FINAL SITE INSPECTION PRIORITIZATION REPORT

FARWELL STREET DUMP

BARRE, VT

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY - New England
Office of Site Remediation and Restoration
Boston, MA

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INTRODUCTION

Stone & Webster Environmental Technology & Services (Stone & Webster) was requested by the U.S. Environmental Protection Agency - New England (EPA-New England) Office of Site Remediation and Restoration to perform a Site Inspection Prioritization (SIP) of the Farwell Street Dump in Barre, Vermont. All tasks were conducted in accordance with the New England Corps of Engineers Contract No. DACW33-94-D-0007, which was issued to Stone & Webster on December 30, 1994. The Vermont Department of Environmental Conservation (VT DEC) performed a Preliminary Assessment (PA) of this of this property in 1987, and a Screening Site Inspection (SSI) was conducted by NUS Corporation for EPA Region I in 1989. Updated information since the last EPA activity encountered during the SIP process is included in this report. Relevant text from the SSI report is presented in this report in italics.

Background information used in the generation of this report was obtained through file searches conducted at the VT DEC, the Barre Town Hall, conversations with Reginald Abare, Engineer for the City of Barre, telephone interviews with local water department personnel, information obtained through computer database searches, and conversations with other federal, state, and local agencies. Additional information was obtained during Stone & Webster's onsite reconnaissance on June 13, 1995.

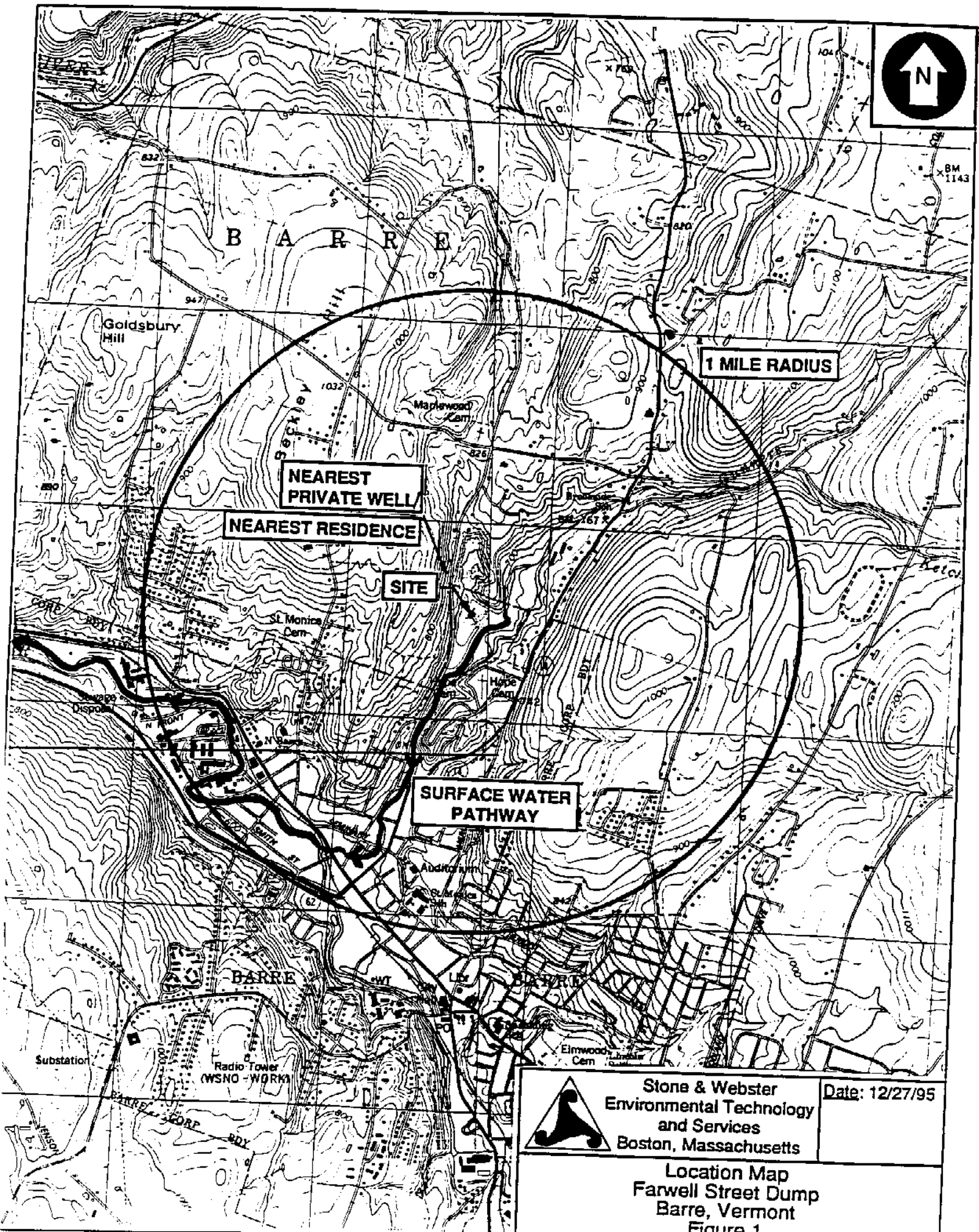
This package follows guidelines developed under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended, commonly referred to as Superfund. However, these documents do not necessarily fulfill the requirements of other EPA regulations, such as those under the Resource Conservation and Recovery Act (RCRA) or other federal, state, and local regulations. An SIP is intended to provide a preliminary screening of sites to facilitate EPA's assignment of site priorities. It is a limited effort, and is not intended to supersede more detailed investigations.

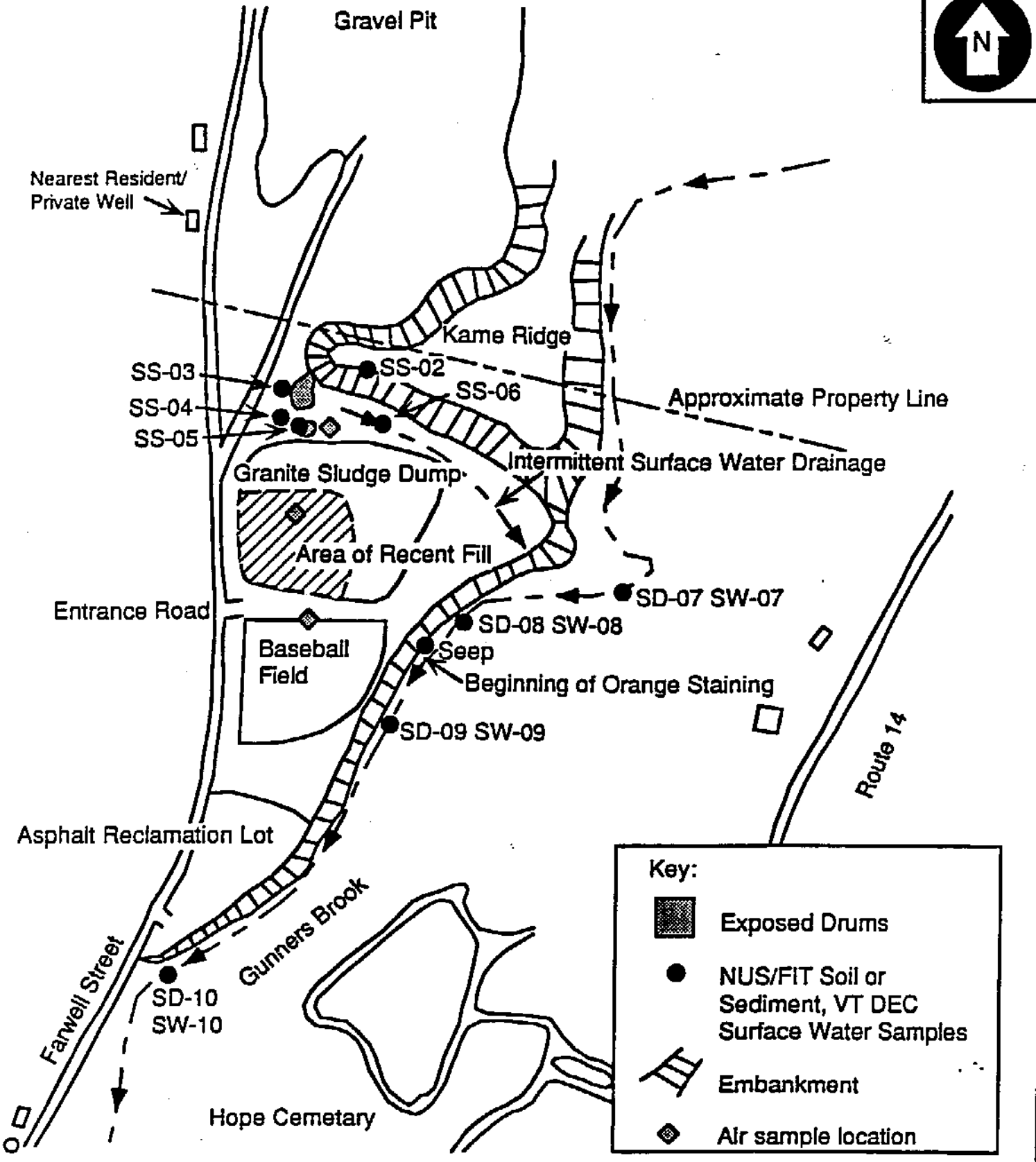
SITE DESCRIPTION

The Farwell Street Dump is located in the City of Barre, Vermont on Farwell Street, just north of the Barre town line, and is owned by the City of Barre. The site is located on a tract of land approximately 14 acres in size, at latitude 44° 12' 53", and longitude 72° 30' 4" (see Figure 1). [1, 2, 3, 4] Farwell Street Dump is located at about 680 feet above mean sea level, upgradient from and adjacent to Gunners Brook. Topography in the vicinity of the dump is mainly rolling hills. Surficial material on the site is mapped as kame terrace. Bedrock outcrops are visible adjacent to the landfill on the west side of Farwell Street. Available information indicates that groundwater flow is probably east, across the site, with some component flow discharging to

Gunners Brook, as evidenced by leachate seeps to the brook. [1]

Just north of the dump is the Lepage sand and gravel quarry. [1, 5] North of the gravel pit, land use is mainly rural residential, agricultural, and forest. Directly south of the property are woods, and approximately ½ mile to the south lies the population center of Barre City. Directly east, the site is bounded by Gunners Brook, and across Gunners Brook is a large cemetery. To the west is Farwell Street. Public access to the site is routine since a softball field is located on part of the old dump, as shown on Figure 2. [1, 5, 6]


N
B A R R E
Goldsbury Hill
1 MILE RADIUS
NEAREST PRIVATE WELL
NEAREST RESIDENCE
SITE
SURFACE WATER PATHWAY
Maplewood Cem
St Monica Cem
Hope Cem
Elmwood Cem
BARRE
Substation
Radio Tower (WSNO - WORK)
Stone & Webster Environmental Technology and Services Boston, Massachusetts
Date: 12/27/95
Location Map
Farwell Street Dump
Barre, Vermont
Figure 1



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Base Map taken from
NUS Corporation Screening Site Inspection, 1989

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Site Sketch
Farwell Street Dump
Barre, Vermont
Figure 2

OPERATIONAL AND REGULATORY IIISTORY AND WASTE CHARACTERISTICS

The dump property was purchased by the City of Barre from Arthur and Lillian Campbell in 1944 (Sweitzer, 1988b). The city began municipal dumping sometime in 1947 (VT ANR, 1988). Information concerning previous use of the land was not available. The City of Barre operated the property as a municipal waste dump since at least 1947, at which time disposal in the form of open dumping was started. The dump was closed in December of 1974 (VT ANR, 1987a).

Farwell Street Dump was operated as an open dump by the City of Barre for at least 27 years. [5] During this operating time, the dump reportedly took all of Barre's municipal trash, including wastes from some local industries. As identified through interviews conducted between the Vermont Department of Environmental Conservation (VT DEC) and former employees of local industries, these wastes included granite sludges from nearby granite processing facilities, waste capacitors and resins from the Sprague Electric Facility, and solvents from a local dry cleaning facility, Malnati Dry Cleaning, both of Barre, Vermont. The granite sludges were disposed of in the northern 1/3 of the property. The Sprague wastes were disposed of north of the granite sludge pit. [5]

Numerous granite processing facilities located in the Barre area used the northern portion of the dump property for the disposal of granite sludges (used silicon carbide, granite fines, and water) until 1979 (VT ANR, 1987a; Barre Granite Assoc., 1978). This practice of dumping granite sludges was thought by VT AEC to be a possible cause of the leachate problems at the dump/Gunners Brook interface. The high water content of the granite sludge, in combination with the permeability of the underlying sands and gravels, was the explanation given (Barre Granite Assoc., 1978; VT AEC, 1973; 1973b; 1977a; 1977d; 1977e; 1979).

Sprague manufactured electrical capacitors and generated synthetic organic solvents - including methylene chloride, trichloroethane, and trichloroethylene - as part of their manifested waste stream (VT AEC, 1985d). Interviews conducted by VT DEC with former Sprague employees indicate that liquid industrial wastes and off-spec capacitors were trucked to the dump and poured on the ground (VT ANR, 1987b, 1988). The capacitors were described by former employees as "can capacitors", some of which contained oil and were used by telephone companies. Information concerning the duration of this dumping practice was not obtained (VT ANR, 1988).

In 1985, S.B. Electronics took over the Sprague production line of radial film foil capacitors, which are made up of a 60/40 Tin-Zinc solder, polyester, polypropylene, aluminum foil, and cellulose acetate (Kennedy, 1986; VT AEC, 1985f). It is not known if these are the same type of capacitor disposed of at the dump. The exact nature of the liquid wastes has not been determined, although former employees indicate that wastes including "vinyl carbosol", "orange dip" (possibly epoxy resin), divinylbenzene, and ethyl benzene were disposed of at the dump (VT ANR, 1988).

During the closure of the Sprague Electric facility in 1985, the City of Barre requested a list

from Sprague, outlining all wastes known to have been disposed of at the dump. Sprague Electric claimed that no hazardous wastes were disposed of at the dump. The following wastes were included on the list provided by Sprague: various plastics, foils, wires, paper and cardboard, epoxies, and rejected capacitors (Stone, 1985a; 1985b; City of Barre, 1985). In addition, Sprague Electric conducted research and development at the Barre plant, involving numerous small quantities of chemicals; these may also have been taken to the dump (VT AEC, 1985b; 1985d).

The Malnati Dry Cleaning facility of Barre, Vermont used the dump for an undetermined number of years for the disposal of waste lint and dry-cleaning solvents. As of 1952, the facility was disposing of approximately 360 gallons of waste per year. The waste lint and solvents were not separated from other refuse in the dump (VT ANR, 1989).

Disposal began at the southern end of the property, now occupied by a city-operated asphalt reclamation lot. During the operating years of the dump, the area of disposal migrated north, reaching a line along the southern edge of the granite sludge dump by 1974. Onsite boring logs indicate that refuse deposits may have been as thick as 50 feet (VT DOH, 1971). The central portion of the property was covered, capped, and converted to a softball field during 1977 (Sweitzer, 1988a). The area of the granite sludge dump at the northern end of the property is currently being filled and leveled by the City, in preparation for the construction of a second ball field.

In 1988, at the time of the SSI site reconnaissance conducted by NUS Corporation, evidence of industrial waste disposal, in the form of drums and capacitors, was observed at the extreme northern end of the property. Approximately 15 - 20 drums were exposed in a pile at the northwest corner of the property, as shown in Figure 2. The drums were rusted, some partially deteriorated, and contained a solid orange material. The solid orange material was described by the Vermont Agency of Environmental Conservation (VT AEC) as epoxy resin. [5]

Table 1 below presents identified areas or structures on the dump property that are potential sources of contamination, the containment factors associated with each source, and the relative location of each source.

Table 1: Source Evaluation for Farwell Street Dump

Potential Source Area	Containment Factors	Spatial Location
Drums	None; drums are currently buried	Northwest edge of landfill property
Granite Sludge Dump	Currently being filled and leveled by City	Central portion of former landfill area

Landfill/Leachate Seep	Southern portion of landfill is an asphalt reclamation lot; central portion is closed and capped and is a ball field; northern portion currently undergoing filling and leveling. Seep still active.	14-acre parcel of Farwell Street Dump; leachate seeps observed on eastern edge of dump, on the embankment of Gunners Brook
Contaminated Soil	None; no soil has been removed.	On the northern portion of the dump in the area of the exposed drums

[1, 5, 6]

Table 2 summarizes the types of potentially hazardous substances which have been disposed, used, or stored on the Farwell Street Dump property.

Table 2: Hazardous Waste Quantity for Farwell Street Dump

Substance	Quantity or Volume/Area	Years of Use/Storage	Years of Disposal	Source Area
Granite sludge	Estimated at 5 acres	NA	1947-1974	Granite sludge dump, northern 1/3 of property
municipal trash	14 acres	NA	1947-1974	Entire dump property
waste lint and drycleaning solvents	Unknown; mixed in with municipal trash	NA	unknown	Entire dump property
contaminated soil	Unknown; area surrounding drums	NA	Discovered in 1988	Northern edge of dump property
waste capacitors, resins, liquid industrial wastes(ethyl benzene, vinyl carbosol, divinyl benzene)	Unknown; mixed in with municipal trash	NA	unknown	Entire dump property
drums	15-20 55-gallon drums	NA	Discovered in 1988	Northern edge of dump property

NA = Not Applicable
[1, 5]

After closure of the dump in 1974, several complaints were filed with VT AEC concerning leachate flowing into Gunners Brook. On several occasions during the mid to late 1970s, surface water samples were collected from Gunners Brook by VT AEC.

Following is a summary of previous work at the Farwell Street Dump:

- *1970-1972 - VT AEC inspections were conducted. The 8/7/72 inspection noted violations concerning refuse disposal within 50 feet of Gunners Brook.*

- *1971-1972 - The City of Barre initiated plans for improvements of landfilling operations at the Farwell Street Dump. Soil borings were performed across the property (VT DOH, 1971).*

- *1973 - VT AEC collected surface water samples from Gunners Brook, with analyses performed for limited metals, nitrates, nitrites, BOD, temperature, conductivity, pH, and turbidity (VT AEC, 1973a).*

- *1973-1979 - Various VT AEC inspections noted the need for improvement at the sludge disposal area in order* [to] *correct leachate problems in Gunners Brook (VT AEC, 1973b; 1977a; 1977c; 1979).*

- *1977 - VT AEC collected surface water samples from Gunners Brook and analyzed for iron (VT AEC, 1977d; 1977e).*

- *1978 - VT AEC responded to complaints of stream turbidity, and collected surface water samples from Gunners Brook (VT AEC, 1978a; 1978b; 1978c).*

- *1982 - VT AEC investigated a fish kill in Gunners Brook in the vicinity of the Farwell Street Dump (VT AEC, 1982).*

- *1985 - VT AEC collected surface water samples from Gunners Brook and analyzed for VOCs using methods 601 & 602 (VT AEC, 1985c).*

- *1987 - VT DEC completed a Preliminary Assessment of the Farwell Street Dump (VT ANR 1987a).* A medium priority for Site Inspection was recommended, due to the likelihood of hazardous waste disposal at the site, the proximity of Gunners Brook, and the close presence of a considerable population base. [1]

- *October 1988 - NUS/FIT conducted an onsite reconnaissance of the Farwell Street Dump, under the current TDD.*

- *November 1988 - NUS/FIT conducted a spontaneous potential geophysical survey of the area around the exposed drums under TDD No. F1-8811-14.*

- *December 1988 - NUS/FIT performed sampling of soils in the vicinity of the drum disposal area, and sediments along Gunners Brook. VT ANR simultaneously collected surface water samples adjacent to the NUS sediment samples, and one leachate sample from the dump embankment.* A Final Screening Site Inspection Report was prepared by

NUS/FIT on August 7, 1989. [5]

- May 1989 - The Farwell Street Dump site was referred to the U. S. EPA Emergency Planning and Response Branch (EPRB) by Michael Nalipinsky of the Superfund Support Section Remedial Branch. The Roy F. Weston Technical Assistance Team (TAT) was tasked by the EPA EPRB to conduct a Removal Program Site Investigation. [26]

- June 1989 - VT DEC conducted a soil sampling survey at the softball field located on a portion of the Farwell Street Dump, to determine if VOCs were present in surface or shallow depth soils on the ballfield. No VOCs were detected above background. [22, 23]

- June 1989 - Aquatec Inc., contracted by the VT DEC, performed air sampling at the Farwell Street Dump site. No VOCs analyzed for were detected in samples taken at the softball field and in the fill area. Two VOCs were detected at low levels in the drum area sample. The VT Air Pollution Control Division determined that there should be no adverse effect upon air quality or human health at the ballfield. [22, 27]

- July 1990 - EPA determines a Removal Action is not appropriate at the Farwell Street Dump site, based upon sampling results from the Removal Site Evaluation, as "the amount, quantity, or concentration released does not warrant a Federal response." The Removal Site Evaluation is terminated. [26]

Stone & Webster Environmental Technology and Services (S&W) conducted a site reconnaissance of the Farwell Street Dump on June 13, 1995. At this time, the City of Barre was still in the process of filling and leveling the northern portion of the former granite sludge dump area. In the area of the exposed drums identified by NUS/FIT, one rusted, crushed drum was observed protruding halfway from the soil. No other drums were visible; no stained soil or odors were observed. Weather conditions prohibited the use of a photoionization detector. [6]

There is one other CERCLIS site within 1 mile of the Farwell Street Dump, called Safety Kleen Corp, located 0.8 miles southwest of the dump. There are 14 RCRA facilities within one mile of the dump. These facilities and their status are listed in Table 3 below:

Table 3: RCRA Facilities Within 1 Mile of Farwell Street Dump

Site ID	Status	Address	Distance/Direction from Farwell Street Dump
Safety Kleen Corp	TSD	23 West Second St	0.8 miles/SW
Cumberland Farms	VGN	360 N Main St	0.7 miles/SW
Dessureau Machines Inc.	VGN	53 Granite St	0.9 miles/SW

Fresh N Dry Cleaners	SGN	11 Maple Ave	0.6 miles/SW
Rouleau Granite Co. Inc.	VGN	Depot Sq	0.9 miles/SW
Central VT Medical Center	SGN	Fisher Road	NON GC*
Crossway Motors Inc	SGN	Barre Montpelier Rd	NON GC*
Green Mountain Lincoln	VGN	Barre Montpelier Rd	NON GC*
Jasons Drycleaning Inc	VGN	Barre Montpelier Rd	NON GC*
Pike Ind Inc	SGN	Granger Rd	NON GC*
Rossi Buick Oldsmobile	SGN	Barre Montpelier Rd	NON GC*
Transed Assembly Plt	SGN	15 Stewart Ln	NON GC*
VT Gas Co	SGN	205 No Main St	NON GC*
Woodbridge Nursing Home	VGN	Fisher Rd	NON GC*

* - Non-geocoded; exact location and distance from site unknown.
TSD - Storage and treatment facility; transporter; generates more than 1000 kg/month of hazardous waste.
VGN - Generates less than 100 kg/month of hazardous waste.
SGN - Generates 100-1000 kg/month of hazardous waste.
[6]

GROUNDWATER PATHWAY

Bedrock outcrops are visible adjacent to the landfill on the west side of Farwell Street. Bedrock underlying the site is the Barton River member of the Waits River formation consisting of interbedded siliceous crystalline limestone and sericite-quartz-chlorite phyllite. *The formation generally strikes north-northeast, with a 55° to 70° westward dip (VGS, 1957). Bedrock outcrops along Farwell Street adjacent to the dump are highly fractured (VT AEC, 1977). Logs from the 1971 onsite test borings show that bedrock may be present at depths of 10 to 50 feet (VT DOH, 1971).* Available information indicates groundwater flow is probably east, across the site, with some component of flow discharging to Gunners Brook, as evidenced by leachate seeps to the Brook. [1]

In 1988, the VT ANR, Ground Water Management Section (GWMS) completed a study which designated Well Head Protection Areas (WHPAs) for existing public groundwater supplies and

analyzed additional groundwater resources for the town of Barre. The area parallel to and west of Route 14, north of Barre City, was designated as having the highest potential for future groundwater exploration (Smith, 1988). This is the same area described by Stuart as a buried river valley, now filled with unconsolidated glacial and glaciolacustrine sediments. This valley is believed to supply water to the sediment of the Stevens Brook valley at Barre. The dump is located in the kame gravel deposit which blocks this valley at its southern terminus (Stuart, 1971).

Portions of the towns of Montpelier, East Montpelier, Berlin, and Barre - including Barre City - are located within a four mile radius of the dump (USGS, 1978; 1981). There are no municipally-owned groundwater supply wells located within this radius. [9, 10, 11] The City of Barre is supplied by surface water from the Thurman Dixon Reservoir, located approximately 4.5 miles southeast of the dump. [4, 10] Privately-owned public supply wells which serve portions of the population within these towns do exist within a four mile radius of the dump, and are listed in Table 4 below. A portion of the population within four miles of the dump that is not served by public supply wells or municipal surface water supplies relies on private groundwater wells. Information used to estimate this population served by private wells is derived from the Frost Associates Report generated for the Farwell Street Dump. Frost Associates estimated the population served by private wells by summing the total number of drilled and dug wells within each CENTRACTS block (a Cartesian data management system used by the Census Bureau) and multiplying this total by the average number of people in each household. [19] *The closest private well to the dump is located approximately 700 feet north-northwest, on the west side of Farwell Street. This well is drilled to 430 feet and is screened in bedrock (Sweitzer, 1989b; VT ANR, 1989c).*

Table 4

Public Groundwater Supply Sources Within Four Miles of Farwell Street Dump

Distance/ Direction from Site	Source Name	Location of Source	Estimated Population Served	Source Type
2.2 miles W/NW	RMC Mobile Home Park, WSID# 5344	Berlin	69	1 bedrock
2.8 miles W	Berlin Convalescent, WSID# 5529	Berlin	147	3 bedrock
2.8 miles W/NW	Berlin Mobile Home Park, WSID# 5256	Berlin	70	1 bedrock
3.4 miles N/NE	Sandy Pine Mobile Home Park, WSID# 5267	East Montpelier	100	3 bedrock

3.5 miles N/NE	Crystal Springs Water Co., WSID# 5264	East Montpelier	300	springs, 1 gravel well
3.5 miles SW	Birchwood Park Water System, WSID# 5253	Barre	36	1 bedrock
3.8 miles S/SE	Wells-Lamson Water Co., WSID# 5251	Barre	60	2 springs
3.9 miles S	Mt. View Acres Water Co., WSID# 5252	Barre	32	1 bedrock
4 miles SE	Deep Rock Water Co., WSID# 5249	Barre	75	1 bedrock

[5, 9, 10, 11]

Table 5 lists the total estimated populations served by both public and private groundwater sources within 4 miles of the Farwell Street Dump.

Table 5

Estimated Drinking Water Populations Served by Groundwater Sources Within Four Miles of Farwell Street Dump

Radial Distance From Farwell Street Dump (miles)	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Population Served by Groundwater Sources Within the Ring
0.00 < 0.25	7	0	7
0.25 < 0.50	43	0	43
0.50 < 1.00	137	0	137
1.00 < 2.00	457	0	457
2.00 < 3.00	758	286	1044
3.00 < 4.00	977	603	1580
TOTAL	2379	889	3268

[5, 9, 10, 11, 19]

There has been no sampling of the groundwater at the Farwell Street Dump.

SURFACE WATER PATHWAY

Surface water runoff from the dump property occurs as both overland runoff and along an intermittent stream channel at the north end of the property along the base of the acial kame ridge.

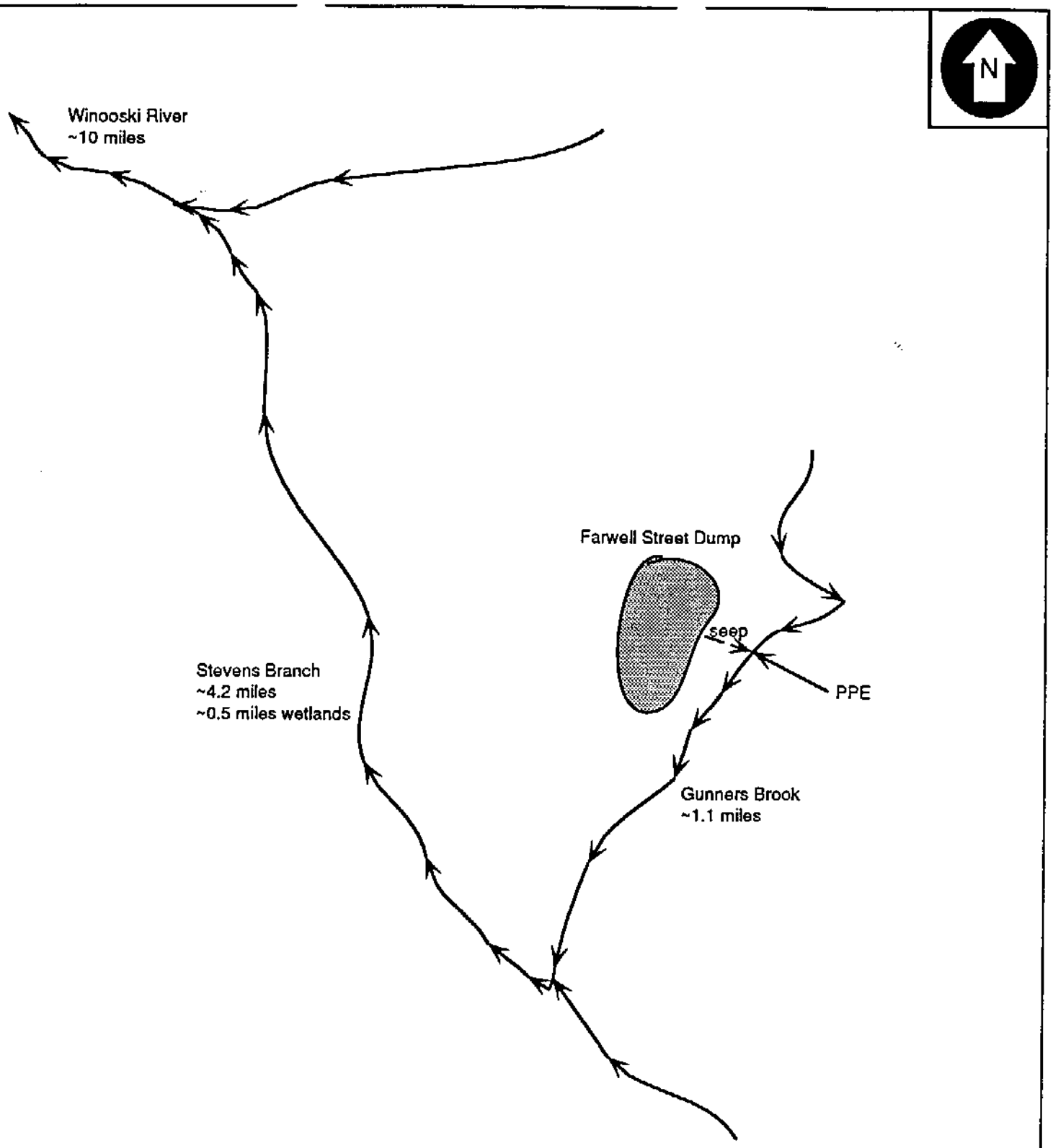
Several erosional runoff channels are evident along the embankment leading down to Gunners Brook. One of these channels exists on the northern border of the property, where an intermittent surface water drainage ditch runs west to east/southeast and directs runoff to Gunners Brook (see Figure 2). [6] *In addition, leachate seeps have been evident in the past as well as during the NUS/FIT sampling event (NUS/FIT, 1988a; VT ANR, 1989d). All runoff from the dump property enters Gunners Brook. During the October 11 NUS/FIT onsite reconnaissance, orange stained sediment was observed in Gunners Brook, from a point directly below the northeast corner of the ballfield and continuing downstream beyond the dump property. The staining was also evident during the December 5 sampling visit (Shepard, 1989g)*, as well as during the S&W June 13, 1995 site reconnaissance. [6] The approximate location of the seep is shown on Figure 2.

Gunners Brook flows south through the City of Barre for approximately 1.1 miles and then joins Stevens Branch. The Stevens Branch flows north-northwest from this junction for approximately 4.2 miles before joining the Winooski River in Montpelier. From this junction, the Winooski River flows west-northwest approximately 45 miles to Lake Champlain, at Burlington, Vermont. The average flow of the Winooski River in Montpelier is 592 cubic feet per second. [20] *Both the 1.1 mile stretch of Gunners Brook--downstream of the dump to the Stevens Branch--and the 4.2 mile stretch of the Stevens Branch--from the Gunners Brook confluence to the mouth--are considered by VT ANR Water Quality Division (WQD) to be non-supportive of biota, non-contact recreation, and aesthetics. This status is due to the presence of both point and non-point pollution sources located within the drainage basins of both of these surface water bodies. All point sources are regulated by the state of Vermont. Significant non-point sources include the Barre Coal Tar site, the Unifirst and Williamstown landfills, the Farwell Street Dump, and the Granite Sheds of Barre. Identified contaminants include both organics and metals (VT/ANR-WQD, 1989).* There are no surface water intakes along the 15-mile downstream pathway. [14] A Surface Water Pathway sketch is provided as Figure 3. A summary of the in-water segments for the surface water migration path, the estimated length of reach, flowrate, and length of wetlands along each segment is provided in Table 6 below.

Table 6
Water Bodies Within the Surface Water Segment of
Farwell Street Dump

Surface Water Body	Descriptor[a]	Length of Reach	Flow Characteristics (cfs)	Length of Wetlands
Gunners Brook	Minimal stream	1.1 miles	< 10	0
Stevens Branch	Large stream to river	4.2 miles	10-100	~ 0.5 miles
Winooski River	Moderate to large stream	10 miles	100-1,000	0

[3, 4, 5, 20]



NOT TO SCALE

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Boston, Massachusetts

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Surface Water Pathway
Farwell Street Dump
Barre, Vermont
Figure 3

The Stevens Branch, from the vicinity of the City of Barre to the mouth, is used for fishing. Boating, which is limited to small non-power boats because of depth limitations, occurs mainly in the Montpelier area. The river is not used extensively for swimming, again due to depth limitations, although children have been known to play along the shores (Sweitzer, 1989c). A yearly fishing derby in Gunners Brook is sponsored by the Barre Fish and Game Club for children in Barre, which reportedly takes place in a location upstream from the dump. [17, 25] There are reportedly no occurrences of Significant Natural Communities, nor rare, threatened, or endangered species along the 15-mile downstream pathway. [8] There is approximately ½ miles of wetlands frontage along the downstream pathway, near the confluence of Stevens Branch and the Winooski River, about 5.3 downstream miles from the dump. [3, 4, 21]

Between 1973 and 1985, VT AEC conducted several surface water sampling events on Gunners Brook, in response to complaints of leachate outbreaks and discoloration of the stream. Samples collected in 1973, 1974, and 1978 were analyzed for the water quality parameters of pH, COD, chloride, sulfate, hardness, CaC03, nitrates, nitrites, phosphates, conductivity, BOD, and iron. Two sampling events in 1977 involved analysis for iron only. The 1985 samples were analyzed for metals and volatile organic compounds (VOCs).

A comparison of analytical results from samples collected upstream of the dump to those collected adjacent to it or downstream indicates degradation of the Gunners Brook water quality as it flows past the dump. This degradation is illustrated by increased levels of COD, nitrates, nitrites, conductivity, and both dissolved and total iron (VT AEC, 1973a; 1974; 1973b; 1978c; 1985c). Leachate samples collected in 1977 and 1978 were characterized by a lower pH, and higher conductivity, iron, and chloride than the upstream brook samples (VT AEC, 1977f; 1979).

In 1977, VT AEC suggested that the orange discoloration of Gunners Brook was caused by iron-oxidizing bacteria that rely upon iron in the water for growth. The report indicated that growth of these bacteria was not necessarily indicative of abnormally high iron concentrations in surface water (VT AEC, 1977c).

In 1982, VT AEC investigated a fish kill in Gunners Brook in the vicinity of the Farwell Street Dump. Water quality analysis indicated no water quality deterioration at the time of sampling (VT AEC, 1982). In 1985, VT AEC sampled and analyzed samples from Gunners Brook. Analysis for pH, COD, conductivity, chloride, nine metals, and VOCs--using EPA methods 601 and 602--confirmed that levels of iron and COD were elevated in downstream samples. No VOCs were detected (Attachment A, section 4) (VT AEC, 1985c).

An undated memo from the City of Barre manager indicates that a surface water sample from Gunners Brook was analyzed for polychlorinated biphenyls (PCBs). No PCBs were detected (City of Barre, circa 1985).

NUS/FIT, in conjunction with VT ANR, conducted an onsite reconnaissance of the Farwell Street Dump on October 11, 1988. On November 23, 1988, NUS/FIT conducted a Spontaneous Potential (SP) geophysical survey of the drum disposal area at the northern end of the dump property, under

TDD No. F1-8811-14. The survey was conducted in an attempt to map the lateral extent of the drum burial area. On December 5, 1983, NUS/FIT, again in conjunction with VT ANR, collected onsite soil samples, sediment and surface water samples from Gunners Brook, and one leachate sample from the dump embankment. A total of six soil samples (including one blank and one replicate/duplicate) and four sediment samples were collected by NUS/FIT; four surface water samples and one leachate sample were collected by VT ANR. Sample locations are indicated on Figure 2.

A summary of the sediment samples taken by NUS/FIT is presented in the table below:

Table 7

Sample Summary: Farwell Street Dump
Sediment Samples Collected by NUS/FIT on 12/05/88

Station Location/ Sample No.	Traffic Report No.	Time	Remarks	Sample Source
MATRIX: sediment				
SD-07 22048	AM943 MAL066	1135	grab, 0-6 inches	background, upstream of Beaver Dam
SD-08 22049	AM944 MAL067	1110	grab, 0-6 inches	upstream of first orange staining
SD-09 22050	AM945 MAL068	1045	grab, 0-6 inches	below outfield fence of ball field
SD-10 22051	AM946 MAL069	1003	grab, 0-6 inches	beneath guardrail, south end of asphalt reclamation lot

KEY:
Traffic Report Numbers: Top # = Organic Traffic Report #
Bottom # = Inorganic Traffic Report #
SD = Sediment sample from Gunners Brook
NOTE: Surface water samples collected by the VT DEC and shown on Figure 2 are numbered to correspond to the NUS/FIT sediment samples, as they were collected at the same locations on Gunners Brook.
[5]

A leachate outbreak was observed on the embankment leading to Gunners Brook, approximately 50 yards downstream from location SD-08, and near where the orange staining was first encountered during the October 11 reconnaissance (Figure 2). Dave Shepard (VTANR) collected a sample of this leachate.

All NUS/FIT sediment samples were analyzed for compounds on the EPA Superfund List through a full Contract Laboratory Program (CLP) analysis. *This included analysis for volatile organic*

compounds (VOCs), extractable organic compounds, and inorganic elements.

The four surface water samples collected by VT DEC--labeled SW-07 through SW-10-were analyzed by the VT DEC Water Resources Laboratory. Analyses were performed for selected metals and VOCs, using EPA methods 601 and 602, which were modified for the use of a flame ionization detector. Any positive results were confirmed with EPA method 624. The leachate sample was analyzed for VOCs only, using EPA methods 601 and 602.

The following sections summarize the analytical results from sediment samples collected by NUS/FIT, and surface water samples collected by VT ANR. *Note that NUS/FIT sample results qualified by a "J" are considered approximate due to limitations identified during the quality control review. In addition, extractable organic sample results reported at concentrations below detection limits and confirmed by mass spectrometry are qualified by a "J" and considered approximate.*

SEDIMENT ANALYTICAL RESULTS

Four sediment samples were collected from locations along the west bank of Gunners Brook, adjacent to the dump embankment. The sample from location SD-07 was collected upstream of the dump, SD-08 and SD-09 from points adjacent to the toe of the embankment, and SD-10 from downstream of the dump property (Figure 2).

Volatile Organic Compounds (VOCs)

No VOCs were detected in the background sediment sample from SD-07. The VOC 1,1,1-trichloroethane was detected in samples from SD-08 (4.0 ppb) and SD-09 (2.0J ppb). Chloroform was detected in samples from SD-09 (10.0 ppb) and SD-10 (1 .0J ppb). No other VOCs were detected in the sediment samples.

Extractable Organic Compounds
(semi-volatiles, pesticides, and PCBs)

A total of thirteen semi-volatile organic compounds were detected in sediment samples collected from Gunners Brook. The majority of these compounds are polycyclic aromatic hydrocarbons The sample from SD-09 contained the greatest number (12) of compounds, with four at higher concentrations than were found in background sample SD-07. In addition, six of the twelve compounds detected in SD-09 were not detected in SD-07. None of the compounds detected were at levels greater than two times the background levels. Location SD-09 is downstream of both the observed seep and the first observed occurrence of orange staining in the brook. No extractable organic compounds were detected in any sediment samples above the sample detection limits. [5]

No pesticides were detected in sediment samples from SD-07, SD-08 or SD-09. Only one pesticide was detected in the sample from SD-10 (alpha-Chlordane at 1.7J ppb). No PCBs were detected in any of the stream sediment samples.

Inorganic Elements

Similar concentrations of inorganic elements were detected in all four sediment samples collected, including the background sample, SD-07.

SURFACE WATER/SEEP ANALYTICAL RESULTS

VT ANR collected four surface water samples from Gunners Brook, and one leachate sample from the face of the dump embankment. The four surface water samples were collected at the same locations as the NUS/FIT sediment samples. The leachate sample was collected from a point on the embankment, approximately 25 to 50 feet downstream of location SW-08 (Figure 2). These samples were analyzed for volatile organic compounds using EPA methods 601 and 602, which were modified for the use of a flame ionization detector. Any positive results were confirmed with EPA method 624. The leachate sample was analyzed for VOCs only, using EPA methods 601 and 602. All surface water samples were analyzed for the following inorganic elements: arsenic, cadmium, chromium, lead, mercury, selenium, silver, antimony, beryllium, copper, nickel, thallium, and zinc.

Volatile Organic Compounds (VOCs)

No VOCs were detected in the surface water samples. Two VOCs were detected in the leachate sample: 1,1-dichloroethane at 35.0 ppb; and 1,1,1-trichloroethane at 8.0 ppb. The EPA method 602 analysis of the leachate sample also indicated the presence of additional unidentified peaks.

Inorganic Elements

Analysis of the VT ANR samples for inorganic elements was performed on the surface water samples only. Copper was detected in the sample from SW-10 at levels 4.6 times greater than that found in the background sample SW-07.

The results indicate that zinc (from 4.0 to 10.0 ppb) and copper (from 4.0 to 55.0 ppb) were detected in all four samples; nickel was detected in samples SW-09 (8.0 ppb) and SW- 10 (5.0 ppb); and mercury was detected in sample SW-10 (0.3 ppb). Except for copper, none of the other three inorganic elements were detected at levels greater than 3 times those found in the background sample, SW-07.

The Farwell Street Dump site was referred to the U.S. EPA Emergency Planning and Response Branch (EPRB) by Michael Nalipinsky of the Superfund Support Section Remedial Branch in May 1989. The Roy F. Weston Technical Assistance Team was tasked by the EPRB to conduct a removal Program Site Investigation, in order to assist the Site Investigator and the Chief of the Enforcement and Preparedness Section to make a Removal Action decision. Apparently, soil and aqueous samples were again collected in April 1990 by Roy F. Weston. The sample locations are unknown. The PA/SI reports completed by Roy F. Weston in 1990 were not available in file information. However, in a memorandum from the EPA Site Investigator, Carol B. Goldsberry, to the Farwell Street Dump Site File dated 7/26/90, it was stated that the major hazardous substances

for which there is threat of release in water are: 1,1-Dichloroethane, 1,2-Dichloroethylene isomers, 1,1,1-Trichloroethane, Trichloroethylene, Toluene, Ethylbenzene, Methylene Chloride, and Naphthalene. In this memo, it was declared that the Removal Site Evaluation was terminated, because the "amount, quantity, or concentration released does not warrant Federal response." [26]

SOIL EXPOSURE PATHWAY

The surficial geology of this region of Vermont consists primarily of unconsolidated glacial deposits. The immediate area of the dump has been mapped as kame terrace deposits of unconsolidated, stratified sand and gravel. The ridge bordering the dump to the north has been mapped as a kame moraine.

Extending north to East Montpelier, to the west of and essentially paralleling Route 14, the surficial deposits have been mapped as glaciolacustrine sediments and recent alluvium. These consist of sand and gravel in the vicinity of the dump, and grade northward to silt, silty clay, and clay. (VSG, 1970; Stewart, 1971). This area has been described as a former river valley which was subsequently buried with glacial outwash and kame deposits. Based upon both seismic and well data, these deposits reach a maximum thickness of 200 feet in the East Montpelier area, approximately 3.5 miles north of the dump (Stewart, 1971).

There are an estimated 3,338 people within a one mile distance from the site. [19] There are no known terrestrial sensitive environments on site, and it is estimated that there is approximately 5 workers on site, to cut the lawn for the ball field, move piles of stockpiled debris, and perform other maintenance work for the City of Barre. [5, 6, 8]

NUS/FIT, in conjunction with VT ANR, conducted an onsite reconnaissance of the Farwell Street Dump on October 11, 1988. On November 23, 1988, NUS/FIT conducted a Spontaneous Potential (SP) geophysical survey of the drum disposal area at the northern end of the dump property, under TDD No. F1-8811-14. The survey was conducted in an attempt to map the lateral extent of the drum burial area. On December 5, 1988, NUS/FIT, again in conjunction with VT ANR, collected onsite soil samples, sediment and surface water samples. A total of six soil samples (including one blank and one replicate/duplicate) were collected by NUS/FIT. [5]

A summary of the soil samples taken by NUS/FIT is presented in the table below:

Table 8

Sample Summary: Farwell Street Dump
Soil Samples Collected by NUS/FIT on 12/05/88

Station Location/ Sample No.	Traffic Report No.	Time	Remarks	Sample Source
MATRIX: soil				
SS-01 22042	AL632 N/A	1800	grab	QC/QA blank
SS-02 22043	AL643 MAL061	0955	grab, 0-6 inches	background, top of kame ridge
SS-03 22044	AM924 MAL062	1220	composite, 0-2 feet	west of drums, near capacitor
SS-04 22045	AM940 MAL063	1150	composite, 0-2 feet	west of drums, OVA readings > 100 ppm above background
SS-05 22046	AM941 MAL064	1150	composite, 0-2 feet	replicate (VOC) duplicate (inorganics and volatile fraction)
SS-06 22047	AM942 MAL065	1030	composite, 0-2 feet	downgradient of drum area, along drainage

KEY:
Traffic Report Numbers: Top # = Organic Traffic Report #
Bottom # = Inorganic Traffic Report #
SS = Soil sample from dump property.
[5]

Significant observations made during the three onsite visits included the following:

- *Locations SS-03, 04, and 05 were chosen based upon observations made during the collection of Spontaneous Potential (SP) data on November 23, 1988 (NUS/FIT, 1988b). During the placement of electrodes into the soil, readings for total volatile organic compounds of up to 46 parts per million (ppm) above background were indicated on the Organic Vapor Analyzer (OVA) at the ground level, at SP station L60-40. Capacitors were also discovered, both on the ground and in the soil, at SP station L60-50.*

- *SS-04 and SS-05 (Figure 2) were located adjacent to SP station L60-40, where the most elevated readings of total organic compounds were detected with the OVA on November 23, 1988. Readings of over 1,000 ppm above background were detected within the SP L60-40 hole, and up*

to 100 ppm above background in the sampling hole, at the time of sample collection. No readings above background levels were encountered in the breathing zone.

- *SS-03 was located adjacent to SP station L60-50, where the capacitors were discovered on November 23 (Figure 2). Readings ranging from 100 to 1,000 ppm above background were detected on the OVA, within the sample hole. No readings above background levels were observed in the breathing zone.*

- *The capacitors were 0.5 -1 inch in length, 0.25 inches in diameter, and were wrapped in a cellophane and foil-like material. Three capacitors were recovered from the sampling hole, and one was found on the ground surface.*

- *The ground surface in the vicinity of sample locations SS-03, SS-04, and SS-05 appeared to be less vegetated and more level than the surrounding area. The grass was sparse, and the soil was a very dense, dark brown, clayey silt. Adjacent soils on the kame ridge (SS-02) consisted of tan to reddish brown, medium to fine sand with silt.*

All NUS/FIT soil samples were analyzed for compounds on the EPA Superfund List through a full Contract Laboratory Program (CLP) analysis. This included analysis for volatile organic compounds (VOCs), extractable organic compounds, and inorganic elements. The soil blank from SS-01 was analyzed for VOCs and extractable organic compounds only. [5]

The following section summarizes the analytical results from soil samples collected by NUS/FIT.

SOIL ANALYTICAL RESULTS

Five soil samples (including one duplicate) were collected from the northern portion of the dump property. One sample (SS-02) was collected as a background from atop the kame ridge. Three samples (SS-03, SS-04, SS-05) were collected from the area just west of the exposed drums. Sample location SS-06 was chosen downgradient from the exposed drums, along the intermittent surface water drainage (See Figure 2 for sample locations).

Volatile Organic Compounds (VOCs)

A total of seven VOCs were detected in soil samples from locations SS-03, SS-04, and SS-05, at levels--reported in parts per billion (ppb)--ranging from 64J ppb to 186,000J ppb. 1,1,1-Trichloroethane, trichloroethene, and tetrachloroethene were all found in these three samples; no VOCs were detected in background sample from SS-02, nor in sample SS-06. The highest levels detected were in the sample from SS-03: trichloroethene (186,000J ppb); tetrachloroethene (980J ppb); and 1,1,1-trichloroethane (940J ppb).

The soil sample from SS-03 also had the highest levels of four additional VOCs: total xylene (30,000J ppb); acetone (4,600 ppb); ethylbenzene (3,300 ppb); and 1,1,2-trichloroethane (130J ppb).

Extractable Organic Compounds (semi-volatiles, pesticides, PCBs)

A total of 26 semi-volatile organic compounds were detected in soil samples collected from locations SS-03, SS-04, SS-05 and SS-06. The majority of the semi-volatile organic compounds detected in samples from these locations were of the polycyclic aromatic hydrocarbon (PAH) and phthalate compound groups, and were detected at levels equal to or below the background sample detection limits.

In addition, N-nitrosodiphenylamine was detected in all four soil samples. The sample from SS-03 also contained dibenzofuran, 4-chlorophenyl-phenylether, 4-bromophenyl-phenylether, and hexachlorobenzene. No semi-volatile organic compounds were detected in background sample SS-02.

Three semi-volatile organic compounds were detected at levels at least two to eight times above the background sample detection limits. The highest levels of semi-volatile organic compounds were detected in the soil sample from SS-03.

Naphthalene was detected at 3,700 ppb (at least 8 times background) in the sample from SS-03. This is the highest concentration of the semivolatile organic compounds detected in the soil samples. This compound is used in the manufacture of synthetic resins (Siddig, 1981), and may be associated with the resins contained in the exposed drums.

Di-n-butylphthalate was detected in soil samples from SS-03 at 2,200 ppb (at least 5.8 times background), SS-04 at 2,000 ppb (at least 5 times background), and SS-05 at 1,500 ppb (at least 4 times background). Di-n-butylphthalate is used in plasticizing vinyl acetate and cellulose esters (Siddig, 1981); it may be associated with the capacitors found in the exposed drum area.

Butylbenzylphthalate was detected in the sample from SS-03 at 750J ppb (at least 2 times background) .

Several other semi-volatile organic compounds were detected at lesser concentrations in the samples from the following four locations: twenty-one compounds were detected in the sample from SS-03, five each in samples from SS-04 and SS-05, and ten in the sample from SS-06.

Five different pesticides were detected in soil samples from SS-03, SS-04, SS-05, and SS-06, with levels ranging from 1.1J ppb to 12J ppb. No pesticides were detected in the background sample. All levels were below the background sample detection limits for each compound.

No polychlorinated biphenyls (PCBs) were detected in any of the soil samples.

Inorganic Elements

Results of the analysis of the soil sample from SS-06 indicate the presence of five elements at levels two to four times greater than levels in the background sample, SS-02. The highest levels of inorganic elements were detected in SS-06. These included barium at 61.5 parts per million (ppm)

(4 times background), vanadium at 37.8 ppm (4 times background), and sodium at 484 ppm (4 times background).

Lead was detected in all of the soil samples from the exposed drum area. Samples from locations SS-03, SS-04, and SS-05 contained lead at levels five times greater than the detected background levels, with concentrations of 22.6 ppm, 24.0 ppm, and 24.4 ppm, respectively. In addition, SS-03 also contained zinc at 104 ppm (4 times background). Lead was also detected at SS-06 at 15.4 ppm (3.4 times background).

There were no other inorganic elements detected in the soil samples at levels greater than 2 times the detected background levels.

As a result of the soil samples analyses reported by NUS/FIT during the SSI, on May 15, 1989 the Secretary of the Agency of Natural Resources for the state of Vermont determined that "the disposal of hazardous substances at the Farwell Street Dump in Barre has resulted in the release of contaminants which may present an imminent and substantial danger to the public health or environment." Among other actions, the Secretary concluded that access to the area of contaminated soil identified by NUS/FIT in the northwestern portion of the site should be restricted by erecting fencing around this area, and that a soil gas survey of the ballfield be conducted to determine if contamination with VOCs is present at or beneath the surface of the ballfield. [23]

Based upon the Secretary's determination, on June 22, 1989 the Vermont Department of Environmental Conservation (VT DEC) conducted a soil sampling survey at the softball field located on a portion of the Farwell Street Dump. The purpose of this sampling effort was to determine if VOCs "which were deposited in the dump [were] present in surface or shallow depth soils (up to 6 inches) on the ballfield." [22] A grid was formed on the field, resulting in 33 sample points. At each of these points, a hole was augered to approximately six inches with a screw auger, and the soil was removed and placed into a ziplock bag. The depth of six inches was chosen in order to sample the upper soil horizon without impacting the underlying clay cap. The hole was screened with the HNu, as was the soil in the ziplock bag. Soil samples for lab analysis were collected by again augering to six inches and collecting enough soil from the boring to fill a 40 mL VOA vial. [22]

Screening of all of the holes augered during the survey were negative; no elevated readings were detected. Readings taken of the soil in the ziplock bags were either zero or registered below zero, probably as a result of the moisture in the soil. Because of the negative results, five samples for laboratory analysis were chosen at random. [22] The five soil samples were analyzed by method 8240 GC/MS for volatile organics - soils, by the VT DEC Laboratory. Analyses results for all samples were non-detect. [24]

In 1990, in accordance with section 300.400 of the National Contingency Plan (NCP), a Removal Site Evaluation, consisting of a Preliminary Assessment and Site Investigation (PA/SI), was undertaken for the Farwell Street Dump. Sampling was again performed in April, 1990 by Roy F. Weston. Soil samples were analyzed by the US EPA Region I Laboratory in Lexington, MA, using EPA Consensus Protocol, Organic Analysis, Multi-Media, Multi-Concentration, Medium Level

Preparation for Screening and Analysis of Semivolatiles (BNA), 1/87 (IFB WA 84-A266). The following compounds were identified in soil samples collected from the site: trichloroethylene, bis(2-ethylhexyl)phthalate, and naphthalene. However, on July 26, 1990, the Removal Site Evaluation was terminated as "the amount, quantity, or concentration released does not warrant Federal Response." [26] The Weston reports were not included in file information and the sample locations are unknown.

At the time of the S&W site reconnaissance on June 13, 1995, the City of Barre was continuing to fill and level that northern portion of the property, formerly occupied by the granite sludge dump, in preparation of a second ballfield. [6, 17]

AIR PATHWAY

There are no significant natural communities nor rare, threatened, or endangered species identified by the Vermont Nongame & Natural Heritage Program on the Farwell Street Dump site, nor within 2 miles of the site. Within the 2-3 mile radial distance ring from the site is the occurrence of the *Ardea Herodias*, or Great Blue Heron, considered rare within the State of Vermont, and an uncommon breeder. Within the 3-4 mile distance ring from the site is the occurrence of the *Bartramia Longicauda*, commonly known as the Upland Sandpiper, which is designated as State Threatened. [8] The closest individual to the Farwell Street Dump is located approximately 700 feet north-northwest of the site, on the west side of Farwell Street. [3, 4, 5, 6] Table 9 below summarizes the estimated surrounding population, within 4 miles of the site.

Table 9: Estimated Population Within Four Miles of Farwell Street Dump

Radial Distance From Farwell Street Dump (miles)	Estimated Population
0.00 < 0.25	411
0.25 < 0.50	492
0.50 < 1.00	2435
1.00 < 2.00	7419
2.00 < 3.00	3078
3.00 < 4.00	4408
TOTAL	18,243

[19]

Evidence of industrial waste disposal was noted in an area at the northern end of the dump property during the NUS/FIT onsite reconnaissance and sampling activities. Elevated readings of total volatile organic vapors, above the background levels at the site, were detected in the ambient air during the collection of soil samples from this area. [5]

During the placement of electrodes into the soil, readings for total volatile organic compounds of up to 46 parts per million (ppm) above background were indicated on the Organic Vapor Analyzer (OVA) at the ground level, at SP station L60-40. SS-04 and SS-05 (Figure 2) were located adjacent to SP station L60-40, where the most elevated readings of total organic compounds were detected with the OVA on November 23, 1988. Readings of over 1,000 ppm above background were detected within the SP L60-40 hole, and up to 100 ppm above background in the sampling hole, at the time of sample collection. No readings above background levels were encountered in the breathing zone.

SS-03 was located adjacent to SP station L60-50, where the capacitors were discovered on November 23 (Figure 2). Readings ranging from 100 to 1,000 ppm above background were detected on the OVA, within the sample hole. No readings above background levels were observed in the breathing zone.

Air sampling was performed at the Farwell Street Dump site pursuant to the actions recommended by the Secretary of the Agency of Natural Resources, as a result of the NUS/FIT sampling results. It was deemed necessary that air sampling be conducted between the area of soil contamination and the ball field in order to determine if airborne contaminants are migrating from the source area toward the ballfield where they may pose a threat to human health. [23]

Aquatec Inc. performed air sampling at the Farwell Street Dump site on June 1, 1989. Three locations at the dump site were utilized during the four hour sampling event. The locations are indicated on Figure 2. The baseball field sample (Lab No. 98794) was collected next to the shed just north of the baseball diamond. The drum area sample (Lab No. 98797) was collected inside the fenced/restricted area near the north western boundary of the site. The fill area sample (Lab No. 98800) was collected approximately in line with the shed and drum area 275 feet from the shed. The three samples and a trip blank were analyzed for tetrachloroethylene, trichloroethylene, 1,1,1- and 1,1,2- trichloroethane, ethylbenzene, and xylenes in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020. Sample results were non-detect, except for the drum area sample, which resulted in 0.64 ppb trichloroethylene, and 0.24 ppb 1,1,1-trichloroethane. [27]

It was determined by the VT Air Pollution Control Division that the lack of any contaminants at the other two sampling stations along with the principle of dispersion indicates that there should be no adverse effect upon air quality or human health at the ballfield. [22]

SUMMARY AND CONCLUSIONS

The former Farwell Street Dump, which is located on Farwell Street in Barre, Vermont, was operated as an open dump for at least 27 years. During this operating time, the dump accepted both municipal and industrial wastes including granite sludges from nearby granite processing facilities, waste capacitors and resins from the Sprague Electric facility--formerly located in Barre, Vermont--and solvents from the Malnati dry-cleaning facility. The granite sludges were disposed of in the northern 1/3 of the property. The Sprague wastes were disposed of north of the

granite sludge dump. Sprague wastes may also have been disposed of in other areas of the dump, and may have been disposed of with municipal solid waste.

Former employees of Sprague Electric have stated that wastes included "vinyl carbosol", ethyl benzene, divinylbenzene, epoxy resins, and waste capacitors. In addition, methylene chloride, trichloroethane, and trichloroethylene were documented as part of the Sprague Electric manifested waste stream. As of 1952, the Malnati facility was disposing of approximately 360 gallons of waste per year. The waste lint and solvents were not separated from other refuse in the dump.

Evidence of industrial waste disposal (capacitors and resin-containing drums) was noted in an area at the northern end of the dump property during the NUS/FIT onsite reconnaissance and sampling activities. Elevated readings of total volatile organic vapors, above the background levels at the site, were detected in the ambient air during the collection of soil samples from this area.

Based upon the evidence of industrial waste disposal, the NUS/FIT sampling focused on the area of exposed drums, the intermittent surface water drainage at a point between the drums and Gunners Brook, and sediments from the brook. VT ANR collected surface water samples from Gunners Brook and one leachate sample from the dump embankment.

A total of seven volatile organic compounds were detected in soil samples collected from the exposed drum area. These included 1,1,2-trichloroethane, trichloroethene, tetrachloroethene, ethylbenzene, acetone, total xylene, and 1,1,1-trichloroethane. The highest level detected was of trichloroethene at 186,000J ppb. Three semi-volatile organic compounds were detected in soil samples from this area, at levels ranging from two to eight times above levels detected in the background sample. Naphthalene (3,700 ppb) and Di-n-butylphthalate (2,200 ppb) were detected at the highest levels.

Lead was detected in all onsite soil samples at levels three to five times above levels detected in the background sample. In addition, zinc was detected in the sample from SS-03, and barium and vanadium were detected in the sample from SS-06, all at levels four times above background.

The leachate sample collected by VT ANR showed levels of 1,1 -dichloroethane at 35.0 ppb and 1,1,1-trichloroethane at 8.0 ppb. The volatile organic compound 1,1-dichloroethane can be a byproduct of the anaerobic bacterial degradation of 1,1,1-trichloroethane.

Sediment samples also contained 1,1,1-trichloroethane at 4.0 ppb. The background sediment sample had no VOCs detected. A total of thirteen semi-volatile organic compounds were detected in the sediment samples, with four at concentrations greater than the background sample.

No PCBs were detected in any of the soil and sediment samples.

In summary, the volatile organic compound 1,1,1-trichloroethane has been detected onsite near

the exposed drums, as well as in a leachate sample from the dump embankment, and a sediment sample from Gunners Brook, adjacent to the base of the dump embankment. Ethylbenzene, along with several other volatile organic compounds, were also detected in soils from the exposed drum area.

The above data suggest[ed] *that the area near the exposed drums, at the northern end of the property, was used for the disposal of hazardous wastes, including volatile organic compounds. In addition, the semi- volatile organic compounds and lead detected there may be associated with the disposed capacitors and drums of resins.*

Analyses of leachate and sediment samples also indicated that Gunners Brook is being impacted by wastes disposed of in the dump. Gunners Brook is the nearest surface water receptor of any contaminants from the dump; it flows into the Stevens Branch less than 1.5 miles to the south.

In response to the NUS/FIT sampling event, soil and air sampling were performed under the supervision of the VT DEC at the dump in May 1989 to determine if VOCs were present in the area of the ballfield. NUS/FIT stated their concern after encountering levels of total volatile organic compounds (up to 1,000 ppm) in the air, while collecting soil samples in the vicinity of the exposed drums. A soil sampling survey conducted on the ball field resulted in no VOCs detected during the screening survey, and no volatile organics detected from laboratory analyses of the samples. Air sampling results taken at the dump were non-detected when tested for tetrachloroethylene, trichloroethylene, 1,1,1- and 1,1,2-trichloroethane, ethylbenzene and xylenes in the ball field area; samples taken from the drum sample area resulted in 0.64 ppb trichloroethylene, and 0.24 ppb 1,1,1-trichloroethane. [22, 24, 27] The VT Air Pollution Control Division determined that there should be no adverse effect upon air quality or human health at the ballfield. [22]

Also in May 1989, the Farwell Street Dump site was referred to the U.S. EPA Emergency Planning and Response Branch (EPRB) by Michael Nalipinski of the Superfund Support Section Remedial Branch. The Roy F. Weston Technical Assistance Team (TAT) was tasked by the EPRB to conduct a removal Program Site Investigation, in order to assist the Site Investigator and the Chief of the Enforcement and Preparedness Section to make a Removal Action decision.

Soil and aqueous samples were collected in April 1990 by Roy F. Weston. Sample locations are unknown, as the PA/SI reports completed by Weston in 1990 were not available in file information. In a memorandum from the EPA Site Investigator, Carol B. Goldsberry, to the Farwell Street Dump Site File dated 7/26/90, the major hazardous substances that were being released or for which there was threat of release were defined in the Weston reports as follows:

Substances	Media
1,1-dichloroethane	water
1,2-dichloroethylene isomers	water
1,1,1-trichloroethane	water
trichloroethylene	water, soil

toluene	water
ethylbenzene	water
methylene chloride	water
naphthalene	water, soil
bis(2-ethylhexyl)phthalate	soil

[26]

The Removal Site Evaluation was terminated, because the "amount, quantity, or concentration released does not warrant a Federal response." [26]

Stone & Webster conducted a site reconnaissance at the Farwell Street Dump on June 13, 1995. At this time, the City of Barre was still in the process of filling and leveling the northern portion of the former granite sludge dump area. In the area of the exposed drums identified by NUS/FIT, one rusted, crushed drum was observed protruding halfway from the soil. No other drums were visible, and no stained soil or odors were evident. The seep on the embankment of Gunners Brook was evident, and an orange staining on the embankment and within the stream was observed. The southern half of the central portion of the former dump area is still actively used as a ball field for the City of Barre. The southern portion of the former dump is currently utilized as an asphalt reclamation lot.

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