



**Second Five-Year Review Report**

Center  
SITE: BENNINGTON LANDFILL  
Base: 8.3  
OTHER: 457558

for

**Bennington Landfill Superfund Site**

**Bennington**

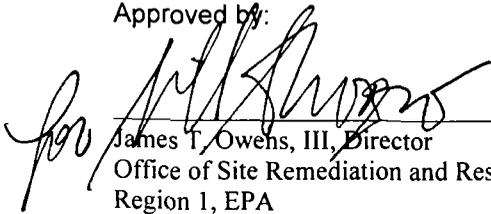
**Bennington County, Vermont**

**September 2009**

**PREPARED BY:**

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Date:

  
9-11-09



# Five-Year Review Report

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## List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	United States Environmental Protection Agency
CFR	Code of Federal Regulations
CWA	Clean Water Act
FYR	Five-Year Review
GAC	Granular activated carbon
HAAS	Hazardous ambient air standards
IC	Institutional control
IPC	Influent pump chamber
LCTS	Leachate collection treatment systems
LTMP	Long-term monitoring plan
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MW	Monitoring well
NCP	National Contingency Plan
NFA	No Further Action
NPL	National Priorities List
NTCRA	Non-Time Critical Removal Action
O&F	Operational and functional
O&M	Operation and Maintenance
OU	Operable Unit
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
PCOR	Preliminary Close-Out Report
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision

TAL	Target analyte list
TCA	1,1,1-trichloroethane
TCE	trichloroethylene
TCG	Target Cleanup Goals
VGES	Vermont Groundwater Enforcement Standards
VOC	Volatile Organic Compound
VT DEC	Vermont Department of Environmental Conservation
VT DOH	Vermont Department of Health
VT-GWES	Vermont Groundwater Enforcement Standard



## Executive Summary

The Non-Time Critical Removal Action (NTCRA) for Bennington Landfill Superfund Site included excavation and on-site disposal of contaminated soils, a multi-layer landfill cap, drainage controls, passive gas vents, an interceptor trench for surface and ground water, groundwater and leachate collection and on-site treatment, long-term monitoring, and institutional controls. A 1998 Record of Decision (ROD) made the final remedial decision that no further action (NFA) beyond the NTCRA was required at the site to protect human health and the environment. The site achieved construction completion on June 30, 1999. In the ROD, EPA also determined that it would conduct five-year reviews of the site as a matter of policy. The first of these reviews was signed on September 21, 2004, and is the trigger date for this second five-year review report. The VT Department of Environmental Conservation has reviewed and provided input into this five-year review report.

This five-year review found that the remedy was constructed in accordance with the requirements of the NTCRA Action Memorandum, Consent Decree, and Record of Decision (ROD). The remedy is functioning as designed. Because the response actions at all OUs are protective, the site is protective of human health and the environment.



## Five-Year Review Summary Form

SITE IDENTIFICATION		
<b>Site name (from WasteLAN):</b> Bennington Municipal Sanitary Landfill		
<b>EPA ID (from WasteLAN):</b> VTD981064223		
<b>Region:</b> 1	<b>State:</b> VT	<b>City/County:</b> Bennington/Bennington
SITE STATUS		
<b>NPL status:</b> <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
<b>Remediation status</b> (choose all that apply): <input type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
<b>Multiple OUs?*</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<b>Construction completion date:</b> 6/30/99	
<b>Has site been put into reuse?</b> NO		
REVIEW STATUS		
<b>Lead agency:</b> <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
<b>Author name:</b> Almerinda Silva		
<b>Author title:</b> Remedial Project Manager	<b>Author affiliation:</b> U.S. EPA	
<b>Review period:**</b> 7/28/08 to 9/21/09		
<b>Date(s) of site inspection:</b> 05 / 08 / 2009		
<b>Type of review:</b> policy review <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input checked="" type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion		
<b>Review number:</b> <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____		
<b>Triggering action:</b> <input type="checkbox"/> Actual RA Onsite Construction at OU # _____ <input type="checkbox"/> Actual RA Start at OU# _____ <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify)		
<b>Triggering action date (from WasteLAN):</b> 9/21/04		
<b>Due date (five years after triggering action date):</b> 9/30/09		

\* ["OU" refers to operable unit.]

\*\* [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

## Five-Year Review Summary Form, cont'd.

### Issues:

No major issues were identified as a result of the five-year review.

### Recommendations and Follow-up Actions:

All immediate threats at the Site have been addressed. The cleanup actions remain protective of human health and the environment as a result of the institutional controls and maintenance of the actions implemented as part of the NTCRA. The basis for the No Further Action has been supported by the Five Year Review. The combined NTCRA and No Further Action ROD are considered to be protective of human health and the environment in the short-term and long-term.

All post-remediation source control (PRSC) activities, including monitoring and ensuring ICs stay in place, will continue to ensure long-term protectiveness.

### Short-Term Protectiveness:

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 land use restriction (restrictive covenant and groundwater reclassification) prevents any use of the land or groundwater that would result in an exposure to hazardous substances, pollutants, or contaminants.

### Long-Term Protectiveness:

Long-term protectiveness of the response actions will be verified through periodic inspections and long-term monitoring of the Site. The data collected since the signing of the ROD supports that there is only a limited plume of contaminated groundwater at the downgradient edge of the landfill. Future use of the groundwater is not likely given that there are multiple institutional controls in place. The area containing the groundwater contamination is included in the reclassification zone and is further controlled by a restrictive covenant on the land. therefore, future use of the groundwater is not likely. Leachate flow from the landfill, as documented by the influent flow for the leachate collection and treatment system, has been reduced over 90% since the cap installation of the cap. There continues to be no unacceptable risk to human health or the environment at the landfill site.



# Five-Year Review Report

## 1.0 Introduction

EPA conducted a second policy five-year review (FYR) of the Bennington Municipal Landfill Superfund Site (“the Site”). The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of these reviews are documented in Five-Year Review Reports. In addition, Five-Year Review Reports identify issues found during the review, if any, and recommendations to address them.

The U.S. Environmental Protection Agency-Region 1 (EPA) is preparing this Five-Year Review Report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

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

The agency interpreted this requirement further in the National Contingency Plan (NCP). 40 CFR §300.430(f)(4)(ii) 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 action no less often than every five years after the initiation of the selected remedial action.*

The United States Environmental Protection Agency (EPA)-Region 1 conducted a FYR of the response actions implemented at the Bennington Landfill site in Bennington, VT. This review was conducted from July 28, 2008 through September 2009. The FYR included consultation with the Vermont Department of Environmental Conservation (VT DEC). This report documents the results of the review.

This is the second FYR for the Bennington Municipal Landfill Superfund Site. There are two operable units (OUs) at the Site: a non-time critical removal action (NTCRA) and a no further action (NFA) remedial decision. Operation and maintenance continues at the site. Therefore, this FYR addresses the status of the Site response actions in entirety and considers components of both the NTCRA and the final remedial decision. The triggering action for this review is the date of the previous Five-Year Review Report, signed on September 21, 2004, as shown in EPA’s WasteLAN database. This policy review is conducted because hazardous substances, pollutants, or contaminants remain on-site above levels that allow for unlimited use and unrestricted exposure and the actions at the site were removals and no remedial actions were required.

## 2.0 Site Chronology

**Table 1: Chronology of Site Events**

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Date	Event
prior to 1969	Site run as a sand and gravel operation
1969-1985	Site leased by the Town of Bennington as a municipal solid waste and industrial dump
1969-1975	Portion of the site used as a liquid waste lagoon
1987	Landfill closed
March 31, 1989	NPL listing
1990	State solid waste closure performed by the Town of Bennington
1991	Remedial Investigation (RI) begun
December 23, 1994	Action Memorandum to initiate Non-Time Critical Removal Action (NTCRA) signed
November 26, 1996	Administrative Order on Consent (AOC) for NTRCA design signed
December, 1996	NTCRA design phase begins
August 18, 1997	Consent Decree for construction and maintenance of NTCRA signed
September, 1997	NTCRA construction begins
December 23, 1997	RI completed
July 1, 1998	Restrictive covenant and groundwater reclassification for landfill and area of groundwater impact implemented
September 29, 1998	Record of Decision signed
1998	Maintenance and monitoring
June 30, 1999	NTCRA construction completed, PCOR signed
September 21, 2004	First Five-Year Review Report signed
2004-2009	Ongoing Site monitoring, maintenance, and inspections

## **3.0 Background**

### **3.1 Physical Characteristics**

The Site consists of a 15 acre municipal solid waste landfill and associated drainage pond situated in an 85 acre parcel owned by the Town of Bennington, Vermont. Prior to the landfill, the location of the Site was a sand and gravel pit. The areas to the north and east of the Site are former borrow pits. The area directly east of the Site is wetland/woodland that is within the groundwater institutional control area and is unlikely to be developed in the future. The other areas surrounding the Site are residential. The Site is bordered by wetlands serving as headwaters for Hewitt Brook to the east of the Site, residential areas are to the south, and U.S. Route 7 to the west. The 2006 U.S. Census Bureau population estimate for the Town of Bennington is 36,382. A map of the Site is included in Attachment A as Figure 3-1.

### **3.2 Land and Resource Use**

There were no zoning or other land use restrictions in place at the start of the remedial investigation and feasibility study (RI/FS) that would have precluded future residential use of the Site. The restrictive covenant implemented by the Town of Bennington and State of Vermont as part of the NTRCA prohibits residential development and helps prevent exposure to contaminated soil and groundwater. Land use decisions in Bennington County are made by the Bennington County Regional Planning Commission in accordance with their Regional Plan (most recent, is May 17, 2007).

A solid waste transfer station and recycling center are currently located adjacent to the landfill. This transfer station accepts mixed solid waste and recyclables. It is operated by Casella Waste Management.

To compensate for Natural Resource Damages at the Site, the U.S. Fish and Wildlife Service and the Town of Bennington conducted a wetland restoration project approximately 3 miles southeast of the Site on Burgess Road. An antiquated water collection system of concrete cisterns and underground pipes was removed to restore natural hydrologic conditions. The restoration project was completed in 1998, with monitoring through 2001. The project restored 2.8 acres of wetland and protected 14 acres of wetland and upland in perpetuity via a conservation covenant, as required by the 1997 Consent Decree.

In addition, as compensation for Natural Resource Damages at two other Superfund Sites (the Burgess Brothers Landfill and the Tansitor Electronics Site), the U.S. Fish and Wildlife Service has restored 2 acres of wetland and 7 acres of grassland immediately adjacent to the Bennington Landfill Superfund Site. This effort was completed in partnership with the Town of Bennington and the USDA Natural Resource Conservation Service.

### **3.3 History of Contamination**

The landfill began operations in 1969 and received commercial, residential, and industrial solid and liquid wastes. The Town of Bennington leased the property for use as a landfill until 1985, when the Town purchased the property. In April 1987, the landfill was closed and the Town established a transfer station adjacent to the landfill.

Throughout the entire period of operation (1969-1987), residential, industrial, and commercial waste was disposed in the landfill. One portion of the landfill was used for disposal of liquid wastes from 1969-

1975. This area, known as the “lagoon,” was covered with debris and is within the limits of the current solid waste mass. A drainage system was constructed within the landfill in 1976 to lower the groundwater level in the waste. The outlet for this drainage system was a pipe the discharge from which was responsible for the creation of the drainage pond.

The Town of Bennington performed a solid waste closure of the landfill in 1990 in accordance with the Vermont Solid Waste Program. Collection of the underdrain discharge was not included in the solid waste closure.

The surficial sand and gravel aquifer was impacted by the landfill. Polychlorinated biphenyls (PCBs), volatile organic compounds (including vinyl chloride, chloroethane, 1,1, dichloroethene, 1,2 dichloroethene, 1,1,1 trichloroethane, trichloroethene, methylene chloride, and benzene) and several metals (arsenic, barium, and maganese) were detected at elevated levels. Elevated levels of PCBs were also found in the soil and sediment of a small area of standing water near the outlet to the discharge from the drainage pipe.

The contamination of the surficial sand and gravel aquifer extended from under the landfill to the area to the east where groundwater recharges the wetland serving as headwaters for Hewitt Brook. Elevated levels of contaminants were detected in wells abutting the landfill and dropped significantly within several hundred feet of the landfill. There was an increase in arsenic with distance from the landfill that was likely a result of the mobilization of arsenic from natural soil materials due to a reducing environment created by the presence of landfill leachate. Very low levels of volatile organic compounds (VOCs) were detected in the bedrock aquifer adjacent to the landfill. High levels of PCBs were found in the soil and sediment adjacent to the discharges from the underdrain discharge pipe. Some of the PCBs migrated into the sediments of the wetland and of Hewitt Brook.

### **3.4 Initial Response**

In December 1994, EPA signed an Action Memorandum to initiate a non-time-critical removal action (NTCRA) at the Site to address the source of contamination. The NTCRA was designed to control the source of contamination to groundwater, surface water, and sediment. The major components of the NTCRA are:

- Construction of a multi-barrier landfill cap over the entire waste mass
- Construction of an upgradient interceptor trench to divert groundwater upgradient of the landfill around the waste
- Construction of a leachate collection and treatment system to collect and treat discharge from the underdrain discharge pipe
- Excavation and consolidation of sediments and soils with PCB concentrations above 1 mg/kg

The NTCRA also included institutional controls (ICs) to prevent future use of the Site. EPA entered into an Administrative Order with the potentially responsible parties (PRPs) for the design of the NTCRA in 1996. EPA and the PRPs entered into a Consent Decree (CD) in August 1997. The CD required the PRPs to perform construction activities, implement ICs, and perform long-term post-removal site control (PRSC). All construction activities and institutional controls included in the NTCRA were completed in June 1999.

### **3.5 Basis for Taking Action**

The initial cleanup action was taken to address the PCB contamination in sediments adjacent to the landfill and to comply with federal and state landfill closure requirements. The Human Health and Ecological Risk Assessment (HHERA) concluded that there was not an unacceptable risk to human health or the environment after completion of the NTCRA.

## **4.0 Remedial Actions**

### **4.1 Remedy Selection**

A Record of Decision (ROD) selecting “no further action” was signed in September 1998. This ROD records the final remedy decision for the Site. Based on the RI/FS, HHERA, and monitoring results upon the completion of the NTCRA, the ROD determined that no further remedial action was required at the Site to ensure protectiveness of human health and the environment. The ROD did include a long-term monitoring requirement to confirm that conditions upon which the remedy decision was based do not change. EPA is responsible for monitoring activities during the first ten years (December 1999 – December 2009) of the Site’s post-construction life; the State of Vermont for the remainder.

### **4.2. Remedy Implementation**

The long-term monitoring required by the ROD is being implemented by EPA. The NTCRA construction activities and institutional controls were completed in June 1999. The cleanup actions implemented by the NTCRA are operated and maintained by the Town of Bennington in accordance with the Action Memorandum and 1997 CD, with EPA providing oversight.

### **4.3 Institutional Controls**

Institutional controls are non-engineered instruments, such as administrative and/or legal controls, that help minimize the potential for exposure to contamination and protect the integrity of the remedy. Compliance with ICs is required to assure long-term protectiveness for any areas which do not allow for unlimited use or unrestricted exposure (UU/UE). ICs are required at the Site to ensure the protectiveness of the remedy and are selected in both the NTCRA Action Memorandum and ROD. All non-UU/UE areas are addressed effectively by institutional controls as determined by IC evaluation activities discussed below. The ICs in use at this site are effective and no further ICs or changes to the current ICs are recommended at this time.

#### **4.3.1 ICs in Site Documents**

The 1993 Action Memorandum for the NTCRA included ICs and the 1997 CD and NTCRA Statement of Work (SOW) detailed IC requirements and outlined the objectives:

- Restrict groundwater use
- Limit exposure to landfill material
- Protect remedy components
- Maintain effectiveness and integrity of response actions

The ROD states that the ICs implemented as part of the NTCRA adequately address the exposure potential from future use of groundwater.

#### **4.3.2 IC Implementation**

The Town of Bennington, as PRP and site owner, recorded a restrictive covenant on the Site properties on July 1, 1998 (Town of Bennington Land Records 0-343 p. 81). The Town is the grantor and the State the grantee on this covenant. The covenant includes a 35 acre capped landfill parcel and a 46 acre groundwater restriction parcel. Surveys of both parcels are included in the recorded covenant. The covenant includes perpetual right of access, listings of restricted activities, emergency provisions, enforcement stipulations, and termination provisions. The covenant runs with the land and is incorporated into all deeds, mortgages, leases, and transfers.

In brief, the restrictions included in the restrictive covenant are:

- No use that disturbs the integrity of the cap, LCTS, gas vents, or other response action or monitoring structures
- No use of groundwater for any purpose
- No installation of groundwater wells for purposes other than site-related monitoring
- No residential development

In addition to the restrictive covenant, the State of Vermont reclassified the groundwater at the site as Class IV (non-potable). This IC provides a layered approach to the potential for groundwater exposure, further ensuring that the groundwater is not used for any purpose.

Interviews and data review conducted during this FYR confirmed that these ICs are adequate to meet the site goals and help prevent long-term exposure and ensure long-term protectiveness of the Site.

#### **4.4 Operation and Maintenance**

The Town of Bennington is conducting long-term monitoring and maintenance activities associated with the PRSC. Such activities focus on the condition of the multilayer landfill cap (e.g., vegetative cover, erosion), the operation of the LTSC and underdrain system, and groundwater monitoring. The primary activities associated with O&M and long-term monitoring include:

- Regular monitoring and maintenance of the leachate collection and treatment system
- Regular inspection of landfill cap
- Regular inspection of the landfill gas collection system

EPA's oversight contractor, Nobis Engineering, Inc.,<sup>a</sup> performs semi-annual inspections of the Site as part of EPA's oversight of the Town of Bennington. Inspections are typically conducted each spring and fall. Oversight of ambient monitoring is scheduled to be transferred from EPA to the State of VT by the end of 2009. The future monitoring will also include inspection to ensure that the prohibited activities associated with the land use restrictions do not occur. EPA will remain responsible for conducting future FYRs of

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<sup>a</sup> Nobis Engineering, Inc. replaced TRC Solutions, Inc. as EPA's oversight contractor in late 2007. The first site inspection conducted by Nobis was on June 5, 2008.

this site.

## **5.0 Progress Since the Last Review**

This is the second FYR for the Site. The previous Five-Year Review Report was completed in September 2004. The 2004 review found the site to be protective in the short and long-term. No major issues were identified. The site inspection conducted during the 2004 FYR did identify several maintenance issues requiring attention including small cuts in the geomembrane boot at the base of several riser pipes, and possible future needs to repair gabion walls (monitoring was recommended). The Town of Bennington continues to make such repairs on a per need basis and continues with regular site monitoring.

Actions completed by EPA since the last FYR include:

- Sampling of residential wells (fall 2004)
- Annual groundwater monitoring (2004-2006)

## **6.0 Five-Year Review Process**

### **6.1 Administration Components**

EPA, the lead agency for this FYR, notified VT DEC and the PRPs in December 2008 that it was conducting a five-year review with a report to be completed by September 2009. The Five-Year Review Team was led by Almerinda Silva, the site Remedial Project Manager, of EPA's Office of Site Remediation and Restoration. Kristen Conroy is the EPA Community Involvement Coordinator for the site and provided support in this capacity. John Schmeltzer, the site manager for VTDEC, was also a part of the review team. Document review began in July 2008 and other activities were conducted as indicated.

Components of this review included:

- Community involvement
- Document review
- Data review
- Site inspection
- Local interviews
- Five-Year Review Report development

### **6.2 Community Notification and Involvement**

EPA placed a public notice in the Bennington Banner Newspaper on July 31, 2009 describing the five-year review process, recent actions at the Site, and how the community can contribute during the review process. EPA did not receive any comments regarding the protectiveness of remedial actions. Site interviews indicate that there is little current public interest in the Site.

### **6.3 Document Review**

The FYR includes a review of documents containing information relevant to assessing the protectiveness of the Site. Documents, such as Records of Decision, provide the remedial action objectives of the site. Others, such as Remedial Action Reports, detail specific actions taken at the site. Previous FYR was also examined to assess the status of the Site over time. Additionally, enforcement documents, institutional controls, and various regulations are reviewed. A complete set of documents reviewed for this FYR can be found in Attachment B.

### **6.4 Data Review**

Data from the 1997 Consent Decree, the 1998 ROD, the 1999 Preliminary Close-Out Report, and the Final Pollution Report for the NTRCA provide site and remedy background information. These documents contain information about remedy objectives, remedy implementation, and post-construction monitoring requirements. The most recent monitoring report from April 2006 was used to evaluate the current state of the remedy at the Site. A full list of documents used in this FYR is provided in Attachment B.

Overall, the remedy components have been performing as expected. Detailed descriptions are provided by media and contaminant in the following sections.

#### **6.4.1 Groundwater**

##### *Monitoring and Contaminant Trends*

Groundwater is divided into two systems at the Site. The shallow system is comprised of a surficial sand and gravel unit, ranging in thickness from 7 to 29 feet. Groundwater in this system flows predominantly west to east. The headwaters of Hewitt Brook serve as the discharge zone for this system. The sand and gravel unit is underlain by dense till that is characterized as a confining layer ranging in thickness from 0 feet west of the landfill to 530 feet east of the landfill. The bedrock and deep sand and gravel unit represents the second water-bearing formation at the site.

Since completion of the landfill cap, contaminant levels in groundwater have been monitored periodically to ensure the remedy is protective of human health and the environment. Since the previous 2004 five-year review period groundwater quality at the Site was monitored once in 2006 at approximately 22 monitoring wells for target analyte list (TAL) metals, target compound list (TCL) volatile organic compounds (VOCs), and PCBs. Sampling conducted in April 2006 is the most recent round of groundwater monitoring data available for this FYR. This monitoring event also included measurements of groundwater elevation levels. No monitoring samples were collected in 2007 or 2008 due to the process of changing oversight contractors.

Table 2 compares the maximum concentrations of contaminants of concern found in groundwater during the RI/FS to the most current (April 2006) set of groundwater data. All 18 of the contaminants of concern were detected above drinking water standards in groundwater during the RI/FS. When the two wells located adjacent to the landfill, B-6 and B-14, were removed from the data set, the RI/FS data showed a significant decrease in concentrations with increasing distance from the landfill for almost all contaminants (excluding arsenic, barium, and PCBs, which remained almost constant). The B-6 cluster is currently monitored. However, B-14 was removed during the completion of the NTRCA landfill cap.

Groundwater elevations have not changed appreciably in recent years. Hydraulic gradients across the site range from 0.0019 ft/ft in the wetland to the east to 0.1 ft/ft to the west of the landfill.

Detection of no or little water in well B-6-1, the shallow well within the landfill footprint, indicates that the groundwater isolation trench and landfill cap are effective in preventing infiltration of groundwater and storm water through the solid waste mass.

Recent data show, stable or decreasing trends in downgradient contaminant levels. Contaminants above Target Compound Goals (TCGs) have not been detected in bedrock wells and concentrations in overburden wells indicate no expansion of contaminant plumes. VOCs, TAL metals, and PCBs were all detected in overburden wells above TCGs. However, the negative oxidation reduction potential values recorded in groundwater downgradient of the site indicates that a reducing environment is created by landfill leachate and contributes to elevated levels of arsenic, iron, and manganese in groundwater. Thus, groundwater is still negatively impacted by contamination in the landfill.

Further discussion of contaminant concentration trends is provided below by constituent type.

**Table 2**  
**Comparison of Maximum Contaminant Concentrations in Groundwater: R/FS to 2006**  
**Data**  
**Bennington Landfill**

Contaminant of Concern	VTGES or MCL	ROD Maximum (all wells)	ROD Maximum (excluding B-6 and B-14)	April 2006 (all wells)
<i>Volatile Organic Compounds (ug/L)</i>				
1,1,1-Trichloroethane	200	660	ND	ND
1,1,-Dichloroethene	7	30	ND	ND
1,2-Dichloroethene	70	4050	14	NA
Benzene	5	25	4	ND
Methylene chloride	5	180	2	ND
Tetrachloroethene	5	70	ND	ND
Toluene	1000	1650	0.8	ND
Trichloroethene	5	53	ND	ND
Vinyl chloride	2	95	11	ND
<i>Polychlorinated Biphenyls (ug/L)</i>				
Total PCBs	0.5	7	12	5.0
<i>Metals (ug/L)</i>				
Arsenic	50/10	17	31	32.0
Barium	2000	4270	4040	1960
Beryllium	4	5.4	ND	ND
Chromium	100	145	24	0.75 J
Cadmium	5	ND	6	0.13J
Lead	20	120	11	0.39J
Manganese	840	2300	1480	3620
Nickel	100	247	50	38.3

MCL=Maximum contaminant level from National Primary Drinking Water Regulations, updated 2002

NA= Not analyzed

ND= No detections of given contaminant for sampling event

VTGES=Vermont Groundwater Enforcement Standard

J=estimated value

Concentrations in **bold** exceed MCL or VTGED standards

### *VOCs*

All VOCs detected in overburden monitoring wells in April 2006 were below cleanup goal levels. The only well where any COC VOC was detected in April 2006 was B-15, where 2 ug/L of MTBE were measured (TCG is 40 ug/L). With few exceptions, all VOCs detected since completion of remedial construction have been below TCGs. A downward trend in total VOC concentrations is also supported by monitoring data.

Low concentrations of VOCs were detected in bedrock monitoring wells adjacent to the landfill prior to the completion of the landfill cap. However, these concentrations were always below drinking water standards and not considered a problem. The total VOC concentrations in groundwater collected from these wells were consistently less than 10 ug/L in post-NTCRA samples and concentrations of individual constituents were less than all applicable drinking water standards. No COC TCL VOCs were detected in bedrock wells in April 2006.

No VOCs were detected in residential wells sampled in fall 2004.

### *PCBs*

During April 2006 sampling, PCBs were detected in excess of TCGs in 5 of the 13 overburden monitoring wells sampled downgradient and east of the landfill and of the leachate collection treatment system (LCTS). Exceedance areas include portions of the wetland to the east of the landfill. Concentrations at up to ten times the VT-GWES concentration of 0.5 ug/L were detected. However, the plume appears to be stable as its extent and concentrations have not changed markedly from historical values.

No PCBs were detected in bedrock wells during the most recent sampling event.

No PCBs were detected in residential wells sampled in fall 2004.

### *TAL Metals*

The MCL for arsenic decreased from 50 ug/L to 10 ug/L in late 2002. This new value is only used in comparison to all data from 2003 and subsequent years to determine if any exceedances exist and has not been compared to historic data.

Arsenic, iron, and manganese were all detected in excess of TCGs in overburden wells during April 2006 sampling. These results indicated that groundwater downgradient of the Site is negatively impacted by landfill leachate. Arsenic exceeded the Site TCGs at 6 wells with a high concentration of 32.0 ug/L in B-22. Iron exceeded its TCG of 300 ug/L in 12 downgradient wells with a high concentration of 29,200 ug/L, also at B-22. Manganese exceeded its TCG of 840 ug/L in 8 downgradient wells, with a high of 3620 ug/L at B-20.

Up until 2004, barium routinely exceeded TCG levels. Barium did not exceed TCGs in either 2005 or 2006. In addition to barium, lead and thallium appear to exhibit decreasing trends.

No TAL metals were detected above the TCGs in bedrock wells during the April 2006 sampling event. Since site closure in 1999, iron, manganese, and aluminum concentrations appear to show a decreasing trend directly below the landfill (well B-6-3), whereas barium, lead, and thallium exhibit stable trends.

Overall, the downgradient TAL metals plume does not appear to be expanding beyond historic limits.

Trace metals were detected at concentrations below regulatory standards in residential wells sampled in fall 2004.

#### **6.4.2 Surface Water**

Surface water monitoring data were evaluated as part of the FYR process to determine if a change in concentration has occurred that would call into question the risk findings in the ROD. As documented in the ROD, EPA determined that no unacceptable human health or ecological risks remained after the completion of the NTCRA. The ROD states that the LCTS and landfill cap are expected to prevent further degradation of surface water and sediment quality.

There are five major landfill seep and leachate discharge points: the wetland areas, Ponds A, B, and C, and Hewitt Brook. Water quality criteria applicable to these discharge points include Federal and State Ambient Water Quality Criteria. These five surface water bodies were sampled for total PCBs and TAL metals three times since the completion of the landfill cap (once each in October 1999, June 2000, and October 2000).

Table 3 presents the minimum and maximum concentration of select metals and total PCBs in surface water samples. The table compares the data from the RI/FS to data collected in October 1999 and 2000. In general, the concentrations for metals in 1999 and 2000 data sets appear to be consistent with the RI/FS data. Concentrations of total PCBs in surface water samples collected along Hewitt Brook from Pond B to Houghton Land are also consistent with RI/FS data. However, PCB concentrations in surface water samples collected from Pond B were several orders of magnitude lower than the historic data.

The 1999 and 2000 analytical data indicate concentration of some metals and PCBs exceeded benchmark standards in surface water samples collected at and immediately downstream of Pond B. The samples collected in Hewitt Brook decrease in concentration with respect to distance from Pond B. Concentrations in the samples collected at the Houghton Land Crossing were below most benchmark values. Surface water sampling was discontinued after the initial post-ROD meeting confirmed that conditions were not changing.

Because EPA determined no unacceptable risk would remain after completion of the NTCRA and the post-NTCRA concentrations are consistent with RI/FS data, it is reasonable to conclude that there are currently no unacceptable risks due to surface water. Continued effectiveness of the landfill cap and LCTS ensure that there is no longer any source of site-related contaminants to surface water.

**Table 3**  
**Comparison of Surface Water Analytical Data (ug/L)**  
**Bennington Landfill**

<b>Pond B</b>				
<b>Analyte</b>	<b>RI (1)</b>	<b>Oct-99</b>	<b>Jun-00</b>	<b>Oct-00</b>
Aluminum	ND	19.6 - 115	55.1 - 62.3	ND - 108
Arsenic	25.3	6 - 20.2	5.2 - 9.2	ND - 5.7
Barium	611	755 - 869	598 - 774	681 - 823
Calcium	104,000 J	124,000 - 138,000	97,400 - 118,000	126,000 - 132,000
Cobalt	5 J	15.4 - 19.8	4.6 - 13.0	ND - 9.6
Iron	2,420 J	4,730 - 13,800	1,750 - 5,350	401 - 3,400
Manganese	121	1,220 - 1,310	569 - 1,310	53.3 - 1,040
Nickel	14 J	5.1 - 8.2	3.7 - 5.3	4.2 - 6.2
Silver	ND	ND - 1.7	ND	ND
Sodium	53,500	38,200 - 59,400	35,700 - 54,400	26,900 - 31,900
Total PCB	427	0.56 - 0.97	0.559 - 1.487	0.32 - 0.833
<b>Hewitt Brook (Pond B - Pond C)</b>				
	<b>RI (2)</b>	<b>Oct-99</b>	<b>Jun-00</b>	<b>Oct-00</b>
Aluminum	ND	31.9 - 35.3	49.8 - 51.3	51.3 - 204
Arsenic	4 J	ND - 8.2	5.5 - 9.5	5.6 - 9.5
Barium	227	738 - 756	570 - 573	570 - 990
Calcium	78,400	121,000 - 122,000	97,600 - 102,000	63,000 - 102,000
Cobalt	ND	15.4 - 16.4	13.4 - 13.7	10.0 - 13.4
Iron	1,690 J	1,660 - 3,290	4,480 - 7,070	7070 - 7500
Manganese	246	1,400 - 1,690	1,030 - 1,240	338 - 1,030
Nickel	ND	5.6 - 8.4	2.9 - 3.7	3.4 - 3.7
Silver	ND	1.5 - 1.6	ND	ND
Sodium	7,500	40,400 - 42,700	25,600 - 26,400	10,600 - 26,400
Total PCB	ND	0.43 - 0.44	0.507 - 0.676	0.093
<b>Hewitt Brook (Pond C - Houghton Lane)</b>				
	<b>RI</b>	<b>Oct-99</b>	<b>Jun-00</b>	<b>Oct-00</b>
Aluminum	ND - 4,490	25.2 - 59.9	66.2 - 71.7	ND - 137
Arsenic	ND - 36	ND	ND - 3.3	ND
Barium	336 - 1,940	302 - 736	407 - 576	440 - 652
Calcium	62,000 - 118,000	38,100 - 124,000	68,600 - 103,000	71,300 - 91,500
Cobalt	ND - 154	ND - 6	ND - 4.6	ND - 2.9
Iron	68.6 - 82,000	74 - 637	143 - 463	92 - 2,420
Manganese	14.5 - 28,200	31.4 - 766	52.4 - 698	79.2 - 873
Nickel	ND - 30.3 J	ND - 5.5	1.3 - 3.4	ND - 4
Silver	ND - 3.4 J	ND - 1.3	ND	ND
Sodium	13,700 - 35,400	12,400 - 42,000	18,200 - 29,900	13,600 - 24,900
Total PCB	0.297 (3)	0.042 - 0.24	0.238 - 0.355	0.039 - 0.135

**Notes:**

Concentrations in ug/L

- (1) Represented by one sample collected at southern end of Pond B (SW - 18).
  - (2) Represented by one sample collected just upstream from Pond C (SWAT - 01).
  - (3) Represented by one sample collected just upstream of staff gauge GHB-03 (SW - 002).
- RI - Remedial Investigation (McLaren/Hart, 1997).  
 ND - Not Detected

### 6.4.3 Sediment

Post-NTCRA sediment monitoring data were evaluated as part of the FYR process to determine if a change in concentration occurred that would call into question the risk findings in the ROD. Prior to the NTCRA, soil and sediment samples were obtained from leachate outbreaks within the landfill limits, areas surrounding the landfill, and the pond areas and Hewitt Brook between 1993 and 1997. The samples were analyzed for VOCs, pesticides, semi-VOCs, PCBs, and metals. Based on a subsequent risk analysis, it was determined that PCBs were the only contaminant of concern in sediment. All soil and sediment with PCB concentrations greater than 1,000 ug/kg were excavated and placed under the landfill cap to prevent contact and migration of contamination.

One round of post-NTCRA sediment samples were collected in October 1999. Analytical results indicated the highest concentration of TAL metal and total PCBs were detected in samples from Pond B and immediately downstream of Pond B. The concentrations decreased with distance downstream from Pond C. The PCB concentration in one sediment sample was 1,327 ug/kg, a level above the NTCRA cleanup level of 1,000 ug/kg. This isolated concentration does not represent a risk. Table 4 compares post-NTCRA data for select PCBs and metals in sediment samples collected from three general sampling areas to concentration detected during the RI at similar locations.

In general, the concentrations of PCBs measured during the October 1999 sampling event are comparable to RI/FS data. Concentrations of arsenic, barium, and iron were detected at higher than those recorded during the RI/FS. These concentrations do not represent an increased threat to human health as the risk falls within the acceptable range given the limited frequency and duration of exposure in these wetland areas where these higher concentrations were detected. Sediment sampling was discontinued after 1999.

<b>Table 4</b>						
<b>Comparison of Sediment Analytical Data (mg/kg)</b>						
<b>Bennington Landfill</b>						
<b>Analytes</b>	<b>Pond B</b>		<b>Hewitt Brook (Pond B to Pond C)</b>		<b>Hewitt Brook (Pond C to Houghton Lane)</b>	
	<b>RI</b>	<b>1999</b>	<b>RI</b>	<b>1999</b>	<b>RI</b>	<b>1999</b>
PCBs	ND – 0.796	0.055 – 1.327	ND – 0.113	0.017 – 0.706	NA	0.017 – 0.268
<i>Metals</i>						
Aluminum	1440 – 2580	1410 – 4360	3040	886 – 3120	1770 – 4490	2240 – 3750
Arsenic	4.6 – 9.9	7.2 – 37.8	1.6	4.6 – 201	3.1 – 64.2	2 – 19.3
Barium	27.8 – 61.4	46 – 437	248	58.3 – 5410	250 – 2700	61.4 – 750
Calcium	81200 – 123000	2720 – 10500	62800	23300 – 33900	11200 – 31500	3550 – 26200
Cobalt	8.7 – 14.3	7.6 – 41.1	24.2	13.1 – 67.8	16.1 – 57.1	4.6 – 58.9
Iron	16300 – 182000	10100 – 42600	13200	6710 – 166000	8400 – 57200	5740 – 28400
Manganese	426 – 672	133 – 1210	1720	619 – 31000	2050 – 13300	75.6 – 3410
Nickel	6.3 – 12.6	4 – 12.8	8.6	5.5 – 51.6	7 – 21.9	4.5 – 12.7

Silver	NA	0.03 – 0.15	NA	0.05 – 0.1	ND – 1.6	0.06 – 0.11
Sodium	NA	23 – 89.8	NA	23.4 - 241	NA	25.1 - 142

NA – Not analyzed

ND – Not detected

#### 6.4.4 Leachate Collection and Treatment System

Construction of the leachate collection and treatment system (LCTS) was required as part of the NTCRA for the landfill. The LCTS has been decommissioned within this past five-year review period (see below for more detail). The ROD states that after completion of the NTCRA, all the landfill waste should be above the water table. Therefore, significant reduction in the generation of leachate was expected to occur as a result of the NTCRA.

The general process and operation of the LCTS is described as follows:

1. Leachate is collected from the landfill via a series of underdrain pipes installed at the base of the landfill.
2. The leachate is transferred to an influent pump chamber (IPC).
3. From the IPC, the leachate is transferred through the treatment system where large particles are removed by bag filters, three granular activated carbon filters (GAC) and cartridge filters remove PCBs and VOCs. The treatment system also includes a control panel that allows remote monitoring.
4. Treated leachate is transferred into an effluence pump pit and then to the on-site groundwater infiltration system.

The concentrations of total PCBs in the LCTS influent stream have increased dramatically over the last few monitoring events. However, the effluent stream has consistently met discharge standards, so the increase in influent concentration is not considered to be an issue.

The operation of the LCTS was performed by the Town of Bennington and consists of the following:

- Monthly monitoring of leachate flow;
- Quarterly change-out of bag filter, cartridge filter, and primary GAC unit;
- Annual change-out of the secondary and tertiary GAC units;
- Annual inspection of the influent pump chamber and effluent pump pit; and
- Biennial cleaning for the influent pump chamber.

The ROD indicates that the reduction of leachate generation was already evident at that time in the influent stream to the LCTS. Prior to the installation of the landfill cap and upgradient groundwater diversion system, the rate of leachate flow from the underdrain discharge pipe was between 1 and 6 gpm, with an average of approximately 2 gpm. In September 1998, the flow of water into the LCTS was consistently below 1 gpm with little fluctuation since the installation of the groundwater interception trench in December 1997. The flow rate of leachate from the underdrain has been less than 0.1 gpm since May 2001, with the average flow from October 2001 through August 2003 of less than 0.04 gpm. The average flow rate from October 2001 to August 2003 reported in the previous FYR was 0.04 gpm. In 2008, the Town of Bennington requested that the LCTS be decommissioned due to very small amounts of leachate being generated. EPA agreed and the LCTS has since been decommissioned. The leachate is now allowed to re-infiltrate back into the groundwater.

### **6.4.5 Air Monitoring**

A system of landfill gas vents was installed below the multilayer cap to allow landfill gases to passively escape from the waste mass into the ambient air. This prevents accumulation of gas pressure within the landfill that could destabilize the cap. Air quality monitoring is not required by the ROD and is not performed as part of the Site monitoring program. However, qualitative observations are made during site inspections. No evidence of slope instability or breaching of the liner through cap cover soils has been observed. The lack of this evidence indicates that there is no damaging accumulation of gas pressure below the landfill cap.

### **6.5 Site Inspections**

The FYR site inspection was conducted on May 9, 2009 by representatives from EPA and Nobis Engineering (EPA's oversight contractor). See Attachment D for Site Inspection Report. The inspection team visited the on-site treatment facility and walked all areas of the landfill. The surface of the cap and the various drainage channels and collection areas were evaluated.

### **6.6 Interviews**

The VT DEC project manager, the Town Manager, Casella Waste Management Facility Manager, and site residents were interviewed. There were no issues identified. Records of the site interviews can be found in Attachment C.

## **7.0 Technical Assessment**

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

Yes.

The long-term monitoring data and oversight inspections confirm that the NTCRA is functioning as intended and that the No Further Action ROD monitoring program is being implemented. The information sources include review of the available documents, review of post NTCRA monitoring data, the interviews, and the site inspection. The landfill cap and LCTS have achieved the remedial objectives to minimize the migration of contaminants and prevent direct contact with, or ingestion of, contaminants.

Evidence to indicate that the remedy is performing as intended includes the following:

- The remedial objectives of the cap have been achieved by preventing direct exposure to waste and contaminated soils. All waste materials added to the cap as part of the NTCRA were placed at least 30 feet above the groundwater table to ensure there would be no further impact to area groundwater.
- There is no indication that the cap is leaking; therefore, the objective of reducing or eliminating the generation of landfill leachate has been met. The cap is maintained and inspected by the Town. The Town is responsible for repair work at the landfill site.
- At the time of this five-year review, the landfill cap and upgradient groundwater isolation system appear to be functioning as designed and in good overall condition. The surface of the landfill

remains stable and shows no signs of erosion or cracks. The benches in the landfill surface are also functioning as designed and in good overall condition. Perimeter ditches remain in good overall condition and operating as designed. The outlet pipes and riprap outlet of the drainage layer at the perimeter of the cover system remains in good overall condition. The upgradient groundwater isolation system continues to function as designed and requires minimal maintenance.

- Construction of the landfill cap and leachate collection system were designed to eliminate the discharge of contaminants to surface water receptors. With continued maintenance of the landfill cap and decommissioning of the leachate collection system, future compliance regarding surface water and sediments can be expected without additional remedial action.
- There is evidence of a significant decrease in leachate generation into the LCTS. The flow rate of leachate into the system has dropped from an initial 2 gpm prior to the completion of the NTCRA to an average of less than 0.04 gpm.
- The running average of total PCB concentrations in the effluent leachate stream for the LCTS comply with the EPA monitoring requirements of a twelve-month running average of less than 0.5 ug/L.
- The operation and maintenance of the cap and the recently decommissioned leachate collection system has been and continues to be effective. Issues identified during the semi-annual site inspections are regularly addressed or continue to be monitored. The current sampling and analytical methods for groundwater are adequate to evaluate the performance of the remedy. The location and number of wells sampled give sufficient coverage to monitor the location and concentrations of the contaminated plume.
- A restrictive covenant has also been placed on the property to prevent the use of contaminated groundwater. The impacted groundwater has been reclassified as non-potable to further prevent future use. No activities were observed that would have violated the institutional controls.

Data indicate that the landfill cap and isolation trench are effective at preventing infiltration of water through the solid waste mass.

Groundwater downgradient of the landfill in the shallow groundwater unit is still negatively impacted by landfill leachate. Cleanup goals for arsenic, iron, and manganese and PCBs are not fully met. However, the contaminant plume has not expanded its extent either horizontally or vertically, indicating that the remedy is effective at preventing spread of site-related contamination.

ICs ensure that risk of exposure is low by preventing use of groundwater and any land activities that could threaten the effectiveness of the landfill cap and remedy.

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

Yes.

The exposure assumptions used to develop the ROD focused on the groundwater ingestion pathway. No individuals are currently exposed to contaminated groundwater.

A new MCL for arsenic, 10ppb, became effective on February 22, 2002 and drinking water systems were to be in compliance with this new level by January 23, 2006. However as no groundwater cleanup levels were identified for the Site in the No Further Action ROD, this new level does not change the need for remedial actions at the site. In addition, future use of contaminated groundwater is effectively prevented by ICs.

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

No.

Review of site material and the site inspection revealed no new information that calls into question the effectiveness and protectiveness of the remedy selected in the NTCRA Action Memorandum and ROD. No new human or ecological receptors have been identified at this time.

**Technical Assessment Summary**

According to the data reviewed, the site inspection, and the interviews, the remedy is functioning as intended by the NTCRA Action Memorandum, CD, and ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. There have been no changes to the overall exposure assumptions used in evaluating human health and ecological risk. Because the site is a no further action, there are no ARARs set in the ROD at this site. There is no other information that calls into question the protectiveness of the remedy.

**8.0 Issues**

There are no issues which affect the protectiveness of the remedy. For continued protectiveness and effectiveness of remedy implementation, regular O&M should be continued by the Town of Bennington with oversight by VT DEC and EPA.

While there are no protectiveness issues at this time, it is possible that conditions not addressed by improved O&M could potentially affect protectiveness in the future. None of the issues listed below affect current and future protectiveness. Future remedy protectiveness would only be affected if the O&M is not consistent at or above the level conducted at present.

**Table 5: Issues**

Issues  Figure 1 of the Site Inspection Report in Attachment D	Affects Protectiveness (Y/N)	
	Current	Future
Burrow holes and other areas of animal disturbance as indicated on Figure 1 should be filled in.	N	N

Areas of mower damage as indicated on Figure 1 should be filled and seeded.	N	N
Small trees and bushes near the perimeter of the landfill cap extension should be removed.	N	N
Areas of subsidence and depressions as indicated on Figure 1 should be watched for increases in settling.	N	N
Soil loss and settling along the northern and northeastern perimeter ditches should be filled and seeded and watched for future cap stability.	N	N
Sediment observed at the outlet pipe openings in the perimeter ditch near the northeast corner of the landfill should be removed periodically.	N	N
The gabions should continue to be monitored for evidence of overturning or other instability; especially in the area of the gabion retaining wall where the bulging has been noted in previous inspections. Monitoring should be done on a monthly basis, or more frequently in time of high precipitation,	N	N

## 9.0 Recommendations and Follow-up Actions

These recommendations do not affect the protectiveness of the site. Recommendations listed here address O&M activities and updates that are important for the future long-term protectiveness of the remedy at Bennington Landfill.

**Table 6: Recommendations and Follow-up Actions**

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness (Y/N)	
				Current	Future
Transfer of monitoring oversight from EPA to VTDEC	EPA/VTDEC	EPA/VTDEC	12/21/09	N	N

## 10.0 Protectiveness Statement

Because the response actions at all OUs are protective, the site is protective of human health and the environment. Contamination at the site has been addressed through excavation and on-site disposal of contaminated soil, capping of contaminated soils on-site, a leachate and groundwater collection system, on-site treatment of contaminated groundwater and leachate, gas collection vents, and institutional controls. Operation and maintenance activities and regular oversight inspections ensure that the remedy remains effective and the site is protective of human health and the environment.

## **11.0 Next Review**

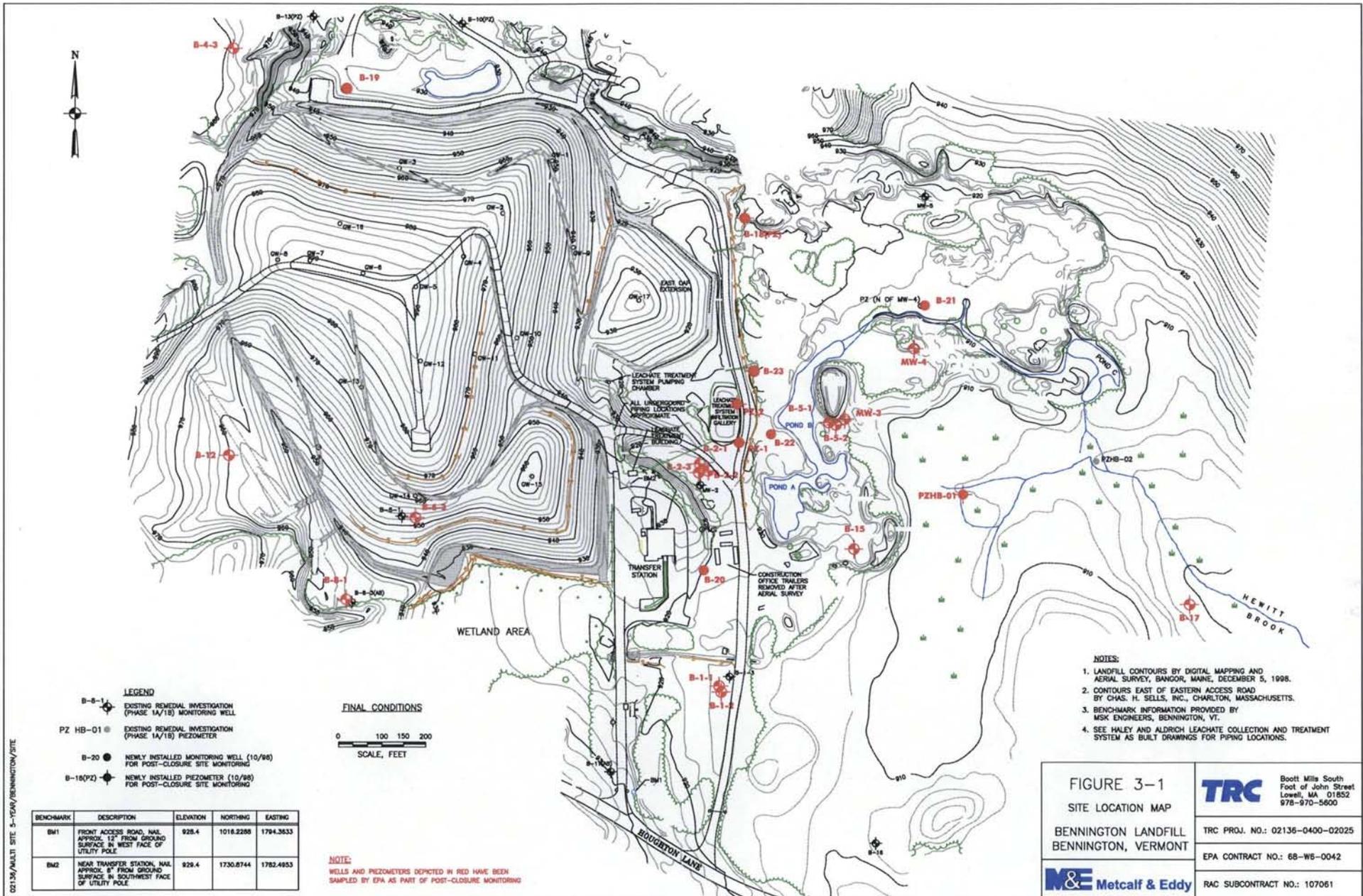
The next five-year review for the Bennington Landfill Superfund Site is required by September 2014, five years from the date this FYR Report is signed.



# **Attachment A**

## **Site Map**





02136/MULTI SITE 5-YEAR/BENNINGTON/SITE

- LEGEND**
- B-8-1 EXISTING REMEDIAL INVESTIGATION (PHASE 1A/1B) MONITORING WELL
  - PZ HB-01 EXISTING REMEDIAL INVESTIGATION (PHASE 1A/1B) PIEZOMETER
  - B-20 NEWLY INSTALLED MONITORING WELL (10/98) FOR POST-CLOSURE SITE MONITORING
  - B-18(PZ) NEWLY INSTALLED PIEZOMETER (10/98) FOR POST-CLOSURE SITE MONITORING

**FINAL CONDITIONS**

0 100 150 200  
SCALE, FEET

BENCHMARK	DESCRIPTION	ELEVATION	NORTHING	EASTING
BM1	FRONT ACCESS ROAD, NAIL APPROX. 12" FROM GROUND SURFACE IN WEST FACE OF UTILITY POLE	928.4	1018.2288	1794.2633
BM2	NEAR TRANSFER STATION, NAIL APPROX. 8" FROM GROUND SURFACE IN SOUTHWEST FACE OF UTILITY POLE	929.4	1730.8744	1782.4953

**NOTE:**  
WELLS AND PIEZOMETERS DEPICTED IN RED HAVE BEEN SAMPLED BY EPA AS PART OF POST-CLOSURE MONITORING

- NOTES:**
- LANDFILL CONTOURS BY DIGITAL MAPPING AND AERIAL SURVEY, BANGOR, MAINE, DECEMBER 5, 1998.
  - CONTOURS EAST OF EASTERN ACCESS ROAD BY CHAS. H. SELLS, INC., CHARLTON, MASSACHUSETTS.
  - BENCHMARK INFORMATION PROVIDED BY MSK ENGINEERS, BENNINGTON, VT.
  - SEE WALEY AND ALDRICH LEACHATE COLLECTION AND TREATMENT SYSTEM AS BUILT DRAWINGS FOR PIPING LOCATIONS.

<p><b>FIGURE 3-1</b></p> <p>SITE LOCATION MAP</p> <p>BENNINGTON LANDFILL</p> <p>BENNINGTON, VERMONT</p> <p><b>M&amp;E Metcalf &amp; Eddy</b></p>	<p><b>TRC</b></p> <p>Boott Mills South Foot of John Street Lowell, MA 01852 978-970-5600</p>
	TRC PROJ. NO.: 02136-0400-02025
	EPA CONTRACT NO.: 68-W6-0042
	RAC SUBCONTRACT NO.: 107061

## **Attachment B**

**Set of Documents Reviewed for this Five-Year Review**



### **Set of Documents Reviewed for this Five-Year Review**

- Action Memorandum to Initiate Non-Time Critical Removal Action (NTCRA) signed December 23, 1994;
- Administrative Order on Consent (AOC) for NTCRA design signed November 26, 1996;
- Consent Decree for construction and maintenance of NTCRA signed August 18, 1997;
- Record of Decision signed September 29, 1998;
- Five Year Review Report for Bennington Landfill Superfund Site Bennington, VT, dated September 2004; and
- TRC Data Report dated April 2006
- Nobis Engineering 2009 Spring Inspection Report



**Attachment C**  
**Record of Interviews**



### INTERVIEW DOCUMENTATION FORM

The following is a list of individuals interviewed for this five-year review. See the attached interview record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
John Schmeltzer	Environmental Analyst	Vermont DEC	7/20/09
Name	Title/Position	Organization	Date
Stuart Hurd	Municipal Manager	Town of Bennington	7/20/09
Name	Title/Position	Organization	Date
Dale Baker	Manager	Casella Waste Management	7/20/09
Name	Title/Position	Organization	Date
Steve Brusio	Resident	Homeowner	7/20/09
Name	Title/Position	Organization	Date
Barbara Brusio	Resident	Homeowner	7/20/09
Name	Title/Position	Organization	Date
Brenda Rowland	Resident	Homeowner	7/20/09
Name	Title/Position	Organization	Date
Name	Title/Position	Organization	Date

### INTERVIEW RECORD

Site Name: Bennington Landfill		EPA ID No.: VTD981064223	
Subject: Second Five-Year Review		Time: 2:30 PM	Date: 7/20/09
Type: <input checked="" type="checkbox"/> Telephone, <input type="checkbox"/> Visit, <input type="checkbox"/> Other		Incoming <input type="checkbox"/> Outgoing <input checked="" type="checkbox"/>	
Location of Visit:			
CONTACT MADE BY			
Name: Almerinda Silva	Title: Project Manager	Organization: EPA	
INDIVIDUAL CONTACTED:			
Name: John Schmeltzer	Title: Environmental Analyst	Organization: Vermont Department of Environmental Conservation	
Telephone No: (802)241-3886 Fax No:		Street Address: 103 South Main St., West Bldg. City, State, Zip: Waterbury, VT 05671-0404	
SUMMARY OF CONVERSATION			
Q1: What is your overall impression of the project and site?			

A1: Good overall impression. The landfill capping was successful and the septic trench is working effectively.

Q2: Are you aware of any issues the five-year review should focus on?

A2: This may not be a Five-Year Review issue but VT DEC would like to have input into EPA upcoming groundwater sampling event this fall. This would be helpful to VT DEC since the State will be taking over monitoring responsibilities for the Site starting next year.

Q4: Is the remedy functioning as expected?

A4: Yes

Q6: Do you have any comments or suggestions regarding the site's management or operation?

A6: No.

Q7: Are you aware of any community concerns regarding the site or its operation and administration?

A7: No.

Q8: Have there been any changes in the site or surrounding property in the last 5 years, or are changes planned?

A8: Institutional controls are in place and continue to be effective. Groundwater has been reclassified.

Q9: Have there been any complaints or incidents that required a response by your office?

A9: No.

### INTERVIEW RECORD

Site Name: Bennington Landfill		EPA ID No.: VTD981064223	
Subject: Second Five-Year Review		Time: 12:00 PM	Date: 7/20/09
Type: <input checked="" type="checkbox"/> Telephone	<input type="checkbox"/> Visit	<input type="checkbox"/> Other	Incoming <input type="checkbox"/> X Outgoing
Location of Visit:			

### CONTACT MADE BY

Name: Almerinda Silva	Title: Project Manager	Organization: EPA
-----------------------	------------------------	-------------------

### INDIVIDUAL CONTACTED:

Name: Stuart Hurd	Title: Town Manager	Organization: Town of Bennington, VT
-------------------	---------------------	--------------------------------------

Telephone No: (802) 442-1037	Street Address: 205 South Street
Fax No:	City, State, Zip: Bennington, VT 05201
E-Mail Address:	

### SUMMARY OF CONVERSATION

Q1: What is your overall impression of the project and site?

A1: It is running very well. Only minor repair work from time to time due to groundhogs digging holes that need to be patched up.

Q2: Are you aware of any issues the five-year review should focus on?

A2: No issues.

Q3: Are you aware of any community concerns regarding the site or its operation and administration?

A3: None.

Q4: Have there been any complaints or incidents that required a response by your office?

A4: None

### INTERVIEW RECORD

Site Name: Bennington Landfill	EPA ID No.: VTD981064223	
<b>Subject:</b> Second Five-Year Review	Time: 12:00 PM	Date: 7/20/09
<b>Type:</b> <input checked="" type="checkbox"/> Telephone . Visit . Other	Incoming <input type="checkbox"/> Outgoing <input checked="" type="checkbox"/>	
Location of Visit:		

### CONTACT MADE BY

Name: Almerinda Silva	Title: Project Manager	Organization: EPA
-----------------------	------------------------	-------------------

### INDIVIDUAL CONTACTED:

Name: Dale Baker	Title: Manager	Organization: Casella Waste Management, Southerland County
------------------	----------------	--

Telephone No: (802) 733-1311	Street Address: Adjacent to Bennington Landfill City, State, Zip: Bennington, VT 05201
Fax No:	
E-Mail Address:	

### SUMMARY OF CONVERSATION

Q1: What is your overall impression of the project and site?

A1: It is running very smoothly. It is maintained professionally.

Q2: Are you aware of any issues the five-year review should focus on?

A2: No issues.

Q3: Are you aware of any community concerns regarding the site or its operation and administration?

A3: None.

Q4: Have there been any complaints or incidents that required a response by your office?

A4: None

### INTERVIEW RECORD

Site Name: Bennington Landfill		EPA ID No.: VTD981064223	
Subject: Second Five-Year Review		Time: 11:00 AM	Date: 5/22/09
Type: <input checked="" type="checkbox"/> Telephone . Visit . Other		Incoming <input type="checkbox"/> Outgoing <input checked="" type="checkbox"/>	
Location of Visit:			

### CONTACT MADE BY

Name: Almerinda Silva	Title: Project Manager	Organization: EPA
-----------------------	------------------------	-------------------

### INDIVIDUAL CONTACTED:

Name: Steve Bruso	Title: Resident and Gate Keeper for the Town	Organization: Homeowner and Town Employee
Telephone No: (802) 442-8446	Street Address: Houghton Lane	
Fax No:	City, State, Zip: Bennington, VT	
E-Mail Address:		

### SUMMARY OF CONVERSATION

Q1: What is your overall impression of the project and site?

A1: Everything seems to be running very smoothly.

Q2: Do you have any questions or concerns regarding the site?

A2: No.

### INTERVIEW RECORD

Site Name: Bennington Landfill		EPA ID No.: VTD981064223	
Subject: Second Five-Year Review		Time: 11:00 AM	Date: 5/22/09
Type: <input checked="" type="checkbox"/> Telephone . Visit . Other		Incoming <input type="checkbox"/> Outgoing <input checked="" type="checkbox"/>	
Location of Visit:			

### CONTACT MADE BY

Name: Almerinda Silva	Title: Project Manager	Organization: EPA
-----------------------	------------------------	-------------------

### INDIVIDUAL CONTACTED:

Name: Barbara Bruso	Title: Resident	Organization: Homeowner
---------------------	-----------------	-------------------------

Telephone No: (802) 442-8446 Fax No: E-Mail Address:	Street Address: Houghton Lane City, State, Zip: Bennington, VT
--	---

**SUMMARY OF CONVERSATION**

Q1: What is your overall impression of the project and site?  
A1: Everything looks like it is doing what it is supposed to be doing.

Q2: Do you have any questions or concerns regarding the site?  
A2: No.

**INTERVIEW RECORD**

Site Name: Bennington Landfill	EPA ID No.: VTD981064223	
Subject: Second Five-Year Review	Time: 11:00 AM	Date: 5/22/09
Type: <input checked="" type="checkbox"/> Telephone    Visit    Other	Incoming <input checked="" type="checkbox"/> Outgoing	
Location of Visit:		

**CONTACT MADE BY**

Name: Almerinda Silva	Title: Project Manager	Organization: EPA
-----------------------	------------------------	-------------------

**INDIVIDUAL CONTACTED:**

Name: Brenda Rowland	Title: Resident	Organization: Homeowner
Telephone No: (802) 447-0831 Fax No: E-Mail Address:	Street Address: 860 Houghton Lane City, State, Zip: Bennington, VT	

**SUMMARY OF CONVERSATION**

Q1: What is your overall impression of the project and site?  
A1: Everything appears to be fine.

Q2: Do you have any questions or concerns regarding the site?  
A2: No concerns.



# **Attachment D**

## **Spring 2009 Site Inspection Report**



Nobis Engineering, Inc.  
18 Chenell Drive  
Concord, NH 03301  
Tel (603) 224-4182  
Fax (603) 224-2507  
www.nobisengineering.com

EPA Region 1 RAC 2 Contract No. EP-S1-06-03

June 19, 2009  
Nobis Project No. 80019  
NH-2081-2008-D

Via Electronic Submittal

U.S. Environmental Protection Agency, Region 1  
Attention: Mr. Edward Hathaway, Task Order Project Officer  
1 Congress Street, Suite 1100  
Boston, Massachusetts 02114-2023

Subject: Transmittal of the Spring 2009 Inspection Report  
Bennington Landfill Superfund Site, Bennington, Vermont  
Long-Term Removal Action Oversight  
Task Order Number 0019-AN-GM-01C2

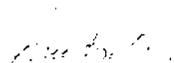
Dear Mr. Hathaway:

Attached with this correspondence are the Nobis Engineering comments for the landfill inspection, which was conducted on May 8, 2009 at the Bennington Landfill Superfund Site.

Should you have any questions or comments, please contact me at (603) 724-6236, or [cadams@nobisengineering.com](mailto:cadams@nobisengineering.com).

Sincerely,

NOBIS ENGINEERING, INC.

  
J. Christopher Adams, P.E.  
Project Manager

Attachment

c: File 80019/MA (w/enc.)

**SEMI-ANNUAL INSPECTION REPORT  
BENNINGTON LANDFILL SUPERFUND SITE  
BENNINGTON, VERMONT**

**1.0 INTRODUCTION**

This letter report documents and presents observations made by Nobis Engineering, Inc. (Nobis) during the Spring Inspection of the Bennington Landfill (Site) in Bennington, Vermont conducted on May 8, 2009. A panoramic view of the landfill surface is shown in Photo 1. This report is also based on visual observations with reference to the cover system installation Record Drawings prepared by Dames and Moore of Augusta, Maine and dated June 1997 (last revision February, 1999). A representative from EPA visited the Site while Nobis was present, but did not accompany the Nobis inspector during the inspection.

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;
- Inspecting the above ground portions of structures that penetrate the cap (i.e., gas vents, etc.) for damage; and
- Inspecting the above ground, exterior portions of the Leachate Collection and Treatment System (LCTS) building for obvious damage and material deterioration.

A site-specific inspection checklist was used to document the inspection and is provided as Attachment 1. The evaluation of subsurface conditions was not within the scope of this inspection. Observations made during the inspection are summarized below.

**2.0 SUMMARY OF INSPECTION**

The results of the Site inspection are presented according to the various components of the landfill cover system. Where appropriate, current conditions are compared to those observed in prior inspections. The following sections of the report correspond to the inspection items listed in the checklist. Photographs documenting observations made during the inspection are

provided in Attachment 2. References to Site Features (e.g. benches, gas vents, letdown channels) are shown on Figure 1 (included as part of Attachment 1).

### **Landfill Surface**

Based on the walk over the perimeter and top of the landfill cap, the Nobis inspector found the following items not identified in previous inspections:

- A small hole at the base of GW-7 (see Photo 2 and Figure 1, Item 1). This photo also shows damage to GW-7's vent boot with unknown cause; this should be repaired.
- An area of ground separation and some settling, which may be mower damage, on the landfill slope near the perimeter ditch at the northwestern corner of the landfill (see Photo 3 and Figure 1, Item 2). This area should be repaired, and monitored for future separation and/or settling.
- A low spot adjacent to the riprap bench, approximately 20 feet northeast of the above-described area of separation and settling (see Photo 4). This area should be watched for future changes.
- An area of soil loss, adjacent to the perimeter ditch on the northeastern corner of the Site (see Photo 5 and Figure 1, Item 3).
- Upslope of the second highest bench on the northeastern face of the landfill, there is an animal hole with some slight soil erosion downstream of the hole (see Photos 6 and 7 and Figure 1, Item 4).

The following are updates on items discovered during the Fall 2008 and prior inspections:

- An area of subsidence identified during inspections conducted in 2008 on top of the landfill cap and located on the face in between GW-12 and GW-13 was observed. No changes were observed during the Spring 2009 inspection (see Figure 1, Item 5). This area should continue to be monitored for further subsidence.

- Near the above-mentioned subsidence location, a slight sinking of the cap surface with no dead vegetation was observed in past inspections. No changes were observed during the Spring 2009 inspection. This area should continue to be monitored for further settlement (see Figure 1, Item 6).
- During prior inspections, Nobis inspectors observed a slight depression near the upstream end of the slope diversion channel near GW-2 (see Figure 1, Item 7). No changes were observed during the Spring 2009 inspection. This area should continue to be watched for further settling and drainage problems. Apparent mower damage previously observed in this area is no longer present.
- Mower damage previously identified downslope from MW B-6-3 is still present (see Figure 1, Item 8, and Photo 8).
- Mower damage previously identified near the corner of the perimeter ditch across from the transfer station, and near GW-8, is no longer present.
- A woodchuck hole observed in the Spring and Fall of 2008 inspections near the lower bench and downslope from GW-3 is still present (see Photo 9 and Figure 1, Item 9).
- An area of soil disturbance previously identified adjacent to the riprap near GW-14 is still present, and unchanged (see Photo 10 and Figure 1, Item 10). The disturbance is suspected to be a result of animal activity.
- As observed during prior inspections, there is an apparent loss of soil and area of settling that needs to be watched for future slope stability, along the northern edge of the cap, where it meets a perimeter ditch (see Figure 1, Item 11, and Photo 11). Vegetation continues to appear intact in this area. Photo 12 shows one location in this area where part of the riprap channel appears to have settled approximately two feet lower than adjacent areas. This is based on the appearance of the riprap's boundary with vegetation on the upslope side, and is unchanged from the Fall 2008 inspection. Photos 11 and 12 also show exposed liner along the edge of the perimeter ditch. Newly observed during this inspection was a slight settling, approximately 2 inches deep and 3 to 4 feet wide, that runs parallel to the perimeter ditch in this area (see Photo 13).

- Newly observed during this inspection was similar settling and soil loss along the same perimeter ditch, but closer to the northeast corner of the landfill (see Photo 14 and Figure 1, Item 12).
- During the Fall 2008 inspection, the inspector observed a loss of soil above a drain outlet, near the northernmost limit of the perimeter road (see Photo 15 and Figure 1, Item 13). Exposed liner is also visible in this photo above the drain, near the perimeter ditch. A sinkhole previously observed near the outlet is no longer present; however, some ground separation, which may be mower damage, is present near the drain outlet. This area should be loamed and seeded, and continue to be monitored for future slope stability.
- Slight depressions near the eastern edge of the cap have not changed since the Fall 2008 Site inspection and should continue to be monitored (see Figure 1, Item 14).
- There are four other areas of minor settling that are unchanged from the Fall 2008 inspection (see Figure 1, Items 15 to 18).

### **Benches/Slope Diversion Channels**

The benches were in good condition with no apparent signs of erosion, undermining, bypass or breaching. The inspector observed one area of vegetation in a slope diversion channel that was observed during the Fall 2008 inspection, as indicated on Figure 1, Item 19. Other channels appeared clear of vegetation during the Site inspection.

At the northwestern corner of the Site, there is a slope diversion channel that discharges into a perimeter ditch. During the Fall 2008 inspection, the Nobis inspector observed an apparent riprap bulge adjacent to a pipe outlet. This area is unchanged during this inspection. See Figure 1, Item 20 and Photo 16.

### **Cover Penetrations**

Cover penetrations through the landfill cover system include 17 passive gas vent structures (GV-1 through GV-17) and two monitoring wells (see Figure 1 for locations). All of the structures appeared to be in good condition and were vertical or nearly vertical at the time of the inspection. The geomembrane boot for GW-7 has been damaged (see Photo 2 and Figure 1, Item 1) and should be repaired.

### **Monitoring Wells**

No damage was observed to the monitoring wells located throughout the Site.

### **Cover Drainage Layer**

The outlet pipes and riprap outlet of the drainage layer at the perimeter of the cover system appeared to be in good condition with no obvious damage to the outlet pipes. The inspector made the following observations during the Site inspection:

- Observed during the Fall 2008 and prior Site inspections, at the outlet pipe openings in the perimeter ditch near the northeastern corner of the landfill, and at the northern end of the eastern cap extension area, slight sedimentation is still present. Sedimentation and establishment of vegetation could disrupt the hydraulic flow of the perimeter ditch if allowed to build up. See Figure 1, Item 21 and Photo 17.
- Observed during the Fall 2008 and prior Site inspections, immediately adjacent to the riprap drainage layer outlet around the perimeter of the cap extension to the east of the main landfill, small trees and/or bushes are still present. While not on the cap, roots from the woody vegetation could impact the cap by growing up into the drainage layer. Woody vegetation in this area increases the chances that unacceptable vegetation will become established on the cap. If allowed to grow to maturity, large trees could also damage the edge of the cap if uprooted. See Figure 1, Item 22 and Photo 18.

## **Retaining Walls**

The gabion retaining wall at the end of the Upgradient Groundwater Isolation Trench (UGIT) was inspected. The slight deformation (bulging) noticed in previous inspections has not increased. The deformation is likely due to the rearrangement of the riprap in the gabion basket. See Photo 19 and Figure 1, Item 23.

## **Groundwater Systems**

The two systems at the landfill that collect and/or direct the flow of groundwater include the UGIT and the LCTS. The UGIT consists of subsurface perforated piping to collect groundwater and a riprap-lined drainage ditch to collect surface water runoff. Observations for the UGIT surface water drainage ditch are presented below under the "Perimeter Ditches and Off-Site Discharge" section.

No obvious damage or vandalism was observed to the outside of the LCTS Building. The LCTS components in the treatment shed were not inspected.

## **Perimeter Ditches and Off-Site Discharge**

The inspector observed vegetation and sedimentation present in several locations as indicated on Figure 1, Items 24 to 28. This includes locations observed during the Fall 2008 Site inspection and prior inspections. There is a location near the LCTS Building where a layer of soil is on the riprap (see Photo 20 and Figure 1, Item 29).

## **Fencing and Roads**

The chain link fence installed between the landfill and the transfer station appeared to be in good condition. The gravel roads were in good condition.

To the east of the landfill, a drainage ditch discharging to a U.S. Fish and Wildlife restoration area contains sedimentation that should be removed (see Photo 21 and Figure 1, Item 30).

### **3.0 CORRECTIVE ACTIONS**

This section summarizes recommendations made in the Fall 2008 Inspection Report and their current status:

- Monitor and remove sediments and vegetation from benches and ditches, including pipe outlets, as needed.
  - Sedimentation and vegetation as described in the Fall 2008 Inspection Report is still present.
- Conduct regular inspections and animal eradication as part of routine maintenance. Fill in burrow holes and reseed disturbed areas.
  - A burrow hole near the lower bench downslope from GW-3 observed in Fall 2008 is still present. An additional area of possible animal activity adjacent to riprap near GW-14 is still present and should be monitored.
- Remove small trees and bushes from perimeter of landfill cap extension.
  - Trees and bushes have not been removed from this area.
- The bulge in the southern end of the gabion retaining wall at the south end of the UGIT should be monitored for additional shifting or settlement. Repairs to the retaining wall may be necessary in the future if overturning of the retaining wall is observed.
  - Bulging in the gabion retaining wall has not increased.

### **4.0 RECOMMENDATIONS**

The following corrective actions are recommended based on the observations made during the May 2009 inspection:

- Burrow holes and other areas of animal disturbance as indicated on Figure 1 should be filled in.

- Areas of mower damage as indicated on Figure 1 should be filled and seeded.
- Sedimentation in areas shown on Figure 1 should be removed periodically, and pipe openings cleared.
- Small trees and bushes near perimeter of landfill cap extension should be removed.
- Areas of subsidence and depressions as indicated on Figure 1 should be watched for increases in settling.
- Soil loss and settling along the northern and northeastern perimeter ditches should be filled and seeded and watched for future cap stability.
- Sediment observed at the outlet pipe openings in the perimeter ditch near the northeast corner of the landfill should be removed periodically.
- The gabions should continue to be monitored for evidence of overturning or other instability; especially in the area of the gabion retaining wall where the bulging has been noted in previous inspections. Monitoring should be done on a monthly basis, or more frequently in times of high precipitation.

**Attachment 1**

**Inspection Checklist and Site Plan  
May 8, 2009**



EPA RAC Contract # EP-S1-06-03

SEMI-ANNUAL LANDFILL INSPECTION CHECKLIST

Task Order: 0019-AM-GM-01C2 Weather: Sunny  
 Site Name: Bennington Landfill Temperature: 60°F  
 Town: Bennington Site Map: Attach Map  
 State: Vermont Date of Inspection: 5/8/2009  
 PRP Representatives: None (Ed & Hanky of EPA on site)  
 Inspection Team: B. Wachter

ITEM	REMARKS
<b>LANDFILL SURFACE</b>	
1. SETTLEMENT (LOW SPOTS) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Location (indicate on site map): Areal Extent: Depth:	Some areas of possible settling as indicated on map.
2. CRACKS Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Location (indicate on site map): Length: Width: Depth:	
3. EROSION Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Location (indicate on site map): Areal Extent: Depth:	As a result of animal holes, see map
4. HOLES Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Location (indicate on site map): Areal Extent: Depth: Suspected Cause (rodent or other):	- 3 holes, see map
5. VEGETATIVE COVER Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Grass: Condition: Trees/Shrubs: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Location (indicate on site map): Size:	Vegetation in good condition except holes, mower damage
6. ARMORED COVER Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Material Type: Condition:	
7. BULGES Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Location (indicate on site map): Areal Extent: Height: Suspected Cause (gas pressure or other):	





EPA RAC Contract # EP-S1-06-03

ITEM	REMARKS
<b>LETDOWN CHANNELS</b>	
1. SETTLEMENT                      Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Location (indicate on site map): Areal Extent:                      Depth:	Some settling along edge, see map
2. MATERIAL DEGRADATION      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Material Type: Location (indicate on site map): Areal Extent: Degree of Degradation:	
3. EROSION                              Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Location (indicate on site map): Areal Extent:                      Depth:	
4. UNDERCUTTING                  Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Location (indicate on site map): Areal Extent:                      Depth:	
5. OBSTRUCTIONS                      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Type: Location (indicate on site map): Areal Extent:                      Size:	
6. VEGETATIVE GROWTH              Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Type: Location (indicate on site map): Areal Extent:	Minor growth, mostly veg in eastern area
<b>COVER PENETRATIONS</b>	
1. GAS VENTS                              Active <input type="checkbox"/> <u>Passive</u> <input checked="" type="checkbox"/> Located:                                  Yes <input type="checkbox"/> No <input type="checkbox"/> Functioning:                              Yes <input type="checkbox"/> No <input type="checkbox"/> Condition:	No visible damage
2. GAS MONITORING PROBES          Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Located:                                  Yes <input type="checkbox"/> No <input type="checkbox"/> Functioning:                              Yes <input type="checkbox"/> No <input type="checkbox"/> Condition:	
3. MONITORING WELLS                  Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Located:                                  Yes <input type="checkbox"/> No <input type="checkbox"/> Functioning:                              Yes <input type="checkbox"/> No <input type="checkbox"/> Condition:	No visible damage



EPA RAC Contract # EP-S1-06-03

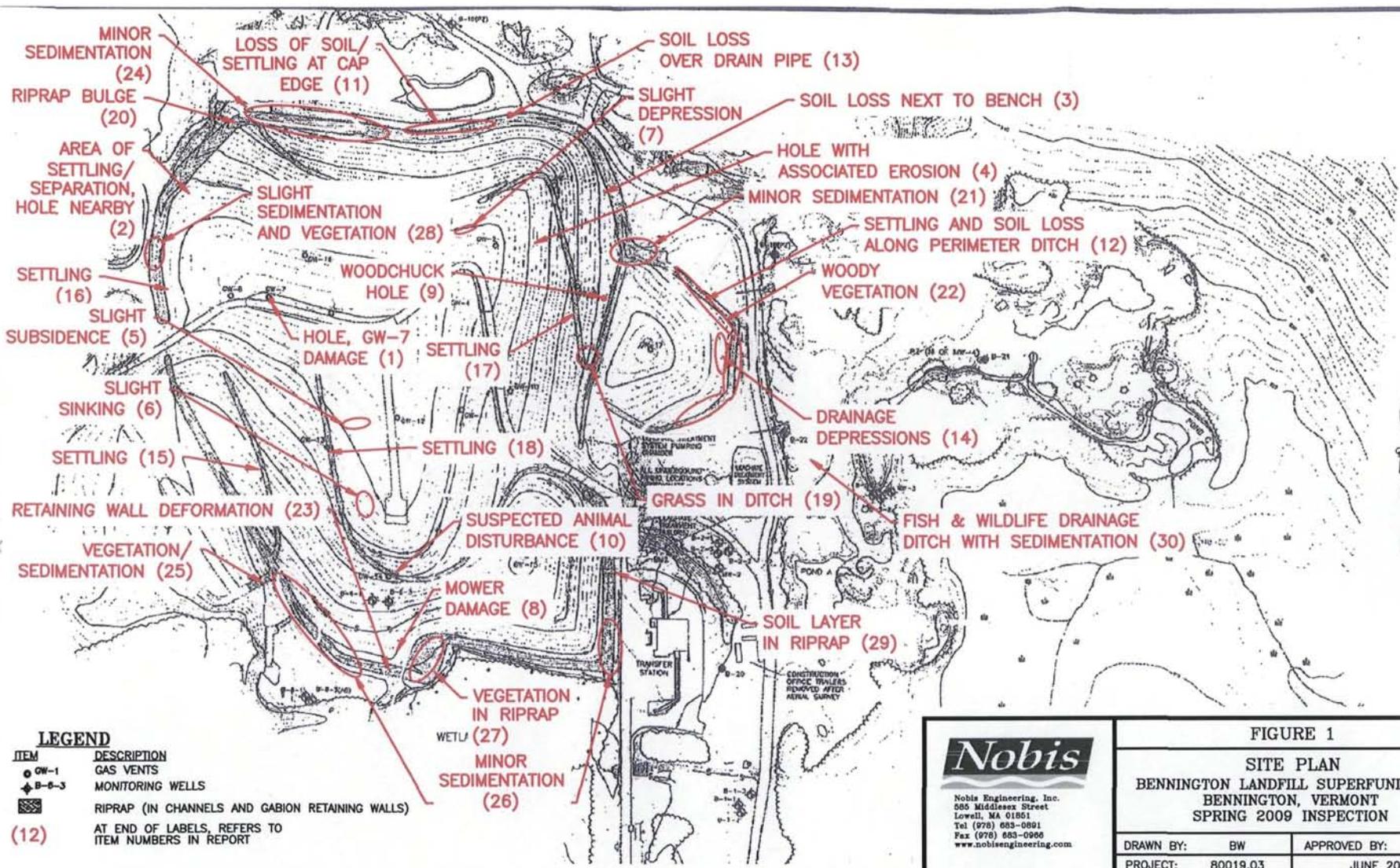
ITEM	REMARKS
<b>COVER DRAINAGE LAYER</b>	
1. OUTLET PIPES Functioning: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Condition: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Clean veg. at eastern outlet pipe
2. OUTLET ROCK Functioning: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Condition: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	good condition except for veg.
<b>RETAINING WALLS (End of UGIT)</b>	
1. DEFORMATIONS Location (indicate on site map): Horizontal Displacement: Vertical Displacement: Rotational Displacement:	Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/> unchanged from last inspection
2. DEGRADATION Location (indicate on site map): Description of Damage:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
<b>GROUNDWATER SYSTEMS</b>	
1. LEACHATE COLLECTION AND TREATMENT SYSTEM Functioning: Yes <input type="checkbox"/> No <input type="checkbox"/> - Influent wet well/pumps Yes <input type="checkbox"/> No <input type="checkbox"/> - Piping, flow meters, etc. Yes <input type="checkbox"/> No <input type="checkbox"/> - Particulate and carbon filters Yes <input type="checkbox"/> No <input type="checkbox"/> - Effluent wet well/pumps Yes <input type="checkbox"/> No <input type="checkbox"/> Routinely Monitored: Yes <input type="checkbox"/> No <input type="checkbox"/>	Not inspected
2. UPGRADIENT GROUNDWATER ISOLATION TRENCH Flowing: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Estimated discharge:	Little/no flow





EPA RAC Contract # EP-S1-06-03

<b>INTERVIEWS</b> (conduct interviews if the following are present during inspection)	
1. INTERVIEW WORKERS ON SITE Problems: Suggestions: <i>Attach Report</i>	N/A
2. INTERVIEW SITE NEIGHBORS Problems: Suggestions: <i>Attach Report</i>	
3. INTERVIEW LOCAL OFFICIALS Problems: Suggestions: <i>Attach Report</i>	
<b>REVIEW DOCUMENTS</b>	
1. GROUNDWATER MONITORING RECORDS Abnormalities:	N/A
2. LANDFILL CLOSURE PROGRESS REPORT Report Date: Abnormalities:	
3. OPERATION AND MAINTENANCE PLAN Is there a plan in place?      Yes <input type="checkbox"/> No <input type="checkbox"/> Is it being followed?        Yes <input type="checkbox"/> No <input type="checkbox"/> Is it adequate?                Yes <input type="checkbox"/> No <input type="checkbox"/>	



**LEGEND**

ITEM	DESCRIPTION
● GW-1	GAS VENTS
◆ B-5-3	MONITORING WELLS
▨	RIPRAP (IN CHANNELS AND GABION RETAINING WALLS)
(12)	AT END OF LABELS, REFERS TO ITEM NUMBERS IN REPORT

**Nobis**

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 260 Middlesex Street  
 Lowell, MA 01851  
 Tel (978) 683-0801  
 Fax (978) 683-0966  
 www.nobisengineering.com

FIGURE 1	
SITE PLAN BENNINGTON LANDFILL SUPERFUND SITE BENNINGTON, VERMONT SPRING 2009 INSPECTION	
DRAWN BY: BW	APPROVED BY: JCA
PROJECT: 80019.03	JUNE 2009

**Attachment 2**  
**Site Inspection Photographs**  
**May 8, 2009**



Photo 1 Panoramic view of the landfill surface looking south



Photo 2 Small hole at base of GW-7



Photo 3 Ground separation/settling (possible mower damage) near northwestern corner of landfill



Photo 4 Low spot adjacent to riprap bench, 20 feet northeast of area shown in Photo 3



Photo 5 Soil loss near northeastern corner of Site



Photo 6 Animal hole on northeastern face of landfill



Photo 7 Erosion associated with hole in Photo 5



Photo 8 Mower damage downslope from MW B-6-3



Photo 9 Woodchuck hole downslope from GW-3



Photo 10 Possible animal activity near GW-14



Photo 11 Soil loss/settling area along northern edge of cap



Photo 12 Possible riprap settling along northern edge of landfill



Photo 13 Settling along perimeter ditch, parallel to perimeter ditch near area shown in Photos 11 and 12



Photo 14 Settling and soil loss along perimeter ditch near northeast corner of landfill



Photo 15 Soil loss over drain along northern edge of landfill



Photo 16 Apparent riprap bulge adjacent to pipe outlet near northwest corner of landfill



Photo 17 Sedimentation near outlet pipe openings



Photo 18 Woody vegetation near eastern boundary of landfill



Photo 19 Gabion retaining wall at UGIT area



Photo 20 Soil deposits on riprap near LCTS Building



Photo 21 Drainage ditch to U.S. Fish & Wildlife area, contains sedimentation