# EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)

**RE-SOLVE, INC. SUPERFUND SITE**
**MANAGEMENT OF MIGRATION**
**OPERABLE UNIT 3**

**NORTH DARTMOUTH, MASSACHUSETTS**

**September 2015**

**U.S. ENVIRONMENTAL PROTECTION AGENCY**
**NEW ENGLAND - REGION 1**
**5 POST OFFICE SQUARE**
**BOSTON, MA 02109-3912**

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U.S. EPA Region 1
Explanation of Significant Differences (ESD)
Re-Solve, Inc. Superfund Site, Management of Migration (MOM)
Operable Unit 3 (OU3)
September 2015

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# I. INTRODUCTION

## A. SITE NAME & LOCATION

Site Name: Re-Solve, Inc. Superfund Site (Site)

Site Location: North Dartmouth, Bristol County, Massachusetts

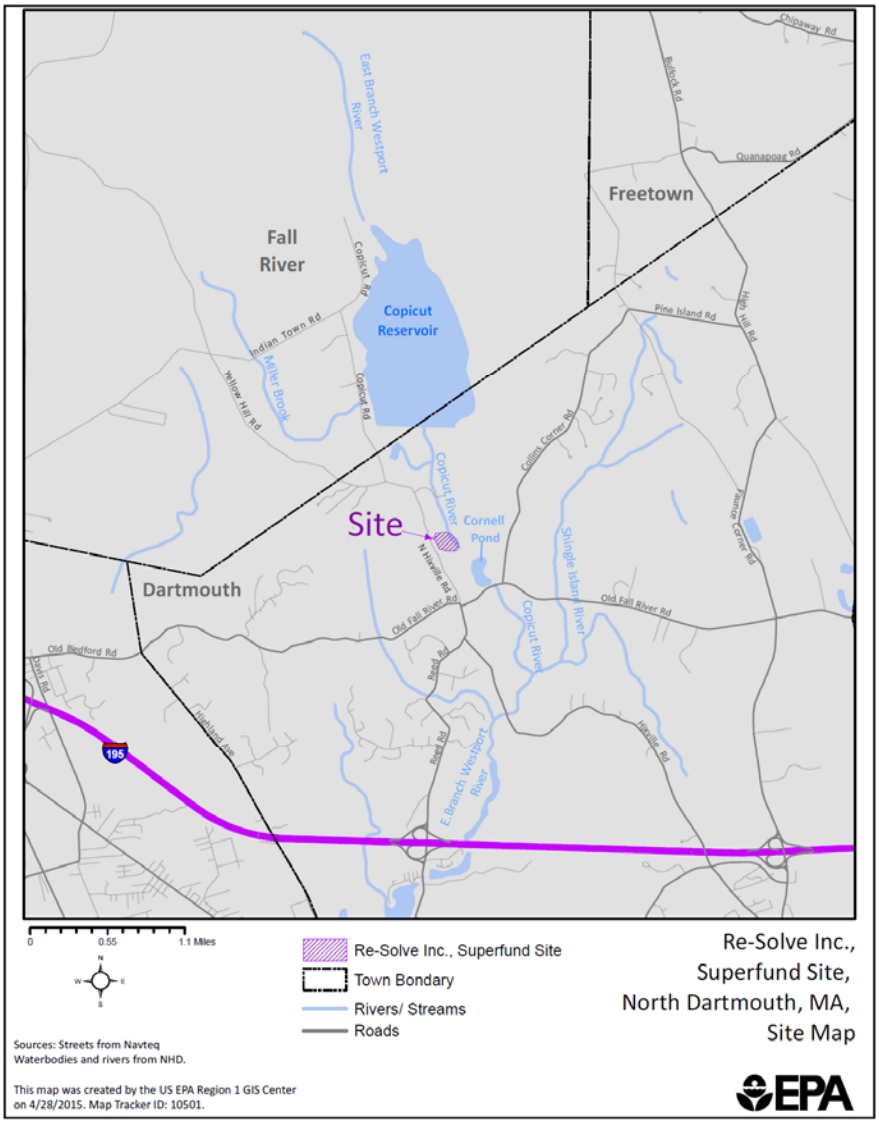



Figure 1: Re-Solve, Inc. Superfund Site, North Dartmouth, Massachusetts

(This figure is also provided in the attached figures.)

## B. LEAD & SUPPORT AGENCIES

Lead Agency: United States Environmental Protection Agency (EPA)

- *Contact: Joseph LeMay, EPA Remedial Project Manager, (617) 918-1323*

Support Agency: Massachusetts Department of Environmental Protection (MassDEP)

- *Contact: Dorothy Allen, MassDEP Project Manager, (617) 292-5795*

## C. LEGAL AUTHORITY FOR ESD

This Explanation of Significant Differences (ESD) for the Re-Solve, Inc. Superfund Site (Site) documents differences in Operable Unit 3 (OU3), the Management of Migration (MOM) component of the remedy, as originally set forth in the September 24, 1987 Record of Decision (1987 ROD).

This ESD has been prepared to provide the public with an explanation of a modification of the selected remedy for MOM at the Site. The United States Environmental Protection Agency (EPA) is required to publish this ESD by Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act, as amended (CERCLA), 42 U.S.C. § 9617(c), and the rule at 40 C.F.R. § 300.435(c)(2)(i).

Under Section 117(c) of CERCLA, 42 U.S.C. § 9617(c), the rule at 40 C.F.R. § 300.435(c)(2)(i), and Office of Solid Waste and Emergency Response (OSWER) Directive 9200.1-23P (1999 ROD Guidance), if EPA determines that differences in the remedial action significantly change but do not fundamentally alter the remedy selected in the ROD, with respect to scope, performance, or cost, EPA shall publish an ESD to describe the differences between the remedial action being undertaken and the remedial action set forth in the ROD, and the reasons such changes are being made. EPA has determined that the adjustments to the 1987 ROD provided in this ESD are significant, but do not fundamentally alter the overall remedy for the Re-Solve, Inc. Superfund Site with respect to scope, performance, or cost. Therefore, this ESD is properly issued.

While not required by Section 300.435(c) of the National Contingency Plan (NCP), 40 C.F.R. § 300.435(c), in accordance with Section 300.825(b) of the NCP, 40 C.F.R. § 300.825(b), EPA voluntarily held a public comment period on the draft ESD from July 17, 2015 to August 17, 2015 to ensure that all interested parties had an opportunity to provide input to EPA before its final decision on this modification to the remedy. EPA did not receive any comments during the comment period.

## D. SUMMARY OF CIRCUMSTANCES NECESSITATING THIS ESD

The Management of Migration component of the 1987 ROD for Re-Solve, Inc. Superfund Site (OU3) required "a recirculation, pump, treat and flush system." (1987 ROD, p. 51.) The 1987 ROD called for treated groundwater to "be discharged back into the aquifer via a distribution system. The soils within these areas will be flushed by this process, thus reducing the level of volatile organic compounds." (1987 ROD, p. 51.) The 1987 ROD further described that the treated groundwater discharge would entail discharging a large portion of treated water "back to the groundwater" and that a "small portion of the effluent, approximately 5 to 10 gallons per

minute (gpm), will be discharged to the surface water to maintain groundwater flow towards the contaminated zone. The discharge to the surface water will receive advanced treatment to ensure protection of freshwater aquatic life and the environment." (1987 ROD, p. 41).

In 1996, the Management of Migration Remedial Design Implementation Plan (1996 MOM Implementation Plan (100% Remedial Design)) was completed, documenting the details for a pump and treatment system. The flushing aspect of the MOM component of the remedy was eliminated during the MOM Remedial Design process, as groundwater modeling simulations indicated that the inclusion of reinjection wells might pose a risk of remobilizing dense non-aqueous phase liquid (DNAPL) and a reevaluation for the need for soil flushing indicated that inclusion of reinjection wells would not offer significant improvements in plume capture or cleanup times. Additionally, it was determined that the bulk of contaminated soils above the seasonal groundwater low (SGL) level was excavated and treated during the Source Control component (OU2) of the remedy, further mitigating the need for flushing (1994 Intermediate (60%) Design Report, Management of Migration (60% Remedial Design), pp. 4-5 – 4-6). Therefore, all treated groundwater is discharged to surface water (i.e. Copicut River) on-site, in compliance with the substantive requirements of the Clean Water Act National Pollutant Discharge Elimination System (NPDES) regulations. In 1999, EPA documented the successful construction and operations of the MOM pump and treatment system in the Final Remedial Action Report - Management of Migration Remedial Action (1999 MOM Remedial Action Report). See Figure 2 for location of MOM Extraction and Monitoring Wells.

The elimination of the reinjection/flushing of treated groundwater back into the aquifer and the change to have all treated groundwater be discharged to surface water on-site do significantly, but not fundamentally, alter the overall groundwater pump and treatment cleanup approach for the Site, and an ESD is appropriate to document these changes to the cleanup approach.

The 1987 ROD also called for extraction of contaminated groundwater from both the overburden and bedrock aquifers and treatment on-site using alternative MOM-2c Precipitation/Air Stripping/Activated Carbon/Filtration. In 1996, the MOM Implementation Plan (100% Remedial Design) was completed, documenting the details for a pump and treatment system with an air stripper and catalytic oxidizer.[1]

Since 2002, various pilot studies have been implemented at the Site to evaluate potential modifications to the MOM system to more cost-effectively achieve surface water discharge standards. In 2011, EPA agreed to allow the construction and monitoring of a full-scale pilot system, known as Anaerobic BioReactor (ABR), in accordance with the approved May 2011 "Sustainability Enhancement Design" (ABR Sustainability Enhancement Design) and associated November 2011 "Photovoltaic System" Design (Photovoltaic Design). In July 2014, the Settling Defendants[2] (known as the ReSolve Site Group) submitted a "Sustainability Enhancement Performance Report, Management of Migration, Groundwater Extraction and Treatment System" (2014 MOM Sustainability Enhancement Performance Report), documenting successful operations and monitoring of the ABR Sustainability Enhancement Design and Photovoltaic Design, as a modification to the original MOM design (1996 MOM Implementation Plan), and

[1] As documented in the 2008 Five Year Review (FYR), influent concentrations to the air stripper had reduced sufficiently to warrant turning off and disconnecting the catalytic oxidizer, while maintaining air compliance under the Clean Air Act.

[2] A Consent Decree was approved by the U.S. District Court in 1989, under which various potentially responsible parties agreed to conduct cleanup activities and reimburse the governments for response costs at the Site.

the achievement of surface water discharge standards.[3]

The 2014 MOM Sustainability Enhancement Performance Report documents successful operation and monitoring of the ABR Sustainability Enhancement Design, which significantly reduces contaminants through the Granular Activated Carbon (GAC) and ABR treatment beds, and does not require an air stripper. As described in the 2013 FYR, "the ABR is generally a closed, passive treatment system (no air stripper) with primary VOC treatment from anaerobic degradation and GAC sorption. Each of the two beds associated with the ABR has a passive air vent. Any VOC releases from the ABR air vents would be minuscule relative to the prior [groundwater treatment plant (GWTP)] air stripper emissions which did not require treatment.…" (2013 FYR, p. 57.) Additional air monitoring in 2014 confirmed substantially reduced VOC emissions (MOM Monthly Operations Report for June 2014, dated July 23, 2014).

Consistent with the 1999 ROD Guidance, including the "Secondary Technology" example under Highlight 7-1 of the 1999 ROD Guidance,[4] the ABR enhancement does significantly, but not fundamentally, alter the overall groundwater pump and treatment cleanup approach for the Site, and an ESD is appropriate to document this change to the cleanup approach.

The 1987 ROD selected MOM target cleanup levels for certain contaminants of concern outside the boundary of the waste management area (see Figure 2 for approximate location of waste management area) based upon the Safe Drinking Water Act's Maximum Contaminant Levels (MCLs) or risk assessment:

- Lead – 50 parts per billion (ppb)
- Trichloroethylene (TCE) – 5 ppb
- Tetrachloroethylene (PCE) – 5 ppb
- Methylene chloride – 5 ppb

Subsequent to the 1987 ROD, because the Safe Drinking Water Act established MCLs for additional contaminants, EPA selected target cleanup levels for additional contaminants of concern, as well as changed the target cleanup level for lead, including:

- Vinyl chloride – 2 ppb
- 1,1-Dichloroethylene – 7 ppb
- P-Dichlorobenzene – 75 ppb
- Lead – 15 ppb
- Benzene – 5 ppb
- Carbon tetrachloride – 5 ppb
- 1,2-Dichloroethane – 5 ppb
- 1,1,1-Trichloroethane – 200 ppb

Although the changes in groundwater cleanup standards significantly change the MOM remedy, they will not fundamentally alter the remedy specified in the 1987 ROD (i.e., the selected

[3] A comparison of the original MOM treatment system to the ABR enhancement is presented in Figure 3.
[4] "The lead agency decides to use a biological treatment method instead of air stripping (which was identified in the ROD) for ex-situ treatment of extracted groundwater. The basic pump and treat approach remains unaltered and the cleanup level specified in the ROD will be met by the alternate technology; the change is significant, but not fundamental." *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*, OSWER 9200.1-23P, July 1999, at 7-3.

technologies will not change because of the changes in the groundwater cleanup standards), and they will not impact the level of protection that the MOM remedy will provide. Accordingly, an ESD is appropriate to document these changes to the cleanup approach.

Therefore, for the reasons described above, this ESD documents the following:

1. Elimination of the reinjection/flushing component of the MOM remedy, and the consequent change from discharging a small portion, or approximately 5 to 10 gallons per minute, to discharging all treated groundwater to surface water on-site.
2. Modification of the method to remove the contaminated groundwater's VOCs from air stripping to the ABR Sustainability Enhancement Design and the associated Photovoltaic Design.
3. Selection of target cleanup levels for additional contaminants of concern (including 2 ppb for vinyl chloride, 7 ppb for 1,1-dichloroethylene, and 75 ppb for p-dichlorobenzene) and change of the target cleanup level for lead from 50 ppb to 15 ppb.

### E. AVAILABILITY OF DOCUMENTS

This ESD, supporting documentation, and the Administrative Record are available to the public at the following locations and may be reviewed at the times listed:

U.S. Environmental Protection Agency
Records Center
5 Post Office Square, Suite 100
Boston, MA 02109
617-918-1440
Monday-Friday: 9:00 am – 5:00 pm
Saturday and Sunday: Closed

Southworth Library
732 Dartmouth Street
South Dartmouth, MA 02748
Phone: 508-999-0726
Fax: 508-910-7100
Monday-Thursday: 9:00 am – 8:00 pm
Friday & Saturday: 9:00 am – 5:00 pm
Sunday: Closed

## II. SUMMARY OF SITE HISTORY, CONTAMINATION AND SELECTED REMEDY

### A. SITE HISTORY AND CONTAMINATION

The Re-Solve, Inc. Superfund Site (Site) is a former waste chemical reclamation facility that operated between 1956 and 1980. Various types of industrial and commercial solvents were brought to and processed at the facility. Residues, liquid sludge waste, and burned tires were disposed of in four on-site unlined lagoons. An oil waste sludge that accumulated at the bottom of the degreaser distillation still was disposed of on one portion of the Site through land farming. This oil waste sludge was also spread throughout the Site to control dust. These practices resulted in contamination of the soil, sediment and groundwater at the Site. In 1980, the

Commonwealth of Massachusetts accepted Re-Solve, Inc.'s offer to surrender its disposal license on the condition that all hazardous waste be removed from the Site. In 1981, all drums, debris, and buildings were removed from the Site, but the contents of the four lagoons remained.

EPA issued a Record of Decision (ROD) for the Site on July 1, 1983 (1983 ROD). This ROD established Operable Unit 1 (OU1) to perform remedial action work. This work included the excavation of approximately 15,000 cubic yards of contaminated soils and sediments from source areas on Site. Studies conducted near completion of the remedy indicated that extensive contamination remained and the OU1 remedial action was terminated in 1985. The remaining polychlorinated biphenyl (PCB) contamination was to be addressed through a subsequent comprehensive remedial action (Operable Unit 2), to supersede OU1.

EPA issued a second ROD on September 24, 1987 (1987 ROD), which established two additional OUs: the Source Control component, Operable Unit 2 (OU2), and the Management of Migration (MOM) component, OU3. The 1987 ROD called for site security, excavation and treatment of PCB-contaminated soils and sediments by on-site dechlorination, and treatment of volatile organic compound (VOC) contaminated groundwater by an on-site process involving metals removal, air stripping, and carbon adsorption. The 1987 ROD set cleanup standards for PCBs for soil and sediment at 25 parts per million (ppm) and 1 ppm, respectively, under OU2. Site-related groundwater indicator compounds identified in OU3 of the ROD include trichloroethene (TCE), tetrachloroethene (PCE), and methylene chloride. Treatment to 5 parts per billion (ppb) for TCE, PCE, and methylene chloride was expected to reduce other contaminants identified in groundwater to non-detectable levels. Additional groundwater cleanup standards were identified in, and subsequent to, the 1987 ROD. These cleanup levels included all Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act, including, but not limited to, lead, vinyl chloride, p-dichlorobenzene, and 1,1-dichloroethylene.

In June 1993, EPA prepared the 1993 ESD for OU2 based upon initial Source Control pilot tests. The Source Control pilot test evaluated the ROD's dechlorination process, which included two components (low-thermal desorption (via X*TRAX) and DECHLOR (via chemical reagent mixture to neutralize/detoxify PCBs)). The DECHLOR component of the pilot test increased the overall volume of PCB material requiring off-site disposal and costs. As a result of the pilot tests, EPA eliminated the DECHLOR component from the dechlorination process, and the small volume of desorbed liquid waste from the low-thermal desorption process would be shipped off-site for appropriate disposal.

OU2 activities commenced in June of 1993 and were completed in December of 1994 and included site security, excavation and treatment of contaminated soils and sediments, and wetland restoration. Approximately 36,000 cubic yards of PCB-contaminated soils and sediments were treated to an average concentration of 2.8 ppm, backfilled within the waste management area (WMA), and covered with 18 inches of gravel cap. Dense non-aqueous phase liquid (DNAPL) were also discovered in soils and groundwater during OU2 excavation activities and removed. Institutional controls prevent building construction, extraction of groundwater, excavation beyond six inches, and residential development. EPA documented the completion of the OU2 remedy in the Final Remedial Action Report—Source Control Remedial Action (1996 Source Control Remedial Action Report). The 1998 FYR Report concluded that the OU2 remedy was protective.

Construction of OU3, which took place during 1997 and 1998, included the installation of a two-tiered groundwater extraction system and construction of a groundwater treatment system consisting of metals removal, air stripping, and carbon adsorption for treatment of groundwater, and a catalytic oxidizer for treatment of the VOC emissions from the air stripper. The inner group of four Tier I extraction wells were installed along the eastern boundary of the WMA to contain DNAPL contamination and prevent migration beyond the WMA. The outer group of four Tier II extraction wells were installed along the eastern boundary of the dissolved VOC plume to treat the groundwater contaminants to the established cleanup standards.

Full-scale operation of the MOM remedy commenced on April 27, 1998, using the four Tier I extraction wells. Operation of the Tier II wells commenced on July 27, 1998, in conjunction with the Tier I wells. Monthly average pumping rates for the extraction system were maintained at or near the target of 48 gallons per minute (gpm) from November 1999 until November 2010, when the EPA approved a reduction in pumping rate to 35 gpm. Since November 2010, the system has operated at or near the reduced target rate, except for short periods when wells were shut down for planned maintenance or construction, for unplanned maintenance events, or during power outages.

A November 2006 study had concluded that discontinuing use of the oxidizer would not result in adverse health effects from the air stripper emissions in the vicinity of the Site. In December 2006, the catalytic oxidizer used to treat air emissions from the MOM's air stripper and was removed from service, as there were no adverse health effects from emissions and compliance with the Clean Air Act was met, in order to reduce unnecessary propane consumption.

Various on-site sustainability enhancement studies were conducted from 2002 through 2011 that used natural treatment processes as a means to reduce the energy and chemical use, residuals generation, and disposal associated with the Site groundwater treatment plant. In May 2011, EPA and the ReSolve Site Group agreed to a full-scale pilot Anaerobic Biological Reactor (ABR) "Sustainability Enhancement Design" (ABR Sustainability Enhancement Design), to monitor and potentially modify a portion of the MOM groundwater treatment plant process, and subsequently, the associated November 2011 "Photovoltaic System" Design (Photovoltaic Design), to provide on-site electricity to the MOM treatment process.

The ABR Sustainability Enhancement Design was constructed from August 2011 to December 2011. The ABR full-scale pilot operated in various transition phases from December 2011 until July 2012. The original groundwater treatment plant (GWTP) was shut down on July 3, 2012 for completion of the transition to the ABR full-scale pilot system, and the full-scale pilot system began operation on July 31, 2012. EPA required comprehensive monitoring for a 1- to 2-year period to evaluate: the effectiveness of the ABR system in achieving treatment levels comparable to the conventional treatment system; compliance with the existing GWTP discharge standards; and compliance with ROD Applicable or Relevant and Appropriate Requirements (ARARs). If the full-scale pilot were to achieve the stated objectives, EPA would consider using the system as an optimization, enhancement, or modification to the original GWTP. Despite some operational issues, the ABR system has operated consistently since July 31, 2012 and has consistently achieved the required effluent discharge standards. The operation, monitoring and compliance of the ABR full-scale pilot system with various implemented operational adjustments (e.g. membrane degassing) has been documented within the 2014 MOM Sustainability Enhancement Performance Report. A general description of the ABR enhancement is described in Section IV.A below, and the ABR enhance process flow is presented in Figure 3.

The 150-kilowatt (KW) Photovoltaic Design was also constructed on-site in late 2011. Start-up testing of the photovoltaic system was completed in December 2011. The local electric utility inspected and approved the photovoltaic system in February 2012. The system operates on a net-metering basis such that electricity produced by the photovoltaic system that is not used on-site by the MOM system is supplied to the local electricity grid. At times when the photovoltaic system is not producing sufficient power, such as at night, electricity is provided by the local electricity grid. The system has been in full-time operation since receiving approval to operate and currently provides 100% of the electricity for the treatment system.

As documented in the 2014 MOM Sustainability Enhancement Performance Report, the modification of the original MOM treatment process to the ABR system results in compliance and substantial, sustainable energy savings (MOM Sustainability Enhancement Performance Report, Table 6-1):

| **Environmental Impact** | **Original MOM treatment** | **Modified with ABR & Photovoltaic** | **Percent Reductions** |
|---|---|---|---|
| Electricity | 225,000 KWH/Yr. | 0 KWH/Yr. | 100% * |
| Off-Site Disposal | 56,000 lbs | 1,000 lbs. | 98% |
| Chemical Usage | 59,330 lbs | 8,070 lbs. | 86% |
| Net $CO^2$ | 615,206 $CO^2$/Yr. | 122,151 $CO^2$/Yr. | 80% |

* Accounts for 191,000 KWH/Yr. gained by photovoltaic system and 176,000 KWH/Yr. used by ABR.

## B. SUMMARY OF THE 1987 SELECTED REMEDY

The Remedial Action specified in the 1987 ROD is a comprehensive approach for site remediation which includes both a Source Control Operable Unit (OU2), and Management of Migration (MOM) Operable Unit (OU3). Both Operable Units are necessary in order to achieve the response objectives established for site remediation and the governing legal requirements. This ESD concerns OU3, the MOM component of the remedy.

The remedial objectives of OU3, as stated in the 1987 ROD, include:

- Reduction of risks to human health associated with dermal contact and subsequent absorption with surface water, ingestion of groundwater and inhalation of volatiles released from groundwater and surface water.
- Elimination or minimization of the threat posed to public health and the environment from the current and potential future extent of contaminant migration in groundwater and surface water.
- Maintenance of air quality at protective levels for on-site workers and the public during site remediation.

The 1987 ROD called for a recirculation, pump, treat and flush system, to be implemented following completion of the Source Control Remedial Action. The major components of the MOM portion of the remedy, as described in the 1987 ROD, are:

- Extraction of contaminated groundwater from both the overburden and bedrock aquifers.
- Treatment on-site using alternative MOM-2c Precipitation/Air Stripping/Activated Carbon/Filtration.
- Discharge of treated water back into the aquifer via a distribution system.
- Discharge of a small portion of the treated water to the surface water to maintain groundwater flow towards the contaminated zone.
- Restoration of the aquifer, permitting the groundwater outside the Waste Management Area to be used for drinking water purposes in the future.

The 1987 ROD established cleanup levels for certain contaminants of concern for the MOM component of the remedy for groundwater outside the waste management area:

- Lead – 50 parts per billion (ppb)
- Trichloroethylene (TCE) – 5 ppb
- Tetrachloroethylene (PCE) – 5 ppb
- Methylene Chloride – 5 ppb

## III. DESCRIPTION OF SIGNIFICANT DIFFERENCES

### A. Elimination of Reinjection/Flushing Portion of OU3

As described in Section I.D above, the 1987 ROD called for management of migration through a recirculation, pump, treat and flush system. In accordance with the selected remedy, treated groundwater was to "be discharged back into the aquifer via a distribution system. The soils within these areas will be flushed by this process, thus reducing the level of volatile organic compounds.… Flushing of the aquifer will reduce the level of residual organic compounds in the unsaturated zone to an estimated 1 ppm total volatile organics." (1987 ROD, p. 51.) The 1987 ROD further described that the treated groundwater discharge would entail discharging a large portion of treated water "back to the groundwater" and that a "small portion of the effluent, approximately 5 to 10 gallons per minute (gpm), will be discharged to the surface water to maintain groundwater flow towards the contaminated zone. The discharge to the surface water will receive advanced treatment to ensure protection of freshwater aquatic life and the environment." (*Id.* at p. 41).

However, during the Remedial Design process, groundwater modeling simulations showed that the inclusion of reinjection wells might pose a risk of remobilizing dense non-aqueous phase liquid (DNAPL) which had been encountered during Source Control soil excavation activities in 1993. As such, the need for flushing, as called for in the 1987 ROD, was reevaluated. As discussed in the July 1994 Intermediate (60%) Design Report for Management of Migration, inclusion of reinjection wells "incurs this risk [of DNAPL remobilization] without offering significant improvements in [plume] capture or cleanup times" (60% Remedial Design, p. 4-6). Additionally, the source control remediation was assumed to mitigate the need for soil flushing with respect to soils above the water table. As noted in the 1998 FYR, during the Source Control remediation soils above the seasonal groundwater low (SGL) level in VOC-hot spot areas were excavated and treated, addressing the bulk of VOC-contaminated soils in the unsaturated zone. "The minimal remaining VOC contamination (i.e., soils above SGL not excavated) would be addressed by degradation or by natural flushing due to precipitation." (1998 FYR, p. 2-3).

Therefore, as documented in the 1996 MOM Implementation Plan (100% Remedial Design), 1998 FYR Report, and 1999 MOM Remedial Action Report, the flush component of the MOM remedial action was eliminated, and rather than discharging a portion of treated groundwater back into the aquifer, all treated groundwater is discharged to surface water (i.e. Copicut River) on-site in compliance with the discharge standards set in accordance with the substantive requirements of the Clean Water Act National Pollutant Discharge Elimination System (NPDES) regulations.

This change in the MOM component does significantly, but not fundamentally, alter the overall cleanup approach for the Site, and an ESD is appropriate to document the change.

### B. Modification of MOM Groundwater Treatment Process

In accordance with the OU3 component described in the 1987 ROD, contaminated groundwater from both the overburden and bedrock aquifers were to be extracted and treated on-site using alternative MOM-2c Precipitation/Air Stripping/Activated Carbon/Filtration. As documented in the 2008 FYR, influent concentrations to the original MOM air stripper had reduced sufficiently to warrant turning off and disconnecting the catalytic oxidizer, while maintaining air compliance under the Clean Air Act.

In May 2011, EPA agreed to allow the construction and monitoring of a full scale pilot ABR Sustainability Enhancement Design and associated Photovoltaic Design. In July 2014, the ReSolve Site Group submitted a MOM Sustainability Enhancement Performance Report documenting successful operations and monitoring of the ABR Sustainability Enhancement Design and Photovoltaic Design as a modification to the original MOM design, and the achievement of surface water discharge standards. The ABR Sustainability Enhancement Design significantly reduces contaminants through the GAC and ABR treatment beds, and does not require an air stripper.

A general description of the ABR enhancement is as follows:

- The anoxic influent from the eight extraction wells is processed through the phase separator and influent tank, where solids are drained to the sludge holding tank and dewatered (component of original groundwater treatment system).
- The low dissolved oxygen levels are maintained throughout the system until aeration and discharge.
- The process water is pumped from the influent tank to the two 10,000-pound pre-treatment carbon vessels (components of original groundwater treatment system) to primarily remove PCBs.
- The process water flows through a degassing membrane system to reduce total dissolved gasses before entering the ABR 1 and 2 beds. The ABR 1 and 2 beds are two self-contained, subsurface beds filled with a sand-peat media designed to anaerobically degrade VOCs in the process water (via reductive dechlorination process). During months when the groundwater influent from the extraction wells are coldest, heat is applied to the process water before entering the ABR beds for maintaining healthy anaerobic conditions.

- The process water then travels through two 5,000-pound polishing carbon vessels to provide further assurance of compliance with the discharge limits in the event of a system upset.
- Final aeration steps/columns and pH adjustments achieve appropriate surface water dissolve oxygen and pH levels for surface water discharge.

A comparison of the original MOM treatment system to the ABR enhancement is presented in Figure 3.

This full-scale ABR enhancement modification does significantly, but not fundamentally, alter the overall groundwater pump and treatment cleanup approach for the Site, and an ESD is appropriate to document the change.

### C. Modification of MOM Groundwater Cleanup Levels

As described in Section I.D above, the 1987 ROD selected MOM target cleanup levels for certain contaminants of concern outside the boundary of the waste management area based upon the Safe Drinking Water Act's Maximum Contaminant Levels (MCLs) or risk assessment:

- Lead – 50 parts per billion (ppb)
- Trichloroethylene (TCE) – 5 ppb
- Tetrachloroethylene (PCE) – 5 ppb
- Methylene chloride – 5 ppb

As discussed in Footnote 2 above, a Consent Decree was approved by the U.S. District Court in 1989, under which various potentially responsible parties agreed to conduct cleanup activities and reimburse the governments for response costs at the Site. Under the 1989 Consent Decree, all MCLs established under the Safe Drinking Water Act at the time of entry of the Decree are considered groundwater cleanup standards for the MOM remedy. The 1989 Consent Decree specifically identified target cleanup levels for the following additional contaminants of concern:

- Vinyl chloride – 2 ppb
- 1,1-Dichloroethylene – 7 ppb
- P-Dichlorobenzene – 75 ppb

At the time of entry of the 1989 Consent Decree, MCLs established for additional contaminants (see 40 C.F.R. § 141.61 (July 1, 1988 edition explaining that § 141.61 was effective January 9, 1989)). Accordingly, the MCLs for the following additional contaminants are also groundwater cleanup standards for the MOM remedy at the Site:

- Benzene – 5 ppb
- Carbon tetrachloride – 5 ppb
- 1,2-Dichloroethane – 5 ppb
- 1,1,1-Trichloroethane – 200 ppb

In addition, the 1989 Consent Decree noted that the MCL for lead in effect at the time the Pre-Design Workplan is approved shall be the groundwater cleanup standard. In 1992, EPA promulgated treatment methods in the Final National Primary Drinking Water Standards for lead. This regulation establishes treatment techniques that are to be used when an action level of

15 ppb of lead is exceeded at ten percent of the taps sampled that use a public drinking water supply. This regulation vacated the previous MCL of 50 ppb. As the MOM Design Refinement Workplan, dated August 1992, was approved after the original lead MCL was vacated, the 15 ppb action level serves as the target cleanup level for lead.

The changes in groundwater cleanup standards, discussed above, significantly change the MOM remedy. However, they do not fundamentally alter the remedy specified in the 1987 ROD. The selected technologies were not changed because of the changes in the groundwater cleanup standards. They will not impact the level of protection that the MOM remedy will provide. Moreover, treatment of groundwater to 5 ppb for the three indicator compounds of TCE, PCE and methylene chloride is expected to reduce other compounds identified in groundwater to non-detectable levels. Accordingly, an ESD is appropriate to document these changes to the cleanup approach.

### D. Summary of Costs

There are minimal to no costs associated with the elimination of the reinjection/flushing aspect of the OU3 remedy, as contemplated by the 1987 ROD. In fact, it is expected that some savings were achieved by this change, since it eliminated costs associated with construction of the distribution system to discharge treated groundwater into the aquifer.

Based on information provided by the ReSolve Site Group, the capital costs for the ABR sustainability enhancements totaled $1,524,263, while the capital costs for the photovoltaic system totaled $772,372, for a combined total of $2,296,635 (Attachment 1). It is anticipated, however, that the fully operational enhancement system will likely yield future operational cost savings. The annual costs for the fourteenth year of operation of the original groundwater treatment plant, ending August 2012, prior to full-scale operation of the ABR system were approximately $452,340. These costs are consistent with costs in recent prior years. The costs for the fifteenth year of operation, beginning just after the transition to the ABR system, are estimated to be approximately $427,436. The costs are expected to continue to decrease over time.

Also, the change to groundwater cleanup levels are not expected to have an impact on cost of the MOM remedy.

## IV. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

<u>Clean Water Act</u>

The Clean Water Act is the statutory basis for the National Pollution Discharge Elimination System (NPDES) permit program, which determines the maximum allowable effluent discharge limits for water treated on-site. The NPDES permit equivalency limits that are being used were developed in 1998, and were calculated using a system flow rate of 50 gallons per minute (gpm), using Ambient Water Quality Criteria (AWQC) and Best Available Technology (BAT) limits as the basis for the equivalency calculation. Though the system flow rate was reduced to 35 gpm in November 2010, the calculated permit equivalency limits are expected to remain applicable.

The applicable AWQC (now known as National Recommended Water Quality Criteria) include fresh water Criteria Maximum Concentrations (CMCs), fresh water Criteria Continuous

Concentration (CCC), and human health criteria based on the consumption of fish. AWQC were used to develop equivalency limits for inorganic contaminants. Changes to the AWQC for inorganic contaminants were identified in the 2008 FYR. No further changes have occurred that are applicable to contaminants at this Site. Therefore, the NPDES permit equivalency limits being used for inorganic contaminants in effluent are assumed to be protective of human health and the environment. BAT limits were used as the basis for development of discharge permit equivalency limits for most of the organic contaminants for which limits were established. BAT limits have remained unchanged since the inception of the OU3 MOM remedy; the permit equivalency limits being used to evaluate organic contaminant levels in effluent originating from the GWTP remain protective of human health and the environment.

The current AWQC for human consumption of fish for PCBs is 0.000064 ug/L, based on the level established in 2002. The NPDES permit equivalency limit used to evaluate the concentrations of PCBs in effluent was lowered from 0.5 ug/L to 0.004 ug/L following the 2003 FYR, based on the issuance of the lower AWQC for PCBs in 2002. On March 27, 2015, EPA approved a revision of the PCB discharge limit to 0.0115 ug/L for the Site, following an evaluation by the ReSolve Site Group of Copicut River flow rate based on ten years (2004-2014) of data.[5]

Clean Air Act

The Clean Air Act was an ARAR identified in the ROD that served, with respect to OU3, to establish contaminant loading limits for air emissions from the catalytic oxidizer during the MOM remedy. Although the catalytic oxidizer was disconnected in 2006, until July 2012, air emissions were still generated through the air stripper and monitored in accordance with EPA's approval to disconnect the catalytic oxidizer. Compliance with this ARAR continued to maintain the protectiveness of the remedy while the air stripper was in operation.

With the transition to treatment in the ABR, there is no longer an air stripper and stack for emissions. The ABR is a generally closed, passive treatment (no air stripper) with primary VOC treatment from anaerobic degradation and GAC sorption. Each of the two beds associated with the ABR has a passive air vent. Any VOC releases from the ABR air vents would be miniscule relative to the prior GWTP air stripper emissions, which themselves did not require treatment.

As part of the ABR monitoring plan, air samples were collected from each vent during ABR operation and monitoring to determine whether VOCs are being released into the atmosphere. As reported in the June 2014 MOM Monthly Operations Report dated July 23, 2014 for the Site, monitoring of the air in the ABR bed vents, and also of the ambient air upwind and downwind of the ABR beds, was performed in June 2014, and indicated that VOC release to the atmosphere is very low to negligible, and further reflected no adverse impact on ambient air quality resulting from the operation of the ABR treatment beds. Where appropriate, additional ABR air emissions sampling may be scheduled in the future to further evaluate any potential VOC emissions or Clean Air Act compliance.

[5] Letter dated March 27, 2015 to Michael Worthy, "Re-Solve Inc., Superfund Site, North Dartmouth, MA – EPA review of 'Response to EPA letter Dated August 8, 2014, Regarding PCB Discharge Limit,' dated September 23, 2014, and acceptance of new PCB discharge limit."

Safe Drinking Water Act

See Section III.C above for a discussion of additional groundwater cleanup standards or changes in the cleanup levels for the MOM remedy based upon relevant changes of the Safe Drinking Water Act's MCLs.

## V. SUPPORTING AGENCY COMMENTS

The Massachusetts Department of Environmental Protection (MassDEP) concurs with this ESD and has provided a letter of support (Attachment 2).

## VI. STATUTORY DETERMINATIONS

EPA, in consultation with MassDEP, has determined that the modified remedy, as described in this ESD, remains protective of human health and the environment, complies with all Federal and State requirements that are applicable or relevant and appropriate to this remedial action, meets the remedial action objectives specified in the ROD, and is cost-effective.

## VII. PUBLIC PARTICIPATION COMPLIANCE

While not required by Section 300.435(c) of the National Contingency Plan (NCP), 40 C.F.R. § 300.435(c), in accordance with Section 300.825(b) of the National Contingency Plan, 40 C.F.R. § 300.825(b), EPA voluntarily chose to allow a 30-day public comment period prior to the finalization and signing of this ESD. Such comment period is designed to allow consideration of any possible concerns from the public, local municipalities, and or the PRPs. A public notice of the draft ESD was published in The Standard-Times, New Bedford, MA on July 17, 2015, and The Dartmouth-Westport Chronicle, Dartmouth, MA on July 22, 2015. The formal public comment period regarding the draft ESD was held from July 17, 2015 to August 17, 2015. EPA did not receive any comments during the comment period.

## VIII. DECLARATION

For the foregoing reasons, by my signature below, I approve the issuance of this Explanation of Significant Differences for Operable Unit 3, Management of Migration component of the Re-Solve, Inc. Superfund Site in North Dartmouth, Bristol County, Massachusetts, and the changes stated therein.

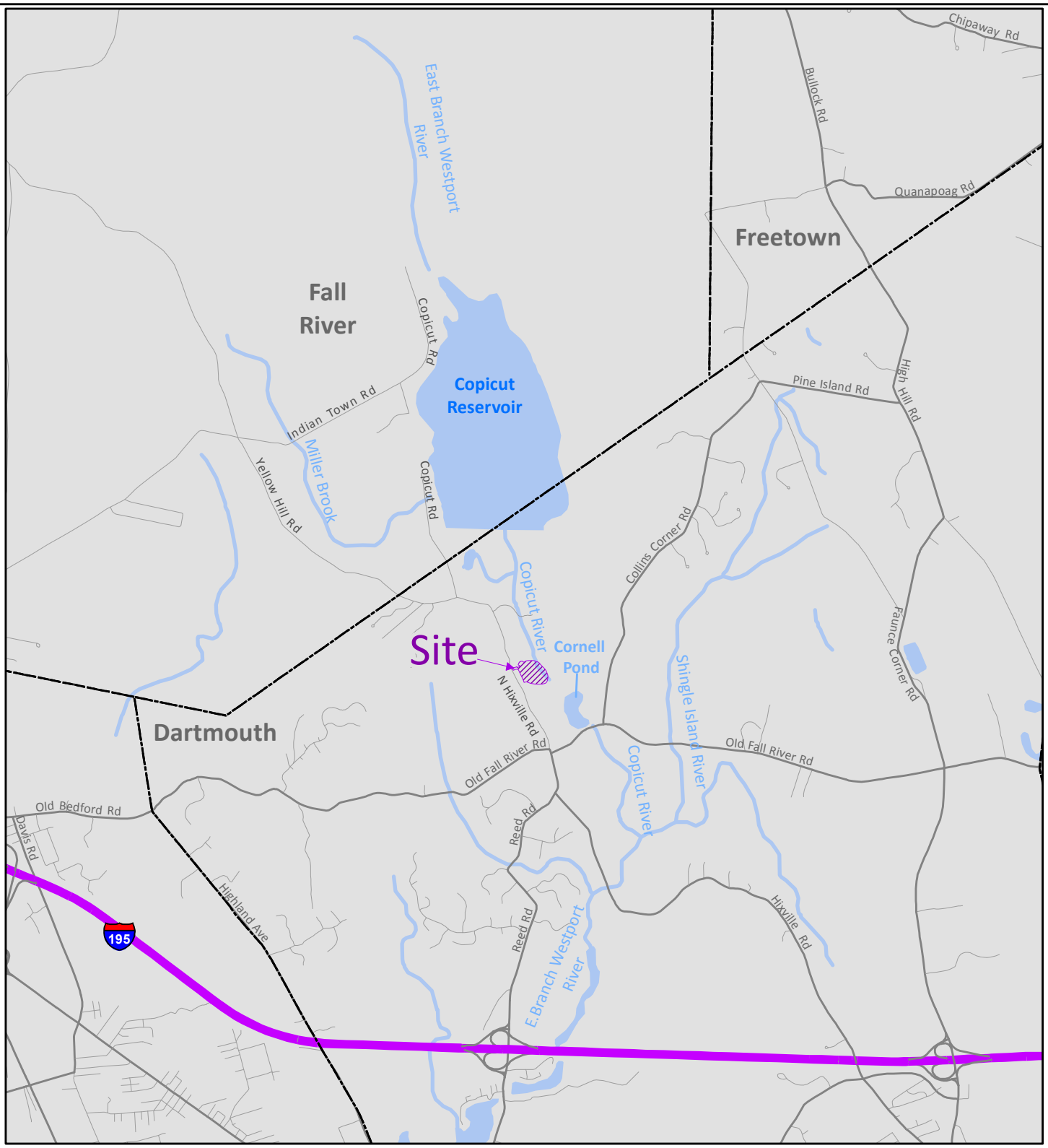
Nancy Barmakian

Nancy Barmakian, Acting Director
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency
Region 1- New England

09/08/15
Date

**Figure 1**

**Re-Solve Inc. Superfund Site, North Dartmouth, Massachusetts**




0 0.55 1.1 Miles

N W E S

Re-Solve Inc., Superfund Site

Town Bondary

Rivers/ Streams

Roads

# Re-Solve Inc., Superfund Site, North Dartmouth, MA, Site Map

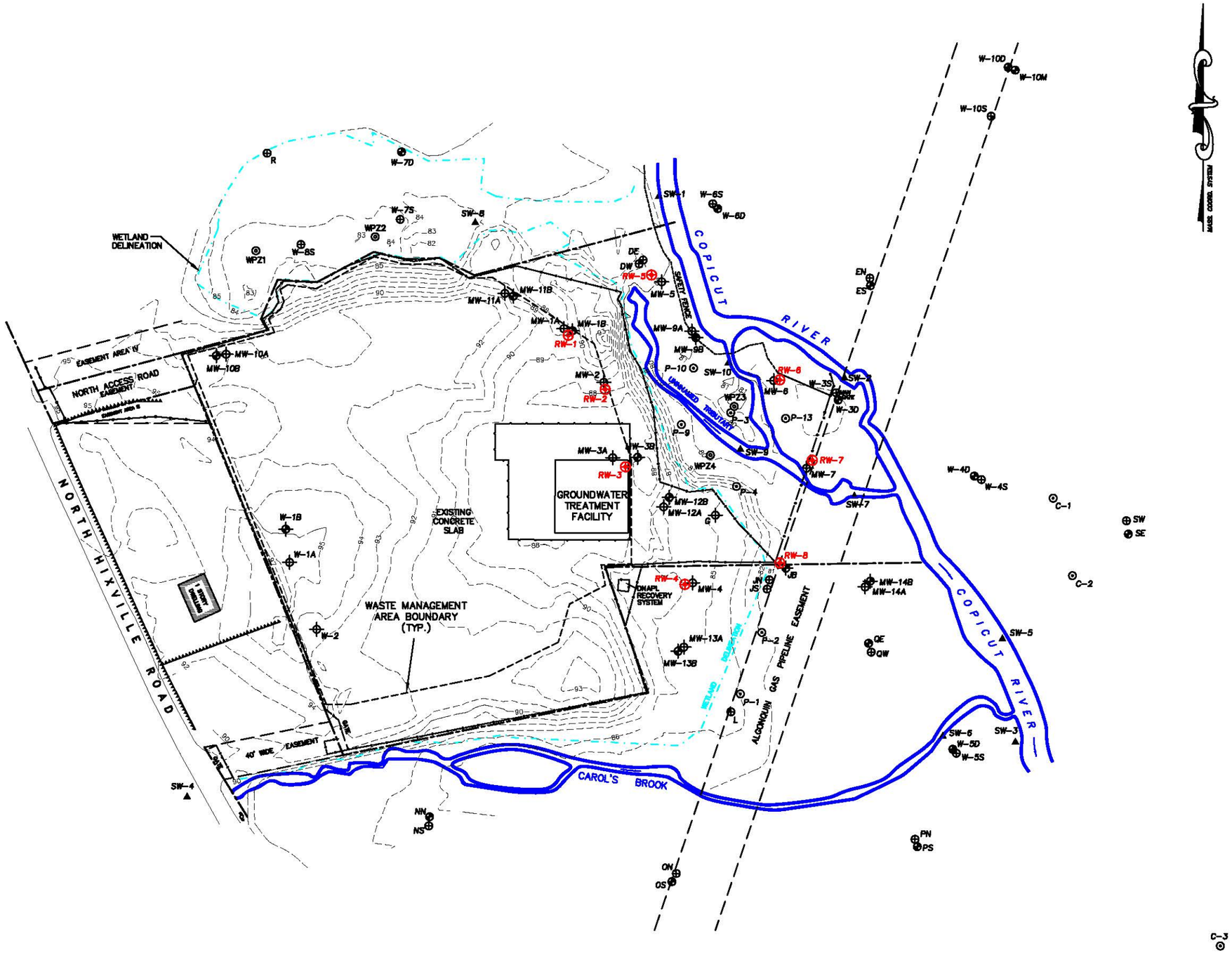
Sources: Streets from Navteq
Waterbodies and rivers from NHD.

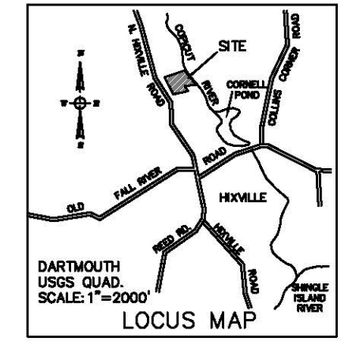
This map was created by the US EPA Region 1 GIS Center on 4/28/2015. Map Tracker ID: 10501.

EPA

**Figure 2**

**Re-Solve Inc. Superfund Site, MOM, OU3**




| | |
|---|---|
| MW-1B | BEDROCK MONITORING WELL (INSTALLED BY WESTON) |
| MW-1A | OVERBURDEN MONITORING WELL (INSTALLED BY WESTON) |
| W-3D | BEDROCK MONITORING WELL (INSTALLED BY OTHERS) |
| W-3S | OVERBURDEN MONITORING WELL (INSTALLED BY OTHERS) |
| SW-1 | SURFACE WATER STATION |
| P-1 | WETLAND PIEZOMETER (INSTALLED BY WESTON) |
| WPZ1 | WETLAND PIEZOMETER (INSTALLED BY OTHERS) |
| RW-1 | GROUNDWATER EXTRACTION WELL (INSTALLED BY WESTON) |
| | CHAIN LINK FENCE |
| | WETLAND DELINEATION |
| | PROPERTY LINE |

NOTES:

1. PLAN BASED ON SITE SURVEY CONDUCTED BY DANSON SURVEY & ENGINEERING, CO., NEW BEDFORD, MASSACHUSETTS, JULY 1997.
2. MONITORING WELLS W-1A, W-1B, W-7D, W-2 AND G ARE REPLACEMENT WELLS INSTALLED BY WESTON.
3. N 250929.184 (y) REPRESENTS MASSACHUSETTS E 727851.371 (x) GEODETIC CONTROL DATA
4. ALL ELEVATIONS ARE REFERED TO VERTICAL DATUM AS CONTROLLED BY MASS. GEODETIC SURVEY OF 1929 (NGVD).
5. BENCHMARK: VERTICAL CONTROL DISK #M6ACC ELEV. = 82.62.

120 0 120 240

SCALE IN FEET
1" = 120'

AECOM

# Figure 3-1

EXTRACTION AND MONITORING WELLS

RESOLVE DARTMOUTH, MA
JULY 2013

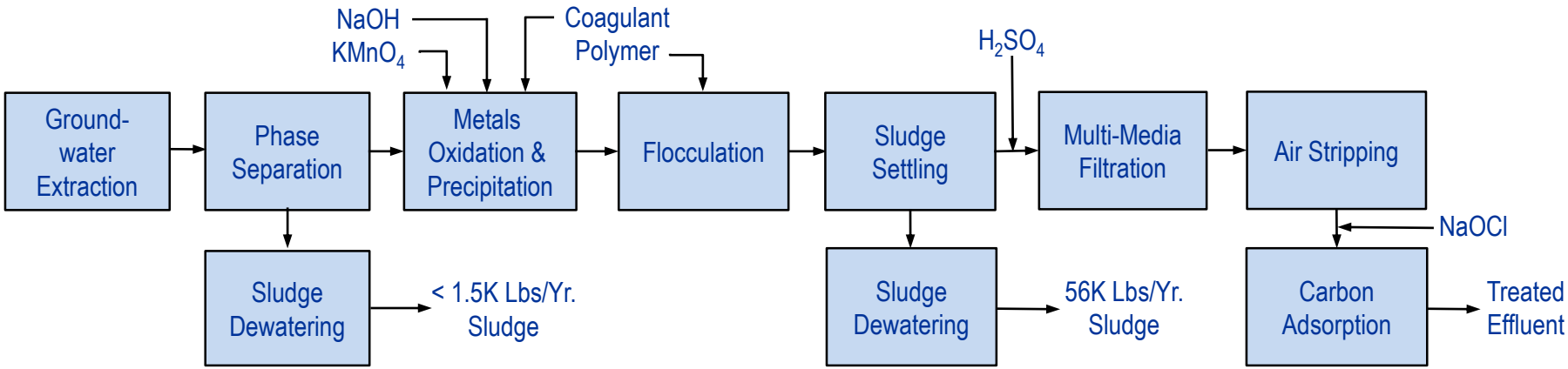
File: J:\Cadfiles\CADD\60189978\60189978-01B.dwg Layout: Model User: barryk Plotted: Jun 04, 2013 - 2:48pm Xref's:

**Figure 3**

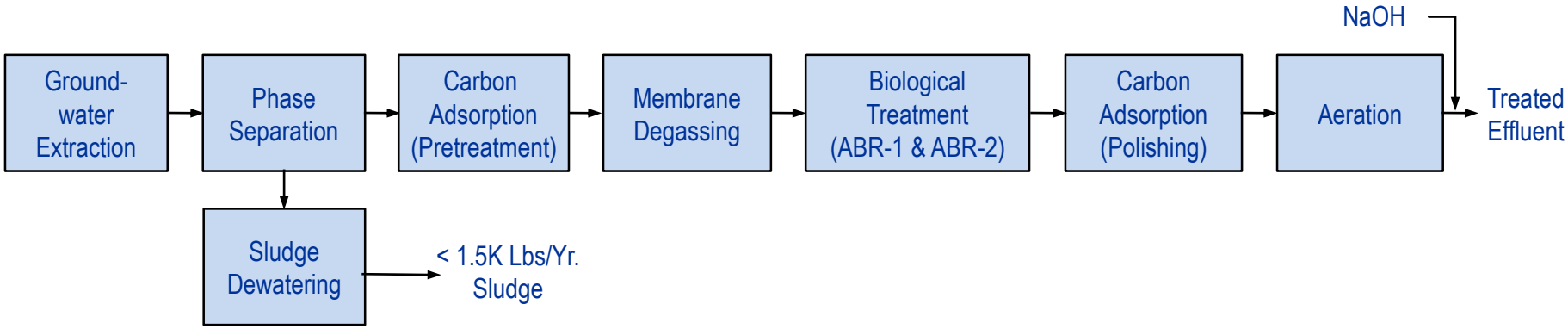
**Re-Solve Inc. MOM Treatment: Comparison of Original and ABR Enhancement**

# ReSolve Inc., Superfund Site, MOM Treatment: Original and ABR Enhancement Comparison

## Original System




## ABR Enhancement System



# Attachment 1

## Sustainability Enhancements Capital Cost

## Capital Costs for Construction and Startup of Sustainability Enhancements

### ReSolve, Inc. Superfund Site
### North Dartmouth, Massachusetts

| Description | | Cost | |
|---|---|---|---|
| **Anaerobic Bioreactor Treatment System** | | | |
| | Pre-Construction Procurement & Plans | $ | 78,119 |
| | Mobilization/Demobilization<br>Subsurface Piping to Beds<br>Construction of ABR Beds<br>Subsurface Piping to Beds | $ | 689,931 |
| | Modified Process Pumps<br>Modified Process Piping in Building<br>ABR Heating System in Building<br>Polishing Carbon<br>Electrical Work<br>Modified Controls<br>Degassing Membrane Contactor System | $ | 665,343 |
| | Startup Inspection and Testing | $ | 90,870 |
| | **Total ABR System** | **$** | **1,524,263** |

| | | | |
|---|---|---|---|
| **Solar Photovoltaic System** | | | |
| | Design & Procurement | $ | 33,549 |
| | Solar PV System Construction | $ | 738,823 |
| | **Total Solar PV System** | **$** | **772,372** |

| | | |
|---|---|---|
| **Total Sustainability Enhancements** | **$** | **2,296,635** |

# Attachment 2

## MassDEP ESD Letter of Support

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

# Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

August 28, 2015

Mr. Robert Cianciarulo, Chief
Massachusetts Superfund Section
USEPA Region 1
5 Post Office Square
Boston, MA 02109-3912

Re: Comments on the Explanation of Significant Differences (ESD)
September 2015, Resolve Superfund Site

Dear Mr. Cianciarulo,

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed the above referenced document. The ESD describes the background of the Resolve site and summarizes changes in the design and implementation of the Management of Migration portion of the remedy as originally stipulated in the Record of Decision dated September 24, 1987. MassDEP is in agreement with three reasons for the ESD:

> Elimination of the reinjection/flushing component of the MOM remedy and the resulting discharge of entire treated groundwater to surface water on-site,
>
> Modification of the groundwater treatment from conventional metals and VOC removal methods to the sustainable Anaerobic Bioreactor design powered with photovoltaic electricity, and
>
> Selection of target cleanup levels for additional contaminants of concern and the lowering of the cleanup level for lead.

MassDEP is particularly pleased to recognize that the changes in the treatment system that replace conventional operations with the Anaerobic Bioreactor process and solar energy, decrease off-site waste disposal, chemical usage and carbon emissions.

MassDEP is also in agreement that these changes are significant but do not fundamentally change the site remedy that stipulates the restoration of the overburden and the bedrock aquifers

**This information is available in alternate format. Call Michelle Waters-Ekanem, Diversity Director, at 617-292-5751. TTY# MassRelay Service 1-800-439-2370**
MassDEP Website: www.mass.gov/dep

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and establishes the boundary of the Waste Management Area as the compliance point for meeting cleanup levels as documented in the 1987 ROD.

If you should have any questions regarding this letter please contact Dorothy Allen at 617-292-5795.

Sincerely,

Jay Naparstek
Deputy Division Director
Bureau of Waste Site Cleanup

cc: Joe LeMay, USEPA
Dorothy Allen MassDEP