Norwich University Power Plant
Site Investigation - Underground Storage Tanks

Norwich University Military College of Vermont
Northfield, Vermont

February 1995

Prepared for:

NORWICH UNIVERSITY
Route 12
Northfield, Vermont

Prepared by:

THE JOHNSON COMPANY, INC.
100 State Street, Suite 600
Montpelier, Vermont 05602
(802) 229-4600

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EXECUTIVE SUMMARY

During an assessment of the Norwich University underground storage tanks (USTs) conducted by The Johnson Company in August 1994, soil contamination was detected around the two 30,000-gallon #6 fuel oil USTs at the Northfield campus Power Plant.

An investigation was requested by the Vermont Department of Environmental Conservation Sites Management Section (SMS) to determine the extent of contamination to the site soils and groundwater. This investigation was carried out by The Johnson Company on January 13, 1995.

A tracer test of tank integrity was completed on both USTs by Eastern Analytical, Inc. of Concord, New Hampshire in November and December, 1994. Both USTs were determined to be free of leaks exceeding 0.05 gallons per hour with a 97% probability of detection, according to Eastern Analytical.

One soil boring, located approximately 75 feet west of the USTs, was completed to bedrock at approximately 49 feet below the ground surface (bgs). Photoionization detector (PID) screening of soil samples collected at 5 foot intervals in this boring indicated that the soils at this location are not contaminated by organic compounds. No groundwater was encountered in this boring. A sample of wet soil was collected from the bottom of this boring. The sample was analyzed at MicroAssays of Vermont laboratory in Middlesex, Vermont, using EPA Method 8020 for aromatic hydrocarbons and using modified EPA Method 8100 for total petroleum hydrocarbons. The laboratory reported that no contaminants were detected in this sample above the practical quantitation limits.

A second soil boring was completed approximately five feet west of the USTs. Contaminated soils, as indicated by PID headspace screening, were encountered in this boring. The highest PID reading was 185.6 parts per million (ppm) at 15 to 17 feet bgs. No PID evidence of soil contamination was seen at 25 to 27 feet bgs, indicating that this contamination had not migrated downward to the seasonal high water table. A soil sample was collected from 30 to 32 feet bgs, and was analyzed using the same methods as the sample from the previous boring. No contaminants were reported above the practical quantitation limits in this sample.

An assessment of potential sensitive receptors of the site contamination determined that the site contamination does not threaten any water supply wells, surface waters, wetlands or basements of buildings.

Based on the results of this investigation, The Johnson Company recommends that site be placed on Site Monitoring Activity Completed status by the SMS.

1.0 INTRODUCTION

In September 1994, The Johnson Company prepared a report that outlined the results of an assessment of several of Norwich University's underground storage tanks (USTs). During these assessments, soil contamination was detected around the two 30,000-gallon #6 fuel oil USTs at the Northfield campus Power Plant. (See Figure 1, Site Location Map.) The assessment report recommended that these two 30,000-gallon USTs be integrity tested to determine whether the contamination detected in the soils is due to leaking that occurred prior to when the USTs were lined with cement several years ago, or if the USTs are continuing to leak.

As a result of this recommendation, the USTs were tested by Eastern Analytical, Inc. from Concord, New Hampshire, using a tracer test method, whereby the USTs were inoculated with a highly volatile, non-hazardous material. The soil vapors around the USTs were later sampled for the presence of the inoculating compound. The results of the tank integrity testing were positive for both USTs, meaning that both tanks were found to be free of leaks in excess of 0.05 gallons per hour with a 97% probability of detection. Eastern Analytical's report for this testing is included as Appendix A.

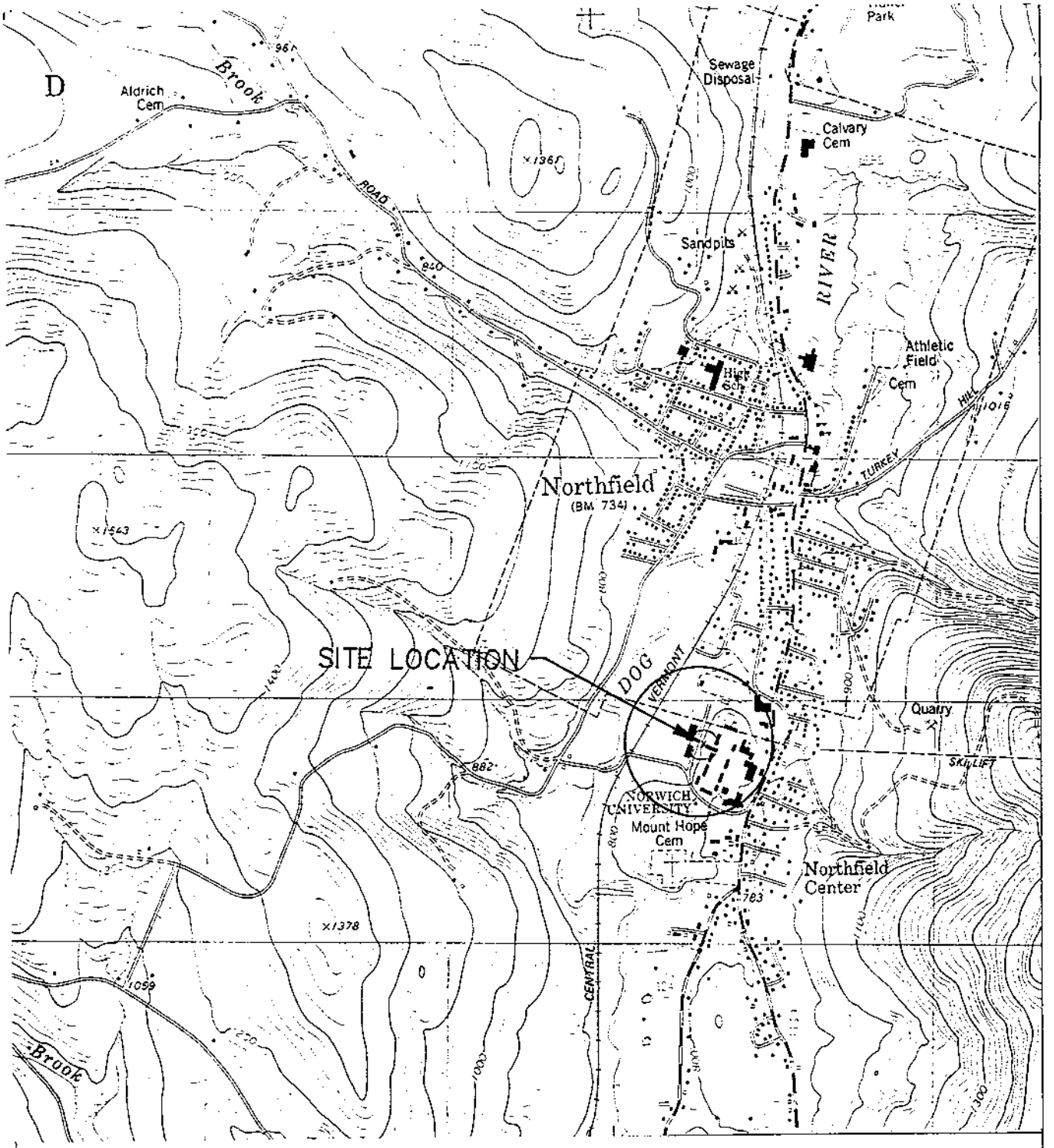
The Vermont Department of Environmental Conservation Sites Management Section (SMS) requested that the area around the USTs be further investigated to:

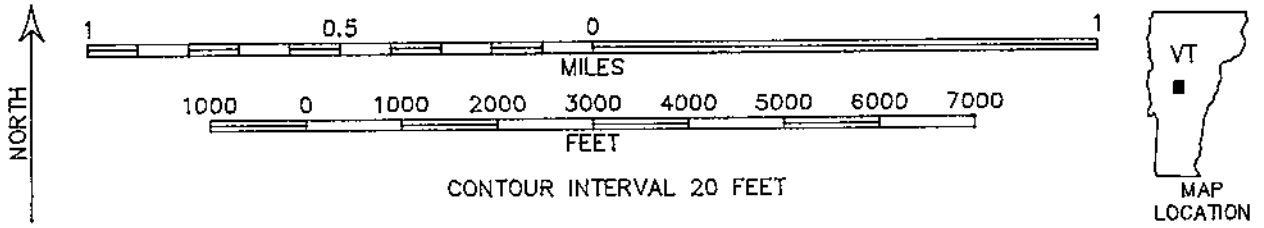
- determine the degree and extent of the soil contamination,
- determine the degree and extent of contamination, to groundwater,
- determine the potential for sensitive receptors to be impacted by the contamination,
- determine the need for a long term treatment and/or monitoring plan.

The soil and groundwater investigation at the Norwich University Power Plant was conducted by The Johnson Company on January 13, 1995. Drilling services were provided by Tri-State Drilling and Boring of West Burke, Vermont. Laboratory analytical services were provided by MicroAssays of Vermont laboratory of Middlesex, Vermont. The work plan for this investigation was approved by Richard Spiese, Acting Supervisor of the SMS. SMS approval was required because the site is listed by the SMS as an Active Hazardous Waste Site, due to the documented soil contamination around the USTs.

2.0 SITE INVESTIGATION

The work plan for this soil and groundwater investigation included advancement of three soil borings, installation of three groundwater monitoring wells, soil sampling in each boring, sampling and laboratory analysis of groundwater, and preparation of a report detailing the results of the investigation,





BASE MAP : USGS 7.5 Minute Topographic Quadrangle: Northfield, Vermont (1980).

FIGURE 1 : Site Location Map
Norwich University
Power Plant Site Investigation
Northfield, Vermont

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

with recommendations regarding further investigative work, if the data makes further investigation necessary. However, due to the site conditions encountered, the work that was carried out for this investigation was significantly different than the original work plan.

Soil boring 1 (SB-1) was completed approximately 75 feet west of the USTs (see Figure 2, Site Sketch). This boring was completed to a depth of 47 feet below the ground surface (bgs) where bedrock was encountered. The hollow-stem auger was advanced 2 feet into the bedrock, for a total boring depth of 49 feet bgs. Soil samples were collected at 5-foot intervals from SB-1 and were screened with a photoionization detector (PID) using a plastic bag headspace method. PID headspace readings for all soil samples from SB-1 were 0.0 parts per million (ppm). No evidence of contamination was seen in any sample from SB-1. Groundwater was not encountered in SB-1, however, the soils were wet for approximately 4 inches above bedrock. A sample of this wet soil was collected for laboratory analysis for aromatic hydrocarbons (including BTEX and MTBE) using EPA Method 8020 and for total petroleum hydrocarbons using modified EPA Method 8100. The laboratory reported that none of the analytes for these methods were detected in this soil sample. The laboratory report is included as Appendix B.

The auger was left in place in SB-1 for approximately 45 minutes, on the expectation that groundwater might enter the boring and allow us to install a groundwater monitoring well for groundwater sample collection. No groundwater entered the boring during this period of time, so a groundwater monitoring well was not installed.

Prior to removing the auger from this boring, we notified the SMS of the need to modify the work plan due to the site conditions encountered. Charles Schwer, Acting Chief of the SMS, verbally approved of the following modification to the SI. Instead of installing groundwater monitoring wells on the site, we completed SB-1 as described above and completed a second boring, SB-2, in close proximity to the USTs, as shown on Figure 2. This boring was completed to a depth below the site contamination (as detected with a PID), and a sample of unsaturated soil was collected for laboratory analysis. The [redacted] The soil sample PID headspace screening of the soil samples from [redacted] rovided the following results:

5 to 7 feet bgs	0.0 ppm
10 to 12 feet bgs	55.3 ppm
[redacted]	[redacted]
20 to 22 feet bgs	5.4 ppm
[redacted]	[redacted]
30 to 32 feet bgs	0.0 ppm

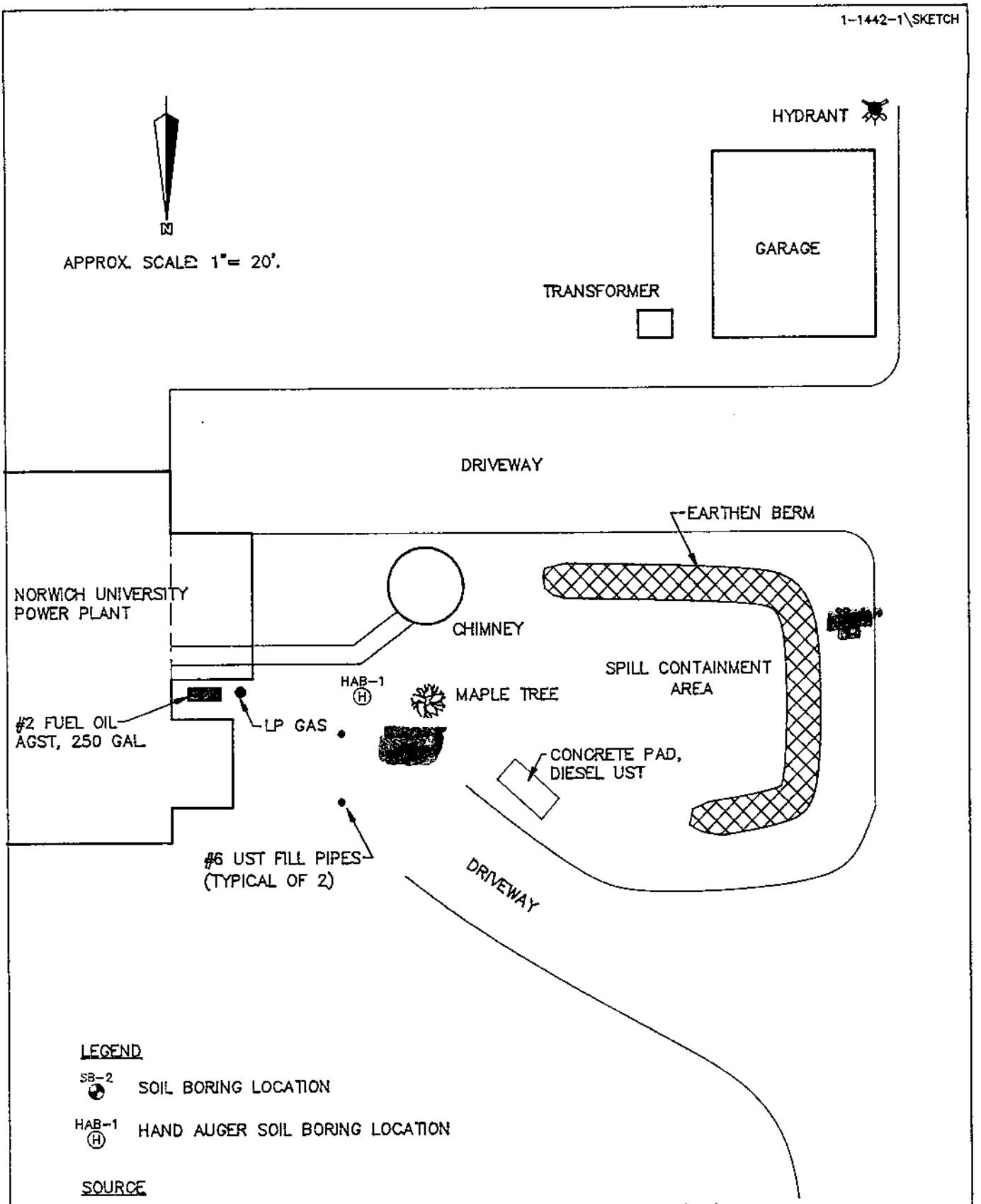


FIGURE 2 – SITE SKETCH
NORWICH UNIVERSITY POWER PLANT
NORTHFIELD, VERMONT

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

The soil samples from 10 to 12 feet bgs and 15 to 17 feet bgs were visibly blackened, apparently by fuel oil, and produced a strong odor of oil.

The reported results of the laboratory analysis of the soil sample collected from SB-2 at 30 to 32 feet bgs were the same as for the sample from SB-1, no contaminants were detected. (See Appendix B.)

Similar findings were made during the initial assessment of these USTs, conducted in August 1994. PID headspace screening of soil samples from the hand auger boring completed slightly south of the USTs showed that soil contamination was evident at approximately six feet bgs, and that the magnitude of this contamination increased in concentration to 129.4 ppm at approximately 11 feet bgs. By 13 feet bgs, the concentration of vapors in the soils had decreased to 51 ppm; and the black soil discoloration in this boring which was noted at approximately 7 feet bgs had ceased to be present by approximately 12.5 feet bgs.

3.0 CONCLUSIONS

Based on the results of this investigation, The Johnson Company concludes that the soil contamination that is present around the 30,000-gallon #6 fuel oil USTs at the Norwich University Power Plant is of limited extent, and is not likely to be impacting the groundwater. This conclusion is based on the fact that borings in close proximity to the USTs have shown that the depth of soil contamination is generally limited to the upper 20 feet of soil or less. The groundwater in this area appears to be in the bedrock at depths greater than 45 feet bgs. This buffer of 20 to 30 feet of uncontaminated soils minimizes the risk of groundwater contamination in this area.

The tracer integrity testing of the USTs that was conducted by Eastern Analytical has demonstrated with a high probability that the release of fuel oil into the soils around the USTs either occurred as a past leak that was remedied when the USTs were lined with concrete, or from past surface spills. The results of the integrity testing indicate that the USTs are not likely to be currently releasing fuel oil into the Site soils at a rate greater than 0.05 gallons per hour.

There are no sensitive receptors near this area that are at risk of impact from the soil contamination around these USTs. The buildings on the campus are served by the Northfield municipal water system. There are no nearby surface waters or wetlands. There are no potential receptors of atmospheric contamination, such as building basements, in proximity to the soil contamination on the site.

4.0 RECOMMENDATIONS

The Johnson Company recommends that this Site be placed on Site Management Activity Completed status. We do not believe that the site conditions require any further investigation or evaluation.

5.0 LIMITATIONS

The conclusions and recommendations presented in this report were arrived at through consideration of the findings of this investigation as presented herein. Consideration was given to the information gathered during the Site Investigation, the field screening results of environmental samples, and through interpretation of laboratory analytical data. A diligent effort was made to identify areas of concern that may have been indicated from the conditions described above.

This Site Investigation was based on sound scientific investigative techniques and experience with similar investigations. However, the conclusions and recommendations of this investigation are limited by the sources of data, as stated above, and the conclusions and recommendations must be considered within this context. The status of the Site may change, and additional information may become available in the future which will require modification or updating of the conclusions and recommendations presented here. If conditions are found to vary from those presented here, supplemental conclusions and recommendations may be warranted.

Appendix A

Integrity Testing Report
Eastern Analytical, Inc.

Eastern Analytical, Inc. 130 Hall St., Concord, NH 03301 (603) 228-0525

1/4/95

Brad Wheeler
The Johnson Company
100 State St.
Montpelier, VT 05602

Subject: Integrity Test of
2 Underground Storage Tanks
at
Norwich University
Powerhouse
Northfield, VT

December 22, 1994

Dear Brad,

Enclosed please find a complete report of our findings, including a site map, of the above identified facility.

Unless otherwise agreed to, you are responsible to file a copy of the report with the appropriate regulatory agencies.

If you have questions regarding this work, please do not hesitate to call me. We appreciate the opportunity to be of service to you, and look forward to your continued patronage.

Sincerely,

Robert Faulkner, Jr.
Manager, Field Service Div.

encl

INTRODUCTION

EAFSD and Tracer Research Corporation performed Tracer Tight® leak testing of 2 underground storage tanks at the Norwich University Power House site in Northfield, VT. The tanks were inoculated with tracer on October 26, 1994. Samples were collected on November 11, 1994 with sample vacuums of 2-6 inches Hg. The following table shows the tank size, type of tracer in each tank, and the product through put factor in the first 72 hours after inoculation.

SYSTEM#	SIZE	TRACER	FACTOR
Tank 1	30,000	A	1
Tank 2	30,000	C	1

The following table shows the type of product in the tank, the product level and the water level in each tank measured in inches at time of inoculation and sampling.

		AT INOCULATION		AT SAMPLING	
SYSTEM#	PRODUCT	H_2O	PRODUCT	H_2O	PRODUCT
Tank 1	#6 Fuel Oil	0.00	87.00	0.00	72.00
Tank 2	#6 Fuel Oil	0.00	75.00	0.00	75.00

The depth to water in the tank pit was determined to be >9 feet below grade.

CERTIFICATION

Job Number : 94-9310-31

Date : November 16, 1994

Location: Norwich University Power House
Rte. #12
Northfield, VT 05663

SYSTEM#	PRODUCT	SIZE	TRACER	LEAK STATUS *TANK*	*LINE*
Tank 1	#6 Fuel Oil	30,000	A	Pass	N/A
Tank 2	#6 Fuel Oil	30,000	C	Incl *	N/A

* Tank 2 Inconclusive, product not heated to liquid state.

Tracer Research Corporation certifies that the tanks and product distribution lines listed in the above table have been tested by means of Tracer Tight®, which meets the criteria set forth in NFPA 329 for a precision leak test. According to EPA standard test procedures for evaluating leak detection methods, the Tracer Tight® method is capable of detecting leaks of 0.05 gallons per hour with a Probability of Detection (P_D) of 0.97 and Probability of False Alarm (P_{FA}) of 0.029.

Submitted by:

Michael S. Nolan
Tracer Research Corporation

Testers State License Number: N/A

The following criteria are used for the classification of leakage based on the presence or absence of tracer.

PASS	FAIL
Criteria:	Criteria:
No tracer detected	tracer detected

Tracer Research Corporation

TRACER TIGHT® TEST RESULTS

Prepared for:

EAFSD
128 Hall Street
Concord, NH 03301
Testers St. Lic. No: N/A

12/22/94

Job No: 94-9310a31
Norwich University
Rte. 12
Northfield, VT 05663

SYSTEM#	PRODUCT	SIZE	TRACER	LEAK STATUS TANK	LEAK STATUS LINE
Tank 2	#6 Fuel Oil	30,000	R	Pass	N/A

Site vacuum readings are: 2-5 inches Hg

SYSTEM#	AT INOCULATION 12/02/94 H_2O (in)	AT INOCULATION 12/02/94 PROD (in)	AT SAMPLING 12/16/94 H_2O (in)	AT SAMPLING 12/16/94 PROD (in)	DEPTH FROM GRADE TO WATER TABLE (in)	DEPTH FROM GRADE TO TANK BOTTOM (in)
Tank 2	0.00	81.00	0.00	70.00	>108	144

Submitted by:

Michael S. Nolan
Tracer Research Corporation

Tracer Research Job No. 94-9310-31

11/16/94 CONDENSED DATA

Location	Compound	Concentration
001-5	A	0.0000
001-5	C	0.0000
002-5	A	0.0000
002-5	C	0.0000
003-5	A	0.0000
003-5	C	0.0000
004-5	A	0.0000
004-5	C	0.0000
005-5	A	0.0000
005-5	C	0.0000
006-5	A	0.0000
006-5	C	0.0000
007-5	A	0.0000
007-5	C	0.0000
008-5	A	0.0000
008-5	C	0.0000
009-5	A	0.0000
009-5	C	0.0000

0.0000 = Not detected
-99999999999 = No sample

Tracer Research Job No. 94-9310-31

11/16/94 CONDENSED DATA

Location	Compound	Concentration
BLANK01	A	0.0000
BLANK01	C	0.0000

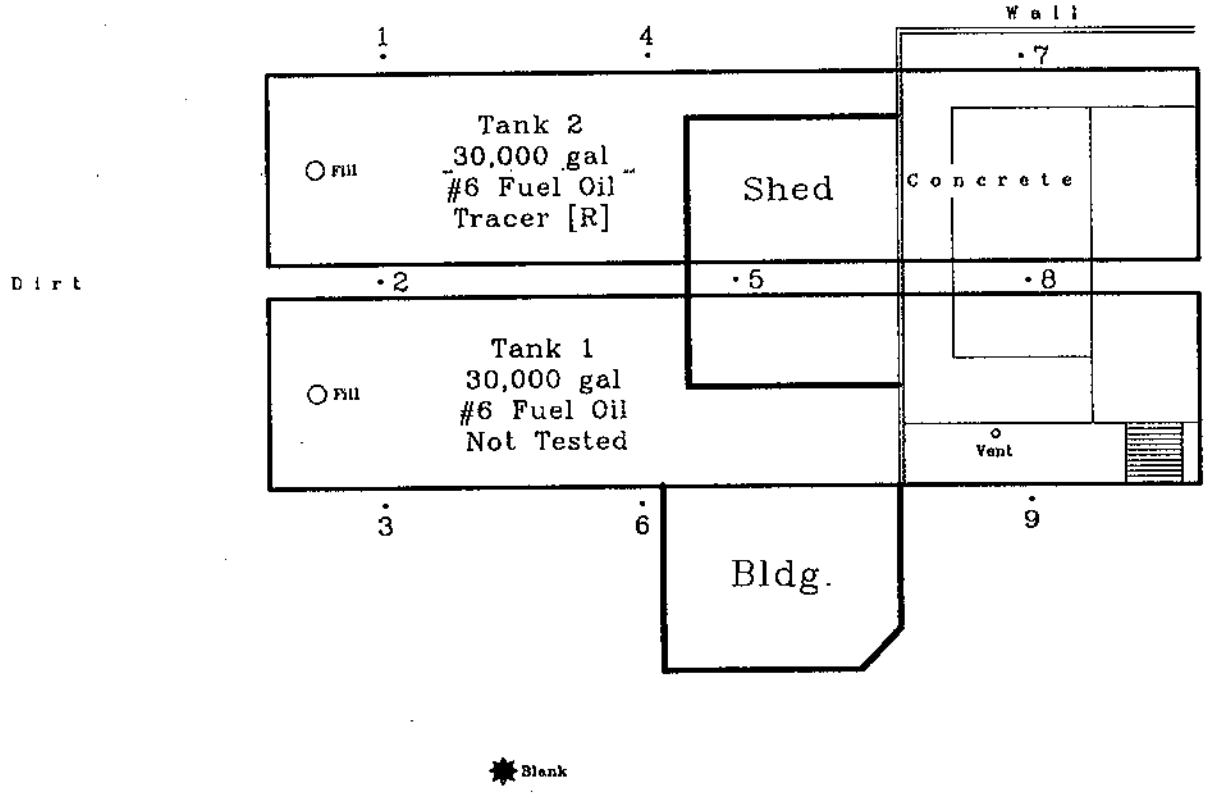
0.0000 = Not detected
-99999999999 = No sample

Tracer Research Job No. 94-9310a31

12/22/94 CONDENSED DATA

Location	Compound	Concentration
001	R	0.0000
002	R	0.0000
004	R	0.0000
005	R	0.0000
007	R	0.0000
008	R	0.0000
BLANK01	R	0.0000

0.0000 = Not detected
-99999999999 = No sample



94-9310a31

EXPLANATION

•1 Sampling Probe Location

------- Approximate Pipeline Location

N

0 5 10

feet

NORWICH UNIVERSITY POWER HOUSE

RTE. #12
NORTHFIELD, VERMONT 05663

SAMPLING LOCATIONS

Figure 1

CONCEPT OF OPERATION AND IMPLEMENTATION

The tracer leak detection method relies upon the addition of a highly volatile liquid chemical to the product in a storage system. If a leak occurs in the storage system, the tracer labeled product is released. Tracer escapes from the product by vaporization and disperses by molecular diffusion. Various means are used to sample the vapors in the immediate vicinity of the storage systems and associated piping. Each probe should detect a leak anywhere within the area described by the 10 foot radius around a probe. The process of leak detection by placing a liquid or gas tracer in a liquid product followed by detection of the tracer underground in the vapor phase is protected under *TRACER* patents.

WATER INGRESS

The detection of water ingress relies on measurements of the level of water in a storage system. The water level is measured by placing water indicating paste on the lower end of a stick used to measure the product level. The minimum required waiting period between water level measurements is the time required for a 0.1 gph ingress or the inward leakage of water to produce a change in the water level of 0.25 inches. The typical waiting period between measurements is 14-30 days as part of the Tracer Tight® test. Tanks greater than 60,000 gallons require a longer waiting period than the minimum 14 days.

TVHC

If requested, total volatile hydrocarbon (TVHC) concentrations are measured to give additional information about site conditions. The TVHC data provide information about the severity of the leakage, and the degree of any possible environmental damage that may have occurred. The TVHC data is not used as a criterion factor to determine the status of a particular storage system and is provided as supplemental information only.

LEAK DETECTION CRITERIA

The classification of leakage is based on the presence or absence of tracer.

PASS: NO Tracer Detected or Water Level Change < 0.25 inches.

FAIL: Tracer Detected or Water Level Change ≥ 0.25 inches.

Results of U.S. EPA Standard Evaluation

Nonvolumetric Tank Tightness Testing Method

This form tells whether the tank tightness testing method described below complies with the performance requirements of the federal underground storage tank regulation. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA "Standard Test Procedure for Evaluating Leak Detection Methods: Nonvolumetric Tank Tightness Testing Methods." The full evaluation report also includes a form describing the method and a form summarizing the test data.

Tank owners using this leak detection system should keep this form on file to prove compliance with the federal regulations. Tank owners should check with State and local agencies to make sure this form satisfies their requirements.

Method Description

Name Tracer Tight®

Version

Vendor Tracer Research Corporation

(address) 3855 North Business Center Drive

(city) Tucson (state) Arizona (zip) 85705 (phone) 602/888-9400

Evaluation Results

This method, which declares a tank to be leaking when tracer is detected outside the tank at concentrations greater than 3×10^{-5} times the tracer concentration in the tank has an estimated probability of false alarms [P(FA)] of a 0.0 % based on the test results of 0 false alarms out of 22 tests. A 95% confidence interval for P(FA) is from 0 % to 13 %

The corresponding probability of detection [P(D)] of a 0.05 gallon per hour leak is 100 % based on the test results of 45 detections out of 45 simulated leak tests. A 95% confidence interval for P(D) is from 92.4 % to 100 %

The corresponding probability of detection [P(D)] of a 0.1 gallon per hour leak is 100 % based on the test results of 93 detections out of 93 simulated leak tests. A 95% confidence interval for P(D) is from 96.2 % to 100 %

Does this method use additional modes of leak detection? ☒ Yes ☐ No If Yes, complete additional evaluation results on page 3 of this form.

Based on the results above, and on page 3 if applicable, this method ☒ does ☐ does not meet the federal performance standards established by the U.S. Environmental Protection Agency (0.10 gallon per hour at P(D) of 95% and P(FA) of 5%).

Test Conditions During Evaluation

The evaluation testing was conducted outside a 55 -gallon ☒ steel ☐ fiberglass tank that was 22 inches in diameter and 34 inches long, installed in silty clay native soil backfill.

The ground-water level was 0 inches above the bottom of the tank.

Test Conditions During Evaluation (continued)

The tests were conducted with the tank 38/0.0 percent full.

The temperature difference between product added to fill the tank and product already in the tank ranged from NA °F to NA °F,
with a standard deviation of NA °F.

The product used in the evaluation was regular leaded gasoline

This method may be affected by other sources of interference. List these interferences below and give the ranges of conditions under which the evaluation was done. (Check None if not applicable.)

☒ None

Interferences	Range of Test Conditions

Limitations on the Results

The performance estimates above are only valid when:

- The method has not been substantially changed.
- The vendors instructions for using the method are followed.
- The tank contains a product identified on the method description form.
- The tank capacity is NA gallons or smaller. *NO SIZE LIMITATION*
- The difference between added and in-tank product temperatures is no greater than + or - NA degrees Fahrenheit.

☒ Check if applicable:

Temperature is not a factor because Tracer Tight is an external leak detection method

- The waiting time between the end of filling the test tank and the start of the test data colleciton is at least NA hours.
- The waiting time between the end of "topping off" to final testing level and the start of the test data collection is at least NA hours.
- The total data collection time for the test is at least NA hours.
- The product volume in the tank during testing is NA % full.
- This method ☒ can ☐ cannot be used if the ground-water level is above the bottom of the tank.

Other limitations specified by the vendor or determined during testing:

Soil must be permeable enough to yield at least 0.15 cfm of air through a 3/4" nominal diameter probe under a vacuum of 15" of Hg.

Nonvolumetric TTT Method Tracer Tight®
Version

>Safety disclaimer: This test procedure only addresses the issue of the methods ability to detect leaks. It does not test the equipment for safety hazards.

Additional Evaluation Results (if applicable)

This method, which declares a tank to be leaking when water ingress is detected has an estimated probability of false alarms [P(FA)] of N/A % based on the test results of false alarms out of N/A tests. Note: A perfect score during testing does not mean that the method is perfect. Based on the observed results, a 95% confidence interval for P(FA) is from 0 % to N/A %.

The corresponding probability of detetecton [P(D)] of a N/A gallon per hour leak is N/A % based on the test results of N/A detections out of N/A simulated leak tests. Note: A perfect score during testing does not mean that the method is perfect. Based on the observed results, a 95% confidence interval for P(D) is from N/A % to 100 %.

>Water detection mode (if applicable)

Using a false alarm rate of 0% the minimum water level that the water sensor can detect with a 100% probability of detection is 0.008 inches.

Using a false alarm rate of 5% the minimum change in water level that the water sensor can detect with a 95% probability of detection is 0.19 inches.

Based on the minimum water level and change in water level that the water sensor can detect with a false alarm rate of 5% and a 95% probability of detection, the minimum time for the system to detect an increase in water level at an incursion rate of 0.10 gallon per hour is 1836 minutes in a 75,000 - gallon tank.

Certification of Results

I certify that the nonvolumetric tank tightness testing method was installed and operated according the the vendors instructions. I also certify that the evaluation was performed according to the standard EPA test procedure for nonvolumetric tank tightness testing methods and that the results presented above are those obtained during the evaluation.

Curtis W. Bryant
(printed name)

Curtis W. Bryant
(signature)

May 20, 1992
(date)

Control Strategies Engineering
(organization performing evaluation)

12550 West Manville Road
Tucson, Arizona 85743
(city, state, zip)

(602) 682-8726
(phone number)

Appendix B

Laboratory Analytical Report
MicroAssays of Vermont

BAW
1-1442-1

RECEIVED
FEB 7 95
THE JOHNSON CO. INC
MONTPELIER, VERMONT

LABORATORY ANALYSIS

CLIENT NAME:	The Johnson Company	REF #:	10499
ADDRESS:	100 State Street Montpelier, VT 05602	PROJECT NO.:	1-1442-1
SAMPLE LOCATION:	Norwich	DATE OF SAMPLE:	1/13/95
SAMPLER:	Brad Wheeler	DATE OF RECEIPT:	1/13/95
		DATE OF ANALYSIS:	1/20/95
ATTENTION:	Brad Wheeler	DATE OF REPORT:	2/7/95

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. Soil samples were not preserved. They were kept under refrigeration until time of analysis.
- 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 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:

Denise E. Bouchard

Director, Chemical Services

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

LABORATORY REPORT

CLIENT NAME:	The Johnson Company	PROJECT CODE:	1-1442-1
PROJECT NAME:	Norwich	REF.#:	10,499
REPORT DATE:	February 7, 1995	STATION:	SB-1
DATE SAMPLED:	January 13, 1995	TIME SAMPLED:	09:30
DATE RECEIVED:	January 13, 1995	SAMPLER:	Brad Wheeler
ANALYSIS DATE:	January 20, 1995	SAMPLE TYPE:	Soil - 78% dry wt
		EXTRACTION:	Methanol (10g>20ml)

EPA METHOD 8020 ANALYTES + MTBE by METHOD 8260 (GC/MS Confirmation)

PARAMETER	PQL (µg/Kg dry wt.)	Conc. (µg/Kg dry wt.)
Benzene	26	BPQL
Toluene	26	BPQL
Ethylbenzene	26	BPQL
m+p-Xylene	52	BPQL
o-Xylene	26	BPQL
Chlorobenzene	26	BPQL
1,2-Dichlorobenzene	26	BPQL
1,3-Dichlorobenzene	26	BPQL
1,4-Dichlorobenzene	26	BPQL
MTBE	26	BPQL

Surrogate % Recovery: 94 %

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

CLIENT NAME:	The Johnson Company	PROJECT CODE:	1-1442-1
PROJECT NAME:	Norwich	REF.#:	10,499
REPORT DATE:	February 7, 1995	STATION:	SB-2
DATE SAMPLED:	January 13, 1995	TIME SAMPLED:	12:25
DATE RECEIVED:	January 13, 1995	SAMPLER:	Brad Wheeler
ANALYSIS DATE:	January 20, 1995	SAMPLE TYPE:	Soil - 97% dry wt
		EXTRACTION:	Methanol (10g>20ml)

EPA METHOD 8020 ANALYTES + MTBE by METHOD 8260 (GC/MS Confirmation)

PARAMETER	PQL (µg/Kg dry wt.)	Conc. (µg/Kg dry wt.)
Benzene	21	BPQL
Toluene	21	BPQL
Ethylbenzene	21	BPQL
m+p-Xylene	42	BPQL
o-Xylene	21	BPQL
Chlorobenzene	21	BPQL
1,2-Dichlorobenzene	21	BPQL
1,3-Dichlorobenzene	21	BPQL
1,4-Dichlorobenzene	21	BPQL
MTBE	21	BPQL

Surrogate % Recovery: 97 %

BPQL = Below Practical Quantitation Limit (PQL).

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

LABORATORY ANALYSIS

CLIENT NAME:	The Johnson Company, Inc.	REF #:	10499
ADDRESS:	100 State Street Montpelier, VT 05602	PROJECT NO.:	1-1442-1
SAMPLE LOCATION:	Norwich	DATE OF SAMPLE:	1/13/95
SAMPLER:	Brad Wheeler	DATE OF RECEIPT:	1/13/95
		DATE OF ANALYSIS:	1/20/95
ATTENTION:	Brad Wheeler	DATE OF REPORT:	2/7/95

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

Sample	PQL	TPH in mg/Kg
SB-1	1	BPQL
SB-2	1	BPQL

BPQL = Below Practical Quantitation Limit (PQL)

Reviewed by:

Denise E. Bouchard

Director, Chemical Services

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

P

CHAIN OF CUSTODY RECORD

MicroAssays of Vermont
RR# Box 5210 P.O. Box 189
Montpelier, VT 05602
Ph. (802)223-1468 Fax (802)223-8688

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MAV # 10499

CLIENT NAME: The Johnson Co.
ADDRESS: Suite 600; 100 State St.; Montpelier, VT
PROJECT NAME: Norwich
PROJECT NUMBER: 1-1442-1
PROJECT MANAGER: Brad Wheeler
SAMPLER: Brad Wheeler

ANALYSIS REQUESTED

Sample Location	Date	Time	# of cont.	pres ervd	Sample Type	8020	mod. 8100										REMARKS:
SB-1 OK	1/13/95	9:30	2	no	Soil	X	X										78% D.W.
SB-2 OK	1/13/95	12:25	2	no	Soil	X	X										97% D.W

Relinquished by:	Received by:	Date/Time	Relinquished by:	Received by:	Date/Time
Bradley H. Wheeler	K Gray	1/13/95 14:05			

Appendix C

Driller's Logs
Tri-State Drilling and Boring

BAW
1-1442.

SOIL PROBE LOG

TRI STATE
DRILLING & BORING, INC.
RFD #2, Box 113 West Burke, VT 05871
(802) 467-3125

MW #1
Norwich University
Norwich, VT

	SAMPLER	
	Continuous	
TYPE		
SIZE		
HAMMER		
FALL		

SOIL
Saturated
Wet
Moist
Damp
Slightly Damp

DATE STARTED: 01/13/95 DATE COMPLETED: 01/13/95

FOOTAGE DEPTH	BLOW COUNTS 6	12	18	24	REC		DRILLER'S NOTES & COMMENTS
5-7'	6	5	4	6	18"	Dry.	Old cinders and silty fine sand over 12' of fine and medium sand.
10-12'	4	4	3	4	17"	Moist.	Medium and fine sand with thin silt layers that are wet, sand is dry.
15-17'	4	6	8	9	20"	Dry.	Fine sand, little silt.
20-22'	7	9	11	12	20"	Dry.	Same as above.
25-27'	4	7	9	10	20"	Dry.	Same as above.
30-32'	6	7	7	8	16"	Dry.	Fine sand, some silt at bottom of sample
35-37'	4	6	9	10	20"	Dry.	Fine sand, trace of silt.
40-42'	7	8	10	11	19"	Dry.	Same as above.
45-47'	9	10	20	17	20"	Dry.	Same as above, wet at tip.
							Auger refusal at 49'. No well.

Fill to 1' below GS. Cement 1' to GS.

Project: Norwich University
Job Location: Norwich, VT
Engineer: The Johnson Company
Montpelier, VT
Inspector: Brad Wheeler

Driller: Neal S. Faulkner
Helper: Sean G. Hogan
Materials: 1 bag hole plug.

SOIL PROBE LOG

TRI STATE
DRILLING & BORING, INC.
RFD #2, Box 113 West Burke, VT 05871
(802) 467-3123

MW #2
Norwich University
Norwich, VT

	SAMPLER	SOIL
	Continuous	Saturated
TYPE	_____	Wet
SIZE	_____	Moist
HAMMER	_____	Damp
FALL	_____	Slightly Damp

DATE STARTED: 01/13/95 DATE COMPLETED: 01/13/95

FOOTAGE DEPTH	BLOW COUNTS 6	12	18	24	REC	DRILLER'S NOTES & COMMENTS
4-6'	2	1	1	1	18" Dry.	Silty fine sand.
9-11'	3	3	2	3	14" Dry.	Silty fine sand with some cinders or coal, oily smell.
14-16'	6	7	6	6	19" Dry.	Dark brown silty fine sand, oily smell.
19-21'	6	7	7	6	18" Dry.	Silty fine sand, very faint odor or no odor.
24-26'	5	5	5	5	18" Dry.	Fine sand, no odor.
29-31'	6	7	9	12	18" Dry.	Fine sand, no odor.

Fill 29' to 4' below GS.
Bentonite 4' to 2' below GS.
Fill 2' to 1' below GS.

Project: Norwich University
Job Location: Norwich, VT
Engineer: The Johnson Company
Montpelier, VT
Inspector: Brad Wheeler

Driller: Neal S. Faulkner
Helper: Sean G. Hogan
Materials: 1 bag hole plug.