48677

Five-Year Review Report

Second Five -Year Review Report
for
Old Springfield Landfill Superfund Site
Springfield, Vermont

September 2003

PREPARED BY:

United States Environmental Protection Agency
Region 1
Boston, Massachusetts

Approved by: Date:

Susan Studlien September 26, 2003

Susan Studlien, Acting Director
Office of Site Remediation and Restoration

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Five-Year Review Report
Old Springfield Landfill Superfund Site
Springfield, VT

TABLES

ATTACHMENTS

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Old Springfield Landfill Superfund Site		
EPA ID: VTD000860239		
Region: 1	**State:** VT	**City/County:** Springfield/Windsor

SITE STATUS	
NPL Status: X Final Deleted Other (specify)	
Remediation Status (choose all that apply): Under Construction Operating Complete X	
Multiple OUs? XYes No	**Construction completion date:** 09/22/1994
Has site been put into reuse? Yes X No	

REVIEW STATUS	
Lead Agency: X EPA State Tribe Other Federal Agency ____________	
Author name: Edward Hathaway	
Author title: Remedial Project Manager	**Author affiliation:** U.S. Environmental Protection Agency
Review Period: 9/29/1998 to 9/30/2003	
Date(s) of inspection: 05/21/2003	
Type of Review: XPost-SARA Pre-SARA NPL-Removal Only Non-NPL Remedial Action Site NPL State/Tribe-lead Regional Discretion	
Review number: 1 (first) X 2 (second) 3 (third) Other (specify) ____________	
Triggering Action: Actual RA Onsite Construction at OU #______ Actual RA Start at OU#________ Construction Completion X Previous Five-Year Review Report Other (specify) Signing of ROD	
Triggering action date (from WasteLAN): 09 / 29 / 1998	
Due date (five years after triggering action date): 09/ 29 / 2003	

* ["OU" refers to operable unit.]

Five-Year Review Summary Form, cont'd.

Issues:

There are no major issues to be addressed. EPA and Vermont ANR will continue to perform periodic inspections to indicate areas where maintenance may be necessary.

Recommendations and Follow-up Actions:

The recommendation and follow-up actions involve the continued oversight of the work being performed by the PRPs to assure compliance with the consent decree and Records of Decision requirements.

Protectiveness Statement:
Because the remedial actions at this Site are protective, the Site is protective of human health and the environment.

- 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 with the landfill.
- The groundwater extraction system prevents the migration of the contaminated groundwater towards Seavers Brook.
- The water line has eliminated groundwater use within the area impacted by the landfill. The small quantity of contaminated groundwater that may be reaching the Black River is rapidly diluted by the flow of the Black River.
- PCBs and other constituents that would present a threat to biota in the Black River are not longer available for transport to the Black River via erosion as a result of the landfill cover.
- Landfill gas is treated with carbon drums and testing has confirmed that the levels do not represent an unacceptable risk.
- Extracted groundwater is being successfully treated by the groundwater treatment system and discharged in compliance with the NPDES permit.

The long-term protectiveness of the remedy will continue to be verified through monitoring and routine site inspections, which are included as part of the site's operation and maintenance activities.

Old Springfield Landfill Five Year Report

1.0 Introduction

A second five-year review was conducted of the remedial actions selected for the Old Springfield Landfill, in Springfield, Vermont. The purpose of the five-year review is to determine whether the remedy being implemented at the Site remains protective of human health and the environment. The methods, findings, and conclusions of the five-year review are documented in this Five-Year Review Report. In addition, this report presents issues identified during the review and provides recommendations to address them.

This Five-Year Review Report was prepared 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 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.

This is the second five-year review for the Site. The triggering action for this statutory review is the completion of the last five-year review in 1998. The five-year review is required due to the fact that contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

2.0 SITE CHRONOLOGY (TABLE 1)

DATE	EVENT
1947	Approximate time period for the initiation of the waste disposal activities.
1968	Dump was closed and converted into a mobile home park.
12/82	Site added the National Priorities List.
1984	PRPs install a water line.
6/88	Remedial Investigation report completed.
6/88	Operable Unit I (OU I) Feasibility Study completed.
9/22/88	EPA issued a Record of Decision (ROD) for OU I of the Site.
3/89	EPA enters into Administrative Order with PRPs to perform Operable Unit II (OU II) Feasibility Study.
9/89	EPA and PRPs enter into a Consent Decree to perform OU I ROD.
9/28/90	EPA issued a Record of Decision (ROD) for OU II of the Site.
5/91	EPA and PRPS enter into a Consent Decree to perform OU II ROD.
4/92	Remedial Design (RD) for OU I completed.
6/92	Remedial Action (RA) for OU I initiated.
5/93	RD for OUII completed.
9/93	Construction of OU I completed.
6/94	Construction of OU II completed.
9/94	Preliminary Close Out Report (PCOR) and Interim Remedial Action Reports for OU I and OU II completed.
1994-present	Operation and maintenance of OU I and OU II RA by PRPs with EPA oversight.
1998	First five year review completed.

3.0 BACKGROUND

The 10 acre Old Springfield Landfill (hereafter referred to as "the Site") is located approximately one mile southeast of the city center in the Town of Springfield, Windsor County, Vermont. The 1980 National Census lists the population of the Town of Springfield at 10,180. The Villages of Goulds Mill and Hardscrabble Corner are located within a one-mile radius of the site. The Old Springfield Landfill was also referred to as the Will Dean Dump, was operated by the Town of Springfield between 1947 and 1968. Hazardous industrial waste from local industries was co-disposed with municipal trash. The industrial waste was disposed both in discrete trenches and mixed with municipal solid waste. Most hazardous material was disposed in bulk liquid and semi-liquid form. After the closure of the landfill in 1968, it was sold and developed for use as a mobile home park, known as the Springfield Mobile Home Estates. At the time of the mobile home park's development, the Vermont Department of Health (DOH) recommended that drilled wells not be used to supply water to the mobile homes because the development was located over areas that had been used for chemical disposal. Municipal water lines were extended to serve the mobile homes. Springfield Mobile Home Estates is no longer occupied and the mobile homes have been removed. Only a caretaker for the estate of John Curtin, the owner of the property, still resides on the site. A six-building condominium complex and 13 single family residences are located in the immediate vicinity of the site.

3.1 Physical Characteristics

The Site is situated on an upland plateau with slopes that descend steeply to the north, east, and west. Seavers Brook runs west of the site and the Black River runs east of the site. Seavers Brook flows northward until it reaches the Black River, which flows to the south and empties into the Connecticut River. Will Dean Road is located along the western side of the site. Will Dean Road intersects Route 11 just north of the site. Route 11 runs along the eastern side of the site.

3.2 Land and Resource Use

The land use within a one-mile radius of the site is primarily low density residential housing, light agriculture, undeveloped forest land and commercial. Approximately 200 homes and condominiums are located within a one-mile radius of the site, housing an estimated population of between 650 and 750 people.

Natural resources in the vicinity of the site include groundwater, surface water, fish and game, arable land, forest, woodland and minerals.

All other residents in close proximity to the Site receive municipal water from the Town of Springfield. A bedrock aquifer is a current source for drinking water in the area for those individuals not part of the municipal water supply system. Users of the bedrock aquifer groundwater in the site vicinity are located primarily upgradient of the Site. Groundwater monitoring wells are located between the Site and current users of the bedrock aquifer. Figure 1 shows the Site and location of the Town water supply line.

3.3 History of Contamination

The Site was operated by the Town of Springfield between 1947 and 1968. Hazardous industrial waste from local industries was co-disposed with municipal trash. The industrial waste was disposed both in discrete trenches and mixed with municipal solid waste. Most hazardous material was disposed in bulk liquid and semi-liquid form.

Shortly after the opening of Springfield Mobile Home Estates, a nearby resident's complaint about foul-smelling water prompted an investigation of the site by the Vermont DOH and the Vermont Agency of Environmental Conservation (VTAEC). In response to finding volatile organic compound contamination in a spring located near Seavers Brook and in the residential well near the mobile home park, the spring was abandoned and the affected home near the mobile home park was connected to the public water supply.

3.4 Initial Response

In 1984, the PRPs installed a water line. EPA then performed a remedial investigation and feasibility study. In 1988, EPA signed the first Record of Decision for the Site to initiate a cleanup action for the contaminated groundwater and seeps. In 1990, EPA signed the second, and final, Record of Decision to address the landfill closure.

3.5 Basis for Taking Action

The Human Health Risk Assessment for the Old Springfield Landfill documented an unacceptable threat to human health based on:

- Future potential ingestion of groundwater contaminated with vinyl chloride, trichloroethene, tetrachloroethene, dichloroethene, and methylene chloride.
- Current and future potential exposure to landfill waste and soil containing polychlorinated biphenyls (PCBs) and polycyclic aromatic compounds (PAHs)

4.0 REMEDIAL ACTIONS

4.1 Remedy Selection

The cleanup action for the Site has been implemented in two Operable Units.

The Remedial Action Objectives for the first Operable Unit (OU I) are:

Prevent direct contact (incidental ingestion and dermal absorption) with contaminated surface soils throughout the site by residents and by construction workers;

Prevent the volatilization of contaminants from contaminated soils, wastes, and leachate seeps;

Prevent the contamination of fish in the Black River by preventing leaching of contaminants from the site soils to shallow groundwater to the bedrock aquifer with subsequent discharge to Seavers Brook and into the Black River; and

Prevent the leaching of contaminants from site soils to shallow groundwater with subsequent transportation from the shallow groundwater to the potable bedrock aquifer.

To meet these remedial action objectives, the OU I Record of Decision required the design and construction of:

(1) two groundwater extraction wells;
(2) a collection system for three areas of contaminated seepage, two on the east side of the Site at the base of Waste Areas 2 and 3, and one on the west side along Seavers Brook Road; and
(3) a pre-treatment facility for discharge of collected water to a POTW.

The OU I Record of Decision also included the implementation of Town of Springfield Municipal Ordinance 88-2 as an institutional control to prevent future use of the groundwater. The OU I Record of Decision did not address the closure of the landfill.

To complete the remediation of the Sit, EPA signed Record of Decision to implement a second Operable Unit (OU II) in September 1990. The Remedial Action Objectives for OU II are:

Prevent the leaching of soil contaminants to the groundwater;

Prevent the migration of contaminated groundwater to the rest of the aquifer;

Prevent contact with contaminated soil or leachate that present a risk;

Prevent further migration of contaminated groundwater offsite; and

Prevent the uncontrolled emission of landfill gases containing hazardous substances.

To meet these remedial action objectives, the OU II required the design and construction of:

(1) a third groundwater extraction well;
(2) upgradient french drains and surface water diversions; and
(3) a multi-layer landfill cap with gas vents.

The OU II Record of Decision also required the application of Municipal Ordinance 88-2 to the area to be capped. Long-term operation, maintenance, and monitoring of the remedial actions were requirements of the OU I and OU II Records of Decision.

4.2 Remedy Implementation

The remedial design process for OU I was completed in April 1992. The final design required the construction of a pre-treatment facility with two air strippers, metals pre-treatment, and carbon treatment of the air emissions. The PRP contractor, REMCOR, mobilized to the Site on June 1, 1992. Construction activities for the ground water extraction wells, west side seepage collection system, and pre-treatment facility were completed by February 8, 1993. The east side leachate collection system was delayed until placement of the cap. The start-up testing and performance testing of the collection systems and pre-treatment facility were completed by February 28, 1993. The pre-treatment system successfully passed the hydraulic and analytical performance tests. The east side collection system and additional extraction well were completed June 18, 1993 and performance testing for the source control well and eastern seep collection system was completed on August 8, 1993.

The construction completion of OU I collection systems and pre-treatment facility were documented in the Remedial Action Report for OU I, September 1993. This Report was approved by EPA on September 30, 1993. EPA and the oversight contractor performed a final inspection on September 16, 1993.

Sample results and water level measurements demonstrate that OU I is meeting the ROD objectives of controlling groundwater flow and meeting the pre-treatment requirements of the POTW. The goal of containment of the groundwater has been met. The long-term goal of groundwater restoration will not be achieved for many years. The OU I remedial action has also achieved control over the landfill seeps. These seeps are now collected and pumped to the pre-treatment facility and then discharged to the POTW.

The final design of OU II was complete May 1993. As part of the pre-design activities a pre-load of common borrow soil was placed on Waste Area 4 in the fall of 1992 to reduce long-term settlement of the waste material. The PRPs contractor, REMCOR, mobilized to the Site in May 1993. Two french drains were installed, one upgradient of Waste Area No. 4 and the other upgradient of Waste Area No.3, using a bio-polymer slurry technique during June 1993. Cap construction was initiated in July 1993. The cap included a 12 inch gas vent layer, geosynthetic clay liner, 40 mil VLDPE geomembrane, 12 inch sand drainage layer, 36 inches of frost and erosion protection, and 6 inches of top soil. Passive gas vents with carbon treatment canisters attached were installed. The cap on the steep slopes consisted of a 40 mil textured geomembrane over common borrow. The layers above the geomembrane were the same as the previously discussed. Construction activities were completed in November 1993. EPA and the oversight contractor performed a substantial completion inspection in December 1993. In April 1994 a retention pond overflowed due to a construction defect. This defect was corrected by changing the design of the discharge pipe and installing a new overflow channel. In addition, areas of erosion were repaired and re-seeded in June 1994.

EPA and the oversight contractor performed a final inspection of OU II on June 30, 1994. The cap, source control well, french drains, and surface water diversions were determined to be constructed according to design with some minor erosion and sparse vegetation noted. On August 11, 1994, based upon an EPA follow-up inspection, the landfill was determined to have a well established grass cover in all areas. The french drains and cap have been successful in reducing the saturation of the waste material as measured by piezometers below the waste. A Remedial Action Report for OU II was completed in September 1994. A Preliminary Close Out Report (PCOR) for Operable Units I and II was completed in September 1994.

The remedial action has been completed and is considered operational and functional as of the PCOR and Interim RA Reports in 1994. The long-term remedial action will be operated and maintained for at least thirty years by the PRPs as required by the two consent decrees. In reality, the operation and maintenance will continue in perpetuity. The Town of Springfield is performing the operation and maintenance actions. Institutional controls required by OU II have been fully implemented and the institutional controls required by OU I have been partially implemented. The Town of Springfield has restricted use of the property containing the cap and treatment facility.

A final Remedial Action Report will be prepared once the remedial has achieved the ground water cleanup goals established in the OU I and OU II RODs. The final Remedial Action Report will support the final Superfund Site Closeout Report to document the completion of all cleanup activities.

4.3 Operation and Maintenance

The Town of Springfield, VT is conducting long-term monitoring and maintenance activities according to the Operation and Maintenance (O&M) Plan and the Long-term Monitoring Plan. The primary activities associated with O&M and long-term monitoring include:

- Routine inspection and maintenance of the landfill cover system, extraction wells, French drains, water treatment system
- Periodic sampling of the groundwater, treatment plant influent and effluent, ambient air within treatment plant, and air discharge from carbon units
- Submission of an annual Report to EPA and Vermont DEC to document the performance of the O & M and present the sampling results.

EPA's oversight contractor, TRC Solutions, Inc., performs semi-annual inspections of the Site as part of the oversight of the Town of Springfield.

5.0 PROGRESS SINCE LAST REVIEW

This is the second Five-Year Review for the Site. The previous Five-Year review was completed in September 1998. Significant activities completed since the last five-year review included the following:

- Revision of the Operation and Maintenance Plan to reflect changes in operating procedures.
- Replacement of the bulk carbon canisters with carbon drums to provide more cost effective treatment of the air effluent from the air stripper.
- Repair of several areas of slope instability (adjacent to the cap)

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 2003 that the five-year review would be completed. The Five-Year Review Team was led by Edward Hathaway of EPA, Remedial Project Manger, for the Old Springfield Landfill Superfund Site, and included staff from EPA's oversight and five year review support contract TRC Solutions Inc. Brian Woods of the Vemont DEC was as also part of the review team.
The review components included:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection;
- Local Interviews; and
- Five-Year Review Report Development and Review.

6.2 Community Involvement

EPA issued a fact sheet that was mailed to the residents within one-half mile of the Site and made available to the general public at the Town Hall. The fact sheet described the Five-Year Review process and how the community can contribute during the review process. EPA did not receive any comments regarding the protectiveness of the remedial action.

6.3 Document Review

The five-year review consisted of a review of relevant documents including O&M records and monitoring data. Applicable or relevant and appropriate requirements (ARARs) in effect at the time of the ROD were also reviewed. A list of the documents reviewed is attached.

6.4 Data Review

Monitoring data presented in the Annual Operations and Maintenance Reports for the Site for the following years: 1997, 1999, 2000, 2001 and 2002 was reviewed as part of the five year review. A summary of the reviewed data is presented below.

Groundwater Monitoring Data

During the five-year review period, groundwater quality at the site has been monitored in 10 monitoring wells and three extraction points on an annual basis for Target Compound List (TCL) VOCs and metals (iron, manganese, molybdenum, mercury and sodium).

Metals in Monitoring Wells

There are no site-specific cleanup levels for metals in site groundwater. Conservatively, MCLs are used to evaluate monitoring results. A review of the 2002 groundwater quality data indicates that only three TAL metals (iron, manganese and/or sodium) were detected above the laboratory quantitation limits. Of the metals detected, MCLs have not been established and only iron and manganese have non-enforceable secondary drinking water standards of 300 ug/L and 50 ug/L, respectively. Iron and/or manganese exceeded the secondary standard in only four of the 10 monitoring wells (MW-20, MW-41B, MW-41G and MW-45B). The highest iron (3200 ug/L) and manganese (1500 ug/L) concentrations were detected in the 2002 sample from monitoring well MW-41G.

VOCs in Monitoring Wells

Prior to the implementation of the groundwater treatment system, more than eight VOC analytes were previously detected in monitoring well samples at levels exceeding maximum contaminant levels (MCLs). These contaminants include vinyl chloride, methylene chloride, 1,1-dichloroethene, 1,2-dichloroethene (1,2-DCE), 1,1,1-trichloroethane, trichloroethene (TCE), tetrachloroethene, and acetone.

During 1998, three VOC analytes were detected in groundwater samples at concentrations exceeding the site-specific MCLs. These contaminants were vinyl chloride, 1,2-DCE, and TCE. The most recent (2002) round of groundwater monitoring results indicate that only these three contaminants continue to be detected at concentrations exceeding the MCLs. Therefore, it appears that the number of VOC contaminants in groundwater exceeding MCLs has remained stable and did not increase over the past 5 years.

Concentrations of VOCs have been generally decreasing in most of the wells monitored. However, groundwater data from 1998 to 2001 shows a sudden and noticeable increase in concentrations of certain VOCs (i.e., vinyl chloride, 1,1-DCA, 1,2-DCE TCE, and acetone) in bedrock well MW-45B. During the most recent (2002) monitoring round, the concentrations of these VOCs decreased to concentrations more consistent with historic levels, indicating that the previous increases in VOC levels in this well may have been a temporary, seasonally-influenced or non-significant trend. However, the VOC concentrations in this downgradient bedrock monitoring well should be examined in the future for indications of further increases that may indicate the off-site migration of contaminants.

VOCs in Extraction and Source Control Wells

The extraction wells (EW-1 and EW-2) remove groundwater from the subsurface sand and gravel unit for the purpose of containing contaminated groundwater to the site boundary, and minimizing the migration of contaminants to the discharge point at the Western Seep. Historically, only one or two VOCs have been detected at low levels in EW-1, while EW-2 contributes a majority of contaminants removed at the PTF. In general, the number of contaminants and the concentrations of contaminants in EW-1 and EW-2 has decreased or remained stable over time (since 1993). This data, in part, indicates these extraction wells are effectively and consistently removing contaminated groundwater from the sand and gravel layer, and controlling migration of contaminants to the Western Seep.

The source control well (SC-1, or EW-3) removes groundwater from the weathered bedrock layer that slopes towards the east, below the site, thereby minimizing migration of contaminated groundwater towards the Black River and the eastern seeps. While the number of contaminants detected has remained stable or increased, the concentrations of contaminants in SC-1 appear to have decreased over time (since 1994). An increase in the number of compounds detected may indicate that degradation products are becoming more prevalent, and that SC-1 has remained effective in capturing contaminated groundwater entering the bedrock layer. In addition, decreasing contaminant concentrations in SC-1 indicate the treatment system, combined with the effectiveness of other source controls (i.e., the cap, French drains, etc.) is limiting the migration of contamination into the bedrock layer and towards the Black River.

Samples are collected annually from EW-1, EW-2 and SC-1 and analyzed for TCL VOCs. In 1998, five VOCs (methylene chloride, vinyl chloride, 1,1,1-trichloroethane, trichloroethene, and tetrachloroethene) were detected in both EW-2 and SC-1 at concentrations at or exceeding their MCLs. In addition, trichloroethene was detected in EW-1 at a concentration exceeding its MCL.

In 2002, 1,1,1-trichloroethane concentrations in EW-2 and SC-1 decreased to below MCLs, but the four other VOCs listed for 1998 (vinyl chloride, 1,1-dichloroethene, trichloroethene and tetrachloroethene) were again detected in both samples at concentrations exceeding the MCLs. In 2002, two VOCs (trichloroethene and acetone) were detected in the EW-1 sample, but at concentrations below the MCL, where applicable.

French Drain Monitoring

Water samples are collected on an annual basis in three French drain valve and meter vaults at the site and analyzed for TCL VOCs. The purpose of the French drains is to intercept off-site groundwater before it enters the landfill mass. Flow from the French drains appears to be seasonally influenced (higher flows during the wetter spring months). This is consistent with the objective of intercepting shallow overburden groundwater. Since the construction of the cap, VOCs have been sporadically detected in the French drain samples. The source of the VOCs may be small amounts of leachate from the adjacent waste areas. The presence of VOCs in the collected water is not a concern since the water is treated at the Pre-Treatment Facility and the POTW.

Groundwater Elevation Contours

Groundwater elevations measured in site monitoring wells during the past five years were reviewed to determine the highest and lowest water table events. The highest measured water table event during the five-year period occurred during May 2000, and the lowest measured water table event occurred during July 1999.

Groundwater elevations measured during the high and low events in bedrock wells and in overburden wells were each plotted on the site map to evaluate groundwater flow direction. Groundwater flow at the site generally occurs in a northeasterly direction below the cap and then in a more easterly direction, following the steep slope towards the Black River.

On the west side of the site, groundwater also flows in a westerly direction towards Seavers Brook. Overall, these elevations indicate a drop in water table elevation of over 200 feet from the top of the site to the base of the slope near the Black River. In general, the water table fluctuated approximately two feet in each well from the low to the high event.

Locally, it is assumed groundwater flow in the vicinity of the source control well and extraction wells (SC-1, EW-1 and EW-2) is influenced by the extraction of groundwater at these points. However depth to water measurements for these extraction points was not provided in the documents reviewed as part of this five-year review. Therefore, the groundwater contours derived in the vicinity of SC-1, EW-1 and EW-2 were based solely on groundwater elevations measured in nearby monitoring wells.

While the extent of the capture zone of EW-1 and EW-2 cannot be determined precisely from the available data, the lower water elevation at MW-41G indicates the extraction is lowering the water table in the local vicinity. The locally low water level at well MW-41B may also be an indication of drawdown caused by the source control well SC-1.

Surface Water Monitoring

Surface water controls for the site include the interception of seep water from 10 seeps identified on the eastern slope and 4 seeps on the western slope. The seep water is intercepted by a French drain system. The west seep French drain system accounts for a little more than half of the total collection system flow. A surface water collection system was installed to direct surface water runoff away from the waste areas and cap. Concrete and grass lined ditches direct stormwater to a claymax® lined holding pond designed for controlling a 100-year flood.

Naturally-occurring surface water bodies located in proximity to the site include Seavers Brook, located approximately 350 feet west of the Site, and the Black River, located less than 200 feet east (downgradient) of the Site. These surface water bodies are not sampled as part of site monitoring activities. However, the following reports by EPA dated 1999 were reviewed: "Lower Black River Assessment Report"; and "Minor Tributaries - Lower Black River Assessment Report" (Reports are included in Attachment 3). The first report discussed the section of the Black River nearest the Springfield, VT Wastewater Treatment Facility (which receives treated groundwater from the site), and the second report included a general discussion of Seavers Brook water quality impacts.

The first report noted that water quality in the Black River was threatened by algae, organic and nutrient enrichment and pathogens as a result of

Wastewater Treatment Facility discharges and road runoff from Route 11, but did not reference potential impacts resulting from site conditions. This report also noted that the site was capped and a groundwater pump and treat system was in operation since 1994, and that volatile contaminants from the identified landfill seeps were likely to volatilize before reaching the River, according to Matt Germon of VTDEC. The second report noted that water quality in Seavers Brook was threatened by sedimentation resulting from nearby encroaching developments, but did not mention potential impacts to Seavers Brook from the site.

Construction of the landfill cap and the collection and discharge of leachate to the POTW were designed to eliminate the discharge of contaminants to surface water receptors. With continued maintenance of the landfill cap and leachate collection system, future compliance regarding surface water and sediments can be expected without additional remedial action.

Extraction System Monitoring

Flow Monitoring

Flows at each of the seven groundwater and leachate collection points are measured continuously by digitized totalizing flow meters. A totalizing flow meter is also located on the downstream side of the equalization tank in the PTF. Leachate flow readings are recorded from meters at each collection point and the PTF influent on a daily basis, and this information is summarized in annual O&M reports for the site.

The design average flow rate for influent to the PTF is 87 gallons per minute (gpm). Historically, actual mean flows have been only about 25% of the design flow rate (around 21 gpm). EW-1 and EW-2 have accounted for a majority (about 75%) of the flow to the PTF. The remainder of flow into the PTF originates from the source control well, French drains 1, 2 and 3, and the eastern leachate seep collection system (LSE 3/4). The running average flow to the PTF (presented in Annual O&M Reports) suggests the flow rate has been fairly steady since 1996.

Flow rates in EW-1 and EW-2 decreased between 1994 and 1999 until new discharge piping was installed due to the build up of fouling agents. The flow rate increased after the new piping was installed and has decreased to pre-1999 levels in 2002. This suggests that the discharge piping has become fouled and should be either cleaned or replaced. Similarly the flow rate from the source control well increased after the replacement of the discharge piping and pump in 2001. The flow rate from SC-1 should be monitored in the future for indications of fouling or pump problems.

The flow rate from the eastern leachate seep collection system (LSE-3 and LSE-4) averages approximately 1.7 gpm. The flow rate varies over time and appears to be seasonally influenced (higher flow during the wet spring months).

The flow rates from the three French Drains average less than 1 gpm each. The flow rates also vary over time and appear to be seasonally influenced.

PTF Influent Concentrations

Quarterly analysis of the combined PTF influent water shows the presence of several VOCs including 11 chlorinated hydrocarbons, acetone, bromoform and MEK. Trichloroethene, vinyl chloride, 1,1-dichloroethene, tetrachloroethene, and methylene chloride are consistently detected above the drinking water standard. The majority of the contaminant load appears to from EW-2 and SC-1. On the other hand, contaminant concentrations in the discharge from EW-1 is consistently below the detection limit and only three concentrations exceeded the drinking water standard since 1993.

Seep Monitoring

An annual sample of the discharge from the Eastern Leachate Seeps (LSE-3 and LSE-4) is collected in the LSE 3/4 common valve meter vault. The LSE 3/4 samples are submitted for analysis of VOCs. In general, LSE 3/4 analytical results for the past 5 years show similar VOCs present in 2002 and at slightly higher concentrations than in 1997. Of the nine VOCs detected in the LSE 3/4 sample in 1997, two VOCs, vinyl chloride and methylene chloride, were detected at concentrations exceeding their MCLs. In 2002, 10 VOCs were detected in the LSE 3/4 sample. These VOCs included 1,1-DCE, tetrachloroethene, and TCE at concentrations above their MCLs, and vinyl chloride at a concentration equal to its MCL. In 2002, TCE was detected at an unusually high concentration (310 ig/L), over 60 times its MCL. This concentration was well above the long-term average for TCE in the LSE 3/4 samples.

The Western Seep is sampled on a quarterly basis for VOCs and metals and annually for PCBs, pesticides and SVOCs. A review of analytical data from 1997 and 2002 suggests that contaminant concentrations are decreasing. During the 1997 annual sampling period, six TAL Metals were detected in the Western Seep sample (barium, calcium, manganese, magnesium, potassium, and sodium) at concentrations below drinking water standards. PCBs, pesticides, and SVOCs were not detected above laboratory reporting limits in the 1997 samples. One VOC (methylene chloride) was detected in the summer, fall and winter 1997 quarterly samples, each time at concentrations exceeding its MCL.

In 2002, no VOCs were detected in the Western Seep sample in February and July, and up two three VOCs were detected at low concentrations (well below MCLs) in March and October. Therefore, VOC levels in the Western Seep appear to have decreased over the past 5 years.

Two new seep samples were collected on May 29, 2003. One sample was collected from a new seep (LSE-1A) in a sinkhole area located approximately half way between LSE-01 and LSE-02. A second sample ("Headwall") was collected from a suspected seep, where water was flowing over the concrete lining at the junction of two fabriform ditches near the southeast corner of the site. In addition a third sample was collected from the LSE-02/Station 2 seep location at the request of EPA. The May 2003 seep samples were submitted for analysis of Target Analyte List (TAL) Metals and VOCs.

VOCs were not detected above the laboratory's method detection limits in either the LSE-1A or the LSE-02 samples. Acetone and methylene chloride were detected in the Headwall sample, but at concentrations below applicable MCLs.

Metals were not detected at concentrations exceeding applicable MCLs in the Headwall sample. Antimony was detected at concentrations of 8.2 and 7.4 ug/L, in the new seep (LSE-1A) and Station 2 (LSE-2), respectively. These concentrations exceed the MCL of 6 ug/L for Antimony. Concentrations of this metal previously did not exceed the MCL in the seeps sampled during the five-year review period or before. Only methylene chlorifde was detected at an estimated concentration of 1 ug/L in the Headwall and LSE-1A samples.

System Performance Evaluation

Overall, the Remedial Action components have been performing as expected.

Cap and French Drains

The remedial objectives of the cap 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 objective of reducing or eliminating the generation of landfill leachate has been met. The cap is well-maintained, and is periodically inspected and repaired as necessary.

Two French drain systems were constructed to intercept upgradient, overburden ground water and prevent it from entering the wastes of Waste areas 3 and 4. The

French drain systems extend to about 25 feet below ground surface (bgs) and are designed to intercept shallow groundwater that may migrate along the top of till. Water collected in the French drain sumps is pumped to the PTF.

The running average flows in the French drains have remained fairly steady since 1995. Monthly flows in the French drains vary, apparently due to seasonal fluctuations in the shallow groundwater table. The overall steady average flow in the French drains indicates the French drain system is operating reliably and as intended.

Extraction Wells

The groundwater extraction system includes two groundwater extraction wells (EW-1 and EW-2). These extraction wells were installed in the vicinity of Waste Areas 3 and 4 to extract contaminated groundwater from the shallow sand and gravel layer that exhibits a preferential gradient towards Seavers Brook and the Western Seep. Extracted groundwater is routed to the PTF prior to being conveyed to the POTW. About half of the water received at the PTF is derived from these extraction wells.

While the degree of containment is uncertain, groundwater elevations in the vicinity of the extraction wells indicate localized groundwater containment. Additional evidence of groundwater containment is the decreasing contaminant trends in wells MW-41G and MW-52G. Contaminant concentrations have been below the MCL in MW-41G since 1998 and the regression analysis presented in the Technical Memorandum in support of the five-year review prepared by TRC Solutions Inc, in September 2003, documents decreasing trends for vinyl chloride, 1,2-Dichloroethene, and TCE at well MW-52G. Both of these wells are located within the sand and gravel unit near or downgradient of the extraction wells.

The concentrations of chemicals of concern at the site have basically stabilized. The primary contaminant of concern, trichloroethene, remains at a concentration of about 1 ppm at the influent to the PTF, which is at a level about 200 times the potable groundwater standard. Declines in well concentrations over time should occur as the source material is depleted, by natural degradation, by sorption to organic matter, natural chemical reactions, dispersion and capture by the treatment system.

The steady concentration of TCE in groundwater may be due to the presence of free product TCE in the ground, also referred to as dense nonaqueous phase liquid (DNAPL). The natural biodegradation of TCE to vinyl chloride and 1,2-DCE likely accounts for their presence at stable levels in groundwater. The slow steady leaching of TCE DNAPL and desorption from the matrix rock will likely continue at the site for tens of years or longer.

In general, the groundwater extraction system appears to be functioning as originally approved in 1994 and is consistent with its intended purpose of groundwater containment. Continued monitoring at remote monitoring wells and continued operation of the leachate and groundwater recovery system will ensure the effectiveness of the groundwater containment system.

Source Control Well

The source control well, SC-1 (also referred to as EW-3) is located within Waste Area 3 to extract contaminated groundwater from the underlying weathered bedrock formation. SC-1 was configured to target the bedrock groundwater that would otherwise flow downgradient (over the steep bedrock incline) towards the Black River. Groundwater that is recovered in SC-1 is pumped to the PTF prior to being conveyed to the POTW.

In general, the running average flow in SC-1 decreased gradually from 1995 to 2000, and has been increasing slightly since 2000. In particular, daily flows have been slightly higher, overall, since July 2001. The reason for this increase is unclear, but could be related to the replacement of the pump in SC-1 in 2001.

Based on the regression analysis performed by TRC, concentrations of contaminants are not increasing with time at well MW-45B. This suggests that no additional contaminants are migrating from the site through the upper weathered bedrock to the west. Ultimately the groundwater contamination in well MW-45 is expected to discharge into the Black River and become highly diluted and likely below aquatic risk levels. In any case, the nearby residences are on a public water supply and are therefore protected from groundwater consumption exposures.

Western Leachate Seep

The Western Seep refers to groundwater that formerly discharged to the ground surface to the west of the site, near Seavers Brook. Prior to the implementation of the remedy, it was found that this groundwater was contaminated with landfill related contaminants. The source of the Western Seep appears to be the sand and gravel unit present in the waste areas that has a hydraulic gradient to the west. To prevent human contact and/or ingestion with this seep, groundwater is intercepted at the Western Seep via a French drain and is discharged to the POTW untreated. The leachate and groundwater quality is monitored and reported in accordance with the POTW permit for volatile organic compounds, total metals and alkalinity/conductivity.

As a result of the operation of the Western Seep collection system, the Western Seep has been effectively captured and is no longer exiting at the ground surface. Running average flow rates for the Western Seep collection system show a sharp decrease in flow in 1993. Flows have remained steady since 1994 (around 26 to

27 gallons per minute). This may suggest that the flow to the Western seep was affected by the groundwater extraction system within the landfill.

Eastern Leachate Seeps

The capture and treatment of two primary leachate seeps, located on the east side of the landfill, was included as part of the remedy. These eastern leachate seeps, LSE-03 and LSE-04, were formerly located near the middle of the steep slope on the eastern side of the landfill. A French drain collection network with two sumps (LSE-03 and LSE-04) was installed in 1993 to collect the eastern seeps and convey them to the PTF for treatment prior to being discharged to the POTW. The combined flow from LSE-03/04 is measured in their shared meter vault.

The fact that no new seeps have developed in the area of LSE-3 and LSE-4 indicates the collection system is effectively capturing the leachate and preventing the leachate from impacting surface water resources.

A new small seep has developed on the eastern slope where the two fabriform concrete-lined ditches converge. This flow was observed by TRC, Dufresne-Henry and EPA during a site visit in May 2003. The flow rate of the seep could not be estimated accurately, but appeared to be less than 1 gallon per minute. The new seep has likely developed because the concrete lining prevents normal discharge of shallow groundwater into the drainage channels. Therefore, shallow groundwater would tend to concentrate at the convergence of the two fabriform channels. Samples show moderate levels of some leachate indicators (i.e., iron and manganese). However, flow from the new seep is low and contaminants will be highly diluted in the receiving surface water (Black River).

Air Monitoring, Emissions, and Compliance

The landfill gas vents and an air stripper used as part of the contaminated groundwater treatment system emit some contaminants to the ambient air. Analytical data for landfill gas samples collected by the PRP in 2001 were evaluated to identify any applicable air regulations.

Potential Landfill Gas Emission Routes to the Atmosphere

The landfill vents extend to some depth below the landfill cover to provide an outlet for gases generated in remaining waste. The vents help to minimize the amount of potentially explosive methane gas in the landfill, a major constituent of landfill gas.

The groundwater treatment system at the site employs an air stripper where volatile and, to a lesser degree, semi-volatile contaminants are preferentially transferred from liquid media (groundwater) to gaseous media (air) within the stripper. The contaminant-bearing air stream is then passed through a carbon bed where the contaminants adhere to the carbon. The carbon beds are changed periodically to minimize breakthrough, noted as a sharp increase in the levels of one or more contaminants in the exhaust air.

Emissions Data

Air emissions test data were obtained by the PRP's contractor in 2001. Test results for the air stripper compared influent and effluent concentrations for target analytes along with respective Vermont Hazardous Ambient Air Standards (HAAS) and "potential release" estimates for 8-hour periods. Results for each landfill gas vent are compared the HAAS and NIOSH 8-hour TWA but do not include any exhaust flow data.

6.5 Site Inspection

Summary of Current Site Inspection

EPA, Vermont ANR, a representative for the EPA technical consultant TRC, and the technical consultant for the Town of Springfield, Dufrense and Henry, performed an inspection of the Site on May 21, 2003.

In addition, the results of the semi-annual inspection of the Old Springfield Landfill performed on April 18, 2003 is summarized below.

The inspection was performed as part of the semi-annual inspection and also the Five-Year Review for the landfill. A Five-Year Review checklist was used to document the observations made during the inspection. The report is based on observations made by TRC during the visual inspection of the landfill surface. No testing was performed on components of the landfill system.

TRC inspected components of the landfill cover system, as summarized below.

- **Landfill surface** -- The landfill surface was generally in good condition with some rodent holes on Waste Areas 3 and 4.

- **Fabri-Form Channels**-- Overall, the three Fabri-Form channels were observed to be in good condition. A slight separation was observed at a seam in the Fabri-Form material in the southern channel. A cavity was present in the soils next to the seam, where runoff was entering the cavity from off the cap. Repair of the channel was recommended to prevent further degradation of the Fabri-Form channel.

- **Cover penetrations** -- In general the gas vents and gas vent sheds were in good condition with no signs of operational issues. However, rodent damage, including mounded soil and displaced insulation, was observed in many of the sheds. TRC recommended removal of the mounded soils and continued rodent control measures. The O&M staff indicated that they planned to install concrete floors in the gas vent sheds in the next year. This should not affect the performance of the gas vents.

- **Cover drainage layer** -- The drain pipe outlets for the drainage layer into the Fabri-Form channels appeared to be in good condition and flowing freely.

- **Detention/Sedimentation Basin** -- A recent slope failure was observed on the western sidewall of the detention basin, near the southwest corner. The Geosynthetic Clay Liner appears to be degraded and is promoting infiltration of water into the soils underlying the basin. Due to sidewall erosion that has occurred in the past (2001-2002), TRC recommended that the GCL below the detention basin be replaced, and that the sidewall be repaired.

- **Groundwater systems** -- The above ground portions of the systems were in good condition. At the time of the inspection, the granular activated carbon units in the PTF were being replaced.

Recommendations of corrective actions based on the inspection included the investigating the cause of the seep and repairing related erosion in the detention basin, repair of the split in the southern Fabri-Form channel, continued monitoring and removal of sediments and vegetation in the channels, and continued rodent removal on the cap. The overall conclusion based on the site inspection is that the components of the landfill cover system are working as designed, with the exception of the detention basin.

Past Inspections

Semi-annual inspections of the Old Springfield Landfill have been conducted by TRC since November 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, leachate collection, and groundwater extraction systems continued operation.

6.6 Interviews

On May 21, 2003, Ed Hathaway of EPA and Brian Woods of Vermont DEC met with the operators for the Old Springfield Landfill remedial action, the Director of the Springfield Department of Public Works and the Town Manager. The interview indicated there were no major concerns about the site and that there is minimal public interest regarding the Site at this time.

In addition, During the semi-annual inspection of the Old Springfield Landfill on April 18, 2003, Amy Stattel of TRC interviewed Mr. Rick Chambers, Chief Operator of the Town of Springfield Wastewater Treatment Plant/Publicly-Owned Treatment Works

(POTW). Mr. Chambers, on behalf of the POTW, oversees the operations and maintenance of the landfill on an ongoing (almost daily) basis. Mr. Chambers was at the site on the day of the inspection to answer TRC's questions and to oversee the replacement of the granular activated carbon units at the PTF.

TRC asked if there were any outstanding operational/maintenance issues to be aware of during the semiannual inspection. Rick indicated that a system alarm was currently sounding at the pre-treatment building control panel due to defective pump in groundwater pumping well LSE-3 (manhole P4). He indicated that the pump would be replaced the following week (week ending 4/25/03).

TRC asked what the flow has been from the pretreatment building to the POTW (given the snowmelt from winter 2002/2003 and the heavy spring 2003 rains). Mr. Chambers indicated that the total flow (2003, to-date) was currently at 30,000 gallons as of April 2003, and that the site discharge permit is for 75,000 gallons annually. He also indicated that the total flow for fall/winter last year was only 18,000 gallons, so the total annual flow last year was well below the permitted annual flow.

On July 23, 2003, TRC contacted Rick Chambers via telephone for a follow-up interview. TRC asked about maintenance events in the last year that may have influenced flow. Rick indicated that the pump in LSE-3/P4 (pump was malfunctioning during TRC's Spring 2003 Inspection) was replaced at the end of April 2003. Rick also indicated that the switch meters are cleaned periodically due to fouling, but that this activity has a temporary effect only on localized flow; not total flow. Also, they plan to gradually replace all of the iron extraction system lines (2 or 3 per year) with plastic pipes to decrease clogging (some already replaced). Other periodic flow-maintenance activities performed by the POTW staff include periodic replacement of the screens at the ends of the lines to the french drains because they tend to get clogged.

7.0 TECHNICAL ASSESMENT

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

Remedial Action Performance

The work performed during production of this memorandum indicates that the remedy is functioning as intended. The information sources include review of the available documents and data, trend and statistical analysis of groundwater, the interview, and the site inspection. The landfill cap, and the O&M of the leachate seep collection and groundwater extraction systems have achieved the remedial objectives: to minimize the migration of contaminants and prevent direct contact with or ingestion of contaminants. Based on the fairly consistent detection of

VOCs in perimeter monitoring wells over the past five years, and the slowly decreasing concentrations, the long term goal of groundwater restoration at the site will likely not be achieved for many years.

The lack of statistical trends in VOC concentrations in a few wells (i.e., MW-45T and MW-45B) warrant close monitoring in future inspections and data reviews to evaluate whether the migration of impacted water off-site is increasing or additional hydraulic controls may be considered to ensure the capture of landfill contamination. These wells monitor the deep-aquifer groundwater that flows east towards the Black River.

The presence of leachate indicators (manganese and iron) at low concentrations in new seeps does not warrant additional sampling.

System Operations/O&M

Operation and maintenance of the cap and leachate seep collection and groundwater extraction systems has been, and continues to be effective. Issues identified during the semi-annual site inspections are regularly addressed or continue to be monitored.

Groundwater flow and potentiometric surface is currently measured at only seven bedrock wells and 14 overburden wells. Only one bedrock well (MW-45B) located on or at the base of steep eastern slope (downgradient of wastes) is included in groundwater elevation measurements, to monitor the hydraulic gradient related to the weathered bedrock unit that flows towards the Black River. Also, only one overburden well is measured within the sand and gravel layer to the west of the landfill, where shallow groundwater tends to flow towards the Western Seep. To more accurately evaluate groundwater flow and the effectiveness of the groundwater containment system (source control and extraction wells), it would be useful to add groundwater elevations from deep wells on the west slope (e.g., MW-42T, if serviceable) and from available shallow wells on the east side of the site, between the extraction wells and the Western Seep (e.g., MW-29, MW-15). Water levels in the extraction wells (EW-1, EW-2 and SC-1) should also be measured at least once per year in order to evaluate drawdown and capture at the wells.

Opportunities for Optimization

The groundwater extraction system is the only system at the Site where optimization is possible. The low level of contaminants in the discharge of EW-1 indicates extraction at that point is not needed, or the extraction rate is too high causing excessive amounts of clean groundwater to be drawn into the well. If optimization is attempted, the EW-1 flow rate should be reduced gradually over a period of months. The concentration in the discharge should be monitored periodically until the contaminant removal rate is maximized. Groundwater in the sand and gravel unit should be monitored quarterly, if not monthly to ensure that contaminant concentrations do not increase indicating a decrease in the extraction well capture zone.

Early Indicators of Potential Issues

One indication of a potential performance deficiency in the remedy is the lack of statistical trends (continued detection) in VOC concentrations in monitoring wells MW-45T and MW-45B. The data should be monitored for an increasing trend that may indicate VOCs in the weathered bedrock unit are bypassing the source control well and migrating to the east towards the Black River.

Implementation of Institutional Controls and Other Measures

Institutional controls implemented at the site include the fencing of the landfill to limit access and exposure, limited development within the fence line, the restriction of groundwater use by the Town of Springfield outside the fence enclosing the cap, and a public water supply provided to nearby residents. No activities were observed that would have violated the institutional controls.

Is There a Need to Update any of the Monitoring Plans used to Evaluate the Performance of the Remedy?

A review of the sampling and analytical procedures was conducted to determine the need to update any of the monitoring plans used to evaluate the performance of the remedy. Consideration should be given to supplementing the number of groundwater elevations measured and improving accuracy in evaluating groundwater flow by adding additional wells.

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

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The exposure assumptions used to develop the Human Health Risk Assessment included:

(1) ingestion of groundwater;
(2) direct contact with leachate;
(3) inhalation of the contaminants from the soil, groundwater, surface water, and leachate by workers or other individuals, and
(4) consumption of fish.

No individuals are currently exposed to contamination groundwater. With the expansion of the public water supply, and completion of the landfill cap, leachate collection system, and security fence, exposure assumptions 1 – 4 above have been addressed. The potential ingestion of contaminated fish remains the only valid exposure scenario. The intent of the remedial action with respect to exposure assumption 4 was to prevent the migration of contaminants that could bio-accumulate in fish tissue. The landfill cap prevents the migration of those contaminants into the Black River. The contaminants contained with the groundwater are volatile and are not considered to be a concern with respect to fish ingestion. The exposure pathways used at the time of remedy selection are still valid.

While there have been some changes to the toxicity data used to develop the human health risk assessment, the cleanup levels are set at MCLs. The MCLs for the established cleanup levels have not changed since the signing of the Records of Decision. The Remedial Action Objectives and Cleanup levels are still valid.

Changes in Standards and To Be Considereds

Applicable or relevant and appropriate requirements (ARARs) were evaluated as part of the 1988 and 1990 Records of Decision. There have no changes to ARAR or To Be Considered requirements that would call into question the protectiveness of the remedy. The cover system would comply with all current regulations and guidance. The water treatment operates under a State of Vermont discharge permit that is periodically updated. .

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

From all of the activities conducted as part of this five-year review, no new information has come to light which would call into question the effectiveness of the remedy. No new human or ecological receptors have been identified at this time. No evidence of significant damage due to natural disasters or lack of maintenance was noted during the site inspection.

8.0 ISSUES

There are no major issues to be addressed. EPA and Vermont ANR will continue to perform periodic inspections to indicate areas where maintenance may be necessary.

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The recommendation and follow-up actions involve the continued oversight of the work being performed by the PRPs to assure compliance with the consent decree and Records of Decision requirements.

10.0 PROTECTIVENESS STATEMENT(S)

Because the remedial actions at this Site are protective, the Site is protective of human health and the environment.

- 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 prevent exposure to the waste material and contaminants with the landfill.
- The groundwater extraction system prevents the migration of the contaminated groundwater towards Seavers Brook.
- The water line has eliminated groundwater use within the area impacted by the landfill. The small quantity of contaminated groundwater that may be reaching the Black River is rapidly diluted by the flow of the Black River.
- PCBs and other constituents that would present a threat to biota in the Black River are not longer available for transport to the Black River via erosion as a result of the landfill cover.
- Landfill gas is treated with carbon drums and testing has confirmed that the levels do not represent an unacceptable risk.
- Extracted groundwater is being successfully treated by the groundwater treatment system and discharged in compliance with the NPDES permit.

11.0 NEXT REVIEW

The next five-year review will be conducted by September 2008.

Documents Reviewed:

- Dufresne-Henry, Inc., *Annual Operations and Maintenance Report with Appendices, (1997), Old Springfield Landfill, Springfield, Vermont,* March 31, 1998.
- Dufresne-Henry, Inc., *Annual Operations and Maintenance Report with Appendices, (1999), Old Springfield Landfill, Springfield, Vermont,* April 5, 2000.
- Dufresne-Henry, Inc., *Annual Operations and Maintenance Report with Appendices, (2000), Old Springfield Landfill, Springfield, Vermont,* March 28, 2001.
- Dufresne-Henry, Inc., *Annual Operations and Maintenance Report with Appendices, (2001), Old Springfield Landfill, Springfield, Vermont,* March 29, 2002.
- Dufresne-Henry, Inc., *Annual Operations and Maintenance Report with Appendices, (2002), Old Springfield Landfill, Springfield, Vermont,* May 4, 2003.
- Ebasco Services, Inc., *Draft Supplemental Remedial Investigation Report, Volume 1, Old Springfield Landfill Site, Springfield, Vermont,* February 1988.

- Remcor, Inc., *Final Submittal, Operation and Maintenance Manual, Site Collection and Pumping System and Pretreatment Facility (OU1), Old Springfield Landfill Site, Springfield, Vermont,* October 25, 1993.
- Remcor, Inc., *Long-Term Monitoring Plan (Years 3 and Beyond); Old Springfield Landfill Site, Springfield, Vermont,* March 31, 1993.
- Remcor, Inc., *Operations and Maintenance Manual, Operable Unit No. 2; Old Springfield Landfill Site, Springfield, Vermont,* August 24, 1994.
- Remcor, Inc., *Remedial Action Report, Operable Unit No. 2; Old Springfield Landfill Site, Springfield, Vermont,* August 26, 1994.
- TRC, *Technical Memorandum, 2001 Annual Operations and Maintenance Report (dated April 2002) for the Old Springfield Landfill, Springfield, Vermont,* July 19, 2002.
- United States Environmental Protection Agency, *Comprehensive Five-Year Review Guidance,* EPA 540-R-01-007, June 2001.
- United States Environmental Protection Agency, *Record of Decision, Operable Unit No. 1, Old Springfield Landfill Superfund Site, Springfield, Vermont*, September 1988.
- United States Environmental Protection Agency, *Record of Decision, Operable Unit No. 2, Old Springfield Landfill Superfund Site, Springfield, Vermont*, September 1990.
- United States Environmental Protection Agency, Superfund Preliminary Close Out Report (Operable Units No. 1 and No.2), Old Springfield Landfill Superfund Site, Springfield, Vermont, September 1994.
- United States Environmental Protection Agency, Five-Year Review Report, Old Springfield Landfill Site, Springfield, Vermont, September 1998.

ATTACHMENT 1

Dufresne-Henry
North Springfield, Vermont
Tel (802)886-2261
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SITE PLAN
OF
OLD SPRINGFIELD LANDFILL

VERMONT

SPRINGFIELD,

Proj. No.	4030002
Proj. Mgr.	FDD
Scale	NOT TO SCALE
Date	JUNE 2003
A	SP1

Attachment 2

TECHNICAL MEMORANDUM

Date:	September 10, 2003
To:	Mr. Edward Hathaway Remedial Project Manager U.S. Environmental Protection Agency One Congress Street, Suite 1100 (Mailcode HBT) Boston, MA 02114-2023
From:	Gregory A. Mischel, P.E. TRC Project Manager Lowell, Massachusetts
CC:	Barbara Weir, M&E
Reference:	Contract No. 68-W6-0042 (Subcontract 107061) Work Assignment No. 148 Multi-Site Five-Year Review
SUBJECT:	**Old Springfield Landfill, Springfield, Vermont** **Input for Five-Year Review**

1.0 INTRODUCTION

TRC is assisting EPA in performing a five-year review of the Old Springfield Landfill Superfund Site (site) in accordance with OSWER Directive 9355.7-03B-P "Comprehensive Five-Year Review Guidance" (June 2001). This is the second five-year review conducted for the Old Springfield Landfill. The information in this Technical Memorandum will be used by EPA to evaluate and certify the protectiveness of the remedy in EPA's five-year review report.

TRC performed the following tasks to support EPA's five-year review:

- Reviewed site-related documents;
- Evaluated site conditions and performance of the remedy;
- Interviewed the Chief Operator of the Publicly-Operated Treatment Works (POTW), who is responsible for overseeing O&M of the site;
- Inspected the site to verify the integrity of the remedial system and to assess O&M; and
- Prepared this technical memorandum.

2.0 DOCUMENT REVIEW

The following documents were reviewed as part of the Second Five-Year Review Report:

- Record of Decision (Operable Unit No.1), September 1988 (ROD, 1988);
- Record of Decision (Operable Unit No.2), September 1990 (ROD, 1990);
- Long-Term Monitoring Plan, Years Three and Beyond, March 1993 (LTMP, 1993); and
- Five-Year Review Report, September 1998 (Five-Year Review, 1998).

2.1 Remedial Action Objectives

The remedial action at the Old Springfield landfill was divided into two operable units. Operable Unit No. 1 (O.U. 1) dealt primarily with the management of migration of contaminated seeps and groundwater from the site using a leachate collection and groundwater extraction system, pretreatment on site and off-site treatment of contaminated leachate and groundwater. Operable Unit No. 2 (O.U. 2) addressed source controls and included construction of a multi-layer cap, means of upgradient groundwater diversion and the installation of a source control groundwater extraction well.

The objectives and basis of the remedial action are to:

- Prevent exposure to contaminated surface soils or leachate by residents, construction workers, and future users of the site (i.e., prevent contact via ingestion and dermal absorption);
- Prevent volatilization of contaminants from contaminated soils, wastes and leachate seeps;
- Prevent contamination of fish in the Black River by limiting leachate migration from the site;
- Prevent the leaching of contaminants from site soils to shallow and bedrock aquifers;
- Prevent further migration of contaminated groundwater offsite; and
- Prevent the uncontrolled emission of landfill gases containing hazardous substances.

The remedies implemented to achieve the remedial objectives (ROD 1988; ROD, 1990) include:

- Stabilization of steep waste area side slopes (Areas 2 and 3) to prevent slope failure and construction of a multi-layer cap over Waste Areas 2, 3 and 4 to reduce infiltration and leachate generation (O.U. 2);
- Construction of upgradient french drains and surface water diversions (O.U. 2);
- Installation of a leachate collection system to limit migration of contaminated seeps from the site (O.U. 1);

- Installation of three extraction wells for extraction of contaminated groundwater from the site (O.U. 1 and 2);
- Treatment of leachate and contaminated groundwater at the publicly owned treatment works (POTW) facility, with pretreatment on site (O.U. 1). Average flows from the site pre-treatment facility to the POTW are around 25 gallons per minute, or 36,000 gallons per day.
- Installation of passive gas vents on Waste Areas 2, 3 and 4 (O.U. 2);
- Institutional controls, including deed restrictions and the restriction of groundwater use in the immediate vicinity of the landfill (O.U. 2); and
- Monitoring of groundwater, seeps and air for thirty years.

2.2 Design and Construction

The remedial design process was completed in April 1992 for O.U. 1 and in May 1993 for O.U. 2 (Superfund Five-Year Review, Sept. 1998). Construction activities for O.U. 1 began in June 1992 and were completed by June 1993. The components of O.U. 1 included 2 groundwater extraction wells, a leachate seepage collection system, and an on-site pretreatment facility. Construction of O.U. 2 began in May 1993. Components of O.U. 2 included a third groundwater extraction well (the "source control" well), two french drains, and a multi-layer cap including passive gas vents. The active gas collection and treatment system originally proposed (ROD, 1990) was not installed in Waste Area 3 due to the low landfill gas generation rate. Passive gas vents were installed to allow the minor landfill gas to escape through the Waste area 3 cap and granular activated carbon canisters were installed on all passive gas vents to remove volatile organic compounds (VOCs) from the air emissions.

Landfill cap construction activities began in July 1993. The landfill cap consisted of a 6-inch vegetated topsoil layer, 36-inch cover soil/frost protection layer, 12-inch sand drainage layer, 40-mil low density polyethylene geomembrane liner, a geosynthetic clay liner, and a 12-inch gas vent layer. The steep slopes on the eastern sides of Waste Areas 2 and 3 were stabilized with common borrow, followed by 40-mil textured geomembrane, followed by the typical cap cross-section. Construction of the cap over Waste Areas 2, 3 and 4 was completed in November 1993.

Long-term monitoring of the site began in December 1993, and the first Five-Year Review report was completed in September 1998.

2.3 Performance Standards

The goals for site cleanup will be achieved when the following conditions (ROD 1988; ROD, 1990) are met:

a) Soils in which contaminant concentrations exceed total carcinogenic risk levels of 10^{-5} (level of excess cancer risk considering dermal and ingestion exposure routes for soils contaminated with PAHs and PCBs) are capped. This included capping waste areas 2, 3, and 4;

b) Groundwater at and within the boundaries of the waste management unit (i.e., the site) must meet Vermont groundwater quality standards. The state standards are equivalent to the Federal maximum contaminant levels (MCLs) and/or maximum contaminant level goals (MCLGs) per the Safe Drinking Water Act. Cleanup goals for site groundwater contaminants are equal to Federal MCLs and state criteria, with the exception of tetrachloroethene (PCE). A PCE cleanup goal was waived by EPA based on its ARARs, because its MCL standard was below its practical quantitation limit, and therefore the MCL for PCE was not a technically feasible cleanup goal.

c) The effluent of leachate and/or groundwater that is treated off-site must meet the permitting requirements of the National Pollutant Discharge Elimination System (NPDES). In addition, the on-site pretreatment system will be designed, constructed and operated to ensure that all NPDES requirements are met.

d) Air strippers must be operated as part of the on-site pre-treatment system and must meet the emissions requirements (for volatiles) of 52 F.R. 3748, "Proposed Standards for Control of Emissions of Volatile Organics", February 1987.

e) The POTW must have a NPDES permit to discharge to the Black River, and must maintain compliance with that permit.

2.4 Monitoring Requirements

A monitoring program was established to monitor environmental media at the site for a period of 30 years. The objectives of the monitoring (LTMP, 1993) are:

- *To monitor the effectiveness of the remedy and any subsequent remedies;*
- To monitor groundwater quality changes and groundwater elevation changes and to identify the presence of new contaminated bedrock flows, seeps, or residential wells;
- To assess the potential for further impacts to public health and the environment; and
- To identify and monitor groundwater changes due to the implementation of the remedy.

The original requirements in the RODs (ROD, 1988; ROD, 1990) included monitoring of existing and new groundwater monitoring wells, residential wells, seeps, surface water, and collected leachate and groundwater. The monitoring program also included recommendations for (a) the installation of new bedrock wells (locations to be determined through additional studies completed prior to and during construction of the remedy), (b) the development of statistical methods for evaluating whether groundwater and leachate were meeting cleanup goals, and (c) consideration of the potential for new chemical compounds to appear as contaminants due to chemical mixing and degradation.

The initial frequency of monitoring for O.U. 1 was quarterly, pending completion of the final remedial action (ROD, 1988). After the construction and implementation of O.U. 2, quarterly sampling of monitoring wells was to continue for a period of three years. The sampling frequency for years four and five was set at semi-annually, per the 1988 ROD, and once per year for years five through ten. After year ten the sampling frequency may be reduced to once every other year. The analytical parameters for groundwater monitoring were VOCs, SVOCs, PCBs, and metals (ROD, 1988). The need to add or remove analytical parameters to this list was to be re-evaluated regularly during the monitoring period. Specifically, the need for monitoring plan modification is to be addressed during each five-year review, at a minimum. Recent modifications to the monitoring program include the elimination of residential well, surface water, and seep monitoring. The list of metals analytes were also reduced.

Currently, the PRP submits an annual O&M report to present monitoring data and analytical data, and provide an evaluation of the leachate collection system, groundwater extraction system, and landfill cap.

2.5 Cleanup Levels

Cleanup levels were developed for both soil and groundwater. The soil cleanup levels were achieved during the implementation of the remedy by capping the solid waste and contaminated soils. Groundwater cleanup levels were established for those contaminants that were identified in the 1988 Endangerment Assessment (EA) which were found to pose an unacceptable risk to either public health or the environment. The site's groundwater cleanup levels are achieved when the analytical data from monitored wells is below the federal MCLs (and the equivalent state criteria). Table 2-1 summarizes the cleanup goals specified in the 1990 ROD for O.U. 2 for a subset of the contaminants of concern identified in groundwater.

Table 2-1
Groundwater Cleanup Goals
Old Springfield Landfill

Parameter	Unit	Cleanup Level / MCL
VOCs		
Benzene	ug/l	5
1,1-Dichloroethene	ug/l	7
Tetrachloroethene	ug/l	5
Trichloroethene	ug/l	5
Xylenes (total)	ug/l	400
Vinyl Chloride	ug/l	2

3.0 DATA REVIEW

3.1 Introduction

TRC reviewed monitoring data presented in the Annual Operations and Maintenance Plans for the site for the following years: 1997, 1999, 2000, 2001 and 2002. As discussed previously, environmental monitoring data are available for the monitoring wells, extraction wells, surface water drainage channels, leachate, seeps, and air discharges. A summary of the reviewed data is presented below.

3.2 Groundwater Monitoring Data

During the five-year review period, groundwater quality at the site has been monitored in 10 monitoring wells and three extraction points on an annual basis for Target Compound List (TCL) VOCs and metals (iron, manganese, molybdenum, mercury and sodium). The locations of the monitoring wells are shown on the figures in Attachment 1.

Originally, groundwater samples were tested for all of the Target Analyte List (TAL) metals, but the metals list has been shortened during the course of the project life per EPA and VTANR approval. In previous years, groundwater samples were also analyzed for base neutral/acid (BNA) extractable (or semi-volatile) compounds and PCBs. However, based on data summarized in the PRP's annual O&M reports, it appears these parameters were dropped from analytical requirements for monitoring wells sometime prior to the current five-year review period.

3.2.1 Metals in Monitoring Wells

There are no site-specific cleanup levels for metals in site groundwater. Conservatively, MCLs are used to evaluate monitoring results for metals (LTMP, 1993).

A review of the 2002 groundwater quality data indicates that only three TAL metals (iron, manganese and/or sodium) were detected above the laboratory quantitation limits. Of the metals detected, MCLs have not been established and only iron and manganese have non-enforceable secondary drinking water standards of 300 ug/L and 50 ug/L, respectively. Iron and/or manganese exceeded the secondary standard in only four of the 10 monitoring wells (MW-20, MW-41B, MW-41G and MW-45B). The highest iron (3200 ug/L) and manganese (1500 ug/L) concentrations were detected in the 2002 sample from monitoring well MW-41G.

3.2.2 VOCs in Monitoring Wells

Prior to the implementation of the groundwater treatment system, more than eight VOC analytes were previously detected in monitoring well samples at levels exceeding the maximum contaminant levels (MCLs) specified in the LTMP. These contaminants include vinyl chloride, methylene chloride, 1,1-dichloroethene, 1,2-dichloroethene (1,2-DCE), 1,1,1-trichloroethane, trichloroethene (TCE), tetrachloroethene, and acetone.

During 1998, three VOC analytes were detected in groundwater samples at concentrations exceeding the site-specific MCLs. These contaminants were vinyl chloride, 1,2-DCE, and TCE. The most recent (2002) round of groundwater monitoring results indicate that only these three contaminants continue to be detected at concentrations exceeding the MCLs. Therefore, it appears that the number of VOC contaminants in groundwater exceeding MCLs has remained stable and did not increase over the past 5 years.

Table 3-1 summarizes the number of monitoring wells in which VOCs were detected at concentrations exceeding the cleanup goals, for each annual sampling event during the 5-year review period. The monitoring wells are broken into three categories based on the subsurface geologic unit over which they are screened (e.g., sand/gravel, till, or bedrock).

Table 3-1
Number of Wells exceeding USEPA MCL VOC Standards
Old Springfield Landfill

	Sept. 1998	July 1999	Sept. 2000	Dec. 2001	Oct. 2002
Total Wells Sampled	10	10	10	10	10
Number of Wells in which one or more VOCs exceeded MCLS:					
Wells Screened in Bedrock	1	1	1	1	1
Wells Screened in Till	1	1	1	1	1
Wells Screened in Gravel/Sand	1	0	0	1	1

MCL – Maximum contaminant level from National Primary Drinking Water Regulations.

Table 3-2 presents the monitoring well and the concentrations of the contaminants exceeding the MCL during the period from 1998 to 2002.

Table 3-2
VOC MCL Exceedances
Old Springfield Landfill

	MCL Standard	Sept. 1998	July 1999	Sept. 2000	Dec. 2001	Oct. 2002
MW-45B						
Vinyl Chloride	2	8	26	37	83E	36
Trichloroethene	5	5	8	12	36	9
1,2-Dichloroethene	70	31	29	40	100E	31
MW-45T						
Vinyl Chloride	2	2J	31	1J	55E	39
Trichloroethene	5	25	34	26	50	31
1,2-Dichloroethene	70	82	95	84	140E	99
MW-52G						
Trichloroethene	5	40	ND	4J	24	13

MCL – Maximum contaminant level from National Primary Drinking Water Regulations.
E – Laboratory estimated value.
J – Laboratory estimated value.
ND – Not detected.

3.2.2.1 *Trend Analysis of VOC Data in Monitoring Wells*

An analysis of the temporal trend in VOCs including vinyl chloride, 1,2-DCE and TCE was completed for historical data in three monitoring wells using simple linear regression. Well MW-52G was selected because the well is screened in the high-permeability subsurface gravel layer and the well is located between the extraction wells and the west seep. Wells MW-45T and MW-45B (screened in the till and bedrock layers, respectively) were selected based on their downgradient location at the base of the landfill. VOCs data for each of the three select wells was plotted versus time (one plot for each constituent) and a trendline was incorporated into each plot using a linear line fit. Attachment 2 presents the regression analysis plots.

For the purposes of the temporal analysis, each sample event was represented cumulatively by month, i.e. 1...4...7...n, and paired with a corresponding VOC concentration. All VOC data presented as "less than the method detection limit", were converted to one-half of that value. The paired data were then subjected to a linear regression analysis. TRC has assigned 0.05 a probability (p) levels to all R^2-values generated by the regression analysis with a t-statistic (t_s).

As a guide to this analysis, cited probability or p-values indicate what the likelihood of getting a particular test-statistic would be. More specifically, the p-value indicates the probability of getting a value more extreme than your test result. As a rule of thumb, a test result is statistically significant if $p \leq 0.05$. This means that if 95% of your expected test results fall under the curve, then anything that falls beyond it, say into the 99% bracket, is highly unusual and statistically significant at the 0.01 level (99%). Conversely, if $p > 0.05$ then that is generally reported as non-significant (NS).

Trends in the data are represented in three ways. A (+) sign indicates an increasing trend, a (-) sign indicates a decreasing trend, and (No trend) when time cannot be used to effectively predict which way the concentrations of constituents are going, regardless of the slope of the line. No trend may also indicate that in spite of the absence of a trend, recent "spikes" in the constituent warrant further investigation. A summary of the R^2 and "p" values and related trends that were identified based on the time-series analysis of contaminant trends in each well is summarized in Table 3-3 below.

Table 3-3
Summary Trend Analysis for Select VOCs, 1993 to 2002
Old Springfield Landfill

Well ID	VOC	R^2	p-value	Identified Trend
MW-52G	Vinyl chloride	0.4724	0.002	-
MW-52G	1,2-DCE	0.4595	0.003	-
MW-52G	TCE	0.6677	0.0001	-
MW-45T	Vinyl chloride	0.0385	0.61 NS	No Trend
MW-45T	1,2-DCE	0.0002	0.96 NS	No Trend
MW-45T	TCE	0.0557	0.54 NS	No Trend

Table 3-3 Summary Trend Analysis for Select VOCs, 1993 to 2002 Old Springfield Landfill				
Well ID	**VOC**	**R^2**	***p*-value**	**Identified Trend**
MW-45B	Vinyl chloride	0.1561	0.12 NS	No Trend
MW-45B	1,2-DCE	0.2088	0.07 NS	No Trend
MW-45B	TCE	0.0073	0.75 NS	No Trend

Notes:

All reported significance levels are non-directional. Testing of a non-directional hypothesis makes no assumptions about the direction of the correlation relationship. That is, no assumptions are made about the positive or negative relationship between a given set of variables.

N=number of samples; NS denotes non-significance. (-) denotes decreasing trend; (+) denotes increasing trend; and (No trend) indicates that the p-value denotes randomness.

As seen in Table 3-3, analytical results for all three VOC constituents exhibited a decreasing trend in well MW-52G. This decreasing trend could be attributed to the operation of the groundwater treatment system. For all three VOC constituents, the temporal trend in wells MW-45T and MW-45B is not significant and concentrations appear to occur independently of time.

The scatter plots in Attachment 2 depict three, somewhat distinct trends in the shape of the data. Specifically, MW-52G data consistently exhibit a downward trend with some randomness; MW-45T data are widely scattered and random; and finally the data in MW-45B exhibit randomness in combination with what appears to be a pronounced seasonality (cycle and random).

Concentrations of VOCs have been generally decreasing in most of the wells monitored. However, groundwater data from 1998 to 2001 shows a sudden and noticeable increase in concentrations of certain VOCs (i.e., vinyl chloride, 1,1-DCA, 1,2-DCE TCE, and acetone) in bedrock well MW-45B. During the most recent (2002) monitoring round, the concentrations of these VOCs decreased to concentrations more consistent with historic levels, indicating that the previous increases in VOC levels in this well may have been a temporary, seasonally-influenced or non-significant trend. However, the VOC concentrations in this downgradient bedrock monitoring well should be examined in the future for indications of further increases that may indicate the off-site migration of contaminants.

3.2.3 VOCs in Extraction and Source Control Wells

The extraction wells (EW-1 and EW-2) remove groundwater from the subsurface sand and gravel unit for the purpose of containing contaminated groundwater to the site boundary, and minimizing the migration of contaminants to the discharge point at the Western Seep. Historically, only one or two VOCs have been detected at low levels in EW-1, while EW-2 contributes a majority of contaminants removed at the PTF. In general, the number of contaminants and the concentrations of contaminants in EW-1 and EW-2 has decreased or remained stable over time (since 1993). This data, in part, indicates these extraction wells are effectively and consistently removing contaminated groundwater from the sand and gravel layer, and controlling migration of contaminants to the Western Seep.

The source control well (SC-1, or EW-3) removes groundwater from the weathered bedrock layer that slopes towards the east, below the site, thereby minimizing migration of contaminated groundwater towards the Black River and the eastern seeps. While the number of contaminants detected has remained stable or increased, the concentrations of contaminants in SC-1 appear to have decreased over time (since 1994). An increase in the number of compounds detected may indicate that degradation products are becoming more prevalent, and that SC-1 has remained effective in capturing contaminated groundwater entering the bedrock layer. In addition, decreasing contaminant concentrations in SC-1 indicate the treatment system, combined with the effectiveness of other source controls (i.e., the cap, French drains, etc.) is limiting the migration of contamination into the bedrock layer and towards the Black River.

Samples are collected annually from EW-1, EW-2 and SC-1 and analyzed for TCL VOCs. In 1998, five VOCs (methylene chloride, vinyl chloride, 1,1,1-trichloroethane, trichloroethene, and tetrachloroethene) were detected in both EW-2 and SC-1 at concentrations at or exceeding their MCLs. In addition, trichloroethene was detected in EW-1 at a concentration exceeding its MCL.

In 2002, 1,1,1-trichloroethane concentrations in EW-2 and SC-1 decreased to below MCLs, but the four other VOCs listed for 1998 (vinyl chloride, 1,1-dichloroethene, trichloroethene and tetrachloroethene) were again detected in both samples at concentrations exceeding the MCLs. In 2002, two VOCs (trichloroethene and acetone) were detected in the EW-1 sample, but at concentrations below the MCL, where applicable.

3.2.4 French Drain Monitoring

Water samples are collected on an annual basis in three French drain valve and meter vaults at the site and analyzed for TCL VOCs. The purpose of the French drains is to intercept off-site groundwater before it enters the landfill mass. Flow from the French drains appears to be seasonally influenced (higher flows during the wetter spring months). This is consistent with the objective of intercepting shallow overburden groundwater. Since the construction of the cap, VOCs have been sporadically detected in the French drain samples. The source of the VOCs may be small amounts of leachate from the adjacent waste areas. The presence of VOCs in the collected water is not a concern since the water is treated at the Pre-Treatment Facility and the POTW.

3.2.5 Groundwater Elevation Contours

Groundwater elevation data was used to prepare potentiometric surface contour maps for the purpose of determining potentiometric gradient and potential contaminant migration pathways, and to evaluate the performance of the leachate collection and groundwater extraction systems. Groundwater elevation data was obtained from the *Annual Operations and Maintenance Report, May 2003*. Depth to groundwater data for the 1998-2003 period included data for five bedrock monitoring wells and 10 overburden monitoring wells. However, depth to groundwater data for the extraction and source control wells were not included in the reports reviewed by TRC.

Therefore, groundwater draw down around the extraction wells is inferred based on water levels from surrounding monitoring wells.

Groundwater elevations measured in site monitoring wells during the past five years were reviewed to determine the highest and lowest water table events. The highest measured water table event during the five-year period occurred during May 2000, and the lowest measured water table event occurred during July 1999.

Groundwater elevations measured during the high and low events in bedrock wells and in overburden wells were each plotted on the site map to evaluate groundwater flow direction. Figures 1 and 2 show the elevations of groundwater in overburden wells and bedrock wells, respectively, as measured during the high event on May 24, 2000. Figures 3 and 4 show the elevations of groundwater in overburden and bedrock wells, respectively, as measured during the low event on July 15, 1999.

As shown in the figures presented in Attachment 1, groundwater flow at the site generally occurs in a northeasterly direction below the cap and then in a more easterly direction, following the steep slope towards the Black River. On the west side of the site, groundwater also flows in a westerly direction towards Seavers Brook. Overall, these elevations indicate a drop in water table elevation of over 200 feet from the top of the site to the base of the slope near the Black River. In general, the water table fluctuated approximately two feet in each well from the low to the high event.

Locally, it is assumed groundwater flow in the vicinity of the source control well and extraction wells (SC-1, EW-1 and EW-2) is influenced by the extraction of groundwater at these points. However, as mentioned above, depth to water measurements for these extraction points was not provided in the documents reviewed as part of this five-year review. Therefore, the groundwater contours derived by TRC in the vicinity of SC-1, EW-1 and EW-2 were based solely on groundwater elevations measured in nearby monitoring wells.

While the extent of the capture zone of EW-1 and EW-2 cannot be determined precisely from the available data, the lower water elevation at MW-41G indicates the extraction is lowering the water table in the local vicinity. The locally low water level at well MW-41B may also be an indication of drawdown caused by the source control well SC-1.

3.3 Surface Water Monitoring

Surface water controls for the site include the interception of seep water from 10 seeps identified on the eastern slope and 4 seeps on the western slope. The seep water is intercepted by a French drain system. The west seep French drain system accounts for a little more than half of the total collection system flow. A surface water collection system was installed to direct surface water runoff away from the waste areas and cap. Concrete and grass lined ditches direct stormwater to a claymax® lined holding pond designed for controlling a 100-year flood.

The LTMP calls for semi-annual testing of a composite sample of drainage channel discharge. Based on available information, it appears EPA and ANR agreed that this surface water sampling could be discontinued as of 1996 or 1997.

Naturally-occurring surface water bodies located in proximity to the site include Seavers Brook, located approximately 350 feet west of the Site, and the Black River, located less than 200 feet east (downgradient) of the Site. These surface water bodies are not sampled as part of site monitoring activities. However, TRC reviewed the following reports by EPA dated 1999: "Lower Black River Assessment Report"; and "Minor Tributaries - Lower Black River Assessment Report" (Reports are included in Attachment 3). The first report discussed the section of the Black River nearest the Springfield, VT Wastewater Treatment Facility (which receives treated groundwater from the site), and the second report included a general discussion of Seavers Brook water quality impacts.

The first report noted that water quality in the Black River was threatened by algae, organic and nutrient enrichment and pathogens as a result of Wastewater Treatment Facility discharges and road runoff from Route 11, but did not reference potential impacts resulting from site conditions. This report also noted that the site was capped and a groundwater pump and treat system was in operation since 1994, and that volatile contaminants from the identified landfill seeps were likely to volatilize before reaching the River, according to Matt Germon of VTDEC. The second report noted that water quality in Seavers Brook was threatened by sedimentation resulting from nearby encroaching developments, but did not mention potential impacts to Seavers Brook from the site.

Construction of the landfill cap and the collection and discharge of leachate to the POTW were designed to eliminate the discharge of contaminants to surface water receptors. With continued maintenance of the landfill cap and leachate collection system, future compliance regarding surface water and sediments can be expected without additional remedial action.

3.4 Extraction System Monitoring

3.4.1 Flow Monitoring

Flows at each of the seven groundwater and leachate collection points are measured continuously by digitized totalizing flow meters. A totalizing flow meter is also located on the downstream side of the equalization tank in the PTF. Leachate flow readings are recorded from meters at each collection point and the PTF influent on a daily basis, and this information is summarized in annual O&M reports for the site.

The design average flow rate for influent to the PTF is 87 gallons per minute (gpm). Historically, actual mean flows have been only about 25% of the design flow rate (around 21 gpm). EW-1 and EW-2 have accounted for a majority (about 75%) of the flow to the PTF. The remainder of flow into the PTF originates from the source control well, French drains 1, 2 and 3, and the eastern leachate seep collection system (LSE 3/4). The running average flow to the PTF (presented in Annual O&M Reports) suggests the flow rate has been fairly steady since 1996.

Flow rates in EW-1 and EW-2 decreased between 1994 and 1999 until new discharge piping was installed due to the build up of fouling agents. The flow rate increased after the new piping was installed and has decreased to pre-1999 levels in 2002. This suggests that the discharge piping has become fouled and should be either cleaned or replaced. Similarly the flow rate from the source control well increased after the replacement of the discharge piping and pump in 2001. The flow rate from SC-1 should be monitored in the future for indications of fouling or pump problems.

The flow rate from the eastern leachate seep collection system (LSE-3 and LSE-4) averages approximately 1.7 gpm. The flow rate varies over time and appears to be seasonally influenced (higher flow during the wet spring months).

The flow rates from the three French Drains average less than 1 gpm each. The flow rates also vary over time and appear to be seasonally influenced.

3.4.2 PTF Influent Concentrations

Quarterly analysis of the combined PTF influent water shows the presence of several VOCs including 11 chlorinated hydrocarbons, acetone, bromoform and MEK. Trichloroethene, vinyl chloride, 1,1-dichloroethene, tetrachloroethene, and methylene chloride are consistently detected above the drinking water standard. The majority of the contaminant load appears to from EW-2 and SC-1. On the other hand, contaminant concentrations in the discharge from EW-1 is consistently below the detection limit and only three concentrations exceeded the drinking water standard since 1993.

3.5 Seep Monitoring

An annual sample of the discharge from the Eastern Leachate Seeps (LSE-3 and LSE-4) is collected in the LSE 3/4 common valve meter vault. The LSE 3/4 samples are submitted for analysis of VOCs. In general, LSE 3/4 analytical results for the past 5 years show similar VOCs present in 2002 and at slightly higher concentrations than in 1997. Of the nine VOCs detected in the LSE 3/4 sample in 1997, two VOCs, vinyl chloride and methylene chloride, were detected at concentrations exceeding their MCLs. In 2002, 10 VOCs were detected in the LSE 3/4 sample. These VOCs included 1,1-DCE, tetrachloroethene, and TCE at concentrations above their MCLs, and vinyl chloride at a concentration equal to its MCL. In 2002, TCE was detected at an unusually high concentration (310 µg/L), over 60 times its MCL. This concentration was well above the long-term average for TCE in the LSE 3/4 samples.

The Western Seep is sampled on a quarterly basis for VOCs and metals and annually for PCBs, pesticides and SVOCs. A review of analytical data from 1997 and 2002 suggests that contaminant concentrations are decreasing. During the 1997 annual sampling period, six TAL Metals were detected in the Western Seep sample (barium, calcium, manganese, magnesium, potassium, and sodium) at concentrations below drinking water standards. PCBs, pesticides, and SVOCs were not detected above laboratory reporting limits in the 1997 samples. One VOC (methylene chloride) was detected in the summer, fall and winter 1997 quarterly samples, each time at concentrations exceeding its MCL.

In 2002, no VOCs were detected in the Western Seep sample in February and July, and up two three VOCs were detected at low concentrations (well below MCLs) in March and October. Therefore, VOC levels in the Western Seep appear to have decreased over the past 5 years.

The LTMP calls for the sampling of any newly identified seeps. Two new seep samples were collected on May 29, 2003. In accordance with the LTMP, one sample was collected from a new seep (LSE-1A) in a sinkhole area located approximately half way between LSE-01 and LSE-02. A second sample ("Headwall") was collected from a suspected seep, where water was flowing over the concrete lining at the junction of two fabriform ditches near the southeast corner of the site. In addition a third sample was collected from the LSE-02/Station 2 seep location at eh request of EPA. The May 2003 seep samples were submitted for analysis of Target Analyte List (TAL) Metals and VOCs. A copy of the laboratory analytical report for the May 2003 Supplemental Seep sampling is included in Attachment 4.

VOCs were not detected above the laboratory's method detection limits in either the LSE-1A or the LSE-02 samples. Acetone and methylene chloride were detected in the Headwall sample, but at concentrations below applicable MCLs.

Metals were not detected at concentrations exceeding applicable MCLs in the Headwall sample. Antimony was detected at concentrations of 8.2 and 7.4 µg/L, in the new seep (LSE-1A) and Station 2 (LSE-2), respectively. These concentrations exceed the MCL of 6 µg/L for Antimony. Concentrations of this metal previously did not exceed the MCL in the seeps sampled during the five-year review period or before. According to David Deane of Dufresne-Henry, antimony is not known to be a site contaminant, but was likely used at one or more of the manufacturers historically operating in Springfield. Only methylene chlorifde was detected at an estimated concentration o 1 ug/L in the Headwall and LSE-1A samples.

3.6 System Performance Evaluation

The selected remedy for the site includes both source control and management of migration (through groundwater containment) components including:

- providing alternative water supply to residents;
- grading and placement of a RCRA cap over the landfill;
- surface water controls;
- leachate collection/groundwater extraction;
- treatment of leachate and contaminated groundwater onsite and at the Springfield Publicly Operated Treatment Works;
- monitoring; and
- institutional controls.

3.6.1 *Cap and French Drains*

The remedial objectives of the cap 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 objective of reducing or eliminating the generation of landfill leachate has been met. The cap is well-maintained, and is periodically inspected and repaired as necessary.

Two French drain systems were constructed to intercept upgradient, overburden ground water and prevent it from entering the wastes of Waste areas 3 and 4. The French drain systems extend to about 25 feet below ground surface (bgs) and are designed to intercept shallow groundwater that may migrate along the top of till. Water collected in the French drain sumps is pumped to the PTF.

The running average flows in the French drains have remained fairly steady since 1995. Monthly flows in the French drains vary, apparently due to seasonal fluctuations in the shallow groundwater table. The overall steady average flow in the French drains indicates the French drain system is operating reliably and as intended.

3.6.2 *Extraction Wells*

The groundwater extraction system includes two groundwater extraction wells (EW-1 and EW-2). These extraction wells were installed in the vicinity of Waste Areas 3 and 4 to extract contaminated groundwater from the shallow sand and gravel layer that exhibits a preferential gradient towards Seavers Brook and the Western Seep. Extracted groundwater is routed to the PTF prior to being conveyed to the POTW. About half of the water received at the PTF is derived from these extraction wells.

While the degree of containment is uncertain, groundwater elevations in the vicinity of the extraction wells indicate localized groundwater containment. Additional evidence of groundwater containment is the decreasing contaminant trends in wells MW-41G and MW-52G. Contaminant concentrations have been below the MCL in MW-41G since 1998 and the regression analysis presented herein shows decreasing trends for vinyl chloride, 1,2-Dichloroethene, and TCE at well MW-52G. Both of these wells are located within the sand and gravel unit near or downgradient of the extraction wells.

The concentrations of chemicals of concern at the site have basically stabilized. The primary contaminant of concern, trichloroethene, remains at a concentration of about 1 ppm at the influent to the PTF, which is at a level about 200 times the potable groundwater standard. Declines in well concentrations over time should occur as the source material is depleted, by natural degradation, by sorption to organic matter, natural chemical reactions, dispersion and capture by the treatment system.

The steady concentration of TCE in groundwater may be due to the presence of free product TCE in the ground, also referred to as dense nonaqueous phase liquid (DNAPL). The natural biodegradation of TCE to vinyl chloride and 1,2-DCE likely accounts for their presence at stable levels in groundwater. The slow steady leaching of TCE DNAPL and desorption from the matrix rock will likely continue at the site for tens of years or longer.

In general, the groundwater extraction system appears to be functioning as originally approved in 1994 and is consistent with its intended purpose of groundwater containment. Continued monitoring at remote monitoring wells and continued operation of the leachate and groundwater recovery system will ensure the effectiveness of the groundwater containment system.

3.6.3 Source Control Well

The source control well, SC-1 (also referred to as EW-3) is located within Waste Area 3 to extract contaminated groundwater from the underlying weathered bedrock formation. SC-1 was configured to target the bedrock groundwater that would otherwise flow downgradient (over the steep bedrock incline) towards the Black River. Groundwater that is recovered in SC-1 is pumped to the PTF prior to being conveyed to the POTW.

In general, the running average flow in SC-1 decreased gradually from 1995 to 2000, and has been increasing slightly since 2000. In particular, daily flows have been slightly higher, overall, since July 2001. The reason for this increase is unclear, but could be related to the replacement of the pump in SC-1 in 2001.

Based on the regression analysis, concentrations of contaminants are not increasing with time at well MW-45B. This suggests that no additional contaminants are migrating from the site through the upper weathered bedrock to the west. Ultimately the groundwater contamination in well MW-45 is expected to discharge into the Black River and become highly diluted and likely below aquatic risk levels. In any case, the nearby residences are on a public water supply and are therefore protected from groundwater consumption exposures.

3.6.4 Western Leachate Seep

The Western Seep refers to groundwater that formerly discharged to the ground surface to the west of the site, near Seavers Brook. Prior to the implementation of the remedy, it was found that this groundwater was contaminated with landfill related contaminants. The source of the Western Seep appears to be the sand and gravel unit present in the waste areas that has a hydraulic gradient to the west. To prevent human contact and/or ingestion with this seep, groundwater is intercepted at the Western Seep via a French drain and is discharged to the POTW untreated. The leachate and groundwater quality is monitored and reported in accordance with the POTW permit for volatile organic compounds, total metals and alkalinity/conductivity.

As a result of the operation of the Western Seep collection system, the Western Seep has been effectively captured and is no longer exiting at the ground surface. Running average flow rates for the Western Seep collection system show a sharp decrease in flow in 1993. Flows have remained steady since 1994 (around 26 to 27 gallons per minute). This may suggest that the flow to the Western seep was affected by the groundwater extraction system within the landfill.

3.6.5 *Eastern Leachate Seeps*

The capture and treatment of two primary leachate seeps, located on the east side of the landfill, was included as part of the remedy. These eastern leachate seeps, LSE-03 and LSE-04, were formerly located near the middle of the steep slope on the eastern side of the landfill. A French drain collection network with two sumps (LSE-03 and LSE-04) was installed in 1993 to collect the eastern seeps and convey them to the PTF for treatment prior to being discharged to the POTW. The combined flow from LSE-03/04 is measured in their shared meter vault.

The fact that no new seeps have developed in the area of LSE-3 and LSE-4 indicates the collection system is effectively capturing the leachate and preventing the leachate from impacting surface water resources.

As discussed in Section 3.5, a new small seep has developed on the eastern slope where the two fabriform concrete-lined ditches converge. This flow was observed by TRC, Dufresne-Henry and EPA during a site visit in May 2003. The flow rate of the seep could not be estimated accurately, but appeared to be less than 1 gallon per minute. The new seep has likely developed because the concrete lining prevents normal discharge of shallow groundwater into the drainage channels. Therefore, shallow groundwater would tend to concentrate at the convergence of the two fabriform channels. Samples show moderate levels of some leachate indicators (i.e., iron and manganese). However, flow from the new seep is low and contaminants will be highly diluted in the receiving surface water (Black River).

3.7 Air Monitoring, Emissions, and Compliance

The landfill gas vents and an air stripper used as part of the contaminated groundwater treatment system emit some contaminants to the ambient air. Analytical data for landfill gas samples collected by the PRP in 2001 were evaluated to identify any applicable air regulations.

3.7.1 *Potential Landfill Gas Emission Routes to the Atmosphere*

The landfill vents extend to some depth below the landfill cover to provide an outlet for gases generated in remaining waste. The vents help to minimize the amount of potentially explosive methane gas in the landfill, a major constituent of landfill gas.

The groundwater treatment system at the site employs an air stripper where volatile and, to a lesser degree, semi-volatile contaminants are preferentially transferred from liquid media (groundwater) to gaseous media (air) within the stripper. The contaminant-bearing air stream is then passed through a carbon bed where the contaminants adhere to the carbon. The carbon beds are changed periodically to minimize breakthrough, noted as a sharp increase in the levels of one or more contaminants in the exhaust air.

3.7.2 *Emissions Data*

Air emissions test data were obtained by the PRP's contractor in 2001. Test results for the air stripper compared influent and effluent concentrations for target analytes along with respective

Vermont Hazardous Ambient Air Standards (HAAS) and "potential release" estimates for 8-hour periods. Results for each landfill gas vent are compared the HAAS and NIOSH 8-hour TWA but do not include any exhaust flow data.

3.7.3 Regulatory Review

Air emissions from landfills are potentially subject to state and Federal air regulations.

3.7.3.1 State Air Regulations

Vermont's Air Pollution Control Regulations are found in Chapter V of the Environmental Protection Regulations. The regulations generally focus on new sources or modifications to existing sources that emit air contaminants above specific regulatory thresholds. The air emissions data reviewed for this site did not include any quantification of emissions (mass of contaminant emitted per unit time) for the landfill vents that would be required to conduct a more complete regulatory applicability analysis of the site. Given that restraint, the following is a review of regulations that may apply to the site, but for which no definitive conclusion may be drawn for some regulations due to the lack of quantified emissions data.

Item (17) of 5-401 (Classification of Air Contaminant Sources) allows for a case-by-case determination to be made by the Air Pollution Control Officer. The corresponding Air Pollution Control Permitting Handbook (1999) indicates that a new landfill could be considered as an air contaminant source under 5-401(17). However, the subject landfill is not a new source and does not trigger any current air permitting requirements. The permitting threshold for sources identified in this regulation is allowable emissions of "10 tons per year or more of all air contaminants in the aggregate". A source meeting this requirement is referred to as a "Subchapter X major source".

Regulation 5-253(20) (Other Sources that Emit Volatile Organic Compounds) contains a minimum emissions threshold of 50 tons per year, above which the regulation applies. A number of the contaminants measured as part of the air monitoring effort at the site are classified as VOCs. Landfill gas, at the methane-producing stage, consists mostly of methane and carbon dioxide, with small amounts of non-methane organic compounds (NMOCs). The NMOCs include the VOCs reported in the ambient sampling for the site. Given the low concentration levels of NMOCs in landfill gas, it is unlikely that the site has VOC emissions approaching the 50-ton per year threshold.

Regulation 5-261 (Control of Hazardous Air Contaminants) applies to any source that emits a hazardous air contaminant above a contaminant-specific Action Level, given in terms of pounds of contaminant emitted per 8-hour period. Under subpart (2) of this regulation, a facility emitting any Category I contaminant listed in Appendix C had to submit an emissions inventory to the Air Pollution Control Officer by December 31, 1993. Review of the sampling data reveals a number of Category I air contaminants were sampled by OSM. Under (6)(a) of this regulation, any source emitting a Category I air contaminant after January 1, 1993 cannot cause an exceedance of a stationary source hazardous air impact standard (numerically equivalent to the

HAAS, see Appendix C of the regulations). A stationary source may be requested by ANR to conduct an air dispersion modeling study to evaluate its compliance with (6)(a).

There are provisions for the ANR to modify a HAAS and, under 5-261(7), to develop an HAAS for a facility emitting a hazardous air contaminant which is not listed in Appendix B of the regulations. It is possible that the subject facility may have to demonstrate compliance with any modified or new HAAS at the request of ANR. A "General News" item on the Air Pollution Controls Division (APCD) indicates that APCD and the VT Department of Health are working jointly on revisions to the HAAS. No target date for the revisions is identified in the brief.

Information available on the ANR's Vermont Air Toxics Program web page indicate that "most" point sources are required to register their hazardous air contaminant (HAC) emissions annually. ANR's Point Source Registration Program web page contains the annual reporting threshold of 5 tons per year of actual emissions of criteria pollutants. While not explicitly stated on either of the above web pages, it is likely that any source meeting the annual registration requirement would also trigger the need to report HAC emissions. A review of annual emissions for sources in VT also available on the ANR website for two recent years does not include the subject landfill.

The state's air pollution control regulations address ambient air quality standards for the criteria pollutants in sections 5-302 to 5-312, reflecting the National Ambient Air Quality Standards (NAAQS). Vermont also has ambient standards for particulate matter (total suspended particulate) and a secondary standard for sulfates at 5-312.

For a source that ANR felt was causing or contributing to a condition of air pollution, the ambient air quality standards and/or HAAS would form the basis for demonstrating compliance through the conduct of an air dispersion modeling study for such a source. Sampling data for the subject site are compared with HAAS. Sampling results for the water stripper exhaust show that none of the action levels (pounds per 8-hour period) are triggered. Results for the landfill vents indicate that some hazardous air contaminants are emitted to the atmosphere in concentrations exceeding respective HAAS. Given the difference between measured data from within the source and HAAS, it is likely that the emitted air contaminants would not pose a threat at the facility property line, the nearest point at which ambient air is defined. Further, based on a discussion with an ANR representative (see below), an opinion was expressed that the subject landfill does not pose any threat to ambient air quality standards and/or the HAAS as of this writing. Although the HAAS were exceeded, the HAAS are based on constant lifetime exposure and site workers are briefly and infrequently exposed to gas vents.

Air quality modeling may be required under 5-406 by ANR for any new source or modification to an existing source addressed under 5-501 and for indirect sources at 5-503. The subject source is not classified as new and is not an indirect source, and modeling is therefore not required under this regulation.

Regulation 5-241 (Prohibition of Nuisance and Odor) is a wide-ranging regulation that addresses conditions that may emanate from the site, such as odor, that may trigger a regulatory review and possible enforcement action if detected beyond a facility's property line. It is possible that ANR could require a source to perform an air dispersion modeling analysis of the problem source as part of their evaluation. Given the low odor detection levels of some components of landfill gas, such as hydrogen sulfide, there is incentive for the facility's operator to maintain equipment in good working order.

Vermont's operating permit program regulations are found in Subchapter X. The subject landfill does not meet any of the applicability criteria under 5-1003, and is therefore not subject to this regulation.

3.7.3.2 State Agency Contact

As part of this effort, TRC contacted an ANR representative familiar with the state's landfill air emissions. Mr. Doug Elliott stated that the landfills that were closed in the 1990s were all reviewed and the appropriate level of air emissions controls was in place.

3.7.3.3 Federal Air Regulations

Federal air regulations are not applicable to the Old Springfield Landfill. The Federal rules for landfills apply to facilities that have accepted waste after November 7, 1987 and have uncontrolled non-methane organic compound (NMOC) air emissions of approximately 55 tons per year. (National Emission Standards for Hazardous Air Pollutants (NESHAPS) at 40 CFR 63 Subpart WWW (Municipal Solid Waste Landfills) and New Source Performance Standards (NSPS) at 40 CFR 60 Subpart Cc (Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills))

A MACT standard is being developed by EPA under 40 CFR 63 Subpart AAAA. This standard will only apply to facilities meeting the same applicability criteria as NESHAPS WWW. Therefore, the proposed MACT standard does not apply to the Old Springfield Landfill.

The air stripper vent is subject to performance criteria under RCRA regulations at Subpart CC. These regulations were identified as an ARAR via a reference in the ROD to regulations proposed in 1987 that eventually were promulgated as Subpart CC. This control device employs activated carbon to reduce emissions. The RCRA regulations call for 95 percent removal of all organics by the carbon media with carbon media changes occurring on a regular basis. Periodic sampling of the exhaust should be done to monitor for breakthrough. The sampling period may range from daily to one-fifth of the period expected for total working capacity to be used. If breakthrough occurs, the media should be changed immediately with the contaminated media disposed of properly.

TRC reviewed four sets of measurement data for the carbon bed influent and effluent for 2002. The results show that for 3 of the sets of measurements (2/6, 4/24, and 8/9), the 95 percent control efficiency was being achieved. The measurement data for 10/3 showed 53 percent control. However, there is at least one unusual finding associated with that data that could be used to challenge its validity. A number of compounds were detected in the effluent in concentrations greater than seen in the influent measurements. The total loading of organics into the carbon bed for the October test was also the lowest of the four tests. One other potential factor in the lower control level could be the elapsed time from the last carbon media change to the October test. The average control for the 4 tests is 92 percent, just below the 95 percent threshold in Subpart CC.

3.7.4 Compliance with Air Regulations

Based on available information, a review of Federal and state air regulations for the Old Springfield landfill indicates that the facility is not subject to existing air permitting requirements. However, some additional future effort may be required at the request of VT ANR to demonstrate compliance with any new or revised HAAS.

Further, review of existing and proposed Federal air regulations for landfills indicates that the facility should not be subject to NSPS or MACT standards. However, it appears that monitoring of the air stripper carbon bed performance should be more frequent and that the media should be changed as soon as breakout has been detected to comply with RCRA requirements.

4.0 SITE INSPECTION

4.1 Summary of Current Site Inspection

Amy Stattel, a TRC engineer, conducted the semi-annual inspection of the Old Springfield Landfill on April 18, 2003. The inspection was performed as part of the semi-annual inspection and also the Five-Year Review for the landfill. The Semi-Annual Inspection Report is presented at Attachment 5. A Five-Year Review checklist was used to document the observations made during the inspection. The report is based on observations made by TRC during the visual inspection of the landfill surface. No testing was performed on components of the landfill system.

TRC inspected components of the landfill cover system, as summarized below.

- **Landfill surface** – The landfill surface was generally in good condition with some rodent holes on Waste Areas 3 and 4.

- **Fabri-Form Channels**– Overall, the three Fabri-Form channels were observed to be in good condition. A slight separation was observed at a seam in the Fabri-Form material in the southern channel. A cavity was present in the soils next to the seam, where runoff was entering the cavity from off the cap. Repair of the channel was recommended to prevent further degradation of the Fabri-Form channel.

- **Cover penetrations** – In general the gas vents and gas vent sheds were in good condition with no signs of operational issues. However, rodent damage, including mounded soil and displaced insulation, was observed in many of the sheds. TRC recommended removal of the mounded soils and continued rodent control measures. The O&M staff indicated that they planned to install concrete floors in the gas vent sheds in the next year. This should not affect the performance of the gas vents.

- **Cover drainage layer** – The drain pipe outlets for the drainage layer into the Fabri-Form channels appeared to be in good condition and flowing freely.

- **Detention/Sedimentation Basin** – A recent slope failure was observed on the western sidewall of the detention basin, near the southwest corner. The Geosynthetic Clay Liner appears to be degraded and is promoting infiltration of water into the soils underlying the basin. Due to sidewall erosion that has occurred in the past (2001-2002), TRC recommended that the GCL below the detention basin be replaced, and that the sidewall be repaired.

- **Groundwater systems** – The above ground portions of the systems were in good condition. At the time of the inspection, the granular activated carbon units in the PTF were being replaced.

Recommendations of corrective actions based on the inspection included the investigating the cause of the seep and repairing related erosion in the detention basin, repair of the split in the southern Fabri-Form channel, continued monitoring and removal of sediments and vegetation in the channels, and continued rodent removal on the cap. The overall conclusion based on the site inspection is that the components of the landfill cover system are working as designed, with the exception of the detention basin.

4.2 *Past Inspections*

Semi-annual inspections of the Old Springfield Landfill have been conducted by TRC since November 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, leachate collection, and groundwater extraction systems continued operation.

5.0 INTERVIEWS

During the semi-annual inspection of the Old Springfield Landfill on April 18, 2003, Amy Stattel of TRC interviewed Mr. Rick Chambers, Chief Operator of the Town of Springfield Wastewater Treatment Plant/Publicly-Owned Treatment Works (POTW). Mr. Chambers, on behalf of the POTW, oversees the operations and maintenance of the landfill on an ongoing (almost daily) basis. Mr. Chambers was at the site on the day of the inspection to answer TRC's questions and to oversee the replacement of the granular activated carbon units at the PTF.

TRC asked if there were any outstanding operational/maintenance issues to be aware of during the semiannual inspection. Rick indicated that a system alarm was currently sounding at the pre-treatment building control panel due to defective pump in groundwater pumping well LSE-3 (manhole P4). He indicated that the pump would be replaced the following week (week ending 4/25/03).

TRC asked what the flow has been from the pretreatment building to the POTW (given the snowmelt from winter 2002/2003 and the heavy spring 2003 rains). Mr. Chambers indicated that the total flow (2003, to-date) was currently at 30,000 gallons as of April 2003, and that the site discharge permit is for 75,000 gallons annually. He also indicated that the total flow for fall/winter last year was only 18,000 gallons, so the total annual flow last year was well below the permitted annual flow.

On July 23, 2003, TRC contacted Rick Chambers via telephone for a follow-up interview. TRC asked about maintenance events in the last year that may have influenced flow. Rick indicated that the pump in LSE-3/P4 (pump was malfunctioning during TRC's Spring 2003 Inspection) was replaced at the end of April 2003. Rick also indicated that the switch meters are cleaned periodically due to fouling, but that this activity has a temporary effect only on localized flow; not total flow. Also, they plan to gradually replace all of the iron extraction system lines (2 or 3 per year) with plastic pipes to decrease clogging (some already replaced). Other periodic flow-maintenance activities performed by the POTW staff include periodic replacement of the screens at the ends of the lines to the french drains because they tend to get clogged.

6.0 TECHNICAL ASSESSMENT

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

6.1.1 Remedial Action Performance

The work performed during production of this memorandum indicates that the remedy is functioning as intended. The information sources include review of the available documents and data, TRC's trend and statistical analysis of groundwater, the interview, and the site inspection. The landfill cap, and the O&M of the leachate seep collection and groundwater extraction systems have achieved the remedial objectives: to minimize the migration of contaminants and prevent direct contact with or ingestion of contaminants. Based on the fairly consistent detection of VOCs in perimeter monitoring wells over the past five years, and the slowly decreasing concentrations, the long term goal of groundwater restoration at the site will likely not be achieved for many years.

The lack of statistical trends in VOC concentrations in a few wells (i.e., MW-45T and MW-45B) warrant close monitoring in future inspections and data reviews to evaluate whether the migration of impacted water off-site is increasing or additional hydraulic controls may be considered to ensure the capture of landfill contamination. These wells monitor the deep-aquifer groundwater that flows east towards the Black River.

The presence of leachate indicators (manganese and iron) at low concentrations in new seeps does not warrant additional sampling.

6.1.2 System Operations/O&M

Operation and maintenance of the cap and leachate seep collection and groundwater extraction systems has been, and continues to be effective. Issues identified during the semi-annual site inspections are regularly addressed or continue to be monitored.

Groundwater flow and potentiometric surface is currently measured at only seven bedrock wells and 14 overburden wells. Only one bedrock well (MW-45B) located on or at the base of steep eastern slope (downgradient of wastes) is included in groundwater elevation measurements, to monitor the hydraulic gradient related to the weathered bedrock unit that flows towards the Black River. Also, only one overburden well is measured within the sand and gravel layer to the west of the landfill, where shallow groundwater tends to flow towards the Western Seep. To more accurately evaluate groundwater flow and the effectiveness of the groundwater containment system (source control and extraction wells), TRC recommends adding additional wells to regular groundwater elevation measurement activities. Specifically, it would be useful to add groundwater elevations from deep wells on the west slope (e.g., MW-42T, if serviceable) and from available shallow wells on the east side of the site, between the extraction wells and the Western Seep (e.g., MW-29, MW-15). Water levels in the extraction wells (EW-1, EW-2 and SC-1) should also be measured at least once per year in order to evaluate drawdown and capture at the wells.

6.1.3 Opportunities for Optimization

The groundwater extraction system is the only system at the Site where optimization is possible. The low level of contaminants in the discharge of EW-1 indicates extraction at that point is not needed, or the extraction rate is too high causing excessive amounts of clean groundwater to be drawn into the well. If optimization is attempted, the EW-1 flow rate should be reduced gradually over a period of months. The concentration in the discharge should be monitored periodically until the contaminant removal rate is maximized. Groundwater in the sand and gravel unit should be monitored quarterly, if not monthly to ensure that contaminant concentrations do not increase indicating a decrease in the extraction well capture zone.

6.1.4 Early Indicators of Potential Issues

One indication of a potential performance deficiency in the remedy is the lack of statistical trends (continued detection) in VOC concentrations in monitoring wells MW-45T and MW-45B. The data should be monitored for an increasing trend that may indicate VOCs in the weathered bedrock unit are bypassing the source control well and migrating to the east towards the Black River.

6.1.5 Implementation of Institutional Controls and Other Measures

Institutional controls implemented at the site include the fencing of the landfill to limit access and exposure, limited development within the fence line, the restriction of groundwater use by the town of Springfield outside the fence enclosing the cap, and a public water supply provided to nearby residents. The attached figure (Attachment 6) shows the location of the water supply line currently utilized by nearby residents. No activities were observed that would have violated the institutional controls.

6.2 Question B: Is There a Need to Update any of the Monitoring Plans used to Evaluate the Performance of the Remedy?

TRC conducted a review of the sampling and analytical procedures to determine the need to update any of the monitoring plans used to evaluate the performance of the remedy. Prior to the implementation of the remedy, hydraulic monitoring was conducted about semiannually at up to 23 monitoring wells. However, the number of monitored wells has declined sharply. The list of wells recommended in the 1993 LTMP for groundwater elevation measurements did not include the wells described above. Consideration should be given to supplementing the number of groundwater elevations measured and improving accuracy in evaluating groundwater flow by adding additional wells.

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

From all of the activities conducted as part of this five-year review, no new information has come to light which would call into question the effectiveness of the remedy. No new human or ecological receptors have been identified at this time. No evidence of damage due to natural disasters or lack of maintenance was noted during the site inspection.

7.0 REFERENCES

Code of Federal Regulations, Title 40, Part 264 (40CFR 264)

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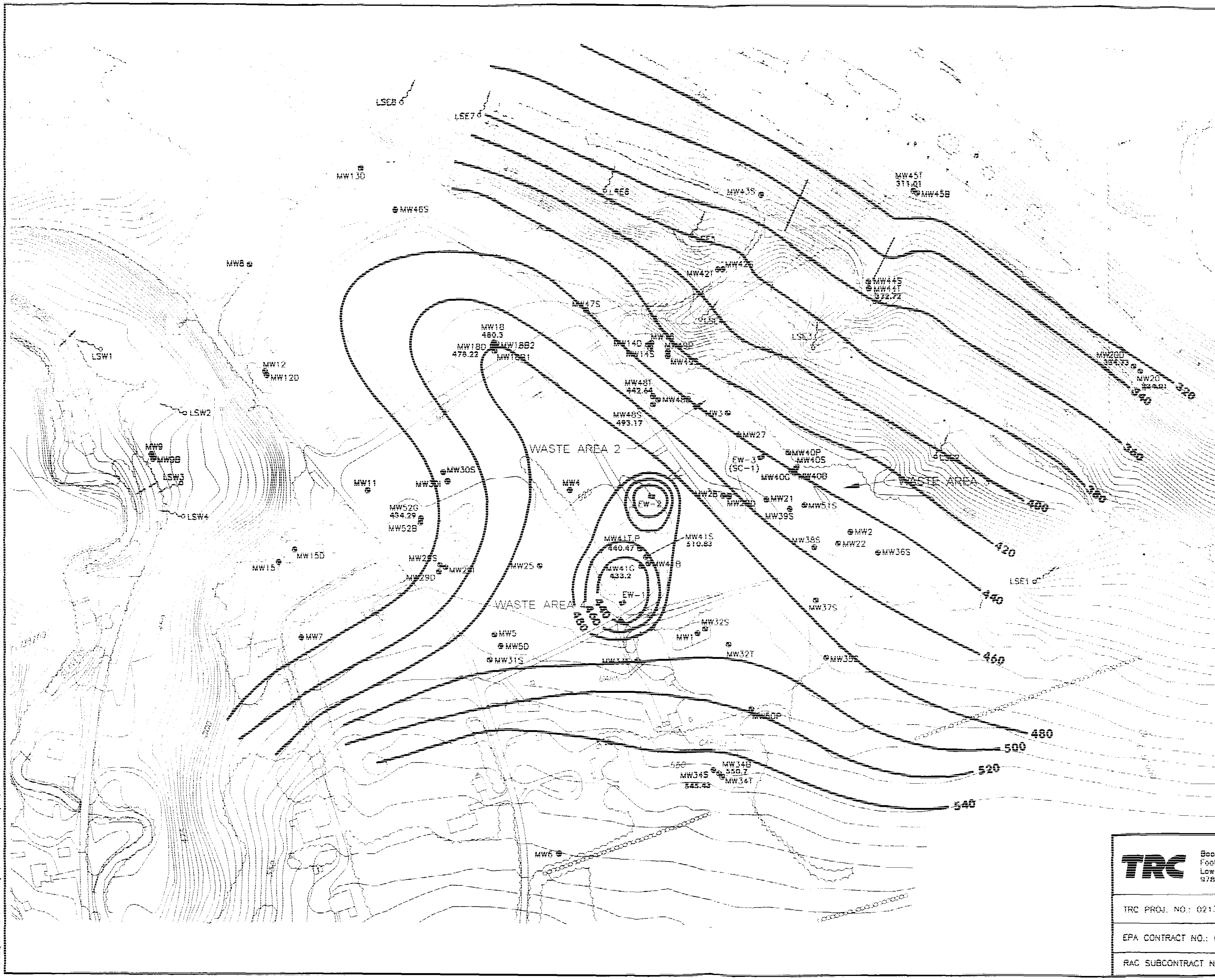
ATTACHMENT 1

FIGURES



LEGEND:

- MW3 550.7 — MONITORING WELL LOCATION AND DESIGNATION WITH GROUNDWATER ELEVATION DATA
- EW-1 — EXTRACTION WELL LOCATION
- 320 — APPROX. GROUNDWATER CONTOUR

NOTES:

1. COMPLETE CONSTRUCTION ACTIVITIES ASSOCIATED WITH OU1/I NOT SHOWN AS EXISTING CONDITIONS ON THIS PLAN.
2. ALL LOCATIONS ARE APPROXIMATE.
3. DEPTH TO GROUNDWATER DATA FOR EXTRACTION WELLS WAS NOT AVAILABLE FOR THE GROUNDWATER EVENT SHOWN. THEREFORE, GROUNDWATER CONTOURS ARE BASED ON MONITORING WELL ELEVATION DATA ONLY.

BASE MAP SOURCE.
REMCOR, APRIL 6, 1993, DRAWING NO. 92093-E124

SCALE, FEET
100 0 100 200

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0530-02022

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

FIGURE 1
GROUNDWATER CONTOUR MAP
MAY 24, 2000
HIGH GROUNDWATER CONDITIONS
OVERBURDEN WELLS

OLD SPRINGFIELD LANDFILL
SPRINGFIELD, VERMONT

Metcalf & Eddy

02136\MULTI-SITE 5-YEAR\OLD SPFLD LANDFILL\GW5-24-00 HIGH OVERB

LEGEND:

MW3 319.27 — MONITORING WELL LOCATION AND DESIGNATION WITH GROUNDWATER ELEVATION DATA

EW-1 — EXTRACTION WELL LOCATION

320 — APPROX. GROUNDWATFR CONTOUR

NOTES:

1. COMPLETE CONSTRUCTION ACTIVITIES ASSOCIATED WITH OU1/I NOT SHOWN AS EXISTING CONDITIONS ON THIS PLAN.
2. ALL LOCATIONS ARE APPROXIMATE.
3. DEPTH TO GROUNDWATER DATA FOR EXTRACTION WELLS WAS NOT AVAILABLE FOR THE GROUNDWATER EVENT SHOWN. THEREFORE, GROUNDWATER CONTOURS ARE BASED ON MONITORING WELL ELEVATION DATA ONLY.

BASE MAP SOURCE.
REMCOR, APRIL 6, 1993. DRAWING NO. 92093-E124

SCALE, FEET
100 0 100 200

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0530-02022

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

FIGURE 2
GROUNDWATER CONTOUR MAP
MAY 24, 2000
HIGH GROUNDWATER CONDITIONS
BEDROCK WELLS
OLD SPRINGFIELD LANDFILL
SPRINGFIELD, VERMONT

Metcalf & Eddy

02136\MULTI-SITE 5-YEAR\OLD SPFLD LANDFILL\GW\5-24-00 BEDROCK HIGH

LEGEND:

MONITORING WELL LOCATION AND DESIGNATION WITH GROUNDWATER ELEVATION DATA (MW3 309.81)

EXTRACTION WELL LOCATION (EW-1)

APPROX. GROUNDWATER CONTOUR (320)

EXISTING CULVERT

NOTES:

1. COMPLETE CONSTRUCTION ACTIVITIES ASSOCIATED WITH OU1/I NOT SHOWN AS EXISTING CONDITIONS ON THIS PLAN.
2. ALL LOCATIONS ARE APPROXIMATE.
3. DEPTH TO GROUNDWATER DATA FOR EXTRACTION WELLS WAS NOT AVAILABLE FOR THE GROUNDWATER EVENT SHOWN. THEREFORE, GROUNDWATER CONTOURS ARE BASED ON MONITORING WELL ELEVATION DATA ONLY.

BASE MAP SOURCE:
REMCOR, APRIL 6, 1993. DRAWING NO. 92093-E124

SCALE, FEET
100 0 100 200

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0530-02022

EPA CONTRACT NO.: 68-W6-0042

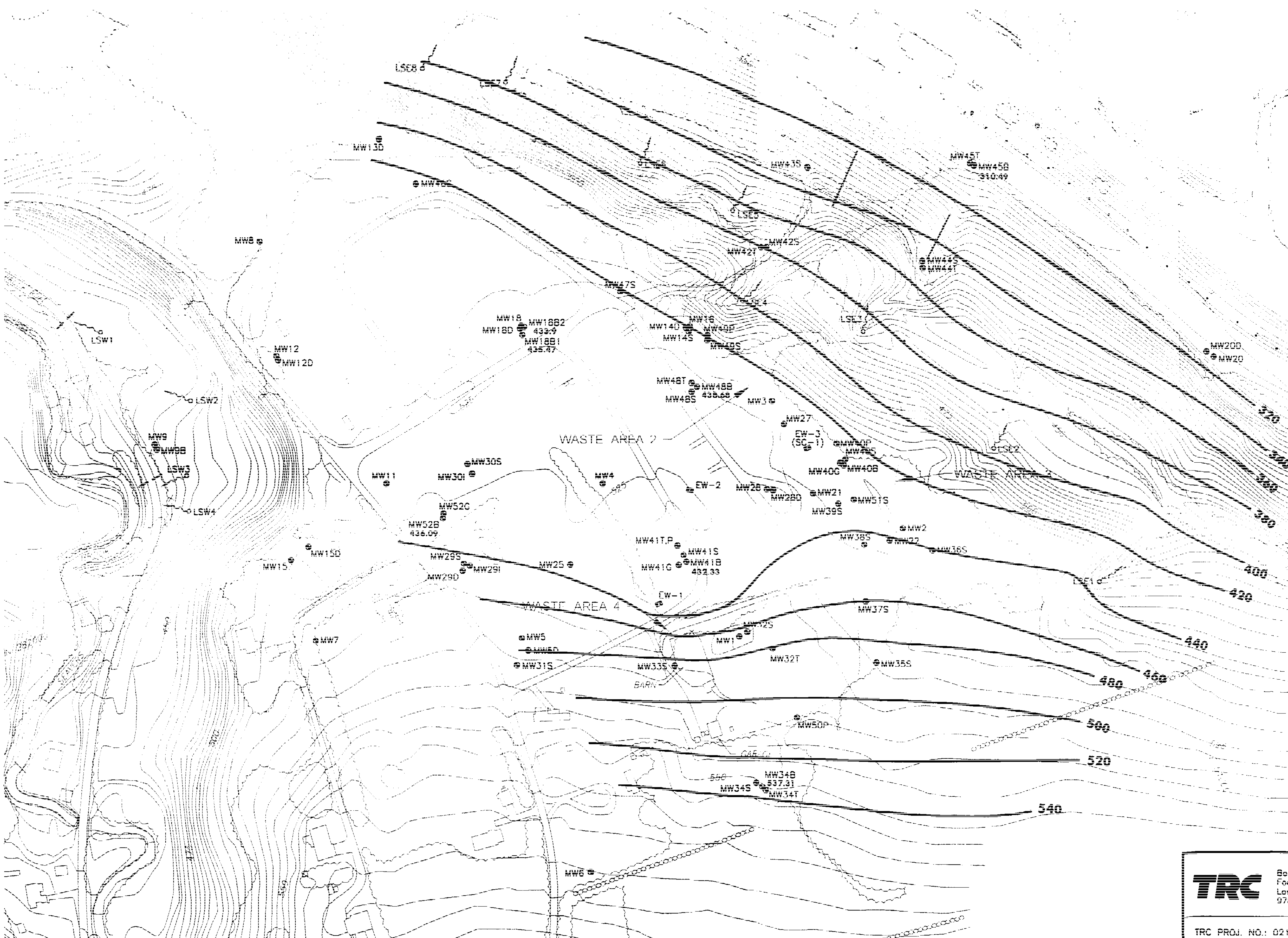
RAC SUBCONTRACT NO.: 107061

FIGURE 3
GROUNDWATER CONTOUR MAP
JULY 15, 1999
LOW GROUNDWATER CONDITIONS
OVERBURDEN WELLS

OLD SPRINGFIELD LANDFILL
SPRINGFIELD, VERMONT

Metcalf & Eddy

02136\MULTI-SITE 5-TEAR\OLD SPFLD LANDFILL\GW\7-15-99 LOW OVERB



LEGEND:

- MW3 537.31 — MONITORING WELL LOCATION AND DESIGNATION WITH GROUNDWATER ELEVATION DATA
- EW-1 — EXTRACTION WELL LOCATION
- 320 — APPROX. GROUNDWATER CONTOUR

NOTES:

1. COMPLETE CONSTRUCTION ACTIVITIES ASSOCIATED WITH OU1/I NOT SHOWN AS EXISTING CONDITIONS ON THIS PLAN.
2. ALL LOCATIONS ARE APPROXIMATE.
3. DEPTH TO GROUNDWATER DATA FOR EXTRACTION WELLS WAS NOT AVAILABLE FOR THE GROUNDWATER EVENT SHOWN. THEREFORE, GROUNDWATER CONTOURS ARE BASED ON MONITORING WELL ELEVATION DATA ONLY.

BASE MAP SOURCE:
REMCOR, APRIL 6, 1993, DRAWING NO. 92093-E124.

SCALE, FEET
100 0 100 200

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0530-02022

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

FIGURE 4
GROUNDWATER CONTOUR MAP
JULY 15, 1999
LOW GROUNDWATER CONDITIONS
BEDROCK WELLS

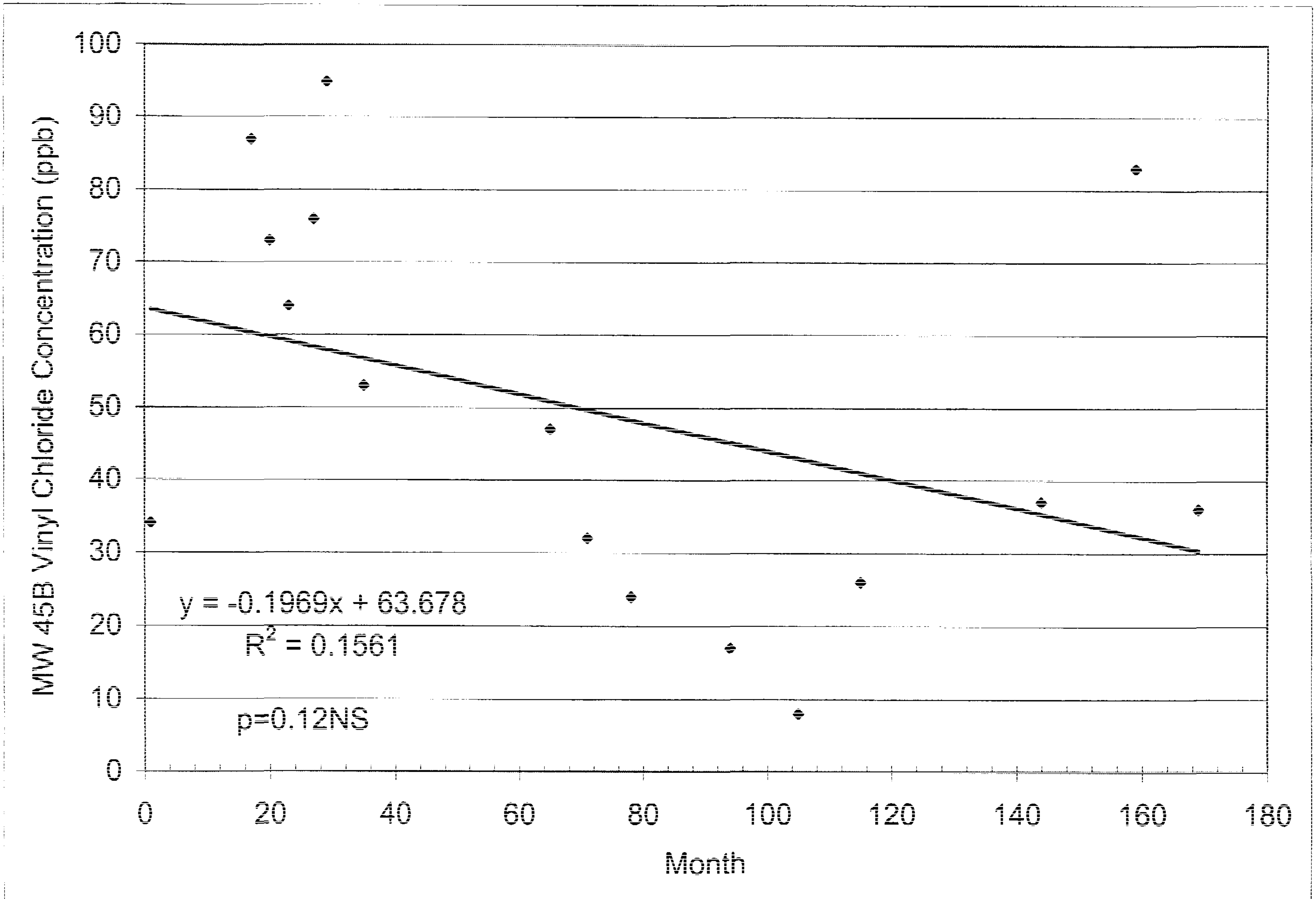
OLD SPRINGFIELD LANDFILL
SPRINGFIELD, VERMONT

Metcalf & Eddy

ATTACHMENT 2

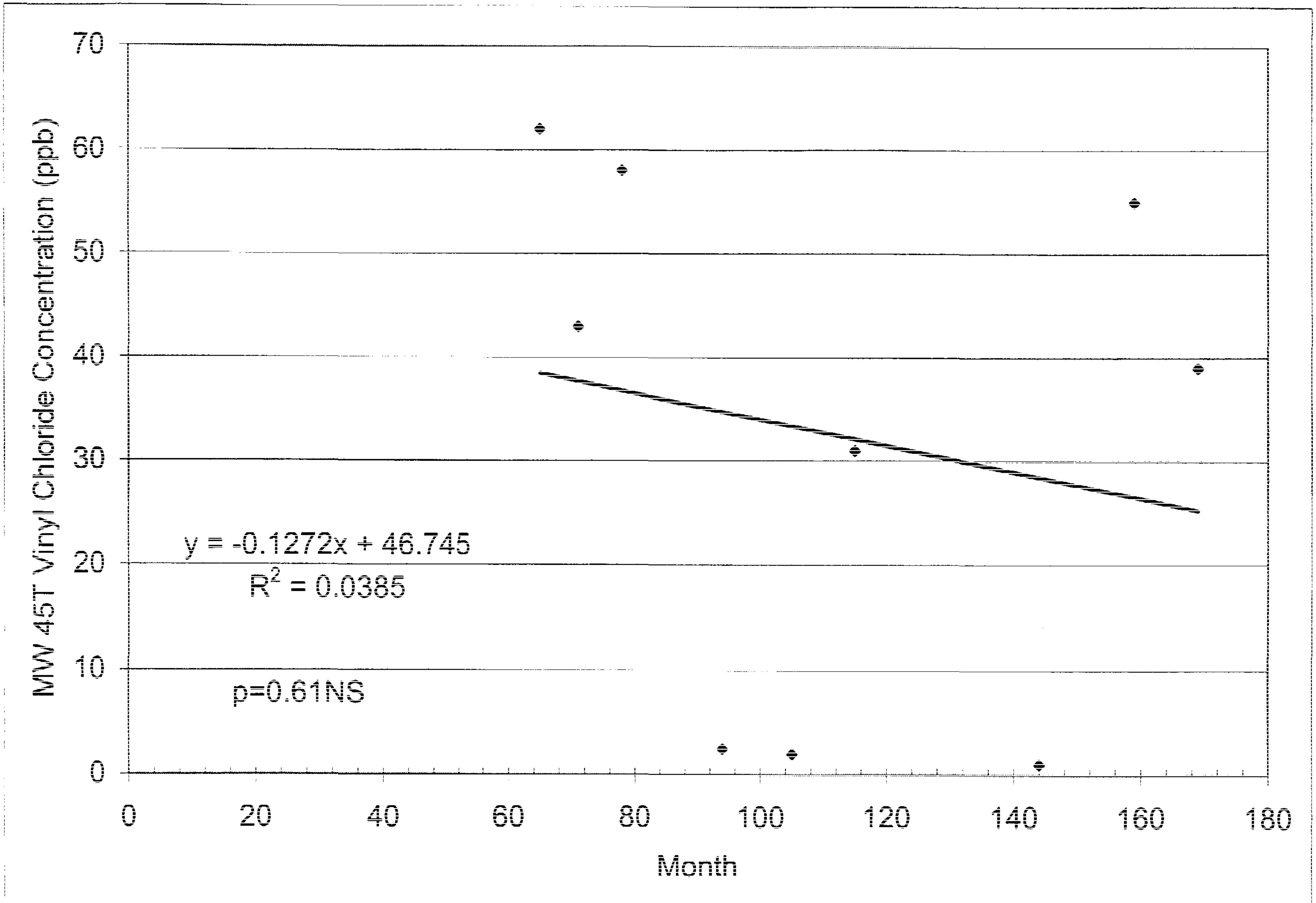
REGRESSION ANALYSIS PLOTS

Old Springfield Landfill, Springfield, VT
5-Year Review



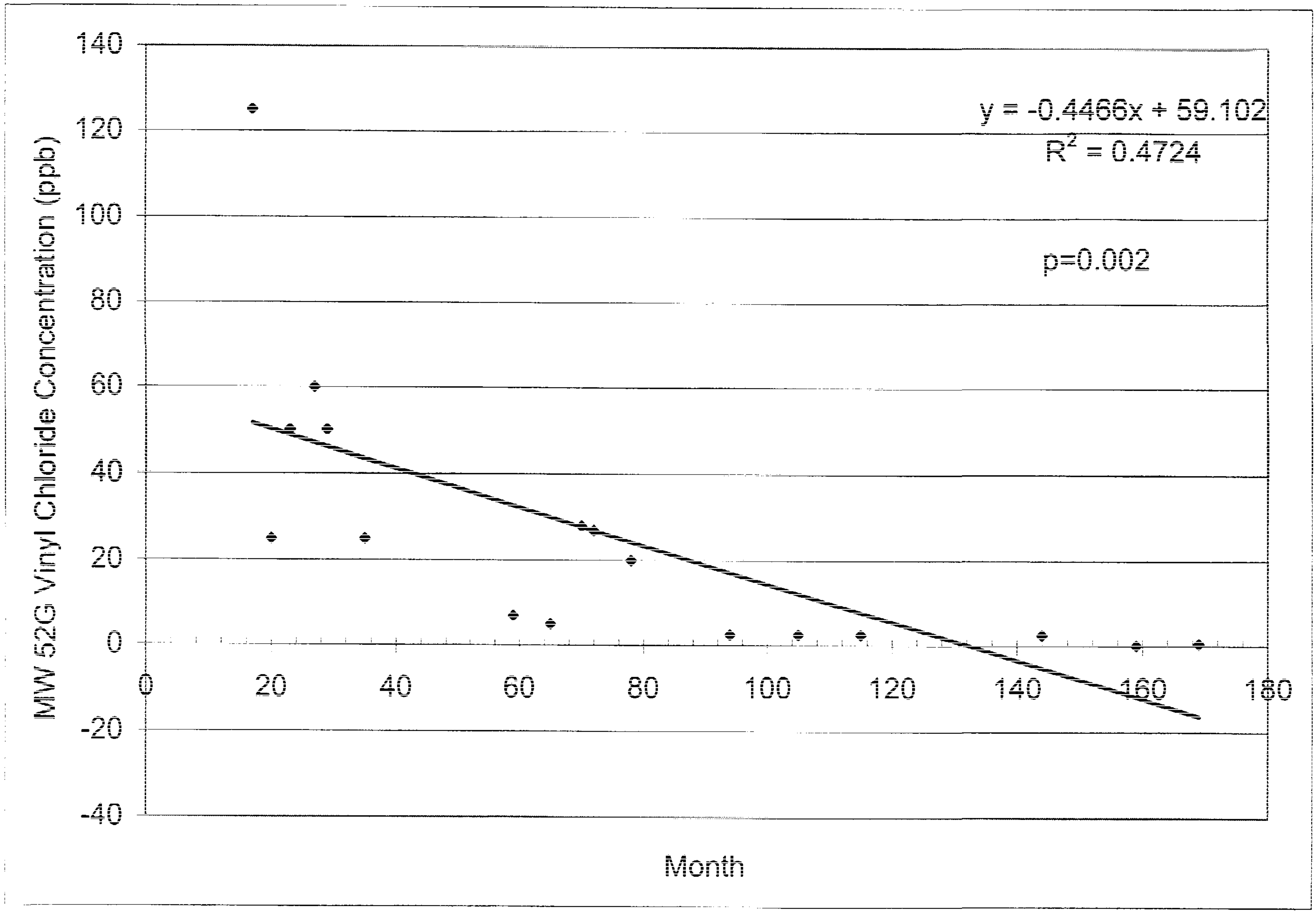
7/24/2003

Old Springfield Landfill, Springfield, VT
5-Year Review



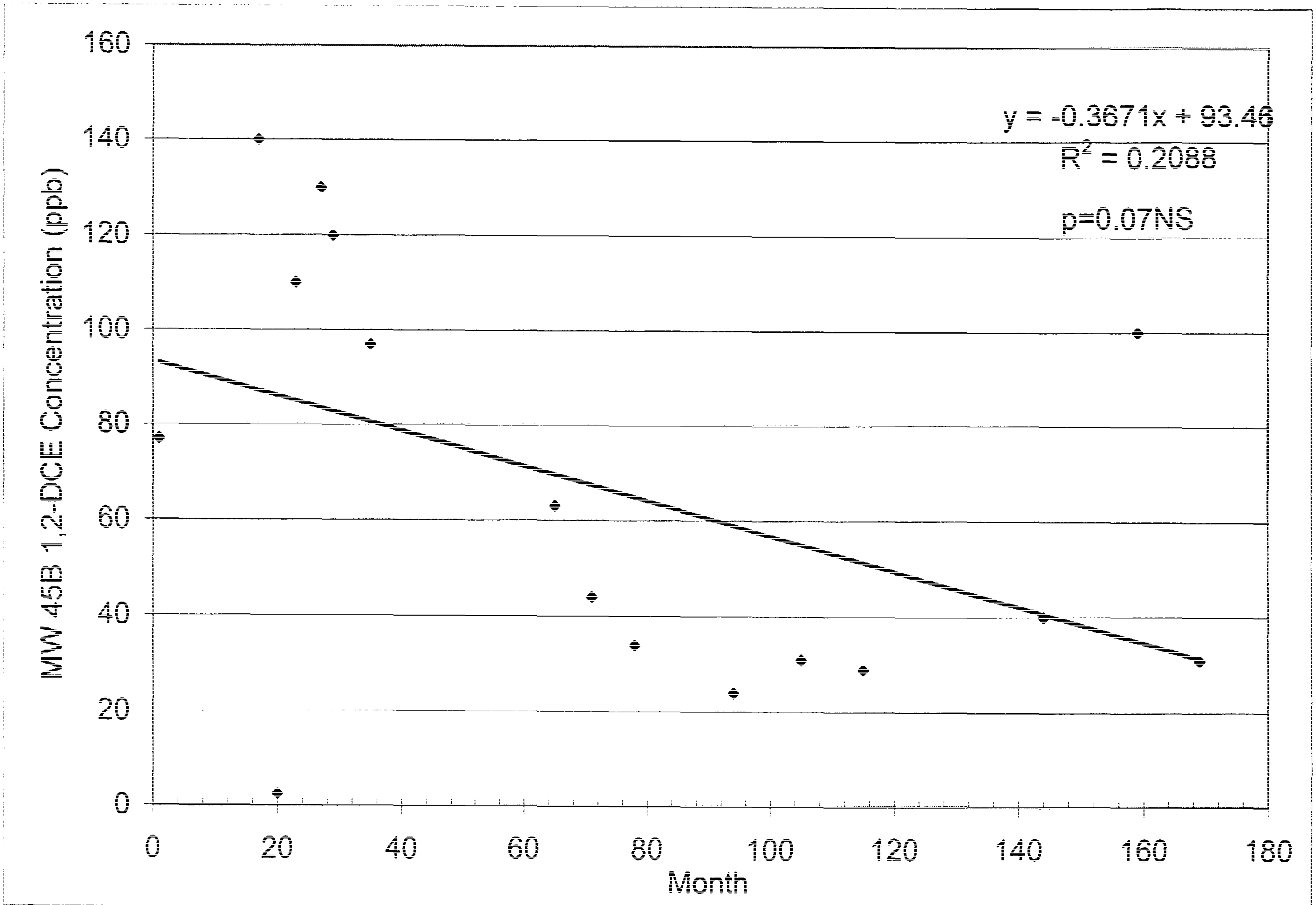
7/24/2003

Old Springfield Landfill, Springfield, VT
5-Year Review



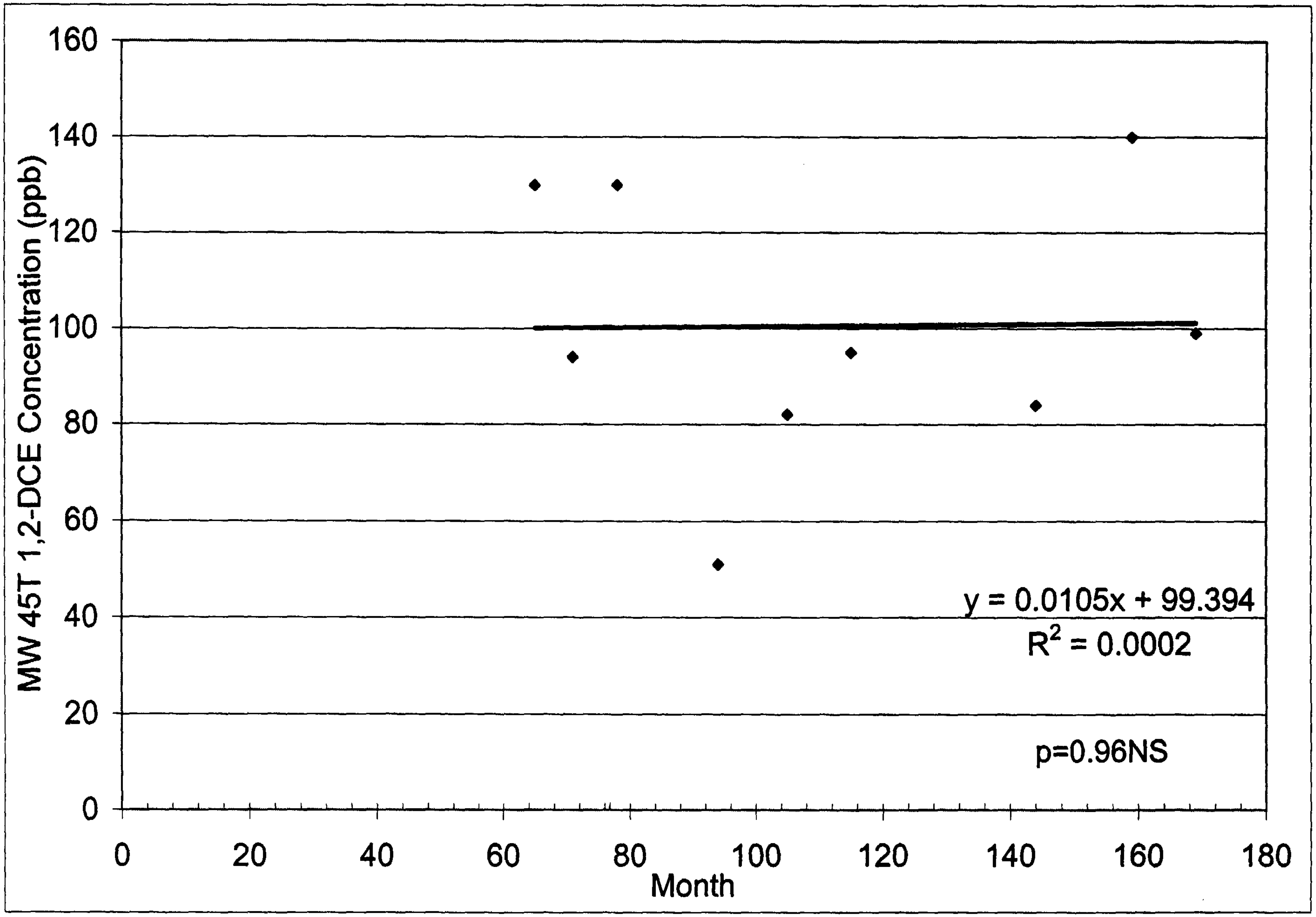
7/24/2003

Old Springfield Landfill, Springfield, VT
5-Year Review



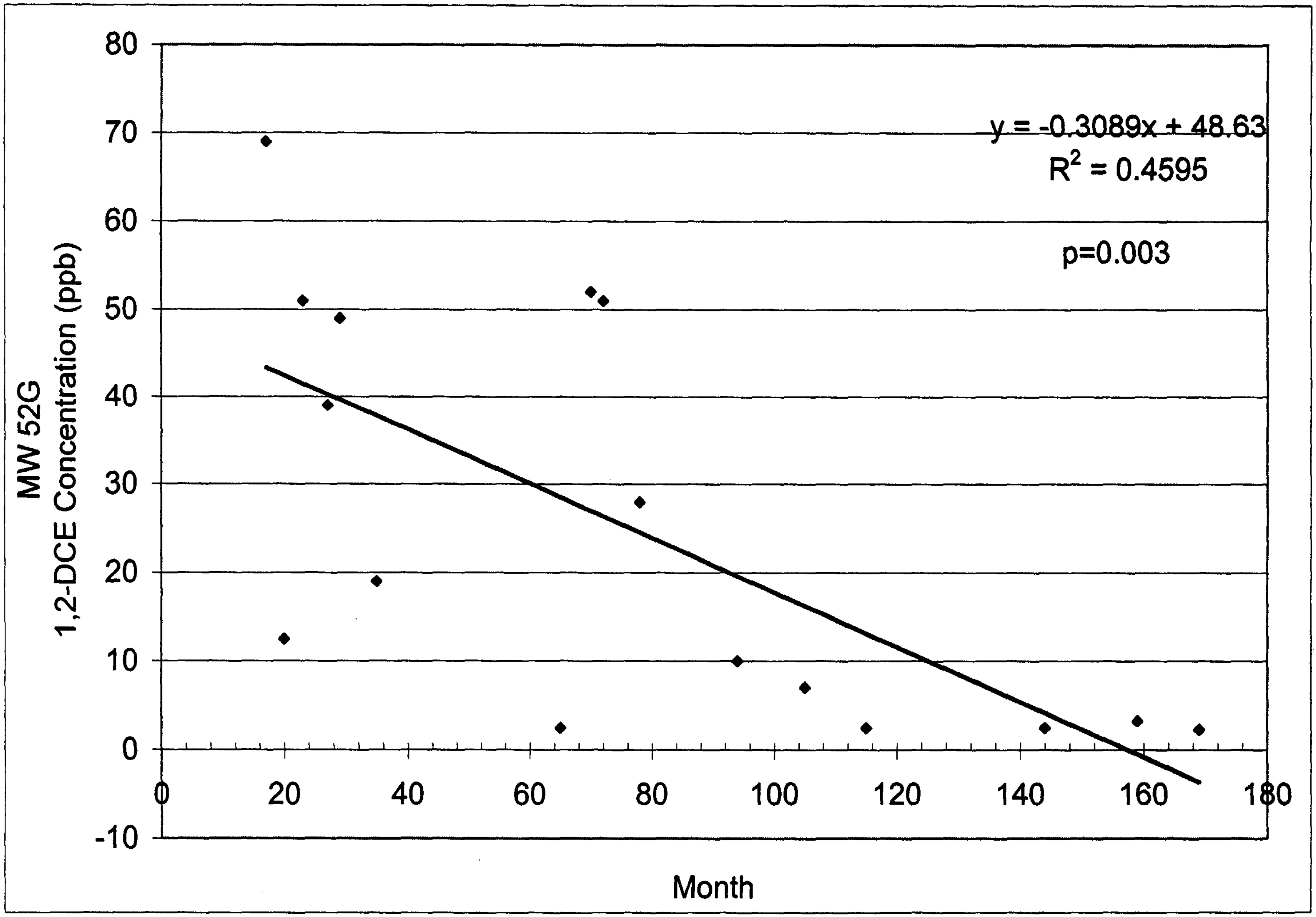
7/24/2003

Old Springfield Landfill, Springfield, VT
5-Year Review



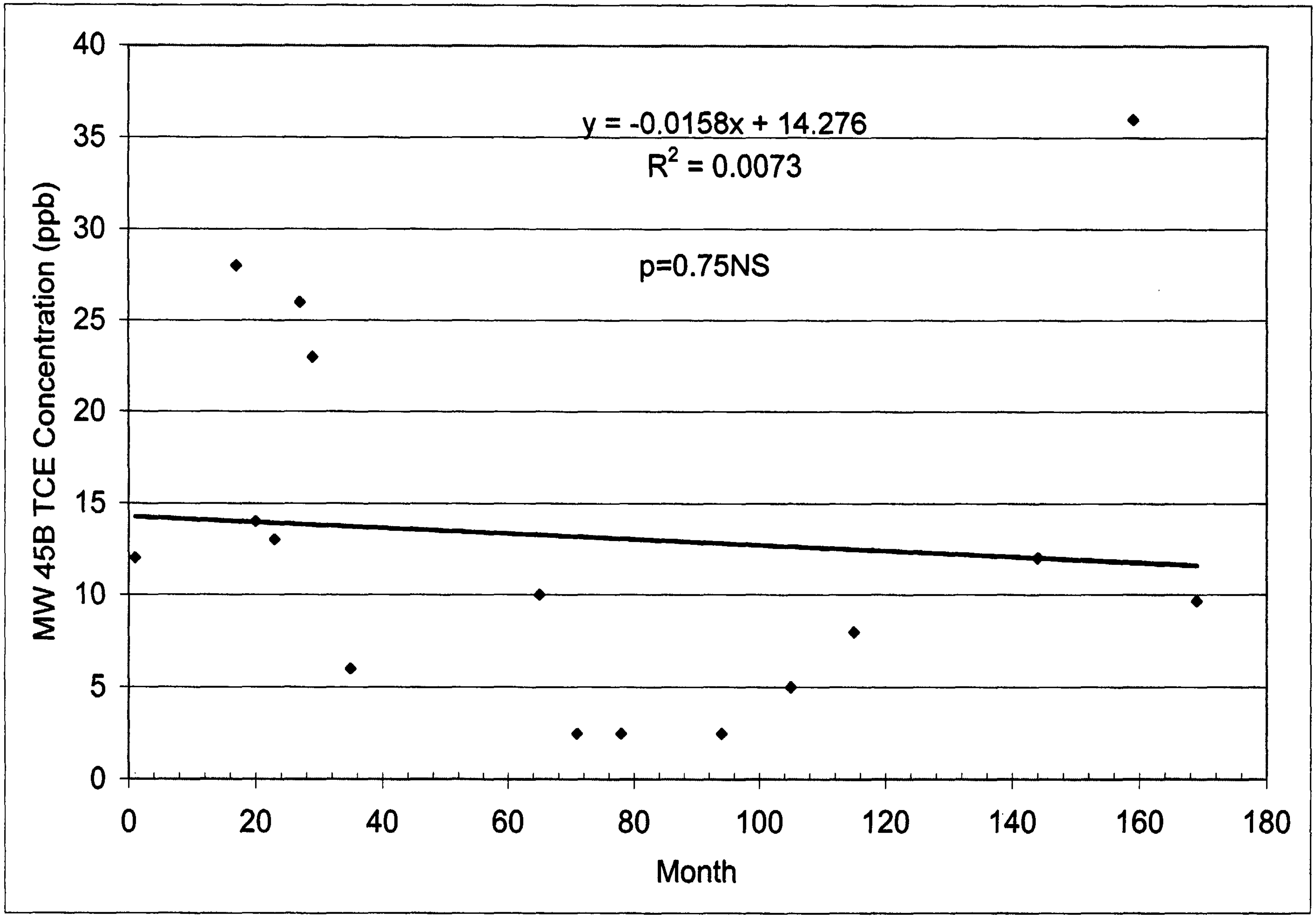
7/24/2003

Old Springfield Landfill, Springfield, VT
5-Year Review



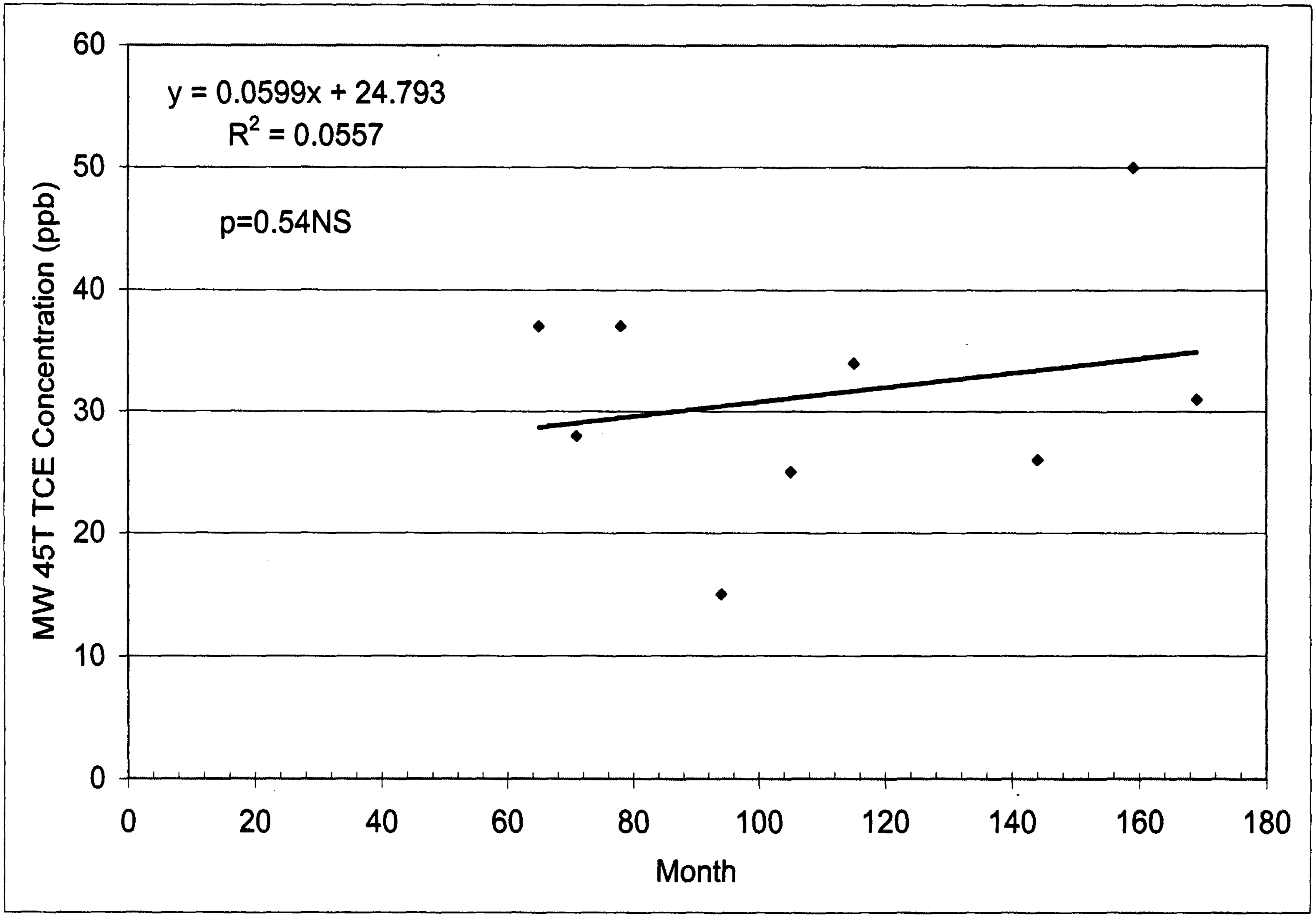
7/24/2003

Old Springfield Landfill, Springfield, VT
5-Year Review



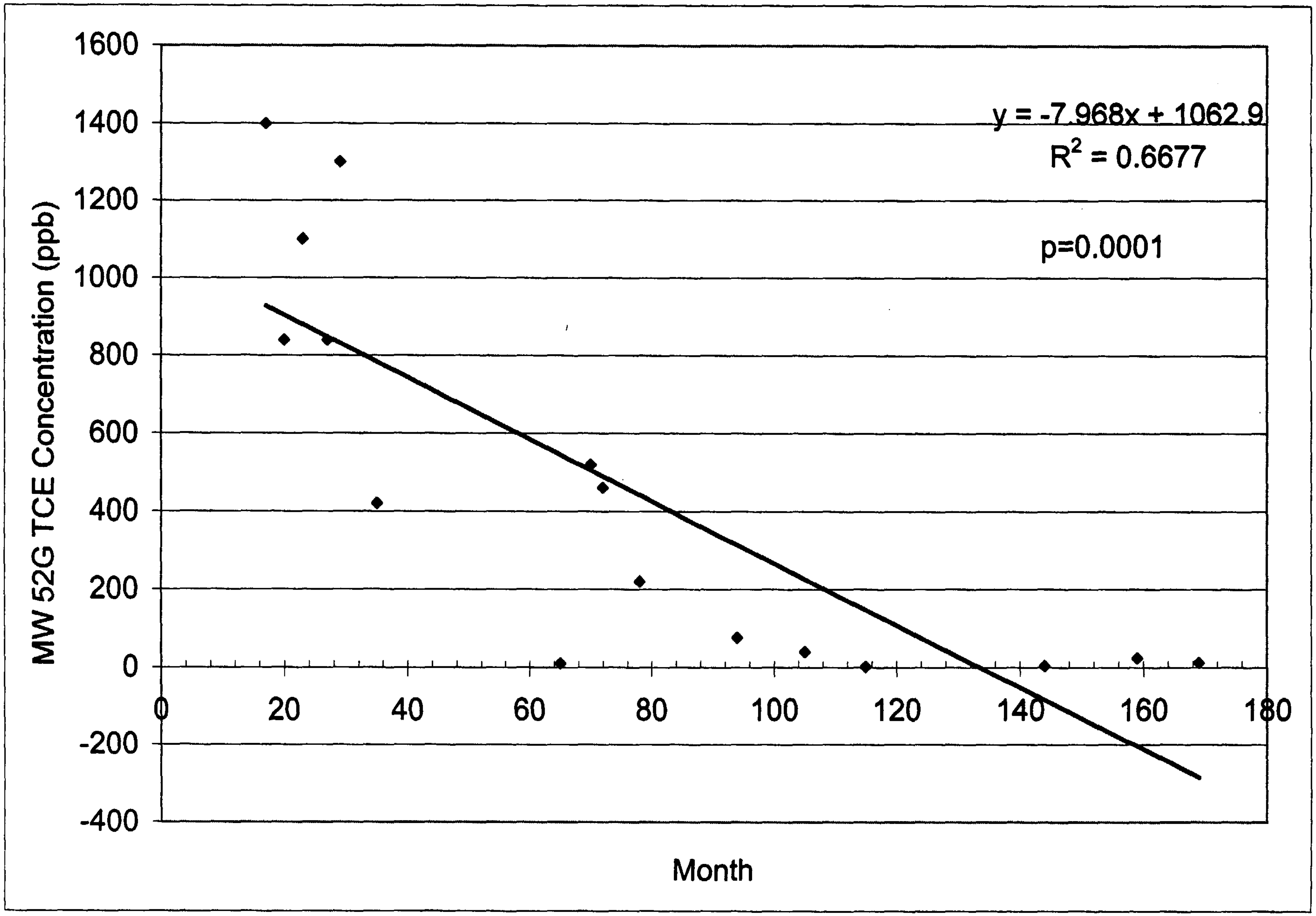
7/24/2003

Old Springfield Landfill, Springfield, VT
5-Year Review



7/24/2003

Old Springfield Landfill, Springfield, VT
5-Year Review



7/24/2003

ATTACHMENT 3

"LOWER BLACK RIVER ASSESSMENT REPORT"; AND "MINOR TRIBUTARIES - LOWER BLACK RIVER ASSESSMENT REPORT" (EPA, 1999)

Lower Black River
Assessment Report

Waterbody No: VT10-11 **Assessment Date** 1999
River Length (mi.): 8.6 **Date Last Updated:** 12/8/1999
Description: Black River mainstem from mouth to dam at North Springfield Reservoir

Location

ANR Enforcement District: 2 **NRCS District:** 9
Fish and Wildlife District: 1 **Regional Planning Commission:** SOW

Assessment Information

Monitored	8.6	**Assessment**
Evaluated (mi.):	0.0	Land use information and location of sources
		Non-fixed station chemical/physical monitoring-conventional pollutants
On 303(d) List?	Y	
		RBP III or equivalent benthos surveys
Monitored for		Modeling
Toxics Testing		Discharger self-monitoring data (effluent)

Waste Management Zone - **Description**

Assessment Comments

NON-SUPPORT MILES
Black River: 2.8 - from mouth upstream - non-support of contact recreation and aesthetics due to organic and nutrient enrichment, pathogens and thick algae growth from CSOs, municipal WWTF, and road runoff. c(900,1200,1700,2210) s(200,400,4500)

PARTIAL SUPPORT MILES
Black River: 3.2 - from North Springfield flood control dam downstream to Fellows dam - partial support of aquatic habitat and secondary contact recreation due to fluctuating flows, temperature increases and siltation from the dam and its impoundment. c(1100,1400,1500) s(7350,7400)

THREATENED MILES
Black River: 2.8 - from mouth upstream (same miles as in non-support) - threats to aquatic biota/habitat, contact recreation, secondary contact recreation and drinking water supply due to nutrient and organic enrichment, suspended solids, pH and toxic compounds from CSOs, WWTF, urban and road runoff and a hazardous waste site. c(900,1000,1200,2100,2210) s(200,400,4500)
Black River: 2.6 - from 2.8 to 5.4 miles above the mouth - threats to aquatic biota/habitat, aesthetics, and contact recreation from nutrients, sediments, temperature increases, oil, grease and metals from urban runoff, road runoff, land development, CSOs, and an impoundment. c(500,900,1100,1400,1900) s(400,3200,4000,4500,7350)

Black River:0.2 - below Springfield Landfill (subset of lowest 2.8 miles) - threats to drinking water and aquatic biota due to priority organics in seep from Old Springfield Landfill. c(300) s(6300)

COMMENTS

Springfield WWTF issues: combined sewer overflows result in discharges of raw sewage from as many as 26 locations in Springfield. Likewise, pump station overflows cause similar impairment. There were permit violations for TRC, settable solids, total suspended solids, and E. coli during 1996-1997. There were 149 days with pH violations from Sept 1997 to June 1998.

Phosphorus samples were taken three times in the summer of 1999 from three stations on the lower Black River. The total phosphorus results were as follows: upstream site (above WWTF & near fire station) = .012mg/liter, .027mg/liter and .018 mg/liter; midway site (below the WWTF about 1/2 mile) = 0.115mg/liter, 0.127mg/liter and .101mg/liter; and downstream site (just upstream of Route 5 bridge)= .086mg/liter, .108mg/liter and.101mg/liter. These results were used as to check the ballpark accuracy of estimated upstream and downstream concentrations that were generated using the WWTF effluent phosphorus concentrations, effluent flows, and river flows. Results from the modeling are available from the Water Quality Division.

Macroinvertebrate sampling at milepoint 2.4 resulted in the following community assessments: 1986-fair; 1989-good; 1991-fair; 1992-good/fair; 1995-good; 1997-good; 1999-good. In 1999, a site above the WWTF as well as site 2.4 below were sampled. "The Richness, EPT, PPCS-F and the Bio Index metrics all do indicate that moderate changes have occurred to the macroinvertebrate community at both sites. The richness and EPT index from both sites was just above the Class B biocriteria for VAL (higher order, lower elevation, large rivers or streams) streams. These relatively low values for the numbers of taxa present at both sites indicates a moderate level of impairment to the community." Some level of toxic urban impact is suspected because a moderately enriched community would normally have an increased number of taxa and and increase in algal shredders and scrapes whereas the shredder functional groups were absent from this sample. Flow fluctuations and other impacts from the North Springfield flood control dam are listed for 3.2 miles from the dam to the first dam in Springfield. Likely the impacts continue on downstream but other pollutants and impacts come into play in Springfield and these are the problems listed from the Fellows dam downstream.

The Jones & Lamson site in Springfield had contaminants of concern including PCBs, VOC, lead, and #6 fuel on its 2 sites in Springfield. Some clean-up work has been done but it is not clear if the floor drains from one of the plants have been cleaned and sealed. These drains presumably connected to outfall pipes are one of the potential sources of pollution to the Black River.

INFORMATION SOURCES Gilman Hydro - Hydropower Dam - Priv - R

Steve Fiske, Vermont DEC Water Quality Division Biomonitoring Section - macroinvertebrate monitoring data from 1989 to 1999 and analysis of macroinvertebrate community integrity (1992, 1999)

Ken Cox, Vermont Dept of Fish & Wildlife - impacts from North Springfield flood control dam (1996, 1999)

Connecticut River Watch - data from 1990, 1992, and 1993 included violations of E. coli standards in most samples. Samples taken in the lower 3 miles consistently ranged between 300-10,000 counts/100 ml over the 1992-1993 sampling periods (1994).

NH DES Ambient Monitoring Program - high E coli numbers in 92-93 seasons (1994).

George Desch, Vt. DEC Hazardous Materials - noted that remediation has occurred at the Old Springfield Landfill this past season (1993). The landfill has been capped and there is a groundwater intercept pump and treatment system in place (1994).

Matt Germon - noted that a seep with volatiles and semi-volatiles was not addressed by the remediation. Contains vinyl chloride (13 ppb) and other organics. About 300 feet from the Black River. Most probably volatilize before reaching the river. (1994)

Vermont Waste Management Division Sites Management Section files, 1998

Jerry McArdle, Vermont DEC Water Quality Division - field assessment of the Lower Black River in Autumn 1998, (1999)

Lower Black River **VT10-11**

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	0.0	2.6	3.2	2.8	0.0
20	Aquatic biota/habitat	0.0	5.4	3.2	0.0	0.0
21	Fish consumption	0.0	8.6	0.0	0.0	0.0
42	Contact recreation	3.2	2.6	0.0	2.8	0.0
44	Noncontact recreation	2.6	2.8	3.2	0.0	0.0
50	Drinking water supply	0.0	0.2	0.0	0.0	8.4
62	Aesthetics	3.2	2.6	0.0	2.8	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	8.6

Impairment	Magnitude	Size (mi.)
Priority organics	T	0.20
Nutrients	M	2.80
Nutrients	T	5.40
Siltation	M	3.20
Siltation	T	2.60
Organic enrichment/Low D.O.	M	2.80
Thermal modifications	M	3.20
Thermal modifications	T	2.60
Flow alterations	M	3.20
Pathogens	M	2.80
Oil and grease	T	2.60
Suspended solids	T	2.80

Impairment	Magnitude	Size (mi.)
Municipal point sources	M	2.80
Combined sewer overflows	M	2.80
Land development	T	2.60
Urban/developed land runoff	T	2.60
Highway/road/bridge runoff	S	2.80
Highway/road/bridge runoff	T	2.60
Landfills	T	0.20
Upstream impoundment	M	3.20
Flow regulation/modification	M	3.20

Permit No.	Point or Nonpoint Source
VT0100374	Springfield WWTF 2.20mgd
VT0100374	Springfield WWTF bypass
VT0000272	Springfield Electroplating
3-0313	Springfield Mun Swimming Pool
1-1081	Springfield Elderly Housing Project
1-1115	Community College of Vermont
1-1211	Grappone Industrial Facility
1-1303	Springfield State Office Building
	Springfield CSO - CSO - Black River - 21
	Comtu Falls Hydro - Hydropower Dam - Pri
	Lovejoy Hydro - Hydropower Dam - Priv -
	N. Springfield Dam - Flood control dam -
	Slack Dam Hydro - Hydropower Dam - Priv
	Fellows Dam Hydro - Hydropower Dam - Pri
	Old Sprgfld Lndfl - Hazardous Waste Site

Minor Tribs - Lower Black
Assessment Report

Waterbody No: VT10-12 **Assessment** 1999

River Length (mi.): 29 **Date Last Updated:** 12/13/1999

Description: Tributaries draining into lower Black River including Great, Schoolhouse, Chester and Seaver Brooks

Location

ANR Enforcement District: 2 **NRCS District:** 9

Fish and Wildlife District: 1 **Regional Planning Commission:** SOW

Assessment Information

Monitored 0.0

Evaluated (mi.): 29.0

On 303(d) List? N

Monitored for Y

Assessment

Surveys of fish and game biologists or other professionals

Occurrence of conditions judged to cause impairment

Toxics Testing

Pesticides in sediments

Metals in sediments

Waste Management Zone - **Description**

Assessment

THREATENED MILES

Great Brook: 6.0 - upstream from mouth - threats to aquatic biota/habitat due to sedimentation from road runoff, encroaching residential yards and homes, channel alterations. c(1100), s(3200,7100,8300)

Spoonerville Brook: 3.0 - threats to aquatic biota/habitat due to sedimentation, turbidity from periodic industrial site discharges (concrete production and storage). c(1100), s(4000)

Chester Brook: 3.0 - threats to aquatic biota/habitat due to sedimentation and turbidity from bank erosion, road runoff, encroaching development. c(1100), s(3200,4500,7700)

Seaver Brook: 3.5 - threats to aquatic biota/habitat due to sedimentation from encroaching development. c(1100), s(3200)

Tribs east of Black River: 6.0 - threats to aquatic biota/habitat due to sedimentation from erosion due to ag runoff, urban runoff, private ponds. c(1100), s(1000,4000)

COMMENTS

Sediment samples were taken by EPA consultants in Baltimore Brook (a trib. to the Black River in North Springfield) as part of sampling program for Johnson & Dix site. One pesticide (29 ppb methoxychlor) was found as well as cobalt (4.9 ppm), silver (1.5 ppm) and sodium (111 ppm). Not likely related to the Johnson & Dix site.

Great Brook appears fairly well shaded in the length observed (approximately 4 miles from North Springfield upstream) due to tree cover or overhanging alder. However, numerous yards, lawns, and residential activity encroach on the riparian zone up to the streambank top or to the brook's edge. From its headwaters to North Springfield, roads cross the brook sixteen times (DeLorme Vermont Atlas & Gazetteer Ninth Edition 1996) and at three places where roads off Route 10 crossed the brook, there were concrete bridges with no edge or barrier to keep sand, debris or other substances from going directly to the brook.

INFORMATION SOURCES

Ken Cox, Vermont Dept of Fish & Wildlife - noted potential impacts from land development, road runoff... on brooks listed above. (9401) (1998)

Mike Young - Vt. DEC Hazardous Materials Division - Site Inspection Final Report, March 1993 for Johnson & Dix Site, Springfield, Vt.

Cathy Kashanski, Vermont DEC Water Quality Division - field observations of Great Brook. (1998)

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	7.5	21.5	0.0	0.0	0.0
20	Aquatic biota/habitat	7.5	21.5	0.0	0.0	0.0
21	Fish consumption	0.0	29.0	0.0	0.0	0.0
42	Contact recreation	29.0	0.0	0.0	0.0	0.0
44	Noncontact recreation	29.0	0.0	0.0	0.0	0.0
50	Drinking water supply	0.0	0.0	0.0	0.0	29.0
62	Aesthetics	29.0	0.0	0.0	0.0	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	29.0

Impairment	Magnitude	Size (mi.)
Siltation	T	21.50

Impairment	Magnitude	Size (mi.)
Agriculture	T	6.00
Land development	T	12.50
Urban/developed land runoff	T	9.00
Highway/road/bridge runoff	T	9.00
Channelization	T	6.00
Streambank modification/destabilization	T	3.00

Permit No.	Point or Nonpoint Source	Receiving Water
VT0020907	Fellows Corp-non-contact CW - UT Great	
1-0537	Double Four Orchards Subdiv- UT Black R	
1-0866	Pine Brook Town House Dev-UT Baltimore	
1-0986	Residential Subdiv-Great Brook& UT Black	
1-1118	Pine Brook Condos - UT Baltimore Brook	
	Springfield CSO - CSO - Valley St Brook	

ATTACHMENT 4

MAY 2003 SUPPLEMENTAL SEEP SAMPLING RESULTS

Dufresne-Henry

Creating Better Places To Live, Work And Play

June 27, 2003

Edward M. Hathaway
US EPA - Region I
mailcode: HBT
1 Congress Street, Suite 1100
Boston, MA 02114-2023

Re: Additional Seep Sampling
Old Springfield Landfill
DH 4030002

Dear Ed:

Enclosed are the analytical results from the seep samples taken at specific locations identified by you and Greg Mischel of TRC Solutions after our meeting of May 21, 2003. The samples were obtained on May 29, 2003, and sent by overnight delivery to Ceimic Corporation in Narragansett, Rhode Island for volatile organic compound (VOC) and Target Analyte List (TAL) metals analysis. The lab provided sample containers.

Relative to the site as a whole, the locations may be found on the site map included with our annual report. The "Headwall" sample was obtained at the junction of the two fabriform ditches near the southeast corner of the site. The "New Seep/LSE1A" sample was taken from the sinkhole area east of the sedimentation basin, roughly halfway between the points labeled LSE01 and LSE02 on the plan. Sample "Station2/LSE2" was taken at the LSE2 location on the plan. Appropriate QA/QC samples were also run.

No VOC's were present above method detection limits in any of the field samples. Numerous metals were identified in the Headwall sample. Fewer, but still several metals were also identified in the other seep samples. To facilitate comparison a summary table, including current MCL's, is enclosed.

The only detected metal which exceeds its MCL is antimony. The exceedence is very slight. Antimony is not a metal with which we have experience, thus the significance of this finding is unclear. Based on the uses of antimony described in the Merck Index it is likely that the metal was used at one or more of the manufacturers in Springfield. Any insight you could offer would be appreciated.

We have not listed secondary standards, but clearly the iron and manganese in the headwall sample are significantly elevated, which accounts for the appearance of that seep.

Very truly yours,

DUFRESNE-HENRY, INC.

David

F. David Deane, P.E.
Environmental Services

FDD/dim

Enclosures

cc Brian Woods - ANR
Jeff Strong - Springfield DPW
Bob Forguites - Town Manager
Greg Mischel - TRC Environmental

J:\Environmental Services\Old Springfield Landfill\2002 Report\Hathaway Seep Tran 6273.doc

OLD SPRINGFIELD LANDFILL

Summary of Seep Water Quality Sampling Results
All results are expressed in ug/l

TARGET ANALYTE METALS

SAMPLE COMPOUND	MCL	Headwall	New Seep/LSE1A	Station2/LSE2
Aluminum	None	250	<99	110
Antimony	6	<5.6	8.2	7.4
Arsenic	10	7.6	<6.9	<6.9
Barium	2000	129	<12	<12
Beryllium	4	<0.28	<0.28	<0.28
Cadmium	5	<0.31	<0.31	<0.31
Calcium	None	54000	16000	18000
Chromium	100	1.9	<0.63	<0.63
Cobalt	None	8.8	<1.0	<1.0
Copper	1300	4.3	<3.0	4.2
Iron	None	46000	49	120
Lead	15	<3.4	<3.4	<3.4
Magnesium	None	5100	1800	1900
Manganese	None	4900	<3.1	10
Mercury	2	<0.025	<0.025	<0.025
Molybdenum	None	<1.6	<1.6	<1.6
Nickel	None	6.2	<2.6	<2.6
Potassium	None	3300	1200	1100
Selenium	50	<6.7	<6.7	<6.7
Silver	None	<0.58	<0.58	<0.58
Sodium	None	2600	1800	1700
Titanium	None	7.9	<3.5	4.9
Vanadium	None	3.3	<1.9	<1.9
Zinc	None	58	<27	54

CEIMIC
Corporation
"Analytical Chemistry for Environmental Management"

June 16, 2003

Mr. Jeff Strong
Town of Springfield
Public Works Dept.
96 Main Street
Springfield, VT 05156

Dear Mr. Strong:

Enclosed are the results for the analyses performed in support of Town of Springfield, OSL Site, SDG No. 053003. The 4 water samples were taken from the field on May 29, 2003 and received at Ceimic Corporation on May 30, 2003.

This sample is reported under Ceimic Project Number 030626, which can be referenced when inquiring about this project.

If you have any questions or concerns regarding this data, please call me at the telephone number listed below.

Sincerely,

Ines Bauer
Laboratory Manager

IB/jr

Enclosures

10 Dean Knauss Drive, Narragansett, RI 02882 • Tel: (401) 782-8900 • Fax: (401) 782-8905

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

SPRINGFIELD SAMPLE NO.

HEADWALL

Lab Name: CEIMIC CORP   Project: OSL SITE

Lab Code: CEIMIC   Case No.: 40300   SDG No.: 053003

Matrix: (soil/water) WATER   Lab Sample ID: 030626-03

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: L0832

Level: (low/med) LOW   Date Received: 05/30/03

% Moisture: not dec. ________   Date Analyzed: 06/03/03

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	5	U
75-01-4	Vinyl Chloride	5	U
74-83-9	Bromomethane	5	U
75-00-3	Chloroethane	5	U
67-64-1	Acetone	3	J
75-35-4	1,1-Dichloroethene	5	U
75-09-2	Methylene Chloride	1	J
75-15-0	Carbon Disulfide	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
156-59-2	cis-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
107-06-2	1,2-Dichloroethane	5	U
71-43-2	Benzene	5	U
79-01-6	Trichloroethene	5	U
78-87-5	1,2-Dichloropropane	5	U
75-27-4	Bromodichloromethane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
108-88-3	Toluene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
79-00-5	1,1,2-Trichloroethane	5	U
127-18-4	Tetrachloroethene	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	15	U
108-38-3	m,p-Xylenes	10	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

SPRINGFIELD SAMPLE NO.

HEADWALL

Lab Name: CEIMIC CORP Project: OSL SITE

Lab Code: CEIMIC Case No.: 40300 SDG No.: 053003

Matrix: (soil/water) WATER Lab Sample ID: 030626-03

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: LO832

Level: (low/med) LOW Date Received: 05/30/03

% Moisture: not dec. ________ Date Analyzed: 06/03/03

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
95-47-6	o-Xylene	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

SPRINGFIELD SAMPLE NO.

NEW SEEP/LSE1A

Lab Name: CEIMIC CORP Project: OSL SITE

Lab Code: CEIMIC Case No.: 40300 SDG No.: 053003

Matrix: (soil/water) WATER Lab Sample ID: 030626-01

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: LO830

Level: (low/med) LOW Date Received: 05/30/03

% Moisture: not dec. ________ Date Analyzed: 06/03/03

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	5	U
75-01-4	Vinyl Chloride	5	U
74-83-9	Bromomethane	5	U
75-00-3	Chloroethane	5	U
67-64-1	Acetone	10	U
75-35-4	1,1-Dichloroethene	5	U
75-09-2	Methylene Chloride	1	J
75-15-0	Carbon Disulfide	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
156-59-2	cis-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
107-06-2	1,2-Dichloroethane	5	U
71-43-2	Benzene	5	U
79-01-6	Trichloroethene	5	U
78-87-5	1,2-Dichloropropane	5	U
75-27-4	Bromodichloromethane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
108-88-3	Toluene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
79-00-5	1,1,2-Trichloroethane	5	U
127-18-4	Tetrachloroethene	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	15	U
108-38-3	m,p-Xylenes	10	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

SPRINGFIELD SAMPLE NO.

NEW SEEP/LSE1A

Lab Name: CEIMIC CORP   Project: OSL SITE

Lab Code: CEIMIC   Case No.: 40300   SDG No.: 053003

Matrix: (soil/water) WATER   Lab Sample ID: 030626-01

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: LO830

Level: (low/med) LOW   Date Received: 05/30/03

% Moisture: not dec. ________   Date Analyzed: 06/03/03

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
95-47-6	o-Xylene	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

SPRINGFIELD SAMPLE NO.

NEW SEEP /LSE1AMS

Lab Name: CEIMIC CORP   Project: OSL SITE

Lab Code: CEIMIC   Case No.: 40300   SDG No.: 053003

Matrix: (soil/water) WATER   Lab Sample ID: 030626-01MS

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: L0833

Level: (low/med) LOW   Date Received: 05/30/03

% Moisture: not dec. ________   Date Analyzed: 06/03/03

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	57	
75-01-4	Vinyl Chloride	59	
74-83-9	Bromomethane	55	
75-00-3	Chloroethane	57	
67-64-1	Acetone	62	
75-35-4	1,1-Dichloroethene	58	
75-09-2	Methylene Chloride	53	
75-15-0	Carbon Disulfide	57	
156-60-5	trans-1,2-Dichloroethene	56	
75-34-3	1,1-Dichloroethane	55	
78-93-3	2-Butanone	79	
156-59-2	cis-1,2-Dichloroethene	56	
540-59-0	1,2-Dichloroethene (total)	110	
67-66-3	Chloroform	55	
71-55-6	1,1,1-Trichloroethane	55	
56-23-5	Carbon Tetrachloride	56	
107-06-2	1,2-Dichloroethane	53	
71-43-2	Benzene	55	
79-01-6	Trichloroethene	55	
78-87-5	1,2-Dichloropropane	54	
75-27-4	Bromodichloromethane	54	
10061-01-5	cis-1,3-Dichloropropene	53	
108-88-3	Toluene	55	
10061-02-6	trans-1,3-Dichloropropene	53	
79-00-5	1,1,2-Trichloroethane	51	
127-18-4	Tetrachloroethene	55	
108-10-1	4-Methyl-2-Pentanone	91	
591-78-6	2-Hexanone	84	
124-48-1	Dibromochloromethane	52	
108-90-7	Chlorobenzene	54	
100-41-4	Ethylbenzene	55	
1330-20-7	Xylenes (total)	160	
108-38-3	m,p-Xylenes	110	

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

SPRINGFIELD SAMPLE NO.

NEW SEEP /LSE1AMS

Lab Name: CEIMIC CORP   Project: OSL SITE

Lab Code: CEIMIC   Case No.: 40300   SDG No.: 053003

Matrix: (soil/water) WATER   Lab Sample ID: 030626-01MS

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: L0833

Level: (low/med) LOW   Date Received: 05/30/03

% Moisture: not dec. ______   Date Analyzed: 06/03/03

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
95-47-6	o-Xylene	55	
100-42-5	Styrene	57	
75-25-2	Bromoform	50	
79-34-5	1,1,2,2-Tetrachloroethane	46	

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

SPRINGFIELD SAMPLE NO.

NEW SEEP /LSE1AMSD

Lab Name: CEIMIC CORP   Project: OSL SITE

Lab Code: CEIMIC   Case No.: 40300   SDG No.: 053003

Matrix: (soil/water) WATER   Lab Sample ID: 030626-01MSD

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: LO835

Level: (low/med) LOW   Date Received: 05/30/03

% Moisture: not dec. ________   Date Analyzed: 06/03/03

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	47	
75-01-4	Vinyl Chloride	50	
74-83-9	Bromomethane	58	
75-00-3	Chloroethane	49	
67-64-1	Acetone	62	
75-35-4	1,1-Dichloroethene	49	
75-09-2	Methylene Chloride	49	
75-15-0	Carbon Disulfide	48	
156-60-5	trans-1,2-Dichloroethene	49	
75-34-3	1,1-Dichloroethane	49	
78-93-3	2-Butanone	78	
156-59-2	cis-1,2-Dichloroethene	50	
540-59-0	1,2-Dichloroethene (total)	100	
67-66-3	Chloroform	50	
71-55-6	1,1,1-Trichloroethane	49	
56-23-5	Carbon Tetrachloride	48	
107-06-2	1,2-Dichloroethane	50	
71-43-2	Benzene	49	
79-01-6	Trichloroethene	49	
78-87-5	1,2-Dichloropropane	50	
75-27-4	Bromodichloromethane	50	
10061-01-5	cis-1,3-Dichloropropene	49	
108-88-3	Toluene	48	
10061-02-6	trans-1,3-Dichloropropene	50	
79-00-5	1,1,2-Trichloroethane	47	
127-18-4	Tetrachloroethene	48	
108-10-1	4-Methyl-2-Pentanone	89	
591-78-6	2-Hexanone	83	
124-48-1	Dibromochloromethane	49	
108-90-7	Chlorobenzene	48	
100-41-4	Ethylbenzene	48	
1330-20-7	Xylenes (total)	140	
108-38-3	m,p-Xylenes	95	

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

SPRINGFIELD SAMPLE NO.

NEW SEEP /LSE1AMSD

Lab Name: CEIMIC CORP   Project: OSL SITE

Lab Code: CEIMIC   Case No.: 40300   SDG No.: 053003

Matrix: (soil/water) WATER   Lab Sample ID: 030626-01MSD

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: LO835

Level: (low/med) LOW   Date Received: 05/30/03

% Moisture: not dec. ________   Date Analyzed: 06/03/03

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
95-47-6	o-Xylene	48	
100-42-5	Styrene	49	
75-25-2	Bromoform	47	
79-34-5	1,1,2,2-Tetrachloroethane	45	

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

SPRINGFIELD SAMPLE NO.

STATION2/LSE2

Lab Name: CEIMIC CORP   Project: OSL SITE

Lab Code: CEIMIC   Case No.: 40300   SDG No.: 053003

Matrix: (soil/water) WATER   Lab Sample ID: 030626-02

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: LO831

Level: (low/med) LOW   Date Received: 05/30/03

% Moisture: not dec. ________   Date Analyzed: 06/03/03

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	5	U
75-01-4	Vinyl Chloride	5	U
74-83-9	Bromomethane	5	U
75-00-3	Chloroethane	5	U
67-64-1	Acetone	10	U
75-35-4	1,1-Dichloroethene	5	U
75-09-2	Methylene Chloride	5	U
75-15-0	Carbon Disulfide	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
156-59-2	cis-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
107-06-2	1,2-Dichloroethane	5	U
71-43-2	Benzene	5	U
79-01-6	Trichloroethene	5	U
78-87-5	1,2-Dichloropropane	5	U
75-27-4	Bromodichloromethane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
108-88-3	Toluene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
79-00-5	1,1,2-Trichloroethane	5	U
127-18-4	Tetrachloroethene	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	15	U
108-38-3	m,p-Xylenes	10	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

SPRINGFIELD SAMPLE NO.

STATION2/LSE2

Lab Name: CEIMIC CORP Project: OSL SITE

Lab Code: CEIMIC Case No.: 40300 SDG No.: 053003

Matrix: (soil/water) WATER Lab Sample ID: 030626-02

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: L0831

Level: (low/med) LOW Date Received: 05/30/03

% Moisture: not dec. ________ Date Analyzed: 06/03/03

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
95-47-6	o-Xylene	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

SPRINGFIELD SAMPLE NO.

TRIPBLANK

Lab Name: CEIMIC CORP   Project: OSL SITE

Lab Code: CEIMIC   Case No.: 40300   SDG No.: 053003

Matrix: (soil/water) WATER   Lab Sample ID: 030626-04

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: L0829

Level: (low/med) LOW   Date Received: 05/30/03

% Moisture: not dec. ________   Date Analyzed: 06/03/03

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	5	U
75-01-4	Vinyl Chloride	5	U
74-83-9	Bromomethane	5	U
75-00-3	Chloroethane	5	U
67-64-1	Acetone	10	U
75-35-4	1,1-Dichloroethene	5	U
75-09-2	Methylene Chloride	2	J
75-15-0	Carbon Disulfide	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
156-59-2	cis-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
107-06-2	1,2-Dichloroethane	5	U
71-43-2	Benzene	5	U
79-01-6	Trichloroethene	5	U
78-87-5	1,2-Dichloropropane	5	U
75-27-4	Bromodichloromethane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
108-88-3	Toluene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
79-00-5	1,1,2-Trichloroethane	5	U
127-18-4	Tetrachloroethene	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	15	U
108-38-3	m,p-Xylenes	10	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

SPRINGFIELD SAMPLE NO.

TRIPBLANK

Lab Name: CEIMIC CORP   Project: OSL SITE

Lab Code: CEIMIC   Case No.: 40300   SDG No.: 053003

Matrix: (soil/water) WATER   Lab Sample ID: 030626-04

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: L0829

Level: (low/med) LOW   Date Received: 05/30/03

% Moisture: not dec. ________   Date Analyzed: 06/03/03

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
95-47-6	o-Xylene	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VBLKLC

Lab Name: CEIMIC CORP   Project: OSL SITE

Lab Code: CEIMIC   Case No.: 40300   SDG No.: 053003

Matrix: (soil/water) WATER   Lab Sample ID: V120603-B1

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: L0827

Level: (low/med) LOW   Date Received: ________

% Moisture: not dec. ________   Date Analyzed: 06/03/03

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	5	U
75-01-4	Vinyl Chloride	5	U
74-83-9	Bromomethane	5	U
75-00-3	Chloroethane	5	U
67-64-1	Acetone	10	U
75-35-4	1,1-Dichloroethene	5	U
75-09-2	Methylene Chloride	5	U
75-15-0	Carbon Disulfide	5	U
156-60-5	trans-1,2-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
156-59-2	cis-1,2-Dichloroethene	5	U
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
107-06-2	1,2-Dichloroethane	5	U
71-43-2	Benzene	5	U
79-01-6	Trichloroethene	5	U
78-87-5	1,2-Dichloropropane	5	U
75-27-4	Bromodichloromethane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
108-88-3	Toluene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
79-00-5	1,1,2-Trichloroethane	5	U
127-18-4	Tetrachloroethene	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	15	U
108-38-3	m,p-Xylenes	10	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VBLKLC

Lab Name: CEIMIC CORP Project: OSL SITE

Lab Code: CEIMIC Case No.: 40300 SDG No.: 053003

Matrix: (soil/water) WATER Lab Sample ID: V120603-B1

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: LO827

Level: (low/med) LOW Date Received: ________

% Moisture: not dec. ________ Date Analyzed: 06/03/03

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
95-47-6	o-Xylene	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VLCSLC

Lab Name: CEIMIC CORP   Project: OSL SITE

Lab Code: CEIMIC   Case No.: 40300   SDG No.: 053003

Matrix: (soil/water) WATER   Lab Sample ID: V120603-LCS

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: L0828

Level: (low/med) LOW   Date Received: ________

% Moisture: not dec. ________   Date Analyzed: 06/03/03

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	48	
75-01-4	Vinyl Chloride	52	
74-83-9	Bromomethane	59	
75-00-3	Chloroethane	49	
67-64-1	Acetone	96	
75-35-4	1,1-Dichloroethene	52	
75-09-2	Methylene Chloride	50	
75-15-0	Carbon Disulfide	51	
156-60-5	trans-1,2-Dichloroethene	51	
75-34-3	1,1-Dichloroethane	51	
78-93-3	2-Butanone	96	
156-59-2	cis-1,2-Dichloroethene	51	
540-59-0	1,2-Dichloroethene (total)	100	
67-66-3	Chloroform	51	
71-55-6	1,1,1-Trichloroethane	51	
56-23-5	Carbon Tetrachloride	51	
107-06-2	1,2-Dichloroethane	51	
71-43-2	Benzene	50	
79-01-6	Trichloroethene	50	
78-87-5	1,2-Dichloropropane	51	
75-27-4	Bromodichloromethane	51	
10061-01-5	cis-1,3-Dichloropropene	52	
108-88-3	Toluene	51	
10061-02-6	trans-1,3-Dichloropropene	52	
79-00-5	1,1,2-Trichloroethane	49	
127-18-4	Tetrachloroethene	49	
108-10-1	4-Methyl-2-Pentanone	95	
591-78-6	2-Hexanone	99	
124-48-1	Dibromochloromethane	51	
108-90-7	Chlorobenzene	49	
100-41-4	Ethylbenzene	50	
1330-20-7	Xylenes (total)	150	
108-38-3	m,p-Xylenes	99	

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VLCSLC

Lab Name: CEIMIC CORP Project: OSL SITE

Lab Code: CEIMIC Case No.: 40300 SDG No.: 053003

Matrix: (soil/water) WATER Lab Sample ID: V120603-LCS

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: LO828

Level: (low/med) LOW Date Received: ________

% Moisture: not dec. ________ Date Analyzed: 06/03/03

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
95-47-6	o-Xylene	50	
100-42-5	Styrene	50	
75-25-2	Bromoform	51	
79-34-5	1,1,2,2-Tetrachloroethane	48	

FORM I VOA

FORM 2
WATER VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: CEIMIC CORP   Project: OSL SITE

Lab Code: CEIMIC   Case No.: 40300   SDG No.: 053003

	CLIENT SAMPLE NO.	SMC1 (DFM) #	SMC2 (DCE) #	SMC3 (TOL) #	OTHER (BFB) #	TOT OUT
	============	======	======	======	======	===
01	VBLKLC	104	92	96	96	0
02	VLCSLC	100	88	90	88	0
03	TRIPBLANK	112	98	102	100	0
04	NEW SEEP/LSE	108	92	98	98	0
05	STATION2/LSE	112	96	102	100	0
06	HEADWALL	106	92	98	96	0
07	NEW SEEP/LSE	108	90	98	94	0
08	NEW SEEP/LSE	98	86	86	84	0
09						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						

		QC LIMITS
SMC1 (DFM)	= Dibromofluoromethane	(75-125)
SMC2 (DCE)	= 1,2-Dichloroethane-d4	(62-139)
SMC3 (TOL)	= Toluene-d8	(75-125)
OTHER (BFB)	= Bromofluorobenzene	(75-125)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D System Monitoring Compound diluted out

3A
WATER VOLATILE LAB CONTROL SAMPLE

Lab Name: CEIMIC CORP Project: OSL SITE

Lab Code: CEIMIC Case No.: 40300 SDG No.: 053003

Matrix Spike - EPA Sample No.: VLCSLC

COMPOUND	SPIKE ADDED (ug/l)	SAMPLE CONCENTRATION (ug/L)	LCS CONCENTRATION (ug/l)	LCS % REC #	QC. LIMITS REC.
Chloromethane	50		48	96	63-123
Vinyl Chloride	50		52	104	70-128
Bromomethane	50		59	118	69-122
Chloroethane	50		49	98	69-129
Acetone	100		96	96	27-160
1,1-Dichloroethene	50		52	104	68-124
Methylene Chloride	50		50	100	65-125
Carbon Disulfide	50		51	102	58-153
trans-1,2-Dichloroethen	50		51	102	75-132
1,1-Dichloroethane	50		51	102	73-120
2-Butanone	100		96	96	56-148
cis-1,2-Dichloroethene	50		51	102	63-117
Chloroform	50		51	102	68-124
1,1,1-Trichloroethane	50		51	102	68-128
Carbon Tetrachloride	50		51	102	64-124
1,2-Dichloroethane	50		51	102	65-125
Benzene	50		50	100	78-127
Trichloroethene	50		50	100	75-120
1,2-Dichloropropane	50		51	102	72-121
Bromodichloromethane	50		51	102	66-125
cis-1,3-Dichloropropene	50		52	104	68-126
Toluene	50		51	102	71-132
trans-1,3-Dichloroprope	50		52	104	62-133
1,1,2-Trichloroethane	50		49	98	74-125
Tetrachloroethene	50		49	98	76-118
4-Methyl-2-Pentanone	100		95	95	52-139
2-Hexanone	100		99	99	47-165
Dibromochloromethane	50		51	102	62-122

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS: ______________________

3A

WATER VOLATILE LAB CONTROL SAMPLE

Lab Name: CEIMIC CORP   Project: OSL SITE

Lab Code: CEIMIC   Case No.: 40300   SDG No.: 053003

Matrix Spike - EPA Sample No.: VLCSLC

COMPOUND	SPIKE ADDED (ug/l)	SAMPLE CONCENTRATION (ug/L)	LCS CONCENTRATION (ug/l)	LCS % REC #	QC. LIMITS REC.
Chlorobenzene	50		49	98	77-128
Ethylbenzene	50		50	100	69-129
Xylenes (total)	150		150	100	68-133
m,p-Xylenes	100		99	99	67-127
o-Xylene	50		50	100	73-133
Styrene	50		50	100	72-132
Bromoform	50		51	102	70-122
1,1,2,2-Tetrachloroetha	50		48	96	72-121

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 0 outside limits
Spike Recovery: 0 out of 36 outside limits

COMMENTS: ______________________

FORM 4
VOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE NO.

VBLKLC

Lab Name: CEIMIC CORP   Project: OSL SITE

Lab Code: CEIMIC   Case No.: 40300   SDG No.: 053003

Lab File ID: LO827   Lab Sample ID: V120603-B1

Date Analyzed: 06/03/03   Time Analyzed: 1700

GC Column: DB-624   ID: 0.25 (mm)   Heated Purge: (Y/N) N

Instrument ID: MS12

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	VLCSLC	V120603-LCS	LO828	1750
02	TRIPBLANK	030626-04	LO829	1856
03	NEW SEEP/LSE	030626-01	LO830	1931
04	STATION2/LSE	030626-02	LO831	2007
05	HEADWALL	030626-03	LO832	2043
06	NEW SEEP/LSE	030626-01MS	LO833	2119
07	NEW SEEP/LSE	030626-01MSD	LO835	2249
08				
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COMMENTS:

FORM IV VOA

Ceimic Laboratories
Metals Results

Client: Town of Springfield
SDG: 053003
Project Name: OSL Site
Ceimic ID: 030626

Lab Sample ID	Sample ID	Matrix	Date Sampled	Date Received	% Solids
030626-01	NEW SEEP/LSE1A	WATER	5/29/2003	5/30/2003	

Parameter	Units	Result	Quant. Limit
Aluminum	ug/L	ND	99
Antimony	ug/L	8.2	5.6
Arsenic	ug/L	ND	6.9
Barium	ug/L	ND	12
Beryllium	ug/L	ND	0.28
Cadmium	ug/L	ND	0.31
Calcium	ug/L	16000	39
Chromium	ug/L	ND	0.63
Cobalt	ug/L	ND	1.0
Copper	ug/L	ND	3.0
Iron	ug/L	49	34
Lead	ug/L	ND	3.4
Magnesium	ug/L	1800	12
Manganese	ug/L	ND	3.1
Molybdenum	ug/L	ND	1.6
Mercury	ug/L	ND	0.025
Nickel	ug/L	ND	2.6
Potassium	ug/L	1200	110
Selenium	ug/L	ND	6.7
Silver	ug/L	ND	0.58
Sodium	ug/L	1800	120
Titanium	ug/L	ND	3.5
Vanadium	ug/L	ND	1.9
Zinc	ug/L	ND	27

Ceimic Laboratories

Metals Results

Client: Town of Springfield
SDG: 053003
Project Name: OSL Site
Ceimic ID: 030626

Lab Sample ID	Sample ID	Matrix	Date Sampled	Date Received	% Solids
030626-02	STATION2/LSE2	WATER	5/29/2003	5/30/2003	

Parameter	Units	Result	Quant. Limit
Aluminum	ug/L	110	99
Antimony	ug/L	7.4	5.6
Arsenic	ug/L	ND	6.9
Barium	ug/L	ND	12
Beryllium	ug/L	ND	0.28
Cadmium	ug/L	ND	0.31
Calcium	ug/L	18000	39
Chromium	ug/L	ND	0.63
Cobalt	ug/L	ND	1.0
Copper	ug/L	4.2	3.0
Iron	ug/L	120	34
Lead	ug/L	ND	3.4
Magnesium	ug/L	1900	12
Manganese	ug/L	10	3.1
Mercury	ug/L	ND	0.025
Molybdenum	ug/L	ND	1.6
Nickel	ug/L	ND	2.6
Potassium	ug/L	1100	110
Selenium	ug/L	ND	6.7
Silver	ug/L	ND	0.58
Sodium	ug/L	1700	120
Titanium	ug/L	4.9	3.5
Vanadium	ug/L	ND	1.9
Zinc	ug/L	54	27

Ceimic Laboratories

Metals Results

Client: Town of Springfield
SDG: 053003
Project Name: OSL Site
Ceimic ID: 030626

Lab Sample ID	Sample ID	Matrix	Date Sampled	Date Received	% Solids
)30626-03	HEADWALL	WATER	5/29/2003	5/30/2003	

Parameter	Units	Result	Quant. Limit
Aluminum	ug/L	250	99
Antimony	ug/L	ND	5.6
Arsenic	ug/L	7.6	6.9
Barium	ug/L	129	12
Beryllium	ug/L	ND	0.28
Cadmium	ug/L	ND	0.31
Calcium	ug/L	54000	39
Chromium	ug/L	1.9	0.63
Cobalt	ug/L	8.8	1.0
Copper	ug/L	4.3	3.0
Iron	ug/L	46000	34
Lead	ug/L	ND	3.4
Magnesium	ug/L	5100	12
Manganese	ug/L	4900	3.1
Mercury	ug/L	ND	0.025
Molybdenum	ug/L	ND	1.6
Nickel	ug/L	6.2	2.6
Potassium	ug/L	3300	110
Selenium	ug/L	ND	6.7
Silver	ug/L	ND	0.58
Sodium	ug/L	2600	120
Titanium	ug/L	7.9	3.5
Vanadium	ug/L	3.3	1.9
Zinc	ug/L	58	27

Ceimic Laboratories

Metals - Quality Control Report
METHOD BLANK

Client: Town of Springfield
SDG: 053003
Project Name: OSL Site
Ceimic ID: 030626
Sample ID: PBW

Parameter	Units	Blank Result
Aluminum	ug/L	<8.900
Antimony	ug/L	<2.500
Arsenic	ug/L	<4.900
Barium	ug/L	<12.03
Beryllium	ug/L	<0.110
Cadmium	ug/L	<0.340
Calcium	ug/L	<69.000
Chromium	ug/L	<0.530
Cobalt	ug/L	<9.500
Copper	ug/L	<5.900
Iron	ug/L	<13.800
Lead	ug/L	<4.500
Magnesium	ug/L	<11.600
Manganese	ug/L	<0.690
Molybdenum	ug/L	<1.000
Mercury	ug/L	<0.025
Nickel	ug/L	<5.000
Potassium	ug/L	<82.200
Selenium	ug/L	<3.500
Silver	ug/L	<1.200
Sodium	ug/L	<40.600
Titanium	ug/L	<1.000
Vanadium	ug/L	<4.800
Zinc	ug/L	<3.200

Ceimic Laboratories

Metals - Quality Control Report

LABORATORY CONTROL SAMPLE

Client: Town of Springfield
SDG: 053003
Project Name: OSL Site
Ceimic ID: 030626

Sample ID: LCSW

Parameter	Units	Spiked Sample	Spike Conc.	% Rec.	QC Limits %
Aluminum	ug/L	2017.47	2000.0	101	80.0-120.0
Antimony	ug/L	749.48	800.0	94	80.0-120.0
Arsenic	ug/L	750.64	800.0	94	80.0-120.0
Barium	ug/L	203.01	200.0	102	80.0-120.0
Beryllium	ug/L	193.23	200.0	97	80.0-120.0
Cadmium	ug/L	193.99	200.0	97	80.0-120.0
Calcium	ug/L	1115.73	1000.0	112	80.0-120.0
Chromium	ug/L	395.87	400.0	99	80.0-120.0
Cobalt	ug/L	205.47	200.0	103	80.0-120.0
Copper	ug/L	294.23	300.0	98	80.0-120.0
Iron	ug/L	2945.80	3000.0	98	80.0-120.0
Lead	ug/L	1014.72	1000.0	101	80.0-120.0
Magnesium	ug/L	2045.08	2000.0	102	80.0-120.0
Manganese	ug/L	204.18	200.0	102	80.0-120.0
Molybdenum	ug/L	386.43	400.0	97	80.0-120.0
Nickel	ug/L	507.99	500.0	102	80.0-120.0
Potassium	ug/L	9705.85	10000.0	97	80.0-120.0
Selenium	ug/L	1837.74	2000.0	92	80.0-120.0
Silver	ug/L	68.90	75.0	92	80.0-120.0
Sodium	ug/L	3406.43	3000.0	114	80.0-120.0
Titanium	ug/L	194.00	200.0	97.0	80.0-120.0
Vanadium	ug/L	279.95	300.0	93	80.0-120.0
Zinc	ug/L	205.04	200.0	103	80.0-120.0

030626
VOA, 1

Chain of Custody

Original Chain of Custody goes to Laboratory

0495

Page 1 of 1

Project #	Project Name	Samplers (please print)
4030002	Old Springfield LF	Oscar Garcia

Date	Time	Comp./Grab	Sample Identification	Sample Matrix	No. of Containers	VOC's by 8260	TAL Metals*	Remarks
5/28/03	8:35	G	New Seep/LSE 1A	SW	4	↓	↓	
↓	8:45	↓	Station 2/LSE2	↓	↓	↓	↓	
↓	8:20	↓	Headwall	↓	↓	↓	↓	
			Trip Blank	aq/aq	3	↓		

Relinquished by (signature)	Date/Time	Received by (signature)	Date/Time
[signature]	5/29/03 4:00p		

Remarks:
*Metals Include: Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn

▪ = Lab Use Only

Celmic Corporation, 10 Dean Knauss Drive, Narragansett, RI 02882 - Tel: (401) 782-8900, Fax: (401) 782-8905

Th[illegible] for labeling the bottles!!

CEIMIC CORPORATION
Sample Receiving Checklist

LIMS #________ Cooler Number: 1

Client: D. Henry Number of Coolers: 1

Project: Old Sp. LF Date Received: 5/30/03

A. PRELIMINARY EXAMINATION PHASE: Date cooler was opened: 5/30/03

1. Have designated person initial here to acknowledge receipt of cooler: EA (date): 5/30/03

2. *Did cooler come with a shipping slip (airbill, etc.)?* .... (YES) NO

   If YES, enter carrier name & airbill number here: UPS1Z0256490141986615

3. Were custody seals on outside of cooler? .... YES (NO)

   How many & where: ______ seal date: __/__/__ seal name:

4. Were custody seals unbroken and intact at the date and time of arrival .... YES NO

5. *Did you screen samples for radioactivity using a Geiger Counter?* .... Reading: 0 (YES) NO

6. Chain of Custody #: 0495

7. Were custody papers sealed in a plastic bag & taped inside to the lid? .... (YES) NO

8. Were custody papers filled out properly (ink, signed, etc.)? .... (YES) NO

9. Did you sign custody papers in the appropriate place? .... (YES) NO

10. Was project identifiable from custody papers? .... (YES) NO

11. If required, was enough ice used? .... Cooler Temperature: 2 °C Type of ice: loose cubes (YES) NO

B. LOG-IN PHASE: Date samples were logged-in: 5/30/03

   by (print): Elizabeth Asting (sign): Elizabeth Asting

12. *Describe type of packing in cooler:* bubble wrap, sty. peanuts

13. Were all bottles sealed in separate plastic bags? .... (YES) NO

14. Did all bottles arrive unbroken and were labels in good condition? .... (YES) NO

15. Were all bottle labels complete (ID, date, time, signature, preservative, etc.)? .... (YES) NO

16. Did all bottle labels agree with custody papers? .... (YES) NO

17. Were correct containers used for the tests indicated? .... (YES) NO

18. Were samples received at the correct pH? .... (YES) NO

19. Was a sufficient amount of sample sent for tests indicated? .... (YES) NO

20. Were bubbles absent in VOA samples? If NO, list by sample#: ______ (YES) NO

21. Are the lot numbers of the bottleware consistent with those of the bottleware shipped to the client? .... (YES) NO

~~21.~~ 22. Laboratory labelling verified by: (Initials): EA (date): 5/30/03

EA 5/30/03

ATTACHMENT 5

OLD SPRINGFIELD LANDFILL SEMI-ANNUAL INSPECTION REPORT – APRIL 18, 2003

TRC
Customer-Focused Solutions

TRC Reference # 02136-0400-04046

May 30, 2003

Mr. Edward Hathaway
Remedial Project Manager
U.S. Environmental Protection Agency
Suite 1100
Mailcode HBT
One Congress Street
Boston, Massachusetts 02114-2023

Subject: Semi-Annual Inspection Report, Spring 2003
Old Springfield Landfill Superfund Site, Springfield, Vermont

Reference: Contract No. 68-W6-0042 (Subcontract 107061)
Work Assignment No. 131-TATA-01ZZ
Multi-Site Post Construction Monitoring

Dear Mr. Hathaway:

This letter report has been prepared to document and present the observations made by TRC Environmental Corporation (TRC) during the semi-annual inspection of the Old Springfield Landfill Superfund Site (the "Site"). TRC personnel conducted the inspection on April 18, 2003. The inspection was also performed as part of the Five-Year Review for the landfill. A Five-Year Review checklist was used to document the observations made during the inspection (attached). Jeff Strong and Rick Chamber, representatives of the City of Springfield POTW, provided access to the Site and accompanied TRC during an inspection of the interior of the wastewater Pre-Treatment Facility.

This Report is based on visual observations made during the inspection with reference to the Record Drawings of the cover system installation. The inspection by TRC consisted of the following scope of work:

- TRC inspectors traversed the perimeter and top of the landfill cap to look for evidence of erosion, cap disturbance, excessive settlement, and poor growth of vegetation.
- On- and off-cap storm water control structures were inspected for damage, settlement, sedimentation, vegetation and blockage.
- The above ground portions of structures that penetrate the cap (i.e. gas vents etc.) were inspected for damage. No attempt was made to evaluate subsurface conditions.
- The wastewater Pre-Treatment Facility was inspected for obvious damage and to determine if the treatment system was operating at the time of the inspection. No testing

was performed to determine if the components were operating within specified ranges, or to measure the contaminant removal efficiency of the air stripper and carbon units.

- The above ground portions of the various groundwater and leachate control structures were inspected for damage. No attempt was made to evaluate subsurface conditions.
- TRC inspected recent repair and operation and maintenance (O&M) work to determine if the repairs were performing as intended.

Observations made during the inspection are summarized below.

SUMMARY OF INSPECTION

The results of the inspection are presented in the following sections according to the various components of the landfill cover system.

Landfill Surface

The surface of the landfill was generally in good condition with no obvious signs of settlement, erosion, or cracks (see Photos 1 and 2). The surface of the cover system appeared to be firm and stable on the day of inspection. The vegetative cover was in good condition. During the inspection, a 2-foot wide depression caused by animal burrows was observed on the northern portion of waste area No. 4 (Photo 9). Gopher and mole holes were also observed in the northeast portion of waste area No. 3, near the lower bench on the slope and near the center of waste area No. 2.

Off-Cap Surfaces

TRC engineers inspected the steep slope that was repaired and stabilized using a French drain system in November 2001. The area appeared to be stable, and the vegetation at the top of the slope repair area was in good condition (see Photo 3). Water was flowing from the upper French drain outlet pipe in the slope repair area. However, there was no water flowing from the lower slope repair French drain pipe, which appeared to be raised above the slope and covered with a mound of riprap, rather than situated flush with the slope surface below the riprap like the upper French drain pipe in this area.

Fabri-Form Drainage Channels

There are three concrete-lined Fabri-Form drainage channels at the site that intercept and convey stormwater runon and runoff from the landfill cover system to two culverts on the east side of the landfill.

In general the channels were in fair to good condition (see Photos 3, 4 and 5). However, in the southern Fabri-Form ditch a slight split was observed at a seam in the Fabri-Form material, and water flowing in the channel was seeping into this split (see Photo 6). Adjacent to the split Fabri-Form material, a cavity was present in the soil on the outer edge of the concrete (outside the landfill cap), and runoff appeared to be entering the cavity from the adjacent wooded area southeast of waste area No. 3 and bypassing the Fabri-Form ditch (see Photo 7).

In general the Fabri-Form ditches and related culverts passing beneath the access road were clear of moss or sediments. As noted in TRC's Fall 2002 inspection report, a minor amount of sediment was observed in the northern Fabri-Form ditch, below the downslope opening of the culvert below the access road. Sediment appears to be collecting here because the elevation of the Fabri-Form ditch lining is slightly raised compared to the corrugated pipe at this end of the culvert. TRC recommends these sediments be removed, and that this area be inspected regularly for sediment accumulation and to evaluate potential settlement of the road and/or associated culvert materials.

The concrete headwall and culverts at the base of the southern and middle Fabri-Form ditches were inspected for build-up of sediment and/or vegetation. The drainage culvert outlet pipe from the middle Fabri-Form ditch was partially obstructed at the opening to the basin due to build-up of sediments and fallen leaves (see Photo 8). The drainage culvert openings at the concrete headwall and the bottom of the drainage basin should be cleared of any sediments or debris. TRC understands that the Fabri-Form ditches and related structures are regularly inspected and cleared of debris, and recommends that these blockages continue to be detected and removed regularly.

Cover Penetrations

Penetrations through the landfill cover system include ten passive gas vent structures, three piezometers, and one source control extraction well. The above ground portions of the gas vent sheds were opened and inspected for damage. Although the gas vent sheds generally appear to be in good condition, rodent holes were observed at the base of several of the sheds. Rodent damage, including displaced insulation and/or mounded soils, was also observed inside some of the sheds (see Photo 10). Mounded soil up to 1-foot deep was observed inside the middle shed on waste area No. 2 and the southern shed on waste area No. 2. The accumulated sediments should be removed from these gas vent sheds. The rodent activity does not appear to be affecting the operation of the gas vent structures. TRC understands that the POTW plans to improve the gas vent sheds with concrete floors sometime this year.

Monitoring Wells

The monitoring wells immediately adjacent to the landfill were inspected for damage to the wellhead. No damage was observed. Most of the well covers were without locks.

Cover Drainage Layer

TRC did not observe any moss or sediments in the outlets of the lateral subsurface drainpipes that discharge into the middle drainage channel. Water was flowing into the Fabri-Form ditches from 3 drainpipe outlets along the southern Fabri-Form ditch and from 2 drainpipe outlets along the middle Fabri-Form ditch. TRC understands that the drainpipe outlets are visually inspected and cleared of debris on a regular basis. TRC recommends that these blockages continue to be detected and removed regularly.

Detention/Sedimentation Basin

During the April 2003 snowmelt, a seep developed on the western sidewall at the southwest corner of the sedimentation basin (see Photo 11). The location of the slope failure was consistent with the location where a seep was observed during TRC's November 2001 inspection. At the time of TRC's April 18, 2003 inspection, the slope failure spanned approximately ten feet across the western sidewall of the basin, beginning at the southwest corner near the outlet of the southern Fabri-Form channel into the basin. As discussed in the Fall 2002 inspection report, the walls of the sedimentation basin were previously stabilized and regraded in the fall of 2002. The existing geosynthetic clay layer (GCL) lining underlying the detention basin was not replaced as part of the recent repairs. During previous inspections, TRC noted that this GCL was severely degraded and was promoting the infiltration of water into the soils below the basin. In the area of the recent slope failure, a portion of the soils underlying the erosion control mat on the basin wall had eroded and was deposited on the floor of the basin, and an opening was present in the sidewall down to the GCL. Water was flowing in a northeasterly direction across the bottom of the opening in sidewall, but it was not clear whether water was infiltrating the GCL in the slope failure area (see Photo 12).

Groundwater Systems

The aboveground portions of the groundwater collections system at the site appeared to be in good condition at the time of the inspection. The French Drain valve and meter vaults located on the north and south ends of waste area No. 4 were unlocked. TRC recommends that locks are kept on the French Drain vaults to prevent vandalism or unauthorized entrance.

No damage or vandalism to the Pre-Treatment Facility was observed. At the time of the inspection, the Pre-Treatment facility was temporarily shut down during the replacement of the vapor phase carbon units.

Perimeter Ditches and Off-Site Discharge

See the *Fabri-Form Drainage Channels* section for information on perimeter ditches.

Fencing

The majority of fencing was in good condition. However, slight damage (i.e., collapsed barbed-wires) was observed on the perimeter fence located northeast of waste area No. 2 and down-slope of Gate C, apparently as a result of fallen trees outside the cap (see Photo 13). The fence below the bent barbed wire was in tact.

Perimeter Road

The perimeter roads were in good condition with no erosion, rutting, or potholes (see Photo 14).

CORRECTIVE ACTIONS AND RECOMMENDATIONS

Status of Corrective Actions

The following table summarizes the status of previously identified maintenance deficiencies or landfill component defects.

Outstanding Deficiencies/Defects	Status	Corrective Action Adequate?	Recommendation
Holes along edges of Fabri-Form ditches	Hole observed on southern ditch adjacent to split in Fabri-Form.	No. Runoff flowing in hole and undermining ditch.	Capture/divert flow, if necessary. Repair hole.
Sedimentation and vegetation in Fabri-Form ditches	Sediments and leaf debris present in inlets and basin at intersection of southern and middle Fabri-Form ditches.	Yes, if addressed regularly.	Remove debris from inlet pipe from middle Fabri-Form ditch and bottom of basin.
Depression on slope below detention basin	Still Present	Not Applicable.	Monitor depression for expansion or evidence of slope failure.
Erosion of detention basin sidewalls	New slope failure in western sidewall at southwest corner of basin.	No.	Cause of slope failure should be investigated and permanent repair of basin should be undertaken.
Gopher holes	Still Present	No.	

Recommendations

TRC recommends the following corrective actions based on the observations made during the landfill inspection:

- The cause of the seep and related erosion on the western sidewall of the sedimentation basin should be investigated and permanent repairs should be undertaken. As noted in TRC's previous inspection reports, consideration should be given to replacing the GCL lining below the detention basin in the future to prevent further erosion and limit the infiltration of water at the top of the steep slope. An alternative to GCL, such as HDPE geomembrane, is recommended.

- The split in the southern Fabri-Form ditch should be repaired to prevent further damage to the concrete lining and to prevent infiltration and further undermining of the drainage ditch. The related soil erosion area on the south side of the Fabri-Form ditch, adjacent to the cracked Fabri-Form, should be filled or repaired.

- Sediments and leaf debris should be removed from the drainage culvert outlet pipes in the concrete headwall located at the intersection of the southern and middle Fabri-Form ditches, and from the bottom of the concrete headwall basin.

- The damage to the barbed wire on the top of the fence northeast of waste area No. 2 should be repaired and downed trees should be moved away from the fence to prevent further damage.

- The downslope end of the culvert where the access road intersects with the northern Fabri-Form ditch should be monitored for sediment accumulation, and for potential settlement of the culvert structures and/or access road at this location.

- Monitor the depression on the slope below the detention basin that could threaten the stability of the slope.

- The slope of the drainage layer outlet pipes should be adjusted periodically to maintain a free-flowing condition from the pipes. Accumulated sediments should continue to be removed periodically as well.

- The gopher eradication program should continue to be included in regular maintenance activities at the landfill. Mounded soils accumulated as a result of gopher burrows should be removed from the inside of the gas vent sheds (especially the middle and southern gas vent sheds on waste area No. 2) so the gas vent structures are kept visible and accessible for maintenance, etc.

Please do not hesitate to contact me at (978) 656-3569 with any questions or comments.

Sincerely,

TRC Environmental Corporation

Gregory A. Mischel P.E.
Project Manager

Amy L. Stattel
Environmental Engineer

Attachments: Attachment 1, Inspection Checklist and Site Plan
Attachment 2, Photographs

cc: Jeff Strong, Town of Springfield
David Deane, Dufresne-Henry, Inc.
Don Dwight, M&E

Attachment 1

Inspection Checklist and Site Plan
April 18, 2003

Semi-Annual/Five-Year Inspection Report
Old Springfield Landfill
Springfield, Vermont

Five-Year Review Site Inspection Checklist

Purpose of the Checklist

The site inspection checklist provides a useful method for collecting important information during the site inspection portion of the five-year review. The checklist serves as a reminder of what information should to be gathered and provides the means of checking off information obtained and reviewed, or information not available or applicable. The checklist is divided into sections as follows:

I. Site Information
II. Interviews
III. On-site Documents & Records Verified
IV. O&M Costs
V. Access and Institutional Controls
VI. General Site Conditions
VII. Landfill Covers
VIII. Vertical Barrier Walls
IX. Groundwater/Surface Water Remedies
X. Other Remedies
XI. Overall Observations

Some data and information identified in the checklist may or may not be available at the site depending on how the site is managed. Sampling results, costs, and maintenance reports may be kept on site or may be kept in the offices of the contractor or at State offices. In cases where the information is not kept at the site, the item should not be checked as "not applicable," but rather it should be obtained from the office or agency where it is maintained. If this is known in advance, it may be possible to obtain the information before the site inspection.

This checklist was developed by EPA and the U.S. Army Corps of Engineers (USACE). It focuses on the two most common types of remedies that are subject to five-year reviews: landfill covers, and groundwater pump and treat remedies. Sections of the checklist are also provided for some other remedies. The sections on general site conditions would be applicable to a wider variety of remedies. The checklist should be modified to suit your needs when inspecting other types of remedies, as appropriate.

The checklist may be completed and attached to the Five-Year Review report to document site status. Please note that the checklist is not meant to be completely definitive or restrictive; additional information may be supplemented if the reviewer deems necessary. Also note that actual site conditions should be documented with photographs whenever possible.

Using the Checklist for Types of Remedies

The checklist has sections designed to capture information concerning the main types of remedies which are found at sites requiring five-year reviews. These remedies are landfill covers (Section VII of the checklist) and groundwater and surface water remedies (Section IX of the checklist). The primary elements and appurtenances for these remedies are listed in sections which can be checked off as the facility is inspected. The opportunity is also provided to note site conditions, write comments on the facilities, and attach any additional pertinent information. If a site includes remedies beyond these, such as soil vapor extraction or soil landfarming, the information should be gathered in a similar manner and attached to the checklist.

Considering Operation and Maintenance Costs

Unexpectedly widely varying or unexpectedly high O&M costs may be early indicators of remedy problems. For this reason, it is important to obtain a record of the original O&M cost estimate and of annual O&M costs during the years for which costs incurred are available. Section IV of the checklist provides a place for documenting annual costs and for commenting on unanticipated or unusually high O&M costs. A more detailed categorization of costs may be attached to the checklist if available. Examples of categories of O&M costs are listed below.

Operating Labor - This includes all wages, salaries, training, overhead, and fringe benefits associated with the labor needed for operation of the facilities and equipment associated with the remedial actions.

Maintenance Equipment and Materials - This includes the costs for equipment, parts, and other materials required to perform routine maintenance of facilities and equipment associated with a remedial action.

Maintenance Labor - This includes the costs for labor required to perform routine maintenance of facilities and for equipment associated with a remedial action.

Auxiliary Materials and Energy - This includes items such as chemicals and utilities which can include electricity, telephone, natural gas, water, and fuel. Auxiliary materials include other expendable materials such as chemicals used during plant operations.

Purchased Services - This includes items such as sampling costs, laboratory fees, and other professional services for which the need can be predicted.

Administrative Costs - This includes all costs associated with administration of O&M not included under other categories, such as labor overhead.

Insurance, Taxes and Licenses - This includes items such as liability and sudden and accidental insurance, real estate taxes on purchased land or right-of-way, licensing fees for certain technologies, and permit renewal and reporting costs.

Other Costs - This includes all other items which do not fit into any of the above categories.

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Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION

Site name: Old Springfield Landfill	**Date of inspection:** 4/18/03
Location and Region: Springfield, VT	**EPA ID:**
Agency, office, or company leading the five-year review:	**Weather/temperature:**

Remedy Includes: (Check all that apply)

- ☑ Landfill cover/containment
- ☑ Access controls
- ☐ Institutional controls
- ☑ Groundwater pump and treatment
- ☑ Surface water collection and treatment
- ☐ Other__________
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☑ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Jeff Strong (Name) Water + Wastewater Superintendant (Title) 4/18/03 (Date)
   Interviewed ☑ at site ☐ at office ☑ by phone Phone no. ______
   Problems, suggestions; ☐ Report attached ______

2. **O&M staff** Rick Chamber (Name) Chief Operator, POTW (Title) 4/18/03 (Date) 7/23/03 via phone
   Interviewed ☑ at site ☑ at office ☐ by phone Phone no. ______
   Problems, suggestions; ☐ Report attached ______

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency ______________________
Contact ______________________ ______________ ______ _________
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached ______________________________

Agency ______________________
Contact ______________________ ______________ ______ _________
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached ______________________________

Agency ______________________
Contact ______________________ ______________ ______ _________
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached ______________________________

Agency ______________________
Contact ______________________ ______________ ______ _________
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached ______________________________

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - [x] O&M manual — [x] Readily available — [x] Up to date — [ ] N/A
   - [x] As-built drawings — [x] Readily available — [x] Up to date — [ ] N/A
   - [x] Maintenance logs — [x] Readily available — [x] Up to date — [ ] N/A
   - Remarks______________________________

2. **Site-Specific Health and Safety Plan** — [x] Readily available — [ ] Up to date — [ ] N/A
   - [x] Contingency plan/emergency response plan — [x] Readily available — [ ] Up to date — [ ] N/A
   - Remarks______________________________

3. **O&M and OSHA Training Records** — [ ] Readily available — [ ] Up to date — [x] N/A
   - Remarks______________________________

4. **Permits and Service Agreements**
   - [ ] Air discharge permit — [ ] Readily available — [ ] Up to date — [x] N/A (Air monitoring only)
   - [x] Effluent discharge — [ ] Readily available — [ ] Up to date — [ ] N/A
   - [x] Waste disposal, POTW — [x] Readily available — [x] Up to date — [ ] N/A
   - [ ] Other permits______________ — [ ] Readily available — [ ] Up to date — [x] N/A
   - Remarks______________________________

5. **Gas Generation Records** — [ ] Readily available — [ ] Up to date — [x] N/A
   - Remarks______________________________

6. **Settlement Monument Records** — [ ] Readily available — [ ] Up to date — [x] N/A
   - Remarks______________________________

7. **Groundwater Monitoring Records** — [x] Readily available — [x] Up to date — [ ] N/A
   - Remarks______________________________

8. **Leachate Extraction Records** — [x] Readily available — [x] Up to date — [ ] N/A
   - Remarks______________________________

9. **Discharge Compliance Records**
   - [x] Air — [x] Readily available — [x] Up to date — [ ] N/A
   - [x] Water (effluent) — [x] Readily available — [x] Up to date — [ ] N/A
   - Remarks______________________________

10. **Daily Access/Security Logs** — [ ] Readily available — [ ] Up to date — [x] N/A
    - Remarks______________________________

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other ______

2. **O&M Cost Records**
☑ Readily available ☑ Up to date
☑ Funding mechanism/agreement in place
Original O&M cost estimate ______ ☐ Breakdown attached

Total annual cost by year for review period if available

From ______ (Date) To ______ (Date) ______ (Total cost) ☐ Breakdown attached
From ______ (Date) To ______ (Date) ______ (Total cost) ☐ Breakdown attached
From ______ (Date) To ______ (Date) ______ (Total cost) ☐ Breakdown attached
From ______ (Date) To ______ (Date) ______ (Total cost) ☐ Breakdown attached
From ______ (Date) To ______ (Date) ______ (Total cost) ☐ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: None - except slope repair area (lower part of southern fabriform channel)

V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☑ Location shown on site map ☐ Gates secured ☐ N/A
Remarks: Fallen tree - outside landfill cap - fell on barbed wire - top of fence damaged

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☑ N/A
Remarks ______

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☑ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☑ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) ______

Frequency ______

Responsible party/agency ______

Contact ______ ______ ______ ______

Name Title Date Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☑ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☑ No ☐ N/A

Other problems or suggestions: ☐ Report attached

______

2. **Adequacy** ☑ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks______

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☑ No vandalism evident

Remarks______

2. **Land use changes on site** ☑ N/A

Remarks______

3. **Land use changes off site** ☑ N/A

Remarks______

VI. GENERAL SITE CONDITIONS

A. Roads ☑ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☑ Roads adequate ☐ N/A

Remarks______

B. Other Site Conditions

Remarks______________________________

VII. LANDFILL COVERS ☑ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) (off cap) ☐ Location shown on site map ☐ Settlement not evident
Areal extent______ Depth______
Remarks slight settlement on slope below detention basin (see previous reports); off cap.

2. **Cracks** ☐ Location shown on site map ☑ Cracking not evident
Lengths______ Widths______ Depths______
Remarks______________________________

3. **Erosion** ☐ Location shown on site map ☑ Erosion not evident
Areal extent______ Depth______
Remarks______________________________

4. **Holes** ☑ Location shown on site map ☐ Holes not evident
Areal extent up to 2 ft. wide Depth______
Remarks Holes caused by rodent activity.

5. **Vegetative Cover** ☑ Grass ☑ Cover properly established ☑ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks some ruts in grass due to mole holes especially lower half of landfill surface

6. **Alternative Cover (armored rock, concrete, etc.)** ☑ N/A
Remarks______________________________

7. **Bulges** ☐ Location shown on site map ☑ Bulges not evident
Areal extent______ Height______
Remarks______________________________

8.	**Wet Areas/Water Damage**	☑ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Areal extent______
	☐ Ponding	☐ Location shown on site map	Areal extent______
	☐ Seeps	☐ Location shown on site map	Areal extent______
	☐ Soft subgrade	☐ Location shown on site map	Areal extent______
	Remarks detention pond - Infiltration of water through GCL is causing wet area / sidewall blowout - southwest corner		
9.	**Slope Instability** ☐ Slides	☐ Location shown on site map	☑ No evidence of slope instability
	Areal extent______		
	Remarks______		

B. Benches ☑ Applicable ☐ N/A The benches were not designed to convey runoff.

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff ~~and intercept and convey the runoff to a lined channel.)~~

1.	**Flows Bypass Bench**	☐ Location shown on site map	☑ N/A or okay
	Remarks______		
2.	**Bench Breached**	☐ Location shown on site map	☑ N/A or okay
	Remarks______		
3.	**Bench Overtopped**	☐ Location shown on site map	☑ N/A or okay
	Remarks______		

C. Letdown Channels ☐ Applicable ☑ N/A see Perimeter ditch section, below

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1.	**Settlement**	☐ Location shown on site map	☐ No evidence of settlement
	Areal extent______	Depth______	
	Remarks______		
2.	**Material Degradation**	☐ Location shown on site map	☐ No evidence of degradation
	Material type______	Areal extent______	
	Remarks______		
3.	**Erosion**	☐ Location shown on site map	☐ No evidence of erosion
	Areal extent______	Depth______	
	Remarks______		

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent______ Depth______
Remarks______

5. **Obstructions** Type______ ☐ No obstructions
☐ Location shown on site map Areal extent______
Size______
Remarks______

6. **Excessive Vegetative Growth** Type______
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent______
Remarks______

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☑ Passive
☑ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☑ Needs Maintenance
☐ N/A
Remarks Concrete floors to be added in gas vent sheds later in 2003 to reduce rodent problems.

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☑ N/A
Remarks______

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☑ Good condition (some - no locks)
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks______

4. **Leachate Extraction Wells** → except LSE-3 ←
☐ Properly secured/locked ☑ Functioning ☐ Routinely sampled ☑ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks At time of inspection pump was not functioning in LSE-3; replacement of pump was planned by end of April 2003.

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☑ N/A
Remarks______

E. Gas Collection and Treatment ☐ Applicable ☑ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks

F. Cover Drainage Layer ☑ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☑ Functioning ☐ N/A
Remarks some have no flow (4/18/03)

2. **Outlet Rock Inspected** ☐ Functioning ☑ N/A
Remarks

G. Detention/Sedimentation Ponds ☑ Applicable ☐ N/A

1. **Siltation** Areal extent 30 Sq. ft. Depth ☐ N/A
☐ Siltation not evident
Remarks failure of slope on west sidewall at southwest corner of sed. pond.

2. **Erosion** Areal extent on plan ~30 sq. ft. Depth
☐ Erosion not evident
Remarks Approx. 12 ft. wide (see siltation, above)

3. **Outlet Works** ☑ Functioning ☐ N/A
Remarks

4. **Dam** ☐ Functioning ☑ N/A
Remarks

H. Retaining Walls ☐ Applicable ☑ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement________ Vertical displacement________
Rotational displacement________
Remarks________

5. **Degradation** (Fabriform) ☑ Location shown on site map ☐ Degradation not evident
Remarks Seam in FabriForm in South letdown channel at west end - channel is cracked above det. pond.

I. Perimeter Ditches/Off-Site Discharge ☑ Applicable ☐ N/A (FabriForm Ditches)

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent________ Depth________
Remarks________

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent________ Type________
Remarks________

3. **Erosion** ☑ Location shown on site map ☐ Erosion not evident
Areal extent ~1 sq. ft. Depth 1 ft.
Remarks cavity next to split in southern Fabri form ditch - water flowing into cavity from off-cap is undermining ditch.

4. Lower basin/culvert ~~**Discharge Structure**~~ ☑ Functioning ☐ N/A
Remarks Basin at bottom of Fabriform ditches (where they converge) - some minor sedimentation + leaf debris.

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☑ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent________ Depth________
Remarks________

2. **Performance Monitoring** Type of monitoring________
☐ Performance not monitored
Frequency________ ☐ Evidence of breaching
Head differential________
Remarks________

xtraction wells not visible r inspection interview + m records dicate EW-1 + EW2 erating s expected, ut EW-3 (SC-3) needs new pump.

IX. GROUNDWATER/SURFACE WATER REMEDIES ☑ Applicable ☐ N/A	
A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A	
1.	**Pumps, Wellhead Plumbing, and Electrical** ☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A Remarks Not viewed
2.	**Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks Not viewed; meters switched annually; pipes cleaned (to remove fouling) annually.
3.	**Spare Parts and Equipment** ☑ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks
B. Surface Water Collection Structures, Pumps, and Pipelines ☑ Applicable ☐ N/A → french Drains	
1.	**Collection Structures, Pumps, and Electrical** ☑ Good condition ☐ Needs Maintenance Remarks French drain pump/meter vaults opened. Appeared to be in good condition.
2.	**Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks Not viewed directly. As discussed during interview all French Drain pipes will eventually be converted to plastic.
3.	**Spare Parts and Equipment** NA ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks

C. Treatment System	☑ Applicable ☐ N/A	
1.	**Treatment Train** (Check components that apply) ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation ☑ Air stripping ☑ Carbon adsorbers ☑ Filters ☐ Additive (*e.g.*, chelation agent, flocculent) none needed - Iron settles out in clarifyer. ☐ Others ☑ Good condition ☐ Needs Maintenance ☐ Sampling ports properly marked and functional ☑ Sampling/maintenance log displayed and up to date ☑ Equipment properly identified ☐ Quantity of groundwater treated annually ☐ Quantity of surface water treated annually Remarks change air stripper tower media every 6 months. Air stripper media changed Spring 2003; activated carbon drums changed out on April 18, 2003	
2.	**Electrical Enclosures and Panels** (properly rated and functional) ☐ N/A ☑ Good condition ☐ Needs Maintenance Remarks	
3.	**Tanks, Vaults, Storage Vessels** ☐ N/A ☑ Good condition ☐ Proper secondary containment ☐ Needs Maintenance Remarks	
4.	**Discharge Structure and Appurtenances** ☐ N/A ☑ Good condition ☐ Needs Maintenance Remarks	
5.	**Treatment Building(s)** ☐ N/A ☑ Good condition (esp. roof and doorways) ☐ Needs repair ☑ Chemicals and equipment properly stored Remarks	
6.	**Monitoring Wells** (pump and treatment remedy) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A Remarks See sect. D - cover penetrations	
D. Monitoring Data		
1.	Monitoring Data ☑ Is routinely submitted on time ☑ Is of acceptable quality	
2.	Monitoring data suggests: ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining — decreasing trend in MW-52	

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☑ N/A
Remarks

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

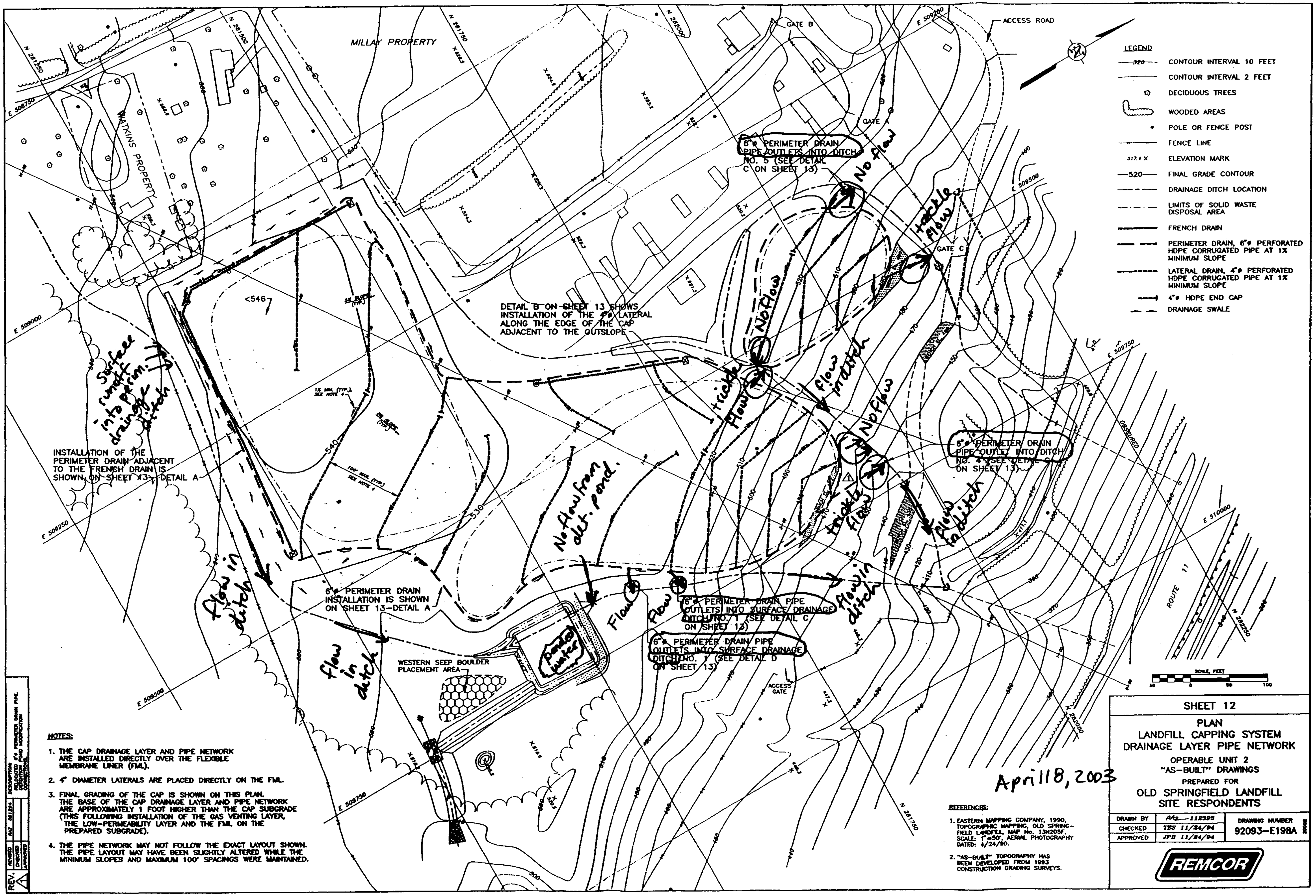
A. Implementation of the Remedy

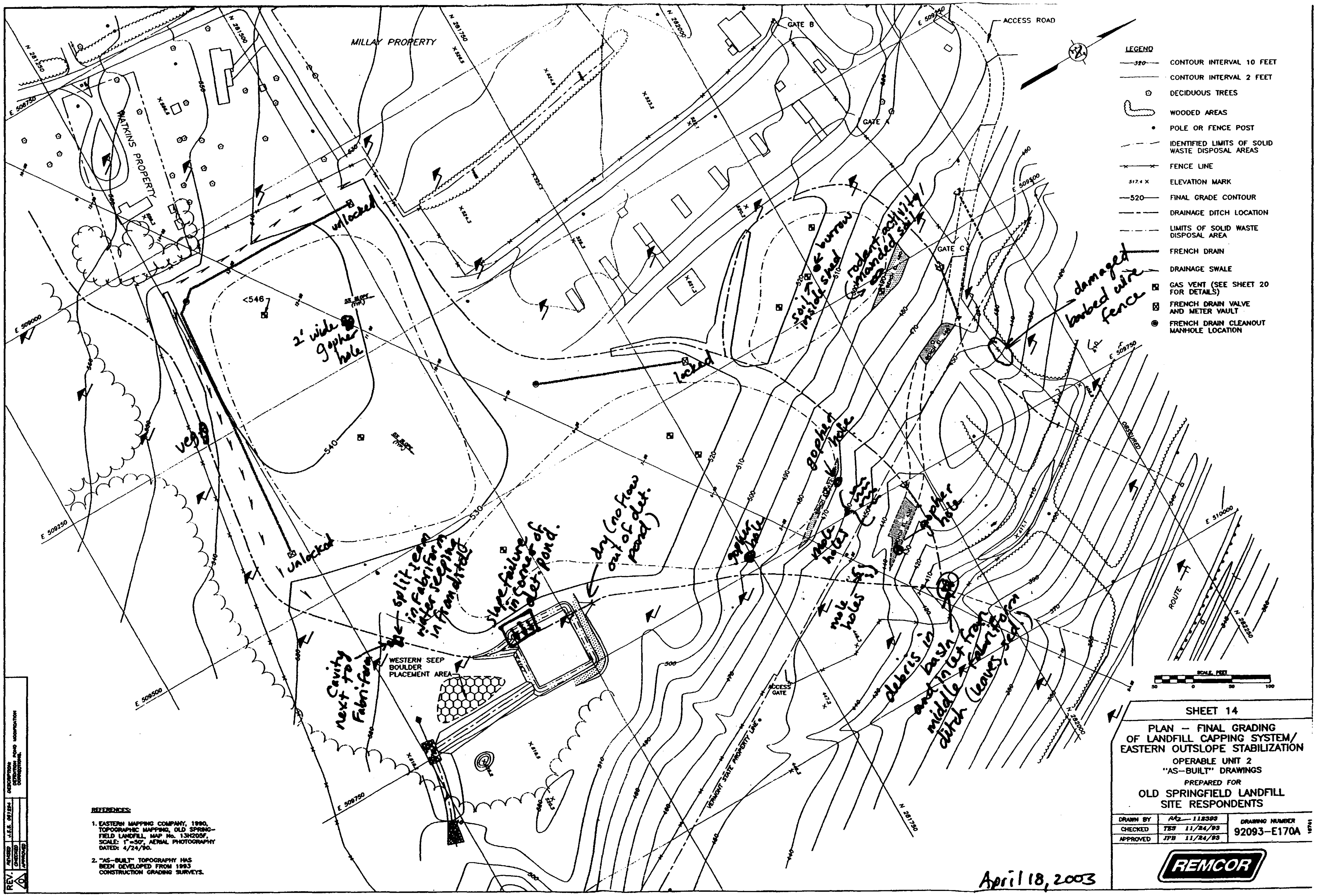
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Control of rodents / burrowing animals needs improvement. Should have exterminator or animal control professional involved. Burrowing animals can penetrate cap liner exposing wastes and allow water to infiltrate, producing leachate and contributing to G.W. contamination. Ground water elevations should be determined in extraction wells whenever monitoring wells are sounded as part of regular O&M Activities.


ACCESS ROAD
LEGEND
CONTOUR INTERVAL 10 FEET
CONTOUR INTERVAL 2 FEET
DECIDUOUS TREES
WOODED AREAS
POLE OR FENCE POST
FENCE LINE
ELEVATION MARK
FINAL GRADE CONTOUR
DRAINAGE DITCH LOCATION
LIMITS OF SOLID WASTE DISPOSAL AREA
FRENCH DRAIN
PERIMETER DRAIN, 6"ø PERFORATED HDPE CORRUGATED PIPE AT 1% MINIMUM SLOPE
LATERAL DRAIN, 4"ø PERFORATED HDPE CORRUGATED PIPE AT 1% MINIMUM SLOPE
4"ø HDPE END CAP
DRAINAGE SWALE
MILLAY PROPERTY
WATKINS PROPERTY
GATE B
GATE
GATE C
ACCESS GATE
ROUTE 11
OBSCURED
6"ø PERIMETER DRAIN PIPE OUTLETS INTO DITCH NO. 5 (SEE DETAIL C ON SHEET 13)
6"ø PERIMETER DRAIN PIPE OUTLET INTO DITCH NO. 4 (SEE DETAIL C ON SHEET 13)
6"ø PERIMETER DRAIN PIPE OUTLETS INTO SURFACE DRAINAGE DITCH NO. 1 (SEE DETAIL C ON SHEET 13)
6"ø PERIMETER DRAIN PIPE OUTLETS INTO SURFACE DRAINAGE DITCH NO. 1 (SEE DETAIL D ON SHEET 13)
DETAIL B ON SHEET 13 SHOWS INSTALLATION OF THE 4"ø LATERAL ALONG THE EDGE OF THE CAP ADJACENT TO THE OUTSLOPE
INSTALLATION OF THE PERIMETER DRAIN ADJACENT TO THE FRENCH DRAIN IS SHOWN ON SHEET 13—DETAIL A
6"ø PERIMETER DRAIN INSTALLATION IS SHOWN ON SHEET 13—DETAIL A
WESTERN SEEP BOULDER PLACEMENT AREA
No flow
trickle flow
No flow
flow in ditch
trickle flow
No flow
trickle flow
flow in ditch
No flow from det. pond.
ponded water
Flow
Flow
flow in ditch
flow in ditch
Flow in ditch
Surface runoff into perim. drainage ditch
April 18, 2003
NOTES:
1. THE CAP DRAINAGE LAYER AND PIPE NETWORK ARE INSTALLED DIRECTLY OVER THE FLEXIBLE MEMBRANE LINER (FML).
2. 4" DIAMETER LATERALS ARE PLACED DIRECTLY ON THE FML.
3. FINAL GRADING OF THE CAP IS SHOWN ON THIS PLAN. THE BASE OF THE CAP DRAINAGE LAYER AND PIPE NETWORK ARE APPROXIMATELY 1 FOOT HIGHER THAN THE CAP SUBGRADE (THIS FOLLOWING INSTALLATION OF THE GAS VENTING LAYER, THE LOW-PERMEABILITY LAYER AND THE FML ON THE PREPARED SUBGRADE).
4. THE PIPE NETWORK MAY NOT FOLLOW THE EXACT LAYOUT SHOWN. THE PIPE LAYOUT MAY HAVE BEEN SLIGHTLY ALTERED WHILE THE MINIMUM SLOPES AND MAXIMUM 100' SPACINGS WERE MAINTAINED.
REFERENCES:
1. EASTERN MAPPING COMPANY, 1990, TOPOGRAPHIC MAPPING, OLD SPRINGFIELD LANDFILL MAP No. 13H205F, SCALE: 1"=50', AERIAL PHOTOGRAPHY DATED: 4/24/90.
2. "AS-BUILT" TOPOGRAPHY HAS BEEN DEVELOPED FROM 1993 CONSTRUCTION GRADING SURVEYS.
SCALE, FEET
SHEET 12
PLAN
LANDFILL CAPPING SYSTEM
DRAINAGE LAYER PIPE NETWORK
OPERABLE UNIT 2
"AS-BUILT" DRAWINGS
PREPARED FOR
OLD SPRINGFIELD LANDFILL
SITE RESPONDENTS
DRAWN BY
CHECKED TES 11/24/94
APPROVED JPB 11/24/94
DRAWING NUMBER
92093—E198A
REMCOR
REV. REVISED CHECKED APPROVED
DESCRIPTION RELOCATED 6"ø PERIMETER DRAIN PIPE, DETENTION POND MODIFICATION CORRECTIONS.



LEGEND
CONTOUR INTERVAL 10 FEET
CONTOUR INTERVAL 2 FEET
DECIDUOUS TREES
WOODED AREAS
POLE OR FENCE POST
IDENTIFIED LIMITS OF SOLID WASTE DISPOSAL AREAS
FENCE LINE
ELEVATION MARK
FINAL GRADE CONTOUR
DRAINAGE DITCH LOCATION
LIMITS OF SOLID WASTE DISPOSAL AREA
FRENCH DRAIN
DRAINAGE SWALE
GAS VENT (SEE SHEET 20 FOR DETAILS)
FRENCH DRAIN VALVE AND METER VAULT
FRENCH DRAIN CLEANOUT MANHOLE LOCATION
ACCESS ROAD
GATE B
GATE
GATE C
MILLAY PROPERTY
WATKINS PROPERTY
WESTERN SEEP BOULDER PLACEMENT AREA
ACCESS GATE
VERMONT STATE PROPERTY LINE
ROUTE
OBSCURED
SCALE, FEET
SHEET 14
PLAN – FINAL GRADING OF LANDFILL CAPPING SYSTEM/ EASTERN OUTSLOPE STABILIZATION
OPERABLE UNIT 2
"AS-BUILT" DRAWINGS
PREPARED FOR
OLD SPRINGFIELD LANDFILL SITE RESPONDENTS
DRAWN BY 112393
CHECKED TES 11/24/93
APPROVED JPB 11/24/93
DRAWING NUMBER
92093-E170A
REMCOR
REFERENCES:
1. EASTERN MAPPING COMPANY, 1990, TOPOGRAPHIC MAPPING, OLD SPRINGFIELD LANDFILL, MAP No. 13H205F, SCALE: 1"=50', AERIAL PHOTOGRAPHY DATED: 4/24/90.
2. "AS-BUILT" TOPOGRAPHY HAS BEEN DEVELOPED FROM 1993 CONSTRUCTION GRADING SURVEYS.
REV. REVISED CHECKED APPROVED
DESCRIPTION DETENTION POND MODIFICATION CONDITIONAL
unlocked
locked
2' wide gopher hole
veg
soil & burrow inside shed
rodent activity / mounded soil
damaged barbed wire fence
gopher hole
mole holes
debris in basin and inlet from middle fabriform ditch (leaves, sed)
dry (no flow out of det. pond)
slope failure in corner of det. pond.
split seam in fabriform water seeping in from ditch
Cavity next to Fabriform
April 18, 2003

Attachment 2

Inspection Photographs
April 18, 2003

Semi-Annual/Five-Year Inspection Report
Old Springfield Landfill
Springfield, Vermont

Photo 1: Landfill cover over waste area No. 4, facing south.
Photo 2: Landfill slope on east side of waste area No. 2, facing southeast.
Photo 3: South Fabri-Form ditch at slope repair area.
Photo 4: South Fabri-Form ditch at top of landfill/south end of waste area No. 4.
Photo 5: Middle Fabri-Form ditch, facing west.
Photo 6: Crack at seam in south Fabri-Form ditch above detention basin.
Photo 7: Cavity next to south Fabri-Form ditch near crack in ditch.
Photo 8: Sediment and leaf debris at base of middle Fabri-Form ditch (left) and basin.
Photo 9: Animal burrow in northwest portion of waste area No. 4.
Photo 10: Gas vent shed with 1-foot deep soil inside (from gopher) on waste area No. 2.
Photo 11: Seep/erosion problem on western sidewall of detention basin, facing north.
Photo 12: Close-up of water flowing north through eroded detention basin sidewall.
Photo 13: Damaged barbed wire fence near north Fabri-Form ditch, east of Gate C.
Photo 14: Access road and gas vent shed near north end of waste area No. 2.

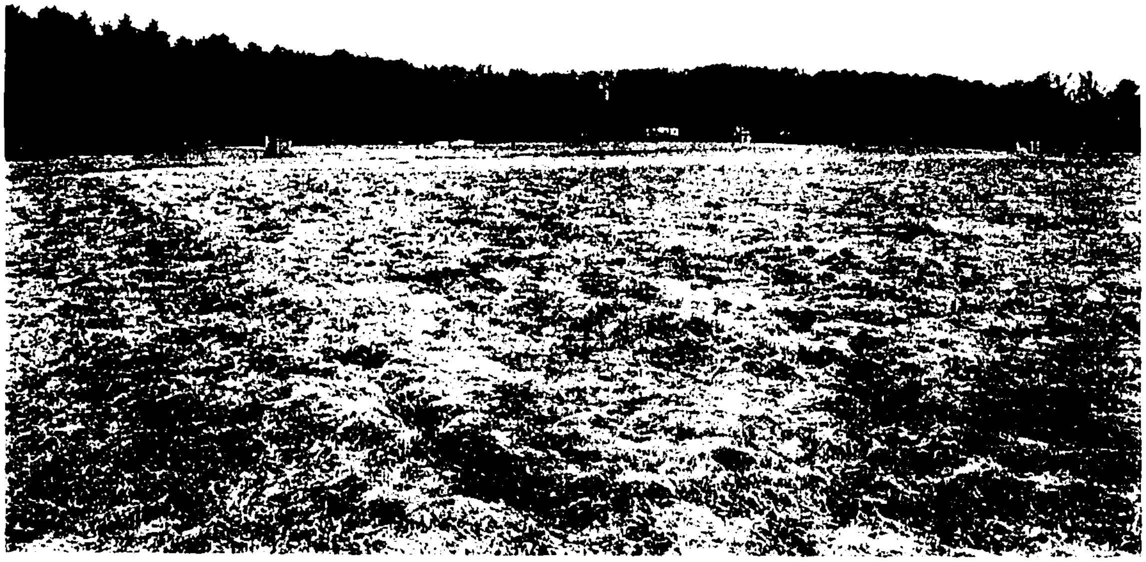


Photo 1: Landfill cover over waste area No. 4, facing south.

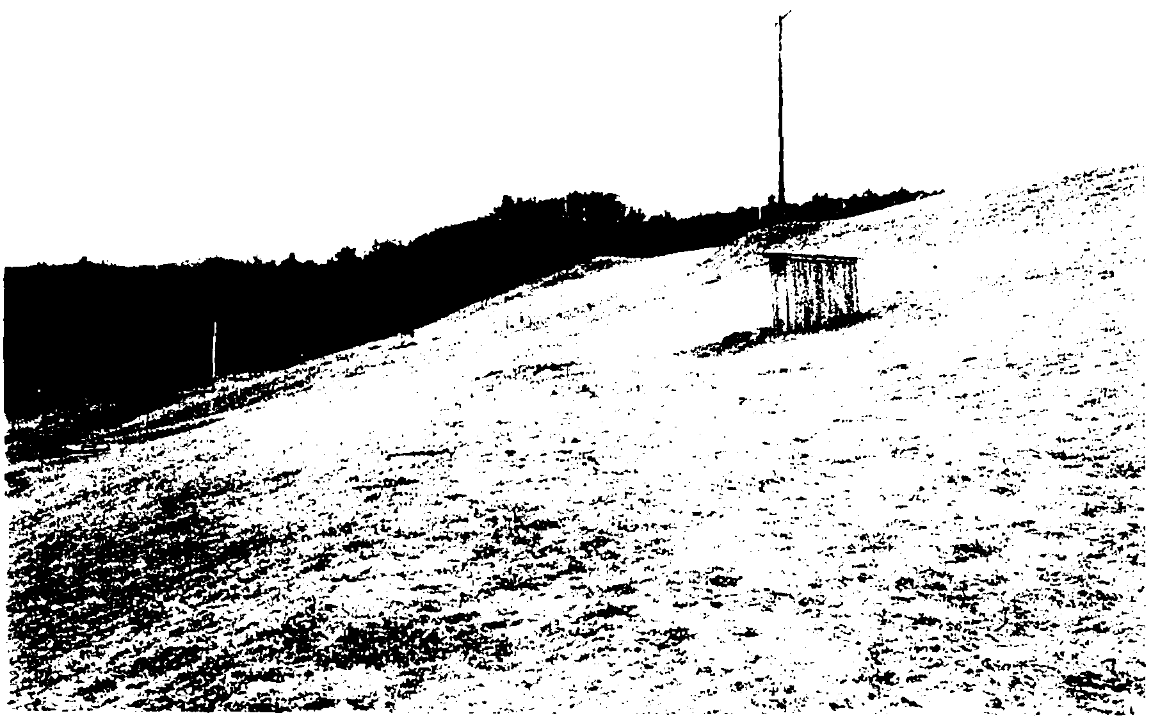


Photo 2: Landfill slope on east side of waste area No. 2, facing southeast.

Photo 3: South Fabri-Form ditch at slope repair area.

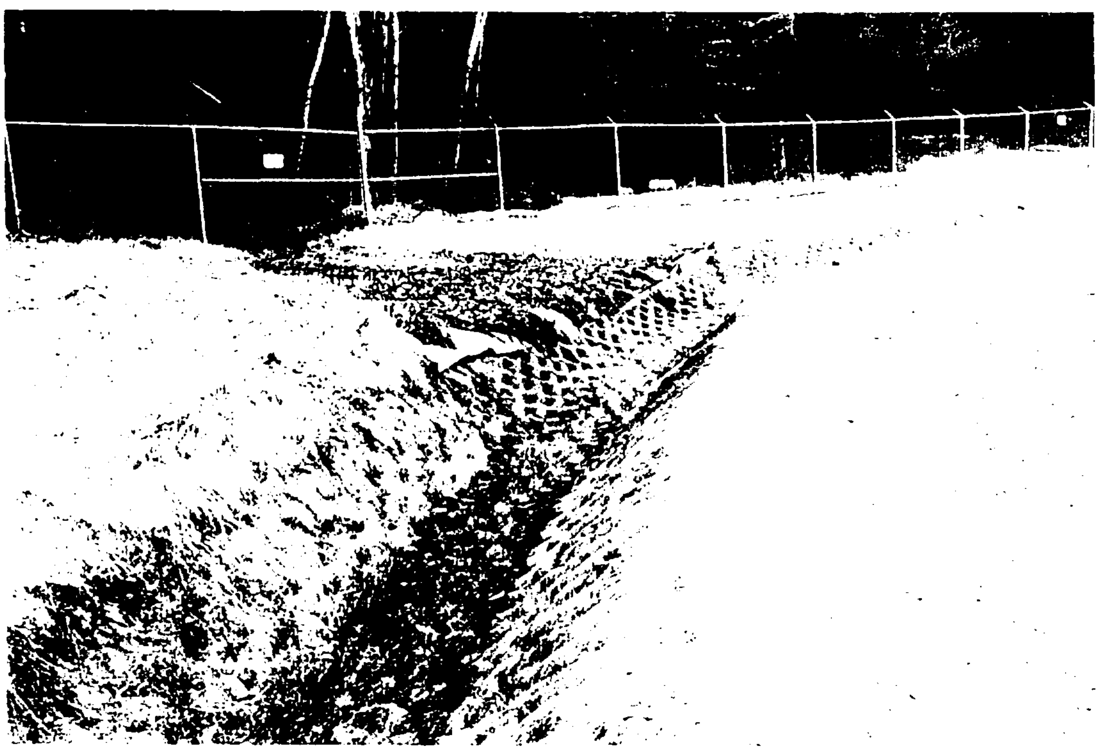


Photo 4: South Fabri-Form ditch at top of landfill/south end of waste area No. 4.

Photo 5: Middle Fabri-Form ditch, facing west.

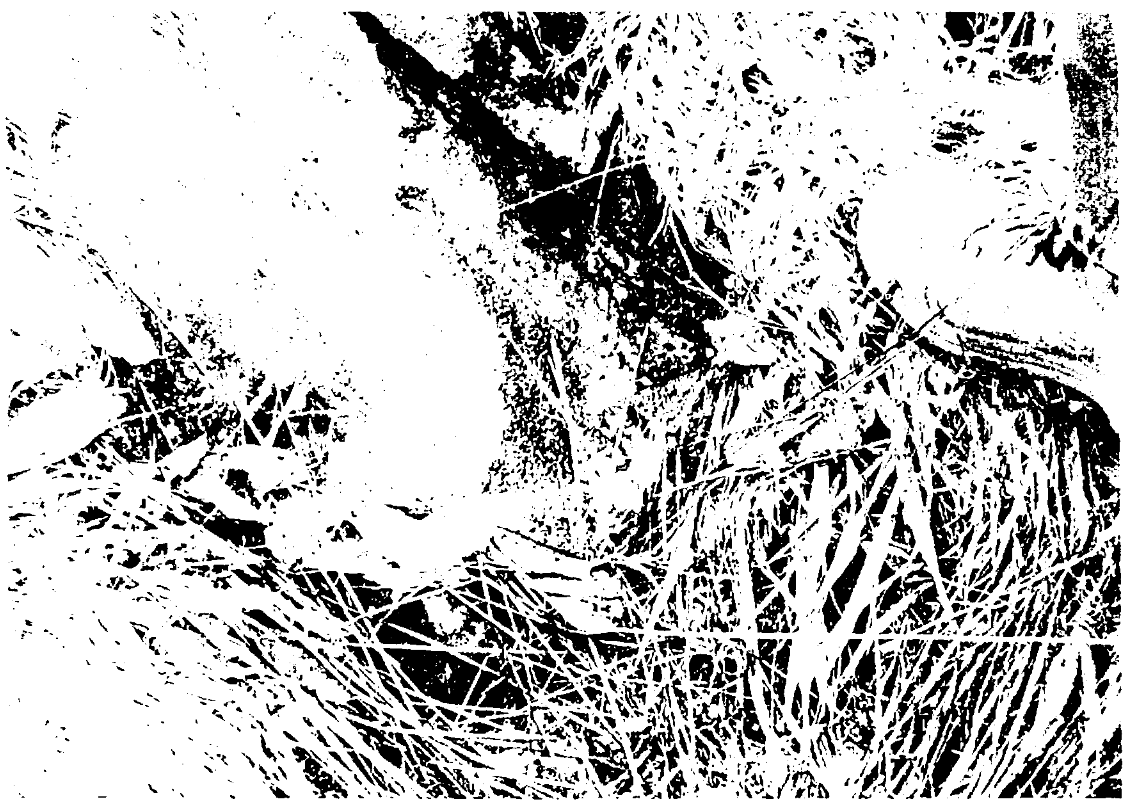


Photo 6: Crack at seam in south Fabri-Form ditch above detention basin.

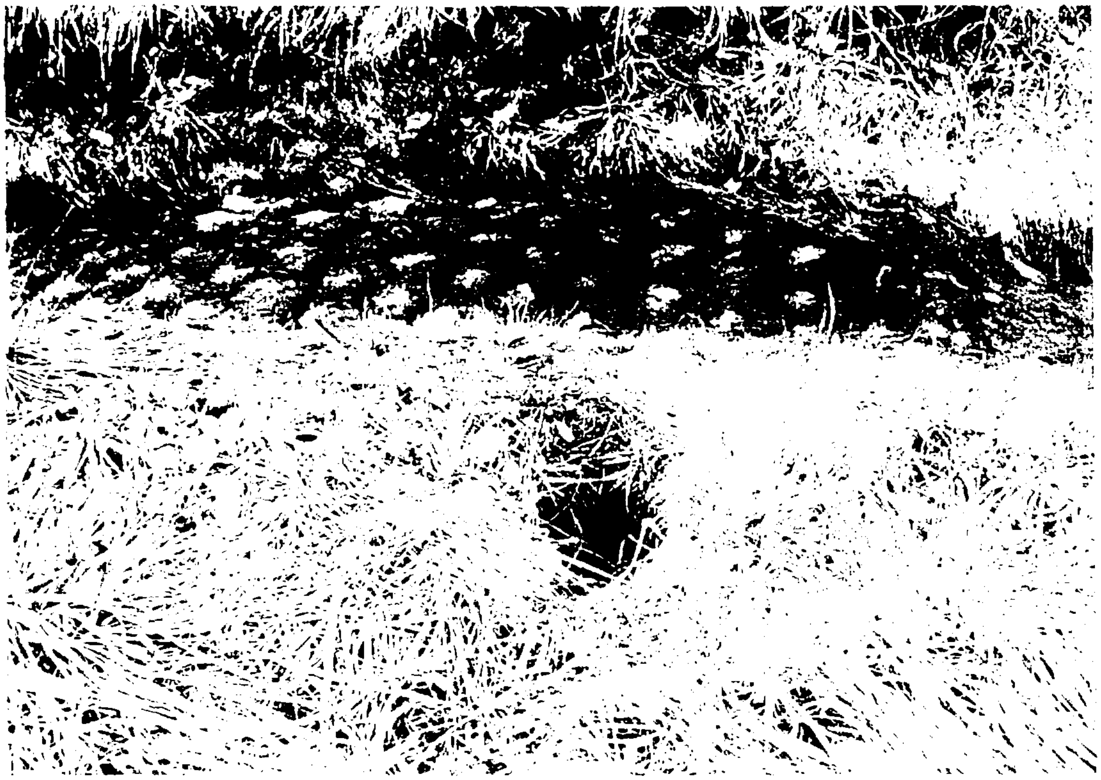


Photo 7: Cavity next to south Fabri-Form ditch near crack in ditch.

Photo 8: Sediment and leaf debris at base of middle Fabri-Form ditch (left) and basin.

Photo 9: Animal burrow in northwest portion of waste area No. 4.

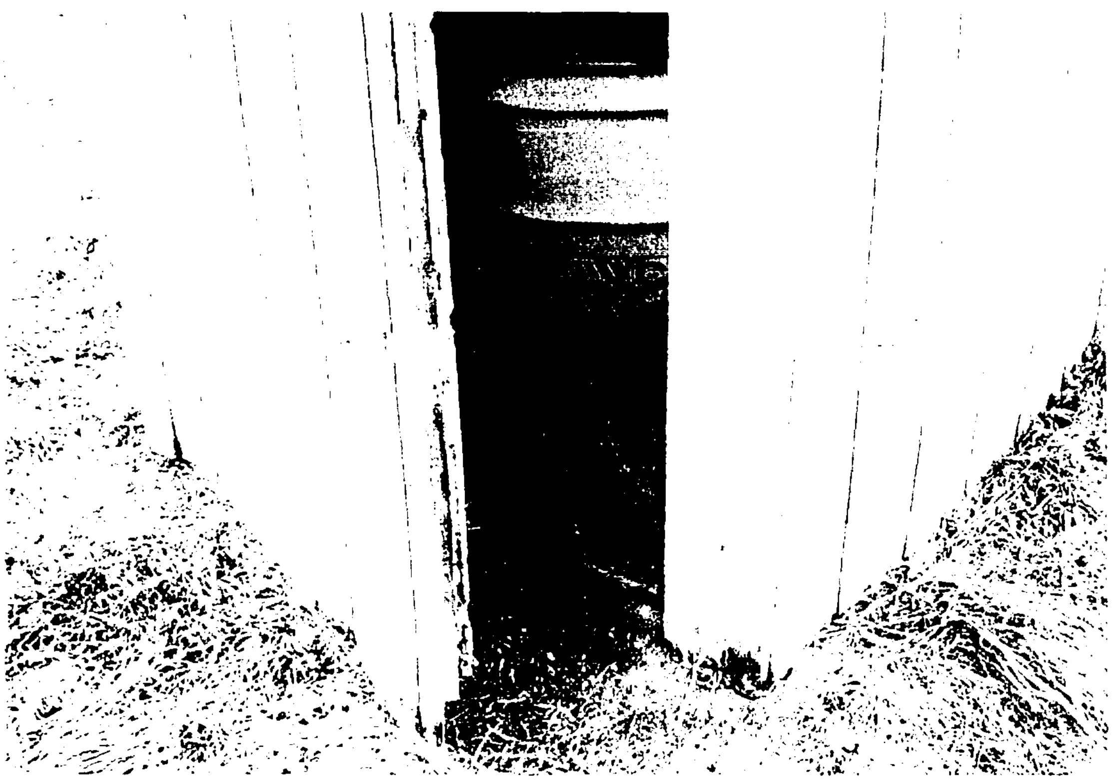


Photo 10: Gas vent shed with 1-foot deep soil inside (from gopher) on waste area No. 2.

Photo 11: Seep/erosion problem on western sidewall of detention basin, facing north.

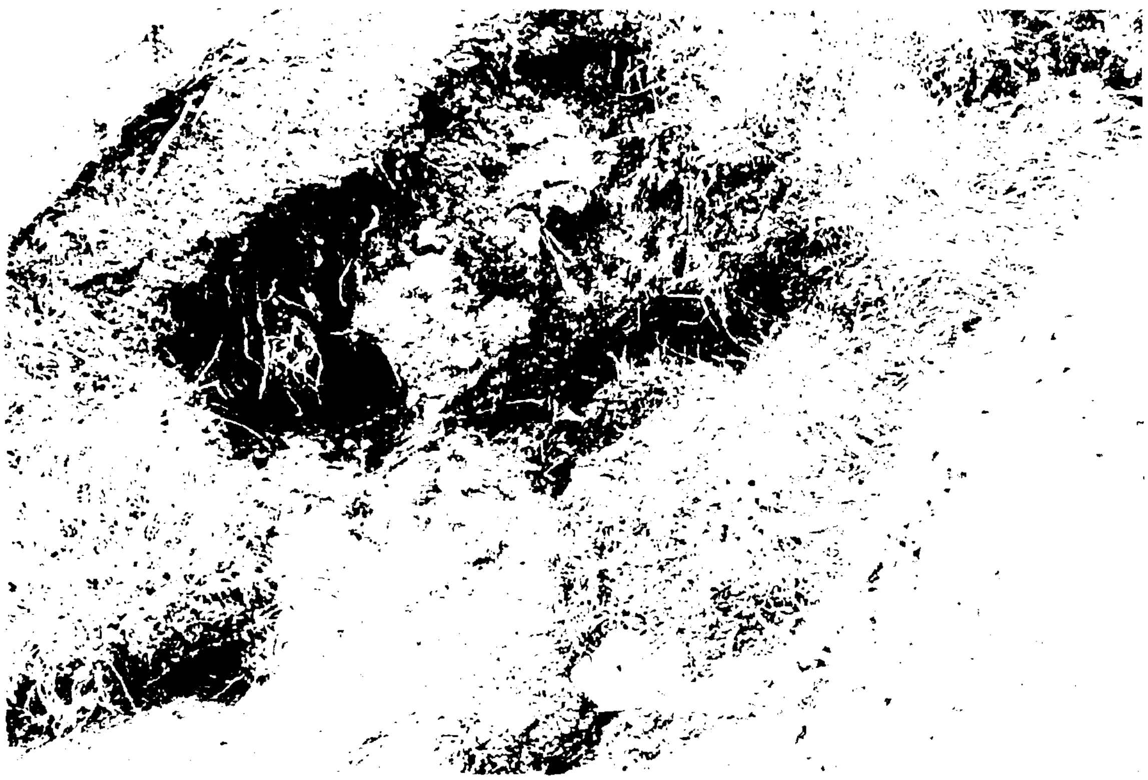


Photo 12: Close-up of water flowing north through eroded detention basin sidewall.

Photo 13: Damaged barbed wire fence near north Fabri-Form ditch, east of Gate C.

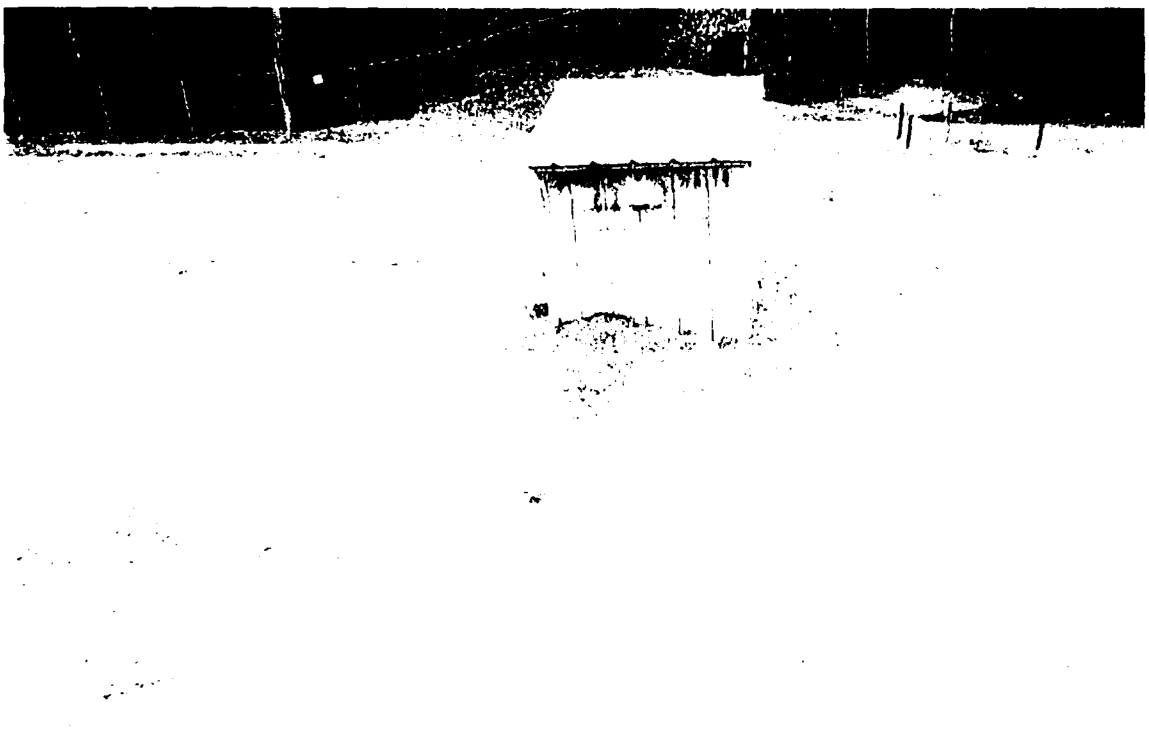


Photo 14: Access road and gas vent shed near north end of waste area No. 2.

ATTACHMENT 6

PLAN SHOWING NEARBY POTABLE WATER SUPPLY LINE

Dufresne-Henry
North Springfield, Vermont
Tel (802)886-2261
www.dufresne-henry.com

SITE PLAN
OF
OLD SPRINGFIELD LANDFILL

VERMONT SPRINGFIELD,

Proj. No.	4030002
Proj. Mgr.	FDD
Scale	NOT TO SCALE
Date	JUNE 2003
A	SP1