

OCT 16 1992

COPY



**JAWORSKI
GEOTECH, INC.**

92-1275

October 14, 1992

Mr. Douglass R. Symmes
D. R. Symmes and Associates
119 V. A. Cut-Off Road
White River Junction, VT 05001

re: Groundwater Investigation
Hartford Woolen Company
Hartford, Vermont

Project No. V92229

Dear Mr. Symmes:

The following is our summary report concerning an evaluation of subsurface conditions at the above-referenced site. The project site is located in the Town of Hartford, Windsor County, Vermont. Jaworski Geotech, Inc. (JGI) completed an initial investigation of the site which revealed the presence of volatile organic compounds (VOCs) in July 1992. Test pits were excavated at locations shown in Figure 1. Field screening with an organic vapor meter and laboratory analysis on the excavated soils indicated the presence of petroleum hydrocarbons in the vicinity of the former underground storage tanks (USTs). Additional results and details of that work were presented in our report of August 11, 1992, which has not been duplicated herein. This report is subject to the attached Limitations.

The State of Vermont had expressed its concern regarding potential groundwater contamination at the site in a letter to you from the Hazardous Materials Management Division (HMMD) dated August 19, 1992. In their letter, the HMMD requested the installation of monitoring wells, the preparation of a groundwater contour plan and the identification of sensitive receptors, such as drinking water wells, in the area.

SUBSURFACE EXPLORATION AND CONDITIONS ENCOUNTERED

A subsurface exploration program was undertaken which included the advancement of soil test borings, installation of monitoring wells and collection and analysis of soil and water samples. Well locations were selected following discussions with Ms. Cindy Woods of the HMMD. Approximate well locations are shown in Figure 1.

Test Borings and Monitoring Well Installation

Three test borings were completed and monitoring wells installed on September 15, 1992, by Tri State Drilling & Boring, Inc. of West Burke, Vermont. The explorations were accomplished under the full-time direction of a JGI representative who visually classified soil samples obtained, screened soils for VOCs and logged these findings and other pertinent data on the attached Test Boring Logs.

Test borings were advanced using a 4½ inch I.D. hollow-stem auger. Soils were sampled by means of a two inch O.D. split-spoon sampler in accordance with ASTM D-1586. Soils were sampled continuously during test boring JB-1 and at five foot intervals in test borings JB-2 and JB-3. Test borings were advanced to three to five feet below what appeared to be the groundwater table. Contamination in the split-spoon soil samples were evaluated visually, olfactory and with an 11.2 eV Hnu Photoionization Detector (PID). The contaminant findings are recorded on the attached Test Boring Logs. Due to the chemical nature of the weathered petroleum, the PID was found not to be effective in evaluating contamination levels.

Following the completion of these test borings, a two inch I.D. PVC monitoring well was installed. Each well was constructed with the lowermost portion of well pipe consisting of slotted well screen. The length of the screen was such that the screened portion of the well penetrated the saturated zone and extended above what appeared to be the water table. This was done to allow for potential groundwater fluctuations. The borehole was then backfilled with silica sand and the riser pipe sealed above the water table with a bentonite clay seal. The top of the well was completed with a protective roadbox cover, set in a concrete surface seal to reduce the potential for surface water intrusion, vandalism or other damage. Specific details regarding the installation of individual monitoring wells were recorded and are provided on the attached Monitoring Well Logs.

Summary of Test Borings and Monitoring Wells

Monitoring Well 1 (MW-1): MW-1 is located in the immediate area of Test Pit TP-1 in the upper parking lot. This test pit, excavated during the preceding phase of work, had shown the highest levels of contamination. The very-loose to medium-dense fill encountered during the advancement of the boring was composed of fine to coarse sand with gravel. The fill also contained broken granite, slate and wood debris. Significant contamination was not detected above eight feet. Below approximately eight feet, the fine to coarse sands were very wet, and "oily" and black in color. Groundwater was encountered at a depth of approximately nine feet.

Monitoring Well 2 (MW-2): MW-2 is located 45 feet northwest (downgradient) from MW-1 at the edge of the bank of the upper parking lot. The loose fill encountered during the advancement of boring was predominantly fine to medium sand and gravel. Some silt was present below approximately nine feet. Significant contamination was not observed above 11 feet. Below 11 feet, the soil contained significant petroleum contamination. Groundwater was encountered at a depth of approximately 10½ feet.

Monitoring Well 3 (MW-3): MW-3 is located approximately six feet from the northwest corner of the building at the edge of Mill Road. The loose fill encountered during the advancement of the boring was predominantly fine sand. No contamination was observed in this boring at a depth of nine feet. Groundwater was not encountered before auger refusal. A Monitoring Well was installed because soils were moist and groundwater may be present in the well during seasonal high water levels.

GROUNDWATER SAMPLING AND ANALYSIS

On September 16, 1992, JGI visited the site for the purpose of locating the recently installed wells by tape from existing structures, and obtaining groundwater samples from the monitoring wells. Observations such as depth to water, pH and specific conductance were made. A summary of the field groundwater observations is attached.

Groundwater measurements and samples were collected employing the following protocol. Field instruments used to measure conductivity and temperature were cleaned with methanol and distilled water rinses between wells to reduce the potential of cross contamination. The temperature and conductivity at the top and bottom of the groundwater in the monitoring well were measured with a YSI (Yellow Springs Instruments) meter. Following this measurement, the wells were purged by removal of three to five times the volume of the well with a disposable polyethylene bailer. A dedicated bailer was used for each well. After purging, the pH was measured with a field pH meter calibrated with pH 7.0 buffer. Samples were collected in glass containers and preserved with the appropriate acid. The samples were packed in ice for transport to the laboratory. The samples were submitted to Eastern Analytical, Inc. (EAI), Concord, New Hampshire for VOC (EPA Method 8020) and TPH (EPA Method 418.1) analysis. Copies of the laboratory reports are attached.

A non-continuous "oil" sheen was observed on the groundwater samples from MW-1 and MW-2. Groundwater was not present in MW-3. The results of the chemical analysis indicated the presence of 4 parts per billion (ppb) benzene, 1 ppb toluene, 9 ppb ethylbenzene 36 ppb xylenes, and 11 ppb chlorobenzene in the sample from MW-1. Dissolved VOCs and TPHs were not detected in the sample from MW-2. The absence of detectable dissolved TPHs may be the result of the solubility of weathered petroleum compounds and the relatively high detection limit of Method 418.1 (5 ppm).

GROUNDWATER FLOW AND SENSITIVE RECEPTORS

Groundwater measurements could be performed on only two of the wells. Due to this limitation, a groundwater contour plan was not prepared. There was approximately a two foot difference in groundwater depth between MW-1 (8.67 feet) and MW-2 (10.63 feet). Further to the north of the site is the White River which expected to have a significant influence in groundwater flow. Based on the foregoing, together with groundwater observations made in the monitoring wells at the site, groundwater is expected to flow in a northwesterly direction toward the White River.

The areas which appear to be downgradient from the site are supplied by town water and sewer systems. The closest surface water to the site is the White River. The White River is approximately 200 feet to the north/northwest of the site and flows in an easterly direction.

EVALUATION AND RECOMMENDATIONS

Based on the results of our studies, we have completed an evaluation of the site relative to the TPH contamination. The area of contamination is the site of the former two 20,000 gallon USTs. The USTs were used for the storage of heating oil. Mr. John Cone with the Hartford Woolen Company, Inc. has stated that the USTs were removed circa 1958.

When reviewing Figure 1, the gradient between the monitoring wells in the upper parking lot (MW-1, MW-2) and MW-3 is not apparent. MW-3 is approximately 20 + feet lower in elevation than MW-1 and MW-2. MW-1 and MW-2 are at approximately the same elevation. According to Mr. Cone, who was present at the time, the fill area of the upper parking lot, where the USTs were located, was formerly a steep slope with bedrock outcrops. The Army core of Engineers blasted rock from a narrow point of the White River and placed the large boulders in the area where the that would become the upper parking lot. Subsequent to that activity, various fill materials

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where placed behind a concrete and railroad tie retaining wall to form the upper parking Lot and UST site. The elevation of MW-3 is characterized by areas of bedrock outcrops limiting the locations for monitoring wells.

Indications are that the plume of contamination is relatively immobile and confined in the soils in the area of this upper parking lot (See Figure 1). The retaining wall appears to be serving as a dam for runoff and groundwater flow. The groundwater in the area of contamination is backed up behind this dam and is probably not a part of the area groundwater system. The contamination has apparently been present for approximately 30 years without significant migration. There is no evidence that the White River has been impacted and no other sensitive receptors have been identified. Considering these factors, we would recommend that the area remain undisturbed and the soils left in place.

A groundwater interceptor trench could be constructed between the railroad tracks and the upper parking lot. The interceptor trench may divert run-off and groundwater to the west of the fill area, reducing the potential of leaching of the contamination within the fill. We would recommend a topographical survey of the site and trench design plans prior to proceeding with this plan.

It is recommended, that monitoring of the groundwater continues on a semiannual basis for a period of one year. The purpose for the monitoring would be to observe VOC and TPH levels at high and low groundwater levels and to ascertain if there is a constant level of contamination in the groundwater. It is further recommended that the TPH analysis be performed by EPA Method 8015 (modified). Method 8015 has a detection limit of 1 ppm (lower if requested), and would allow the fingerprinting of any TPHs detected.

The options of bioremediation and excavation and off-site treatment/disposal have been evaluated. Considering the length of time the contamination has been present with no significant environmental impacts demonstrated, for economic considerations the options do not appear to be warranted.

Diethyl ether

Ethanol

Methyl ethyl ketone (MEK)

Methyl ~~ethyl~~ isobutyl ketone (MIBK)

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We trust the contents of this report meets with your approval. Should you have any questions or require further information, please do not hesitate to contact our office.

Very Truly Yours,

JAWORSKI GEOTECH, INC.



Cliff Lyons

CL/etc

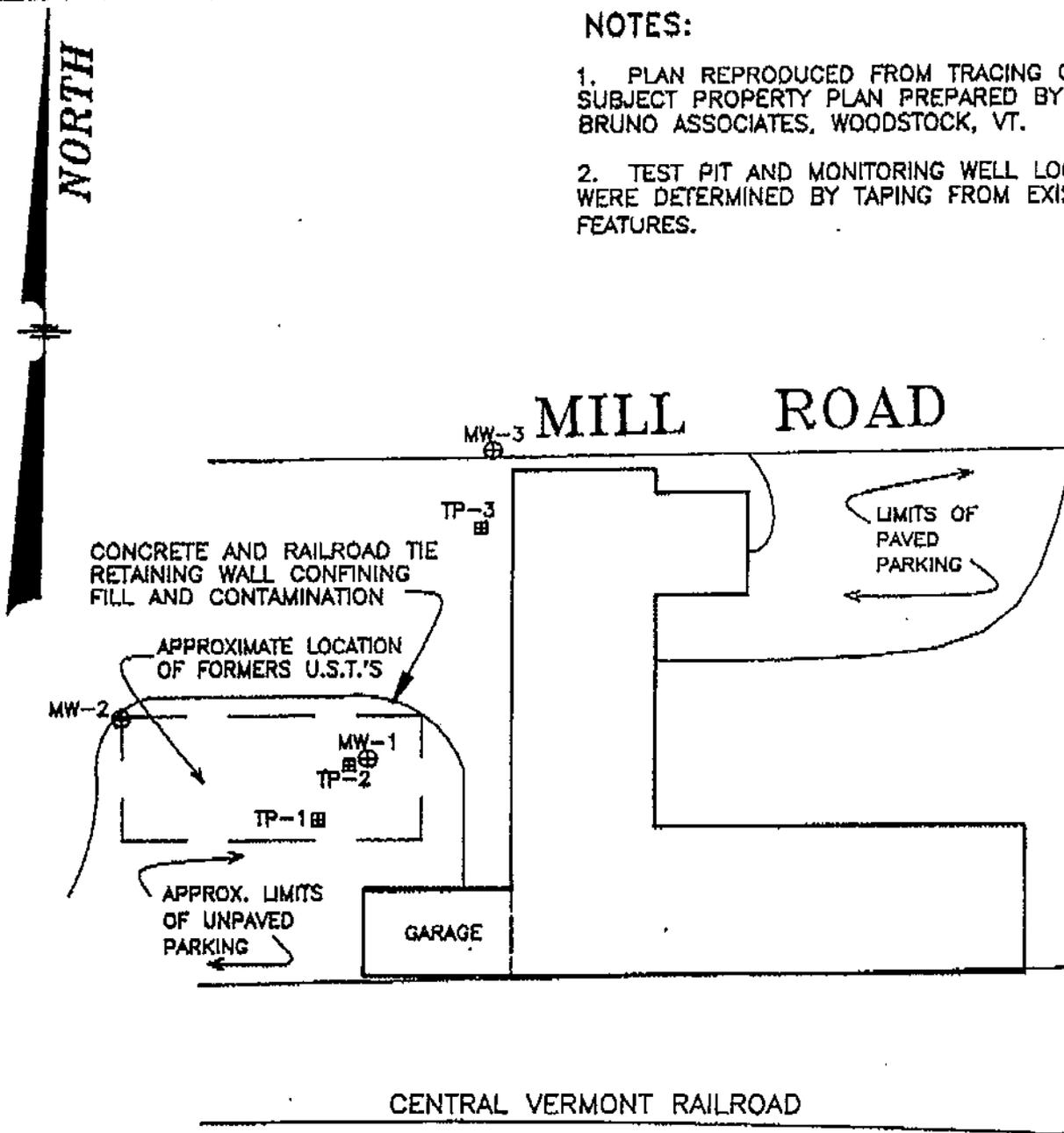
Attachments

cc: 

NOTES:

1. PLAN REPRODUCED FROM TRACING OF SUBJECT PROPERTY PLAN PREPARED BY BRUNO ASSOCIATES, WOODSTOCK, VT.

2. TEST PIT AND MONITORING WELL LOCATIONS WERE DETERMINED BY TAPING FROM EXISTING FEATURES.



HARTFORD WOOLEN COMPANY

HARTFORD, VERMONT

PREPARED FOR:
DR. SYMMES & ASSOCIATES
119 V.A. CUT-OFF ROAD
WHITE RIVER JUNCTION, VT. 05001

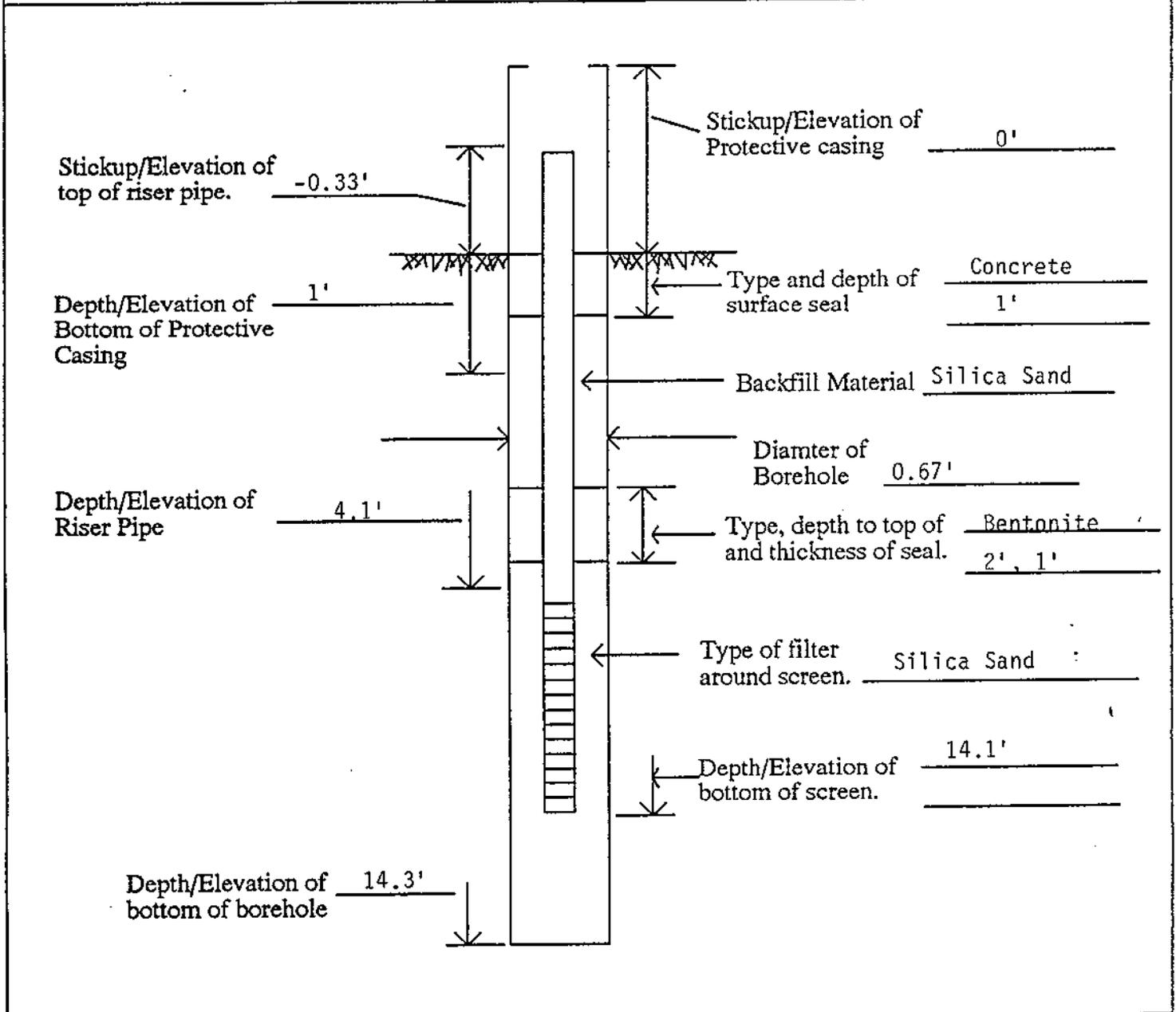
SEPTEMBER, 1992
SCALE: 1"=30'
PROJECT NO. J92229

FIGURE 1
SUBSURFACE
EXPLORATION
LOCATION PLAN



MONITORING WELL LOG

Project: <u>Hartford Woolen Company</u> <u>Hartford, Vermont</u>	Drilling Co.: <u>Tri-State</u> <u>Drilling & Boring Company</u>	Sheet <u>1</u> of <u>1</u> Boring No: <u>JB-1</u> Well No: <u>MW-1</u>
Project No: <u>v92229</u>	Foreman: <u>Raymond Gilfillan</u>	Surface Elev. <u>---</u>
Date Start: <u>9/15/92</u>	JGI Representative: <u>Cliff Lyons</u>	
Date End: <u>9/15/92</u>		



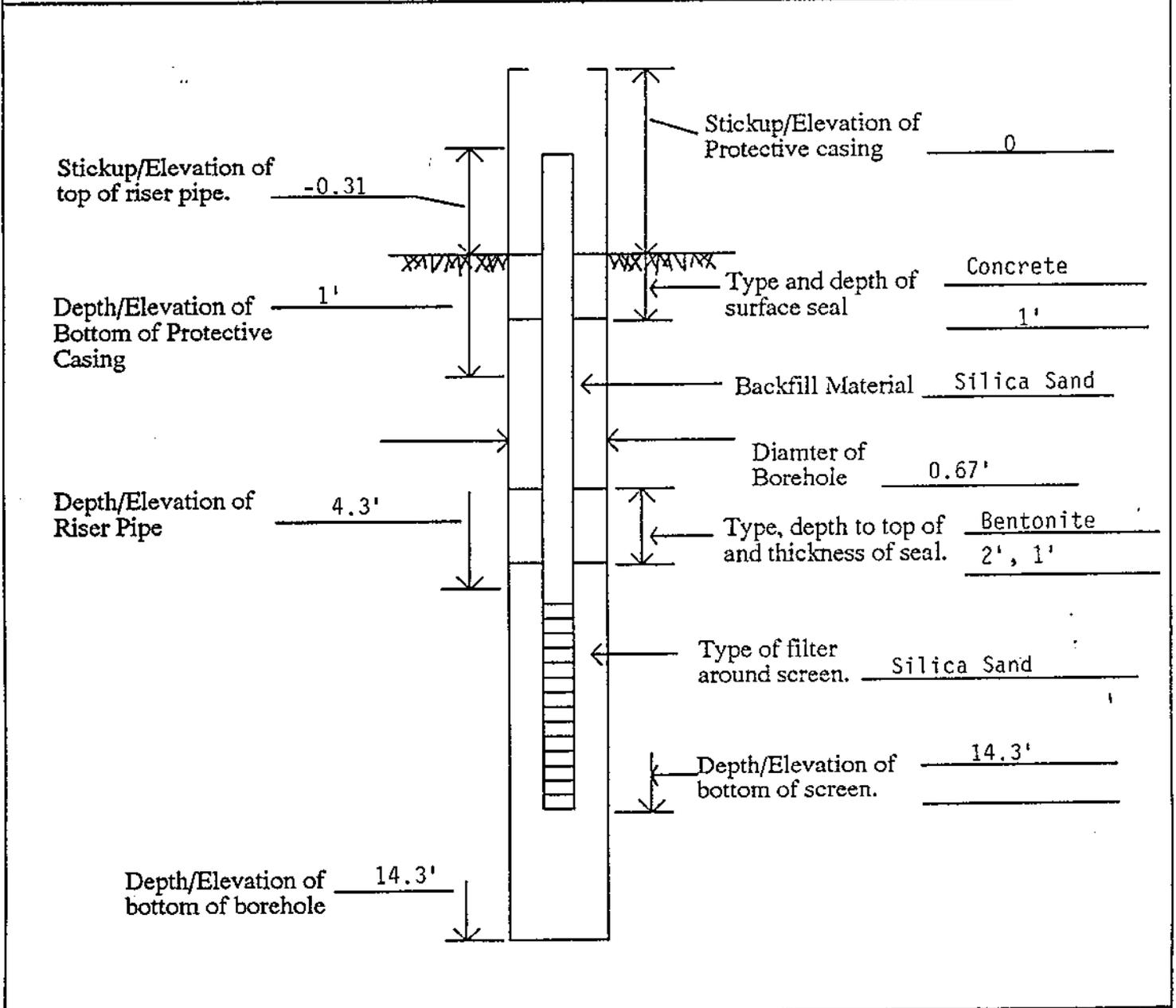
WELL MATERIALS

	TYPE	DIAMETER	LENGTH
PROTECTIVE CASING	Steel	8"	1'
RISER PIPE	PVC Sch 40	2"	3.77'
WELL SCREEN	PVC Sch 40	2"	10'



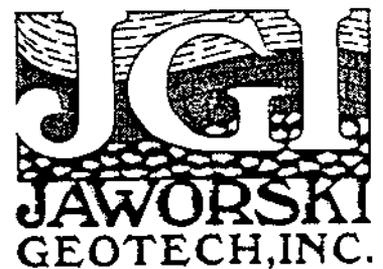
MONITORING WELL LOG

Project: <u>Hartford Woolen Company</u> <u>Hartford, Vermont</u>	Drilling Co.: <u>Tri-State</u> <u>Drilling & Boring Company</u>	Sheet <u>1</u> of <u>1</u> Boring No: <u>JB-2</u> Well No: <u>MW-2</u>
Project No: <u>V92229</u>	Foreman <u>Raymond Gilfillan</u>	Surface Elev. <u> </u>
Date Start: <u>9/15/92</u>	JGI Representative: <u> </u>	
Date End: <u>9/15/92</u>	<u>Cliff Lyons</u>	



WELL MATERIALS

	TYPE	DIAMETER	LENGTH
PROTECTIVE CASING	Steel	8"	1'
RISER PIPE	PVC Sch 40	2"	4'
WELL SCREEN	PVC Sch 40	2"	10'



Test Boring Log

Project: <u>Hartford Woolen Company</u> <u>Hartford, Vermont</u> Project No.: <u>V92229</u> Date Start: <u>9/15/92</u> Date End: <u>9/15/92</u>	Drilling Co.: <u>Tri-State Drilling & Boring Company</u> Foreman: <u>Raymond Gilfillan</u> JGI Representative: <u>Cliff Lyons</u>	Sheet <u>1</u> of <u>1</u> Boring No.: <u>JB-3</u> Location: <u>MW-3</u> Surface Elev.: <u>---</u>
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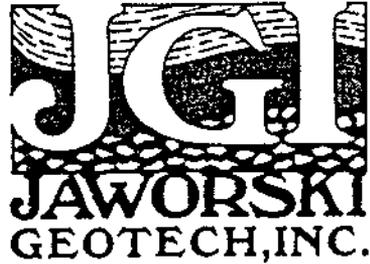
Type: <u>HSA</u> Size: <u>4 1/4" ID</u> Hammer: _____ Fall: _____	Casing <u>HSA</u> Sampler <u>Split Spoon</u> <u>2"</u> <u>140 Pounds</u> <u>30"</u>	Groundwater Observations <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Date</th> <th>Depth</th> <th>Casing at</th> <th>Stabilization Period</th> </tr> </thead> <tbody> <tr> <td>9/15/92</td> <td>No Water</td> <td></td> <td></td> </tr> <tr> <td>9/16/92</td> <td>No Water</td> <td></td> <td></td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Date	Depth	Casing at	Stabilization Period	9/15/92	No Water			9/16/92	No Water						
Date	Depth	Casing at	Stabilization Period															
9/15/92	No Water																	
9/16/92	No Water																	

Depth ft.	Cas bl/ft	Sample					Strata Change	Sample Description	Note
		No.	Depth	Pen.	Rec.	Blows/6"			
5		S-1	0-2	24"	18"	2-2 5-4		S-1: Dark brown, loam asphalt residue (6"), light brown, fine SAND trace of Gravel. Loose Fill.	
		S-2	5-7	24"	12"	1-1 1-1			
10								Terminated boring at 9'. Auger refusal due to bedrock or large boulder.	(1)

Notes:
 (1) Weathered rock outcrops are numerous in this area (elevation of site).

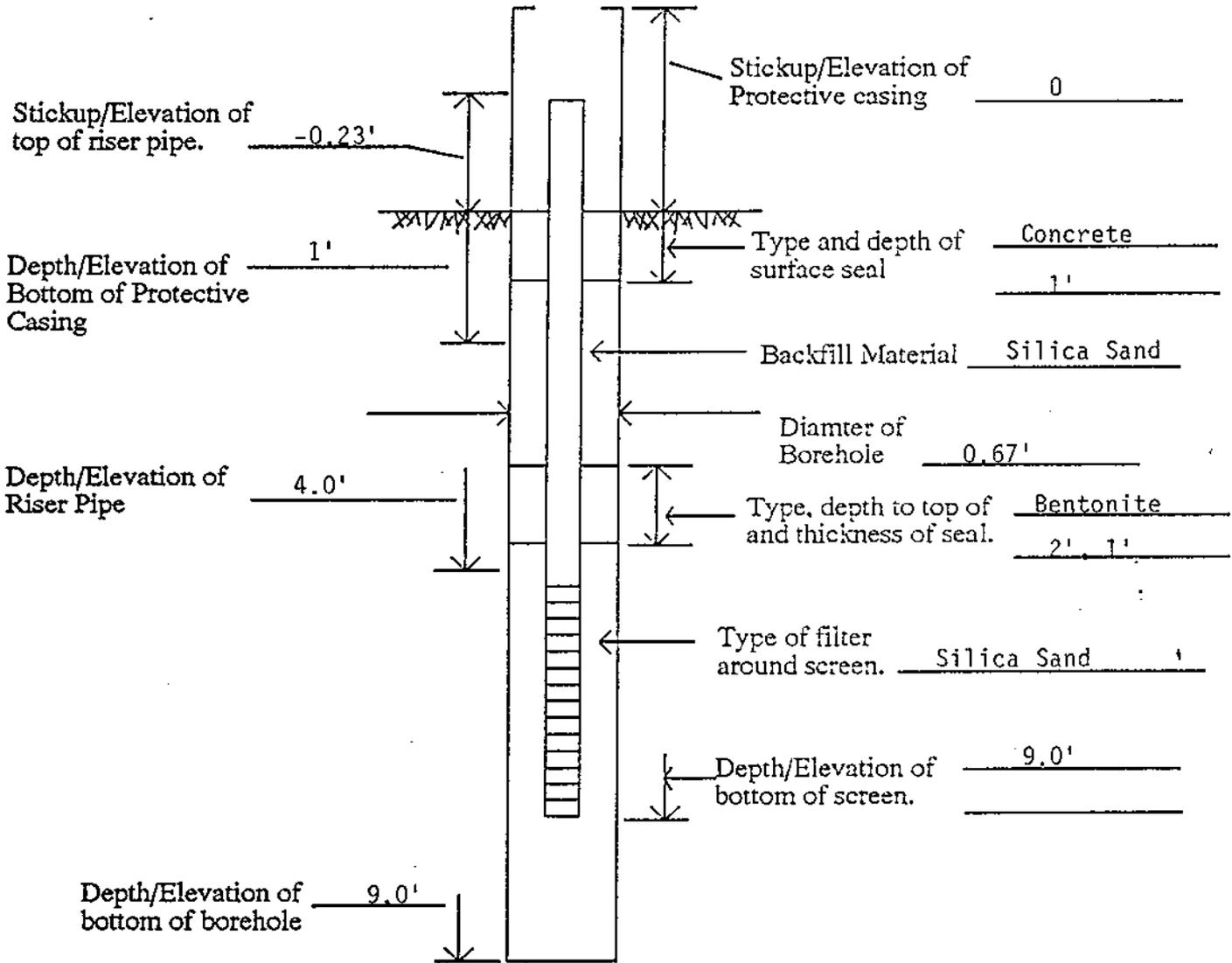
Proportions used: trace (0-10%), little (10-20%), some (20-35%), and (35-50%) Cohesive Consistency (Blows/ft.) very soft 0-2 soft 2-4 medium stiff 4-8 stiff 8-15 very stiff 15-30 hard 30+	Cohesionless Density (Blows/ft.) very loose 0-4 loose 4-10 medium dense 10-30 dense 30-50 very dense 50+
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Remarks: The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.



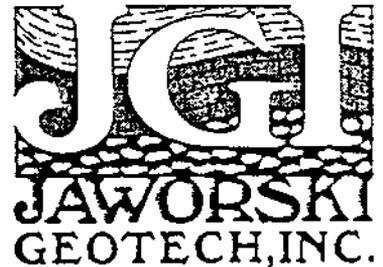
MONITORING WELL LOG

Project: <u>Hartford Woolen Company</u> <u>Hartford, Vermont</u>	Drilling Co.: <u>Tri-State</u> <u>Drilling & Boring Company</u>	Sheet <u>1</u> of <u>1</u> Boring No: <u>JB-3</u> Well No: <u>MW-3</u>
Project No: <u>V92229</u>	Foreman <u>Raymond Gilfillan</u>	Well No: <u>MW-3</u>
Date Start: <u>9/15/92</u>	JGI Representative:	Surface Elev. <u>--</u>
Date End: <u>9/15/92</u>	<u>Cliff Lyons</u>	



WELL MATERIALS

	TYPE	DIAMETER	LENGTH
PROTECTIVE CASING	Steel	8"	1'
RISER PIPE	PVC Sch 40	2"	3.77'
WELL SCREEN	PVC Sch 40	2"	5'



LABORATORY REPORT

Eastern Analytical, Inc. ID#: 4595 JGI

Client: Jaworski Geotech Inc.
Client Designation: V92229/Hartford Woolen Co.

Sample Qty/Type: 2 aqueous
Date Received: September 18, 1992

Hazardous Substance List Volatile Organic Compounds

Sample ID:	MW-1	MW-2	EPA
Matrix:	Aqueous	Aqueous	Method
Date of Analysis:	9/21/92	9/21/92	
Units:	µg/L	µg/L	
Analyst:	NZ	NZ	
Benzene	4	<1	8020
Toluene	1	<1	8020
Ethylbenzene	9	<1	8020
Total Xylenes	36	<1	8020
Chlorobenzene	11	<1	8020
Styrene	<1	<1	8020

Approved By: Timothy Schaper, Organics Supervisor

Timothy D. Schaper

LABORATORY REPORT

Eastern Analytical, Inc. ID#: 4595 JGI

Client: Jaworski Geotech Inc.
Client Designation: V92229/Hartford Woolen Co.

Sample Qty/Type: 2 aqueous
Date Received: September 18, 1992

Organics

Sample ID: Matrix:	MW-1 Aqueous	MW-2 Aqueous	Date of Analysis	Analyst	EPA Method
Organics: (mg/L) Total Petroleum Hydrocarbons	< 5	< 5	9/28/92	LB	418.1

Approved by: Lorraine Olashaw, Inorganics Supervisor Lorraine

LIMITATIONS

1. Analytical tests were performed in the field and/or in JGI's lab utilizing a portable gas chromatograph (GC). These tests were done so for the purpose of identifying the likelihood that hazardous wastes exist beneath the Site. It should be noted that the tests completed using the GC can be considered only qualitative in their screening for volatile organic compounds. Analytical tests were not completed for every compound on the EPA list of priority pollutants, nor was the entire Site explored for the purpose of revealing a potential problem. Explorations were widely spaced, thus it is possible that hazardous materials may be present beneath unexplored areas of the Site.
2. The analysis and conclusions in this report are based in part upon limited field and laboratory test data. They are also based in part on chemical test data provided by others, and, as such, are contingent upon their validity. Should additional chemical analyses indicate evidence of contamination, these data should be reviewed by Jaworski Geotech, Inc. and the conclusions presented herein may be modified. It should be noted that variations in the type of contaminants, their concentrations, and their direction of flow will occur due to water table fluctuations and alteration of disposal practices, as well as other factors. As such, it cannot be stated with absolute certainty whether or not a hazardous waste contamination problem exists or will exist in the future at the Site.
3. This study and report have been prepared for the exclusive use of D. R. Symmes and Associates solely for the use of an evaluation of the Site. This report and the findings contained herein shall not, in whole or in part, be disseminated or conveyed to any other party, nor used by any other party, in whole or in part, without prior written consent of Jaworski Geotech, Inc. This report has been prepared in accordance with generally accepted environmental assessment practices. No other warranty, expressed or implied, is made.