Union Street Dump
80-84 Union Street
Newport, VT 05855

EPA ID #: VTD982542847
Site Inspection
August, 1993

Hazardous Materials Management Division
Department of Environmental Conservation
Vermont Agency of Natural Resources

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## I. Introduction

The Hazardous Materials Management Division, Department of Environmental Conservation (DEC - formerly known as the Department of Water Resources and Environmental Engineering), Vermont Agency of Natural Resources (ANR) has completed a Site Inspection (SI) report on the Union Street Dump located at 80-84 Union Street in Newport, Vermont. The SI was undertaken in response to a Preliminary Assessment (PA) completed by the DEC in July, 1989 which recommended that an SI be performed. The SI was completed based on information from review of state and local government files, interviews with knowledgeable parties, and from site visits and sample results.

This report complies with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended, commonly known as Superfund. Site Inspections are intended to provide a preliminary screening of sites and to facilitate EPA's assignment of site priorities as well as to gather basic information regarding the potential hazard posed by a site. They are limited efforts and are not intended to substitute for more detailed investigations.

The Union Street Dump site; as relates to this SI report, is considered to include a daycare center, an auto parts store, and a former recycling business. The daycare property is owned by Mayland Mason, the auto parts store by John and Ann Ambler and the former recycling business by a bank (1,23). An SI is being conducted at this site due to concern over an orange, slimy material which appeared in the daycare basement following filling of an adjacent wet area.

## II. Site History

The daycare is operated by the Northeast Kingdom Community Action (NEKCA) Child and Family Development Program, who have been at this location for seven years (2). The current owner, Mayland Mason, purchased the property in 1977 from the Northern New England Assembly of God. Prior to being used as a church the building was evidently an apartment house. The adjoining property, which is identified as 80-84 Union Street, has been owned and operated by a number of different businesses including a woodworking shop, hardware store, auto parts store, lumber mill, construction company and a body shop. This property was originally a single lot, occupied by a woodworking business or lumber yard from 1932 until the land was subdivided in 1970. In 1970 the lot at 80 Union Street was sold to Hagar Hardware and Paint Co. who subsequently sold to the current owners, John and Ann Ambler, in 1986. This lot is currently occupied by an auto parts store. The lot at 84 Union Street has housed an auto body business, a paint store, a construction company and a recycling business operated by Vermont Newspaper Recycling Center, Inc. (1). This property is currently owned by a bank and is for sale (23).

It appears that the land adjoining the daycare property was originally wetland and has been filled in over the years, presumedly to create more useable space. Review of aerial photos taken in 1962 show what appears to be fairly recent filling (4). According to the owner of the property and the current tenants, the daycare building has always had a wet basement but the appearance of the orange slimy material seemed to follow additional filling on the adjoining property (2,3). This was done about 1985 by Scott's Construction Company, owners of the property at the time. The small brook which flows through the property was moved to the eastern edge of the lot and diverted into a culvert to carry it beneath the southern portion of the lot.

The DEC became aware of this site as a result of a complaint call in April of 1986 concerning the appearance of the orange, slimy material in the daycare basement. An initial inspection of the site was conducted and samples were collected of the material in the basement. Information obtained from an interview with a daycare worker during this initial inspection indicated that there may

have been an old "metals dump" behind the daycare. Samples were analyzed for metals and volatile organic chemicals (VOCs). The results of these analyses are inconclusive due to quality control problems. These results were forwarded to the Vermont Department of Health (DOH) for determination of any potential health threat. The DOH advised that dermal exposure to the water in the basement could cause a rash due to the level of nickel (5).

There is no documentation of the disposal of hazardous wastes on the daycare or the adjacent property. The presence of a number of potential producers of hazardous wastes for a number of years on the property adjacent to the daycare does indicate the possibility of some onsite disposal of hazardous waste. In addition, there are a number of potential sources of contamination located along the ravine further upstream on the same small stream which flows through the USD site. Behind Hayes Ford, an auto dealer and garage, is an area where dumping has occurred with some metal auto parts and drums evident. There are allegations that in the past, a straight pipe from the Hayes Ford garage discharged into the ravine. Adjacent to Hayes Ford is a drycleaning facility which reportedly used petroleum based solvents. All along the course of the brook are spots where refuse has been dumped over the steep banks above the brook (1,6).

## III. Environmental Setting

The USD is located at a local topographic low point on the eastern side of the City of Newport. Much of the eastern portion of the City of Newport is located on a fairly level plateau bounded by steeper hills to the east and south. Newport is located in a portion of Vermont designated as the Vermont Piedmont, characterized by gentle hills, broad valleys and lakes (7).

Landuse in the vicinity of the USD is mainly residential with some commercial development. A vacant business and an auto parts store are located on the site. East of the site along East Main Street are a number of commercial establishments including the drycleaner and auto dealership referenced above. A high school is located approximately 1000' to the northwest. Gardner Park, a city recreation area is located 1000' to the south and is situated on property which was once a dump (10). There is a municipal beach on the shore of Lake Memphremagog, 2000' northwest of the USD. The lower reachs and deltas of both the Black and Barton Rivers are State wildlife management areas.

Elevated terraces that occur in the vicinity of Lake Memphremagog are assumed to be features associated with glacial Lake Memphremagog. The higher of these terraces is thought to represent, at least in part, a former delta of the Clyde River (11). Surficial materials in the vicinity include both kamic ice marginal deposits, generally at higher elevations, and lacustrine deposits at lower elevations. The lacustrine deposits range from silts and clays to sands of varying coarseness (12,13).

The underlying bedrock is the Ayers Cliff member of the Waits River formation. It is described as a siliceous, crystalline limestone with thin beds of slate and phyllite. The site is in the vicinity of the Indian Point Syncline, which strikes to the northeast and dips moderately to the northwest. This structure is complicated in the vicinity of Indian Point where the dip is reversed (11).

Lake Memphremagog, encompassing some 6713 acres in Vermont, is located 1000' west of the site. To the south, the Clyde River, a major tributary of Lake Memphremagog, flows within 800' of the USD at its closest point. Two other major tributaries are also located within four miles of the USD, the Black and Barton rivers. Both of these rivers flow into South Bay and have formed a significant delta. Extensive wetlands are present along the lower reaches of both of these rivers (9). A small, unnamed stream flows through the site. The channel of this stream has been altered in a number of places and it flows through culverts for

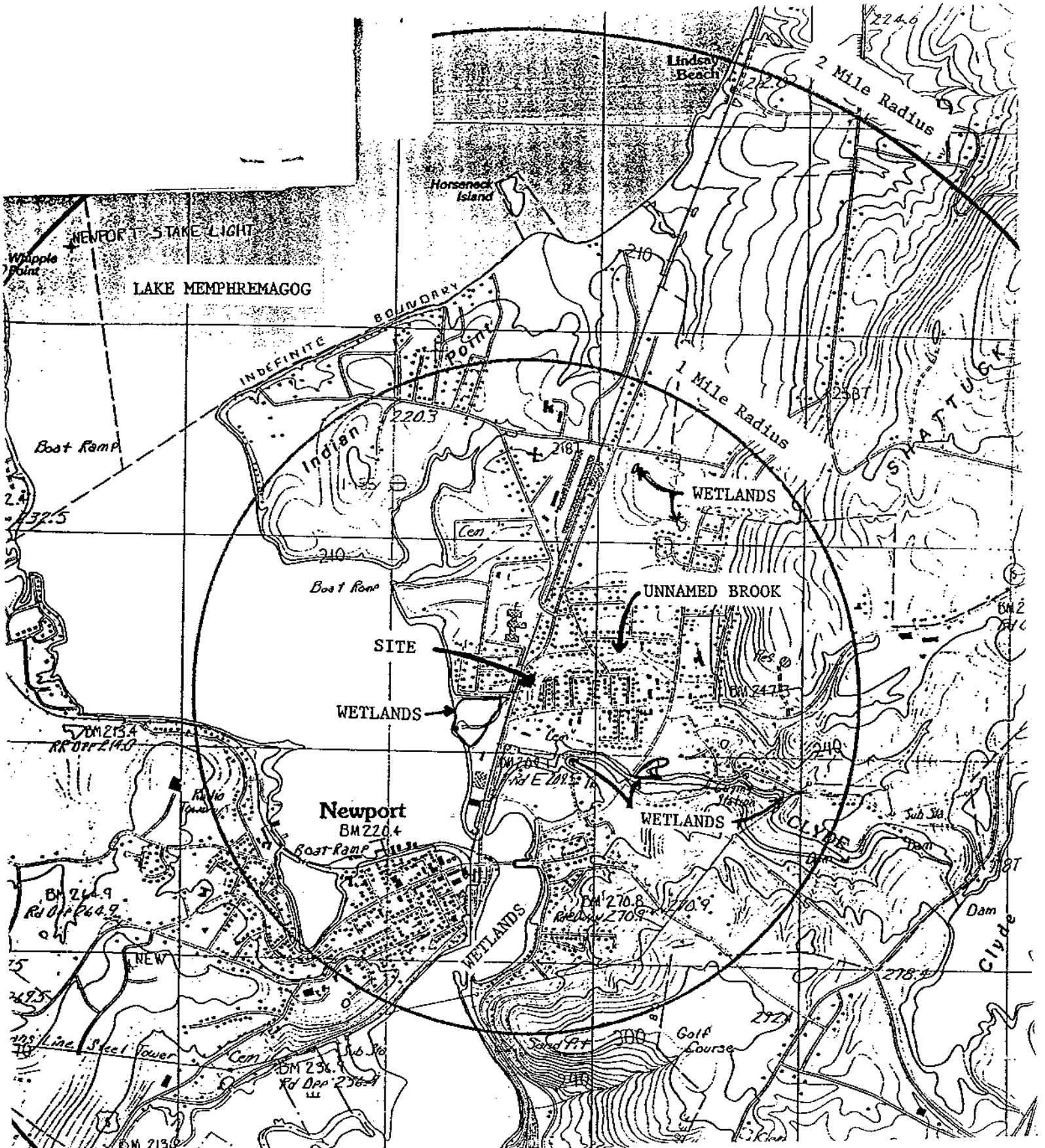


Figure 1
Location map showing the site, one mil
radius around the site, and wetlands.

From: USGS 7.5' quadrangle, provision
edition, 1986, Newport, VT.

a portion of its path through the site and beneath Union Street. Several small wetland areas, which are not identified on the National Wetlands Inventory Map, are located along the course of this brook. A larger, mapped wetland is present to the west, bordering on Lake Memphremagog (9).

The water table is shallow at the site as evidenced by the wet basement at the daycare and the standing water and wetland vegetation at the site. Groundwater flow is presumed to be westward toward Lake Memphremagog, following the topography and the surface water drainage pattern. The surficial materials underlying Newport and extending southwest and northeast of the City are identified as having excellent groundwater potential (14). The surficial materials supplying this aquifer are over 250' thick and consist of approximately 225' of fine sand and silt with lenses of clay over a layer of about 30' of medium sand and gravel. It is this lower zone of coarser sand and gravel that is tapped by the City of Newport for their municipal water supply. The aquifer is described as a slowly draining water table aquifer (15).

Mean annual precipitation for Newport is 39.94 inches. Average lake evaporation is 24 inches per year resulting in an estimated annual net precipitation of 15.94 inches. The average temperature is 41.8° F (16, 17).

## IV. Receptors

Potential receptors for contamination from the USD include groundwater, surface water, soil and air. There is potential for impact upon public and private water supplies, wildlife habitat and for direct human exposure.

Most residents of Newport City are served by the municipal water system. Some private wells do exist within the City, especially in the higher elevations (1). The closest identified well to the site is one of the backup wells for the municipal system and is 3800' to the south. The main production well is 8200' southwest of the site and on the opposite side of Lake Memphremagog. A wellhead protection area (WHPA) has been designated for the municipal system which includes the delta of the Black River and much of downtown Newport (18). At its closest point, the WHPA is within about 3500' of the site. One other public community water supply is located within a four mile radius of the site; the Holbrook Bay Ltd. system located 2.2 miles to the west. This system is served by one bedrock well and supplies water to 80 people. The population served by groundwater within a four mile radius of the site is estimated to be 7494 people. This figure is computed by counting the number of houses within four miles of the site, outside of the service areas of the community supplies, and multiplying by the average number of persons per household in Orleans County (2.79). This figure is added to the number of persons served by groundwater from community supplies within 4 miles of the site to obtain the total. A breakdown of the population served by groundwater within various distances from the site is as follows:

TABLE 1
Population Served by Groundwater

| Miles From Site | Public Wells | Private Wells | Total |
|---|---|---|---|
| 0-1/4 | 0 | 0 | 0 |
| 1/4-1/2 | 0 | 0 | 0 |
| 1/2-1 | 0 | 28 | 28 |
| 1-2 | 5500 | 497 | 5997 |
| 2-3 | 80 | 717 | 797 |
| 3-4 | 0 | 672 | 672 |
| **Total Population:** | **5580** | **1914** | **7494** |

**TABLE 2**
**Population Served by Bedrock and Surficial Wells**

| Miles From Site | Bedrock | Surficial | Total |
|---|---|---|---|
| 0-1/4 | 0 | 0 | 0 |
| 1/4-1/2 | 0 | 0 | 0 |
| 1/2-1 | 28 | 0 | 28 |
| 1-2 | 469 | 5528 | 5997 |
| 2-3 | 758 | 39 | 797 |
| 3-4 | 672 | 0 | 672 |
| **Total Population:** | **1927** | **5567** | **7494** |

The 15 mile surface water pathway begins at the unnamed brook on the site and continues into Lake Memphremagog and on into Canada. Approximately 5 miles of the pathway are within Vermont with the remainder in Canada. There are no known surface water intakes along the path in Vermont, but some lakeshore residents may utilize Lake Memphremagog as their water source.

Wetlands are present along the surface water migration path with the closest being approximately 300' west of the site along the unnamed stream. This is a palustrine, forested wetland bordering on the unnamed stream and Lake Memphremagog. Additional wetlands are present along the shore of Lake Memphremagog (9). Rare plants and animals and significant natural communities are located within a four mile radius of the site (8). Lake Memphremagog is a very important sport fishery. Important seasonal spawning runs of salmon, rainbow and brown trout occur in the Black, Barton and Clyde rivers. Lake Memphremagog is host to a diverse population of fish species including: yellow perch, chain pickerel, walleye pike, rainbow smelt, sunfish and small and largemouth bass in addition to the salmonids previously mentioned. Anecdotal evidence indicates that some minnow trapping may take place in the unnamed stream that flows through the site (19).

Lake Memphremagog is an important recreational resource. In addition to fishing, other uses include boating and swimming. A public beach and boat launch are located about 2000' northwest of the site.

The location of the site in an area used for commercial and residential purposes means that there are human receptors for any air releases from the site. These potential targets include children since a daycare facility borders on the site. If contaminants with the potential to impact air quality are entering the basement of the daycare, this could provide a potential route for human exposure.

Direct contact is a concern for essentially the same reasons as for air releases. Children from the daycare play in the back yard of the daycare facility which borders on the USD. Residential areas also border on the site. If contaminated soil is present, there is potential for people to come into contact with it.

## V. Methods

The Vermont DEC conducted sampling for the USD SI on November 2, 1989. Sampling activities were carried out in accordance with the

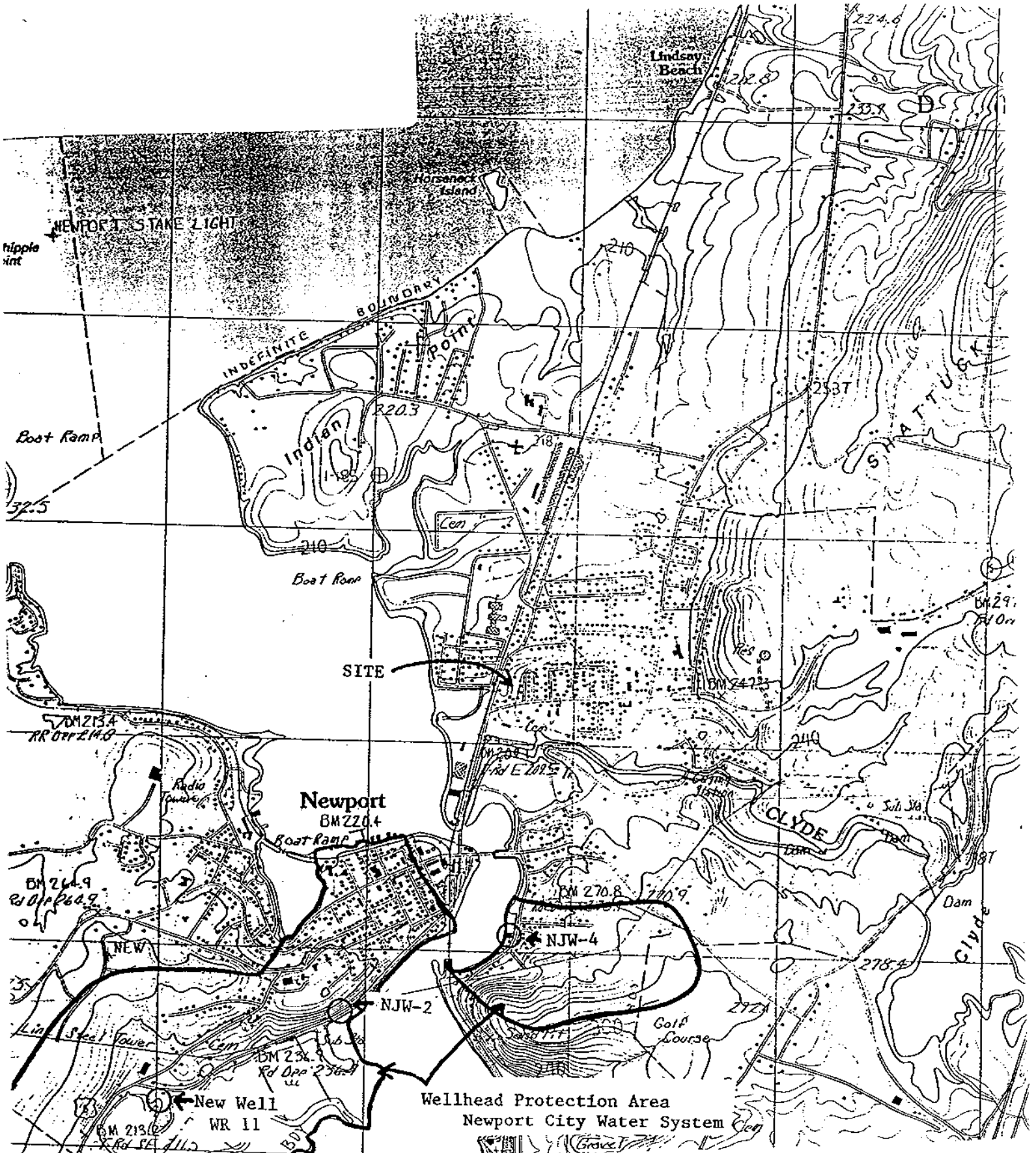


Figure 2
Municipal wells and wellhead protection area for Newport City Water System.

From : USGS 7.5' quadrangle, provisiona edition, 1986, Newport, VT.

USD Sampling Plan. Media sampled included soil, groundwater and surface water and sediment. Sample locations and parameters are outlined on Table 3.

Groundwater:

Groundwater monitoring wells were hand installed using a shovel and bucket auger. In all cases, the water table was within about two feet of the ground surface, facilitating hand installation. Wells were constructed of five foot lengths of hand slotted PVC pipe with bottom caps. The screened section was approximately one foot in length. Pipe was pre-cleaned at the DEC offices and placed into a plastic bag for transport to the site. The technique used to install the wells was to auger into the water table, insert the pipe and lightly strike a piece of wood placed over the top of the well pipe with a sledge hammer to set the well as deeply as possible. Wells were backfilled using native materials.

Field measurements of the water level, temperature and specific conductance were recorded (Table 2) and the wells sampled using a teflon bailer. Wells were not purged prior to sampling as they were sampled immediately after installation such that the water in the well was fresh aquifer water. Initially, it was intended to sample each well for volatile organic chemicals (VOCs) and priority pollutant metals. Due to poor yield, only VOCs were collected from GW-4. Because the large amount of extremely fine silt in the samples from GW-2 made filtering very difficult, only enough water was obtained to analyze for a selected number of metals.

GW-1:

GW-1 was installed on the property of the former Vermont Newspaper Recycling Center Inc. adjacent to the backyard of the daycare facility. The well was located near the boundary of the two properties on the edge of a filled area used to park the trailers from tractor trailer units. The location of this well was chosen to represent groundwater quality near the southerly edge of the alleged dump area. Soils consisted of sandy fill over silt. It appeared that sand was flowing into the well during sampling as the well seemed to be getting progressively shallower. This was probably due to the fairly large slot size resulting from the use of a hacksaw to create the slots.

GW-2:

GW-2 was located on the daycare property near the boundary between the daycare and VT Newspaper Recycling Center Inc. The rationale for this location was to provide groundwater quality data on the edge of the daycare property closest to the alleged dump. The well was installed through about 1.5' to 2' of mixed fill material into a saturated deposit of sawdust and small woodchips. The wood material was readily identifiable and did not appear to have been significantly decomposed.

GW-3:

GW-3 was installed near the southerly boundary of the daycare property at the base of a steep bank. This well was designed to assess the potential for contaminants to be moving onto the daycare property from areas upslope and to the south. Soils were sandy and there was no evidence of wood chips as at GW-2. The well produced sufficient water to collect all samples without significantly drawing down the water level in the well.

GW-4:

GW-4 was chosen to be a background location and was located approximately 1500' northeast of the site. It was installed near the same stream which runs through the site upgradient from the site. It was learned from a conversation with William Wolcott, owner of the land where GW-4 was installed, that a junkyard was formerly located in this vicinity. Other pollution sources identified in the PA are located upgradient of this well. Soils were sandy with some gravel. The water table appeared to be about 10 inches below grade. Recharge

in this well was so poor that repeated bailers were necessary to fill even the VOC vials. This could have resulted in some loss of volatiles through volatilization.

Surface Water/Sediment:

Surface water samples were collected from the small stream which runs through the site and from one location of pooled water on the daycare property. Samples were collected directly into the sample containers. Samples were analyzed for metals and VOCs. Sediment samples were collected from the bottom of the stream in the same location as the respective surface water samples. Parameters included semi-volatile organic chemicals and metals. Sediments were scooped up with a shovel and transferred to sample containers with a metal trowel for SVOCs and with a plastic spoon for metals.

SW/SD-1:

SW-1 is downstream of the site a short distance from where the stream emerges from a culvert after having passed beneath Union Street. This location was selected to indicate water quality downstream of the alleged dump. The stream in this area is very straight and appears to be flowing in an artificial channel. Stream velocity was slow with a gravelly substrate.

SW/SD-2:

SW-2 is not a stream location but is located in the backyard of the daycare, under a large willow tree, where there is pooled water which apparently persists for much of the year. Flow from this wet area moves northerly via a ditch to the stream. This location was chosen to provide data on the presence of contaminants in an area where children play.

SW/SD-3:

SW-3 is located a short distance upstream of the alleged dump. It is downstream of other potential pollution sources as identified by the PA. Stream flow was again slow, the channel somewhat more natural in appearance than at SW-1.

SW/SD-4:

SW-4 was the upstream station chosen to represent background conditions. Considering the number of identified potential sources of contamination along the ravine through which this stream flows, a true background location may not exist. This location is approximately 1500' northeast of the site. The stream channel is natural in appearance except that various items are visible in the stream such as old drums, tires and similar articles of refuse. A small sheen was visible on the surface of the water just upstream of the sampling point. Sediment contained a considerable amount of organic matter such as leaves.

Soil:

Concerns on the part of daycare personnel regarding the presence of an orange slimy material in the basement of the daycare was the impetus for investigating this site. To address the potential for contaminants to be present in the basement, samples from the basement floor were collected. The floor is unfinished (not concrete) and is very wet. A layer of orange slime about 0.5 inches thick, presumed to be the result of iron precipitate/iron bacteria, covers most of the floor. Shallow puddles of water with flocs of iron precipitate were present throughout the basement. Samples of this material were collected for VOC, SVOC and metal analysis.

Choosing a background location with which to compare the results from the basement was problematic. It was not apparent what sort of background location might be appropriate for a basement floor sample. The location chosen as the most appropriate under the circumstances was a soil sample from the backyard of

the daycare in a location which appeared to be minimally affected by the alleged dump. Samples were collected for SVOC and priority pollutant metal analysis. VOC samples were not collected due to a shortage of sample vials.

Quality Control:

All sampling equipment was decontaminated prior to commencing sampling by washing in water containing Liquinox followed by a rinse with deionized water provided by the DEC laboratory. A separate wash bucket was used for the dirtier sampling tools (augers and shovels) and those used for actual sample collection (trowels and bailer). A field blank was collected from the bailer following decontamination after sampling the last monitoring well.

Replicate samples were collected from GW-2, but only the VOCs were analyzed. The replicate metals sample was not analyzed due to the difficulty encountered in filtering the sample from GW-2.

All samples were labelled and handled in accordance with DEC chain of custody procedures. Samples were transported to the DEC laboratory where they were placed in locked refrigerators. The following day they were logged into the lab computer system and water samples collected for metals analysis were filtered and preserved with nitric acid. Samples were then relinquished to lab personnel.

**TABLE 3**
**Sample Locations**

| Sample Location | Parameters | Description |
|---|---|---|
| Groundwater: | | |
| GW-1 | VOC, Metals | Southern boundary of site |
| GW-2 | VOC, Metals | Between site and daycare |
| GW-2R | VOC | Replicate of GW-2 |
| GW-3 | VOC, Metals | Southern portion of daycare property |
| GW-4 | VOC | Background |
| Surface Water: | | |
| SW-1 | VOC, Metals | Brook downstream of site |
| SW-2 | VOC, Metals | Pooled water in yard of daycare |
| SW-3 | VOC, Metals | Brook short distance upstream of site |
| SW-4 | VOC, Metals | Brook upstream of site |
| Sediment: | | |
| SD-1 | Metals, SVOC | Brook at SW-1 |
| SD-2 | Metals, SVOC | Yard of daycare at SW-2 |
| SD-3 | Metals, SVOC | Brook at SW-3 |
| SD-4 | Metals, SVOC | Brook at SW-4 |
| Soil: | | |
| SS-1 | Metals, SVOC | Background |
| SS-2 | VOC, metals, SVOC | Basement of Daycare |
| Quality Control: | | |
| F.B. | VOC | Field Blank |
| T.B. | VOC | Trip Blank |

**TABLE 4**
**Field Data**

| Location | Temperature (C) | Conductivity ($\mu$hmos/cm$^3$) |
|---|---|---|
| GW-1 | 9.4 | 1044 |
| GW-2 | 8.8 | 524 |
| GW-3 | 8.9 | 289 |
| GW-4 | -- | -- |

## VI. Results

Groundwater:

Samples from all four wells installed for the site inspection were analyzed for VOCs. No VOCs were detected in any of the samples.

Samples from GW-1 and GW-3 were analyzed for the 13 priority pollutant metals: arsenic, cadmium, chromium, lead, mercury, selenium, silver, antimony, beryllium, copper, nickel, thallium and zinc. The sample from GW-2 was analyzed for a reduced set of metals due to the difficulty in obtaining sufficient filtered water for analysis (see Table 3). No metals analysis was performed on water from GW-4 due to the inability to collect sufficient water from this well. The metals which were not analyzed from GW-2 were not detected in either GW-1 or GW-3. The lowest levels of metals detected were found in GW-3, so the other results will be compared to the GW-3 results. With the exception of copper, highest levels of metals were found in GW-1. Concentrations of arsenic (35 ppb) and nickel (687 ppb) in GW-1 were considerably higher than in GW-2 located only a short distance away and were not detected in GW-3. The level of nickel detected in GW-1 is above the Enforcement Standard in the Vermont Groundwater Protection Rule and Strategy.

Soil:

Soil samples were collected from the basement of the daycare (SS-2) and from a spot in the backyard of the daycare (SS-1) chosen to represent background. Both samples were analyzed for metals and SVOCs but only the basement sample was analyzed for VOCs.

Methylene chloride (25 ppb) was the only VOC detected in the sample from the basement and this result was reported by the lab with the qualification that the reported result might be in error. One SVOC was detected in SS-2, di-n-butyl phthalate at 25,500 ppb. No SVOCs were detected in the background sample. Some uses of di-n-butyl phthalate are: as a plasticizer in nitrocellulose lacquers, elastomers, explosives, and nail polish; a solvent for perfume oils; perfume fixative; textile lubrication agent; insecticides; printing inks; resin solvent; paper coatings; and adhesives (20). Seven metals were detected in both soil samples with all but nickel being higher in SS-2. The two metals that were most elevated in SS-2 were lead at more than 22 times the level in SS-1 (187 ppb vs. 8.3 ppb) and zinc at 9.5 times (370 ppb vs. 38.9 ppb).

Surface Water and Sediment:

No VOCs were detected in the stream samples or in the sample from the ponded water on the daycare property. Copper and zinc were detected at low levels (2 - 10 ppb) in all three stream samples while chromium (2 ppb) was also detected at SW-4. The sample from the ponded water, SW-2, had slightly higher levels of

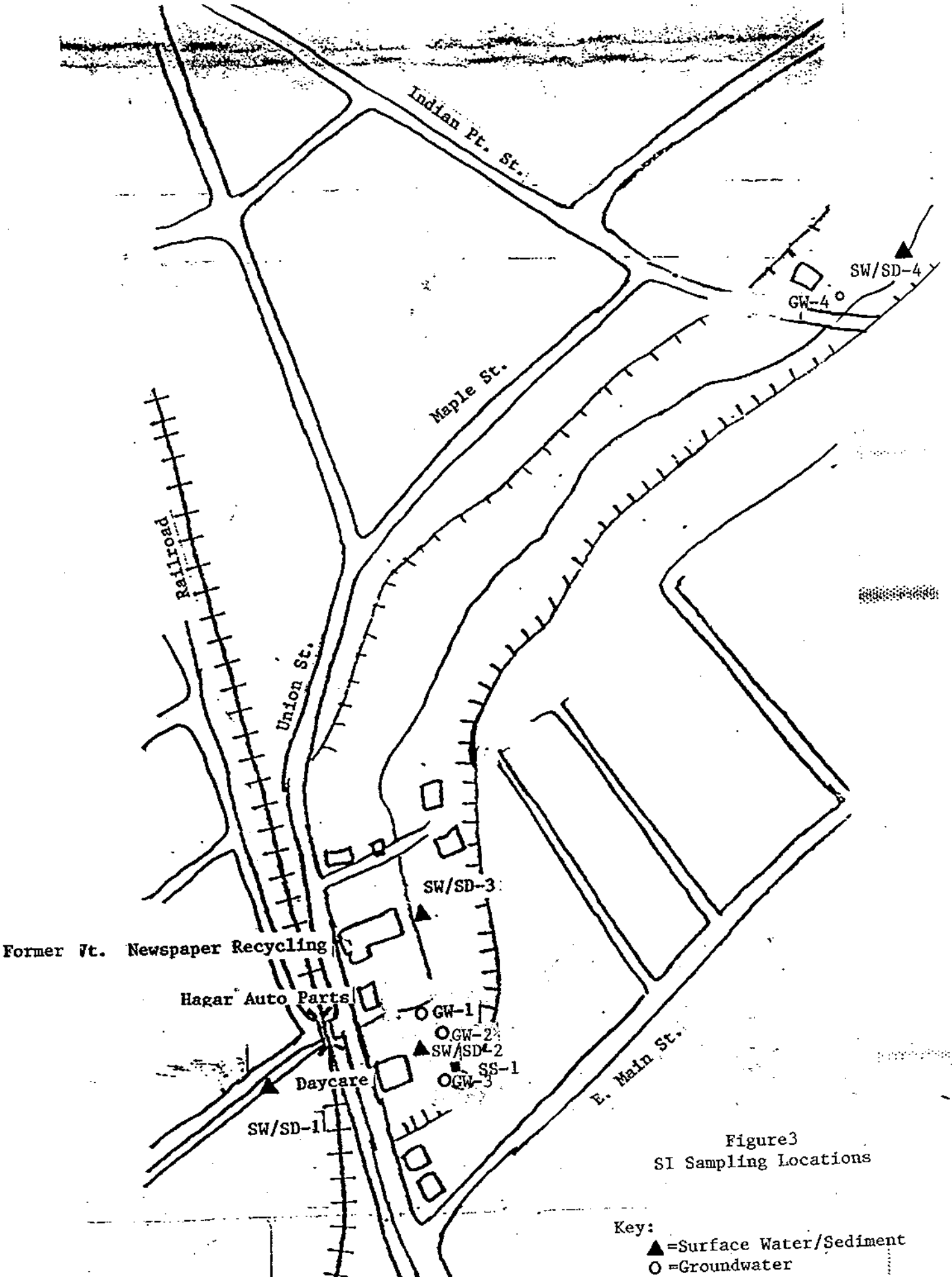


Figure3
SI Sampling Locations

copper, chromium and zinc (3 - 16 ppb) than the stream samples and was the only surface water location where nickel was detected (56 ppb). None of these metals were present in the stream at levels in excess of Vermont Water Quality Standards. The levels of metals in the ponded water were all below applicable standards for drinking water quality.

A total of 11 SVOCs were detected in each of the stream sediment samples (Table 5). All of these SVOCs are members of a class of compounds known as polycyclic aromatic hydrocarbons (PAHs). PAHs are produced during the incomplete combustion of organic substances such as coal, oil and gas, wood and tobacco. Natural sources include volcanoes, forest fires, crude oil and shale oil (21). Concentrations were highest in the furthest upstream location (SD-4) ranging from 2300 ppb to 6500 ppb. The lowest levels were detected in the most downstream sample (SD-1) where concentrations ranged from less than 299 ppb to 957 ppb. Sample location SD-3, the intermediate stream location, also had intermediate levels of PAHs ranging from less than 1229 ppb to 1966 ppb. The same group of PAHs were also detected in sediment beneath the ponded water, at generally lower levels (less than 502 ppb to 602 ppb) than in the stream sediments. A technical document prepared by the National Oceanic and Atmospheric Administration (NOAA) (22) identifies levels of hazardous substances in sediments that are observed or predicted to be associated with biological effects. The NOAA document lists chemical concentrations in the lower 10 percentile as an Effects Range-Low (ER-L) and the median as Effects Range-Median (ER-M). The concentrations of both individual PAHs and total PAHs at SD-4 exceed the ER-M level while the ER-L is exceeded for some individual PAHs and total PAHs at both SD-1 and SD-3.

A number of metals; arsenic, chromium, lead, beryllium, copper, nickel and zinc, were detected at each of the stream sediment sampling locations (Table 4). Silver was detected at low levels at both SD-3 and SD-4 while mercury was only detected at SD-4. In general, metals results showed the same pattern as SVOCs with highest concentrations at SD-4, lower concentrations at SD-3 and lowest levels at SD-1. The two metals with the greatest difference in concentration between upstream and downstream are lead at 794 ppm at SD-4 as compared to 9.6 ppm at SD-1, and zinc at 403 ppm as compared to 68 ppm. A comparison of metals concentrations with ER-M and ER-L levels is as follows:

ER-M exceeded
SD-4: lead, nickel and zinc
SD-3: nickel

ER-L exceeded
SD-3: chromium, lead and zinc
SD-1: nickel

## VII. Conclusions

This site first came to the attention of the DEC through a complaint call in 1986 concerning the appearance of an orange, slimy substance in the basement of a daycare center. The SI has been conducted to investigate the possibility that hazardous substances may have been disposed of at this site and to collect screening samples to check for the presence of hazardous chemicals that may present a potential threat to human health and the environment.

No evidence of disposal of hazardous substances at this site was discovered during the course of this investigation. Some filling of land that was formerly wetlands has occurred but the nature of materials used for this purpose is unknown. Hazardous substances were detected in environmental samples collected from the site. Several metals were detected in onsite groundwater at apparently elevated levels (nickel and arsenic). Metals and PAHs were detected in sediments in an unnamed stream and a wet area in the daycare yard. Concentrations of several metals and the PAHs in the stream sediments were above levels where there

may be biological effects.

The source of the elevated levels of metals and PAHs detected in stream sediments is currently unknown. Since the concentrations generally increase in an upstream direction, the potential source would appear to be located upstream of the site. The source of PAHs and elevated metals in the wet area of the daycare yard is also unknown but may be related to seasonal flooding from the unnamed stream.

## References


1. Landsman, Michael (VT DEC). 1989. Preliminary Assessment of the Union Street Dump.

2. Shepard, Dave (VT DEC) October 19, 1989. Personal interview with Judi Kennedy (NEKCA Daycare).

3. Shepard, Dave (VT DEC). October 19, 1989. Personal interview with Mayland Mason (owner of daycare building).

4. Aerial Photos: 1962 #VT-62-L-244 and #VT-62-L-245.

5. Linsley, Brad K. (VT DOH). July 31, 1986. Letter to Giselle Place of Newport Daycare Center RE: sample results from daycare basement.

6. Shepard, Dave (VT DEC). 1989. Field logbook: Union Street Dump Site Inspection.

7. Johnson, Charles W. 1980. The Nature of Vermont. 276p.

8. Marshall, Everett (VT Nongame and Natural Heritage Program). April 9, 1990. Memorandum RE: presence of rare plants, animals and significant natural communities within 4-mile radius of the Union Street Dump site.

9. U.S. Department of the Interior. 1977. National Wetlands Inventory Map - Memphremagog VT, 15 minute quadrangle.

10. Shepard, Dave (VT DEC). April 10, 1990. Phone interview with Gloria Reynolds (Newport City Managers Office).

11. Doll, Charles G. 1951. Geology of the Memphremagog quadrangle and the southeastern portion of the Irasburg quadrangle, Vermont. VT Geol. Surv. Bull. #3. 113p.

12. Stewart, D.P. and P. MacClintock. 1969. The surficial geology and Pleistocene history of Vermont. VT Geol. Surv. Bull. #31. 251 pp.

13. Stewart, D.P. and Paul MacClintock. 1970. Surficial geologic map of Vermont.

14. Hodges, Arthur L. Jr. and David Butterfield. 1967. Groundwater favorability map of the Lake Memphremagog basin, Vermont. Published by Vermont Department of Water Resources in cooperation with the U.S. Geological Survey.

15. Layne-New England. 1979. Groundwater Investigations, City of Newport, VT.

16. National Climatic Data Center. 1987. Climatological data annual summary, New England. NOAA Vol 99, #13.

17. U.S. Department of Commerce. 1979. Climatic atlas of the U.S.

18. Vermont DEC. Water Supply Division. Newport Water System File.

19. Shepard, Dave (VT DEC) March 7, 1991. Phone interview with Leonard Gerardi (VT Fish and Wildlife Department).

20. Hawley, Gessner G. 1981. The condensed chemical dictionary. 10th edition, 1118 pp.

21. Agency for Toxic Substances and Disease Registry. 1990. Toxicological profile for polycyclic aromatic hydrocarbons. 231 pp.

22. National Oceanic and Atmospheric Administration. 1990. The potential for biological effects of sediment-sorbed contaminants tested in the National Status and Trends Program. NOAA Technical Memorandum NOS OMA 52. 175 pp.

23. Shepard, Dave (VT DEC). December 14, 1992. Personal interview with Richard Bernier.

# APPENDIX A

TABLE 5
Metals and Volatile Organic Chemicals
Surface Water and Groundwater ug/l (ppb)

| Parameters | SW-1 | SW-2 | SW-3 | SW-4 | GW-1 | GW-2 | GW-3 | GW-4 |
|---|---|---|---|---|---|---|---|---|
| Metals | | | | | | | | |
| Arsenic | ND | ND | ND | ND | 35 | 5 | ND | NA |
| Cadmium | ND | ND | ND | ND | ND | ND | ND | NA |
| Chromium | ND | 3 | ND | 2 | 3 | ND | ND | NA |
| Lead | ND | ND | ND | ND | ND | ND | ND | NA |
| Mercury | ND | ND | ND | ND | ND | NA | ND | NA |
| Selenium | ND | ND | ND | ND | ND | ND | ND | NA |
| Silver | ND | ND | ND | ND | ND | NA | ND | NA |
| Antimony | ND | ND | ND | ND | ND | NA | ND | NA |
| Beryllium | ND | ND | ND | ND | ND | NA | ND | NA |
| Copper | 2 | 8 | 6 | 6 | 8 | 16 | 3 | NA |
| Nickel | ND | 56 | ND | ND | 687 | 9 | ND | NA |
| Thallium | ND | ND | ND | ND | ND | NA | ND | NA |
| Zinc | 10 | 16 | 6 | 6 | 19 | 14 | 7 | NA |
| Volatiles | ND | ND | ND | ND | ND | ND | ND | ND |

Note: See appendix A for complete data sheets

TABLE 6
Metals - Sediments and Soils mg/kg (ppm)

| Parameter | SD-1 | SD-2 | SD-3 | SD-4 | SS-1 | SS-2 |
|---|---|---|---|---|---|---|
| Arsenic | 9.8 | 31.7 | 19.9 | 18.1 | 20.0 | 35.0 |
| Cadmium | ND | ND | ND | ND | ND | ND |
| Chromium | 27.8 | 62.7 | 83.5 | 60.9 | 31.2 | 36.0 |
| Lead | 9.6 | 106.0 | 74.2 | 794.0 | 8.3 | 187.0 |
| Mercury | ND | ND | ND | 0.3 | ND | ND |
| Selenium | ND | ND | ND | ND | ND | ND |
| Silver | ND | ND | 0.2 | 0.3 | ND | ND |
| Antimony | NR | NR | NR | NR | NR | NR |
| Beryllium | 0.1 | 0.2 | 0.2 | 0.3 | 0.2 | 0.3 |
| Copper | 14.6 | 41.0 | 25.6 | 36.6 | 21.5 | 41.0 |
| Nickel | 40.0 | 121.1 | 65.6 | 61.1 | 114.1 | 48.0 |
| Thallium | ND | ND | ND | ND | ND | ND |
| Zinc | 68.2 | 187.6 | 133.0 | 403.1 | 38.9 | 370.0 |

Notes:
SD= Sediment sample
SS= Soil sample
NR= Results not reported due to background interference
All results reported on a dry weight basis

TABLE 7
VOLATILE AND SEMIVOLATILE ORGANIC CHEMICALS
SOIL/SEDIMENT ug/kg (ppb)

| Parameter | SD-1 | SD-2 | SD-3 | SD-4 | SS-1 | SS-2 |
|---|---|---|---|---|---|---|
| **Volatiles** | | | | | | |
| methylene chloride | NA | NA | NA | NA | NA | <25J |
| **Semivolatiles** | | | | | | |
| fluoranthene | 957 | 542 | 1229 | 6200 | ND | ND |
| phenanthrene | 813 | 502 | 1229 | 4618 | ND | ND |
| pyrene | 957 | 542 | 1966 | 6500 | ND | ND |
| anthracene | <299 | 502 | <1229 | <500 | ND | ND |
| benzo(a)anthracene | 526 | <502 | <1229 | 5100 | ND | ND |
| chrysene | 682 | 602 | <1229 | 6300 | ND | ND |
| benzo(b)fluoranthene | 467 | <502 | <1229 | 4300 | ND | ND |
| benzo(k)fluoranthene | 574 | <502 | <1229 | 6000 | ND | ND |
| benzo(a)pyrene | 299 | <502 | <1229 | 3800 | ND | ND |
| indeno(1,2,3-cd)pyrene | <299 | <502 | <1229 | 2300 | ND | ND |
| benzo(ghi)perylene | <299 | <502 | <1229 | 2600 | ND | ND |
| di-n-butyl phthalate | ND | ND | ND | ND | ND | 25500 |

**Notes:**
- J: Reported value may be in error
- Results listed only for those compounds detected, see Appendix A for complete data sheets.
- <: The compound was detected but at a concentration less than the reliable quantitation level.
- All results reported on a dry weight basis.