Five Year Review Report
For
Burgess Brothers Superfund Site
Woodford and Bennington, Vermont

March 2005

Prepared By:

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Date:

3-31-05

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ATTACHMENTS

List of Acronyms

AWQC	Ambient Water Quality Criteria
ARAR	Applicable or Relevant and Appropriate Requirement
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminant of Concern
DOCP	Demonstration of Compliance Plan
EMP	Environmental Monitoring Plan
EPA	United States Environmental Protection Agency
CFR	Code of Federal Regulations
ICL	Interim Cleanup Level
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MNA	Monitored Natural Attenuation
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
PCB	Polychlorinated Biphenyl
PCE	Perchloroethene (Tetrachloroethene)
PCEM	Post Closure Environmental Monitoring
PL	Performance Level
PQL	Practical Quantitation Limit
PRP	Potentially Responsible Party
QAPP	Quality Assurance Project Plan
RA	Remedial Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study

ROD	Record of Decision
RP	Responsible Party
SARA	Superfund Amendment and Remediation Act
SOW	Statement of Work
SVE	Soil Vapor Extraction
TCE	Trichloroethene
TCL	Target Compound List
VtAEC	Vermont Agency of Environmental Conservation
VtDEC	Vermont Department of Environmental Conservation
VOC	Volatile Organic Compound

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EXECUTIVE SUMMARY

The purpose of this Five-Year Review is to determine whether the remedy implemented at the Burgess Brothers Superfund Site is protective of human health and the environment. The review was conducted in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act § 121, the National Contingency Plan, and the Comprehensive Five-Year Review Guidance (EPA, June 2001). Elements of the review included:

- A review of site background, land use, history of contamination, and response actions
- A site visit
- Review of remedy selection and implementation
- Communication with site representatives and local officials
- Review of changes to toxicity values and Applicable or Relevant and Appropriate Requirements
- Review of progress to date since the implementation of the selected remedy
- Review of long term response operations, maintenance, and monitoring data
- Technical assessment of the remedy
- Determination of Remedy Protectiveness

In 1998, the U.S. Environmental Protection Agency (EPA) issued a Record of Decision (ROD) that detailed the clean up plan for the Site. This plan included:

- Construction and maintenance of a multi-barrier, low permeability cap with drainage controls over the landfill area;
- Construction and maintenance of a cap over the Marshy Area;
- Installation of a landfill gas management system;
- Installation, operation, and maintenance/monitoring of an SVE/Air Sparge system in the area of the former lagoon cells, including off-gas treatment;

- Institutional controls such as access restrictions, deed restrictions, easements, and groundwater reclassification;
- Long-term monitoring of groundwater, surface water, and sediment;
- Modeling and evaluation of contaminant degradation rates and pathways to evaluate the effectiveness of natural attenuation

All of these actions were implemented as part of a Consent Decree between the USEPA and the PRP Group. The Site achieved construction completion on March 29, 2000.

The selected remedy, as prescribed in the ROD, identified the following cleanup goals:

Groundwater Target Compound List and Cleanup Levels

Volatile Organic Compounds	Interim Cleanup Level (µg/L)
Vinyl Chloride	2
Methylene Chloride	5
1,1-Dichloroethene	7
Cis-1,2-Dichloroethene	70
Trans-1,2-Dichloroethene	100
Chloroform	6
1,2-Dichloroethane	5
Trichloroethene	5
Benzene	5
Tetrachloroethene	5
Chlorobenzene	100
1,4-Dichlorobenzene	75

Semi-Volatile Organic Analyses	Interim Cleanup Level (µg/L)
Bis-2-ethylhexylphthalate	6

Inorganic Analyses	Interim Cleanup Level (µg/L)
Arsenic	50
Lead	15
Manganese	840
Thallium	2

Surface Water Target Compound List and Performance Level

Volatile Organic Compounds	Performance Level (ppb)
Vinyl Chloride	2
1,1-Dichloroethene	0.057
Trichloroethene	2.7
Bromodichloromethane	0.27
Tetrachloroethene	0.8
Inorganic Analyses	
Aluminum	87
Antimony	14
Arsenic	0.018
Cobalt	10
Copper	8
Iron	1000
Lead	1.5
Manganese	4100
Mercury	0.012
Nickel	108
Selenium	5
Silver	1.2
Thallium	1.7
Zinc	58.9
Cyanide	5.2

Sediment Target Compound List and Performance Level

Inorganic Analyses	Performance Level (mg/kg)
Arsenic	6
Cadmium	0.6
Chromium	26
Copper	16
Iron	20000
Lead	31
Manganese	460
Mercury	0.2
Nickel	16
Zinc	120

Groundwater modeling, completed at the time of the Feasibility Study and ROD, estimated the effects of natural attenuation by predicting trichloroethene (TCE) concentrations at various down gradient monitoring wells. This model, which was based on the assumption that the VOC source was completely removed, predicted that groundwater cleanup levels would be achieved seven years after source removal.

The removal of the source of VOC contamination was to be achieved by an SVE/air sparge system. It was predicted that the SVE/air sparge system would require 6 months to 2 years for complete source removal. While the operation of the SVE/air sparge system, now in its fourth year of operation, has been effective at removing a significant mass of VOC contamination, a source of VOC contamination remains. It has recently been determined that the operation of the air sparge component of the remedy no longer affects the amount of VOC mass removal. Because of this, the air sparge component of the remedy has been discontinued. The SVE system continues to operate, however, its effectiveness (i.e. the mass of VOCs removed over time) is expected to continue to decline.

Groundwater VOC concentrations in a monitoring well (W-08S1) located adjacent to the SVE/air sparge system have been greatly reduced, however, monitoring wells located further down gradient show little to no VOC reduction. In some wells, contaminant concentrations have actually increased and remain several orders of magnitude above cleanup levels. Current data available indicate that the groundwater plume has moved slightly down gradient from the source and deeper into a till layer. However, the plume appears to remain within the limits of institutional controls (groundwater reclassification area). Contaminant concentrations in bedrock groundwater wells are below ICLs.

All required institutional controls have been implemented which include restricting site access (signage, fence, and locked gate); groundwater reclassification with the State of Vermont (from a Class 3 (suitable for human consumption with minimal treatment) to a Class 4 (not potable)); and the recording of a Grant of Environmental Protection Easement and Declaration of Restrictive Covenants. The Easement and Declaration, which run with the land, prohibit the use of the groundwater as a drinking water supply and the land for residential purposes.

Based on the information gathered in support of this Five-Year Review, the remedy as implemented is currently protective of human health and the environment. However, VOCs remaining as a source in the lagoon area and the exceedences of groundwater cleanup goals in down gradient monitoring wells, indicate that the remedial action objectives of the ROD (EPA, 1998) have not been met and are not likely to be achieved in the near future. In addition, unless additional source control actions are implemented, it will likely be many years until the ROD cleanup goals are achieved.

In summary, based on the information gathered in support of this Five-Year Review, the following protectiveness statement is made:

- The remedy at the Burgess Brothers Site currently protects human health and the environment because exposure pathways for direct contact and groundwater ingestion have been addressed by landfill/marshy area caps and institutional controls, respectively. However, in order for the remedy to be protective in the long-term, the source control and groundwater remedies need to be re-evaluated. If necessary, modification to the remedies should be made.

Because the remedial action is currently protective, the Site is protective of human health and the environment. Recommendations for follow-up from this five year review include:

1. evaluating alternatives for either increasing the effectiveness of the SVE/air sparge system or addressing the VOC source through other treatment options,
2. evaluating groundwater contaminant levels and plume to ensure:
    a. contamination is not migrating vertically or laterally from known locations in sampled monitoring wells;
    b. the groundwater plume remains defined and that additional monitoring wells are not needed;
    c. the groundwater reclassification area is delineated appropriately;
    d. natural attenuation remains an appropriate treatment alternative, and;

e. the current groundwater model is revised to more accurately represent site conditions

Five-Year Review Summary Form

Site Identification
Site name: Burgess Brothers Superfund Site
EPA ID: VTD003965415
Region: 1 State: Vermont City/County: Woodford & Bennington/Bennington
Site Status
NPL Status: Final
Remediation Status: Construction complete with long-term operation, maintenance, and monitoring
Multiple Operable Units: No
Construction Completion Date: 12/14/2000
Has Site been put into reuse: No
Review Status
Lead Agency: EPA
Author Name: Ronald Jennings
Author Title: Remedial Project Manager Author Affiliation: EPA New England
Review Period: 8/15/04-3/28/05
Date of Site Inspection: 9/17/04
Type of Review: Post-SARA – statutory
Review Number: 1 (first)
Triggering Action: Construction Completion
Triggering Action Date (from WasteLAN): 3/29/2000
Due Date for Five Year Review (five years after action date): 3/29/2005

Five-Year Review Summary Form, cont'd.

Issues:

1. The SVE/air sparge system is no longer as effective as it once was in removing the VOC contamination in the lagoon area. However, the lagoon area does appear to be a continuing source of VOC contamination.

2. Groundwater contamination in down gradient monitoring wells remains well above interim cleanup levels and in some wells VOC concentrations are increasing. Based on available data, it does not appear that these concentrations will decrease in the foreseeable future.

Recommendations and Follow-Up Actions:

1. The effectiveness of the SVE/air sparge system must be reevaluated. Alternatives for either increasing its effectiveness or addressing the VOC source through other treatment options must be conducted

2. Groundwater contaminant levels and locations must be reevaluated to ensure contamination is not migrating vertically or laterally from known locations in sampled monitoring wells. An evaluation must be conducted to ensure that the groundwater plume remains defined and that additional monitoring wells are not needed. The groundwater reclassification area should be revaluated to ensure that the current delineation is appropriate. Because groundwater concentrations at many locations have not decreased as predicted, the potential for groundwater to be remediated through natural attenuation needs to be re-evaluated. Finally, a more detailed groundwater model capable of predicting contaminant concentrations in down gradient monitoring wells based on current site conditions is needed.

Protectiveness Statement:

Long-term protectiveness of the response actions will continue to be verified through periodic inspections and long-term monitoring of the Site groundwater, surface water, and sediments. Current data available indicate that the groundwater plume has moved slightly down gradient from the source and deeper into a till layer. However, the plume appears to remain within the limits of institutional controls (groundwater reclassification area). Additional sampling will be conducted within the next six months to confirm. Based on the information gathered in support of this Five-Year Review, the following protectiveness statement is made:

- The remedy at the Burgess Brothers Site currently protects human health and the environment because exposure pathways for direct contact and groundwater ingestion have been addressed by landfill/marshy area caps and institutional controls, respectively. However, in order for the remedy to be protective in the long-term, the source control and groundwater remedies need to be re-evaluated. If necessary, modification to the remedies should be made.

Because the remedial action is currently protective, the Site is protective of human health and the environment.

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1.0 INTRODUCTION

The purpose of a 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 reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERCLA § 121 and the National Contingency Plan. 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 the 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 Protection Agency (EPA), Region I, conducted this five-year review of the remedy implemented at the Burgess Brothers Superfund Site (Site), located in the Towns of Woodford and Bennington, Vermont. This review was conducted from August 2004 through March 2005. This report documents the results of the review.

This is the first five-year review for the Burgess Site. The triggering action for this statutory review is the initiation of the remedial action on March 29, 2000. The five year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

2.0 SITE CHRONOLOGY

Table 1 – Chronology of Site Events

Date	Event
1940s	Location of the Site was a sand and gravel operation
Early 1950s - 1976	Site was used as a metal salvage facility and disposal area for industrial waste, including solid, semi-solid and liquid wastes.
1967 to 1976	Portion of Site used for a liquid waste and sludge lagoon.
1976	Disposal operations ceased.
1976	VtAEC site inspection; collected surface waster and leachate samples
1984 – 1989	Preliminary environmental investigations and monitoring performed by VtDEC, EPA and Union Carbide Corporation.
1985	VtDEC conducted Preliminary Site Assessment.
1988	EPA proposed Site for listing on National Priorities List (NPL)
1989	EPA added site to NPL
1991	VtDEC sampled nearby private drinking water wells
1991	EPA entered into Administrative Order by Consent with PRPs to conduct an RI/FS. Initiated multi-phase Remedial Investigation (RI)
1994 – Present	Long-Term Groundwater Monitoring
1997	EPA completes Baseline Risk Assessment.
1997	Remedial Investigation completed
1998	Feasibility Study (FS) completed.
1998	EPA issued Record of Decision (ROD)
1999	EPA and PRPs entered into Consent Decree for Remedial Design/Remedial Action (RD/RA)
1999	Completed Remedial Design (RD); Start of onsite construction of remedy
1999	Completed Remedial Action (RA) construction.
2000	EPA approved Final Remedial Design Report
2000	Initiated Operation and Maintenance (O&M) of SVE/air sparge system
2000	EPA issued Preliminary Close Out Report (PCOR)
2001	EPA approved Final Remedial Action Construction Report
2001	EPA approved Post-Closure Operation and Maintenance Plan

3.0 BACKGROUND

3.1 Physical Characteristics

The Site is located in southern Vermont in the Towns of Woodford and Bennington, between Burgess Road and the Walloomsac Brook, as shown in Attachment 1. The latitude of the Site is 42 52’ 40” and the longitude is 73 09’ 00”. The Site is approximately a three-acre area located in the northeastern section of a 60-acre parcel owned by Clyde Burgess Jr. The landfill area of the Site occupied approximately 60,000 square feet (SF), which included two former lagoon cells

covering an area of approximately 4,000 SF. Access to the Site is through the Burgess Brothers Construction Company's facility on Burgess Road, approximately 1.1 miles southeast of the junction of Burgess Road and State Highway 9. The Green Mountain National Forest borders the Site to the north.

The site geology consists of an unconsolidated overburden comprised of a kame sand and ablation glacial till, underlain by a lodgement till, underlain by bedrock. Combined, the kame sand and ablation glacial till are up to 35 feet thick. The lodgement till, which separates the kame sand and ablation till from the bedrock, is approximately 35 to 90 feet thick. Bedrock consists of shallow weathered bedrock, deep weathered bedrock, and competent bedrock. The weathered bedrock consists of schist and gneiss; the competent bedrock consists of massive to thick bedded quartzite with frequent high-angle fractures.

The Site contains two groundwater systems. Shallow groundwater is found within the kame sand and ablation till and flows generally from the landfill to the south-southeast. Groundwater elevation data indicate generally upward gradients in the kame sand and ablation glacial till in the Marshy Area, with the water in the kame sand/ablation till discharging into an adjacent unnamed tributary stream. Significant hydraulic testing indicates that the kame sand and ablation till are of low permeability, low yield, and low saturated thickness. Groundwater within the bedrock flows towards the west-southwest, generally following the hill slope topography.

3.2 Land and Resource Use

The primary land use in the vicinity of the site is undeveloped forest. Burgess Brothers Construction Company uses the area immediately to the north for limited sand and gravel mining operations, the stockpiling of soil (for screening and resale), and for limited scrap metal storage.

Industrial, commercial, and residential properties are located along Burgess Road, approximately one mile southwest of the Site. Approximately ½ mile to the northwest is a residential development along Barney Road, which is connected to public water. Since completion of the Remedial Action, a combination residential dwelling and commercial building has been constructed approximately 1000 feet to the northwest of the landfill. This building is connected to the public water line on Barney Road.

Two municipal water supply systems, Ryder Spring and Morgan Spring, are located within one mile of the Site. These systems are operated by the Bennington Water Department. Two private drinking wells are located within one mile of the Site. Repeated sampling of the residential wells and springs during the Remedial Investigation (RI) and Supplemental RI (1990-1996) indicate no impact from the Site. Additional wells have been installed at the site, since completion of the RI and Supplemental RI, downgradient of the landfill that have been used to define the limits of the contaminant plume. Sample results from these downgradient wells have been used to confirm that the contaminant plume does not reach any of these public and private water supplies.

Several drainage swales flow down from the Hillside Area into the Marshy Area, then southwesterly into an unnamed stream. The unnamed stream flows southwesterly into Barney Brook, which empties into the Walloomsac River. Both Barney Brook and the Walloomsac River are classified by the State of Vermont as Class B waters, which are defined as waters of a quality that consistently exhibit good aesthetic value and provide high quality habitat for aquatic biota, fish and wildlife. The use of Class B waters are public water supply (with filtration and disinfection), irrigation and other agricultural uses, swimming, and recreation. During remediation, the drainage swales from the Hillside Area were diverted away from the landfill area, but still empty into the unnamed stream. The unnamed stream is routinely monitored and has shown minimal affect from the landfill, and only in that portion of the stream immediately downhill of the landfill. Barney Brook has been sampled and is unimpacted from the Site.

3.3 History of Contamination

Starting in the early 1950's the Site was used as a metal salvage facility and disposal area. Metals, sludges, rejected small appliance and military specialty batteries were also disposed at the Site. The two Lagoon Cells (unlined pits) received both liquid wastes and sludge from approximately 1967-1976. These wastes consisted of lead contaminated wastewater, spent solvents, and battery wastes. From 1971-1976, approximately 2,371,100 gallons of liquid waste (primarily TCE and PCE), and 241,090 pounds of solid or semi-solid wastes (primarily lead sludges) were reportedly disposed of at the Site. Site investigations and information provided by the former site operator indicate the landfill also received newspaper and building demolition debris.

The groundwater in the kame sand and ablation till has been impacted by the landfill, and most probably by the disposal of wastes into the former lagoon cells. 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 (barium and manganese) have been detected at elevated levels.

The VOC contamination in the groundwater in the kame sand and ablation till extends approximately 300 feet downgradient from the edge of the landfill. Sampling of existing groundwater monitoring wells appears to indicate that the limit of the VOC plume has not changed significantly since monitoring began in 1994. The limited downgradient extent of VOCs in the kame sand and ablation till is consistent with the low permeability of these geologic units.

Sampling of existing bedrock groundwater monitoring wells appears to indicate that the groundwater within the bedrock remains unaffected by the landfill.

Sediments in the Marshy area were impacted by landfill operations. Surface water in that portion of the unnamed stream that flows near the landfill continues to show low level impacts of VOCs, however, VOCs are not found further downstream.

3.4 Initial Response

In 1976, the Vermont Agency of Environmental Conservation (VtAEC, now Vermont Department of Environmental Conservation (VTDEC)) conducted a site inspection and collected samples of surface water and leachate from seeps in the landfill sideslopes. In 1984, VtAEC again sampled surface water and leachate, and also private drinking water supplies in the area. In 1985, VtAEC completed a Preliminary Assessment and Site Investigation.

In February 1989, at the request of VtDEC, EPA conducted a site inspection which included surface water sampling. Additional EPA sampling included conducted soil gas surveys, soil sampling in the former lagoon area, surface water sampling and sediment sampling in the Marshy Area. In March 1989, EPA placed the site on the NPL.

In 1989, Eveready Battery Company (now Energizer) installed wells and sampled groundwater, surface water, soil, and sediment. Due to the remote location of the Site, access by trespassers was not a recurrent problem and placing a fence around the Site was not deemed necessary. Burgess Brothers restricted access to the Site by requiring that all visitors sign in at their office as they entered or exited the property.

Early response actions also included the removal of all scrap metal from the landfill area and regrading the landfill and surrounding land to promote surface water drainage.

3.5 Basis for Taking Action

Contaminants: Hazardous substances that have been released at the site in each media include:

Groundwater	Surface Water	Sediments
Vinyl Chloride	Vinyl Chloride	Arsenic
Methylene Chloride	1,1-Dichloroethene	Cadmium
1,1-Dichloroethene	Trichloroethene	Chromium
Cis-1,2-Dichloroethene	Bromodichloromethane	Copper
Trans-1,2-Dichloroethene	Tetrachloroethene	Iron
Chloroform	Aluminum	Lead
1,2-Dichloroethane	Antimony	Manganese
Trichloroethene	Arsenic	Mercury
Benzene	Cobalt	Nickel
Tetrachloroethene	Copper	Zinc
Chlorobenzene	Iron	
Bis-2-ethylhexylphthalate	Lead	
Arsenic	Manganese	
Lead	Mercury	
Manganese	Nickel	
Thallium	Selenium	
	Silver	
	Thallium	
	Zinc	
	Cyanide	

Elevated levels of VOCs, semi-VOCs, and metals were found within the landfill and, specifically, within the former Lagoon Cells which are considered a "hot spot". Significantly elevated levels of VOCs, semi-VOCs, and metals were found within the soils and sediments in the Marshy Area. Elevated levels of VOCs were found in the overburden groundwater in the Landfill Area, Former Lagoon Cells, Marshy Area, and downgradient of the landfill.

Exposures to soil, groundwater, sediments, and surface water were associated with significant human health risks, due to exceedance of EPA's risk management criteria for either the average or reasonable maximum exposure scenarios. The greatest risks were determined to be from future ingestion of shallow groundwater at the Site. Vinyl chloride, tetrachlorethene, trichloroethene and 1,1-dichlorethene were some of the key contributors to future carcinogenic risk estimates. Trichloroethene, 1,2-dichloroethene, benzene, and tetrachlorethene were some of the key contributors to noncarcinogenic risk estimates.

4.0 REMEDIAL ACTIONS

4.1 Remedy Selection

The ROD for the Burgess Brothers Site was signed on September 25, 1998. Remedial Action Objectives (RAOs) were developed as a result of data collected during the Remedial Investigation to aid in the development and screening of remedial alternatives to be considered for the ROD. The RAOs for Burgess were as follows:

Landfill RA Objectives

- Prevent, to the extent practicable, the potential for water to contact or infiltrate through the debris mass and lagoon.

- Prevent, to the extent practicable, the generation of landfill seeps and the migration of landfill impacted surface water into the unnamed streams adjacent to the landfill (Marshy Area).

- 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 substances, pollutants, or contaminants; and meet state and federal air standards.

- Prevent, to the extent practicable, the migration of contaminated groundwater/leachate beyond the points of compliance by controlling the source of the contamination.

- Minimize the potential for slope failure of the debris mass associated with the landfill cap.

- Prevent, to the extent practicable, direct contact with and ingestion of soil/debris within the landfill and beneath the landfill.

- Control, to the extent practicable, surface water runoff to minimize erosion.

- Prevent, to the extent practicable, the migration of contamination from the lagoon area.

- Prevent, to the extent practicable, the saturation of the landfill debris mass from upgradient groundwater.

Groundwater RA Objectives

- Prevent, to the extent practicable, the ingestion of landfill impacted bedrock groundwater exceeding Maximum Contaminant Levels (MCLs), Vermont Primary Ground Water Quality Standards, or in their absence, the more stringent of an excess cancer risk of 1 x 10^{-6} for each compound or a hazard quotient of unity for each noncarcinogenic compound by any individual who may use the bedrock groundwater or within an area that the groundwater could become impacted as a result of pumping activities.

- Restore the bedrock groundwater at the edge of the Waste Management Unit (capped area of landfill/marshy area) to MCLs, Vermont Primary Ground Water Quality Standards, or in their absence, the more stringent of excess cancer risk of 1 x 10^{-6} for each compound or a hazard quotient of unity for each noncarcinogenic compound.

Surface Water RA Objectives

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

- Prevent, to the extent practicable, ecological impacts from contaminants in the Marshy Area.

- Meet federal and state Applicable Relevant and Appropriate Requirements (ARARs) for any surface water discharge.

Ecological RA Objectives

- Protect surface water, to the extent practicable, from exceedances of the Ambient Water Quality Criteria (AWQC) Acute and Chronic Standards.

- Protect sediments, to the extent practicable, from exceedances of the Aquatic Sediment Quality Guidelines of the Ontario Ministry of the Environment.

The major components of the remedy selected in the ROD included the following:

1. Construction and maintenance of a multi-barrier, low permeability cap with drainage controls over the landfill area;
2. Construction and maintenance of a cap over the Marshy Area;
3. Installation of a landfill gas management system;
4. Installation, operation and maintenance/monitoring of an SVE/Air Sparge system in the area of the former lagoon cells, including off-gas treatment;
5. Institutional controls such as access restrictions, deed restrictions, easements, groundwater reclassification;
6. Long-term monitoring of groundwater, surface water and sediment;
7. Modeling and evaluation of contaminant degradation rates and pathways to evaluate the effectiveness of natural attenuation.

4.2 Remedy Implementation

In May 1999, the EPA entered into a Consent Decree with three responsible parties for the Remedial Design (RD)/Remedial Action (RA) of the remedy selected by EPA. Prior to the execution of the Consent Decree, the PRPs had initiated the Remedial Design and, as a result, the RD was completed in June 1999. Construction activities were conducted at the Site between July 6 and October 28, 1999.

The RD and RA were conducted in conformance with the ROD. A Substantial Completion meeting was conducted on November 23, 1999 and the site achieved Construction Completion on March 29, 2000. The following describes the implementation of the major components of the remedy:

a. Landfill Cap Area

The top slope of the Landfill Area was graded to approximately three percent and the side slopes were graded at three horizontal to one vertical (3:1) or flatter. No side slope was graded more steeply than 3:1. Prior to any intrusive activity, erosion and sedimentation controls were implemented to protect the swales, unnamed stream, and wetlands adjacent to and south of the Landfill Area. These controls were inspected on a routine basis and maintained until soil stabilization was established. Grading of the Landfill Area took into account the adjacent swales, unnamed stream, and wetlands and minimized adverse effects to these areas. Landfill grading and capping led to the loss of approximately 0.64 acres of wetlands. (As required by the Consent Decree, the responsible parties resolved their liability for any natural resource damages associated with the loss of wetlands). The adjacent swales were re-routed through a conduit adjacent to the landfill and Marshy Area cap. A continuous multi-layer (or "composite barrier") cap was constructed over the Landfill Area. The cap was designed and constructed, and is being operated and maintained to meet the performance requirements of the Resource Conservation and Recovery Act ("RCRA") Subtitle C regulations.

b. Landfill Gas Management

Landfill gas within the gas collection layer of the landfill capping system is passively vented to the atmosphere through two gas vents located at the highest elevation of the landfill. Ambient air and gas vent monitoring was conducted prior to startup of the SVE/air sparge system on December 13, 2000. Ambient air monitoring was conducted at three locations (one upgradient and two downgradient), and, at the same time, the two passive gas vents within the landfill cap were also field screened and sampled.

Sampling results of the gas vents found VOC concentrations below Performance Levels by at least four orders of magnitude. Although Performance Levels are not applicable to ambient air, the sampling results of ambient air found VOC concentrations below the Performance Levels by at least six orders of magnitude.

c. Marshy Area Cap

The Marshy Area cap was constructed using a 24-inch thick permeable soil barrier, with the top 6-inches comprised of topsoil. The barrier design was based on factors such as constructability, maintenance, and ability to achieve RA objectives. The Marshy Area cap covers an area of approximately one-half acre. To promote positive drainage from the area, soils were shaped to achieve a minimum 3% grade toward drainage swales that were constructed as part of the multi-barrier cap over the Landfill Area.

d. SVE/Air Sparge System

The SVE/air sparge system was constructed to remediate soils in the Lagoon Area considered to be the source of groundwater contamination. The air sparging system was designed to be used in conjunction with the SVE system to remediate the saturated zone soils by forcing air into the groundwater beneath the lagoon area. This induced airflow accelerates the volatilization of VOCs in both the saturated and vadose zones, forcing them upwards towards air extraction wells. The SVE system removes VOCs from the vadose zone soils by drawing air through the extraction wells and producing a vacuum in the subsurface. VOCs contained within the vadose zone migrate toward the air extraction wells where they are removed for capture in granular activated carbon canisters. Any condensate collected from system operation is characterized and treated off-site, as appropriate.

e. Surface Water Management

Surface water drainage controls were constructed to minimize erosion of the cap and impacts to abutting wetlands. Drainage swales were installed on the top and perimeter of the Landfill Area to control runoff. The Landfill Area was also revegetated and is maintained to prevent erosion. Storm water runoff from the Landfill is managed in accordance with Vermont Water Quality

Standards. The drainage system of the cap is capable of handling a 100-year, 24-hour storm event.

f. Institutional Controls

Institutional controls were established to:

1. Protect the capped areas;
2. Prevent the use of groundwater potentially impacted by the Site, and,
3. Inform future purchasers of the restrictions associated with the property.

Institutional controls restricting access consist of appropriate signage, fencing, and a secured gate. In addition, a Grant of Environmental Protection Easement and Declaration of Restrictive Covenants as well as groundwater reclassification have been implemented to limit future use of the site.

A Grant of Environmental Protection Easement and Declaration of Restrictive Covenants was executed between Clyde Burgess (site owner) and the Secretary of the Agency of Natural Resources for the State of Vermont (recorded in Woodford land records on March 5, 2005 in Book 39, pages 63-74 and in Bennington land records on February 23, 2005 in Book 418 page 71). This Easement and Declaration, which runs with the land, prohibits the use of the groundwater as a drinking water supply and the use of the land for residential purposes.

The groundwater beneath and immediately around the landfill has been reclassified by the state from Class III (suitable for human consumption with minimal treatment) to Class IV (not potable). This was accomplished through a petition submitted by the VtDEC, at the request of the PRPs, to the Secretary of the Agency of Natural Resources of the State of Vermont. This request was approved on November 6, 2003. The Reclassification prohibits the Site groundwater from use as a domestic water supply and from irrigation, agricultural, and general industrial and commercial uses.

This reclassification is to serve as an interim control to remain in effect while the selected remedy is proceeding and shall remain in effect until the cleanup and performance levels are attained.

4.3 System Operation and Maintenance/Environmental Monitoring

The operation, maintenance, and environmental monitoring activities for the Site are being implemented by the PRPs in accordance with the long term operation and maintenance plan approved by EPA on April 12, 2001. Post-Closure Environmental Monitoring (PCEM) is being performed at the site to monitor air, groundwater, surface water, and sediment for documentation of compliance. PCEM is also performed to monitor effectiveness of remedial actions, including capping of the landfill and operation of the SVE/Air Sparge System. Sampling is conducted in accordance with the Environmental Monitoring Plan (EMP) and the Quality Assurance Project Plan (QAPP).

The results of each environmental monitoring event are provided to EPA and VtDEC in Operations and Maintenance Progress Reports. For the first two years, O&M Progress Reports were submitted to EPA and VtDEC on a quarterly basis. In 2002, the O&M Progress reports have been submitted on an annual basis.

The primary activities associated with the O&M include the following:

- Visual inspection of the caps with regard to access restrictions (fence & gate), vegetative cover, settlement, stability, and any need for corrective action. In addition, the cap is scheduled to be mowed semi-annually;

- Inspection of the drainage swales for blockage, erosion and instability, and any need for corrective actions;

- Inspection of the condition of groundwater monitoring wells;

- Environmental monitoring: semi-annual monitoring is conducted for most shallow (sand) wells, annual monitoring is conducted for ablation glacial till wells, surface water, and sediment, and bi-annual monitoring is conducted for all bedrock groundwater wells;

- Operation and maintenance of the SVE/air sparge system

The major cleanup activities of the Burgess Brothers Site occurred during the construction phase of the Remedial Action (capping of the landfill and marshy area). The remaining components of the remedy are the operation of the SVE/air sparge system to address source control and monitoring the natural attenuation of the groundwater. Because of this, as indicated in the planned O&M activities listed above, the primary O&M activities are geared towards the operation of the SVE/air sparge system, monitoring of groundwater, surface water, and sediments, inspections, and monitoring of the caps.

O&M costs include cap and drainage structure maintenance, operation and maintenance of the SVE/air sparge system, environmental sampling and monitoring, monitoring well maintenance, and reporting. A significant reduction in O&M costs from 2001 to 2002 was realized which was associated with the carbon treatment of the off-gas from the SVE/air sparge system. The reason for this cost reduction is that the concentrations of VOCs in the SVE/air sparge air influent from the Former Lagoon Area declined significantly in 2002. Costs associated with carbon consumption continue to decline as the concentrations of VOCs in the air influent decline.

Annual costs associated with the O&M of the remedy are shown below in Table 2 (these costs are exclusive of EPA oversight costs).

Table 2 – Annual System Operation/O&M Costs

Dates		Total Cost rounded to nearest $1000
From	**To**	
Jan 2001	Dec 2001	$ 749,000
Jan 2002	Dec 2002	$ 377,000
Jan 2003	Dec 2003	$ 305,000
Jan 2004	Dec 2004	$ 280,000

5.0 PROGRESS SINCE LAST REVIEW

This was the first five year review.

6.0 FIVE-YEAR REVIEW PROCESS

6.1 Administrative Components

EPA, the lead agency for this five-year review, notified VTDEC and the PRPs in early 2004 that the five-year review would be completed. The Five-Year Review Team was led by Ron Jennings of EPA, Remedial Project Manger for the Site, and included regional technical advisory staff with expertise in community relations, hydrology, risk assessment, and legal matters. Gerold Noyes, Environmental Engineer for VtDEC, was also part of the review team.

From August 15, 2004 to March 31, 2005, the review team established the review schedule whose components included:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection;
- Communication with Site Representatives and Local Officials; and
- Five-Year Review Report Development and Review.

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6.2 Community Involvement

There has been virtually no public interest in the Burgess Site from the very beginning of the remedial process. Over the years there have been various efforts to inform the public of site

activities such as mailing of fact sheets, public notices in local newspapers, and door to door visits/interviews of nearby neighbors. None of these efforts have resulted in any public interest.

On March 15, 2005, Ron Jennings, the EPA Project Manager, telephoned Mr. Stuart Hurd, the town manager for both Woodford and Bennington, to discuss the five-year review. Mr. Hurd was not available, but Mr. William Colvin, who was acting on Mr. Hurd's behalf, was briefed on the purpose of the Five-Year Report. Mr. Colvin confirmed that, to the best of his knowledge, there continues to be no local interest in the Site.

As part of the notification process, EPA will publish a notice in local newspapers stating that this five year review report on the Burgess site is available for public review in the site information repository at the Bennington Public library.

6.3 Document Review

This five-year review consisted of a review of relevant documents including O&M records and monitoring data (see Attachment 3). Applicable groundwater cleanup standards, as listed in the 1998 Record of Decision, were also reviewed (See Attachment 4).

6.4 Data Review

Environmental monitoring data that was reviewed included the following: semi-annual data from most shallow (sand) wells, annual data from ablation glacial till wells, surface water, and sediment, and bi-annual data from all bedrock groundwater wells. Ambient air monitoring was performed only during 2000 prior to the startup of the SVE/air sparge system.

The following is a summary of findings for each media.

Groundwater: Conceptual Hydrogeologic Model

The groundwater monitoring program is oriented toward three zones that correspond with the general site geology that exists at the Site: 1) kame sand underlain by 2) ablation glacial till and 3) dense lodgemont till and bedrock. Combined, the kame sand and ablation glacial till represent the shallow overburden aquifer and are up to 35 feet thick. In the vicinity of the landfill the two layers each have an average thickness of approximately 15 feet. South of the landfill and toward the Unnamed Stream the kame sand thins out and then disappears, leaving only the ablation till overlying the bedrock.

The boundary between the two units is transitional. The kame sand is more sand rich than the ablation till, which is more poorly sorted and contains more silt and gravel. The hydraulic conductivity of the kame sand and ablation till are similar, although the till is slightly lower. The lodgemont till separates the shallow groundwater from the bedrock aquifer and is dense and of low permeability. It is a confining layer, separating these two groundwater zones and appears to serve as a vertical barrier for contaminant migration at the Site.

Groundwater flows from the north towards the south/southwest and discharges into the Unnamed Stream. The Unnamed Stream appears to serve as a natural hydraulic barrier to downgradient migration of contamination in shallow groundwater.

Groundwater: Modeling

Groundwater modeling, completed at the time of the Feasibility Study and ROD, estimated the effects of natural attenuation by predicting trichloroethene (TCE) concentrations at various down gradient monitoring wells. This model, which was based on the assumption that the VOC source was completely removed, predicted that groundwater cleanup levels would be achieved seven years after source removal.

The removal of the source of VOC contamination was to be achieved by an SVE/air sparge system. It was predicted that the SVE/air sparge system would require 6 months to 2 years for complete source removal. While the operation of the SVE/air sparge system, now in its fourth year of operation, has been effective at removing a significant mass of VOC contamination, a source of VOC contamination remains.

Because the VOC source is still present, the current model cannot accurately predict groundwater. Future contaminant levels and the expected timeframe for meeting the ICLs specified in the ROD are unknown. A groundwater model capable of representing actual site conditions is needed.

Groundwater: Monitoring Program

Groundwater monitoring has been conducted at the Burgess Brothers Site since the late 1980's. Since the initiation of long term monitoring, monitoring has been performed by sampling wells screened in the kame sand, ablation till, and bedrock zones. During this five-year review period samples were collected from 25 monitoring wells to monitor the potential horizontal and vertical migration of site-related contaminants. Samples were collected on either a semi-annual, annual, or bi-annual basis and analyzed for constituents with Interim Cleanup Levels (ICLs), as defined in the ROD.

The evaluation of the natural attenuation process at a site is to be achieved by evaluating four indicators that are recommended in the *Use of Monitored Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites* (OSWER Directive No. 9200.4-17P, April 21, 1999) for evaluating performance on a monitored natural attenuation (MNA) remedy. The four indicators are:

- Demonstrate that natural attenuation is occurring according to expectations;
- Detect changes in environmental conditions that may reduce the efficacy of the natural attenuation processes;
- Identify any potentially toxic or mobile transformation products; and
- Verify that the plume is not expanding either down gradient, laterally, or vertically.

MNA parameters were evaluated during the RI/FS, however, no further monitoring has been conducted. Based on current shallow groundwater concentrations, additional MNA monitoring and a re-evaluation of the natural attenuation remedy appears to be warranted.

Groundwater: Contaminant Trends

The ROD anticipated that after the RA was complete, contaminant levels in groundwater would steadily decline and achieve the Interim Cleanup Levels (ICLs) within seven years after source removal. This conclusion was based on transport modeling conducted as part of the Feasibility Study and re-evaluated in a Year 2 Remedy Evaluation Report that computed TCE concentrations at selected compliance boundary wells.

The maximum concentrations of contaminants of concern in groundwater found during either the RI, the Supplemental RI, or from groundwater data obtained in April 2004 are summarized in Tables 3, 4, and 5 for the kame sand, ablation till, and bedrock monitoring wells, respectively.

VOCs

Groundwater contaminant concentrations in the kame sand and ablation till continue to have concentrations several orders of magnitude above ICLs. While some contaminants appear to have decreasing trends, other contaminant concentrations are increasing. Most notably are increasing concentrations of 1,2-dichloroethene, trichloroethene, and tetrachloroethene in the ablation till which may be indicative of vertical migration from the kame sand layer above. In addition, a slight down gradient movement of the groundwater plume appears to be occurring towards the marshy area (W-04 & W-06) and beyond the W-09 well cluster. However, the plume appears to remain within the limits of institutional controls (groundwater reclassification area). Contaminant concentrations in bedrock groundwater wells are below ICLs.

VOC concentrations are below ICLs in all wells closest to and along the Groundwater Reclassification Boundary. The Marshy Area and the West of the Landfill Area have VOC concentrations above ICLs, with the highest concentrations being in the Marshy Area.

The concentrations of VOCs near the SVE/air sparge system (as detected at W-08S1) have been steadily decreasing since the first sampling event in spring 2001, which coincides with the startup of the SVE/air sparge system.

An increase in VOCs has been observed in wells downgradient of the Former Lagoons. At W-09TD, screened in the ablation till, concentrations of TCE have increased from 110 ppb in Fall 1999 to 560 ppb in April 2004, and PCE concentrations have increased from 43 ppb to 520 ppb over the same period. The same trend has occurred in the W-04D, W-04T and W-06D wells, as summarized in Table 6 below.

Table 3. Kame Sand: Contaminants of Concern – Interim Cleanup Level, Maximum Concentration in RI and Supplemental RI and ICL Exceedances in Spring 2004 Sampling Data (a).

Contaminant of Concern	Interim Cleanup Level	RI/Supplemental RI Maximum Kame Sand Wells	April/October 2004 Kame Sand Wells
Volatile Organic Compounds (ug/l)			
Vinyl Chloride	2	2,300	2,700
Methylene Chloride	5	22	ND
1,1-Dichloroethene	7	620	ND
1,2-Dichloroethene	70/100 (b)	22,000	11,000
Chloroform	6	ND	ND
1,2-Dichloroethane	5	25	ND
Trichloroethene	5	40,000	9,800
Benzene	5	550	ND
Tetrachloroethene	5	21,000	31,000
Chlorobenzene	100	580	ND
Metals (ug/l) (c)			
Arsenic	50	20.6/ND	ND
Lead	15	130/ND	91/ND
Manganese	840	8,860	4,980/958
Thallium	2	6.4	24.4/ND

Notes:

a. Data includes VOC sampling results from both the RI and Supplemental RI. Metal sampling results are only from the Supplemental RI data (because Supplemental RI metals samples were collected using low flow purge and sample techniques, as were the samples collected in 2004).

b. ICL is 70 for cis-1,2-dichloroethene and 100 for trans-1,2-dichloroethene

c. Results reported as total metals/filtered metals results. If only one value is reported then the value listed is for total metals.

ND = Not Detected (Method Detection Limits are10 ppb for all constituents, except lead which is 3 ppb)

Table 4. Ablation Till: Contaminants of Concern – Interim Cleanup Level, Maximum Concentration in RI and Supplemental RI and ICL Exceedances in Spring 2004 Sampling Data (a).

Contaminant of Concern	Interim Cleanup Level	RI and Supplemental RI Maximum Ablation Till Wells	April 2004 Ablation Till Wells
Volatile Organic Compounds (ug/l)			
Vinyl Chloride	2	190	370
Methylene Chloride	5	150	ND
1,1-Dichloroethene	7	ND	ND
1,2-Dichloroethene	70/100 (b)	950	7,600
Chloroform	6	ND	ND
1,2-Dichloroethane	5	21	ND
Trichloroethene	5	9,000	18,000
Benzene	5	ND	ND
Tetrachloroethene	5	81	25,000
Chlorobenzene	100	ND	ND
Metals (ug/l) (c)			
Arsenic	50	23.5	ND
Lead	15	221	ND
Manganese	840	18,000	1,900/845
Thallium	2	12.3	ND

Notes:

a. Data includes VOC sampling results from both the RI and Supplemental RI. Metal sampling results are only from the Supplemental RI data (because Supplemental RI metals samples were collected using low flow purge and sample techniques, as were the samples collected in 2004).

b. ICL is 70 for cis-1,2-dichloroethene and 100 for trans-1,2-dichloroethene

c. Results reported as total metals/filtered metals results. If only one value is reported then the value listed is for total metals

ND = Not Detected (Method Detection Limits are10 ppb for all constituents, except lead which is 3 ppb)

Table 5. Bedrock Wells: Contaminants of Concern – Interim Cleanup Level, Maximum Concentration in RI and Supplemental RI and ICL Exceedances in Spring 2004 Sampling Data (a).

Contaminant of Concern	Interim Cleanup Level	RI and Supplemental RI Maximum Bedrock Wells	April 2004 Bedrock Wells
Volatile Organic Compounds (ug/l)			
Vinyl Chloride	2	ND	ND
Methylene Chloride	5	ND	ND
1,1-Dichloroethene	7	ND	ND
1,2-Dichloroethene	70/100 (b)	3.3	ND
Chloroform	6	ND	ND
1,2-Dichloroethane	5	ND	ND
Trichloroethene	5	69	2.0
Benzene	5	ND	ND
Tetrachloroethene	5	100	3.0
Chlorobenzene	100	ND	ND
Metals (ug/l) (c)			
Arsenic	50	ND	ND
Lead	15	26.6	354/ND
Manganese	840	407/29.9	ND
Thallium	2	7.6	5.9/ND

Notes:

a. Data includes VOC sampling results from both the RI and Supplemental RI. Metal sampling results are only from the Supplemental RI data (because Supplemental RI metals samples were collected using low flow purge and sample techniques, as were the samples collected in 2004).

b. ICL is 70 for cis-1,2-dichloroethene and 100 for trans-1,2-dichloroethene

c. Results reported as total metals/filtered metals results. If only one value is reported then the value listed is for total metals

ND = Not Detected (Method Detection Limits are10 ppb for all constituents, except lead which is 3 ppb)

Table 6 – VOC Concentrations in Selected Down Gradient Wells
Fall 1999 - Fall 2004

Location / Compound	ICL	Fall 1999	Spring 2001	Fall 2001	Spring 2002	Fall 2002	Spring 2003	Fall 2003	Spring 2004	Fall 2004
W-04D										
VC	2	BDL	BDL		BDL		BDL		BDL	BDL
TCE	5	3400	1600		10000		1000		9800	6700
PCE	5	1600	950		12000		37000 / 12000*		27000	31000
W-04T										
VC	2	48	180	65	160	560	270	480	370	
TCE	5	2100	2200	5200	7000	12000	13000	22000	18000	
PCE	5	680	370	3400	6700	13000	12000	26000	24000	
W-06D										
1,2-DCE **	70 / 100	BDL	2600	1200	1000		4300		6600	
TCE	5	1 J	220	150	210		1600		5000	
PCE	5	BDL	120	78	160		1300		7100	
W-09TD										
1,2-DCE **	70 / 100	2	2		16		25		61	
TCE	5	110	61		320		460		560	
PCE	5	43	25		180		330		520	

* Values shown are Sample/Duplicate Sample
** Vinyl Chloride at W-06D is below method detection limits for all sampling events; therefore, this table shows the concentrations of 1,2-DCE.
ND: Not Detected above Method Detection Limits (10 ppb for VOCs)

- An increase in VOCs is not observed at W-03 and W-25S1, which are located approximately 60 feet east and 80 feet west of the W-04 well cluster, respectively. Concentrations of VOCs at these locations have remained consistent with historical data.

- VOCs were not detected above method detection limits in the Spring 2004 sampling event at either wells located on the east side of the Unnamed Stream and coincident with the Groundwater Reclassification Boundary (W-28T and W-29T) or in the most downgradient well (W-30T).

Metals

The April 2004 analytical results on the metals plume have been generally consistent with historical data from the past 10 years. The areas where levels of metals are above ICLs are located either upgradient of the landfill (P-06 & W-01 (thallium)), in the Marshy Area (W-03 & W-04D (arsenic, lead, manganese, & thallium)), or along the western edge of the landfill (W-25S1 (thallium)). With the exception of W-01, which is considered to be background, all of the locations with metal concentrations above ICLs are within the groundwater reclassification area.

Metals concentrations are the highest in the kame sand, with generally similar but lower concentrations in the ablation till. The bedrock groundwater had the lowest concentrations of metals. All filtered groundwater samples had non-detect concentrations of metals with the exception of manganese.

Surface Water

Surface water monitoring data were evaluated as part of the five-year review process to determine compliance with performance levels defined in the ROD. Six surface water locations have been sampled at the following locations: upstream of the landfill (1 sample), the landfill toe of slope swale where it discharges from the Marshy Area (1 sample), the Unnamed Stream (2 samples), and Barney Brook (2 samples).

Surface water samples are analyzed for VOCs, total metals, cyanide, and hardness. The initial surface water sampling event was performed prior to completion of the landfill cap, and a second round of surface water sampling was performed after substantial completion of the landfill cap and prior to startup of the SVE/air sparge system. Subsequent to these two sampling events, surface water has been sampled annually as part of the spring sampling round.

The maximum concentrations of contaminants of concern in surface water found during the RI and the most current set of surface water data obtained in April 2004 are summarized below in Table 7.

Table 7. Surface Water Contaminants of Concern – Performance Level, RI Maximum Concentration and PL Exceedances in Spring 2004 Sampling Data (a).

Contaminant of Concern	Performance Level	RI Maximum	PL Exceedances April 2004
Volatile Organic Compounds (ug/l)			
1,1-Dichloroethene	0.057	8	-
Dichlorobromomethane	0.27	10	-
Tetrachloroethene	0.80	920	10 (b)
Trichloroethene	2.70	97	33 (b)
Metals (ug/l)			
Aluminum	87	1280	132 (c)
Antimony	14	60	-
Arsenic	0.018	10	3.1 (d)
Cobalt	10	5.8	-
Copper	8	12.2	-
Cyanide	5.2	6	-
Iron	1000	593,000	-
Lead	1.5	7.5	-
Manganese	4100	223,800	-
Mercury	0.012	0.22	-
Nickel	108	587	-
Selenium	5	4.1	-
Silver	1.2	12	-
Thallium	1.7	97.6(e)	-
Zinc	58.9	62.7	-

Notes:

a. Table 33 of RI Report.
b. Toe of slope swale (SW-18)
c. Aluminum PL exceeded at background sample location (SW-08: 94.3 ppb), Unnamed Stream (SW-15: 132 ppb, SW-04: 97.4 ppb) and the upstream sample at Barney Brook (SW-06: 99.2 ppb).
d. Arsenic PL exceeded in background sample location (SW-08: 3.1 ppb) and Toe of Slope Swale (2.9 ppb).
e. Detection from Fall 1994 sampling event, referenced in Supplemental RI as being anomalously high.
f. "-" indicates result was less than the Performance Level.

Results of the 2004 spring sampling event found that VOCs are only present in surface water at the toe-of-slope swale location (SW-18). The presence of VOCs at this location is an expected consequence of the landfill capping system being constructed. VOCs were not detected downstream in sampling locations in the Unnamed Stream or in Barney Brook.

Metals in surface water at concentrations greater than the PL were detected in the upgradient sample (aluminum and arsenic at SW-08). These compounds were also detected down gradient of the landfill in the Unnamed Stream and the upstream sample of Barney Brook at levels consistent with background.

Sediment

Sediment monitoring data were evaluated as part of the five-year review process to determine compliance with performance levels defined in the ROD. Sediment sampling has been performed annually during the spring sampling events since 2001. The analytical results demonstrate that metals in sediments are below the Performance Levels at all sampled locations. This is consistent with historical data and expected as a result of the remedial action.

Table 8. Sediment Contaminants of Concern – Performance Level, RI Maximum Concentration and PL Exceedances in Spring 2004 Sampling Data (a).

Contaminant of Concern	Performance Level (ppm)	RI Maximum (ppm)	PL Exceedances April 2004
Aluminum	6	11,900	-
Cadmium	0.6	1.6	-
Chromium	26	28.7	-
Copper	16	21.3	-
Iron	20000	78,900	-
Lead	31	70.3	-
Manganese	460	4090	-
Mercury	0.2	0.45	-
Nickel	16	59.8	-
Zinc	120	176	-

Notes:

a. Table 31 of RI Report.

b. "-" indicates result was less than the Performance Level.

Ambient Air Monitoring

In accordance with the requirements of the Demonstration of Compliance Plan (DOCP), air monitoring of ambient air and the passive gas vents was conducted to demonstrate that air emissions from the passive gas vents were below the Performance Levels (PL) for the Site. Ambient air monitoring was conducted in April/May 2000 and in December 2000. The December 2000 sampling round serves as the initial sampling event under the DOCP because the samples were collected immediately prior to SVE/air sparge system startup.

VOCs, methane and carbon dioxide were not detected at any of the ambient air or passive gas vent sample locations for both the April 2000 and December 2000 sampling events. The oxygen levels ranged from 20.4-20.5% for both sampling events.

The air emissions from the passive gas vents are within PLs defined in the EMP and QAPP.

6.5 Site Inspection

A site inspection was conducted on September 17, 2004 by EPA and VtDEC. The purpose of the inspection was to assess the protectiveness of the remedy, including the presence of fencing to restrict access, the integrity of the cap, the performance of the surface water drainage control structures, and the maintenance of the SVE/air sparge system. Accompanying EPA and VtDEC were representatives for the PRPs.

No significant issues were identified at any time regarding the cap, the drainage structures or the fence. Examination of the cap revealed no presence of erosion or animal borrows.

Quarterly, annual and periodic inspections of the Site have been conducted by the PRPs, EPA, and Vermont ANR since 1999. There have been no major issues regarding the operation and maintenance of the landfill remedial system. Operations, maintenance, and monitoring have adequately established the landfill cap integrity, site access restrictions, and O&M of the SVE/air sparge system.

6.6 Interviews

Interviews were conducted concurrent with the September 17, 2004 Site inspection. Geoffrey Seibel of *de maximis* (the PRP Group Technical Coordinator) and Mr. Mark White and Ms. Ann Marie Petricca of Environmental Partners (O&M contractor for the PRPs) were present during the inspection to answer questions and voice concerns. No issues other the SVE/air sparge system performance and groundwater contaminant concentrations were identified.

On March 15, 2005, Bill Colvin of the town managers office for both Woodford and Bennington, was contacted and briefed on the purpose of the Five-Year Report, its development, findings, and proposed recommendations. No issues were identified.

On March 16, 2005, Penny Burgess, a representative of the Burgess Brothers Construction Company, where the Site is located, was contacted. The operation and maintenance of the site was discussed. No issues were identified.

7.0 TECHNICAL ASSESSMENT

Question A: Is the Remedy Functioning as Intended by the Decision Documents?

The review of documents, ARARs, risk assumptions, and the results of the site inspections indicates that the remedy is functioning as intended by the ROD. There are, however, limitations in the effectiveness of several components of the remedy as discussed below.

The major components of the remedy include:

- placement of caps over the Landfill and Marshy Area;
- installation and operation of a Soil Vapor Extraction (SVE)/air sparge system;
- long term monitoring to determine the effectiveness of natural attenuation: and
- institutional controls.

The remedial objectives of the Landfill and Marshy Area caps have been achieved by preventing direct exposure to waste and contaminated soils and controlling gas emissions. There is no indication that the cap is leaking, therefore the remedial objective of reducing or eliminating the generation of landfill leachate has also been met. The capping system is extremely stable and maintenance free (with the exception of grass mowing), with no areas of erosion or settlement.

The SVE/air sparge system has been in operation since December 2000. It has recently been determined that the operation of the air sparge component of the remedy no longer affects VOC mass removal and has been discontinued. The SVE system continues to operate, however, its effectiveness (i.e. the mass of VOCs removed over time) is expected to continue to decline. The system has been in pulse mode for the last two years as influent VOC concentrations and removal rates have progressively declined. Since January 2004, however, the influent concentrations have remained relative constant at approximately 225 ppm, confirming the presence of a continued VOC source.

Groundwater contaminant concentrations in down gradient kame sand and ablation till wells continue to have concentrations several orders of magnitude above ICLs. While some contaminants appear to have decreasing trends, other contaminant concentrations are increasing. Most notable are increasing concentrations of 1,2-dichloroethene, trichloroethene, and tetrachloroethene in the ablation till which may be indicative of vertical migration from the kame sand layer above. Current data available indicate that the groundwater plume has moved slightly down gradient from the source and deeper into the till layer. However, the plume appears to remain within the limits of institutional controls (groundwater reclassification area). Contaminant concentrations in bedrock groundwater wells are below ICLs.

Ongoing monitoring of environmental conditions that may affect the efficacy of the MNA remedy has not been conducted. Based on current shallow groundwater concentrations, additional monitoring of MNA parameters and a re-evaluation of the natural attenuation remedy appears to be warranted.

All institutional controls as required by the ROD have been implemented. Site access is restricted with appropriate signage, fencing, and a secured gate. A Grant of Environmental Protection Easement and Declaration of Restrictive Covenants was executed between Clyde Burgess (site owner) and the Secretary of the Agency of Natural Resources for the State of Vermont (recorded in Woodford land records on March 5, 2005 Book 39, pages 63-74 and in Bennington land records on February 23, 2005 in Book 418 page 71). This Easement and

Declaration, which runs with the land, prohibits the use of the groundwater as a drinking water supply and the use of the land for residential purposes.

The groundwater beneath and immediately around the landfill has been reclassified by the state from Class III to Class IV. This was accomplished through a petition submitted by the VtDEC, at the request of PRPs, to the Secretary of the Agency of Natural Resources of the State of Vermont. This request was approved on November 6, 2003. The Reclassification prohibits the Site groundwater from use as a domestic water supply and from irrigation, agricultural, and general industrial and commercial uses.

Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of the Remedy Selection Still Valid?

Other than an apparent slight down gradient movement of the groundwater plume, there have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes in ARARs Standards and To Be Considereds (TBCs)

Since the signing of the ROD in 1998, there have been changes in reference doses and reference concentrations for benzene, trichloroethene, and vinyl chloride. These changes will result in increased noncarcinogenic risks in the future groundwater use pathway. There have also been changes in cancer toxicity values for arsenic, vinyl chloride, and trichloroethene. The changes in cancer toxicity values for arsenic and vinyl chloride will result in a reduction of carcinogenic risks, while the change in trichloroethene will increase carcinogenic risks. The differences between the historical and current toxicity values, however, are considered minimal and would cause minimal impact on the overall results of the risk assessment. Further, the MCLs for these chemicals have not changed so there would be no effect on the remedy's protectiveness at the site.

It should be noted that the Maximum Concentration Level (MCL) for arsenic in groundwater was changed (from 50 ppb to 10 ppb) as a result of an amendment to the Safe Drinking Water Act in 1996. This amendment required EPA to review drinking water standards for arsenic and propose a new MCL by a certain date. The proposed MCL was 10 ppb. After some delay and further review, EPA affirmed the 10 ppb standard for arsenic in drinking water and the arsenic drinking water rule became effective on February 22, 2002. Although this new rule applies to certain drinking water systems, the Superfund program also adopted this new standard and is treating it as it would any other MCL-based contaminant concentration level in its decision making process for site contamination. In the Burgess ROD, the Safe Drinking Water Act MCLs and non-zero MCLGs are cited as chemical specific, relevant and appropriate requirements to measure the performance of the groundwater remedies and cap rather than groundwater cleanup values. This means that at the completion of the remedy, MCLs must be met at the edge of the waste management unit (edge of cap).

The change in the arsenic standard does not appear to have an impact on groundwater at the Burgess Site as filtered groundwater arsenic concentrations are already below the 10 ppb

standard in all three monitored horizons (sand, ablation till, and bedrock). In addition, because institutional controls prohibiting the use of groundwater continues to be in place, the remedy remains protective.

Except as noted in this report, the site remedy continues to meet ARARs. Attachment 3 is the ARARs chart that was attached to the ROD.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The exposure assumptions used to develop the Human Health Risk Assessment included both current exposures (youth trespassers) and potential future exposures (adjacent resident (child & adult), youth trespasser, and excavation worker). All of these assumptions remain valid.

Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No other information other than what has been discussed previously in this document has come to light that could call into question the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed, the site inspection, and the interviews, the remedy is currently functioning as intended by the ROD. The question of continued effectiveness of the SVE/air sparge system, and elevated (and increasing) VOC levels in monitoring wells down gradient of the landfill area (W-04, W-06, and W-09 clusters), however, are both of concern.

The effectiveness of the SVE/air sparge system, installed to address the source of VOC contamination, appears to be declining. The air sparge component of the remedy has been discontinued. The SVE component of the remedy continues to operate, however, system influent VOC concentrations have remained constant since January 2004, confirming the presence of a continued VOC source.

Groundwater contaminant concentrations in the kame sand and ablation till wells down gradient of the landfill continue to have concentrations several orders of magnitude above ICLs, and in some wells VOC concentrations are increasing. These impacted locations, however, appear to be within the limits of institutional controls (groundwater reclassification area). An estimated timeframe for achieving groundwater cleanup levels specified in the ROD is unknown as the current groundwater model used to predict natural attenuation is not representative of site conditions.

Other than an apparent slight down gradient movement of the groundwater plume, there have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. There have been no significant changes in toxicity factors for the contaminants of

concern that were used in the baseline risk assessment and there have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy. Other than the issues outlined above, there is no information that calls into question the protectiveness of the remedy.

8.0 ISSUES

Table 9: Issues

Issues	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
The SVE/air sparge system is no longer as effective as it once was in removing the VOC contamination in the lagoon area. However, the lagoon area does appear to be a continuing source of VOC contamination.	N	Y
Groundwater contamination in down gradient monitoring wells remains well above ICLs, and in some wells VOC concentrations are increasing. Based on available data, it does not appear that these concentrations will decrease in the foreseeable future.	N	Y

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table 10: Recommendations for Follow-Up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Evaluation of the SVE/air sparge system	Evaluate alternatives for either increasing effectiveness or addressing the VOC source through other treatment options	PRPs	EPA/State	September 2005	N	Y
Groundwater contaminant levels	1) Evaluate to ensure contamination is not migrating vertically or laterally	PRPs	EPA/State	September 2005	N	Y
	2) Evaluate to ensure that the GW plume remains defined and that additional monitoring wells are not needed	PRPs	EPA/State	September 2005	N	Y
	3) Evaluate GW reclassification area to ensure delineation remains appropriate	PRPs	EPA/State	September 2005	N	Y
	4) Re-evaluate the potential for GW to be remediated through natural attenuation	PRPs	EPA/State	September 2005	N	Y
	5) Utilize a more detailed groundwater model capable of predicting contaminant concentrations in downgradient monitoring wells based on current site conditions.	PRPs	EPA/State	September 2005	N	N

10.0 PROTECTIVENESS STATEMENT

Long-term protectiveness of the response actions will continue to be verified through periodic inspections and long-term monitoring of the Site groundwater, surface water, and sediments. Current data available indicate that the groundwater plume has moved slightly down gradient from the source and deeper into a till layer. However, the plume appears to remain within the limits of institutional controls (groundwater reclassification area). Additional sampling will be conducted within the next six months to confirm. Based on the information gathered in support of this Five-Year Review, the following protectiveness statement is made:

- The remedy at the Burgess Brothers Site currently protects human health and the environment because exposure pathways for direct contact and groundwater ingestion have been addressed by landfill/marshy area caps and institutional controls, respectively. However, in order for the remedy to be protective in the long-term, the source control and groundwater remedies need to be re-evaluated. If necessary, modification to the remedies should be made.

Because the remedial action is currently protective, the Site is protective of human health and the environment.

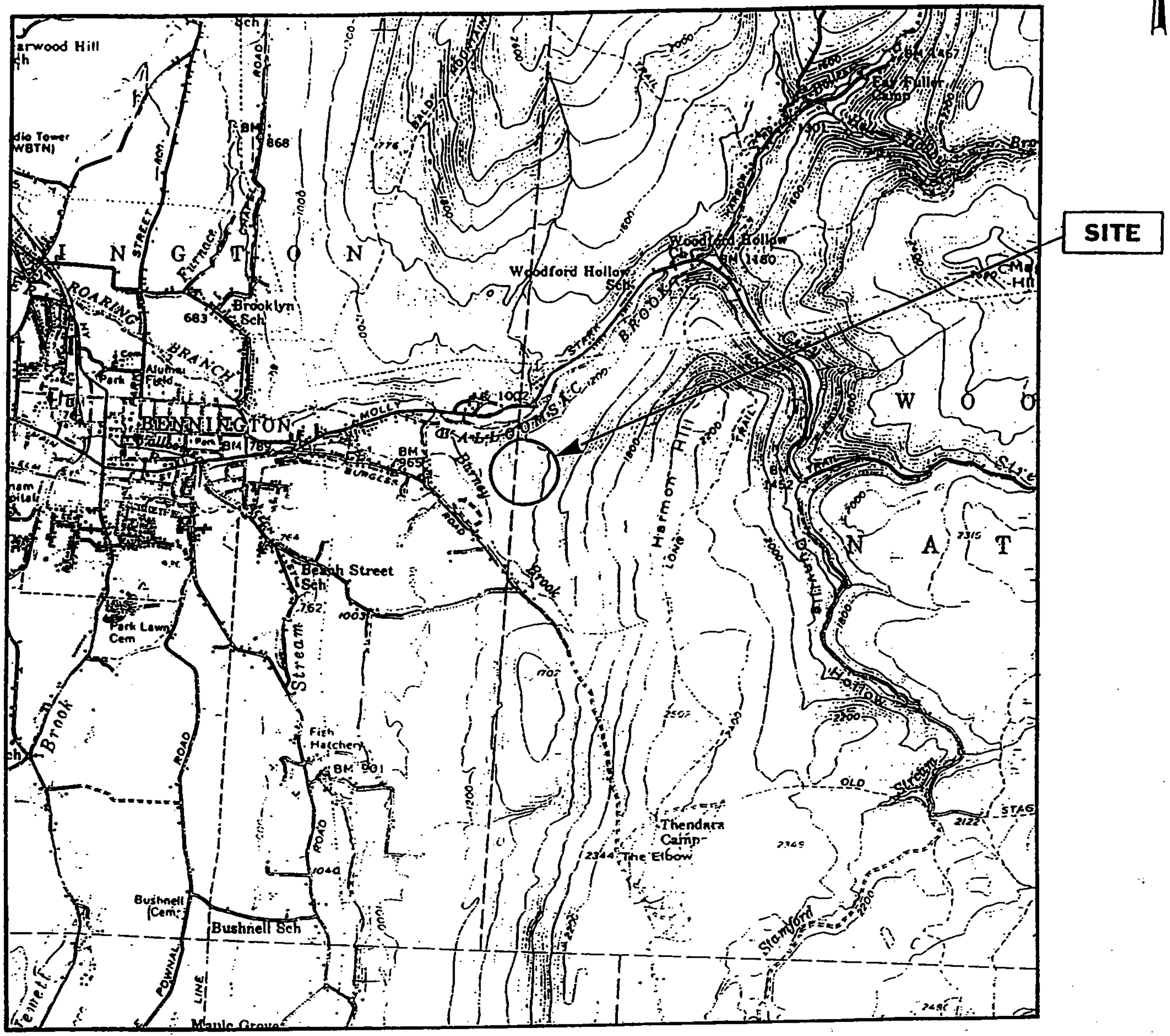
11.0 NEXT REVIEW

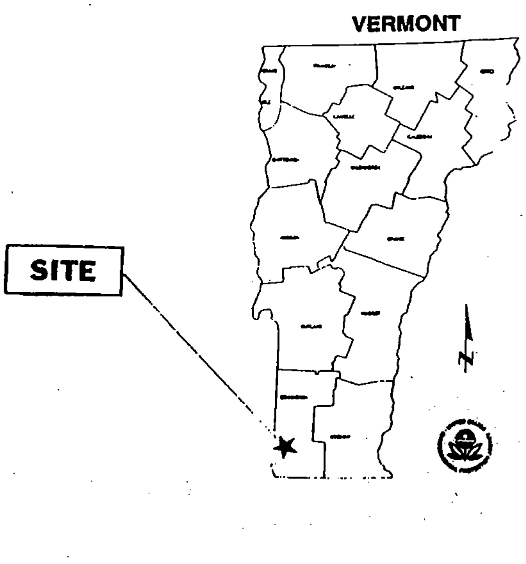
The next five-year review for the Burgess Brothers Superfund Site is required by March 2010, five years from the date of this review.

ATTACHMENT 1

SITE LOCATION MAP

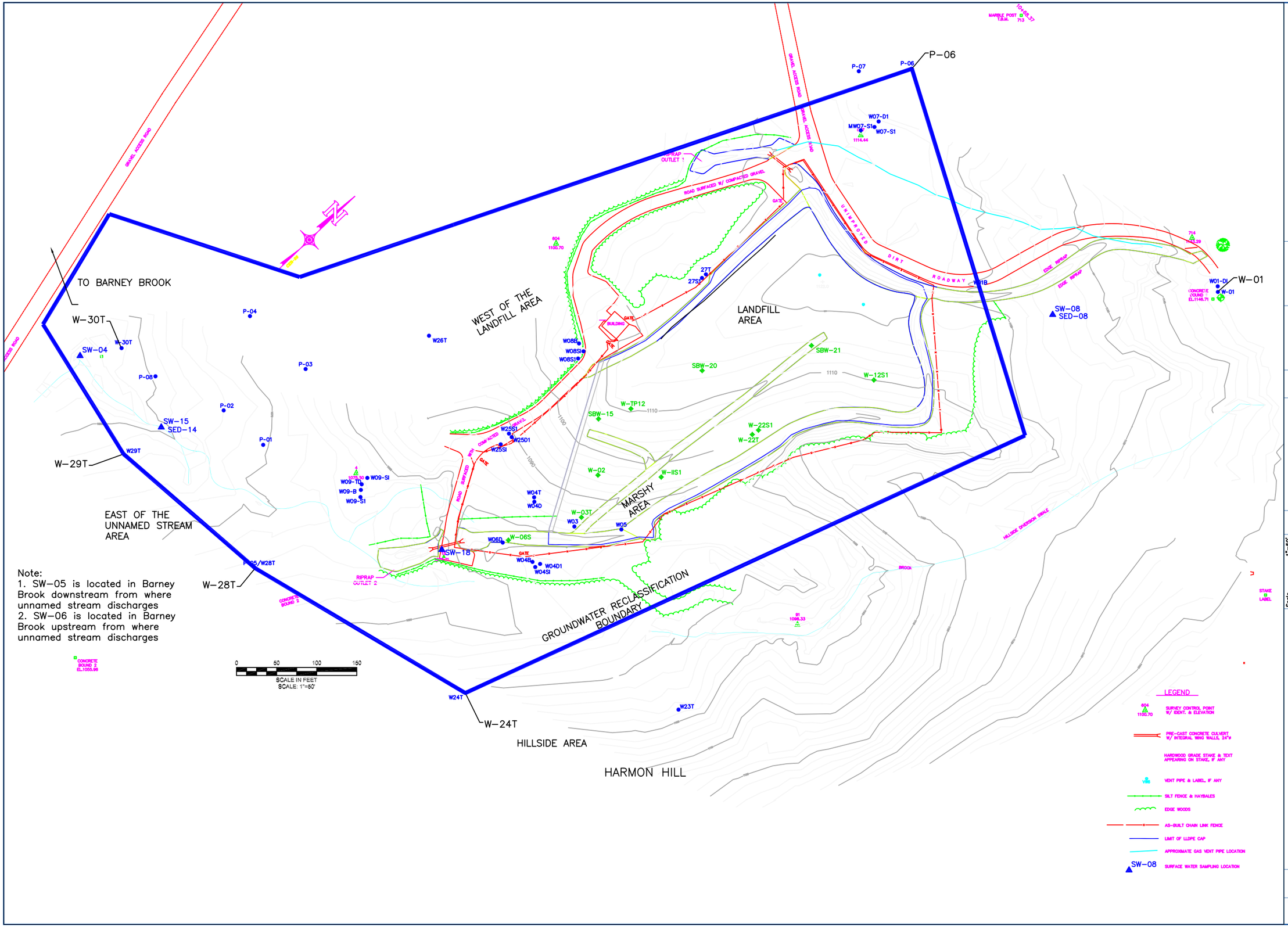
FIGURE 1


SITE
BENNINGTON
Woodford Hollow Sch
Woodford Hollow
Brooklyn Sch
Beach Street Sch
Park Lawn Cem
Fish Hatchery
Bushnell Cem
Bushnell Sch
Harmon Hill
Thendara Camp
The Elbow
Stream
Brook
ROARING BRANCH
Stamford


VERMONT
SITE

ATTACHMENT 2

SITE PLAN



Note:
1. SW–05 is located in Barney Brook downstream from where unnamed stream discharges
2. SW–06 is located in Barney Brook upstream from where unnamed stream discharges

LEGEND

- SURVEY CONTROL POINT W/ IDENT. & ELEVATION
- PRE-CAST CONCRETE CULVERT W/ INTEGRAL WING WALLS, 24"ø
- HARDWOOD GRADE STAKE & TEXT APPEARING ON STAKE, IF ANY
- VENT PIPE & LABEL, IF ANY
- SILT FENCE & HAYBALES
- EDGE WOODS
- AS-BUILT CHAIN LINK FENCE
- LIMIT OF LLDPE CAP
- APPROXIMATE GAS VENT PIPE LOCATION
- SW-08 SURFACE WATER SAMPLING LOCATION

ENVIRONMENTAL PARTNERS GROUP INC.
HINGHAM, MASSACHUSETTS WEST STOCKBRIDGE, MASSACHUSETTS

Description	Date
REVISIONS	

Scale	1"=50'
Date	3/23/05
Job No.	106-0401C
Designed by	LMC
Drawn by	MNW
Checked by	
Approved by	

BURGESS BROTHERS SUPERFUND SITE
YEAR 5 REVIEW
SITE PLAN WITH ENVIRONMENTAL SAMPLING LOCATIONS AND GROUNDWATER RECLASS AREA

Sheet No.

File No.

I:\Burgess Brothers\18 Five Year Review\Figure 1.dwg

ATTACHMENT 3

LIST OF DOCUMENTS REVIEWED

ATTACHMENT 3
LIST OF DOCUMENTS REVIEWED

Final Remedial Design Report, Burgess Brothers Superfund Site, June 1999

Remedial Action Work Plan and Project Operations Plan (RAWP/POP), Burgess Brothers Superfund Site, August 1999

Institutional Control Plan (ICP), Burgess Brothers Superfund Site, March 2000

Demonstration of Compliance Plan (DOCP), Burgess Brothers Superfund Site, April 2000

Final Remedial Construction Report, Burgess Brothers Superfund Site, June 2001

Final Wetlands Impact Assessment Report, Burgess Brothers Superfund Site, September 2001

Year 2 Remedy Evaluation Report, Burgess Brothers Superfund Site, January 2004

Final Remedial Investigation Report, Burgess Brothers Superfund Site, July 1996

Final Feasibility Study Report, Burgess Brothers Superfund Site, March 1998

Operations and Maintenance Progress Reports, Burgess Brothers Superfund Site, December 2000 – Present

Supplemental Remedial Investigation Report, Burgess Brothers Superfund Site, September 1996

Groundwater Reclassification Petition, Burgess Brothers Superfund Site, February 2002

Findings of Fact & Reclassification Order, Groundwater Reclassification at the Burgess Brothers Superfund Site, September 2003

State of Vermont Groundwater Protection Rule and Strategy, Chapter 12, Rule No. 97-P14, November 1997

Final Consent Decree and Statement of Work, Docket No. 2 (99-CV-194)), Burgess Brothers Superfund Site, May 1999

Record of Decision, Burgess Brothers Superfund Site, September 1998

ATTACHMENT 4

APPLICABLE OR
RELEVANT AND APPROPRIATE REQUIREMENTS
(ARARS)

ATTACHMENT 4 – APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Type	Medium	Requirements	Status	Synopsis of Requirements	Action to be Taken to Attain ARAR
Chemical-Specific	Groundwater	Vermont Groundwater Protection Regulations (EPR 12-702)	Applicable, for Enforcement Standards	Establish primary groundwater quality standards. Enforcement standards are applicable. Preventative action limits are not an ARAR.	Groundwater quality would improve due to the treatment of the lagoon soils and construction of a multi-barrier cap over the landfill. Source remediation and natural degradation processes would reduce the concentrations to below the primary groundwater quality standards.
		Vermont Health Advisories	To Be Considered	Vermont developed health advisories as guidance criteria for drinking water in the absence of Federal Maximum Contaminant Levels.	Considered in selection of remedial alternative, and will be used in the absence of numerical standards.
		Federal Safe Drinking Water Act – Maximum Contaminated Levels (MCLs) for Organic and Inorganic Chemicals (40 CFR 141 Subparts B, G and I)	Relevant and Appropriate	MCLs have been promulgated for a number of common organic and inorganic chemicals and action levels for lead and copper. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered appropriate for groundwater aquifers potentially used for drinking water.	Groundwater quality would improve due to the treatment of the lagoon soils and construction of a multi-barrier cap over the landfill. Source remediation and natural degradation processes would reduce the concentrations to below MCLs.
		Federal Safe Drinking Water Act – Maximum Contaminant Level Goals (MCLGs) for Organic and Inorganic Chemicals (40 CFR 151 Subpart F)	Relevant and Appropriate, if non-zero	Establishes MCLGs for organic and inorganic contaminants. MCLGs that are non-zero will be relevant and appropriate.	Groundwater quality would improve due to the treatment of the lagoon soils and construction of a multi-barrier cap over the landfill. Source remediation and natural degradation processes would reduce the concentrations to below MCLGs.

Type	Medium	Requirements	Status	Synopsis of Requirements	Action to be Taken to Attain ARAR
		EPA Reference Doses (RfDs) and EPA Carcinogen Assessment Group Potency Factors	To Be Considered	RfDs are dose levels EPA has developed for use in risk characterization due to non-carcinogens in various media. The Potency Factors are used to evaluate an acceptable risk from a carcinogen.	Considered in selection of remedial alternative, and will be used in the absence of numerical standards.
		EPA Health Advisories	To Be Considered	EPA publishes contaminant-specific health advisories that indicate the non-carcinogenic risks associated with consuming contaminated drinking water.	Considered in selection of remedial alternative, and will be used in the absence of numerical standards.
Location – Specific	Wetlands	Federal Executive Order on Protection of Wetlands (E.O. 11990, 40 CFR Part 6, Appendix A)	Applicable	Requires federal agencies to avoid impacts associated with the destruction or loss of wetlands, minimize potential harm, preserve and enhance wetlands, and avoid support of new construction in wetlands if a practicable alternative exists.	Impacted wetlands would be restored or replicated.
		Federal Fish and Wildlife Coordination Act (16 USC 661 et. Seq.) 40 CFR Part 6	Applicable	Establishes requirements for a consultation with U.S. Fish and Wildlife Service and state wildlife agencies to mitigate losses of fish and wildlife that result from modification of a water body.	Fish and Wildlife Service has been consulted regarding potential impact to water bodies.
		Federal Clean Water Act (33 USC 1344), US Army Corps of Engineers Nationwide Permit Program (33 CFR Part 330), and Federal Guidelines for Specification of Disposal Sites (40 CFR Part 230)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative that has less effect is available. The requirements also describe actions to minimize adverse impacts.	Permit conditions would be evaluated during pre-design. Impacted wetlands will be restored or replicated.

Type	Medium	Requirements	Status	Synopsis of Requirements	Action to be Taken to Attain ARAR
Action – Specific	Air	Vermont Air Pollution Control Regulations (10 VSA Section 551, et. Seq. EPR 5-101, 5-211, 5-231 to 5-252, 5-253.20, 5-261, 5-301 to 5-311, 5-501 to 5-502, and 5-1010)	Applicable	Establishes air quality standards and allowable discharges.	SVE/air sparge system and system generator would be designed to satisfy discharge limits.
		Federal RCRA Air Emission Standards for Equipment Leaks, 40 CFR Part 264, Subpart BB	Applicable, if threshold limits are exceeded	Standards for air emissions for equipment that contains or contacts RCRA wastes with organic concentrations of at least 10% by weight.	SVE/air sparge system would be designed to satisfy emission standards if threshold limits are exceeded.
		Federal RCRA Air Emission Standards for Process Vents, 40 CFR Part 264, Subpart AA	Applicable, if threshold limits are exceeded	Standards for air emissions form process vents associated with distillation, fractionation, thin film evaporation, column extraction or air steam stripping operations that treat RCRA substances and have total organic concentrations of 10 ppm or greater.	SVE/air sparge system would be designed to satisfy emission standards if threshold limits are exceeded.
		Federal Clean Air Act – Non-Methane Organic Compounds (40 CFR Part 60 Subpart WWW)	Relevant and Appropriate, if threshold limits are exceeded	Regulations require NMOC-specific gas collection and control systems, monitoring, and gas generation estimates. The rule establishes a performance standard for NMOCs emissions of greater than 50 megagrams/year from municipal solid water landfills.	Landfill gas venting system would be designed to satisfy performance standards if threshold limits are exceeded.
	Groundwater	Vermont Groundwater Protection Regulations (10VSA Chapter 48, EPR 12-704 and 12-705)	Applicable	Establish standards and requirements for groundwater monitoring.	The groundwater monitoring program would be designed to satisfy these requirements.

Type	Medium	Requirements	Status	Synopsis of Requirements	Action to be Taken to Attain ARAR
	Surface Water	Vermont Water Quality Standards (10 VSA Chapter 47, EPR Sections 1-04, 2-01, 2-02, 2-03, 2-05, 3-01, 3-03, 3-04, and Appendix C and D)	Relevant and Appropriate	Outlines criteria for discharging to surface waters, such as dissolved oxygen, temperature, nutrients, pH, and alkalinity, and outlines water quality criteria for protection of aquatic biota.	Source control measures would control erosion, runoff and contaminant migration and thereby improve surface water quality over time. Water Quality Standards will be used to measure the effectiveness of source control measures.
		Federal Clean Water Act – Ambient Water Quality Criteria	Relevant and Appropriate	Pursuant to Section 304(a)(1) of the Clean Water Act, the EPA establishes Ambient Water Quality Criteria. These criteria present scientific data and guidance on the environmental effects of pollutants. The criteria can contribute to establishing regulatory requirements that govern impacts to water quality.	Source control measures would control erosion, runoff and contaminant migration and thereby improve surface water quality over time. Water Quality Criteria will be used to measure the effectiveness of source control measures.
	Sediment	Ontario Ministry of the Environment Sediment Quality Guidelines	To Be Considered	The Sediment Quality Guidelines present scientific data and guidance on the environmental effects of pollutants. The criteria can contribute to establishing requirements that govern impacts to sediment quality.	Sediment quality would improve due to the presence of a cap. However, existing inorganic concentrations would not change significantly. Sediment Quality Guidelines will be used to measure the effectiveness of source control measures.
	Landfill Material	Federal RCRA Subtitle C, Regulations, 40 CFR Part 264 Subpart N-Landfills, Section 264.310*	Relevant and Appropriate	Requirements for Hazardous Waste landfill closure.	Landfill cap design and construction would satisfy requirements.
		Federal RCRA Subtitle C Regulations, 40 CFR Part 264 Subpart B – General Facility Standards, Section 264.19*	Relevant and Appropriate	Requirements for developing a Construction Quality Assurance Program for final cover system.	Landfill cap construction would satisfy requirements.

Type	Medium	Requirements	Status	Synopsis of Requirements	Action to be Taken to Attain ARAR
		Federal RCRA Subtitle C Regulations, 40 CFR Part 264 Subpart F – Releases from Solid Waste Management Units, Sections 264.95, 264.96(a) and (c), 264.97, 264.98 and 264.99*	Relevant and Appropriate	Groundwater monitoring requirements and compliance points for determining the need for additional monitoring and corrective action.	The groundwater monitoring program would be designed to satisfy these requirements.
		Federal RCRA Subtitle C Regulations, 40 CFR Part 264 Subpart G – Closure and Post Closure, Sections 264.111, 264.114, and 264.117*	Relevant and Appropriate	Establishes performance standards for closure of hazardous waste landfills and groundwater monitoring	Landfill closure and post-closure requirements would be satisfied.
		USEPA Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments (EPA/530-SW-89-047)	To Be Considered	Presents technical specifications for the design and multi-barrier covers at landfills at which hazardous wastes were disposed.	Guidance would be considered during design of landfill cap.
		USEPA Technical Guidance Document: Construction Quality Management for Remedial Action and Remedial Design Waste Containment Systems (EPA/540/R-92/073, October 1992)	To Be Considered	Presents technical specifications for the design and multi-barrier covers at landfills at which hazardous wastes were disposed.	Guidance would be considered during design of landfill cap.
		USEPA Technical Guidance Document: QA and QC for Waste Containment Facilities (EPA/600/R-93/182, September 1993)	To Be Considered	Presents technical specifications for the design of multi-barrier covers at landfills at which hazardous wastes were disposed.	Guidance would be considered during design of landfill cap.
		USEPA Technical Guidance Document: Alternative Cap Design Guidance for Unlined Hazardous Waste Landfills, EPA Region I, September 30, 1997.	To Be Considered	Presents technical specifications for the design of multi-barrier covers at landfills at which hazardous wastes were disposed.	Guidance would be considered during design of landfill cap.

* RCRA requirements are made effective by the Vermont Hazardous Waste Regulations (EPR 7-502)