THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering

SEP 16 1994

September 16, 1994

Mr. Chuck Schwer, Supervisor
Sites Management Section
Vermont Department of Environmental Conservation
Waterbury, Vermont 05671-0404

Re: Stuarts Department Stores, Inc.
Harry's Department Store Property, Berlin, Vermont.
JCO #1-1969-1
SMS Site #94-1568

Dear Chuck:

Stuarts Department Stores has requested that I forward a copy of the enclosed report. The results of the soil and groundwater sampling and analysis conducted during this investigation indicate that the contamination at the site is of low concentrations and not widespread. Stuarts objective is to get this site closed, and we believe that the data supports closure.

We would appreciate a response to this report and closure request from your office as soon as possible. Please feel free to call if you have any questions.

Sincerely,

THE JOHNSON COMPANY, INC.

By: Bradley A. Wheeler

Bradley A. Wheeler, CPSS
Senior Scientist

cc: Gene Twomey, Stuarts Department Stores

enclosure

Reviewed by: J-B
I:\PROJECTS\1-1969-1\SCHWER.994 September 15, 1994 16:43 BAW

Investigation of Petroleum Contamination

at the

Harry's Discount Store Property

Barre-Montpelier Road, Berlin, Vermont

July 1994

Prepared for:

STUARTS DEPARTMENT STORES
16 Forge Parkway
Franklin, Massachusetts 02038

Prepared by:

THE JOHNSON COMPANY, INC
100 State Street
Montpelier, Vermont 05602
(802) 229-4600

EXECUTIVE SUMMARY

In January 1994, two 4,000 gallon underground fuel oil storage tanks (USTs), were removed from the Harry's Discount Store property in Berlin, Vermont. Soil contamination was encountered during the site assessment completed by The Johnson Company during the UST removals. Due to this soil contamination, additional site investigation was requested by the Vermont Department of Environmental Conservation Sites Management Section (SMS) in their March 3, 1994 letter to Gene Twomey of Stuart's Department Stores. The following tasks were completed in order to comply with this request from the SMS.

On April 25, 1994, four soil borings were completed on the property to allow soil and groundwater samples to be collected and analyzed at a laboratory for volatile organic compounds and total petroleum hydrocarbons. A groundwater monitoring well was installed in one of the borings.

Soil samples were collected from two of the borings. Groundwater samples were collected from the well installed on April 25 and from a nearby monitoring well previously installed during a Phase II Environmental Site Assessment conducted for this property. The soil and groundwater samples were analyzed at Microassays Laboratory of Vermont in Middlesex, Vermont for volatile organic compounds and total petroleum hydrocarbons. Soil samples were collected from each of the soil borings for field analysis using a photoionization detector (PID) headspace method.

A survey of sensitive receptors was conducted to determine if there are any basements, surface waters or water supply wells that may be at risk due to the contamination at the site. It was determined that there are currently no sensitive receptors at risk from the site contamination.

The results of this investigation indicate that there is a limited degree of contamination in the soils and groundwater on the property. The zone of contamination appears to be limited to the area directly adjacent to the former location of the USTs. The levels of contaminants reported in the groundwater samples are below the Vermont Groundwater Protection Rule and Strategy Enforcement Standards.

Based on the findings of this investigation, The Johnson Company recommends that this site be removed from the Vermont Active Hazardous Sites List and placed on the Low Priority/Closed Sites List. We do not believe that the results of this investigation warrant any further action at the site at this time.

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1.0 INTRODUCTION

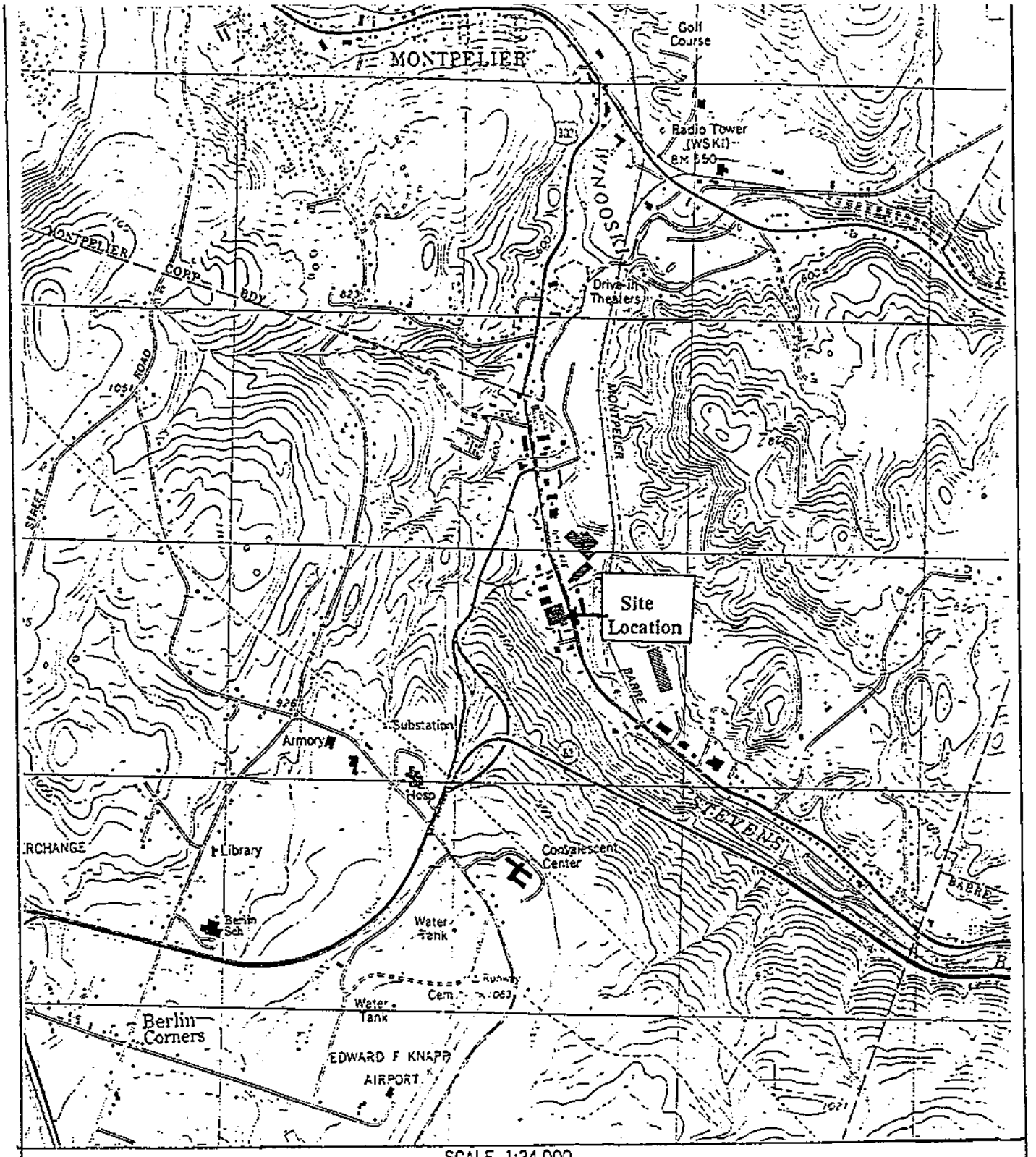
The Johnson Company was retained by Stuarts Department Stores to conduct a soil and groundwater investigation at the Harry's Discount Store property in Berlin, Vermont. This investigation was the result of a request by the Vermont Department of Environmental Conservation Sites Management Section (SMS), following the removal of two 4,000 gallon underground fuel oil storage tanks (USTs). A location map for this site is provided as Figure 1. Tasks included in this investigation were the completion of four soil borings with soil samples collected for laboratory analysis, installation and sampling of one new groundwater monitoring well, sampling of an existing groundwater monitoring well, and soil sampling and photoionization detector (PID) headspace analysis of the soil samples from each of the borings. An evaluation of the potential for sensitive receptors to be adversely impacted by the site contamination was also carried out.

The soil and groundwater samples collected during the investigation were analyzed for total petroleum hydrocarbons (TPH) using a modified EPA Method 8100 and for volatile organic compounds (VOCs) using EPA Method 8020 with mass spectrometer confirmation.

2.0 SOIL BORING AND SAMPLING

On April 25, 1994, four soil borings were completed in and around the area where the USTs were formerly located. The drilling contractor used for this investigation was Adams Engineering of Underhill, Vermont. The locations of these borings are shown on Figure 2. Three of the borings were completed using a 2.4 inch inside-diameter five foot long lined sampler driven with a vibratory head. The fourth boring was completed using a 4 inch diameter solid auger.

All drilling equipment was steam cleaned prior to use and between drilling for each well to prevent accidental cross-contamination. The soils were sampled along the entire length of the boring. Each boring was completed to a depth slightly below the water table, which was generally encountered within approximately 4.5 feet of the surface. Soil Boring 3, directly east of the UST excavation area, was advanced to 10.3 feet, yet no groundwater was encountered, presumably because of the very heavy soil textures encountered in this boring. A total of ten soil samples were placed into plastic "zip-lock" bags for headspace analysis using a photoionization detector (PID). The soil samples filled approximately 1/2 of each bag. After the soils in the bags had warmed up in the sun, the soils were shaken and the probe of a PID was inserted into the air space of the bag to obtain a "headspace" reading of the organic vapors that had volatilized from the soil samples.



Ref: U.S. Geological Survey, 1978, Barre West, Vermont, 1:24,000 Quadrangle Map.

FIGURE 1

Harry's Discount Store
Site Location Map

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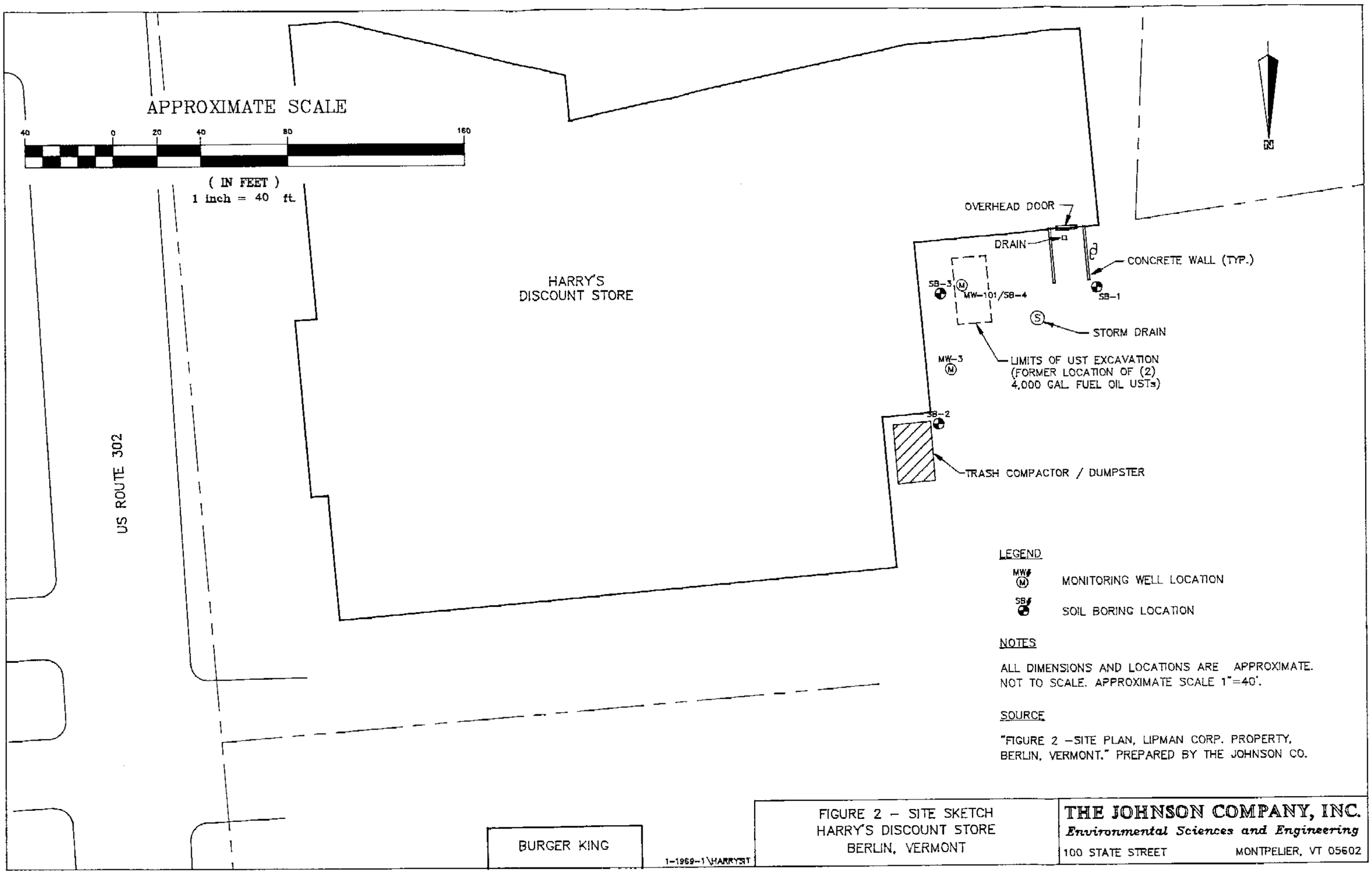

1-1969-1\HARRYST

FIGURE 2 – SITE SKETCH
HARRY'S DISCOUNT STORE
BERLIN, VERMONT

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering
100 STATE STREET MONTPELIER, VT 05602

Table 1 provides the approximate sampling depths and the headspace readings for the soil samples collected for this investigation.

TABLE 1 - SOIL SAMPLE HEADSPACE RESULTS		
BORING #	SOIL SAMPLE DEPTH (FEET)	HEADSPACE PID READING (ppm)
SB-1	3.5-4.5	0.0-0.4
SB-1	4.5-5	0.0-0.4
SB-1	5-5.3	0.0
SB-2	2-2.5	0.0
SB-2	3-3.5	0.0
SB-2	4.0	0.0
SB-2	4.5	0.0
SB-3	2-2.5	0.0
SB-3	5.3	0.0
SB-4/MW-101	4	164.0

Four soil samples were also collected for laboratory analysis. Microassays of Vermont, in Middlesex, Vermont, was the laboratory used for analytical services for this investigation. Two samples were collected from the saturated zone encountered in SB-1 and two samples were collected from the saturated zone encountered in SB-2. From each of these borings, one soil sample was analyzed for total petroleum hydrocarbons (TPH) using modified EPA Method 8100 and one was analyzed for volatile organic compounds (VOCs) using EPA Method 8020 with mass spectrometer confirmation. The laboratory reported that no contaminants were detected in any of these soil samples. See Appendix B for the laboratory analytical reports.

In SB-2 and SB-3, the soil textures encountered under a relatively thin layer of sandy fill were silty clay. The soil headspace analysis for the samples collected from SB-3 indicated that the soils are not significantly contaminated at depths of 2 to 2.5 feet below the ground surface (bgs) and 5.3 feet bgs. The sandy fill in the UST excavation area, which is only approximately 5 feet from SB-3, is heavily contaminated, as evidenced during the removal of the USTs. A soil sample from 4 feet bgs in SB-4/MW-101 that was analyzed using the same headspace analysis method yielded a result of 164 ppm. Additionally, the soils in SB-3

were not saturated even at a depth of 10 feet bgs, while the water table was encountered at approximately 2.6 feet bgs in MW-101 on May 3, 1994 when the groundwater was sampled from the well. This information suggests that due to the silty clay soil textures surrounding the UST excavation area, which has been primarily backfilled with sandy fill material, water (and contaminant) flow out of the excavation area is severely restricted. It appears that this condition is helping to minimize the spread of contamination in this area.

3.0 GROUNDWATER SAMPLING

One groundwater monitoring well was installed on the day that the soil borings were completed. This well is numbered MW-101. MW-3, which was installed in the vicinity of the USTs during a previous Phase II Environmental Site Assessment, was located on the same day, and was later sampled for this investigation. The locations of these wells are shown on Figure 2.

MW-101 is constructed of 1.5-inch diameter PVC casing with a 10 foot long screened section. The screened section of the well is slotted with 0.01 inch wide slots for water inflow. The well is packed with filter sand around the screened section and to approximately 2 feet above the screened section, and a cap of approximately 1 foot of bentonite slurry is placed above the sand to keep surface water from running down the sides of the well to the screened section.

After construction, MW-101 was developed by pumping water out of the well for approximately 2 hours using a peristaltic pump. The drilling and well construction log for MW-101 is included as Appendix A.

MW-3 is a 2" diameter PVC well that set at 10 feet bgs, with 8 feet of screened section. There is a sand pack installed from 1.5 to 10 feet bgs, and 1 foot of bentonite plug is above the sand pack. A flush-mounted protective cover is cemented in place over the well.

3.1 SAMPLE COLLECTION AND HANDLING

Groundwater samples were collected from MW-101 and MW-3 on May 3, 1993 by The Johnson Company. The wells were sampled using a separate bailer for each well. The depth to groundwater in both wells was 2.6 feet below the ground surface. More than 3 well volumes of water were purged from each well prior to sample collection. Sample collection from each well included four (4) 40 milliliter vials for analysis for VOCs by EPA Method 8020 with mass spectrometer confirmation and for analysis for TPH by modified EPA Method 8100. Each sample was placed in a cooler on ice immediately following sample collection. The samples were preserved with hydrochloric acid. The samples were delivered by The Johnson Company under chain of custody to Microassays Laboratory on the day of sampling.

3.2 ANALYTICAL RESULTS

The reported total petroleum hydrocarbon analysis (modified EPA Method 8100) results are as follows:

MW-101	20.2 parts per million (ppm)*
MW-3	6.3 ppm

* 1 ppm is the practical quantitation limit for this analysis.

See Appendix B for copies of the laboratory analytical reports.

The reported laboratory analysis results for VOCs (EPA Method 8020 with mass spectrometer confirmation) are summarized below in Table 2.

TABLE 2 - GROUNDWATER ANALYTICAL RESULTS
FROM ANALYSIS USING EPA METHOD 8020
(all units are parts per billion)

REPORTED COMPOUND	MW-101	MW - 3	GROUNDWATER STANDARD[1]
BENZENE	1	BPQL[2]	5
TOLUENE	38	BPQL	2,420
ETHYLBENZENE	20	BPQL	680
XYLENES	37	BPQL	400
TOTAL BTEX	96	BPQL	NA

1 Vermont Groundwater Protection Rule and Strategy Enforcement Standard
2 BPQL - Below Practical Quantitation Limit of 1 ppb, except for xylenes which had a practical quantitation limit of 2 ppb

This data indicates that the samples of groundwater collected from these wells are not contaminated at levels that exceed the Vermont Groundwater Protection Rule and Strategy Enforcement Standard. The compounds that were detected are all typical of petroleum releases, and their likely source is from the underground fuel oil storage tanks that were formerly located on this property.

4.0 SENSITIVE RECEPTOR SURVEY

The SMS requested that an evaluation for sensitive receptors such as basements of adjacent buildings, nearby surface water and drinking water wells be conducted to determine whether there is a likelihood for these types of receptors to be impacted by the site contamination.

The two buildings that could be potentially impacted by the site contamination, Harry's Discount Store and Burger King Restaurant, are both built on concrete slabs, so there is no concern regarding hazardous vapors entering basements of adjacent buildings.

Before this area was developed, a small stream flowed approximately 500 feet north of the former UST location from west to east into the Stevens Branch of the Winooski River. This stream has been redirected to accommodate the area construction, and it now flows in a concrete culvert from the west side of Capitol Chrysler, under the parking area and US Route 302, where it discharges from the culvert and flows surficially between Vermont Shopping Center and McDonalds Restaurant. Based on the distance from the former UST location to this stream, the fact that it is carried through a culvert for the stretch nearest the site, and the low levels of contamination reported at the site, it is not believed that this stream is at risk of being adversely impacted by the site contamination.

Berlin Fire District #1 informed us that the area near the site is served by a community water supply system. According to the Fire District, none of the nearby businesses or homes have a private drinking water supply.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The reported results of the groundwater analysis conducted for this investigation indicate that the groundwater in the area of the former location of the USTs is contaminated with benzene, toluene, ethylbenzene, xylenes and other petroleum hydrocarbons. The concentrations of these compounds do not exceed the Vermont Groundwater Protection Rule and Strategy Enforcement Standards for these compounds.

There is no formal groundwater enforcement standard applicable to the TPH data. Generally speaking, however, a groundwater TPH level of 20.2 ppm at a site which is in an area that is not in residential use is not considered particularly high, or of much concern from a regulatory standpoint. It is likely that the TPH reported in the groundwater from MW-101 has come from the documented fuel oil release from the USTs that were formerly in the location of MW-101.

The results of the soil headspace analysis conducted on the soil sample collected from the boring for MW-101 (SB-4) indicated a significant concentration (164 ppm) of organic vapors. This reading was most likely a result of the release of fuel oil documented when the USTs were removed. SB-4 is located in the former location of the USTs.

The headspace readings obtained from the soil samples collected from SB-1, SB-2 and SB-3 indicated no presence of contamination by volatile organic compounds. The 0.0-0.4 ppm readings reported for two of the samples from SB-1 could be a result of normal background variations or naturally occurring decomposing organic matter, and do not provide any reason for serious concern.

The data collected during this investigation indicate that the fuel oil contamination from the USTs that formerly occupied the site is not widespread in the area soils or groundwater. The clayey texture of the soils surrounding the excavation from which the USTs were removed, and the sandy texture of the backfill material in the excavation area, cause the lateral movement of water out of the excavation to be severely limited. This appears to be helping to limit the zone of contamination to a small area directly adjacent to the former location of the USTs.

5.2 RECOMMENDATIONS

The data collected during this investigation indicate that the site contamination is of limited extent and that the reported concentrations are below the Vermont Groundwater Protection Rule and Strategy Enforcement Standards. There are no sensitive receptors that are at risk of adverse impacts from the site contamination.

We recommend that this site be removed from the Active Sites List of Vermont Hazardous Waste Sites and placed on the Low Priority/Closed Sites List. No further action is warranted for investigation or remediation of the site at this time.

Reviewed by: J-B

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APPENDIX A

Drilling and Well Construction Log for MW-101

The Johnson Company, Inc.
Environmental Sciences and Engineering
100 State Street
Montpelier, Vermont 05602

DRILLING LOG
WELL # MW-101

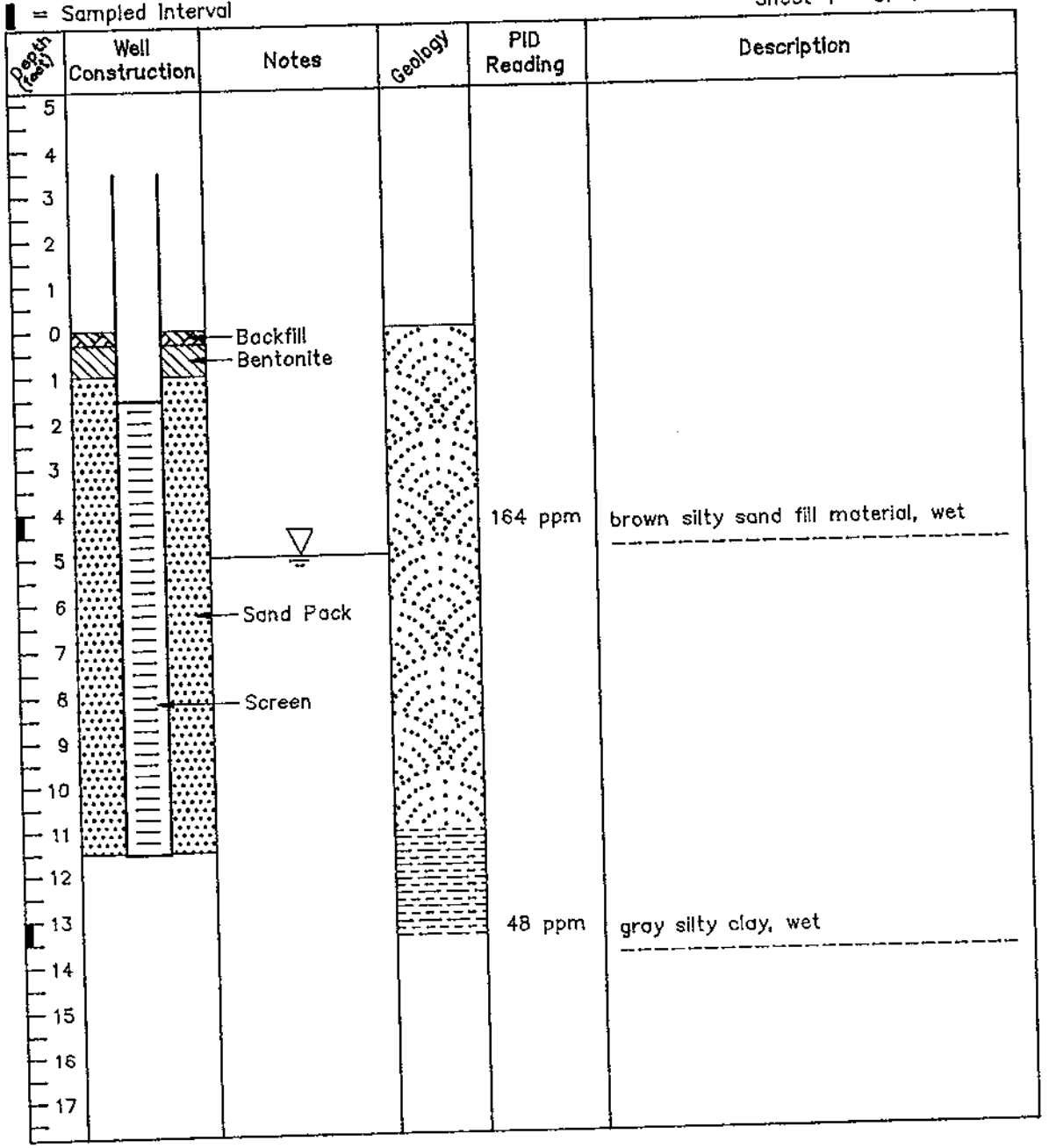
Project: Stuarts Dept. Stores
Location: Harry's, Berlin, VT
Job # 1-1969-1
Logged By: BAW
Date Drilled: 4/25/94
Driller: Adams Engineering
Drill Method: solid stem auger

Casing Type: PVC
Casing Diameter: 1.5 in.
Casing Length: 15.0 ft.
Screen Type: Factory PVC
Screen Diameter: 1.5 in.
Screen Length: 10.0 ft.
Slot Size: 0.01"

Total Pipe: 15.0 ft.
Stick Up: 3.5 ft.
Total Hole Depth: 11.5 ft.
Well Guard Length: 0.0 ft.
Initial Water Level: 5.0 ft.
Surface Elevation: –
T.O.C. Elevation: –

Sheet 1 of 1

▌ = Sampled Interval



APPENDIX B

Laboratory Analytical Reports

BAW

MICROASSAYS OF VERMONT INCORPORATED

RECEIVED
MAY 13 1994
THE JOHNSON CO., INC.
MONTPELIER, VERMONT

LABORATORY ANALYSIS

CLIENT NAME:	The Johnson Company, Inc.	REF #:	8745
ADDRESS:	100 State Street	PROJECT NO.:	1-1969-1
	Montpelier, VT 05602		
SAMPLE LOCATION:	Stuarts - Harrys	DATE OF SAMPLE:	4/25/94
SAMPLER:	Bradley A. Wheeler	DATE OF RECEIPT:	4/25/94
		DATE OF ANALYSIS:	4/27/94
ATTENTION:	Bradley A. Wheeler	DATE OF REPORT:	5/10/94

TOTAL PETROLEUM HYDROCARBONS
by Capillary GC/MS
(modified semivolatile method 8100)

Sample	TPH (mg/Kg)	PQL (mg/Kg)
SB-1 Soil	BPQL	1
SB-2 Soil	BPQL	1

BPQL = Below Practical Quantitation Limit

Reviewed by:

Brendan McMahon, Ph.D.
Director, Chemical Services

LABORATORY REPORT

EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	The Johnson Company, Inc.	PROJECT CODE:	1-1969-1
PROJECT NAME:	Stuarts	REF.#:	8,745
REPORT DATE:	May 5, 1994	STATION:	SB-1
DATE SAMPLED:	April 25, 1994	TIME SAMPLED:	08:45
DATE RECEIVED:	April 25, 1994	SAMPLER:	Bradley A. Wheeler
ANALYSIS DATE:	May 5, 1994	SAMPLE TYPE:	Soil, 90% Dry wt.

PARAMETER	PQL (µg/Kg dry wt.)	Concentration (µg/Kg dry wt.)
Benzene	22	BPQL
Toluene	44	BPQL
Ethylbenzene	22	BPQL
m+p-Xylene	44	BPQL
o-Xylene	22	BPQL
Chlorobenzene	22	BPQL
1,2-Dichlorobenzene	22	BPQL
1,3-Dichlorobenzene	22	BPQL
1,4-Dichlorobenzene	22	BPQL
MTBE	22	BPQL

Surrogate % Recovery: 95%

BPQL = Below Practical Quantitation Limit (PQL).

MicroAssays of Vermont, Inc. P.O. Box 189 Middlesex, Vermont 05602 (802) 223-1468 FAX 223-8688

LABORATORY REPORT

EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	The Johnson Company, Inc.	PROJECT CODE:	1-1969-1
PROJECT NAME:	Stuarts	REF.#:	8,745
REPORT DATE:	May 5, 1994	STATION:	SB-2
DATE SAMPLED:	April 25, 1994	TIME SAMPLED:	09:40
DATE RECEIVED:	April 25, 1994	SAMPLER:	Bradley A. Wheeler
ANALYSIS DATE:	May 5, 1994	SAMPLE TYPE:	Soil, 89% Dry wt.

PARAMETER	PQL (µg/Kg dry wt.)	Concentration (µg/Kg dry wt.)
Benzene	22	BPQL
Toluene	44	BPQL
Ethylbenzene	22	BPQL
m+p-Xylene	44	BPQL
o-Xylene	22	BPQL
Chlorobenzene	22	BPQL
1,2-Dichlorobenzene	22	BPQL
1,3-Dichlorobenzene	22	BPQL
1,4-Dichlorobenzene	22	BPQL
MTBE	22	BPQL

Surrogate % Recovery: 95%

BPQL = Below Practical Quantitation Limit (PQL).

MicroAssays of Vermont, Inc. P.O. Box 189 Middlesex, Vermont 05602 (802) 223-1468 FAX 223-8688

MICROASSAYS OF VERMONT INCORPORATED

LABORATORY ANALYSIS

CLIENT NAME: The Johnson Company
ADDRESS: 100 State Street
Montpelier, VT 05602

SAMPLER: Bradley Wheeler
SAMPLE LOCATION: Harry's

MAV CONTROL #: 8821
DATE OF SAMPLE: 5/3/94
DATE OF REPORT: 5/31/94
PROJECT NUMBER: 1-1969-1

EXAMINATION REQUESTED:

Test - Total Petroleum Hydrocarbons. EPA Modified 8100

SPECIMENS:

(2) glass jars containing water samples Labled MW 3, and MW 101.

FINDINGS:

	MW - 3	MW - 101	Units	PQL
TPH	6.2	20.2	mg / kg	1

Reviewed by:

Kenneth Somerville
Head Chemist,Chemical Services

LABORATORY REPORT

EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	The Johnson Company, Inc.	PROJECT CODE:	1-1969-1
PROJECT NAME:	Stuarts/Harry's	REF.#:	8,821
REPORT DATE:	May 12, 1994	STATION:	MW-3
DATE SAMPLED:	May 3, 1994	TIME SAMPLED:	11:15
DATE RECEIVED:	May 3, 1994	SAMPLER:	Bradley A. Wheeler
ANALYSIS DATE:	May 9, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
m+p-Xylene	2	BPQL
o-Xylene	1	BPQL
Chlorobenzene	1	BPQL
1,2-Dichlorobenzene	1	BPQL
1,3-Dichlorobenzene	1	BPQL
1,4-Dichlorobenzene	1	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 104%

BPQL = Below Practical Quantitation Limit (PQL).

MicroAssays of Vermont, Inc. P.O. Box 189 Middlesex, Vermont 05602 (802) 223-1468 FAX 223-8688

LABORATORY REPORT

EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	The Johnson Company, Inc.	PROJECT CODE:	1-1969-1
PROJECT NAME:	Stuarts/Harry's	REF.#:	8,821
REPORT DATE:	May 12, 1994	STATION:	MW-101
DATE SAMPLED:	May 3, 1994	TIME SAMPLED:	10:05
DATE RECEIVED:	May 3, 1994	SAMPLER:	Bradley A. Wheeler
ANALYSIS DATE:	May 10, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	1
Toluene	1	38
Ethylbenzene	1	20
m+p-Xylene	2	27
o-Xylene	1	10
Chlorobenzene	1	BPQL
1,2-Dichlorobenzene	1	BPQL
1,3-Dichlorobenzene	1	BPQL
1,4-Dichlorobenzene	1	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 106%

BPQL = Below Practical Quantitation Limit (PQL).

MicroAssays of Vermont, Inc. P.O. Box 189 Middlesex, Vermont 05602 (802) 223-1468 FAX 223-8688