

**FOURTH FIVE-YEAR REVIEW REPORT FOR
LANDFILL & RESOURCE RECOVERY (L&RR) SUPERFUND SITE
NORTH SMITHFIELD, RHODE ISLAND**

Superfund Records Center

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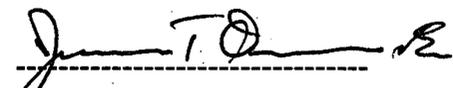
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9/25/14

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LIST OF ACRONYMS

1,1-DCA	1,1-Dichloroethane
1,2-DCA	1,2-Dichloroethane
ARAR	Applicable or Relevant and Appropriate Requirement
AAL	Acceptable Air Level
bgs	below ground surface
COC	Contaminant of Concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
HDPE	high density polyethylene
ICs	Institutional Controls
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
POC	Point of Compliance
ppb	parts per billion
ppm	parts per million
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objectives
ROD	Record of Decision
RCRA	Resource Conservation and Recovery Act
RIDEM	Rhode Island Department of Environmental Management
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SDWA	Safe Drinking Water Act
PCE	Tetrachloroethene
TCE	Trichloroethene
TCL	Target Compound List
µg/L	micrograms per liter
VC	Vinyl Chloride
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

This is the Fourth Five-Year Review (FYR) for the Landfill and Resource Recovery Superfund Site (Site) located in North Smithfield, Providence County, Rhode Island. The purpose of this FYR is to review information to determine if the remedy is and will continue to be protective of human health and the environment. The triggering action for this statutory FYR was the signing of the previous FYR on 9/2/2009.

The Site is a 28-acre closed landfill which is part of a 36-acre parcel owned by Landfill & Resource Recovery, Inc. (L&RR). The Site is located in an undeveloped area and is primarily surrounded by woodlands. Groundwater from the Site generally flows in east-northeasterly direction.

The remedy selected in the September 29, 1988 Record of Decision (ROD) for the Site, as modified by two ESDs, included: upgrading the landfill closure, installing a landfill gas collection and thermal destruction system, and periodic monitoring of groundwater and air at the Site for a period of thirty years. A requirement to implement institutional controls for land and water use was added in 1997 by the Consent Decree that was entered for the Site.

Construction of the remedy was completed in accordance with the ROD. A gas collection and treatment system (enclosed flare) has been operational since 1996 for most of the post-ROD period to reduce landfill gas emissions to the atmosphere and to control methane gas migration below ground outside the landfill. Major system improvements have been made to the system during this FYR period following an entire system shutdown from 2007-2009. Ambient Air Levels (AALs) promulgated under the Rhode Island Air Toxics Regulations were selected in the ROD as the target cleanup levels for gaseous emissions from the Site.

Groundwater sampling in newly installed, downgradient monitoring wells away from the eastern-northeastern edge of the landfill shows that contaminant concentrations exceed the MCLs for volatile organic compounds (VOCs) of concern and arsenic. In addition, 1,4-dioxane has also been identified in well locations east beyond the landfill footprint. However, recent testing of several residential wells in the direction of this groundwater contamination have not detected any contaminants (except chloroform which has not been identified in Site monitoring wells).

While this FYR has determined that the remedy is currently protective of human health and the environment, it also identifies the following issue(s) that call into question the long-term protectiveness of the remedy: (a) institutional controls are still required on a number of parcels to generally restrict the use of groundwater and surface water, and prohibit use of the property in any way that would disturb remedial measures taken, and (b) the ongoing investigations into the nature and extent of the groundwater plume beyond the landfill boundary and an evaluation of the need for a response (if appropriate) must be completed.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION

Site Name: Landfill and Resource Recovery (L&RR) Superfund Site

EPA ID: RID093212439

Region: 1

State: RI

City/County: North Smithfield/Providence

SITE STATUS

NPL Status: Final

Multiple OUs?

No

Has the site achieved construction completion?

Yes

REVIEW STATUS

Lead agency: EPA

Author name (Federal or State Project Manager): Anna Krasko

Author affiliation: U.S. Environmental Protection Agency

Review period: 1/9/2014 – 9/30/2014

Date of site inspection: 5/19/2014

Type of review: Statutory

Review number: 4

Triggering action date: 9/2/2009

Due date (five years after triggering action date): 9/2/2014

Five-Year Review Summary Form (continued)

Issues and Recommendations Identified in the Five-Year Review:

OU(s):	Issue Category: Institutional Controls			
	Issue: Required ICs have not been implemented			
	Recommendation: Finalize Land Usage Restrictions, Record ICs, and memorialize the ICs requirement in a decision document			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	Settling Defendants	EPA/State	9/30/2017

OU(s):	Issue Category: Remedy Performance			
	Issue: Groundwater migration beyond the landfill boundary at concentrations above MCLs.			
	Recommendation: Complete ongoing investigations into the nature and extent of the groundwater plume beyond the landfill boundary and evaluate need for a response (if appropriate).			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	Settling Defendants	EPA/State	9/30/2016

Site wide Protectiveness Statement	
<i>Protectiveness Determination:</i> Short-term Protective	<i>Addendum Due Date (if applicable):</i>
<p><i>Protectiveness Statement:</i> The remedy at the L&RR Superfund Site currently protects human health and the environment because: (a) access to the Site is restricted to prevent direct exposures to waste; (b) the vegetative cover and the drainage system are constructed and maintained to prevent erosion of soil and deposition in the surrounding wetlands; (c) institutional controls are in place on the landfill property; and (d) the cap, the landfill gas collection system, and the flare capture and treat landfill gases to prevent exposures at the landfill boundary. However, in order for the remedy to be protective in the long-term, the existing groundwater well network needs to continue to be monitored to evaluate trends in groundwater volatile organic compounds (VOCs) concentrations (including 1,4-dioxane), and the additional ELUR/plume delineation needs to be completed. In addition, EPA will continue to evaluate the proper groundwater investigation and response (if appropriate) to the migration of contamination further away from the capped landfill. Finally, the remaining institutional controls required in the settlement agreement must be finalized and the required ICs must be memorialized in a decision document.</p>	

1. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 and the National Contingency Plan (NCP). CERCLA 121 states:

“If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.”

EPA interpreted this requirement further in the NCP; 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

“If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such actions no less often than every five years after the initiation of the selected remedial action.”

EPA conducted this FYR of the remedy implemented at the Landfill and Resource Recovery (L&RR) Superfund Site (Site) in North Smithfield, Rhode Island. EPA is the lead agency for developing and implementing the remedy for the Site. Rhode Island Department of Environmental Management (RIDEM), as the support agency representing the State of Rhode Island, has reviewed all supporting documentation and provided input to EPA during this FYR process.

This is the Fourth FYR for the Site. The triggering action for this statutory review is signature of the last FYR, which was completed on September 2, 2009. The FYR is required due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

2. PROGRESS SINCE THE LAST REVIEW

The following provides the protectiveness determination and a list of the recommendations presented in the 2012 FYR Addendum to the 2009 FYR for the Site.

Table 1: Protectiveness Determination/Statement from the August 27, 2012 FYR Addendum to September 2009 FYR

OU #	Protectiveness Determination	Protectiveness Statement
Site wide	Short-term Protective	The remedy at the L&RR Superfund Site currently protects human health and the environment because: (a) access to the Site is restricted to prevent direct exposures to waste; (b) the vegetative cover and the drainage system are constructed and maintained to prevent erosion of soil and deposition in the surrounding wetlands; and (c) the cap, the landfill gas collection system, and the flare capture and treat landfill gases to prevent exposures at the landfill boundary. However, in order for the remedy to be protective in the long-term, the existing groundwater well network needs to continue to be monitored to evaluate declining trends in groundwater volatile organic compounds (VOCs) concentrations and the need for additional plume delineation, and to monitor the effectiveness of the existing landfill closure. Finally, the remaining institutional controls required in the settlement agreement must be finalized and the required ICs must be memorialized in a decision document.

Table 2: Status of Recommendations from the August 27, 2012 FYR Addendum to September 2009 FYR

OU #	Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Party	Original Milestone Date	Current Status	Completion Date (if applicable)
	The interim four fluidic flares and passive landfill gas collection system are not adequately controlling landfill gas migration at the Site.	Restart the enclosed flare and active landfill gas collection system and conduct performance testing and modeling to confirm compliance.	Settling Defendants.	EPA	9/3/2012	Completed	8/27/2012
	Several contaminants are present in one downgradient groundwater monitoring well beyond the landfill boundary at concentrations above MCLs.	Continue monitoring the existing groundwater well network and continue to evaluate declining trends in groundwater VOCs concentrations and the need for additional plume delineation and monitor effectiveness of the existing landfill closure.	Settling Defendants	EPA	12/30/2013	Ongoing	

	Required Institutional Controls have not been implemented.	Finalize Land Usage Restrictions, record ICs, and memorialize the ICs requirement in a decision document.	Settling Defendants	EPA	12/30/2013	Ongoing	
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Recommendation 1:

The enclosed flare and landfill gas collection system were upgraded and restarted in August 2012 following major system improvements beginning in 2009. However, intermittent operation of the flare has continued since that time due to low landfill gas production.

Recommendation 2:

Several VOCs and arsenic have been historically detected above MCLs or health risk-based levels at the CW-5 and MW-102 groundwater monitoring well locations on the northeastern-eastern side of the landfill (see Figure 1 – Site Plan). In July and August 2013, the Waterloo Advanced Profiling System (Waterloo) was used to obtain overburden vertical profiling data at three locations for the Settling Defendant’s environmental land use restriction (ELUR)-related groundwater plume delineation; all three locations were downgradient from either wells CW-5 or MW-102. Levels of several VOCs and arsenic were found above MCLs or human health risk-based levels in deeper overburden and above bedrock at one of the downgradient locations, WL-2 (located east of MW-102), with a few slightly elevated levels (but below MCLs) at the other downgradient locations, WL-1 and at WL-3 (see Figure 1 – Site Plan).

In addition to contaminants historically detected at the Site, 1,4-dioxane has been analyzed for and found at elevated levels since the last FYR, including high levels (maximum concentration of 450 ppb) detected at MW-104A (1,4-dioxane does not have an established MCL). As a result, a drinking water sample was also collected from the residential bedrock well on Lot 23 along Pound Hill Road on September 10, 2013 with all results shown as non-detect.

Based on this data, it was agreed that further assessment of the extent of the groundwater plume beyond the Trout Brook Pond wetland area (located east of the landfill) was warranted. Therefore, the Settling Defendants have conducted additional ELUR-related groundwater plume investigations in March and April 2014. Levels of several VOCs were still found above MCLs in the bedrock borehole (BH14-1) installed beyond Trout Brook Pond, approximately 1,000 feet east from the landfill (see Figure 1 – Site Plan). In addition, several nearby residential drinking water wells located along Pound Hill Road were tested during April 2014, and no VOCs were detected.

Recommendation 3:

Institutional controls, in the form of ELURs, are generally required at the Site to restrict groundwater use, restrict activities impeding remedial action measures, restrict residential use, and restrict soil disturbances at the landfill. An ELUR was previously recorded in November 2009 on the property that comprises the landfill. Progress has been made regarding other ELURs that are required for the Site, but negotiations are still on-going with RIDEM, the Settling Defendants, and the property owners as described below:

Status of ELUR negotiations with National Grid for Lots 81, 82, 83, 88, 89 and 90

Negotiations are on-going with National Grid and RIDEM (and the Settling Defendants) regarding the ELURs and soil management plans (SMPs) for National Grid lots 81, 82, 83, 88, 89 and 90, which are

located adjacent to the landfill (see Figure 1 – Site Plan).

In March 2014, National Grid provided to EPA drawings from its U.S. Army Corps of Engineers Clean Water Act Section 404 permit application for the proposed upgrade and construction of new transmission lines within their existing Right of Way and easement.

Status of ELUR negotiations for a portion of Lot 3

A small, triangular portion of Lot 3 requires an ELUR due to levels of methane gas that occur when the flare at the landfill is not fully operating due to maintenance and/or low methane levels being generated at the landfill. Negotiations have commenced and are on-going with the Owner Settling Defendants at the Site and the owner of Lot 3.

Status of ELUR negotiations for Lots 15, 23, 24, 66, and 70

The Settling Defendants are currently conducting investigations to further delineate the groundwater plume for an ELUR that may be necessary on the following lots: Lots 15, 23, 24, 66, and 70 adjacent to the Landfill. EPA will evaluate the results of the ELUR-related groundwater plume delineation (see recommendation #1 discussion above) prior to entering into negotiations for these ELURs.

Remedy Implementation Activities

As described above, several remedial implementation activities have occurred at the Site during this FYR including; (a) additional groundwater sampling and investigations, and (b) ELUR discussions.

System Operation/Operation and Maintenance Activities

Operation and maintenance and monitoring activities have continued since the last FYR and have included:

- Monthly landfill inspections and maintenance;
- Monthly monitoring of operational parameters of the 18 gas extraction wells and the enclosed flare;
- Monthly monitoring of the landfill gas probes;
- Flare inlet testing in February 2014;
- Settlement Monuments monitoring;
- Annual groundwater monitoring; and
- Annual surface water monitoring.

Additional repair activities conducted since the last FYR included an area of settlement (27 feet by 34 feet by 3 feet) in the landfill cap located near gas extraction wells W-4 and W-5, which was observed in February 2013 and subsequently repaired on November 4-5, 2013. No damage was noted in the existing 20 mil PVC liner and the repair was done with a 30 mil PVC liner patch adhered to the existing liner after leveling the subsided area and backfilling to the existing grade with vegetative support soil.

These activities have been summarized in monthly progress reports and Annual Post-Closure Site Monitoring reports submitted to EPA and RIDEM by the Settling Defendants. Data from these operation and maintenance and monitoring activities since the last FYR are further discussed in Section III of this report.

3. FIVE-YEAR REVIEW PROCESS

3.1 Administrative Components

The Settling Defendants were notified of the initiation of the FYR on 1/14/2014. The L&RR Superfund Site FYR was led by Anna Krasko of the U.S. EPA, Remedial Project Manager for the Site. Gary Jablonski of the Rhode Island Department of Environmental Management, assisted in the review as the representative for the support agency.

The review, which began on 1/9/2014 with a review team meeting, consisted of the following components:

- Community Notification and Involvement;
- Document Review;
- Data Review;
- Site Inspection; and
- Interviews.

3.2 Community Notification and Involvement

Activities to involve the community in the FYR process were initiated with a consultation in January 2014 between the RPM and Community Involvement Coordinator for the Site. A press release (see Appendix D) was issued by EPA Region 1 on February 13, 2014, stating that there was a five-year review for a number of Superfund sites across New England this year, including the Site and inviting the public to submit any comments to the EPA. On April 9, 2014, EPA also issued a fact sheet (see Appendix D) with a five-year review update for the Site, informing the public of the on-going monitoring activities and planned additional groundwater sampling. The results of the review and the report will be made available at the Site information repositories located at Municipal Annex Building, 85 Smithfield Road, North Smithfield, RI 02895 and the OSRR Records and Information Center, 1st Floor, 5 Post Office Square, Suite 100 (HSC), Boston, MA.

3.3 Document Review

This FYR consisted of a review of relevant documents including O&M records, Annual Post-Closure Site Monitoring reports, and Site monitoring data. The documents reviewed are listed in Appendix C.

3.4 Data Review

Data collected by the Settling Defendants since the last FYR were evaluated to assess landfill conditions, and groundwater, surface water and air concentration levels. It should be noted that the ROD has no specific groundwater remedial component, but requires annual groundwater monitoring at the Site to monitor the performance and integrity of the landfill closure. As described in the 1996 ESD for the Site, "EPA has reserved its rights to address groundwater in the future should information indicate that the groundwater presents an unacceptable risk to human health or the environment." A summary of the data review by media is provided below.

Groundwater

Groundwater monitoring is conducted annually at the following seven wells, which comprise the monitoring network at the Site: MW-201, MW-202, MW-102A, MW-103A, MW-104A, CW-7B

(in place of damaged well 7A), and CW-5B (see Figure 1 – Site Plan). The 2014 annual groundwater sampling round was also conducted during the preparation of this FYR and the available preliminary data indicates that the groundwater contaminant levels and trends are consistent with the annual groundwater monitoring data at the Site since the last FYR. In 2012 and 2014, at EPA's request, three additional monitoring wells (CW-5A, CW-5C and MW-102B) were also sampled.

Groundwater elevation data indicate that the groundwater is flowing in an east-northeasterly direction at the Site (see Figure 2).

During annual sampling rounds from 2010 through 2014, MCL exceedances of the following VOCs were detected in MW-102A, which is located downgradient (east-northeast) of the landfill: cis-1,2-dichloroethene, vinyl chloride, and arsenic (total and dissolved). Since 2011, cis-1,2-dichloroethene (cis-1,2-DCE) concentrations have remained below the MCL of 70 ppb, tetrachloroethene (PCE) has not been detected above the MCL of 5 ppb, and vinyl chloride concentrations have remained at or below 10 ppb. This recent data indicates that contaminated groundwater is migrating beyond this well, toward the abutting lot(s) and Trout Brook Pond (see Appendix B for trend plots for this well). In monitoring well CW-5B, which is located to the northwest of well MW-102A, but is still considered generally downgradient of the landfill, the concentration of tetrachloroethene, as well as all other contaminants, have declined to below MCLs in each annual monitoring round since 2010 (see Appendix B for trend plots for this well). In monitoring well MW-104A, which is located to the south of MW-102A but is also downgradient (due east) of the landfill, concentrations of arsenic (total and dissolved) were detected above the MCL (ranging from approximately 11-59 ppb) in all monitoring rounds since the last FYR. No trichloroethane, tetrachloroethene or vinyl chloride were found in MW-104A exceeding MCLs (see Appendix B for trend plots for this well). Groundwater concentrations in wells CW-5A, CW-5C, CW-7A/B, MW-102B, MW-103A, MW-201 (background well), and MW-202 have remained at or below MCLs throughout this FYR period.

Since 1996, the highest concentrations of several VOCs were generally found in monitoring wells CW-5B, MW-102A and MW-104A between the years 2000 and 2004. With few exceptions, such as arsenic at MW-104A, these concentrations have continued to decline or remain stable since the last FYR (see Appendix B trend plots for these wells).

Since the 2013 annual monitoring round, several VOCs have been added to the reported analyte list, including 1,4-dioxane. Due to elevated laboratory reporting limits, most 1,4-dioxane data was unacceptable prior to the 2014 annual sampling round, except for in well MW-104A, where it was reported at a high level of 450 ppb in 2012. During the 2014 annual monitoring, using a laboratory method with a lower detection limit, 1,4-dioxane was found in MW-104A at approximately 313 ppb, in CW-7B at 3.9 ppb, and in all of the other 8 wells tested for 1,4-dioxane at concentrations less than 2 ppb.

Since the last FYR, the Settling Defendants have been conducting an ELUR-related groundwater plume investigation. As part of that investigation, the Settling Defendant's installed three groundwater profiling boreholes on lots 23 and 81, WL-1, WL-2 and WL-3, downgradient of the landfill in the summer of 2013 (see Figure 1 – Site Plan). At boring location WL-2, which straddled up to 80 feet of overburden and is located 300 feet due east of the MW-102A, benzene, vinyl chloride, and arsenic had several detections exceeding their respective MCLs. In addition, 1,1-dichloroethane and 1,4-dioxane, which do not have MCLs, were found at levels in WL-2 that

exceeded their drinking water risk-based screening levels, with 1,4-dioxane as high as 268 ppb.

Due to the detection of several contaminants above their respective MCLs or human health risk-based levels, notably high levels of 1,4-dioxane at MW-104A and WL-2, the Settling Defendants conducted an additional ELUR-related groundwater plume investigation in March 2014. That investigation included a surface water hydraulic evaluation in the Trout Brook Pond area and installation of a bedrock borehole (BH14-1) east of Trout Brook Pond, approximately 1,000 feet east of the landfill (see Figure 1 – Site Plan). Based on the downhole geophysical logging, three select water-bearing fracture zones, 42-52 feet, 68-78 feet, and 81-91 feet, were sampled at BH14-1 in April 2014. An additional planned bedrock borehole that would have been located to the southeast of BH14-1 was not installed in March 2014 due to the inaccessibility of the planned drilling location. Elevated levels of VOCs were detected in BH14-1 that are generally higher at the deeper screened zones (greater than 68 feet bgs), including maximum concentrations of 1,4-dioxane at 13 ppb, PCE at 19.5 ppb, and trichloroethene (TCE) at 12.4 ppb.

As a result of the contamination found in BH14-1 on the east side of Trout Brook Pond, several residential drinking water wells on Pound Hill Road downgradient from BH14-1 were tested in April 2014 for the presence of VOCs and 1,4-dioxane. The residential drinking water wells were non-detect for all contaminants, with the exception of chloroform detected at a couple of residential well locations but at concentrations within EPA's acceptable risk range.

Surface Water

Surface water is monitored annually at six locations: SW-5, SW-8, SW-10, SW-16, LCH-3, and LCH-5 (see Figure 1 – Site Plan). During the 2014 annual sampling, with lower 1,4-dioxane laboratory detection limits, 1,4-dioxane was found at SW-8, SW-10, SW-16, and LCH-5, with the highest level of 35 ppb found at SW-8 and 16.7 ppb found at SW-10, indicating that some contaminated groundwater is discharging into surface water near the eastern side of the landfill. Of further note from the 2014 surface water sampling event, total arsenic exceeded the human health criteria for consumption of aquatic organisms only of 1.4 ppb at all locations, except LCH-5. However, dissolved arsenic concentrations only exceeded this human health criteria at location SW-8.

Landfill Gas

The RIDEM performance standard of 1.25% methane in seven perimeter compliance gas probes has been largely met since summer 2012 after re-start and upgrade of the flare system. Generally, when the flare and landfill gas extraction system are operational, gas migration is controlled and methane levels in gas probes at the edge of the landfill are in compliance.

However, a significant decline in the quantity and methane content of the gas extracted from the 18 gas wells within the landfill has occurred since the flare was first installed and operational in 1995. Estimates in 2014 have shown that gas generation is nearly half of that from 10 years ago, and average methane levels entering the flare system from May 2013-April 2014 were only at 25%. Currently, the Settling Defendants, EPA and RIDEM are in discussions regarding operation of the gas extraction and flare system on an intermittent basis.

Flare Performance Monitoring

During this FYR, Flare Performance Tests were conducted on December 1, 2009, and flare inlet gas sampling for VOCs was conducted on February 27, 2014, which were compared to the flare inlet samples obtained in 2009. According to the Flare Inlet Test Report, the results of the gas testing in 2014 were consistent with past results, with many compounds showing a decrease in concentrations from 2009 to 2014. Evaluation of the December 2009 stack test results for comparison to the RIDEM's air quality standards was not performed in the original 2010 report but was recently completed in April 2014. The review compared 2009 stack test results to AALs by applying the 2005 air dispersion modeling, and found air emissions to be in compliance at the landfill property boundary, despite the fact that a handful of in-stack contaminant concentrations, including benzene, exceeded RIDEM AALs. Overall, air toxics emissions are on a downward trend, with some air toxics being reduced by 90 percent or greater since 1995.

Settlement Monitoring

The 12 existing settlement monuments on the landfill cap were surveyed in March 2013 and 2014, and compared with the historic landfill settlement data. Long-term settlement rates are on the order of 2 to 4 inches per year for most monitoring stations, except at SM-8 and SM-9 near the top of the landfill where settlement rates are nearly 9 inches per year. No additional settlement monitoring is recommended to be performed at this time.

As noted previously, cap repair activities conducted during this FYR included an area of settlement (27 feet by 34 feet by 3 feet) in the landfill cap located near gas extraction wells W-4 and W-5, which was observed in February 2013 and subsequently repaired on November 4-5, 2013. No damage was noted in the existing 20 mil PVC liner and the repair was done with a 30 mil PVC liner patch adhered to the existing liner after leveling the subsided area and backfilling to the existing grade with vegetative support soil.

3.5 Site Inspection

The inspection of the Site was conducted on May 19, 2014. In attendance were representatives of EPA, RIDEM, and Woodard & Curran, a contractor for the Settling Defendants. The purpose of the inspection was to assess the protectiveness of the remedy.

Site inspection attendees visually inspected and discussed the conditions of the remedy, including portions of the gas system, cover system, monitoring system, and Site controls. The following is a summary of the inspection:

*Various components of flare treatment system were reviewed and their operational status was discussed, including a substantial amount of repairs to the system that have occurred to both the collection system and treatment system since the last FYR;

*The Settling Defendants' contractor explained that the flare no longer has a sufficient, continuous quantity and quality of landfill gas to operate on a full-time basis. The flare was operational on the morning of the Site inspection, but shutdown immediately prior to the start of the inspection due to inadequate methane. The subsequent discussion was focused on the operation and condition of the system as it relates to the inability of the system to operate full-time and EPA's request for a description of the repairs that have been done since the last FYR, along with additional operational data concerning the flare as the Agencies review the Settling Defendants' recent request to formally

operate the flare on an intermittent basis;

*Several gas extraction wells were inspected, including an area near W-18 where repairs have been completed since the last FYR;

*Soil gas compliance replacement probes GP-1R and GP-4R were observed and their compliance with the 25% Lower Explosive Limit (LEL) methane requirement was discussed;

*Condition of the cover system were noted, including a location where the landfill cover had recently subsided and had been repaired. The grass growth was a bit sparse in that area and the Settling Defendants' contractor indicated that this would be augmented as necessary;

*The eastern boundary of the landfill was also observed, including perimeter monitoring wells where elevated levels of contaminants are found in groundwater, and an area of the adjacent National Grid easements where some preparatory vegetation clearing work was evident in preparation for the National Grid plans to upgrade its power lines; and

*The EPA attendees, following the Site inspection, drove along Pound Hill Road to observe the locations where residential well testing was performed in April 2014, and where the location of the NIKE site was along that road.

3.6 Interviews

During the FYR process, interviews were conducted with parties impacted by the Site, including the current homeowners and town officials involved in Site activities or aware of the Site. The purpose of the interviews was to document any perceived problems or successes with the remedy that has been implemented to date. Interviews were conducted on April 9 and April 29, 2014. Interviews are summarized below.

EPA's Community Involvement Coordinator met and interviewed Paulette Hamilton, Town Administrator of North Smithfield, RI, and a number of residents who live near the Site and whose drinking water wells were recently tested in April 2014. No real concerns were expressed. All of the interviewees seemed satisfied with the contact and expressed no concerns. The residents were pleased that wells were being tested and no one expressed any concerns about their well water. Ms. Hamilton, Town Administrator, was very familiar with the Site. She was also aware of the other hazardous waste-type sites in North Smithfield, RI, and specifically mentioned the former NIKE site located on Pound Hill Road to the northeast of the L&RR Site. The former NIKE site is a state-lead cleanup project. Ms. Hamilton was updated on the status of the Site, including annual monitoring of ground water and surface water, monthly landfill inspections, and the then-pending testing of resident's private drinking wells. Ms. Hamilton did not raise any issues during the interview or during follow-up call after the residential well testing results were available.

4. TECHNICAL ASSESSMENT

4.1 Question A: Is the remedy functioning as intended by the decision documents?

YES. Construction of the remedy was completed in accordance with the 1988 ROD through the installation of the landfill cap and drainage structures, as well as the gas collection and treatment

system. The flare performance and flare inlet testing results demonstrate that the gas collection and treatment system complies with RIDEM's AALs (last 5-Year flare performance test done in December 2009 and the next performance test is scheduled for December 2014, last inlet testing done in February 2014) when the system is properly operating. Flare inlet VOC concentrations have been decreasing since the start of flare operation. Following significant flare repairs in 2009 and 2011, the flare has been generally operating on a continued basis (except during short-term shut downs due to malfunction and repair) until recently and has been controlling landfill gas migration as indicated by methane levels in compliance probes at the perimeter at the landfill. Since early 2014, however, the flare has been shutting down intermittently due to declining landfill gas generation. As a result, additional changes were made to the flare system in 2014 to utilize remote telemetry and control programming that will allow the flare to operate more efficiently (but on an intermittent basis based on gas generation).

However, groundwater data recently collected as part of the Settling Defendants' ELUR-related groundwater investigation in 2013 and 2014 shows levels of several VOCs and arsenic above MCLs in overburden and bedrock groundwater extending further away from the landfill in the east-northeast direction, including beyond the streams and wetlands associated with the Trout Brook Pond. These groundwater data indicate that groundwater contamination from the landfill has migrated beyond these surface water bodies, contrary to the assumption in prior FYRs that the Trout Brook Pond would prevent such migration by acting as a groundwater discharge area. Data from the nearest 8-10 downgradient residential drinking water wells, however, did not contain any detectable levels of VOCs (except low levels of chloroform which is not found in Site monitoring wells) in April 2014.

The estimated cancer risks that would be associated with exposure to the levels of VOCs, arsenic and 1,4-dioxane detected in the overburden and bedrock groundwater in borehole BH14-1 (see Figure 1 – Site Plan) are within the EPA target risk range of 10^{-4} to 10^{-6} . The non-cancer hazard index estimate that would be associated with exposure to the levels of TCE detected in the overburden and bedrock groundwater in BH14-1 is above the acceptable hazard index of 1. However, no exposure to such groundwater is currently occurring because the nearest residential drinking water wells do not contain any detectable levels of VOCs. Despite the lack of current exposure, the potential for migration of contaminants to the residents' drinking water wells indicates that a future potential risk may exist. EPA will continue to evaluate the proper groundwater investigation and response (if appropriate) to the migration of contamination further away from the capped landfill.

Elevated levels of 1,4-dioxane and arsenic have also been found in surface waters associated with Trout Brook Pond. Although there is no MCL and no surface water screening level for 1,4-dioxane, the highest detected level of 35 ppb in surface water was screened against drinking water screening levels to be conservative. This maximum detected level exceeds the risk-based screening level but results in $4.5E-5$ cancer risk (within EPA's acceptable risk range) should the water be used for drinking and household activities. Arsenic levels found at SW-5 and SW-8 also exceed the surface water screening level, but are below the MCL of 10 ppb, and result in cancer risk of $5.2E-6$. These levels do not exceed EPA's target risk range or hazard index.

The Consent Decree requires institutional controls, in the form of ELURs, to be put in place on a number of parcels at the Site. The ELURs will generally restrict the use of groundwater and surface water, prohibit disturbance of the landfill cap, and prohibit use of the property in any way that would disturb the remedial measures implemented at the Site. While the ELURs on the

landfill itself have been recorded, other ELURs are still being developed and negotiated with adjacent property owners. EPA is continuing to make progress in its discussions with RIDEM, the Settling Defendants and the property owners regarding the ELURs. A review of activities conducted on these parcels indicates that no one is currently using the parcels in a manner inconsistent with the contemplated ELURs. The recent groundwater contamination findings are expected to impact the scope of ELURs required on certain property(s) located east of the landfill.

As expected, the landfill gas production rates (both gas volume and methane content) have decreased over almost 20 years of gas extraction and flare operation. The gas generation estimate for 2014 is about half that of 10 years ago and forecasts another 50 percent decrease in flow over the next 10 years. To address that change, the flare has been temporarily retrofitted in 2014 to operate intermittently. Currently, this change does not affect protectiveness of the remedy.

The investigations of the extent of the groundwater plume and proper response are continuing. Additional groundwater well(s) are likely to be needed and the closest residential wells are expected to be tested as a precautionary measure to confirm that they are not impacted.

4.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy section still valid?

NO. While there are no changes in current land uses at the Site, or any changes in the physical conditions or receptors that could result in increased exposure to Site contaminants, contaminated groundwater plume migration to the east-northeast of the landfill suggests that a future risk from groundwater contact may exist. The RAOs used at the time of the remedy selection, as amended, are still valid.

Changes in Standards and TBCs

Landfill gaseous emissions were recognized as the greatest component of human health risk in the 1988 ROD. Cleanup levels for air were established as AALs listed in RIDEM Air Toxic Regulations. The AALs were updated most recently in a 2008 revision of the regulations, which was based on toxicity information and encompasses more contaminants. A discussion of these changes was provided in 2009 FYR and these changes still do not call into question the protectiveness of the remedy. Evaluation of the last stack test from 2009 shows that the emissions meet the previous and current RIDEM AALs.

Changes in Exposure Pathways

The human health exposure pathways considered in the Public Health and Environmental Assessment (Ebasco, 1988) included: (1) ingestion of groundwater as drinking water; (2) children exposed to surface water and sediment while wading in nearby streams; and (3) future children exposed to gas emissions from the landfill. At the time, groundwater at the landfill boundaries met drinking water criteria, thus no unacceptable risk from groundwater use was found in the ROD. Risks from surface water and sediment exposures were also considered insignificant. The greatest risk that required the landfill closure remedy in accordance with the 1988 ROD resulted from exposures to landfill gas emissions.

Since landfill closure, elevated contaminant levels have been detected in groundwater at the edge and now away from the eastern boundaries of the landfill. During the ELUR-related groundwater plume investigation in 2013 and 2014, several VOCs and arsenic were detected above MCLs in overburden and bedrock groundwater samples at groundwater monitoring locations approximately 300 feet (WL-2) and 1,000 feet (BH14-1) downgradient of the landfill. Furthermore, 1,4-dioxane has been analyzed for during recent sampling events for this FYR and has been found at elevated levels in monitoring wells MW-104A and BH14-1. Although groundwater at these monitoring locations is not currently used as drinking water and no VOCs or other contaminants were detected in the nearby residential drinking water wells tested at the same time, the levels of VOCs from BH14-1 could be used to estimate risks from exposure to groundwater should this groundwater be used for residential purpose.

The 1988 ROD did not evaluate the vapor intrusion exposure pathway. Elevated levels of VOCs in groundwater sampled at borehole BH14-1 in 2014 were compared to EPA vapor intrusion screening levels (VISLs) and do not exceed the VISLs, except for PCE and TCE. However, vapor intrusion is not currently occurring at the location of borehole BH 14-1 because this borehole is located at least 300 feet away from the nearest residence located on Pound Hill Road.

The Public Health and Environmental assessment conducted for the Site considered children exposed to surface water and sediment while wading in nearby streams from dermal exposure only. Current standard practice in risk assessment would also include evaluation of incidental ingestion of sediments for wading scenarios. However, no sediment monitoring is required at the Site by the ROD or as part of the landfill O&M and no recent sediment data exist to confirm low levels of contaminants in sediment for such an exposure scenario. Nevertheless, the changes in exposure assumption for this receptor have been determined to be unlikely to result in a change in the conclusion of the risk assessment, even with the recent detection of 1,4-dioxane in surface water.

Changes in Toxicity and Other Contaminant Characteristics

The 2009 FYR re-evaluated the inhalation risk for the landfill gas emissions based on updated toxicity factors developed since the 1988 ROD and concluded that the conservative risk estimate for the compounds detected in the effluent from the stack remains within EPA's acceptable risk range. That risk re-evaluation included contaminants not detected or analyzed for at the time of the remedy selection but detected in more recent inlet and stack tests, such as dioxin-like PCBs, dioxins and furans, and several VOCs.

Though MCLs are not considered groundwater cleanup standards for groundwater at the Site as described in the 1996 ESD, they are being used to monitor the performance and integrity of the landfill closure. As described further below, several toxicity values have been modified for the contaminants of concern (COC) identified in 1988 ROD. Furthermore, a number of additional compounds not detected at the time of the ROD but recently found at elevated levels in groundwater, such as 1,4-dioxane, cis-1,2-DCE, TCE, PCE and vinyl chloride, now have toxicity values established which can be used to estimate risks from exposure.

On September 28, 2011, EPA finalized the revised toxicity assessment for TCE with new toxicity values. Based on the new assessment, TCE is more toxic for both cancer and non-cancer health effects. On February 10, 2012, EPA also finalized the revised toxicity assessment for PCE. Based on the new assessment, PCE is less toxic for cancer effects but more toxic for non-

cancer health effects. In 2010 and 2013, EPA finalized the cancer and non-cancer toxicity assessment for 1,4-dioxane, showing 1,4-dioxane to be more toxic for both cancer and non-cancer effects. For other COCs identified at the Site, there are no changes of toxicity assessment since the 2009 FYR. The changes to the toxicity values of TCE, PCE, and 1,4-dioxane would likely result in an increase of overall estimated Site risks but would still be within EPA's acceptable risk range.

For carcinogens, risk estimates are measured in terms of probability or chance. Exposure to a particular carcinogen can be estimated as 10^{-4} or 1 in 10,000 increased chance of causing cancer over an estimated lifetime of 70 years. The EPA acceptable cancer risk range is 10^{-4} to 10^{-6} , which is a 1-in-10,000 to 1-in-1 million increased chance of developing cancer from being exposed to carcinogenic contaminants at a site over an estimated lifetime of 70 years. Exposure to detected levels of VOCs, arsenic, and 1,4-dioxane at depths in BH14-1 would result in estimated cancer risk level of 5×10^{-5} should the water be used for drinking and household activities, which is within EPA's acceptable risk range. Exposure to detected levels of VOCs in other residential wells of Pound Hill Road would result in estimated cancer risk level of 1×10^{-5} (due to low levels of chloroform at 3.4 ppb). These estimated risk levels are within EPA acceptable cancer risk range.

For non-carcinogens, exposures are estimated and compared to a reference dose, which is a chemical-specific level developed to estimate the amount of chemical a person could be exposed to over a lifetime without developing adverse health effects. The ratio of the exposure dose to the reference dose is measured as a hazard index (HI). A HI level of 1 or below 1 suggests that there are no adverse health effects from the exposures. The non-cancer hazard estimate that would be associated with exposure to the levels of TCE in groundwater at BH14-1 exceed the acceptable HI of 1, with the highest detected TCE level resulting in HI of 5. Although the nearest residents rely on private drinking water bedrock wells, no VOCs or other contaminants were detected in the nearby residential drinking water wells tested at the same time. Although no contaminants have been detected in sampling of the residential wells located downgradient of BH14-1, the contaminated plume migration east-northeast of the landfill suggests that a future groundwater risk may exist at the Site. EPA will evaluate the proper groundwater investigation and response.

Cancer risks and non-cancer hazards via the vapor intrusion exposure pathway were also estimated based on groundwater detections in BH14-1. The estimated vapor intrusion cancer risks from exposure to all detected groundwater concentrations (including PCE and TCE) would be 1×10^{-5} , which is within the EPA acceptable risk range.

Except for cancer toxicity values for PCE, although the new toxicity values are more stringent for some of the COCs at the Site than those used in the human health risk assessment for the 1988 ROD and could result in higher risks at the Site, the estimated cancer risks from groundwater and surface water are still within EPA acceptable risk range. With the new changes in non-cancer toxicity values for TCE, this is the only contaminant which would result in a HI above the acceptable level should the groundwater at this location be used for drinking and household activities.

Changes in Risk Assessment Methods

Since the 1988 ROD, changes have been adopted to the equations used to calculate risks from

exposures to ambient air, surface water, sediment and groundwater. In 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. http://www.epa.gov/oswer/riskassessment/superfund_hh_exposure.htm (items # 22 and #23 of this web link). Many of these exposure factors differ from those used in the risk assessment for the 1988 ROD. These changes in general would result in a slight decrease of the risk estimates for most chemicals.

There are also changes in methods used to evaluate early childhood cancer risks from contaminants that act via a mutagenic mode of action (EPA's Guidelines for Carcinogen Risk Assessment and Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens, 2005). TCE and vinyl chloride are the only Site COCs considered to act via a mutagenic mode of action. Applying this new method of evaluating cancer risks from TCE and vinyl chloride would result in higher cancer risks to future residents potentially exposed to these Site contaminants. Although calculated risks from potential exposure pathways at the Site may differ from those previously estimated, slightly higher for some contaminants and slightly lower for others, the revised methodologies themselves are not expected to affect the protectiveness of the remedy.

Expected Progress towards Meeting RAOs

Landfill closure and gas collection and treatment system have been constructed and operated in accordance with the ROD. The VOC groundwater plume from the landfill may indicate that the landfill cap is not performing effectively or as designed. Additional studies and evaluations to determine the extent of the groundwater contamination and whether RAOs need to be revised may be needed.

4.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

YES. The investigations of the extent of the groundwater plume and proper response are continuing. Additional groundwater well(s) are likely to be needed and the closest residential wells are expected to be tested as a precautionary measure to confirm that they are not impacted.

4.4 Technical Assessment Summary

The landfill closure remedy is generally functioning as intended by the 1988 ROD, as modified by ESDs. Groundwater investigation, however, has detected the presence of an overburden and bedrock plume extending beyond the nearby Trout Brook Pond area which had previously been thought to be a natural discharge area for contaminated water from the landfill. Levels of VOCs in excess of MCLs were detected in bedrock nearly 1,000 feet east of the landfill, with several residential water supply wells located a few hundred feet just beyond that monitoring point. Although no VOCs were detected in these residential wells, additional investigation and evaluation are needed to establish the extent of the groundwater contamination, to confirm that residential wells are not impacted, and to determine the appropriate response.

For the landfill gas collection and treatment system, a monitoring program will need to be established to demonstrate that the intermittent flare operation is in compliance with RIDEM standards for the landfill gas migration and air emissions.

5. ISSUES/RECOMMENDATIONS AND FOLLOW UP ACTIONS

Table 3: Issues and Recommendations/Follow-up Actions

OU #	Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
						Current	Future
	Required ICs have not been implemented	Finalize Land Usage Restrictions, Record ICs, and memorialize the ICs requirement in a decision document	Settling Defendants	EPA and RIDEM	9/30/2017	No	Yes
	Groundwater migration beyond the landfill boundary at concentrations above MCLs.	Complete ongoing investigations into the nature and extent of the groundwater plume beyond the landfill boundary and evaluate need for a response (if appropriate).	Settling Defendants	EPA and RIDEM	9/30/2016	No	Yes

In addition, the following are recommendations that may be considered in the future that could improve effectiveness of remedy, reduce costs and provide energy conservation but do not affect current or future protectiveness and were identified during the preparation of this FYR:

The Settling Defendants have proposed modifications to the protocols for operating the landfill gas management system due to declining gas generation at the Site. This proposed modification would include remote telemetry and control programming that would allow the flare to operate on an intermittent (daily on-off cycle) basis, while ensuring compliance with the post-closure operational requirements.

6. PROTECTIVENESS STATEMENT

Site wide Protectiveness Statement	
<i>Protectiveness Determination:</i> Short-term Protective	<i>Addendum Due Date (if applicable):</i>
<i>Protectiveness Statement:</i> The remedy at the L&RR Superfund Site currently protects human health and the environment because: (a) access to the Site is restricted to prevent direct exposures to waste; (b) the vegetative cover and the drainage system are constructed and maintained to prevent erosion of soil and deposition in the surrounding wetlands; (c) institutional controls are in place on the landfill property; and (d) the cap, the landfill gas collection system, and the flare capture and treat landfill gases to prevent exposures at the landfill boundary. However, in order for the remedy to be protective in the long-term, the existing groundwater well network needs to continue to be monitored to evaluate trends in groundwater volatile organic compounds (VOCs) concentrations (including 1,4-dioxane), and the additional ELUR/plume delineation needs to be completed. In addition, EPA will continue to evaluate the proper groundwater investigation and response (if appropriate) to the migration of contamination further away from the capped landfill. Finally, the remaining institutional controls required in the settlement agreement must be finalized and the required ICs must be memorialized in a decision document.	

7. NEXT REVIEW

The next five-year review report for the L&RR Superfund Site is required five years from the signature date of this review in 2019.

APPENDIX A – EXISTING SITE INFORMATION

A. SITE CHRONOLOGY

Date	Event
November 1977	Landfill & Resource Recovery, Inc., (L&RR) submitted plans for installation of seven monitoring wells to the Rhode Island Department of Health
September 1979	The Rhode Island Department of Environmental Management ordered L&RR to stop accepting hazardous wastes for disposal
September 8, 1983	Final listing on EPA National Priorities List
1985	Landfill closure began
June 1988	Completion of Remedial Investigation/Feasibility Study
September 29, 1988	Record of Decision is signed
June 29, 1990	Unilateral Administrative Order (UAO) issued by EPA
October 14, 1990	The Statement of Work attached to the UAO was modified
March 8, 1991	First Explanation of Significant Differences issued for the Site
March 1993	Remedial Design start
September 1994	Remedial Design completion
May 1994	RA construction activities began at the Site
February 1995	RA construction completed
September 1996	Post Closure Operation and Maintenance Plan approved by EPA
September 16, 1996	Second Explanation of Significant Differences issued for the Site
February 18, 1997	Settlement Agreement and Consent Decree lodged in U.S. District Court
February 24, 1997	Preliminary Close Out Report issued by EPA
March 25, 1997	Final As-Built Drawing submitted for EPA review and approval
September 4, 1997	Remedial Action report issued by EPA
September 1999	First FYR report issued by EPA for the Site
September 28, 2004	Second FYR report issued by EPA for the Site.
January 2007	Shut down of the enclosed flare and condensate injection system due to mechanical failures.
Spring 2007	Groundwater monitoring frequency was changed from semi-annual to annual.
April 2007	Approval by EPA and RIDEM for the installation of four interim fluidic (candlestick) flares as a stop-gap measure until the enclosed flare system could be repaired.
November 2008	Settling Defendants install 45 temporary gas monitoring probes to monitor off-site landfill gas migration.
July 2009	Reactivation of the enclosed flare and active gas collection system
September 2009	Third FYR report issued by EPA for the Site.
November 2009	ELURs for Lots 9, 9A, 67,10,11 and 68 (owner PRP) are recorded
December 2009	Flare Performance Stack Test was performed

August 2012	Addendum to Third FYR issued for the Site
2010-2014	Settling Defendants conduct additional ELUR-related groundwater investigations for Lots 15 and 23
August 2013	Settling Defendants install new gas probes GP-1R and GP-4R to replace GP-1 and GP-4
November 2013	Settling Defendants repair cap subsidence area near gas wells W-4 and W-5
April 2014	Approximately 8-10 residential wells are sampled by the Settling Defendants

B. BACKGROUND

Physical Characteristics

The Site is a 28-acre closed landfill located in North Smithfield, Providence County, Rhode Island. The landfill is part of a 36-acre parcel owned by Landfill & Resource Recovery, Inc. (L&RR), which is located on Oxford Turnpike (also called Old Forge Road) northwest of its intersection with Pound Hill Road. Access to the Site is by way of an unpaved road that connects Douglas Pike (Route 7) to Oxford Turnpike just north of the Site (see Figure 1 -- Site Location Map in Appendix B).

The Site is located in an undeveloped area and is primarily surrounded by woodlands. The landfill extends to Oxford Turnpike to the west and southwest; to a wetland and intermittent stream to the southeast; and to the property line or onto the adjacent power line property to the north and east (see Figure 1 – Site Plan in Appendix B).

Hydrology

Groundwater from the Site generally flows in east-northeasterly direction, toward the Trout Brook. The potentiometric data indicates converging flow along the eastern margin of the landfill near the groundwater monitoring well MW-102 and an upward vertical gradient in that area. Three unnamed streams are located to the south and east of the Site. These streams flow through wetland areas and then discharge to Trout Brook. Trout Brook flows into Trout Brook Pond which then discharges to the lower Slatersville Reservoir. Trout Brook and the Slatersville Reservoir are designated as Class B water bodies by RIDEM, which indicates that they are suitable for fishing, swimming, and other recreational activities.

Land and Resource Use

The landfill is located over the Slatersville Aquifer, which has been designated as a drinking water source by the State of Rhode Island. The Tiff Road well, a public water supply well operated by the North Smithfield Water Authority, is located just north of Tiff Road and just west of Trout Brook Pond. In the past, the water authority has considered replacement of the Tiff Road well. If this were to occur, the replacement well may be designed to pump at a higher rate (200 gallons per minute (gpm)) than the existing well, which operates at a rate of 100 gpm. A groundwater flow model developed by USGS and reviewed by EPA showed that this potential increased water withdrawal did not capture groundwater from the Site and did not substantially change the direction of groundwater flow downgradient of the landfill. Residences on most other streets around the Site, including Pound Hill Road, Black Plain Road, rely on private wells for water supply. The closest residence to the Site is approximately 1,200 feet southeast of the landfill, on Pound Hill Road.

History of Contamination

The landfill is a former sand and gravel pit which reportedly began accepting municipal wastes for disposal around 1927. During its years of operation, the landfill also accepted commercial and industrial wastes for disposal. In 1974, the landfill and surrounding land was sold to L&RR, the current owner of the Site. EPA has estimated that more than two million gallons of hazardous chemicals including solvents, plating waste, asbestos, oils, and dyes were brought to the landfill for disposal.

Initial Response

The first indication that disposal of hazardous waste was occurring at the Site was in November 1977, when L&RR submitted plans to the Rhode Island Department of Health for installation of seven monitoring wells to comply with State regulations pertaining to hazardous waste disposal. In September 1979, Rhode Island Department of Environmental Management (RIDEM) ordered L&RR to stop accepting hazardous wastes for disposal. In December 1979, L&RR placed a synthetic cover over a portion of the landfill (an area it claimed contained hazardous waste). Several monitoring wells were installed and sampled between 1977 and 1980.

EPA conducted a Preliminary Site Assessment in 1980 and 1981, which resulted in the Site being placed on the National Priorities List (NPL). The Site received final listing on the NPL in September 1983.

The landfill stopped accepting waste in January 1985. Landfill closure began in 1985 pursuant to a 1983 Court Order and Consent Order and Agreement between RIDEM and L&RR. In 1986, under the direction of RIDEM, L&RR covered a majority of the landfill with a 20-mil polyvinyl chloride geomembrane and soil, and installed a system of 18 gas vents.

EPA initiated a Remedial Investigation/Feasibility Study (RI/FS) in 1986. The RI/FS was completed in June 1988.

Basis for Taking Action

A baseline human health risk assessment performed as part of the RI/FS concluded that although exposures to surface water and sediments adjacent to the Site or groundwater at the boundary of the Site did not pose a significant risk to human health, potential exposure to gaseous emissions from the landfill posed a significant health risk to neighboring residents and children who may play on the landfill.

The baseline environmental risk assessment concluded that while there were no risks to wildlife at the Site from exposure to Contaminants of Concern (COCs), erosion of the landfill cover and filling in nearby wetlands was destroying vegetation and decreasing the ability of the wetland areas to support indigenous plant and animal life.

The following summarizes the contaminants detected in various media at the Site, as identified in the 1988 RI:

Air. Hydrogen sulfide, volatile organic compounds (VOCs), and methane were detected in gas samples collected from the 18 vents on the landfill. Five of the vents, located within the approximate area where hazardous wastes were purportedly disposed, contained much higher levels of VOCs. Methane, hydrogen sulfide, and several VOCs were also detected in fugitive emissions from the surface of the uncovered area of the landfill.

Groundwater. Low levels of VOCs and metals (arsenic, cadmium, and lead) were detected in groundwater downgradient of the Site. All concentrations were below Safe Drinking Water Act Maximum Contaminant Levels (MCLs) at the time. In addition, iron, manganese, chloride, and specific conductance were detected in downgradient groundwater at slightly elevated levels than are typically found in groundwater migrating from municipal landfills. COCs in groundwater included 2-butanone (methyl ethyl ketone), arsenic, and lead.

Subsurface Soil. No significant levels of contaminants were identified in subsurface soils in the RI.

Sediment and Surface Water. Low levels of VOCs and inorganic compounds were detected in surface water and sediments from nearby streams. COCs in surface water and/or sediments included 2-butanone, toluene, trans-1,2-dichloroethene (trans-1,2-DCE), 1,1-dichloroethane (1,1-DCA), arsenic, lead, and zinc.

C. REMEDIAL ACTIONS

Remedy Selection

The Record of Decision (ROD) was signed on September 29, 1988. The remedial action objectives stated in the ROD¹ as modified by the two ESDs are:

Remediate the landfill so that federal and state applicable, or relevant, and appropriate requirements are met and to insure that the landfill is protective of human health and the environment;

Remediate the landfill gas so that VOC concentrations in ambient air are reduced and risks to public health and the environment are minimized.

The selected remedy consisted of the following components:

1. **Upgrading the Landfill Closure.** This component included installing a fence; developing a post-closure monitoring plan; upgrading the surface water runoff management system; stabilizing the steep side slopes and installing a synthetic cover over the uncovered northeast area of the landfill; establishing a soil cover thickness of 24 inches; and establishing vegetation.
2. **Gas Collection and Thermal Destruction.** This component involved collecting gas from the existing 18 vents and installing a subsurface piping system to direct gaseous emissions to a thermal treatment system. Three alternative thermal destruction technologies (combustion, flaring, and incineration) were identified as potential treatment options for the gaseous emissions.
3. **Wetlands Remediation.** This component involved excavating sands from two wetlands areas impacted by sedimentation and subsequent restoration of the excavated areas.

¹ In addition to the two objectives listed here, the ROD contained two remedial action objectives concerning impact to and restoration of adjacent wetlands. These objectives are no longer applicable due to a modification in the remedy set forth in the 1991 Explanation of Significant Differences and discussed in greater detail in the text.

4. Site Monitoring. This component involved periodic monitoring of groundwater and air for a period of thirty years. Groundwater monitoring was to be conducted quarterly while the air monitoring program would be outlined during the design phase.

Two Explanation of Significant Differences (ESDs) have been issued for the Site. The first ESD, signed on March 8, 1991, stated that EPA had re-evaluated information for the Site and determined that the wetlands remediation required by the 1988 ROD would be more properly addressed through the Federal Clean Water Act, or other federal or state statutes or regulations.

The second ESD, signed on September 16, 1996, was issued to clarify that the groundwater standards referenced in the ROD (i.e., Safe Drinking Water Act MCLs) are to be used to evaluate and monitor the integrity and performance of the landfill closure and are not, by themselves, cleanup or performance standards for groundwater.

In addition, a requirement that institutional controls for land and water use restrictions to protect public health and the environment, and to protect the remedy, was memorialized in the 1997 Settlement Agreement and Consent Decree (CD). Accordingly, the CD requires placement of environmental land use restrictions on certain properties. Additionally, the CD requires long-term monitoring of surface water.

Remedy Implementation

The remedial design/remedial action activities were performed by a number of respondents under a Unilateral Administrative Order (UAO) issued by EPA in June 1990. In 1997, the Consent Decree (CD) for the Site was signed, whereby the Settling Defendants agreed to continue the required post closure and operation and maintenance activities and to establish the required institutional controls.

RD activities started in March 1993 and concluded in September 1994. RA construction activities started in May 1994, including an extension of the eastern landfill slope and placing of a PVC cover over the remaining 20 percent of the landfill and installation of the gas treatment system. A landfill gas treatment system was constructed and included lateral and header pipes connecting the existing 18 vents to transfer landfill gas (under vacuum) to an enclosed 40-foot high flare unit. The system also included condensate knock-out sumps and collection pipes, vacuum extraction blowers, a flame arrester, and a system control panel. The remedy construction concluded with the Demonstration of Compliance testing and startup of the enclosed flare in February 1995. In July 1995, post-closure monitoring activities were initiated and the Settling Defendants, EPA, and RIDEM conducted the Pre-Final Site Inspection on July 19, 1995.

In September 1996, the Post Closure Operation and Maintenance Plan was completed and approved by EPA and the Final Site Inspection was conducted on November 1, 1996.

Diminishing landfill gas generation and associated mechanical problems with the flare unit and the condensate injection system led to the discontinuation of the flare unit in January 2007 and the cessation of gas collection and treatment. From early 2007 to July 2009, the gas collection system was outfitted with four fluidic (candlestick) flares as an interim measure to treat gas collected via passive pressures. The existing enclosed flare unit and the blower for the active gas collection system were restarted on July 27, 2009, and have been operating on and off due to low methane concentrations since that time with condensate collected and shipped off-site.

Intermittent operation of the flare system is currently under discussion between the Settling

Defendants, EPA and RIDEM as of September 2014.

System Operation/Operation and Maintenance

Operation and maintenance, as well as the long-term monitoring of various media at the Site, are performed by the Settling Defendants in accordance with the CD. The 1996 Post-Closure Operation & Maintenance Plan (1996 O&M Plan) details operations, maintenance, and monitoring at the Site through the year 2025. Other related documents, such as the Operation and Maintenance Manual for Landfill Gas Treatment System, are incorporated into the O&M Plan by reference. Routine operation and maintenance activities, as well as deficiencies and corrective actions, are summarized in the Progress Reports sent to EPA and RIDEM. Activities covered by this plan, along with a brief description of issues related to each activity, are summarized below.

Landfill Inspection and Maintenance

O&M for the Site includes monthly inspections and as-needed maintenance of the security system; the landfill cover; the stormwater management system; the groundwater monitoring wells, gas extraction wells, and gas migration monitoring probes; and the landfill settlement monuments. The 1996 O&M Plan calls for the grass on the landfill cover to be cut twice per year. Chemical weed control is typically used on the roadways and drainage channels in the summer.

Landfill Gas Extraction and Treatment Systems Operation and Monitoring

Monitoring of the landfill gas extraction and treatment systems includes monthly measurement of methane, oxygen, carbon dioxide, temperature, and vacuum at the 18 gas extraction wells; adjustment of the flow from individual wells as needed; and monitoring of methane, oxygen, carbon dioxide, flame temperature, and air flow rate at the enclosed flare. In early 2005, following detection of landfill gas odor, the gas recovery wellheads and manifolding were repaired. The base of the wellhead vault areas was excavated so that the liner/well seal was exposed and could be inspected. The wellheads that were repaired were also retrofitted with above-grade manifolding.

Landfill Gas Migration Monitoring

Methane concentrations at three to four landfill gas probes (GP-1, GP-4, GP-5, and GP-8) are measured monthly to evaluate the effectiveness of the extraction system in controlling landfill gas migration. The performance standard for this monitoring is 1.25% methane content. According to the 1996 O&M Plan, measurements are required at GP-1 and GP-4 to monitor potential landfill gas migration to a parcel (Lot 2) west of Oxford Turnpike, and at GP-8 to monitor potential landfill gas migration to a parcel (Lot 15) northeast of the landfill. Since the flare shutdown in January 2007, landfill gas probes GP-2, GP-3 and GP-6 have been added to the monthly monitoring. In November 2008, forty-five temporary shallow gas monitoring probes were installed at 50 foot increments along transects centered on existing permanent gas probes to investigate landfill gas migration. With flare shutdown, the performance standard of 1.25% methane established for the Site was exceeded at multiple locations along the entire perimeter of the landfill and some of the methane levels detected at GP-1, GP-2, GP-3, GP-4, GP-5, and GP-6 were as high as 65% methane. Following the flare re-start in a summer of 2009, there has been a reduction in the gas probe methane levels; with additional improvements leading to methane levels being in compliance following major landfill gas collection system upgrades in April 2011.

Flare Performance Monitoring

Blower and flare inspection and maintenance are routinely performed twice per year. Once per year, the flare inlet gas was sampled and tested for VOCs by Method TO-14 prior to the flare shut down in 2007. Since the flare reactivation, the flare inlet gas was tested in 2009 and 2014. Every five years, a performance test is scheduled to be conducted to ensure that the enclosed flare is operating at the appropriate efficiency, and that flare emissions are compliant with Rhode Island Air Toxics Regulation No. 22. The last flare performance test was conducted in December 2009. The next flare performance test is scheduled for December 2014. The ambient air sampling requirement from the O&M plan has been waived since September 2004.

Groundwater Monitoring

As described in the 1996 O&M Plan, the purpose of groundwater monitoring at the Site is to detect contamination that may be migrating toward off-site receptors. The O&M Plan identifies the following wells to be sampled for the groundwater monitoring program: MW-201, MW-104A, MW-102A, MW-103A, CW-5B, CW-7A, and MW-202 (see Figure 1 – Site Plan in Appendix B). The wells are constructed, so that samples may be collected from one or more of the three main hydrogeologic zones (shallow overburden kame delta deposits, deep overburden ice-contact deposits, and bedrock) that underlie the Site. The samples are analyzed for VOCs; chloride; biological and chemical oxygen demand; ammonia; total iron; lead, and arsenic; and dissolved lead, arsenic, manganese and cadmium. Since the spring 2009, monitoring well CW-7B is being sampled in place of CW-7A, as well CW-7A was damaged and is no longer operable.

A statistical analysis of the groundwater data from 1996 through 2005 had been performed annually and in 2006 was replaced by graphical presentation of data. As permitted by the O&M Plan, the sampling frequency was changed from semi-annual to annual starting in October 2006.

In response to elevated levels of several VOCs and arsenic in wells MW-102A and CW-5B geoprobe sampling was conducted east of the landfill near Trout Brook Pond in 2006. This sampling did not identify groundwater contamination near Trout Brook Pond; however, due to the limited scope of this sampling, the downgradient extent of the plume was still uncertain and additional investigation was conducted since the last FYR in 2013 and 2014 (including the sampling of approximately 8-10 residential wells along Pound Hill Road).

Surface Water Monitoring

Surface water samples are collected annually at six locations on the south and east sides of the landfill. The samples are analyzed for VOCs, arsenic, chloride, pH, and specific conductance.

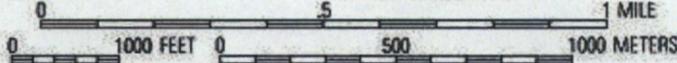
Settlement Monitoring

In 1994, twelve settlement monuments were established on the landfill and two additional monuments were installed in August 1997. The monuments were surveyed annually for 10 years (2000 – 2009) since the start of the O&M and once again in 2014 to monitor settlement across the landfill.

APPENDIX B – FIGURES



71°36.000' W 71°35.000' W WGS84 71°34.00



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Base Map Source:
TOPO!™ © 2003
National Geographic

DES.BY:	DR.BY: MES	CK.BY: CB
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L&RR Superfund Site
North Smithfield, RI

FIGURE 1 - SITE LOCATION MAP

SCALE: AS SHOWN	JOB NO.: 224263.14
DATE: SEPTEMBER 2014	FILE NAME:

	COMMITMENT & INTEGRITY DRIVE RESULTS 40 Shattuck Road, Suite 110 Andover, MA 01810 T: 866.702.6371
--	--



MAP	Lot	Owner
4	447	Town of North Smithfield
7	2 (Portion)	Holliston Sand Company, Inc.
7	3 (Portion)	Slater Farms, LLC
7	9	Landfill & Resource Recovery, Inc. (Charles Wilson)
7	9A	Landfill & Resource Recovery, Inc. (Charles Wilson)
7	10	Charles Wilson
7	11	Charles Wilson
7	15	William King
7	23	Doris & Alfred Caron
7	24	Sandra & Alfred Caron
7	66	Slater Homes, LLC (Condominium Units 1301 - 1325)
7	67	TA Consulting LLC (David Wilson)
7	68	Charles Wilson
7	70	Rochelle White
7	81-83	Narragansett Electric Company
	88-90	(D/B/A National Grid)

Legend

- ⊕ Monitoring Well
- ⊕ Monitoring Well Sampled for 1,4-Dioxane via Method 8260 LL-SIM
- ⊖ Piezometer
- Residential Well
- GeoprobeGW
- Borehole
- ⊖ Waterloo Profile
- ▲ Surface Water
- Powerlines
- Roads
- Parcel Boundaries (Drawing C-01)

Notes:

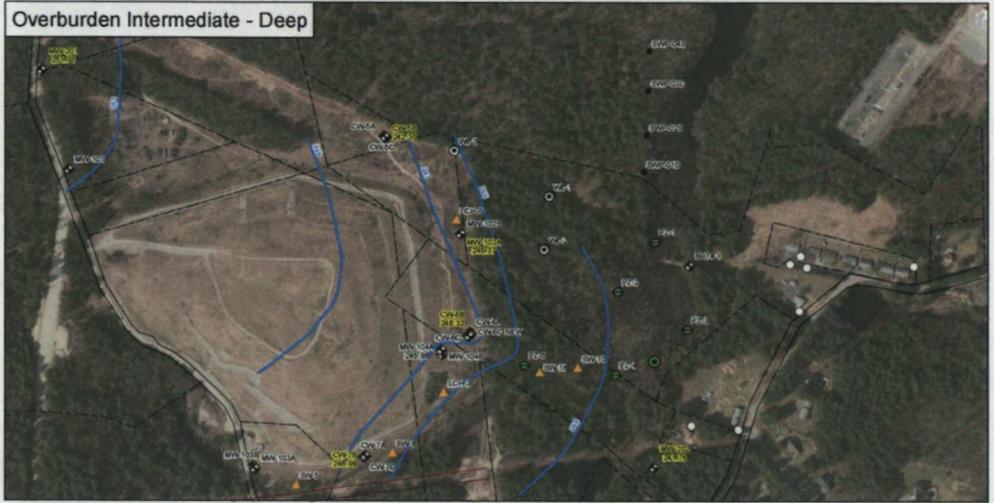
- All well locations as shown are approximate.
- Locations of residential wells are approximated based on observations made during sampling.
- Parcel ownership information based on the North Smithfield, RI Assessors Online Database powered by Vision Government Solutions, Inc.
- Geoprobe groundwater sampling locations installed by O&M, Inc. in December 2005. Approximate locations based on Figure 2 of "Landfill Resource and Recovery (L&RR) Superfund Site Results for the Groundwater Geoprobe Sampling Points" dated June 12, 2006.
- Parcel Boundaries (Drawing C-01) from May 2012 Existing Site Plan and do not reflect on-the-ground accuracy.

L&RR Landfill Site
North Smithfield, Rhode Island

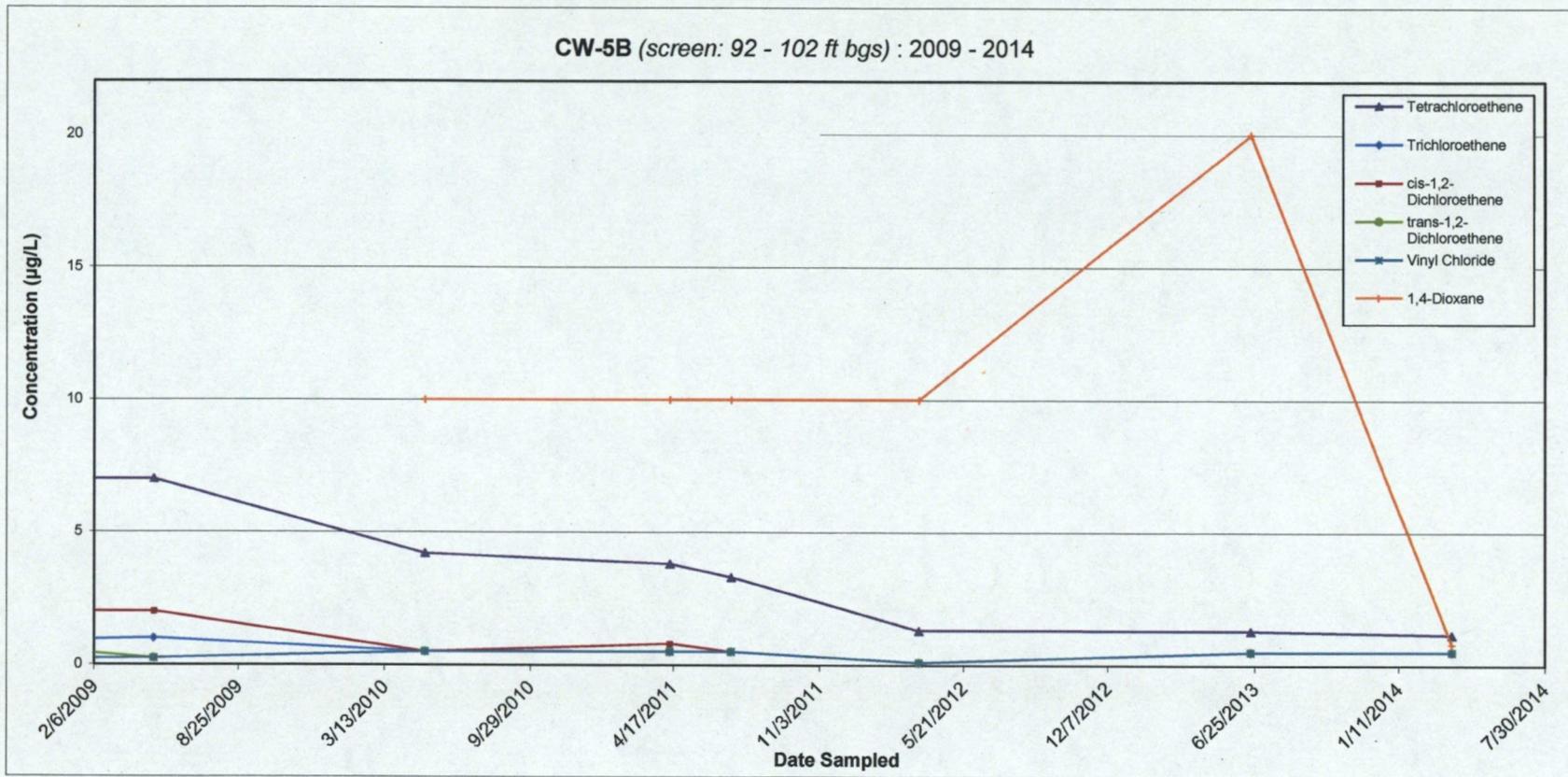
Site Plan

FIGURE 1

SCALE: 1" = 300'	DOC: Site Plan.MXD
DATE: July 2014	JOB NO.: 224263.14
DRAWN BY: CJT	SOURCE: ESRI



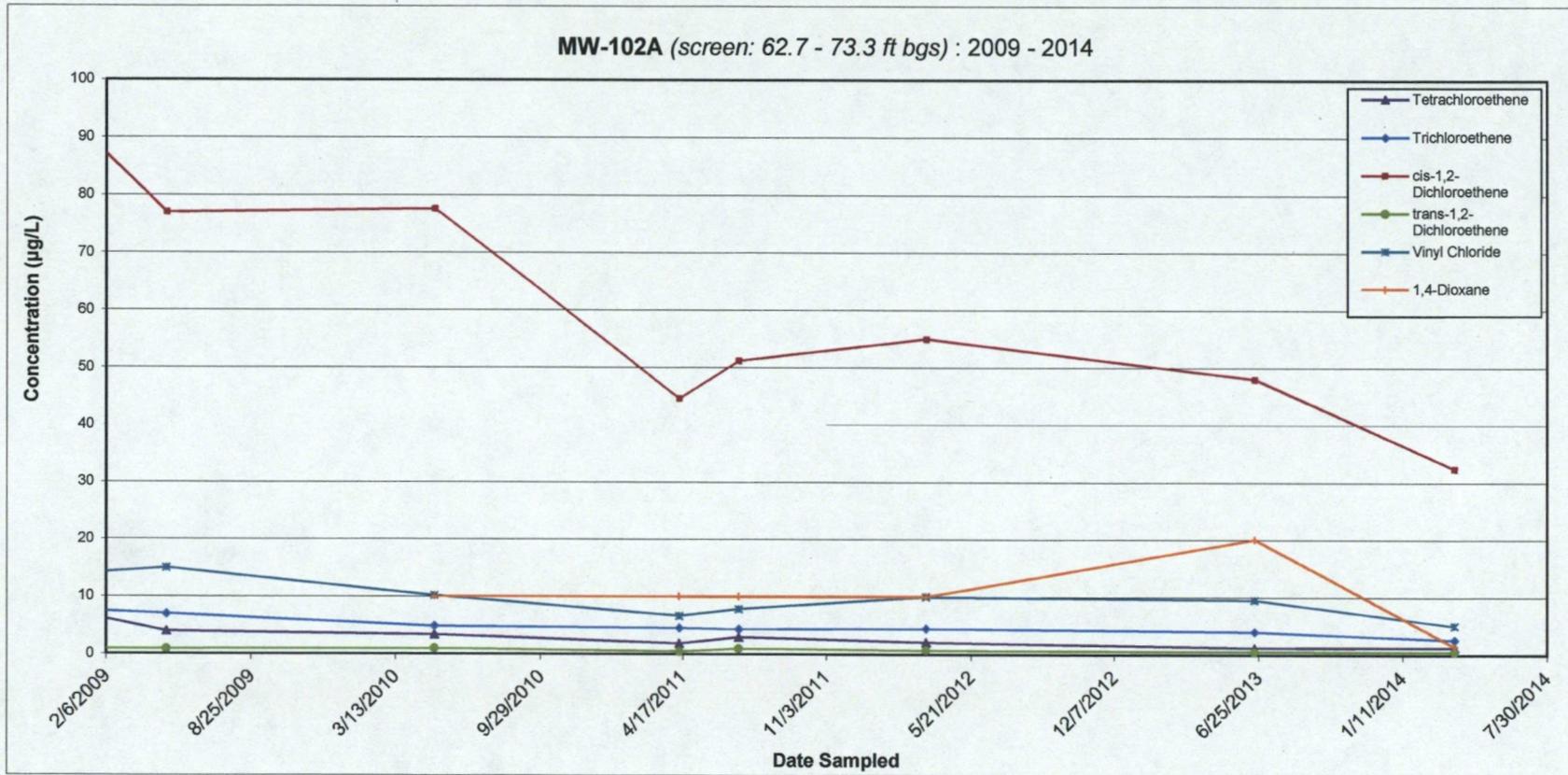
**Select VOC Concentrations Over Time (2009 - 2014)
L&RR Superfund Site - North Smithfield, RI**



NOTES

1. Detection limit for "non-detect" results are posted as half of the laboratory's reporting limit.
2. Estimated values are posted "as-is" for comparison purposes.
3. Analysis of 1,4-dioxane began as part of the 2010 Annual Groundwater Monitoring event.

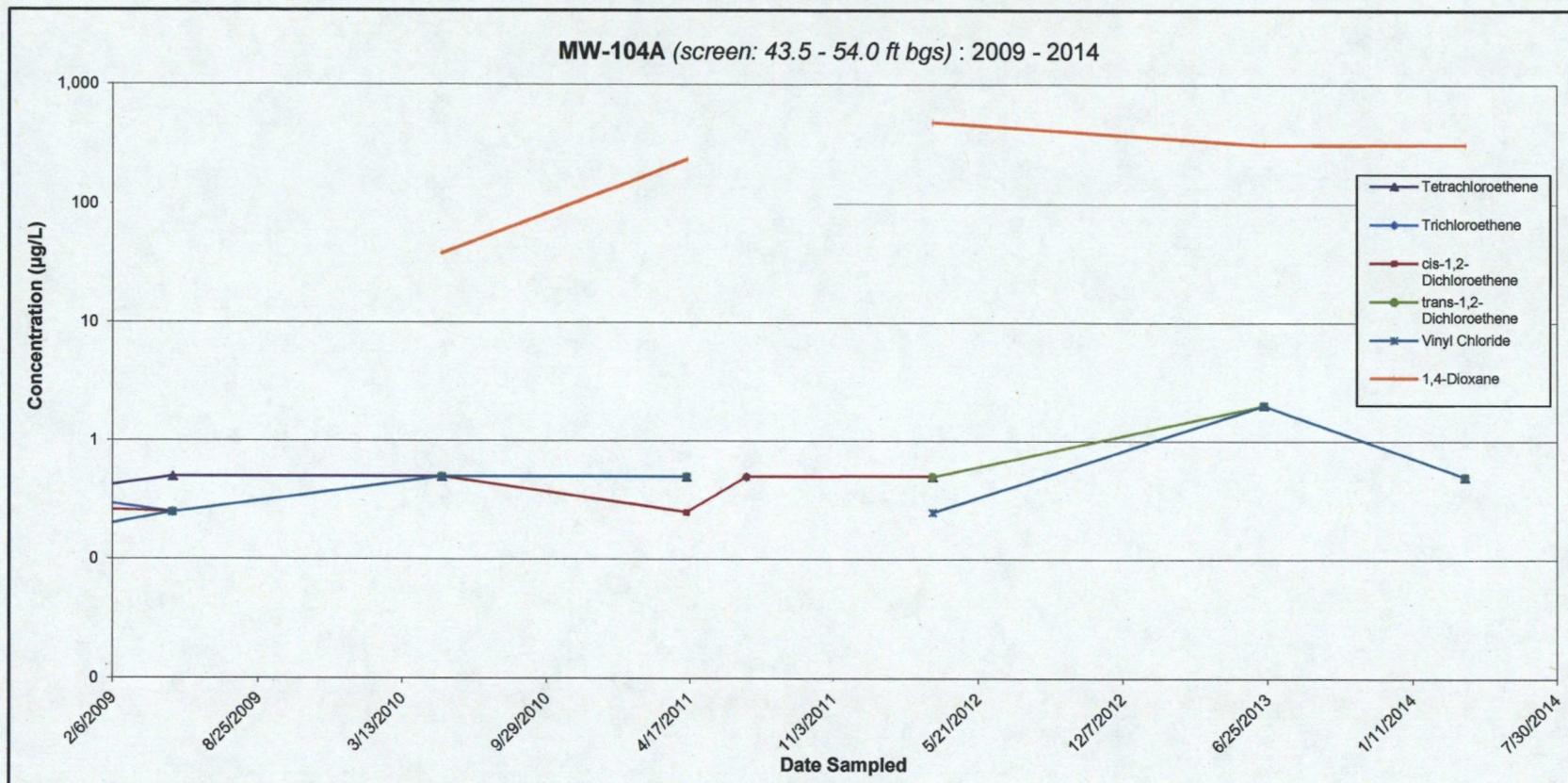
**Select VOC Concentrations Over Time (2009 - 2014)
L&RR Superfund Site - North Smithfield, RI**



NOTES

1. Detection limit for "non-detect" results are posted as half of the laboratory's reporting limit.
2. Estimated values are posted "as-is" for comparison purposes.
3. Analysis of 1,4-dioxane began as part of the 2010 Annual Groundwater Monitoring event.

**Select VOC Concentrations Over Time (2009 - 2014)
L&RR Superfund Site - North Smithfield, RI**



NOTES

1. Detection limit for "non-detect" results are posted as half of the laboratory's reporting limit.
2. Estimated values are posted "as-is" for comparison purposes.
3. Analysis of 1,4-dioxane began as part of the 2010 Annual Groundwater Monitoring event.

APPENDIX C - DOCUMENTS REVIEWED

- de maximis, Inc. 1996. Post-Closure Operation and Maintenance Plan. de maximis, Inc., September 1996.
- de maximis, Inc. 1997. Remedial Action Report, Landfill and Resource Recovery (L&RR) Superfund Site, North Smithfield, Rhode Island. Prepared for The L&RR Group Performing Settling Defendants. September 1997.
- Ebasco Services, Inc. (Ebasco). 1988. Remedial Investigation/Feasibility Study, Landfill and Resource Recovery (L&RR), Town of North Smithfield, Providence County, Rhode Island. June 1988.
- EPA, 1988. Record of Decision. Landfill & Resource Recovery (L&RR), North Smithfield, RI. Environmental Protection Agency, September 29, 1988.
- EPA, 1991. Explanation of Significant Differences. Landfill & Resource Recovery, Inc. (L&RR), EPA ID: RID093212439, OU 01, North Smithfield, RI. Environmental Protection Agency, March 8, 1991.
- EPA, 1996. Explanation of Significant Differences. Landfill & Resource Recovery, Inc. (L&RR), EPA ID: RID093212439, OU 01, North Smithfield, RI. Environmental Protection Agency, September 16, 1996.
- EPA, 2001. Comprehensive Five-Year Review Guidance. Environmental Protection Agency. June 2001.
- EPA, 2009. Third Five-Year Review for Landfill & Resource Recovery (L&RR) Superfund Site. Environmental Protection Agency, September 2009.
- EPA, 2012. Addendum to Third Five-Year Review for Landfill & Resource Recovery (L&RR) Superfund Site. Environmental Protection Agency, August 2012.
- Woodard & Curran, 2010. Landfill and Resource Recovery (L&RR) Superfund Site, Annual Post-Closure Site Monitoring Report. Woodard & Curran, August 2010.
- Woodard & Curran, 2011. Landfill and Resource Recovery (L&RR) Superfund Site, Annual Post-Closure Site Monitoring Report. Woodard & Curran, September 2011.
- Woodard & Curran, 2012. Landfill and Resource Recovery (L&RR) Superfund Site, Annual Post-Closure Site Monitoring Report. Woodard & Curran, August 2012.
- Woodard & Curran, 2012. Landfill and Resource Recovery (L&RR) Superfund Site, Approach to Lots 15 and 23. Woodard & Curran, December 3, 2012.
- Woodard & Curran, 2013. Landfill and Resource Recovery (L&RR) Superfund Site, Annual Post-Closure Site Monitoring Report. Woodard & Curran, November 2013.

Woodard & Curran, 2013. Landfill and Resource Recovery (L&RR) Superfund Site, Summary of Findings, ELUR Investigation. Woodard & Curran, November 4, 2013.

Woodard & Curran, 2013. Landfill and Resource Recovery (L&RR) Superfund Site, New Gas Probes GP-1R and GP-4R. Woodard & Curran, November 4, 2013.

Woodard & Curran, 2014. Landfill and Resource Recovery (L&RR) Superfund Site, Five year Review of Air Emissions. Woodard & Curran, April 1, 2014.

Woodard & Curran, 2013. Landfill and Resource Recovery (L&RR) Superfund Site, Repair to Cap Subsidence Completed. Woodard & Curran, December 12, 2013.

Woodard & Curran, 2014. Landfill and Resource Recovery (L&RR) Superfund Site, Settlement Monument Survey. Woodard & Curran, April 8, 2014.

Woodard & Curran, 2014. Landfill and Resource Recovery (L&RR) Superfund Site, Flare Inlet Gas Sampling. Woodard & Curran, April 8, 2014.

APPENDIX D – PRESS RELEASE AND SITE FACT SHEET

NEWS RELEASE

U.S. Environmental Protection Agency
New England Regional Office
February 13, 2014

Contact: Emily Zimmerman, 617-918-1037

EPA Will Review 27 Superfund Site Clean Ups This Year

Boston, Mass. – (February 13, 2014) – EPA will review site clean ups and remedies at 27 Superfund Sites across New England this year by doing routine Five-Year Reviews at each site.

EPA conducts evaluations every five years on previously-completed clean up and remediation work performed at Superfund sites and Federal Facilities listed on the “National Priorities List” (aka Superfund sites) to determine whether the implemented remedies at the sites continue to be protective of human health and the environment. Further, five-year review evaluations identify any deficiencies to the previous work and, if called for, recommend action(s) necessary to address them.

In addition to a careful evaluation of technical work at the sites, during the Five Year Review process EPA also provides the public with an opportunity to evaluate preliminary findings and to provide input on potential follow up activity that may be required following the review process.

The Superfund Sites at which EPA is performing Five Year Reviews over the following several months include the following sites. Please note: the Web link provided after each site provides detailed information on site status and past assessment and cleanup activity.

Connecticut

Linemaster, Woodstock, CT
<http://www.epa.gov/region1/superfund/sites/linemaster>

Nutmeg Valley, Wolcott, CT
<http://www.epa.gov/region1/superfund/sites/nutmeg>

Maine

Saco Tannery Waste Pits, Saco
<http://www.epa.gov/region1/superfund/sites/sacotannery>

Massachusetts

Nyanza Chemical Waste Dump, Ashland
<http://www.epa.gov/region1/superfund/sites/nyanza>

Baird & McGuire, Holbrook
<http://www.epa.gov/region1/superfund/sites/baird>

Hatheway & Patterson, Mansfield
<http://www.epa.gov/region1/superfund/sites/hatheway>

Hocomonco Pond, Westborough
<http://www.epa.gov/region1/superfund/sites/hocomonco>

Rose Disposal, Lanesborough
<http://www.epa.gov/region1/superfund/sites/ftrose>

Silresim, Lowell
<http://www.epa.gov/region1/superfund/sites/silresim>

W.R. Grace, Acton
<http://www.epa.gov/region1/superfund/sites/graceacton>

Wells G&H, Woburn
<http://www.epa.gov/region1/superfund/sites/wellsgh>

Norwood PCBs, Norwood
<http://www.epa.gov/region1/superfund/sites/norwood>

South Weymouth Naval, Weymouth, MA
<http://www.epa.gov/region1/superfund/sites/sweymouth>

New Hampshire

Ottati & Goss, Kingston
<http://www.epa.gov/region1/superfund/sites/og>

Tinkham Garage, Londonderry
<http://www.epa.gov/region1/superfund/sites/tinkham>

Sylvester, Hillsborough County
<http://www.epa.gov/region1/superfund/sites/sylvester>

Town Garage/Radio Beacon, Rockingham
<http://www.epa.gov/region1/superfund/sites/towngarage>

New Hampshire Plating, Hillsborough County
<http://www.epa.gov/region1/superfund/sites/nhplating>

Pease Air Force Base, Portsmouth, Newington and Greenland, NH
<http://www.epa.gov/region1/superfund/sites/pease>

Rhode Island

Landfill Resource & Recovery, North Smithfield
<http://www.epa.gov/region1/superfund/sites/lrr>

Vermont

Elizabeth Mine, Strafford
<http://www.epa.gov/region1/superfund/sites/elizmine>

Parker Sanitary Landfill, Lyndonville
<http://www.epa.gov/region1/superfund/sites/parker>

Pownal, North Pownal
<http://www.epa.gov/region1/superfund/sites/pownal>

Bennington Municipal Landfill, Bennington
<http://www.epa.gov/region1/superfund/sites/bennington>

BFI Sanitary Landfill, Rockingham
<http://www.epa.gov/region1/superfund/sites/bfi>

Tansitor Electronics, Inc., Bennington County
<http://www.epa.gov/region1/superfund/sites/tansitor>

Pine Street Canal, Burlington
<http://www.epa.gov/region1/superfund/sites/pinestreet>

Learn more about the [Latest EPA News & Events in New England](http://www.epa.gov/region1/newsevents/index.html)
(<http://www.epa.gov/region1/newsevents/index.html>)

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SUPERFUND

Landfill and Resource Recovery, Inc. (L&RR)

North Smithfield, RI

U.S. EPA | HAZARDOUS WASTE PROGRAM AT EPA NEW ENGLAND



MAINTAINING AND MONITORING SUPERFUND

SITES: After a Superfund Site or portion of a Superfund Site has been cleaned up, EPA continues to monitor the site to ensure the cleanup is operating effectively over time. Five-Year Reviews provide an opportunity to fully evaluate the implementation and performance of a cleanup and determine whether it remains protective of human health and the environment.

SITE BACKGROUND:

The Landfill and Resource Recovery, Inc. (L&RR) site is a 28-acre landfill on a 36-acre parcel of land. The site originally was a sand and gravel pit and was used for small-scale refuse disposal from 1927 to 1974. In 1974, the site was sold and developed into a large-scale disposal facility accepting commercial, municipal, and industrial wastes. Until 1979, an estimated 1 million gallons of hazardous wastes were accepted and disposed of with other wastes in the central portion of the landfill. In 1979, the operator placed a polyvinyl chloride cover over the area containing hazardous waste to prevent rainwater from entering. Landfilling of commercial and residential wastes continued until 1985, when the owners closed the landfill and placed another synthetic cover over most of the landfill. Soil was placed over the synthetic cover and it was partially planted with vegetation.

The Site was listed on the National Priorities List (NPL) in 1982. EPA did a full investigation of the Site, and in September 1988 signed off on a cleanup plan, or Record of Decision (ROD). That plan required construction of a landfill cap and an enclosed flare to thermally treat the landfill gases. The cleanup was eventually completed in the summer of 1995. Since that time, the potentially responsible parties have been operating and maintaining the remedy as well as conducting monitoring to ensure the remedy remains protective. Since the cleanup, EPA has come back to the site every five years to do comprehensive Five Year Reviews of the cleanup.

FIVE YEAR REVIEW 2014:

This year EPA is doing its scheduled Forth 5-Year review of the L&RR superfund site. In the last few Five Year Reviews, EPA has recommended continued monitoring and testing of groundwater in the area. We have existing monitoring wells, and EPA requires sampling of the well water for contaminants that could be coming from the L&RR Site.

WHAT TO EXPECT:

ADDITIONAL SAMPLING:

The on-going sampling work includes additional monitoring along the Trout Brook Pond, next to the landfill, including monitoring done last summer and continued to this spring, 2014. Contamination was found in the groundwater along Trout Brook Pond. Therefore, it is a standard EPA's practice to test nearby residential drinking water wells.

The contractor who does the landfill operations and monitoring under EPA and the State oversight, plans to contact several nearby homeowners and have their private wells tested in the next few weeks. Results of this testing will be available and will be part of the 5-Year Review report which is expected to be issued in September 2014.

ADDITIONAL CONTACTS:

Gary Jablonski, Project Manager, Office of Waste Management, Rhode Island Department of Environmental Management, (401) 222-2797 x 7148, Gary.Jablonski@dem.ri.gov

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www.epa.gov/ne/superfund/
sites/lrr

The Superfund Process: Discovery and Cleanup for a Long-Term Site

