

**Summary Report of
A Site Investigation at the
Bethany Congregational Church
Montpelier, Vermont**

May 1994

Prepared for:

BETHANY CONGREGATIONAL CHURCH
115 Main Street
Montpelier, Vermont 05602

Prepared by:

THE JOHNSON COMPANY, INC.
100 State Street
Montpelier, Vermont 05602
(802)229-4600
ENVIRONMENTAL SCIENCES AND ENGINEERING

THE JOHNSON COMPANY, INC.

Environmental Sciences and Engineering

May 23, 1994

Mr. Chuck Schwer, Supervisor
Hazardous Materials Management Division
Sites Management Section
103 South Main Street
Waterbury, Vermont 05671-0404

Re: DEC Site # 93-1541
Summary Report of UST Investigation, Bethany Church, Montpelier, Vermont
JCO # 1-0284-2 (47)

Dear Chuck:

Following is a summary of the work performed and results obtained in connection with The Johnson Company's investigation at the Bethany Congregational Church at 115 Main Street, Montpelier, Vermont. This work was performed pursuant to your approval letter of February 11, 1994.

Please don't hesitate to call me if you have questions concerning our report. Thank you.

Sincerely,

THE JOHNSON COMPANY, INC.

By: 
Alan R. Liptak
Senior Scientist

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EXECUTIVE SUMMARY

The Johnson Company has completed a site investigation at the Bethany Congregational Church, 115 Main Street, Montpelier, Vermont. This investigation follows the apparent release of an unknown quantity of #2 fuel oil from a 5,500 gallon Underground Storage Tank (UST) at the Church, which was removed on December 16, 1993. The investigation included a review of existing information related to the site and to adjacent sites, the installation of four groundwater monitoring wells, a monitoring well position and elevation survey, a receptor inventory, and sampling and analysis of groundwater for heating oil-related compounds.

The conclusions of this investigation are:

1. Prevailing groundwater flow in the surficial aquifer beneath the site is in a westerly direction, toward the North Branch of the Winooski River.
2. A small groundwater mound has formed beneath the grassy strip between the Church and NYNEX building to the east. This mound is most likely related to seasonal recharge and is probably a transient feature.
3. Groundwater monitoring reports indicate that low concentrations of weathered fuel oil are present immediately adjacent to the former UST location. Some fresh gasoline was also reported from this location. Trace concentrations of xylene and MTBE were also reported in a monitoring well at NYNEX. No other contaminants which were tested for, were reported from any other sampling location, indicating that significant contamination has not spread beyond the immediate vicinity of the former UST.

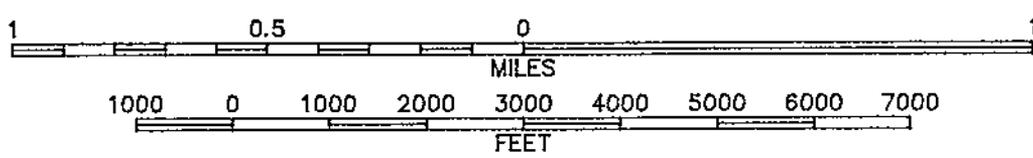
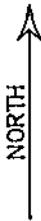
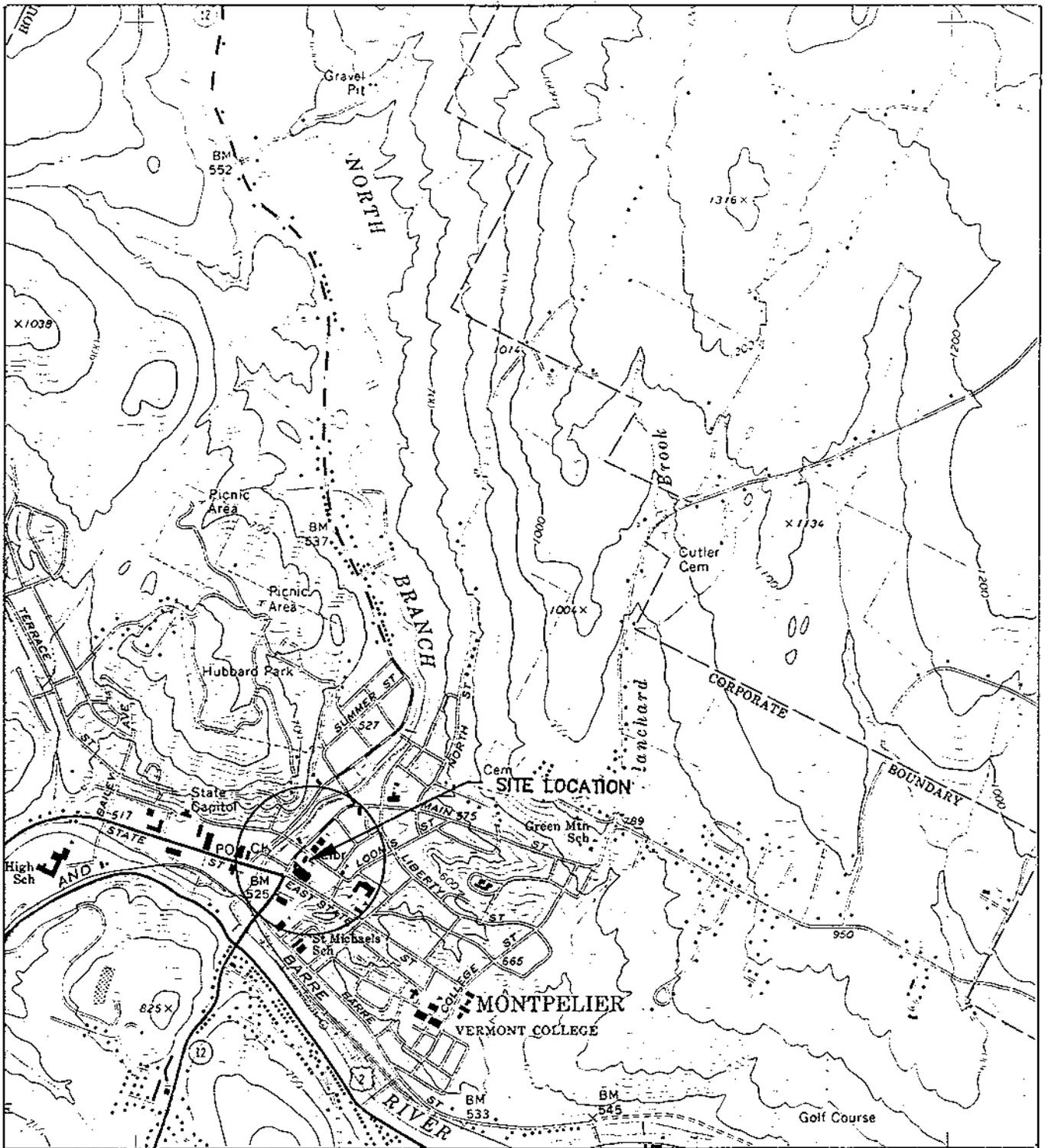
Although some contaminated soils remain beneath the site, further contaminant mobility appears to be improbable. Given the absence of receptors in the vicinity, The Johnson Company recommends that the former UST location be paved to prevent infiltration in this area. No other remedial measures are recommended at this time.

1.0 INTRODUCTION

The Johnson Company, Inc., an Environmental Sciences and Engineering Company in Montpelier, Vermont, was retained by the Bethany Congregational Church (Church) to perform a site investigation at the Church property at 115 Main Street in Montpelier. The purpose of the site investigation was to determine whether an unknown quantity of #2 fuel oil released from a former 5,500 gallon underground storage tank (UST) has affected the quality of the soils or groundwater in the area or whether any receptors could have been affected. This work was performed in response to a letter from the Sites Management Section of the Vermont Hazardous Materials Management Division (HMMD) dated February 11, 1994 (Attachment 1).

The Church location is indicated on Figure 1. The former UST had been installed approximately 1957 and was removed on December 16, 1993 (See "Report of Underground Storage Tank Removal", The Johnson Company Inc., December 17, 1993). The Church UST was reported as being in poor condition with numerous pits and rust holes on it's underside. Fuel oil was observed in the soils and on the groundwater table during the tank removal. The quantity of oil released to the subsurface environment is unknown, however, judging from the condition of the UST upon removal, the release could have occurred over a span of several years. Excavated soils were back filled, due to the unknown quantity of contaminated soils and limited/non-existent space for on-site storage.

The Church is adjacent to and west of the NYNEX (former New England Telephone) Facility, which is listed on the HMMD Active sites list, Site # 93-1418 due to a release of #2 heating oil from underground storage tanks on the southeast side of NYNEX. There are three groundwater monitoring wells at NYNEX at the time of the Bethany Church site investigation. Water level data and groundwater quality data were obtained from the NYNEX wells as part of our investigation and these were utilized in formulating the conclusions presented herein. Additionally, there is one functioning groundwater monitoring well at the City Center building, south of and adjacent to the Church, and water level data from this well was collected and utilized during our investigation.



CONTOUR INTERVAL 20 FEET



MAP LOCATION

BASE MAP : USGS 7.5 Minute Topographic Quadrangle: Montpelier, Vt. (1968)

FIGURE 1 : Site Location Map
The Bethany Church
Montpelier, Vermont

THE JOHNSON COMPANY
Environmental Sciences and Engineering
MONTPELIER, VERMONT

2.0 SCOPE OF WORK

The specific tasks performed at the Church during this site investigation consisted of a review of existing information related to water supplies in the area and to a prior site investigation at NYNEX, advancement of four soil borings, installation of four new groundwater monitoring wells, a survey of the positions and elevations of the new wells and other nearby monitoring wells and structures, water level and river elevation measurements, preparation of a groundwater flow map for the area, a survey of nearby possible receptors, an inventory of existing water supply wells within the vicinity of the church, and water quality sampling and analysis.

2.1 REVIEW OF EXISTING INFORMATION AND NEARBY RECEPTORS SURVEY

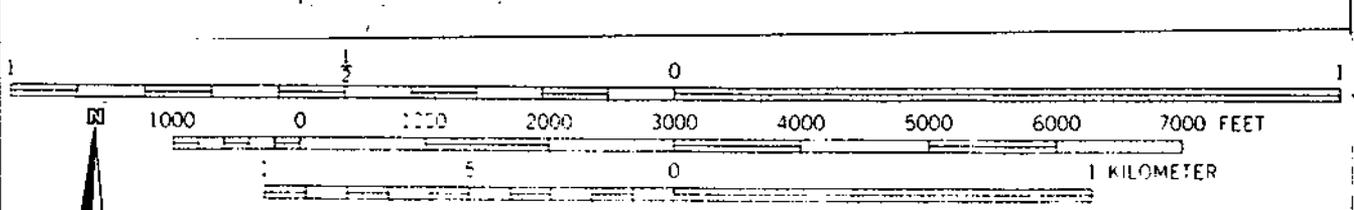
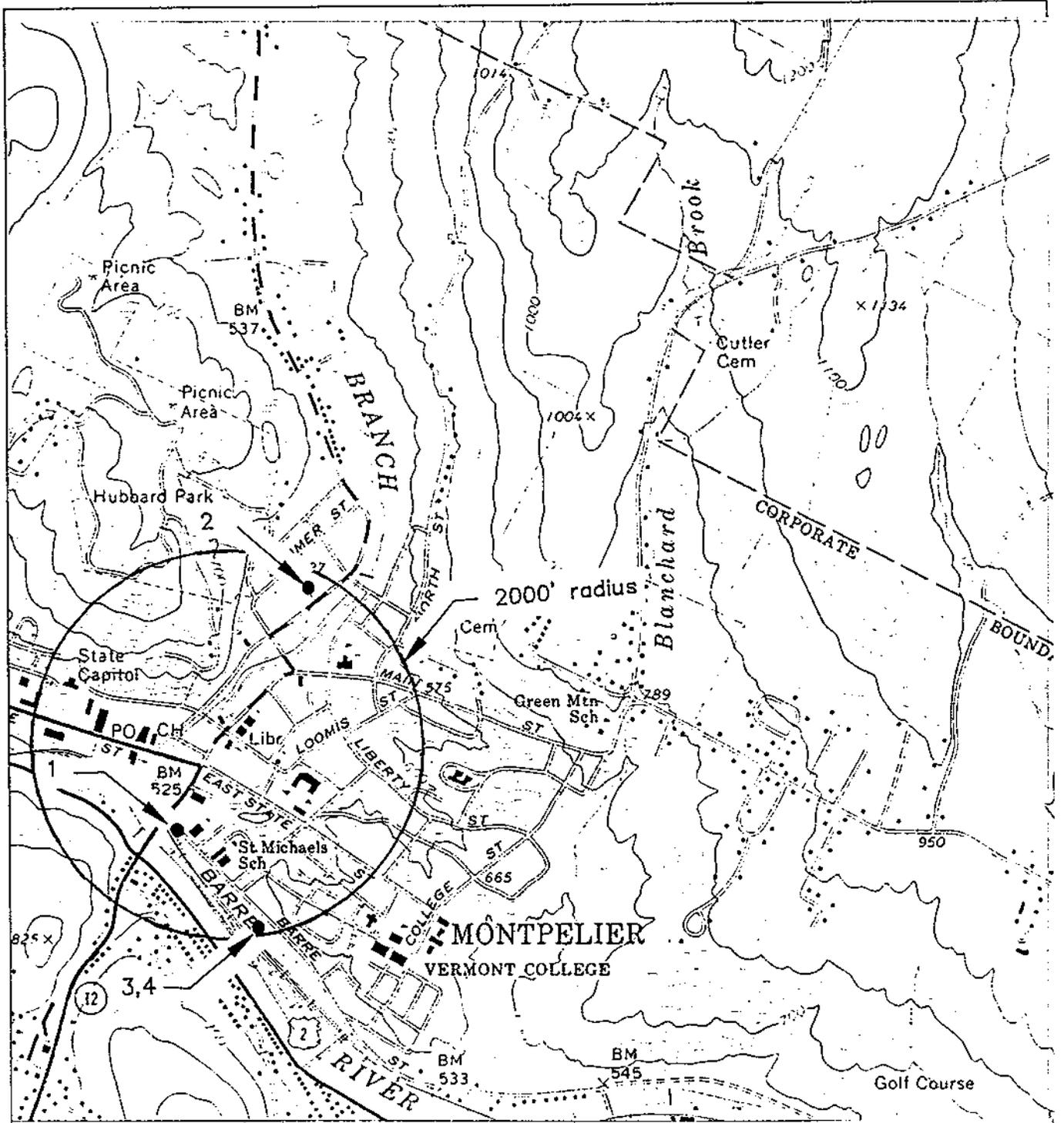
2.1.1 Drilled Well Logs

Drilled well logs contained in the files of the Department of Environmental Conservation Water Supply Division were reviewed during the preliminary phase of this investigation. A summary of nearby water wells is included in Table 2-1, below. Approximate locations of each well are shown on Figure 2.

Map #	Name	DEC #	Location	Total Depth (ft)	Yield (gpm)
1	F.G.B. Corp	WCR 396	Barre Street	185	30
2	U.S. Geo. Survey	1	Winter Street	26	observation well
3	Montpelier Granite	97	Barre Street	205	100
4	Desilets Granite	98	Barre Street	285	100

In short, while the majority of the downtown Montpelier area is served by municipal water, there are several drilled wells within 2,000 feet of the Church, which are used for commercial purposes. None of the drilled wells for which logs have been identified during this investigation, appear to be at risk from a release on the Church property.

The nearest community water supplies to the Church are The Town Hill Water Company (#WSID 5273) and the Murray Hill Water Supply (WSID 5601). Both of these are between ½ - 1½ miles east of the Bethany Church and neither are at risk from the release at the Church.



CONTOUR INTERVAL 20 FEET
 DATUM IS MEAN SEA LEVEL

BASE MAP : USGS 7.5 Minute Topographic Quadrangle: Montpelier (1968)

<p>FIGURE 2 : Nearby Water Supply Locations The Bethany Church Montpelier, Vermont</p>	<p>THE JOHNSON COMPANY Environmental Sciences and Engineering MONTPELIER, VERMONT</p>
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2.1.2 NYNEX Tank Removal and Site Investigation Reports

Two reports related to activities at NYNEX were obtained from the HMMD files. These include: Stearns and Wheler, "UST Closure Report, New England Telephone Facility, School Street, Montpelier, Vermont", dated July 16, 1993; and RESNA Industries, Inc., "Report on Limited Site Investigation at New England Telephone Facility, 23-25 School Street, Montpelier, Vermont", dated February 4, 1993 (sic, 1994).

The Stearns and Wheler report documents the removal of two former UST's from the NYNEX property on June 23, 1993. These consisted of one, 500-gallon #2 diesel UST along the western edge of the NYNEX property, adjacent to the Church driveway off School Street; and one, 3,000-gallon #2 fuel oil UST in the paved area southeast of the NYNEX building. The approximate locations of the former NYNEX UST's are indicated on Figure 3.

The 500-gallon NYNEX UST was reported to be in good condition upon removal. However, soil staining was noted adjacent to the vent pipe, and a fuel oil odor was noted in the excavation. No product was reported. Two soil samples were collected for laboratory analysis from the excavation; one sample, D-1, was reported to contain 10,000 ug/kg of volatile petroleum hydrocarbons in the C11-C16 range, indicating a relatively weathered low-level contaminant profile. The soils removed from this excavation were stockpiled on-site.

A greater magnitude of contamination was reported during the removal of the 3,000 gallon NYNEX UST southeast of the NYNEX building. Some corrosion was noted on the tank bottom upon excavation, although no holes were observed in the tank. Strong odors and elevated PID measurements were obtained from this excavation, and some free product was reported. Soil samples collected from the excavation were reported to contain varying concentrations of volatile hydrocarbons as well as significant concentrations of longer-chain volatile hydrocarbons. Soils from this excavation were stockpiled on site, although an impeding clay layer at the 8 foot level as well as a pipe in the excavation, may have resulted in some contaminated soils remaining in the excavation.

Following the removal of the UST's from the NYNEX site, RESNA Industries, Inc. performed a "Limited Environmental Site Investigation" of the NYNEX site. This investigation consisted of a review of the HMMD sites list and spills database, a review of City Public Works records, three soil borings, installation of three groundwater monitoring wells, soil and groundwater sampling, and a monitoring well

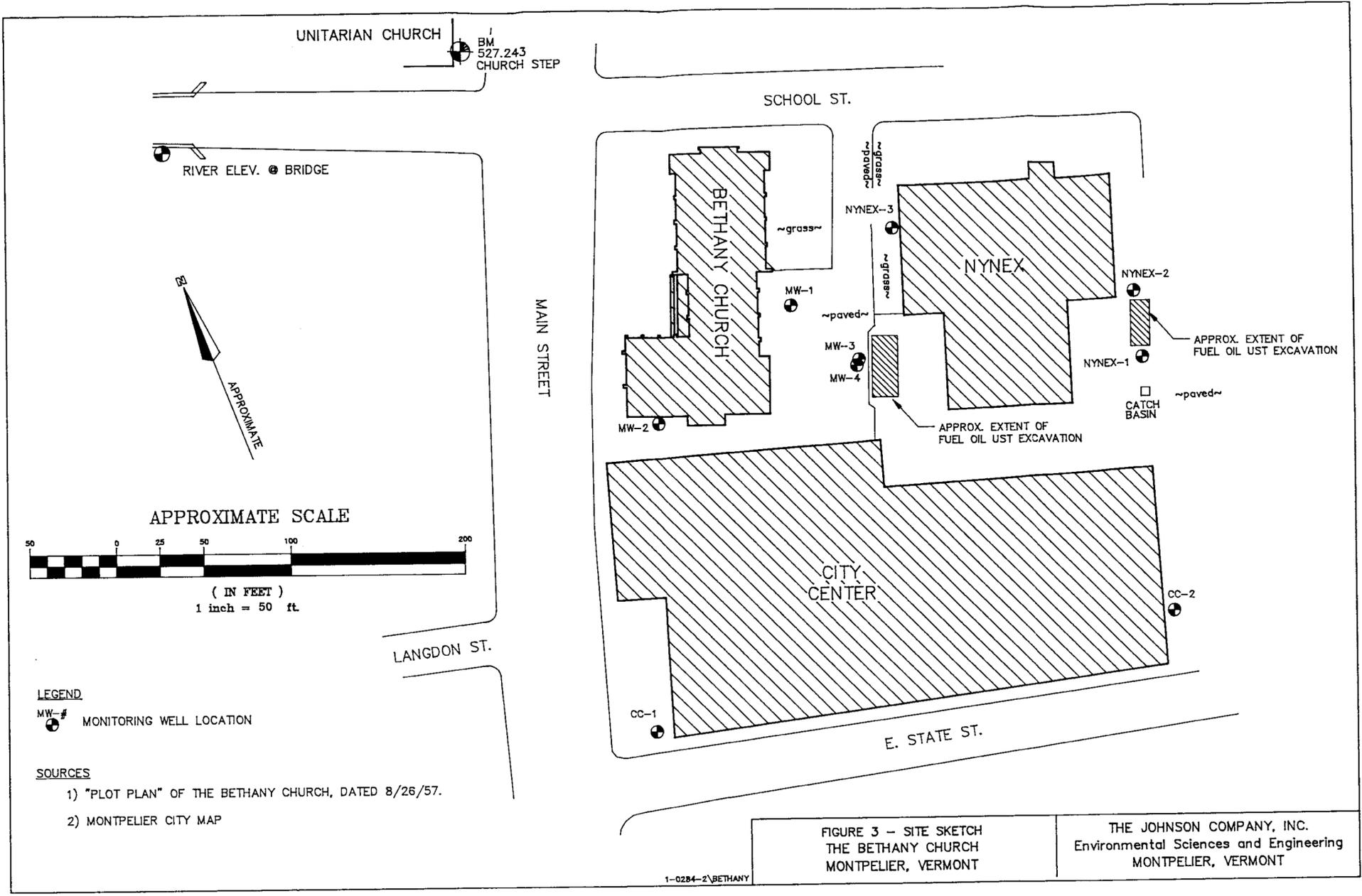


FIGURE 3 - SITE SKETCH
THE BETHANY CHURCH
MONTPELIER, VERMONT

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering
MONTPELIER, VERMONT

1-0284-2\BETHANY

elevation survey. Two soil borings and groundwater monitoring wells were placed adjacent to the former 3,000-gallon NYNEX UST, and one well was placed near the former 500-gallon NYNEX UST. Soil samples collected during the soil borings were analyzed for Total Petroleum Hydrocarbons (TPH) using EPA method 418.1, and for VOC's using Methods 8015 and 8020. Reported TPH concentrations in soil samples collected during the soil borings ranged from 130 mg/kg - 150 mg/kg, however, no specific volatile organic compounds were reported in any of the soil samples.

Groundwater quality data was obtained for monitoring wells MW-1 and MW-3; monitoring well MW-2 was dry on the date of sampling. Groundwater samples were analyzed for VOC's using EPA Methods 602 and 8015; No compounds were reported above detection limits in groundwater with the exception of ethylbenzene, which was reported in monitoring well MW-1 at 7 ug/l. No TPH or PAH analysis was performed on groundwater samples. A general northerly groundwater flow direction was predicted in this report, based upon data from two functional water level measurement points. No remedial recommendations are drawn by RESNA in the NYNEX site investigation report, however, NYNEX has recommended that no further action be taken based upon the data contained in the RESNA report.

2.1.3 PID Survey of Nearby Structures

A PID survey of indoor air was performed in the Bethany Church basement on April 20, 1994. This was performed to ascertain whether fuel oil vapors from the UST could be migrating into the building. No unusual PID measurements were obtained during this survey and no fuel oil odors were noted during the survey, indicating little likelihood of vapor migration to the building. The furnace room of the Church was not included in this survey because it houses two, 275-gallon above-ground fuel oil storage tanks as well as the furnace for the church, and thus could be expected to harbor some vapors originating from within the room. Additionally, a PID survey was performed in the rear service hallway of the City Center Building, at the Request of City Center management. The City Center building has no basement. Again, no fuel oil odors or elevated PID measurements were obtained, indicating little likelihood of vapor migration from the Church property to the City Center building.

2.2 GROUNDWATER MONITORING WELL INSTALLATION

Four soil borings were advanced at the Church on March 25, 1994 by Tristate Drilling and Boring Inc. of West Burke, Vermont, using hollow-stem-augers, with oversight by The Johnson Company. Each of the borings was advanced by drilling a hole approximately eight inches in diameter with the hollow-stem auger to approximately 5-7 feet below the water table. Split spoon samples were collected at

approximately five foot intervals during drilling to allow for the description of the stratigraphy and the determination of the depth to the water table.

Four new groundwater monitoring wells were installed in the soil borings at the Church on March 25. The installation of the wells was in accord with the Johnson Company's Standard Operating Procedure #003. When each borehole was completed, a 2-inch diameter, PVC pipe was inserted into the hollow stem of the augers; for monitoring wells MW-1 and MW-2, the bottom ten feet of the pipe was a factory-slotted screen with slots 0.010 inches wide. Five-foot well screens were installed in monitor wells MW-3 and MW-4, which are constructed as a monitoring well couplet. Clean filter sand was poured into the annulus between the PVC pipe and the auger as the auger was slowly lifted, allowing the sand to flow into the hole and surround the screen, forming a sand pack. The sand pack extends to approximately one foot above the top of the screen. Bentonite pellets were poured on top of the sand pack. Finally, a locking compression fitting and a flush-mounted road box were installed to plug the well and to minimize the potential for damage. Monitor well logs for MW-1 through MW-4 are included as Attachment 2.

2.3 MONITORING WELL SURVEY

The positions and elevations of the groundwater monitoring wells near the facility were surveyed by The Johnson Company on April 13, 1994. Surveying of the position and elevation of each monitoring well allows depth-to-groundwater measurements to be used to plot the attitude of the groundwater table and the groundwater flow direction. This survey was accomplished using an autolevel and tape.

The position and elevation of the functional monitoring well at City Center relative to the new wells at the Church was established on April 13. Also, the position and elevation of monitoring well NYNEX-3 relative to the monitoring wells at the Church was established at that time; the relative positions and elevations of monitoring wells NYNEX-1, NYNEX 2 and NYNEX-3 were previously surveyed by others, and this data was used in our investigation to create a common datum for all eight known, functional monitoring wells in the vicinity of the Church. Also, the elevation of the North Branch of the Winooski River on April 13, 1994 was established at the School Street Bridge. The relative TOC and water level elevations are presented in Table 2-2. The physical layout of the wells is indicated on Figure 3.

TABLE 2-1
MONITORING WELL CASING AND GROUNDWATER ELEVATIONS
 (All elevations NVGD1929, in feet above mean sea level)

WELL ID	TOC	4/13/94-GWELEV	4/14/94-GWELEV	4/20/94-GWELEV
CC-1	523.21	513.75	N/M	N/M
MW-1	523.54	514.99	515.33	515.64
MW-2	522.94	517.15	514.36	514.78
MW-3	523.03	516.48	517.58	518.01
MW-4	523.47	517.51	516.87	517.05
NYNEX-1	523.62	517.51	517.85	517.91
NYNEX-2	523.56	514.65	N/M	N/M
NYNEX-3	523.54	517.37	517.71	N/M

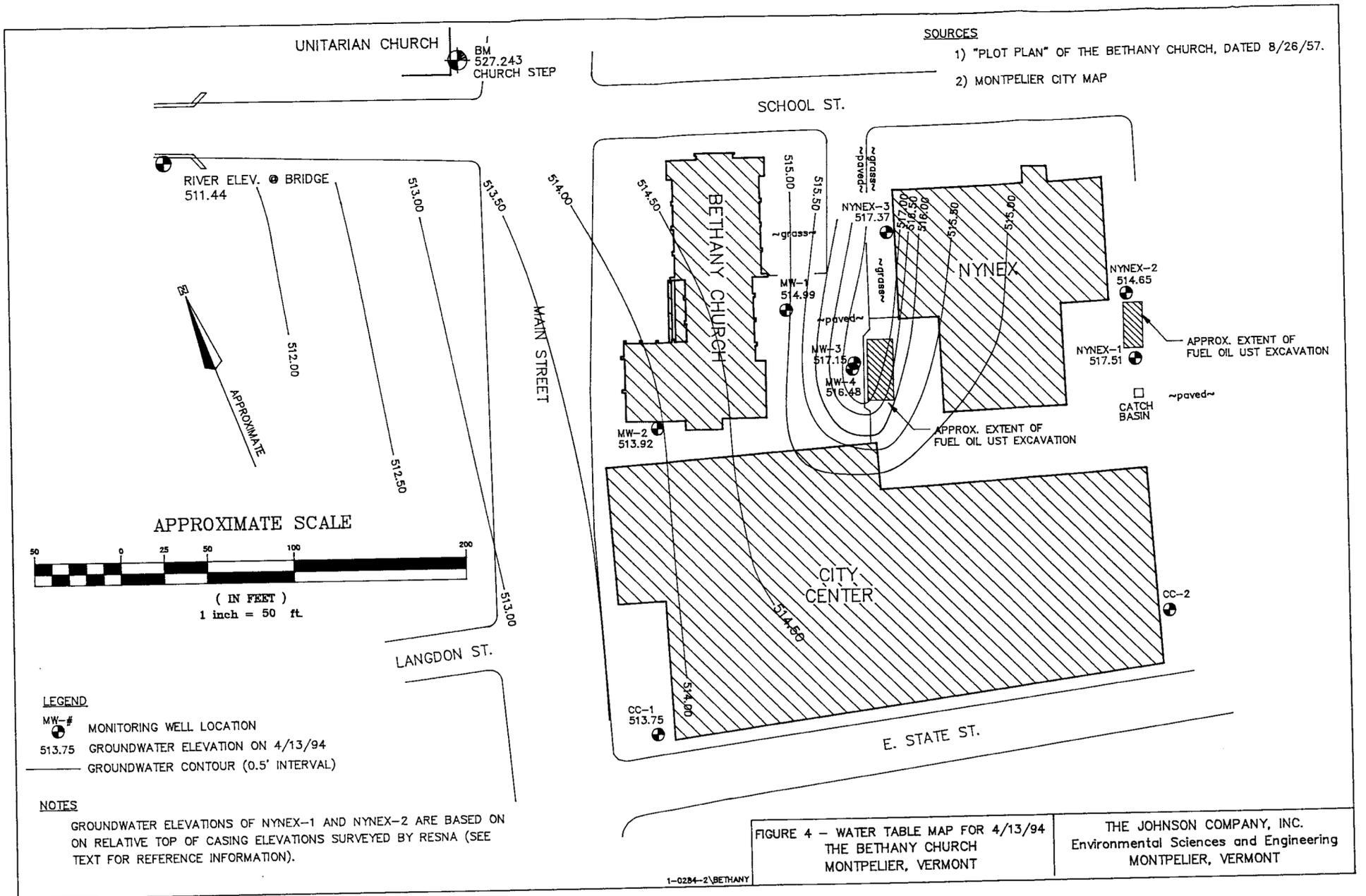
N/M = Not Measured

2.4 GROUNDWATER FLOW DIRECTION AND GRADIENTS

Figure 4 is a water table contour map of the Church vicinity on April 13, 1994. This map indicates that the prevailing direction of groundwater-flow is west toward the North Branch of the Winooski River, at an approximate gradient of 0.01 feet per foot (1%). However, along the grassy eastern edge of the Church property, a significant groundwater mound is apparently present. The magnitude of this mound was on the order of 1-2 feet higher than the surrounding aquifer. The prevailing groundwater flow direction could be locally reversed by such a mound.

Measured vertical downward gradient in monitoring wells MW-3 and MW-4 ranged from 0.12 feet/foot on April 14, to 0.17 feet per foot on April 13. The relatively low gradient and it's rapid fluctuation suggest a transient recharge-related water level response had occurred.

Water level elevations at the site in April were unusual in that some elevations were significantly higher than others, over short separation distances. The monitoring wells with high water level elevations on April 13, 1994 were MW-3, MW-4, NYNEX-1 and NYNEX-3. Monitoring wells MW-1, MW-2, CC-1, and NYNEX-2 all produced lower water level measurements on that date.



The climatic situation in Montpelier as of April 13, 1994 was warm and rainy. A significant amount of snow had melted that week and significant rain had also fallen. Consequently, significant quantities of stored and recent precipitation were available to recharge the surficial aquifer. To further complicate the hydrologic situation, most of the Church property and its surroundings are either paved or covered by buildings, effectively eliminating these areas as aquifer recharge zones. The only areas in the Church vicinity which could serve as recharge zones for the surficial aquifer are the grassy strip along the eastern property line of the Church, the grassy playground area to the north of MW-1, and the unpaved excavated area from which the UST was removed in December.

Each of the wells with higher water level measurements on April 13 (except for NYNEX-1) were located in or very near to unpaved areas which probably acted as aquifer recharge zones. Monitoring well NYNEX-1 is in a paved area, however, it is adjacent to a stormwater catch basin which may recharge the aquifer at this location. Each of the wells with relative lower water levels are in paved areas. This distinction suggests that the groundwater mound near the eastern property line of the Church could be due to the intense slug of meltwater and precipitation which was available for recharge in early April 1994. Our interpretation is that the mound represents a transient recharge phenomenon based on the low, rapidly changing vertical gradient, and that any flow reversals due to groundwater mounding are short lived and of little consequence for contaminant transport.

2.5 WATER QUALITY SAMPLING AND ANALYSIS

Groundwater quality samples were collected from monitoring wells MW-1, MW-2, MW-3, MW-4, NYNEX-1 and NYNEX-3, on April 14, 1994.

2.5.1 Procedure

All groundwater samples were collected using standard decontamination and documentation procedures as prescribed in Standard Operating Procedure JCO-027. Field measurement of water level was performed at the time of sampling. Chain-of-custody procedures were employed during shipment of the samples to the laboratory.

The samples were delivered to Microassays of Vermont, an analytical testing laboratory located in Middlesex, Vermont, on the day of their collection for analysis using EPA Methods 8020 for BTEX and Modified Method 8015 for Total Petroleum Hydrocarbons (TPH). The laboratory reports for the groundwater quality analyses are included in Attachment 3. A tabular summary of compounds reported above quantitation limits is provided in Table 2-3, below.

TABLE 2-3 - LABORATORY REPORTED COMPOUNDS IN GROUNDWATER
MONITORING WELLS
GROUNDWATER SAMPLES COLLECTED AT THE BETHANY CHURCH ON APRIL 14, 1994 (M8020/8015)

Location	Parameter	Reported Concentration ($\mu\text{g}/\ell$ unless otherwise indicated)	Vermont Enforcement Standard ($\mu\text{g}/\ell$)	Vermont Preventative Action Limit ($\mu\text{g}/\ell$)	EPA Drinking Water MCL(1) or VT HA(2) $\mu\text{g}/\ell$
MW-4	Benzene	40	5.0	0.5	5.0 (1) 1.0 (2)
	Toluene	7	2,420	1,210	1,000 (1)
	Ethylbenzene	21	680	340	700 (1)
	Total Xylenes	114	400.0	200.0	1,000 (1)
	MTBE	10	—	—	40 (2)
	TPH	1.1 $\mu\text{g}/\ell$	—	—	—
NET-1	Total Xylenes	6	400.0	200.0	1,000 (1)
	MTBE	9	—	—	40 (2)

Note: Shaded entry indicates the reported value exceeds a groundwater standard.

The reported results of the laboratory analyses indicate that the only well on the Church property with reported contaminant concentrations above Practical Quantitation Limits (PQL's) was MW-4, immediately adjacent to and deeper than, the former UST location. No contaminants were reported above PQL's from the wells west of and north of the former UST location. These include: monitoring well MW-1, in the parking lot northwest of the former UST; monitoring well MW-2, in the driveway between the Church and City Center; monitoring well MW-3, immediately adjacent to, and at the same elevation as the former UST; and NYNEX-3, between the Church and NYNEX buildings (ref. Figure 3 and 4). Trace concentrations of xylenes and MTBE were reported from NYNEX-1.

With the exception of benzene, none of the reported contaminant concentrations in MW-4 or NYNEX-1 exceeded any Groundwater Standards (ES/PAL) or drinking water standards (MCL/HA). Benzene was reported in MW-4 at 40 $\mu\text{g}/\ell$, which exceeds the ES/MCL of 5.0 $\mu\text{g}/\ell$. The reported presence of MTBE in MW-4 and NYNEX-1 suggests the presence of fresh gasoline in addition to fuel oil. This possibility was confirmed by the laboratory, which examined the chromatographs for MW-4 and confirmed the presence of both weathered fuel oil and fresh gasoline in the sample.

3.0 CONCLUSIONS

The results of this investigation indicate that groundwater flow at the Church is in a westerly direction toward the North Branch of the Winooski River at about 1% gradient. Although a documented release of #2 heating oil had occurred, the relatively silty soils in the upper soil horizons at the site have contained much of the release, and consequently, contaminant migration through soils or groundwater adjacent to the site has been minimal. The only reported groundwater contamination from the Church site is from MW-4, which was immediately adjacent to, and deeper than, the former UST. Other downgradient monitoring locations were not reported to contain detectible contaminant concentrations on April 14, 1994. The receptor survey indicates that there are no existing water wells downgradient of the Church, between the Church and the North Branch, so any off-site contaminant migration would not affect drinking water supplies. No evidence of vapor migration was noted during the PID/MGI survey of the basements of the Church or inside of the City Center.

Based upon the foregoing information, we recommend that the excavated area of the former UST be paved to prevent infiltration, and that the Church site be considered for site closure. This recommendation could be confirmed in the near future with a additional round of groundwater sampling, and if similar low or non-detectible results are obtained, then no further testing of groundwater is recommended.

ATTACHMENT 1
February 11, 1994 HMMD Letter



State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
Natural Resources Conservation Council
RELAY SERVICE FOR THE HEARING IMPAIRED
1-800-253-0191 TDD>Voice
1-800-253-0195 Voice>TDD

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation

Hazardous Materials Management Division
103 South Main Street/West Office
Waterbury, Vermont 05671-0404

(802) 241-3888

FAX (802) 241-3296

THE JOHNSON CO., INC.
MONTPELIER, VERMONT

FEB 15 1994

RECEIVED

February 11, 1994

Mr. Alan Liptak
The Johnson Co
5 State Street
Montpelier, VT 05602

Re: Petroleum contamination at the Bethany Church, Montpelier (Site #93-1541)

Dear Mr. Liptak:

The Sites Management Section (SMS) has received the workplan dated January 24, 1994 developed for the above referenced site. This workplan includes the installation of three monitoring wells, groundwater sampling, a hydrogeologic survey, a receptor survey, and a summary report. The cost for this work is estimated to be \$4,900. The SMS approves of this proposal as submitted.

Please keep the SMS informed of the progress of this work.

Sincerely,

Chuck Schwer, Supervisor
Sites Management Section

CC: Brian Mitofsky

CBS/petro/Bethany.wkp

ATTACHMENT 2
Monitoring Well Logs

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

DRILLING LOG
WELL # MW-2

Project: The Bethany Church
 Location: Montpelier, Vermont
 Job # 1-0284-2
 Logged By: L. Hinckley
 Date Drilled: 3/25/94
 Driller: Tristate
 Drill Method: Hollow Stem Auger
 (4.25" D.I.)

Casing Type: PVC
 Casing Diameter: 2.0 in.
 Casing Length: 4.7 ft.
 Screen Type: Factory Slotted
 Screen Diameter: 2.0 in.
 Screen Length: 10.0 ft.
 Slot Size: .01"

Total Pipe: 14.7 ft.
 Stick Up: -0.4 ft.
 Total Hole Depth: 15.0 ft.
 Well Guard Length: 1.2 ft.
 Initial Water Level: 9.02' BGS
 Surface Elevation: -
 T.O.C. Elevation: 522.94

█ = Sampled Interval

Sheet 1 of 1

Depth (feet)	Well Construction	Notes	Geology	PID Reading	Description
5					
4					
3					
2					
1					
0					
0.3'	Well Guard				
0.3'-1.2'	Cement				
1.2'-2.3'	Backfill			0.0/0.0	0.3'-2.3': 3,3,2,3 24" recovery;
2.3'-4.0'	Bentonite				0"-4": brown coarse sand w/ debris, brick, some stones (50mm). 4"-16": brown fine sand and silt w/ trace slate frags. 16"-18": fine and medium sand w/ stones (10-65mm). 18"-24": brown medium sand well-sorted, fill.
4.0'-5.0'					
5.0'					
5.0'-7.0'				0.0/1.0ppm	5.0'-7.0'bgs 2,2,1,2 22" recovery;
7.0'-8.0'					0"-2": moist br. coarse sand. 2"-6": light brown silt and fine sand w/ brick fragments. 6"-22": brown well-sorted fine sand, wood fiber, fill.
8.0'					
9.0'					
9.02'					
10.0'					
10.0'-12.0'	Sand Pack				
12.0'-15.0'	Screen			0/1.0ppm	10.0-12.0'bgs; 8,15,10,17 15" recovery;
15.0'-17.0'					0"-8": coarse sand w/ pebbles (~40 mm). 8"-15": grey medium to coarse sand w/ some pebbles, (10-40 mm) damp, 25-60 mm orange mottles, w/ black coarse sand centers, damp.
17.0'	Backfill			0.0/1.0ppm	15.0-17.0'bgs; 8,4,5,6 10" recovery;
					0'-6": grey coarse sand and gravel w/ some sand, some stones, and trace silt, saturated. 6"-10": grey coarse sand and gravel matrix, with some silt, loose, saturated.

* Groundwater level measure on 4/13/94.

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

DRILLING LOG
WELL # MW-3

Project: The Bethany Church
 Location: Montpelier, Vermont
 Job # 1-0284-2
 Logged By: L. Hinckley
 Date Drilled: 3/25/94
 Driller: Tristate
 Drill Method: Hollow Stem Auger
 (4.25" I.D.)

Casing Type: PVC
 Casing Diameter: 2.0 in.
 Casing Length: 3.2 ft.
 Screen Type: Factory Slotted
 Screen Diameter: 2.0 in.
 Screen Length: 5.0 ft.
 Slot Size: .01"

Total Pipe: 8.2 ft.
 Stick Up: -0.8 ft.
 Total Hole Depth: 9.0 ft.
 Well Guard Length: 1.2 ft.
 Initial Water Level: 5.88' BGS
 Surface Elevation: -
 T.O.C. Elevation: 523.03

█ = Sampled Interval

Sheet 1 of 1

Depth (feet)	Well Construction	Notes	Geology	PID Reading	Description
5					
4					
3					
2					
1					
0	Well Guard				
	Cement				
1					0.5'-2.5'bgs; 8,16,15,15 recovery 20";
2	Bentonite			0.0/3.0ppm	0"-12": sand and silt fill w/ brick and debris, fill, wet. 12"-20": light brown well-sorted medium sand, frozen at 16".
3					
4					
5					
6	Sand Pack			.1/1.8ppm	5.0'-7.0'bgs 2,2,2,2 recovery 22"; greyish light brown medium sand w/ some fine sand, mottles @ ~7.0'bgs. (Some stones in spoils, ~40mm), moist.
7	Screen				
8				.1/2.7ppm	7.0'-9.0'bgs; 12,15,18,2 14" recovery; 0"-8": is chloritic schist. 8"-14": orangish brown medium sand w/ trace silt, no pebbles, damp.
9	Bentonite				
10				.1/2.1ppm	
11					9.0'-11.0'bgs; 2,2,2,3 16" recovery; 0"-4": grey medium and coarse sand, wet. 4"-8": pebbly gravel, wet. 8"-16": brown-grey medium and coarse sand, saturated. Drilled to 10', plugged hole w/ bentonite to 9' bgs.
12					
13					
14					
15					
16					
17					

* Groundwater level measured on 4/13/94.

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

DRILLING LOG
WELL # MW-4

Project: The Bethany Church
 Location: Montpelier, Vermont
 Job # 1-0284-2
 Logged By: L. Hinckley
 Date Drilled: 3/25/94
 Driller: Tristate
 Drill Method: Hollow Stem Auger

Casing Type: PVC
 Casing Diameter: 2.0 in.
 Casing Length: 4.7 ft.
 Screen Type: Factory Slotted
 Screen Diameter: 2.0 in.
 Screen Length: 5 ft.
 Slot Size: .01

Total Pipe: 14.7 ft.
 Stick Up: -0.3 ft.
 Total Hole Depth: 15.0 ft.
 Well Guard Length: 1.2 ft.
 Initial Water Level: 6.99' BGS
 Surface Elevation: -
 T.O.C. Elevation: 523.47

■ = Sampled Interval

Sheet 1 of 1

Depth (feet)	Well Construction	Notes	Geology	PID Reading	Description
5					
4					
3					
2					
1					
0	Well Guard Cement				
1					Note: See MW-3 (adjacent well) for geologic descriptions 0-10 feet below ground surface.
2					
3					
4	Backfill				
5					
6					
7					
8	Bentonite				
9					
10					
11					
12	Screen Sand Pack				
13					
14					
15					15.0'-17.0'bgs: 12,7,9,11 13" recovery, 0"-1"- dark bluish black rotten muck w/some silt, wet. 1"-12": orangish brown gravel with some coarse sand w/ some stones, saturated.
16				N/A	
17					

* Groundwater level measured on 4/13/94.

ATTACHMENT 3
Water Quality Results



LABORATORY ANALYSIS

CLIENT NAME:	The Johnson Company, Inc.	REF #:	8691
ADDRESS:	100 State Street Montpelier, VT 05602	PROJECT NO.:	1-0284-2 (044)
SAMPLE LOCATION:	Bethany Church	DATE OF SAMPLE:	4/14/94
SAMPLER:	Liz Hinckley	DATE OF RECEIPT:	4/14/94
		DATE OF ANALYSIS:	4/21,4/25/94
ATTENTION:	Liz Hinckley	DATE OF REPORT:	5/2/94

Pertaining to the analyses of specimens submitted under the accompanying chain of custody form, please note the following:

- Water samples submitted for VOC analysis were preserved with HCL.
- Specimens were processed and examined according to the procedures outlined in the specified method.
- Holding times were honored.
- Instruments were appropriately tuned and calibrations were checked with the frequencies required in the specified method.
- Blank contamination was not observed at levels interfering with the analytical results.
- Continuing calibration standards were monitored at intervals indicated in the specified method. The resulting analytical precision and accuracy were determined to be within method QA/QC acceptance limits.
- The inferred efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analytes to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

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:	1-0284-2 (044)
PROJECT NAME:	Bethany Church	REF.#:	8,691
REPORT DATE:	May 2, 1994	STATION:	MW-1
DATE SAMPLED:	April 14, 1994	TIME SAMPLED:	09:34
DATE RECEIVED:	April 14, 1994	SAMPLER:	Liz Hinckley
ANALYSIS DATE:	April 21, 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: 96%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	The Johnson Company, Inc.	PROJECT CODE:	1-0284-2 (044)
PROJECT NAME:	Bethany Church	REF.#:	8,691
REPORT DATE:	May 2, 1994	STATION:	MW-2
DATE SAMPLED:	April 14, 1994	TIME SAMPLED:	10:05
DATE RECEIVED:	April 14, 1994	SAMPLER:	Liz Hinckley
ANALYSIS DATE:	April 21, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Conc. ($\mu\text{g/L}$)
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: 97%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	The Johnson Company, Inc.	PROJECT CODE:	1-0284-2 (044)
PROJECT NAME:	Bethany Church	REF.#:	8,691
REPORT DATE:	May 2, 1994	STATION:	MW-3
DATE SAMPLED:	April 14, 1994	TIME SAMPLED:	11:24
DATE RECEIVED:	April 14, 1994	SAMPLER:	Liz Hinckley
ANALYSIS DATE:	April 21, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Conc. ($\mu\text{g/L}$)
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: 98%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	The Johnson Company, Inc.	PROJECT CODE:	1-0284-2 (044)
PROJECT NAME:	Bethany Church	REF.#:	8,691
REPORT DATE:	May 2, 1994	STATION:	MW-4
DATE SAMPLED:	April 14, 1994	TIME SAMPLED:	11:54
DATE RECEIVED:	April 14, 1994	SAMPLER:	Liz Hinckley
ANALYSIS DATE:	April 21, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	40
Toluene	1	2
Ethylbenzene	1	21
m+p-Xylene	2	75
o-Xylene	1	39
Chlorobenzene	1	BPQL
1,2-Dichlorobenzene	1	BPQL
1,3-Dichlorobenzene	1	BPQL
1,4-Dichlorobenzene	1	BPQL
MTBE	1	10

Surrogate % Recovery: 99%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	The Johnson Company, Inc.	PROJECT CODE:	1-0284-2 (044)
PROJECT NAME:	Bethany Church	REF.#:	8,691
REPORT DATE:	May 2, 1994	STATION:	Net-1
DATE SAMPLED:	April 14, 1994	TIME SAMPLED:	12:42
DATE RECEIVED:	April 14, 1994	SAMPLER:	Liz Hinckley
ANALYSIS DATE:	April 21, 25 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
m+p-Xylene	2	3*
o-Xylene	1	3*
Chlorobenzene	1	BPQL
1,2-Dichlorobenzene	1	BPQL
1,3-Dichlorobenzene	1	BPQL
1,4-Dichlorobenzene	1	BPQL
MTBE	1	9*

Surrogate % Recovery: 96%

BPQL = Below Practical Quantitation Limit (PQL).

*Note: These represent the average results of two replicate analyses.



LABORATORY REPORT

EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	The Johnson Company, Inc.	PROJECT CODE:	1-0284-2 (044)
PROJECT NAME:	Bethany Church	REF.#:	8,691
REPORT DATE:	May 2, 1994	STATION:	Net-3
DATE SAMPLED:	April 14, 1994	TIME SAMPLED:	10:47
DATE RECEIVED:	April 14, 1994	SAMPLER:	Liz Hinckley
ANALYSIS DATE:	April 21, 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: 98%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	The Johnson Company, Inc.	PROJECT CODE:	1-0284-2 (044)
PROJECT NAME:	Bethany Church	REF.#:	8,691
REPORT DATE:	May 2, 1994	STATION:	Trip Blank
DATE SAMPLED:	April 14, 1994	TIME SAMPLED:	not given
DATE RECEIVED:	April 14, 1994	SAMPLER:	Liz Hinckley
ANALYSIS DATE:	April 21, 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: 97%

BPQL = Below Practical Quantitation Limit (PQL).



1-0284-2
Liz
RECEIVED
MAY 13 1994
THE JOHNSON CO., INC.
MONTPELIER, VERMONT

LABORATORY ANALYSIS

CLIENT NAME:	The Johnson Company, Inc.	REF #:	8691
ADDRESS:	100 State Street Montpelier, VT 05602	PROJECT NO.:	1-0284-2 (044)
SAMPLE LOCATION:	Bethany Church	DATE OF SAMPLE:	4/14/94
SAMPLER:	Liz Hinckley	DATE OF RECEIPT:	4/14/94
		DATE OF ANALYSIS:	4/21/94
ATTENTION:	Liz Hinckley	DATE OF REPORT:	5/10/94

TOTAL PETROLEUM HYDROCARBONS by Capillary GC/MS (modified volatile method 8015)

Sample	TPH (mg/L)	PQL (mg/L)
MW-1	BPQL	0.5
MW-2	BPQL	0.5
MW-3	BPQL	0.5
MW-4	1.1	0.5
Net-1	BPQL	0.5
Net-3	BPQL	0.5

BPQL = Below Practical Quantitation Limit

Reviewed by:

Brendan McMahon, Ph.D.
Director, Chemical Services

CHAIN OF CUSTODY RECORD

No. 1248

Client/Project Name Bethany Church			Project Location Montpelier, VT			ANALYSES			8691					
Project No. 1-0284-2 (044)			Field Logbook No. LPH-001 and 1-0284-2 notes: hydra-007									VOC / BOD (STEX) report mtab Modified 8/15		
Sampler: (Signature) 			Chain of Custody Tape No.											
Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample							REMARKS			
✓ MW-1	4/14/94	9:34		groundwater	X	X								
✓ MW-2	4/14/94	10:05		"	X	X								
✓ Net-3	4/14/94	10:47		"	X	X								
✓ MW-3	4/14/94	11:24		"	X	X								
✓ MW-4	4/14/94	11:54		"	X	X								
✓ Net-1	4/14/94	12:42		"	X	X								
Trip Blank					X									
Relinquished by: (Signature) 				Date	Time	Received by: (Signature)				Date	Time			
Relinquished by: (Signature) Lina Jordan				Date	Time	Received by: (Signature)				Date	Time			
Relinquished by: (Signature)				Date	Time	Received for Laboratory: (Signature)				Date	Time			
Sample Disposal Method:				Disposed of by: (Signature)				Date	Time					
SAMPLE COLLECTOR				ANALYTICAL LABORATORY										
5 State Street Montpelier, VT 05602 (802) 229-4600 Fax: (802) 229-5876 THE JOHNSON COMPANY, INC. Environmental Sciences and Engineering														