line
- Fence
- Trail
- Paved Road
- Unpaved Road
- Railroad
- Structure
- Surface Water
- Wetland Boundary
- 51 Eames St Property Boundary
- Containment Area
- Aboveground Conveyance Piping
- Underground Conveyance Piping

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Figure 1-3
Site Features (Current and Historic)

Focused DAPL RI Report
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Wilmington, Massachusetts

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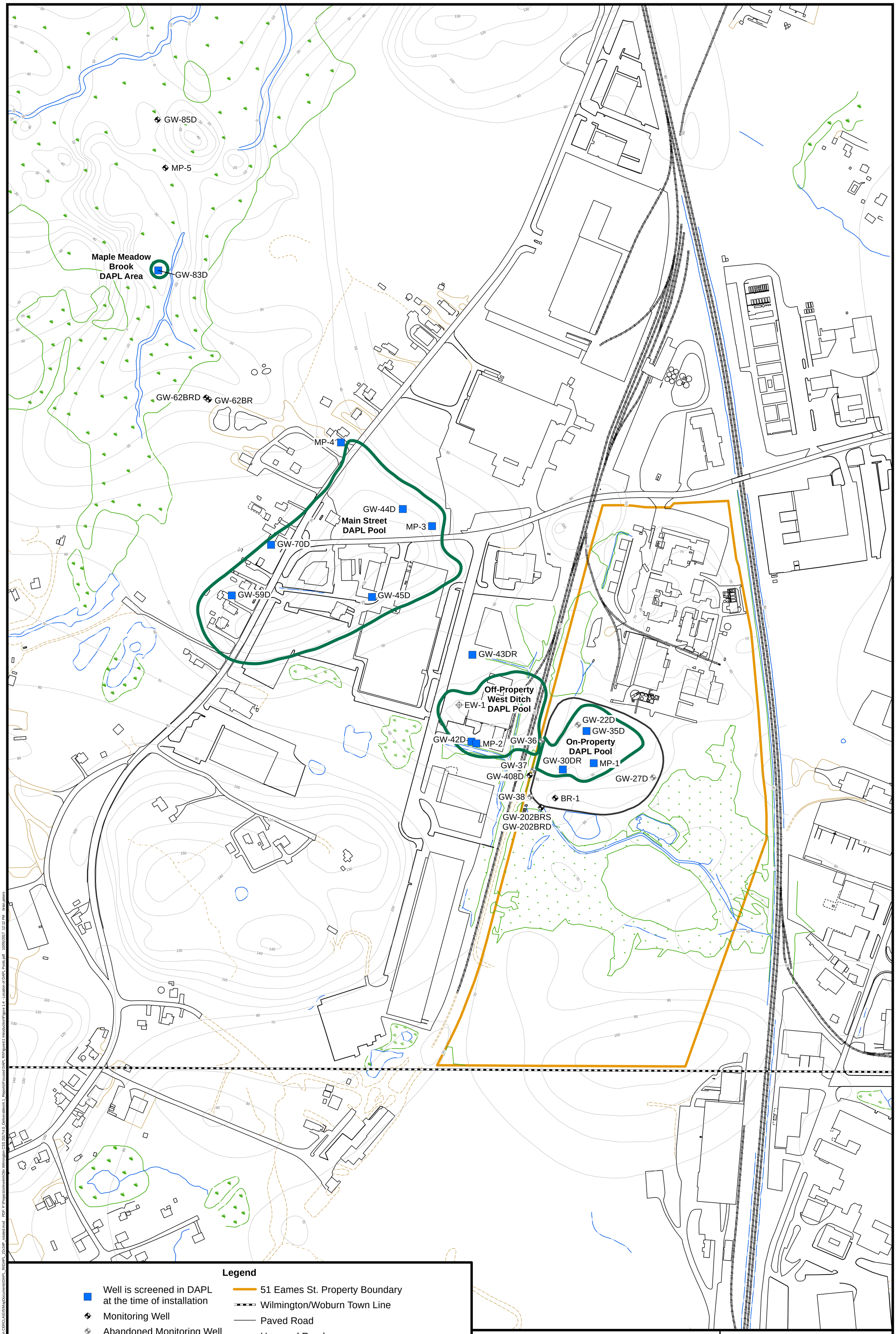

Legend

- Well is screened in DAPL at the time of installation
- Monitoring Well
- Abandoned Monitoring Well
- DAPL Pilot Pumping Well
- Approximate DAPL Boundary
- Containment Area
- 51 Eames St. Property Boundary
- Wilmington/Woburn Town Line
- Paved Road
- Unpaved Road
- Railroad
- Structure
- Surface Water
- Wetland Boundary

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Figure 1-4
Location of DAPL Pools

Focused DAPL RI Report
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Wilmington, Massachusetts

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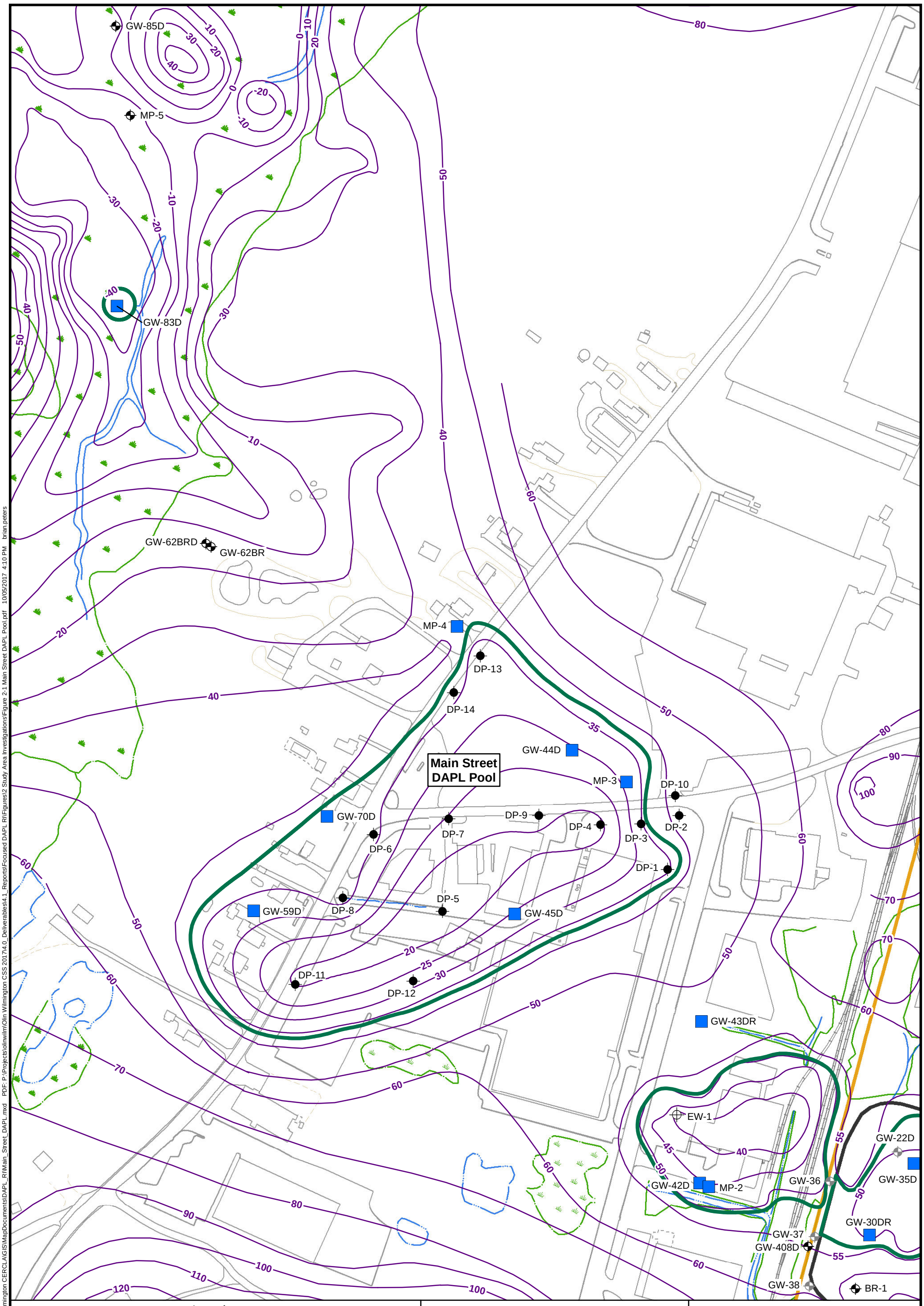

Legend

- Well is screened in DAPL at the time of installation
- Monitoring Well
- Abandoned Monitoring Well
- DAPL Pilot Pumping Well
- Geoprobe Explorations
- DAPL Boundary
- Containment Area
- 51 Eames St. Property Boundary
- Bedrock Countour
- Structure
- Paved Road
- Unpaved Road
- Railroad
- Surface Water
- Wetland Boundary

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0 100 200 400 Feet

Figure 2-1
Main Street DAPL Pool

Focused DAPL RI Report
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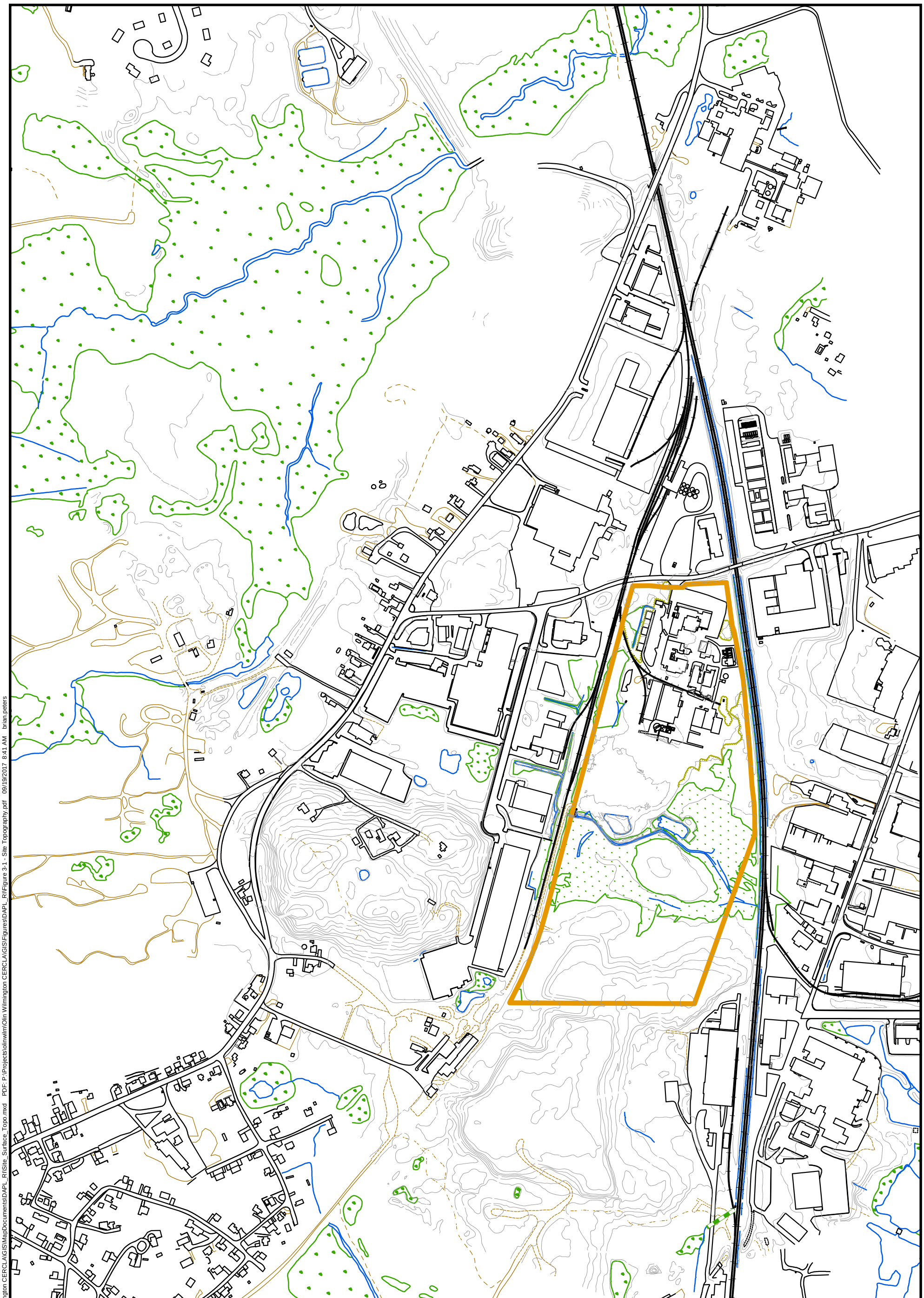

Legend

- Elevation Contour (ft)
- 51 Eames St. Property Boundary
- Paved Road
- Unpaved Road
- Sidewalk
- Railroad
- Structure
- Surface Water
- Trail
- Wooded Area
- Wetland Boundary
- Culvert

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271 Mill Road
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N

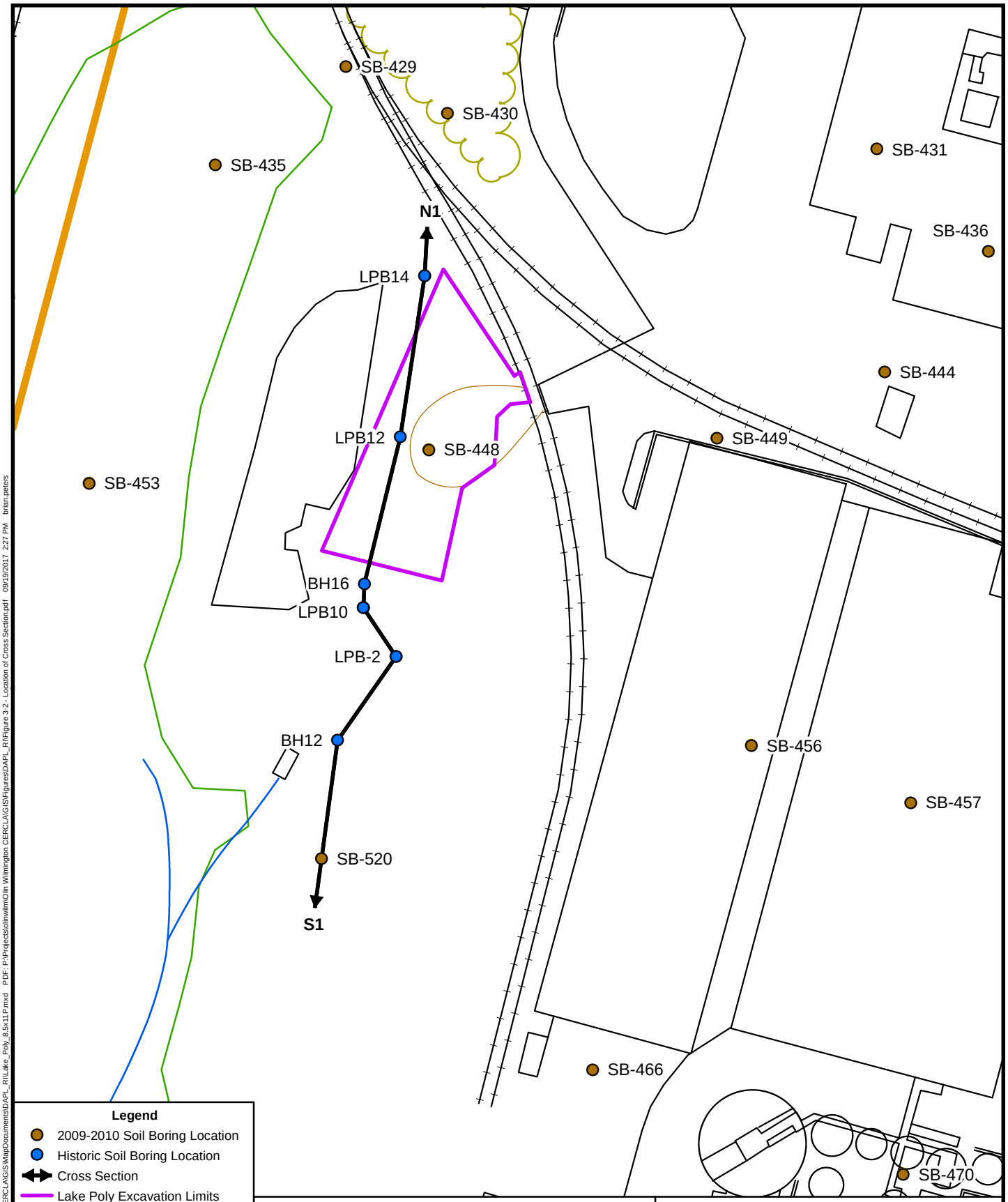
0 250 500 1,000 Feet

Figure 3-1
Site Topography

Focused DAPL RI Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

Prepared/Date: BRP 09/19/17 | Checked/Date: PHT 09/19/17

Document: P:\Projects\olinwlm\Olin Wilmington CERCLA\GIS\MapDocuments\DAPL_RI\Site_Surface_Topo.mxd PDF: P:\Projects\olinwlm\Olin Wilmington CERCLA\GIS\Figures\DAPL_RI\Figure 3-1 - Site Topography.pdf 09/19/2017 8:41 AM brian.peters



Legend

- 2009-2010 Soil Boring Location
- Historic Soil Boring Location
- Cross Section
- Lake Poly Excavation Limits
- 51 Eames St. Property Boundary
- Paved Road
- Unpaved Road
- Railroad
- Structure
- Surface Water
- Wetland Boundary
- Wooded Areas

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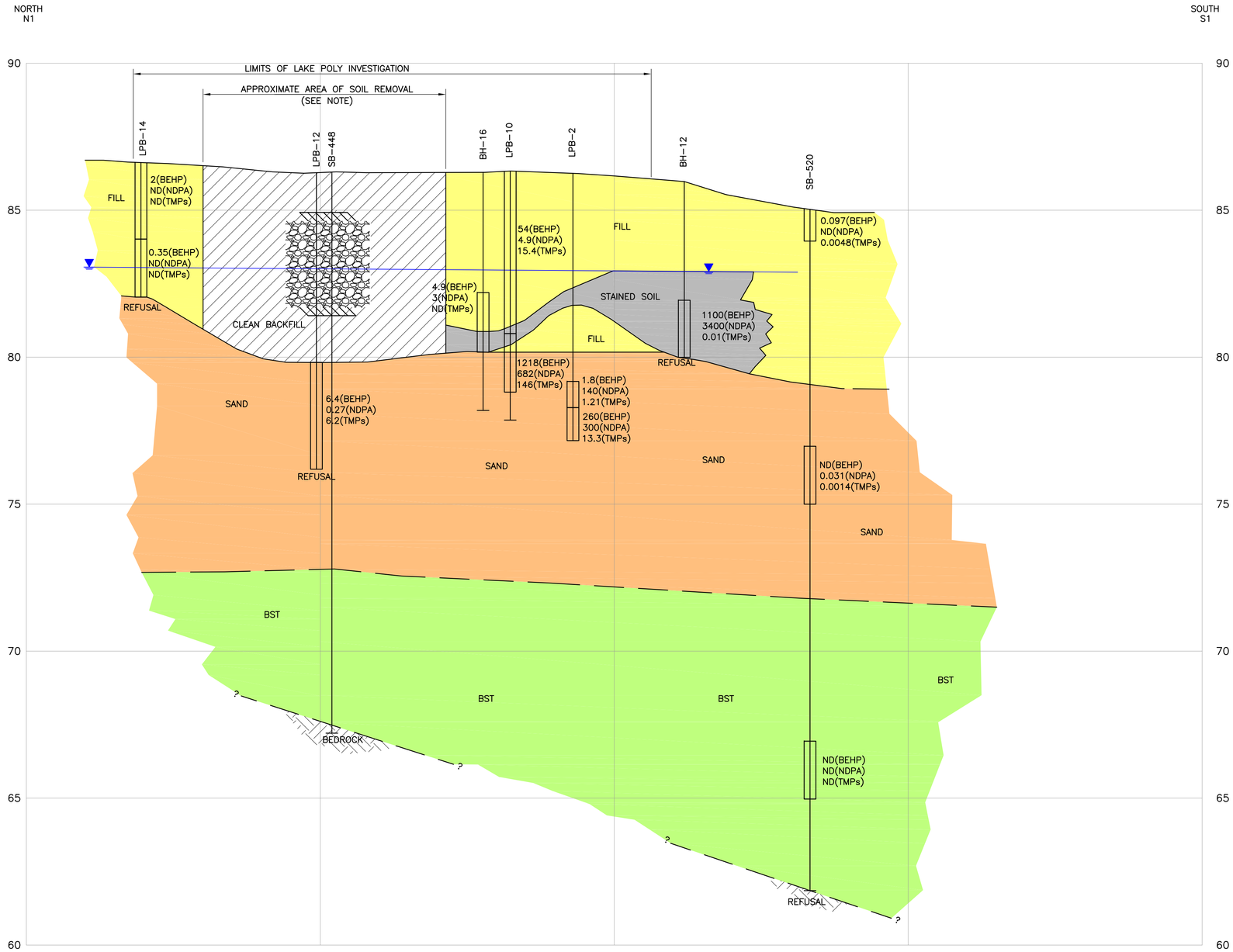
N

0 25 50 100 Feet

Figure 3-2
Location of Cross Section
Former Lake Poly
Focused DAPL RI Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

Prepared/Date: BRP 09/19/17 | Checked/Date: PHT 09/19/17

Document: P:\Projects\olinwlm\Olin Wilmington CERCLA\GIS\MapDocuments\DAPL_RI\Lake_Poly_8.5x11P.mxd PDF: P:\Projects\olinwlm\Olin Wilmington CERCLA\GIS\Figures\DAPL_RI\Figure 3-2 - Location of Cross Section.pdf 09/19/2017 2:27 PM brian.peters



NOTE
SOIL WAS REMOVED FROM THE LAKE POLY AREA IN 2000 AND 2004. THIS X-SECTION PASSES THROUGH A PORTION OF THE EXCAVATED AREA, WHICH MOSTLY LIES TO THE EAST OF THIS SECTION.

NOTES:

SB-405 = EXPLORATION ID

SEE FIGURE 3.2-1 FOR SECTION LINE LOCATION

VERTICAL EXAGGERATION IS 10:1

GEOFABRIC

LAKE POLY RIPRAP FILL

FILL MATERIAL (GENERALLY FINE TO COARSE SAND) WITH TRACES TO SOME GRAVEL

GLACIAL OUTWASH (SAND) UNIFORM FINE TO COARSE SAND

BASAL TILL (BST) FINE TO COARSE SAND AND GRAVEL WITH SOME COBBLES AND SILT

GENERALIZED GROUNDWATER ELEVATION BASED UPON OCTOBER 2011 DATA

0.031(BEHP)
ND(NDPA)
ND(TMPs)
SOIL SAMPLE INTERVAL WITH ANALYTICAL RESULTS FOR:

BEHP (Bis[2-ethylhexyl]phthalate)

NDPA (n-Nitrosodiphenylamine)

TMPs (Trimethylpentenes)(Total)

20 mg/kg TOTAL CONCENTRATION OF COMPOUND DETECTED AT SAMPLE INTERVAL

ND NOT DETECTED

-- NOT ANALYZED

0 10 20 40
SCALE IN FEET

Prepared/Date: JVM 09/18/17
Checked/Date: PHT 09/18/17

FOCUSED DAPL RI REPORT
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

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INTERPRETED CROSS SECTION N1-S1
LAKE POLY AREA
Project 6107-17-0016
Figure 3.3

Z:\Projects\OLIN-Wilmington\FIG 3-3.dwg Mon, 18 Sep 2017 - 4:00pm john.mckenzie

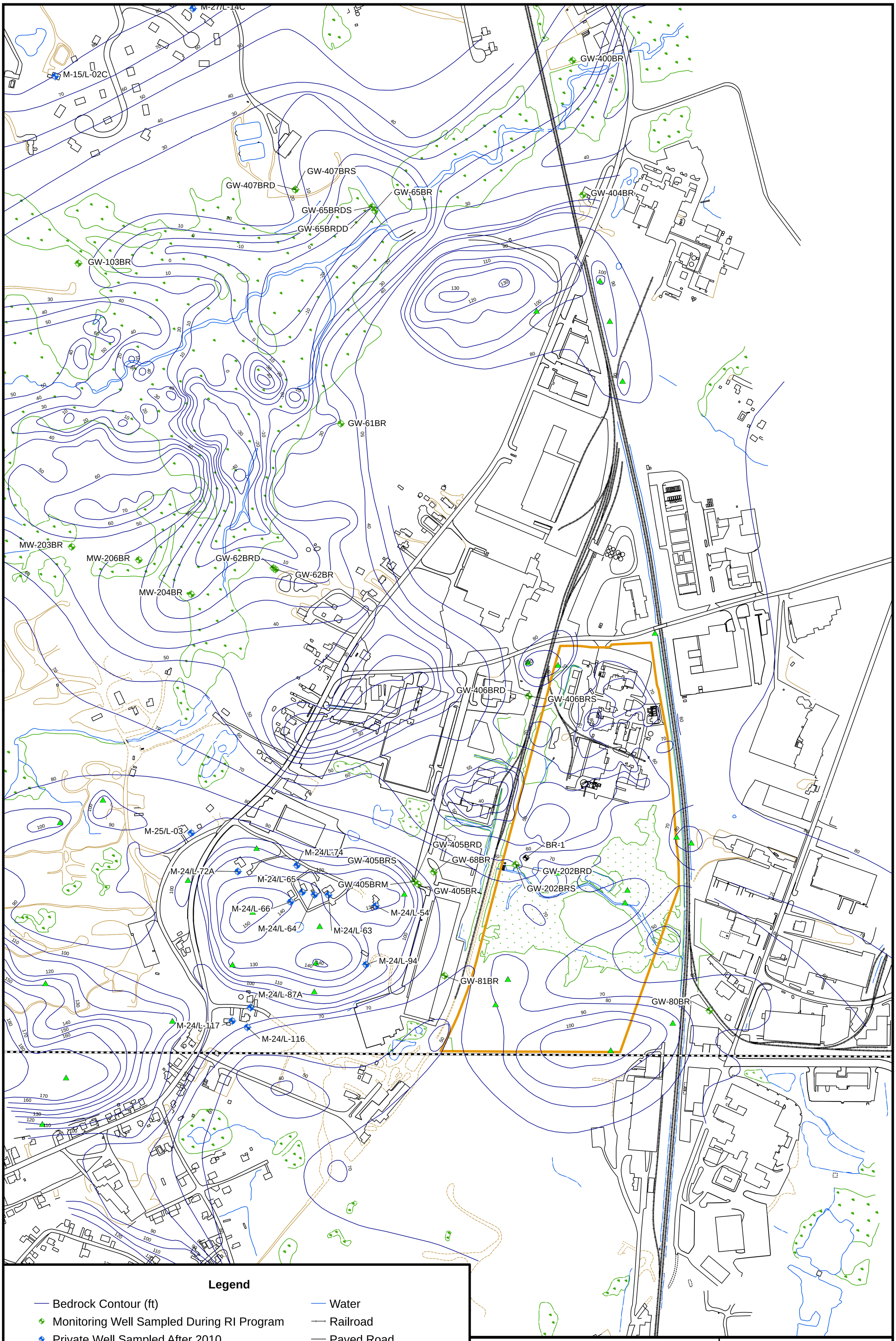

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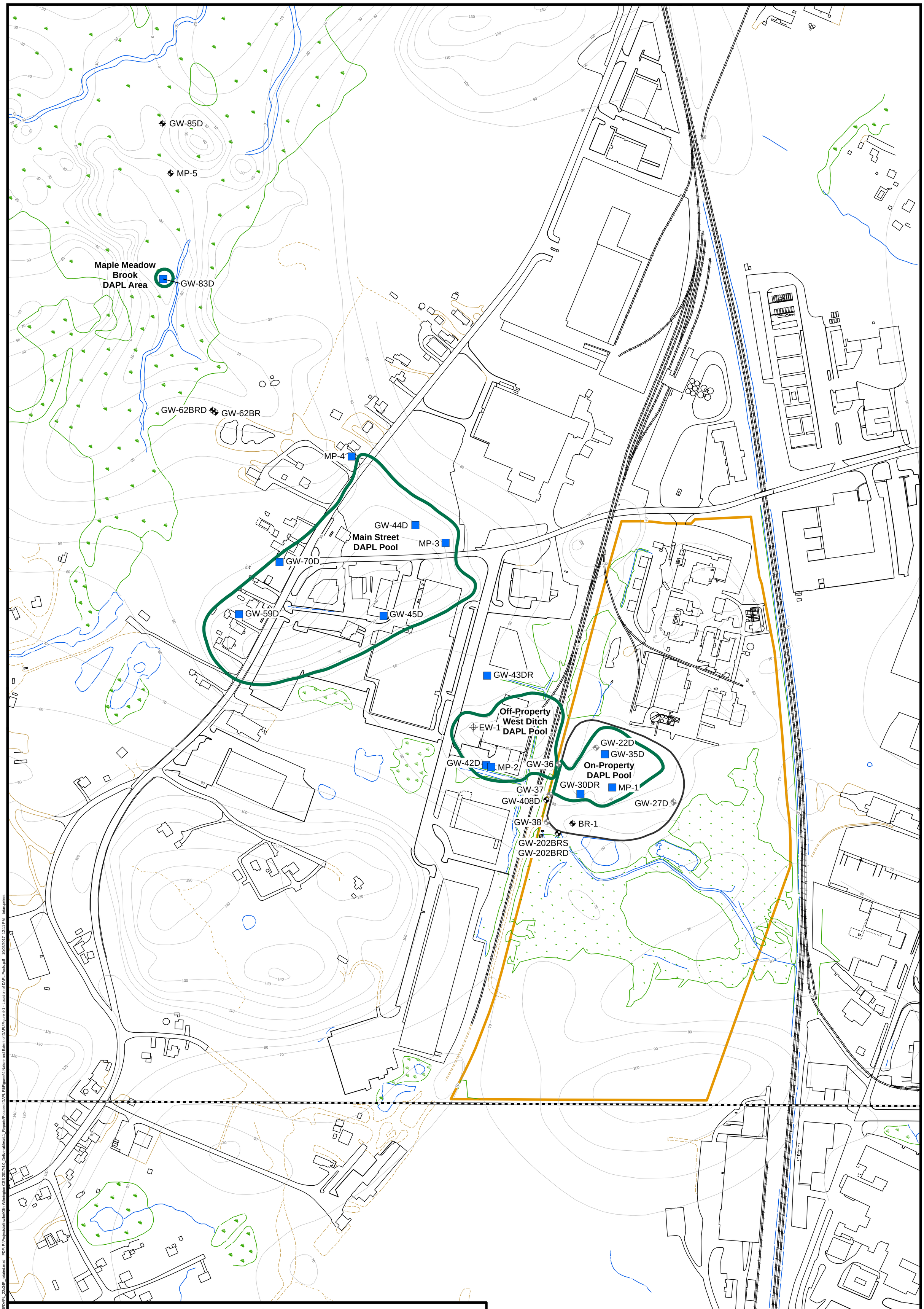
Figure 3-4
Bedrock Surface Topography

Focused DAPL RI Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

Prepared/Date: BRP 09/22/17 | Checked/Date: JBR 09/22/17

Document: P:\Projects\olinwilm\Olin Wilmington CERCLA\GIS\MapDocuments\DAPL_RI\Bedrock_Topo.mxd PDF: P:\Projects\olinwilm\Olin Wilmington CSS 2017\4.0_Deliverables\4.1_Reports\Focused DAPL RI\Figures\3 Physical Characteristics of Study Area\Figure 3-4 - Bedrock Surface Topography.pdf 09/22/2017 11:42 AM brian.peters



Legend

- Well is screened in DAPL at the time of installation
- Monitoring Well
- Abandoned Monitoring Well
- DAPL Pilot Pumping Well
- Approximate DAPL Boundary
- Containment Area
- 51 Eames St. Property Boundary
- Wilmington/Woburn Town Line
- Paved Road
- Unpaved Road
- Railroad
- Structure
- Surface Water
- Wetland Boundary

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N

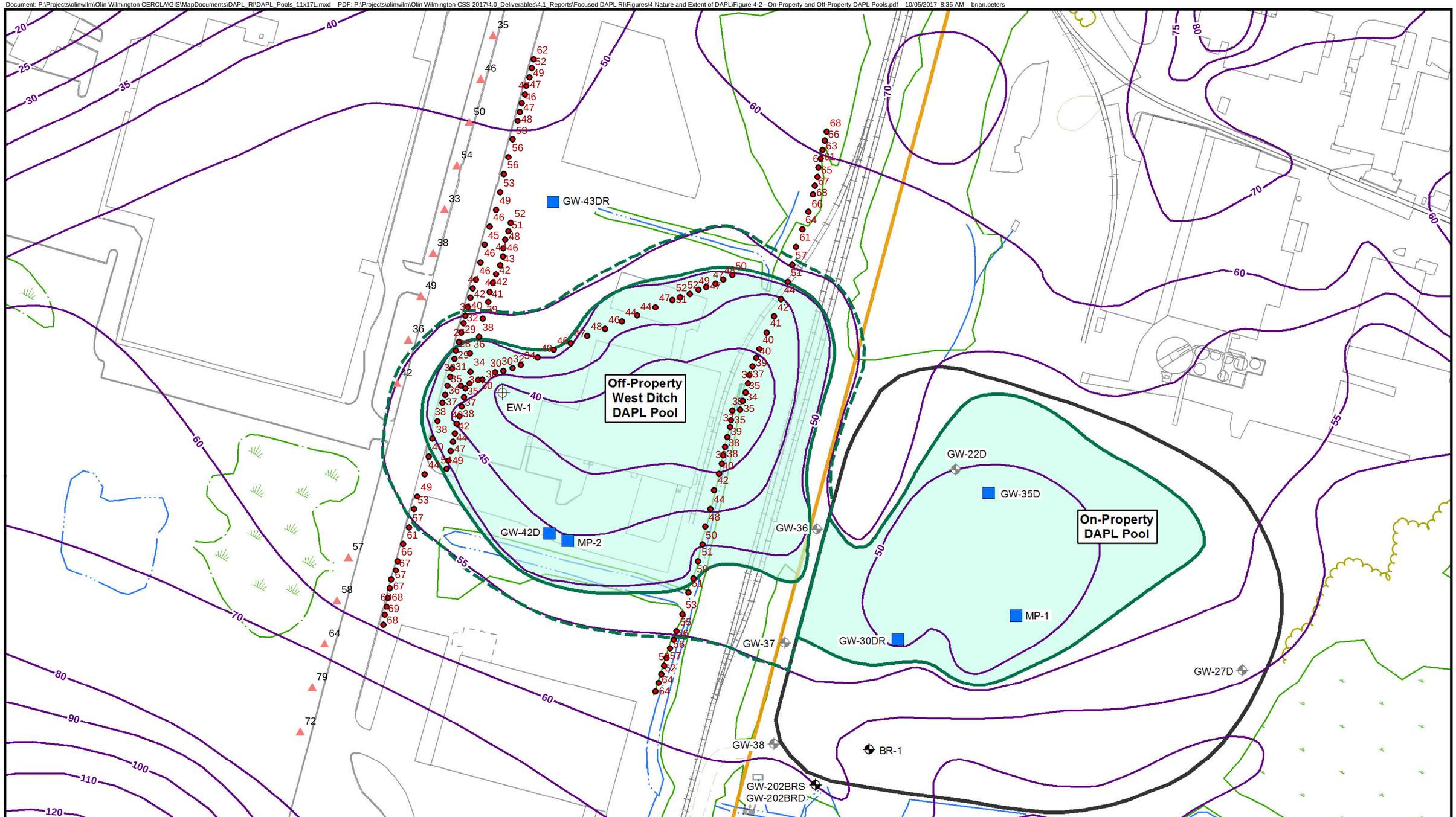
0 180 360 Feet

Figure 4-1
Location of DAPL Pools

Focused DAPL RI Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

Prepared/Date: BRP 10/05/17 | Checked/Date: JBR 10/05/17

Document: P:\Projects\olinwlm\Olin Wilmington CERCLA\GIS\MapDocuments\DAPL_RI\DAPL_22x34P_rotated.mxd PDF: P:\Projects\olinwlm\Olin Wilmington CSS 2017\4.0_Deliverables\4.1_Reports\Focused DAPL RI\Figures\4 Nature and Extent of DAPL\Figure 4-1 - Location of DAPL Pools.pdf 10/05/2017 12:11 PM brian.peters



Legend

- Well is screened in DAPL at the time of installation
- Monitoring Well
- Abandoned Monitoring Well
- DAPL Pilot Pumping Well
- 2005 Seismic Lines (Bedrock Elevation: Ft MSL)
- Seismic Reflection Point (Bedrock Elevation: Ft MSL)
- Former Off-Property DAPL Boundary
- Existing On-Property and Off-Property DAPL Distribution
- Containment Area
- Bedrock Countour
- Paved Road
- Unpaved Road
- 51 Eames St. Property Boundary
- Structure
- Railroad
- Surface Water
- Wetland Boundary

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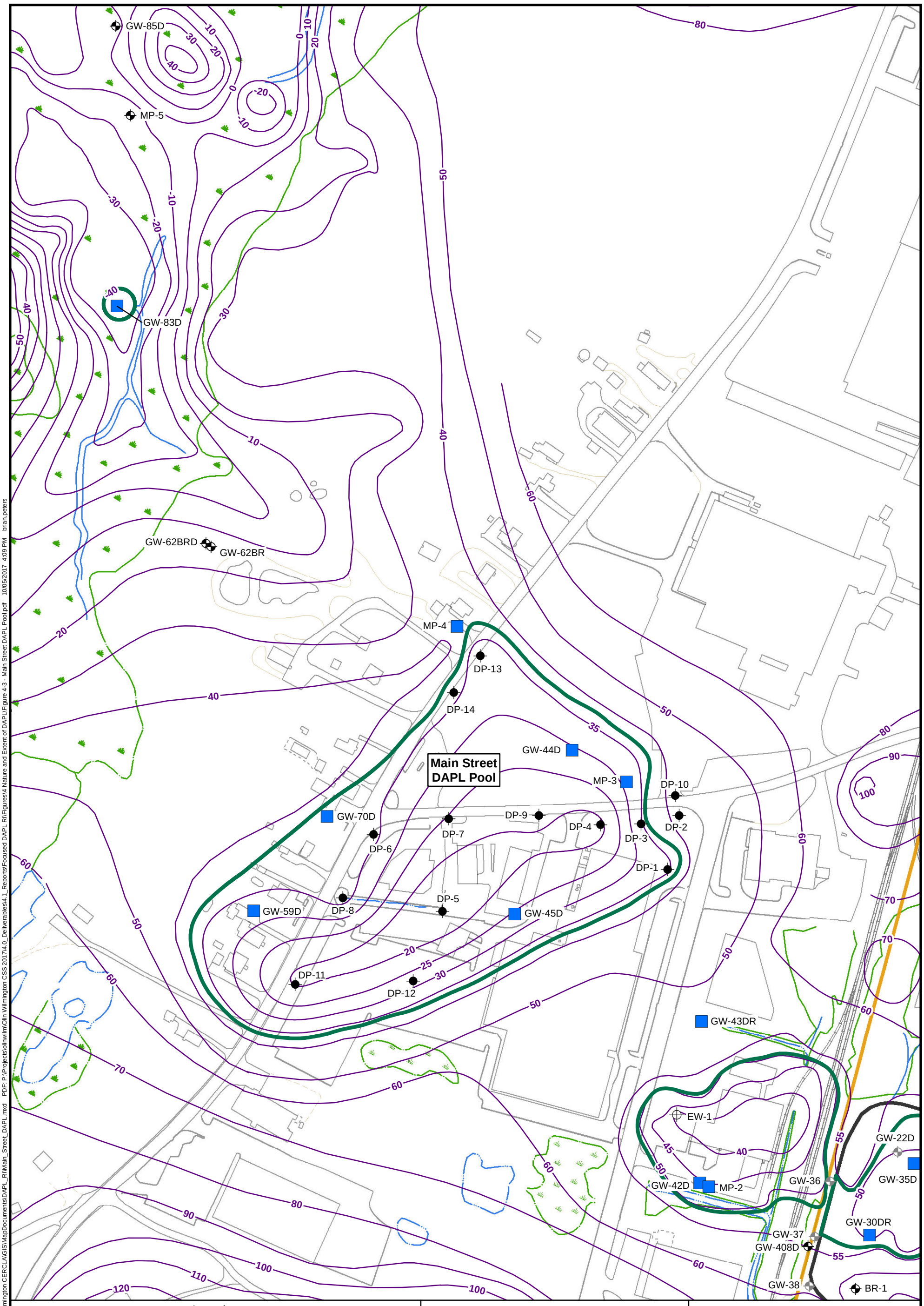
N

0 50 100 200 Feet

Figure 4-2
On-Property and Off-Property West Ditch DAPL Pools
Focused DAPL RI Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

Prepared/Date: BRP 10/05/17 | Checked/Date: JBR 10/05/17



Legend

- Well is screened in DAPL at the time of installation
- Monitoring Well
- Abandoned Monitoring Well
- DAPL Pilot Pumping Well
- Geoprobe Explorations
- DAPL Boundary
- Containment Area
- 51 Eames St. Property Boundary
- Bedrock Countour
- Structure
- Paved Road
- Unpaved Road
- Railroad
- Surface Water
- Wetland Boundary

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N

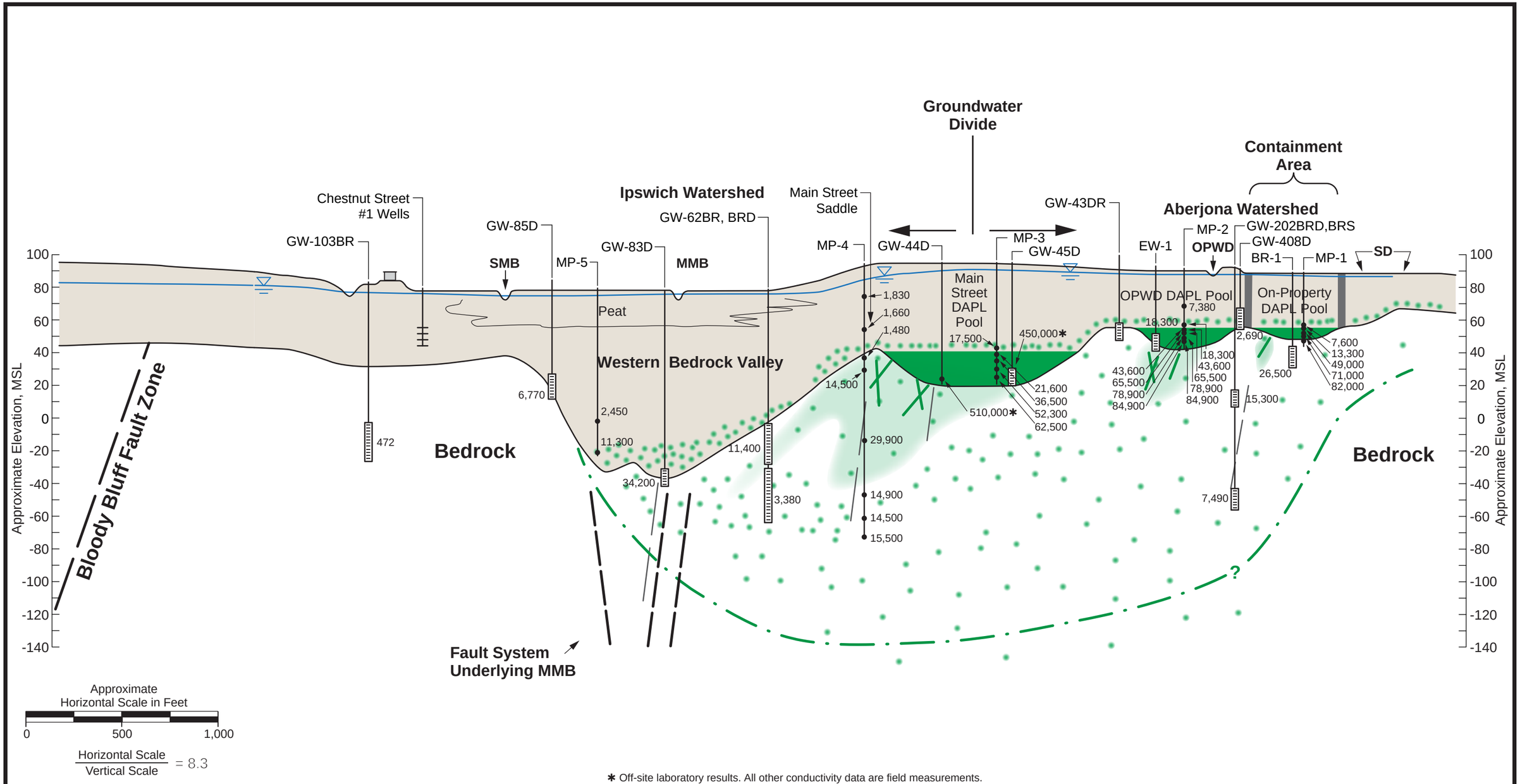
0 100 200 400 Feet

Figure 4-3
Main Street DAPL Pool

Focused DAPL RI Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

Prepared/Date: BRP 10/05/17 | Checked/Date: JBR 10/05/17

Document: P:\Projects\olinwilm\Olin Wilmington CERCLA\GIS\MapDocuments\DAPL_RI\Main_Street_DAPL.mxd PDF: P:\Projects\olinwilm\Olin Wilmington CSS 201740_Deliverables\4.1_Reports\Focused DAPL RI\Figures\4 Nature and Extent of DAPL\Figure 4-3 - Main Street DAPL Pool.pdf 10/05/2017 4:09 PM brian.peters



* Off-site laboratory results. All other conductivity data are field measurements.

Legend

- Approximate orientation of bedrock structure (foliation) based on borehole geophysics and bedrock mapping (corrected for vertical exaggeration)
- Groundwater Table
- Slurry Wall (Containment Area)
- ? >3,000 / <3,000 — Estimated Vertical Extent of Diffuse Groundwater
- DAPL Impacted Fractures with Bedrock Matrix Diffusion
- Diffuse Groundwater
- Fault
- 7,490 — Monitoring Well or Zone; Specific Conductance (umhos/cm)
- From (Amec 2010-2012, Geomega 2005)

SMB	Saw Mill Brook
MMB	Maple Meadow Brook
OPWD	Off-Property West Ditch
SD	South Ditch

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Chelmsford, MA 01824

Figure 5.1
Conceptual Model of DAPL and Groundwater Interaction
Focused DAPL RI Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

Prepared/Date: JPH 10/05/17 | Checked/Date: PHT 10/05/17

PORT2017016a.ai

TABLES

Table 1.1
DAPL Pool Well Location Summary

Focused DAPL RI Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

DAPL Pool Association	Well ID	Status
On-Property DAPL Pool	GW-22D	Abandoned
On-Property DAPL Pool	GW-27D	Abandoned
On-Property DAPL Pool	GW-30DR	Active
On-Property DAPL Pool	GW-35D	Active
On-Property DAPL Pool	GW-37	Abandoned
On-Property DAPL Pool	GW-38	Abandoned
On-Property DAPL Pool	MP-1 #01	Active
On-Property DAPL Pool	MP-1 #02	Active
On-Property DAPL Pool	MP-1 #03	Active
On-Property DAPL Pool	MP-1 #04	Active
Off-Property West Ditch DAPL Pool	GW-36	Abandoned
Off-Property West Ditch DAPL Pool	GW-42D	Active
Off-Property West Ditch DAPL Pool	GW-43D/GW-43DR	Abandoned (GW-43D only)
Off-Property West Ditch DAPL Pool	MP-2 #01	Active
Off-Property West Ditch DAPL Pool	MP-2 #02	Active
Off-Property West Ditch DAPL Pool	MP-2 #03	Active
Off-Property West Ditch DAPL Pool	MP-2 #04	Active
Off-Property West Ditch DAPL Pool	MP-2 #06	Active
Off-Property West Ditch DAPL Pool	MP-2 #09	Active
Main Street DAPL Pool	GW-44D	Active
Main Street DAPL Pool	GW-45D	Active
Main Street DAPL Pool	GW-59D	Active
Main Street DAPL Pool	GW-70D	Active
Main Street DAPL Pool	MP-3 #01	Active
Main Street DAPL Pool	MP-3 #02	Active
Main Street DAPL Pool	MP-3 #03	Active
Main Street DAPL Pool	MP-3 #04	Active
Main Street DAPL Pool	MP-4 #02	Active
Main Street DAPL Pool	MP-4 #03	Active
Main Street DAPL Pool	MP-4 #05	Active
Main Street DAPL Pool	MP-4 #08	Active
Main Street DAPL Pool	MP-4 #09	Active
Maple Meadow Brook DAPL Area	GW-83D	Active

Prepared by BJS 09/19/2017
Checked by JBR 09/22/2017

Table 2.1
Main Street Pool Bedrock Depth Calculations

Focused DAPL RI Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

Location	Date	Ground Surface Elevation (ft)*	Estimated Working Bedrock Elevation (ft)	Estimated Depth (ft bgs)	Refusal Depth (ft bgs)**		Revised Bedrock Elevation (ft)			Difference from Working Elevation
					A	B	A	B	Average	
DP-1	5/11/2017	90.65	40	51	57.5	57.5	33.2	33.2	33.2	-6.8
DP-2	5/10/2017	93.86	35	59	48.3	52.6	45.6	41.3	43.4	8.4
DP-3	5/10/2017	93.67	30	64	58.2	57.0	35.5	36.7	36.1	6.1
DP-4	5/10/2017	92.32	26	66	71.5	75.5	20.8	16.8	18.8	-7.2
DP-5	5/11/2017	87.50	20	68	70.1	72.2	17.4	15.3	16.4	-3.7
DP-6	5/9/2017	88.94	26	63	51.0	54.2	37.9	34.7	36.3	10.3
DP-7	5/9/2017	91.90	25	67	69.5	65.6	22.4	26.3	24.4	-0.6
DP-8	5/9/2017	87.63	25	63	50.6	50.0	37.0	37.6	37.3	12.3
DP-9	5/10/2017	93.83	18	76	72.5	73.5	21.3	20.3	20.8	2.8
DP-10	5/10/2017	92.49	35	57	50.3	49.1	42.2	43.4	42.8	7.8
DP-11	5/11/2017	87.24	23	64	67.8	67.6	19.4	19.6	19.5	-3.5
DP-12	5/11/2017	86.55	30	57	56.9	59.8	29.7	26.8	28.2	-1.8
DP-13	5/9/2017	96.82	38	59	66.0	63.0	30.8	33.8	32.3	-5.7
DP-14	5/9/2017	96.39	35	61	62.0	61.2	34.4	35.2	34.8	-0.2

Notes

* = Ground surface elevation from LIDAR data.

** = Refusal depth of Geoprobe exploration. Two explorations completed adjacent to each other (exploration A and exploration B).

ft = feet

ft bgs = feet below ground surface

Prepared by BJS 09/14/2017
Checked by JBR 09/22/2017

Table 4.1
Summary of Chemical Analysis for DAPL Wells

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

Location	Sample Date	Sample ID	Class Fraction Qc Code	VOCs Total Count	DMF Total Count	VPH Total Count	SVOCs Total Count	NDMA Total Count	Acrylamide Total Count	Hydrazine/aldehydes Total Count	EPH Total Count	Pest/Herb Total Count	Metals Total Count	Metals Dissolved Count	Oils and Fuels Total Count	Misc Analysis* Total Count	Misc Analysis* Dissolved Count	Non Standard Analysis** Total Count	Freezing Point Total Count	Color Total Count	Odor Total Count	Specific Cond. Total Count	Turbidity Total Count
GW-22D	3/1/1981	GW-22-D	FS										1			3							
GW-22D	4/1/1981	GW-22-D	FS											2		3							
GW-22D	5/1/1981	GW-22-D	FS											2		3							
GW-22D	6/1/1981	GW-22-D	FS											2		3							
GW-22D	8/1/1981	GW-22-D	FS											2		3							
GW-22D	10/1/1982	GW-22-D	FS										1			4							
GW-22D	6/1/1983	GW-22-D	FS										1			4							
GW-22D	10/1/1983	GW-22-D	FS										1			4							
GW-22D	7/1/1984	GW-22-D	FS										1			4							
GW-22D	12/1/1984	GW-22-D	FS										1			4							
GW-22D	5/1/1985	GW-22-D	FS										1			2							
GW-22D	12/1/1985	GW-22-D	FS										1			4							
GW-22D	6/26/1986	GW-22-D	FS				7						2			3							
GW-22D	12/1/1986	GW-22-D	FS										1			3							
GW-22D	6/1/1987	GW-22-D	FS										1			3							
GW-22D	12/1/1987	GW-22-D	FS										1			3							
GW-22D	5/19/1988	GW-22-D	FS	2			7						1			3							
GW-22D	12/8/1988	GW-22-D	FS	2			7							1		3							
GW-22D	5/1/1989	GW-22-D	FS	2			7							1		3							
GW-22D	5/1/1989	GW-22-D DUP	FD	2			7							5		3							
GW-22D	11/1/1989	GW-22-D	FS										1			3							
GW-22D	2/16/1990	GW-22-D	FS	30			46						1			3							
GW-22D	5/1/1990	GW-22-D	FS											2		3							
GW-22D	8/12/1992	GW-22-D	FS	35			64					21		21		3							
GW-22D	11/5/1992	GW-22-D	FS	36			65					21		23		3							
GW-22D	3/13/1996	GW-22-D	FS															2					
GW-22D	5/2/1996	GW-22-D	FS															2					
GW-22D	1/19/2000	GW-22-D	FS	37			66							22		8						1	
GW-27D	7/25/1986	GW-27-D	FS				7						2			3							
GW-27D	12/1/1986	GW-27-D	FS													3							
GW-27D	6/1/1987	GW-27-D	FS										1			3							
GW-27D	12/1/1987	GW-27-D	FS										1			3							
GW-27D	5/19/1988	GW-27-D	FS	2			7							1		3							
GW-27D	12/8/1988	GW-27-D	FS	2			7							1		3							
GW-27D	5/1/1989	GW-27-D	FS	2			7							1		3							
GW-27D	11/1/1989	GW-27-D	FS										1			3							
GW-27D	5/1/1990	GW-27-D	FS	30			46							1		3							
GW-27D	12/10/1991	GW-27-D	FS	36			65					27	23			4							
GW-27D	8/12/1992	GW-27-D	FS	36			65					21		23		2							
GW-27D	11/9/1992	GW-27-D	FS	36			65					21		23		3							
GW-27D	1/13/1995	GW-27-D	FS										1				2						
GW-27D	3/12/1996	GW-27-D	FS															2					
GW-27D	5/1/1996	GW-27-D	FS															2					
GW-27D	1/19/2000	GW-27-D	FS	37			66							22		8						1	
GW-30DR	7/25/1986	GW-30-DR	FS				7						2			3							
GW-30DR	12/1/1986	GW-30-DR	FS										1			3							
GW-30DR	5/19/1988	GW-30-DR	FS	2			7						1			3							
GW-30DR	12/8/1988	GW-30-DR	FS	2			7							1		3							
GW-30DR	5/1/1989	GW-30-DR	FS	2			7							1		3							
GW-30DR	11/1/1989	GW-30-DR	FS										1			3							
GW-30DR	2/16/1990	GW30DR	FS	30			46						1			3							
GW-30DR	5/1/1990	GW30DR	FS											2		3							

Table 4.1
Summary of Chemical Analysis for DAPL Wells

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

Location	Sample Date	Sample ID	Class Fraction Qc Code	VOCs Total Count	DMF Total Count	VPH Total Count	SVOCs Total Count	NDMA Total Count	Acrylamide Total Count	Hydrazine/aldehydes Total Count	EPH Total Count	Pest/Herb Total Count	Metals Total Count	Metals Dissolved Count	Oils and Fuels Total Count	Misc Analysis* Total Count	Misc Analysis* Dissolved Count	Non Standard Analysis** Total Count	Freezing Point Total Count	Color Total Count	Odor Total Count	Specific Cond. Total Count	Turbidity Total Count
GW-30DR	8/4/1992	GW-30-DR	FS	36			65					21		23		3							
GW-30DR	11/9/1992	GW-30-DR	FS	36			65					21		23		3							
GW-30DR	3/24/1993	GW-30DR	FS													3							
GW-30DR	3/24/1993	GW-30DR DUP	FD													3							
GW-30DR	4/10/1997	GW-30DR	FS													2							
GW-35D	2/16/1990	GW35D	FS	30			46						1			3							
GW-35D	5/1/1990	GW35D	FS											2		3							
GW-35D	8/4/1992	GW-35-D	FS	36			65					21		23		3							
GW-35D	11/5/1992	GW-35-D	FS	36			65					21		23		2							
GW-35D	11/10/1992	GW-35-D	FS													1							
GW-35D	3/13/1996	GW-35-D	FS															2					
GW-35D	5/2/1996	GW-35-D	FS															2					
GW-35D	11/28/2003	GW35D-DAPL	FS										8			2							
GW-35D	11/28/2003	GW35D-TREAT	FS										8			1							
GW-36	2/16/1990	GW36D	FS	30			46						1			3							
GW-36	5/1/1990	GW36	FS											2		3							
GW-36	8/30/1990	MW36D	FS	30			57							2		3							
GW-36	11/21/1990	GW36	FS	30			46							3		3							
GW-36	12/21/1990	GW36	FS				11																
GW-36	8/1/1991	GW-36	FS										1			3							
GW-36	12/10/1991	GW-36	FS	36			65					27	23			4							
GW-36	8/11/1992	GW-36	FS	36			65					21		24		2							
GW-36	11/16/1992	GW-36	FS	36			65					21		24		5							
GW-36	3/24/1993	GW-36	FS													3							
GW-36	1/13/1995	GW-36	FS											14			13						
GW-36	3/12/1996	GW-36	FS															2					
GW-36	5/2/1996	GW-36	FS															2					
GW-36	1/27/2000	GW-36	FS	37			66							22		8						1	
GW-37	2/16/1990	GW37D	FS	30			46						1			3							
GW-37	5/1/1990	GW37	FS											2		3							
GW-37	8/30/1990	MW37D	FS	30			57							2		3							
GW-37	11/21/1990	GW37	FS	30			46							3		3							
GW-37	12/21/1990	GW37	FS				11																
GW-37	8/1/1991	GW-37	FS										1			3							
GW-37	8/11/1992	GW-37	FS	36			65					21		24		3							
GW-37	11/16/1992	GW-37	FS	36			65					21		24		5							
GW-37	3/12/1996	GW-37	FS															2					
GW-37	5/2/1996	GW-37	FS															2					
GW-37	1/27/2000	GW-37	FS	37			66							22		8						1	
GW-38	2/16/1990	GW38D	FS	30			46						1			3							
GW-38	5/1/1990	GW38	FS											2		3							
GW-38	8/30/1990	MW38D	FS	30			57							2		3							
GW-38	11/21/1990	GW38	FS	30			46							3		3							
GW-38	12/21/1990	GW38	FS				11																
GW-38	8/1/1991	GW-38	FS										1			3							
GW-38	8/1/1991	GW-38 DUP	FD										1			3							
GW-38	8/4/1992	GW-38	FS	36			65					21		23		3							
GW-38	11/9/1992	GW-38	FS	36			65					21		23		3							
GW-42D	8/1/1991	GW-42-D	FS										1			3							
GW-42D	12/10/1991	GW-42-D	FS	36			65					27	23			4							
GW-42D	12/10/1991	GW-42-D DUP	FD	36			65					27	23			4							
GW-42D	8/5/1992	GW-42-D	FS	36			65					21		24		3							

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Summary of Chemical Analysis for DAPL Wells

Focused DAPL RI
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GW-42D	8/5/1992	GW-42-D DUP	FD	36			65					21		24		3							
GW-42D	11/11/1992	GW-42-D	FS	36			65					21		24		5							
GW-42D	11/11/1992	GW-42-D DUP	FD	36			65					21		24		5							
GW-42D	3/24/1993	GW-42D	FS													3							
GW-42D	1/11/1995	GW-42-D	FS											15		3	12						
GW-42D	1/11/1995	GW-42-D DUP	FD											26		13	12						
GW-42D	10/17/1995	GW-42-D	FS										12	14		1	12						
GW-42D	10/17/1995	GW-42-D DUP	FD										12	14		1	12						
GW-42D	4/10/1997	GW-42-D	FS													2							
GW-42D	8/13/1998	GW-42D	FS											23		6							
GW-42D	4/1/2003	SD-GW-42D	FS					1															
GW-42D	3/29/2004	GW-42D	FS					1						1		5							
GW-42D	11/12/2007	OC-GW-42D	FS																1				
GW-42D	5/19/2008	OC-GW-42D	FS										1			3							
GW-42D	6/2/2008	OC-GW-42D	FS									20											
GW-42D	7/9/2008	OC-GW-42D	FS									11											
GW-43D	8/1/1991	GW-43-D	FS										1			3							
GW-43D	8/5/1992	GW-43-D	FS	36			65					21		24		3							
GW-43D	8/5/1992	GW-43-D DUP	FD	36			65					21		24		3							
GW-43D	11/11/1992	GW-43-D	FS	36			65					21		24		5							
GW-43D	11/11/1992	GW-43-D DUP	FD	36			65					21		24		5							
GW-43D	10/17/1995	GW-43-D	FS										12	14		1	11						
GW-43D	4/10/1997	GW-43-D	FS													2							
GW-43D	3/24/2003	GW-43D	FS				65	1															
GW-43D	3/5/2004	GW-43D	FS					1		1				1		6		2					
GW-43D	3/5/2004	GW-43D DUP	FD					1		1				1		6		2					
GW-44D	1/27/1992	GW-44-D	FS										1			3							
GW-44D	8/12/1992	GW-44-D	FS	36			65					21		24		2							
GW-44D	11/10/1992	GW-44-D	FS	36			65					21		24		5							
GW-44D	10/17/1995	GW-44-D	FS										12	14		1	12						
GW-44D	4/10/1997	GW-44-D	FS													2							
GW-44D	7/7/1999	GW-44D	FS	2										2		3						2	
GW-44D	7/21/1999	GW-44D	FS	2										2		3				1		1	
GW-44D	5/26/2005	GW-44D	FS							2													
GW-44D	10/12/2011	OC-GW-44D-DUP	FD	77	1		74			5			25			6		8					
GW-44D	10/12/2011	OC-GW-44D-XXX	FS	77	1		74			5			25			6		8					
GW-44D	4/17/2012	OC-GW-44D-XXX	FS	77	1		72	2		5			25			6		8					
GW-45D	12/13/1991	GW-45-D	FS										1			3							
GW-45D	8/10/1992	GW-45-D	FS	36			65					21		24		3							
GW-45D	11/12/1992	GW-45-D	FS	36			65					21		24		4							
GW-45D	1/13/1995	GW-45-D	FS											14			14						
GW-45D	10/17/1995	GW-45-D	FS										12	14		1	13						
GW-45D	4/10/1997	GW-45-D	FS													2							
GW-45D	7/7/1999	GW-45D	FS	2										2		3						2	
GW-45D	8/28/2003	GW-45D	FS					1															
GW-45D	5/19/2010	OC-GW-45D-XXX	FS	77			73						24			6							
GW-45D	10/27/2010	OC-GW-45D-DUP	FD	77			73						24			6							
GW-45D	10/27/2010	OC-GW-45D-XXX	FS	77			73						24			6							
GW-59D	2/8/1992	GW-59-D	FS										1			3							
GW-59D	8/6/1992	GW-59-D	FS	36			65					21		23		3							
GW-59D	8/6/1992	GW-59-D DUP	FD	36			65					21		24		3							
GW-59D	11/10/1992	GW-59-D	FS	36			65					21		24		5							

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GW-59D	11/10/1992	GW-59-D DUP	FD	36			65					21		24		5							
GW-59D	3/22/2004	GW-59D	FS					1		1						1		2					
GW-70D	8/10/1992	GW-70-D	FS	36			65					21		24		2							
GW-70D	11/12/1992	GW-70-D	FS	36			65					21		23		3							
GW-70D	3/22/2004	GW-70D	FS					1		1						1		2					
GW-70D	10/22/2010	OC-GW-70D-XXX	FS	77			73						24			6							
GW-70D	5/18/2011	OC-GW-70D-XXX	FS	77			73						24			6							
GW-83D	10/3/1996	GW-83-D	FS										1			1							
GW-83D	10/8/1996	GW-83-D	FS										23			3							
GW-83D	10/26/1996	GW-83-D	FS	36			65						1	23			8						
GW-83D	1/20/1997	GW-83-D	FS											6			7						
GW-83D	4/23/1997	GW-83D	FS													1						1	
GW-83D	5/6/1999	GW-83D	FS											7		6						1	
GW-83D	11/2/1999	GW-83D	FS											7		6						1	
GW-83D	5/4/2000	GW-83D	FS											7		6						1	
GW-83D	11/9/2000	GW-83D	FS											7		6						1	
GW-83D	5/16/2001	GW-83D	FS											7		6						1	
GW-83D	11/9/2001	GW-83D	FS											7		6						1	
GW-83D	6/12/2002	GW-83D	FS											7		6						1	
GW-83D	11/8/2002	GW-83D	FS											7		6						1	1
GW-83D	4/2/2003	SD-GW-83D	FS					1															
GW-83D	5/6/2003	GW-83D	FS											7		9						1	
GW-83D	7/29/2003	GW-83D	FS							2						9						1	
GW-83D	11/10/2003	GW-83D	FS											7		7						1	
GW-83D	3/2/2004	GW-83D	FS					1		3				1		6		2					
GW-83D	5/11/2004	GW-83D	FS					1		2				7		6						1	
GW-83D	11/16/2004	GW-83D	FS											7		6						1	
GW-83D	5/10/2005	GW-83D	FS							2													
GW-83D	11/8/2005	GW-83D	FS											7		6						1	
GW-83D	11/18/2010	OC-GW-83D-XXX	FS	77	1		74			5			25			6		8					
GW-83D	5/25/2011	OC-GW-83D-XXX	FS	77	1		74			5			25			6		8					
MP-1 #01	4/18/1996	MP-1 #01	FS											24			5						
MP-1 #01	5/23/1996	MP-1 #01	FS											24		3	3						
MP-1 #01	8/11/1998	MP-1 #01	FS											24		6							
MP-1 #01	1/20/2000	MP-1-1	FS	62		12	82				21	40		25		19		2		1	1	1	1
MP-1 #01	3/25/2003	MP1-#1	FS										24			12						1	
MP-1 #01	9/4/2003	MP1-1	FS							2													
MP-1 #01	3/29/2004	MP1-DAPL	FS					1		1				1		5		2					
MP-1 #01	5/3/2005	MP-1 Port 1	FS											6		6							
MP-1 #01	5/25/2005	MP-1-Port 1	FS							2													
MP-1 #01	5/17/2010	OC-MP-1 #01-DUP	FD	77	1		74			5			25			6		8					
MP-1 #01	5/17/2010	OC-MP-1 #01-XXX	FS	77	1		74			5			25			6		8					
MP-1 #01	7/20/2010	MLP-1-1	FS											6		6							
MP-1 #01	10/20/2010	OC-MP-1 #01-XXX	FS	77	1		74			5			25			6		8					
MP-1 #01	2/9/2012	OC-MP-1 #1	FS										6			6							
MP-1 #02	4/18/1996	MP-1 #02	FS											24			5						
MP-1 #02	5/23/1996	MP-1 #02	FS											24		3	3						
MP-1 #02	8/11/1998	MP-1 #02	FS											23		6							
MP-1 #03	5/23/1996	MP-1 #03	FS											24		3	3						
MP-1 #03	5/23/1996	MP-1 #03 DUP	FD											24		2	4						
MP-1 #03	8/11/1998	MP-1 #03	FS											23		6							
MP-1 #03	3/25/2003	MP1-#3	FS										24			12						1	

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MP-1 #04	4/18/1996	MP-1 #04	FS											24			5						
MP-1 #04	5/23/1996	MP-1 #04	FS											24		3	3						
MP-1 #04	8/11/1998	MP-1 #04	FS											23		6							
MP-1 #04	5/13/2001	MP-1-4	FS											24		10						1	
MP-1 #04	3/25/2003	MP1-#4	FS										24			12						1	
MP-1 #04	5/3/2005	MP-1 Port 4	FS											6		6							
MP-1 #04	7/20/2010	MLP-1-4	FS											6		6							
MP-1 #04	2/9/2012	OC-MP-1 #4	FS										6			6							
MP-2 #01	5/20/1996	MP-2 #01	FS											24		3	3						
MP-2 #01	8/12/1998	MP-2 #01	FS											18		6							
MP-2 #01	5/14/2001	MP-2-1	FS											24		10						1	
MP-2 #01	7/25/2002	MP-2 DAPL	FS	2			7		1	2			2		13	4							
MP-2 #01	3/27/2003	MLP2-#1	FS										24			12						1	
MP-2 #01	7/31/2003	MP2-1	FS													9						1	
MP-2 #01	9/4/2003	MP2-1	FS							2													
MP-2 #01	3/9/2004	DAPL-Li	FS										1										
MP-2 #01	3/30/2004	MP2-DAPL	FS					1		1				1		5		2					
MP-2 #01	5/2/2005	MP-2 Port 1	FS											6		6							
MP-2 #01	5/24/2005	MP2-Port1	FS							2													
MP-2 #01	11/12/2007	OC-MP-2-1	FS																1				
MP-2 #01	7/19/2010	MLP-2-1	FS											6		6							
MP-2 #01	1/10/2012	OC-MP-2 #1	FS										6			6							
MP-2 #02	5/20/1996	MP-2 #02	FS											24		3	3						
MP-2 #02	8/12/1998	MP-2 #02	FS											18		6							
MP-2 #02	3/27/2003	MLP2-#2	FS										24			12						1	
MP-2 #02	8/23/2004	MP2-PORT2	FS											1									
MP-2 #03	5/20/1996	MP-2 #03	FS											24		3	3						
MP-2 #03	8/12/1998	MP-2 #03	FS											18		6							
MP-2 #03	3/27/2003	MLP2-#3	FS										24			12						1	
MP-2 #04	5/20/1996	MP-2 #04	FS											24		3	3						
MP-2 #04	8/12/1998	MP-2 #04	FS											18		6							
MP-2 #04	5/14/2001	MP-2-4	FS											24		10						1	
MP-2 #04	3/27/2003	MLP2-#4	FS										24			12						1	
MP-2 #04	5/2/2005	MP-2 Port 4	FS											6		6							
MP-2 #04	11/12/2007	OC-MP-2-4	FS																1				
MP-2 #04	7/19/2010	MLP-2-4	FS											6		6							
MP-2 #04	1/10/2012	OC-MP-2 #4	FS										6			6							
MP-2 #04	10/26/2012	OC-MP-2 PORT 4	FS										4			2							
MP-2 #04	11/2/2012	OC-MP-2 PORT 4	FS										4			2							
MP-2 #06	5/20/1996	MP-2 #06	FS											24		3	4						
MP-2 #06	8/12/1998	MP-2 #06	FS											18		6							
MP-2 #06	9/24/2002	MP-2-06	FS					1															
MP-2 #06	3/27/2003	MLP2-#6	FS										24			12						1	
MP-2 #06	3/30/2004	MP2-DIFF	FS					1		1				1		5		2					
MP-2 #06	5/2/2005	MP-2 Port 6	FS											6		6							
MP-2 #06	7/19/2010	MLP-2-6	FS											6		6							
MP-2 #06	1/10/2012	OC-MP-2 #6	FS										6			6							
MP-2 #06	11/16/2012	OC-MP2 #6	FS										4			2							
MP-2 #06	1/9/2013	OC MP2 Port 6	FS										4			3							
MP-2 #06	1/30/2013	OC MP2 Port 6	FS										4			3							
MP-2 #09	5/20/1996	MP-2 #09	FS											24		4	4						
MP-2 #09	8/11/1998	MP-2 #09	FS											23		6							

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MP-2 #09	5/14/2001	MP-2-9	FS											24		10						1	
MP-2 #09	3/27/2003	MLP2-#9	FS										24			12						1	
MP-2 #09	4/9/2003	MP-2 PORT 9	FS					1															
MP-2 #09	7/31/2003	MP2-9	FS													9						1	
MP-2 #09	9/4/2003	MP2-9	FS							2													
MP-2 #09	8/23/2004	MP2-PORT9	FS											1									
MP-2 #09	5/2/2005	MP-2 Port 9	FS											6		6							
MP-2 #09	5/24/2005	MP2-Port9	FS							2													
MP-2 #09	7/19/2010	MLP-2-9	FS											6		6							
MP-2 #09	7/19/2010	MLP-2-9D	FD											6		6							
MP-2 #09	1/10/2012	OC-MP-2 #9	FS										6			6							
MP-3 #01	5/22/1996	MP-3 #01	FS											24		3	3						
MP-3 #01	8/13/1998	MP-3 #01	FS											23		6							
MP-3 #01	9/8/2003	MP3-1	FS							2													
MP-3 #01	1/8/2004	MP3-DAPL-SPLIT 1	FS				1																
MP-3 #01	1/8/2004	MP3-DAPL-SPLIT 2	FS				1																
MP-3 #01	1/8/2004	MP3-DAPL-SPLIT 3	FS				1																
MP-3 #01	1/8/2004	MP3-DAPL-SPLIT 4	FS				1																
MP-3 #01	1/8/2004	MP3-DAPL-SPLIT 4A	FS				1																
MP-3 #01	1/8/2004	MP3-DAPL-SPLIT 5A	FS				1																
MP-3 #01	1/8/2004	MP3-DAPL-SPLIT 5B	FS				1																
MP-3 #01	1/8/2004	MP3-DAPL-SPLIT 6A	FS				1																
MP-3 #01	1/8/2004	MP3-DAPL-SPLIT 6B	FS				1																
MP-3 #01	1/8/2004	MP3-DAPL-SPLIT 7A	FS				1																
MP-3 #01	1/8/2004	MP3-DAPL-SPLIT 7B	FS				1																
MP-3 #01	1/8/2004	MP3-DAPL-SPLIT 8	FS				1																
MP-3 #01	1/8/2004	MP3-DAPL-SPLIT 9	FS				1																
MP-3 #01	3/31/2004	MP3-DAPL	FS											1		5							
MP-3 #01	5/4/2005	MP3 Port 1	FS											6		5							
MP-3 #01	5/24/2005	MP-3-Port 1	FS							2													
MP-3 #01	10/11/2011	OC-MP-3 #01-XXX	FS	77	1		74			5			25			6		8					
MP-3 #01	4/17/2012	OC-MP-3 #01-XXX	FS	77	1		72	2		5			25			6		8					
MP-3 #02	5/22/1996	MP-3 #02	FS											24		2	3						
MP-3 #02	8/13/1998	MP-3 #02	FS											23		6							
MP-3 #02	5/15/2001	MP-3-2	FS											24		9						1	
MP-3 #02	3/26/2003	MLP3-#2	FS										24			11						1	
MP-3 #03	5/22/1996	MP-3 #03	FS											24		2	3						
MP-3 #03	8/13/1998	MP-3 #03	FS											23		6							
MP-3 #03	5/4/2005	MP3 Port 3	FS											6		5							
MP-3 #03	1/11/2012	OC-MP-3 #3	FS										6			5							
MP-3 #04	5/22/1996	MP-3 #04	FS											24		2	4						
MP-3 #04	8/13/1998	MP-3 #04	FS											23		6							
MP-3 #04	5/15/2001	MP-3-4	FS											24		9						1	
MP-3 #04	3/26/2003	MLP3-#4	FS										24			11						1	
MP-3 #04	5/4/2005	MP3 Port 4	FS											6		5							
MP-3 #04	1/11/2012	OC-MP-3 #4	FS										6			5							
MP-4 #01	6/29/2000	MP-4 #1	FS											24		8						1	
MP-4 #01	5/15/2001	MP-4-1	FS											23		4							
MP-4 #01	3/28/2003	MLP-4-#1	FS											24		11						1	
MP-4 #01	9/8/2003	MP4-1	FS							2													
MP-4 #02	6/29/2000	MP-4 #2	FS											24		8						1	
MP-4 #02	5/15/2001	MP-4-2	FS											24		9						1	

Prepared by BJS 09/21/2017
Checked by JBR 09/22/2017

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MP-4 #02	3/28/2003	MLP-4-#2	FS										24			11						1	
MP-4 #02	5/4/2005	MP4 Port 2	FS											6		5							
MP-4 #02	5/25/2010	OC-MP-4 #02-XXX	FS	77	1		74			5			25			6		8					
MP-4 #02	7/21/2010	MLP-4-2	FS											6		5							
MP-4 #02	10/27/2010	OC-MP-4 #2-XXX	FS	77	1		72	2		5			25			6		8					
MP-4 #02	1/9/2012	OC-MP-4 #2	FS										6			5							
MP-4 #03	6/29/2000	MP-4 #3	FS											24		8						1	
MP-4 #03	5/15/2001	MP-4-3	FS											24		9						1	
MP-4 #03	3/28/2003	MLP-4-#3	FS										24			11						1	
MP-4 #03	5/4/2005	MP4 Port 3	FS											6		5							
MP-4 #03	7/21/2010	MLP-4-3	FS											6		5							
MP-4 #03	1/9/2012	OC-MP-4 #3	FS										6			5							
MP-4 #05	6/29/2000	MP-4 #5	FS											24		8						1	
MP-4 #05	5/15/2001	MP-4-5	FS											23		4							
MP-4 #05	3/28/2003	MLP-4-#5	FS											24		11						1	
MP-4 #05	5/4/2005	MP4 Port 5	FS											6		5							
MP-4 #05	7/21/2010	MLP-4-5	FS											6		5							
MP-4 #08	6/29/2000	MP-4 #8	FS											24		8						1	
MP-4 #09	6/29/2000	MP-4 #9	FS											24		8						1	

Notes
VOCs = Volatile organic compounds
DMF = Dimethylformamide
SVOCs = Semivolatile organic compounds
NDMA = N-Nitrosodimethylamine
EPH = Extractable petroleum hydrocarbons
VPH = Volatile petroleum hydrocarbons
Pest/Herb = Pesticides / Herbicides
Specific Cond. = Specific Conductance
Count = Count of samples
FS = Field Sample
FD = Field Duplicate

Non Standard Analysis**
A subset of the following:
4,4'-Isopropylidenediphenol
4-(1,1,3,3-Tetramethylbutyl)phenol
4-Nonylphenol (Tech.)
Kempore (Azodicarbonamide)
Monomethylhydrazine (MMH)
Nonylphenol Diethoxylate
Nonylphenol Diethoxylate (Tech.)
OPEX
Perchlorate
Phthalic Acid/Phthalic anhydride
UDMH

Misc Analysis*
A subset of the following:
Total Alkalinity, as CaCO3
Bicarbonate Alkalinity, as CaCO3
Carbonate Alkalinity, as CaCO3
Bromide
Carbonate
Chemical Oxygen Demand
Chloramine
Chloride
CO2 as C
Cyanide, Total
Dissolved Organic Carbon
Fluoride
Nitrate as N
Nitrate+Nitrite as N
Nitrite as N
Nitrogen, as Ammonia
Nitrogen, Total Kjeldahl
Orthophosphate
pH
Phosphate, Total as P
Phosphorus, Total as P
Specific Gravity
Sulfate
Sulfide
Total Dissolved Solids
Total Suspended Solids
Total Organic Carbon
Dissolved Organic Carbon
Viscosity

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**																			
		Location	GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-27D		GW-27D	
		Sample Date	6/26/1986		5/19/1988		12/8/1988		5/1/1989		5/1/1989		2/16/1990		8/12/1992		11/5/1992		1/19/2000		7/25/1986		5/19/1988	
		Sample ID	GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D DUP		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-27-D		GW-27-D	
		Qc Code	FS		FS		FS		FS		FD		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs	1,1,1-Trichloroethane	µg/L											5	U	5	U	5	U	5	U				
VOCs	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L																						
VOCs	1,1,2-Trichloroethane	µg/L											5	U	5	U	5	U	5	U				
VOCs	1,1-Dichloroethane	µg/L											5	U	5	U	5	U	5	U				
VOCs	1,1-Dichloroethene	µg/L											5	U	5	U	5	U	5	U				
VOCs	1,2,4-Trichlorobenzene	µg/L																						
VOCs	1,2,4-Trimethylbenzene	µg/L																						
VOCs	1,2-Dichlorobenzene	µg/L																						
VOCs	1,2-Dichloroethane	µg/L											11		12		9		5	U				
VOCs	1,2-Dichloroethene (total)	µg/L											5	U	5	U	5	U						
VOCs	1,2-Dichloropropane	µg/L											5	U	5	U	5	U	5	U				
VOCs	1,3,5-Trimethylbenzene	µg/L																						
VOCs	1,3-Dichlorobenzene	µg/L																						
VOCs	1,4-Dichlorobenzene	µg/L																						
VOCs	2,4,4-Trimethyl-1-pentene	µg/L			10	U	10	U	10	U	10	U	10	U	10	U	10	U	5	U			10	U
VOCs	2,4,4-Trimethyl-2-pentene	µg/L			10	U	10	U	10	U	10	U	10	U	10	U	10	U	5	U			10	U
VOCs	2-Butanone	µg/L													21		12	J	10	U				
VOCs	2-Hexanone	µg/L													15	U	15	U	10	U				
VOCs	4-iso-Propyltoluene	µg/L																						
VOCs	4-Methyl-2-pentanone	µg/L															15	U	10	U				
VOCs	Acetone	µg/L													140		170		10	U				
VOCs	Benzene	µg/L											5	U	1		2	J	5	U				
VOCs	Bromochloromethane	µg/L																						
VOCs	Bromodichloromethane	µg/L											29		25		26		5	U				
VOCs	Bromoform	µg/L											190		65		48		5	U				
VOCs	Carbon disulfide	µg/L													13		20		5	U				
VOCs	Carbon tetrachloride	µg/L											4	J	5		9		5	U				
VOCs	Chlorobenzene	µg/L											5	U	5	U	5	U	5	U				
VOCs	Chloroform	µg/L											47		46		44		6					
VOCs	Chloromethane	µg/L											8	J	7		6	J	10	U				
VOCs	Cis-1,2-Dichloroethene	µg/L																	5	U				
VOCs	Dibromochloromethane	µg/L											40		22		21		5	U				
VOCs	Dibromomethane	µg/L																						
VOCs	Ethylbenzene	µg/L											5	U	5	U	5	U	5	U				
VOCs	Isopropylbenzene	µg/L																						
VOCs	Methyl Tertbutyl Ether	µg/L																						
VOCs	Methylene chloride	µg/L											7	J	10	U	10		5	U				
VOCs	Naphthalene	µg/L																						
VOCs	Propylbenzene	µg/L																						

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**																			
		Location	GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-27D		GW-27D	
		Sample Date	6/26/1986		5/19/1988		12/8/1988		5/1/1989		5/1/1989		2/16/1990		8/12/1992		11/5/1992		1/19/2000		7/25/1986		5/19/1988	
		Sample ID	GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D DUP		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-27-D		GW-27-D	
		Qc Code	FS		FS		FS		FS		FD		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs	Tetrachloroethene	µg/L											5	U	5	U	5	U	5	U				
VOCs	Toluene	µg/L											21		16		23		5	U				
VOCs	trans-1,2-Dichloroethene	µg/L																	5	U				
VOCs	Trichloroethene	µg/L											3	J	3		4	J	5	U				
VOCs	Vinyl chloride	µg/L											10	U	10	U	10	U	10	U				
VOCs	Xylene, o	µg/L																						
VOCs	Xylenes (m&p)	µg/L																						
VOCs	Xylenes, Total	µg/L													5	U	5	U	5	U				
SVOCs	1,2,4-Trichlorobenzene	µg/L											10	U	10	UJ	10	U	6	U				
SVOCs	1,2-Dichlorobenzene	µg/L											10	U	10	UJ	10	U	5	U				
SVOCs	1,3-Dichlorobenzene	µg/L											10	U	10	UJ	10	U	6	U				
SVOCs	1,4-Dichlorobenzene	µg/L											10	U	10	UJ	10	U	3	U				
SVOCs	2,4,6-Trichlorophenol	µg/L													10	UJ	10	U	6	U				
SVOCs	2,4-Dichlorophenol	µg/L													10	UJ	10	U	4	U				
SVOCs	2,4-Dimethylphenol	µg/L													10	UJ	10	U	7	U				
SVOCs	2,4-Dinitrophenol	µg/L													25	UJ	25	U	14	U				
SVOCs	2-Chlorophenol	µg/L													2	J	3	J	5	U				
SVOCs	2-Methylnaphthalene	µg/L													10	UJ	10	U	6	U				
SVOCs	2-Methylphenol	µg/L													10	UJ	10	U	4	U				
SVOCs	2-Nitrophenol	µg/L													60	J	120		110					
SVOCs	3 & 4 Methylphenol	µg/L																						
SVOCs	4,6-Dinitro-2-methylphenol	µg/L													25	UJ	25	U	12	U				
SVOCs	4-Bromophenyl phenyl ether	µg/L											10	U	1	J	2	J	6	U				
SVOCs	4-Chloro-3-methylphenol	µg/L													10	UJ	10	U	6	U				
SVOCs	4-Chloroaniline	µg/L													10	UJ	10	U	6	U				
SVOCs	4-Chlorophenyl phenyl ether	µg/L											10	U	10	UJ	10	U	5	U				
SVOCs	4-Methylphenol	µg/L													10	UJ	10	U	4	U				
SVOCs	4-Nitrophenol	µg/L													54	J	330		330					
SVOCs	Acenaphthylene	µg/L											10	U	10	UJ	10	U	4	U				
SVOCs	Acetophenone	µg/L																						
SVOCs	Benzaldehyde	µg/L																						
SVOCs	Benzo(a)pyrene	µg/L											10	U	10	UJ	10	U	3	U				
SVOCs	Benzo(b)fluoranthene	µg/L											10	U	10	UJ	10	U	3	U				
SVOCs	Benzo(ghi)perylene	µg/L											10	U	10	UJ	10	U	10	U				
SVOCs	Benzo(k)fluoranthene	µg/L											10	U	10	UJ	10	U	3	U				
SVOCs	Benzoic Acid	µg/L													50	UJ	50	U	140	U				
SVOCs	Benzyl alcohol	µg/L													9	J	9	J	6	U				
SVOCs	Biphenyl	µg/L																						
SVOCs	Bis(2-Ethylhexyl)phthalate	µg/L	10	U	50	U	160		10	U	10	U	15	B	32	UJ	6	J	4	U	10	U	50	U

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**																			
		Location	GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-27D		GW-27D	
		Sample Date	6/26/1986		5/19/1988		12/8/1988		5/1/1989		5/1/1989		2/16/1990		8/12/1992		11/5/1992		1/19/2000		7/25/1986		5/19/1988	
		Sample ID	GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D DUP		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-27-D		GW-27-D	
		Qc Code	FS		FS		FS		FS		FD		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
SVOCs	Caprolactam	µg/L																						
SVOCs	Chrysene	µg/L											10	U	10	UJ	10	U	4	U				
SVOCs	Dibenz(a,h)anthracene	µg/L											10	U	10	UJ	10	U	8	U				
SVOCs	Dibenzofuran	µg/L													10	UJ	10	U	5	U				
SVOCs	Diethylphthalate	µg/L	10	U	50	U	100	U	10	U	10	U	10	U	10	UJ	10	U	4	U	10	U	50	U
SVOCs	Dimethylformamide	µg/L																						
SVOCs	Dimethylphthalate	µg/L	10	U	50	U	100	U	10	U	10	U	10	U	10	UJ	10	U	5	U	13		50	U
SVOCs	Di-n-butylphthalate	µg/L	10	U	50	U	100	U	10	U	10	U	3	J	10	UJ	10	U	3	U	10	U	50	U
SVOCs	Di-n-octylphthalate	µg/L	10	U	50	U	100	U	10	U	10	U	10	U	10	UJ	10	U	6	U	10	U	50	U
SVOCs	Diphenyl ether	µg/L																						
SVOCs	Fluoranthene	µg/L											10	U	10	UJ	10	U	3	U				
SVOCs	Indeno(1,2,3-cd)pyrene	µg/L											10	U	10	UJ	10	U	8	U				
SVOCs	Isophorone	µg/L											10	U	4	J	10	U	6	U				
SVOCs	Naphthalene	µg/L											10	U			79		4	U				
SVOCs	N-Nitrosodimethylamine	µg/L											10	U										
SVOCs	N-Nitrosodiphenylamine	µg/L	140		50	U	100	U	10	U	10	U	10	U	10	UJ	10	U	6	U	10	U	50	U
SVOCs	Pentachlorophenol	µg/L													25	UJ	25	UJ	6	U				
SVOCs	Phenanthrene	µg/L											10	U	10	UJ	10	U	4	U				
SVOCs	Phenol	µg/L													7	J	150		380					
SVOCs	Pyrene	µg/L											10	U	10	UJ	10	U	4	U				
SVOCs2	Acenaphthylene	µg/L																						
SVOCs2	Benzo(a)pyrene	µg/L																						
SVOCs2	Benzo(b)fluoranthene	µg/L																						
SVOCs2	Benzo(ghi)perylene	µg/L																						
SVOCs2	Benzo(k)fluoranthene	µg/L																						
SVOCs2	Chrysene	µg/L																						
SVOCs2	Dibenz(a,h)anthracene	µg/L																						
SVOCs2	Fluoranthene	µg/L																						
SVOCs2	Indeno(1,2,3-cd)pyrene	µg/L																						
SVOCs2	Naphthalene	µg/L																						
SVOCs2	Phenanthrene	µg/L																						
SVOCs2	Pyrene	µg/L																						
NDMA	N-Nitrosodimethylamine	ng/L																						
Pest/Herb	2,4,5-T	µg/L																						
Pest/Herb	2,4,5-TP/Silvex	µg/L																						
Pest/Herb	2,4-DB	µg/L																						
Pest/Herb	Alpha-BHC	µg/L													0.13		0.13							
Pest/Herb	Beta-BHC	µg/L													0.05	U	0.05	U						
Pest/Herb	Delta-BHC	µg/L													0.05	U	0.05	U						

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**																			
		Location	GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-27D		GW-27D	
		Sample Date	6/26/1986		5/19/1988		12/8/1988		5/1/1989		5/1/1989		2/16/1990		8/12/1992		11/5/1992		1/19/2000		7/25/1986		5/19/1988	
		Sample ID	GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D DUP		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-27-D		GW-27-D	
		Qc Code	FS		FS		FS		FS		FD		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Pest/Herb	Dicamba	µg/L																						
Pest/Herb	Dieldrin	µg/L													0.1	U	0.1	U						
Pest/Herb	Endosulfan I	µg/L													0.05	U	0.05	U						
Pest/Herb	Endosulfan sulfate	µg/L													0.1	U	0.11							
Pest/Herb	Endrin	µg/L													0.1	U	0.1	U						
Pest/Herb	Gamma-BHC/Lindane	µg/L													0.05	U	0.05	U						
Pest/Herb	Heptachlor	µg/L													0.05	U	0.05	U						
Pest/Herb	Heptachlor epoxide	µg/L													0.05	U	0.05	U						
Pest/Herb	MCPA	µg/L																						
Pest/Herb	MCPP	µg/L																						
Pest/Herb	Pentachlorophenol	µg/L																						
Pest/Herb	Picloram	µg/L																						
VPH	Target Compounds	µg/L																						
EPH	Target Compounds	µg/L																						
Oils/Fuels	PETROLEUM NAPHTHA	mg/L																						
Oils/Fuels	Unmatched	mg/L																						

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**																			
		Location	GW-27D		GW-27D		GW-27D		GW-27D		GW-27D		GW-27D		GW-30DR		GW-30DR		GW-30DR		GW-30DR	
		Sample Date	12/8/1988		5/1/1989		5/1/1990		12/10/1991		8/12/1992		11/9/1992		1/19/2000		7/25/1986		5/19/1988		12/8/1988		5/1/1989	
		Sample ID	GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-30-DR		GW-30-DR		GW-30-DR		GW-30-DR	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs	1,1,1-Trichloroethane	µg/L					31		37		18		10		5	U								
VOCs	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L																						
VOCs	1,1,2-Trichloroethane	µg/L					5	U	25	U	5	U	5	U	5	U								
VOCs	1,1-Dichloroethane	µg/L					9		7	J	4		4		5	U								
VOCs	1,1-Dichloroethene	µg/L					4	J	5	J	3		2		5	U								
VOCs	1,2,4-Trichlorobenzene	µg/L																						
VOCs	1,2,4-Trimethylbenzene	µg/L																						
VOCs	1,2-Dichlorobenzene	µg/L																						
VOCs	1,2-Dichloroethane	µg/L					5	U	22	J	3		3		5	U								
VOCs	1,2-Dichloroethene (total)	µg/L					5	U	25	U	5	U	5	U										
VOCs	1,2-Dichloropropane	µg/L					5	U	25	U	5	U	5	U	5	U								
VOCs	1,3,5-Trimethylbenzene	µg/L																						
VOCs	1,3-Dichlorobenzene	µg/L																						
VOCs	1,4-Dichlorobenzene	µg/L																						
VOCs	2,4,4-Trimethyl-1-pentene	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	5	U			100	U	48		10	U
VOCs	2,4,4-Trimethyl-2-pentene	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	5	U			100	U	25		10	U
VOCs	2-Butanone	µg/L							75	U	1		15	U	10	U								
VOCs	2-Hexanone	µg/L							75	U	15	U	15	U	10	U								
VOCs	4-iso-Propyltoluene	µg/L																						
VOCs	4-Methyl-2-pentanone	µg/L							75	U	15	U	15	U	10	U								
VOCs	Acetone	µg/L							79	U	570	J	15	U	10	U								
VOCs	Benzene	µg/L					5	U	4	J	5	U	5	U	5	U								
VOCs	Bromochloromethane	µg/L																						
VOCs	Bromodichloromethane	µg/L					3	J	46		4		3		5	U								
VOCs	Bromoform	µg/L					30		440		34		30		8									
VOCs	Carbon disulfide	µg/L							26	J	10	U	10	U	5	U								
VOCs	Carbon tetrachloride	µg/L					5	U	25	U	5	U	5	U	5	U								
VOCs	Chlorobenzene	µg/L					5	U	2	J	5	U	5	U	5	U								
VOCs	Chloroform	µg/L					2	J	32		2		2		5	U								
VOCs	Chloromethane	µg/L					2	J	4	J	10	U	10	U	10	U								
VOCs	Cis-1,2-Dichloroethene	µg/L													5	U								
VOCs	Dibromochloromethane	µg/L					9		140		9		8		5	U								
VOCs	Dibromomethane	µg/L																						
VOCs	Ethylbenzene	µg/L					5	U	25	U	5	U	5	U	5	U								
VOCs	Isopropylbenzene	µg/L																						
VOCs	Methyl Tertbutyl Ether	µg/L																						
VOCs	Methylene chloride	µg/L					10	U	23	U	10	U	10	U	5	U								
VOCs	Naphthalene	µg/L																						
VOCs	Propylbenzene	µg/L																						

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**																	
		Location	GW-27D		GW-27D		GW-27D		GW-27D		GW-27D		GW-27D		GW-30DR		GW-30DR		GW-30DR		GW-30DR	
		Sample Date	12/8/1988		5/1/1989		5/1/1990		12/10/1991		8/12/1992		11/9/1992		1/19/2000		7/25/1986		5/19/1988		12/8/1988		5/1/1989	
		Sample ID	GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-30-DR		GW-30-DR		GW-30-DR		GW-30-DR	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs	Tetrachloroethene	µg/L					5	U	14	J	5	U	5	U	5	U								
VOCs	Toluene	µg/L					8		63		2		5	U	5	U								
VOCs	trans-1,2-Dichloroethene	µg/L													5	U								
VOCs	Trichloroethene	µg/L					5	U	4	J	5	U	5	U	5	U								
VOCs	Vinyl chloride	µg/L					10	U	50	U	10	U	10	U	10	U								
VOCs	Xylene, o	µg/L																						
VOCs	Xylenes (m&p)	µg/L																						
VOCs	Xylenes, Total	µg/L							25	U	5	U	5	U	5	U								
SVOCs	1,2,4-Trichlorobenzene	µg/L					10	U	10	U	10	U	10	U	10	U								
SVOCs	1,2-Dichlorobenzene	µg/L					10	U	10	U	10	U	10	U	10	U								
SVOCs	1,3-Dichlorobenzene	µg/L					10	U	10	U	1		10	U	10	U								
SVOCs	1,4-Dichlorobenzene	µg/L					10	U	10	U	10	U	10	U	10	U								
SVOCs	2,4,6-Trichlorophenol	µg/L							10	U	10	U	10	U	10	U								
SVOCs	2,4-Dichlorophenol	µg/L							10	U	10	U	10	U	10	U								
SVOCs	2,4-Dimethylphenol	µg/L							10	U	10	U	10	U	10	U								
SVOCs	2,4-Dinitrophenol	µg/L							50	U	25	U	25	U	50	U								
SVOCs	2-Chlorophenol	µg/L							10	U	10	U	1		10	U								
SVOCs	2-Methylnaphthalene	µg/L							10	U	10	U	10	U	10	U								
SVOCs	2-Methylphenol	µg/L							10	U	10	U	10	U	10	U								
SVOCs	2-Nitrophenol	µg/L							31		42		88		18									
SVOCs	3 & 4 Methylphenol	µg/L																						
SVOCs	4,6-Dinitro-2-methylphenol	µg/L							50	U	25	U	25	U	50	U								
SVOCs	4-Bromophenyl phenyl ether	µg/L					1	J	14		33		34		22									
SVOCs	4-Chloro-3-methylphenol	µg/L							10	U	10	U	10	U	10	U								
SVOCs	4-Chloroaniline	µg/L							10	U	10	U	10	U	10	U								
SVOCs	4-Chlorophenyl phenyl ether	µg/L					10	U	10	U	2		3		10	U								
SVOCs	4-Methylphenol	µg/L							10	U	10	U	10	U	10	U								
SVOCs	4-Nitrophenol	µg/L							35	J	69		150		50	U								
SVOCs	Acenaphthylene	µg/L					10	U	10	U	10	U	10	U	10	U								
SVOCs	Acetophenone	µg/L																						
SVOCs	Benzaldehyde	µg/L																						
SVOCs	Benzo(a)pyrene	µg/L					10	U	10	U	10	U	10	U	10	U								
SVOCs	Benzo(b)fluoranthene	µg/L					10	U	10	U	10	U	10	U	10	U								
SVOCs	Benzo(ghi)perylene	µg/L					10	U	10	U	10	U	10	U	10	U								
SVOCs	Benzo(k)fluoranthene	µg/L					10	U	10	U	10	U	10	U	10	U								
SVOCs	Benzoic Acid	µg/L							4	J	50	U	50	U	50	U								
SVOCs	Benzyl alcohol	µg/L							7	J	10	U	10	U	10	U								
SVOCs	Biphenyl	µg/L																						
SVOCs	Bis(2-Ethylhexyl)phthalate	µg/L	10	U	13		1	J	10	U	180		10	U	10	U	76		100	U	1	J	10	

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**										
		Location	GW-27D	GW-27D	GW-27D	GW-27D	GW-27D	GW-27D	GW-27D	GW-30DR	GW-30DR	GW-30DR	GW-30DR
		Sample Date	12/8/1988	5/1/1989	5/1/1990	12/10/1991	8/12/1992	11/9/1992	1/19/2000	7/25/1986	5/19/1988	12/8/1988	5/1/1989
		Sample ID	GW-27-D	GW-27-D	GW-27-D	GW-27-D	GW-27-D	GW-27-D	GW-27-D	GW-30-DR	GW-30-DR	GW-30-DR	GW-30-DR
		Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
SVOCs	Caprolactam	µg/L											
SVOCs	Chrysene	µg/L			10 U	10 U	10 U	10 U	10 U				
SVOCs	Dibenz(a,h)anthracene	µg/L			10 U	10 U	10 U	10 U	10 U				
SVOCs	Dibenzofuran	µg/L				10 U	10 U	1	10 U				
SVOCs	Diethylphthalate	µg/L	10 U	10 U	10 U	31	10 U	10 U	10 U	10 U	100 U	10 U	1 J
SVOCs	Dimethylformamide	µg/L											
SVOCs	Dimethylphthalate	µg/L	10 U	10 U	10 U	4 J	10 U	10 U	10 U	10 U	100 U	10 U	10 U
SVOCs	Di-n-butylphthalate	µg/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U
SVOCs	Di-n-octylphthalate	µg/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U
SVOCs	Diphenyl ether	µg/L											
SVOCs	Fluoranthene	µg/L			10 U	10 U	10 U	10 U	10 U				
SVOCs	Indeno(1,2,3-cd)pyrene	µg/L			10 U	10 U	10 U	10 U	10 U				
SVOCs	Isophorone	µg/L			10 U	10 U	10 U	10 U	10 U				
SVOCs	Naphthalene	µg/L			1 J	10 U	1	6	10 U				
SVOCs	N-Nitrosodimethylamine	µg/L			2 J								
SVOCs	N-Nitrosodiphenylamine	µg/L	4 J	10 U	10 U	10 U	10 U	3	10 U	98	100 U	10 U	10 U
SVOCs	Pentachlorophenol	µg/L				50 U	25 U	25 U	50 U				
SVOCs	Phenanthrene	µg/L			10 U	10 U	10 U	10 U	10 U				
SVOCs	Phenol	µg/L				18	3	26	10 U				
SVOCs	Pyrene	µg/L			10 U	10 U	10 U	10 U	10 U				
SVOCs2	Acenaphthylene	µg/L											
SVOCs2	Benzo(a)pyrene	µg/L											
SVOCs2	Benzo(b)fluoranthene	µg/L											
SVOCs2	Benzo(ghi)perylene	µg/L											
SVOCs2	Benzo(k)fluoranthene	µg/L											
SVOCs2	Chrysene	µg/L											
SVOCs2	Dibenz(a,h)anthracene	µg/L											
SVOCs2	Fluoranthene	µg/L											
SVOCs2	Indeno(1,2,3-cd)pyrene	µg/L											
SVOCs2	Naphthalene	µg/L											
SVOCs2	Phenanthrene	µg/L											
SVOCs2	Pyrene	µg/L											
NDMA	N-Nitrosodimethylamine	ng/L											
Pest/Herb	2,4,5-T	µg/L											
Pest/Herb	2,4,5-TP/Silvex	µg/L											
Pest/Herb	2,4-DB	µg/L											
Pest/Herb	Alpha-BHC	µg/L				0.5 UJ	0.05 U	0.13					
Pest/Herb	Beta-BHC	µg/L				0.5 UJ	0.05 U	0.062					
Pest/Herb	Delta-BHC	µg/L				0.5 UJ	0.05 U	0.05 U					

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**																			
		Location	GW-27D		GW-27D		GW-27D		GW-27D		GW-27D		GW-27D		GW-27D		GW-30DR		GW-30DR		GW-30DR		GW-30DR	
		Sample Date	12/8/1988		5/1/1989		5/1/1990		12/10/1991		8/12/1992		11/9/1992		1/19/2000		7/25/1986		5/19/1988		12/8/1988		5/1/1989	
		Sample ID	GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-30-DR		GW-30-DR		GW-30-DR		GW-30-DR	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Pest/Herb	Dicamba	µg/L																						
Pest/Herb	Dieldrin	µg/L							1	UJ	0.1	U	0.1	U										
Pest/Herb	Endosulfan I	µg/L							0.5	UJ	0.19		0.05	U										
Pest/Herb	Endosulfan sulfate	µg/L							1	UJ	0.1	U	0.1	U										
Pest/Herb	Endrin	µg/L							1	UJ	0.1	U	0.1	U										
Pest/Herb	Gamma-BHC/Lindane	µg/L							0.5	UJ	0.05	U	0.05	U										
Pest/Herb	Heptachlor	µg/L							0.5	UJ	0.05	U	0.05	U										
Pest/Herb	Heptachlor epoxide	µg/L							0.5	UJ	0.05	U	0.051											
Pest/Herb	MCPA	µg/L																						
Pest/Herb	MCPP	µg/L																						
Pest/Herb	Pentachlorophenol	µg/L																						
Pest/Herb	Picloram	µg/L																						
VPH	Target Compounds	µg/L																						
EPH	Target Compounds	µg/L																						
Oils/Fuels	PETROLEUM NAPHTHA	mg/L																						
Oils/Fuels	Unmatched	mg/L																						

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**										
		Location	GW-30DR	GW-30DR	GW-30DR	GW-35D	GW-35D	GW-35D	GW-37	GW-37	GW-37	GW-37	GW-37
		Sample Date	2/16/1990	8/4/1992	11/9/1992	2/16/1990	8/4/1992	11/5/1992	2/16/1990	8/30/1990	11/21/1990	12/21/1990	8/11/1992
		Sample ID	GW30DR	GW-30-DR	GW-30-DR	GW35D	GW-35-D	GW-35-D	GW37D	MW37D	GW37	GW37	GW-37
		Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
VOCs	1,1,1-Trichloroethane	µg/L	50 U	5	4	5 U	5 U	5 U	32	41	43		19
VOCs	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L											
VOCs	1,1,2-Trichloroethane	µg/L	50 U	5 U	5 U	5 U	5 U	5 U	5 U	25 U	5 U		5 U
VOCs	1,1-Dichloroethane	µg/L	50 U	5 U	5 U	5 U	5 U	5 U	2 J	25 U	6		5
VOCs	1,1-Dichloroethene	µg/L	50 U	5 U	5 U	5 U	5 U	5 U	5 U	25 U	4 J		2
VOCs	1,2,4-Trichlorobenzene	µg/L											
VOCs	1,2,4-Trimethylbenzene	µg/L											
VOCs	1,2-Dichlorobenzene	µg/L											
VOCs	1,2-Dichloroethane	µg/L	50 U	15	15	11	5	8	22	22 J	14		6
VOCs	1,2-Dichloroethene (total)	µg/L	50 U	5 U	5 U	5 U	5 U	5 U	5 U	25 U	5 U		5 U
VOCs	1,2-Dichloropropane	µg/L	50 U	5 U	5 U	5 U	5 U	5 U	5 U	25 U	5 U		5 U
VOCs	1,3,5-Trimethylbenzene	µg/L											
VOCs	1,3-Dichlorobenzene	µg/L											
VOCs	1,4-Dichlorobenzene	µg/L											
VOCs	2,4,4-Trimethyl-1-pentene	µg/L	100 U	10 U	10 U	10 U	7	10 U	10 U	50 U	10 U		10 U
VOCs	2,4,4-Trimethyl-2-pentene	µg/L	100 U	10 U	10 U	10 U	2	10 U	10 U	50 U	10 U		10 U
VOCs	2-Butanone	µg/L		15	15 U		15 U	5 J					15 U
VOCs	2-Hexanone	µg/L		15 U	15 U		15 U	15 U					15 U
VOCs	4-iso-Propyltoluene	µg/L											
VOCs	4-Methyl-2-pentanone	µg/L		15 U	15 U		15 U	15 U					15 U
VOCs	Acetone	µg/L		230	220		15 U	58					200
VOCs	Benzene	µg/L	50 U	1	5 U	5 U	5 U	5 U	5 U	25 U	5 U		5 U
VOCs	Bromochloromethane	µg/L											
VOCs	Bromodichloromethane	µg/L	39 J	46	43	16	6	24	39	36	22		10
VOCs	Bromoform	µg/L	630	610	750	110	44	160	590	640	270		190
VOCs	Carbon disulfide	µg/L		7	10		4	9 J					4
VOCs	Carbon tetrachloride	µg/L	50 U	5 U	5 U	22	11	16	5 U	25 U	5 U		5 U
VOCs	Chlorobenzene	µg/L	50 U	9	5 U	5 U	5 U	5 U	5 U	25 U	5 U		5 U
VOCs	Chloroform	µg/L	36 J	18	32	32	16	23	42	38	13		6
VOCs	Chloromethane	µg/L	100 U	1	10 U	3 J	10 U	2 J	6 J	50 U	2 J		2
VOCs	Cis-1,2-Dichloroethene	µg/L											
VOCs	Dibromochloromethane	µg/L	180	250	170	20	7	30	190	180	100		45
VOCs	Dibromomethane	µg/L											
VOCs	Ethylbenzene	µg/L	50 U	5 U	5 U	5 U	5 U	5 U	5 U	25 U	5 U		5 U
VOCs	Isopropylbenzene	µg/L											
VOCs	Methyl Tertbutyl Ether	µg/L											
VOCs	Methylene chloride	µg/L	100 U	10 U	8	7 J	10 U	3 J	11	50 U	4 J		10 U
VOCs	Naphthalene	µg/L											
VOCs	Propylbenzene	µg/L											

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**										
		Location	GW-30DR	GW-30DR	GW-30DR	GW-35D	GW-35D	GW-35D	GW-37	GW-37	GW-37	GW-37	GW-37
		Sample Date	2/16/1990	8/4/1992	11/9/1992	2/16/1990	8/4/1992	11/5/1992	2/16/1990	8/30/1990	11/21/1990	12/21/1990	8/11/1992
		Sample ID	GW30DR	GW-30-DR	GW-30-DR	GW35D	GW-35-D	GW-35-D	GW37D	MW37D	GW37	GW37	GW-37
		Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
VOCs	Tetrachloroethene	µg/L	50 U	5 U	5 U	5 U	5 U	5 U	5 U	25 U	5 U		5 U
VOCs	Toluene	µg/L	26 J	19	27	8	4	8	42	29	14		7
VOCs	trans-1,2-Dichloroethene	µg/L											
VOCs	Trichloroethene	µg/L	50 U	1	5 U	3 J	1	3 J	3 J	25 U	5 U		1
VOCs	Vinyl chloride	µg/L	100 U	10 U	10 U	10 U	10 U	10 U	10 U	50 U	10 U		10 U
VOCs	Xylene, o	µg/L											
VOCs	Xylenes (m&p)	µg/L											
VOCs	Xylenes, Total	µg/L		5 U	5 U		5 U	5 U					5 U
SVOCs	1,2,4-Trichlorobenzene	µg/L	10 U	10 UJ	10 U	10 U	R	10 U	10 U	10 U	10 U		10 UJ
SVOCs	1,2-Dichlorobenzene	µg/L	10 U	10 UJ	10 U	10 U	R	10 U	10 U	10 U	10 U		10 UJ
SVOCs	1,3-Dichlorobenzene	µg/L	10 U	2 J	10 U	10 U	R	10 U	10 U	10 U	10 U		10 UJ
SVOCs	1,4-Dichlorobenzene	µg/L	10 U	10 UJ	10 U	10 U	R	10 U	10 U	10 U	10 U		10 UJ
SVOCs	2,4,6-Trichlorophenol	µg/L		10 UJ	10 U		R	10 U		10 U		10 U	10 UJ
SVOCs	2,4-Dichlorophenol	µg/L		1 J	1		R	10 U		10 U		10 U	1 J
SVOCs	2,4-Dimethylphenol	µg/L		10 UJ	10 U		R	10 U		10 U		10 U	10 UJ
SVOCs	2,4-Dinitrophenol	µg/L		25 UJ	25 U		R	25 U		50 U		50 U	25 UJ
SVOCs	2-Chlorophenol	µg/L		6 J	10 U		R	10 U		10 U		10 U	3 J
SVOCs	2-Methylnaphthalene	µg/L		10 UJ	10 U		R	10 U					10 UJ
SVOCs	2-Methylphenol	µg/L		16 J	20		R	10 U					7 J
SVOCs	2-Nitrophenol	µg/L		150 J	190		2 J	1 J		10 U		13	130 J
SVOCs	3 & 4 Methylphenol	µg/L											
SVOCs	4,6-Dinitro-2-methylphenol	µg/L		25 UJ	25 U		R	25 U		50 U		50 U	25 UJ
SVOCs	4-Bromophenyl phenyl ether	µg/L	10 U	10 UJ	10 U	1 J	R	5 J	10 U	10 U	10 U		10 UJ
SVOCs	4-Chloro-3-methylphenol	µg/L		10 UJ	6		R	10 U		10 U		10 U	10 UJ
SVOCs	4-Chloroaniline	µg/L		10 UJ	10 U		R	10 U					10 UJ
SVOCs	4-Chlorophenyl phenyl ether	µg/L	10 U	10 UJ	10 U	10 U	R	10 U	10 U	10 U	10 U		10 UJ
SVOCs	4-Methylphenol	µg/L		38 J	52		1 J	10 U					36 J
SVOCs	4-Nitrophenol	µg/L		120 J	160		30 J	3 J		50 U		50 U	110 J
SVOCs	Acenaphthylene	µg/L	10 U	10 UJ	10 U	10 U	R	10 U	10 U	10 U	10 U		10 UJ
SVOCs	Acetophenone	µg/L											
SVOCs	Benzaldehyde	µg/L											
SVOCs	Benzo(a)pyrene	µg/L	10 U	10 UJ	10 U	10 U	R	10 U	10 U	10 U	10 U		10 UJ
SVOCs	Benzo(b)fluoranthene	µg/L	10 U	10 UJ	10 U	10 U	R	10 U	10 U	10 U	10 U		10 UJ
SVOCs	Benzo(ghi)perylene	µg/L	10 U	10 UJ	10 U	10 U	R	10 U	10 U	10 U	10 U		10 UJ
SVOCs	Benzo(k)fluoranthene	µg/L	10 U	10 UJ	10 U	10 U	R	10 U	10 U	10 U	10 U		10 UJ
SVOCs	Benzoic Acid	µg/L		13 J	14		R	50 U					50 UJ
SVOCs	Benzyl alcohol	µg/L		10 UJ	5		R	2 J					10 UJ
SVOCs	Biphenyl	µg/L											
SVOCs	Bis(2-Ethylhexyl)phthalate	µg/L	2 J	15 UJ	10 U	6 JB	R	3 J	1 J	2 J	11 B		10 UJ

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**																					
		Location	GW-30DR		GW-30DR		GW-30DR		GW-35D		GW-35D		GW-35D		GW-37		GW-37		GW-37		GW-37		GW-37	
		Sample Date	2/16/1990		8/4/1992		11/9/1992		2/16/1990		8/4/1992		11/5/1992		2/16/1990		8/30/1990		11/21/1990		12/21/1990		8/11/1992	
		Sample ID	GW30DR		GW-30-DR		GW-30-DR		GW35D		GW-35-D		GW-35-D		GW37D		MW37D		GW37		GW37		GW-37	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
SVOCs	Caprolactam	µg/L																						
SVOCs	Chrysene	µg/L	10	U	10	UJ	10	U	10	U		R	10	U	10	U	10	U	10	U			10	UJ
SVOCs	Dibenz(a,h)anthracene	µg/L	10	U	10	UJ	10	U	10	U		R	10	U	10	U	10	U	10	U			10	UJ
SVOCs	Dibenzofuran	µg/L			2	J	2					R	10	U									1	J
SVOCs	Diethylphthalate	µg/L	10	U	10	UJ	10	U	10	U		R	10	U	10	U	3	J	10	U			10	UJ
SVOCs	Dimethylformamide	µg/L																						
SVOCs	Dimethylphthalate	µg/L	10	U	10	UJ	10	U	10	U		R	10	U	10	U	10	U	10	U			10	UJ
SVOCs	Di-n-butylphthalate	µg/L	9	J	10	UJ	10	U	10	U		R	10	U	10	U	10	U	10	U			10	UJ
SVOCs	Di-n-octylphthalate	µg/L	10	U	10	UJ	10	U	10	U		R	10	U	10	U	10	U	10	U			10	UJ
SVOCs	Diphenyl ether	µg/L																						
SVOCs	Fluoranthene	µg/L	10	U	10	UJ	10	U	10	U		R	10	U	10	U	10	U	10	U			10	UJ
SVOCs	Indeno(1,2,3-cd)pyrene	µg/L	10	U	10	UJ	10	U	10	U		R	10	U	10	U	10	U	10	U			10	UJ
SVOCs	Isophorone	µg/L	10	U	10	UJ	10	U	2	J		R	8	J	10	U	10	U	10	U			10	UJ
SVOCs	Naphthalene	µg/L	10	U	2	J	88		10	U		R	1	J	1	J	10	U	10	U			45	J
SVOCs	N-Nitrosodimethylamine	µg/L	10	U					10	U					10	U	10	U	10	U				
SVOCs	N-Nitrosodiphenylamine	µg/L	10	U	10	UJ	10	U	10	U		R	10	U	10	U	10	U	10	U			10	UJ
SVOCs	Pentachlorophenol	µg/L			25	UJ	25	U				R	25	UJ			50	U			50	U	25	UJ
SVOCs	Phenanthrene	µg/L	10	U	10	UJ	10	U	10	U		R	10	U	10	U	10	U	10	U			10	UJ
SVOCs	Phenol	µg/L			1000	J	1000				39	J	10	U			110				13		1100	J
SVOCs	Pyrene	µg/L	10	U	10	UJ	10	U	10	U		R	10	U	10	U	10	U	10	U			10	UJ
SVOCs2	Acenaphthylene	µg/L																						
SVOCs2	Benzo(a)pyrene	µg/L																						
SVOCs2	Benzo(b)fluoranthene	µg/L																						
SVOCs2	Benzo(ghi)perylene	µg/L																						
SVOCs2	Benzo(k)fluoranthene	µg/L																						
SVOCs2	Chrysene	µg/L																						
SVOCs2	Dibenz(a,h)anthracene	µg/L																						
SVOCs2	Fluoranthene	µg/L																						
SVOCs2	Indeno(1,2,3-cd)pyrene	µg/L																						
SVOCs2	Naphthalene	µg/L																						
SVOCs2	Phenanthrene	µg/L																						
SVOCs2	Pyrene	µg/L																						
NDMA	N-Nitrosodimethylamine	ng/L																						
Pest/Herb	2,4,5-T	µg/L																						
Pest/Herb	2,4,5-TP/Silvex	µg/L																						
Pest/Herb	2,4-DB	µg/L																						
Pest/Herb	Alpha-BHC	µg/L			0.13		0.3				0.08		0.05	U									0.26	
Pest/Herb	Beta-BHC	µg/L			0.05	U	0.05	U			0.05	U	0.05	U									0.088	
Pest/Herb	Delta-BHC	µg/L			0.05	U	0.05	U			0.05	U	0.05	U									0.05	U

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**																					
		Location	GW-30DR		GW-30DR		GW-30DR		GW-35D		GW-35D		GW-35D		GW-37		GW-37		GW-37		GW-37		GW-37	
		Sample Date	2/16/1990		8/4/1992		11/9/1992		2/16/1990		8/4/1992		11/5/1992		2/16/1990		8/30/1990		11/21/1990		12/21/1990		8/11/1992	
		Sample ID	GW30DR		GW-30-DR		GW-30-DR		GW35D		GW-35-D		GW-35-D		GW37D		MW37D		GW37		GW37		GW-37	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Pest/Herb	Dicamba	µg/L																						
Pest/Herb	Dieldrin	µg/L			0.1	U	0.1	U			0.1	U	0.1	U									0.1	U
Pest/Herb	Endosulfan I	µg/L			0.05	U	0.05	U			0.05	U	0.05	U									0.05	U
Pest/Herb	Endosulfan sulfate	µg/L			0.1	U	0.1	U			0.1	U	0.1	U									0.1	U
Pest/Herb	Endrin	µg/L			0.1	U	0.1	U			0.1	U	0.1	U									0.1	U
Pest/Herb	Gamma-BHC/Lindane	µg/L			0.05	U	0.05	U			0.05	U	0.05	U									0.13	
Pest/Herb	Heptachlor	µg/L			0.05	UJ	0.05	U			0.05	U	0.05	U									0.05	U
Pest/Herb	Heptachlor epoxide	µg/L			0.05	U	0.05	U			0.05	U	0.05	U									0.05	U
Pest/Herb	MCPA	µg/L																						
Pest/Herb	MCPP	µg/L																						
Pest/Herb	Pentachlorophenol	µg/L																						
Pest/Herb	Picloram	µg/L																						
VPH	Target Compounds	µg/L																						
EPH	Target Compounds	µg/L																						
Oils/Fuels	PETROLEUM NAPHTHA	mg/L																						
Oils/Fuels	Unmatched	mg/L																						

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**										
		Location	GW-37	GW-37	GW-38	GW-38	GW-38	GW-38	GW-38	GW-38	MP-1 #01	MP-1 #01	MP-1 #01
		Sample Date	11/16/1992	1/27/2000	2/16/1990	8/30/1990	11/21/1990	12/21/1990	8/4/1992	11/9/1992	1/20/2000	3/29/2004	5/17/2010
		Sample ID	GW-37	GW-37	GW38D	MW38D	GW38	GW38	GW-38	GW-38	MP-1-1	MP1-DAPL	OC-MP-1 #01-DUP
		Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FD
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
VOCs	1,1,1-Trichloroethane	µg/L	5 U	10 U	46	39	19		6	8	2.5 U		10 U
VOCs	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L											10 U
VOCs	1,1,2-Trichloroethane	µg/L	5 U	10 U	5 U	25 U	5 U		5 U	5 U	2.5 U		10 U
VOCs	1,1-Dichloroethane	µg/L	5 U	10 U	14	16 J	14		5	5	2.5 U		10 U
VOCs	1,1-Dichloroethene	µg/L	5 U	10 U	9	25 U	5		1	5 U	2.5 U		10 U
VOCs	1,2,4-Trichlorobenzene	µg/L									2.5 U		10 UJ
VOCs	1,2,4-Trimethylbenzene	µg/L									2.5 U		10 U
VOCs	1,2-Dichlorobenzene	µg/L									2.5 U		10 U
VOCs	1,2-Dichloroethane	µg/L	20	10	3 J	25 U	5 U		1	6	5.3		10 U
VOCs	1,2-Dichloroethene (total)	µg/L	5 U		5 U	25 U	5 U		5 U	5 U			
VOCs	1,2-Dichloropropane	µg/L	5 U	10 U	5 U	25 U	5 U		5 U	5 U	2.5 U		10 U
VOCs	1,3,5-Trimethylbenzene	µg/L									2.5 U		10 U
VOCs	1,3-Dichlorobenzene	µg/L									2.5 U		10 U
VOCs	1,4-Dichlorobenzene	µg/L									2.5 U		10 U
VOCs	2,4,4-Trimethyl-1-pentene	µg/L	10 U	10 U	120	100	130		130	49	2.5 U		10 U
VOCs	2,4,4-Trimethyl-2-pentene	µg/L	10 U	10 U	360	200	61		38	13	2.5 U		10 U
VOCs	2-Butanone	µg/L	15 U	20 UJ					15 U	15 U			R
VOCs	2-Hexanone	µg/L	15 U	20 UJ					15 U	15 U			R
VOCs	4-iso-Propyltoluene	µg/L									2.5 U		10 UJ
VOCs	4-Methyl-2-pentanone	µg/L	15 U	20 UJ					15 U	15 U			R
VOCs	Acetone	µg/L	280	75 U					17 U	40			R
VOCs	Benzene	µg/L	5 U	10 U	5 U	25 U	5 U		5 U	5 U	2.5 U		10 U
VOCs	Bromochloromethane	µg/L									2.5 U		10 U
VOCs	Bromodichloromethane	µg/L	30	11	3 J	25 U	5 U		5 U	8	4.4		7.2 J
VOCs	Bromoform	µg/L	400	180	36	25 U	23		18	100	48		51 J
VOCs	Carbon disulfide	µg/L	24	12					10 U	6 J			16 J
VOCs	Carbon tetrachloride	µg/L	5 U	10 U	5 U	25 U	5 U		5 U	5 U	2.5 U		10 U
VOCs	Chlorobenzene	µg/L	5 U	10 U	5 U	25 U	5 U		5 U	5 U	2.5 U		10 U
VOCs	Chloroform	µg/L	75	32	3 J	11 J	5 U		1	13	33		60
VOCs	Chloromethane	µg/L	10 U	20 U	10 U	50 U	10 U		10 U	10 U	2.5 U		20 U
VOCs	Cis-1,2-Dichloroethene	µg/L		10 U							2.5 U		10 U
VOCs	Dibromochloromethane	µg/L	140	44	10	40	7		5	28	12		17
VOCs	Dibromomethane	µg/L									2.5 U		6.6 J
VOCs	Ethylbenzene	µg/L	5 U	10 U	5 U	25 U	5 U		5 U	5 U	2.5 U		10 U
VOCs	Isopropylbenzene	µg/L									2.5 U		10 U
VOCs	Methyl Tertbutyl Ether	µg/L									2.5 UJ		10 U
VOCs	Methylene chloride	µg/L	12	10 U	10 U	50 U	10 U		10 U	10 U	12 J		58
VOCs	Naphthalene	µg/L									2.5 U		50 UJ
VOCs	Propylbenzene	µg/L									2.5 U		10 U

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**										
		Location	GW-37	GW-37	GW-38	GW-38	GW-38	GW-38	GW-38	GW-38	MP-1 #01	MP-1 #01	MP-1 #01
		Sample Date	11/16/1992	1/27/2000	2/16/1990	8/30/1990	11/21/1990	12/21/1990	8/4/1992	11/9/1992	1/20/2000	3/29/2004	5/17/2010
		Sample ID	GW-37	GW-37	GW38D	MW38D	GW38	GW38	GW-38	GW-38	MP-1-1	MP1-DAPL	OC-MP-1 #01-DUP
		Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FD
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
VOCs	Tetrachloroethene	µg/L	5 U	10 U	5 U	25 U	5 U		5 U	5 U	2.5 U		10 U
VOCs	Toluene	µg/L	60	28	5 U	25 U	5 U		5 U	12	17		28
VOCs	trans-1,2-Dichloroethene	µg/L		10 U							2.5 U		10 U
VOCs	Trichloroethene	µg/L	4 J	10 U	5 U	25 U	5 U		5 U	5 U	2.5 U		10 U
VOCs	Vinyl chloride	µg/L	10 U	20 U	10 U	50 U	10 U		10 U	10 U	2.5 U		5 U
VOCs	Xylene, o	µg/L									2.5 U		10 U
VOCs	Xylenes (m&p)	µg/L									2.5 U		20 U
VOCs	Xylenes, Total	µg/L	5 U	10 U					5 U	5 U			
SVOCs	1,2,4-Trichlorobenzene	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		
SVOCs	1,2-Dichlorobenzene	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		
SVOCs	1,3-Dichlorobenzene	µg/L	10 U	42 U	10 U	10 U	10 U		1 J	10 U	1 U		
SVOCs	1,4-Dichlorobenzene	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		
SVOCs	2,4,6-Trichlorophenol	µg/L	10 U	42 U		10 U		10 U	10 UJ	10 U	2 U		4.5 U
SVOCs	2,4-Dichlorophenol	µg/L	10 U	42 U		10 U		10 U	10 UJ	1	1 U		4.5 U
SVOCs	2,4-Dimethylphenol	µg/L	10 U	42 UJ		10 U		10 U	10 UJ	10 U	1 U		4.5 U
SVOCs	2,4-Dinitrophenol	µg/L	25 U	210 UJ		50 U		50 U	25 UJ	25 U	19 U		4.5 U
SVOCs	2-Chlorophenol	µg/L	10 U	42 U		10 U		10 U	10 UJ	10 U	10		7.3
SVOCs	2-Methylnaphthalene	µg/L	10 U	42 U					10 UJ	10 U	1 U		0.91 U
SVOCs	2-Methylphenol	µg/L	6 J	42 U					3 J	5	16		9.2 J
SVOCs	2-Nitrophenol	µg/L	130	42 U		3 J		10 U	75 J	150	1 U		140
SVOCs	3 & 4 Methylphenol	µg/L											16 J
SVOCs	4,6-Dinitro-2-methylphenol	µg/L	25 U	210 UJ		50 U		50 U	25 UJ	25 U	5 U		R
SVOCs	4-Bromophenyl phenyl ether	µg/L	10 U	42 U	10	8 J	10 U		1 J	10 U	2 U		4.5 U
SVOCs	4-Chloro-3-methylphenol	µg/L	10 U	42 U		10 U		10 U	10 UJ	10 U	2 J		4.5 U
SVOCs	4-Chloroaniline	µg/L	10 U	42 U					10 UJ	10 U	1 U		4.5 UJ
SVOCs	4-Chlorophenyl phenyl ether	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		4.5 U
SVOCs	4-Methylphenol	µg/L	34	42 U					10 J	19	23		
SVOCs	4-Nitrophenol	µg/L	190 J	210 U		2 J		50 U	99 J	150	10 U		58 J
SVOCs	Acenaphthylene	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		0.27 U
SVOCs	Acetophenone	µg/L											10 J
SVOCs	Benzaldehyde	µg/L											4.4 J
SVOCs	Benzo(a)pyrene	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		0.18 U
SVOCs	Benzo(b)fluoranthene	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		0.27 U
SVOCs	Benzo(ghi)perylene	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		0.45 U
SVOCs	Benzo(k)fluoranthene	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		0.27 U
SVOCs	Benzoic Acid	µg/L	3 J	210 UJ					2 J	4	24 J		R
SVOCs	Benzyl alcohol	µg/L	10 U	42 U					3 J	10 U	5 U		2.1 J
SVOCs	Biphenyl	µg/L											4.5 U
SVOCs	Bis(2-Ethylhexyl)phthalate	µg/L	10 U	42 U	4 J	10 U	7 JB		10 UJ	10 U	12		1.8 U

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**										
		Location	GW-37	GW-37	GW-38	GW-38	GW-38	GW-38	GW-38	GW-38	MP-1 #01	MP-1 #01	MP-1 #01
		Sample Date	11/16/1992	1/27/2000	2/16/1990	8/30/1990	11/21/1990	12/21/1990	8/4/1992	11/9/1992	1/20/2000	3/29/2004	5/17/2010
		Sample ID	GW-37	GW-37	GW38D	MW38D	GW38	GW38	GW-38	GW-38	MP-1-1	MP1-DAPL	OC-MP-1 #01-DUP
		Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FD
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
SVOCs	Caprolactam	µg/L											R
SVOCs	Chrysene	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		0.91 U
SVOCs	Dibenz(a,h)anthracene	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		0.45 UJ
SVOCs	Dibenzofuran	µg/L	10 U	42 U					10 UJ	10 U	1 U		4.5 U
SVOCs	Diethylphthalate	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	2 U		4.5 U
SVOCs	Dimethylformamide	µg/L											
SVOCs	Dimethylphthalate	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	2 U		4.5 U
SVOCs	Di-n-butylphthalate	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	2 U		4.5 U
SVOCs	Di-n-octylphthalate	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	2 U		4.5 U
SVOCs	Diphenyl ether	µg/L											1 J
SVOCs	Fluoranthene	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		0.91 U
SVOCs	Indeno(1,2,3-cd)pyrene	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		0.45 U
SVOCs	Isophorone	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		R
SVOCs	Naphthalene	µg/L	63	42 U	10 U	10 U	10 U		10 UJ	49	86		
SVOCs	N-Nitrosodimethylamine	µg/L			10 U	10 U	10 U						1.4 J
SVOCs	N-Nitrosodiphenylamine	µg/L	10 U	42 U	21	18	21		1 J	10 U	1 U		4.5 U
SVOCs	Pentachlorophenol	µg/L	25 U	210 U		50 U		50 U	25 UJ	25 U	3 U		R
SVOCs	Phenanthrene	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		0.18 U
SVOCs	Phenol	µg/L	1000 B	210 J		5 J		7 J	360 J	500	1000		530 J
SVOCs	Pyrene	µg/L	10 U	42 U	10 U	10 U	10 U		10 UJ	10 U	1 U		4.5 U
SVOCs2	Acenaphthylene	µg/L									0.77 J		
SVOCs2	Benzo(a)pyrene	µg/L									0.021 U		
SVOCs2	Benzo(b)fluoranthene	µg/L									0.033 U		
SVOCs2	Benzo(ghi)perylene	µg/L									0.094 U		
SVOCs2	Benzo(k)fluoranthene	µg/L									0.026 U		
SVOCs2	Chrysene	µg/L									0.056 U		
SVOCs2	Dibenz(a,h)anthracene	µg/L									0.045 U		
SVOCs2	Fluoranthene	µg/L									0.019 U		
SVOCs2	Indeno(1,2,3-cd)pyrene	µg/L									0.061 U		
SVOCs2	Naphthalene	µg/L									0.9 J		
SVOCs2	Phenanthrene	µg/L									0.044 U		
SVOCs2	Pyrene	µg/L									0.17 U		
NDMA	N-Nitrosodimethylamine	ng/L										1900 J	
Pest/Herb	2,4,5-T	µg/L									0.0356 J		
Pest/Herb	2,4,5-TP/Silvex	µg/L									0.259		
Pest/Herb	2,4-DB	µg/L									0.095 U		
Pest/Herb	Alpha-BHC	µg/L	0.14						0.14	0.098	0.089		
Pest/Herb	Beta-BHC	µg/L	0.059						0.05 U	0.05 U	0.01 U		
Pest/Herb	Delta-BHC	µg/L	0.05 U						0.05 U	0.05 U	0.029 U		

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**																			
		Location	GW-37		GW-37		GW-38		GW-38		GW-38		GW-38		GW-38		MP-1 #01		MP-1 #01		MP-1 #01	
		Sample Date	11/16/1992		1/27/2000		2/16/1990		8/30/1990		11/21/1990		12/21/1990		8/4/1992		11/9/1992		1/20/2000		3/29/2004		5/17/2010	
		Sample ID	GW-37		GW-37		GW38D		MW38D		GW38		GW38		GW-38		GW-38		MP-1-1		MP1-DAPL		OC-MP-1 #01-DUP	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FD	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Pest/Herb	Dicamba	µg/L																	0.201	J				
Pest/Herb	Dieldrin	µg/L	0.1	U											0.14		0.1	U	0.02	U				
Pest/Herb	Endosulfan I	µg/L	0.052												0.05	U	0.05	U	0.01	U				
Pest/Herb	Endosulfan sulfate	µg/L	0.1	U											0.1	U	0.1	U	0.02	U				
Pest/Herb	Endrin	µg/L	0.1	U											0.1	U	0.1	U	0.047	J				
Pest/Herb	Gamma-BHC/Lindane	µg/L	0.09												0.05	U	0.05	U	0.01	U				
Pest/Herb	Heptachlor	µg/L	0.05	U											0.06	J	0.05	U	0.01	U				
Pest/Herb	Heptachlor epoxide	µg/L	0.05	U											0.05	U	0.05	U	0.01	U				
Pest/Herb	MCPA	µg/L																	94	J				
Pest/Herb	MCPP	µg/L																	340					
Pest/Herb	Pentachlorophenol	µg/L																	0.1					
Pest/Herb	Picloram	µg/L																	50					
VPH	Target Compounds	µg/L																	ND					
EPH	Target Compounds	µg/L																	ND					
Oils/Fuels	PETROLEUM NAPHTHA	mg/L																						
Oils/Fuels	Unmatched	mg/L																						

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**		**Off-Property West Ditch DAPL Pool**								
		Location	MP-1 #01	MP-1 #01	GW-36	GW-36	GW-36	GW-36	GW-36	GW-36	GW-36	GW-36	GW-42D
		Sample Date	5/17/2010	10/20/2010	2/16/1990	8/30/1990	11/21/1990	12/21/1990	12/10/1991	8/11/1992	11/16/1992	1/27/2000	12/10/1991
		Sample ID	OC-MP-1 #01-XXX	OC-MP-1 #01-XXX	GW36D	MW36D	GW36	GW36	GW-36	GW-36	GW-36	GW-36	GW-42-D
		Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
VOCs	1,1,1-Trichloroethane	µg/L	10 U	50 U	5 U	25 U	5 U		2 J	5 U	5 U	25 U	5 U
VOCs	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	10 U	50 U									
VOCs	1,1,2-Trichloroethane	µg/L	10 U	50 U	5 U	25 U	5 U		2 J	5 U	5 U	25 U	5 U
VOCs	1,1-Dichloroethane	µg/L	10 U	50 U	5 U	25 U	5 U		5 U	5 U	5 U	25 U	5 U
VOCs	1,1-Dichloroethene	µg/L	10 U	50 U	5 U	25 U	5 U		5 U	5 U	5 U	25 U	5 U
VOCs	1,2,4-Trichlorobenzene	µg/L	10 UJ	50 U									
VOCs	1,2,4-Trimethylbenzene	µg/L	10 U	50 U									
VOCs	1,2-Dichlorobenzene	µg/L	10 U	50 U									
VOCs	1,2-Dichloroethane	µg/L	10 U	50 U	6	26	5		22	4	16	25 U	1 J
VOCs	1,2-Dichloroethene (total)	µg/L			5 U	25 U	5 U		5 U	5 U	5 U		5 U
VOCs	1,2-Dichloropropane	µg/L	10 U	50 U	5 U	25 U	5 U		1 J	5 U	5 U	25 U	5 U
VOCs	1,3,5-Trimethylbenzene	µg/L	10 U	50 U									
VOCs	1,3-Dichlorobenzene	µg/L	10 U	50 U									
VOCs	1,4-Dichlorobenzene	µg/L	10 U	50 U									
VOCs	2,4,4-Trimethyl-1-pentene	µg/L	10 U	50 U	10 U	50 U	10 U		10 U	10 U	10 U	25 U	10 U
VOCs	2,4,4-Trimethyl-2-pentene	µg/L	10 U	50 U	10 U	50 U	10 U		10 U	10 U	10 U	25 U	10 U
VOCs	2-Butanone	µg/L	R	500 U					18 U	15 U	15 U	50 UJ	46
VOCs	2-Hexanone	µg/L	R	500 U					160	15 U	15 U	50 UJ	150
VOCs	4-iso-Propyltoluene	µg/L	10 UJ	50 U									
VOCs	4-Methyl-2-pentanone	µg/L	R	500 U					1 J	15 U	15 U	50 UJ	3 J
VOCs	Acetone	µg/L	R	2500 UJ					130	26 U	920	140 U	190
VOCs	Benzene	µg/L	10 U	50 U	5 U	25 U	5 U		3 J	5 U	5 U	25 U	1 J
VOCs	Bromochloromethane	µg/L	10 U	50 U									
VOCs	Bromodichloromethane	µg/L	7.5 J	50 UJ	7	40	7		34	6	12	26	1 J
VOCs	Bromoform	µg/L	55 J	35 J	130	760	120		680	79	170	410	18
VOCs	Carbon disulfide	µg/L	16 J	500 U					14	10 U	24	25 U	23
VOCs	Carbon tetrachloride	µg/L	10 U	50 U	3 J	25 U	5 U		1 J	2	5 U	25 U	5 U
VOCs	Chlorobenzene	µg/L	10 U	50 U	5 U	25 U	5 U		1 J	5 U	5 U	25 U	5 U
VOCs	Chloroform	µg/L	65	56 U	19	78	12		51	9	94	55	59
VOCs	Chloromethane	µg/L	20 U	100 U	2 J	50 U	10 U		5 J	10 U	6 J	50 U	6 J
VOCs	Cis-1,2-Dichloroethene	µg/L	10 U	50 U								25 U	
VOCs	Dibromochloromethane	µg/L	17	170	29	170	28		150	19	39	94	3 J
VOCs	Dibromomethane	µg/L	6.4 J	50 U									
VOCs	Ethylbenzene	µg/L	10 U	50 U	5 U	25 U	5 U		1 J	5 U	2 J	25 U	1 J
VOCs	Isopropylbenzene	µg/L	10 U	50 U									
VOCs	Methyl Tertbutyl Ether	µg/L	10 U	50 U									
VOCs	Methylene chloride	µg/L	49	100 U	3 J	50 U	10 U		10 U	10 U	13	25 U	4 U
VOCs	Naphthalene	µg/L	50 UJ	250 U									
VOCs	Propylbenzene	µg/L	10 U	50 U									

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**		**Off-Property West Ditch DAPL Pool**								
		Location	MP-1 #01	MP-1 #01	GW-36	GW-36	GW-36	GW-36	GW-36	GW-36	GW-36	GW-36	GW-42D
		Sample Date	5/17/2010	10/20/2010	2/16/1990	8/30/1990	11/21/1990	12/21/1990	12/10/1991	8/11/1992	11/16/1992	1/27/2000	12/10/1991
		Sample ID	OC-MP-1 #01-XXX	OC-MP-1 #01-XXX	GW36D	MW36D	GW36	GW36	GW-36	GW-36	GW-36	GW-36	GW-42-D
		Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
VOCs	Tetrachloroethene	µg/L	10 U	50 U	5 U	25 U	5 U		78	5 U	5 U	25 U	4 U
VOCs	Toluene	µg/L	26	28 J	12	55	8		37	7	57	44	56
VOCs	trans-1,2-Dichloroethene	µg/L	10 U	50 U								25 U	
VOCs	Trichloroethene	µg/L	10 U	50 U	5 U	25 U	5 U		3 J	1	4 J	25 U	5
VOCs	Vinyl chloride	µg/L	5 U	25 U	10 U	50 U	10 U		10 U	10 U	10 U	50 U	10 U
VOCs	Xylene, o	µg/L	10 U	50 U									
VOCs	Xylenes (m&p)	µg/L	20 U	100 U									
VOCs	Xylenes, Total	µg/L							1 J	5 U	5 U	25 U	5 U
SVOCs	1,2,4-Trichlorobenzene	µg/L			10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	1,2-Dichlorobenzene	µg/L			10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	1,3-Dichlorobenzene	µg/L			10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	1,4-Dichlorobenzene	µg/L			10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	2,4,6-Trichlorophenol	µg/L	4.5 U	45 U		10 U		10 U	R	10 U	10 U	100 U	R
SVOCs	2,4-Dichlorophenol	µg/L	4.5 U	45 U		10 U		10 U	R	1	10 U	100 U	R
SVOCs	2,4-Dimethylphenol	µg/L	4.5 U	45 U		10 U		10 U	R	10 U	10 U	100 UJ	R
SVOCs	2,4-Dinitrophenol	µg/L	4.5 U	45 U		50 U		50 U	R	25 U	25 U	520 UJ	R
SVOCs	2-Chlorophenol	µg/L	7.6	4.9 J		10 U		10 U	R	10 U	10 U	100 U	R
SVOCs	2-Methylnaphthalene	µg/L	0.91 U	9.1 U					10 U	10 U	10 U	100 U	11 U
SVOCs	2-Methylphenol	µg/L	9.7 J	6.7 J					R	10	6 J	100 U	R
SVOCs	2-Nitrophenol	µg/L	150	74		10 U		76	R	120	120	100 U	R
SVOCs	3 & 4 Methylphenol	µg/L	16 J	12 J									
SVOCs	4,6-Dinitro-2-methylphenol	µg/L	R	45 U		50 U		50 U	R	25 U	25 U	520 UJ	R
SVOCs	4-Bromophenyl phenyl ether	µg/L	4.5 U	45 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	4-Chloro-3-methylphenol	µg/L	4.5 U	45 U		10 U		10 U	R	10 U	10 U	100 U	R
SVOCs	4-Chloroaniline	µg/L	4.5 UJ	45 U					10 U	10 U	10 U	100 U	11 U
SVOCs	4-Chlorophenyl phenyl ether	µg/L	4.5 U	45 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	4-Methylphenol	µg/L							15 J	38	27	100 U	46 J
SVOCs	4-Nitrophenol	µg/L	53 J	42 J		50 U		13 J	22 J	180	170 J	520 U	13 J
SVOCs	Acenaphthylene	µg/L	0.27 U	2.7 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Acetophenone	µg/L	11 J	7.1 J									
SVOCs	Benzaldehyde	µg/L	4.8	45 U									
SVOCs	Benzo(a)pyrene	µg/L	0.18 U	1.8 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Benzo(b)fluoranthene	µg/L	0.27 U	2.7 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Benzo(ghi)perylene	µg/L	0.45 U	4.5 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Benzo(k)fluoranthene	µg/L	0.27 U	2.7 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Benzoic Acid	µg/L	R	45 UJ					43 J	12	5 J	520 UJ	54 J
SVOCs	Benzyl alcohol	µg/L	2.2 J	91 U					4 J	3	10 U	100 U	2 J
SVOCs	Biphenyl	µg/L	4.5 U	45 U									
SVOCs	Bis(2-Ethylhexyl)phthalate	µg/L	1.8 U	18 U	2 J	2 J	8 JB		3 J	10 U	10 U	100 U	11 U

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**		**Off-Property West Ditch DAPL Pool**								
		Location	MP-1 #01	MP-1 #01	GW-36	GW-36	GW-36	GW-36	GW-36	GW-36	GW-36	GW-36	GW-42D
		Sample Date	5/17/2010	10/20/2010	2/16/1990	8/30/1990	11/21/1990	12/21/1990	12/10/1991	8/11/1992	11/16/1992	1/27/2000	12/10/1991
		Sample ID	OC-MP-1 #01-XXX	OC-MP-1 #01-XXX	GW36D	MW36D	GW36	GW36	GW-36	GW-36	GW-36	GW-36	GW-42-D
		Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
SVOCs	Caprolactam	µg/L	R	45 UJ									
SVOCs	Chrysene	µg/L	0.91 U	9.1 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Dibenz(a,h)anthracene	µg/L	0.45 UJ	4.5 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Dibenzofuran	µg/L	4.5 U	45 U					10 U	10 U	10 U	100 U	11 U
SVOCs	Diethylphthalate	µg/L	4.5 U	45 U	10 U	1 J	10 U		2 U	10 U	10 U	100 U	11 U
SVOCs	Dimethylformamide	µg/L											
SVOCs	Dimethylphthalate	µg/L	4.5 U	45 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Di-n-butylphthalate	µg/L	4.5 U	45 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Di-n-octylphthalate	µg/L	4.5 U	45 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Diphenyl ether	µg/L	0.93 J	45 U									
SVOCs	Fluoranthene	µg/L	0.91 U	9.1 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Indeno(1,2,3-cd)pyrene	µg/L	0.45 U	4.5 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Isophorone	µg/L	R	45 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Naphthalene	µg/L			10 U	10 U	10 U		10 U	10 U	69	100 U	11 U
SVOCs	N-Nitrosodimethylamine	µg/L	1.3 J	45 U	10 U	10 U	10 U						
SVOCs	N-Nitrosodiphenylamine	µg/L	4.5 U	45 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Pentachlorophenol	µg/L	R	9.1 U		50 U		50 U	R	25 U	25 U	520 U	R
SVOCs	Phenanthrene	µg/L	0.18 U	1.8 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs	Phenol	µg/L	460 J	360 J		280		160	240 J	1300	1200 B	520 J	350 J
SVOCs	Pyrene	µg/L	4.5 U	45 U	10 U	10 U	10 U		10 U	10 U	10 U	100 U	11 U
SVOCs2	Acenaphthylene	µg/L											
SVOCs2	Benzo(a)pyrene	µg/L											
SVOCs2	Benzo(b)fluoranthene	µg/L											
SVOCs2	Benzo(ghi)perylene	µg/L											
SVOCs2	Benzo(k)fluoranthene	µg/L											
SVOCs2	Chrysene	µg/L											
SVOCs2	Dibenz(a,h)anthracene	µg/L											
SVOCs2	Fluoranthene	µg/L											
SVOCs2	Indeno(1,2,3-cd)pyrene	µg/L											
SVOCs2	Naphthalene	µg/L											
SVOCs2	Phenanthrene	µg/L											
SVOCs2	Pyrene	µg/L											
NDMA	N-Nitrosodimethylamine	ng/L											
Pest/Herb	2,4,5-T	µg/L											
Pest/Herb	2,4,5-TP/Silvex	µg/L											
Pest/Herb	2,4-DB	µg/L											
Pest/Herb	Alpha-BHC	µg/L							0.5 U	0.14	0.13		0.12 J
Pest/Herb	Beta-BHC	µg/L							0.5 U	0.05 U	0.05 U		0.06 UJ
Pest/Herb	Delta-BHC	µg/L							0.5 U	0.05 U	0.05 U		0.2 J

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**On-Property DAPL Pool**				**Off-Property West Ditch DAPL Pool**																	
		Location	MP-1 #01		MP-1 #01		GW-36		GW-36		GW-36		GW-36		GW-36		GW-36		GW-36		GW-42D			
		Sample Date	5/17/2010		10/20/2010		2/16/1990		8/30/1990		11/21/1990		12/21/1990		12/10/1991		8/11/1992		11/16/1992		1/27/2000		12/10/1991	
		Sample ID	OC-MP-1 #01-XXX		OC-MP-1 #01-XXX		GW36D		MW36D		GW36		GW36		GW-36		GW-36		GW-36		GW-36		GW-42-D	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Pest/Herb	Dicamba	µg/L																						
Pest/Herb	Dieldrin	µg/L													1	U	0.1	U	0.1	U			0.1	UJ
Pest/Herb	Endosulfan I	µg/L													0.5	U	0.05	U	0.05	U			0.05	UJ
Pest/Herb	Endosulfan sulfate	µg/L													1	U	0.1	U	0.1	U			0.1	UJ
Pest/Herb	Endrin	µg/L													1	U	0.1	U	0.1	U			0.1	UJ
Pest/Herb	Gamma-BHC/Lindane	µg/L													0.5	U	0.05	U	0.05	U			0.06	UJ
Pest/Herb	Heptachlor	µg/L													0.5	U	0.05	U	0.05	U			0.06	UJ
Pest/Herb	Heptachlor epoxide	µg/L													0.5	U	0.05	U	0.05	U			0.06	UJ
Pest/Herb	MCPA	µg/L																						
Pest/Herb	MCPP	µg/L																						
Pest/Herb	Pentachlorophenol	µg/L																						
Pest/Herb	Picloram	µg/L																						
VPH	Target Compounds	µg/L																						
EPH	Target Compounds	µg/L																						
Oils/Fuels	PETROLEUM NAPHTHA	mg/L																						
Oils/Fuels	Unmatched	mg/L																						

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Off-Property West Ditch DAPL Pool**										
		Location	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-43D	GW-43D
		Sample Date	12/10/1991	8/5/1992	8/5/1992	11/11/1992	11/11/1992	4/1/2003	3/29/2004	6/2/2008	7/9/2008	8/5/1992	8/5/1992
		Sample ID	GW-42-D DUP	GW-42-D	GW-42-D DUP	GW-42-D	GW-42-D DUP	SD-GW-42D	GW-42D	OC-GW-42D	OC-GW-42D	GW-43-D	GW-43-D DUP
		Qc Code	FD	FS	FD	FS	FD	FS	FS	FS	FS	FS	FD
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
VOCs	1,1,1-Trichloroethane	µg/L	5 U	5 U	5 U	5 U	5 U					5 U	5 U
VOCs	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L											
VOCs	1,1,2-Trichloroethane	µg/L	5 U	5 U	5 U	5 U	5 U					5 U	5 U
VOCs	1,1-Dichloroethane	µg/L	5 U	5 U	5 U	5 U	5 U					5 U	5 U
VOCs	1,1-Dichloroethene	µg/L	5 U	5 U	5 U	5 U	5 U					5 U	5 U
VOCs	1,2,4-Trichlorobenzene	µg/L											
VOCs	1,2,4-Trimethylbenzene	µg/L											
VOCs	1,2-Dichlorobenzene	µg/L											
VOCs	1,2-Dichloroethane	µg/L	1 J	2	2	5 U	5 U					2	2
VOCs	1,2-Dichloroethene (total)	µg/L	5 U	5 U	5 U	5 U	5 U					1	1
VOCs	1,2-Dichloropropane	µg/L	5 U	5 U	5 U	5 U	5 U					5 U	5 U
VOCs	1,3,5-Trimethylbenzene	µg/L											
VOCs	1,3-Dichlorobenzene	µg/L											
VOCs	1,4-Dichlorobenzene	µg/L											
VOCs	2,4,4-Trimethyl-1-pentene	µg/L	10 U	10 U	10 U	10 U	10 U					10 U	10 U
VOCs	2,4,4-Trimethyl-2-pentene	µg/L	10 U	10 U	10 U	10 U	10 U					10 U	10 U
VOCs	2-Butanone	µg/L	42	15 UJ	64 J	52	46					15 U	15 U
VOCs	2-Hexanone	µg/L	150	15 U	15 U	15 U	15 U					15 U	15 U
VOCs	4-iso-Propyltoluene	µg/L											
VOCs	4-Methyl-2-pentanone	µg/L	3 J	15 U	15 U	4 J	3 J					15 U	15 U
VOCs	Acetone	µg/L	150	630	860	300 U	260 B					15 U	15 U
VOCs	Benzene	µg/L	1 J	5 U	5 U	5 UJ	5 U					5 U	5 U
VOCs	Bromochloromethane	µg/L											
VOCs	Bromodichloromethane	µg/L	5 U	5 U	5 U	5 U	1 J					4	4
VOCs	Bromoform	µg/L	19	4	5	21	18					2	2
VOCs	Carbon disulfide	µg/L	23	4	5	12	18					10 U	10 U
VOCs	Carbon tetrachloride	µg/L	5 U	5 U	5 U	5 U	5 U					5 U	5 U
VOCs	Chlorobenzene	µg/L	1 J	5 U	5 U	5 UJ	5 U					5 U	5 U
VOCs	Chloroform	µg/L	60	7	9	44	52					4	4
VOCs	Chloromethane	µg/L	9 J	10 U	10 U	4 J	6 J					10 U	10 U
VOCs	Cis-1,2-Dichloroethene	µg/L											
VOCs	Dibromochloromethane	µg/L	3 J	5 UJ	1 J	3 J	3 J					3	5 U
VOCs	Dibromomethane	µg/L											
VOCs	Ethylbenzene	µg/L	1 J	5 U	5 U	5 U	1 J					5 U	5 U
VOCs	Isopropylbenzene	µg/L											
VOCs	Methyl Tertbutyl Ether	µg/L											
VOCs	Methylene chloride	µg/L	3 U	10 U	10 U	10 U	10 U					10 U	10 U
VOCs	Naphthalene	µg/L											
VOCs	Propylbenzene	µg/L											

Prepared by BJS 09/18/2017
Checked by JBR 09/22/2017

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Off-Property West Ditch DAPL Pool**										
		Location	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-43D	GW-43D
		Sample Date	12/10/1991	8/5/1992	8/5/1992	11/11/1992	11/11/1992	4/1/2003	3/29/2004	6/2/2008	7/9/2008	8/5/1992	8/5/1992
		Sample ID	GW-42-D DUP	GW-42-D	GW-42-D DUP	GW-42-D	GW-42-D DUP	SD-GW-42D	GW-42D	OC-GW-42D	OC-GW-42D	GW-43-D	GW-43-D DUP
		Qc Code	FD	FS	FD	FS	FD	FS	FS	FS	FS	FS	FD
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
VOCs	Tetrachloroethene	µg/L	3 U	5 U	5 U	5 U	5 U					5 U	5 U
VOCs	Toluene	µg/L	54	16	15	37	49 J					3	2
VOCs	trans-1,2-Dichloroethene	µg/L											
VOCs	Trichloroethene	µg/L	5	1	1	3 J	4 J					5 U	5 U
VOCs	Vinyl chloride	µg/L	10 U	10 U	10 U	10 U	10 U					10 U	10 U
VOCs	Xylene, o	µg/L											
VOCs	Xylenes (m&p)	µg/L											
VOCs	Xylenes, Total	µg/L	1 J	5 U	5 U	5 U	5 UJ					5 U	5 U
SVOCs	1,2,4-Trichlorobenzene	µg/L	10 U	10 U	10 UJ	10 U	10 U					1 J	10 UJ
SVOCs	1,2-Dichlorobenzene	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 UJ	10 U
SVOCs	1,3-Dichlorobenzene	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 UJ	2 J
SVOCs	1,4-Dichlorobenzene	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 U	10 UJ
SVOCs	2,4,6-Trichlorophenol	µg/L	R	10 U	10 UJ	10 U	10 U					10 UJ	10 U
SVOCs	2,4-Dichlorophenol	µg/L	R	10 U	10 UJ	10 U	10 U					10 UJ	10 U
SVOCs	2,4-Dimethylphenol	µg/L	R	10 U	10 UJ	10 U	10 U					10 U	10 UJ
SVOCs	2,4-Dinitrophenol	µg/L	R	30 UJ	25 U	25 U	25 U					25 U	25 UJ
SVOCs	2-Chlorophenol	µg/L	R	10 U	10 UJ	3 J	10 U					10 U	10 UJ
SVOCs	2-Methylnaphthalene	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 U	10 UJ
SVOCs	2-Methylphenol	µg/L	R	2	3 J	3 J	4 J					1 J	10 UJ
SVOCs	2-Nitrophenol	µg/L	9 J	160 J	82 J	210	220					15 J	9
SVOCs	3 & 4 Methylphenol	µg/L											
SVOCs	4,6-Dinitro-2-methylphenol	µg/L	R	30 UJ	25 U	25 U	25 U					25 U	25 UJ
SVOCs	4-Bromophenyl phenyl ether	µg/L	10 U	10 U	10 UJ	10 U	10 U					3	5 J
SVOCs	4-Chloro-3-methylphenol	µg/L	R	10 UJ	2 J	10 U	10 U					10 U	10 UJ
SVOCs	4-Chloroaniline	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 U	10 UJ
SVOCs	4-Chlorophenyl phenyl ether	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 UJ	10 U
SVOCs	4-Methylphenol	µg/L	42 J	39	56 J	81	86					5 J	3
SVOCs	4-Nitrophenol	µg/L	13 J	170 J	110 J	310 J	300					5 J	25 J
SVOCs	Acenaphthylene	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 U	10 UJ
SVOCs	Acetophenone	µg/L											
SVOCs	Benzaldehyde	µg/L											
SVOCs	Benzo(a)pyrene	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 UJ	10 U
SVOCs	Benzo(b)fluoranthene	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 U	10 UJ
SVOCs	Benzo(ghi)perylene	µg/L	10 U	10 UJ	10 U	10 U	10 U					10 U	10 UJ
SVOCs	Benzo(k)fluoranthene	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 U	10 UJ
SVOCs	Benzoic Acid	µg/L	51 J	14 J	50 UJ	50 U	50 U					50 UJ	50 U
SVOCs	Benzyl alcohol	µg/L	2 J	1 J	3 J	3 J	2 J					1	1 J
SVOCs	Biphenyl	µg/L											
SVOCs	Bis(2-Ethylhexyl)phthalate	µg/L	10 U	26 UJ	10 UJ	10 U	10 U					10 U	10 UJ

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Off-Property West Ditch DAPL Pool**										
		Location	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-43D	GW-43D
		Sample Date	12/10/1991	8/5/1992	8/5/1992	11/11/1992	11/11/1992	4/1/2003	3/29/2004	6/2/2008	7/9/2008	8/5/1992	8/5/1992
		Sample ID	GW-42-D DUP	GW-42-D	GW-42-D DUP	GW-42-D	GW-42-D DUP	SD-GW-42D	GW-42D	OC-GW-42D	OC-GW-42D	GW-43-D	GW-43-D DUP
		Qc Code	FD	FS	FD	FS	FD	FS	FS	FS	FS	FS	FD
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
SVOCs	Caprolactam	µg/L											
SVOCs	Chrysene	µg/L	10 U	10 UJ	10 U	10 U	10 U					10 UJ	10 U
SVOCs	Dibenz(a,h)anthracene	µg/L	10 U	10 UJ	10 U	10 U	10 U					10 U	10 UJ
SVOCs	Dibenzofuran	µg/L	10 U	10 UJ	10 U	10 U	10 U					10 U	10 UJ
SVOCs	Diethylphthalate	µg/L	5 U	10 UJ	10 U	10 U	10 U					10 U	10 UJ
SVOCs	Dimethylformamide	µg/L											
SVOCs	Dimethylphthalate	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 UJ	10 U
SVOCs	Di-n-butylphthalate	µg/L	10 U	10 U	10 UJ	10 U	10 U					1 J	10 UJ
SVOCs	Di-n-octylphthalate	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 U	10 UJ
SVOCs	Diphenyl ether	µg/L											
SVOCs	Fluoranthene	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 U	10 UJ
SVOCs	Indeno(1,2,3-cd)pyrene	µg/L	10 U	10 UJ	10 U	10 U	10 U					10 U	10 UJ
SVOCs	Isophorone	µg/L	10 U	10 UJ	10 U	10 U	10 U					1 J	10 UJ
SVOCs	Naphthalene	µg/L	10 U	1 J	10 UJ	42	68					2	3 J
SVOCs	N-Nitrosodimethylamine	µg/L											
SVOCs	N-Nitrosodiphenylamine	µg/L	10 U	10 U	10 UJ	10 U	10 U					3 J	2
SVOCs	Pentachlorophenol	µg/L	R	30 UJ	25 U	25 U	25 U					25 UJ	25 U
SVOCs	Phenanthrene	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 UJ	10 U
SVOCs	Phenol	µg/L	390 J	380	580 J	590 J	640					67 J	40 J
SVOCs	Pyrene	µg/L	10 U	10 U	10 UJ	10 U	10 U					10 UJ	10 U
SVOCs2	Acenaphthylene	µg/L											
SVOCs2	Benzo(a)pyrene	µg/L											
SVOCs2	Benzo(b)fluoranthene	µg/L											
SVOCs2	Benzo(ghi)perylene	µg/L											
SVOCs2	Benzo(k)fluoranthene	µg/L											
SVOCs2	Chrysene	µg/L											
SVOCs2	Dibenz(a,h)anthracene	µg/L											
SVOCs2	Fluoranthene	µg/L											
SVOCs2	Indeno(1,2,3-cd)pyrene	µg/L											
SVOCs2	Naphthalene	µg/L											
SVOCs2	Phenanthrene	µg/L											
SVOCs2	Pyrene	µg/L											
NDMA	N-Nitrosodimethylamine	ng/L						4400 J	4200 J				
Pest/Herb	2,4,5-T	µg/L								10 U	0.075 U		
Pest/Herb	2,4,5-TP/Silvex	µg/L								10 U	0.05 U		
Pest/Herb	2,4-DB	µg/L								10 U	2.4 J		
Pest/Herb	Alpha-BHC	µg/L	0.09 J	0.09	0.13	0.196	0.05 U					0.05	0.05 U
Pest/Herb	Beta-BHC	µg/L	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U					0.05 U	0.06
Pest/Herb	Delta-BHC	µg/L	0.06 UJ	0.05 U	0.05 U	0.05 U	0.05 U					0.05 U	0.05 U

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Off-Property West Ditch DAPL Pool**										
		Location	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-43D	GW-43D
		Sample Date	12/10/1991	8/5/1992	8/5/1992	11/11/1992	11/11/1992	4/1/2003	3/29/2004	6/2/2008	7/9/2008	8/5/1992	8/5/1992
		Sample ID	GW-42-D DUP	GW-42-D	GW-42-D DUP	GW-42-D	GW-42-D DUP	SD-GW-42D	GW-42D	OC-GW-42D	OC-GW-42D	GW-43-D	GW-43-D DUP
		Qc Code	FD	FS	FD	FS	FD	FS	FS	FS	FS	FS	FD
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
Pest/Herb	Dicamba	µg/L								10 U	0.3 U		
Pest/Herb	Dieldrin	µg/L	0.1 UJ	0.1 U	0.1 U	0.1 U	0.1 U					0.1 U	0.1 U
Pest/Herb	Endosulfan I	µg/L	0.06 UJ	0.05 U	0.05 U	0.05 U	0.05 U					0.05 U	0.05 U
Pest/Herb	Endosulfan sulfate	µg/L	0.1 UJ	0.1 U	0.1 U	0.1 U	0.1 U					0.1 U	0.1 U
Pest/Herb	Endrin	µg/L	0.1 UJ	0.1 U	0.1 U	0.1 U	0.1 U					0.1 U	0.1 U
Pest/Herb	Gamma-BHC/Lindane	µg/L	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U					0.05 U	0.07
Pest/Herb	Heptachlor	µg/L	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U					0.05 U	0.05 U
Pest/Herb	Heptachlor epoxide	µg/L	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U					0.05 U	0.05 U
Pest/Herb	MCPA	µg/L									1500 U		
Pest/Herb	MCPP	µg/L								1000 U	250 U		
Pest/Herb	Pentachlorophenol	µg/L									0.14 U		
Pest/Herb	Picloram	µg/L											
VPH	Target Compounds	µg/L											
EPH	Target Compounds	µg/L											
Oils/Fuels	PETROLEUM NAPHTHA	mg/L											
Oils/Fuels	Unmatched	mg/L											

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Off-Property West Ditch DAPL Pool**																			
		Location	GW-43D		GW-43D		GW-43D		GW-43D		GW-43D		MP-2 #01		MP-2 #01		MP-2 #06		MP-2 #06		MP-2 #09	
		Sample Date	11/11/1992		11/11/1992		3/24/2003		3/5/2004		3/5/2004		7/25/2002		3/30/2004		9/24/2002		3/30/2004		4/9/2003	
		Sample ID	GW-43-D		GW-43-D DUP		GW-43D		GW-43D		GW-43D DUP		MP-2 DAPL		MP2-DAPL		MP-2-06		MP2-DIFF		MP-2 PORT 9	
		Qc Code	FS		FD		FS		FS		FD		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs	1,1,1-Trichloroethane	µg/L	5	U	1	J																
VOCs	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L																				
VOCs	1,1,2-Trichloroethane	µg/L	5	U	5	U																
VOCs	1,1-Dichloroethane	µg/L	5	U	5	U																
VOCs	1,1-Dichloroethene	µg/L	5	U	5	U																
VOCs	1,2,4-Trichlorobenzene	µg/L																				
VOCs	1,2,4-Trimethylbenzene	µg/L																				
VOCs	1,2-Dichlorobenzene	µg/L																				
VOCs	1,2-Dichloroethane	µg/L	25		27																	
VOCs	1,2-Dichloroethene (total)	µg/L	5	U	5	U																
VOCs	1,2-Dichloropropane	µg/L	5	U	5	U																
VOCs	1,3,5-Trimethylbenzene	µg/L																				
VOCs	1,3-Dichlorobenzene	µg/L																				
VOCs	1,4-Dichlorobenzene	µg/L																				
VOCs	2,4,4-Trimethyl-1-pentene	µg/L	5	J	6	J																
VOCs	2,4,4-Trimethyl-2-pentene	µg/L	3	J	4	J																
VOCs	2-Butanone	µg/L	3	J	6	J																
VOCs	2-Hexanone	µg/L	15	U	15	U																
VOCs	4-iso-Propyltoluene	µg/L																				
VOCs	4-Methyl-2-pentanone	µg/L	15	U	3	J																
VOCs	Acetone	µg/L	40	U	60	B																
VOCs	Benzene	µg/L	3	J	3	J																
VOCs	Bromochloromethane	µg/L																				
VOCs	Bromodichloromethane	µg/L	2	J	2	J																
VOCs	Bromoform	µg/L	39		51																	
VOCs	Carbon disulfide	µg/L	3	J	3	J																
VOCs	Carbon tetrachloride	µg/L	5	U	5	U																
VOCs	Chlorobenzene	µg/L	5	U	5	U																
VOCs	Chloroform	µg/L	11		10																	
VOCs	Chloromethane	µg/L	1	J	1	J																
VOCs	Cis-1,2-Dichloroethene	µg/L																				
VOCs	Dibromochloromethane	µg/L	9		11																	
VOCs	Dibromomethane	µg/L																				
VOCs	Ethylbenzene	µg/L	2	J	2	J																
VOCs	Isopropylbenzene	µg/L																				
VOCs	Methyl Tertbutyl Ether	µg/L																				
VOCs	Methylene chloride	µg/L	17	U	12	U																
VOCs	Naphthalene	µg/L																				
VOCs	Propylbenzene	µg/L																				

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Off-Property West Ditch DAPL Pool**																			
		Location	GW-43D		GW-43D		GW-43D		GW-43D		GW-43D		MP-2 #01		MP-2 #01		MP-2 #06		MP-2 #06		MP-2 #09	
		Sample Date	11/11/1992		11/11/1992		3/24/2003		3/5/2004		3/5/2004		7/25/2002		3/30/2004		9/24/2002		3/30/2004		4/9/2003	
		Sample ID	GW-43-D		GW-43-D DUP		GW-43D		GW-43D		GW-43D DUP		MP-2 DAPL		MP2-DAPL		MP-2-06		MP2-DIFF		MP-2 PORT 9	
		Qc Code	FS		FD		FS		FS		FD		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs	Tetrachloroethene	µg/L	5	U	5	U																
VOCs	Toluene	µg/L	33		35																	
VOCs	trans-1,2-Dichloroethene	µg/L																				
VOCs	Trichloroethene	µg/L	3	J	3	J																
VOCs	Vinyl chloride	µg/L	10	U	10	U																
VOCs	Xylene, o	µg/L																				
VOCs	Xylenes (m&p)	µg/L																				
VOCs	Xylenes, Total	µg/L	6		6																	
SVOCs	1,2,4-Trichlorobenzene	µg/L	1	J	10	U	10	U														
SVOCs	1,2-Dichlorobenzene	µg/L	10	U	10	U	10	U														
SVOCs	1,3-Dichlorobenzene	µg/L	10	U	10	U	10	U														
SVOCs	1,4-Dichlorobenzene	µg/L	10	U	10	U	10	U														
SVOCs	2,4,6-Trichlorophenol	µg/L	1	J	1	J	10	U														
SVOCs	2,4-Dichlorophenol	µg/L	10	U	10	U	10	U														
SVOCs	2,4-Dimethylphenol	µg/L	10	U	10	U	10	U														
SVOCs	2,4-Dinitrophenol	µg/L	25	U	25	U	10	U														
SVOCs	2-Chlorophenol	µg/L	1	J	2	J	10	U														
SVOCs	2-Methylnaphthalene	µg/L	10	U	10	U	10	U														
SVOCs	2-Methylphenol	µg/L	3	J	2	J	10	U														
SVOCs	2-Nitrophenol	µg/L	14		13		10	U														
SVOCs	3 & 4 Methylphenol	µg/L																				
SVOCs	4,6-Dinitro-2-methylphenol	µg/L	25	U	3	J	50	U														
SVOCs	4-Bromophenyl phenyl ether	µg/L	9	J	7	J	10	U														
SVOCs	4-Chloro-3-methylphenol	µg/L	10	U	10	U	20	U														
SVOCs	4-Chloroaniline	µg/L	10	U	10	U		R														
SVOCs	4-Chlorophenyl phenyl ether	µg/L	10	U	10	U	10	U														
SVOCs	4-Methylphenol	µg/L	10		7	J	10	U														
SVOCs	4-Nitrophenol	µg/L	33		29		50	UJ														
SVOCs	Acenaphthylene	µg/L	10	U	10	U	10	U														
SVOCs	Acetophenone	µg/L																				
SVOCs	Benzaldehyde	µg/L																				
SVOCs	Benzo(a)pyrene	µg/L	10	U	10	U	10	U														
SVOCs	Benzo(b)fluoranthene	µg/L	10	U	10	U	10	U														
SVOCs	Benzo(ghi)perylene	µg/L	10	U	10	U	10	U														
SVOCs	Benzo(k)fluoranthene	µg/L	10	U	10	U	10	U														
SVOCs	Benzoic Acid	µg/L	50	U	50	U	50	U														
SVOCs	Benzyl alcohol	µg/L	2	J	1	J	20	UJ														
SVOCs	Biphenyl	µg/L																				
SVOCs	Bis(2-Ethylhexyl)phthalate	µg/L	10	U	10	U	10	U														

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Off-Property West Ditch DAPL Pool**																	
		Location	GW-43D		GW-43D		GW-43D		GW-43D		GW-43D		MP-2 #01		MP-2 #01		MP-2 #06		MP-2 #06		MP-2 #09	
		Sample Date	11/11/1992		11/11/1992		3/24/2003		3/5/2004		3/5/2004		7/25/2002		3/30/2004		9/24/2002		3/30/2004		4/9/2003	
		Sample ID	GW-43-D		GW-43-D DUP		GW-43D		GW-43D		GW-43D DUP		MP-2 DAPL		MP2-DAPL		MP-2-06		MP2-DIFF		MP-2 PORT 9	
		Qc Code	FS		FD		FS		FS		FD		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
SVOCs	Caprolactam	µg/L																				
SVOCs	Chrysene	µg/L	10	U	10	U	10	U														
SVOCs	Dibenz(a,h)anthracene	µg/L	10	U	10	U	10	U														
SVOCs	Dibenzofuran	µg/L	10	U	10	U	10	U														
SVOCs	Diethylphthalate	µg/L	10	U	10	U	10	U														
SVOCs	Dimethylformamide	µg/L												R								
SVOCs	Dimethylphthalate	µg/L	10	U	10	U	10	U														
SVOCs	Di-n-butylphthalate	µg/L	2	J	2	J	10	U														
SVOCs	Di-n-octylphthalate	µg/L	10	U	10	U	10	U														
SVOCs	Diphenyl ether	µg/L																				
SVOCs	Fluoranthene	µg/L	10	U	10	U	10	U														
SVOCs	Indeno(1,2,3-cd)pyrene	µg/L	10	U	10	U	10	U														
SVOCs	Isophorone	µg/L	2	J	1	J	10	U														
SVOCs	Naphthalene	µg/L	5	J	5	J	10	U														
SVOCs	N-Nitrosodimethylamine	µg/L																				
SVOCs	N-Nitrosodiphenylamine	µg/L	5	J	4	J	10	U														
SVOCs	Pentachlorophenol	µg/L	25	U	25	U	50	U														
SVOCs	Phenanthrene	µg/L	10	U	10	U	10	U														
SVOCs	Phenol	µg/L	89	B	81		22	J														
SVOCs	Pyrene	µg/L	10	U	10	U	10	U														
SVOCs2	Acenaphthylene	µg/L																				
SVOCs2	Benzo(a)pyrene	µg/L																				
SVOCs2	Benzo(b)fluoranthene	µg/L																				
SVOCs2	Benzo(ghi)perylene	µg/L																				
SVOCs2	Benzo(k)fluoranthene	µg/L																				
SVOCs2	Chrysene	µg/L																				
SVOCs2	Dibenz(a,h)anthracene	µg/L																				
SVOCs2	Fluoranthene	µg/L																				
SVOCs2	Indeno(1,2,3-cd)pyrene	µg/L																				
SVOCs2	Naphthalene	µg/L																				
SVOCs2	Phenanthrene	µg/L																				
SVOCs2	Pyrene	µg/L																				
NDMA	N-Nitrosodimethylamine	ng/L					3200	J	8600	J	6600	J			2500	J	120		1100		1600	J
Pest/Herb	2,4,5-T	µg/L																				
Pest/Herb	2,4,5-TP/Silvex	µg/L																				
Pest/Herb	2,4-DB	µg/L																				
Pest/Herb	Alpha-BHC	µg/L	0.05	U	0.05	U																
Pest/Herb	Beta-BHC	µg/L	0.097		0.05	U																
Pest/Herb	Delta-BHC	µg/L	0.05	U	0.05	U																

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Off-Property West Ditch DAPL Pool**																			
		Location	GW-43D		GW-43D		GW-43D		GW-43D		GW-43D		MP-2 #01		MP-2 #01		MP-2 #06		MP-2 #06		MP-2 #09	
		Sample Date	11/11/1992		11/11/1992		3/24/2003		3/5/2004		3/5/2004		7/25/2002		3/30/2004		9/24/2002		3/30/2004		4/9/2003	
		Sample ID	GW-43-D		GW-43-D DUP		GW-43D		GW-43D		GW-43D DUP		MP-2 DAPL		MP2-DAPL		MP-2-06		MP2-DIFF		MP-2 PORT 9	
		Qc Code	FS		FD		FS		FS		FD		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Pest/Herb	Dicamba	µg/L																				
Pest/Herb	Dieldrin	µg/L	0.1	U	0.1	U																
Pest/Herb	Endosulfan I	µg/L	0.05	U	0.05	U																
Pest/Herb	Endosulfan sulfate	µg/L	0.1	U	0.1	U																
Pest/Herb	Endrin	µg/L	0.1	U	0.1	U																
Pest/Herb	Gamma-BHC/Lindane	µg/L	0.05	U	0.06																	
Pest/Herb	Heptachlor	µg/L	0.05	U	0.05	U																
Pest/Herb	Heptachlor epoxide	µg/L	0.05	U	0.047	J																
Pest/Herb	MCPA	µg/L																				
Pest/Herb	MCPP	µg/L																				
Pest/Herb	Pentachlorophenol	µg/L																				
Pest/Herb	Picloram	µg/L																				
VPH	Target Compounds	µg/L																				
EPH	Target Compounds	µg/L																				
Oils/Fuels	PETROLEUM NAPHTHA	mg/L											0.95									
Oils/Fuels	Unmatched	mg/L											0.95									

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**																			
		Location	GW-44D		GW-44D		GW-44D		GW-44D		GW-44D		GW-44D		GW-45D		GW-45D		GW-45D		GW-45D	
		Sample Date	8/12/1992		11/10/1992		7/7/1999		7/21/1999		10/12/2011		10/12/2011		4/17/2012		8/10/1992		11/12/1992		7/7/1999		8/28/2003	
		Sample ID	GW-44-D		GW-44-D		GW-44D		GW-44D		OC-GW-44D-DUP		OC-GW-44D-XXX		OC-GW-44D-XXX		GW-45-D		GW-45-D		GW-45D		GW-45D	
		Qc Code	FS		FS		FS		FS		FD		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs	1,1,1-Trichloroethane	µg/L	9		5	U					5	U	5	U	10	U	5	U	50	U				
VOCs	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L									5	U	5	U	10	U								
VOCs	1,1,2-Trichloroethane	µg/L	5	U	5	U					5	U	5	U	10	U	5	U	50	U				
VOCs	1,1-Dichloroethane	µg/L	3		5	U					5	U	5	U	10	U	5	U	50	U				
VOCs	1,1-Dichloroethene	µg/L	5	U	5	U					5	U	5	U	10	U	5	U	50	U				
VOCs	1,2,4-Trichlorobenzene	µg/L									5	U	5	U	10	U								
VOCs	1,2,4-Trimethylbenzene	µg/L									5	U	5	U	10	U								
VOCs	1,2-Dichlorobenzene	µg/L									5	U	5	U	10	U								
VOCs	1,2-Dichloroethane	µg/L	5	U	3	J					4.8	J	4.4	J	4.5	J	5	U	50	U				
VOCs	1,2-Dichloroethene (total)	µg/L	2		5	U											1		50	U				
VOCs	1,2-Dichloropropane	µg/L	5	U	5	U					5	U	5	U	10	U	5	U	50	U				
VOCs	1,3,5-Trimethylbenzene	µg/L									5	U	5	U	10	U								
VOCs	1,3-Dichlorobenzene	µg/L									5	U	5	U	10	U								
VOCs	1,4-Dichlorobenzene	µg/L									5	U	5	U	10	U								
VOCs	2,4,4-Trimethyl-1-pentene	µg/L	10	U	10	U	8.2		8.4		5	U	5	U	10	U	10	U	100	U	3.8			
VOCs	2,4,4-Trimethyl-2-pentene	µg/L	10	U	10	U	1.4		1.4		5	U	5	U	10	U	10	U	100	U	1	U		
VOCs	2-Butanone	µg/L	5		27						22	J	23	J	13	J	15	U	200	U				
VOCs	2-Hexanone	µg/L	15	U	15	U					50	U	50	U	100	U	15	U	200	U				
VOCs	4-iso-Propyltoluene	µg/L									5	U	5	U	10	U								
VOCs	4-Methyl-2-pentanone	µg/L	15	U	3	J					50	U	50	U	100	U	15	U	200	U				
VOCs	Acetone	µg/L	120		240	B					760		770		290	J	29		700					
VOCs	Benzene	µg/L	5	U	2	J					3.4	J	3.3	J	3.4	J	5	U	50	U				
VOCs	Bromochloromethane	µg/L									5	U	5	U	10	U								
VOCs	Bromodichloromethane	µg/L	1		2	J					1.5	J	1.5	J	5	U	5	U	50	U				
VOCs	Bromoform	µg/L	2		14						7.4		7.3		13		1		8	J				
VOCs	Carbon disulfide	µg/L	4		15						21	J	21	J	16	J	10	U	100	U				
VOCs	Carbon tetrachloride	µg/L	5	U	5	U					5	U	5	U	10	U	5	U	50	U				
VOCs	Chlorobenzene	µg/L	5	U	5	UJ					5	U	5	U	10	U	5	U	50	U				
VOCs	Chloroform	µg/L	18		79						84		82		86		5		54					
VOCs	Chloromethane	µg/L	2		7	J					3	J	2.8	J	3	J	10	U	100	U				
VOCs	Cis-1,2-Dichloroethene	µg/L									5	U	5	U	10	U								
VOCs	Dibromochloromethane	µg/L	5	U	3	J					2.1	J	2.1	J	2.3	J	5	U	50	U				
VOCs	Dibromomethane	µg/L									5	U	1.1	J	10	U								
VOCs	Ethylbenzene	µg/L	2		4	J					3.8	J	3.7	J	4	J	5	U	50	U				
VOCs	Isopropylbenzene	µg/L									5	U	5	U	10	U								
VOCs	Methyl Tertbutyl Ether	µg/L									5	U	5	U	10	U								
VOCs	Methylene chloride	µg/L	10	U	10	U					10	U	10	U	20	U	12		100	U				
VOCs	Naphthalene	µg/L									25	U	25	U	50	U								
VOCs	Propylbenzene	µg/L									5	U	5	U	10	U								

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**										
		Location	GW-44D	GW-44D	GW-44D	GW-44D	GW-44D	GW-44D	GW-44D	GW-45D	GW-45D	GW-45D	GW-45D
		Sample Date	8/12/1992	11/10/1992	7/7/1999	7/21/1999	10/12/2011	10/12/2011	4/17/2012	8/10/1992	11/12/1992	7/7/1999	8/28/2003
		Sample ID	GW-44-D	GW-44-D	GW-44D	GW-44D	OC-GW-44D-DUP	OC-GW-44D-XXX	OC-GW-44D-XXX	GW-45-D	GW-45-D	GW-45D	GW-45D
		Qc Code	FS	FS	FS	FS	FD	FS	FS	FS	FS	FS	FS
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
VOCs	Tetrachloroethene	µg/L	5 U	5 U			5 U	5 U	10 U	5 U	50 U		
VOCs	Toluene	µg/L	24	84 J			89	89	95	6	81		
VOCs	trans-1,2-Dichloroethene	µg/L					5 U	5 U	10 U				
VOCs	Trichloroethene	µg/L	2	7			9.3	8.9	11	5 U	50 U		
VOCs	Vinyl chloride	µg/L	10 U	10 U			2.5 U	2.5 U	5 U	10 U	100 U		
VOCs	Xylene, o	µg/L					1 J	1 J	10 U				
VOCs	Xylenes (m&p)	µg/L					10 U	10 U	20 U				
VOCs	Xylenes, Total	µg/L	4	4 J						5 U	50 U		
SVOCs	1,2,4-Trichlorobenzene	µg/L	10 UJ	10 U						10 U	10 U		
SVOCs	1,2-Dichlorobenzene	µg/L	10 UJ	1 J						10 U	10 U		
SVOCs	1,3-Dichlorobenzene	µg/L	10 UJ	10 U						1	10 U		
SVOCs	1,4-Dichlorobenzene	µg/L	1 J	1 J						10 U	10 U		
SVOCs	2,4,6-Trichlorophenol	µg/L	10 UJ	10 U			50 U	4.7 U	50 U	10 U	10 U		
SVOCs	2,4-Dichlorophenol	µg/L	3 J	3 J			50 U	2.4 J	50 U	10 U	2 J		
SVOCs	2,4-Dimethylphenol	µg/L	10 UJ	10 U			50 U	4.7 U	50 U	10 U	10 U		
SVOCs	2,4-Dinitrophenol	µg/L	25 UJ	25 U			50 U	4.7 U	50 UJ	25 U	25 U		
SVOCs	2-Chlorophenol	µg/L	5 J	10 U			50 U	2.9 J	50 U	10 U	10 U		
SVOCs	2-Methylnaphthalene	µg/L	2 J	1 J			10 U	0.93 U	10 U	10 U	10 U		
SVOCs	2-Methylphenol	µg/L	5 J	6 J			50 U	1.8 J	50 U	2	3 J		
SVOCs	2-Nitrophenol	µg/L	43 J	45			33 J	21 J	26 J	51	93		
SVOCs	3 & 4 Methylphenol	µg/L					17 J	13	14 J				
SVOCs	4,6-Dinitro-2-methylphenol	µg/L	25 UJ	25 U			50 U	4.7 U	50 UJ	25 U	25 U		
SVOCs	4-Bromophenyl phenyl ether	µg/L	10 UJ	10 U			50 U	4.7 U	50 U	10 U	10 U		
SVOCs	4-Chloro-3-methylphenol	µg/L	10 UJ	10 U			50 U	4.7 U	50 U	10 U	10 U		
SVOCs	4-Chloroaniline	µg/L	10 UJ	10 U			50 U	4.7 U	50 U	10 U	10 U		
SVOCs	4-Chlorophenyl phenyl ether	µg/L	10 UJ	10 U			50 U	4.7 U	50 U	10 U	10 U		
SVOCs	4-Methylphenol	µg/L	28 J	32						13	16		
SVOCs	4-Nitrophenol	µg/L	72 J	110			37 J	34	33 J	64	190 J		
SVOCs	Acenaphthylene	µg/L	10 UJ	10 U			3 U	0.28 U	3 U	10 U	10 U		
SVOCs	Acetophenone	µg/L					6.7 J	3.5 J	6.7 J				
SVOCs	Benzaldehyde	µg/L					11 J	5.9 J	12 J				
SVOCs	Benzo(a)pyrene	µg/L	10 UJ	10 U			2 U	0.19 U	2 U	10 U	10 U		
SVOCs	Benzo(b)fluoranthene	µg/L	10 UJ	10 U			3 U	0.28 U	3 U	10 U	10 U		
SVOCs	Benzo(ghi)perylene	µg/L	10 UJ	10 U			5 U	0.47 U	5 U	10 U	10 U		
SVOCs	Benzo(k)fluoranthene	µg/L	10 UJ	10 U			3 U	0.28 U	3 U	10 U	10 U		
SVOCs	Benzoic Acid	µg/L	50 UJ	41 J			50 UJ	4.7 U	15 J	10	50 U		
SVOCs	Benzyl alcohol	µg/L	3 J	4 J			100 U	2.8 J	6 J	2	4 J		
SVOCs	Biphenyl	µg/L					50 U	4.7 U	50 U				
SVOCs	Bis(2-Ethylhexyl)phthalate	µg/L	10 UJ	10 U			20 U	1.9 U	5.3 J	10 U	10 U		

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**										
		Location	GW-44D	GW-44D	GW-44D	GW-44D	GW-44D	GW-44D	GW-44D	GW-45D	GW-45D	GW-45D	GW-45D
		Sample Date	8/12/1992	11/10/1992	7/7/1999	7/21/1999	10/12/2011	10/12/2011	4/17/2012	8/10/1992	11/12/1992	7/7/1999	8/28/2003
		Sample ID	GW-44-D	GW-44-D	GW-44D	GW-44D	OC-GW-44D-DUP	OC-GW-44D-XXX	OC-GW-44D-XXX	GW-45-D	GW-45-D	GW-45D	GW-45D
		Qc Code	FS	FS	FS	FS	FD	FS	FS	FS	FS	FS	FS
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
SVOCs	Caprolactam	µg/L					50 UJ	4.7 UJ	6.4 J				
SVOCs	Chrysene	µg/L	10 UJ	10 U			10 U	0.93 U	10 U	10 U	10 U		
SVOCs	Dibenz(a,h)anthracene	µg/L	10 UJ	10 U			5 U	0.47 U	5 U	10 U	10 U		
SVOCs	Dibenzofuran	µg/L	10 UJ	10 U			50 U	4.7 U	50 U	10 U	10 U		
SVOCs	Diethylphthalate	µg/L	10 UJ	10 U			50 U	4.7 U	50 U	10 U	10 U		
SVOCs	Dimethylformamide	µg/L											
SVOCs	Dimethylphthalate	µg/L	10 UJ	10 U			50 U	4.7 U	50 U	10 U	10 U		
SVOCs	Di-n-butylphthalate	µg/L	10 UJ	10 U			50 U	4.7 U	50 U	10 U	10 U		
SVOCs	Di-n-octylphthalate	µg/L	10 UJ	10 U			50 U	4.7 U	50 UJ	10 U	10 U		
SVOCs	Diphenyl ether	µg/L					14 J	9.8 J	12 J				
SVOCs	Fluoranthene	µg/L	10 UJ	10 U			10 U	0.93 U	10 U	10 U	10 U		
SVOCs	Indeno(1,2,3-cd)pyrene	µg/L	10 UJ	10 U			5 U	0.47 U	5 U	10 U	10 U		
SVOCs	Isophorone	µg/L	10 UJ	10 U			50 U	4.7 U	50 U	10 U	10 U		
SVOCs	Naphthalene	µg/L	13 J	15						2	8 J		
SVOCs	N-Nitrosodimethylamine	µg/L					50 U	4.8					
SVOCs	N-Nitrosodiphenylamine	µg/L	10 UJ	10 U			50 U	4.7 U	50 U	10 U	10 U		
SVOCs	Pentachlorophenol	µg/L	25 UJ	25 U			10 U	0.93 U	10 U	25 U	25 U		
SVOCs	Phenanthrene	µg/L	10 UJ	10 U			2 U	0.19 U	2 U	10 U	10 U		
SVOCs	Phenol	µg/L	600 J	600 B			190 J	260 J	180	300	620		
SVOCs	Pyrene	µg/L	10 UJ	10 U			50 U	4.7 U	50 U	10 U	10 U		
SVOCs2	Acenaphthylene	µg/L											
SVOCs2	Benzo(a)pyrene	µg/L											
SVOCs2	Benzo(b)fluoranthene	µg/L											
SVOCs2	Benzo(ghi)perylene	µg/L											
SVOCs2	Benzo(k)fluoranthene	µg/L											
SVOCs2	Chrysene	µg/L											
SVOCs2	Dibenz(a,h)anthracene	µg/L											
SVOCs2	Fluoranthene	µg/L											
SVOCs2	Indeno(1,2,3-cd)pyrene	µg/L											
SVOCs2	Naphthalene	µg/L											
SVOCs2	Phenanthrene	µg/L											
SVOCs2	Pyrene	µg/L											
NDMA	N-Nitrosodimethylamine	ng/L							25000 J				16000 J
Pest/Herb	2,4,5-T	µg/L											
Pest/Herb	2,4,5-TP/Silvex	µg/L											
Pest/Herb	2,4-DB	µg/L											
Pest/Herb	Alpha-BHC	µg/L	0.05	0.073						0.13	0.05 U		
Pest/Herb	Beta-BHC	µg/L	0.05 U	0.05 U						0.05 U	0.05 U		
Pest/Herb	Delta-BHC	µg/L	0.05 U	0.05 U						0.05 U	0.05 U		

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**																			
		Location	GW-44D		GW-44D		GW-44D		GW-44D		GW-44D		GW-44D		GW-44D		GW-45D		GW-45D		GW-45D		GW-45D	
		Sample Date	8/12/1992		11/10/1992		7/7/1999		7/21/1999		10/12/2011		10/12/2011		4/17/2012		8/10/1992		11/12/1992		7/7/1999		8/28/2003	
		Sample ID	GW-44-D		GW-44-D		GW-44D		GW-44D		OC-GW-44D-DUP		OC-GW-44D-XXX		OC-GW-44D-XXX		GW-45-D		GW-45-D		GW-45D		GW-45D	
		Qc Code	FS		FS		FS		FS		FD		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Pest/Herb	Dicamba	µg/L																						
Pest/Herb	Dieldrin	µg/L	0.1	U	0.1	U											0.1	U	0.1	U				
Pest/Herb	Endosulfan I	µg/L	0.05	U	0.05	U											0.05	U	0.05	U				
Pest/Herb	Endosulfan sulfate	µg/L	0.1	U	0.1	U											0.1	U	0.1	U				
Pest/Herb	Endrin	µg/L	0.1	U	0.1	U											0.1	U	0.1	U				
Pest/Herb	Gamma-BHC/Lindane	µg/L	0.05	U	0.05	U											0.05	U	0.085					
Pest/Herb	Heptachlor	µg/L	0.05	U	0.05	U											0.05	U	0.05	U				
Pest/Herb	Heptachlor epoxide	µg/L	0.05	U	0.05	U											0.05	U	0.05	U				
Pest/Herb	MCPA	µg/L																						
Pest/Herb	MCPP	µg/L																						
Pest/Herb	Pentachlorophenol	µg/L																						
Pest/Herb	Picloram	µg/L																						
VPH	Target Compounds	µg/L																						
EPH	Target Compounds	µg/L																						
Oils/Fuels	PETROLEUM NAPHTHA	mg/L																						
Oils/Fuels	Unmatched	mg/L																						

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**										
		Location	GW-45D	GW-45D	GW-45D	GW-59D	GW-59D	GW-59D	GW-59D	GW-59D	GW-70D	GW-70D	GW-70D
		Sample Date	5/19/2010	10/27/2010	10/27/2010	8/6/1992	8/6/1992	11/10/1992	11/10/1992	3/22/2004	8/10/1992	11/12/1992	3/22/2004
		Sample ID	OC-GW-45D-XXX	OC-GW-45D-DUP	OC-GW-45D-XXX	GW-59-D	GW-59-D DUP	GW-59-D	GW-59-D DUP	GW-59D	GW-70-D	GW-70-D	GW-70D
		Qc Code	FS	FD	FS	FS	FD	FS	FD	FS	FS	FS	FS
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
VOCs	1,1,1-Trichloroethane	µg/L	4 U	4 U	4 U	5 U	5 U	5 U	5 U		5 U	5 U	
VOCs	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	15	3.4 J	3.6 J								
VOCs	1,1,2-Trichloroethane	µg/L	4 U	4 U	4 U	5 U	5 U	5 U	5 U		5 U	5 U	
VOCs	1,1-Dichloroethane	µg/L	4 U	4 U	4 U	5 U	5 U	5 U	5 U		5 U	5 U	
VOCs	1,1-Dichloroethene	µg/L	4 U	4 U	4 U	5 U	5 U	5 U	5 U		5 U	5 U	
VOCs	1,2,4-Trichlorobenzene	µg/L	4 U	4 U	4 U								
VOCs	1,2,4-Trimethylbenzene	µg/L	4.2	5.9	5.8								
VOCs	1,2-Dichlorobenzene	µg/L	4 U	4 U	4 U								
VOCs	1,2-Dichloroethane	µg/L	23	22	22	5 U	5 U	3 J	5		5 U	5 U	
VOCs	1,2-Dichloroethene (total)	µg/L				5 U	5 U	5 U	5 U		5 U	5 U	
VOCs	1,2-Dichloropropane	µg/L	4 U	4 U	4 U	5 U	5 U	5 U	5 U		5 U	5 U	
VOCs	1,3,5-Trimethylbenzene	µg/L	0.98 J	1.5 J	1.4 J								
VOCs	1,3-Dichlorobenzene	µg/L	4 U	4 U	4 U								
VOCs	1,4-Dichlorobenzene	µg/L	4 U	4 U	4 U								
VOCs	2,4,4-Trimethyl-1-pentene	µg/L	4 U	3.1 J	3.2 J	10 U	10 U	10 U	3 J		10 U	10 U	
VOCs	2,4,4-Trimethyl-2-pentene	µg/L	4 U	4 U	4 U	10 U	10 U	10 U	10 U		10 U	10 U	
VOCs	2-Butanone	µg/L	40 U	40 U	40 U	10	7	11 J	2 J		15 U	15 U	
VOCs	2-Hexanone	µg/L	40 U	40 U	40 U	15 U	15 U	15 U	15 U		15 U	15 U	
VOCs	4-iso-Propyltoluene	µg/L	4 U	4 U	4 U								
VOCs	4-Methyl-2-pentanone	µg/L	40 U	40 U	40 U	15 U	15 U	3 J	15 U		15 U	15 U	
VOCs	Acetone	µg/L	200 UJ	200 UJ	200 UJ	72	69	370 B	63 B		31	25	
VOCs	Benzene	µg/L	7.6	9.7	9.9	5 U	5 U	3 J	4 J		4	5 U	
VOCs	Bromochloromethane	µg/L	1.3 J	0.93 J	0.92 J								
VOCs	Bromodichloromethane	µg/L	2.5 J	1.9 J	2 J	5 U	5 U	5 U	1 J		5 U	5 U	
VOCs	Bromoform	µg/L	27	21	23	5 U	5 U	4 J	11		5 U	5 U	
VOCs	Carbon disulfide	µg/L	5.9 J	7.2 J	6.9 J	10 U	10 U	14	19		10 U	10 U	
VOCs	Carbon tetrachloride	µg/L	4 U	4 U	4 U	5 U	5 U	5 U	2 J		5 U	5 U	
VOCs	Chlorobenzene	µg/L	4 U	4 U	4 U	5 U	5 U	1 J	1 J		5 U	5 U	
VOCs	Chloroform	µg/L	23	33	33	4	4	77	80		7	24	
VOCs	Chloromethane	µg/L	8 U	8 U	8 U	10 U	10 U	1 J	10 U		1	10 U	
VOCs	Cis-1,2-Dichloroethene	µg/L	4 U	4 U	4 U								
VOCs	Dibromochloromethane	µg/L	6.3	16	17	5 U	5 U	5 U	2 J		5 U	5 U	
VOCs	Dibromomethane	µg/L	8.5	4.8	5.2								
VOCs	Ethylbenzene	µg/L	3 J	4.7	4.6	1 J	5 UJ	7 J	13		5 U	2 J	
VOCs	Isopropylbenzene	µg/L	4 U	1.1 J	1.1 J								
VOCs	Methyl Tertbutyl Ether	µg/L	4 U	4 U	4 U								
VOCs	Methylene chloride	µg/L	25	27	25	10 U	10 U	10 U	10 U		10 U	8 J	
VOCs	Naphthalene	µg/L	13 J	3.5 J	3.3 J								
VOCs	Propylbenzene	µg/L	1.7 J	2.5 J	2.4 J								

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**										
		Location	GW-45D	GW-45D	GW-45D	GW-59D	GW-59D	GW-59D	GW-59D	GW-59D	GW-70D	GW-70D	GW-70D
		Sample Date	5/19/2010	10/27/2010	10/27/2010	8/6/1992	8/6/1992	11/10/1992	11/10/1992	3/22/2004	8/10/1992	11/12/1992	3/22/2004
		Sample ID	OC-GW-45D-XXX	OC-GW-45D-DUP	OC-GW-45D-XXX	GW-59-D	GW-59-D DUP	GW-59-D	GW-59-D DUP	GW-59D	GW-70-D	GW-70-D	GW-70D
		Qc Code	FS	FD	FS	FS	FD	FS	FD	FS	FS	FS	FS
Class	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
VOCs	Tetrachloroethene	µg/L	4 U	4 U	4 U	5 U	5 U	5 U	5 U		5 U	5 U	
VOCs	Toluene	µg/L	83	98	100	6	6	120 J	110		8	86	
VOCs	trans-1,2-Dichloroethene	µg/L	4 U	4 U	4 U								
VOCs	Trichloroethene	µg/L	7.2	7.4	7.8	5 U	5 U	7	8		1	7	
VOCs	Vinyl chloride	µg/L	2 U	2 U	2 U	10 U	10 U	10 U	10 U		10 U	10 U	
VOCs	Xylene, o	µg/L	3.6 J	5.7	5.8								
VOCs	Xylenes (m&p)	µg/L	3 J	5.4 J	5.3 J								
VOCs	Xylenes, Total	µg/L				5 U	5 U	10 J	28		5 U	5 U	
SVOCs	1,2,4-Trichlorobenzene	µg/L				10 U	10 U	10 U	10 U		10 U	10 U	
SVOCs	1,2-Dichlorobenzene	µg/L				1	1	1 J	10 U		10 U	10 U	
SVOCs	1,3-Dichlorobenzene	µg/L				10 UJ	2 J	10 U	10 U		10 U	3 J	
SVOCs	1,4-Dichlorobenzene	µg/L				1	1	2 J	1 J		10 U	10 U	
SVOCs	2,4,6-Trichlorophenol	µg/L	0.48 J	18 U	R	10 U	10 U	10 U	10 U		10 U	10 U	
SVOCs	2,4-Dichlorophenol	µg/L	0.66 J	18 U	0.78 J	3	3	3 J	3 J		10 U	10 U	
SVOCs	2,4-Dimethylphenol	µg/L	4.5 U	18 U	R	10 U	10 U	1 J	10 U		10 U	10 U	
SVOCs	2,4-Dinitrophenol	µg/L	0.46 J	18 U	R	25 U	25 U	25 U	25 U		25 U	25 U	
SVOCs	2-Chlorophenol	µg/L	0.75 J	18 U	0.76 J	10 U	10 U	10 U	10 U		10 U	10 U	
SVOCs	2-Methylnaphthalene	µg/L	0.91 U	3.6 U	0.91 U	10 U	10 U	10 U	10 U		10 U	10 U	
SVOCs	2-Methylphenol	µg/L	0.62 J	18 U	0.58 J	13	13	17	12		2	7 J	
SVOCs	2-Nitrophenol	µg/L	73	93 J	49 J	19	22	32	25		10 U	10 U	
SVOCs	3 & 4 Methylphenol	µg/L	2.2 J	5.5 J	2.8 J								
SVOCs	4,6-Dinitro-2-methylphenol	µg/L	4.5 U	18 U	R	25 U	25 U	25 U	25 U		25 U	25 U	
SVOCs	4-Bromophenyl phenyl ether	µg/L	0.84 J	18 U	4.5 U	10 U	10 U	10 U	10 U		10 U	10 U	
SVOCs	4-Chloro-3-methylphenol	µg/L	4.5 U	18 U	R	10 U	10 U	10 U	10 U		10 U	10 U	
SVOCs	4-Chloroaniline	µg/L	0.85 J	18 UJ	4.5 UJ	10 U	10 U	10 U	10 U		10 U	10 U	
SVOCs	4-Chlorophenyl phenyl ether	µg/L	4.5 U	18 U	4.5 U	10 U	10 U	10 U	10 U		10 U	10 U	
SVOCs	4-Methylphenol	µg/L				35	38	51	33		9	33	
SVOCs	4-Nitrophenol	µg/L	13 J	54 J	44 J	42	61	73	65		25 U	25 U	
SVOCs	Acenaphthylene	µg/L	0.27 U	1.1 U	0.27 U	10 U	10 U	10 U	10 U		10 U	10 U	
SVOCs	Acetophenone	µg/L	2.7 J	5.1 J	2.6 J								
SVOCs	Benzaldehyde	µg/L	5.5	18 UJ	4.5 UJ								
SVOCs	Benzo(a)pyrene	µg/L	0.3	0.73 U	0.18 U	10 U	10 U	10 U	10 U		10 U	10 U	
SVOCs	Benzo(b)fluoranthene	µg/L	0.51	1.1 U	0.27 U	10 U	10 U	10 U	10 U		10 U	10 U	
SVOCs	Benzo(ghi)perylene	µg/L	0.32 J	1.8 U	0.45 U	10 U	10 U	10 U	10 U		10 U	10 U	
SVOCs	Benzo(k)fluoranthene	µg/L	0.22 J	1.1 U	0.27 U	10 U	10 U	10 U	10 U		10 U	10 U	
SVOCs	Benzoic Acid	µg/L	0.85 J	12 J	4.5 UJ	50 U	61	27 J	50 U		50 U	50 U	
SVOCs	Benzyl alcohol	µg/L	0.75 J	36 U	9.1 U	5	6	6 J	4 J		10 U	2 J	
SVOCs	Biphenyl	µg/L	4.4 J	6.7 J	3.8 J								
SVOCs	Bis(2-Ethylhexyl)phthalate	µg/L	1.8 U	7.3 U	11 U	10 U	10 U	10 U	10 U		10 U	10 U	

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**																			
		Location	GW-45D		GW-45D		GW-45D		GW-59D		GW-59D		GW-59D		GW-59D		GW-70D		GW-70D		GW-70D	
		Sample Date	5/19/2010		10/27/2010		10/27/2010		8/6/1992		8/6/1992		11/10/1992		11/10/1992		3/22/2004		8/10/1992		11/12/1992		3/22/2004	
		Sample ID	OC-GW-45D-XXX		OC-GW-45D-DUP		OC-GW-45D-XXX		GW-59-D		GW-59-D DUP		GW-59-D		GW-59-D DUP		GW-59D		GW-70-D		GW-70-D		GW-70D	
		Qc Code	FS		FD		FS		FS		FD		FS		FD		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
SVOCs	Caprolactam	µg/L	4.5	UJ	R		R																	
SVOCs	Chrysene	µg/L	0.32	J	3.6	U	0.91	U	10	U	10	U	10	U	10	U			10	U	10	U		
SVOCs	Dibenz(a,h)anthracene	µg/L	0.085	J	1.8	U	0.45	U	10	U	10	U	10	U	10	U			10	U	10	U		
SVOCs	Dibenzofuran	µg/L	4.5	U	18	U	4.5	U	10	U	10	U	10	U	10	U			10	U	10	U		
SVOCs	Diethylphthalate	µg/L	4.5	U	18	U	4.5	U	10	U	10	U	10	U	10	U			10	U	10	U		
SVOCs	Dimethylformamide	µg/L																						
SVOCs	Dimethylphthalate	µg/L	4.5	U	18	U	4.5	U	10	U	10	U	10	U	10	U			10	U	10	U		
SVOCs	Di-n-butylphthalate	µg/L	4.5	U	18	U	4.5	U	10	U	10	U	10	U	10	U			10	U	10	U		
SVOCs	Di-n-octylphthalate	µg/L	4.5	U	18	U	4.5	UJ	10	U	10	U	1	J	10	U			10	U	10	U		
SVOCs	Diphenyl ether	µg/L	40		29	J	14	J																
SVOCs	Fluoranthene	µg/L	0.34	J	3.6	U	0.91	U	10	U	10	U	10	U	10	U			10	U	10	U		
SVOCs	Indeno(1,2,3-cd)pyrene	µg/L	0.26	J	1.8	U	0.45	U	10	U	10	U	10	U	10	U			10	U	10	U		
SVOCs	Isophorone	µg/L	4.5	U	18	U	4.5	U	10	U	10	U	10	U	10	U			10	U	10	U		
SVOCs	Naphthalene	µg/L							10	U	10	U	11		7	J			10	U	4	J		
SVOCs	N-Nitrosodimethylamine	µg/L	3.9	J	8.7	J	4.5	J																
SVOCs	N-Nitrosodiphenylamine	µg/L	4.5	U	18	U	4.5	U	10	U	10	U	10	U	10	U			10	U	10	U		
SVOCs	Pentachlorophenol	µg/L	0.91	U	3.6	U	R		25	U	25	U	25	U	25	U			25	U	25	U		
SVOCs	Phenanthrene	µg/L	0.18	U	0.73	U	0.089	J	10	U	10	U	10	U	10	U			10	U	10	U		
SVOCs	Phenol	µg/L	52	J	140	J	71	J	1600		1300		1200	B	1300				81		280			
SVOCs	Pyrene	µg/L	0.32	J	18	U	4.5	U	10	U	10	U	10	U	10	U			10	U	10	U		
SVOCs2	Acenaphthylene	µg/L																						
SVOCs2	Benzo(a)pyrene	µg/L																						
SVOCs2	Benzo(b)fluoranthene	µg/L																						
SVOCs2	Benzo(ghi)perylene	µg/L																						
SVOCs2	Benzo(k)fluoranthene	µg/L																						
SVOCs2	Chrysene	µg/L																						
SVOCs2	Dibenz(a,h)anthracene	µg/L																						
SVOCs2	Fluoranthene	µg/L																						
SVOCs2	Indeno(1,2,3-cd)pyrene	µg/L																						
SVOCs2	Naphthalene	µg/L																						
SVOCs2	Phenanthrene	µg/L																						
SVOCs2	Pyrene	µg/L																						
NDMA	N-Nitrosodimethylamine	ng/L															9600	J					15000	J
Pest/Herb	2,4,5-T	µg/L																						
Pest/Herb	2,4,5-TP/Silvex	µg/L																						
Pest/Herb	2,4-DB	µg/L																						
Pest/Herb	Alpha-BHC	µg/L							0.07		0.09		0.073		0.075				0.071		0.059			
Pest/Herb	Beta-BHC	µg/L							0.05	U	0.05	U	0.05	U	0.05	U			0.05	U	0.05	U		
Pest/Herb	Delta-BHC	µg/L							0.05	U	0.05	U	0.05	U	0.05	U			0.05	U	0.05	U		

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**																			
		Location	GW-45D		GW-45D		GW-45D		GW-59D		GW-59D		GW-59D		GW-59D		GW-59D		GW-70D		GW-70D		GW-70D	
		Sample Date	5/19/2010		10/27/2010		10/27/2010		8/6/1992		8/6/1992		11/10/1992		11/10/1992		3/22/2004		8/10/1992		11/12/1992		3/22/2004	
		Sample ID	OC-GW-45D-XXX		OC-GW-45D-DUP		OC-GW-45D-XXX		GW-59-D		GW-59-D DUP		GW-59-D		GW-59-D DUP		GW-59D		GW-70-D		GW-70-D		GW-70D	
		Qc Code	FS		FD		FS		FS		FD		FS		FD		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Pest/Herb	Dicamba	µg/L																						
Pest/Herb	Dieldrin	µg/L							0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U		
Pest/Herb	Endosulfan I	µg/L							0.05	U	0.05	U	0.05	U	0.05	U			0.05	U	0.05	U		
Pest/Herb	Endosulfan sulfate	µg/L							0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U		
Pest/Herb	Endrin	µg/L							0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U		
Pest/Herb	Gamma-BHC/Lindane	µg/L							0.11		0.08		0.11		0.15				0.05	U	0.05	U		
Pest/Herb	Heptachlor	µg/L							0.05	U	0.05	U	0.05	U	0.05	U			0.05	U	0.05	U		
Pest/Herb	Heptachlor epoxide	µg/L							0.05	U	0.05	U	0.05	U	0.05	U			0.05	U	0.05	U		
Pest/Herb	MCPA	µg/L																						
Pest/Herb	MCPP	µg/L																						
Pest/Herb	Pentachlorophenol	µg/L																						
Pest/Herb	Picloram	µg/L																						
VPH	Target Compounds	µg/L																						
EPH	Target Compounds	µg/L																						
Oils/Fuels	PETROLEUM NAPHTHA	mg/L																						
Oils/Fuels	Unmatched	mg/L																						

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**															
		Location	GW-70D		GW-70D		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01	
		Sample Date	10/22/2010		5/18/2011		1/8/2004		1/8/2004		1/8/2004		1/8/2004		1/8/2004		1/8/2004	
		Sample ID	OC-GW-70D-XXX		OC-GW-70D-XXX		MP3-DAPL-SPLIT 1		MP3-DAPL-SPLIT 2		MP3-DAPL-SPLIT 4		MP3-DAPL-SPLIT 4A		MP3-DAPL-SPLIT 5A		MP3-DAPL-SPLIT 5B		MP3-DAPL-SPLIT 6A	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs	1,1,1-Trichloroethane	µg/L	1	U	1	U														
VOCs	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	1	U	1	U														
VOCs	1,1,2-Trichloroethane	µg/L	1	U	1	U														
VOCs	1,1-Dichloroethane	µg/L	1	U	1	U														
VOCs	1,1-Dichloroethene	µg/L	1	U	1	U														
VOCs	1,2,4-Trichlorobenzene	µg/L	1	U	1	U														
VOCs	1,2,4-Trimethylbenzene	µg/L	2.5		2.6															
VOCs	1,2-Dichlorobenzene	µg/L	0.77	J	0.75	J														
VOCs	1,2-Dichloroethane	µg/L	2.7		2.6															
VOCs	1,2-Dichloroethene (total)	µg/L																		
VOCs	1,2-Dichloropropane	µg/L	1	U	1	U														
VOCs	1,3,5-Trimethylbenzene	µg/L	0.68	J	0.65	J														
VOCs	1,3-Dichlorobenzene	µg/L	1	U	1	U														
VOCs	1,4-Dichlorobenzene	µg/L	0.75	J	0.7	J														
VOCs	2,4,4-Trimethyl-1-pentene	µg/L	4.4		41															
VOCs	2,4,4-Trimethyl-2-pentene	µg/L	0.92	J	13															
VOCs	2-Butanone	µg/L	10	U	10	U														
VOCs	2-Hexanone	µg/L	10	U	10	U														
VOCs	4-iso-Propyltoluene	µg/L	1	U	0.43	J														
VOCs	4-Methyl-2-pentanone	µg/L	10	U	10	U														
VOCs	Acetone	µg/L	50	UJ	50	U														
VOCs	Benzene	µg/L	3.5		3.5															
VOCs	Bromochloromethane	µg/L	1	U	1	U														
VOCs	Bromodichloromethane	µg/L	1	UJ	0.5	U														
VOCs	Bromoform	µg/L	1	U	1	U														
VOCs	Carbon disulfide	µg/L	0.88	J	0.76	J														
VOCs	Carbon tetrachloride	µg/L	1	U	1	U														
VOCs	Chlorobenzene	µg/L	0.68	J	0.65	J														
VOCs	Chloroform	µg/L	21		18															
VOCs	Chloromethane	µg/L	1	J	0.95	J														
VOCs	Cis-1,2-Dichloroethene	µg/L	0.75	J	0.7	J														
VOCs	Dibromochloromethane	µg/L	0.5	U	0.5	U														
VOCs	Dibromomethane	µg/L	1	U	1	U														
VOCs	Ethylbenzene	µg/L	2.2		2.1															
VOCs	Isopropylbenzene	µg/L	0.75	J	0.69	J														
VOCs	Methyl Tertbutyl Ether	µg/L	1.3		1.2															
VOCs	Methylene chloride	µg/L	3.2		2.6															
VOCs	Naphthalene	µg/L	0.78	J	5	U														
VOCs	Propylbenzene	µg/L	1.1		0.92	J														

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**															
		Location	GW-70D		GW-70D		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01	
		Sample Date	10/22/2010		5/18/2011		1/8/2004		1/8/2004		1/8/2004		1/8/2004		1/8/2004		1/8/2004	
		Sample ID	OC-GW-70D-XXX		OC-GW-70D-XXX		MP3-DAPL-SPLIT 1		MP3-DAPL-SPLIT 2		MP3-DAPL-SPLIT 4		MP3-DAPL-SPLIT 4A		MP3-DAPL-SPLIT 5A		MP3-DAPL-SPLIT 5B		MP3-DAPL-SPLIT 6A	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs	Tetrachloroethene	µg/L	1	U	1	U														
VOCs	Toluene	µg/L	71		73															
VOCs	trans-1,2-Dichloroethene	µg/L	1	U	1	U														
VOCs	Trichloroethene	µg/L	7		6.4															
VOCs	Vinyl chloride	µg/L	0.5	U	0.5	U														
VOCs	Xylene, o	µg/L	3.5		3.1															
VOCs	Xylenes (m&p)	µg/L	3		2.8															
VOCs	Xylenes, Total	µg/L																		
SVOCs	1,2,4-Trichlorobenzene	µg/L																		
SVOCs	1,2-Dichlorobenzene	µg/L																		
SVOCs	1,3-Dichlorobenzene	µg/L																		
SVOCs	1,4-Dichlorobenzene	µg/L																		
SVOCs	2,4,6-Trichlorophenol	µg/L	4.5	U	4.5	U														
SVOCs	2,4-Dichlorophenol	µg/L	0.68	J	0.67	J														
SVOCs	2,4-Dimethylphenol	µg/L	4.5	U	0.49	J														
SVOCs	2,4-Dinitrophenol	µg/L	4.5	U	4.5	U														
SVOCs	2-Chlorophenol	µg/L	1.6	J	1.8	J														
SVOCs	2-Methylnaphthalene	µg/L	0.91	U	0.91	U														
SVOCs	2-Methylphenol	µg/L	3.7	J	4.1	J														
SVOCs	2-Nitrophenol	µg/L	4.5	U	4.5	U														
SVOCs	3 & 4 Methylphenol	µg/L	3.8	J	3.9	J														
SVOCs	4,6-Dinitro-2-methylphenol	µg/L	4.5	U	4.5	U														
SVOCs	4-Bromophenyl phenyl ether	µg/L	4.5	U	4.5	U														
SVOCs	4-Chloro-3-methylphenol	µg/L	4.5	U	4.5	U														
SVOCs	4-Chloroaniline	µg/L	4.5	U	4.5	U														
SVOCs	4-Chlorophenyl phenyl ether	µg/L	4.5	U	4.5	U														
SVOCs	4-Methylphenol	µg/L																		
SVOCs	4-Nitrophenol	µg/L	0.91	J	4.5	U														
SVOCs	Acenaphthylene	µg/L	0.27	U	0.27	U														
SVOCs	Acetophenone	µg/L	2.8	J	4.5	U														
SVOCs	Benzaldehyde	µg/L	1.1	J	4.5	U														
SVOCs	Benzo(a)pyrene	µg/L	0.18	U	0.18	U														
SVOCs	Benzo(b)fluoranthene	µg/L	0.27	U	0.27	U														
SVOCs	Benzo(ghi)perylene	µg/L	0.45	U	0.45	U														
SVOCs	Benzo(k)fluoranthene	µg/L	0.27	U	0.27	U														
SVOCs	Benzoic Acid	µg/L	4.5	U	4.5	UJ														
SVOCs	Benzyl alcohol	µg/L	9.1	U	9.1	U														
SVOCs	Biphenyl	µg/L	4.5	U	4.5	U														
SVOCs	Bis(2-Ethylhexyl)phthalate	µg/L	5.5	UJ	1.8	U														

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**															
		Location	GW-70D		GW-70D		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01	
		Sample Date	10/22/2010		5/18/2011		1/8/2004		1/8/2004		1/8/2004		1/8/2004		1/8/2004		1/8/2004	
		Sample ID	OC-GW-70D-XXX		OC-GW-70D-XXX		MP3-DAPL-SPLIT 1		MP3-DAPL-SPLIT 2		MP3-DAPL-SPLIT 4		MP3-DAPL-SPLIT 4A		MP3-DAPL-SPLIT 5A		MP3-DAPL-SPLIT 5B		MP3-DAPL-SPLIT 6A	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
SVOCs	Caprolactam	µg/L	0.63	J	4.5	UJ														
SVOCs	Chrysene	µg/L	0.91	U	0.91	U														
SVOCs	Dibenz(a,h)anthracene	µg/L	0.45	U	0.45	U														
SVOCs	Dibenzofuran	µg/L	4.5	U	4.5	U														
SVOCs	Diethylphthalate	µg/L	4.5	U	4.5	U														
SVOCs	Dimethylformamide	µg/L																		
SVOCs	Dimethylphthalate	µg/L	4.5	U	4.5	U														
SVOCs	Di-n-butylphthalate	µg/L	4.5	U	4.5	U														
SVOCs	Di-n-octylphthalate	µg/L	4.5	U	4.5	U														
SVOCs	Diphenyl ether	µg/L	3.1	J	3.3	J														
SVOCs	Fluoranthene	µg/L	0.91	U	0.91	U														
SVOCs	Indeno(1,2,3-cd)pyrene	µg/L	0.45	U	0.45	U														
SVOCs	Isophorone	µg/L	4.5	U	4.5	U														
SVOCs	Naphthalene	µg/L																		
SVOCs	N-Nitrosodimethylamine	µg/L	7.9		9.9		12		9.5		64		9.2		11		10		12	
SVOCs	N-Nitrosodiphenylamine	µg/L	4.5	U	4.5	U														
SVOCs	Pentachlorophenol	µg/L	0.91	U	0.91	U														
SVOCs	Phenanthrene	µg/L	0.18	U	0.18	U														
SVOCs	Phenol	µg/L	3	J	4.5	UJ														
SVOCs	Pyrene	µg/L	4.5	U	4.5	U														
SVOCs2	Acenaphthylene	µg/L																		
SVOCs2	Benzo(a)pyrene	µg/L																		
SVOCs2	Benzo(b)fluoranthene	µg/L																		
SVOCs2	Benzo(ghi)perylene	µg/L																		
SVOCs2	Benzo(k)fluoranthene	µg/L																		
SVOCs2	Chrysene	µg/L																		
SVOCs2	Dibenz(a,h)anthracene	µg/L																		
SVOCs2	Fluoranthene	µg/L																		
SVOCs2	Indeno(1,2,3-cd)pyrene	µg/L																		
SVOCs2	Naphthalene	µg/L																		
SVOCs2	Phenanthrene	µg/L																		
SVOCs2	Pyrene	µg/L																		
NDMA	N-Nitrosodimethylamine	ng/L																		
Pest/Herb	2,4,5-T	µg/L																		
Pest/Herb	2,4,5-TP/Silvex	µg/L																		
Pest/Herb	2,4-DB	µg/L																		
Pest/Herb	Alpha-BHC	µg/L																		
Pest/Herb	Beta-BHC	µg/L																		
Pest/Herb	Delta-BHC	µg/L																		

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**															
		Location	GW-70D		GW-70D		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01	
		Sample Date	10/22/2010		5/18/2011		1/8/2004		1/8/2004		1/8/2004		1/8/2004		1/8/2004		1/8/2004	
		Sample ID	OC-GW-70D-XXX		OC-GW-70D-XXX		MP3-DAPL-SPLIT 1		MP3-DAPL-SPLIT 2		MP3-DAPL-SPLIT 4		MP3-DAPL-SPLIT 4A		MP3-DAPL-SPLIT 5A		MP3-DAPL-SPLIT 5B		MP3-DAPL-SPLIT 6A	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Pest/Herb	Dicamba	µg/L																		
Pest/Herb	Dieldrin	µg/L																		
Pest/Herb	Endosulfan I	µg/L																		
Pest/Herb	Endosulfan sulfate	µg/L																		
Pest/Herb	Endrin	µg/L																		
Pest/Herb	Gamma-BHC/Lindane	µg/L																		
Pest/Herb	Heptachlor	µg/L																		
Pest/Herb	Heptachlor epoxide	µg/L																		
Pest/Herb	MCPA	µg/L																		
Pest/Herb	MCPP	µg/L																		
Pest/Herb	Pentachlorophenol	µg/L																		
Pest/Herb	Picloram	µg/L																		
VPH	Target Compounds	µg/L																		
EPH	Target Compounds	µg/L																		
Oils/Fuels	PETROLEUM NAPHTHA	mg/L																		
Oils/Fuels	Unmatched	mg/L																		

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**															
		Location	MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-4 #02		MP-4 #02	
		Sample Date	1/8/2004		1/8/2004		1/8/2004		1/8/2004		1/8/2004		10/11/2011		4/17/2012		5/25/2010		10/27/2010	
		Sample ID	MP3-DAPL-SPLIT 6B		MP3-DAPL-SPLIT 7A		MP3-DAPL-SPLIT 7B		MP3-DAPL-SPLIT 8		MP3-DAPL-SPLIT 9		OC-MP-3 #01-XXX		OC-MP-3 #01-XXX		OC-MP-4 #02-XXX		OC-MP-4 #2-XXX	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs	1,1,1-Trichloroethane	µg/L											5	U	4	U	1	U	1	U
VOCs	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L											5	U	4	U	1	U	1	U
VOCs	1,1,2-Trichloroethane	µg/L											5	U	4	U	1	U	1	U
VOCs	1,1-Dichloroethane	µg/L											5	U	4	U	1	U	1	U
VOCs	1,1-Dichloroethene	µg/L											5	U	4	U	1	U	1	U
VOCs	1,2,4-Trichlorobenzene	µg/L											5	U	4	U	1	U	1	U
VOCs	1,2,4-Trimethylbenzene	µg/L											5	U	4	U	0.22	J	1	U
VOCs	1,2-Dichlorobenzene	µg/L											5	U	0.86	J	1	U	1	U
VOCs	1,2-Dichloroethane	µg/L											3.8	J	4.4		6.3		6.3	
VOCs	1,2-Dichloroethene (total)	µg/L																		
VOCs	1,2-Dichloropropane	µg/L											5	U	4	U	1	U	1	U
VOCs	1,3,5-Trimethylbenzene	µg/L											5	U	4	U	0.26	J	1	U
VOCs	1,3-Dichlorobenzene	µg/L											5	U	4	U	1	U	1	U
VOCs	1,4-Dichlorobenzene	µg/L											5	U	4	U	1	U	1	U
VOCs	2,4,4-Trimethyl-1-pentene	µg/L											5	U	4	U	1	U	1.8	
VOCs	2,4,4-Trimethyl-2-pentene	µg/L											5	U	4	U	1	U	1	U
VOCs	2-Butanone	µg/L											25	J	14	J	10	U	10	U
VOCs	2-Hexanone	µg/L											50	U	40	U	10	U	10	U
VOCs	4-iso-Propyltoluene	µg/L											5	U	4	U	0.43	J	1	U
VOCs	4-Methyl-2-pentanone	µg/L											50	U	40	U	10	U	10	U
VOCs	Acetone	µg/L											690		300	J	50	UJ	50	UJ
VOCs	Benzene	µg/L											2.9	J	2.7	J	3.4		3	
VOCs	Bromochloromethane	µg/L											5	U	4	U	1	U	1	U
VOCs	Bromodichloromethane	µg/L											1.7	J	2.1		1	U	1	UJ
VOCs	Bromoform	µg/L											9.6		16		1	U	1	U
VOCs	Carbon disulfide	µg/L											24	J	20	J	10	U	0.56	J
VOCs	Carbon tetrachloride	µg/L											5	U	4	U	1	U	1	U
VOCs	Chlorobenzene	µg/L											5	U	4	U	1	U	1	U
VOCs	Chloroform	µg/L											93		93		1	U	1	U
VOCs	Chloromethane	µg/L											3	J	2.3	J	2	U	2	U
VOCs	Cis-1,2-Dichloroethene	µg/L											5	U	4	U	14		13	
VOCs	Dibromochloromethane	µg/L											2.5		3.1		0.5	U	0.5	U
VOCs	Dibromomethane	µg/L											5	U	4	U	1	U	1	U
VOCs	Ethylbenzene	µg/L											3.7	J	3.4	J	0.76	J	0.56	J
VOCs	Isopropylbenzene	µg/L											5	U	4	U	0.34	J	1	U
VOCs	Methyl Tertbutyl Ether	µg/L											5	U	4	U	1	U	1	U
VOCs	Methylene chloride	µg/L											10	U	5.6	J	2	U	2	U
VOCs	Naphthalene	µg/L											25	U	20	U	5	U	5	U
VOCs	Propylbenzene	µg/L											5	U	4	U	0.43	J	0.29	J

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**															
		Location	MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-4 #02		MP-4 #02	
		Sample Date	1/8/2004		1/8/2004		1/8/2004		1/8/2004		1/8/2004		10/11/2011		4/17/2012		5/25/2010		10/27/2010	
		Sample ID	MP3-DAPL-SPLIT 6B		MP3-DAPL-SPLIT 7A		MP3-DAPL-SPLIT 7B		MP3-DAPL-SPLIT 8		MP3-DAPL-SPLIT 9		OC-MP-3 #01-XXX		OC-MP-3 #01-XXX		OC-MP-4 #02-XXX		OC-MP-4 #2-XXX	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs	Tetrachloroethene	µg/L											5	U	4	U	1	U	1	U
VOCs	Toluene	µg/L											84		79		0.51	J	0.43	J
VOCs	trans-1,2-Dichloroethene	µg/L											5	U	4	U	0.56	J	0.37	J
VOCs	Trichloroethene	µg/L											7.6		7.6		0.76	J	1	U
VOCs	Vinyl chloride	µg/L											2.5	U	2	U	0.37	J	0.5	U
VOCs	Xylene, o	µg/L											5	U	0.84	J	0.73	J	0.58	J
VOCs	Xylenes (m&p)	µg/L											10	U	8	U	0.52	J	2	U
VOCs	Xylenes, Total	µg/L																		
SVOCs	1,2,4-Trichlorobenzene	µg/L																		
SVOCs	1,2-Dichlorobenzene	µg/L																		
SVOCs	1,3-Dichlorobenzene	µg/L																		
SVOCs	1,4-Dichlorobenzene	µg/L																		
SVOCs	2,4,6-Trichlorophenol	µg/L											4.7	U	50	U	4.7	U	4.5	U
SVOCs	2,4-Dichlorophenol	µg/L											3.1	J	50	U	4.7	U	0.63	J
SVOCs	2,4-Dimethylphenol	µg/L											4.7	U	50	U	4.7	U	4.5	U
SVOCs	2,4-Dinitrophenol	µg/L											4.7	U	50	UJ	4.7	U	R	
SVOCs	2-Chlorophenol	µg/L											3.8	J	50	U	4.7	U	4.5	U
SVOCs	2-Methylnaphthalene	µg/L											0.94	U	10	U	0.94	U	0.91	U
SVOCs	2-Methylphenol	µg/L											2.1	J	50	U	4.7	U	4.5	U
SVOCs	2-Nitrophenol	µg/L											38	J	28	J	4.7	U	4.5	U
SVOCs	3 & 4 Methylphenol	µg/L											18		12	J	4.7	U	4.5	U
SVOCs	4,6-Dinitro-2-methylphenol	µg/L											4.7	U	50	UJ	4.7	U	R	
SVOCs	4-Bromophenyl phenyl ether	µg/L											4.7	U	50	U	4.7	U	4.5	U
SVOCs	4-Chloro-3-methylphenol	µg/L											4.7	U	50	U	4.7	U	4.5	U
SVOCs	4-Chloroaniline	µg/L											4.7	U	50	U	4.7	U	4.5	U
SVOCs	4-Chlorophenyl phenyl ether	µg/L											4.7	U	50	U	4.7	U	4.5	U
SVOCs	4-Methylphenol	µg/L																		
SVOCs	4-Nitrophenol	µg/L											54		31	J	4.7	UJ	4.5	U
SVOCs	Acenaphthylene	µg/L											0.28	U	3	U	0.28	U	0.27	U
SVOCs	Acetophenone	µg/L											4.7		5.7	J	4.7	U	4.5	U
SVOCs	Benzaldehyde	µg/L											8.7		11	J	4.7	U	4.5	U
SVOCs	Benzo(a)pyrene	µg/L											0.19	U	2	U	0.19	U	0.18	U
SVOCs	Benzo(b)fluoranthene	µg/L											0.28	U	3	U	0.28	U	0.27	U
SVOCs	Benzo(ghi)perylene	µg/L											0.47	U	5	U	0.47	U	0.45	U
SVOCs	Benzo(k)fluoranthene	µg/L											0.28	U	3	U	0.28	U	0.27	U
SVOCs	Benzoic Acid	µg/L											4.7	U	8.5	J	4.7	UJ	R	
SVOCs	Benzyl alcohol	µg/L											3.1	J	5	J	9.4	U	9.1	U
SVOCs	Biphenyl	µg/L											4.7	U	50	U	4.7	U	0.99	J
SVOCs	Bis(2-Ethylhexyl)phthalate	µg/L											1.9	U	20	UJ	1.9	U	38	UJ

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**																	
		Location	MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-4 #02		MP-4 #02	
		Sample Date	1/8/2004		1/8/2004		1/8/2004		1/8/2004		1/8/2004		10/11/2011		4/17/2012		5/25/2010		10/27/2010	
		Sample ID	MP3-DAPL-SPLIT 6B		MP3-DAPL-SPLIT 7A		MP3-DAPL-SPLIT 7B		MP3-DAPL-SPLIT 8		MP3-DAPL-SPLIT 9		OC-MP-3 #01-XXX		OC-MP-3 #01-XXX		OC-MP-4 #02-XXX		OC-MP-4 #2-XXX	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
SVOCs	Caprolactam	µg/L											4.7	UJ	5.7	J		R	4.5	UJ
SVOCs	Chrysene	µg/L											0.94	U	10	U	0.94	U	0.91	U
SVOCs	Dibenz(a,h)anthracene	µg/L											0.47	U	5	U	0.47	U	0.45	U
SVOCs	Dibenzofuran	µg/L											4.7	U	50	U	4.7	U	4.5	U
SVOCs	Diethylphthalate	µg/L											4.7	U	50	U	4.7	U	4.5	U
SVOCs	Dimethylformamide	µg/L																		
SVOCs	Dimethylphthalate	µg/L											4.7	U	50	U	4.7	U	4.5	U
SVOCs	Di-n-butylphthalate	µg/L											4.7	U	50	U	4.7	U	4.5	U
SVOCs	Di-n-octylphthalate	µg/L											4.7	U	50	UJ	4.7	U	4.5	UJ
SVOCs	Diphenyl ether	µg/L											12		7.9	J	4.7	U	4.4	J
SVOCs	Fluoranthene	µg/L											0.94	U	10	U	0.94	U	0.91	U
SVOCs	Indeno(1,2,3-cd)pyrene	µg/L											0.47	U	5	U	0.47	U	0.45	U
SVOCs	Isophorone	µg/L											4.7	U	50	U	4.7	U	4.5	U
SVOCs	Naphthalene	µg/L																		
SVOCs	N-Nitrosodimethylamine	µg/L	9.2		11		10		64		11		5.5				4.7	UJ		
SVOCs	N-Nitrosodiphenylamine	µg/L											4.7	U	50	U	4.7	U	4.5	U
SVOCs	Pentachlorophenol	µg/L											0.94	U	10	U	0.94	U	0.91	UJ
SVOCs	Phenanthrene	µg/L											0.19	U	2	U	0.19	U	0.18	U
SVOCs	Phenol	µg/L											300	J	150		4.7	UJ	4.5	UJ
SVOCs	Pyrene	µg/L											4.7	U	50	U	4.7	U	4.5	U
SVOCs2	Acenaphthylene	µg/L																		
SVOCs2	Benzo(a)pyrene	µg/L																		
SVOCs2	Benzo(b)fluoranthene	µg/L																		
SVOCs2	Benzo(ghi)perylene	µg/L																		
SVOCs2	Benzo(k)fluoranthene	µg/L																		
SVOCs2	Chrysene	µg/L																		
SVOCs2	Dibenz(a,h)anthracene	µg/L																		
SVOCs2	Fluoranthene	µg/L																		
SVOCs2	Indeno(1,2,3-cd)pyrene	µg/L																		
SVOCs2	Naphthalene	µg/L																		
SVOCs2	Phenanthrene	µg/L																		
SVOCs2	Pyrene	µg/L																		
NDMA	N-Nitrosodimethylamine	ng/L													25000	J			5700	J
Pest/Herb	2,4,5-T	µg/L																		
Pest/Herb	2,4,5-TP/Silvex	µg/L																		
Pest/Herb	2,4-DB	µg/L																		
Pest/Herb	Alpha-BHC	µg/L																		
Pest/Herb	Beta-BHC	µg/L																		
Pest/Herb	Delta-BHC	µg/L																		

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Main Street DAPL Pool**																	
		Location	MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-4 #02		MP-4 #02	
		Sample Date	1/8/2004		1/8/2004		1/8/2004		1/8/2004		1/8/2004		10/11/2011		4/17/2012		5/25/2010		10/27/2010	
		Sample ID	MP3-DAPL-SPLIT 6B		MP3-DAPL-SPLIT 7A		MP3-DAPL-SPLIT 7B		MP3-DAPL-SPLIT 8		MP3-DAPL-SPLIT 9		OC-MP-3 #01-XXX		OC-MP-3 #01-XXX		OC-MP-4 #02-XXX		OC-MP-4 #2-XXX	
		Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Pest/Herb	Dicamba	µg/L																		
Pest/Herb	Dieldrin	µg/L																		
Pest/Herb	Endosulfan I	µg/L																		
Pest/Herb	Endosulfan sulfate	µg/L																		
Pest/Herb	Endrin	µg/L																		
Pest/Herb	Gamma-BHC/Lindane	µg/L																		
Pest/Herb	Heptachlor	µg/L																		
Pest/Herb	Heptachlor epoxide	µg/L																		
Pest/Herb	MCPA	µg/L																		
Pest/Herb	MCPP	µg/L																		
Pest/Herb	Pentachlorophenol	µg/L																		
Pest/Herb	Picloram	µg/L																		
VPH	Target Compounds	µg/L																		
EPH	Target Compounds	µg/L																		
Oils/Fuels	PETROLEUM NAPHTHA	mg/L																		
Oils/Fuels	Unmatched	mg/L																		

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Maple Meadow Brook DAPL Area**											
		Location	GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D	
		Sample Date	10/26/1996		4/2/2003		3/2/2004		5/11/2004		11/18/2010		5/25/2011	
		Sample ID	GW-83-D		SD-GW-83D		GW-83D		GW-83D		OC-GW-83D-XXX		OC-GW-83D-XXX	
		Qc Code	FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs	1,1,1-Trichloroethane	µg/L	5	U							4	U	4	U
VOCs	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L									4	U	4	U
VOCs	1,1,2-Trichloroethane	µg/L	5	U							4	U	4	U
VOCs	1,1-Dichloroethane	µg/L	5	U							4	U	4	U
VOCs	1,1-Dichloroethene	µg/L	5	U							4	U	4	U
VOCs	1,2,4-Trichlorobenzene	µg/L									4	U	4	U
VOCs	1,2,4-Trimethylbenzene	µg/L									3.3	J	3.4	J
VOCs	1,2-Dichlorobenzene	µg/L									4	U	4	U
VOCs	1,2-Dichloroethane	µg/L	20								23		22	
VOCs	1,2-Dichloroethene (total)	µg/L	2	J										
VOCs	1,2-Dichloropropane	µg/L	5	U							4	U	4	U
VOCs	1,3,5-Trimethylbenzene	µg/L									4	U	4	U
VOCs	1,3-Dichlorobenzene	µg/L									4	U	4	U
VOCs	1,4-Dichlorobenzene	µg/L									4	U	4	U
VOCs	2,4,4-Trimethyl-1-pentene	µg/L	5	U							3.6	J	18	J
VOCs	2,4,4-Trimethyl-2-pentene	µg/L	5	U							4	U	5.1	
VOCs	2-Butanone	µg/L	10	U							40	U	40	U
VOCs	2-Hexanone	µg/L	10	U							40	U	40	U
VOCs	4-iso-Propyltoluene	µg/L									4	U	4	U
VOCs	4-Methyl-2-pentanone	µg/L	10	U							40	U	40	U
VOCs	Acetone	µg/L	18								200	UJ	200	U
VOCs	Benzene	µg/L	11								11		11	
VOCs	Bromochloromethane	µg/L									4	U	4	U
VOCs	Bromodichloromethane	µg/L	5	U							4	UJ	2	U
VOCs	Bromoform	µg/L	5	U							4	UJ	4	UJ
VOCs	Carbon disulfide	µg/L	5								4.5	J	6.6	J
VOCs	Carbon tetrachloride	µg/L	5	U							4	U	4	UJ
VOCs	Chlorobenzene	µg/L	5	U							1.4	J	4	U
VOCs	Chloroform	µg/L	27								20		17	
VOCs	Chloromethane	µg/L	10	U							8	U	8	U
VOCs	Cis-1,2-Dichloroethene	µg/L									2.6	J	2.6	J
VOCs	Dibromochloromethane	µg/L	5	U							2	U	2	U
VOCs	Dibromomethane	µg/L									4	U	4	U
VOCs	Ethylbenzene	µg/L	5								4.1		3.4	J
VOCs	Isopropylbenzene	µg/L									4	U	4	U
VOCs	Methyl Tertbutyl Ether	µg/L									4	U	4	UJ
VOCs	Methylene chloride	µg/L	20								12		16	
VOCs	Naphthalene	µg/L									20	U	20	U
VOCs	Propylbenzene	µg/L									1.1	J	0.89	J

Prepared by BJS 09/18/2017
Checked by JBR 09/22/2017

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Maple Meadow Brook DAPL Area**											
		Location	GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D	
		Sample Date	10/26/1996		4/2/2003		3/2/2004		5/11/2004		11/18/2010		5/25/2011	
		Sample ID	GW-83-D		SD-GW-83D		GW-83D		GW-83D		OC-GW-83D-XXX		OC-GW-83D-XXX	
		Qc Code	FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs	Tetrachloroethene	µg/L	2	J							2.1	J	1.7	J
VOCs	Toluene	µg/L	170								160		150	
VOCs	trans-1,2-Dichloroethene	µg/L									4	U	4	U
VOCs	Trichloroethene	µg/L	91								99		88	
VOCs	Vinyl chloride	µg/L	10	U							2	U	2	U
VOCs	Xylene, o	µg/L									3.2	J	2.7	J
VOCs	Xylenes (m&p)	µg/L									3.5	J	3	J
VOCs	Xylenes, Total	µg/L	9											
SVOCs	1,2,4-Trichlorobenzene	µg/L	10	U										
SVOCs	1,2-Dichlorobenzene	µg/L	0.3	J										
SVOCs	1,3-Dichlorobenzene	µg/L	10	U										
SVOCs	1,4-Dichlorobenzene	µg/L	10	U										
SVOCs	2,4,6-Trichlorophenol	µg/L	10	U							0.88	J	1	J
SVOCs	2,4-Dichlorophenol	µg/L	1	J							1.9	J	2.2	J
SVOCs	2,4-Dimethylphenol	µg/L	10	U							4.5	U	4.5	U
SVOCs	2,4-Dinitrophenol	µg/L	50	U							4.5	U	4.5	UJ
SVOCs	2-Chlorophenol	µg/L	1	J							2.5	J	2.8	J
SVOCs	2-Methylnaphthalene	µg/L	10	U							0.91	U	0.91	U
SVOCs	2-Methylphenol	µg/L	2	J							2.6	J	3	J
SVOCs	2-Nitrophenol	µg/L	10	U							4.5	U	4.5	U
SVOCs	3 & 4 Methylphenol	µg/L									3.5	J	4.3	J
SVOCs	4,6-Dinitro-2-methylphenol	µg/L	50	U							4.5	U	4.5	U
SVOCs	4-Bromophenyl phenyl ether	µg/L	10	U							4.5	U	4.5	U
SVOCs	4-Chloro-3-methylphenol	µg/L	10	U							4.5	U	4.5	U
SVOCs	4-Chloroaniline	µg/L	10	U							4.5	U	4.5	U
SVOCs	4-Chlorophenyl phenyl ether	µg/L	10	U							4.5	U	4.5	U
SVOCs	4-Methylphenol	µg/L	2	J										
SVOCs	4-Nitrophenol	µg/L	5	J							2.7	J	2.8	J
SVOCs	Acenaphthylene	µg/L	10	U							0.27	U	0.27	U
SVOCs	Acetophenone	µg/L									2.5	J	3.5	J
SVOCs	Benzaldehyde	µg/L									4.5	U	4.5	U
SVOCs	Benzo(a)pyrene	µg/L	10	U							0.18	U	0.18	U
SVOCs	Benzo(b)fluoranthene	µg/L	10	U							0.27	U	0.27	U
SVOCs	Benzo(ghi)perylene	µg/L	10	U							0.45	U	0.45	U
SVOCs	Benzo(k)fluoranthene	µg/L	10	U							0.27	U	0.27	U
SVOCs	Benzoic Acid	µg/L	50	U							4.5	UJ	4.5	U
SVOCs	Benzyl alcohol	µg/L	2	J							9.1	U	9.1	U
SVOCs	Biphenyl	µg/L									1.5	J	1.6	J
SVOCs	Bis(2-Ethylhexyl)phthalate	µg/L	0.2	JB							1.8	U	1.8	U

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Maple Meadow Brook DAPL Area**											
		Location	GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D	
		Sample Date	10/26/1996		4/2/2003		3/2/2004		5/11/2004		11/18/2010		5/25/2011	
		Sample ID	GW-83-D		SD-GW-83D		GW-83D		GW-83D		OC-GW-83D-XXX		OC-GW-83D-XXX	
		Qc Code	FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
SVOCs	Caprolactam	µg/L									4.5	UJ	4.5	UJ
SVOCs	Chrysene	µg/L	10	U							0.91	U	0.91	U
SVOCs	Dibenz(a,h)anthracene	µg/L	10	U							0.45	U	0.45	U
SVOCs	Dibenzofuran	µg/L	10	U							4.5	U	4.5	U
SVOCs	Diethylphthalate	µg/L	0.4	JB							16	UJ	4.5	U
SVOCs	Dimethylformamide	µg/L												
SVOCs	Dimethylphthalate	µg/L	0.4	J							4.5	U	0.53	J
SVOCs	Di-n-butylphthalate	µg/L	0.3	JB							4.5	U	4.5	U
SVOCs	Di-n-octylphthalate	µg/L	10	U							4.5	U	4.5	U
SVOCs	Diphenyl ether	µg/L									18	J	18	
SVOCs	Fluoranthene	µg/L	10	U							0.91	U	0.91	U
SVOCs	Indeno(1,2,3-cd)pyrene	µg/L	10	U							0.45	U	0.45	U
SVOCs	Isophorone	µg/L	10	U							4.5	U	4.5	U
SVOCs	Naphthalene	µg/L	0.4	J										
SVOCs	N-Nitrosodimethylamine	µg/L									8.5	J	8.4	J
SVOCs	N-Nitrosodiphenylamine	µg/L	10	U							4.5	U	4.5	U
SVOCs	Pentachlorophenol	µg/L	50	U							0.91	U	0.91	U
SVOCs	Phenanthrene	µg/L	10	U							0.18	U	0.18	U
SVOCs	Phenol	µg/L	63								35	J	57	J
SVOCs	Pyrene	µg/L	10	U							4.5	U	4.5	U
SVOCs2	Acenaphthylene	µg/L												
SVOCs2	Benzo(a)pyrene	µg/L												
SVOCs2	Benzo(b)fluoranthene	µg/L												
SVOCs2	Benzo(ghi)perylene	µg/L												
SVOCs2	Benzo(k)fluoranthene	µg/L												
SVOCs2	Chrysene	µg/L												
SVOCs2	Dibenz(a,h)anthracene	µg/L												
SVOCs2	Fluoranthene	µg/L												
SVOCs2	Indeno(1,2,3-cd)pyrene	µg/L												
SVOCs2	Naphthalene	µg/L												
SVOCs2	Phenanthrene	µg/L												
SVOCs2	Pyrene	µg/L												
NDMA	N-Nitrosodimethylamine	ng/L			17000	J	12000	J	25000	J				
Pest/Herb	2,4,5-T	µg/L												
Pest/Herb	2,4,5-TP/Silvex	µg/L												
Pest/Herb	2,4-DB	µg/L												
Pest/Herb	Alpha-BHC	µg/L												
Pest/Herb	Beta-BHC	µg/L												
Pest/Herb	Delta-BHC	µg/L												

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

		DAPL Pool ID	**Maple Meadow Brook DAPL Area**											
		Location	GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D	
		Sample Date	10/26/1996		4/2/2003		3/2/2004		5/11/2004		11/18/2010		5/25/2011	
		Sample ID	GW-83-D		SD-GW-83D		GW-83D		GW-83D		OC-GW-83D-XXX		OC-GW-83D-XXX	
		Qc Code	FS		FS		FS		FS		FS		FS	
Class	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Pest/Herb	Dicamba	µg/L												
Pest/Herb	Dieldrin	µg/L												
Pest/Herb	Endosulfan I	µg/L												
Pest/Herb	Endosulfan sulfate	µg/L												
Pest/Herb	Endrin	µg/L												
Pest/Herb	Gamma-BHC/Lindane	µg/L												
Pest/Herb	Heptachlor	µg/L												
Pest/Herb	Heptachlor epoxide	µg/L												
Pest/Herb	MCPA	µg/L												
Pest/Herb	MCPP	µg/L												
Pest/Herb	Pentachlorophenol	µg/L												
Pest/Herb	Picloram	µg/L												
VPH	Target Compounds	µg/L												
EPH	Target Compounds	µg/L												
Oils/Fuels	PETROLEUM NAPHTHA	mg/L												
Oils/Fuels	Unmatched	mg/L												

Table 4.2-1
Analytes Detected - Organics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

Notes

Blank Cell indicates parameter not analyzed
VOCs = Volatile organic compounds
SVOCs = Semivolatile organic compounds
SVOCs2 = Semivolatile organic compounds by alternate method
NDMA = N-Nitrosodimethylamine
Pest/Herb = Pesticides / Herbicides
EPH = Extractable petroleum hydrocarbons
VPH = Volatile petroleum hydrocarbons
Qual = Data qualifier
Data Qualifiers:
- U = Not detected at the quantitation limit shown
- J = Estimated concentration
- R = result rejected during data validation
- B = Analyte detected in the associated blank
- ND = Not Detected

Units:
- ng/L = nanograms per liter
- µg/L = micrograms per liter
- mg/L = milligrams per liter

QC Codes:
- FS = Field sample
- FD = Duplicate sample

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D	
			Sample Date	3/1/1981		4/1/1981		5/1/1981		6/1/1981		8/1/1981		10/1/1982		6/1/1983		10/1/1983		7/1/1984		12/1/1984		5/1/1985	
			Sample ID	GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L																						
Metals	T	Antimony	mg/L																						
Metals	T	Arsenic	mg/L																						
Metals	T	Barium	mg/L																						
Metals	T	Beryllium	mg/L																						
Metals	T	Cadmium	mg/L																						
Metals	T	Calcium	mg/L																						
Metals	T	Chromium	mg/L																						
Metals	T	Chromium, Hexavalent	mg/L	0.22																					
Metals	T	Chromium, Trivalent	mg/L											10.2		590		830		1500		1099.9		0.005	U
Metals	T	Cobalt	mg/L																						
Metals	T	Copper	mg/L																						
Metals	T	Iron	mg/L																						
Metals	T	Lead	mg/L																						
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L																						
Metals	T	Manganese	mg/L																						
Metals	T	Mercury	mg/L																						
Metals	T	Nickel	mg/L																						
Metals	T	Potassium	mg/L																						
Metals	T	Selenium	mg/L																						
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L																						
Metals	T	Sodium	mg/L																						
Metals	T	Thallium	mg/L																						
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L																						
Metals	T	Zinc	mg/L																						
Metals	D	Aluminum	mg/L																						
Metals	D	Antimony	mg/L																						
Metals	D	Arsenic	mg/L																						
Metals	D	Barium	mg/L																						
Metals	D	Beryllium	mg/L																						
Metals	D	Cadmium	mg/L																						
Metals	D	Calcium	mg/L																						
Metals	D	Chromium	mg/L																						
Metals	D	Chromium, Hexavalent	mg/L			0.01		0.02		0.01		0.01	U												
Metals	D	Chromium, Trivalent	mg/L			11.12		16.25		12.69		11.13													
Metals	D	Cobalt	mg/L																						
Metals	D	Copper	mg/L																						
Metals	D	Iron	mg/L																						
Metals	D	Lead	mg/L																						
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L																						
Metals	D	Manganese	mg/L																						
Metals	D	Mercury	mg/L																						
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L																						
Metals	D	Potassium	mg/L																						
Metals	D	Selenium	mg/L																						
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D	
			Sample Date	3/1/1981		4/1/1981		5/1/1981		6/1/1981		8/1/1981		10/1/1982		6/1/1983		10/1/1983		7/1/1984		12/1/1984		5/1/1985	
			Sample ID	GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L																						
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L																						
Metals	D	Vanadium	mg/L																						
Metals	D	Zinc	mg/L																						
Inorg_WC	T	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	T	Bromide	mg/L																						
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	1,742		7,200		5,360		7,450		7,990		7,744		2,300		10,000		4,900		12,000		17,000	
Inorg_WC	T	Cyanide, Total	mg/L																						
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L																						
Inorg_WC	T	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	T	Nitrite as N	mg/L																						
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	192		4102		2757		2340		2545		4928		1900		3000		2500		2000			
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	6,706		27,500		33,846		59,000		26,500		36,956		3,140		5,400		58,000		42,000		59,000	
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	T	Total Dissolved Solids	mg/L																						
Inorg_WC	T	Total Organic Carbon	mg/L																						
Inorg_WC	T	Total Suspended Solids	mg/L																						
Inorg_WC	T	Specific Gravity	g/ml																						
Inorg_WC	T	Viscosity	cpoise																						
Inorg_WC	T	pH	PH UNITS											5		4.2		3.5		4.1		4.5			
Inorg_WC	D	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	D	Bromide	mg/L																						
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L																						
Inorg_WC	D	CO2 as C	mg/L																						
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L																						
Inorg_WC	D	Nitrate as N	mg/L																						
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L																						
Inorg_WC	D	Nitrogen, as Ammonia	mg/L																						
Inorg_WC	D	Orthophosphate	mg/L																						
Inorg_WC	D	pH	PH UNITS																						
Inorg_WC	D	Phosphorus, Total as P	mg/L																						
Inorg_WC	D	Sulfate	mg/L																						
Inorg_WC	D	Sulfide	mg/L																						
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D	
			Sample Date	12/1/1985		6/26/1986		12/1/1986		6/1/1987		12/1/1987		5/19/1988		12/8/1988		5/1/1989		5/1/1989		11/1/1989		2/16/1990	
			Sample ID	GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D DUP		GW-22-D		GW-22-D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FD		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L																						
Metals	T	Antimony	mg/L																						
Metals	T	Arsenic	mg/L																						
Metals	T	Barium	mg/L																						
Metals	T	Beryllium	mg/L																						
Metals	T	Cadmium	mg/L																						
Metals	T	Calcium	mg/L																						
Metals	T	Chromium	mg/L			67				1700		1700		2100								760		620	
Metals	T	Chromium, Hexavalent	mg/L			0.005	U																		
Metals	T	Chromium, Trivalent	mg/L	1200				1900																	
Metals	T	Cobalt	mg/L																						
Metals	T	Copper	mg/L																						
Metals	T	Iron	mg/L																						
Metals	T	Lead	mg/L																						
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L																						
Metals	T	Manganese	mg/L																						
Metals	T	Mercury	mg/L																						
Metals	T	Nickel	mg/L																						
Metals	T	Potassium	mg/L																						
Metals	T	Selenium	mg/L																						
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L																						
Metals	T	Sodium	mg/L																						
Metals	T	Thallium	mg/L																						
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L																						
Metals	T	Zinc	mg/L																						
Metals	D	Aluminum	mg/L																	1700					
Metals	D	Antimony	mg/L																						
Metals	D	Arsenic	mg/L																						
Metals	D	Barium	mg/L																						
Metals	D	Beryllium	mg/L																						
Metals	D	Cadmium	mg/L																						
Metals	D	Calcium	mg/L																	500					
Metals	D	Chromium	mg/L													410		480		460					
Metals	D	Chromium, Hexavalent	mg/L																						
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L																						
Metals	D	Copper	mg/L																						
Metals	D	Iron	mg/L																	390					
Metals	D	Lead	mg/L																						
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L																	1300					
Metals	D	Manganese	mg/L																						
Metals	D	Mercury	mg/L																						
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L																						
Metals	D	Potassium	mg/L																						
Metals	D	Selenium	mg/L																						
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D		GW-22D	
			Sample Date	12/1/1985		6/26/1986		12/1/1986		6/1/1987		12/1/1987		5/19/1988		12/8/1988		5/1/1989		5/1/1989		11/1/1989		2/16/1990	
			Sample ID	GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-22-D DUP		GW-22-D		GW-22-D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FD		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L																						
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L																						
Metals	D	Vanadium	mg/L																						
Metals	D	Zinc	mg/L																						
Inorg_WC	T	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	T	Bromide	mg/L																						
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	16,000		1,400		16,000		18,000		17,000		10,000		9,800		6,700		7,500		12,000		12,000	
Inorg_WC	T	Cyanide, Total	mg/L																						
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L																						
Inorg_WC	T	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	T	Nitrite as N	mg/L																						
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	6400		590		6900		6600		2500		5100		4300		2700		3000		4800		3600	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	53,000		5,700		64,000		84,000		110,000		62,000		47,000		38,000		37,000		52,000		41,000	
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	T	Total Dissolved Solids	mg/L																						
Inorg_WC	T	Total Organic Carbon	mg/L																						
Inorg_WC	T	Total Suspended Solids	mg/L																						
Inorg_WC	T	Specific Gravity	g/ml																						
Inorg_WC	T	Viscosity	cpoise																						
Inorg_WC	T	pH	PH UNITS	3.9																					
Inorg_WC	D	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	D	Bromide	mg/L																						
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L																						
Inorg_WC	D	CO2 as C	mg/L																						
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L																						
Inorg_WC	D	Nitrate as N	mg/L																						
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L																						
Inorg_WC	D	Nitrogen, as Ammonia	mg/L																						
Inorg_WC	D	Orthophosphate	mg/L																						
Inorg_WC	D	pH	PH UNITS																						
Inorg_WC	D	Phosphorus, Total as P	mg/L																						
Inorg_WC	D	Sulfate	mg/L																						
Inorg_WC	D	Sulfide	mg/L																						
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	GW-22D		GW-22D		GW-22D		GW-22D		GW-27D		GW-27D		GW-27D		GW-27D		GW-27D		GW-27D	
			Sample Date	5/1/1990		8/12/1992		11/5/1992		1/19/2000		7/25/1986		12/1/1986		6/1/1987		12/1/1987		5/19/1988		12/8/1988		5/1/1989	
			Sample ID	GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L																						
Metals	T	Antimony	mg/L																						
Metals	T	Arsenic	mg/L																						
Metals	T	Barium	mg/L																						
Metals	T	Beryllium	mg/L																						
Metals	T	Cadmium	mg/L																						
Metals	T	Calcium	mg/L																						
Metals	T	Chromium	mg/L									120				120		130							
Metals	T	Chromium, Hexavalent	mg/L									0.005	U												
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L																						
Metals	T	Copper	mg/L																						
Metals	T	Iron	mg/L																						
Metals	T	Lead	mg/L																						
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L																						
Metals	T	Manganese	mg/L																						
Metals	T	Mercury	mg/L																						
Metals	T	Nickel	mg/L																						
Metals	T	Potassium	mg/L																						
Metals	T	Selenium	mg/L																						
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L																						
Metals	T	Sodium	mg/L																						
Metals	T	Thallium	mg/L																						
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L																						
Metals	T	Zinc	mg/L																						
Metals	D	Aluminum	mg/L	1700		1400		1500		2000															
Metals	D	Antimony	mg/L			0.25	U	0.05	U	6.4															
Metals	D	Arsenic	mg/L			0.25	U	0.25	U																
Metals	D	Barium	mg/L			0.025	U	0.026		0.051															
Metals	D	Beryllium	mg/L			0.1		0.085		0.16															
Metals	D	Cadmium	mg/L			0.055		0.11		0.13															
Metals	D	Calcium	mg/L			460		420		460															
Metals	D	Chromium	mg/L	730		560		740		900										160		99		220	
Metals	D	Chromium, Hexavalent	mg/L																						
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L			3.8		2.9		5.5															
Metals	D	Copper	mg/L			8.3		5.6		0.8															
Metals	D	Iron	mg/L			1500		2100		3500															
Metals	D	Lead	mg/L			0.25	U	0.25	U	0.34															
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L			1400		1700		2600															
Metals	D	Manganese	mg/L					130		160															
Metals	D	Mercury	mg/L			0.0002	U	0.0002	U	0.0002	U														
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L			4.4		3.6		8.4															
Metals	D	Potassium	mg/L			17		19		15															
Metals	D	Selenium	mg/L			0.5	U	0.5	U	0.1	U														
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L			0.075	U	0.015	U	0.05	U														

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	GW-22D		GW-22D		GW-22D		GW-22D		GW-27D		GW-27D		GW-27D		GW-27D		GW-27D		GW-27D	
			Sample Date	5/1/1990		8/12/1992		11/5/1992		1/19/2000		7/25/1986		12/1/1986		6/1/1987		12/1/1987		5/19/1988		12/8/1988		5/1/1989	
			Sample ID	GW-22-D		GW-22-D		GW-22-D		GW-22-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L					12000		7400															
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L			0.13	U	0.1	U	0.33															
Metals	D	Vanadium	mg/L			0.32		0.53		1.1															
Metals	D	Zinc	mg/L			9.5		8.8		14															
Inorg_WC	T	Bicarbonate Alkalinity	mg/L							2	U														
Inorg_WC	T	Bromide	mg/L																						
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	12,000		8,500		6,500		18,000		5,000		4,200		5,100		4,100		5,100		3,500		3,800	
Inorg_WC	T	Cyanide, Total	mg/L																						
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L							10															
Inorg_WC	T	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	T	Nitrite as N	mg/L							0.28															
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	4700		2900		4000		3800		2500		2400		3100		2700		2100		2200		2100	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	48,000		33,000	J	28,000		74,000		20,000		3,100		15,000		42,000		32,000		17,000		16,000	
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	T	Total Dissolved Solids	mg/L																						
Inorg_WC	T	Total Organic Carbon	mg/L																						
Inorg_WC	T	Total Suspended Solids	mg/L																						
Inorg_WC	T	Specific Gravity	g/ml																						
Inorg_WC	T	Viscosity	cpoise																						
Inorg_WC	T	pH	PH UNITS							3.75															
Inorg_WC	D	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	D	Bromide	mg/L																						
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L																						
Inorg_WC	D	CO2 as C	mg/L																						
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L																						
Inorg_WC	D	Nitrate as N	mg/L																						
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L																						
Inorg_WC	D	Nitrogen, as Ammonia	mg/L																						
Inorg_WC	D	Orthophosphate	mg/L																						
Inorg_WC	D	pH	PH UNITS																						
Inorg_WC	D	Phosphorus, Total as P	mg/L																						
Inorg_WC	D	Sulfate	mg/L																						
Inorg_WC	D	Sulfide	mg/L																						
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	GW-27D		GW-27D		GW-27D		GW-27D		GW-27D		GW-27D		GW-27D		GW-30DR		GW-30DR		GW-30DR		GW-30DR	
			Sample Date	11/1/1989		5/1/1990		12/10/1991		8/12/1992		11/9/1992		1/13/1995		1/19/2000		7/25/1986		12/1/1986		5/19/1988		12/8/1988	
			Sample ID	GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-30-DR		GW-30-DR		GW-30-DR		GW-30-DR	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L					330																	
Metals	T	Antimony	mg/L					0.05	U																
Metals	T	Arsenic	mg/L					0.1	U																
Metals	T	Barium	mg/L					0.07																	
Metals	T	Beryllium	mg/L					0.034																	
Metals	T	Cadmium	mg/L					0.029																	
Metals	T	Calcium	mg/L					430																	
Metals	T	Chromium	mg/L	80				73						2.2				1500		2000		1600			
Metals	T	Chromium, Hexavalent	mg/L															0.005	U						
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L					2.1																	
Metals	T	Copper	mg/L					3.1																	
Metals	T	Iron	mg/L					120																	
Metals	T	Lead	mg/L					0.05	U																
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L					420																	
Metals	T	Manganese	mg/L					64																	
Metals	T	Mercury	mg/L					0.0002	U																
Metals	T	Nickel	mg/L					1.6																	
Metals	T	Potassium	mg/L					26																	
Metals	T	Selenium	mg/L					0.25	U																
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L					0.015	U																
Metals	T	Sodium	mg/L					3800																	
Metals	T	Thallium	mg/L					0.05	U																
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L					0.075																	
Metals	T	Zinc	mg/L					2.8																	
Metals	D	Aluminum	mg/L							520		370				130									
Metals	D	Antimony	mg/L							0.1	U	0.025	U			0.14									
Metals	D	Arsenic	mg/L							0.1	U	0.25	U												
Metals	D	Barium	mg/L							0.017		0.018				0.014									
Metals	D	Beryllium	mg/L							0.046		0.037				0.013									
Metals	D	Cadmium	mg/L							0.025		0.029				0.0087									
Metals	D	Calcium	mg/L							400		420				330									
Metals	D	Chromium	mg/L			87				75		91				16								0.015	U
Metals	D	Chromium, Hexavalent	mg/L																						
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L							2.3		2.6				0.83									
Metals	D	Copper	mg/L							3.5		3.2				0.95									
Metals	D	Iron	mg/L							57		160				36									
Metals	D	Lead	mg/L							0.1	U	0.1	U			0.013									
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L							470		540				210									
Metals	D	Manganese	mg/L							66		92				26									
Metals	D	Mercury	mg/L							0.0002	U	0.0002	U			0.0002	U								
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L							2		1.7				0.68									
Metals	D	Potassium	mg/L							18		34				10	U								
Metals	D	Selenium	mg/L							0.25	U	0.25	U			0.01	U								
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L							0.015	U	0.015	U			0.005	U								

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	GW-27D		GW-27D		GW-27D		GW-27D		GW-27D		GW-27D		GW-30DR		GW-30DR		GW-30DR		GW-30DR	
			Sample Date	11/1/1989		5/1/1990		12/10/1991		8/12/1992		11/9/1992		1/13/1995		1/19/2000		7/25/1986		12/1/1986		5/19/1988		12/8/1988	
			Sample ID	GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-27-D		GW-30-DR		GW-30-DR		GW-30-DR		GW-30-DR	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L							3800		5200				1600									
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L							0.005	U	0.05	U			0.01	U								
Metals	D	Vanadium	mg/L							0.025	U	0.025	U			0.01	U								
Metals	D	Zinc	mg/L							3.7		3.2				1.1									
Inorg_WC	T	Bicarbonate Alkalinity	mg/L													2	U								
Inorg_WC	T	Bromide	mg/L																						
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	3,400		3,900		3,700	J	3,700		3,700				1,200		14,000		5,900		8,400		420	
Inorg_WC	T	Cyanide, Total	mg/L					0.02	UJ																
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L													3.8									
Inorg_WC	T	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	T	Nitrite as N	mg/L													0.01	U								
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	2500		2300		55				730				780		3600		2400		14000		1300	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	18,000		16,000		18,000		18,000	J	18,000				6,200		56,000		22,000		70,000		1,200	
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	T	Total Dissolved Solids	mg/L																						
Inorg_WC	T	Total Organic Carbon	mg/L																						
Inorg_WC	T	Total Suspended Solids	mg/L																						
Inorg_WC	T	Specific Gravity	g/ml																						
Inorg_WC	T	Viscosity	cpoise																						
Inorg_WC	T	pH	PH UNITS													4.03									
Inorg_WC	D	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	D	Bromide	mg/L																						
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L																						
Inorg_WC	D	CO2 as C	mg/L																						
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L																						
Inorg_WC	D	Nitrate as N	mg/L																						
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L																						
Inorg_WC	D	Nitrogen, as Ammonia	mg/L											3700											
Inorg_WC	D	Orthophosphate	mg/L																						
Inorg_WC	D	pH	PH UNITS																						
Inorg_WC	D	Phosphorus, Total as P	mg/L																						
Inorg_WC	D	Sulfate	mg/L											23000											
Inorg_WC	D	Sulfide	mg/L																						
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	GW-30DR		GW-30DR		GW-30DR		GW-30DR		GW-30DR		GW-30DR		GW-30DR		GW-30DR		GW-35D		GW-35D	
			Sample Date	5/1/1989		11/1/1989		2/16/1990		5/1/1990		8/4/1992		11/9/1992		3/24/1993		3/24/1993		4/10/1997		2/16/1990		5/1/1990	
			Sample ID	GW-30-DR		GW-30-DR		GW30DR		GW30DR		GW-30-DR		GW-30-DR		GW-30DR		GW-30DR DUP		GW-30DR		GW35D		GW35D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FD		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L																						
Metals	T	Antimony	mg/L																						
Metals	T	Arsenic	mg/L																						
Metals	T	Barium	mg/L																						
Metals	T	Beryllium	mg/L																						
Metals	T	Cadmium	mg/L																						
Metals	T	Calcium	mg/L																						
Metals	T	Chromium	mg/L			0.037		1800														83			
Metals	T	Chromium, Hexavalent	mg/L																						
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L																						
Metals	T	Copper	mg/L																						
Metals	T	Iron	mg/L																						
Metals	T	Lead	mg/L																						
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L																						
Metals	T	Manganese	mg/L																						
Metals	T	Mercury	mg/L																						
Metals	T	Nickel	mg/L																						
Metals	T	Potassium	mg/L																						
Metals	T	Selenium	mg/L																						
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L																						
Metals	T	Sodium	mg/L																						
Metals	T	Thallium	mg/L																						
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L																						
Metals	T	Zinc	mg/L																						
Metals	D	Aluminum	mg/L							2500		2100		2300										2400	
Metals	D	Antimony	mg/L									0.5	U	0.1	U										
Metals	D	Arsenic	mg/L									1.3	U	0.5	U										
Metals	D	Barium	mg/L									0.025	U	0.015											
Metals	D	Beryllium	mg/L									0.13		0.1											
Metals	D	Cadmium	mg/L									0.12		0.058											
Metals	D	Calcium	mg/L									540		590											
Metals	D	Chromium	mg/L	0.015	U					2100		1700		1600										1400	
Metals	D	Chromium, Hexavalent	mg/L																						
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L									5.4		3.8											
Metals	D	Copper	mg/L									2.7		2.6											
Metals	D	Iron	mg/L									3200		3400											
Metals	D	Lead	mg/L									0.05	U	0.25	U										
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L									1700		1700											
Metals	D	Manganese	mg/L									160		170											
Metals	D	Mercury	mg/L									0.0011		0.00053											
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L									6.1		4.3											
Metals	D	Potassium	mg/L									14		12											
Metals	D	Selenium	mg/L									0.63	U	0.5	U										
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L									0.075	U	0.015	U										

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	GW-30DR		GW-30DR		GW-30DR		GW-30DR		GW-30DR		GW-30DR		GW-30DR		GW-30DR		GW-35D		GW-35D	
			Sample Date	5/1/1989		11/1/1989		2/16/1990		5/1/1990		8/4/1992		11/9/1992		3/24/1993		3/24/1993		4/10/1997		2/16/1990		5/1/1990	
			Sample ID	GW-30-DR		GW-30-DR		GW30DR		GW30DR		GW-30-DR		GW-30-DR		GW-30DR		GW-30DR DUP		GW-30DR		GW35D		GW35D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FD		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L									17000		17000											
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L									0.025	U	0.25	U										
Metals	D	Vanadium	mg/L									2.3		1.8											
Metals	D	Zinc	mg/L									13		14											
Inorg_WC	T	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	T	Bromide	mg/L																						
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	9,200		180		16,000		17,000		23,000		16,000								2,000		19,000	
Inorg_WC	T	Cyanide, Total	mg/L																						
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L																						
Inorg_WC	T	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	T	Nitrite as N	mg/L																						
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	6100		110		6500		6500		8000		1900								840		830	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	43,000		1,100		82,000		72,000		72,000		87,000								8,500		6,300	
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	T	Total Dissolved Solids	mg/L													100000		110000							
Inorg_WC	T	Total Organic Carbon	mg/L																						
Inorg_WC	T	Total Suspended Solids	mg/L																						
Inorg_WC	T	Specific Gravity	g/ml																	1.102					
Inorg_WC	T	Viscosity	cpoise																	1.75					
Inorg_WC	T	pH	PH UNITS																						
Inorg_WC	D	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	D	Bromide	mg/L																						
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L																						
Inorg_WC	D	CO2 as C	mg/L																						
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L																						
Inorg_WC	D	Nitrate as N	mg/L																						
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L																						
Inorg_WC	D	Nitrogen, as Ammonia	mg/L																						
Inorg_WC	D	Orthophosphate	mg/L																						
Inorg_WC	D	pH	PH UNITS																						
Inorg_WC	D	Phosphorus, Total as P	mg/L																						
Inorg_WC	D	Sulfate	mg/L																						
Inorg_WC	D	Sulfide	mg/L																						
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	GW-35D		GW-35D		GW-35D		GW-35D		GW-35D		GW-37		GW-37		GW-37		GW-37		GW-37	
			Sample Date	8/4/1992		11/5/1992		11/10/1992		11/28/2003		11/28/2003		2/16/1990		5/1/1990		8/30/1990		11/21/1990		8/1/1991		8/11/1992	
			Sample ID	GW-35-D		GW-35-D		GW-35-D		GW35D-DAPL		GW35D-TREAT		GW37D		GW37		MW37D		GW37		GW-37		GW-37	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L																						
Metals	T	Antimony	mg/L																						
Metals	T	Arsenic	mg/L							0.25	U	0.025	U												
Metals	T	Barium	mg/L							0.25	U	0.025	U												
Metals	T	Beryllium	mg/L																						
Metals	T	Cadmium	mg/L							0.04		0.005													
Metals	T	Calcium	mg/L																						
Metals	T	Chromium	mg/L							368		0.352		900								840			
Metals	T	Chromium, Hexavalent	mg/L																						
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L																						
Metals	T	Copper	mg/L																						
Metals	T	Iron	mg/L																						
Metals	T	Lead	mg/L							0.25	U	0.025	U												
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L																						
Metals	T	Manganese	mg/L																						
Metals	T	Mercury	mg/L							0.00076		0.00035													
Metals	T	Nickel	mg/L																						
Metals	T	Potassium	mg/L																						
Metals	T	Selenium	mg/L							0.25	U	0.025	U												
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L							0.1	U	0.01	U												
Metals	T	Sodium	mg/L																						
Metals	T	Thallium	mg/L																						
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L																						
Metals	T	Zinc	mg/L																						
Metals	D	Aluminum	mg/L	2400		210										2200		1400		1500				2000	
Metals	D	Antimony	mg/L	0.5	U	0.005	U																	0.25	U
Metals	D	Arsenic	mg/L	0.5	U	0.025	U																	0.5	U
Metals	D	Barium	mg/L	0.025	U	0.025																		0.025	U
Metals	D	Beryllium	mg/L	0.12		0.015	U																	0.12	
Metals	D	Cadmium	mg/L	0.14		0.01	U																	0.11	
Metals	D	Calcium	mg/L	520		250																		540	
Metals	D	Chromium	mg/L	1300		34										1400		960		870				1700	
Metals	D	Chromium, Hexavalent	mg/L																					31	J
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L	4.1		0.36																		4.6	
Metals	D	Copper	mg/L	1.1		0.55																		5.4	
Metals	D	Iron	mg/L	3300		68														1000				1800	
Metals	D	Lead	mg/L	0.5	U	0.05	U																	0.5	U
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	1700		190																		1200	
Metals	D	Manganese	mg/L	120		12																		150	
Metals	D	Mercury	mg/L	0.0006		0.0002	U																	0.0005	
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L	5.8		0.52																		5.6	
Metals	D	Potassium	mg/L	15		3.1																		17	
Metals	D	Selenium	mg/L	0.63	U	0.1	U																	1.3	U
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L	0.075	U	0.048																		0.075	U

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	GW-35D		GW-35D		GW-35D		GW-35D		GW-35D		GW-37		GW-37		GW-37		GW-37		GW-37	
			Sample Date	8/4/1992		11/5/1992		11/10/1992		11/28/2003		11/28/2003		2/16/1990		5/1/1990		8/30/1990		11/21/1990		8/1/1991		8/11/1992	
			Sample ID	GW-35-D		GW-35-D		GW-35-D		GW35D-DAPL		GW35D-TREAT		GW37D		GW37		MW37D		GW37		GW-37		GW-37	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L	16000		1300																		14000	
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L	0.025	U	0.025	U																	0.025	U
Metals	D	Vanadium	mg/L	1.8		0.025	U																	0.85	
Metals	D	Zinc	mg/L	13		1.1																		11	
Inorg_WC	T	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	T	Bromide	mg/L																						
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	17,000		1,300								7,900		11,000		9,800		7,200		7,800		13,000	
Inorg_WC	T	Cyanide, Total	mg/L																						
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L																						
Inorg_WC	T	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	T	Nitrite as N	mg/L																						
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	7000				2.4		4390				3800		4800		4000		3500		3200		5700	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	58,000		5,600								36,000		51,000		31,000		33,000		36,000		49,000	J
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	T	Total Dissolved Solids	mg/L																						
Inorg_WC	T	Total Organic Carbon	mg/L																						
Inorg_WC	T	Total Suspended Solids	mg/L							95700		53100													
Inorg_WC	T	Specific Gravity	g/ml																						
Inorg_WC	T	Viscosity	cpoise																						
Inorg_WC	T	pH	PH UNITS																						
Inorg_WC	D	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	D	Bromide	mg/L																						
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L																						
Inorg_WC	D	CO2 as C	mg/L																						
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L																						
Inorg_WC	D	Nitrate as N	mg/L																						
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L																						
Inorg_WC	D	Nitrogen, as Ammonia	mg/L																						
Inorg_WC	D	Orthophosphate	mg/L																						
Inorg_WC	D	pH	PH UNITS																						
Inorg_WC	D	Phosphorus, Total as P	mg/L																						
Inorg_WC	D	Sulfate	mg/L																						
Inorg_WC	D	Sulfide	mg/L																						
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	GW-37		GW-37		GW-38		GW-38		GW-38		GW-38		GW-38		GW-38		GW-38		MP-1 #01	
			Sample Date	11/16/1992		1/27/2000		2/16/1990		5/1/1990		8/30/1990		11/21/1990		8/1/1991		8/1/1991		8/4/1992		11/9/1992		4/18/1996	
			Sample ID	GW-37		GW-37		GW38D		GW38		MW38D		GW38		GW-38		GW-38 DUP		GW-38		GW-38		MP-1 #01	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FD		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L																						
Metals	T	Antimony	mg/L																						
Metals	T	Arsenic	mg/L																						
Metals	T	Barium	mg/L																						
Metals	T	Beryllium	mg/L																						
Metals	T	Cadmium	mg/L																						
Metals	T	Calcium	mg/L																						
Metals	T	Chromium	mg/L					9.4								29		25							
Metals	T	Chromium, Hexavalent	mg/L																						
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L																						
Metals	T	Copper	mg/L																						
Metals	T	Iron	mg/L																						
Metals	T	Lead	mg/L																						
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L																						
Metals	T	Manganese	mg/L																						
Metals	T	Mercury	mg/L																						
Metals	T	Nickel	mg/L																						
Metals	T	Potassium	mg/L																						
Metals	T	Selenium	mg/L																						
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L																						
Metals	T	Sodium	mg/L																						
Metals	T	Thallium	mg/L																						
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L																						
Metals	T	Zinc	mg/L																						
Metals	D	Aluminum	mg/L	2200		1200				940		120		64						1200		720		1800	
Metals	D	Antimony	mg/L	0.1	U	7														0.13	U	0.025	U	0.74	
Metals	D	Arsenic	mg/L	0.5	U															0.25	U	0.25	U	0.77	
Metals	D	Barium	mg/L	0.015		0.25	U													0.025	U	0.013		0.05	U
Metals	D	Beryllium	mg/L	0.11		0.09														0.08		0.052		0.25	U
Metals	D	Cadmium	mg/L	0.076		0.068														0.055		0.04		0.1	U
Metals	D	Calcium	mg/L	500		380														410		330		420	
Metals	D	Chromium	mg/L	1700		790				460		43		20						760		440		2200	
Metals	D	Chromium, Hexavalent	mg/L	36	J																			150	
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L	4.8		4														3		1.7		9.2	
Metals	D	Copper	mg/L	5.5		3.3														3		1.8		7.8	
Metals	D	Iron	mg/L	2200		1400								22						1000		520		2800	
Metals	D	Lead	mg/L	2	U	0.25	U													0.025	U	0.1	U	0.16	
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	1300		830														830		500		1500	
Metals	D	Manganese	mg/L	170		120														87		53		200	
Metals	D	Mercury	mg/L	0.00081		0.00047														0.0003		0.0002	U	0.0047	
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L	5.1		4.3														3.6		1.9		8.3	
Metals	D	Potassium	mg/L	15		50	U													6.6		4.1		66	
Metals	D	Selenium	mg/L	0.5	U	1	U													0.5	U	0.25	U	0.1	U
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L	0.03	U	0.25	U													0.075	U	0.015	U	0.15	U

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool										
			Location	GW-37	GW-37	GW-38	GW-38	GW-38	GW-38	GW-38	GW-38	GW-38	GW-38	MP-1 #01
			Sample Date	11/16/1992	1/27/2000	2/16/1990	5/1/1990	8/30/1990	11/21/1990	8/1/1991	8/1/1991	8/4/1992	11/9/1992	4/18/1996
			Sample ID	GW-37	GW-37	GW38D	GW38	MW38D	GW38	GW-38	GW-38 DUP	GW-38	GW-38	MP-1 #01
			Qc Code	FS	FS	FS	FS	FS	FS	FS	FD	FS	FS	FS
Class	**Fraction**	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
Metals	D	Sodium	mg/L	16000	9300							8000	4700	25000
Metals	D	Strontium	mg/L											
Metals	D	Thallium	mg/L	0.2 U	1 U							0.025 U	0.05 U	0.38 U
Metals	D	Vanadium	mg/L	0.8	0.25 U							0.25	0.13	1.3
Metals	D	Zinc	mg/L	11	8.2							7.1	4.1	19
Inorg_WC	T	Bicarbonate Alkalinity	mg/L		1 U									
Inorg_WC	T	Bromide	mg/L											
Inorg_WC	T	Chemical Oxygen Demand	mg/L											
Inorg_WC	T	Chloride	mg/L	13,000	8,700	590	3,800	840	590	820	860	15,000	4,700	
Inorg_WC	T	Cyanide, Total	mg/L											
Inorg_WC	T	Dissolved Organic Carbon	mg/L											
Inorg_WC	T	Fluoride	mg/L											
Inorg_WC	T	Nitrate as N	mg/L	16 J	9.1									
Inorg_WC	T	Nitrate+Nitrite as N	mg/L											
Inorg_WC	T	Nitrite as N	mg/L	0.17	0.25 U									
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	13	4200	300	2200	570	400	300	360	3200	2600	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L											
Inorg_WC	T	Orthophosphate	mg/L											
Inorg_WC	T	Phosphorus, Total as P	mg/L											
Inorg_WC	T	Sulfate	mg/L	58,000	44,000	2,300	28,000	2,400	2,600	3,700	3,400	43,000	24,000	
Inorg_WC	T	Sulfide	mg/L											
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L											
Inorg_WC	T	Total Dissolved Solids	mg/L											
Inorg_WC	T	Total Organic Carbon	mg/L											
Inorg_WC	T	Total Suspended Solids	mg/L											
Inorg_WC	T	Specific Gravity	g/ml											
Inorg_WC	T	Viscosity	cpoise											
Inorg_WC	T	pH	PH UNITS		3.91									
Inorg_WC	D	Bicarbonate Alkalinity	mg/L											
Inorg_WC	D	Bromide	mg/L											
Inorg_WC	D	Carbonate	mg/L											
Inorg_WC	D	Chloride	mg/L											17000
Inorg_WC	D	CO2 as C	mg/L											
Inorg_WC	D	Cyanide, Total	mg/L											
Inorg_WC	D	Dissolved Organic Carbon	mg/L											
Inorg_WC	D	Nitrate as N	mg/L											
Inorg_WC	D	Nitrate+Nitrite as N	mg/L											2.1
Inorg_WC	D	Nitrite as N	mg/L											
Inorg_WC	D	Nitrogen, as Ammonia	mg/L											7.1
Inorg_WC	D	Orthophosphate	mg/L											
Inorg_WC	D	pH	PH UNITS											3.7
Inorg_WC	D	Phosphorus, Total as P	mg/L											
Inorg_WC	D	Sulfate	mg/L											74000
Inorg_WC	D	Sulfide	mg/L											
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L											
Inorg_WC	D	Total Dissolved Solids	mg/L											

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	MP-1 #01		MP-1 #01		MP-1 #01		MP-1 #01		MP-1 #01		MP-1 #01		MP-1 #01		MP-1 #01		MP-1 #01		MP-1 #01	
			Sample Date	5/23/1996		8/11/1998		1/20/2000		3/25/2003		3/29/2004		5/3/2005		5/17/2010		5/17/2010		7/20/2010		10/20/2010		2/9/2012	
			Sample ID	MP-1 #01		MP-1 #01		MP-1-1		MP1-#1		MP1-DAPL		MP-1 Port 1		OC-MP-1 #01-DUP		OC-MP-1 #01-XXX		MLP-1-1		OC-MP-1 #01-XXX		OC-MP-1 #1	
			Qc Code	FS		FS		FS		FS		FS		FS		FD		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L							2560						1800		1700				1800		1700	
Metals	T	Antimony	mg/L							7.28						6	U	6	U			0.3	U		
Metals	T	Arsenic	mg/L							1.11						5	U	5	U			2.5	U		
Metals	T	Barium	mg/L							0.5	U					10	U	10	U			0.5	U		
Metals	T	Beryllium	mg/L							0.184						1	U	1	U			0.13			
Metals	T	Cadmium	mg/L							0.17						0.2	J	1	U			0.043	J		
Metals	T	Calcium	mg/L							133						660		630				590		530	
Metals	T	Chromium	mg/L							2340						1800		1800				1600		1500	
Metals	T	Chromium, Hexavalent	mg/L							0.5	U					0.05	UJ	0.05	U			0.001	U		
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L							12.2						12		12				10			
Metals	T	Copper	mg/L							12.9						9.7	J	9.3	J			8.6			
Metals	T	Iron	mg/L							678						3100		3000				3100		3300	
Metals	T	Lead	mg/L							0.25	U					5	U	5	U			0.25	UJ		
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L							1930						1600		1600				1500		1500	
Metals	T	Manganese	mg/L							291						250		240				220			
Metals	T	Mercury	mg/L							0.00296						0.002		0.0023				0.0031			
Metals	T	Nickel	mg/L							10.1						9.9	J	9.3	J			8.2			
Metals	T	Potassium	mg/L							20	U					4000	U	4000	U			260			
Metals	T	Selenium	mg/L							0.5	U					10	U	10	U			0.5	U		
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L							0.25	U					32		32				27			
Metals	T	Sodium	mg/L							24600						24000		23000				21000		27000	
Metals	T	Thallium	mg/L							0.5	U					0.25	U	0.25	U			0.05	U		
Metals	T	Tin	mg/L													870		890				2.5	U		
Metals	T	Vanadium	mg/L							1.59						10	U	10	U			0.25	J		
Metals	T	Zinc	mg/L							20.6						17	J	17	J			15			
Metals	D	Aluminum	mg/L	2100		840		463						2100						1800					
Metals	D	Antimony	mg/L	0.99		0.112		0.103	J																
Metals	D	Arsenic	mg/L	0.92		0.05	U	0.44																	
Metals	D	Barium	mg/L	0.13	U	0.25	U	0.0089																	
Metals	D	Beryllium	mg/L	0.14		0.2		0.051																	
Metals	D	Cadmium	mg/L	0.25	U	0.17		0.207																	
Metals	D	Calcium	mg/L	460		140		181						600						600					
Metals	D	Chromium	mg/L	2100		1700		2220						2100						1800					
Metals	D	Chromium, Hexavalent	mg/L	70		0.698																			
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L	12		9.6		3.65																	
Metals	D	Copper	mg/L	9.7		8.1		6.18																	
Metals	D	Iron	mg/L	3400		2900		3180						3300						2900					
Metals	D	Lead	mg/L	0.22		0.0884		0.044																	
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	1800		1600		590						1700						1600					
Metals	D	Manganese	mg/L	260		220		225																	
Metals	D	Mercury	mg/L	0.0031				0.003																	
Metals	D	Molybdenum	mg/L					0.0298																	
Metals	D	Nickel	mg/L	9.9		8.6		3.01																	
Metals	D	Potassium	mg/L	45		43		19.9																	
Metals	D	Selenium	mg/L	0.25	U	0.05	U	0.24	U																
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L	0.38	U	0.25	U	0.0308																	

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool										
			Location	MP-1 #01	MP-1 #01	MP-1 #01	MP-1 #01	MP-1 #01	MP-1 #01	MP-1 #01	MP-1 #01	MP-1 #01	MP-1 #01	MP-1 #01
			Sample Date	5/23/1996	8/11/1998	1/20/2000	3/25/2003	3/29/2004	5/3/2005	5/17/2010	5/17/2010	7/20/2010	10/20/2010	2/9/2012
			Sample ID	MP-1 #01	MP-1 #01	MP-1-1	MP1-#1	MP1-DAPL	MP-1 Port 1	OC-MP-1 #01-DUP	OC-MP-1 #01-XXX	MLP-1-1	OC-MP-1 #01-XXX	OC-MP-1 #1
			Qc Code	FS	FS	FS	FS	FS	FS	FD	FS	FS	FS	FS
Class	**Fraction**	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
Metals	D	Sodium	mg/L	23000	20000	22600		23800	20000			22000		
Metals	D	Strontium	mg/L			3.55 J								
Metals	D	Thallium	mg/L	0.38 U	0.005 U									
Metals	D	Vanadium	mg/L	1.7	1.2	0.0019 U								
Metals	D	Zinc	mg/L	21	19	14.1								
Inorg_WC	T	Bicarbonate Alkalinity	mg/L		5 U	1 U	1 U							
Inorg_WC	T	Bromide	mg/L							100 U	100 U		28	
Inorg_WC	T	Chemical Oxygen Demand	mg/L			1900								
Inorg_WC	T	Chloride	mg/L		18,300	18,000	1,470	18,000	590	5,800	7,600	7,900	17,000	16,000
Inorg_WC	T	Cyanide, Total	mg/L			0.01 U								
Inorg_WC	T	Dissolved Organic Carbon	mg/L											
Inorg_WC	T	Fluoride	mg/L			53								
Inorg_WC	T	Nitrate as N	mg/L			14	50 U	13	3.1	50 U	50 U	14	16	16
Inorg_WC	T	Nitrate+Nitrite as N	mg/L	2	8.76									
Inorg_WC	T	Nitrite as N	mg/L			0.42	10 U	5 U	0.5 U	10 U	10 U	0.2 U	0.74	5 U
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	170	6830	1600 J	4.54	7700	9700	3100	3700	380	6.6	8100
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L			12000								
Inorg_WC	T	Orthophosphate	mg/L			2.9								
Inorg_WC	T	Phosphorus, Total as P	mg/L											
Inorg_WC	T	Sulfate	mg/L		42,700	63,000	7,490	72,000	4,700	35,000	44,000	50,000	100,000 J	74,000
Inorg_WC	T	Sulfide	mg/L											
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L				1 U							
Inorg_WC	T	Total Dissolved Solids	mg/L			120000	123000							
Inorg_WC	T	Total Organic Carbon	mg/L			2600	3300							
Inorg_WC	T	Total Suspended Solids	mg/L			20								
Inorg_WC	T	Specific Gravity	g/ml											
Inorg_WC	T	Viscosity	cpoise											
Inorg_WC	T	pH	PH UNITS			3.72	3.7 J							
Inorg_WC	D	Bicarbonate Alkalinity	mg/L											
Inorg_WC	D	Bromide	mg/L											
Inorg_WC	D	Carbonate	mg/L											
Inorg_WC	D	Chloride	mg/L	91000										
Inorg_WC	D	CO2 as C	mg/L											
Inorg_WC	D	Cyanide, Total	mg/L											
Inorg_WC	D	Dissolved Organic Carbon	mg/L											
Inorg_WC	D	Nitrate as N	mg/L											
Inorg_WC	D	Nitrate+Nitrite as N	mg/L											
Inorg_WC	D	Nitrite as N	mg/L											
Inorg_WC	D	Nitrogen, as Ammonia	mg/L											
Inorg_WC	D	Orthophosphate	mg/L											
Inorg_WC	D	pH	PH UNITS	3.6										
Inorg_WC	D	Phosphorus, Total as P	mg/L											
Inorg_WC	D	Sulfate	mg/L	73000										
Inorg_WC	D	Sulfide	mg/L											
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L											
Inorg_WC	D	Total Dissolved Solids	mg/L											

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool																			
			Location	MP-1 #02		MP-1 #02		MP-1 #02		MP-1 #03		MP-1 #03		MP-1 #03		MP-1 #04		MP-1 #04		MP-1 #04		MP-1 #04	
			Sample Date	4/18/1996		5/23/1996		8/11/1998		5/23/1996		5/23/1996		8/11/1998		3/25/2003		4/18/1996		5/23/1996		8/11/1998		5/13/2001	
			Sample ID	MP-1 #02		MP-1 #02		MP-1 #02		MP-1 #03		MP-1 #03 DUP		MP-1 #03		MP1-#3		MP-1 #04		MP-1 #04		MP-1 #04		MP-1-4	
			Qc Code	FS		FS		FS		FS		FD		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L													1750									
Metals	T	Antimony	mg/L													2.25									
Metals	T	Arsenic	mg/L													0.5	U								
Metals	T	Barium	mg/L													0.5	U								
Metals	T	Beryllium	mg/L													0.126									
Metals	T	Cadmium	mg/L													0.094									
Metals	T	Calcium	mg/L													121									
Metals	T	Chromium	mg/L													718									
Metals	T	Chromium, Hexavalent	mg/L													0.5	U								
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L													7.33									
Metals	T	Copper	mg/L													8.91									
Metals	T	Iron	mg/L													148									
Metals	T	Lead	mg/L													0.25	U								
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L													1310									
Metals	T	Manganese	mg/L													165									
Metals	T	Mercury	mg/L													0.00046									
Metals	T	Nickel	mg/L													6.34									
Metals	T	Potassium	mg/L													20	U								
Metals	T	Selenium	mg/L													0.5	U								
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L													0.25	U								
Metals	T	Sodium	mg/L													2200									
Metals	T	Thallium	mg/L													0.5	U								
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L													0.544									
Metals	T	Zinc	mg/L													12.6									
Metals	D	Aluminum	mg/L	1500		1700		1000		1800		1700		13000				1200		1300		770		410	
Metals	D	Antimony	mg/L	0.68		0.81		0.099		0.59		0.56		0.05	U			0.08		0.061		0.05	U	0.39	
Metals	D	Arsenic	mg/L	0.57		0.8		0.05	U	0.54		0.51		0.05	U			0.064		0.16		0.069		0.035	
Metals	D	Barium	mg/L	0.05	U	0.13	U	0.25	U	0.13	U	0.13	U	0.25	U			0.025	U	0.007		0.025	U	0.01	U
Metals	D	Beryllium	mg/L	0.13	U	0.13	U	0.14		0.13		0.13	U	0.12				0.13	U	0.067		0.045		0.024	
Metals	D	Cadmium	mg/L	0.1	U	0.25	U	0.15		0.25	U	0.25	U	0.11				0.05	U	0.047		0.025		0.011	
Metals	D	Calcium	mg/L	420		550		160		550		540		180				420		530		430		470	
Metals	D	Chromium	mg/L	1900		1800		1500		1400		1400		1000				400		350		99		46	
Metals	D	Chromium, Hexavalent	mg/L	97		42		0.552		28		28		0.346				12		7		0.05	U	0.0057	
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L	8.7		10		9.8		7.2		7.1		7.8				4.7		3.6		2.1		0.96	
Metals	D	Copper	mg/L	9.2		9.2		9.4		6.8		6.7		7.3				4.7		5.3		2.4		1.1	
Metals	D	Iron	mg/L	2100		2300		2000		1800		1800		1100				190		190		26		15	
Metals	D	Lead	mg/L	0.084		0.13	U	0.005	U	0.13	U	0.13	U	0.005	U			0.025	U	0.03		0.005	U	0.01	U
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	1200		1400		1200		1200		1200		1000				900		1100		610		400	
Metals	D	Manganese	mg/L	190		220		200		160		160		160				110		120		52		24	
Metals	D	Mercury	mg/L	0.0016		0.00058				0.0002	U	0.0002	U					0.001		0.0002	U			0.00028	
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L	7.3		8		7.4		7		6.8		6.2				4.6		5.4		2.4		1	
Metals	D	Potassium	mg/L	26		21		25	U	5	U	5	U	25	U			5	U	5	U	25	U	1	U
Metals	D	Selenium	mg/L	0.1	U	0.25	U	0.05	U	0.25	U	0.25	U	0.05	U			0.05	U	0.01	U	0.05	U	0.01	U
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L	0.15	U	0.38	U	0.25	U	0.38	U	0.38	U	0.25	U			0.075	U	0.38	U	0.025	U	0.01	U

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool										
			Location	MP-1 #02	MP-1 #02	MP-1 #02	MP-1 #03	MP-1 #03	MP-1 #03	MP-1 #03	MP-1 #04	MP-1 #04	MP-1 #04	MP-1 #04
			Sample Date	4/18/1996	5/23/1996	8/11/1998	5/23/1996	5/23/1996	8/11/1998	3/25/2003	4/18/1996	5/23/1996	8/11/1998	5/13/2001
			Sample ID	MP-1 #02	MP-1 #02	MP-1 #02	MP-1 #03	MP-1 #03 DUP	MP-1 #03	MP1-#3	MP-1 #04	MP-1 #04	MP-1 #04	MP-1-4
			Qc Code	FS	FS	FS	FS	FD	FS	FS	FS	FS	FS	FS
Class	**Fraction**	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
Metals	D	Sodium	mg/L	19000	19000	15000	16000	15000	12000		9300	8900	3400	2300
Metals	D	Strontium	mg/L											
Metals	D	Thallium	mg/L	0.38 U	0.38 U	0.005 U	0.38 U	0.38 U	0.005 U		0.075 U	0.38 U	0.005 U	0.02 U
Metals	D	Vanadium	mg/L	1.3 U	1.2	0.97	0.93	0.91	0.7		1.3 U	0.63 U	0.1 U	0.01 U
Metals	D	Zinc	mg/L	15	16	15	13	13	12		8.7	10	4.6	2.1
Inorg_WC	T	Bicarbonate Alkalinity	mg/L			5 U			5 U	1 U			5 U	1 U
Inorg_WC	T	Bromide	mg/L											
Inorg_WC	T	Chemical Oxygen Demand	mg/L											
Inorg_WC	T	Chloride	mg/L			14,400			11,500	7,960			3,100	2,700
Inorg_WC	T	Cyanide, Total	mg/L											
Inorg_WC	T	Dissolved Organic Carbon	mg/L											
Inorg_WC	T	Fluoride	mg/L											
Inorg_WC	T	Nitrate as N	mg/L							50 UJ				3.9
Inorg_WC	T	Nitrate+Nitrite as N	mg/L		3.1	11.4	3.5	3.7	13.8			8	4.27	
Inorg_WC	T	Nitrite as N	mg/L							10 UJ				0.015
Inorg_WC	T	Nitrogen, as Ammonia	mg/L		230	5940	170	370	5210	6.52		850	1830	1440
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L											
Inorg_WC	T	Orthophosphate	mg/L											
Inorg_WC	T	Phosphorus, Total as P	mg/L											
Inorg_WC	T	Sulfate	mg/L			36,800			32,600	44,400			20,000	9,800
Inorg_WC	T	Sulfide	mg/L											
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L							1 U				
Inorg_WC	T	Total Dissolved Solids	mg/L							62400				16000
Inorg_WC	T	Total Organic Carbon	mg/L							1700				
Inorg_WC	T	Total Suspended Solids	mg/L											
Inorg_WC	T	Specific Gravity	g/ml											
Inorg_WC	T	Viscosity	cpoise											
Inorg_WC	T	pH	PH UNITS							3.57 J				3.61
Inorg_WC	D	Bicarbonate Alkalinity	mg/L											
Inorg_WC	D	Bromide	mg/L											
Inorg_WC	D	Carbonate	mg/L											
Inorg_WC	D	Chloride	mg/L	13000	69000		14000	13000			6400	3900		
Inorg_WC	D	CO2 as C	mg/L											
Inorg_WC	D	Cyanide, Total	mg/L											
Inorg_WC	D	Dissolved Organic Carbon	mg/L											
Inorg_WC	D	Nitrate as N	mg/L											
Inorg_WC	D	Nitrate+Nitrite as N	mg/L	2.5							7.6			
Inorg_WC	D	Nitrite as N	mg/L											
Inorg_WC	D	Nitrogen, as Ammonia	mg/L	5.9							6.3			
Inorg_WC	D	Orthophosphate	mg/L											
Inorg_WC	D	pH	PH UNITS	3.7	3.6		3.5	3.5			3.5	3.4		
Inorg_WC	D	Phosphorus, Total as P	mg/L											
Inorg_WC	D	Sulfate	mg/L	64000	72000		59000	59000			42000	31000		
Inorg_WC	D	Sulfide	mg/L											
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L											
Inorg_WC	D	Total Dissolved Solids	mg/L											

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool								Off-Property West Ditch DAPL Pool											
			Location	MP-1 #04		MP-1 #04		MP-1 #04		MP-1 #04		GW-36		GW-36		GW-36		GW-36		GW-36		GW-36	
			Sample Date	3/25/2003		5/3/2005		7/20/2010		2/9/2012		2/16/1990		5/1/1990		8/30/1990		11/21/1990		8/1/1991		12/10/1991		8/11/1992	
			Sample ID	MP1-#4		MP-1 Port 4		MLP-1-4		OC-MP-1 #4		GW36D		GW36		MW36D		GW36		GW-36		GW-36		GW-36	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L	354						46												2400			
Metals	T	Antimony	mg/L	0.102																		0.25	U		
Metals	T	Arsenic	mg/L	0.05	U																	0.5	U		
Metals	T	Barium	mg/L	0.05	U																	0.14			
Metals	T	Beryllium	mg/L	0.025																		0.084			
Metals	T	Cadmium	mg/L	0.009																		0.19			
Metals	T	Calcium	mg/L	506						460												590			
Metals	T	Chromium	mg/L	37.5						2.6		1300								1300		2000			
Metals	T	Chromium, Hexavalent	mg/L	0.005	U																				
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L	0.736																		3			
Metals	T	Copper	mg/L	1.17																		2.8			
Metals	T	Iron	mg/L	10.8						9.4												3600			
Metals	T	Lead	mg/L	0.025	U																	0.25	U		
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L	324						130												1600			
Metals	T	Manganese	mg/L	21.8																		110			
Metals	T	Mercury	mg/L	0.00024																		0.0009			
Metals	T	Nickel	mg/L	0.974																		4.2			
Metals	T	Potassium	mg/L	4	U																	26			
Metals	T	Selenium	mg/L	0.05	U																	0.5	U		
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L	0.025	U																	0.015	U		
Metals	T	Sodium	mg/L	1840						880												18000			
Metals	T	Thallium	mg/L	0.05	U																	0.1	U		
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L	0.05	U																	1.4			
Metals	T	Zinc	mg/L	2																		14			
Metals	D	Aluminum	mg/L			140		40						2500		2500		2400						2300	
Metals	D	Antimony	mg/L																					0.25	U
Metals	D	Arsenic	mg/L																					0.5	U
Metals	D	Barium	mg/L																					0.025	U
Metals	D	Beryllium	mg/L																					0.13	
Metals	D	Cadmium	mg/L																					0.15	
Metals	D	Calcium	mg/L			450		360																520	
Metals	D	Chromium	mg/L			14		2.6						1800		1800		1400						1800	
Metals	D	Chromium, Hexavalent	mg/L																					39	J
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L																					4.5	
Metals	D	Copper	mg/L																					4	
Metals	D	Iron	mg/L			2.6		4.5										2400						3000	
Metals	D	Lead	mg/L																					0.5	U
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L			270		110																1600	
Metals	D	Manganese	mg/L																					110	
Metals	D	Mercury	mg/L																					0.001	
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L																					6.3	
Metals	D	Potassium	mg/L																					16	
Metals	D	Selenium	mg/L																					1.3	U
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L																					0.075	U

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	On-Property DAPL Pool								Off-Property West Ditch DAPL Pool											
			Location	MP-1 #04		MP-1 #04		MP-1 #04		MP-1 #04		GW-36		GW-36		GW-36		GW-36		GW-36		GW-36	
			Sample Date	3/25/2003		5/3/2005		7/20/2010		2/9/2012		2/16/1990		5/1/1990		8/30/1990		11/21/1990		8/1/1991		12/10/1991		8/11/1992	
			Sample ID	MP1-#4		MP-1 Port 4		MLP-1-4		OC-MP-1 #4		GW36D		GW36		MW36D		GW36		GW-36		GW-36		GW-36	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L			1300		640																16000	
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L																					0.025	U
Metals	D	Vanadium	mg/L																					1.8	
Metals	D	Zinc	mg/L																					13	
Inorg_WC	T	Bicarbonate Alkalinity	mg/L	1	U																				
Inorg_WC	T	Bromide	mg/L																						
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	2,040		110		820		860		130,000		13,000		13,000		13,000		13,000		9,300		17,000	
Inorg_WC	T	Cyanide, Total	mg/L																			0.026	J		
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L	5	UJ	2		1.1		1.2															
Inorg_WC	T	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	T	Nitrite as N	mg/L	1	UJ	0.01	U	0.01	U	0.5	U														
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	721		1100		810		680		5300		6100		5700		5400		520		100			
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	9,950		790		5,800		4,400		52,000		66,000		41,000		53,000		59,000		52,000		67,000	J
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L	1	U																				
Inorg_WC	T	Total Dissolved Solids	mg/L	13700																					
Inorg_WC	T	Total Organic Carbon	mg/L	270																					
Inorg_WC	T	Total Suspended Solids	mg/L																						
Inorg_WC	T	Specific Gravity	g/ml																						
Inorg_WC	T	Viscosity	cpoise																						
Inorg_WC	T	pH	PH UNITS	3.62	J																				
Inorg_WC	D	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	D	Bromide	mg/L																						
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L																						
Inorg_WC	D	CO2 as C	mg/L																						
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L																						
Inorg_WC	D	Nitrate as N	mg/L																						
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L																						
Inorg_WC	D	Nitrogen, as Ammonia	mg/L																						
Inorg_WC	D	Orthophosphate	mg/L																						
Inorg_WC	D	pH	PH UNITS																						
Inorg_WC	D	Phosphorus, Total as P	mg/L																						
Inorg_WC	D	Sulfate	mg/L																						
Inorg_WC	D	Sulfide	mg/L																						
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Off-Property West Ditch DAPL Pool																	
			Location	GW-36		GW-36		GW-36		GW-36		GW-42D		GW-42D		GW-42D		GW-42D		GW-42D	
			Sample Date	11/16/1992		3/24/1993		1/13/1995		1/27/2000		8/1/1991		12/10/1991		12/10/1991		8/5/1992		8/5/1992		11/11/1992		11/11/1992	
			Sample ID	GW-36		GW-36		GW-36		GW-36		GW-42-D		GW-42-D		GW-42-D DUP		GW-42-D		GW-42-D DUP		GW-42-D		GW-42-D DUP	
			Qc Code	FS		FS		FS		FS		FS		FS		FD		FS		FD		FS		FD	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L											1900		1900									
Metals	T	Antimony	mg/L											0.25	U	0.25	U								
Metals	T	Arsenic	mg/L											1		0.9									
Metals	T	Barium	mg/L											0.16		0.13									
Metals	T	Beryllium	mg/L											0.16		0.16									
Metals	T	Cadmium	mg/L											0.1		0.099									
Metals	T	Calcium	mg/L											620		640									
Metals	T	Chromium	mg/L									3500		3000		3000									
Metals	T	Chromium, Hexavalent	mg/L																						
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L											6.6		6.6									
Metals	T	Copper	mg/L											12		14									
Metals	T	Iron	mg/L											1900		2000									
Metals	T	Lead	mg/L											0.25	U	0.25	U								
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L											940		960									
Metals	T	Manganese	mg/L											480		490									
Metals	T	Mercury	mg/L											0.0004		0.0004									
Metals	T	Nickel	mg/L											4.6		4.7									
Metals	T	Potassium	mg/L											60		60									
Metals	T	Selenium	mg/L											0.25	U	0.25	U								
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L											0.05		0.059									
Metals	T	Sodium	mg/L											20000		20000									
Metals	T	Thallium	mg/L											0.1	U	0.1	U								
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L											0.52		0.54									
Metals	T	Zinc	mg/L											9.9		9.9									
Metals	D	Aluminum	mg/L	2000				2500		1600								1800		1900		1900		1600	
Metals	D	Antimony	mg/L	0.2	U					11								0.25	U		R		R	0.05	U
Metals	D	Arsenic	mg/L	0.5	U			0.5	U										R	1.3	U		R	0.5	U
Metals	D	Barium	mg/L	0.017				0.018		0.25	U							0.06		0.06		0.044	B	0.041	
Metals	D	Beryllium	mg/L	0.11						0.14								0.23		0.26		0.17	J	0.15	
Metals	D	Cadmium	mg/L	0.08						0.088								0.15	J	0.14		0.088	UJ	0.086	
Metals	D	Calcium	mg/L	550				620		200								620		550	J	550		550	
Metals	D	Chromium	mg/L	1600				1400		1200								3300		3600		3500		3300	
Metals	D	Chromium, Hexavalent	mg/L	29	J			55										24	J	24	J	64	J	61	J
Metals	D	Chromium, Trivalent	mg/L					1300																	
Metals	D	Cobalt	mg/L	4						5.1								9.5		9.7		5.7		5.2	
Metals	D	Copper	mg/L	3.7						3.2								13		13		11		9.9	
Metals	D	Iron	mg/L	3100				3100		2600								1900		1900		1900		1900	
Metals	D	Lead	mg/L	2	U			1	U	0.25	U							0.5	U		R		R	1	U
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	1500				1800		1500								1200		1100		1000		1100	
Metals	D	Manganese	mg/L	110				130		120								550		550		580		540	
Metals	D	Mercury	mg/L	0.0012						0.00088								0.0007		0.0005		0.00022	J	0.00026	
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L	4.9						6.7								7	J	7.6		4.5	J	4.1	
Metals	D	Potassium	mg/L	12				18		50	U							62	J	57		67	J	59	
Metals	D	Selenium	mg/L	0.5	U					1	U								R	0.63	U		R	0.5	U
Metals	D	Silicon	mg/L					75																	
Metals	D	Silver	mg/L	0.03	U					0.25	U							0.075	U	0.075	U	0.051	J	0.024	

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Off-Property West Ditch DAPL Pool										
			Location	GW-36	GW-36	GW-36	GW-36	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D	GW-42D
			Sample Date	11/16/1992	3/24/1993	1/13/1995	1/27/2000	8/1/1991	12/10/1991	12/10/1991	8/5/1992	8/5/1992	11/11/1992	11/11/1992
			Sample ID	GW-36	GW-36	GW-36	GW-36	GW-42-D	GW-42-D	GW-42-D DUP	GW-42-D	GW-42-D DUP	GW-42-D	GW-42-D DUP
			Qc Code	FS	FS	FS	FS	FS	FS	FD	FS	FD	FS	FD
Class	**Fraction**	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
Metals	D	Sodium	mg/L	17000		16000	13000				21000	22000	22000	22000
Metals	D	Strontium	mg/L											
Metals	D	Thallium	mg/L	0.2 U			1 U				R	0.025 U	R	0.25 U
Metals	D	Vanadium	mg/L	1.5			1.4				0.6 J	0.69	0.49 J	0.53
Metals	D	Zinc	mg/L	12			13				12	13	12	7.9
Inorg_WC	T	Bicarbonate Alkalinity	mg/L				1 U							
Inorg_WC	T	Bromide	mg/L											
Inorg_WC	T	Chemical Oxygen Demand	mg/L											
Inorg_WC	T	Chloride	mg/L	15,000			22,000	18,000	18,000 J	18,000 J	10,000 J	8,600	19,000	18,000
Inorg_WC	T	Cyanide, Total	mg/L						0.034 J	0.039 J				
Inorg_WC	T	Dissolved Organic Carbon	mg/L											
Inorg_WC	T	Fluoride	mg/L											
Inorg_WC	T	Nitrate as N	mg/L	19 J			17						12	13
Inorg_WC	T	Nitrate+Nitrite as N	mg/L											
Inorg_WC	T	Nitrite as N	mg/L	0.18 J			0.087						0.33 J	0.34
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	9.1			4200	620	150	180	12000 J	6400 J	11	13
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L											
Inorg_WC	T	Orthophosphate	mg/L											
Inorg_WC	T	Phosphorus, Total as P	mg/L											
Inorg_WC	T	Sulfate	mg/L	61,000			68,000	830,000	70,000	74,000	69,000	60,000	81,000	78,000
Inorg_WC	T	Sulfide	mg/L											
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L											
Inorg_WC	T	Total Dissolved Solids	mg/L		11000									
Inorg_WC	T	Total Organic Carbon	mg/L											
Inorg_WC	T	Total Suspended Solids	mg/L											
Inorg_WC	T	Specific Gravity	g/ml											
Inorg_WC	T	Viscosity	cpoise											
Inorg_WC	T	pH	PH UNITS				3.72							
Inorg_WC	D	Bicarbonate Alkalinity	mg/L											
Inorg_WC	D	Bromide	mg/L			1000 U								
Inorg_WC	D	Carbonate	mg/L			124								
Inorg_WC	D	Chloride	mg/L			15000								
Inorg_WC	D	CO2 as C	mg/L			124								
Inorg_WC	D	Cyanide, Total	mg/L											
Inorg_WC	D	Dissolved Organic Carbon	mg/L			2700								
Inorg_WC	D	Nitrate as N	mg/L			19								
Inorg_WC	D	Nitrate+Nitrite as N	mg/L											
Inorg_WC	D	Nitrite as N	mg/L			0.11								
Inorg_WC	D	Nitrogen, as Ammonia	mg/L			5200								
Inorg_WC	D	Orthophosphate	mg/L			1.2								
Inorg_WC	D	pH	PH UNITS											
Inorg_WC	D	Phosphorus, Total as P	mg/L			31								
Inorg_WC	D	Sulfate	mg/L			72000								
Inorg_WC	D	Sulfide	mg/L			2								
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L											
Inorg_WC	D	Total Dissolved Solids	mg/L			98000								

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Off-Property West Ditch DAPL Pool																			
			Location	GW-42D		GW-42D		GW-42D		GW-42D		GW-42D		GW-42D		GW-42D		GW-42D		GW-42D		GW-43D		GW-43D	
			Sample Date	3/24/1993		1/11/1995		1/11/1995		10/17/1995		10/17/1995		4/10/1997		8/13/1998		3/29/2004		5/19/2008		8/1/1991		8/5/1992	
			Sample ID	GW-42D		GW-42-D		GW-42-D DUP		GW-42-D		GW-42-D DUP		GW-42-D		GW-42D		GW-42D		OC-GW-42D		GW-43-D		GW-43-D	
			Qc Code	FS		FS		FD		FS		FD		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L							1500		1500													
Metals	T	Antimony	mg/L																						
Metals	T	Arsenic	mg/L							10	UJ	10	UJ												
Metals	T	Barium	mg/L							0.05	UJ	0.05	UJ												
Metals	T	Beryllium	mg/L																						
Metals	T	Cadmium	mg/L																						
Metals	T	Calcium	mg/L							370		370	J												
Metals	T	Chromium	mg/L							2800		2600								2400		120			
Metals	T	Chromium, Hexavalent	mg/L																						
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L																						
Metals	T	Copper	mg/L																						
Metals	T	Iron	mg/L							1400		1400													
Metals	T	Lead	mg/L							0.17	J	0.17	J												
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L							840		870	J												
Metals	T	Manganese	mg/L							580		600													
Metals	T	Mercury	mg/L																						
Metals	T	Nickel	mg/L																						
Metals	T	Potassium	mg/L							98	J	73	J												
Metals	T	Selenium	mg/L																						
Metals	T	Silicon	mg/L							100		95													
Metals	T	Silver	mg/L																						
Metals	T	Sodium	mg/L							22000		21000													
Metals	T	Thallium	mg/L																						
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L																						
Metals	T	Zinc	mg/L																						
Metals	D	Aluminum	mg/L			2100		2000		1800		2000				1100								360	J
Metals	D	Antimony	mg/L													0.13	U							0.025	U
Metals	D	Arsenic	mg/L			0.5	UJ	0.804	UJ	10	UJ	10	UJ			0.52								0.13	U
Metals	D	Barium	mg/L			0.046		0.0557	JBE	1	UJ	1	UJ			0.12	U							0.025	U
Metals	D	Beryllium	mg/L													0.23								0.085	
Metals	D	Cadmium	mg/L													0.099								0.065	
Metals	D	Calcium	mg/L			580		690		440	J	560	J			130								240	
Metals	D	Chromium	mg/L			5200		3800	*J	2600		2900				2700								270	J
Metals	D	Chromium, Hexavalent	mg/L			R		94	J	6.4		6.4				0.184								9.9	J
Metals	D	Chromium, Trivalent	mg/L			R		3700		2600		2900													
Metals	D	Cobalt	mg/L													8.2								1.7	J
Metals	D	Copper	mg/L													11								1.2	J
Metals	D	Iron	mg/L			2100		2000		1600		1800				1600								1400	J
Metals	D	Lead	mg/L			1	U	1	UJ	1	UJ	1	UJ			0.05	U							0.25	U
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L			1100		1200		1100		1200	J			1000								630	J
Metals	D	Manganese	mg/L			570		590	J	470		550				44								56	J
Metals	D	Mercury	mg/L																					0.0002	UJ
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L													7.1								1.6	J
Metals	D	Potassium	mg/L			85	J	77	J	60	UJ	62				50								31	
Metals	D	Selenium	mg/L													0.5	U							0.25	U
Metals	D	Silicon	mg/L			120		120	J	87		96													
Metals	D	Silver	mg/L													0.12	U							0.075	U

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Off-Property West Ditch DAPL Pool																			
			Location	GW-42D		GW-42D		GW-42D		GW-42D		GW-42D		GW-42D		GW-42D		GW-42D		GW-43D		GW-43D	
			Sample Date	3/24/1993		1/11/1995		1/11/1995		10/17/1995		10/17/1995		4/10/1997		8/13/1998		3/29/2004		5/19/2008		8/1/1991		8/5/1992	
			Sample ID	GW-42D		GW-42-D		GW-42-D DUP		GW-42-D		GW-42-D DUP		GW-42-D		GW-42D		GW-42D		OC-GW-42D		GW-43-D		GW-43-D	
			Qc Code	FS		FS		FD		FS		FD		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L			23000		25000		19000		21000				2300		21000						6600	J
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L													0.25	U							0.025	U
Metals	D	Vanadium	mg/L													0.51								0.34	J
Metals	D	Zinc	mg/L													13								2.7	J
Inorg_WC	T	Bicarbonate Alkalinity	mg/L					20	U							5	U								
Inorg_WC	T	Bromide	mg/L																						
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L			21,000		17,000								17,796		17,000				2,100		3,600	
Inorg_WC	T	Cyanide, Total	mg/L																						
Inorg_WC	T	Dissolved Organic Carbon	mg/L					2800																	
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L					12										9.2							
Inorg_WC	T	Nitrate+Nitrite as N	mg/L													5.95									
Inorg_WC	T	Nitrite as N	mg/L					5	U									5	U						
Inorg_WC	T	Nitrogen, as Ammonia	mg/L			5900		5600		7100		6900				6310		9900		3900		2300		2600	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L					0.7																	
Inorg_WC	T	Phosphorus, Total as P	mg/L					19																	
Inorg_WC	T	Sulfate	mg/L			80,000		69,000								18,050		64,000				13,000		15,000	J
Inorg_WC	T	Sulfide	mg/L						R																
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L					20	U																
Inorg_WC	T	Total Dissolved Solids	mg/L	120000				108000	J											110000					
Inorg_WC	T	Total Organic Carbon	mg/L																						
Inorg_WC	T	Total Suspended Solids	mg/L																	840					
Inorg_WC	T	Specific Gravity	g/ml											1.095											
Inorg_WC	T	Viscosity	cpoise											1.69											
Inorg_WC	T	pH	PH UNITS																						
Inorg_WC	D	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	D	Bromide	mg/L			500	U	33		50	U	50	U												
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L			24000		20000		18000		18000													
Inorg_WC	D	CO2 as C	mg/L			104																			
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L			2900	J	2800	J	2700		2500													
Inorg_WC	D	Nitrate as N	mg/L			14		14		3.9	J	3.6	J												
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L			0.24	J	0.34	J	1.2	J	1.8	J												
Inorg_WC	D	Nitrogen, as Ammonia	mg/L			7100		7000		7300		7500													
Inorg_WC	D	Orthophosphate	mg/L			0.3		0.3		0.9		1													
Inorg_WC	D	pH	PH UNITS																						
Inorg_WC	D	Phosphorus, Total as P	mg/L			35	J	54	J	18	J	27	J												
Inorg_WC	D	Sulfate	mg/L			74000		74000		54000	J	35000	J												
Inorg_WC	D	Sulfide	mg/L			4		4	U	4	U	4	U												
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L			97000	J	120000	J	73000		89000													

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Off-Property West Ditch DAPL Pool																			
			Location	GW-43D		GW-43D		GW-43D		GW-43D		GW-43D		GW-43D		GW-43D		MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #01	
			Sample Date	8/5/1992		11/11/1992		11/11/1992		10/17/1995		4/10/1997		3/5/2004		3/5/2004		5/20/1996		8/12/1998		5/14/2001		7/25/2002	
			Sample ID	GW-43-D DUP		GW-43-D		GW-43-D DUP		GW-43-D		GW-43-D		GW-43D		GW-43D DUP		MP-2 #01		MP-2 #01		MP-2-1		MP-2 DAPL	
			Qc Code	FD		FS		FD		FS		FS		FS		FD		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L							440															
Metals	T	Antimony	mg/L																						
Metals	T	Arsenic	mg/L							1	UJ														
Metals	T	Barium	mg/L							0.1	UJ														
Metals	T	Beryllium	mg/L																						
Metals	T	Cadmium	mg/L																						
Metals	T	Calcium	mg/L							290															
Metals	T	Chromium	mg/L							260															
Metals	T	Chromium, Hexavalent	mg/L																						
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L																						
Metals	T	Copper	mg/L																						
Metals	T	Iron	mg/L							600															
Metals	T	Lead	mg/L							0.1	UJ														
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L							350															
Metals	T	Manganese	mg/L							66														492	
Metals	T	Mercury	mg/L																						
Metals	T	Nickel	mg/L																						
Metals	T	Potassium	mg/L							16															
Metals	T	Selenium	mg/L																						
Metals	T	Silicon	mg/L							37															
Metals	T	Silver	mg/L																						
Metals	T	Sodium	mg/L							4000														20100	
Metals	T	Thallium	mg/L																						
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L																						
Metals	T	Zinc	mg/L																						
Metals	D	Aluminum	mg/L	890	J	320		520		420								1600		550		620			
Metals	D	Antimony	mg/L	0.25	U	0.05	U	0.05	U									0.82				10			
Metals	D	Arsenic	mg/L	0.5	U	0.1	U	0.1	U	2.5	UJ							1.2				0.63			
Metals	D	Barium	mg/L	0.03		0.015		0.021		0.025	UJ							0.1	U	0.25	U	0.05	U		
Metals	D	Beryllium	mg/L	0.075	U	0.028		0.05										0.16		0.24		0.1			
Metals	D	Cadmium	mg/L	0.05	U	0.021		0.042										0.2	U	0.15		0.028			
Metals	D	Calcium	mg/L	320		240		280		290								440		200		49			
Metals	D	Chromium	mg/L	790	J	240	J	420	J	320								4700		3300		1300			
Metals	D	Chromium, Hexavalent	mg/L	9.7	J	8.4	J	8.4	J	1.6	UJ							89		1.1		0.5	U		
Metals	D	Chromium, Trivalent	mg/L							320	UJ														
Metals	D	Cobalt	mg/L	3.6	J	1.1	J	2	J									8.3		8.7		3.3			
Metals	D	Copper	mg/L	0.43	J	0.37		0.49										8.1		11		3.9			
Metals	D	Iron	mg/L	780	J	500	J	1100	J	570								1600		2200		980			
Metals	D	Lead	mg/L	0.5	U	0.1	U	0.1	U	0.025	UJ							0.33				0.037			
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	340	J	280		420		340								940		1300		500			
Metals	D	Manganese	mg/L	120	J	39	J	76	J	66								700		540		190			
Metals	D	Mercury	mg/L	0.0002	UJ	0.0002	U	0.0002	U									0.00046				0.00086			
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L	3.3	J	0.94	J	1.7	J									6.5		7.6		3.1			
Metals	D	Potassium	mg/L	23		20		27		30	UJ							45		1000	U	16			
Metals	D	Selenium	mg/L	0.25	U	0.1	U	0.1	U									0.2	U			0.05	U		
Metals	D	Silicon	mg/L							39															
Metals	D	Silver	mg/L	0.075	U	0.015	U	0.015	U									0.3	U	0.25	U	0.05	U		

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Off-Property West Ditch DAPL Pool										
			Location	GW-43D	GW-43D	GW-43D	GW-43D	GW-43D	GW-43D	GW-43D	MP-2 #01	MP-2 #01	MP-2 #01	MP-2 #01
			Sample Date	8/5/1992	11/11/1992	11/11/1992	10/17/1995	4/10/1997	3/5/2004	3/5/2004	5/20/1996	8/12/1998	5/14/2001	7/25/2002
			Sample ID	GW-43-D DUP	GW-43-D	GW-43-D DUP	GW-43-D	GW-43-D	GW-43D	GW-43D DUP	MP-2 #01	MP-2 #01	MP-2-1	MP-2 DAPL
			Qc Code	FD	FS	FD	FS	FS	FS	FD	FS	FS	FS	FS
Class	**Fraction**	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
Metals	D	Sodium	mg/L	3800 J	3400	5100	4300		2510	2600	24000	25000	7200	
Metals	D	Strontium	mg/L											
Metals	D	Thallium	mg/L	0.025 U	0.1 U	0.1 U					0.38 U		0.31	
Metals	D	Vanadium	mg/L	0.15 J	0.11	0.18					0.84	0.93	0.38	
Metals	D	Zinc	mg/L	5.9 J	2 J	3.6 J					11	1.4	5.9	
Inorg_WC	T	Bicarbonate Alkalinity	mg/L									5 U	1 U	
Inorg_WC	T	Bromide	mg/L											
Inorg_WC	T	Chemical Oxygen Demand	mg/L											
Inorg_WC	T	Chloride	mg/L	3,800	3,600	3,700			2,300 J	4,100 J		17,903	28,800	
Inorg_WC	T	Cyanide, Total	mg/L											0.01 U
Inorg_WC	T	Dissolved Organic Carbon	mg/L											
Inorg_WC	T	Fluoride	mg/L											
Inorg_WC	T	Nitrate as N	mg/L		3.1	3			1.2	0.96			3.2	
Inorg_WC	T	Nitrate+Nitrite as N	mg/L								2.1	3.4 U		
Inorg_WC	T	Nitrite as N	mg/L		0.05 U	0.05 U			14	19			0.5 U	
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	2900	0.81 J	2.4 J	3000		9.2	9.1	140	4120	12	38.6
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L											
Inorg_WC	T	Orthophosphate	mg/L											
Inorg_WC	T	Phosphorus, Total as P	mg/L											
Inorg_WC	T	Sulfate	mg/L	15,000 J	16,000	15,000			9,700 J	17,000 J		43,100	95,000	73,400
Inorg_WC	T	Sulfide	mg/L											
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L											
Inorg_WC	T	Total Dissolved Solids	mg/L										140000 J	
Inorg_WC	T	Total Organic Carbon	mg/L						520	520				
Inorg_WC	T	Total Suspended Solids	mg/L											
Inorg_WC	T	Specific Gravity	g/ml					1.086						
Inorg_WC	T	Viscosity	cpoise					1.63						
Inorg_WC	T	pH	PH UNITS										3.54	
Inorg_WC	D	Bicarbonate Alkalinity	mg/L											
Inorg_WC	D	Bromide	mg/L				20 U							
Inorg_WC	D	Carbonate	mg/L											
Inorg_WC	D	Chloride	mg/L				4000				17000			
Inorg_WC	D	CO2 as C	mg/L											
Inorg_WC	D	Cyanide, Total	mg/L											
Inorg_WC	D	Dissolved Organic Carbon	mg/L				540							
Inorg_WC	D	Nitrate as N	mg/L				2.4 J							
Inorg_WC	D	Nitrate+Nitrite as N	mg/L											
Inorg_WC	D	Nitrite as N	mg/L				0.05 UJ							
Inorg_WC	D	Nitrogen, as Ammonia	mg/L				3400							
Inorg_WC	D	Orthophosphate	mg/L				0.26							
Inorg_WC	D	pH	PH UNITS								3.4			
Inorg_WC	D	Phosphorus, Total as P	mg/L				3 J							
Inorg_WC	D	Sulfate	mg/L				23000 J				77000			
Inorg_WC	D	Sulfide	mg/L				1 U							
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L											
Inorg_WC	D	Total Dissolved Solids	mg/L				23000							

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**Off-Property West Ditch DAPL Pool**																			
			Location	MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #02		MP-2 #02		MP-2 #02		MP-2 #02	
			Sample Date	3/27/2003		7/31/2003		3/9/2004		3/30/2004		5/2/2005		7/19/2010		1/10/2012		5/20/1996		8/12/1998		3/27/2003		8/23/2004	
			Sample ID	MLP2-#1		MP2-1		DAPL-Li		MP2-DAPL		MP-2 Port 1		MLP-2-1		OC-MP-2 #1		MP-2 #02		MP-2 #02		MLP2-#2		MP2-PORT2	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L	2040												1900						2020			
Metals	T	Antimony	mg/L	23.2																		18.5			
Metals	T	Arsenic	mg/L	1.16																		1	U		
Metals	T	Barium	mg/L	1	U																	1	U		
Metals	T	Beryllium	mg/L	0.208																		0.324			
Metals	T	Cadmium	mg/L	0.112																		0.122			
Metals	T	Calcium	mg/L	616												510						632			
Metals	T	Chromium	mg/L	2940												2000						2420			
Metals	T	Chromium, Hexavalent	mg/L	0.5	U																	0.5	U		
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L	8.43																		12.4			
Metals	T	Copper	mg/L	9.81																		15.3			
Metals	T	Iron	mg/L	2420												2000						1600			
Metals	T	Lead	mg/L	0.5	U																	0.5	U		
Metals	T	Lithium	mg/L					2.71																	
Metals	T	Magnesium	mg/L	1210												1200						1080			
Metals	T	Manganese	mg/L	487																		486			
Metals	T	Mercury	mg/L	0.00069																		0.00046			
Metals	T	Nickel	mg/L	7.43																		9.13			
Metals	T	Potassium	mg/L	1000	U																	1000	U		
Metals	T	Selenium	mg/L	1	U																	1	U		
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L	0.5	U																	0.5	U		
Metals	T	Sodium	mg/L	19100												22000						18900			
Metals	T	Thallium	mg/L	1	U																	1	U		
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L	1	U																	1	U		
Metals	T	Zinc	mg/L	13.6																		15.9			
Metals	D	Aluminum	mg/L									2200		1900				1500		770					
Metals	D	Antimony	mg/L															1.2							
Metals	D	Arsenic	mg/L															0.77							
Metals	D	Barium	mg/L															0.1	U	0.25	U				
Metals	D	Beryllium	mg/L															0.28		0.42					
Metals	D	Cadmium	mg/L															0.2	U	0.17					
Metals	D	Calcium	mg/L									570		570				410		210					
Metals	D	Chromium	mg/L									3000		2300				3300		2800					
Metals	D	Chromium, Hexavalent	mg/L															72		0.831					
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L															12		14					
Metals	D	Copper	mg/L															9.3		17					
Metals	D	Iron	mg/L									2200		2000				1100		1200					
Metals	D	Lead	mg/L															0.86							
Metals	D	Lithium	mg/L																					3.9	
Metals	D	Magnesium	mg/L									1300		1300				1100		1100					
Metals	D	Manganese	mg/L															620		620					
Metals	D	Mercury	mg/L															0.00041							
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L															8.5		10					
Metals	D	Potassium	mg/L															120		1000	U				
Metals	D	Selenium	mg/L															0.2	U						
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L															0.3	U	0.25	U				

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Off-Property West Ditch DAPL Pool																	
			Location	MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #02		MP-2 #02		MP-2 #02		MP-2 #02	
			Sample Date	3/27/2003		7/31/2003		3/9/2004		3/30/2004		5/2/2005		7/19/2010		1/10/2012		5/20/1996		8/12/1998		3/27/2003		8/23/2004	
			Sample ID	MLP2-#1		MP2-1		DAPL-Li		MP2-DAPL		MP-2 Port 1		MLP-2-1		OC-MP-2 #1		MP-2 #02		MP-2 #02		MLP2-#2		MP2-PORT2	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L							23500		21000		20000				22000		26000					
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L															0.38	U						
Metals	D	Vanadium	mg/L															0.5	U	0.37					
Metals	D	Zinc	mg/L															15		17					
Inorg_WC	T	Bicarbonate Alkalinity	mg/L	1	U	1	U													5	U	1	U		
Inorg_WC	T	Bromide	mg/L																						
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	18,800		6,850				19,000		4,300		13,000		16,000				16,828		15,800			
Inorg_WC	T	Cyanide, Total	mg/L																						
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L	18.2	J	25	U			11		4.1		12		11	J					15.8			
Inorg_WC	T	Nitrate+Nitrite as N	mg/L															3.3		3.4	U				
Inorg_WC	T	Nitrite as N	mg/L	2.5	UJ	5	U			5	U	0.5	U	0.2	U	10	U					2.5	U		
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	5.18		5910				6100		12000		600		4900		390		6430		14.8			
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	66,200		77,100				71,000		20,000		71,000		72,000				42,800		60,800			
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L	1	U	1	U															1	U		
Inorg_WC	T	Total Dissolved Solids	mg/L	137000																		122000			
Inorg_WC	T	Total Organic Carbon	mg/L	2800																		2400			
Inorg_WC	T	Total Suspended Solids	mg/L																						
Inorg_WC	T	Specific Gravity	g/ml																						
Inorg_WC	T	Viscosity	cpoise																						
Inorg_WC	T	pH	PH UNITS	3.51	J	3.46																3.44	J		
Inorg_WC	D	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	D	Bromide	mg/L																						
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L															16000							
Inorg_WC	D	CO2 as C	mg/L																						
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L																						
Inorg_WC	D	Nitrate as N	mg/L																						
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L																						
Inorg_WC	D	Nitrogen, as Ammonia	mg/L																						
Inorg_WC	D	Orthophosphate	mg/L																						
Inorg_WC	D	pH	PH UNITS															3.4							
Inorg_WC	D	Phosphorus, Total as P	mg/L																						
Inorg_WC	D	Sulfate	mg/L															71000							
Inorg_WC	D	Sulfide	mg/L																						
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Off-Property West Ditch DAPL Pool																			
			Location	MP-2 #03		MP-2 #03		MP-2 #03		MP-2 #04		MP-2 #04		MP-2 #04		MP-2 #04		MP-2 #04		MP-2 #04		MP-2 #04	
			Sample Date	5/20/1996		8/12/1998		3/27/2003		5/20/1996		8/12/1998		5/14/2001		3/27/2003		5/2/2005		7/19/2010		1/10/2012		10/26/2012	
			Sample ID	MP-2 #03		MP-2 #03		MLP2-#3		MP-2 #04		MP-2 #04		MP-2-4		MLP2-#4		MP-2 Port 4		MLP-2-4		OC-MP-2 #4		OC-MP-2 PORT 4	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L					1740								1240						430			
Metals	T	Antimony	mg/L					12								5.94									
Metals	T	Arsenic	mg/L					1	U							1	U								
Metals	T	Barium	mg/L					1	U							1	U								
Metals	T	Beryllium	mg/L					0.243								0.142									
Metals	T	Cadmium	mg/L					0.1	U							0.1	U								
Metals	T	Calcium	mg/L					573								538						390		230	
Metals	T	Chromium	mg/L					1620								806						150		110	
Metals	T	Chromium, Hexavalent	mg/L					0.5	U							0.5	U								
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L					10.8								5.93									
Metals	T	Copper	mg/L					11.1								5.83									
Metals	T	Iron	mg/L					1170								825						560		270	^
Metals	T	Lead	mg/L					0.5	U							0.5	U								
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L					929								675						280			
Metals	T	Manganese	mg/L					367								212									
Metals	T	Mercury	mg/L					0.00025								0.0002	U								
Metals	T	Nickel	mg/L					7.73								5									
Metals	T	Potassium	mg/L					1000	U							1000	U								
Metals	T	Selenium	mg/L					1	U							1	U								
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L					0.5	U							0.5	U								
Metals	T	Sodium	mg/L					12400								8620						4900		2500	^
Metals	T	Thallium	mg/L					1	U							1	U								
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L					1	U							1	U								
Metals	T	Zinc	mg/L					13.6								8.93									
Metals	D	Aluminum	mg/L	1100		1100				1200		1600		1400				1100		460					
Metals	D	Antimony	mg/L	0.2	U					0.58				8.9											
Metals	D	Arsenic	mg/L	0.6						0.56				0.44											
Metals	D	Barium	mg/L	0.1	U	0.25	U			0.1	U	0.25	U	0.05	U										
Metals	D	Beryllium	mg/L	0.23		0.29				0.17		0.24		0.19											
Metals	D	Cadmium	mg/L	0.2	U	0.14				0.2	U	0.11		0.093											
Metals	D	Calcium	mg/L	340		270				390		230		260				480		410					
Metals	D	Chromium	mg/L	2400		2400				1600		1300		1000				600		200					
Metals	D	Chromium, Hexavalent	mg/L	54		0.566				34		0.404		0.5	U										
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L	11		10				7		7.5		6.6											
Metals	D	Copper	mg/L	9.2		11				4.3		6.6		6.3											
Metals	D	Iron	mg/L	1000		1300				1100		1100		1000				820		520					
Metals	D	Lead	mg/L	0.6						0.72				0.33											
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	850		960				770		810		770				610		310					
Metals	D	Manganese	mg/L	460		370				290		270		240											
Metals	D	Mercury	mg/L	0.00035						0.00021				0.00026											
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L	7.5		8.4				6		6.6		5.9											
Metals	D	Potassium	mg/L	98		500	U			100		500	U	48											
Metals	D	Selenium	mg/L	0.2	U					0.2	U			0.1	U										
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L	0.3	U	0.25	U			0.3	U	0.25	U	0.05	U										

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Off-Property West Ditch DAPL Pool										
			Location	MP-2 #03	MP-2 #03	MP-2 #03	MP-2 #04	MP-2 #04	MP-2 #04	MP-2 #04	MP-2 #04	MP-2 #04	MP-2 #04	MP-2 #04
			Sample Date	5/20/1996	8/12/1998	3/27/2003	5/20/1996	8/12/1998	5/14/2001	3/27/2003	5/2/2005	7/19/2010	1/10/2012	10/26/2012
			Sample ID	MP-2 #03	MP-2 #03	MLP2-#3	MP-2 #04	MP-2 #04	MP-2-4	MLP2-#4	MP-2 Port 4	MLP-2-4	OC-MP-2 #4	OC-MP-2 PORT 4
			Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
Class	**Fraction**	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
Metals	D	Sodium	mg/L	18000	18000		15000	13000	13000		7700	4700		
Metals	D	Strontium	mg/L											
Metals	D	Thallium	mg/L	0.38 U			0.38 U		0.22					
Metals	D	Vanadium	mg/L	0.19	0.25 U		0.13	0.25 U	1.3					
Metals	D	Zinc	mg/L	13	14		11	12	10					
Inorg_WC	T	Bicarbonate Alkalinity	mg/L		5 U	1 U		5 U	1 U	1 U				
Inorg_WC	T	Bromide	mg/L											
Inorg_WC	T	Chemical Oxygen Demand	mg/L											
Inorg_WC	T	Chloride	mg/L		13,710	12,300		11,398	13,800	8,800	2,700	2,500	3,500	3,600
Inorg_WC	T	Cyanide, Total	mg/L											
Inorg_WC	T	Dissolved Organic Carbon	mg/L											
Inorg_WC	T	Fluoride	mg/L											
Inorg_WC	T	Nitrate as N	mg/L			13.8			4.9	14.2	2	0.5 U	25 U	
Inorg_WC	T	Nitrate+Nitrite as N	mg/L	2.7	3.4 U		1.8	4.3						
Inorg_WC	T	Nitrite as N	mg/L			2.5 U			0.5 U	2.5 U	0.1 U	5 UJ	5 U	
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	210	5280	3980	160	4520	3660	360	3900	3100	1900	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L											
Inorg_WC	T	Orthophosphate	mg/L											
Inorg_WC	T	Phosphorus, Total as P	mg/L											
Inorg_WC	T	Sulfate	mg/L		35,900	3,340		31,100	65,000	31,700	12,000	18,000	18,000	18,000
Inorg_WC	T	Sulfide	mg/L											
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L			1 U				1 U				
Inorg_WC	T	Total Dissolved Solids	mg/L			92600			74000 J	60400				
Inorg_WC	T	Total Organic Carbon	mg/L			1900				1300				
Inorg_WC	T	Total Suspended Solids	mg/L											
Inorg_WC	T	Specific Gravity	g/ml											
Inorg_WC	T	Viscosity	cpoise											
Inorg_WC	T	pH	PH UNITS			3.58 J			3.72	3.7 J				
Inorg_WC	D	Bicarbonate Alkalinity	mg/L											
Inorg_WC	D	Bromide	mg/L											
Inorg_WC	D	Carbonate	mg/L											
Inorg_WC	D	Chloride	mg/L	14000			11000							
Inorg_WC	D	CO2 as C	mg/L											
Inorg_WC	D	Cyanide, Total	mg/L											
Inorg_WC	D	Dissolved Organic Carbon	mg/L											
Inorg_WC	D	Nitrate as N	mg/L											
Inorg_WC	D	Nitrate+Nitrite as N	mg/L											
Inorg_WC	D	Nitrite as N	mg/L											
Inorg_WC	D	Nitrogen, as Ammonia	mg/L											
Inorg_WC	D	Orthophosphate	mg/L											
Inorg_WC	D	pH	PH UNITS	3.5			3.7							
Inorg_WC	D	Phosphorus, Total as P	mg/L											
Inorg_WC	D	Sulfate	mg/L	62000			52000							
Inorg_WC	D	Sulfide	mg/L											
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L											
Inorg_WC	D	Total Dissolved Solids	mg/L											

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Off-Property West Ditch DAPL Pool																			
			Location	MP-2 #04		MP-2 #06		MP-2 #06		MP-2 #06		MP-2 #06		MP-2 #06		MP-2 #06		MP-2 #06		MP-2 #06		MP-2 #06	
			Sample Date	11/2/2012		5/20/1996		8/12/1998		3/27/2003		3/30/2004		5/2/2005		7/19/2010		1/10/2012		11/16/2012		1/9/2013		1/30/2013	
			Sample ID	OC-MP-2 PORT 4		MP-2 #06		MP-2 #06		MLP2-#6		MP2-DIFF		MP-2 Port 6		MLP-2-6		OC-MP-2 #6		OC-MP2 #6		OC MP2 Port 6		OC MP2 Port 6	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L							575								14							
Metals	T	Antimony	mg/L							1.14															
Metals	T	Arsenic	mg/L							0.136															
Metals	T	Barium	mg/L							0.1	U														
Metals	T	Beryllium	mg/L							0.062															
Metals	T	Cadmium	mg/L							0.037															
Metals	T	Calcium	mg/L	240						499								130		70		98		98	
Metals	T	Chromium	mg/L	100						159								4.1		1.2		1.6		1.5	
Metals	T	Chromium, Hexavalent	mg/L							0.5	U														
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L							2.28															
Metals	T	Copper	mg/L							1.47															
Metals	T	Iron	mg/L	250	^					367								66		33		40		40	
Metals	T	Lead	mg/L							0.059															
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L							330								43							
Metals	T	Manganese	mg/L							87.6															
Metals	T	Mercury	mg/L							0.0002	U														
Metals	T	Nickel	mg/L							2.05															
Metals	T	Potassium	mg/L							23.7															
Metals	T	Selenium	mg/L							0.1	U														
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L							0.05	U														
Metals	T	Sodium	mg/L	2500	^					3560								1000		580		670		660	
Metals	T	Thallium	mg/L							0.1	U														
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L							0.1	U														
Metals	T	Zinc	mg/L							3.92															
Metals	D	Aluminum	mg/L			39		1100						250		19									
Metals	D	Antimony	mg/L			0.04	U																		
Metals	D	Arsenic	mg/L			0.013																			
Metals	D	Barium	mg/L			0.022		0.25	U																
Metals	D	Beryllium	mg/L			0.009		0.11																	
Metals	D	Cadmium	mg/L			0.01	U	0.05	U																
Metals	D	Calcium	mg/L			120		450						320		74									
Metals	D	Chromium	mg/L			18		410						68		5.3									
Metals	D	Chromium, Hexavalent	mg/L			1.2		0.25	U																
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L			0.38		3.1																	
Metals	D	Copper	mg/L			0.14		3.2																	
Metals	D	Iron	mg/L			44		290						320		51									
Metals	D	Lead	mg/L			0.025																			
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L			48		540						160		34									
Metals	D	Manganese	mg/L			14		100																	
Metals	D	Mercury	mg/L			0.0002	U																		
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L			0.33		3.4																	
Metals	D	Potassium	mg/L			8.9		500	U																
Metals	D	Selenium	mg/L			0.01	U																		
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L			0.015	U	0.25	U																

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Off-Property West Ditch DAPL Pool																	
			Location	MP-2 #04		MP-2 #06		MP-2 #06		MP-2 #06		MP-2 #06		MP-2 #06		MP-2 #06		MP-2 #06		MP-2 #06	
			Sample Date	11/2/2012		5/20/1996		8/12/1998		3/27/2003		3/30/2004		5/2/2005		7/19/2010		1/10/2012		11/16/2012		1/9/2013		1/30/2013	
			Sample ID	OC-MP-2 PORT 4		MP-2 #06		MP-2 #06		MLP2-#6		MP2-DIFF		MP-2 Port 6		MLP-2-6		OC-MP-2 #6		OC-MP2 #6		OC MP2 Port 6		OC MP2 Port 6	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L			700		6000				718		2500		700									
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L			0.075	U																		
Metals	D	Vanadium	mg/L			0.025	U	0.25	U																
Metals	D	Zinc	mg/L			0.57		6.1																	
Inorg_WC	T	Bicarbonate Alkalinity	mg/L					5	U	1	U														
Inorg_WC	T	Bromide	mg/L																						
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	3,500				5,333		3,570		610		2,300		730		720		2,800		530	H	490	
Inorg_WC	T	Cyanide, Total	mg/L																						
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L							5	U	0.05	U	0.05	U	0.05	U	0.5	U						
Inorg_WC	T	Nitrate+Nitrite as N	mg/L			0.066		5.08																	
Inorg_WC	T	Nitrite as N	mg/L							1	U	0.1	U	0.01	U	0.01	U	0.1	U						
Inorg_WC	T	Nitrogen, as Ammonia	mg/L			320		2500		633		360		1600		560		580				480	H	460	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	18,000				24,000		12,000		2,700		9,000		3,500		3,700		2,600		2,200	H	2,000	
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L							1	U														
Inorg_WC	T	Total Dissolved Solids	mg/L							23700															
Inorg_WC	T	Total Organic Carbon	mg/L							420															
Inorg_WC	T	Total Suspended Solids	mg/L																						
Inorg_WC	T	Specific Gravity	g/ml																						
Inorg_WC	T	Viscosity	cpoise																						
Inorg_WC	T	pH	PH UNITS							4	J														
Inorg_WC	D	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	D	Bromide	mg/L																						
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L			500																			
Inorg_WC	D	CO2 as C	mg/L																						
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L																						
Inorg_WC	D	Nitrate as N	mg/L																						
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L																						
Inorg_WC	D	Nitrogen, as Ammonia	mg/L																						
Inorg_WC	D	Orthophosphate	mg/L																						
Inorg_WC	D	pH	PH UNITS			4.3																			
Inorg_WC	D	Phosphorus, Total as P	mg/L																						
Inorg_WC	D	Sulfate	mg/L			2500																			
Inorg_WC	D	Sulfide	mg/L																						
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Off-Property West Ditch DAPL Pool																			
			Location	MP-2 #09		MP-2 #09		MP-2 #09		MP-2 #09		MP-2 #09		MP-2 #09		MP-2 #09		MP-2 #09		MP-2 #09		GW-44D	
			Sample Date	5/20/1996		8/11/1998		5/14/2001		3/27/2003		7/31/2003		8/23/2004		5/2/2005		7/19/2010		7/19/2010		1/10/2012		1/27/1992	
			Sample ID	MP-2 #09		MP-2 #09		MP-2-9		MLP2-#9		MP2-9		MP2-PORT9		MP-2 Port 9		MLP-2-9		MLP-2-9D		OC-MP-2 #9		GW-44-D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FD		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L							5.98												7.4			
Metals	T	Antimony	mg/L							0.02	U														
Metals	T	Arsenic	mg/L							0.02	U														
Metals	T	Barium	mg/L							0.037															
Metals	T	Beryllium	mg/L							0.002	U														
Metals	T	Cadmium	mg/L							0.002															
Metals	T	Calcium	mg/L							107												75			
Metals	T	Chromium	mg/L							1.55												2		930	
Metals	T	Chromium, Hexavalent	mg/L							0.005	U														
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L							0.221															
Metals	T	Copper	mg/L							0.02	U														
Metals	T	Iron	mg/L							33.5												40			
Metals	T	Lead	mg/L							0.01	U														
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L							31.3												25			
Metals	T	Manganese	mg/L							11.1															
Metals	T	Mercury	mg/L							0.0002	U														
Metals	T	Nickel	mg/L							0.171															
Metals	T	Potassium	mg/L							4.69															
Metals	T	Selenium	mg/L							0.02	U														
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L							0.01	U														
Metals	T	Sodium	mg/L							291												640			
Metals	T	Thallium	mg/L							0.02	U														
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L							0.02	U														
Metals	T	Zinc	mg/L							0.21															
Metals	D	Aluminum	mg/L	0.26		520		250								34		5.3		4.9					
Metals	D	Antimony	mg/L	0.008	U	0.05	U	0.49																	
Metals	D	Arsenic	mg/L	0.008	U	0.05	U	0.053																	
Metals	D	Barium	mg/L	0.017		0.25	U	0.05	U																
Metals	D	Beryllium	mg/L	0.005	U	0.052		0.041																	
Metals	D	Cadmium	mg/L	0.01	U	0.05	U	0.024																	
Metals	D	Calcium	mg/L	8.6		230		290								130		33		32					
Metals	D	Chromium	mg/L	0.23		150		65								7.3		1.7		1.6					
Metals	D	Chromium, Hexavalent	mg/L	0.01	U	0.05	U	0.005	U																
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L	0.03	U	1.7		1.3																	
Metals	D	Copper	mg/L	0.025	U	1.3		0.94																	
Metals	D	Iron	mg/L	2.1		130		280								87		19		19					
Metals	D	Lead	mg/L	0.005	U	0.0115		0.021																	
Metals	D	Lithium	mg/L											0.088											
Metals	D	Magnesium	mg/L	1.9		280		170								49		14		14					
Metals	D	Manganese	mg/L	0.72		55		50																	
Metals	D	Mercury	mg/L	0.0002	U			0.0002	U																
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L	0.04	U	1.8		1.2																	
Metals	D	Potassium	mg/L	1	U	25	U	11																	
Metals	D	Selenium	mg/L	0.01	U	0.05	U	0.01	U																
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L	0.015	U	0.25	U	0.01	U																

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Off-Property West Ditch DAPL Pool										
			Location	MP-2 #09	MP-2 #09	MP-2 #09	MP-2 #09	MP-2 #09	MP-2 #09	MP-2 #09	MP-2 #09	MP-2 #09	MP-2 #09	GW-44D
			Sample Date	5/20/1996	8/11/1998	5/14/2001	3/27/2003	7/31/2003	8/23/2004	5/2/2005	7/19/2010	7/19/2010	1/10/2012	1/27/1992
			Sample ID	MP-2 #09	MP-2 #09	MP-2-9	MLP2-#9	MP2-9	MP2-PORT9	MP-2 Port 9	MLP-2-9	MLP-2-9D	OC-MP-2 #9	GW-44-D
			Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FD	FS	FS
Class	**Fraction**	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
Metals	D	Sodium	mg/L	45	3000	3000				810	350	360		
Metals	D	Strontium	mg/L											
Metals	D	Thallium	mg/L	0.015 U	0.005 U	0.02 U								
Metals	D	Vanadium	mg/L	0.025 U	0.25 U	0.013								
Metals	D	Zinc	mg/L	0.025 U	3.1	1.9								
Inorg_WC	T	Bicarbonate Alkalinity	mg/L	20 U	5 U	1 U	1 U	1 U						
Inorg_WC	T	Bromide	mg/L											
Inorg_WC	T	Chemical Oxygen Demand	mg/L											
Inorg_WC	T	Chloride	mg/L		3,086	4,140	362	2,250		720	400	390	760	8,900
Inorg_WC	T	Cyanide, Total	mg/L											
Inorg_WC	T	Dissolved Organic Carbon	mg/L											
Inorg_WC	T	Fluoride	mg/L											
Inorg_WC	T	Nitrate as N	mg/L			0.59	0.5 UJ	12 U		0.05 U	0.05 U	0.05 U	0.5 U	
Inorg_WC	T	Nitrate+Nitrite as N	mg/L	0.05 U	2.48									
Inorg_WC	T	Nitrite as N	mg/L			0.013	0.1 UJ	2.5 U		0.01 U	0.1 U	0.01 U	0.1 U	
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	12	1570	1.4	180	1010		4900	290	290	400	3900
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L											
Inorg_WC	T	Orthophosphate	mg/L											
Inorg_WC	T	Phosphorus, Total as P	mg/L											
Inorg_WC	T	Sulfate	mg/L		16,300	10,000	1,230	7,960		3,300	1,600	1,500	2,200	32,000
Inorg_WC	T	Sulfide	mg/L											
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L				1 U	1 U						
Inorg_WC	T	Total Dissolved Solids	mg/L			17000 J	1920							
Inorg_WC	T	Total Organic Carbon	mg/L				24							
Inorg_WC	T	Total Suspended Solids	mg/L											
Inorg_WC	T	Specific Gravity	g/ml											
Inorg_WC	T	Viscosity	cpoise											
Inorg_WC	T	pH	PH UNITS			3.95	4.67 J	4.01						
Inorg_WC	D	Bicarbonate Alkalinity	mg/L											
Inorg_WC	D	Bromide	mg/L											
Inorg_WC	D	Carbonate	mg/L											
Inorg_WC	D	Chloride	mg/L	49										
Inorg_WC	D	CO2 as C	mg/L											
Inorg_WC	D	Cyanide, Total	mg/L											
Inorg_WC	D	Dissolved Organic Carbon	mg/L											
Inorg_WC	D	Nitrate as N	mg/L											
Inorg_WC	D	Nitrate+Nitrite as N	mg/L											
Inorg_WC	D	Nitrite as N	mg/L											
Inorg_WC	D	Nitrogen, as Ammonia	mg/L											
Inorg_WC	D	Orthophosphate	mg/L											
Inorg_WC	D	pH	PH UNITS	5										
Inorg_WC	D	Phosphorus, Total as P	mg/L											
Inorg_WC	D	Sulfate	mg/L	100										
Inorg_WC	D	Sulfide	mg/L											
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L											
Inorg_WC	D	Total Dissolved Solids	mg/L											

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Main Street DAPL Pool																			
			Location	GW-44D		GW-44D		GW-44D		GW-44D		GW-44D		GW-44D		GW-44D		GW-44D		GW-45D		GW-45D	
			Sample Date	8/12/1992		11/10/1992		10/17/1995		4/10/1997		7/7/1999		7/21/1999		10/12/2011		10/12/2011		4/17/2012		12/13/1991		8/10/1992	
			Sample ID	GW-44-D		GW-44-D		GW-44-D		GW-44-D		GW-44D		GW-44D		OC-GW-44D-DUP		OC-GW-44D-XXX		OC-GW-44D-XXX		GW-45-D		GW-45-D	
			Qc Code	FS		FS		FS		FS		FS		FS		FD		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L					990								1200		1200		1200					
Metals	T	Antimony	mg/L													0.6	U	0.6	U	0.3	U				
Metals	T	Arsenic	mg/L					2.5	UJ							0.2		0.2		0.22					
Metals	T	Barium	mg/L					0.05	UJ							1	U	1	U	0.5	U				
Metals	T	Beryllium	mg/L													0.15		0.16		0.17					
Metals	T	Cadmium	mg/L													0.1	U	0.1	U	0.091					
Metals	T	Calcium	mg/L					360	J							490		510		500					
Metals	T	Chromium	mg/L					790								530		560		530		910			
Metals	T	Chromium, Hexavalent	mg/L													0.00059	J	0.001	U	0.02	UJ				
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L													5.5		5.7		5.7					
Metals	T	Copper	mg/L													4.8		5		4.9					
Metals	T	Iron	mg/L					1800	J							2500		2600		2500					
Metals	T	Lead	mg/L					0.1	J							0.5	U	0.5	U	0.25	U				
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L					750	J							990		1000		990					
Metals	T	Manganese	mg/L					150								160		170		160					
Metals	T	Mercury	mg/L													0.0002	U	0.0002	U	0.00052					
Metals	T	Nickel	mg/L													5.6		5.8		5.8					
Metals	T	Potassium	mg/L					110								320	J	370	J	290					
Metals	T	Selenium	mg/L													1	U	1	U	0.5	U				
Metals	T	Silicon	mg/L					61																	
Metals	T	Silver	mg/L													0.5	U	0.5	U	11					
Metals	T	Sodium	mg/L					10000								10000		11000		12000					
Metals	T	Thallium	mg/L													0.0087	U	0.0066	U	0.005	U				
Metals	T	Tin	mg/L													5	U	5	U	2.5	U				
Metals	T	Vanadium	mg/L													1	U	1	U	0.5	U				
Metals	T	Zinc	mg/L													10		11		11					
Metals	D	Aluminum	mg/L	1400		1300		1300																1100	
Metals	D	Antimony	mg/L	0.25	U	0.05	U																	0.13	U
Metals	D	Arsenic	mg/L	0.5	U	0.5	U	2.5	UJ															0.5	U
Metals	D	Barium	mg/L	0.045		0.038		0.5	UJ															0.04	
Metals	D	Beryllium	mg/L	0.16		0.13																		0.15	
Metals	D	Cadmium	mg/L	0.12		0.1																		0.13	
Metals	D	Calcium	mg/L	500		480		500	J															510	
Metals	D	Chromium	mg/L	940		970		900				670		730										690	
Metals	D	Chromium, Hexavalent	mg/L	26	J	31	J	4.7																21	J
Metals	D	Chromium, Trivalent	mg/L					900																	
Metals	D	Cobalt	mg/L	5		3.9																		11	
Metals	D	Copper	mg/L	5.2		4.7																		5.3	
Metals	D	Iron	mg/L	2300		2400		2500	J			2100		2300										1300	
Metals	D	Lead	mg/L	0.5	U	1	U	0.5	UJ															0.25	U
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	1000		960		1100	J															670	
Metals	D	Manganese	mg/L	160		160		160																240	
Metals	D	Mercury	mg/L	0.0002	U	0.0002	U																	0.0002	U
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L	5.2		3.6																		4.8	
Metals	D	Potassium	mg/L	92		100		97																110	
Metals	D	Selenium	mg/L	0.5	U	0.5	U																	0.5	U
Metals	D	Silicon	mg/L					63																	
Metals	D	Silver	mg/L	0.075	U	0.015	U																	0.075	U

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Main Street DAPL Pool																			
			Location	GW-44D		GW-44D		GW-44D		GW-44D		GW-44D		GW-44D		GW-44D		GW-44D		GW-45D		GW-45D	
			Sample Date	8/12/1992		11/10/1992		10/17/1995		4/10/1997		7/7/1999		7/21/1999		10/12/2011		10/12/2011		4/17/2012		12/13/1991		8/10/1992	
			Sample ID	GW-44-D		GW-44-D		GW-44-D		GW-44-D		GW-44D		GW-44D		OC-GW-44D-DUP		OC-GW-44D-XXX		OC-GW-44D-XXX		GW-45-D		GW-45-D	
			Qc Code	FS		FS		FS		FS		FS		FS		FD		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L	11000		11000		11000																8900	
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L	0.13	U	0.5	U																	0.025	U
Metals	D	Vanadium	mg/L	0.22		0.18																		0.13	U
Metals	D	Zinc	mg/L	11		9.3																		9.3	
Inorg_WC	T	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	T	Bromide	mg/L													50	U	50	U	32					
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	9,000		12,000										9,500		10,000		11,000		11,000		8,400	
Inorg_WC	T	Cyanide, Total	mg/L																						
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L			24										25	UJ	25	U	27					
Inorg_WC	T	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	T	Nitrite as N	mg/L			0.17										5	UJ	5	U	5	U				
Inorg_WC	T	Nitrogen, as Ammonia	mg/L			24		4100				1800		2000		3400		3100		4800		2600		3400	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	39,000	J	40,000						53,000		42,000		34,000		36,000		41,000		45,000		30,000	J
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	T	Total Dissolved Solids	mg/L																						
Inorg_WC	T	Total Organic Carbon	mg/L																						
Inorg_WC	T	Total Suspended Solids	mg/L																						
Inorg_WC	T	Specific Gravity	g/ml							1.066															
Inorg_WC	T	Viscosity	cpoise							1.52															
Inorg_WC	T	pH	PH UNITS									3.89		3.79											
Inorg_WC	D	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	D	Bromide	mg/L					20	U																
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L					13000																	
Inorg_WC	D	CO2 as C	mg/L																						
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L					1500																	
Inorg_WC	D	Nitrate as N	mg/L					5.9	J																
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L					0.2	UJ																
Inorg_WC	D	Nitrogen, as Ammonia	mg/L					3400																	
Inorg_WC	D	Orthophosphate	mg/L					0.5																	
Inorg_WC	D	pH	PH UNITS																						
Inorg_WC	D	Phosphorus, Total as P	mg/L					5.5	J																
Inorg_WC	D	Sulfate	mg/L					28000																	
Inorg_WC	D	Sulfide	mg/L					2	U																
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L					96000																	

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Main Street DAPL Pool																			
			Location	GW-45D		GW-45D		GW-45D		GW-45D		GW-45D		GW-45D		GW-45D		GW-59D		GW-59D		GW-59D	
			Sample Date	11/12/1992		1/13/1995		10/17/1995		4/10/1997		7/7/1999		5/19/2010		10/27/2010		10/27/2010		2/8/1992		8/6/1992		8/6/1992	
			Sample ID	GW-45-D		GW-45-D		GW-45-D		GW-45-D		GW-45D		OC-GW-45D-XXX		OC-GW-45D-DUP		OC-GW-45D-XXX		GW-59-D		GW-59-D		GW-59-D DUP	
			Qc Code	FS		FS		FS		FS		FS		FS		FD		FS		FS		FS		FD	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L					800	J					190		410		420							
Metals	T	Antimony	mg/L											0.06	U	0.06	U	0.06	U						
Metals	T	Arsenic	mg/L					2.5	UJ					1	U	0.5	U	0.5	U						
Metals	T	Barium	mg/L					0.05	UJ					0.029	J	0.034	J	0.034	J						
Metals	T	Beryllium	mg/L											0.04		0.061		0.062							
Metals	T	Cadmium	mg/L											0.046		0.012		0.011							
Metals	T	Calcium	mg/L					350	J					440		420		430							
Metals	T	Chromium	mg/L					560						41		100		100		4.9					
Metals	T	Chromium, Hexavalent	mg/L																						
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L											3.6		5		5							
Metals	T	Copper	mg/L											1.7		2.6		2.7							
Metals	T	Iron	mg/L					1200						400		640		650							
Metals	T	Lead	mg/L					0.087	J					0.022	J	0.033	J	0.034	J						
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L					540	J					330		430		440							
Metals	T	Manganese	mg/L					260						130		170		170							
Metals	T	Mercury	mg/L											0.0002	U	0.0002	U	0.0002	U						
Metals	T	Nickel	mg/L											2.1		3.1		3.1							
Metals	T	Potassium	mg/L					110						160		220	J	220	J						
Metals	T	Selenium	mg/L											0.1	U	0.1	U	0.1	U						
Metals	T	Silicon	mg/L					54																	
Metals	T	Silver	mg/L											0.76		2.8		2.9							
Metals	T	Sodium	mg/L					8700						3200		4500		4500							
Metals	T	Thallium	mg/L											0.0045	J	0.0058		0.0056							
Metals	T	Tin	mg/L											21		0.5	U	0.5	U						
Metals	T	Vanadium	mg/L											0.1	U	0.1	U	0.1	U						
Metals	T	Zinc	mg/L											3.8		5.3		5.3							
Metals	D	Aluminum	mg/L	1000		1200		1100	J													820		800	
Metals	D	Antimony	mg/L	0.1	U																	0.1	U	0.1	U
Metals	D	Arsenic	mg/L	0.5	U	0.25	U	2.5	UJ													0.25	U	0.13	U
Metals	D	Barium	mg/L	0.042		0.037		0.5	UJ													0.02		0.026	
Metals	D	Beryllium	mg/L	0.14																		0.089		0.091	
Metals	D	Cadmium	mg/L	0.098																		0.12		0.11	
Metals	D	Calcium	mg/L	470		690		500	J													450		450	
Metals	D	Chromium	mg/L	690		710		680				540										32		28	
Metals	D	Chromium, Hexavalent	mg/L	20	J	16		2.4	J															0.72	J
Metals	D	Chromium, Trivalent	mg/L			690		680	J																
Metals	D	Cobalt	mg/L	9.9																		6.5		6.8	
Metals	D	Copper	mg/L	5.2																		2.6		2.6	
Metals	D	Iron	mg/L	1200		1700		1500				1500										1900		1700	
Metals	D	Lead	mg/L	1	U	0.25	U	0.5	UJ													0.5	U	0.5	U
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	630		1000		770	J													680		630	
Metals	D	Manganese	mg/L	240		310		280														350		350	
Metals	D	Mercury	mg/L	0.0002	U																	0.0002	U	0.0002	U
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L	4.5																		5.4		5.4	
Metals	D	Potassium	mg/L	81		100		99														130		140	
Metals	D	Selenium	mg/L	0.5	U																	0.5	U	0.5	U
Metals	D	Silicon	mg/L			59		56																	
Metals	D	Silver	mg/L	0.03	U																	0.015	U	0.015	U

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Main Street DAPL Pool																			
			Location	GW-45D		GW-45D		GW-45D		GW-45D		GW-45D		GW-45D		GW-45D		GW-59D		GW-59D		GW-59D	
			Sample Date	11/12/1992		1/13/1995		10/17/1995		4/10/1997		7/7/1999		5/19/2010		10/27/2010		10/27/2010		2/8/1992		8/6/1992		8/6/1992	
			Sample ID	GW-45-D		GW-45-D		GW-45-D		GW-45-D		GW-45D		OC-GW-45D-XXX		OC-GW-45D-DUP		OC-GW-45D-XXX		GW-59-D		GW-59-D		GW-59-D DUP	
			Qc Code	FS		FS		FS		FS		FS		FS		FD		FS		FS		FS		FD	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L	7900		10000		9300														8400		8900	
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L	0.2	U																	0.05	U	0.05	U
Metals	D	Vanadium	mg/L	0.12																		0.46		0.42	
Metals	D	Zinc	mg/L	8.8																		12		11	
Inorg_WC	T	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	T	Bromide	mg/L											13		19	J	19	J						
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	7,600										3,600		5,100		5,100		5,400		9,600		9,100	
Inorg_WC	T	Cyanide, Total	mg/L																						
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L	22										2.7		1.8	J	5.2	J						
Inorg_WC	T	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	T	Nitrite as N	mg/L											1	UJ	0.01	UJ	0.014	J						
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	4.5				3900				800		2000		2200	J	1700	J	190		3000		3200	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	31,000								40,000		9,900		27,000		27,000		19,000		34,000	J	31,000	J
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	T	Total Dissolved Solids	mg/L																						
Inorg_WC	T	Total Organic Carbon	mg/L																						
Inorg_WC	T	Total Suspended Solids	mg/L																						
Inorg_WC	T	Specific Gravity	g/ml							1.042															
Inorg_WC	T	Viscosity	cpoise							1.44															
Inorg_WC	T	pH	PH UNITS									3.81													
Inorg_WC	D	Bicarbonate Alkalinity	mg/L					20	U																
Inorg_WC	D	Bromide	mg/L			1000	U	20	U																
Inorg_WC	D	Carbonate	mg/L			164																			
Inorg_WC	D	Chloride	mg/L			9300		8900																	
Inorg_WC	D	CO2 as C	mg/L			164																			
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L			1300		430																	
Inorg_WC	D	Nitrate as N	mg/L			24		7.5	J																
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L			0.081		0.2	UJ																
Inorg_WC	D	Nitrogen, as Ammonia	mg/L			3000		3300																	
Inorg_WC	D	Orthophosphate	mg/L			0.2		0.4																	
Inorg_WC	D	pH	PH UNITS																						
Inorg_WC	D	Phosphorus, Total as P	mg/L			7.2		4.4	J																
Inorg_WC	D	Sulfate	mg/L			39000		32000																	
Inorg_WC	D	Sulfide	mg/L			1	U	2	U																
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L			55000		29000																	

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Main Street DAPL Pool																			
			Location	GW-59D		GW-59D		GW-59D		GW-70D		GW-70D		GW-70D		GW-70D		MP-3 #01		MP-3 #01		MP-3 #01	
			Sample Date	11/10/1992		11/10/1992		3/22/2004		8/10/1992		11/12/1992		3/22/2004		10/22/2010		5/18/2011		5/22/1996		8/13/1998		3/31/2004	
			Sample ID	GW-59-D		GW-59-D DUP		GW-59D		GW-70-D		GW-70-D		GW-70D		OC-GW-70D-XXX		OC-GW-70D-XXX		MP-3 #01		MP-3 #01		MP3-DAPL	
			Qc Code	FS		FD		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L													2	U	2	U						
Metals	T	Antimony	mg/L													0.12	U	0.12	U						
Metals	T	Arsenic	mg/L													0.1	U	0.0036							
Metals	T	Barium	mg/L													0.2	U	0.2	U						
Metals	T	Beryllium	mg/L													0.02	U	0.02	U						
Metals	T	Cadmium	mg/L													0.02	UJ	0.02	U						
Metals	T	Calcium	mg/L													350		360							
Metals	T	Chromium	mg/L													0.014	J	0.1	U						
Metals	T	Chromium, Hexavalent	mg/L																						
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L													4.5		3.8							
Metals	T	Copper	mg/L													0.2	U	0.2	U						
Metals	T	Iron	mg/L													290		240							
Metals	T	Lead	mg/L													0.1	UJ	0.1	U						
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L													580		590							
Metals	T	Manganese	mg/L													250		210							
Metals	T	Mercury	mg/L													0.00066		0.0002	U						
Metals	T	Nickel	mg/L													2.5		2.1							
Metals	T	Potassium	mg/L													92		97							
Metals	T	Selenium	mg/L													0.2	U	0.2	U						
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L													0.1	U	0.1	U						
Metals	T	Sodium	mg/L													5700		5600							
Metals	T	Thallium	mg/L													0.001	U	0.0001	U						
Metals	T	Tin	mg/L													1	U	1	U						
Metals	T	Vanadium	mg/L													0.2	UJ	0.2	U						
Metals	T	Zinc	mg/L													0.81	J	0.62	J						
Metals	D	Aluminum	mg/L	720		680				2.3		1.2								1500		1600			
Metals	D	Antimony	mg/L	0.025	U	0.05	U			0.05	U	0.05	U							0.2	U	0.05	U		
Metals	D	Arsenic	mg/L		R	0.25	U			0.1	U	0.25	U							0.62		0.25	U		
Metals	D	Barium	mg/L	0.033		0.031				0.023		0.02								0.13	U	0.12	U		
Metals	D	Beryllium	mg/L	0.088		0.086				0.015	U	0.015	U							0.19		0.17			
Metals	D	Cadmium	mg/L	0.12		0.13				0.063		0.054								0.25	U	0.084			
Metals	D	Calcium	mg/L	460		440				430		390								520		220			
Metals	D	Chromium	mg/L	29		22				0.19		0.19								1100		930			
Metals	D	Chromium, Hexavalent	mg/L	0.87	J	1	J				R									79		0.25	U		
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L	6.7		6.5				7.9		9.7								6.7		5			
Metals	D	Copper	mg/L	2.8		2.5				0.33		0.074								10		8.9			
Metals	D	Iron	mg/L	1700		1900				1100		1300								1800		1500			
Metals	D	Lead	mg/L		R	0.1	U			0.1	U	0.25	U							0.23		0.05	U		
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	620		630				610		680								930		890			
Metals	D	Manganese	mg/L	350		350				450		430								200		150			
Metals	D	Mercury	mg/L	0.0002	U	0.0002	U			0.0002	U	0.0002	U							0.0002	U				
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L	4.9		4.9				3.4		3.6								6.5		5.2			
Metals	D	Potassium	mg/L	140		130				100		110								100		80			
Metals	D	Selenium	mg/L		R	0.25	U			0.25	U	0.1	U							0.25	U	0.25	U		
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L	0.015	U	0.015	U			0.057		0.062								0.38	U	0.12	U		

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Main Street DAPL Pool																			
			Location	GW-59D		GW-59D		GW-59D		GW-70D		GW-70D		GW-70D		GW-70D		MP-3 #01		MP-3 #01		MP-3 #01	
			Sample Date	11/10/1992		11/10/1992		3/22/2004		8/10/1992		11/12/1992		3/22/2004		10/22/2010		5/18/2011		5/22/1996		8/13/1998		3/31/2004	
			Sample ID	GW-59-D		GW-59-D DUP		GW-59D		GW-70-D		GW-70-D		GW-70D		OC-GW-70D-XXX		OC-GW-70D-XXX		MP-3 #01		MP-3 #01		MP3-DAPL	
			Qc Code	FS		FD		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L	8000		8100				6000		6300								12000		11000		11100	
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L		R	0.25	U			0.05	U	0.25	U							0.38	U	0.25	U		
Metals	D	Vanadium	mg/L	0.42		0.45				0.23		0.31								0.63	U	0.12	U		
Metals	D	Zinc	mg/L	11		11				1.9		2								14		12			
Inorg_WC	T	Bicarbonate Alkalinity	mg/L																			5	U		
Inorg_WC	T	Bromide	mg/L													12		10	U						
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	8,200		7,500				5,200		5,900				5,000		4,600				11,559		12,000	
Inorg_WC	T	Cyanide, Total	mg/L																						
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L	14		14										0.14		5	UJ					2.6	
Inorg_WC	T	Nitrate+Nitrite as N	mg/L																	5.1		19.6			
Inorg_WC	T	Nitrite as N	mg/L	0.05	U	0.05	U									0.01	U	1	UJ					0.1	U
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	10	J	4.8	J	3.7				61		780		370		1500		310		3880		5300	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	31,000	J	15,000	J			16,000	J	19,000				18,000		13,000				22,400		47,000	
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	T	Total Dissolved Solids	mg/L																						
Inorg_WC	T	Total Organic Carbon	mg/L																						
Inorg_WC	T	Total Suspended Solids	mg/L																						
Inorg_WC	T	Specific Gravity	g/ml																						
Inorg_WC	T	Viscosity	cpoise																						
Inorg_WC	T	pH	PH UNITS																						
Inorg_WC	D	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	D	Bromide	mg/L																						
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L																	12000					
Inorg_WC	D	CO2 as C	mg/L																						
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L																						
Inorg_WC	D	Nitrate as N	mg/L																						
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L																						
Inorg_WC	D	Nitrogen, as Ammonia	mg/L																						
Inorg_WC	D	Orthophosphate	mg/L																						
Inorg_WC	D	pH	PH UNITS																	3.6					
Inorg_WC	D	Phosphorus, Total as P	mg/L																						
Inorg_WC	D	Sulfate	mg/L																	48000					
Inorg_WC	D	Sulfide	mg/L																						
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Main Street DAPL Pool																			
			Location	MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #02		MP-3 #02		MP-3 #02		MP-3 #02		MP-3 #03		MP-3 #03		MP-3 #03	
			Sample Date	5/4/2005		10/11/2011		4/17/2012		5/22/1996		8/13/1998		5/15/2001		3/26/2003		5/22/1996		8/13/1998		5/4/2005		1/11/2012	
			Sample ID	MP3 Port 1		OC-MP-3 #01-XXX		OC-MP-3 #01-XXX		MP-3 #02		MP-3 #02		MP-3-2		MLP3-#2		MP-3 #03		MP-3 #03		MP3 Port 3		OC-MP-3 #3	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L			1400		1600								1800								630	
Metals	T	Antimony	mg/L			0.3	U	0.3	U							2.47									
Metals	T	Arsenic	mg/L			0.21	J	0.26								0.5	U								
Metals	T	Barium	mg/L			0.5	U	0.5	U							0.5	U								
Metals	T	Beryllium	mg/L			0.17		0.21								0.187									
Metals	T	Cadmium	mg/L			0.1		0.11								0.089									
Metals	T	Calcium	mg/L			480		550								127								390	
Metals	T	Chromium	mg/L			590		690								829								73	
Metals	T	Chromium, Hexavalent	mg/L			0.001	U	0.02	UJ							0.5	U								
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L			5.4		6.3								4.59									
Metals	T	Copper	mg/L			7.7		9								5.88									
Metals	T	Iron	mg/L			2000		2200								1900								20	
Metals	T	Lead	mg/L			0.25	U	0.25	U							0.25	U								
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L			880		1000								913								410	
Metals	T	Manganese	mg/L			170		190								136									
Metals	T	Mercury	mg/L			0.0002	U	0.0004	U							0.0002	U								
Metals	T	Nickel	mg/L			5.7		6.5								5.27									
Metals	T	Potassium	mg/L			340		390								100	U								
Metals	T	Selenium	mg/L			0.5	U	0.5	U							0.5	U								
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L			0.63		14								0.25	U								
Metals	T	Sodium	mg/L			12000		13000								10200								4600	
Metals	T	Thallium	mg/L			0.0076	U	0.0059	U							0.5	U								
Metals	T	Tin	mg/L			2.5	U	2.5	U																
Metals	T	Vanadium	mg/L			0.5	U	0.5	U							0.5	U								
Metals	T	Zinc	mg/L			12		14								12									
Metals	D	Aluminum	mg/L	1700						1400		1400		1100				930		980		1100			
Metals	D	Antimony	mg/L							0.2	U	0.05	U	4.8				0.068		0.05	U				
Metals	D	Arsenic	mg/L							0.43		0.25	U	0.28				0.15		0.101					
Metals	D	Barium	mg/L							0.13	U	0.12	U	0.05	U			0.026		0.025	U				
Metals	D	Beryllium	mg/L							0.16		0.14		0.14				0.094		0.11					
Metals	D	Cadmium	mg/L							0.25	U	0.047		0.042				0.043		0.039					
Metals	D	Calcium	mg/L	580						530		160		75				460		180		510			
Metals	D	Chromium	mg/L	960						830		690		610				290		200		220			
Metals	D	Chromium, Hexavalent	mg/L							47		0.25	U	0.5	U			21		0.065					
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L							4.6		3.2		3.3				3.2		2.6					
Metals	D	Copper	mg/L							4.2		6.9		3.8				2.8		2.6					
Metals	D	Iron	mg/L	2200						1800		1400		1600				520		180		150			
Metals	D	Lead	mg/L							0.24		0.05	U	0.029				0.096		0.05	U				
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	1000						830		720		660				600		570		620			
Metals	D	Manganese	mg/L							130		91		93				78		59					
Metals	D	Mercury	mg/L							0.0002	U			0.0002	U			0.0002	U						
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L							5.1		3.9		3.9				3.7		2.9					
Metals	D	Potassium	mg/L							100		70		57				54		5	U				
Metals	D	Selenium	mg/L							0.25	U	0.25	U	0.05	U			0.01	U	0.25	U				
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L							0.38	U	0.12	U	0.05	U			0.015	U	0.025	U				

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Main Street DAPL Pool																	
			Location	MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #02		MP-3 #02		MP-3 #02		MP-3 #03		MP-3 #03		MP-3 #03	
			Sample Date	5/4/2005		10/11/2011		4/17/2012		5/22/1996		8/13/1998		5/15/2001		3/26/2003		5/22/1996		8/13/1998		5/4/2005		1/11/2012	
			Sample ID	MP3 Port 1		OC-MP-3 #01-XXX		OC-MP-3 #01-XXX		MP-3 #02		MP-3 #02		MP-3-2		MLP3-#2		MP-3 #03		MP-3 #03		MP3 Port 3		OC-MP-3 #3	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L	13000						12000		9000		65000				6800		7100		5700			
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L							0.38	U	0.05	U	0.2				0.38	U	0.005	U				
Metals	D	Vanadium	mg/L							0.63	U	0.12	U	0.11				0.025	U	0.025	U				
Metals	D	Zinc	mg/L							12		8.8		8.9				8.2		6.7					
Inorg_WC	T	Bicarbonate Alkalinity	mg/L									5	U	1	U	1	U			5	U				
Inorg_WC	T	Bromide	mg/L			50	U	28																	
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	3,200		11,000		11,000				8,650		13,320		9,280				5,183		540		2,400	
Inorg_WC	T	Cyanide, Total	mg/L																						
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L	12		30		34						14		25.8						15		8.4	
Inorg_WC	T	Nitrate+Nitrite as N	mg/L							6.1		23.1						8.8		16.1					
Inorg_WC	T	Nitrite as N	mg/L	0.1	U	5	U	5	U					0.5	U	2	U					0.02	U	0.5	U
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	5200		2000		5400		29		3170		15		68.3		34		2240		3200		2100	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	4,500		45,000		45,000				28,800		32,000		34,100				23,400		5,600		19,000	
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L													1	U								
Inorg_WC	T	Total Dissolved Solids	mg/L											64000	J	60700									
Inorg_WC	T	Total Organic Carbon	mg/L													1600									
Inorg_WC	T	Total Suspended Solids	mg/L																						
Inorg_WC	T	Specific Gravity	g/ml																						
Inorg_WC	T	Viscosity	cpoise																						
Inorg_WC	T	pH	PH UNITS											3.72		3.71	J								
Inorg_WC	D	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	D	Bromide	mg/L																						
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L							5000								3400							
Inorg_WC	D	CO2 as C	mg/L																						
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L																						
Inorg_WC	D	Nitrate as N	mg/L																						
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L																						
Inorg_WC	D	Nitrogen, as Ammonia	mg/L																						
Inorg_WC	D	Orthophosphate	mg/L																						
Inorg_WC	D	pH	PH UNITS							3.6								3.6							
Inorg_WC	D	Phosphorus, Total as P	mg/L																						
Inorg_WC	D	Sulfate	mg/L							38000								24000							
Inorg_WC	D	Sulfide	mg/L																						
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L																						

Prepared by BJS 09/18/2017
Checked by JBR 09/22/2017

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Main Street DAPL Pool																			
			Location	MP-3 #04		MP-3 #04		MP-3 #04		MP-3 #04		MP-3 #04		MP-4 #02		MP-4 #02		MP-4 #02		MP-4 #02		MP-4 #02	
			Sample Date	5/22/1996		8/13/1998		5/15/2001		3/26/2003		5/4/2005		1/11/2012		6/29/2000		5/15/2001		3/28/2003		5/4/2005		5/25/2010	
			Sample ID	MP-3 #04		MP-3 #04		MP-3-4		MLP3-#4		MP3 Port 4		OC-MP-3 #4		MP-4 #2		MP-4-2		MLP-4-#2		MP4 Port 2		OC-MP-4 #02-XXX	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L							252				64						1	U			0.5	U
Metals	T	Antimony	mg/L							0.117										0.2	U			0.03	U
Metals	T	Arsenic	mg/L							0.03										0.2	U			0.01	UJ
Metals	T	Barium	mg/L							0.02	U									0.2	U			0.02	J
Metals	T	Beryllium	mg/L							0.034										0.02	U			0.005	U
Metals	T	Cadmium	mg/L							0.02										0.02	U			0.0021	J
Metals	T	Calcium	mg/L							389				450						582				600	
Metals	T	Chromium	mg/L							19				3.8						0.1	U			0.005	U
Metals	T	Chromium, Hexavalent	mg/L							0.005	U									0.005	U			0.00047	J
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L							1.6										0.2	U			0.05	U
Metals	T	Copper	mg/L							1.22										0.2	U			0.05	U
Metals	T	Iron	mg/L							9.59				3.3						458				140	
Metals	T	Lead	mg/L							0.028										0.1	U			0.025	UJ
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L							252				130						380				300	
Metals	T	Manganese	mg/L							20.3										16.6				3.7	J
Metals	T	Mercury	mg/L							0.0002	U									0.0002	U			0.0002	U
Metals	T	Nickel	mg/L							1.45										0.2	U			0.05	U
Metals	T	Potassium	mg/L							14.6										100	U			11	J
Metals	T	Selenium	mg/L							0.02	U									0.2	U			0.05	U
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L							0.01	U									0.1	U			0.025	U
Metals	T	Sodium	mg/L							2260				1500						1450				1200	
Metals	T	Thallium	mg/L							0.02	U									0.2	U			0.001	U
Metals	T	Tin	mg/L																					0.25	UJ
Metals	T	Vanadium	mg/L							0.02	U									0.2	U			0.0079	J
Metals	T	Zinc	mg/L							2.69										1	U			0.25	U
Metals	D	Aluminum	mg/L	450		410		300				370				3		0.23				0.2	U		
Metals	D	Antimony	mg/L	0.022		0.0084		0.24								0.02	U	0.02	U						
Metals	D	Arsenic	mg/L	0.054		0.05	U	0.028								0.01	U	0.01	U						
Metals	D	Barium	mg/L	0.022		0.0092		0.014								0.022		0.02							
Metals	D	Beryllium	mg/L	0.048		0.034		0.041								0.002	U	0.002	U						
Metals	D	Cadmium	mg/L	0.026		0.018		0.023								0.01	U	0.011							
Metals	D	Calcium	mg/L	440		360		390				440				420		530				480			
Metals	D	Chromium	mg/L	53		36		27				34				0.38		0.087				0.016			
Metals	D	Chromium, Hexavalent	mg/L	3.6		0.05	U	0.005	U							0.01	J	0.005	UJ						
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L	2.3		1.6		1.8								0.26		0.01	U						
Metals	D	Copper	mg/L	2		1.7		1.5								0.021		0.02	U						
Metals	D	Iron	mg/L	75		21		12				10				180		540				320			
Metals	D	Lead	mg/L	0.046		0.0084		0.028								0.01	U	0.01	U						
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	340		280		260				320				230		470				380			
Metals	D	Manganese	mg/L	32		24		24								15		27							
Metals	D	Mercury	mg/L	0.0002	U			0.0002	U							0.0002	U	0.0002	U						
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L	2.2		1.4		1.6								0.33		0.02	U						
Metals	D	Potassium	mg/L	25		800		12								20		26							
Metals	D	Selenium	mg/L	0.01	U	0.05	U	0.01	U							0.01	U	0.1	U						
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L	0.015	U	0.01	U	0.01	U							0.01	U	0.01	U						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Main Street DAPL Pool										
			Location	MP-3 #04	MP-3 #04	MP-3 #04	MP-3 #04	MP-3 #04	MP-3 #04	MP-4 #02	MP-4 #02	MP-4 #02	MP-4 #02	MP-4 #02
			Sample Date	5/22/1996	8/13/1998	5/15/2001	3/26/2003	5/4/2005	1/11/2012	6/29/2000	5/15/2001	3/28/2003	5/4/2005	5/25/2010
			Sample ID	MP-3 #04	MP-3 #04	MP-3-4	MLP3-#4	MP3 Port 4	OC-MP-3 #4	MP-4 #2	MP-4-2	MLP-4-#2	MP4 Port 2	OC-MP-4 #02-XXX
			Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
Class	**Fraction**	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
Metals	D	Sodium	mg/L	2900	2100	2300		2600		2400	2200		1500	
Metals	D	Strontium	mg/L											
Metals	D	Thallium	mg/L	0.015 U	0.005 U	0.01 U				0.01 U	0.02 U			
Metals	D	Vanadium	mg/L	0.025 U	0.01 U	0.01 U				0.01 U	0.01 U			
Metals	D	Zinc	mg/L	4.1	2.7	3.2				0.44	0.05 U			
Inorg_WC	T	Bicarbonate Alkalinity	mg/L		5 U	1 U	1 U			200	150	450 J		
Inorg_WC	T	Bromide	mg/L											10 U
Inorg_WC	T	Chemical Oxygen Demand	mg/L											
Inorg_WC	T	Chloride	mg/L		2,650	4,020	2,830	24,000	960	4,000	3,600	2,870	1,500	2,600
Inorg_WC	T	Cyanide, Total	mg/L											
Inorg_WC	T	Dissolved Organic Carbon	mg/L											
Inorg_WC	T	Fluoride	mg/L											
Inorg_WC	T	Nitrate as N	mg/L			7.1	7.5	9.1	2.6	0.05 U	0.23	5 UJ	0.33	5 U
Inorg_WC	T	Nitrate+Nitrite as N	mg/L	6.6	4.44									
Inorg_WC	T	Nitrite as N	mg/L			0.011	1 U	0.01 U	0.2 U	0.16	0.01 U	1 UJ	0.01 U	1
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	2	1350	720	589	180	760	2100 J	780	493	5.1	440
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L											
Inorg_WC	T	Orthophosphate	mg/L											
Inorg_WC	T	Phosphorus, Total as P	mg/L											
Inorg_WC	T	Sulfate	mg/L		14,700	12,000	10,300	83,000	5,500	6,400	5,000	4,630	2,500	3,800
Inorg_WC	T	Sulfide	mg/L											
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L				1 U					450 J		
Inorg_WC	T	Total Dissolved Solids	mg/L			16000 J	13600				12000	10600		
Inorg_WC	T	Total Organic Carbon	mg/L				290					93		
Inorg_WC	T	Total Suspended Solids	mg/L											
Inorg_WC	T	Specific Gravity	g/ml											
Inorg_WC	T	Viscosity	cpoise											
Inorg_WC	T	pH	PH UNITS			3.94	4 J			6.01	R	6.39		
Inorg_WC	D	Bicarbonate Alkalinity	mg/L											
Inorg_WC	D	Bromide	mg/L											
Inorg_WC	D	Carbonate	mg/L											
Inorg_WC	D	Chloride	mg/L	1900										
Inorg_WC	D	CO2 as C	mg/L											
Inorg_WC	D	Cyanide, Total	mg/L											
Inorg_WC	D	Dissolved Organic Carbon	mg/L											
Inorg_WC	D	Nitrate as N	mg/L											
Inorg_WC	D	Nitrate+Nitrite as N	mg/L											
Inorg_WC	D	Nitrite as N	mg/L											
Inorg_WC	D	Nitrogen, as Ammonia	mg/L											
Inorg_WC	D	Orthophosphate	mg/L											
Inorg_WC	D	pH	PH UNITS	3.9										
Inorg_WC	D	Phosphorus, Total as P	mg/L											
Inorg_WC	D	Sulfate	mg/L	12000										
Inorg_WC	D	Sulfide	mg/L											
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L											
Inorg_WC	D	Total Dissolved Solids	mg/L											

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Main Street DAPL Pool																			
			Location	MP-4 #02		MP-4 #02		MP-4 #02		MP-4 #03		MP-4 #03		MP-4 #03		MP-4 #03		MP-4 #03		MP-4 #03		MP-4 #05		MP-4 #05	
			Sample Date	7/21/2010		10/27/2010		1/9/2012		6/29/2000		5/15/2001		3/28/2003		5/4/2005		7/21/2010		1/9/2012		6/29/2000		5/15/2001	
			Sample ID	MLP-4-2		OC-MP-4 #2-XXX		OC-MP-4 #2		MP-4 #3		MP-4-3		MLP-4-#3		MP4 Port 3		MLP-4-3		OC-MP-4 #3		MP-4 #5		MP-4-5	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L			0.5	U	0.5	U					1	U					0.5	U				
Metals	T	Antimony	mg/L			0.03	U							0.2	U										
Metals	T	Arsenic	mg/L			0.0028								0.2	U										
Metals	T	Barium	mg/L			0.021	J							0.2	U										
Metals	T	Beryllium	mg/L			0.005	U							0.02	U										
Metals	T	Cadmium	mg/L			0.005	UJ							0.02	U										
Metals	T	Calcium	mg/L			580		670						597						680					
Metals	T	Chromium	mg/L			0.025	U	0.016	J					0.1	U					0.014	J				
Metals	T	Chromium, Hexavalent	mg/L			0.001	U							0.005	U										
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L			0.05	U							0.2	U										
Metals	T	Copper	mg/L			0.031	J							0.2	U										
Metals	T	Iron	mg/L			140		140						499						210					
Metals	T	Lead	mg/L			0.025	U							0.1	U										
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L			300		340						385						330					
Metals	T	Manganese	mg/L			3.7								18.1											
Metals	T	Mercury	mg/L			0.0002	U							0.0002	U										
Metals	T	Nickel	mg/L			0.05	U							0.2	U										
Metals	T	Potassium	mg/L			26								100	U										
Metals	T	Selenium	mg/L			0.05	U							0.2	U										
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L			0.025	U							0.1	U										
Metals	T	Sodium	mg/L			1200		1400						1480						1300					
Metals	T	Thallium	mg/L			0.001	U							0.2	U										
Metals	T	Tin	mg/L			0.25	U																		
Metals	T	Vanadium	mg/L			0.05	U							0.2	U										
Metals	T	Zinc	mg/L			0.25	U							1	U										
Metals	D	Aluminum	mg/L	0.5	U					0.8		0.16				0.2	U	0.5	U			1.7		16	
Metals	D	Antimony	mg/L							0.02	U	0.02	U									0.02	U	0.05	U
Metals	D	Arsenic	mg/L							0.01	U	0.01	U									0.01	U	0.1	U
Metals	D	Barium	mg/L							0.023		0.02										0.017		0.05	U
Metals	D	Beryllium	mg/L							0.002	U	0.002	U									0.002	U	0.021	
Metals	D	Cadmium	mg/L							0.01	U	0.0092										0.023		0.044	
Metals	D	Calcium	mg/L	550						480		500				490		530				440		100	
Metals	D	Chromium	mg/L	0.018						0.14		0.061				0.016		0.012				0.32		3.7	
Metals	D	Chromium, Hexavalent	mg/L							0.005	UJ	0.01	J									0.058	J		
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L							0.17		0.01	U									0.8		2.2	
Metals	D	Copper	mg/L							0.02	U	0.02	U									0.02	U	0.1	U
Metals	D	Iron	mg/L	150						290		520				410		180				700		1900	
Metals	D	Lead	mg/L							0.01	U	0.01	U									0.01		0.05	U
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	330						280		410				380		290				280		760	
Metals	D	Manganese	mg/L							13		22										41		110	
Metals	D	Mercury	mg/L							0.0002	U	0.0002	U									0.0002	U	0.0002	U
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L							0.22		0.02	U									0.88		2.5	
Metals	D	Potassium	mg/L							22		25										36		41	
Metals	D	Selenium	mg/L							0.01	U	0.1	U									0.01	U	0.05	U
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L							0.01	U	0.01	U									0.01	U	0.05	U

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Main Street DAPL Pool																	
			Location	MP-4 #02		MP-4 #02		MP-4 #02		MP-4 #03		MP-4 #03		MP-4 #03		MP-4 #03		MP-4 #03		MP-4 #05		MP-4 #05	
			Sample Date	7/21/2010		10/27/2010		1/9/2012		6/29/2000		5/15/2001		3/28/2003		5/4/2005		7/21/2010		1/9/2012		6/29/2000		5/15/2001	
			Sample ID	MLP-4-2		OC-MP-4 #2-XXX		OC-MP-4 #2		MP-4 #3		MP-4-3		MLP-4-#3		MP4 Port 3		MLP-4-3		OC-MP-4 #3		MP-4 #5		MP-4-5	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L	1400						1500		1800				1600		1200				5100		4400	
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L							0.01	U	0.02	U									0.01	U	0.1	U
Metals	D	Vanadium	mg/L							0.01	U	0.01	U									0.01	U	0.05	U
Metals	D	Zinc	mg/L							0.16		0.05	U									1.3		4.7	
Inorg_WC	T	Bicarbonate Alkalinity	mg/L							76		130		538								640			
Inorg_WC	T	Bromide	mg/L			8	J																		
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	2,500		2,400		2,400		4,100		4,000		2,970		720		2,500		2,500		7,300		7,100	
Inorg_WC	T	Cyanide, Total	mg/L																						
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L	0.94		0.05	UJ	0.5	U	0.05	U	0.15		5	UJ	0.46		0.97		0.5	U	0.05	U		
Inorg_WC	T	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	T	Nitrite as N	mg/L	0.5	U	0.01	UJ	1	U	0.01	U	0.01	U	1	UJ	0.01	U	0.01	U	1	U	0.021			
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	480		450	J	490		650	J	4.1		578		6.8		520		450		1100	J	94	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	4,400		4,300		3,500		5,200		4,800		4,900		1,200		4,500		4,100		11,000		17,000	
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L											538											
Inorg_WC	T	Total Dissolved Solids	mg/L									11000		10200										25000	
Inorg_WC	T	Total Organic Carbon	mg/L											89											
Inorg_WC	T	Total Suspended Solids	mg/L																						
Inorg_WC	T	Specific Gravity	g/ml																						
Inorg_WC	T	Viscosity	cpoise																						
Inorg_WC	T	pH	PH UNITS							5.97		R		6.57								6.18			
Inorg_WC	D	Bicarbonate Alkalinity	mg/L																						
Inorg_WC	D	Bromide	mg/L																						
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L																						
Inorg_WC	D	CO2 as C	mg/L																						
Inorg_WC	D	Cyanide, Total	mg/L																						
Inorg_WC	D	Dissolved Organic Carbon	mg/L																						
Inorg_WC	D	Nitrate as N	mg/L																						
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L																						
Inorg_WC	D	Nitrogen, as Ammonia	mg/L																						
Inorg_WC	D	Orthophosphate	mg/L																						
Inorg_WC	D	pH	PH UNITS																						
Inorg_WC	D	Phosphorus, Total as P	mg/L																						
Inorg_WC	D	Sulfate	mg/L																						
Inorg_WC	D	Sulfide	mg/L																						
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L																						
Inorg_WC	D	Total Dissolved Solids	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Main Street DAPL Pool										Maple Meadow Brook DAPL Area											
			Location	MP-4 #05		MP-4 #05		MP-4 #05		MP-4 #08		MP-4 #09		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D	
			Sample Date	3/28/2003		5/4/2005		7/21/2010		6/29/2000		6/29/2000		10/3/1996		10/26/1996		1/20/1997		4/23/1997		5/6/1999		11/2/1999	
			Sample ID	MLP-4-#5		MP4 Port 5		MLP-4-5		MP-4 #8		MP-4 #9		GW-83-D		GW-83-D		GW-83-D		GW-83D		GW-83D		GW-83D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L																						
Metals	T	Antimony	mg/L																						
Metals	T	Arsenic	mg/L																						
Metals	T	Barium	mg/L																						
Metals	T	Beryllium	mg/L																						
Metals	T	Cadmium	mg/L																						
Metals	T	Calcium	mg/L																						
Metals	T	Chromium	mg/L											0.131		0.074									
Metals	T	Chromium, Hexavalent	mg/L																						
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L																						
Metals	T	Copper	mg/L																						
Metals	T	Iron	mg/L																						
Metals	T	Lead	mg/L																						
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L																						
Metals	T	Manganese	mg/L																						
Metals	T	Mercury	mg/L																						
Metals	T	Nickel	mg/L																						
Metals	T	Potassium	mg/L																						
Metals	T	Selenium	mg/L																						
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L																						
Metals	T	Sodium	mg/L																						
Metals	T	Thallium	mg/L																						
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L																						
Metals	T	Zinc	mg/L																						
Metals	D	Aluminum	mg/L	30.4		26		17		30		24				27.8									
Metals	D	Antimony	mg/L	0.2	U					0.028		0.3				0.06	U								
Metals	D	Arsenic	mg/L	0.2	U					0.022		0.037				0.06									
Metals	D	Barium	mg/L	0.2	U					0.046		0.034				0.2	U								
Metals	D	Beryllium	mg/L	0.02	U					0.0093		0.029				0.021									
Metals	D	Cadmium	mg/L	0.02	U					0.037		0.028				0.005	U								
Metals	D	Calcium	mg/L	499		470		410		480		420				230		339				410		R	
Metals	D	Chromium	mg/L	5.97		5.2		4.4		5.5		40				0.074		0.087				0.12		R	
Metals	D	Chromium, Hexavalent	mg/L	0.005	U					0.005	UJ	0.014	J												
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L	1.71						1.6		1.2				1.84									
Metals	D	Copper	mg/L	0.2	U					0.2		0.21				0.025	U								
Metals	D	Iron	mg/L	2500		2400		1500		740		580				1120		1280				2000		R	
Metals	D	Lead	mg/L	0.1	U					0.01		0.025	U			0.003	U								
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	613		610		550		640		280				295		445				580		R	
Metals	D	Manganese	mg/L	96.2						57		54				46.2						200		R	
Metals	D	Mercury	mg/L	0.0002	U					0.0002	U	0.0002	U			0.0002	U								
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L	1.74						2.1		1.5				1.75									
Metals	D	Potassium	mg/L	100	U					25		25				128		76.2				98		R	
Metals	D	Selenium	mg/L	0.2	U					0.01	U	0.025	U			0.005	U								
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L	0.1	U					0.01	U	0.025	U			0.01	U								

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Main Street DAPL Pool										Maple Meadow Brook DAPL Area											
			Location	MP-4 #05		MP-4 #05		MP-4 #05		MP-4 #08		MP-4 #09		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D	
			Sample Date	3/28/2003		5/4/2005		7/21/2010		6/29/2000		6/29/2000		10/3/1996		10/26/1996		1/20/1997		4/23/1997		5/6/1999		11/2/1999	
			Sample ID	MLP-4-#5		MP4 Port 5		MLP-4-5		MP-4 #8		MP-4 #9		GW-83-D		GW-83-D		GW-83-D		GW-83D		GW-83D		GW-83D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L	3750		4600		3500		3300		2600				71.1		6120				5500			R
Metals	D	Strontium	mg/L																						
Metals	D	Thallium	mg/L	0.2	U					0.01	U	0.025	U			0.051									
Metals	D	Vanadium	mg/L	0.2	U					0.01	U	0.025	U			0.05	U								
Metals	D	Zinc	mg/L	3.87						3.3		2.6				3.94									
Inorg_WC	T	Bicarbonate Alkalinity	mg/L	169						24		1	U									220			R
Inorg_WC	T	Bromide	mg/L																						
Inorg_WC	T	Chemical Oxygen Demand	mg/L																						
Inorg_WC	T	Chloride	mg/L	5,350		1,300		3,400		6,700		4,500										6,100			R
Inorg_WC	T	Cyanide, Total	mg/L																						
Inorg_WC	T	Dissolved Organic Carbon	mg/L																						
Inorg_WC	T	Fluoride	mg/L																						
Inorg_WC	T	Nitrate as N	mg/L	5	UJ	0.41		0.5	U	0.92		0.05	U												
Inorg_WC	T	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	T	Nitrite as N	mg/L	1	UJ	0.01	U	0.1	U	0.01	U	0.01	U												
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	952		15		1600		2100	J	2100	J									210			R
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L																						
Inorg_WC	T	Orthophosphate	mg/L																						
Inorg_WC	T	Phosphorus, Total as P	mg/L																						
Inorg_WC	T	Sulfate	mg/L	15,200		4,100		12,000		9,500		9,200		17,300								20,400			R
Inorg_WC	T	Sulfide	mg/L																						
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L	169																					
Inorg_WC	T	Total Dissolved Solids	mg/L	28200																					
Inorg_WC	T	Total Organic Carbon	mg/L	600																					
Inorg_WC	T	Total Suspended Solids	mg/L																						
Inorg_WC	T	Specific Gravity	g/ml																						
Inorg_WC	T	Viscosity	cpoise																						
Inorg_WC	T	pH	PH UNITS	5.53						5.32		4.29								5.8		6.61		5.43	
Inorg_WC	D	Bicarbonate Alkalinity	mg/L													68		124							
Inorg_WC	D	Bromide	mg/L																						
Inorg_WC	D	Carbonate	mg/L																						
Inorg_WC	D	Chloride	mg/L													4690		4570							
Inorg_WC	D	CO2 as C	mg/L																						
Inorg_WC	D	Cyanide, Total	mg/L													0.01	U								
Inorg_WC	D	Dissolved Organic Carbon	mg/L																						
Inorg_WC	D	Nitrate as N	mg/L																						
Inorg_WC	D	Nitrate+Nitrite as N	mg/L																						
Inorg_WC	D	Nitrite as N	mg/L																						
Inorg_WC	D	Nitrogen, as Ammonia	mg/L													1650		1150							
Inorg_WC	D	Orthophosphate	mg/L																						
Inorg_WC	D	pH	PH UNITS													5.2		5.02							
Inorg_WC	D	Phosphorus, Total as P	mg/L																						
Inorg_WC	D	Sulfate	mg/L													4280		3910							
Inorg_WC	D	Sulfide	mg/L																						
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L													68		124							
Inorg_WC	D	Total Dissolved Solids	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Maple Meadow Brook DAPL Area																			
			Location	GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D	
			Sample Date	5/4/2000		11/9/2000		5/16/2001		11/9/2001		6/12/2002		11/8/2002		5/6/2003		7/29/2003		11/10/2003		3/2/2004		5/11/2004	
			Sample ID	GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L																						
Metals	T	Antimony	mg/L																						
Metals	T	Arsenic	mg/L																						
Metals	T	Barium	mg/L																						
Metals	T	Beryllium	mg/L																						
Metals	T	Cadmium	mg/L																						
Metals	T	Calcium	mg/L																						
Metals	T	Chromium	mg/L																						
Metals	T	Chromium, Hexavalent	mg/L																						
Metals	T	Chromium, Trivalent	mg/L																						
Metals	T	Cobalt	mg/L																						
Metals	T	Copper	mg/L																						
Metals	T	Iron	mg/L																						
Metals	T	Lead	mg/L																						
Metals	T	Lithium	mg/L																						
Metals	T	Magnesium	mg/L																						
Metals	T	Manganese	mg/L																						
Metals	T	Mercury	mg/L																						
Metals	T	Nickel	mg/L																						
Metals	T	Potassium	mg/L																						
Metals	T	Selenium	mg/L																						
Metals	T	Silicon	mg/L																						
Metals	T	Silver	mg/L																						
Metals	T	Sodium	mg/L																						
Metals	T	Thallium	mg/L																						
Metals	T	Tin	mg/L																						
Metals	T	Vanadium	mg/L																						
Metals	T	Zinc	mg/L																						
Metals	D	Aluminum	mg/L																						
Metals	D	Antimony	mg/L																						
Metals	D	Arsenic	mg/L																						
Metals	D	Barium	mg/L																						
Metals	D	Beryllium	mg/L																						
Metals	D	Cadmium	mg/L																						
Metals	D	Calcium	mg/L	400		2.9		84		470		491		404		460				425				480	
Metals	D	Chromium	mg/L	0.066		0.042		0.05		0.15		0.01	U	0.25	U	0.045				0.1	U			0.09	B
Metals	D	Chromium, Hexavalent	mg/L																						
Metals	D	Chromium, Trivalent	mg/L																						
Metals	D	Cobalt	mg/L																						
Metals	D	Copper	mg/L																						
Metals	D	Iron	mg/L	1600		1900		2100		1500		2140		2080		1970				1820				2000	
Metals	D	Lead	mg/L																						
Metals	D	Lithium	mg/L																						
Metals	D	Magnesium	mg/L	510		530		600		490		629		646		545				564				640	
Metals	D	Manganese	mg/L	150		160		180		140		201		198		181				171				180	
Metals	D	Mercury	mg/L																						
Metals	D	Molybdenum	mg/L																						
Metals	D	Nickel	mg/L																						
Metals	D	Potassium	mg/L	80		88		110		94		110		101		106				117				110	
Metals	D	Selenium	mg/L																						
Metals	D	Silicon	mg/L																						
Metals	D	Silver	mg/L																						

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Maple Meadow Brook DAPL Area										
			Location	GW-83D	GW-83D	GW-83D	GW-83D	GW-83D	GW-83D	GW-83D	GW-83D	GW-83D	GW-83D	GW-83D
			Sample Date	5/4/2000	11/9/2000	5/16/2001	11/9/2001	6/12/2002	11/8/2002	5/6/2003	7/29/2003	11/10/2003	3/2/2004	5/11/2004
			Sample ID	GW-83D	GW-83D	GW-83D	GW-83D	GW-83D	GW-83D	GW-83D	GW-83D	GW-83D	GW-83D	GW-83D
			Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
Class	**Fraction**	**Parameter**	**Units**	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual	Result Qual
Metals	D	Sodium	mg/L	5400	5100	5600	4500	5760	5500	5430		5260	5780	4700
Metals	D	Strontium	mg/L											
Metals	D	Thallium	mg/L											
Metals	D	Vanadium	mg/L											
Metals	D	Zinc	mg/L											
Inorg_WC	T	Bicarbonate Alkalinity	mg/L	95	180	170	320	109	69	246	223	232		147
Inorg_WC	T	Bromide	mg/L											
Inorg_WC	T	Chemical Oxygen Demand	mg/L											
Inorg_WC	T	Chloride	mg/L	4,400	6,800	7,000	8,880 J	5,320	3,650	5,590	5,540	5,140	5,200	5,300
Inorg_WC	T	Cyanide, Total	mg/L											
Inorg_WC	T	Dissolved Organic Carbon	mg/L											
Inorg_WC	T	Fluoride	mg/L											
Inorg_WC	T	Nitrate as N	mg/L								5 UJ		5 U	
Inorg_WC	T	Nitrate+Nitrite as N	mg/L											
Inorg_WC	T	Nitrite as N	mg/L								1 UJ		1 U	
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	1400 J	1600	1000 J	780	462	829	1360	2030	1610	230	2800
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L											
Inorg_WC	T	Orthophosphate	mg/L											
Inorg_WC	T	Phosphorus, Total as P	mg/L											
Inorg_WC	T	Sulfate	mg/L	22,000	17,000	24,000	17,000 J	19,800	18,000	19,100	20,400	20,100	19,000	19,000
Inorg_WC	T	Sulfide	mg/L											
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L							246	223	232		147
Inorg_WC	T	Total Dissolved Solids	mg/L											
Inorg_WC	T	Total Organic Carbon	mg/L										560	
Inorg_WC	T	Total Suspended Solids	mg/L											
Inorg_WC	T	Specific Gravity	g/ml											
Inorg_WC	T	Viscosity	cpoise											
Inorg_WC	T	pH	PH UNITS	5.53	5.48	5.63	5.75	5.55	5.5	5.53 J	5.42	5.57		
Inorg_WC	D	Bicarbonate Alkalinity	mg/L											
Inorg_WC	D	Bromide	mg/L											
Inorg_WC	D	Carbonate	mg/L											
Inorg_WC	D	Chloride	mg/L											
Inorg_WC	D	CO2 as C	mg/L											
Inorg_WC	D	Cyanide, Total	mg/L											
Inorg_WC	D	Dissolved Organic Carbon	mg/L											
Inorg_WC	D	Nitrate as N	mg/L											
Inorg_WC	D	Nitrate+Nitrite as N	mg/L											
Inorg_WC	D	Nitrite as N	mg/L											
Inorg_WC	D	Nitrogen, as Ammonia	mg/L											
Inorg_WC	D	Orthophosphate	mg/L											
Inorg_WC	D	pH	PH UNITS											
Inorg_WC	D	Phosphorus, Total as P	mg/L											
Inorg_WC	D	Sulfate	mg/L											
Inorg_WC	D	Sulfide	mg/L											
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L											
Inorg_WC	D	Total Dissolved Solids	mg/L											

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Maple Meadow Brook DAPL Area							
			Location	GW-83D		GW-83D		GW-83D		GW-83D	
			Sample Date	11/16/2004		11/8/2005		11/18/2010		5/25/2011	
			Sample ID	GW-83D		GW-83D		OC-GW-83D-XXX		OC-GW-83D-XXX	
			Qc Code	FS		FS		FS		FS	
Class	Fraction	Parameter	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	T	Aluminum	mg/L					3.5		3.6	
Metals	T	Antimony	mg/L					0.06	U	0.12	U
Metals	T	Arsenic	mg/L					0.5	U	0.019	J
Metals	T	Barium	mg/L					0.024	J	0.032	J
Metals	T	Beryllium	mg/L					0.0058	J	0.0061	J
Metals	T	Cadmium	mg/L					0.01	UJ	0.02	UJ
Metals	T	Calcium	mg/L					380		420	
Metals	T	Chromium	mg/L					0.029	J	0.041	J
Metals	T	Chromium, Hexavalent	mg/L					0.005	U	0.001	UJ
Metals	T	Chromium, Trivalent	mg/L								
Metals	T	Cobalt	mg/L					2.5		2.8	
Metals	T	Copper	mg/L					0.029	J	0.2	U
Metals	T	Iron	mg/L					1600		1900	
Metals	T	Lead	mg/L					0.05	UJ	0.1	UJ
Metals	T	Lithium	mg/L								
Metals	T	Magnesium	mg/L					500		580	
Metals	T	Manganese	mg/L					140		170	
Metals	T	Mercury	mg/L					0.00013	J	0.0002	U
Metals	T	Nickel	mg/L					2.3		2.3	
Metals	T	Potassium	mg/L					130		130	
Metals	T	Selenium	mg/L					0.1	U	0.2	U
Metals	T	Silicon	mg/L								
Metals	T	Silver	mg/L					0.05	U	0.1	U
Metals	T	Sodium	mg/L					4300		4800	
Metals	T	Thallium	mg/L					0.02	U	0.0001	U
Metals	T	Tin	mg/L					0.5	U	1	U
Metals	T	Vanadium	mg/L					0.1	U	0.2	U
Metals	T	Zinc	mg/L					3.2		3.9	
Metals	D	Aluminum	mg/L								
Metals	D	Antimony	mg/L								
Metals	D	Arsenic	mg/L								
Metals	D	Barium	mg/L								
Metals	D	Beryllium	mg/L								
Metals	D	Cadmium	mg/L								
Metals	D	Calcium	mg/L	410		72					
Metals	D	Chromium	mg/L	0.1	U	0.089					
Metals	D	Chromium, Hexavalent	mg/L								
Metals	D	Chromium, Trivalent	mg/L								
Metals	D	Cobalt	mg/L								
Metals	D	Copper	mg/L								
Metals	D	Iron	mg/L	1800		11					
Metals	D	Lead	mg/L								
Metals	D	Lithium	mg/L								
Metals	D	Magnesium	mg/L	570		14					
Metals	D	Manganese	mg/L	170		170					
Metals	D	Mercury	mg/L								
Metals	D	Molybdenum	mg/L								
Metals	D	Nickel	mg/L								
Metals	D	Potassium	mg/L	120		23					
Metals	D	Selenium	mg/L								
Metals	D	Silicon	mg/L								
Metals	D	Silver	mg/L								

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	Maple Meadow Brook DAPL Area							
			Location	GW-83D		GW-83D		GW-83D		GW-83D	
			Sample Date	11/16/2004		11/8/2005		11/18/2010		5/25/2011	
			Sample ID	GW-83D		GW-83D		OC-GW-83D-XXX		OC-GW-83D-XXX	
			Qc Code	FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals	D	Sodium	mg/L	5200		62					
Metals	D	Strontium	mg/L								
Metals	D	Thallium	mg/L								
Metals	D	Vanadium	mg/L								
Metals	D	Zinc	mg/L								
Inorg_WC	T	Bicarbonate Alkalinity	mg/L	158		209					
Inorg_WC	T	Bromide	mg/L					14		20	U
Inorg_WC	T	Chemical Oxygen Demand	mg/L								
Inorg_WC	T	Chloride	mg/L	5,700		5,700		4,800		4,700	
Inorg_WC	T	Cyanide, Total	mg/L								
Inorg_WC	T	Dissolved Organic Carbon	mg/L								
Inorg_WC	T	Fluoride	mg/L								
Inorg_WC	T	Nitrate as N	mg/L					0.05	U	10	UJ
Inorg_WC	T	Nitrate+Nitrite as N	mg/L								
Inorg_WC	T	Nitrite as N	mg/L					0.01	U	2	UJ
Inorg_WC	T	Nitrogen, as Ammonia	mg/L	1300		1900		2300		350	
Inorg_WC	T	Nitrogen, Total Kjeldahl	mg/L								
Inorg_WC	T	Orthophosphate	mg/L								
Inorg_WC	T	Phosphorus, Total as P	mg/L								
Inorg_WC	T	Sulfate	mg/L	20,000		21,000		20,000		19,000	
Inorg_WC	T	Sulfide	mg/L								
Inorg_WC	T	Total Alkalinity, as CaCO3	mg/L	158		209					
Inorg_WC	T	Total Dissolved Solids	mg/L								
Inorg_WC	T	Total Organic Carbon	mg/L								
Inorg_WC	T	Total Suspended Solids	mg/L								
Inorg_WC	T	Specific Gravity	g/ml								
Inorg_WC	T	Viscosity	cpoise								
Inorg_WC	T	pH	PH UNITS								
Inorg_WC	D	Bicarbonate Alkalinity	mg/L								
Inorg_WC	D	Bromide	mg/L								
Inorg_WC	D	Carbonate	mg/L								
Inorg_WC	D	Chloride	mg/L								
Inorg_WC	D	CO2 as C	mg/L								
Inorg_WC	D	Cyanide, Total	mg/L								
Inorg_WC	D	Dissolved Organic Carbon	mg/L								
Inorg_WC	D	Nitrate as N	mg/L								
Inorg_WC	D	Nitrate+Nitrite as N	mg/L								
Inorg_WC	D	Nitrite as N	mg/L								
Inorg_WC	D	Nitrogen, as Ammonia	mg/L								
Inorg_WC	D	Orthophosphate	mg/L								
Inorg_WC	D	pH	PH UNITS								
Inorg_WC	D	Phosphorus, Total as P	mg/L								
Inorg_WC	D	Sulfate	mg/L								
Inorg_WC	D	Sulfide	mg/L								
Inorg_WC	D	Total Alkalinity, as CaCO3	mg/L								
Inorg_WC	D	Total Dissolved Solids	mg/L								

Table 4.2-2
Analytes Detected - Inorganics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

Notes

Blank Cell indicates parameter not analyzed

Inorg_WC = Inorganics and wet chemistry methods

Qual = Data qualifier

Data Qualifiers:

- * = Lab specified qualifier (unknown)
- ^ = Instrument related QC exceeds the laboratory control limits
- H = Lab specified qualifier (unknown)
- E = Lab specified qualifier (unknown)
- S = Lab specified qualifier (unknown)
- U = Not detected at the quantitation limit shown
- J = Estimated concentration
- R = result rejected during data validation
- B = Detected in blank sample

Units:

- g/ml = grams per milliliter
- cpoise = unit of dynamic viscosity in the centimetre gram second system of units
- mg/L = milligrams per liter

QC Codes:

- FS = Field sample
- FD = Duplicate sample

Fraction:

- T = Total
- D = Dissolved

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**On-Property DAPL Pool**																	
			Location	GW-22D		GW-22D		GW-22D		GW-27D		GW-27D		GW-27D		GW-30DR		GW-30DR		GW-35D		GW-35D	
			Sample Date	3/13/1996		5/2/1996		1/19/2000		3/12/1996		5/1/1996		1/19/2000		3/24/1993		3/24/1993		3/13/1996		5/2/1996	
			Sample ID	GW-22-D		GW-22-D		GW-22-D		GW-27-D		GW-27-D		GW-27-D		GW-30DR		GW-30DR DUP		GW-35-D		GW-35-D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FD		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L																				
DMF	T	Dimethylformamide	mg/L																				
Freezing Point	T	Freezing Point	DEG C																				
Hydrazine/aldehydes	T	Acetaldehyde	µg/L																				
Hydrazine/aldehydes	T	Benzaldehyde	µg/L																				
Hydrazine/aldehydes	T	Formaldehyde	µg/L																				
Hydrazine/aldehydes	T	Hydrazine	µg/L																				
Hydrazine/aldehydes	T	UDMH	µg/L																				
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L																				
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L	20	U	3.6	U			20	U	3.6	U							20	U	3.8	
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L																				
Non Standard Analysis	T	OPEX	mg/L	0.3	U	0.11	U			0.3	U	0.11	U							0.3	U	0.11	U
Non Standard Analysis	T	Perchlorate	µg/L																				
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L																				
Non Standard Analysis	T	UDMH	µg/L																				
Specific Conductance	T	Specific Conductance	umhos/cm					702000						11000									
Specific Gravity	T	Specific Gravity	g/ml													1.037		1.05					
Specific Gravity	D	Specific Gravity	g/ml																				
Turbidity	T	Turbidity	NTU																				
Viscosity	T	Viscosity	cpoise													2.03		2.21					
Viscosity	D	Viscosity	cpoise																				
Color	T	Color, Apparent	Color Unit																				
Color	T	Color, True	Color Unit																				
Odor	T	Odor	TON																				

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**On-Property DAPL Pool**																	
			Location	GW-37		GW-37		GW-37		MP-1 #01		MP-1 #01		MP-1 #01		MP-1 #01		MP-1 #01		MP-1 #01	
			Sample Date	3/12/1996		5/2/1996		1/27/2000		5/23/1996		1/20/2000		3/25/2003		9/4/2003		3/29/2004		5/3/2005		5/25/2005	
			Sample ID	GW-37		GW-37		GW-37		MP-1 #01		MP-1-1		MP1-#1		MP1-1		MP1-DAPL		MP-1 Port 1		MP-1-Port 1	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L																				
DMF	T	Dimethylformamide	mg/L																				
Freezing Point	T	Freezing Point	DEG C																				
Hydrazine/aldehydes	T	Acetaldehyde	µg/L													200	U					100	U
Hydrazine/aldehydes	T	Benzaldehyde	µg/L																				
Hydrazine/aldehydes	T	Formaldehyde	µg/L													280						150	
Hydrazine/aldehydes	T	Hydrazine	µg/L															10000	UG				
Hydrazine/aldehydes	T	UDMH	µg/L																				
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L																				
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L	20	U	3.6	U					4	U										
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L															10000	UG				
Non Standard Analysis	T	OPEX	mg/L	0.3	U	0.11	U					0.27											
Non Standard Analysis	T	Perchlorate	µg/L																				
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L																				
Non Standard Analysis	T	UDMH	µg/L															2000	UG				
Specific Conductance	T	Specific Conductance	umhos/cm					465000				746000		122000									
Specific Gravity	T	Specific Gravity	g/ml							1.05				1.205						1.11			
Specific Gravity	D	Specific Gravity	g/ml																				
Turbidity	T	Turbidity	NTU									0.16	J										
Viscosity	T	Viscosity	cpoise																				
Viscosity	D	Viscosity	cpoise																				
Color	T	Color, Apparent	Color Unit									3000	J										
Color	T	Color, True	Color Unit																				
Odor	T	Odor	TON									4	J										

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**On-Property DAPL Pool**																	
			Location	MP-1 #01		MP-1 #01		MP-1 #01		MP-1 #01		MP-1 #01		MP-1 #02		MP-1 #03		MP-1 #03		MP-1 #03		MP-1 #04	
			Sample Date	5/17/2010		5/17/2010		7/20/2010		10/20/2010		2/9/2012		5/23/1996		5/23/1996		5/23/1996		3/25/2003		5/23/1996	
			Sample ID	OC-MP-1 #01-DUP		OC-MP-1 #01-XXX		MLP-1-1		OC-MP-1 #01-XXX		OC-MP-1 #1		MP-1 #02		MP-1 #03		MP-1 #03 DUP		MP1-#3		MP-1 #04	
			Qc Code	FD		FS		FS		FS		FS		FS		FS		FD		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L																				
DMF	T	Dimethylformamide	mg/L	0.049		0.047				0.04	U												
Freezing Point	T	Freezing Point	DEG C																				
Hydrazine/aldehydes	T	Acetaldehyde	µg/L	35		30				19	J												
Hydrazine/aldehydes	T	Benzaldehyde	µg/L																				
Hydrazine/aldehydes	T	Formaldehyde	µg/L	510	J	570	J			490													
Hydrazine/aldehydes	T	Hydrazine	µg/L	0.23	UJ	0.2	UJ			0.15	J												
Hydrazine/aldehydes	T	UDMH	µg/L	63	J	60	J			0.55	U												
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L	4.3	UJ	4.3	UJ			4.4	U												
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L		R		R			10	U												
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L	0.5	UJ	0.5	UJ			0.55	U												
Non Standard Analysis	T	OPEX	mg/L	5	UJ	5	UJ			1	U												
Non Standard Analysis	T	Perchlorate	µg/L	1000	U	1000	U			1000	U												
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L		R		R			10	U												
Non Standard Analysis	T	UDMH	µg/L																				
Specific Conductance	T	Specific Conductance	umhos/cm																	81800			
Specific Gravity	T	Specific Gravity	g/ml					1.1				1.102		1.07		1.02				1.176		1.01	
Specific Gravity	D	Specific Gravity	g/ml															1.04					
Turbidity	T	Turbidity	NTU																				
Viscosity	T	Viscosity	cpoise																				
Viscosity	D	Viscosity	cpoise																				
Color	T	Color, Apparent	Color Unit																				
Color	T	Color, True	Color Unit																				
Odor	T	Odor	TON																				

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**On-Property DAPL Pool**										**Off-Property West Ditch DAPL Pool**									
			Location	MP-1 #04		MP-1 #04		MP-1 #04		MP-1 #04		MP-1 #04		GW-36		GW-36		GW-36		GW-36		GW-42D	
			Sample Date	5/13/2001		3/25/2003		5/3/2005		7/20/2010		2/9/2012		3/24/1993		3/12/1996		5/2/1996		1/27/2000		3/24/1993	
			Sample ID	MP-1-4		MP1-#4		MP-1 Port 4		MLP-1-4		OC-MP-1 #4		GW-36		GW-36		GW-36		GW-36		GW-42D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L																				
DMF	T	Dimethylformamide	mg/L																				
Freezing Point	T	Freezing Point	DEG C																				
Hydrazine/aldehydes	T	Acetaldehyde	µg/L																				
Hydrazine/aldehydes	T	Benzaldehyde	µg/L																				
Hydrazine/aldehydes	T	Formaldehyde	µg/L																				
Hydrazine/aldehydes	T	Hydrazine	µg/L																				
Hydrazine/aldehydes	T	UDMH	µg/L																				
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L																				
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L													20	U	3.6	U				
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L																				
Non Standard Analysis	T	OPEX	mg/L													0.3	U	0.11	U				
Non Standard Analysis	T	Perchlorate	µg/L																				
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L																				
Non Standard Analysis	T	UDMH	µg/L																				
Specific Conductance	T	Specific Conductance	umhos/cm	12900		19200														668000			
Specific Gravity	T	Specific Gravity	g/ml	1.2		1.175		1.01		1.03		1.008		1.015								1.06	
Specific Gravity	D	Specific Gravity	g/ml																				
Turbidity	T	Turbidity	NTU																				
Viscosity	T	Viscosity	cpoise											1.75								2.13	
Viscosity	D	Viscosity	cpoise																				
Color	T	Color, Apparent	Color Unit																				
Color	T	Color, True	Color Unit																				
Odor	T	Odor	TON																				

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**Off-Property West Ditch DAPL Pool**																			
			Location	GW-42D		GW-42D		GW-42D		GW-43D		GW-43D		MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #01	
			Sample Date	10/17/1995		10/17/1995		11/12/2007		3/5/2004		3/5/2004		5/20/1996		5/14/2001		7/25/2002		3/27/2003		7/31/2003	
			Sample ID	GW-42-D		GW-42-D DUP		OC-GW-42D		GW-43D		GW-43D DUP		MP-2 #01		MP-2-1		MP-2 DAPL		MLP2-#1		MP2-1	
			Qc Code	FS		FD		FS		FS		FD		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L															5000	U				
DMF	T	Dimethylformamide	mg/L																				
Freezing Point	T	Freezing Point	DEG C					0															
Hydrazine/aldehydes	T	Acetaldehyde	µg/L																				
Hydrazine/aldehydes	T	Benzaldehyde	µg/L															1000	U				
Hydrazine/aldehydes	T	Formaldehyde	µg/L															3700					
Hydrazine/aldehydes	T	Hydrazine	µg/L							500	UG	500	UG										
Hydrazine/aldehydes	T	UDMH	µg/L																				
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L																				
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L																				
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L							2000	UG	2000	UG										
Non Standard Analysis	T	OPEX	mg/L																				
Non Standard Analysis	T	Perchlorate	µg/L																				
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L																				
Non Standard Analysis	T	UDMH	µg/L							2000	UG	2000	UG										
Specific Conductance	T	Specific Conductance	umhos/cm													28500				105000		198000	
Specific Gravity	T	Specific Gravity	g/ml											1.07		1.1				1.09			
Specific Gravity	D	Specific Gravity	g/ml																				
Turbidity	T	Turbidity	NTU																				
Viscosity	T	Viscosity	cpoise																				
Viscosity	D	Viscosity	cpoise	3.5		4																	
Color	T	Color, Apparent	Color Unit																				
Color	T	Color, True	Color Unit																				
Odor	T	Odor	TON																				

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**Off-Property West Ditch DAPL Pool**																	
			Location	MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #01		MP-2 #02		MP-2 #02		MP-2 #03	
			Sample Date	9/4/2003		3/30/2004		5/2/2005		5/24/2005		11/12/2007		7/19/2010		1/10/2012		5/20/1996		3/27/2003		5/20/1996	
			Sample ID	MP2-1		MP2-DAPL		MP-2 Port 1		MP2-Port1		OC-MP-2-1		MLP-2-1		OC-MP-2 #1		MP-2 #02		MLP2-#2		MP-2 #03	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L																				
DMF	T	Dimethylformamide	mg/L																				
Freezing Point	T	Freezing Point	DEG C									-3											
Hydrazine/aldehydes	T	Acetaldehyde	µg/L	200	U					100	U												
Hydrazine/aldehydes	T	Benzaldehyde	µg/L																				
Hydrazine/aldehydes	T	Formaldehyde	µg/L	440						490													
Hydrazine/aldehydes	T	Hydrazine	µg/L			10000	UG																
Hydrazine/aldehydes	T	UDMH	µg/L																				
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L																				
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L																				
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L			10000	UG																
Non Standard Analysis	T	OPEX	mg/L																				
Non Standard Analysis	T	Perchlorate	µg/L																				
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L																				
Non Standard Analysis	T	UDMH	µg/L			2000	UG																
Specific Conductance	T	Specific Conductance	umhos/cm																	148000			
Specific Gravity	T	Specific Gravity	g/ml					1.11						1.1		1.1		1.08		1.1		1.06	
Specific Gravity	D	Specific Gravity	g/ml																				
Turbidity	T	Turbidity	NTU																				
Viscosity	T	Viscosity	cpoise																				
Viscosity	D	Viscosity	cpoise																				
Color	T	Color, Apparent	Color Unit																				
Color	T	Color, True	Color Unit																				
Odor	T	Odor	TON																				

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**Off-Property West Ditch DAPL Pool**																	
			Location	MP-2 #03		MP-2 #04		MP-2 #04		MP-2 #04		MP-2 #04		MP-2 #04		MP-2 #04		MP-2 #06		MP-2 #06	
			Sample Date	3/27/2003		5/20/1996		5/14/2001		3/27/2003		5/2/2005		11/12/2007		7/19/2010		1/10/2012		5/20/1996		3/27/2003	
			Sample ID	MLP2-#3		MP-2 #04		MP-2-4		MLP2-#4		MP-2 Port 4		OC-MP-2-4		MLP-2-4		OC-MP-2 #4		MP-2 #06		MLP2-#6	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L																				
DMF	T	Dimethylformamide	mg/L																				
Freezing Point	T	Freezing Point	DEG C											-3									
Hydrazine/aldehydes	T	Acetaldehyde	µg/L																				
Hydrazine/aldehydes	T	Benzaldehyde	µg/L																				
Hydrazine/aldehydes	T	Formaldehyde	µg/L																				
Hydrazine/aldehydes	T	Hydrazine	µg/L																				
Hydrazine/aldehydes	T	UDMH	µg/L																				
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L																				
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L																				
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L																				
Non Standard Analysis	T	OPEX	mg/L																				
Non Standard Analysis	T	Perchlorate	µg/L																				
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L																				
Non Standard Analysis	T	UDMH	µg/L																				
Specific Conductance	T	Specific Conductance	umhos/cm	79200				24100		56800												22400	
Specific Gravity	T	Specific Gravity	g/ml	1.107		1.06		1.1		1.068		1.05				1.25		1.03		0.995		1.032	
Specific Gravity	D	Specific Gravity	g/ml																	1.01			
Turbidity	T	Turbidity	NTU																				
Viscosity	T	Viscosity	cpoise																				
Viscosity	D	Viscosity	cpoise																				
Color	T	Color, Apparent	Color Unit																				
Color	T	Color, True	Color Unit																				
Odor	T	Odor	TON																				

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**Off-Property West Ditch DAPL Pool**																	
			Location	MP-2 #06		MP-2 #06		MP-2 #06		MP-2 #06		MP-2 #09		MP-2 #09		MP-2 #09		MP-2 #09		MP-2 #09	
			Sample Date	3/30/2004		5/2/2005		7/19/2010		1/10/2012		5/20/1996		5/14/2001		3/27/2003		7/31/2003		9/4/2003		5/2/2005	
			Sample ID	MP2-DIFF		MP-2 Port 6		MLP-2-6		OC-MP-2 #6		MP-2 #09		MP-2-9		MLP2-#9		MP2-9		MP2-9		MP-2 Port 9	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L																				
DMF	T	Dimethylformamide	mg/L																				
Freezing Point	T	Freezing Point	DEG C																				
Hydrazine/aldehydes	T	Acetaldehyde	µg/L																	200	U		
Hydrazine/aldehydes	T	Benzaldehyde	µg/L																				
Hydrazine/aldehydes	T	Formaldehyde	µg/L																	50	U		
Hydrazine/aldehydes	T	Hydrazine	µg/L	100	UG																		
Hydrazine/aldehydes	T	UDMH	µg/L																				
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L																				
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L																				
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L	20	UG																		
Non Standard Analysis	T	OPEX	mg/L																				
Non Standard Analysis	T	Perchlorate	µg/L																				
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L																				
Non Standard Analysis	T	UDMH	µg/L	20	UG																		
Specific Conductance	T	Specific Conductance	umhos/cm											13300		4360		36900					
Specific Gravity	T	Specific Gravity	g/ml			1.02		1.01		1.008		0.964		1.2		1						1.01	
Specific Gravity	D	Specific Gravity	g/ml									0.982											
Turbidity	T	Turbidity	NTU																				
Viscosity	T	Viscosity	cpoise																				
Viscosity	D	Viscosity	cpoise																				
Color	T	Color, Apparent	Color Unit																				
Color	T	Color, True	Color Unit																				
Odor	T	Odor	TON																				

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**Off-Property West Ditch DAPL Pool**								**Main Street DAPL Pool**											
			Location	MP-2 #09		MP-2 #09		MP-2 #09		MP-2 #09		GW-44D		GW-44D		GW-44D		GW-44D		GW-44D		GW-44D	
			Sample Date	5/24/2005		7/19/2010		7/19/2010		1/10/2012		10/17/1995		7/7/1999		7/21/1999		5/26/2005		10/12/2011		10/12/2011	
			Sample ID	MP2-Port9		MLP-2-9		MLP-2-9D		OC-MP-2 #9		GW-44-D		GW-44D		GW-44D		GW-44D		OC-GW-44D-DUP		OC-GW-44D-XXX	
			Qc Code	FS		FS		FD		FS		FS		FS		FS		FS		FD		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L																				
DMF	T	Dimethylformamide	mg/L																	0.02	UJ	0.02	UJ
Freezing Point	T	Freezing Point	DEG C																				
Hydrazine/aldehydes	T	Acetaldehyde	µg/L	100	U													1000	U	150	U	120	U
Hydrazine/aldehydes	T	Benzaldehyde	µg/L																				
Hydrazine/aldehydes	T	Formaldehyde	µg/L	84														2400		1700		1500	
Hydrazine/aldehydes	T	Hydrazine	µg/L																	0.3		0.27	
Hydrazine/aldehydes	T	UDMH	µg/L																	0.5	U	0.5	U
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L																	4.6	U	4.5	U
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L																	50	UJ	50	UJ
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L																	0.5	U	0.5	U
Non Standard Analysis	T	OPEX	mg/L																	0.1	U	0.1	U
Non Standard Analysis	T	Perchlorate	µg/L																	13		14	
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L																	3.9	J	3.5	J
Non Standard Analysis	T	UDMH	µg/L																				
Specific Conductance	T	Specific Conductance	umhos/cm											480000		510000							
Specific Gravity	T	Specific Gravity	g/ml			1		1		1.004													
Specific Gravity	D	Specific Gravity	g/ml																				
Turbidity	T	Turbidity	NTU																				
Viscosity	T	Viscosity	cpoise																				
Viscosity	D	Viscosity	cpoise									3.5											
Color	T	Color, Apparent	Color Unit																				
Color	T	Color, True	Color Unit											100		650							
Odor	T	Odor	TON																				

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**Main Street DAPL Pool**																	
			Location	GW-44D		GW-45D		GW-45D		GW-59D		GW-70D		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01		MP-3 #01	
			Sample Date	4/17/2012		1/13/1995		7/7/1999		3/22/2004		3/22/2004		5/22/1996		9/8/2003		5/4/2005		5/24/2005		10/11/2011	
			Sample ID	OC-GW-44D-XXX		GW-45-D		GW-45D		GW-59D		GW-70D		MP-3 #01		MP3-1		MP3 Port 1		MP-3-Port 1		OC-MP-3 #01-XXX	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L																				
DMF	T	Dimethylformamide	mg/L	0.02	UJ																	0.02	UJ
Freezing Point	T	Freezing Point	DEG C																				
Hydrazine/aldehydes	T	Acetaldehyde	µg/L	56												400	U			1000	U	56	J
Hydrazine/aldehydes	T	Benzaldehyde	µg/L																				
Hydrazine/aldehydes	T	Formaldehyde	µg/L	2100												1500				3000		1600	
Hydrazine/aldehydes	T	Hydrazine	µg/L	0.18						10	UG	10	UG									0.28	
Hydrazine/aldehydes	T	UDMH	µg/L	0.5	U																	0.5	U
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L	4.5	U																	2.1	J
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L	10	UJ																	50	UJ
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L	0.5	U					10	UG	10	UG									0.5	U
Non Standard Analysis	T	OPEX	mg/L	0.17	U																	0.1	U
Non Standard Analysis	T	Perchlorate	µg/L	13																		14	
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L	2.3	J																	3.7	J
Non Standard Analysis	T	UDMH	µg/L							10	UG	10	UG										
Specific Conductance	T	Specific Conductance	umhos/cm					450000															
Specific Gravity	T	Specific Gravity	g/ml											1.04				1.06					
Specific Gravity	D	Specific Gravity	g/ml																				
Turbidity	T	Turbidity	NTU																				
Viscosity	T	Viscosity	cpoise																				
Viscosity	D	Viscosity	cpoise			3.8																	
Color	T	Color, Apparent	Color Unit																				
Color	T	Color, True	Color Unit					100															
Odor	T	Odor	TON																				

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**Main Street DAPL Pool**																	
			Location	MP-3 #01		MP-3 #02		MP-3 #02		MP-3 #02		MP-3 #03		MP-3 #03		MP-3 #03		MP-3 #04		MP-3 #04		MP-3 #04	
			Sample Date	4/17/2012		5/22/1996		5/15/2001		3/26/2003		5/22/1996		5/4/2005		1/11/2012		5/22/1996		5/15/2001		3/26/2003	
			Sample ID	OC-MP-3 #01-XXX		MP-3 #02		MP-3-2		MLP3-#2		MP-3 #03		MP3 Port 3		OC-MP-3 #3		MP-3 #04		MP-3-4		MLP3-#4	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L																				
DMF	T	Dimethylformamide	mg/L	0.02	UJ																		
Freezing Point	T	Freezing Point	DEG C																				
Hydrazine/aldehydes	T	Acetaldehyde	µg/L	75																			
Hydrazine/aldehydes	T	Benzaldehyde	µg/L																				
Hydrazine/aldehydes	T	Formaldehyde	µg/L	2400																			
Hydrazine/aldehydes	T	Hydrazine	µg/L	0.1	U																		
Hydrazine/aldehydes	T	UDMH	µg/L	0.5	U																		
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L	6.1	U																		
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L	10	UJ																		
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L	0.5	U																		
Non Standard Analysis	T	OPEX	mg/L	0.92	U																		
Non Standard Analysis	T	Perchlorate	µg/L	13																			
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L	2.7	J																		
Non Standard Analysis	T	UDMH	µg/L																				
Specific Conductance	T	Specific Conductance	umhos/cm					22900		79000										13200		31200	
Specific Gravity	T	Specific Gravity	g/ml			1.02		1		1.17		1.02		1.03		1.028		0.967		1		1.128	
Specific Gravity	D	Specific Gravity	g/ml															1.01					
Turbidity	T	Turbidity	NTU																				
Viscosity	T	Viscosity	cpoise																				
Viscosity	D	Viscosity	cpoise																				
Color	T	Color, Apparent	Color Unit																				
Color	T	Color, True	Color Unit																				
Odor	T	Odor	TON																				

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**Main Street DAPL Pool**																	
			Location	MP-3 #04		MP-3 #04		MP-4 #02		MP-4 #02		MP-4 #02		MP-4 #02		MP-4 #02		MP-4 #02		MP-4 #02	
			Sample Date	5/4/2005		1/11/2012		6/29/2000		5/15/2001		3/28/2003		5/4/2005		5/25/2010		7/21/2010		10/27/2010		1/9/2012	
			Sample ID	MP3 Port 4		OC-MP-3 #4		MP-4 #2		MP-4-2		MLP-4-#2		MP4 Port 2		OC-MP-4 #02-XXX		MLP-4-2		OC-MP-4 #2-XXX		OC-MP-4 #2	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L																				
DMF	T	Dimethylformamide	mg/L													0.032				0.0094	J		
Freezing Point	T	Freezing Point	DEG C																				
Hydrazine/aldehydes	T	Acetaldehyde	µg/L													30	U			30	U		
Hydrazine/aldehydes	T	Benzaldehyde	µg/L																				
Hydrazine/aldehydes	T	Formaldehyde	µg/L													30	U			30	U		
Hydrazine/aldehydes	T	Hydrazine	µg/L													0.2	UJ			0.1	U		
Hydrazine/aldehydes	T	UDMH	µg/L													0.5	U			0.5	U		
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L													4.8	U			4.7	U		
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L													1	U			0.6	J		
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L													0.5	U			0.5	U		
Non Standard Analysis	T	OPEX	mg/L													0.029	J			0.2			
Non Standard Analysis	T	Perchlorate	µg/L													100	U			10	U		
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L													10	U			10	U		
Non Standard Analysis	T	UDMH	µg/L																				
Specific Conductance	T	Specific Conductance	umhos/cm					151000		9700		15000											
Specific Gravity	T	Specific Gravity	g/ml	1.02		1.008		1.02		1		1.0321		1				1.05				1.007	
Specific Gravity	D	Specific Gravity	g/ml																				
Turbidity	T	Turbidity	NTU																				
Viscosity	T	Viscosity	cpoise																				
Viscosity	D	Viscosity	cpoise																				
Color	T	Color, Apparent	Color Unit																				
Color	T	Color, True	Color Unit																				
Odor	T	Odor	TON																				

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**Main Street DAPL Pool**																	
			Location	MP-4 #03		MP-4 #03		MP-4 #03		MP-4 #03		MP-4 #03		MP-4 #03		MP-4 #05		MP-4 #05		MP-4 #05		MP-4 #05	
			Sample Date	6/29/2000		5/15/2001		3/28/2003		5/4/2005		7/21/2010		1/9/2012		6/29/2000		5/15/2001		3/28/2003		5/4/2005	
			Sample ID	MP-4 #3		MP-4-3		MLP-4-#3		MP4 Port 3		MLP-4-3		OC-MP-4 #3		MP-4 #5		MP-4-5		MLP-4-#5		MP4 Port 5	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L																				
DMF	T	Dimethylformamide	mg/L																				
Freezing Point	T	Freezing Point	DEG C																				
Hydrazine/aldehydes	T	Acetaldehyde	µg/L																				
Hydrazine/aldehydes	T	Benzaldehyde	µg/L																				
Hydrazine/aldehydes	T	Formaldehyde	µg/L																				
Hydrazine/aldehydes	T	Hydrazine	µg/L																				
Hydrazine/aldehydes	T	UDMH	µg/L																				
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L																				
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L																				
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L																				
Non Standard Analysis	T	OPEX	mg/L																				
Non Standard Analysis	T	Perchlorate	µg/L																				
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L																				
Non Standard Analysis	T	UDMH	µg/L																				
Specific Conductance	T	Specific Conductance	umhos/cm	13000		9700		14200								272000				46500			
Specific Gravity	T	Specific Gravity	g/ml	1.01		1		1.0173		1.01		1.06		1.007		1.03		1		1.0132		1.02	
Specific Gravity	D	Specific Gravity	g/ml																				
Turbidity	T	Turbidity	NTU																				
Viscosity	T	Viscosity	cpoise																				
Viscosity	D	Viscosity	cpoise																				
Color	T	Color, Apparent	Color Unit																				
Color	T	Color, True	Color Unit																				
Odor	T	Odor	TON																				

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**Main Street DAPL Pool**						**Maple Meadow Brook DAPL Area**													
			Location	MP-4 #05		MP-4 #08		MP-4 #09		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D	
			Sample Date	7/21/2010		6/29/2000		6/29/2000		4/23/1997		5/6/1999		11/2/1999		5/4/2000		11/9/2000		5/16/2001		11/9/2001	
			Sample ID	MLP-4-5		MP-4 #8		MP-4 #9		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L																				
DMF	T	Dimethylformamide	mg/L																				
Freezing Point	T	Freezing Point	DEG C																				
Hydrazine/aldehydes	T	Acetaldehyde	µg/L																				
Hydrazine/aldehydes	T	Benzaldehyde	µg/L																				
Hydrazine/aldehydes	T	Formaldehyde	µg/L																				
Hydrazine/aldehydes	T	Hydrazine	µg/L																				
Hydrazine/aldehydes	T	UDMH	µg/L																				
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L																				
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L																				
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L																				
Non Standard Analysis	T	OPEX	mg/L																				
Non Standard Analysis	T	Perchlorate	µg/L																				
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L																				
Non Standard Analysis	T	UDMH	µg/L																				
Specific Conductance	T	Specific Conductance	umhos/cm			292000		255000		38600		26000		335000		326000		16800		14000		54100	
Specific Gravity	T	Specific Gravity	g/ml	1.02		1.02		1.02															
Specific Gravity	D	Specific Gravity	g/ml																				
Turbidity	T	Turbidity	NTU																				
Viscosity	T	Viscosity	cpoise																				
Viscosity	D	Viscosity	cpoise																				
Color	T	Color, Apparent	Color Unit																				
Color	T	Color, True	Color Unit																				
Odor	T	Odor	TON																				

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**Maple Meadow Brook DAPL Area**																	
			Location	GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D	
			Sample Date	6/12/2002		11/8/2002		5/6/2003		7/29/2003		11/10/2003		3/2/2004		5/11/2004		11/16/2004		5/10/2005		11/8/2005	
			Sample ID	GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D		GW-83D	
			Qc Code	FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L																				
DMF	T	Dimethylformamide	mg/L																				
Freezing Point	T	Freezing Point	DEG C																				
Hydrazine/aldehydes	T	Acetaldehyde	µg/L							200	U			100	U	100	U			100	U		
Hydrazine/aldehydes	T	Benzaldehyde	µg/L																				
Hydrazine/aldehydes	T	Formaldehyde	µg/L							64				50	U	64				50	U		
Hydrazine/aldehydes	T	Hydrazine	µg/L											10	U								
Hydrazine/aldehydes	T	UDMH	µg/L																				
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L																				
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L																				
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L											2	B								
Non Standard Analysis	T	OPEX	mg/L																				
Non Standard Analysis	T	Perchlorate	µg/L																				
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L																				
Non Standard Analysis	T	UDMH	µg/L											35	NJ								
Specific Conductance	T	Specific Conductance	umhos/cm	44300		57400		48400		63900		85900				61100		64900				53800	
Specific Gravity	T	Specific Gravity	g/ml																				
Specific Gravity	D	Specific Gravity	g/ml																				
Turbidity	T	Turbidity	NTU			15																	
Viscosity	T	Viscosity	cpoise																				
Viscosity	D	Viscosity	cpoise																				
Color	T	Color, Apparent	Color Unit																				
Color	T	Color, True	Color Unit																				
Odor	T	Odor	TON																				

Prepared by BJS 09/18/2017
Checked by JBR 9/22/2017

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

			DAPL Pool ID	**Maple Meadow Brook DAPL Area**			
			Location	GW-83D		GW-83D	
			Sample Date	11/18/2010		5/25/2011	
			Sample ID	OC-GW-83D-XXX		OC-GW-83D-XXX	
			Qc Code	FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qual	Result	Qual
Acrylamide	T	Acrylamide	µg/L				
DMF	T	Dimethylformamide	mg/L	0.23		0.25	
Freezing Point	T	Freezing Point	DEG C				
Hydrazine/aldehydes	T	Acetaldehyde	µg/L	30	U	30	U
Hydrazine/aldehydes	T	Benzaldehyde	µg/L				
Hydrazine/aldehydes	T	Formaldehyde	µg/L	190		68	
Hydrazine/aldehydes	T	Hydrazine	µg/L	0.13		0.054	J
Hydrazine/aldehydes	T	UDMH	µg/L	0.5	U	0.5	U
Non Standard Analysis	T	4-Nonylphenol (Tech.)	µg/L	4.6	U	5.2	U
Non Standard Analysis	T	Kempore (Azodicarbonamide)	mg/L	0.57	J	1	U
Non Standard Analysis	T	Monomethylhydrazine (MMH)	µg/L	0.5	U	0.5	U
Non Standard Analysis	T	OPEX	mg/L	0.28	J	0.1	UJ
Non Standard Analysis	T	Perchlorate	µg/L	100	U	100	U
Non Standard Analysis	T	Phthalic Acid/Phthalic anhydride	µg/L	10	UJ	0.86	J
Non Standard Analysis	T	UDMH	µg/L				
Specific Conductance	T	Specific Conductance	umhos/cm				
Specific Gravity	T	Specific Gravity	g/ml				
Specific Gravity	D	Specific Gravity	g/ml				
Turbidity	T	Turbidity	NTU				
Viscosity	T	Viscosity	cpoise				
Viscosity	D	Viscosity	cpoise				
Color	T	Color, Apparent	Color Unit				
Color	T	Color, True	Color Unit				
Odor	T	Odor	TON				

Table 4.2-3
Analytes Detected - Non-Standard Analyses

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

Notes

Blank Cell indicates parameter not analyzed

Qual = Data qualifier

Data Qualifiers:

B = Detected in blank sample

J = Estimated concentration

N = = Lab specified qualifier (unknown)

R = result rejected during data validation

U = Not detected at the quantitation limit shown

G = Lab specified qualifier (unknown)

Units:

µg/L = micrograms per liter

g/ml = grams per milliliter

cpoise = unit of dynamic viscosity in the centimetre gram second system of units

mg/L = milligrams per liter

NTU = Nephelometric turbidity units

TON = Threshold odor number

DEG C = Degrees celcius

umhos/cm = Micro mhos per centimeter

QC Codes:

FS = Field sample

FD = Duplicate sample

Fraction:

T = Total

D = Dissolved

Table 4.3
Summary of Statistics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

Parameter [1]	Frequency of Detection [2] # of Detections	# of Samples	Range of Detected Concentrations (mg/L) Minimum	Maximum	Range of Detection Limits for Non-Detect Results (mg/L) Minimum	Maximum
VOCs						
1,1,1-Trichloroethane	17	62	0.002	0.046	0.001	0.05
1,1,2-Trichloro-1,2,2-Trifluoroethane	2	14	0.0036	0.015	0.001	0.05
1,1,2-Trichloroethane	1	62	0.002	0.002	0.001	0.05
1,1-Dichloroethane	13	62	0.002	0.016	0.001	0.05
1,1-Dichloroethene	9	62	0.001	0.009	0.001	0.05
1,2,4-Trimethylbenzene	7	15	0.00022	0.0058	0.001	0.05
1,2-Dichlorobenzene	3	15	0.00075	0.00086	0.001	0.05
1,2-Dichloroethane	46	62	0.001	0.026	0.005	0.05
1,2-Dichloroethene (total)	4	43	0.001	0.002	0.005	0.05
1,2-Dichloropropane	1	62	0.001	0.001	0.001	0.05
1,3,5-Trimethylbenzene	5	15	0.00026	0.0014	0.001	0.05
1,4-Dichlorobenzene	2	15	0.0007	0.00075	0.001	0.05
2,4,4-Trimethyl-1-pentene	17	74	0.0018	0.13	0.001	0.1
2,4,4-Trimethyl-2-pentene	13	74	0.00092	0.36	0.001	0.1
2-Butanone	16	47	0.001	0.052	0.01	0.5
2-Hexanone	2	47	0.15	0.16	0.01	0.5
4-iso-Propyltoluene	2	15	0.00043	0.00043	0.001	0.05
4-Methyl-2-pentanone	5	46	0.001	0.004	0.01	0.5
Acetone	26	47	0.018	0.92	0.01	2.5
Benzene	23	62	0.001	0.011	0.0025	0.05
Bromochloromethane	2	15	0.00092	0.0013	0.001	0.05
Bromodichloromethane	40	62	0.001	0.046	0.0005	0.05
Bromoform	50	62	0.001	0.76	0.001	0.025
Carbon disulfide	33	48	0.00056	0.026	0.005	0.5
Carbon tetrachloride	9	62	0.001	0.022	0.001	0.05
Chlorobenzene	7	62	0.00065	0.009	0.001	0.05
Chloroform	57	62	0.001	0.094	0.001	0.056
Chloromethane	27	62	0.00095	0.008	0.002	0.1
Cis-1,2-Dichloroethene	6	19	0.0007	0.014	0.0025	0.05
Dibromochloromethane	45	62	0.0021	0.25	0.0005	0.05
Dibromomethane	4	15	0.0011	0.0085	0.001	0.05
Ethylbenzene	22	62	0.00056	0.007	0.0025	0.05
Isopropylbenzene	4	15	0.00034	0.0011	0.001	0.05
Methyl Tertbutyl Ether	2	15	0.0012	0.0013	0.001	0.05
Methylene chloride	22	62	0.0026	0.049	0.002	0.1
Naphthalene	3	15	0.00078	0.013	0.0025	0.25
Propylbenzene	8	15	0.00029	0.0024	0.0025	0.05
Tetrachloroethene	5	62	0.0017	0.078	0.001	0.05
Toluene	55	62	0.00043	0.17	0.005	0.025
trans-1,2-Dichloroethene	2	19	0.00037	0.00056	0.001	0.05
Trichloroethene	35	62	0.00076	0.099	0.001	0.05
Vinyl chloride	1	62	0.00037	0.00037	0.0005	0.1
Xylene, o	10	15	0.00058	0.0058	0.0025	0.05
Xylenes (m&p)	7	15	0.00052	0.0053	0.002	0.1
Xylenes, Total	6	34	0.001	0.01	0.005	0.05
SVOCs						
1,2,4-Trichlorobenzene	2	48	0.001	0.001	0.001	0.1
1,2-Dichlorobenzene	4	48	0.0003	0.001	0.001	0.1
1,3-Dichlorobenzene	5	48	0.001	0.003	0.001	0.1
1,4-Dichlorobenzene	4	48	0.001	0.002	0.001	0.1
2,4,6-Trichlorophenol	4	52	0.00048	0.001	0.002	0.1
2,4-Dichlorophenol	20	53	0.00063	0.0031	0.001	0.1

Table 4.3
Summary of Statistics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

Parameter [1]	Frequency of Detection [2] # of Detections	# of Samples	Range of Detected Concentrations (mg/L) Minimum	Maximum	Range of Detection Limits for Non-Detect Results (mg/L) Minimum	Maximum
SVOCs continued						
2,4-Dimethylphenol	2	52	0.00049	0.001	0.001	0.1
2,4-Dinitrophenol	1	51	0.00046	0.00046	0.0045	0.52
2-Chlorophenol	20	53	0.00075	0.01	0.0045	0.1
2-Methylnaphthalene	2	49	0.001	0.002	0.00091	0.1
2-Methylphenol	32	47	0.00058	0.02	0.004	0.1
2-Nitrophenol	38	54	0.001	0.21	0.001	0.1
3 & 4 Methylphenol	12	14	0.0022	0.018	0.0045	0.0047
4-Bromophenyl phenyl ether	15	62	0.00084	0.034	0.002	0.1
4-Chloro-3-methylphenol	2	52	0.002	0.006	0.0045	0.1
4-Chloroaniline	1	48	0.00085	0.00085	0.001	0.1
4-Chlorophenyl phenyl ether	2	62	0.002	0.003	0.001	0.1
4-Methylphenol	25	36	0.001	0.081	0.004	0.1
4-Nitrophenol	42	56	0.00091	0.33	0.0045	0.52
Acenaphthylene	1	1	0.00077	0.00077	NA	NA
Acetophenone	11	14	0.0025	0.011	0.0045	0.0047
Benzaldehyde	7	14	0.0011	0.012	0.0045	0.045
Benzo(a)pyrene	1	62	0.0003	0.0003	0.00018	0.1
Benzo(b)fluoranthene	1	62	0.00051	0.00051	0.00027	0.1
Benzo(ghi)perylene	1	62	0.00032	0.00032	0.00045	0.1
Benzo(k)fluoranthene	1	62	0.00022	0.00022	0.00027	0.1
Benzoic Acid	18	47	0.00085	0.054	0.0045	0.52
Benzyl alcohol	27	49	0.00075	0.009	0.005	0.1
Biphenyl	5	14	0.00099	0.0044	0.0045	0.05
Bis(2-Ethylhexyl)phthalate	24	74	0.0002	0.18	0.0018	0.1
Caprolactam	3	11	0.00063	0.0064	0.0045	0.045
Chrysene	1	62	0.00032	0.00032	0.00091	0.1
Dibenz(a,h)anthracene	1	62	0.000085	0.000085	0.00045	0.1
Dibenzofuran	4	49	0.001	0.002	0.001	0.1
Diethylphthalate	5	74	0.0004	0.031	0.002	0.1
Dimethylphthalate	4	74	0.0004	0.013	0.002	0.1
Di-n-butylphthalate	5	74	0.0003	0.009	0.002	0.1
Di-n-octylphthalate	1	74	0.001	0.001	0.002	0.1
Diphenyl ether	12	14	0.00093	0.04	0.0047	0.045
Fluoranthene	1	62	0.00034	0.00034	0.00091	0.1
Indeno(1,2,3-cd)pyrene	1	62	0.00026	0.00026	0.00045	0.1
Isophorone	5	61	0.001	0.008	0.001	0.1
Naphthalene	25	48	0.0004	0.088	0.004	0.1
N-Nitrosodiphenylamine	10	74	0.001	0.14	0.001	0.1
Phenanthrene	1	62	0.000089	0.000089	0.00018	0.1
Phenol	51	56	0.003	1.6	0.0045	0.01
Pyrene	1	62	0.00032	0.00032	0.001	0.1
NDMA						
N-Nitrosodimethylamine	41	55	0.00012	0.064	0.0047	0.045
Total Metals						
Aluminum	36	44	3.5	2560	0.5	2
Antimony	10	30	0.102	23.2	0.02	6
Arsenic	12	36	0.0028	1.16	0.01	10
Barium	10	36	0.02	0.16	0.02	10
Beryllium	22	30	0.0058	0.324	0.002	1
Cadmium	21	32	0.002	0.19	0.005	1
Calcium	49	49	70	680	NA	NA
Chromium	77	82	0.014	3500	0.005	0.1

Table 4.3
Summary of Statistics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

Parameter [1]	Frequency of Detection [2] # of Detections	# of Samples	Range of Detected Concentrations (mg/L) Minimum	Maximum	Range of Detection Limits for Non-Detect Results (mg/L) Minimum	Maximum
Total Metals Continued						
Chromium, Hexavalent	2	27	0.00047	0.22	0.001	0.05
Chromium, Trivalent	7	8	10.2	1900	0.005	0.005
Cobalt	26	30	0.221	12.4	0.05	0.2
Copper	23	30	0.029	15.3	0.02	0.2
Iron	49	49	3.3	3600	NA	NA
Lead	7	36	0.022	0.17	0.01	5
Lithium	1	1	2.71	2.71	NA	NA
Magnesium	44	44	25	1930	NA	NA
Manganese	35	35	3.7	580	NA	NA
Mercury	15	32	0.00013	0.0031	0.0002	0.0004
Nickel	26	30	0.171	10.1	0.05	0.2
Potassium	23	34	4.69	390	4	4000
Silicon	4	4	37	100	NA	NA
Silver	8	32	0.05	32	0.01	0.5
Sodium	50	50	291	27000	NA	NA
Thallium	2	30	0.0045	0.0056	0.0001	1
Tin	2	14	21	890	0.25	5
Vanadium	7	30	0.0079	1.59	0.02	10
Zinc	26	30	0.21	20.6	0.25	1
Dissolved Metals						
Aluminum	115	119	0.16	13000	0.2	0.5
Antimony	28	73	0.0084	11	0.005	0.5
Arsenic	29	74	0.013	1.2	0.008	10
Barium	39	86	0.007	0.06	0.01	1
Beryllium	65	79	0.009	0.42	0.002	0.25
Cadmium	57	79	0.0087	0.207	0.005	0.25
Calcium	120	120	2.9	690	NA	NA
Chromium	138	144	0.012	5200	0.01	0.25
Chromium, Hexavalent	51	69	0.0057	150	0.005	1.6
Chromium, Trivalent	9	10	11.12	2600	320	320
Cobalt	76	79	0.17	14	0.01	0.03
Copper	71	79	0.021	17	0.02	0.2
Iron	126	126	2.1	3500	NA	NA
Lead	26	79	0.0084	0.86	0.003	2
Lithium	2	2	0.088	3.9	NA	NA
Magnesium	120	120	1.9	2600	NA	NA
Manganese	97	97	0.72	700	NA	NA
Mercury	25	64	0.00021	0.0047	0.0002	0.0002
Molybdenum	1	1	0.0298	0.0298	NA	NA
Nickel	76	79	0.22	10	0.02	0.04
Potassium	78	99	3.1	800	1	1000
Silicon	7	7	39	120	NA	NA
Silver	5	79	0.0308	0.062	0.005	0.38
Sodium	126	126	45	65000	NA	NA
Strontium	1	1	3.55	3.55	NA	NA
Thallium	5	70	0.051	0.33	0.005	1
Vanadium	41	79	0.013	2.3	0.0019	1.3
Zinc	76	79	0.16	21	0.025	0.05

Table 4.3
Summary of Statistics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

Parameter [1]	Frequency of Detection [2] # of Detections	# of Samples	Range of Detected Concentrations (mg/L) Minimum	Maximum	Range of Detection Limits for Non-Detect Results (mg/L) Minimum	Maximum
Pesticides, Herbicides, and Non-Standard Organics						
2,4,5-T	1	3	0.0000356	0.0000356	0.000075	0.01
2,4,5-TP/Silvex	1	3	0.000259	0.000259	0.00005	0.01
2,4-DB	1	3	0.0024	0.0024	0.000095	0.01
Acetaldehyde	5	23	0.019	0.075	0.03	1
Alpha-BHC	24	30	0.00005	0.0003	0.00005	0.0005
Beta-BHC	4	30	0.000059	0.000097	0.00001	0.0005
Delta-BHC	1	30	0.0002	0.0002	0.000029	0.0005
Dicamba	1	3	0.000201	0.000201	0.0003	0.01
Dieldrin	1	30	0.00014	0.00014	0.00002	0.001
Endosulfan I	2	30	0.000052	0.00019	0.00001	0.0005
Endosulfan sulfate	1	30	0.00011	0.00011	0.00002	0.001
Endrin	1	30	0.000047	0.000047	0.0001	0.001
Formaldehyde	19	24	0.064	3.7	0.03	0.05
Gamma-BHC/Lindane	5	30	0.000085	0.00013	0.00001	0.0005
Heptachlor	1	30	0.00006	0.00006	0.00001	0.0005
Heptachlor epoxide	1	30	0.000051	0.000051	0.00001	0.0005
Hydrazine	6	17	0.000054	0.00028	0.0001	10
MCPA	1	2	0.094	0.094	1.5	1.5
MCPP	1	3	0.34	0.34	0.25	1
Pentachlorophenol	1	2	0.0001	0.0001	0.00014	0.00014
PETROLEUM NAPHTHA	1	1	0.95	0.95	NA	NA
Picloram	1	1	0.05	0.05	NA	NA
Unmatched	1	1	0.95	0.95	NA	NA
Inorganics and Wet Chemistry Parameters						
Bicarbonate Alkalinity, as CaCO3	9	42	24	640	1	20
Bromide	6	17	8	32	10	1000
Carbonate	2	2	124	164	NA	NA
Carbonate Alkalinity, as CaCO3	0	41	0	0	1	20
Chloride	194	194	49	130000	NA	NA
CO2 as C	3	3	104	164	NA	NA
Cyanide, Total	2	4	0.026	0.034	0.01	0.02
Dissolved Organic Carbon	7	7	430	2900	NA	NA
Nitrate as N	56	83	0.14	34	0.05	25
Nitrate+Nitrite as N	17	21	0.066	23.1	0.05	3.4
Nitrite as N	17	82	0.011	14	0.01	10
Nitrogen, as Ammonia	199	199	0.81	14000	NA	NA
Orthophosphate	7	7	0.2	1.2	NA	NA
pH**	46	46	3.4	6.57	NA	NA
Phosphorus, Total as P	7	8	3	35	10	10
Sulfate	199	199	100	830000	NA	NA
Sulfide	2	7	2	4	1	4
Total Alkalinity, as CaCO3	3	13	169	538	1	1
Total Dissolved Solids	30	30	1920	140000	NA	NA
Total Organic Carbon	12	12	24	2800	NA	NA
Total Suspended Solids	3	3	840	95700	NA	NA

Table 4.3
Summary of Statistics

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

Parameter [1]	Frequency of Detection [2] # of Detections	# of Samples	Range of Detected Concentrations (mg/L) Minimum	Maximum	Range of Detection Limits for Non-Detect Results (mg/L) Minimum	Maximum
Other Non-Standard Parameters						
Odor**	1	1	4	4	NA	NA
4-Nonylphenol (Tech.)	1	10	0.0021	0.0021	0.0043	0.0061
Monomethylhydrazine (MMH)	1	7	0.002	0.002	0.01	10
UDMH	2	17	0.035	0.06	0.0005	2
Color, Apparent**	1	1	3000	3000	NA	NA
Color, True**	3	3	100	650	NA	NA
Turbidity**	2	2	0.16	15	NA	NA
Kempore (Azodicarbonamide)	3	20	0.57	3.8	1	50
Freezing Point**	3	3	-3	0	NA	NA
OPEX	4	21	0.029	0.28	0.1	5
Perchlorate	4	10	0.013	0.014	0.01	1
Phthalic Acid/Phthalic anhydride	5	9	0.00086	0.0037	0.01	0.01
Dimethylformamide	5	10	0.0094	0.25	0.02	0.04
Viscosity (T and D combined)**	11	11	1.44	3.8	NA	NA
Specific Gravity (T and D combined)**	84	84	0.964	1.25	NA	NA
Specific Conductance**	52	52	4.36	746	NA	NA

Notes
1 = Only includes those parameters that were detected at least once in the samples from the list of DAPL wells presented in Table 1.1 DAPL Pool Well Location Summary.
2 = Excludes field duplicate samples
NA = not applicable
# = number
VOCs = Volatile organic compounds
SVOCs = Semivolatile organic compounds
NDMA = N-Nitrosodimethylamine
mg/L = milligrams per Liter

** = Other Units
pH = pH units
Odor = Threshold odor number unts
Color = Color units
Turbidity = Nephelometric turbidity units
Freezing Point = Degrees celcius
Viscosity = centimetre gram second system of units
Specific Gravity = grams per milliliter
Specific Conductance = Micro mhos per centimeter

Table 4.4
DAPL Pool Volumes

Focused DAPL RI
Olin Chemical Superfund Site
Wilmington, Massachusetts

DAPL Pool	DAPL Volumes
On-Property DAPL Pool	~ 160,000 gallons
Off-Property West Ditch DAPL Pool	~1.55 M gallons
Main Street Pool	~13.5 M gallons

Notes
~ = Approximately
M = million

Prepared by BJS 09/19/2017
Checked by JBR 09/22/2017

ATTACHMENTS

(Provided on CD)