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# EPA Superfund
# Explanation of Significant Differences

# CENTRAL LANDFILL SUPERFUND SITE
# EPA ID: RID980520183
# JOHNSTON, RHODE ISLAND

September 2013

SDMS DocID 547495

# Explanation of Significant Differences
# Central Landfill Superfund Site
# September 2013

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# DECLARATION FOR THE EXPLANATION OF SIGNIFICANT DIFFERENCES CENTRAL LANDFILL SUPERFUND SITE JOHNSTON, RI SEPTEMBER 2013

## Site Name and Location

The Central Landfill Superfund Site is located in Johnston, Rhode Island (RI).

## Lead Agency

United States Environmental Protection Agency (EPA).

## Support Agency

Rhode Island Department of Environmental Management (RIDEM).

## Statement of purpose

This decision document sets forth the basis for the determination to issue the attached Explanation of Significant Differences ("ESD") for the Central Landfill Superfund Site (the "Site"). The EPA developed this decision document after consulting with the RIDEM.

## Statutory Basis for Issuance of the ESD

Pursuant to Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. § 9617(c), and 40 C.F.R. § 300.435(c)(2)(i), if EPA determines that the remedial action being undertaken at a site differs significantly from the Record of Decision ("ROD") for that site, EPA shall publish an ESD and the reasons such changes are being made. According to 40 C.F.R. § 300.435(c)(2)(i), and Office of Solid Waste and Emergency Response (OSWER) Directive 9200.1-23-P, July 1999, an ESD, rather than a ROD amendment, is appropriate where the adjustments being made to the ROD are significant but do not fundamentally alter the remedy with respect to scope, performance or cost. EPA has determined that the adjustments to the 1994 ROD for the Site, as amended by the September 2005 ESD, provided in this ESD are significant but do not fundamentally alter the overall remedy for

the Site with respect to scope, performance, or cost. Therefore, this ESD is properly being issued.

In accordance with Section 117(d) of CERCLA, 42 U.S.C. § 9617(d), and 40 C.F.R. §§ 300.435(c)(2)(i)(A) and 300.825(a)(2), this ESD will become part of the Administrative Record for the Site and will be available for public review at the EPA Records Center in Boston, Massachusetts, on the EPA website at the following address: http://www.epa.gov/region1/cleanup/index.html, and at the public information repository located at the Marian J. Mohr Memorial Library at One Memorial Avenue in Johnston, Rhode Island. This ESD will also be available at RIDEM's offices in Providence, Rhode Island. EPA will publish a notice of availability and a brief description of this ESD in a major local newspaper of general circulation following the signing of this ESD.

**Background**

The ROD for Operable Unit 1 (OU-1) of the Site was signed by the EPA Region 1 Administrator on June 17, 1994 (the "1994 ROD"). The 1994 ROD requires a source control remedy for OU-1 of the Site that includes, among other things, hydraulic containment and treatment of the groundwater in the hot spot area of the landfill, which is an approximately ½ acre area within Phase I of the landfill (as shown on Figure 1) where a minimum of 1.5 million gallons of documented hazardous wastes were disposed of between 1976 and 1979. The 1994 ROD describes the source control remedy as follows: "This is a source control remedy intended to prevent or minimize the continued release of hazardous substances to the groundwater. That is, the selected remedy is expected to (1) prevent groundwater that has contaminant concentrations exceeding MCLs and non-zero MCLGs from migrating beyond the compliance boundary ... or; in the absence of MCLs or non-zero MCLGs, prevent groundwater that has contaminant concentrations above levels that are protective of human health from migrating beyond the compliance boundary ... and; (2) prevent the degradation of surface waters below surface water standards." The 1994 ROD describes the compliance boundary for groundwater containment at the Site as the toe-of-slope (i.e., edge) of the then-existing waste management area. At the time of the 1994 ROD, it was anticipated that hydraulic containment of the groundwater in the hot spot area of the landfill would achieve groundwater and surface water performance standards.

The 1994 ROD selected additional components for the source control remedy, which included the following: (1) constructing a multi-layer RCRA Subtitle C cap over the existing 121 acre Phase I area and incorporating the existing 32 acres of RIDEM-approved cap; (2) implementing deed restrictions on groundwater use and land development within property owned by the Rhode Island Solid Waste Management Corporation ("RISWMC") [now known as the Rhode Island Resource Recovery Corporation ("RIRRC")]; (3) initiating a long-term monitoring program of groundwater, surface water and air; (4) conducting a detailed evaluation of the existing landfill gas collection and combustion system; and (5) installing a chain link fence to prevent access.

## Overview of the ESD

This ESD documents the following modifications to the CERCLA remedy presented in the 1994 ROD:

1. **Modifications to the Hydraulic Containment System Identified in the 1994 ROD**

   At the time the 1994 ROD was issued, it was anticipated that hydraulic containment of the groundwater in the hot spot area of the landfill would achieve the groundwater and surface water performance standards required by the ROD. The hydraulic containment system is currently comprised of one extraction well operating immediately downgradient of the hot spot area within Phase I of the landfill. In this ESD, EPA is documenting its decision to relocate the hydraulic containment system approximately 1,500 feet downgradient (i.e., south) of its current location to where the edge of the waste management area will be after Phase VI of the landfill is completed, as shown on Figure 1. EPA's decision is based on data, gathered after the 1994 ROD, which show that the current hydraulic containment system is not fully capturing the shallow part of the groundwater contaminant plume (GZA 2011a and GZA 2011b), and the fact that the landfill's Phase VI expansion (approximately 153 acres), which is expected to be active in 2014, is designed to piggyback on top of the existing RCRA Subtitle C cap areas by adding approximately 150 feet of landfill material above the current hydraulic containment system location (GZA 2012). The Phase VI landfill expansion will create significant technical and logistical problems for maintaining a hydraulic containment system in the hot spot area while solid waste filling progresses and following filling completion (GZA 2012). The relocated hydraulic containment system, which will extract groundwater and treat as necessary, will be designed to ensure that capture of the eastern part of the groundwater plume is achieved at the edge of the waste management area, and the groundwater and surface water performance standards for the remedy, as described in the 1994 ROD, are achieved. The western part of the plume will be captured by the stone underdrain located underneath Phase V, and will be treated, if necessary, prior to discharge into the Cedar Swamp Brook to achieve the surface water performance standards for the remedy. The relocated hydraulic containment system and the stone underdrain will collectively capture the entire groundwater plume at the edge of the waste management area so that the groundwater and surface water performance standards for the remedy are achieved.

   As described above, the relocated hydraulic containment system will be located approximately 1,500 feet south of its current location to the edge of the waste management area, as shown on Figure 1. The 1994 ROD describes the compliance boundary for groundwater containment at the Site as the toe-of-slope (i.e., edge) of the then-existing waste management area. Since the 1994 ROD, filling has occurred in at least two additional areas (Phase IV and Phase V) of the

landfill, which are located south of the Phase I, II, and III areas. In February 2011, RIRRC was permitted by RIDEM's Office of Waste Management to begin filling in an additional 153-acre area (Phase VI) of the landfill, which will overlie and extend east of the Phase I, II, and III areas. Therefore, EPA has determined that the compliance boundary for this ESD will be the edge of the waste management area at the intersection of the Phase V and Phase VI toe-of-slopes, as shown on Figure 1.

The current hydraulic containment system will be decommissioned after the relocated containment system and the stone underdrain are demonstrated to achieve full capture of the entire groundwater plume and the capability to achieve groundwater and surface water performance standards within a reasonable timeframe. The timeframe for decommissioning the current containment system will be determined based on an evaluation of containment conducted by RIRRC, subject to EPA's approval, in consultation with RIDEM.

## 2. Updates to the numerical groundwater and surface water performance standards

The 1994 ROD describes the groundwater performance standard for the source control remedy for the Site as "prevent groundwater that has contaminant concentrations exceeding MCLs and non-zero MCLGs from migrating beyond the compliance boundary ... or; in the absence of MCLs or non-zero MCLGs, prevent groundwater that has contaminant concentrations above levels that are protective of human health from migrating beyond the compliance boundary." The 1994 ROD also documented the then-applicable MCLs/non-zero MCLGs and levels that were protective of human health (i.e., risk-based levels).

This ESD updates the numerical groundwater standards included in the 1994 ROD, which are used solely for the purpose of measuring the performance of the source control remedy, for several contaminants of concern. In addition to the applicable or relevant and appropriate requirements (ARARs) for groundwater described in the 1994 ROD, EPA considered the June 2010 Rhode Island Groundwater Quality Rules, the EPA 2012 Edition of the Drinking Water Standards and Health Advisories (the "2012 EPA Health Advisories"), which are to-be considered ("TBCs") under EPA guidance, and current cancer and non-cancer toxicity data in evaluating the numerical groundwater performance standards. The following numerical groundwater performance standards are updated to ensure the remedy complies with ARARs and is protective of human health and the environment: naphthalene is updated from 1,500 ug/L to 100 ug/L based on the June 2010 Rhode Island Groundwater Quality Rules; methyl ethyl ketone is updated from 22,000 ug/L to 4,000 ug/L based on the EPA 2012 Edition of the Drinking Water Standards and Health Advisories; 2,4-dichlorophenol is updated from 110 ug/L to 20 ug/L based on the 2012 EPA Health Advisories; manganese is updated from 200 ug/L to 300 ug/L based on the 2012 EPA Health

Advisories; 1,1-dichloroethane is updated from 810 ug/L to 2.4 ug/L based on a $10^{-6}$ risk level; and vanadium is updated from 260 ug/L to 78 ug/L based on a non-cancer hazard index of 1 (see Attachment 1).

The 1994 ROD describes the surface water performance standard for the source control remedy for the Site as "prevent the degradation of surface waters below surface water standards." The 1994 ROD includes both the federal ambient water quality criteria and the Rhode Island water quality criteria in the list of ARARs for surface water. However, the 1994 ROD did not include numerical performance standards for surface water. This ESD specifies applicable numerical standards for surface water based upon the ARARs described in the 1994 ROD, and EPA Region 3 Freshwater Screening Benchmarks or EPA Nutrient Ecoregional Criteria, which are TBCs under EPA guidance (see Attachment 2).

Given the site-specific conditions at the Site, including the uses of the surface water bodies at the Site, EPA has determined that the applicable state water quality criteria must be met for the Upper Simmons Reservoir and the Cedar Swamp Brook, and that for constituents for which the State has not promulgated applicable water quality criteria, the relevant and appropriate national recommended water quality criteria must be met. In addition, EPA has determined that for constituents for which neither State nor federal water quality criteria exist, EPA Region 3 Freshwater Screening Benchmarks or EPA Nutrient Ecoregional Criteria must be satisfied. Attachment 2 provides a list of the surface water quality criteria that must be met at the Site to meet the surface water performance standard for the source control remedy.

This ESD formally incorporates these aforementioned changes into the CERCLA remedy. The State of Rhode Island has been consulted with during preparation of this ESD, and the State's comments have been incorporated into the ESD.

**Declaration**

For the foregoing reasons and as explained herein, by my signature below, I approve the issuance of an Explanation of Significant Differences for the Central Landfill Superfund Site in Johnston, Rhode Island, and the changes stated therein.

James T. Owens III, Director
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency - New England

9/25/13
Date

# EXPLANATION OF SIGNIFICANT DIFFERENCES
# CENTRAL LANDFILL SUPERFUND SITE
# JOHNSTON, RHODE ISLAND
# SEPTEMBER 2013

**SITE NAME:** Central Landfill Superfund Site

**SITE LOCATION:** Johnston, Rhode Island

**LEAD AGENCY:** United States Environmental Protection Agency (EPA)

**SUPPORT AGENCY:** Rhode Island Department of Environmental Management (RIDEM)

## I. INTRODUCTION

This Explanation of Significant Differences ("ESD") is being issued for the Central Landfill Superfund Site ("Site") to document changes to components of the Site remedy set forth in the June 17, 1994 Record of Decision ("1994 ROD"), as amended by the September 2005 ESD (the "2005 ESD"). EPA is required to publish this ESD by Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9617(c), and 40 C.F.R. § 300.435(c)(2)(i). This ESD will serve as the CERCLA decision document to record the following changes to the remedy that do not fundamentally deviate from the remedy described in the 1994 ROD in terms of scope, performance, or cost:

1. **Modifications to the Hydraulic Containment System Identified in the 1994 ROD**

   The 1994 ROD for Operable Unit 1 (OU-1) of the Site, which was signed by the Region 1 Administrator on June 17, 1994, requires a source control remedy that includes, among other things, hydraulic containment and treatment of the groundwater in the hot spot area of the landfill. The hydraulic containment system is currently comprised of one extraction well operating immediately downgradient of the hot spot area, as shown on Figure 1. Since the 1994 ROD, data has been gathered which show that the current hydraulic containment system is not fully capturing the shallow groundwater contaminant plume, and in February 2011, Rhode Island Resource Recovery Corporation ("RIRRC") was permitted by the Rhode Island Department of Environmental Management's ("RIDEM") Office of Waste Management to begin filling in an additional 153-acre area (Phase VI) of the landfill, which will overlie and extend east of the OU-1 area. Therefore, in this ESD, EPA is documenting its decision to relocate the hydraulic containment system approximately 1,500 feet downgradient of its current location to just outside of the intersection of the toe-of-slopes for the

Phase V landfill and the proposed Phase VI landfill expansion area. The relocated hydraulic containment system, which will extract groundwater and treat as necessary, will be designed to ensure that capture of the eastern part of the groundwater plume is achieved at the edge of the waste management area, and the groundwater and surface water performance standards for the remedy, as described in the 1994 ROD, are achieved. The western part of the plume will be captured by the stone underdrain located underneath Phase V, and will be treated, if necessary, prior to discharge into the Cedar Swamp Brook to achieve the surface water performance standards for the remedy. The relocated hydraulic containment system and the stone underdrain will collectively capture the entire groundwater plume at the edge of the waste management area so that the groundwater and surface water performance standards for the remedy are achieved. The current hydraulic containment system will be decommissioned after the relocated containment system and the stone underdrain are demonstrated to achieve full capture of the entire groundwater plume and the capability to achieve the groundwater and surface water performance standards within a reasonable timeframe.

2. **Updates to the numerical groundwater and surface water performance standards**

   The 1994 ROD documented numerical groundwater performance standards, which are used solely for the purpose of measuring the performance of the source control remedy. The 1994 ROD did not, however, include numeric performance standards for surface water. This ESD updates the numerical groundwater standards for several contaminants of concern included in the 1994 ROD. This ESD also specifies applicable numerical performance standards for surface water, which are to be used solely for the purpose of measuring the performance of the source control remedy.

In accordance with CERCLA § 117(d), 42 U.S.C. § 9617(d), and 40 C.F.R. §§ 300.435(c)(2)(i)(A) and 300.825(a)(2), this ESD and its supporting documents will be made available for public inspection and will be added to the Administrative Record for the Site. The Administrative Record is available for public review at the EPA Region 1 Records Center in Boston, Massachusetts, and the repository located near the Site, at the addresses listed below:

EPA Region 1 Records Center
5 Post Office Square, Suite 100
Boston, Massachusetts 02109-3912
By appointment only: 617-918-1440

Marian J. Mohr Memorial Library
One Memorial Avenue
Johnston, RI 02919
(401) 231-4980
Monday-Thursday: 9:00 am – 8:00 pm
Friday: 9:00 am – 6:00 pm
Saturday: 9:00 am – 5:00 pm

This ESD is also available at RIDEM's offices in Providence, Rhode Island. EPA will publish a notice of availability and a brief description of this ESD in a major local newspaper of general circulation following the signing of this ESD. EPA will also make this ESD available on its website at the following address: http://www.epa.gov/region1/cleanup/index.html.

## II. SITE HISTORY, CONTAMINATION, AND THE SELECTED REMEDY

The Site consists of a 121-acre portion (Phase I) of the landfill where disposal of municipal and hazardous material occurred prior to 1980, as well as an additional 33 acres (Phase II and Phase III) that were used to dispose of municipal solid waste, for a combined 154-acre area. This 154-acre Site is located within a larger active landfill (including Phase IV and Phase V: totaling approximately 76 acres) currently owned and operated by RIRRC. Currently, active landfilling activities are limited to Phase V; the active landfill receives over 90 percent of Rhode Island's municipally generated solid waste. In February 2011, RIRRC was permitted by RIDEM's Office of Waste Management to begin filling in an additional 153-acre area (Phase VI) of the landfill, as shown on Figure 1. Filling is expected to begin in Phase VI in 2014.

Located within the 121-acre, Phase I area of the Site is an approximately ½ acre area (the "hot spot area") where a minimum of 1.5 million gallons of documented hazardous wastes were disposed of between 1976 and 1979. Within the ½ acre hot spot area, bulk liquid waste was dumped into trenches that had previously been excavated into bedrock. The wastes disposed of in this area included latex waste, acid waste, corrosive waste, water soluble oils and waste solvents, including methylene chloride, toluene, 1,1,1-trichlorethane and tetrachloroethylene (PCE). EPA believes that, prior to 1976, a large quantity of non-manifested liquid hazardous waste was also disposed of in this ½ acre area.

EPA listed the Site on the National Priorities List in 1986. The 1994 ROD for OU-1 of the Site was signed on June 17, 1994. The 1994 ROD selected a source control remedy consisting of the following elements:

- Constructing a multi-layer RCRA Subtitle C cap over the existing 121 acre Phase I area and incorporating the existing 32 acres of RIDEM-approved cap on the side slopes;

- Hydraulic containment and treatment of groundwater in the hot spot area of the landfill and discharging the treated groundwater to either on-site surface water or the Cranston Waste Water Treatment Plant;
- Implementing deed restrictions on groundwater use and land development within property owned by the RISWMC (now known as RIRRC);
- Initiating a long-term program of sampling and analysis of groundwater, surface water and air;
- Conducting a detailed evaluation of the existing landfill gas collection and combustion system; and
- Installing a chain link fence to prevent access.

Construction of the approximately 89-acre RCRA Subtitle C cap started with the placement of controlled fill in July 1997. The cap construction project was completed in November 2005, bringing the total OU-1 cap area to 121-acres (which includes the 32-acres of pre-existing RIDEM-approved cap). A pre-final inspection was performed for the entire capped area in November 2005.

The 2005 ESD for the Site was signed in September 2005. The 2005 ESD documented that bench scale tests were performed to verify the suitability of an Ultraviolet/Chemical Oxidation ("UV/OX") system for treating contaminated groundwater. While these tests indicated that a UV/OX system might be technically feasible, the results also indicated that on-site treatment of both organic and inorganic contaminants could be eliminated without affecting the protectiveness of the remedy. The 2005 ESD documented that direct discharge of the extracted hot spot groundwater to the existing City of Cranston Waste Water Treatment Plant would be a similar cleanup approach to on-site treatment. The 2005 ESD therefore removed the requirement to treat the extracted hot spot groundwater using an on-site UV/OX system. The September 2005 ESD also revised the OU-1 performance standard for arsenic in groundwater from 50 ppb down to 10 ppb to reflect the national change to the MCL for arsenic.

RIRRC is currently constructing a pipeline to connect its industrial wastewater collection system to the Narragansett Bay Commission ("NBC") Fields Point wastewater treatment facility in Providence, Rhode Island. EPA will evaluate, after consultation with RIDEM, whether the discharge of effluent from the hydraulic containment system, along with RIRRC's other wastewater, to the NBC Fields Point wastewater treatment facility satisfies applicable ARARs and is protective of human health and the environment prior to the containment system effluent being discharged to the NBC wastewater treatment facility.

Construction of the hot spot hydraulic containment system started with the installation of a groundwater extraction well in July 2003. Construction of the final conveyance pipeline to the existing Central Landfill leachate pre-treatment system was completed in September 2006. A pre-final inspection for the hot spot hydraulic containment system was performed on September 21, 2006. The operation of the hydraulic containment system and groundwater treatment system began in September 2006.

Groundwater data show that the contaminated groundwater plume at the Site has an eastern and western part near its downgradient edge. The eastern part of the plume extends in a south-easterly direction from beneath the landfill toward Sedimentation Pond 2, while the western part of the plume extends in a south-westerly direction toward the former course of Cedar Swamp Brook, which is now an underdrain beneath Phase V of the landfill. See Figure 2.

At the time of the OU-1 ROD, Cedar Swamp Brook flowed along the southern border of OU-1 and discharged into Sedimentation Pond 2. During the Phase IV expansion, the segment of Cedar Swamp Brook in the vicinity of Phase IV was moved to the south, around the southern side of Phase IV, but the Brook continued to discharge into Sedimentation Pond 2. When the Phase V expansion occurred, Cedar Swamp Brook was again moved to the south, but the discharge for the re-located Brook now emptied into the Upper Simmons Reservoir, rather than Sedimentation Pond 2. At the time of the Phase V expansion, the original Cedar Swamp Brook channel beneath Phase V was filled with stone to create an underdrain that would control groundwater levels beneath Phase V and collect contaminated groundwater in the western part of the plume. The stone underdrain was configured to discharge to Sedimentation Pond 2. Due to the contribution of excessive concentrations of ammonia and iron to Pond 2, however, RIDEM determined that the discharge from the underdrain must be captured and treated to remove ammonia and iron, which were not identified as contaminants of concern in the OU-1 ROD. The treated groundwater will be discharged to the re-located Cedar Swamp Brook rather than Sedimentation Pond 2.

Deed restrictions and a long-term groundwater, surface water and air monitoring program have been implemented at the Site. As part of the OU-1 remedy, the RIRRC filed a Declaration of Covenants and Environmental Protection/Conservation Easements (the "Covenant") on property it owns at the facility. The Covenant prohibits the use of groundwater, except for remediation purposes, the installation of groundwater wells or the use of existing groundwater wells, and the alteration of the groundwater flow in any way. Further, the Town of Johnston adopted a Town Ordinance that, among other things, prohibits the use of groundwater wells and prohibits the Building Inspector from issuing permits for the construction of groundwater wells in any location where access to Town public water is available; where the well or proposed well is located in certain described areas including where groundwater has been classified by the State as GAA non-attainment, GA non-attainment, GB, GB non-attainment or GC; and where the well or proposed well is located in the Operable Unit 2 ("OU-2") areas recommended for institutional controls (Town of Johnston, RI Ordinance 2002-28). Access to the Site is controlled by a combination of fencing and on-site security, consistent with the 1994 ROD.

In 2002, EPA signed a ROD for OU-2 at the Site, which evaluated off-site migration of contamination. The OU-2 ROD concluded that no further actions were necessary other than those required by the 1994 ROD for OU-1.

## III. BASIS FOR THE DOCUMENT

This ESD is being issued to explain the following modifications to the selected remedy set forth in the 1994 ROD for the Site:

1. **Modifications to the Hydraulic Containment System Identified in the 1994 ROD**

   At the time the 1994 ROD was issued, it was anticipated that hydraulic containment of the groundwater in the hot spot area of the landfill would achieve the groundwater and surface water performance standards required by the ROD. The hydraulic containment system is currently comprised of one extraction well operating immediately downgradient of the hot spot area within Phase I of the landfill. In this ESD, EPA is documenting its decision to relocate the hydraulic containment system approximately 1,500 feet downgradient (i.e., south) of its current location to where the edge of the waste management area will be after Phase VI of the landfill is completed, as shown on Figure 1. EPA's decision is based on data, gathered after the 1994 ROD, which show that the current hydraulic containment system is not fully capturing the shallow part of the groundwater contaminant plume (GZA 2011a and GZA 2011b), and the fact that the landfill's Phase VI expansion (approximately 153 acres), which is expected to be active in 2014, is designed to piggyback on top of the existing RCRA Subtitle C cap areas by adding approximately 150 feet of landfill material above the current hydraulic containment system location (GZA 2012). The Phase VI landfill expansion will create significant technical and logistical problems for maintaining a hydraulic containment system in the hot spot area while solid waste filling progresses and following filling completion (GZA 2012). The relocated hydraulic containment system, which will extract groundwater and treat as necessary, will be designed to ensure that capture of the eastern part of the groundwater plume is achieved at the edge of the waste management area, and the groundwater and surface water performance standards for the remedy, as described in the 1994 ROD, are achieved. The western part of the plume will be captured by the stone underdrain located underneath Phase V, and will be treated, if necessary, prior to discharge into the Cedar Swamp Brook to achieve the surface water performance standards for the remedy. The relocated hydraulic containment system and the stone underdrain will collectively capture the entire groundwater plume at the edge of the waste management area so that the groundwater and surface water performance standards for the remedy are achieved.

   As described above, the relocated hydraulic containment system will be located approximately 1,500 feet south of its current location to the edge of the waste management area, as shown on Figure 1. The 1994 ROD describes the compliance boundary for groundwater containment at the Site as the toe-of-slope (i.e., edge) of the then-existing waste management area. Since the 1994 ROD, filling has occurred in at least two additional areas (Phase IV and Phase V) of the

landfill, which are located south of the Phase I, II, and III areas. In February 2011, RIRRC was permitted by RIDEM's Office of Waste Management to begin filling in an additional 153-acre area (Phase VI) of the landfill, which will overlie and extend east of the Phase I, II, and III areas. Therefore, EPA has determined that the compliance boundary for this ESD will be the edge of the waste management area at the intersection of the Phase V and Phase VI toe-of-slopes, as shown on Figure 1.

The current hydraulic containment system will be decommissioned after the relocated containment system and the stone underdrain are demonstrated to achieve full capture of the entire groundwater plume and the capability to achieve groundwater and surface water performance standards within a reasonable timeframe. The timeframe for decommissioning the current containment system will be determined based on an evaluation of containment conducted by RIRRC, subject to EPA's approval, in consultation with RIDEM.

## 2. Updates to the numerical groundwater and surface water performance standards

The 1994 ROD describes the groundwater performance standard for the source control remedy for the Site as "prevent groundwater that has contaminant concentrations exceeding MCLs and non-zero MCLGs from migrating beyond the compliance boundary ... or; in the absence of MCLs or non-zero MCLGs, prevent groundwater that has contaminant concentrations above levels that are protective of human health from migrating beyond the compliance boundary." The 1994 ROD also documented the then-applicable MCLs/non-zero MCLGs and levels that were protective of human health (i.e., risk-based levels).

This ESD updates the numerical groundwater standards included in the 1994 ROD, which are used solely for the purpose of measuring the performance of the source control remedy, for several contaminants of concern. In addition to the ARARs for groundwater described in the 1994 ROD, EPA considered the June 2010 Rhode Island Groundwater Quality Rules, the EPA 2012 Edition of the Drinking Water Standards and Health Advisories (the "2012 EPA Health Advisories"), which are to-be considered ("TBCs") under EPA guidance, and current cancer and non-cancer toxicity data in evaluating the numerical groundwater performance standards. The following numerical groundwater performance standards are updated to ensure the remedy complies with ARARs and is protective of human health and the environment: naphthalene is updated from 1,500 ug/L to 100 ug/L based on the June 2010 Rhode Island Groundwater Quality Rules; methyl ethyl ketone is updated from 22,000 ug/L to 4,000 ug/L based on the EPA 2012 Edition of the Drinking Water Standards and Health Advisories; 2,4-dichlorophenol is updated from 110 ug/L to 20 ug/L based on the 2012 EPA Health Advisories; manganese is updated from 200 ug/L to 300 ug/L based on the 2012 EPA Health Advisories; 1,1-dichloroethane is updated from

810 ug/L to 2.4 ug/L based on a $10^{-6}$ risk level; and vanadium is updated from 260 ug/L to 78 ug/L based on a non-cancer hazard index of 1 (see Attachment 1).

The 1994 ROD describes the surface water performance standard for the source control remedy for the Site as "prevent the degradation of surface waters below surface water standards." The 1994 ROD includes both the federal ambient water quality criteria and the Rhode Island water quality criteria in the list of ARARs for surface water. However, the 1994 ROD did not include numerical performance standards for surface water. This ESD specifies applicable numerical standards for surface water based upon the ARARs described in the 1994 ROD, and EPA Region 3 Freshwater Screening Benchmarks or EPA Nutrient Ecoregional Criteria, which are TBCs under EPA guidance (see Attachment 2).

Given the site-specific conditions at the Site, including the uses of the surface water bodies at the Site, EPA has determined that the applicable state water quality criteria must be met for the Upper Simmons Reservoir and the Cedar Swamp Brook, and that for constituents for which the State has not promulgated applicable water quality criteria, the relevant and appropriate national recommended water quality criteria must be met. In addition, EPA has determined that for constituents for which neither State nor federal water quality criteria exist, EPA Region 3 Freshwater Screening Benchmarks or EPA Nutrient Ecoregional Criteria must be satisfied. Attachment 2 provides a list of the surface water quality criteria that must be met at the Site to meet the surface water performance standard for the source control remedy.

## IV. DESCRIPTION OF SIGNIFICANT DIFFERENCES

### 1. Modifications to the Hydraulic Containment System Identified in the 1994 ROD

The original remedy for the Site is described in Section II of this document. The 1994 ROD selected a source control remedy which includes hydraulic containment and treatment of groundwater in the hot spot area of the landfill. The performance standards for the source control remedy, as described in the 1994 ROD, are to prevent contaminated groundwater from migrating beyond the compliance boundary and to prevent the degradation of surface waters below surface water standards. The 1994 ROD describes the compliance boundary for groundwater containment at the Site as the toe-of-slope of the 154-acre (Phase I, II, and III) waste management area. The ROD anticipated that hydraulic containment of the groundwater in the hot spot area of the landfill would achieve groundwater and surface water performance standards. The hydraulic containment system is currently comprised of one extraction well operating immediately downgradient of the hot spot area within Phase I of the landfill.

As previously identified, data gathered after the 1994 ROD show that the current hydraulic containment system is not fully capturing the shallow part of the groundwater contaminant plume. Also, the landfill's Phase VI expansion (approximately 153 acres) is designed to piggyback on top of the Phase I cap where the current system is located, which will result in the addition of 150 feet of waste on top of the existing RCRA Subtitle C cap areas where the current hydraulic containment system is located. Therefore, EPA has determined that relocating the hydraulic containment system to just outside of the proposed intersection of the Phase V and Phase VI toe-of-slopes is an appropriate modification to the remedy so as to achieve the groundwater and surface water performance standards identified in the ROD, while accounting for the fact that there are significant technical and logistical problems with maintaining a hydraulic containment system in the hot spot area while solid waste filling progresses (GZA 2012). The compliance boundary under the 1994 ROD was at the edge of the then-existing waste management area. Since the 1994 ROD, the edge of the waste management area in the vicinity of the groundwater contamination plume has moved south by approximately 1,500 feet due to the Phase V and VI landfill expansions. Therefore, EPA has determined that the compliance boundary for this ESD will be the edge of the waste management area at the intersection of the Phase V and Phase VI toe-of-slopes, as shown on Figure 1.

The current hydraulic containment system will be decommissioned at some point in the future, after the relocated containment system is demonstrated to be operational, fully capturing the eastern part of the groundwater plume, the stone underdrain is demonstrated to be fully capturing the western part of the groundwater plume, and in combination have the capability to achieve the groundwater and surface water performance standards within a reasonable timeframe. The timeframe for decommissioning the current system will be determined based on an evaluation conducted by RIRRC, subject to EPA's approval, in consultation with RIDEM.

Groundwater will be monitored to confirm that the relocated hydraulic containment system and the stone underdrain capture the entire contaminated groundwater plume. New groundwater monitoring wells will be installed both to demonstrate the effectiveness of the hydraulic containment system and the stone underdrain, and for purposes of long-term monitoring. Surface water will be monitored to demonstrate that the modified remedy prevents the degradation of surface waters below surface water standards, which is the surface water performance standard for the source control remedy.

This ESD modifies the remedy by relocating the hydraulic containment system to the proposed intersection of the Phase V and Phase VI toe-of-slopes. The relocated hydraulic containment system will be designed so that, in conjunction with the effect of the stone underdrain, capture of the entire groundwater plume is achieved and the groundwater and surface water performance standards for the remedy, as described in the 1994 ROD, are achieved. EPA has determined that moving the location of the hydraulic containment system, but maintaining the compliance boundary at the edge of the waste management area and continuing to meet the groundwater and surface

water performance standards, is significant, but does not fundamentally alter the remedy with respect to scope, performance or cost.

## 2. Updates to the numerical groundwater and surface water performance standards

The 1994 ROD describes the groundwater performance standard for the source control remedy for the Site as "prevent groundwater that has contaminant concentrations exceeding MCLs and non-zero MCLGs from migrating beyond the compliance boundary … or; in the absence of MCLs or non-zero MCLGs, prevent groundwater that has contaminant concentrations above levels that are protective of human health from migrating beyond the compliance boundary." The 1994 ROD also documented the then-applicable MCLs/non-zero MCLGs and levels that were protective of human health (i.e., risk-based levels).

This ESD updates the numerical groundwater standards included in the 1994 ROD, which are used solely for the purpose of measuring the performance of the source control remedy, for several contaminants of concern. In addition to the ARARs for groundwater described in the 1994 ROD, EPA considered the June 2010 Rhode Island Groundwater Quality Rules, the EPA 2012 Edition of the Drinking Water Standards and Health Advisories (the "2012 EPA Health Advisories"), and current cancer and non-cancer toxicity data in evaluating the numerical groundwater performance standards. The following numerical groundwater performance standards are updated to ensure the remedy complies with ARARs and is protective of human health and the environment: naphthalene is updated from 1,500 ug/L to 100 ug/L based on the June 2010 Rhode Island Groundwater Quality Rules; methyl ethyl ketone is updated from 22,000 ug/L to 4,000 ug/L based on the EPA 2012 Edition of the Drinking Water Standards and Health Advisories; 2,4-dichlorophenol is updated from 110 ug/L to 20 ug/L based on the 2012 EPA Health Advisories; manganese is updated from 200 ug/L to 300 ug/L based on the 2012 EPA Health Advisories; 1,1-dichloroethane is updated from 810 ug/L to 2.4 ug/L based on a $10^{-6}$ risk level; and vanadium is updated from 260 ug/L to 78 ug/L based on a non-cancer hazard index of 1 (see Attachment 1).

The 1994 ROD describes the surface water performance standard for the source control remedy for the Site as "prevent the degradation of surface waters below surface water standards." The 1994 ROD includes both the federal ambient water quality criteria and the Rhode Island water quality criteria in the list of ARARs for surface water. However, the 1994 ROD did not include numerical performance standards for surface water. This ESD specifies applicable numerical standards for surface water based upon the ARARs described in the 1994 ROD, and EPA Region 3 Freshwater Screening Benchmarks or EPA Nutrient Ecoregional Criteria, which are to-be-considered ("TBCs") under EPA guidance (see Attachment 2).

Given the site-specific conditions at the Site, including the uses of the surface water bodies at the Site, EPA has determined that the applicable state water quality criteria

must be met for the Upper Simmons Reservoir and the Cedar Swamp Brook, and that for constituents for which the State has not promulgated applicable water quality criteria, the relevant and appropriate national recommended water quality criteria must be met. In addition, EPA has determined that for constituents for which neither State nor federal water quality criteria exist, EPA Region 3 Freshwater Screening Benchmarks or EPA Nutrient Ecoregional Criteria must be satisfied. Attachment 2 provides a list of the surface water quality criteria that must be met at the Site to meet the surface water performance standard for the source control remedy.

## V. SUPPORTING AGENCY COMMENTS

RIDEM participated with EPA in developing the changes to the selected remedy described herein and was consulted during the preparation of this ESD. The State's comments have been incorporated into the ESD.

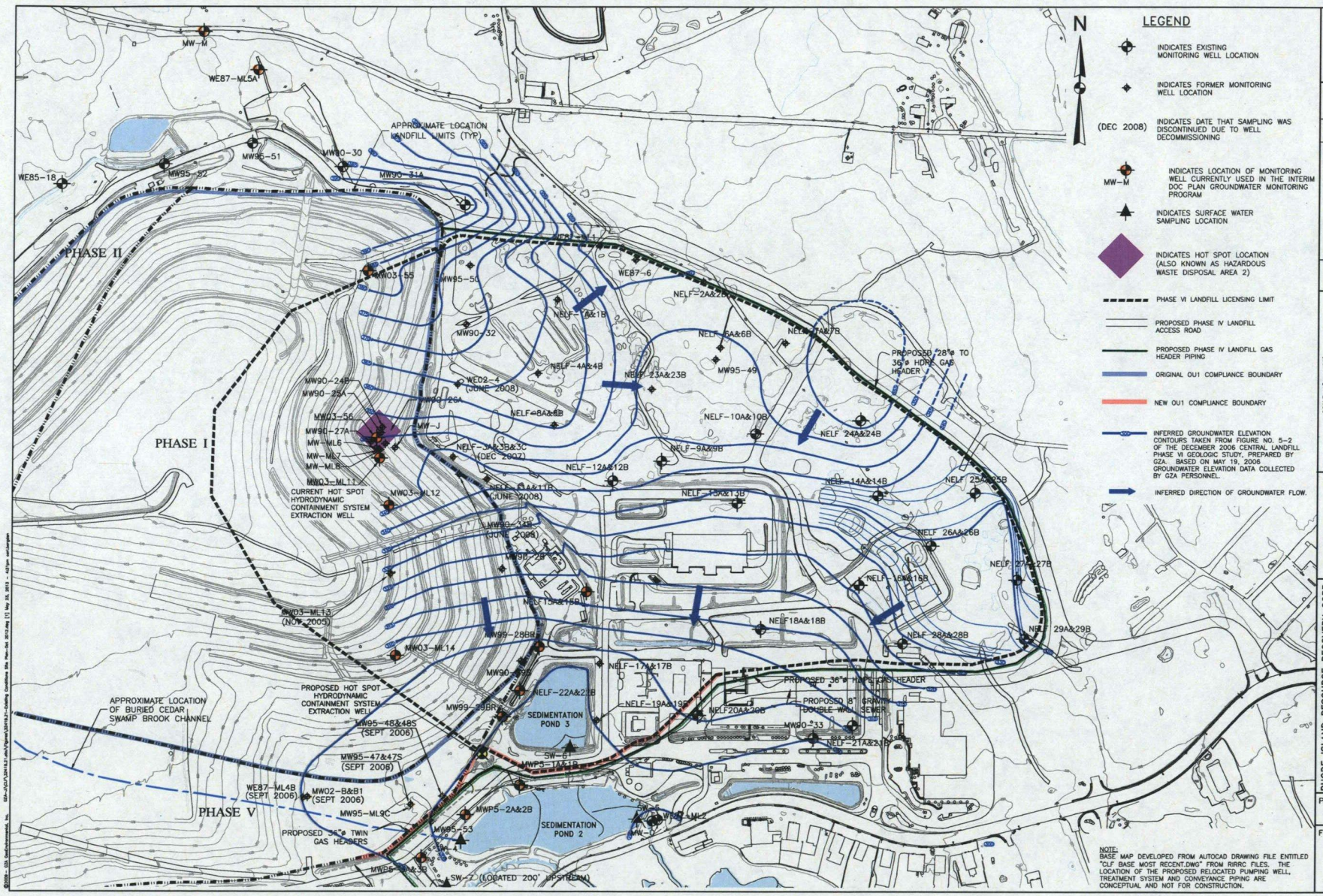
## VI. STATUTORY DETERMINATIONS

EPA believes that the remedy as adjusted herein remains protective of human health and the environment and satisfies the requirements in Section 121 of CERCLA, 42 U.S.C. § 9621. The changes made in this ESD have not changed the source control response objectives for the Site. Rather, the modifications to the remedy described herein will ensure that the remedy will achieve the groundwater and surface water performance standards as outlined in the 1994 ROD within a reasonable timeframe.

## VII. PUBLIC PARTICIPATION COMPLIANCE

In accordance with Section 117(d) with CERCLA, 42 U.S.C. § 9617(d), and 40 C.F.R. § 300.825(a), this ESD will become part of the Site's Administrative Record which is available for public review at the locations identified in the introduction to this ESD. A public notice, which summarizes the modification to the remedy as set forth in this ESD shall be published in a local newspaper of general circulation following the signing of this ESD.

**FIGURE 1**




NOTE:
BASE MAP DEVELOPED FROM AUTOCAD DRAWING FILE ENTITLED "CLF BASE MOST RECENT.DWG" FROM RIRRC FILES. THE LOCATION OF THE PROPOSED RELOCATED PUMPING WELL, TREATMENT SYSTEM AND CONVEYANCE PIPING ARE CONCEPTUAL AND NOT FOR CONSTRUCTION.

| REV. NO. | DESCRIPTION | BY | DATE |
|---|---|---|---|
| | | | |

SCALE: 1" = 400'
0 100 200 400

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REVIEWED BY: EAS
OPERATOR: CRB
DATE: MAY 2013

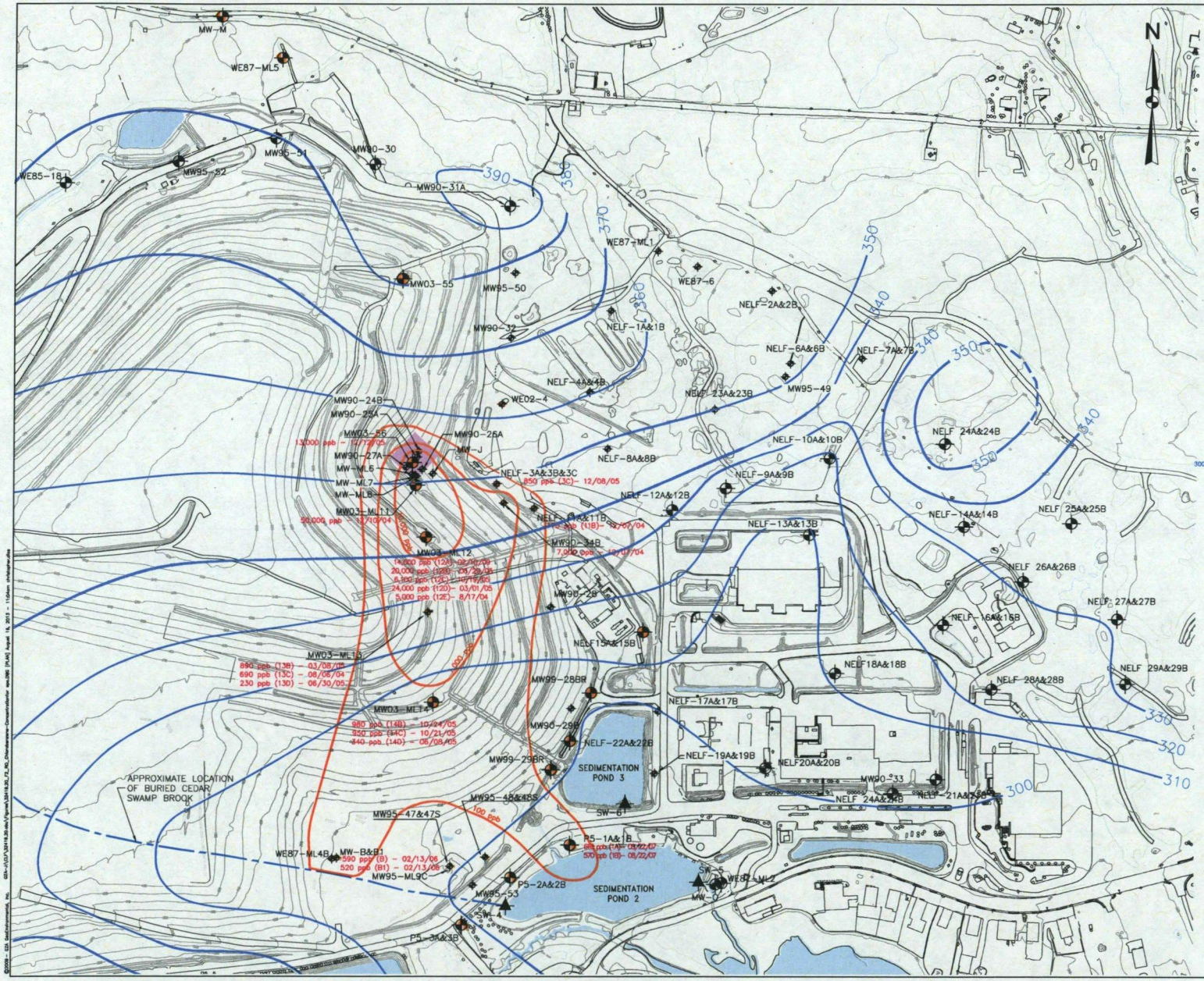
RHODE ISLAND RESOURCE RECOVERY CORP.
CENTRAL LANDFILL
HOT SPOT HYDRODYNAMIC CONTAINMENT SYSTEM
JOHNSTON, RHODE ISLAND

EXPLORATION OF SIGNIFICANT DIFFERENCES
SITE PLAN

PROJECT NO.
32419.21

FIGURE NO.
1

**FIGURE 2**




## LEGEND

- INDICATES EXISTING MONITORING WELL LOCATION
- INDICATES FORMER MONITORING WELL LOCATION
- MW-M — INDICATES MONITORING WELL USED IN GROUNDWATER MONITORING PROGRAM
- INDICATES SURFACE WATER SAMPLING LOCATION
- INDICATES HOT SPOT LOCATION (ALSO KNOWN AS HAZARDOUS WASTE DISPOSAL AREA 2)
- 20,000 ppb — INDICATES MAXIMUM CHLOROBENZENE CONCENTRATION OBSERVED BETWEEN AUGUST 2004 AND OCTOBER 2009. NOTE THAT VALUES ARE POSTED BESIDE MONITORING WELL ONLY IF THE CONCENTRATION EXCEEDED THE MCL OF 100ppb.
- 6/29/05 — INDICATES THE DATE THAT THE MAXIMUM CONCENTRATION WAS OBSERVED
- 10,000 ppb — INDICATES MAXIMUM OBSERVED CHLOROBENZENE CONTOUR – AUGUST 2004 TO OCTOBER 2009 (AT ANY DEPTH).
- 300 — GROUNDWATER ELEVATION CONTOUR (IN FEET) INFERRED FROM WATER LEVEL MEASUREMENTS RECORDED AUGUST 2008. COMPARISON OF AUGUST 2012 GROUNDWATER ELEVATION DATA SHOWS MINIMAL CHANGE FROM AUGUST 2008 AND AUGUST 2008 DATA IS SHOWN BECAUSE A MORE COMPREHENSIVE DATA SET IS AVAILABLE, AS MANY WELLS WERE PERMANENTLY CLOSED BETWEEN 2008 AND 2013.

| REV. NO. | DESCRIPTION | BY | DATE |
|---|---|---|---|

SCALE: 1" = 400'
0 100 200 400

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DESIGNED BY:
REVIEWED BY: EAS
OPERATOR: NEF
DATE: AUGUST 2013

RHODE ISLAND RESOURCE RECOVERY CORP.
CENTRAL LANDFILL
HOT SPOT HYDRODYNAMIC CONTAINMENT SYSTEM
JOHNSTON, RHODE ISLAND

MAXIMUM OBSERVED CHLOROBENZENE CONCENTRATION (ppb)
(AUGUST 2004 TO OCTOBER 2009)

PROJECT NO.
32419.20

FIGURE NO.
2

**ATTACHMENT 1**
Numerical Groundwater Performance Standards

ATTACHMENT 1
Numerical Groundwater Performance Standards
Central Landfill Superfund Site
Johnston, Rhode Island

| COC | MCL in ROD (ppb) | Risk-Based Performance Standard in ROD (ppb) | 2013 ESD Performance Standards (ppb) | Source |
|---|---|---|---|---|
| 1,1-Dichloroethane | - | 810 | 2.4 | Risk-Based (cancer risk = 10-6) |
| Methyl Ethyl Ketone | - | 22000 | 4000 | 2012 EPA Health Advisory |
| 2,4-Dichlorophenol | - | 110 | 20 | 2012 EPA Health Advisory |
| Naphthalene | - | 1500 | 100 | 2010 RIDEM GW Quality Std |
| Manganese | 200 (MCLG) | - | 300 | 2012 EPA Health Advisory |
| Vanadium | - | 260 | 78 | Risk-Based (non-cancer HI = 1) |

**ATTACHMENT 2**

Numerical Surface Water Performance Standards

ATTACHMENT 2
Numerical Surface Water Performance Standards
Central Landfill Superfund Site
Johnston, RI

| Contaminants of Concern | NRWQC [1] | | Freshwater Aquatic Ecological Benchmarks | | RIDEM AWQC [4] | | Surface Water Performance Standard |
|---|---|---|---|---|---|---|---|
| | CCC | Human Health for the Consumption of Organism Only | EPA Region 3 [2] | Nutrient Ecoregional criteria [3] | CCC | Human Health for the Consumption of Organism Only | |
| | (ug/L) | (ug/L) | (ug/L) | (ug/L) | (ug/L) | (ug/L) | (ug/L) |
| Volatile Organic Compounds | | | | | | | |
| Benzene | NA | 51 | 370 | | 5.9 | 510 | 5.9 |
| Chlorobenzene | NA | 1600 | 1.3 | | 18 | 1600 | 18 |
| 1, 1-Dichlorethane | NA | NA | 47 | | NA | NA | 47 |
| Methylene chloride | NA | 590 | 98.1 | | 214 | 5900 | 214 |
| Methyl Ethyl Ketone | NA | NA | 14000 | | NA | NA | 14000 |
| Toluene | NA | 15000 | 2 | | 14 | 15 mg/L | 14 |
| 1, 1, 1-Trichloroethane | NA | NA | 11 | | NA | NA | 11 |
| Trichloroethene | NA | 30 | 21 | | 43 | 300 | 43 |
| Vinyl Chloride | NA | 2.4 | 930 | | NA | 2.4 | 2.4 |
| Semi-Volatile Organic Compounds | | | | | | | |
| Bis(2-ethylhexyl)Phthalate | NA | 2.2 | 16 | | 12 | 22 | 12 |
| 1, 2-Dichlorobenzene | NA | 1300 | 0.7 | | 1.8 | 1300 | 1.8 |
| 1, 4-Dichlorobenzene | NA | 190 | 26 | | 1.2 | 190 | 1.2 |
| 2, 4-Dichlorophenol | NA | 290 | 11 | | 2.2 | 290 | 2.2 |
| Naphthalene | NA | NA | 1.1 | | 2.6 | NA | 2.6 |
| 1, 2, 4-Trichlorobenzene | NA | 70 | 24 | | 1.7 | 70 | 1.7 |
| Inorganics | | | | | | | |
| Arsenic | 150 | 0.14 | NA | | 150 | 1.4 | 1.4 |
| Beryllium | NA | NA | 0.66 | | 0.17 | NA | 0.17 |
| Cadmium (at 100 ppm hardness) | 0.25 | NA | NA | | 0.25 | NA | 0.25 |
| Chromium (hexavalent) | 11 | NA | NA | | 11 | NA | 11 |
| Cyanide | 5.2 | 140 | NA | | 5.2 | 140 | 5.2 |
| Lead (at 100 ppm hardness) | 2.5 | NA | NA | | 2.5 | NA | 2.5 |
| Manganese | NA | 100 | 120 | | NA | NA | 100 |
| Mercury | 0.77 | 0.3 mg/kg | NA | | 0.77 | 0.15 | 0.15 |
| Nickel (at 100 ppm hardness) | 52 | 4600 | NA | | 52 | 4600 | 52 |
| Nitrates (as Nitrogen) | NA | NA | NA | 320 | NA | NA | 320 |
| Vanadium | NA | NA | 20 | | NA | NA | 20 |

[1] NRWQC = National Recommended Water Quality Criteria http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm
(CCC = Criterion Continuous Concentration)

[2] http://www.epa.gov/reg3hwmd/risk/eco/btag/sbv/fw/screenbench.htm

[3] http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/upload/2007_09_27_criteria_nutrient_ecoregions_sumtable.pdf

[4] RIDEM AWQC = Rhode Island Department of Environmental Management Ambient Water Quality Criteria and Guidelines http://www.dem.ri.gov/pubs/regs/regs/water/h20q09.pdf

## References


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