FOURTH FIVE-YEAR REVIEW REPORT FOR BFI ROCKINGHAM LANDFILL SUPERFUND SITE ROCKINGHAM, VERMONT

Prepared by:

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LIST OF ACRONYMS

AO	Administrative Order
ARAR	Applicable or Relevant and Appropriate Requirement
BFI-VT	Browning-Ferris Industries of Vermont
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	Conceptual Site Model
CD	Consent Decree
DSI	Disposal Specialists, Inc.
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five-Year Review
ICs	Institutional Controls
IGCLs	Interim Groundwater Cleanup Levels
MCL	National Primary Drinking Water Maximum Contaminant Level
NCP	National Contingency Plan
NPL	National Priorities List
NTCRA	Non-Time Critical Removal Action
NGVD	National Geodetic Vertical Datum
O&M	Operation and Maintenance
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RDL	Laboratory Reporting Detection Limit
ROD	Record of Decision
RPM	Remedial Project Manager
SDR	Stormwater Discharge Requirements
VI	Vapor Intrusion
VOCs	Volatile Organic Compounds
VTANR	Vermont Agency of Natural Resources
VTDEC	Vermont Department of Environmental Conservation
SOW	Remedial Action Statement of Work (Appendix B of the CD).
SVOCs	Semi-Volatile Organic Compounds
Summit	Summit Environmental Consultants
TI	Technical Impractability

EXECUTIVE SUMMARY

This is the fourth Five-Year Review (FYR) for the BFI Rockingham Landfill Superfund Site (Site) located in Rockingham, Windham County, Vermont. The main purpose of this FYR is to determine if the remedy is and will continue to be protective of human health and the environment. The triggering action for this fourth FYR was the signing of the previous FYR on September 24, 2009.

The BFI Rockingham Landfill Superfund Site, also known as the Disposal Specialists, Inc. Landfill in Rockingham, Vermont, was placed on the National Priorities List (NPL) in 1989. In 1993, the U.S. Environmental Protection Agency (EPA) signed an Action Memorandum to initiate a Non-Time Critical Removal Action (NTCRA). The NTCRA included the placement of a multi-layer cap over the landfill; expansion of the existing landfill gas management system; operation and maintenance of the Route 5 Stabilization and Seepage Control System shallow groundwater collection trench; and institutional controls. In 1994, EPA signed a Record of Decision (ROD) selecting monitored natural attenuation, institutional controls, and maintenance of the NTCRA as the long-term cleanup approach until restoration of contaminated groundwater at the edge of the Waste Management Unit was achieved. Construction of the NTCRA was completed in July 1995 and EPA certified the Completion of Work Report in September 1996. FYRs were completed in 1999, 2004, and 2009.

This FYR documents that the remedy currently protects human health and the environment by minimizing immediate threats, as envisioned by the ROD, through institutional controls (ICs), continued operation of the landfill gas management system, maintenance of the landfill cap, monitoring activities, and provision of an alternate water supply to affected residents. Concurrent with the preparation of this FYR, EPA issued a final Explanation of Significant Differences (ESD) on September 29, 2014. The ESD established a revised timeframe for restoration of Site groundwater; revised interim groundwater cleanup levels (IGCLs) for two metals at the Site, arsenic and lead; documented an additional institutional control measure, groundwater reclassification by the State of Vermont, to prevent groundwater use at the Site; and added the Vermont Water Supply Rule, Chapter 21 of the Vermont Environmental Protection Rules, as a Relevant and Appropriate Action-Specific ARAR, establishing compliance standards for the operation and maintenance of the water line component of the remedy. However, in order for the remedy to be protective in the long-term, the on-going vapor screening level assessment needs to be completed.

EPA will monitor whether additional ICs or other measures are needed to ensure groundwater use remains restricted at the Site.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: BFI Rockingham Landfill Superfund Site		
EPA ID: VTD980520092		
Region: 1	**State:** Vermont	**City/County:** Rockingham/Windham

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): Kevin Heine
Author affiliation: EPA Region 1
Review period: 1/30/2014 - 9/24/2014
Date of site inspection: 6/11/2014
Type of review: Statutory
Review number: 4
Triggering action date: 9/24/2009
Due date *(five years after triggering action date)*: 9/24/2014

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
The site consists of one operable unit (OU), issues and recommendations for OU-1 are provided below.

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): *1 (Site Wide)*	**Issue Category: Monitoring**			
	Issue: Initial vapor intrusion (VI) screening investigations have been performed at the Site and additional VI investigations are planned for late 2014. Preliminary screening results do not indicate a vapor intrusion risk to nearby residences.			
	Recommendation: Complete VI screening investigations.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	12/31/2014

Sitewide Protectiveness Statement

Protectiveness Determination: Short-term Protective

Addendum Due Date (if applicable):

Protectiveness Statement:

The remedy currently protects human health and the environment because:

- There is no current exposure of Site related contaminants to humans or the environment at concentrations that would represent a health concern;
- The Site is secure with fencing and locked access gates to minimize unauthorized access to the closed landfill.
- The landfill cover system prevents exposure to the waste material and contaminants within the landfill;
- The private water line system serving four downgradient properties has eliminated groundwater use within the area impacted by the landfill;
- Ongoing monitoring has demonstrated that Connecticut River water quality is not being adversely affected;
- Landfill gas is collected and treated by the extraction system and enclosed flare;
- The land use restriction for the Site prevents any use of the land that would result in an exposure to hazardous substances, pollutants, or contaminants; and

- VT ANR has reclassified the groundwater beneath the Site from a Class III to a Class IV aquifer, which prohibits potable use.

However, in order for the remedy to be protective in the long-term, the on-going vapor screening level assessment needs to be completed.

EPA will monitor whether additional institutional controls or other measures are needed to ensure groundwater use remains restricted at the Site.

I. 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 is protective of human health and the environment. The methods, findings, and conclusions of the reviews are documented in five-year review 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, 42 U.S.C. Section 9621, and the National Contingency Plan (NCP), 40 C.F.R. Part 300. CERCLA Section 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 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 on the remedy implemented at the BFI Rockingham Landfill Superfund Site (Site) in Rockingham, Windham County, Vermont. EPA is the lead agency for the Site. The Vermont Department of Environmental Conservation, as the support agency representing the State of Vermont, has reviewed supporting documentation and provided input to EPA during this FYR process.

This is the fourth FYR for the BFI Rockingham Landfill Superfund Site. The triggering action for this review is the signature date of the previous FYR. 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. The Site consists of one Operable Unit, which is addressed in this FYR.

II. PROGRESS SINCE THE LAST REVIEW

Table 1: Protectiveness Determinations/Statements from the 2009 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1 (Site Wide)	Protective	The remedy is considered to be protective of human health and the environment in the short-term and the long-term. The basis for the Protectiveness Determination is summarized below.

Short-Term Protectiveness is achieved because:

- There is no current exposure of Site related waste to humans or the environment at levels that would represent a health concern.
- The landfill cover system prevents exposure to the waste material and contaminants within the landfill.
- The private water line has eliminated groundwater use within the area impacted by the landfill. The small quantity of impacted groundwater that may be reaching the Connecticut River is rapidly diluted.
- Landfill gas is collected and treated by the extraction system and enclosed ground flare.
- The land use restriction prevents any use of the land that would result in an exposure to hazardous substances, pollutants, or contaminants.

Long-Term Protectiveness will be achieved through continued performance of operation, maintenance, and monitoring activities along with the eventual restoration of groundwater. Vermont Agency of Natural Resources (VTANR) has reclassified the groundwater beneath the Site from a Class III to a Class IV aquifer which prohibits potable use. This provides an additional layer of protection to human health.

Table 2: Status of Recommendations from the 2009 FYR

OU #	Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Party	Original Milestone Date	Current Status	Completion Date (if applicable)
1	The MCL for arsenic was lowered from 50 ug/L to 10 ug/L in 2006. However, because there is no exposure route, this change does not impact human health or the environment	The new arsenic MCL will be considered when evaluating the long-term cleanup of groundwater	PRP	EPA	2014	Updated arsenic MCL established as a revised IGCL in the 2014 ESD	Sept. 29, 2014

1	Some minor operation and maintenance items were identified in the 2009 Site Inspection Report	These items were addressed by the PRP and do not affect the protectiveness of the remedy	PRP	EPA	2014	Complete	2011

Remedy Implementation Activities

Table 3 summarizes the groundwater usage restrictions implemented at the Site to date. During this FYR period, additional ICs restricting the potable use of groundwater at properties downgradient of the landfill were implemented and are noted in the table.

Table 3: Summary of Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Called for in the Decision Documents?	Impacted Parcel(s)*	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Parcels owned by PRPs: 4-505-894 4-505-890 4-107-032	Right of access. Groundwater use restriction.	Grant of Environmental Restrictions and Right of Access, June 1996
Groundwater	No	Parcels owned by PRPs: 4-505-894 4-505-890 4-107-032 Parcels owned by others: 4-107-014 4-505-897 4-107-012 4-107-010 4-107-006	Reclassify groundwater from Class III to Class IV, thereby restricting potable use.	VTANR Reclassification Order (March 10, 2009, amended November 6, 2013)

***** The impacted parcel locations are identified on Figure 2.

Pursuant to the 1996 consent decree, an Additional Investigation Plan is required when the cleanup levels in the ROD may not be achieved by the estimated timeframe. On October 18, 2011, EPA sent a letter to BFI-VT requesting an Additional Investigation Plan (Plan). The Plan was submitted to EPA on January 12, 2012, details of which are included in Appendix A, C.2.

System Operation/Operation and Maintenance Activities

O&M activities conducted during this FYR included O&M of the private water line system used to provide off-site properties with drinking water; and O&M of the landfill gas management system, Route

5 Seepage Control and Stabilization System, and leachate collection system.

In 2012, as part of the EPA-approved January 12, 2012 Additional Investigation Plan, BFI-VT undertook a systematic review of the water supply system used to provide potable water to off-site residences. Maintenance activities including water main flushing and disinfection were completed and a number of improvements to the water system were installed in 2012 and 2013. System improvements included: 1) installation of particulate filters at one of the source wells and at each residential property being served; 2) installation of an iron and arsenic treatment system on the Primary and Backup wells, respectively; 3) installation of new pressure tanks; and 4) reconfiguration of the plumbing system to improve serviceability and sample collection.

In 2013, at the request of the property owner, BFI-VT extended the water supply line to Parcel 4-107-006 which had previously obtained water from a spring located on BFI-VT property and within the Groundwater Reclassification Buffer Zone. A Water Supply Agreement was executed with the property owner on October 13, 2013 and recorded on the deed to the property. The addition of the Vermont Water Supply Rule, Chapter 21 of the Vermont Environmental Protection Rules, as a Relevant and Appropriate Action-Specific ARAR in the 2014 ESD, established compliance standards for the operation and maintenance of the water line component of the remedy.

III. FIVE-YEAR REVIEW PROCESS

Administrative Components

The BFI Rockingham Landfill Superfund Site Five-Year Review was led by Kevin Heine of the U.S. EPA. Michael B. Smith of the Vermont Department of Environmental Conservation, assisted as the representative for the support agency.

The review, which began on January 30, 2014, consisted of the following components:

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

Community Notification and Involvement

A press release was provided throughout the New England region on February 13, 2014 stating that a FYR was being conducted for this Site and others throughout the region and inviting the public to contact the U.S. EPA for additional information. In addition, activities to involve the community in this five-year review process included June 11 and September 11, 2014 visits to the Site by the EPA that included meetings with downgradient property owner. This FYR will be available at the two Site information repositories: the Rockingham Free Public Library, 65 Westminster Street, Bellows Falls, Vermont, and the EPA Records Center, 5 Post Office Square, Boston, Massachusetts.

Document Review

This five-year review consisted of a review of relevant documents including O&M records, long-term monitoring data and reports for additional investigations performed during this FYR period. Applicable groundwater cleanup standards and surface water standards, as listed in the September 1994 Record of Decision, and current Federal/State standards (ARARs), were also reviewed.

In addition, the following information generated pursuant to the Additional Investigation Plan was reviewed along with semi-annual monitoring reports:

- Long-term monitoring plan results for four semi-annual events in 2009 and 2010 (Summit 2012b & 2012c);
- Updated conceptual site model (Summit 2012c);
- Evaluation of the water supply system and water services agreements (Summit 2013 & 2014d);
- Extension of water supply line to one additional property (Rumrill) and water supply system upgrades (Summit 2013 & 2014d);
- Expansion of the State of Vermont Groundwater Reclassification Zone boundary (Summit 2012e; VTANR 2013);
- Evaluation of potential vapor intrusion (VI) pathways (Summit 2012d, 2014b).
- Investigation plan summary/status report including an estimation for extended timeframe for the restoration of bedrock groundwater (Summit 2014d).

Note that the initial VI investigation sampling event was conducted in June 2014 and the VI investigation is still on-going.

Data Review

A long-term monitoring program has been ongoing at the Site to monitor the Site remedy of monitored natural attenuation since the ROD was signed in 1994. Environmental monitoring data are available for the overburden and bedrock groundwater, shallow overburden groundwater collected by the Route 5 System groundwater collection trench, a surface seep (Seep SW-6) located along Route 5, the landfill cap tire chip drainage layer, Connecticut River surface water, and leachate from the lined ash monofill. The fall 2013 Semi-Annual Monitoring Report (Summit 2014a) presents a summary of environmental monitoring data obtained at the Site from 2003 to 2013. In addition, validated results for the comprehensive June 2014 FYR semi-annual sampling event were reviewed and are summarized in this FYR; a Final Spring 2014 Semi-Annual Monitoring Report was prepared concurrently with this FYR.

<u>Summary of the June 2014 FYR Semi-Annual Monitoring Event Results</u>

The June 2014 FYR semi-annual sampling event included the sampling of overburden and bedrock monitoring wells (9 overburden wells and 19 bedrock wells), four sampling locations on the Connecticut River, landfill tire chip drainage layer, Seep SW-6, the Route 5 System, the lined ash monofill leachate collection system and four water supply wells. The sampling round was conducted in accordance with an EPA/VTDEC-approved Site Specific Quality Assurance Project Plan (QAPP, Summit 2014c) and analyses were performed for selected metals, VOCs and SVOCs, consistent with the sampling and

analysis plan utilized for previous FYR semi-annual monitoring programs. The following findings are based on a review of long term monitoring data from the June 2014 FYR monitoring event.

Groundwater: Results from the June 2014 FYR sampling event indicate that groundwater quality at the majority of sampling locations has achieved compliance with the IGCLs. However, several overburden and bedrock wells continue to exceed one or more IGCL established in the ROD for bedrock groundwater and/or the current State/Federal groundwater standards for arsenic, manganese, chromium, barium, methylene chloride, benzene, 2-butanone, tetrachloroethylene and total xylene. Data from the June 2014 FYR sampling event, presented in Table A-4, was used to prepare tables summarizing exceedances of the IGLCs (Table A-5) and current most-stringent State/Federal standards (Table A-6), the results of which are summarized in Table 4 below.

Table 4:
Summary of Exceedance for the June 2014 FYR Semi-Annual Sampling Event

Constituent of Concern	ROD IGCL (ug/L)	Number of Wells Exceeding / Number of Wells Sampled (% Exceeding)***	
		Overburden Wells	Bedrock Wells***
Arsenic	50*	1/9 (11 %)	3/19 (16 %)
Antimony	6	0/9 (0%)	0/19 (0%)
Barium	1000	1/9 (11%)	0/19 (0%)
Benzene [1]	5	0/9 (0%)	0/19 (0%)
Chromium	50	0/9 (0%)	1/19 (5%)
Lead	20*	0/9 (0%)	0/19 (0%)
Manganese	180	8/9 (89%)	11/19 (58%)
Nickel	100	0/9 (0%)	0/19 (0%)
Trichloroethylene [2]	5	0/9 (0%)	0/19 (0%)
Tetrachloroethylene (PCE) [3]	0.7[8]	0/9 (0%)	1/19 (5%)
Vinyl Chloride [4]	2	0/9 (0%)	0/19 (0%)
Bis (2-chloroisopropyl) ether [5]	1	Not Analyzed	0/4 (0%)
Bis (2-ethyl hexyl) phthalate	6	Not Analyzed	0/4 (0%)
Methylene Chloride [6]	5	1/9 (11%)	0/19 (0%)
Pentachlorophenol	1	Not Analyzed	0/4 (0%)
2-butanone	170	2/9 (22%)	1/19 (5%)
Xylenes, total [7]	400[9]	1/9 (11%)	1/19 (5%)

* Arsenic standard revised from 50 ug/L to 10 ug/L in the 2014 ESD. This change would result in 1 additional overburden well and 3 additional bedrock wells exceeding the 10 ppb IGCL.

** Lead standard revised from 20 ug/L to 15 ug/L in the 2014 ESD. This would not change the results provided above.

*** The ROD established IGCLs for bedrock groundwater only. Locations where overburden groundwater exceeds the IGCLs established for bedrock groundwater are also summarized in Table 4. Where RDLs (shown below) are > IGCLs, these wells are not included in the numerator values.

RDL laboratory Reporting Detection Limit

1. Benzene: RDL > cleanup criteria at 1 bedrock well and 3 overburden wells.
2. Trichloroethylene: RDL > cleanup criteria at 1 bedrock well and 3 overburden wells
3. Tetrachloroethylene: RDL > cleanup criteria at 1 bedrock well and 3 overburden wells
4. Vinyl Chloride: RDL > cleanup criteria at 1 bedrock well and 3 overburden wells
5. Bis (2-chloroisopropyl) ether: RDL > cleanup criteria at 4 bedrock wells
6. Methylene Chloride: RDL > cleanup criteria at 1 bedrock well and 2 overburden wells
7. Xylenes, Total: RDL > cleanup criteria at 1 overburden well
8. Tetrachloroethylene: No State/Federal MCL (5 ug/L) exceedances were reported.
9. Xylenes, Total: No State/Federal MCL (10,000 ug/L) exceedances were reported.

For the June 2014 FYR sampling event, Table A-4, exceedances of one or more IGCLs established for VOCs were reported at two bedrock compliance wells (MW-3 (2-butanone and xylene), and MW-9 (PCE)) and three overburden wells (MW-J35 (2-butanone), MW-E22 (2-butanone and methylene chloride) and MW-B13D (xylene)). However, note that exceedances of the benzene IGCL were reported at one additional bedrock monitoring well (MW-6) in 2012 and 2013.

For the June 2014 FYR sampling event, samples from four bedrock wells where SVOCs have been historically detected, were submitted for analysis of SVOCs. SVOC concentrations did not exceed applicable IGCLs at any of the four monitoring points.

Finally, for the June 2014 FYR sampling event, inorganic constituent IGCL exceedances were limited to arsenic, manganese, barium and chromium. Consistent with historical data, no exceedances of the lead, antimony and nickel IGCLs were reported. Chromium exceeded the IGCL at one bedrock well (MW-9) located downgradient of the landfill while barium exceeded the IGCL at one overburden well (MW-B13D) located in very close proximity to the landfill. Arsenic and manganese concentrations exceeded their respective IGCL in a number of bedrock and overburden wells as noted in Table 4 above.

Route 5 System Groundwater Collection Trench Water Quality

The majority of shallow overburden groundwater downgradient of the landfill is intercepted by the Route 5 Slope Stabilization and Seepage Control System groundwater collection trench, conveyed to 20,000 gallon aboveground storage tank (AST), and hauled to a publically owned treatment works (POTW) for disposal. Samples of collected groundwater are analyzed on a semi-annual basis for cyanide, selected metals, VOCs and SVOCs to comply with POTW acceptance criteria and to assess changes in shallow overburden water quality.

The three-month moving average flow rate for the Route 5 System AST exhibits seasonal fluctuations with lower flow rates in the autumn and higher flow rates in the spring. Consistent with historical results, three-month moving average flow rates for the AST in 2013 ranged from 1.0 to 1.6 gallons per minute (Summit 2014a)

Consistent with previous sampling events, during the June 2014 sampling event, low concentrations of nickel and zinc were reported, and cyanide, arsenic, cadmium, chromium, cooper, lead, silver, mercury, VOCs and SVOCs were not detected above laboratory detection limits. Collected groundwater continues to meet discharge limits established in the Palmer, Massachusetts POTW Industrial Waste Haulers Discharge Permit IWH-05.

Concentrations of VOCs and inorganic parameters in groundwater collected by the Route 5 System have decreased since installation of the System as part of the NTCRA. VOCs have not been reported above detection limits in samples collected from the Route 5 System during the last three consecutive semi-annual sampling events (i.e., since June 2013), although reporting detection limits are typically slightly elevated due to matrix effects. Nonetheless, trends in water quality for the Route 5 System indicate that the landfill cap and shallow overburden groundwater collection trench have been and continue to be effective at controlling the migration of contaminants of concern in shallow groundwater.

Lined Ash-Monofill Leachate Quality

Leachate from the 1.5-acre lined ash monofill leachate collection system is stored in a 10,000 gallon underground storage tank (UST) and hauled to a POTW for disposal. Samples of leachate are analyzed on a semi-annual basis for cyanide, selected metals, VOCs and SVOCs for compliance with POTW acceptance criteria and to monitor leachate quality.

The three-month average flow rates for the lined ash monofill leachate collection system UST indicate that leachate generation rapidly decreased following installation of the landfill cap in June 1995. As anticipated, flows to the UST have stabilized and remained relatively consistent with the cap in place with the three-month moving average leachate generation rate remaining stable at a rate less than 0.07 gallons per minute in 2013 (Summit 2014a).

Consistent with previous sampling results, during the June 2014 sampling of the ash monofill leachate, low concentrations of arsenic, chromium, lead and nickel were reported, and cyanide, cadmium, copper, mercury, silver, zinc, VOCs and SVOCs were not detected above reporting detection limits. While sample matrix issues often affect leachate analytical results for VOCs/SVOCs, these compounds are not typically detected in monofill leachate and are not expected to be present in appreciable quantities in leachate from the ash monofill cell. Leachate from the monofill continues to meet discharge limits established in the Palmer, Massachusetts PTOW Industrial Waste Haulers Discharge Permit IWH-05.

The consistency of analytical results for leachate quality and the consistency of leachate generation rates as measured at the UST indicate that the cap continues to operate within design specifications and cap leakage rates.

Seep SW-6 Water Quality

Since installation of the landfill cap, there have been no significant leachate breakouts or seeps observed on or adjacent to the landfill. Most seeps downgradient of the landfill identified during the RI/FS along Route 5 either stopped discharging following installation of the landfill cap or were captured by the Route 5 System groundwater collection trench. However, the seasonal groundwater Seep SW-6 has continued to flow intermittently and is sampled on a semi-annual basis as part of long-term monitoring activities. Water quality at Seep SW-6 is monitored for compliance with the Stormwater Discharge Requirements (SDRs) established in the Demonstration of Compliance Plan (Dames & Moore, 1994).

In June 2014, consistent with previous semi-annual long-term monitoring events, a sample from Seep SW-6 was collected and submitted for analysis of aluminum, antimony, arsenic, barium, beryllium,

cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium and VOCs. Consistent with results from previous May/June sampling events, results from June 2014 met SDRs. Chloroethane (0.55 ug/L) was the only VOC reported at Seep SW-6 in June 2014.

Flow at Seep SW-6 is typically on the order of 1 gallon per minute in the June and approximately 1 gallon per hour in September. Historical data indicate that iron concentrations vary seasonally at Seep SW-6, with higher iron concentrations typically occurring during September sampling events that periodically exceeded the SDR. It is also worth noting that samples collected in September 2013 contained concentrations of barium, lead and zinc that were not consistent with historical ranges at Seep SW-6; however, the disparity between metal concentrations in primary/duplicate samples and high concentration of most metals was interpreted to reflect sediment being incorporated into the samples (Summit 2014a). Results from June 2014 were consistent with historical results; therefore, it appears that the September 2013 results are anomalous and may not be representative of actual water quality at the seep.

Tire Chip Drainage Layer Water Quality

The multi-layer landfill cap system includes a tire chip drainage layer and associated outfall that discharges to the stormwater control structure located northeast of the landfill. Samples from the tire chip drainage layer have historically met SDRs for multiple consecutive sampling events and the requirement for sampling was reduced to only occur during FYR sampling events after the 2004 FYR. In June 2014, a sample from the tire chip drainage layer outlet was collected and submitted for analysis of aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium and SVOCs.

Aluminum, calcium, iron, lead, manganese and zinc were reported above the laboratory detection limit in the sample collected from the tire chip drainage layer in June 2014. Other metals and SVOCs were reported as not detected above laboratory detection limits.

Prior to 2006, LTMP monitoring events included the collection of water quality samples from four locations (RW-2, RW-3, RW-3A and RW-4) on the Connecticut River to monitor whether Site groundwater, surface water, and stormwater discharges were adversely affecting Connecticut River water quality. Historical results have shown that the Site is not adversely affecting the Connecticut River and after the 2005 sampling events, EPA approved a change to the monitoring plan that limited the Connecticut River sampling to FYR sampling events only.

Surface water samples from the four Connecticut River sampling locations were collected in June 2014 and submitted for analysis of aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium and VOCs.

Results from June 2014 are consistent with historical data and continue to show no significant differences between upstream and downstream sampling points and no adverse effect to Connecticut River water quality from the Site.

Extent of Contamination

The lateral extent of groundwater contamination in overburden and shallow bedrock groundwater has not expanded since the 2009 FYR and concentrations of constituents of concern have been declining or remain stable. However, VOCs in two deeper overburden monitoring wells (MW-J35 and MW-E22) continue to show increasing trends which are attributed to the slow downward migration of impacted groundwater through silty clay overburden deposits (Summit 2012c; Summit 2014a).

The lateral extent of VOCs in bedrock groundwater is limited to a narrow zone between MW-6 and MW-9, while the lateral extent of VOCs in overburden groundwater occurs in a slightly wider zone between MW-E22 and MW-J35. The lateral extent of chromium and barium exceedances in groundwater is limited to isolated areas around MW-9 and MW-B13D, respectively. The chromium, barium, and VOC exceedances are interpreted to be the result of migration of these constituents from the landfill.

Concentrations of manganese and arsenic that exceed the IGCL occur in areas located in close proximity to and downgradient of the landfill; however, arsenic concentrations above the IGCL have also been reported at multiple background residential water supply wells in some area wells sampled as part of the long-term monitoring activities. The presence of manganese and arsenic in groundwater affected by the landfill is the result of a reducing environment attributable to the landfill that has likely mobilized naturally occurring arsenic and manganese that's present within Site overburden and bedrock, as opposed to a migrating plume of arsenic and manganese resulting from disposal of these contaminants in the landfill.

Revised Timeframe for the Restoration of Bedrock Groundwater

The timeframe for the restoration of bedrock groundwater was evaluated during this FYR using the most recent long-term monitoring data (Summit 2014b). This evaluation found that VOC concentrations at bedrock compliance wells have decreased to concentrations at or approaching the IGCLs, such that they are no longer considered to be a key driving factor for predicting the timeframe for the restoration of bedrock groundwater quality at the Site. Arsenic and manganese are the principle constituents of concern requiring an extended period of time to restore bedrock groundwater to the IGCLs established in the ROD (and revised by the 2014 ESD). It is noted that similar challenges in achieving groundwater cleanup goals for arsenic and manganese have been observed at other landfill/CERCLA sites in New England.

Data for arsenic and manganese in bedrock groundwater were assessed and a statistically significant decreasing trend for manganese at selected wells was used to estimate the timeframe for bedrock restoration. It is noted that no long-term statistically significant trends were apparent for the arsenic data set; however, as discussed in the Conceptual Site Model (CSM) Update (Summit 2012c), the mobility/solubility of arsenic, iron and manganese in groundwater are strongly controlled by redox sensitive microbial-mediated geochemical processes, and concentrations of redox sensitive metals will decrease as conditions gradually transition to a more oxidizing environment over time. Given the limitations in the arsenic dataset and similarity of factors controlling the mobility/solubility of arsenic and manganese, it is assumed that arsenic concentrations should achieve IGCL (or background)

concentrations within a similar timeframe as manganese.

Based on the assumptions used in the evaluation for the timeframe predictions, restoration of bedrock groundwater to the IGCLs established in the ROD will likely be achieved between 2055 and 2075, while the IGCLs established in the ROD for VOCs will likely be achieved by 2025. However, as with all time frame estimations, they are subject to change based on the future monitoring results, revisions to cleanup standards (e.g., updated IGCLs to current EPA/VT standards), limitations in the dataset and limitations of statistical tools.

The 2014 ESD established the revised timeframe for the restoration of bedrock groundwater. Additional information regarding the status of the Site selected remedy for monitored natural attenuation and the timeframe estimation for cleanup is provided in Appendix A.

Site Inspection

A Site inspection was conducted on June 11, 2014. In attendance were Kevin Heine, U.S. EPA; Ralph Larimore and Joseph Montello, BFI-VT (Republic Services, Inc.); Roger Bellerose, BGEC, LLC (Site maintenance contractor); Michael Deyling, Summit Environmental Consultants (reporting contractor); and Dave Cloutier, Nobis Engineering (EPA support contractor). The purpose of the inspection was to assess the current conditions of the Site.

The inspection included an annual inspection of the general Site conditions, landfill gas management system, and landfill cap system. In addition, EPA observed environmental monitoring activities and soil vapor/gas probing installation and sampling activities being completed at that time. Results of the inspection are reported on the Site Inspection Form (Appendix C). Annual Site inspections have been performed by the PRPs, EPA (or their oversight contactor), and VTANR since 1999. Consistent with previous inspection results, no major issues were identified regarding the operation and maintenance of the landfill remedial systems.

Interviews

Three residents were interviewed during the FYR process. The purpose of the interviews was to document community sentiments regarding Site activities and implementation of the remedy to date. Interviews were conducted on September 11, 2014 and are included in Appendix B. No issues or concerns were identified by any interviewees.

IV. TECHNICAL ASSESSMENT

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

Yes.

Remedial Action Performance

With the exception of not achieving the estimated timeframe for the restoration of bedrock

groundwater as prescribed in the 1994 ROD, the remedy is functioning as intended by the decision document (ROD). Evidence to indicate that the remedy is performing as intended, include the following:

- The landfill cap remains intact to isolate and prevent direct contact with the solid waste contained in the landfill.

- The lack of new seeps at the Site and the low flow of Seep SW-6 indicate that the landfill cap and the Route 5 System (groundwater interceptor trench) are effectively reducing the flow of contaminated shallow groundwater that could develop into seeps and potentially impact surface water.

- A reduction in the groundwater elevations near the landfill and the decline in leachate collection system flow volumes are both indicators that the landfill cap has minimized the infiltration of surface water through the solid waste mass. Significant improvements in the quality of shallow groundwater intercepted by the Route 5 System are also indicative of a decline in contaminants present in shallow overburden groundwater intercepted by the trench.

- The landfill gas management system has controlled landfill gas emissions so methane gas does not represent an explosion hazard, and prevented the release and subsequent exposure (inhalation) of landfill gas containing hazardous substances, pollutants or contaminants.

- The solid waste mass and multilayer cap appears to be intact and stable against slope movement at this time.

While the remedy is functioning as intended, the time frame for the restoration of bedrock groundwater was not attained within 15 years after the completion of the landfill cap in July 1995, as prescribed in the ROD. Additional investigations were performed during this FYR period to characterize the geochemical conditions in the bedrock aquifer (Summit 2009; Summit 2012a; Summit 2012c) and to estimate a revised timeframe for the restoration of bedrock groundwater (Summit 2014d). The timeframe for the restoration of bedrock groundwater was assessed using long-term monitoring data and statistical techniques (Summit 2014d). Based on this assessment, it is anticipated that bedrock groundwater will likely attain IGCLs for VOCs by 2025, and that the concentrations of arsenic and manganese should decrease to the IGCLs by 2055 to 2075.

System Operations/O&M

Operation and maintenance of the multilayer cap, landfill gas management system, leachate collection system, and Route 5 System has been and continues to be effective. Issues identified during the Site inspections have been addressed or continue to be monitored as recommended.

The monitoring network appears to be adequate; however, a review of the long-term monitoring program sampling locations and analytes list is warranted. The long-term monitoring plan should be modified to identify the proper frequency and locations of monitoring points to assess remedy performance. The plan may also be amended to include the collection of additional redox sensitive parameters such that the monitored natural attenuation of arsenic and manganese can be better assessed data can be used to further refine timeframe estimation predictions (if necessary) as long-term monitoring continues. Additional sampling to better define local background concentrations for arsenic and manganese may also be performed to assist in predictions for achieving remedial goals.

Variations in O&M cost that could indicate a potential remedy problem were not identified.

Opportunities for Optimization

The FYR did not identify any area where changes in the operational procedures would optimize the cleanup actions beyond a review of the long-term monitoring plan described above.

Early Indicators of Potential Issues

VOCs in two deeper overburden monitoring wells (MW-J35 and MW-E22) continue to show increasing concentration trends which are attributed to the slow downward migration of impacted groundwater through silty clay overburden deposits (Summit 2012c; Summit 2014a). The observed improvements in shallow overburden groundwater quality at MW-B13D and at the Route 5 System groundwater collection trench suggest that the landfill cover system has significantly reduced the loading of contaminants to the shallow overburden resulting in groundwater quality improvement. A similar improvement in groundwater quality is considered likely in the deeper overburden; however, improvements are expected to be delayed due to the slower movement of groundwater in the deeper overburden (clayey silt). The next five to ten years will be a critical time for monitoring the extent of VOC impacts in deeper overburden and assessing whether future groundwater quality results are consistent with the CSM.

Implementation of Institutional Controls and Other Measures

Measures to control access have included fencing of the landfill to limit access and signage to identify potential exposure risk.

A restrictive covenant has been placed on the landfill property and downgradient properties owned by the PRPs to prevent the use of contaminated groundwater. The PRPs continue to provide water to four residences located along the Connecticut River in accordance with water supply agreements recorded at the Registry of Deeds for those properties. Furthermore, VTANR has reclassified groundwater in the impacted groundwater area and within a buffer area from Class III to Class IV, which prohibits potable use and provides an added level of protectiveness (see Figure 2). Under Vermont standards, Class III groundwater is suitable as a source of water for individual domestic water supply, irrigation, agricultural use and general industrial and commercial use. Class IV groundwater is not suitable as a source of potable water, but may be

suitable for some agricultural, industrial and commercial uses. This state reclassification was finalized in 2009 and amended in 2013 to expand the reclassification area.

No activities were observed that violate the existing ICs restricting groundwater usage. EPA will monitor whether other measures are needed to ensure groundwater use remains restricted at the Site as groundwater restoration activities continue.

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

No.

Changes in Standards and TBCs

The IGCLs were generally established at the MCL at the time of the ROD; however, risk based guidelines, health advisories and State of Vermont standards were used to establish several IGCLs. Table 5 summarizes the IGCLs established in the ROD, standards established in the 2014 ESD, and the most stringent current State/Federal standards. The Applicable or Relevant and Appropriate Requirement (ARAR) basis for the current State/Federal Standard is also listed in Table 5.

Table 5
IGCLs and Current State/Federal Standards

Constituent of Concern	ROD IGCL (ug/L)	ROD IGCL Basis	IGCL established in the 2014 ESD	Current State/Federal Standard (ug/L)	ARAR Basis for Current State/Federal Standard
Arsenic	50	MCL	10	10	MCL, VTMCL, VTGES
Antimony	6	MCLG	--	6	MCL, VTMCL, VTGES
Barium	1000	VT Std	--	2000	MCL, VTMCL, VTGES
Benzene	5	MCL	--	5	MCL, VTMCL, VTGES
Chromium	50	VT Std	--	100	MCL, VTMCL, VTGES
Lead	20	VT Std	15	15	VTGES
Manganese	180	RB	--	300	VTGES, HA
Nickel	100	MCLG	--	100	VTMCL, VTGES, HA
Trichloroethylene	5	MCL	--	5	MCL, VTMCL,VTGES
Tetrachloroethylene	0.7	VT Std	--	5	MCL, VTMCL,VTGES
Vinyl Chloride	2	MCL	--	2	MCL, VTMCL,VTGES

Bis (2-chloroisopropyl) ether	1	RB	--	300	HA
Bis (2-ethyl hexyl) phthalate	6	MCL	--	6	MCL, VTMCL
Methylene Chloride	5	MCL	--	5	MCL, VTMCL,VTGES
Pentachlorophenol	1	MCL	--	1	MCL, VTMCL,VTGES
2-butanone	170	VT Std	--	4,000	HA
Xylenes, total	400	VT Std	--	10,000	MCL, VTMCL, VTGES

--	The IGCL is not revised by the 2014 ESD
MCL	Federal Primary Drinking Water Standard Maximum Contaminant Level
MCLG	Federal Primary Drinking Water Standard Maximum Contaminant Level Goal
VTMCL	Vermont Drinking Water Standard Maximum Contaminant Level
VTMCLG	Vermont Drinking Water Standard Maximum Contaminant Level Goal
VTGES	Vermont Groundwater Quality Enforcement Standard
HA	EPA Life Time Drinking Water Health Advisory
RB	Risk Based
VT Std	State of Vermont Standard effective at the time of the ROD

The 2014 ESD adopts more stringent IGCLs for lead and arsenic. Despite these changes, the protectiveness of the remedy is maintained in the short and long-term due to the provision of an alternate water supply; however, the more stringent arsenic standard has increased the timeframe for the restoration of bedrock groundwater.

Also, the 2014 ESD added the Water Supply Rule, Chapter 21 of the Vermont Environmental Protection Rules, as a Relevant and Appropriate Action-Specific ARAR, establishing compliance standards for the operation and maintenance of the water line component of the remedy. These standards are captured in the Operation and Maintenance Manual for the water supply system.

Changes in Exposure Assumptions

There have been updates to the exposure assumptions used at the time of the remedy selection. First, potential dermal contact with groundwater used as a household water source and inhalation of volatiles during household water use were not evaluated in the Risk Assessment supporting the ROD. However, these pathways currently are not a concern for on-site use since downgradient residents are provided an alternate water supply. Long-term protectiveness is dependent upon the implementation of ICs for these downgradient residents.

Secondly, in 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. Many of these exposure factors differ from those used in the risk assessment for the ROD. These changes in general would result in a slight decrease of the risk estimates for most chemicals. However, these changes in risk assessment methods do not currently affect the remedy because residents are provided an alternate water supply. Long-term protectiveness is dependent upon the implementation of ICs for these downgradient residents.

Potential vapor intrusion of VOCs into buildings was not included as a potential exposure pathway in the ROD. A VI evaluation is ongoing. The first round of soil vapor/gas sampling occurred in June 2014. Low concentrations of VOCs were reported in shallow soil gas samples collected in the vicinity of and adjacent to four residences located between the landfill and the Connecticut River. Preliminary indications from unvalidated data are that VOC concentrations do not indicate an unacceptable vapor intrusion risk to these residences. A second soil vapor/gas sampling event is planned for fall 2014 and future investigations/actions (if warranted) will be fully evaluated following receipt and review of all validated data.

The exposure pathways for potential ecological receptors, as discussed in the ROD were based primarily on the presence of constituent of concern in seeps in the drainage ditch along Route 5 and potential migration to Connecticut River sampling stations. Shortly following the completion of the landfill cap and installation of the Route 5 System shallow overburden groundwater collection trench the volume of flow to seeps was eliminated or significantly reduced, and subsequent samples collected from the Connecticut River met ambient water quality criteria. Long-term monitoring results for this FYR period are consistent with previous interpretations indicating that the remedy has successfully mitigated exposure pathways for potential ecological receptors.

Changes in Toxicity and Other Contaminant Characteristics

Toxicity values for tetrachloroethylene, trichloroethylene, methylene chloride and pentachlorophenol have changed since the last FYR. Table 6 summarizes changes to toxicity values since the ROD was executed. The changes in the toxicity values are minor with respect to protectiveness. Although these changes may affect the timeline of the remedy, protectiveness is maintained at the Site since there are no known exposures or uses of contaminated groundwater.

Table 6
Toxicity Value Changes Related to Risk Assessment Estimates Supporting the ROD

Constituent of Concern	Noncancer Oral Reference Dose (mg/kg-day)		Cancer Oral Slope Factor $(mg/kg\text{-}day)^{-1}$		Last Revision
	Original	Revised	Original	Revised	
Arsenic	0.0003	--	1.75	1.5	1995
Antimony	0.0004	--	--	--	1991
Barium	0.07	0.2	--	--	2005
Benzene	0.004	--	0.029	0.015 to 0.055	2003
Chromium	0.005	1.5	--	--	1998
Lead	Biokinetic	--	--	--	2004
Manganese	0.005	0.14	--	--	1996
Nickel	0.02	--	--	--	1991
Trichloroethylene	0.0003	0.0005	0.011	0.046	2011
Tetrachloroethylene	0.01	0.006	0.05	0.0021	2012
Vinyl Chloride	0.003	--	1.9	0.72	2000

Bis (2-chloroisopropyl) ether	0.04	--	0.07	--	1990
Bis (2-ethyl hexyl) phthalate	0.02	--	0.014	--	1988
Methylene Chloride	0.06	0.006	0.0075	0.002	2011
Pentachlorophenol	0.03	0.005	0.12	0.4	2010
2-butanone	0.05	0.6	--	--	2003
Xylenes, total	2	0.2	--	--	2003

-- Toxicity value has not been revised

There have been changes in toxicity factors since the 2009 FYR. The non-cancer reference doses of the following COCs have been updated: trichloroethylene (5.0E-04 mg/kg-d), tetrachloroethylene (6.0E-03 mg/kg-d), methylene chloride (6.0E-03 mg/kg-d) and pentachlorophenol (5.0E-03 mg/kg-d). The cancer slope factors for the following COCs have been updated: chromium (0.5 (mg/kg-d)-1), trichloroethylene (4.6E-02 (mg/kg-d)-1), tetrachloroethylene (2.1E-03 (mg/kg-d)-1), vinyl chloride (7.2E-01 (mg/kg-d)-1), methylene chloride (2.0E-03 (mg/kg-d)-1), and pentachlorophenol (4.0E-01 (mg/kg-d)-1). These changes in toxicity factors do not affect the current protectiveness of the remedy due to the provision of an alternate water supply.

Changes in Risk Assessment Methods

None.

Expected Progress Towards Meeting RAOs

The Remedial Action Objectives (RAOs) used at the time of the remedy remain valid; however, the estimated timeframe for the restoration of bedrock groundwater quality was underestimated at the time of the ROD. Additional investigations were undertaken during this FYR period to further assess the progress of bedrock groundwater restoration, and the 2014 ESD revised the timeframe for restoration of bedrock groundwater.

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

No.

Technical Assessment Summary

While the timeframe for the restoration of bedrock groundwater at all compliance wells as prescribed in the 1994 ROD was not achieved, the revised timeframe identified in the 2014 ESD supports the determination that the remedy is functioning as intended. Arsenic and manganese are the principle constituents of concern requiring an extended period of time to restore bedrock groundwater to IGCLs. The timeframe for the restoration of bedrock groundwater evaluation (Summit 2014b) found that VOCs concentrations at bedrock compliance wells have decreased to concentrations at or approaching the IGCLs, such that they are no longer considered to be a

driving factor for predicting the timeframe for the restoration of bedrock groundwater quality at the Site. It is noted that similar challenges in achieving groundwater cleanup goals for arsenic and manganese have been observed at other landfill/CERCLA sites in New England. Summit (2014b) anticipates that bedrock groundwater will likely attain IGCLs for VOCs by 2025, and that concentration of arsenic and manganese should decrease to the IGCLs (or background concentration) by 2055 to 2075. The revised timeframe for bedrock groundwater restoration is incorporated into the 2014 ESD.

The next five to ten years will be a critical time for monitoring the extent of VOC impacts in deeper overburden and assessing whether future groundwater quality results are consistent with the Conceptual Site Model Update (Summit 2012c). As groundwater restoration activities continue, EPA will monitor whether other measures are needed to ensure groundwater use remains restricted at the Site.

A review of the long-term monitoring program sampling locations and analytes list is warranted. The long-term monitoring plan should be modified to identify the proper frequency and locations of monitoring points to assess remedy performance. The plan may also include the collection of additional redox sensitive parameters such that the monitored natural attenuation of arsenic and manganese can be better assessed using additional data and in turn these data can be used to further refine timeframe estimation predictions (if necessary) as long-term monitoring continues. Additional sampling to better define local background concentrations for arsenic and manganese may also be performed to assist in predictions for achieving standards.

A vapor intrusion investigation is ongoing. Preliminary (unvalidated) results from the first round of sampling appear to indicate that the vapor intrusion pathway is not a concern, and does not impact current protectiveness.

V. ISSUES/RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table 7: Issues and Recommendations/Follow-up Actions

OU #	Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
						Current	Future
1	Initial vapor intrusion screening investigations have been performed at the Site and additional investigations are planned for 2014. Preliminary screening results do not indicate a vapor intrusion risk to nearby residences.	Complete VI screening investigations.	PRP	EPA	12/31/14	No	Yes

In addition, the following recommendations to improve the effectiveness the remedy (but do not affect current protectiveness) were identified during the Five-Year Review:

- A review of the long-term monitoring program sampling locations, analyte list, and detection limits is warranted. The long-term monitoring plan should be modified to identify the proper frequency and locations of monitoring points to assess remedy performance. The Plan may also include the collection of additional redox sensitive parameters such that the monitored natural attenuation of arsenic and manganese can be assessed using additional data and in turn these data can be used to refine timeframe estimation predictions as long-term monitoring continues. Additional sampling to better define local background concentrations for arsenic and manganese may also be performed to assist in predictions for achieving standards.

- EPA will monitor whether additional institutional controls or other measures are needed to ensure groundwater use remains restricted at the Site.

VI. PROTECTIVENESS STATEMENT

Sitewide Protectiveness Statement	
Protectiveness Determination: Short-term Protective	*Addendum Due Date (if applicable):*
Protectiveness Statement: The remedy currently protects human health and the environment because: • There is no current exposure of Site related contaminants to humans or the environment at concentrations that would represent a health concern; • The Site is secure with fencing and locked access gates to minimize unauthorized access to the closed landfill. • The landfill cover system prevents exposure to the waste material and contaminants within the landfill; • The private water line system serving four downgradient properties has eliminated groundwater use within the area impacted by the landfill; • Ongoing monitoring has demonstrated that Connecticut River water quality is not being adversely affected; • Landfill gas is collected and treated by the extraction system and enclosed flare; • The land use restriction for the Site prevents any use of the land that would result in an exposure to hazardous substances, pollutants, or contaminants; and • VT ANR has reclassified the groundwater beneath the Site from a Class III to a Class IV aquifer, which prohibits potable use. However, in order for the remedy to be protective in the long-term, the on-going vapor screening level assessment needs to be completed. EPA will monitor whether additional institutional controls or other measures are needed to ensure groundwater use remains restricted at the Site.	

VII. NEXT REVIEW

The next five-year review report for the BFI Rockingham Landfill Superfund Site is required five years from the signature date of this FYR.

APPENDIX A – EXISTING SITE INFORMATION

A. SITE CHRONOLOGY

The following chart provides the basic chronology for site-related activities prior to the 2009 FYR and a more detailed chronology for site-related activities conducted after the 2009 FYR.

Table A-1: Site Chronology

Date	Site-Related Activity / Event
1960's	Site location used as a borrow pit.
1968	Disposal Specialist, Inc. (DSI) landfill began operation after closure of "Old Springfield Landfill."
1973	BFI of Vermont (BFI-VT) acquires DSI.
1980	Water supply well installed to serve the facility and adjacent residents.
1986-1989	Municipal incineration ash disposed in a 1.5-acres lined cell at landfill.
1989	DSI landfill is added to National Priorities List as BFI Sanitary Landfill Superfund Site.
1989	BFI installed an active gas collection system to limit migration of landfill gas
1992	EPA entered into agreement with DSI and BFI-VT for the performance of a site wide investigation.
1993	EPA signed first cleanup decision document, an Action Memorandum, to initiate a Non-Time-Critical Removal Action (NTCRA) to place a cap on the landfill and expand gas collection and treatment systems.
1994	EPA signed second cleanup decision document, a Record of Decision (ROD), identifying Long-Term Monitoring and Natural Attenuation as the long-term groundwater cleanup approach.
1996	NTCRA completed (landfill cap, expanded active gas collection system. groundwater interceptor trench).
1996	EPA entered into consent decree (CD) with DSI and BFI-VT for the performance of the remedial action selected in the ROD.
1999	EPA completed first five-year review.
2004	EPA completed second five-year review.
2009	State of Vermont reclassified groundwater affected by the DSI Site at Class IV groundwater to limit groundwater extraction for potable use.
Jan. 2009	The Fall 2008 Semi-Annual Long-Term Monitoring Report indicates that the cleanup criteria would not be met for bedrock groundwater at some monitoring points with the 15-year timeframe specified in the ROD.
Sept. 2009	EPA completed third five-year review.
Jan. 2012	BFI-VT submitted an Additional Investigation Plan as required by 1996 consent decree if the 15-year groundwater cleanup timeframe would not be met and it is subsequently approved by EPA.
Aug. 2012	BFI-VT submitted Additional Investigation Plan reports: the Conceptual Site Model Update and Vapor Intrusion Evaluation.
2012	BFI-VT performed (as part of the Additional Investigation Plan) a regulatory review and physical evaluation of the water system originally installed in 1980 to serve off-site residents. Upgrades and improvements are made including an iron

	and arsenic removal system, installation of particulate filters and reconfiguration of the conveyance system to allow better access to Primary and Backup supply wells.
Nov. 2012	BFI-VT submitted a draft petition to the State of Vermont to revise/expand the extent of the groundwater reclassification area to correct for inaccurate boundaries used for the 2009 reclassification order.
Apr. 2013	BFI-VT extends water supply line to serve one additional property on River Front Drive.
June. 2013	BFI-VT submits DSI Missing Link Road Non-Public Water System Operation and Maintenance Manual (as part of Additional Investigation Plan).
Oct. 2013	BFI-VT submits copies of Water Supply Agreements recorded on landowner deeds to EPA (as part of the Additional Investigation Plan)
Nov. 2013	State of Vermont revised / expanded the extent of the groundwater reclassification area to correct for inaccurate boundaries included in the original 2008 reclassification petition (based on information provided by BFI-VT in November 2012). This was done to fulfill portions of the Additional Investigation Plan.
Mar. 2014	EPA issues comments on the August 2012 Vapor Intrusion Evaluation and requests a vapor intrusion investigation work plan be developed, and that a new Site Specific Quality Assurance Project Plan (QAPP) be prepared for sampling activities being conducted in 2014 as part of the Five Year Review sampling requirements and soil vapor sampling activities.
June 2014	BFI-VT submits VI Work Plan and QAPP for 2014 5YR semi-annual sampling event and receives approval from EPA/VTDEC. Semi-Annual monitoring event is conducted in accordance with QAPP. Soil vapor/gas probes are installed and sampled in accordance with VI Work Plan.
July 2014	BFI-VT submits an Additional Investigations Plan Summary Report and Estimated Timeframe for the Restoration of Bedrock Groundwater, which provides a summary of the status of the additional investigation plan items and provides an estimated timeframe for the restoration of bedrock groundwater based on long-term monitoring from 1995 to 2013.

B. BACKGROUND

B.1 Physical Characteristics

The Site is located along U.S. Route 5, locally known as Missing Link Road, in the Town of Rockingham, Windham County, Vermont. The 17-acre solid waste landfill is located on a terrace approximately 500 feet from and 200 feet higher in elevation than the Connecticut River. The Site includes the landfill area and the surrounding rural residential areas impacted by the Site. Floodplain and wetlands are present at the base of the steep slopes at the bank of the Connecticut River. However, wetlands and floodplain areas are not present with the 25-acre area that encompasses the landfill and operating facility, which consists of an office building, garage, former solid waste transfer station with associated former storage areas, and landfill gas management system.

B.2 Hydrology

The landfill is situated on a glacial terrace located along the west side of the Connecticut River. Geological cross sections prepared as part of the RI/FS are included as Figures 3 and 4 in Appendix B. The majority of the waste within the landfill is underlain by a relatively thin layer of sand deposits overlying varved lacustrine deposits comprised of interbedded clay and silt. The lacustrine deposits and bedrock are generally separated by a sandy glacial till unit. From top to bottom the overburden sediments include a sand and silty sand, varved clayey silt, silty sand grading downward to sand and glacial till. Overburden sediments are approximately 200 feet thick on the southeast side of the landfill, with little or no overburden present on the northwest side of the landfill.

Bedrock under the Site consists of moderately fractured black and gray phyllite and slate of the Littleton Formation. Sulfide minerals are present within fractures, and fractures in rock core and outcrops were frequently coated with reddish brown oxides. The dominant fractures within the bedrock are foliation parallel and are near-vertical to steeply dipping and north-northeast trending. A less common cross-foliation fracture population oriented perpendicular to foliation that are much shorter in length than foliation-parallel fractures. In some areas, located along the west side of the landfill, waste may be situated in close proximity to bedrock and precipitation percolating through the waste mass in these areas may infiltrate into the fractured bedrock.

The varved lacustrine deposits underlying the majority of the landfill impedes the vertical/downward migration of water beneath the landfill resulting in predominantly horizontal flow within the overlying sand deposits. As shown on the interpreted potentiometric surface contour map for shallow overburden groundwater (Figure 5 – Appendix B**)**, overburden groundwater at the Site flows easterly towards the Connecticut River. Groundwater elevations at shallow and deeper overburden well couplets indicate that there is a component of downward flow. Water levels in shallow overburden declined after the installation of the landfill cap; however, water levels in deeper overburden (varved lacustrine deposits) did not respond significantly to landfill capping.

The majority of the impacted shallow overburden groundwater is currently intercepted by the Route 5 Seepage Control and Stabilization System (Route 5 System) located on the western side of Route 5, which was constructed to, in part, to collect groundwater formerly discharging to a drainage ditch via seeps along Route 5. The base of the trench intersects the geological transition from fine sands to laminated/varved clayey silt at an elevation of 420 feet NGVD. Groundwater collected by the Route 5 System is disposed at an off-site disposal facility. The Route 5 System intercepted the majority of the seeps identified in the RI, however, one impacted seep (Seep SW-6) continues to flow on a seasonal basis.

Interpreted potentiometric surface contour maps for shallow bedrock and deeper bedrock are included as Figures 6 and 7 (Appendix B), respectively. Shallow bedrock is represented by monitoring wells generally screened within the upper 10 feet of bedrock, while deeper bedrock wells are generally screened greater than 50 feet from the bedrock surface. On a site-wide scale the horizontal component of groundwater flow in shallow and deeper bedrock is to the southeast toward the Connecticut River. While Figures 6 and 7 provide the general direction of groundwater flow, the actual flow pathways in bedrock are likely more complex because flow in fractured bedrock is strongly controlled by the

number, aperture (size), orientation and interconnectivity of bedrock fractures, as well as the tortuosity of flow paths within individual fractures. Bedrock ground water discharges to the Connecticut River valley located approximately 500 feet to the east of the landfill boundary.

B.3 Land and Resource Use

The land use within a one-mile radius of the Site supports primarily low-density rural residential housing, light agriculture, undeveloped forest land and commercial activities. Approximately 2,700 people live within one mile and 6,400 people live within three miles of the Site. The PRPs supply water via the Missing Link Road Non-Public Water System to four residential properties located between the landfill and the Connecticut River. Several private residential water supply wells in the vicinity of the Site are sampled periodically. Natural resources near the Site include groundwater, surface water, fish and game, arable land, forest, woodland and minerals.

The current and future land use of the landfill itself is non-residential because of the impractability of constructing residences on a closed landfill. Current land-use restrictions prevent development that could damage the landfill cap. The areas surrounding the landfill are considered residential. However, much of the area surrounding the landfill is not suitable for development due to steep topography, proximity of floodplains and development setbacks from the Connecticut River.

Groundwater usage restrictions (groundwater reclassification and Water Supply Agreements recorded at the Registry of Deeds) have been established to restrict the use of groundwater at properties located downgradient of the DSI Landfill. Water Supply Agreements have been recorded at the Registry of Deeds for the four residences that the PRPs supply potable water to via the Missing Link Road Non-Public Water System. The groundwater aquifer below the landfill property and properties located between the landfill and the Connecticut River was reclassified from Class III to Class IV groundwater by VTANR on March 10, 2009 (amended November 6, 2013). Class IV groundwater is not suitable for potable use. The Water Supply Agreements and groundwater reclassification provided adequate protection for human health in the short-term; however, EPA will monitor whether additional institutional controls or other measures are needed to ensure groundwater use remains restricted at the Site and long-term protectiveness is maintained.

Prior to the implementation of the Site remedy, an Ecological Risk Assessment, as discussed in the ROD, concluded that high aluminum, chromium, iron and lead concentrations in the Connecticut River that were attributable to seeps within the hydraulic influence of the landfill posed a threat to ecological receptors in the Connecticut River. However, the installation of the Route 5 System eliminated the majority of the seepage areas, and monitoring results from Connecticut River samples collected during long-term monitoring activities have met ambient water quality criteria for many years, which indicate the landfill is not adversely affecting the Connecticut River.

B.4 History of Contamination

Prior to the 1960's, the Site was undeveloped woodland. Landfill operations at the Site first started in 1968 (under the ownership of Harry K. Shepard, Inc.) following the removal of significant quantities of borrow material (fill) from the property for the construction of Interstate 91. In 1969, Harry K. Shepard, Inc. deeded the landfill to Disposal Specialist, Inc., and Harry K. Shepard, Inc. was continued as a solid

waste and industrial waste hauling company. The DSI landfill and Harry K. Shepard, Inc. were acquired by Browning-Ferris Industries, Inc. (BFI) in 1973, and Harry K. Shepard, Inc. subsequently changed its name to Browning-Ferris Industries of Vermont, Inc. (BFI-VT).

From 1968 until 1991, the landfill received residential, commercial and industrial solid and liquid waste. Approximately 1.2 million cubic yards of solid waste were disposed in the landfill during its operation. The majority of wastes were placed in unlined landfill cells, with the exception that municipal incinerator ash was placed in a lined monofill cell located in the southeastern section of the landfill from 1986 to 1989. The monofill cell was capped in 1989. Wastes continued to be disposed in the unlined landfill cells until landfilling activities at the Site ceased in November 1991.

In 1989, BFI-VT installed an active landfill gas collection system to comply with Vermont air pollution control regulations. Landfill gas is extracted from numerous gas extraction wells through an underground piping network and landfill gas is subsequently combusted at an on-site flare. The landfill gas collection and treatment system is currently operated and maintained pursuant to a permit issued by the Vermont Air Pollution Control Division.

Neighbors began reporting potential groundwater quality impacts in 1977. In 1979, VTDEC collected and analyzed drinking water samples from six bedrock water supply wells located in the vicinity of the landfill. Metals and volatile organic compounds (VOCs) consistent with impacts attributable to the DSI landfill were reported in some of the bedrock water supply wells sampled, and the State of Vermont required DSI to provide residences located east of the landfill with bottled water for potable use. In 1980, a new water supply well was installed on DSI property and a distribution system was constructed to serve residents previously supplied with bottled water. DSI entered into an agreement (Water Agreement) to continue to supply off-site residences until EPA and VTDEC determine that the water beneath the residences is acceptable for use as a water supply. These Water Agreements are still in effect.

In the past, the overburden groundwater in the immediate vicinity of the landfill contained VOCs, SVOCs and metals attributable to the landfill. The overburden contamination was limited to the area east and hydraulically downgradient of the landfill and the east side of Route 5. Contaminants at shallow depths (in sandy overburden above varve lacustrine sediments) extended short distances to discharge points (seeps) at the top of ravines adjacent to the east side of Route 5 (EPA, 1994).

A shallow overburden groundwater collection trench (the Route 5 Seepage Control and Stabilization System, the “Route 5 System”) was constructed in the fall and winter of 1992 to: 1) collect groundwater seepage discharging within the stormwater drainage ditch to the east of the landfill and immediately adjacent to Route 5; 2) reduce seepage below Route 5; and 3) reduce soil pore water pressure in a localized area along Route 5 to enhance the integrity of the proposed Site remedy. The trench is bounded by sheet piling driven to an elevation of approximately 400 feet NGVD. The Route 5 System eliminated all but one seepage area (Seep SW-6) along Route 5, and has effectively addressed impacted overburden groundwater at the Site. A small amount of impacted overburden groundwater currently discharges seasonally to Seep SW-6 on the east side of Route 5. However, constituents of concern in Seep SW-6 have been reported at concentrations below applicable stormwater standards.

Bedrock groundwater between the landfill and the Connecticut River also contained VOCs, SVOCs and metals consistent with a release from the landfill. However, concentrations were significantly lower than in overburden. Arsenic and manganese were the primary contaminants of concern in bedrock groundwater, which occur naturally in the bedrock fracture fillings, and were mobilized by a reducing condition attributable to the landfill.

B.5 Initial Response

In 1979, VTDEC collected and analyzed groundwater samples from six bedrock wells in the vanity of the landfill. Because those samples were found to be contaminated by the landfill, VTDEC required DSI to supply nearby residences with bottled water. In 1980, a new water supply well was installed on DSI property to service the residences via a water supply line. DSI entered into a water supply agreement with affected property owners to maintain the water line and provide potable water until VTDEC and EPA determine that groundwater on the properties is acceptable for use as a water supply (EPA, 1994).

A series of Assurance of Discontinuance Agreements between DSI and VTDEC required DSI to demonstrate that the landfill would not further degrade groundwater or surface water quality in the vicinity of the landfill. Consequently, beginning in 1979 a series of hydrogeological investigations were performed to investigate groundwater flow and water quality conditions at the landfill. In October 1989, the Site was included on the EPA National Priorities List (NPL).

During the spring of 1992, DSI and BFI-VT, the two Potentially Responsible Parties (PRPs) initiated negotiations with EPA to conduct a Remedial Investigation and Feasibility Study (RI/FS) in accordance with NCP requirements. An Administrative Order (AO), EPA Docket No. I-92-1053, for RI/FS activities was executed by the PRPs in July 1992 and became effective August 8, 1992. Pursuant to the AO, a shallow overburden groundwater collection trench (the Route 5 Seepage Control and Stabilization System, the "Route 5 System") was constructed in the fall and winter of 1992.

As part of the Superfund Accelerated Cleanup Model, EPA initiated a non-time critical removal action (NTRCA) for the Site in December 1992. In February 1993, EPA required the PRPs to prepare an engineering evaluation / cost analysis under the existing RI/FS Order to support the selection of a NTCRA for the Site. EPA signed an Action Memorandum on September 13, 1993 to initiate a NTCRA to install a multi-layer landfill cap and expand the active landfill gas collection and treatment system. The landfill cap and landfill gas collection and treatment system designs were completed in June 1994. Construction of the NTCRA was initiated in April 1994 and completed in July 1995.

B.6 Basis for Taking Action

A Remedial Investigation (RI) was performed at the Site from 1992 to 1994 (Balsam 1993 & 1994). The RI identified the landfill as the source of contamination found in bedrock and overburden groundwater downgradient of the Site. Surface water in the drainages along Route 5 was found to also contain Site-related contaminants. Table A-2 summarizes the contaminants in bedrock groundwater identified during the RI (EPA, 1994).

Table A-2: Remedial Investigation Groundwater Contamination Summary

Contaminant of Concern	Interim Groundwater Cleanup Level (IGCL)	Average Concentration (ug/L)	Maximum Concentration (ug/L)	Frequency of Detection
2-Butanone	170*	18	370	2/34
Antimony	6	14	28	1/32
Arsenic	50*	49	282	18/32
Barium	1,000*	303	1,850	30/32
Benzene	5	6	17	10/34
Bis (2-chloroisoproyl) ether	1*	11	100	1/33
Bis (2-ethylhexyl) phthalate	6	8	62	10/33
Chromium	50*	5	81	5/32
Manganese	180*	1,020	5,830	28/32
Nickel	100	30	102	14/32
Pentachlorophenol	1	3	3	1/34
Tetrachloroethylene	0.7*	5	12	2/34
Xylene, total	400*	82	1,200	11/34
Vinyl chloride	2	4	6	3/34

* Current Federal/State standards (ARARs) have been revised for the contaminants of concern indicated. Refer to Table 5 in the main body of the FYR for further information regarding these ARARs.

The information collected during the Remedial Investigation and Feasibility Study (RI/FS) was used to conduct Human Health and Ecological Risk Assessments. The results indicated that an unacceptable carcinogenic risk and non-carcinogenic hazard would result from ingestion of bedrock groundwater. This was a hypothetical exposure scenario since no individuals were ingesting contaminated groundwater at the Site due to the provision of an alternate water supply. The carcinogenic risk results primarily from arsenic and vinyl chloride. Arsenic and manganese represented the majority of the non-carcinogenic hazard at the Site under both average and maximum exposure scenarios. Constituents that exceeded a federal safe drinking water maximum contaminant level (MCL) or maximum contaminant level goal (MCLG) in bedrock groundwater during any of the five rounds of sampled obtained at the Site during the RI include: antimony, arsenic, barium, benzene, bis (2-ethylhexyl) phthalate, chromium, nickel, pentachlorophenol, tetrachloroethylene, and vinyl chloride. In addition to these substances, exceedances of the State of Vermont groundwater standards for 2-butanone, lead and xylene were also reported. Based on the Ecological Risk Assessment and further sampling results as discussed in the ROD, EPA concluded that severe adverse effects on the Connecticut River were not likely.

C. REMEDIAL ACTIONS

C.1 Remedy Selection

Two CERCLA cleanup actions have been implemented at the Site. The first was a non-time critical removal action (NTCRA), which was described in the 1993 Action Memorandum. The NTCRA included: construction of the multilayer landfill cap and Route 5 Slope Stabilization and Seepage Control System (Route 5 System) groundwater collection trench, expansion of the gas extraction system, and institutional controls to protect the cap. The multilayer cap was constructed with a slope of 3:1 and included: a gas vent layer, a compacted low permeability native soil layer, a very low density polyethylene geomembrane, a stormwater drainage tire chip layer, vegetative support soil and top soil.

The second cleanup action was a remedial action that was selected in the 1994 Record of Decision (ROD). The selected site remedy identified in the ROD called for long-term monitored natural attenuation of surface water and groundwater quality impacts, maintenance of the multi-layer cap and landfill gas extraction system, and the continued operation and maintenance of the off-site potable water supply line, lined ash monofill cell leachate collection system and the Route 5 System. No further construction activities were required under the ROD. The ROD established Interim Groundwater Cleanup Levels (IGCLs) for bedrock groundwater based on the cumulative carcinogenic and non-carcinogenic risks posed to individuals drinking bedrock groundwater. Due to the limited extent and low yield, overburden groundwater was not considered to be a potential drinking water source or a current or future human exposure pathway; therefore, IGCLs were not established for overburden groundwater.

The Consent Decree (CD) was executed by EPA on May 22, 1996 which established requirements related to the operation and maintenance of the components of the site selected remedy, the framework for the long-term monitoring activities and established interim goals (comparison levels) for assessing the restoration of bedrock groundwater quality.

The ROD established the following remedial action objectives.

<u>Landfill (Source Area) Remedial Objectives:</u>

- Prevent, to the extent practicable, the potential for water to contact or infiltrate through the debris mass;
- Prevent, to the extent practicable, the generation of landfill seeps and the migration of landfill-impacted surface water into the Connecticut River;
- Control landfill gas emissions so methane gas does not present an explosion hazard; prevent, to the extent practicable, the inhalation of landfill gas containing hazardous substance, pollutants, or contaminants; and meet state and federal air standards;
- Prevent, to the extent practicable, the migration of contaminated groundwater beyond the points of compliance by controlling the source area;
- Minimize the potential for slope failure of the debris mass associated with the multi-layer landfill cap or any further action; and
- Prevent, to the extent practicable, direct contact with and ingestion of debris within the landfill and beneath the landfill;

Groundwater Remedial Objectives:

- Prevent, to the extent practicable, the ingestion of landfill-impacted bedrock groundwater exceeding EPA Safe Drinking Water Act Maximum Contaminant Levels (MCLs), Vermont Primary Groundwater Quality Standards, or in their absence, the more stringent of an excess cancer risk of $1x10^{-6}$ for each compound or a hazard quotient of 1 for each non-carcinogenic compound by an individual who may use the bedrock groundwater within the area of landfill-impacted groundwater or within an area that could become impacted as a result of pumping activities; and

- Restore the bedrock groundwater at the edge of the Waste Management Unit (solid waste boundary shown on Figure 2) to: MCLs, Vermont Primary Groundwater Quality Standards, or in their absence, the more stringent of an excess cancer risk of $1x10^{-6}$ for each compound or hazard quotient of 1 for each non-carcinogenic compound;

Surface Water (Ecological) Remedial Objectives:

- Protect off-site surface water by preventing the occurrence of landfill impacted seeps;

- Meet federal and state ARARs for any surface-water discharge to the Connecticut River, and; and

- Provide long-term monitoring of the surface water and sediments of the section of the Connecticut River adjacent to the landfill to assure that no landfill-related impacts occur in the future.

C.2 Remedy Implementation

The design of the NTCRA was initiated in October 1993 and completed in July 1994. The expansion of the gas extraction system and Site preparation activities were completed in May 1994. The multi-layer landfill cap was completed in July1995. Surface water (stormwater) control systems were completed by August 1995 and a vegetative cover was established by October 1995.

EPA, VTDEC and the oversight contractor, performed a final inspection in May 1996 and the cap and all related systems were determined to be constructed according to design, with a well-established vegetative cover. The construction activities and completion were documented in a Completion of Work Report that was approved by EPA in September 1996. The report documented the completion of the NTCRA and the initiation of Post-Removal Site Control / Operation and Maintenance by the PRPs.

The ROD identified a monitored natural attenuation remedy, implementation of institutional controls, and maintenance of the NTCRA. No construction activities were required by the ROD. A long-term monitoring plan was approved by EPA in May 1996. The Institution Controls were completed in June 1996 by a “Grant of Environmental Restrictions and Right of Access” for seven parcels of land, including the landfill and adjoining areas. The deed restrictions affect seven parcels of land, which have

been subsequently combined and/or subdivided into three parcels of land (as listed in Table 3 in the main body of the FYR). The following is a summary of the IC requirements, with parcel identification numbers updated per Summit (2012e):

- The Capped Area (capped portion of Parcel 4-505-894): In this area, uses are prevented that disturb the integrity of the landfill cap, the leachate collection system, the landfill gas management system, or any or any other structures (e.g., Route 5 System groundwater collection trench) for maintaining the effectiveness of the Removal/Remedial Action.
- The Groundwater Restriction Area (Parcel 4-107-032, and portions of Parcels 4-505-890 and 4-505-894): This area is defined as a portion of the Site where contaminants were detected above groundwater cleanup levels during the RI. In this area, use for groundwater as a drinking supply is prohibited.
- The Waterline Restriction Area: Alterations or disturbances to the waterline that supplies potable water to residential properties are prohibited in this area. The restrictions apply to the water line supply well and all structures and equipment related to it, as well as the water line itself.
- Additional Restrictions (Parcels 4-505-890, 4-505-894 and 4-107-032): Activities and uses that disturb the Removal Action and Remedial Action, as defined in the ROD, are prohibited in this area.

EPA signed a Preliminary Closeout Report for the entire Site (NTRCA and Remedial Action) in September 1996 upon completion of the cap, which confirmed that no additional monitoring wells or other construction activities were necessary at the Site.

The ROD anticipated that IGCLs would be achieved 15 years after completion of the NTCRA. Long-term monitoring activities have shown significant improvements in groundwater and surface water quality following construction the NTCRA. Results from the fall 2008 Semi-Annual Long-Term Monitoring Report indicated that the IGCLs had been met at many Site monitoring wells. However, review of sample results over time indicated IGCLs for benzene, total xylenes, tetrachloroethene, methylene chloride, 2-butanone, vinyl chloride, arsenic, manganese, barium and chromium will not be met for bedrock groundwater at some bedrock compliance wells located hydraulically downgradient of the landfill within the 15-year restoration estimate contained in the ROD.

In the spring of 2009, following receipt of the Fall 2008 Semi-Annual Long-Term Monitoring Report results, EPA and BFI-VT entered into discussions regarding the need to conduct additional investigations to further evaluate the status of the natural restoration component of the Site remedy. EPA determined that IGCLs would not likely be achieved in the 15-year time frame specified in the ROD (i.e., by 2010) at some bedrock wells. BFI-VT noted that meeting arsenic and manganese IGCLs may be difficult due in part to the naturally occurring presence of these metals in bedrock and the relatively slow rate of groundwater flow through bedrock and bedrock fractures.

Pursuant to the 1996 consent decree, an Additional Investigation Plan is required when the cleanup levels in the ROD may not be achieved by the estimated timeframe. On October 18, 2011, EPA sent a letter to BFI-VT requesting an Additional Investigation Plan (Plan). The Plan was submitted to EPA on

January 12, 2012. A Technical Impracticability (TI) waiver was also considered for the Site; however, EPA determined that a TI waiver was not necessary because the cleanup levels could be achieved in a reasonable timeframe beyond the 15-year estimate in the ROD. On February 16, 2012, EPA approved, with conditions, the actions identified in the Additional Investigation Plan which are summarized below:

- Updating the Conceptual Site Model (CSM) to assess water quality trends, changes in Site conditions and the potential for the Site to meet cleanup goals in the future (Summit 2012c).

- Evaluate potential vapor intrusion pathways related to structures located downgradient of the landfill (Summit 2012d, 2014b). Vapor Intrusion pathways will be assessed based on results from soil vapor/gas and groundwater sampling results from semi-annual sampling events in 2014.

- Establish binding provisions to supply potable water to the landowners on the properties downgradient of the landfill until cleanup goals are met or verifying that existing Agreements are sufficient (Summit 2014d).

- Confirm that the water supply system installed to serve off-site residences substantially meets existing codes for public water lines. Note that the existing supply system is not regulated by the State of Vermont as a Public Supply because of the limited number of users and connections. A summary of operation and maintenance activities completed in this FYR period and the "Disposal Specialists, Inc. Missing Link Road Non-Public Water System Operation and Maintenance Manual" are included in Summit (2013).

- Expand the State of Vermont Groundwater Reclassification Zone boundary to include two additional properties to the north of the existing boundary. VTANR (2013) amended the existing Class IV reclassification zone and buffer area to included two additional properties north of the existing boundary based on Summit (2012e).

- Review the existing groundwater quality monitoring program and establish an updated monitoring program until cleanup criteria are met. An updated long-term monitoring program will be completed following completion and review of data from 2014 Five Year Review semi-annual long-term monitoring events.

Results of the Investigation Plan, completed under SOW Section V-2, formed the basis for the 2014 ESD. A summary of the status of the investigation plan tasks (Summit 2014d) was prepared for this FYR; this report also included an assessment and statistical evaluation of the data supporting a revised timeframe estimation for the restoration of bedrock groundwater.

C.3 System Operation/Operation and Maintenance

Operation, maintenance and monitoring activities are currently being implemented by the PRPs. Monitoring and maintenance reports are submitted to EPA and VTDEC for review. The operation, maintenance and monitoring activities focus on:

- The vegetative cover of the cap and repair of any erosion;

- Balancing the landfill gas extraction system and repair of any wells or conveyance lines;
- Shipment of leachate and collected groundwater to an off-site treatment facility;
- Collection and analysis of samples to monitor the restoration of groundwater; and
- Providing potable water to four properties on River Front Drive and maintaining the water line.

Operation costs for this FYR period are summarized in Table A-3.

Table A-3
Annual Operations/O&M Costs (BFI-VT, 2014, written communication)

Year	System Operation Cost
2013	$380,000
2012	$374,000
2011	$347,000
2010	$281,000
2009	$430,000

The original O&M cost prediction provided in the 1994 ROD for post closure O&M for a period of 5 to 30 after the completion of the NTCRA ranged from $90,000 to $200,000 per year.

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APPENDIX B – ADDITIONAL MAPS, DATA, FIGURES, AND TABLES

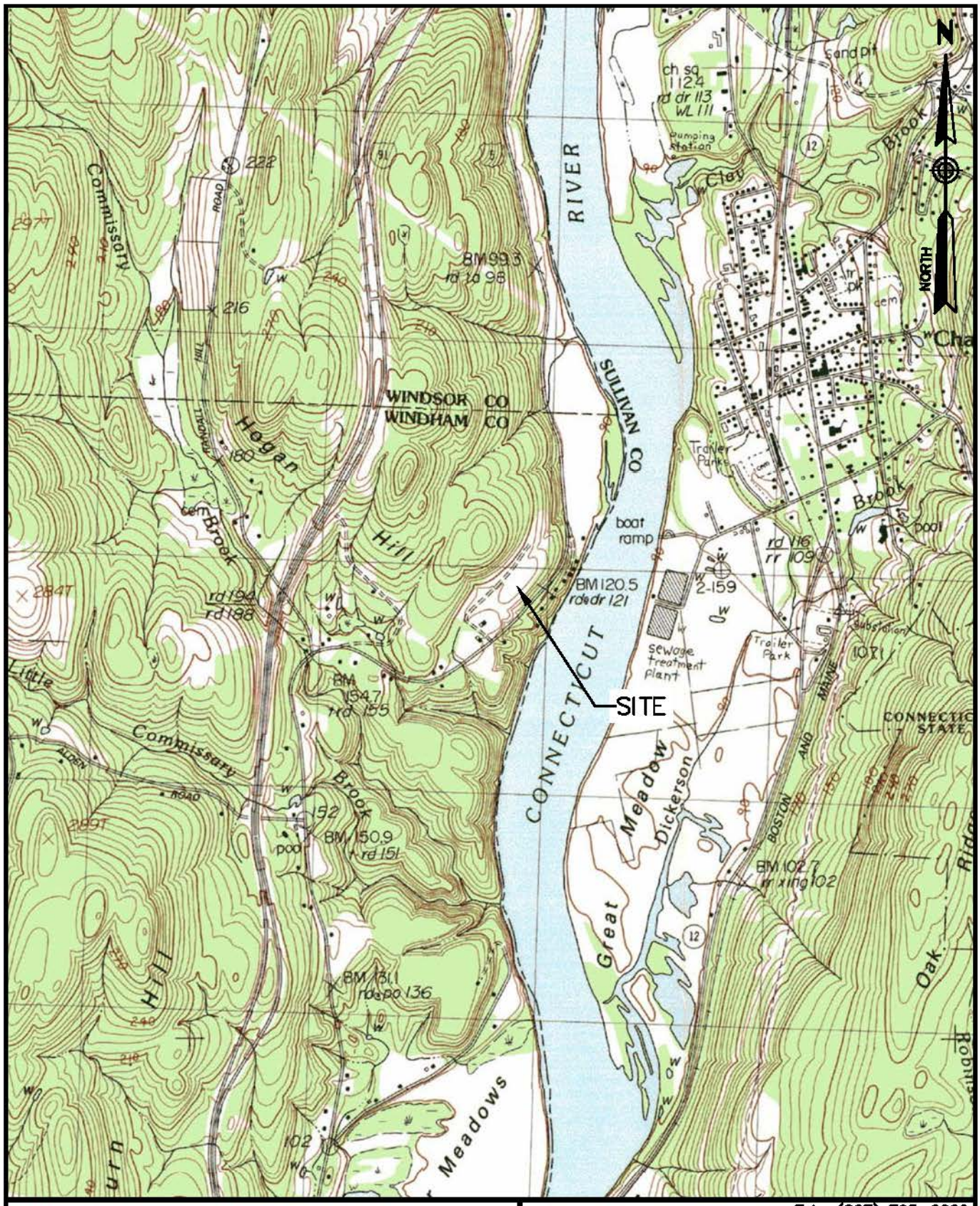

FIGURE 1
U.S.G.S. TOPOGRAPHIC MAP

MISSING LINK ROAD (ROUTE 5) – ROCKINGHAM, VERMONT

PREPARED FOR

BROWNING–FERRIS INDUSTRIES

DATE: SEPT. 2013	DRAWN BY: SBM	CHECKED BY: MAD
JOB: 16819	1" = 2,000 FEET	FILE: 16819–FIG1

640 MAIN ST.
LEWISTON, ME 04240

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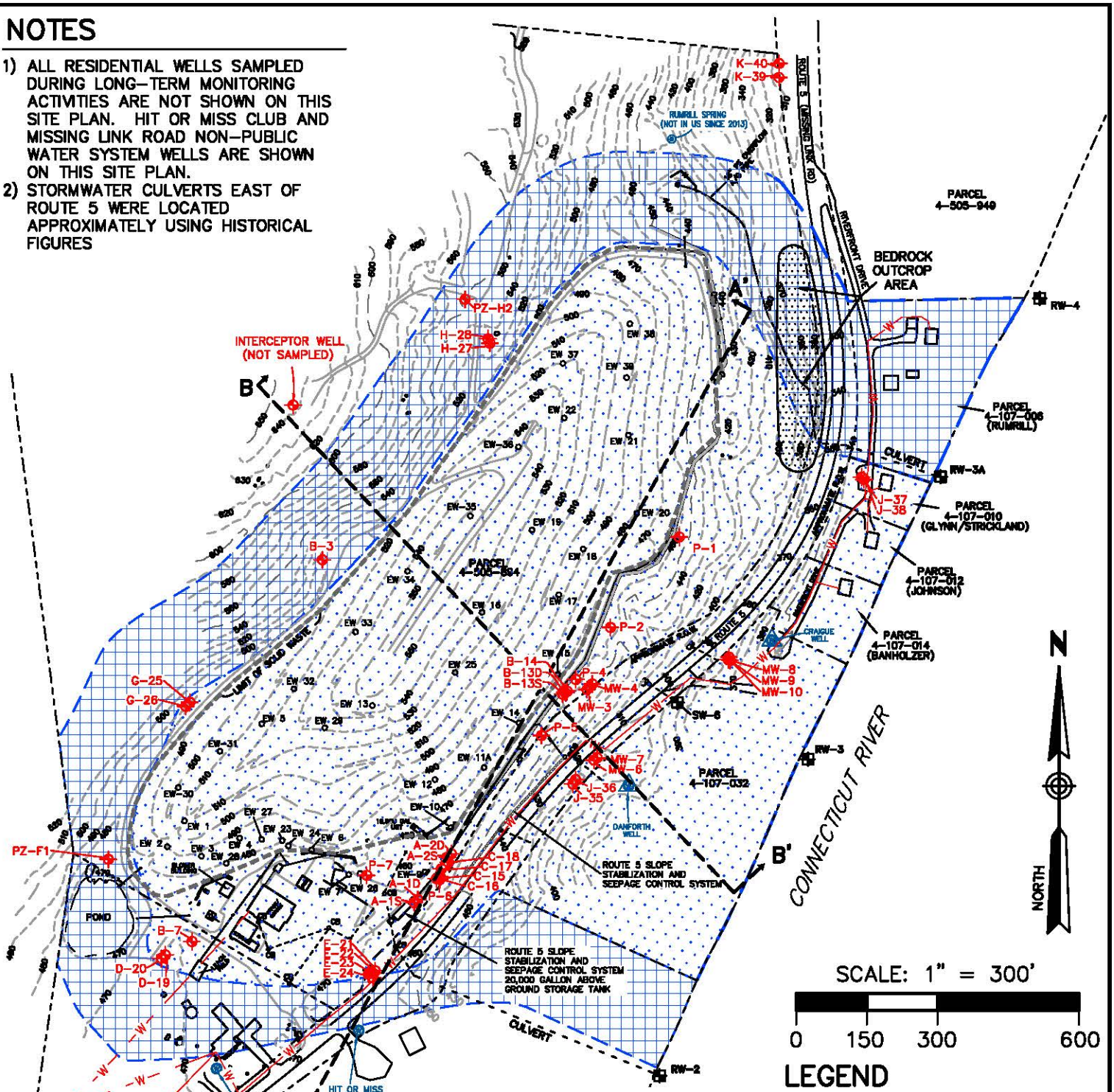
A CES, Inc. Company

NOTES

1) ALL RESIDENTIAL WELLS SAMPLED DURING LONG-TERM MONITORING ACTIVITIES ARE NOT SHOWN ON THIS SITE PLAN. HIT OR MISS CLUB AND MISSING LINK ROAD NON-PUBLIC WATER SYSTEM WELLS ARE SHOWN ON THIS SITE PLAN.
2) STORMWATER CULVERTS EAST OF ROUTE 5 WERE LOCATED APPROXIMATELY USING HISTORICAL FIGURES



LEGEND

- CLASS IV GROUNDWATER RECLASSIFICATION ZONE
- CLASS IV GROUNDWATER RECLASSIFICATION BUFFER

LEGEND

- PROPERTY BOUNDARY
- LANDFILL SOLID WASTE BOUNDARY
- 380 — EXISTING CONTOUR (10 FT INTERVAL)
- W — MISSING LINK ROAD WATER SUPPLY LINE
- A A' — GEOLOGICAL CROSS SECTION LINE
- MW-6 — MONITORING WELL
- EW 11A — GAS EXTRACTION WELL
- RW-4 — CT RIVER OR SEEP SAMPLING LOCATION
- FORMER WATER SUPPLY WELL (NOT IN USE)
- WATER SUPPLY WELL (IN USE, UNLESS NOTED)

FIGURE 2 – SITE PLAN

BFI ROCKINGHAM SANITARY LANDFILL SUPERFUND SITE
DISPOSAL SPECIALIST, INC. LANDFILL
MISSING LINK ROAD (ROUTE 5) – ROCKINGHAM, VERMONT

JOB: 16819	DATE: AUG 2014	DRAWN BY: SBM	FILE: 16819-5YR-SP

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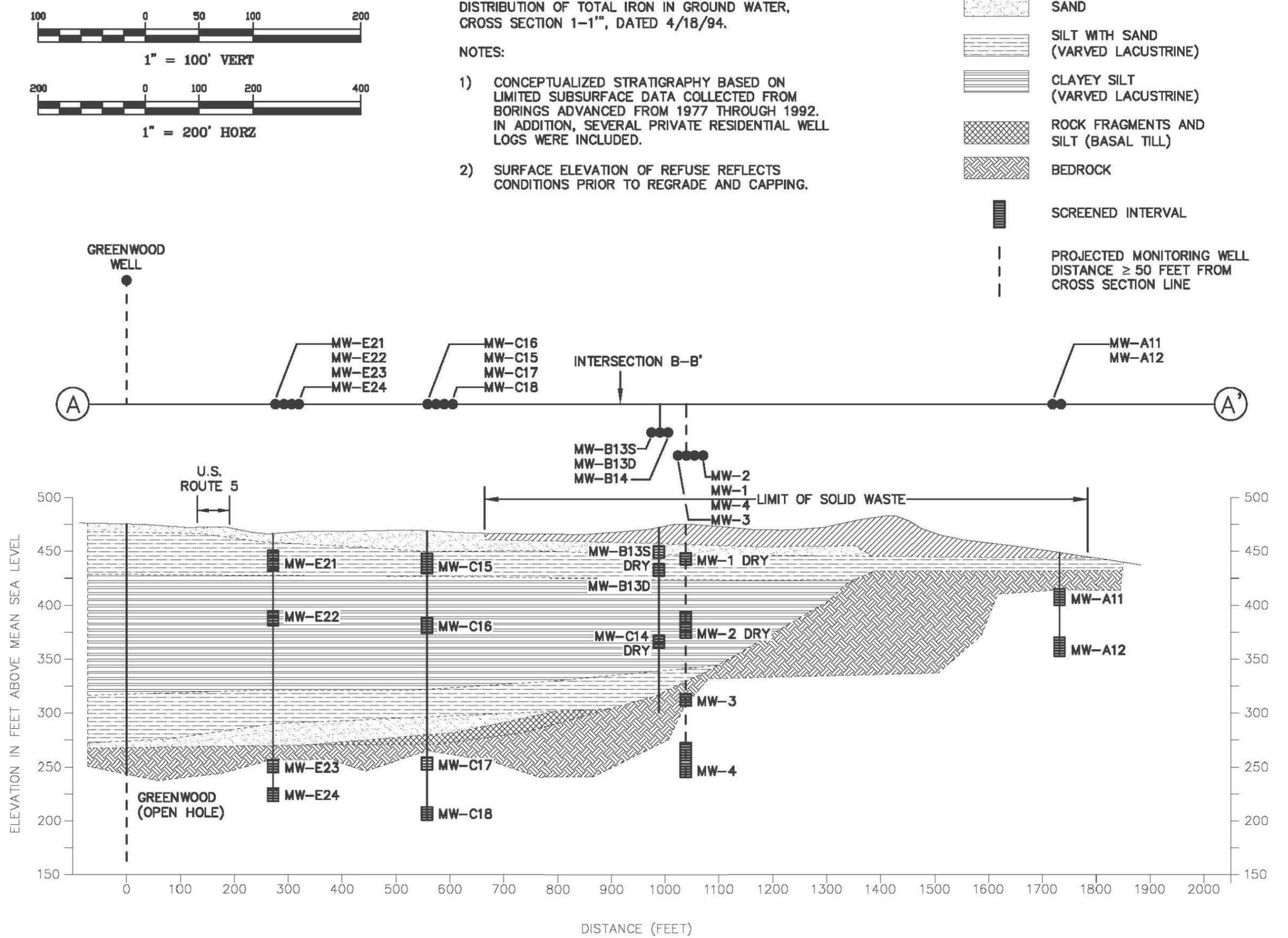

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SCALE: AS NOTED
CADD: 16819-IP-SUMMARY-FIG3A

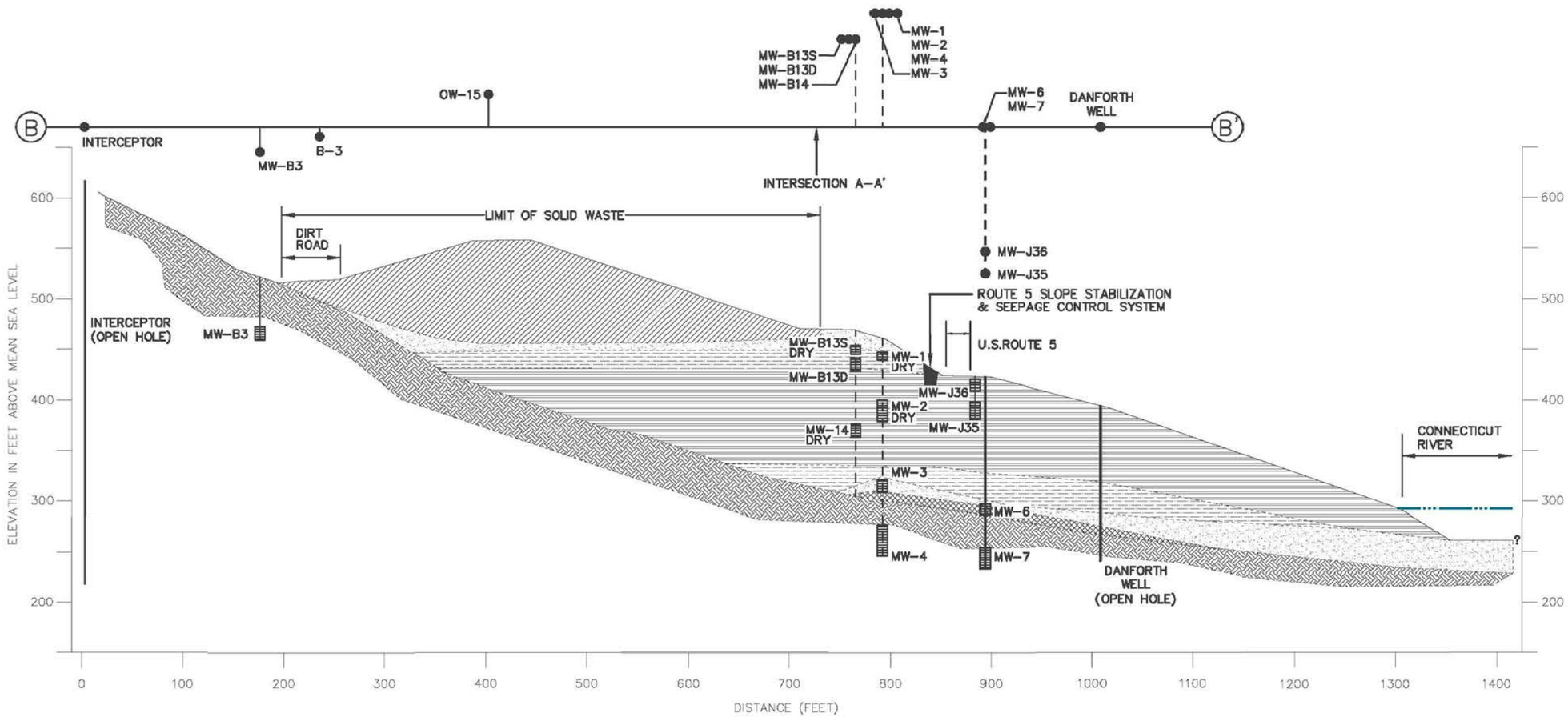
DRAWN BY: SBM
CHECKED BY: MAD

DATE: JUL. 2014
JOB NO.: 16819

GEOLOGICAL CROSS-SECTION A-A'
DISPOSAL SPECIALIST, INC. LANDFILL

MISSING LINK ROAD - ROCKINGHAM, VT

FIGURE 3



LEGEND

- REFUSE
- SAND
- SILT WITH SAND (VARVED LACUSTRINE)
- CLAYEY SILT (VARVED LACUSTRINE)
- ROCK FRAGMENTS AND SILT (BASAL TILL)
- BEDROCK
- SCREENED INTERVAL
- PROJECTED MONITORING WELL DISTANCE ≥ 50 FEET FROM CROSS SECTION LINE

SOURCE: BALSAM ENVIRONMENTAL CONSULTANTS, FROM A PLAN ENTITLED "CONCENTRATION DISTRIBUTION OF TOTAL IRON IN GROUND WATER, CROSS SECTION 2-2'", DATED 4/18/94.

NOTES:

1) STRATIGRAPHY BASED ON LIMITED SUBSURFACE DATA COLLECTED FROM BORINGS ADVANCED FROM 1977 THROUGH 1992. IN ADDITION, SEVERAL PRIVATE RESIDENTIAL WELL LOGS WERE INCLUDED.

2) WELLS SHOWN ON SECTION LINE BUT NOT ON FIGURE HAVE BEEN DESTROYED, COVERED OR TAKEN OUT OF SERVICE.

3) SURFACE ELEVATION OF REFUSE REFLECTS CONDITIONS PRIOR TO REGRADE AND CAPPING.

HORZONTAL & VERTICAL SCALE: 1" = 120'

0 60' 120' 240' 360'

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SCALE: AS NOTED
CADD: 16819-P-SUMMARY-FIG3&4

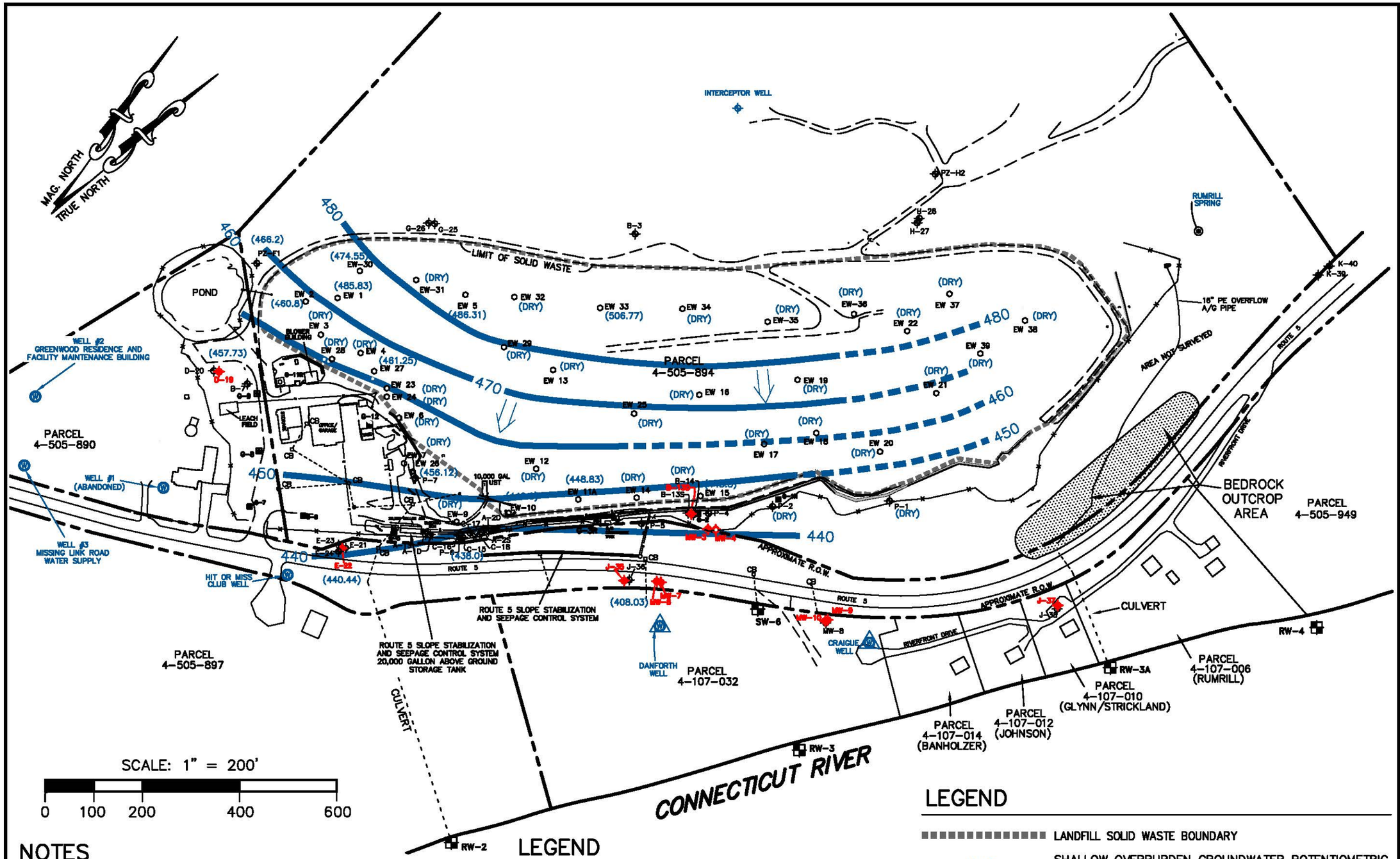
DATE: JUL. 2014
JOB NO.: 16819

DRAWN BY: SBM
CHECKED BY: MAD

GEOLOGICAL CROSS-SECTION B-B'
DISPOSAL SPECIALIST, INC. LANDFILL

MISSING LINK ROAD - ROCKINGHAM, VT

FIGURE 4



NOTES

1) MONITORING WELLS USED TO DEVELOP THE SHALLOW OVERBURDEN GROUNDWATER POTENTIOMETRIC CONTOURS INCLUDE ALL GAS EXTRACTION WELLS (EW-1 THRU EW-39) AND WELLS B-13S, PZ-F1, D-19, E-21, C-15, J-36, P-1 & P-2.

LEGEND

J-36	MONITORING WELL
MW-9	MONITORING WELL CURRENTLY SAMPLED
EW 11A	GAS EXTRACTION WELL
RW-4	CT RIVER OR SEEP SAMPLING LOCATION

LEGEND

	LANDFILL SOLID WASTE BOUNDARY
440	SHALLOW OVERBURDEN GROUNDWATER POTENTIOMETRIC CONTOUR (DASHED WHERE INTERPRETED)
(413.3)	SEPTEMBER 23, 2013 GROUNDWATER ELEVATION
	INTERPRETED FLOW DIRECTION
	FORMER WATER SUPPLY WELL (NOT IN USE)

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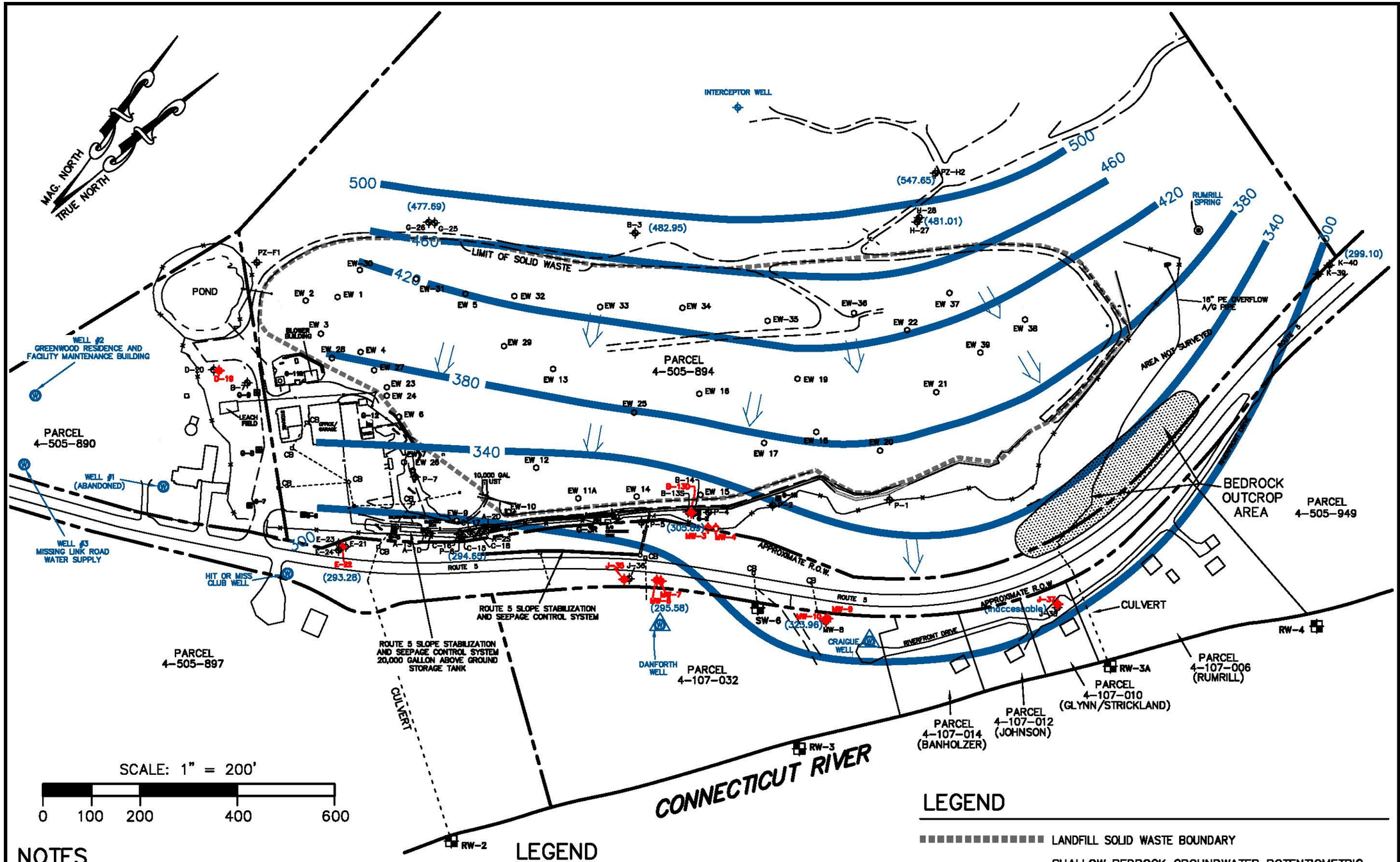
SCALE: 1" = 200'
CADD: 16819-5YR-SEPT13
DRAWN BY: SBM
CHECKED BY: MAD
DATE: FEB 2014
JOB NO.: 16819.1

SEPTEMBER 2013 SHALLOW OVERBURDEN GROUNDWATER POTENTIOMETRIC CONTOURS

DISPOSAL SPECIALIST, INC. LANDFILL

MISSING LINK ROAD – ROCKINGHAM, VT

FIGURE 5



NOTES

1) MONITORING WELLS USED TO DEVELOP THE SHALLOW BEDROCK GROUNDWATER POTENTIOMETRIC CONTOURS INCLUDE WELLS C-17, E-23, G-25, H-27, J-37, PZ-H2, K-39, MW-3, MW-6, MW-9 & B-3.

LEGEND

J-36	MONITORING WELL
MW-9	MONITORING WELL CURRENTLY SAMPLED
EW 11A	GAS EXTRACTION WELL
RW-4	CT RIVER OR SEEP SAMPLING LOCATION

LEGEND

	LANDFILL SOLID WASTE BOUNDARY
440	SHALLOW BEDROCK GROUNDWATER POTENTIOMETRIC CONTOUR (DASHED WHERE INTERPRETED)
(413.3)	SEPT 23, 2013 GROUNDWATER ELEVATION
	INTERPRETED FLOW DIRECTION
	FORMER WATER SUPPLY WELL (NOT IN USE)

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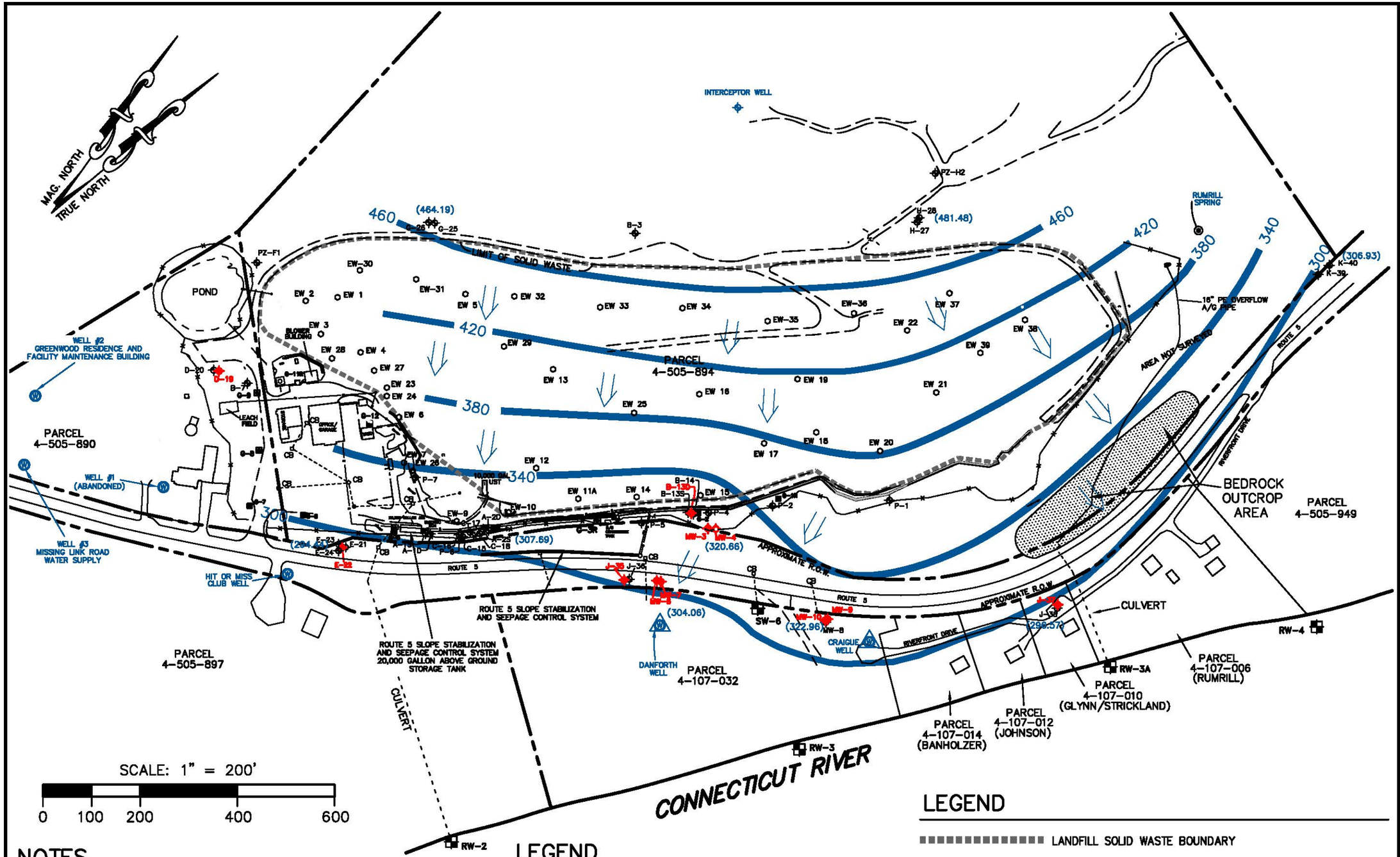
SCALE: 1" = 200'
CADD: 16819-5YR-SEPT13
DRAWN BY: SBM
CHECKED BY: MAD
DATE: FEB. 2014
JOB NO.: 16819.1

SEPTEMBER 2013 SHALLOW BEDROCK GROUNDWATER POTENTIOMETRIC CONTOURS

DISPOSAL SPECIALIST, INC. LANDFILL

MISSING LINK ROAD – ROCKINGHAM, VT

FIGURE 6



NOTES

1) MONITORING WELLS USED TO DEVELOP THE DEEPER BEDROCK GROUNDWATER POTENTIOMETRIC CONTOURS INCLUDE WELLS K-40, H-28, J-38, MW-4, MW-7, MW-10, C-18, E-24 & G-26.

LEGEND

J-36	MONITORING WELL
MW-9	MONITORING WELL CURRENTLY SAMPLED
EW 11A	GAS EXTRACTION WELL
RW-4	CT RIVER OR SEEP SAMPLING LOCATION

LEGEND

	LANDFILL SOLID WASTE BOUNDARY
440	DEEPER BEDROCK GROUNDWATER POTENTIOMETRIC CONTOUR (DASHED WHERE INTERPRETED)
(413.3)	SEPTEMBER 23, 2013 GROUNDWATER ELEVATION
	INTERPRETED FLOW DIRECTION
	FORMER WATER SUPPLY WELL (NOT IN USE)

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SCALE: 1" = 200'
CADD: 16819-5YR-SEPT13
DATE: FEB. 2014
JOB NO.: 16819.1
DRAWN BY: SBM
CHECKED BY: MAD

SEPTEMBER 2013 DEEPER BEDROCK GROUNDWATER POTENTIOMETRIC CONTOURS

DISPOSAL SPECIALIST, INC. LANDFILL

MISSING LINK ROAD – ROCKINGHAM, VT

FIGURE 7

Table A-4
Metals Data for Monitoring Wells
BFI-Rockingham Sanitary Landfill Superfund Site
Rockingham, Vermont

Sample Location **Sample Date** **Sample Number**	**MCL**	**IGCL**	**MW-3** **2014/06/10** **DSI-GW-MW3**	**MW-4** **2014/06/11** **DSI-GW-MW4**	**MW-6** **2014/06/11** **DSI-GW-MW6**	**MW-7** **2014/06/11** **DSI-GW-MW7**	**MW-9** **2014/06/12** **DSI-GW-MW9**	**MW-10** **2014/06/12** **DSI-GW-MW10**	**MW-B3** **2014/06/12** **DSI-GW-MWB3**
Aluminum (ug/L)	-	-	200 U	200 U	200 U	200 U	200 U	266	2060
Antimony (ug/L)	6	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Arsenic (ug/L)	10	50	**588**	**53.2**	**219**	10.0 U	10.0 U	10.0 U	10.0 U
Barium (ug/L)	2000	1000	662	739 J	536 J	342 J	200 U	200 U	200 U
Calcium (ug/L)	-	-	192000	61700	61500	65600	33200	30600	10800
Chromium (ug/L)	100	50	10.0 U	10.0 U	10.0 U	10.0 U	82.4	10.0 U	12.1
Iron (ug/L)	-	-	38500	24200	24900	3390 J	1840	579	1340
Lead (ug/L)	15	20	4.4 J	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
Magnesium (ug/L)	-	-	297000 J	36800	37300	26800	7300 J	6790 J	5000 UJ
Manganese (ug/L)	-	180	1030	4420	1650	1590	169	42.1	350
Nickel (ug/L)	100	100	40.9	48.7	47.7	40.0 U	40.0 U	40.0 U	40.0 U
Potassium (ug/L)	-	-	26900	5000 U	40200	5000 U	5000 U	5000 U	16200
Sodium (ug/L)	-	-	303000	32000	157000	13300	208000	54600	12100

Sample Location **Sample Date** **Sample Number**	**MCL**	**IGCL**	**MW-B7** **2014/06/13** **DSI-GW-MWB7**	**MW-B13D** **2014/06/10** **DSI-GW-MWB13D**	**MW-C15** **2014/06/09** **DSI-GW-MWC15**	**MW-C16** **2014/06/09** **DSI-GW-MWC16**	**MW-C17** **2014/06/09** **DSI-GW-MWC17**	**MW-C18** **2014/06/09** **DSI-GW-MWC18**	**MW-D19** **2014/06/13** **DSI-GW-MWD19**
Aluminum (ug/L)	-	-	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Antimony (ug/L)	6	6	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Arsenic (ug/L)	10	50	10.0 U	**55.4 J**	10.0 U	10.0 U	**13.9 J**	**12.6**	10.0 U
Barium (ug/L)	2000	1000	200 U	**8480**	200 U	200 U	200 U	200 U	200 U
Calcium (ug/L)	-	-	12200	197000	86100 EB	20900 EB	5000 U	33000 EB	11400
Chromium (ug/L)	100	50	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Iron (ug/L)	-	-	100 U	53000	143	229	257	432	779
Lead (ug/L)	15	20	3.0 U	4.9 J	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
Magnesium (ug/L)	-	-	5000 UJ	26300 J	10700 EB	5000 UJ	5000 UJ	8420 EBJ	5000 UJ
Manganese (ug/L)	-	180	1410	913	1340	253	73.3	234	3650
Nickel (ug/L)	100	100	40.0 U	91.7	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U
Potassium (ug/L)	-	-	5000 U	92800	5000 U	5000 U	35300	5000 U	5000 U
Sodium (ug/L)	-	-	5000 U	204000	6290 EB	5810 EB	22000 EB	17500 EB	5000 U

NOTES ON LAST PAGE OF TABLE

Table A-4
Metals Data for Monitoring Wells
BFI-Rockingham Sanitary Landfill Superfund Site
Rockingham, Vermont

Sample Location **Sample Date** **Sample Number**	**MCL**	**IGCL**	**MW-E21** **2014/06/10** **DSI-GW-MWE21**	**MW-E22** **2014/06/10** **DSI-GW-MWE22**	**MW-E23** **2014/06/10** **DSI-GW-MWE23**	**MW-E24** **2014/06/10** **DSI-GW-MWE24**	**MW-G25** **2014/06/13** **DSI-GW-MWG25**	**MW-G26** **2014/06/13** **DSI-GW-MWG26**	**MW-H27** **2014/06/09** **DSI-GW-MWH27**
Aluminum (ug/L)	-	-	200 U	582	200 U	200 U	200 U	200 U	409
Antimony (ug/L)	6	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Arsenic (ug/L)	10	50	10.0 U	**27.9 J**	10.0 U	10.0 U	**26.6**	10.0 U	10.0 U
Barium (ug/L)	2000	1000	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Calcium (ug/L)	-	-	24900 EB	59800 EB	20700 EB	22400 EB	8980	8790	5400 EB
Chromium (ug/L)	100	50	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Iron (ug/L)	-	-	100 U	5140	142	530	29000	206	692
Lead (ug/L)	15	20	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
Magnesium (ug/L)	-	-	5000 UJ	11200 EBJ	5000 UJ	5000 UJ	5000 UJ	5000 UJ	5000 UJ
Manganese (ug/L)	-	180	2410	606	158	194	1190	15.0 U	25.1
Nickel (ug/L)	100	100	40.0 U	40.0 U	40.0 U	40.0 U	40.0	40.0 U	40.0 U
Potassium (ug/L)	-	-	5000 U	5160	5000 U	6560	5000 U	5000 U	5000 U
Sodium (ug/L)	-	-	5000 U	5000 U	7280 EB	15000 EB	5000 U	13100	5000 U

Sample Location **Sample Date** **Sample Number**	**MCL**	**IGCL**	**MW-H28** **2014/06/09** **DSI-GW-MWH28**	**MW-J35** **2014/06/12** **DSI-GW-MWJ35**	**MW-J36** **2014/06/12** **DSI-GW-MWJ36**	**MW-J37** **2014/06/11** **DSI-GW-MWJ37**	**MW-J38** **2014/06/11** **DSI-GW-MWJ38**	**MW-K39** **2014/06/12** **DSI-GW-MWK39**	**MW-K40** **2014/06/12** **DSI-GW-MWK40**
Aluminum (ug/L)	-	-	200 U	243	200 U	3160	986	200 U	200 U
Antimony (ug/L)	6	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Arsenic (ug/L)	10	50	10.0 U	**15.0**	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Barium (ug/L)	2000	1000	200 U	647	200 U	200 U	200 UJ	230	200 U
Calcium (ug/L)	-	-	8400 EB	1430000 EB	82100 EB	31100	21200	60300	25400
Chromium (ug/L)	100	50	10.0 U	10.0 U	10.0 U	13.6	10.0 U	10.0 U	10.0 U
Iron (ug/L)	-	-	100 U	6700 J	390	9610 J	4780	208	100 U
Lead (ug/L)	15	20	3.0 U	4.4	3.0 U	4.3	3.0 U	3.0 U	3.0 U
Magnesium (ug/L)	-	-	5000 UJ	259000 EBJ	6200 EBJ	17400 J	5000 U	9530 J	5000 UJ
Manganese (ug/L)	-	180	15.0 U	3200	95.8	3700	691	1060	92.0
Nickel (ug/L)	100	100	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U
Potassium (ug/L)	-	-	5000 U	18800	12400	5000 U	9570	5000 U	5000 U
Sodium (ug/L)	-	-	5000 U	268000 EB	776000 EB	15900	14600	8530	5970

NOTES ON LAST PAGE OF TABLE

TABLE A-4 - METALS DATA NOTES

ABBREVIATIONS

U	Not Detected
UJ	Not Detected, detection limit estimated
J	Laboratory estimated value
J-	Laboratory estimated value, biased low
J+	Laboratory estimated value, biased high
EB	Parameter Detected in Equiment Blank
IGCL	Interim Groundwater Cleanup Levels, established in the 1994 Record of Decision - see Note 2
MCL	Maximum Contaminant Level - see Note 3
-	An IGCL or MCL has not been established
GRAY	Concentration exceeded IGCL established for bedrock groundwater
BOLD	Concentration exceeds MCL
BOLD	Concentration exceeds MCL and IGCL established for bedrock groundwater

NOTES

1. All results reported in micrograms per liter (ug/l)
2. IGCLs for BFI Rockingham Landfill Superfund Site apply to bedrock compliance monitoring wells: MW-3, MW-4, MW-6, MW-7, MW-9, MW-10, H-27, H-28, B-3, G-25, G-26, C-17, C-18, E-23, E-24, J-37, J-38, K-39 and K-40).
3. US Environmental Protection Agency National Primary Drinking Water Quality Standards Maximum Contaminant Levels (MCL).
4. A Tier I Plus data validation was completed on the data set and laboratory results were qualified in accordance with the National Functional Guidelines for Superfund Inorganic Methods Data Review (OSWER 9200-2.133, EPA-540-R-013-001, dated October 2013).

Table A-4
Semi-Volatile Organic Analytical Data for Monitoring Wells
BFI-Rockingham Sanitary Landfill Superfund Site
Rockingham, Vermont

Sample Location Sample Date Sample Number	CASRN	USEPA MCL/SDWS	IGCL	MW-4 2014/06/11 DSI-GW-MW4	MW-6 2014/06/11 DSI-GW-MW6	MW-7 2014/06/11 DSI-GW-MW7	MW-J38 2014/06/11 DSI-GW-MWJ38	MDL	RDL
2,2,3,3,4,4,6-Heptachlorobiphenyl	52663-71-5	0.5 (Total PCBs)	-	0.49 U	0.49 U	0.49 U	0.48 U	0.0800	0.5
2,2,3,3,4,5,6,6-Octachlorobiphenyl	40186-71-8	0.5 (Total PCBs)	-	0.49 U	0.49 U	0.49 U	0.48 U	0.0510	0.5
2,2,3,4,6-Pentachlorobiphenyl	60233-25-2	0.5 (Total PCBs)	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0510	0.20
2,2,4,4,5,6-Hexachlorobiphenyl	60145-22-4	0.5 (Total PCBs)	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0420	0.20
2,2,4,4-Tetrachlorobiphenyl	2437-79-8	0.5 (Total PCBs)	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0280	0.50
2,3-Dichlorobiphenyl	16605-91-7	0.5 (Total PCBs)	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0200	0.20
2,4,5-Trichlorobiphenyl	15862-07-4	0.5 (Total PCBs)	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0340	0.20
2-Chlorobiphenyl	2051-60-7	0.5 (Total PCBs)	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0400	0.50
Acenaphthylene	208-96-8	-	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0200	0.20
Alachlor	15972-60-8	2	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0330	0.20
Aldrin	309-00-2	-	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0380	0.20
alpha-Chlordane	5103-71-9	2 (Total Chlordane)	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0410	0.50
Anthracene	120-12-7	-	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0230	0.20
Atrazine	1912-24-9	3	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0220	0.20
Benzo(a)anthracene	56-55-3	-	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0200	0.20
Benzo(a)pyrene	50-32-8	0.2	-	0.028 UJ	0.028 UJ	0.028 UJ	0.096 UJ	0.0290	0.20
Benzo(b)fluoranthene	205-99-2	-	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0220	0.20
Benzo(ghi)perylene	191-24-2	-	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0450	0.20
Benzo(k)fluoranthene	207-08-9	-	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0350	0.20
Bis(2-chloroisopropyl) ether	108-60-1	-	1	4.8 U	4.7 U	4.7 U	4.7 U	0.0858	5
Bis(2-ethylhexyl) adipate	103-23-1	400	-	0.59 UJ	0.59 UJ	0.59 UJ	0.57 UJ	0.600	1.5
Bis(2-ethylhexyl)phthalate (BEHP)	117-81-7	6	6	0.59 UJ	0.59 UJ	0.59 UJ	0.57 UJ	0.600	2.0
Butylbenzylphthalate	85-68-7	-	-	0.98 U	0.98 U	0.98 U	0.96 U	0.0440	1.00
Chrysene	218-01-9	-	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0200	0.20
Dibenzo(a,h)anthracene	53-70-3	-	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0620	0.20
Diethyl phthalate	84-66-2	-	-	0.98 UJ	2.9	0.97 UJ	0.96 UJ	0.0200	1.5
Dimethylphthalate	131-11-3	-	-	0.98 UJ	0.98 UJ	0.98 UJ	0.96 UJ	0.0220	1.5
Di-n-butylphthalate	84-74-2	-	-	2 U	2 UJ	2 U	1.9 U	0.0400	2.00
Endrin	72-20-8	2	-	0.071 UJ	0.071 UJ	0.071 UJ	0.069 UJ	0.0720	0.50
Fluorene	86-73-7	-	-	0.098 UJ	0.098 UJ	0.098 UJ	0.96 UJ	0.0200	0.20
gamma-Chlordane	5103-74-2	2 (Total Chlordane)	-	0.098 UJ	0.098 UJ	0.098 UJ	0.96 UJ	0.0450	0.20
Heptachlor	76-44-8	0.4	-	0.098 UJ	0.098 UJ	0.098 UJ	0.96 UJ	0.0540	0.20
Heptachlor epoxide	1024-57-3	0.2	-	0.18 UJ	0.18 UJ	0.18 UJ	0.017 UJ	0.180	0.40
Hexachlorobenzene	118-74-1	1	-	0.098 UJ	0.098 UJ	0.098 UJ	0.96 UJ	0.0410	0.20
Hexachlorocyclopentadiene	77-47-4	50	-	0.098 UJ	0.098 UJ	0.098 UJ	0.96 UJ	0.0420	2.00
Indeno(1,2,3-cd)pyrene	193-39-5	-	-	0.098 UJ	0.098 UJ	0.098 UJ	0.96 UJ	0.0350	0.20
Lindane	58-89-9	0.2	-	0.079 UJ	0.079 UJ	0.079 UJ	0.078 UJ	0.0810	0.20
Methoxychlor	72-43-5	40	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0430	0.50
Pentachlorophenol	87-86-5	1	1	0.95 UJ	0.95 UJ	0.95 UJ	0.95 UJ	0.413	1.00
Phenanthrene	85-01-8	-	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0200	0.20
Pyrene	129-00-0	-	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0200	0.20
Simazine	122-34-9	4	-	0.069 UJ	0.069 UJ	0.069 UJ	0.067 UJ	0.0350	0.50
trans-Nonachlor	39765-80-5	2 (Total Chlordane)	-	0.098 UJ	0.098 UJ	0.098 UJ	0.096 UJ	0.0620	0.50

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Table A-4
Semi-Volatile Organic Analytical Data for Monitoring Wells
BFI-Rockingham Sanitary Landfill Superfund Site
Rockingham, Vermont

TABLE A-4 - SEMI-VOLATILE ORGANIC DATA NOTES

ABBREVIATIONS

U	Not Detected
UJ	Not Detected, detection limit estimated
J	Laboratory estimated value
J-	Laboratory estimated value, biased low
J+	Laboratory estimated value, biased high
TB	Parameter Detected in Trip Blank
EB	Parameter Detected in Equiment Blank
IGCL	Interim Groundwater Cleanup Levels, established in the 1994 Record of Decision - see Note 2
MCL	Maximum Contaminant Level - see Note 3
-	An IGCL or MCL has not been established
CASRN	Chemical Abstract Services Registation Number
MDL	Method Detection Limit
RDL	Laboratory Reporting Detection Limit (may vary slighly from analysis to analysis)
GRAY	Concentration exceeded IGCL established for bedrock groundwater
BOLD	Concentration exceeds MCL
BOLD	Concentration exceeds MCL and IGCL established for bedrock groundwater

NOTES

1. All results reported in micrograms per liter (ug/l)
2. IGCLs for BFI Rockingham Landfill Superfund Site apply to bedrock compliance monitoring wells: MW-3, MW-4, MW-6, MW-7, MW-9, MW-10, H-27, H-28, B-3, G-25, G-26, C-17, C-18, E-23, E-24, J-37, J-38, K-39 and K-40).
3. US Environmental Protection Agency National Primary Drinking Water Quality Standards Maximum Contaminant Levels (MCL).
4. A Tier I Plus data validation was completed on the data set and laboratory results were qualified in accordance with the National Functional Guidelines for Superfund Organic Methods Data Review (OSWER 9200-2.134, EPA-540-R-014-002, dated October 2013).
5. Semi-Volatile Organic Compounds (SVOCs) were analyzed by Method 525.2 or 625 [pentachlorophenol & bis (2-chloroisopropyl) ether - only]. Selected analytes were reported to the MDL which is below the RDL; therfore the RDL is considered to be estimated (UJ); however, routine laboratory procedures do not indicate corrective actions were necessary for detections below the laboratory RDL. The RDLs and MDLs are provided in the last columns of the table.

Table A-4

Volatile Organic Analytical Data for Monitoring Wells
BFI-Rockingham Sanitary Landfill Superfund Site
Rockingham, Vermont

Sample Location Sample Date Sample Number	CASRN	MCL	IGCL	MW-3 2014/06/10 DSI-GW-MW3	MW-4 2014/06/11 DSI-GW-MW4	MW-6 2014/06/11 DSI-GW-MW6	MW-7 2014/06/11 DSI-GW-MW7	MW-9 2014/06/12 DSI-GW-MW9
1,1,1,2-Tetrachloroethane	630-20-6	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Volatile Organic Analytical Data No	71-55-6	200	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	79-34-5	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	79-00-5	5	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	75-34-3	-	-	25 UR	0.87	1.5	0.5 U	0.5 U
1,1-Dichloroethylene	75-35-4	7	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloropropene	563-58-6	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	87-61-6	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane	96-18-4	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	120-82-1	70	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane	106-93-4	0.05	-	25 UR	0.5 U	0.5 U	0.5 U	0.011 U
1,2-Dichlorobenzene	95-50-1	600	-	7.0 UR	0.14 UJ	2.9	0.14 UJ	0.14 UJ
1,2-Dichloroethane	107-06-2	5	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	78-87-5	5	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	541-73-1	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichloropropane	142-28-9	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	106-46-7	75	-	25 UR	0.5 U	5.3	0.5 U	0.5 U
2-Hexanone	591-78-6	-	-	260 J-	2.5 U	2.5 U	2.5 U	2.5 U
Acetone	67-64-1	-	-	1600 J-	2.9	4.2	2.5 U	2.5 U
Benzene	71-43-2	5	5	25 UR	0.5 U	3.8	0.5 U	0.5 U
Benzene, 1,2,4-trimethyl	95-63-6	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Benzene, 1,3,5-trimethyl-	108-67-8	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Benzene,1-methylethyl-	98-82-8	-	-	25 UR	0.5 U	2.0	0.5 U	0.5 U
Bromobenzene	108-86-1	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	75-27-4	80 (THM)	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	75-25-2	80 (THM)	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide	75-15-0	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	56-23-5	5	-	2.7 UR	0.053 UJ	0.053 UJ	0.053 UJ	0.053 UJ
Chlorobenzene	108-90-7	100	-	25 UR	0.5 U	11	0.5 U	0.5 U
Chlorobromomethane	74-97-5	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	75-00-3	-	-	25 UR	0.5 U	3.4	0.5 U	0.5 U
Chloroform	67-66-3	80 (THM)	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	74-87-3	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethylene	156-59-2	70	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	10061-01-5	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	124-48-1	80 (THM)	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloropropane	96-12-8	0.2	-	11 UR	0.21 UJ	0.21 UJ	0.21 UJ	0.011 U
Dichlorodifluoromethane	75-71-8	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	100-41-4	700	-	270 J-	0.5 U	0.5 U	0.5 U	0.5 U
Hexachlorobutadiene	87-68-3	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Methyl bromide	74-83-9	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Methyl ethylketone	78-93-3	-	170	1900 J-	2.5 U	2.5 U	2.5 U	2.5 U
Methyl isobutylketone (MIBK)	108-10-1	-	-	180 J-	2.5 U	2.5 U	2.5 U	2.5 U
Methylene bromide	74-95-3	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	75-09-2	5	5	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Naphthalene	91-20-3	-	-	25 UR	0.5 U	2.6	0.5 U	0.5 U
n-Butylbenzene	104-51-8	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
n-Propylbenzene	103-65-1	-	-	25 UR	0.5 U	0.79	0.5 U	0.5 U
o-Chlorotoluene	95-49-8	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
p-Chlorotoluene	106-43-4	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
p-Cymene	99-87-6	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
sec-Butylbenzene	135-98-8	-	-	25 UR	0.5 U	1.3	0.5 U	0.5 U
sec-Dichloropropane	594-20-7	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	100-42-5	100	-	25 UR	0.5 U	0.5 UJ	0.5 U	0.5 U
tert-Butylbenzene	98-06-6	-	-	25 UR	0.5 U	0.51	0.5 U	0.5 U
Tetrachloroethylene	127-18-4	5	0.7	25 UR	0.5 U	0.5 U	0.5 U	2.7
Toluene	108-88-3	1000	-	300 J-	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,2-Dichloroethene	156-60-5	100	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	10061-02-6	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethylene	79-01-6	5	5	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane	75-69-4	-	-	25 UR	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	75-01-4	2	2	3.0 UR	0.059 UJ	0.059 UJ	0.059 UJ	0.059 UJ
Xylene (total)	1330-20-7	10000	400	1200 J-	1.0 U	0.86	1.0 U	1.0 U
Total VOCs				5710	3.77	40.16	0	2.7

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Table A-4

Volatile Organic Analytical Data for Monitoring Wells
BFI-Rockingham Sanitary Landfill Superfund Site
Rockingham, Vermont

Sample Location Sample Date Sample Number	MW-10 2014/06/12 DSI-GW-MW10	MW-B3 2014/06/12 DSI-GW-MWB3	MW-B7 2014/06/13 DSI-GW-MWB7	MW-B13D 2014/06/10 DSI-GW-MWB13D	MW-C15 2014/06/09 DSI-GW-MWC15	MW-C16 2014/06/09 DSI-GW-MWC16	MW-C17 2014/06/09 DSI-GW-MWC17
1,1,1,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Volatile Organic Analytical Data No	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	4.8	0.5 U
1,1-Dichloroethylene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
1,1-Dichloropropene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane	0.011 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	0.14 UJ	0.14 UJ	0.14 UJ	5.6 UJ	0.14 UJ	0.14 UJ	0.14 UJ
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
1,3-Dichloropropane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	25	0.5 U	0.5 U	0.5 U
2-Hexanone	2.5 U	2.5 U	2.5 U	25 U	2.5 U	2.5 U	2.5 U
Acetone	2.5 U	2.5 U	2.5 U	410	2.5 U	2.5 U	2.5 U
Benzene	0.5 U	0.5 U	0.5 U	20U	0.5 U	0.5 U	0.5 U
Benzene, 1,2,4-trimethyl	0.5 U	0.5 U	0.5 U	28	0.5 U	0.5 U	0.5 U
Benzene, 1,3,5-trimethyl-	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Benzene,1-methylethyl-	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Bromobenzene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Bromoform	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Carbon disulfide	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	0.053 UJ	0.053 UJ	0.053 UJ	2.1 UJ	0.053 UJ	0.053 UJ	0.053 UJ
Chlorobenzene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Chlorobromomethane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Chloroethane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Chloroform	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethylene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Dibromochloropropane	0.011 U	0.14 UJ	0.21 UJ	8.4 UJ	0.21 UJ	0.21 UJ	0.21 UJ
Dichlorodifluoromethane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.5 U	0.5 U	0.5 U	370	0.5 U	0.5 U	0.5 U
Hexachlorobutadiene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Methyl bromide	1.0 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Methyl ethylketone	2.5 U	2.5 U	2.5 U	100 U	2.5 U	2.5 U	2.5 U
Methyl isobutylketone (MIBK)	2.5 U	2.5 U	2.5 U	100 U	2.5 U	2.5 U	2.5 U
Methylene bromide	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	0.5 U	0.5 U	0.5 U	20 U	0.5 U	2.4 EB	0.5 U
Naphthalene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
n-Butylbenzene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
n-Propylbenzene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
o-Chlorotoluene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
p-Chlorotoluene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
p-Cymene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
sec-Butylbenzene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
sec-Dichloropropane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Styrene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
tert-Butylbenzene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Tetrachloroethylene	0.55	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Toluene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Trichloroethylene	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	0.059 UJ	0.059 UJ	0.059 UJ	2.4 UJ	0.059 UJ	0.059 UJ	0.068 J
Xylene (total)	1.0 U	1.0 U	1.0 U	710	1.0 U	1.0 U	1.0 U
Total VOCs	0.55	0	0	1543	0	7.2	0.068

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Table A-4

Volatile Organic Analytical Data for Monitoring Wells
BFI-Rockingham Sanitary Landfill Superfund Site
Rockingham, Vermont

Sample Location Sample Date Sample Number	MW-C18 2014/06/09 DSI-GW-MWC17	MW-D19 2014/06/13 DSI-GW-MWD19	MW-E21 2014/06/10 DSI-GW-MWE21	MW-E22 2014/06/10 DSI-GW-MWE22	MW-E23 2014/06/10 DSI-GW-MWE23	MW-E24 2014/06/10 DSI-GW-MWE24	MW-G25 2014/06/13 DSI-GW-MWG25
1,1,1,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Volatile Organic Analytical Data No	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethylene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
1,1-Dichloropropene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	0.14 UJ	0.14 UJ	0.14 UJ	28 UJ	0.14 UJ	0.14 UJ	0.14 UJ
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
1,3-Dichloropropane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
2-Hexanone	2.5 U	2.5 U	2.5 U	500 U	2.5 U	2.5 U	2.5 U
Acetone	2.5 U	2.5 U	2.5 U	500 U	2.5 U	2.5 U	28
Benzene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Benzene, 1,2,4-trimethyl	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Benzene, 1,3,5-trimethyl-	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Benzene,1-methylethyl-	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Bromobenzene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Bromoform	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Carbon disulfide	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	0.053 UJ	0.053 UJ	0.053 UJ	11 UJ	0.053 UJ	0.053 UJ	0.053 UJ
Chlorobenzene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Chlorobromomethane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Chloroethane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Chloroform	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethylene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Dibromochloropropane	0.21 UJ	0.14 UJ	0.21 UJ	42 UJ	0.21 UJ	0.21 UJ	0.21 UJ
Dichlorodifluoromethane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	2.0
Ethylbenzene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Hexachlorobutadiene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Methyl bromide	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Methyl ethylketone	2.5 U	2.5 U	2.5 U	5500	2.5 U	2.5 U	2.5 U
Methyl isobutylketone (MIBK)	2.5 U	2.5 U	2.5 U	1100	2.5 U	2.5 U	2.5 U
Methylene bromide	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	0.5 U	0.5 U	0.5 U	**480 EB**	0.5 U	0.5 U	0.5 U
Naphthalene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
n-Butylbenzene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
n-Propylbenzene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
o-Chlorotoluene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
p-Chlorotoluene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
p-Cymene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
sec-Butylbenzene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
sec-Dichloropropane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Styrene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
tert-Butylbenzene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Tetrachloroethylene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Toluene	0.5 U	0.5 U	0.5 U	**1800**	0.5 U	0.5 U	10
trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Trichloroethylene	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane	0.5 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	0.13 J	0.059 UJ	0.059 UJ	12 UJ	0.059 UJ	0.059 UJ	0.059 UJ
Xylene (total)	1.0 U	1.0 U	1.0 U	200 U	1.0 U	1.0 U	1.0 U
Total VOCs	0.068	0	0	8880	0	0	40

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Table A-4

Volatile Organic Analytical Data for Monitoring Wells
BFI-Rockingham Sanitary Landfill Superfund Site
Rockingham, Vermont

Sample Location Sample Date Sample Number	MW-G26 2014/06/13 DSI-GW-MWG26	MW-H27 2014/06/09 DSI-GW-MWH27	MW-H28 2014/06/09 DSI-GW-MWH28	MW-J35 2014/06/12 DSI-GW-MWJ35	MW-J36 2014/06/12 DSI-GW-MWJ36	MW-J37 2014/06/11 DSI-GW-MWJ37	MW-J38 2014/06/11 DSI-GW-MWJ38
1,1,1,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Volatile Organic Analytical Data No	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
1,1-Dichloroethylene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
1,1-Dichloropropene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.010 U	0.011 U
1,2-Dichlorobenzene	0.14 UJ	0.14 UJ	0.14 UJ	70 UR	0.14 UJ	0.14 UJ	0.14 UJ
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
1,3-Dichloropropane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
2-Hexanone	2.5 U	2.5 U	2.5 U	1300 UR	2.5 U	2.5 U	2.5 U
Acetone	2.5 U	2.5 U	2.5 U	11000 J-	2.5 U	2.5 U	2.6
Benzene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Benzene, 1,2,4-trimethyl	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 UJ	0.5 U
Benzene, 1,3,5-trimethyl-	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 UJ	0.5 U
Benzene,1-methylethyl-	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Bromobenzene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Bromoform	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Carbon disulfide	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	0.053 UJ	0.053 UJ	0.053 UJ	27 UR	0.053 UJ	0.053 UJ	0.053 UJ
Chlorobenzene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Chlorobromomethane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Chloroethane	0.5 U	0.5 U	0.5 U	770 J-	0.5 U	0.5 U	0.5 U
Chloroform	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethylene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Dibromochloropropane	0.21 UJ	0.21 UJ	0.21 UJ	110 UR	0.21 UJ	0.010 U	0.011 U
Dichlorodifluoromethane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Hexachlorobutadiene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Methyl bromide	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Methyl ethylketone	2.5 U	2.5 U	2.5 U	16000 J-	2.5 U	2.5 U	2.5 U
Methyl isobutylketone (MIBK)	2.5 U	2.5 U	2.5 U	1300 J-	2.5 U	2.5 U	2.5 U
Methylene bromide	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Methylene Chloride	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Naphthalene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
n-Butylbenzene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
n-Propylbenzene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
o-Chlorotoluene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
p-Chlorotoluene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
p-Cymene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
sec-Butylbenzene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
sec-Dichloropropane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Styrene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 UJ	0.5 U
tert-Butylbenzene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Tetrachloroethylene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Toluene	0.5 U	0.5 U	0.5 U	**7000 J-**	0.5 U	0.5 U	0.5 U
trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Trichloroethylene	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane	0.5 U	0.5 U	0.5 U	250 UR	0.5 U	0.5 U	0.5 U
Vinyl chloride	0.059 UJ	0.059 UJ	0.059 UJ	30 UR	0.059 UJ	0.059 UJ	0.059 UJ
Xylene (total)	1.0 U	1.0 U	1.0 U	500 UR	1.0 U	1.0 U	1.0 U
Total VOCs	0	0	0	36070	0	0	2.6

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Table A-4

Volatile Organic Analytical Data for Monitoring Wells
BFI-Rockingham Sanitary Landfill Superfund Site
Rockingham, Vermont

Sample Location Sample Date Sample Number	MW-K39 2014/06/12 DSI-GW-MWK39	MW-K40 2014/06/12 DSI-GW-MWK40	Method 524.2 MDL	Method 524.2 RDL
1,1,1,2-Tetrachloroethane	0.5 U	0.5 U	0.140	0.500
Volatile Organic Analytical Data No	0.5 U	0.5 U	0.0630	0.500
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.0700	0.500
1,1,2-Trichloroethane	0.5 U	0.5 U	0.170	0.500
1,1-Dichloroethane	0.5 U	0.5 U	0.0740	0.500
1,1-Dichloroethylene	0.5 U	0.5 U	0.0590	0.500
1,1-Dichloropropene	0.5 U	0.5 U	0.0630	0.500
1,2,3-Trichlorobenzene	0.5 U	0.5 U	0.0570	0.500
1,2,3-Trichloropropane	0.5 U	0.5 U	0.122	0.500
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.127	0.500
1,2-Dibromoethane	0.5 U	0.5 U	0.140	0.500
1,2-Dichlorobenzene	0.14 UJ	0.14 UJ	0.160	0.500
1,2-Dichloroethane	0.5 U	0.5 U	0.140	0.500
1,2-Dichloropropane	0.5 U	0.5 U	0.110	0.500
1,3-Dichlorobenzene	0.5 U	0.5 U	0.130	0.500
1,3-Dichloropropane	0.5 U	0.5 U	0.150	0.500
1,4-Dichlorobenzene	0.5 U	0.5 U	0.130	0.500
2-Hexanone	2.5 U	2.5 U	0.231	2.50
Acetone	2.5 U	2.5 U	0.537	2.50
Benzene	0.5 U	0.5 U	0.130	0.500
Benzene, 1,2,4-trimethyl	0.5 U	0.5 U	0.0900	0.500
Benzene, 1,3,5-trimethyl-	0.5 U	0.5 U	0.0430	0.500
Benzene,1-methylethyl-	0.5 U	0.5 U	0.0530	0.500
Bromobenzene	0.5 U	0.5 U	0.130	0.500
Bromodichloromethane	0.5 U	0.5 U	0.140	0.500
Bromoform	0.5 U	0.5 U	0.130	0.500
Carbon disulfide	0.5 U	0.5 U	0.150	0.500
Carbon tetrachloride	0.053 UJ	0.053 UJ	0.0530	0.500
Chlorobenzene	0.5 U	0.5 U	0.120	0.500
Chlorobromomethane	0.5 U	0.5 U	0.110	0.500
Chloroethane	0.5 U	0.5 U	0.0700	0.500
Chloroform	0.5 U	0.5 U	0.140	0.500
Chloromethane	0.5 U	0.5 U	0.0629	0.500
cis-1,2-Dichloroethylene	0.5 U	0.5 U	0.120	0.500
cis-1,3-Dichloropropene	0.5 U	0.5 U	0.0800	0.500
Dibromochloromethane	0.5 U	0.5 U	0.160	0.500
Dibromochloropropane	0.21 UJ	0.21 UJ	0.210	0.500
Dichlorodifluoromethane	0.5 U	0.5 U	0.0700	0.500
Ethylbenzene	0.5 U	0.5 U	0.110	0.500
Hexachlorobutadiene	0.5 U	0.5 U	0.110	0.500
Methyl bromide	0.5 U	0.5 U	0.0510	0.500
Methyl ethylketone	2.5 U	2.5 U	0.249	2.50
Methyl isobutylketone (MIBK)	2.5 U	2.5 U	0.262	2.50
Methylene bromide	0.5 U	0.5 U	0.170	0.500
Methylene Chloride	0.5 U	0.5 U	0.250	0.500
Naphthalene	0.5 U	0.5 U	0.0600	0.500
n-Butylbenzene	0.5 U	0.5 U	0.0810	0.500
n-Propylbenzene	0.5 U	0.5 U	0.0570	0.500
o-Chlorotoluene	0.5 U	0.5 U	0.0500	0.500
p-Chlorotoluene	0.5 U	0.5 U	0.0500	0.500
p-Cymene	0.5 U	0.5 U	0.0630	0.500
sec-Butylbenzene	0.5 U	0.5 U	0.0680	0.500
sec-Dichloropropane	0.5 U	0.5 U	0.0480	0.500
Styrene	0.5 U	0.5 U	0.0440	0.500
tert-Butylbenzene	0.5 U	0.5 U	0.0600	0.500
Tetrachloroethylene	0.5 U	0.5 U	0.0670	0.500
Toluene	0.5 U	0.5 U	0.100	0.500
trans-1,2-Dichloroethene	0.5 U	0.5 U	0.130	0.500
trans-1,3-Dichloropropene	0.5 U	0.5 U	0.100	0.500
Trichloroethylene	0.5 U	0.5 U	0.0600	0.500
Trichlorofluoromethane	0.5 U	0.5 U	0.0440	0.500
Vinyl chloride	0.059 UJ	0.059 UJ	0.0590	0.500
Xylene (total)	1.0 U	1.0 U	0.200	1.00
Total VOCs	0	0		

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Table A-4
Volatile Organic Analytical Data for Monitoring Wells
BFI-Rockingham Sanitary Landfill Superfund Site
Rockingham, Vermont

TABLE A-4 - VOLATILE ORGANIC DATA NOTES

ABBREVIATIONS

U	Not Detected
UJ	Not Detected, detection limit estimated
J	Laboratory estimated value
J-	Laboratory estimated value, biased low
J+	Laboratory estimated value, biased high
TB	Parameter Detected in Trip Blank
EB	Parameter Detected in Equiment Blank
IGCL	Interim Groundwater Cleanup Levels, established in the 1994 Record of Decision - see Note 2
MCL	Maximum Contaminant Level - see Note 3
-	An IGCL or MCL has not been established
CASRN	Chemical Abstract Services Registation Number
MDL	Method Detection Limit
RDL	Laboratory Reporting Detection Limit
GRAY	Concentration exceeded IGCL established for bedrock groundwater
BOLD	Concentration exceeds MCL
BOLD	Concentration exceeds MCL and IGCL established for bedrock groundwater

NOTES

1. All results reported in micrograms per liter (ug/l)
2. IGCLs for BFI Rockingham Landfill Superfund Site apply to bedrock compliance monitoring wells: MW-3, MW-4, MW-6, MW-7, MW-9, MW-10, H-27, H-28, B-3, G-25, G-26, C-17, C-18, E-23, E-24, J-37, J-38, K-39 and K-40).
3. US Environmental Protection Agency National Primary Drinking Water Quality Standards Maximum Contaminant Levels (MCL). THM = total trihalomethanes (bromodichlormethane, bromoform, dibromochloromethane and chloroform)
4. A Tier I Plus data validation was completed on the data set and laboratory results were qualified in accordance with the National Functional Guidelines for Superfund Organic Methods Data Review (OSWER 9200-2.134, EPA-540-R-014-002, dated October 2013).
5. Volatile Organic Compounds (VOCs) in groundwater samples were analyzed by Method 524.2. Samples from a subset of monitoring wells (MW-9, MW-10, MW-J37 and MW-J38) were also analyzed for 1,2-dibromoethane and dibromochloropropane with a lower detection limit methodology (EPA Method 8011) to support the vapor intrusion investigation.
6. EPA Method 524.2 Note: Carbon tetrachloride, vinyl chloride, dibromochloropropane, and 1,2-dichlorobenzenewere reported to the MDL which is below the RDL; therfore the RDL is considered to be estimated (UJ); however, routine laboratory procedures do not indicate corrective actions were necessary for detections below the laboratory RDL. Lower detection limits were requested to support the vapor intrusion investigation. RDLs and MDLs for EPA Method 524.2 are provided in the last columns of the table.

TABLE A-5
BFI-Rockingham Sanitary Landfill Superfund Site
Summary of Interim Groundwater Cleanup Standard (IGCLs) Exceedances
June 2014 Five Year Review Semi-Annual Sampling Event

Parameter Group		Metals							Volatile Organic Compounds							Semi-Volatile Organic Compounds			
Interim Groundwater Cleanup Level (1994 ROD)		50 ug/L	6 ug/L	1000 ug/L	50 ug/L	20 ug/L	180 ug/L	100 ug/L	5 ug/L	5 ug/L	0.7 ug/L	2 ug/L	5 ug/L	170 ug/L	400 ug/L	1 ug/L	6 ug/L	1 ug/L	
Parameter / Well ID		Arsenic	Antimony	Barium	Chromium	Lead	Manganese	Nickel	Benzene	Trichloroethylene	Tetrachloroethylene	Vinyl Chloride	Methylene Chloride	2-butanone	Xylenes, total	Bis (2-chloroisopropyl) ether	Bis (2-ethyl hexyl) phthalate	Pentachlorophenol	**Total # of Exceedances at Well**
Bedrock Monitoring Wells	MW-3	X					X		/	/	/	/	/	X	X	NA			**4**
	MW-4	X					X									/			**2**
	MW-6	X					X									/			**2**
	MW-7						X									/			**1**
	MW-9				X						X					NA			**2**
	MW-10															NA			**0**
	H-27															NA			**0**
	H-28															NA			**0**
	B-3						X									NA			**1**
	G-25						X									NA			**1**
	G-26															NA			**0**
	C-17															NA			**0**
	C-18						X									NA			**1**
	E-23															NA			**0**
	E-24						X									NA			**1**
	J-37						X									NA			**1**
	J-38						X									/			**1**
	K-39						X									NA			**1**
	K-40															NA			**0**
Overburden Wells	J-35						X		/	/	/	/	/	X	/	NA			**2**
	J-36															NA			**0**
	B-7						X									NA			**1**
	D-19						X									NA			**1**
	E-21						X									NA			**1**
	E-22						X		/	/	/	/	X	X		NA			**3**
	C-15						X									NA			**1**
	C-16						X									NA			**1**
	B-13D	X		X			X		/	/	/	/	/		X	NA			**4**
Total # of Exceedances for Parameter		**4**	**0**	**1**	**1**	**0**	**19**	**0**	**0**	**0**	**1**	**0**	**1**	**3**	**2**	**0**	**0**	**0**	

Notes:

X Parameter reported above laboratory detection limit and reported concentration exceeds the cleanup criteria indicated.

/ Parameter reported as Not Detected; however laboratory detection limit is above the cleanup criteria indicated.

NA Not Analyzed - SVOC analysis was completed at selected wells only

TABLE A-6
BFI-Rockingham Sanitary Landfill Superfund Site
Summary of Most Stringent ARAR Exceedances
June 2014 Five Year Review Semi-Annual Sampling Event

Parameter Group		Metals							Volatile Organic Compounds							Semi-Volatile Organic Compounds			
Most Stringent ARAR Standard		10 ug/L	6 ug/L	2000 ug/L	100 ug/L	15 ug/L	300 ug/L	100 ug/L	5 ug/L	5 ug/L	5 ug/L	2 ug/L	5 ug/L	4,000 ug/L	10,000 ug/L	300 ug/L	6 ug/L	1 ug/L	
Parameter / Well ID		Arsenic	Antimony	Barium	Chromium	Lead	Manganese	Nickel	Benzene	Trichloroethylene	Tetrachloroethylene	Vinyl Chloride	Methylene Chloride	2-butanone	Xylenes, total	Bis (2-chloroisopropyl) ether	Bis (2-ethyl hexyl) phthalate	Pentachlorophenol	**Total # of Exceedances at Well**
Bedrock Monitoring Wells	MW-3	X					X		/	/	/	/	/	X		NA			**3**
	MW-4	X					X												**2**
	MW-6	X					X												**2**
	MW-7						X												**1**
	MW-9															NA			**0**
	MW-10															NA			**0**
	H-27															NA			**0**
	H-28															NA			**0**
	B-3						X									NA			**1**
	G-25	X					X									NA			**2**
	G-26															NA			**0**
	C-17	X														NA			**1**
	C-18	X														NA			**1**
	E-23															NA			**0**
	E-24															NA			**0**
	J-37						X									NA			**1**
	J-38						X												**1**
	K-39						X									NA			**1**
	K-40															NA			**0**
Overburden Wells	J-35	X					X		/	/	/	/	/	X		NA			**3**
	J-36															NA			**0**
	B-7						X									NA			**1**
	D-19						X									NA			**1**
	E-21						X									NA			**1**
	E-22	X					X		/	/	/	/	X	X		NA			**4**
	C-15						X									NA			**1**
	C-16															NA			**0**
	B-13D	X		X			X		/	/	/	/	/			NA			**3**
Total # of Exceedances for Parameter		**9**	**0**	**1**	**0**	**0**	**16**	**0**	**0**	**0**	**0**	**0**	**1**	**3**	**0**	**0**	**0**	**0**	

Notes:

X Parameter reported above laboratory detection limit and reported concentration exceeds the cleanup criteria indicated.

/ Parameter reported as Not Detected; however laboratory detection limit is above the cleanup criteria indicated.

NA Not Analyzed - SVOC analysis was completed at selected wells only

APPENDIX C – JUNE 2014 SITE INSPECTION REPORT

Engineering a Sustainable Future

EPA Region 1 RAC2 Contract No. EP-S1-06-03

July 17, 2014
Nobis Project No. 80015

Via Electronic Submittal

U.S. Environmental Protection Agency, Region 1
Attention: Mr. Kevin Heine, Task Order Project Officer
5 Post Office Square, Suite 100
Boston, Massachusetts 02109-3919

Subject: Transmittal of the Annual Inspection Report 2014
BFI-Rockingham Landfill Superfund Site, Rockingham, Vermont
Long-Term Removal Action Oversight
Task Order Number 0015-RX-ME-01B6

Dear Mr. Heine:

Attached with this correspondence is the Annual Inspection Report 2014 for the landfill inspection conducted on June 11, 2014 at the BFI-Rockingham Landfill Superfund Site.

Should you have any questions or comments, please contact me at (978) 703-6051, or by email at gmischel@nobiseng.com.

Sincerely,

NOBIS ENGINEERING, INC.

Gregory A. Mischel, P.E.
Project Manager

Attachments:
Spring 2014 Annual Inspection Report, BFI-Rockingham Landfill Superfund Site, Rockingham, Vermont

cc: File 80015/MA

Nobis Engineering, Inc.
585 Middlesex Street
Lowell, MA 01851
T (978) 683-0891

ANNUAL INSPECTION REPORT 2014
BFI-ROCKINGHAM LANDFILL SUPERFUND SITE
ROCKINGHAM, VERMONT
JULY 2014

1.0 INTRODUCTION

This report documents and presents the observations made by Nobis Engineering, Inc. (Nobis) during the annual inspection of the BFI-Rockingham Landfill Superfund Site (Site) conducted on June 11, 2014 under Contract EP-S1-06-03, Task Order 0015-RX-ME-01B6. Representatives from the EPA, the potentially responsible party (PRP), Republic Services, and Blue Granite Environmental Consultants, LLC (Blue Granite) were present at the Site and accompanied Nobis during the inspection. Blue Granite is an engineering firm retained by the PRP to provide landfill engineering and maintenance services.

The inspection included the following activities:

- Walking the perimeter and top of the landfill cap to look for evidence of erosion, cap disturbance, settlement, and poor growth of vegetation;
- Inspecting the on and off-cap storm water control structures for damage, settlement, sedimentation, vegetation, and blockage; and
- Inspecting the above ground portions of structures that penetrate the cap (i.e., gas vents, etc.) for damage.

This report is based on visual observations made during the Site inspection. The evaluation of subsurface conditions was not within the scope of this inspection. A Site-specific Landfill Inspection Checklist (provided as Attachment 1) was used to document the inspection. Refer to the Site Plan (provided as Figure 1) for the location of items noted during the Site inspection. Photographs documenting observations made during the inspection are provided as Attachment 2. The site plan from the previous 2013 inspection report is provided as Attachment 3 for reference.

2.0 SUMMARY OF INSPECTION

The results of the Site inspection are presented below according to the various components of the landfill cover system:

Landfill Surface

The landfill surface appeared to be generally in good condition. Localized differential settlement continues to be observed in the landfill cap, with settlement remaining unchanged from the 2013 inspection near gas vents EW-25, EW-36, and between EW-33 and EW-34. Additional settlement was observed during the 2014 inspection in the vicinity of EW-27, as well as near EW-37. Settlement of the cap can lead to pooling of water on the liner with potential infiltration of water through geomembrane liner imperfections that may exist, impacts to storm water drainage in slope benches, and in extreme cases differential settlement can result in permanent strain or tearing of the geomembrane liner. Work to correct the settlement may require significant disruption of the cap and should be considered only if evidence of leakage or instability of the cap is observed. To date, Nobis has not observed evidence of cap leakage or instability.

Benches

With the exception of the settlement identified above, the benches generally appeared to be in good condition. The areas with significant settlement should be monitored to ensure that water is flowing properly towards the downchutes, and that water is not overtopping the benches and flowing down the cap surface.

Letdown Channels (Downchute)

Gabion-lined downchutes are located on the south, west, and east sides of the landfill to convey storm water runoff downslope to perimeter ditches and detention basins from the cap surface and slope benches. The downchutes appeared to be in good condition (Photos 5, 7 and 8).

Cover Penetrations

Cover penetrations consist of 39 active extraction well structures. Most of the extraction wells are leaning down slope at various degrees of tilt, most likely caused by landfill cap settlement. Based on discussions with Blue Granite, the gas collection system is monitored and adjusted weekly to maximize gas extraction and identify deficiencies. According to Blue Granite, the landfill gas management system is functioning as intended. During the 2014 inspection, there

were multiple small saplings growing near some gas vents and near the perimeter of the landfill (Photos 10-11). These saplings are not presently a threat to the integrity of the cap, but should be removed before they grow large enough to become a hazard.

Monitoring Wells

The monitoring wells located immediately adjacent to the landfill were inspected and no damage was observed.

Cover Drainage Layer

The landfill's drainage outlet pipes appeared to be in good condition and operating normally. Rodent guards were in place and appeared to be working properly.

Detention Basin

The detention basins appeared to be in good condition.

Retaining Walls

The gabion baskets forming the retaining structure along three areas of the landfill were inspected: the southern side of the landfill; the southern wall of the northern detention basin; and the western wall of the northeast detention basin. Nobis continues to observe tilting at the west wall of the northeast detention basin in two locations along the top of the wall (Photo 6). This tilting was observed in prior inspections and has not visibly changed. While it appears that repairs to the gabions are not required at this time, this area should continue to be monitored for evidence of overturning or slope instability.

Perimeter Ditches and Off-Site Discharge

The perimeter ditches and off-site discharge structures appear to be in good condition with no observed damage. The polyethylene (PE) overflow pipe from the north basin is in good condition; a partially-rotted tree trunk had fallen onto the pipe (Photo 12), but the pipe remains undamaged and operational.

Perimeter Roads

The perimeter roads were in good condition with no signs of erosion, ruts, or potholes. Fencing is located along certain sections of the landfill perimeter, and no damage was observed.

Landfill Gas Flare

Routine operation and maintenance of the gas extraction system is conducted by Blue Granite Environmental. The landfill gas extraction system was not functioning at the time of the inspection. According to Ralph Larimore, Republic has set the gas flare on a timer to only operate 12 hours each day. The extraction gas flow rate has been steadily declining below the design rate for the existing flare, and Republic is considering replacing the flare with a smaller system.

Route 5 Interceptor Trench

Nobis discussed the Route 5 Interceptor Trench with Blue Granite Environmental during the inspection. According to Blue Granite Environmental the trench is in good working condition.

3.0 CONCLUSION

The single item requiring maintenance/repair from the Spring 2013 inspection has been moved to be a long-term item for continued monitoring; refer to Table 1 and Table 2 for a summary of these items. Nobis recommends the PRP continue monitoring the gabion retaining walls and settlement observed in the landfill cap and make repairs as needed to correct malfunctioning or damaged cap components. The 2014 inspection indicated several minor new items requiring maintenance or repair; see Table 3 for new items. These items can be addressed during routine operation and maintenance of the landfill and do not appear to affect the performance of the cap system at this time.

TABLES

1 Status of Items from 2013 Inspection
2 Long-Term Monitoring Items
3 Items Requiring Repair/Monitoring from 2014 Inspection

FIGURES

1 Site Plan

ATTACHMENTS

1 Annual Landfill Inspection Checklist
2 Photo Log
3 Fall 2013 Inspection Site Plan

Tables
Annual Inspection Report 2014

Table 1 – Status of Items from 2013 Inspection
Table 2 – Long Term Monitoring Items
Table 3 – Items Requiring Repair/Maintenance from the 2014 Inspection

Table 1
Status of Items from the 2013 Inspection
BFI-Rockingham Landfill Superfund Site
Rockingham, Vermont

Description	Status	Corrective Action Complete?	Recommendation
General Depression of Cap Between EW-33 and EW-34	No Significant Change Since 2013	Moved to Long-Term Items	Monitor for continued settlement

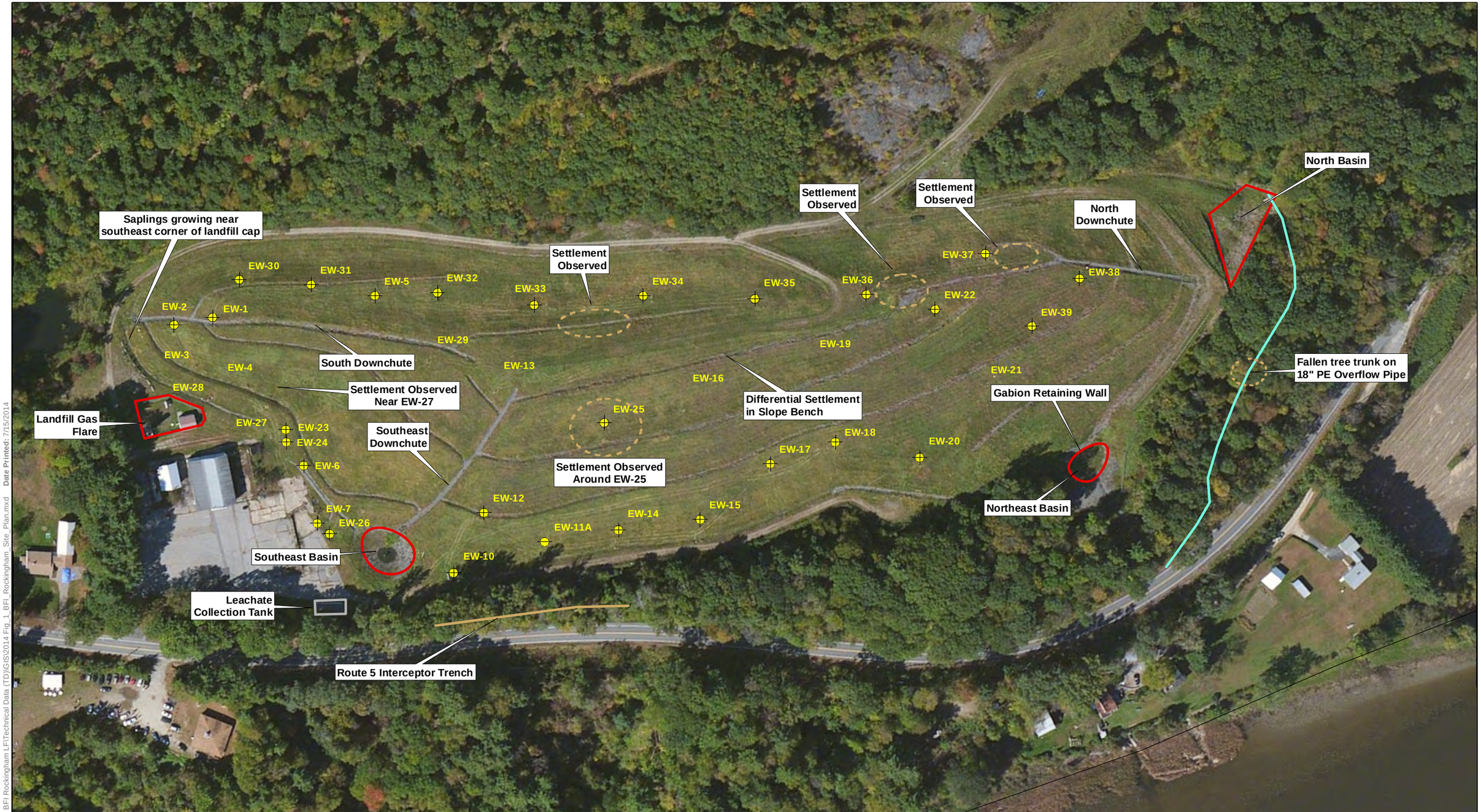
Table 2
Long-Term Monitoring Items
BFI-Rockingham Landfill Superfund Site
Rockingham, Vermont

Description	Status	Recommendation
General Depression of Cap Near EW-36	No Significant Change Since 2013	Review gas data, observe for ponding and continued settlement
Settling of cap and Benches Above and Below EW-25	No Significant Change Since 2013	Observe for continued settlement, ponding, or overtopping of bench
Gabion Tilting/Some Areas of Wall Settling at Northeastern Basin	No Significant Change Since 2013	Monitor for signs of slope instability such as cracking of the slope soils, as well as further tilting of the wall
General Depression of Cap Between EW-33 and EW-34	Ongoing; moved from 2013 table	Observe for continued settlement, ponding, or overtopping of bench

Table 3
Items Requiring Repair/Monitoring from the 2014 Inspection
BFI-Rockingham Landfill Superfund Site
Rockingham, Vermont

Description	Status	Recommendation
Saplings growing around gas vents EW-4, EW-7, EW-26, and EW-28; and immediately off the southwest corner of the cap	New	Remove saplings
General Depression of Cap around EW-27	New	Observe for continued settlement, ponding, or overtopping of bench
Fallen tree trunk on top of the HDPE outlet pipe from the North Basin	New	Remove fallen tree

Figure 1:
Site Plan
BFI Rockingham Landfill Superfund Site
Rockingham, Vermont
June 11, 2014



Notes:

1. Aerial photograph provided by ESRI.

2. Location of all features is approximate. Map is for reference purposes only. Nobis Engineering, Inc. makes no claims, warranties, representations, expressed or implied, relating to the completeness, accuracy, or reliability of the data shown.

Legend

Gas Extraction Well

Pipe

Trench

0 50 100 200

Feet

1 inch = 150 feet

N

FIGURE 1

SITE PLAN
BFI-ROCKINGHAM LANDFILL
SUPERFUND SITE
ROCKINGHAM, VERMONT
2014 ANNUAL INSPECTION

PREPARED BY: DC	CHECKED BY: GM
PROJECT NO. 80015	DATE: JULY 2014

Path: R:\80000 Task Orders\80015 BFI Rockingham LF\Technical Data (TD)\GIS\2014 Fig_1_BFI_Rockingham_Site_Plan.mxd Date Printed: 7/15/2014

Attachment 1

Inspection Checklist
June 11, 2014

EPA RAC Contract # EP-S1-06-03

ANNUAL LANDFILL INSPECTION CHECKLIST

Task Order:	**0015-RX-ME-01B6**	**Weather:**	**Overcast**
Site Name:	**BFI-Rockingham Landfill**	**Temperature:**	**65° F**
Town:	**Rockingham**	**Site Map:**	**Attach Map**
State:	**Vermont**	**Date of**	
PRP Representatives:	**Roger Bellerose (Blue Granite)** **Ralph Larimore (Republic)** **Glen Hartmann (Republic)** **Joe Montello (Republic)**	**Inspection:**	**June 11, 2014**
Inspection Team:	**David Cloutier (Nobis), Kevin Heine (EPA)**		

ITEM	REMARKS
LANDFILL SURFACE	
1. SETTLEMENT (LOW SPOTS) Yes ☒ No ☐ Location (indicate on site map): Areal Extent: Depth:	Depressions in the cap surface continue to be observed throughout the landfill, particularly in the vicinity of gas extraction vents. Low spots observed during the 2013 inspection are still present in the vicinity of EW-25, EW-36, and EW-33/34. Additional low spots were observed in the vicinity of EW-27 and EW-37. Depressions remain minor and do not appear to pose a threat to the integrity of the cap.
2. CRACKS Yes ☐ No ☒ Location (indicate on site map): Length: Width: Depth:	
3. EROSION Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Depth:	
4. HOLES Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Depth: Suspected Cause (rodent or other):	
5. VEGETATIVE COVER Yes ☒ No ☐ Grass: Condition: Good Trees/Shrubs: Yes ☒ No ☐ Location (indicate on site map): Size:	Small saplings (<3/4" diameter) were observed growing out adjacent to gas vents EW-4, EW-7, EW-26 EW-28, and immediately off the southwest corner of the cap. Ralph Larrimore noted that Republic will remove these saplings.
6. ARMORED COVER Yes ☒ No ☐ Material Type: Rip Rap Condition: Good	

ITEM	REMARKS
7. BULGES Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Height: Suspected Cause (gas pressure or other):	
8. WET AREAS Yes ☐ No ☒ Ponding: Location (indicate on site map): Areal Extent: Seeps: Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Estimated Flow Rate: Soft Subgrade: Yes ☐ No ☒ Location (indicate on site map): Areal Extent:	
9. SLOPE INSTABILITY Yes ☐ No ☒ Slides: Location (indicate on site map): Areal Extent: Probable Slide Interface: Suspected Cause: Exposed Cover Components:	
BENCHES	
1. FLOW BYPASS BENCHES Yes ☐ No ☒ Location (indicate on site map): Description of Problem:	
2. BENCH BREACHED Yes ☐ No ☒ Location (indicate on site map): Description of Problem:	

ITEM	REMARKS
LETDOWN CHANNELS	
1. SETTLEMENT Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Depth:	
2. MATERIAL DEGRADATION Yes ☐ No ☒ Material Type: Location (indicate on site map): Areal Extent: Degree of Degradation:	
3. EROSION Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Depth:	
4. UNDERCUTTING Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Depth:	
5. OBSTRUCTIONS Yes ☐ No ☒ Type: Location (indicate on site map): Areal Extent: Size:	
6. VEGETATIVE GROWTH Yes ☒ No ☐ Type: Grasses and weeds Location (indicate on site map):	Vegetation does not appear to be obstructing flow.
COVER PENETRATIONS	
1. GAS VENTS **Active** Passive Located: Yes ☒ No ☐ Functioning: Yes ☒ No ☐ Condition: Vents are leaning down slope, but are functioning according to Roger Bellerose.	
2. GAS MONITORING PROBES Yes ☒ No ☐ Located: Yes ☒ No ☐ Functioning: Yes ☒ No ☐ Condition: Good	
3. MONITORING WELLS Yes ☒ No ☐ Located: Yes ☒ No ☐ Functioning: Yes ☒ No ☐ Condition: Good	The new paint and labels on monitoring wells observed during the 2013 inspection are still in good condition.

ITEM	REMARKS
4. LEACHATE EXTRACTION WELLS Yes ☐ No ☒ Located: Yes ☐ No ☐ Functioning: Yes ☐ No ☐ Condition:	
5. SETTLEMENT MONUMENTS Yes ☐ No ☒ Located: Yes ☐ No ☐ Functioning: Yes ☐ No ☐ Condition:	
COVER DRAINAGE LAYER	
1. OUTLET PIPES Yes ☒ No ☐ Functioning: Yes ☒ No ☐ Condition: Good	
2. OUTLET ROCK Yes ☐ No ☒ Functioning: Yes ☐ No ☐ Condition:	
DETENTION/SEDIMENTATION PONDS	
1. SILTATION Yes ☐ No ☒ Areal Extent: Depth:	
2. EROSION Yes ☐ No ☒ Areal Extent: Depth:	
3. OUTLET WORKS Yes ☒ No ☐ Functioning: Yes ☒ No ☐ Condition: Good	Water was observed flowing at a trickle out of the northern detention pond outlet to the 18-inch HDPE outlet pipe. No water was observed in the northeast or southeast detention basins, but the outlets appear to be functioning.
RETAINING WALLS	
1. DEFORMATIONS Yes ☒ No ☐ Location (indicate on site map): See map Horizontal Displacement: Up to 6 inches Vertical Displacement: < 6 inches	Minor deformations at northeast detention basin, no change from previous inspections. Walls appear to be functioning as designed. Recommend monitoring for further movement.
2. DEGRADATION Yes ☐ No ☒ Location (indicate on site map): Description of Damage:	
VERTICAL BARRIER WALLS	

ITEM	REMARKS
1. SETTLEMENT Yes ☐ No ☐ Location (indicate on site map): Areal Extent: Depth:	None present
2. PERFORMANCE MONITORING Yes ☐ No ☒ Type of Monitoring: Frequency: Evidence of Breaching: Yes ☐ No ☐	
GROUNDWATER SYSTEMS	
1. INTERCEPTOR TRENCH Damage? Yes ☐ No ☒ - Pumps Yes ☐ No ☒ - Piping, flow meters, etc. Yes ☐ No ☒ - 20,000-gal. storage tank Yes ☐ No ☒	
LANDFILL GAS FLARE SYSTEM	
1. FLARE SYSTEM Observed Damage? Yes ☐ No ☒ - Blower Yes ☐ No ☒ - Piping, flow meters, etc. Yes ☐ No ☒ - 20,000-gal. storage tank Yes ☐ No ☒ - Flare Yes ☐ No ☒ - Condensate Management Yes ☐ No ☒ Flare functioning? Yes ☐ No ☒	The flare was not operating at the time of the inspection. According to Ralph Larimore, Republic has set the gas flare on a timer to only operate 12 hours each day. The extraction gas flow rate has been steadily declining below the design rate for the existing flare, and Republic is considering replacing the flare with a smaller system.
PERIMETER DITCHES/OFF-SITE DISCHARGE	
1. SILTATION Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Depth:	
2. VEGETATION GROWTH Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Type:	
3. EROSION Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Depth:	
4. 18-INCH HDPE OUTLET PIPE (North Basin) Functioning: Yes ☒ No ☐ Condition: Good	A 6”-diameter standing dead tree had fallen onto the HDPE outlet pipe. No damage was observed to the pipe.
FENCING	
1. FENCING DAMAGE Yes ☐ No ☒ Location (indicate on site map): Description of Damage:	

ITEM	REMARKS
PERIMETER ROADS	
1. ROADS DAMAGED Yes ☐ No ☒ Location (indicate on site map): Description of Damage:	
SITE ACCESS	
1. ACCESS RESTRICTION Yes ☒ No ☐	
GENERAL	
1. VANDALISM Yes ☐ No ☒ Location (indicate on site map): Description of Damage:	
2. CHANGED SITE CONDITION Yes ☐ No ☒	

INTERVIEWS (conduct interviews if the following are present during inspection)

1. INTERVIEW WORKERS ON SITE
   Problems: *Workers not interviewed*
   Suggestions:

2. INTERVIEW SITE NEIGHBORS
   Problems: *Neighbors not interviewed*
   Suggestions:
   Attach Report

3. INTERVIEW LOCAL OFFICIALS
   Problems: *Local officials not interviewed*
   Suggestions:
   Attach Report

Attachment 2

Photo Log
June 11, 2014

Photo Log June 11, 2014

Photo 1: Southeast basin, looking southeast.

Photo 2: Leachate collection tank.

Photo 3: Condensate collection tank.

Photo 4: View of the north basin looking south.

Photo 5: View of the north downchute looking northeast.

Photo 6: View of the gabion wall at the northeastern basin, looking west.

Photo 7: View of the southeast downchute, looking north.

Photo 8: View of the south downchute looking northeast.

Photo 9: View of the landfill gas flare looking north.

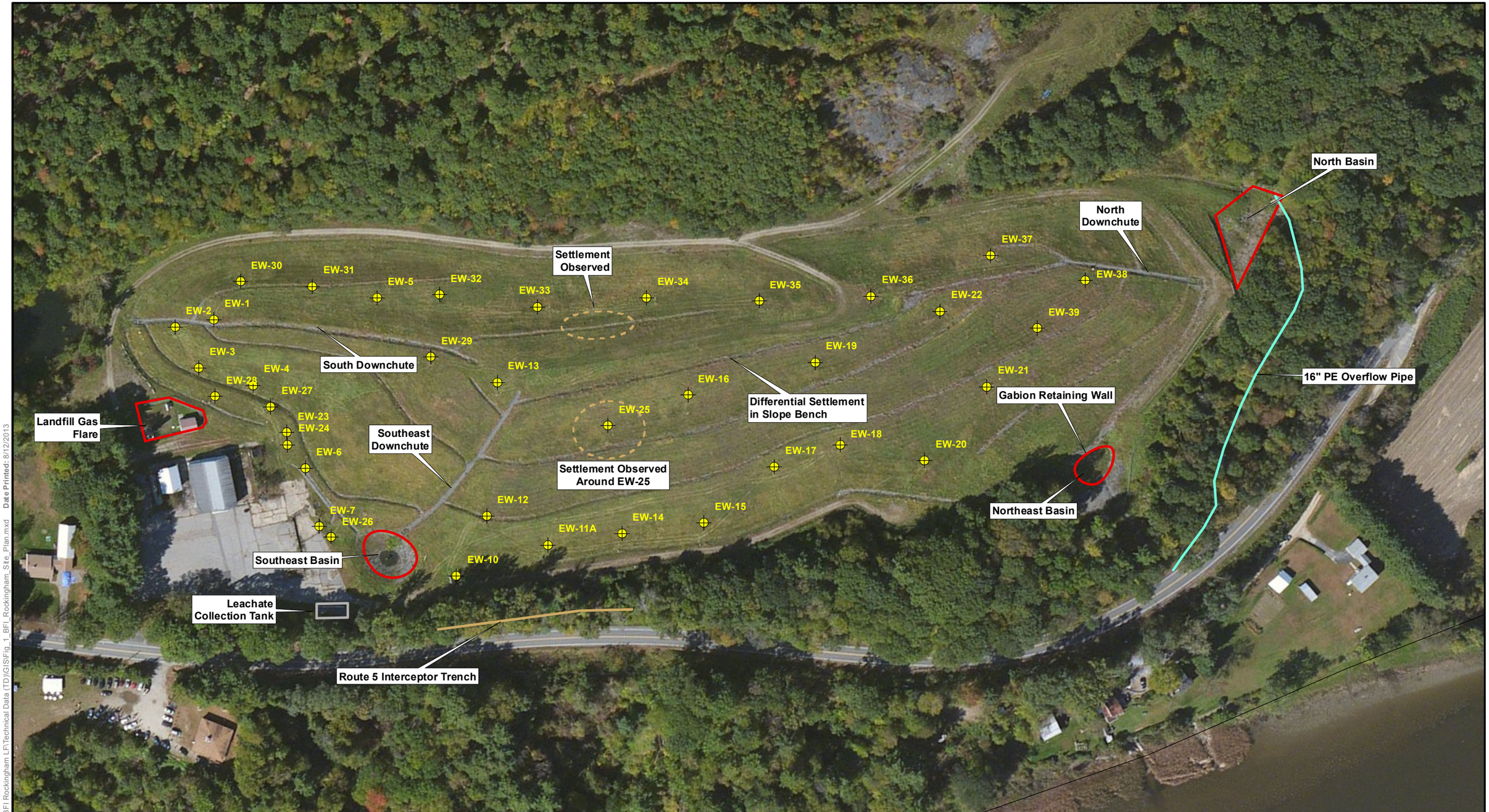
Photo 10: Close-up of sapling growing near gas vent EW-4.

Photo 11: View of saplings growing near southwest corner of cap, looking west.

Photo 12: View of fallen tree on PE overflow pipe, looking north.

Attachment 3

Previous Inspection Site Plan
Spring 2013



Notes:

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2. Location of all features is approximate. Map is for reference purposes only. Nobis Engineering, Inc. makes no claims, warranties, representations, expressed or implied, relating to the completeness, accuracy, or reliability of the data shown.

Legend

Gas Extraction Well

Pipe

Trench

0 50 100 200

Feet

1 inch = 150 feet

N

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www.nobiseng.com

Client-Focused, Employee-Owned

FIGURE 1

SITE PLAN
BFI-ROCKINGHAM LNADFILL
SUPERFUND SITE
ROCKINGHAM, VERMONT
2013 ANNUAL INSPECTION

PREPARED BY: JH	CHECKED BY: GM
PROJECT NO. 80015	DATE: AUGUST 2013

Path: R:\80000 Task Orders\80015 BFI Rockingham LF\Technical Data (TD)\GIS\Fig_1_BFI_Rockingham_Site_Plan.mxd Date Printed: 8/12/2013

APPENDIX D – INTERVIEW DOCUMENTATION

INTERVIEW RECORD

Site Name: BFI Rockingham Landfill Superfund Site	**EPA ID No.**: VTD980520092
Subject: Fourth Five-Year Review	**Time:** a.m. **Date**: Sept. 11, 2014
Type: ☐ Telephone ■ Visit ☐ Other Location of Visit: Rockingham, Vermont	☐ Incoming ☐ Outgoing

CONTACT MADE BY

Name(s): Kevin Heine	**Title(s)**: Project Manager	**Organization(s)**: U.S. EPA, Region 1
Additional Attendees: Roger Bellerose Michael Deyling Ralph Larimore	**Titles(s):** Site Contractor Sr. Project Geologist Environmental Manager	**Organization(s):** BGEC, LLC Summit Environmental Consultants BFI-VT (Republic Services)

INDIVIDUAL CONTACTED:

Name: John Banholzer	**Title**: Resident of 12 years	**Organization**: none
	Street Address: 14 Riverfront Drive **City, State**: Rockingham, Vermont	

SUMMARY OF CONVERSATION

1) What is your overall impression of the project?

   It's good that groundwater is being cleaned-up, too bad it can't occur quicker.

2) What effects have Site operations had on the surrounding community?

   None.

3) Are you aware of any community concerns regarding the Site or its operation and administration?

   No.

4) Do you feel well informed about the Site's activities and progress?

   Yes.

5) Do you have any comments, suggestions, or recommendations regarding the Site's management or operation?

   No.

INTERVIEW RECORD

Site Name: BFI Rockingham Landfill Superfund Site	**EPA ID No.**: VTD980520092
Subject: Fourth Five-Year Review	**Time:** a.m. **Date**: Sept. 11, 2014
Type: ☐ Telephone ■ Visit ☐ Other Location of Visit: Rockingham, Vermont	☐ Incoming ☐ Outgoing

CONTACT MADE BY

Name(s): Kevin Heine	**Title(s)**: Project Manager	**Organization(s)**: U.S. EPA, Region 1
Additional Attendees: Roger Bellerose Michael Deyling Ralph Larimore	**Titles(s):** Site Contractor Sr. Project Geologist Environmental Manager	**Organization(s):** BGEC, LLC Summit Environmental Consultants BFI-VT (Republic Services)

INDIVIDUAL CONTACTED:

Name: Wayne Johnson	**Title**: Resident of 33 years	**Organization**: none
	Street Address: 12 Riverfront Drive **City, State**: Rockingham, Vermont	

SUMMARY OF CONVERSATION

1) What is your overall impression of the project?

   Very good.

2) What effects have Site operations had on the surrounding community?

   Can't identify any.

3) Are you aware of any community concerns regarding the Site or its operation and administration?

   No.

4) Do you feel well informed about the Site's activities and progress?

   Yes.

5) Do you have any comments, suggestions, or recommendations regarding the Site's management or operation?

   None.

INTERVIEW RECORD

Site Name: BFI Rockingham Landfill Superfund Site	**EPA ID No.**: VTD980520092
Subject: Fourth Five-Year Review	**Time:** a.m. **Date**: Sept. 11, 2014
Type: ☐ Telephone ■ Visit ☐ Other Location of Visit: Rockingham, Vermont	☐ Incoming ☐ Outgoing

CONTACT MADE BY

Name(s): Kevin Heine	**Title(s)**: Project Manager	**Organization(s)**: U.S. EPA, Region 1
Additional Attendees: Roger Bellerose Michael Deyling Ralph Larimore	**Titles(s):** Site Contractor Sr. Project Geologist Environmental Manager	**Organization(s):** BGEC, LLC Summit Environmental Consultants BFI-VT (Republic Services)

INDIVIDUAL CONTACTED:

Name: Rod Rumrill	**Title**: Resident since age 8 & care provider for 86 y/o father, Howard, a lifelong resident of 6 Riverfront Dr.	**Organization**: none
	Street Address: 469 Meany Rd **City, State**: Charlestown, New Hampshire	

SUMMARY OF CONVERSATION

1) What is your overall impression of the project?

   Takes time.

2) What effects have Site operations had on the surrounding community?

   Other than a couple of cap washouts in the early to mid-1990s, none.

3) Are you aware of any community concerns regarding the Site or its operation and administration?

   None.

4) Do you feel well informed about the Site's activities and progress?

   Yes.

5) Do you have any comments, suggestions, or recommendations regarding the Site's management or operation?

   No, everything is fine.