Civil Environmental Engineering
Hydrogeology
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Contaminant Fate Analysis
Soil & Water Science
Geology & Geophysics
Rivers and Dams
Solid Waste
Permitting

THE JOHNSON COMPANY, INC.

Environmental Sciences and Engineering

October 23, 1989

Mr. Peter Terry, Vice President
The Howard Bank
48 Railroad Street
St. Johnsbury, Vermont 05819

Re: Site Assessment of the Danville Grain Store
JCO# 1-0813-2

Dear Peter:

Please find the attached copy of our report entitled "Site Assessment of the Danville Grain Store for the Howard Bank".

As you know, significant contamination has been found on the property, and some degree of remediation has already been conducted. We have included additional remedial action recommendations in the report. A copy of this report is being forwarded to the Petroleum Section of the Agency of Natural Resources.

Please do not hesitate to call should you have any questions or comments. We look forward to hearing from you and it has been a pleasure working with you on this project.

Sincerely yours,

THE JOHNSON COMPANY, INC.

BY: Michael H. Pottinger

Michael H. Pottinger
Project Hydrogeologist

MHP/cll
HOWARD.CVR
1-0813-2

cc: Pat Coyne - Agency of Natural Resource

5 State Street
Montpelier, VT 05602
(802) 229-4600
Fax: (802) 229-5876

EXECUTIVE SUMMARY

At the request of The Howard Bank, The Johnson Company has performed an Environmental Site Assessment of the Danville Grain Store located in Danville, Vermont. The Howard Bank is considering initiating foreclosure procedures against the owners of the Danville Grain Store. The investigation was conducted June through September 1989 and included the following: the excavation of nine test pits; the collection and analysis of 11 soil and three groundwater samples; site surveying; the installation of three monitoring wells; slug testing; and a water supply survey and a receptor survey.

Significant subsurface soil contamination was observed during the excavation of two of the five tanks. Photoionization detector (PID) readings were in the 200 - 400 ppm range. Approximately 15 cubic yards of soils were excavated and stockpiled onsite between sheets of heavy plastic. A subsequent test pitting program indicates that while some contaminated soils still remain, it's distribution appears discontinuous.

Laboratory analyses of selected soils samples did not identify the exact type of contaminant present. This is due to the fact that the analytical "pattern" detected in the soil did not match a "pattern" of a standard. This may indicate that the contamination represents a mixture of fuels.

Groundwater samples collected from the three wells installed during this investigation indicate that relatively high concentrations of benzene, toluene, ethylbenzene and xylene (BTEX) are present in the groundwater (BTEX = 10,069 ppb). No non-aqueous phase layer was observed.

A water supply inventory indicates that no water supplies exist within 1,000 feet of the Danville Grain Store. This suggests that although soil and groundwater contamination exists, it does not represent a significant risk to human health.

Based on the data collected during this investigation, it appears that the soil and groundwater contamination detected onsite is most likely the result of multiple sources. Due to the proximity of Tank 4 to the most highly contaminated soil, it appears that Tank 4 may represent the primary source of contamination. Because the source(s) of contamination has been removed, it is suspected that groundwater quality will improve with time.

A quarterly monitoring program is recommended at this site to monitor changing groundwater quality. In addition, it is recommended that stockpiled soil be monitored with the PID. Should average PID readings be below 20 ppm, the stockpiled soils should be spread thin and seeded onsite. For average readings greater than 20 ppm, the soil should be periodically turned over and recovered with plastic until observed levels decrease to 20 ppm. This soil treatment technique has been discussed with Vermont Department of Environmental Conservation and has its verbal approval.

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INTRODUCTION

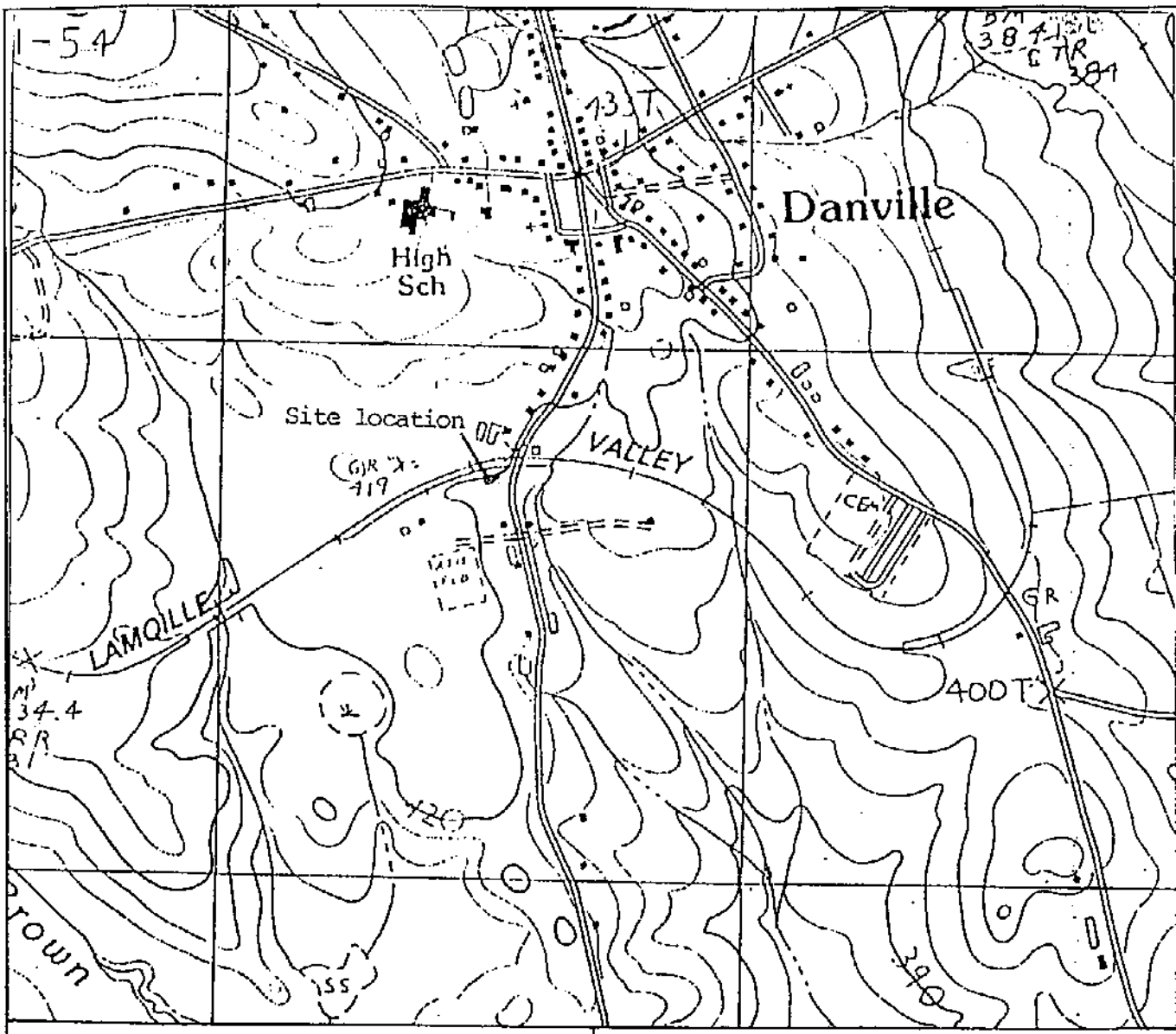
The Johnson Company was retained by the Howard Bank to perform an assessment of potential subsurface contamination by petroleum fuel at the Danville Grain Store property located in Danville, Vermont (Figure 1). The purpose of the investigation was to determine if there had been a release of hazardous materials from five underground storage tanks (UST) located on the property, and if so, whether significant environmental contamination had occurred. The first step of the investigation was to observe the excavation and removal of the five underground storage tanks, three of which were owned by Northern Petroleum, at the site. Subsequently, a work plan based on those observations would be developed and implemented.

Site History

The Danville Grain Store property is located on the west side of Railroad Street, approximately 1½ miles south of Route 2. The property currently consists of three main buildings: a house, a store/warehouse, and a small shed/garage. The house and store are connected.

Information concerning the history of the site is somewhat difficult to obtain because the current owner, Mr. Harold Gray, has filed for personal bankruptcy and his location is unknown. Review of Ernest Tobias Baluvet's Attorney's Report and Opinion of Title indicates that the property was owned by Danville Grain, Inc. in 1928. This suggests the site has a long commercial history. Currently, the store sells typical "general store" items as well as animal feeds. No hazardous materials were observed on the site, with the exception of two partially filled 55 gallon drums labeled bar and chain oil, and approximately 3" - 6" of a water-fuel mixture in the basement which resulted from broken water pipes and subsequent spilling of heating fuel after the property had been abandoned. The spilling was the result of heating fuel tanks tipping over during the flooding during the winter of 1988-89.

The date on which the property first started storing and selling fuel is unknown. The three tanks owned by Northern Petroleum were at least nine years old. They were purchased by Northern Petroleum in 1987 from Menuit-Parks Co., which is no longer in business. It is not certain how long these tanks have been at Danville Grain, but Maynard Farr of Northern Petroleum estimates that the tanks were installed within the last seven years. There are no records for the other two tanks at the Agency of Natural Resources (ANR). According to Dana Calkins of Calkins' Excavating, at least three generations of UST's at the site had been removed. At this time, it is not known why the UST's were removed.



Source: U.S.G.S. St. Johnsbury, Vermont
7.5 x 15 minute quadrangle, 1983

Scale: 1 in. = 1050 ft.

Figure 1. Site location map.

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Tank Removal

Because the tanks have not been in use for more than one year, they violated ANR regulations and therefore were removed on June 8, 1989 by Calkins Excavating of Danville, Vermont under the direction of Patrick Coyne of the ANR. Maynard Farr of Northern Petroleum, Peter Terry of the Howard Bank and Michael Pottinger of The Johnson Company, Inc., were also present during the excavation.

The integrity of the tanks was determined by visual inspection and the surrounding soil was examined visually, olfactorily and with a photoionization detector (PID) manufactured by HNU (model #PI-101). This instrument uses a short wave ultraviolet lamp to impart a charge to (ionize) any molecules with an ionization potential equal to or less then 10.6 electron volts. Included in this category of molecules are benzene, toluene, ethylbenzene and xylene (BTEX) as well as many organic solvents. These compounds are often referred to as volatile organic compounds (VOCs).

The sizes and contents of the five tanks were as follows:

			Owner
o	Tank 1:	2,000 gallons (regular gasoline)	Northern Petroleum
o	Tank 2:	2,000 gallons (unleaded gasoline)	Northern Petroleum
o	Tank 3:	550 gallons (diesel)	Northern Petroleum
o	Tank 4:	550 gallons (kerosene)	Danville Grain Store
o	Tank 5:	275 or 300 gallons (kerosene)	Danville Grain Store

The locations of these tanks are shown on Plate 1.

Slightly contaminated soils were observed when Tanks 1 and 2 were removed. The PID values ranged from 50 to 70 parts per million (ppm) in isolated locations. The tanks themselves, while rusted, appeared to be intact.

The soil around Tank 3 showed similar PID readings. That tank also appeared to be relatively intact.

The removal of Tank 4 and subsequent excavation of soil indicated the presence of much higher concentrations of VOCs (PID = 200 to 400 ppm). Excavation continued in an attempt to define the limits of soil contamination. Approximately 15 cubic yards of soil with PID readings of greater than 20

ppm were excavated. Late in the day, when it became apparent that the limits of contamination had not been determined, the excavated soil was put back in place. This was done to prevent the contamination of clean fill and mitigate a potential hazard in the form of a large open pit left onsite over night.

On June 9, 1989 excavation continued, and at the direction of Pat Coyne of the ANR, the contaminated soil was stock piled on plastic onsite and subsequently covered with plastic. The contamination appeared to extend southward and encroached upon an apparent property line. Excavation was terminated at the property line. PID readings of soil along the south wall of the excavation were up to 200 ppm. PID readings along the north, east and west walls had decreased to approximately 40 to 70 ppm. The excavated area was backfilled with clean fill.

The excavation in the vicinity of Tank 5 also revealed soils that were moderately (PID = ~70 to 100 ppm) contaminated with VOCs. As in the case of the other tanks, Tank 5 had no readily apparent holes or broken seams. Approximately 3-5 yards of contaminated soil from this area were added to the stock pile.

Following tank removal The Johnson Company developed a three phase work plan to further investigate the site. The work plan was submitted to the Petroleum Section of the Hazardous Material Division of the ANR, and verbal approval of the work plan was received from Richard Speise of the ANR on July 21, 1989.

The work plan consisted of the following three phases:

- o Phase I: Define nature and extent of soil and groundwater contamination, identify receptors and determine risks.
- o Phase II: Develop remediation and long term monitoring plans.
- o Phase III: Implement remediation and long term monitoring plans.

It was proposed that Phases II and III would be better defined at a later date based on data collected during Phase I.

Phase I consisted of the following tasks:

- o Determination of fuel type in soil.
- o Determination of extent of contamination and soil.

- o Monitoring well installation and groundwater sampling.
- o Hydraulic conductivity determination.
- o Survey and creating of a site plan.
- o Risk assessment.

This report presents the methods and results of the above tasks in the order that they are listed. This is followed by a discussion of the results, conclusions and recommendations.

PHASE I

Fuel Type and Extent

The highest levels of soil contamination as measured in the field with the PID were recorded in the vicinity of tanks three and four, which had been identified as containing kerosene. A preliminary assessment of the distribution of contamination in the soils suggested that these tanks may not have been the source. Soil samples were therefore submitted to the lab for analysis using EPA method 8020 with a FID scan, and EPA method 5030 - methanol extraction. This data would provide quantitative information of contaminant concentration and identify the fuel type in the soil.

Samples were collected on July 31, 1989 while conducting a test pit program in the area. Test pits were excavated and soil was inspected visually, olfactorily, and with a PID for signs of contamination, and visually for stratigraphy. Nine test pits were dug, and the locations are shown on Plate 1.

The stratigraphy in all test pits generally consisted of two to three feet of fine sand or fill over a gray-green silty clay. The contact between the sand and clay was deeper (four to six feet) in the vicinity of the buried tanks. Test pits 1 through 6 radiated from the area excavated during tank pull. Selected soil samples were obtained and screened with a PID. An attempt was made to delineate the 20 ppm isoconcentration line using the PID. However, because contaminants appeared to occur as "hot spots" this was not possible. The test pit program indicated that the great majority of contaminated soil had already been excavated.

Six soil samples were submitted for analysis. Sample locations were designed to represent the concentration at the fringe of the most contaminated area; to reflect the concentration of maximum contamination; and reflect the concentration of soil that had been stockpiled (also considered soil with the maximum concentration of contaminants).

Soil samples were collected in 40 milliliter (ml) glass jars equipped with teflon lined caps. After collection, samples were placed in a cooler with ice and shipped to Scitest Laboratories in Randolph, Vermont. Table 1 is a summary of the analytical results.

Table 1

Danville Grain Store

Summary of July 31, 1989

Soil Sample Analytical Results

Test Pit	Depth (ft)	Distance from Excavated Area (ft)	Toluene (µg/kg)	Total FID Hydrocarbons (µg/kg)
3	5	18	111	360
3	5	30	ND	ND
5	10	35	ND	ND
9	7	45	ND	13,600
Stockpiled Soil	--	--	198	13,600
Tank 5 Soil	--	--	ND	179

Attachment 1 contains laboratory report sheets for these samples and for all samples collected during this investigation.

The results indicate that with the exception of test pit (TP) 9 and the stockpile soil, relatively low concentrations, if any, were detected.

The sample collected from TP-3, five feet below ground surface (bgs) and approximately 18 feet from the center of the excavated area contained relatively low concentrations of toluene and total FID hydrocarbons. This is despite the fact that the PID registered approximately 50 to 100 ppm. This suggests that either the PID was indicating higher than actual VOC concentrations or that significant degradation of VOCs occurred between sample collection and analysis at the laboratory. Since appropriate sample collection procedures, designed to minimize sample degradation, were utilized, and laboratory analytical results are considered much more

reliable than field screening with the PID, the former is considered much more likely. The sample collected from the vicinity of Tank 5 indicated that while some contamination is present, it is in relatively low concentrations.

R. Shipman, Chief Analyst at Scitest Laboratories, was unable to conclusively determine the exact fuel type that is occurring in the soil, though gasoline was suggested as being the most probable. The laboratory suggested that identification difficulties may be due to degradation of the contaminants over time, or that the contamination was the result of more than one fuel type.

Monitoring Well Installation

On August 20, 1989 three monitoring wells were installed to allow for soil sampling at greater depths than possible with the backhoe, and for groundwater sampling. The locations for the monitoring wells were selected to provide information on areas upgradient of Tanks 3 and 4 (MW-1), immediately in the vicinity of Tanks 3 and 4 (MW-3), and downgradient (MW-2). The locations of the monitoring wells are also shown on Plate 1. Each monitoring well was installed in a corresponding soil boring (SB).

Monitoring wells were installed by Falcon Well Drilling of Lyndonville, Vermont under the supervision of The Johnson Company. A track mounted hollow stem auger rig was used for the soil borings. Split spoon samples were taken at a minimum of every five feet, screened visually, olfactorily and with the PID for signs of contamination. Selected samples were collected for submission to the laboratory.

MW-1 is located on the west side of the Danville Grain Store and was designed to reflect background conditions. The sediment encountered consists of ten feet of sandy silt over what appears to be glacial till. No significant contamination was detected with the PID although a faint odor was detected in the soil near the surface. Saturated sediments were encountered at approximately six feet bgs. A two inch inside diameter (ID) poly vinyl chloride (PVC) well with four feet of factory slotted screen was installed to a depth of ten feet bgs. The screened area was sand packed to insure good communication between the aquifer and the well. A two foot bentonite seal was placed above the sand pack to prevent the percolation of surface water down along the well casing. A steel well guard was cemented flush with the ground surface.

Attachment 2 contains drilling logs displaying information of stratigraphy and well construction for each monitoring well.

MW-2 was placed downgradient of the excavated area. The sediments encountered consist of approximately five feet of silty sand overlying six and a half feet of till which, in turn, overlie a saturated silt. PID readings indicated low levels of contamination at six feet bgs (25 ppm) and at approximately eleven feet bgs (11 ppm). A well constructed similarly to MW-1 was installed down to a depth of 12.5 feet. The water level in the well rose to approximately four feet bgs. This was surprising based on observations of water content of the split spoon samples. An upward vertical gradient may account for the higher then expected water level in MW-2, or a thin saturated layer of silty sand may exist above the till. Such a saturated layer did not occur in an interval that was sampled by the split spoon. This possibility is problematic because if a thin saturated unit above the fill is causing the higher than expected water level, the well would not reflect the presence of a non-aqueous phase layer (NAPL).

MW-3 was installed within the clean fill that replaced the most contaminated soil. This fill extended to approximately ten feet bgs. The last 0.3 feet of this fill appeared to be saturated. A tight silty till was encountered below the clean fill. Below the tight silty till, approximately two and a half feet of loose, sandy till was encountered before meeting refusal. A 0.9 foot screen was installed in the loose till. The screen was shortened to allow for its isolation from the overlying sand using a bentonite seal. This well can be used as an indicator of whether or not contamination had migrated through the tight, grey silty till to the more permeable sandy till below.

The water level in this well rose to 3.3 feet bgs. This indicates that an upward gradient exists in the lower till unit.

On August 24, the monitoring wells were sampled and checked for NAPL or floating product with an interface probe. No NAPL was detected. Before sampling, MW-1, MW-2 and MW-3 were bailed of approximately 9, 4 and 3 well volumes respectively to insure that fresh groundwater was collected. The wells were bailed and samples collected with a stainless steel bailer equipped with a Teflon valve. The bailer was cleaned with liquinox soap and deionized water before sampling each well. A field blank was also collected and submitted to the lab as a quality assurance measure. Samples were placed in 40 ml glass vials equipped with Teflon lined

caps, refrigerated and delivered to the lab the following day. Analysis of samples was done using EPA Method 602 and an FID scan.

The results of the soil samples and groundwater samples are presented in Tables 2 and 3 respectively.

Table 2
Danville Grain Store
Summary of August 20, 1989
Soil Sample Analytical Results
(µg/kg)

Soil Boring	Depth Ft. bgs.	Benzene	Toluene	Ethyl Benzene	Xylenes	Total FID Hydrocarbons
1	5 - 7	ND	039	ND	ND	1,110
2	5 - 7	ND	276	ND	ND	818
2	10 - 12	ND	ND	ND	ND	ND
3	10 - 10.3	314	894	413	1,430	19,300
3	12.7 - 13.7	ND	ND	ND	ND	4,860

Table 3
Danville Grain Store
Summary of August 24, 1989
Groundwater Samples
(µg/l)

Well	Benzene	Toluene	Ethyl Benzene	Xylene	MTBE	Total FID Hydrocarbons
1	ND	ND	ND	ND	ND	ND
2	561	8,250	315	943	<500	17,400
3	10	33	3	288	42	1,040
Field Blank	ND	ND	ND	ND	ND	ND

MTBE = Methyl tertiary butyl ether

The results of the additional soil samples show that relatively low concentrations of toluene exist even in the background area. The source of this contamination is unknown. The results of the two samples collected from SB-2 indicate that moderate contamination is present from five to seven feet bgs, but below detectable limits at ten to twelve feet bgs. Samples collected from SB-3 show high concentrations of contamination from 10 to 10.3 feet. Some hydrocarbons were detected at 12.7 to 13.7 bgs, but none were identified as being BTEX.

Hydraulic Conductivity

In order to characterize aquifer properties, field tests were conducted to determine the hydraulic conductivity (K) of the saturated sediments. This information can be used in conjunction with hydraulic gradient and porosity data to estimate groundwater flow velocities.

Rising and falling head slug tests were performed on MW-1, MW-2 and MW-3 on September 29, 1989. This procedure involves the rapid addition or removal of a known volume of water from the well. The resulting rise or fall of the water level in the well is measured with time. The data is then analyzed to determine hydraulic conductivity. Due to problems encountered during data transfer with the data logger, data is available only for the falling head test of MW-2 and the rising head tests of MW-2 and MW-3. The graphical equation, input values and the display of the data are included in Attachment 3. The results are shown in Table 4.

TABLE 4

Danville Grain Store

Slug Test Results

Well	Test Type	Hydraulic Conductivity (ft/d)
2	Falling	0.43
2	Rising	0.32
3	Rising	0.32

Receptor Survey

A water supply inventory was conducted to determine what potential receptors exist within 1,000 feet of the Danville Grain Store. According to information obtained at the Town Clerk's office and a door to door inventory, no individual water supplies exist within this limit. Residences in this area are connected to city water. The closest individual water supply identified is a dug spring belonging to Gary Schoenemann located approximately 0.4 miles south of the Danville Grain Store on the Peacham Road. Figure 2 shows the Danville Grain Store, the 1,000 foot radius, and the spring's approximate location. The nearest stream is located approximately 300 feet downgradient (south east).

Site Survey

A survey was conducted at the site to develop a site plan (Plate 1) and to determine water table elevations. Table 5 indicates top of casing elevations for the three monitoring wells and corresponding depth to water and water table elevations of August 24, 1989.

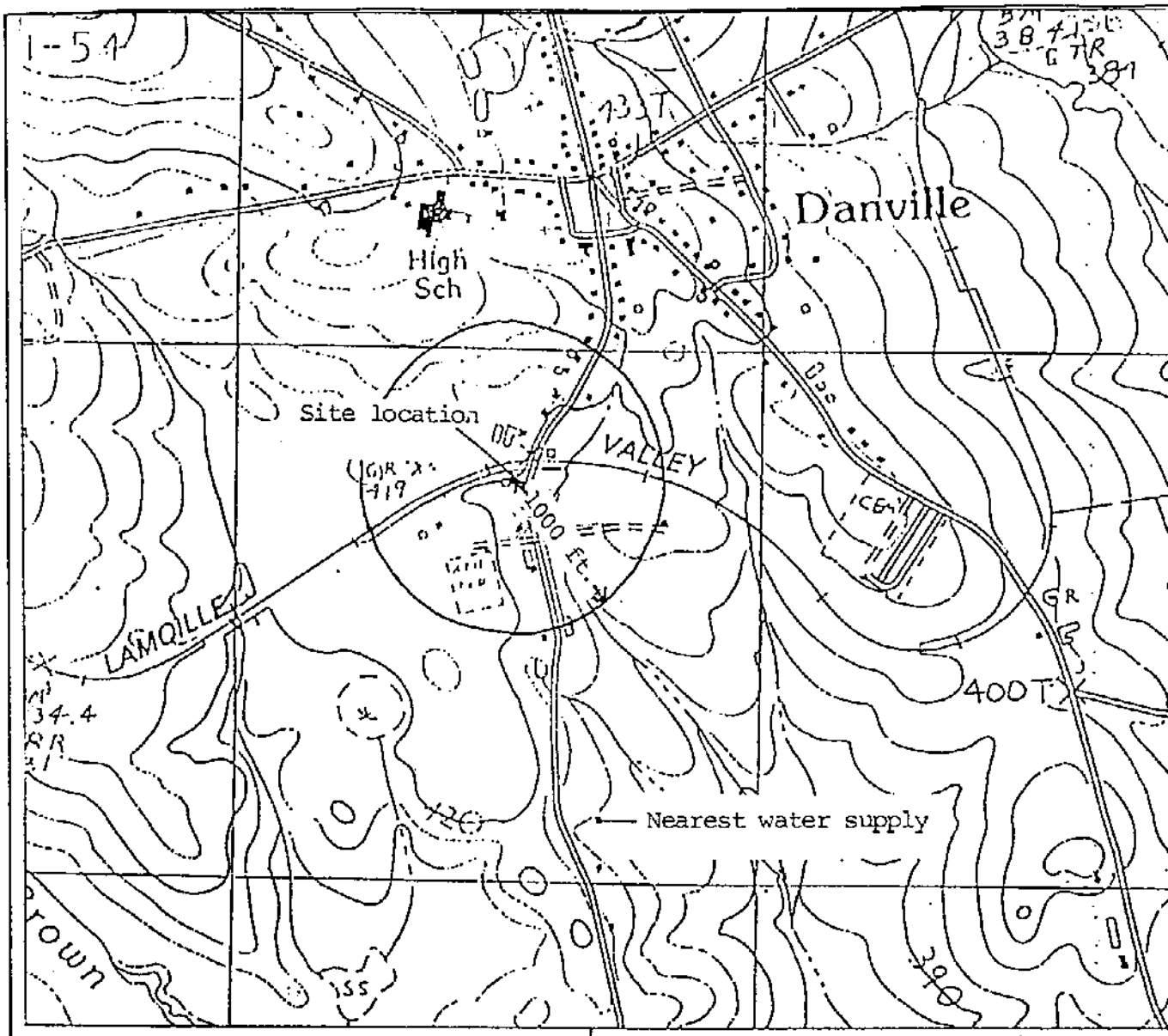
Table 5
Danville Grain Store
Relative Top of Casing Elevation
and Depth to Water Data

Monitoring Well	Relative top of Casing Elevation	Depth to Water (ft)	Relative Water Table Elevation
1	100.04	5.75	94.29
2	92.50	2.65	89.85
3	95.85	3.43	92.43

Groundwater flow directions are also depicted on Plate 1. The southeastward groundwater flow direction as indicated by water level data is supported by topographic data.

CONCLUSIONS

The results of this investigation show clearly that there had been a release(s) of hazardous materials on the site. The most heavily contaminated soil was located in the vicinity of Tank 4, and has



Source: U.S.G.S. St. Johnsbury, Vermont
7.5 x 15 minute quadrangle, 1983.

Scale: 1 in. = 1050 ft.

Figure 2. Water supply inventory.

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been stockpiled on site. Contaminated soil still exists in place on site, but no definite contaminant "plume" in the soil was delineated.

Moderately high levels of dissolved BTEX were detected in groundwater on the site. This contamination, though moderately high, is not likely to present a significant threat to human health due to the absence of nearby receptors.

Although it appears that Tank 4 is the probable source of the majority of contamination, we believe that other sources, perhaps minor, are likely for the following reasons:

1. The distribution of contaminants in soil as measured with the PID is discontinuous. This could result from isolated surface spills.
2. An attorney's opinion of title indicates that the property was owned by a manufacturing corporation in 1928. This suggests that the site may have a long, though perhaps broken, history of commercial activity.

3. The numerous generations of USTs suggests there have been problems in the past. The locations of the previous tanks may have been different from the most recent tanks.

4. The laboratory results did not match any particular fuel type well. This could result from the mixing of contaminants from numerous spills.

There do not appear to be any other major sources of hazardous materials on the site.

RECOMMENDATIONS

The soil containing the highest level of contamination has already been excavated and stock piled on site. Contaminated soil remaining in the ground appeared to be isolated and discontinuous. The excavation of the soil, in fact, probably provided some degree of remediation by introducing oxygen and enhanced volatilization.

We recommend that the stock piled soil be investigated with a PID to determine what the average degree of remaining contamination is. If this level is at or below 20 ppm, the soil should be thinly spread and seeded on site. If the average PID readings are significantly above 20 ppm, the soil should be periodically turned over and recovered with plastic until PID values drop to around 20 ppm. This procedure has been verbally approved by Mr. P. Coyne of the ANR on October 19, 1989.

Because of the absence of receptors, the groundwater contamination does not represent an immediate risk to human health. Since the source(s) of contamination has been removed, contaminant levels should decrease. We propose a quarterly sampling program to monitor the concentration of contaminants with time. At the end of one year, a report summarizing the data should be presented to the ANR.

The water/oil mixture in the cellar should be pumped to containers and disposed of at a certified hazardous waste facility.

Appendix 1

Laboratory Report Forms

SCITEST
LABORATORY SERVICES
P.O. Box 339
Randolph, Vermont 05060-0339
(802) 728-3376

LABORATORY REPORT

CLIENT NAME:	THE JOHNSON COMPANY	LABORATORY NO.:	913-89
ADDRESS:	5 State Street Montpelier, VT 05602	PROJECT NO.:	78611
		DATE OF SAMPLE:	7/31/89
SAMPLE LOCATION:	Daville Grain Store	DATE OF RECEIPT:	8/03/89
CUSTOMER PROJECT NO:	1-0813-1	DATE OF ANALYSIS:	8/09/89
ATTENTION:	Mr. Michael Pottinger	DATE OF REPORT:	8/16/89

RESULTS in (ug/kg) micrograms per kilgogram dry weight of soil

PARAMETER	TP3(5')18	TP3(5')30	TP5(10')35
Benzene	BPQL	BPQL	BPQL
Toluene	111.	BPQL	BPQL
Ethylbenzene	BPQL	BPQL	BPQL
Total Xylenes	BPQL	BPQL	BPQL
BTEX	111.	BPQL	BPQL
Chlorobenzene	BPQL	BPQL	BPQL
1,2-Dichlorobenzene	BPQL	BPQL	BPQL
1,3-Dichlorobenzene	BPQL	BPQL	BPQL
1,4-Dichlorobenzene	BPQL	BPQL	BPQL
n-Hexane	BPQL	BPQL	BPQL
Total FID Hydrocarbons (including BTEX) as n-Hexane	360.	BPQL	BPQL
Methyl tertiary Butyl Ether	BPQL	BPQL	BPQL
% Solid	84.0%	86.4%	85.1%
Surrogate recovery	88.6%	89.7%	97.0%

Detection level 50 ug/kg
EPA Method 8020 with FID scan, with EPA Method 5030 Methanol extraction.

BPQL = Below Practical Quantitation Limit:

250 ppb MTBE
100 ppb Total Hydrocarbons
50 ppb for all other parameters

LABORATORY REPORT

CLIENT NAME:	THE JOHNSON COMPANY	LABORATORY NO.:	913-89
ADDRESS:	5 State Street Montpelier, VT 05602	PROJECT NO.:	78611
		DATE OF SAMPLE:	7/31/89
SAMPLE LOCATION:	Danville Grain Store		
		DATE OF RECEIPT:	8/03/89
CUSTOMER PROJECT NO:	1-0813-1	DATE OF ANALYSIS:	8/09/89
ATTENTION:	Mr. Michael Pottinger	DATE OF REPORT:	8/16/89

RESULTS in (ug/kg) micrograms per kilgogram dry weight of soil

PARAMETER	TP9(7')	STOCK PILE	OLD TANK	SPIKE OF TP3(5') 30
Benzene	BPQL	BPQL	BPQL	107.1% Recovery
Toluene	BPQL	198.	BPQL	113.8%
Ethylbenzene	BPQL	BPQL	BPQL	114.6%
Total Xylenes	BPQL	BPQL	BPQL	113.9%
BTEX	BPQL	198.	BPQL	---
Chlorobenzene	BPQL	BPQL	BPQL	---
1,2-Dichlorobenzene	BPQL	BPQL	BPQL	---
1,3-Dichlorobenzene	BPQL	BPQL	BPQL	---
1,4-Dichlorobenzene	BPQL	BPQL	BPQL	---
n-Hexane	BPQL	BPQL	BPQL	---
Total FID Hydrocarbons (including BTEX) as n-Hexane	13,600.	13,600.	129.	---
Methyl tertiary Butyl Ether	BPQL	BPQL	BPQL	---
% Solid	74.9%	82.8%	85.6%	86.4%
Surrogate recovery	104.9%	107.3%	84.7%	114.1%

Detection level 50 ug/kg
EPA Method 8020 with FID scan, with EPA Method 5030 Methanol extraction.

BPQL = Below Practical Quantitation Limit:

250 ppb MTBE
100 ppb Total Hydrocarbons
50 ppb for all other parameters

Respectfully submitted,

SCITEST, INC.

Roderick J. Lamothe
Laboratory Director

RJL/dma

SCITEST
LABORATORY SERVICES

SCITEST
LABORATORY SERVICES
P.O. Box 339
Randolph, Vermont 05060-0339
(802) 728-3376

LABORATORY REPORT

CLIENT NAME: The Johnson Company

ADDRESS: 5 State Street
Montpelier, VT 05602

SAMPLE LOCATION: Danville Grain/Howard Bank Monitoring Wells

CLIENT PROJECT NO.: 1-0813-2

ATTENTION: Mr. Michael Pottinger

LABORATORY NO.: 1048-89

PROJECT NO.: 78611

DATE OF RECEIPT: 8/25/89

DATE OF REPORT: 9/13/89

DATE OF SAMPLE: 8/24/89

DATE OF ANALYSIS: 8/31/89

RESULTS in ug/l micrograms per liter (ppb)

PARAMETER	MW-1	MW-2	MW-3	FIE BLA
Benzene	BPQL	561.	10.	BPC
Toluene	BPQL	8250.	33.	BPC
Ethylbenzene	BPQL	315.	3.	BPC
Total Xylenes	BPQL	943.	288.	BPC
BTEX	BPQL	10,069.	334.	BPC
Chlorobenzene	BPQL	<500	BPQL	BPC
1,2-Dichlorobenzene	BPQL	<500	BPQL	BPC
1,3-Dichlorobenzene	BPQL	<500	BPQL	BPC
1,4-Dichlorobenzene	BPQL	<500	BPQL	BPC
n-Hexane	BPQL	40	9.	BPC
Total FID Hydrocarbons (including BTEX) as n-Hexane	BPQL	17,400.	1040.	BPC
Methyl tertiary Butyl Ether (MTBE)	BPQL	<500.	42.	BPC

EPA Method 602 with FID scan.

BPQL = Below Practical Quantitation Limit: 5 ppb for MTBE and Total FID Hydrocarbons,
1 ppb for all other parameters unless noted.

Respectfully submitted,

SCITEST, INC.

Roderick J. Lamothe
Laboratory Director

SCITEST
LABORATORY SERVICES

P.O. Box 339
Randolph, Vermont 05060-0339
(802) 728-3376

LABORATORY REPORT

CLIENT NAME: The Johnson Company

ADDRESS: 5 State Street
Montpelier, VT 05602

SAMPLE LOCATION
SOIL SAMPLES: Danville Grain/Howard Bank

CLIENT PROJECT NO.: 1-0813-1

ATTENTION: Mr. Michael Pottinger

LABORATORY NO.: 1037-89

PROJECT NO.: 78611

DATE OF RECEIPT: 8/24/89

DATE OF REPORT: 9/14/89

DATE OF SAMPLE: 8/22/89

DATE OF ANALYSIS: 8/31/89

RESULTS expressed as micrograms per kilogram dry weight of soil (ppb).

PARAMETER	SB-1 5'-7'	SB-2 5'-7'	SB-2 10'-12'	SB-3 10'-10.3'	SB-3 12.7'-13.7'
Benzene	BPQL	BPQL	BPQL	314.	BPQL
Toluene	239.	276.	BPQL	894.	BPQL
Ethylbenzene	BPQL	BPQL	BPQL	413.	BPQL
Total Xylenes	BPQL	BPQL	BPQL	1430.	BPQL
BTEX	239.	276.	BPQL	3051.	BPQL
Chlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,2-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,3-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,4-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
n-Hexane	BPQL	BPQL	BPQL	289	BPQL
Total FID Hydrocarbons (including BTEX) as n-Hexane	1110.	818.	BPQL	19,300.	4860.
Methyl tertiary Butyl Ether	BPQL	BPQL	BPQL	BPQL	BPQL
Surrogate Recovery	89.3%	85.7%	80.1%	86.3%	104.7%
% Solid	81.6%	83.9%	83.5%	83.5%	88.6%

EPA Method 8020 with FID scan and Method 5030 Methanol Extraction.

BPQL = Below Practical Quantitation Limit:
500 ppb for MTBE and Total Hydrocarbons,
100 ppb for all other parameters.

Respectfully submitted,

SCITEST, INC.

Roderick J. Lamothe
Laboratory Director

Appendix 2

Well Logs

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

DRILLING LOG
WELL # MW1

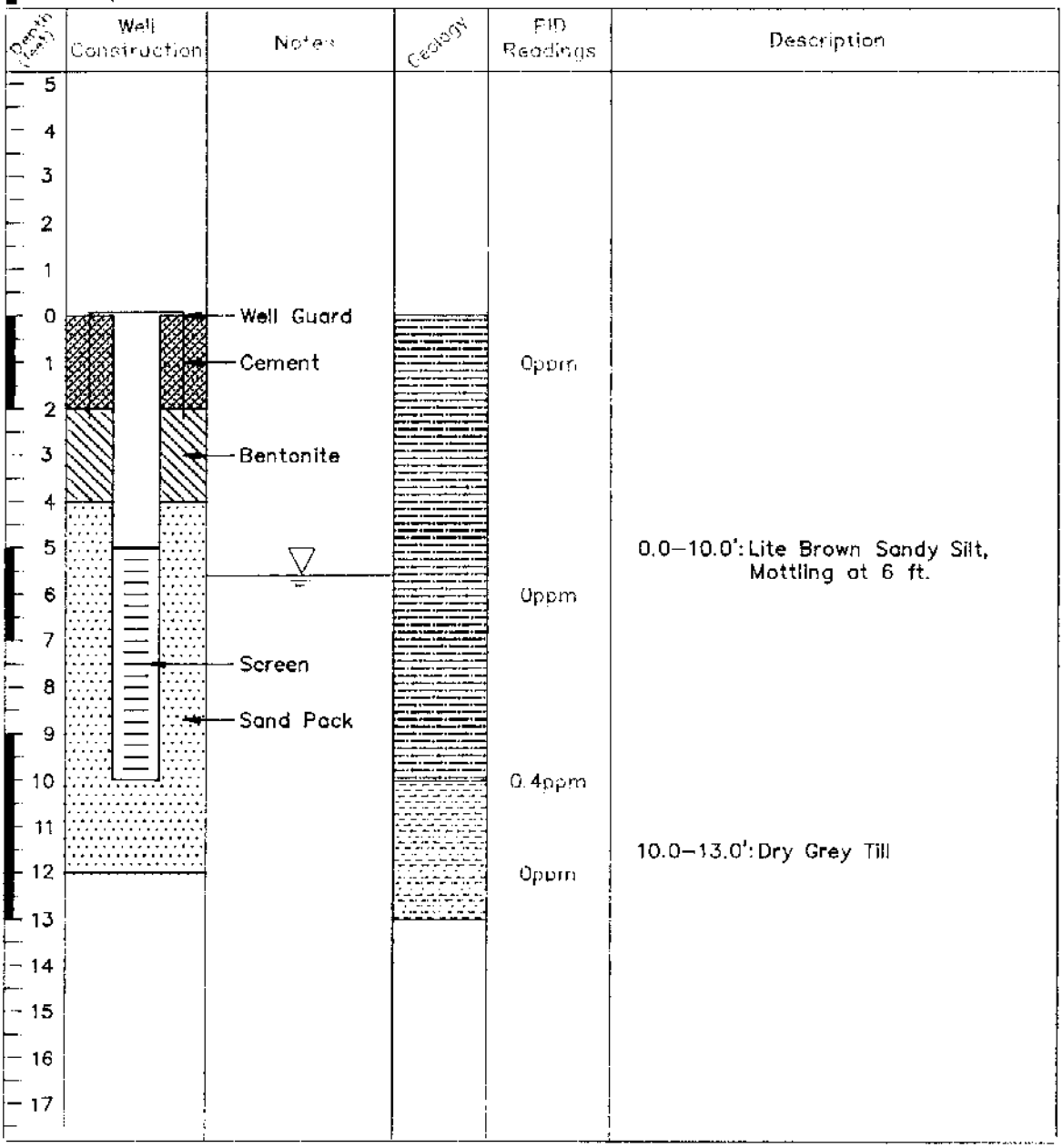
Project: Danville Grain Store
Location: Danville, VT
Job #: 1–0813–2
Logged By: MHP
Date Drilled: 8/22/89
Driller: Falcon Well Drilling
Drill Method: Hollow Stem Auger

Casing Type: PVC
Casing Diameter: 2 in.
Casing Length: 5.0 ft.
Screen Type: PVC
Screen Diameter: 2 in
Screen Length: 4.0 ft
Slot Size: 010

Total Pipe: 10.0 ft
Stick Up: 0.0 ft.
Total Hole Depth: 12.0 ft
Well Guard Length: 2.2 ft
Initial Water Level: 5.6 ft
Surface Elevation: –
T.O.C. Elevation: –

■ = Sampled Interval

Sheet 1 of 1



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

DRILLING LOG
WELL # MW2

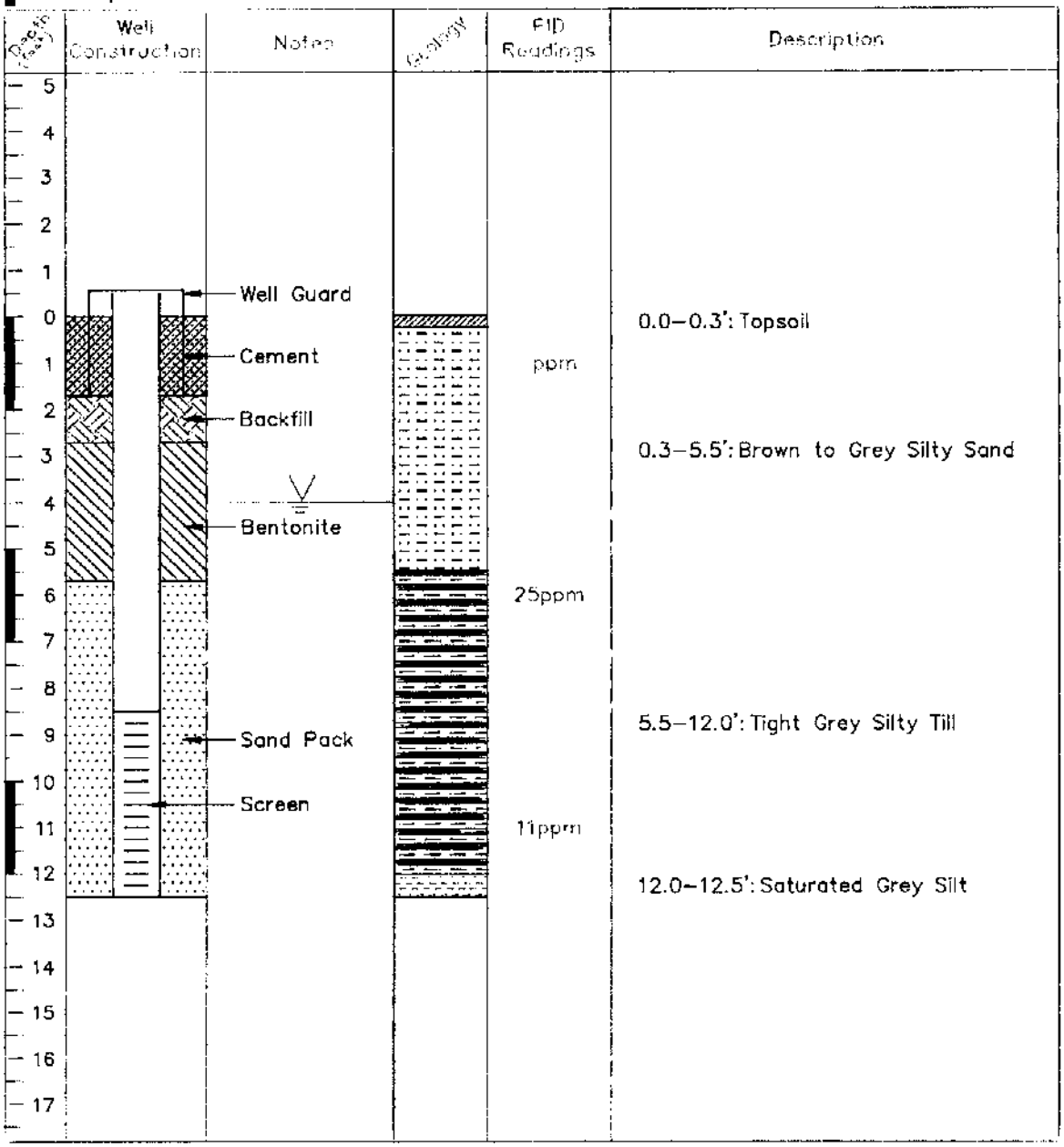
Project: Danville Grain Store
Location: Danville, VT
Job #: 1-0813-2
Logged By: MHP
Date Drilled: 8/22/89
Driller: Falcon Well Drilling
Drill Method: Hollow Stem Auger

Casing Type: PVC
Casing Diameter: 2 in.
Casing Length: 9.0 ft
Screen Type: PVC
Screen Diameter: 2 in.
Screen Length: 4.0 ft.
Slot Size: 010

Total Pipe: 13.0 ft.
Stick Up: 0.5 ft
Total Hole Depth: 12.5 ft
Well Guard Length: 2.2 ft.
Initial Water Level: 4 ft
Surface Elevation: --
T.O.C. Elevation: --

■ = Sampled Interval

Sheet 1 of 1



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

DRILLING LOG
WELL # MW3

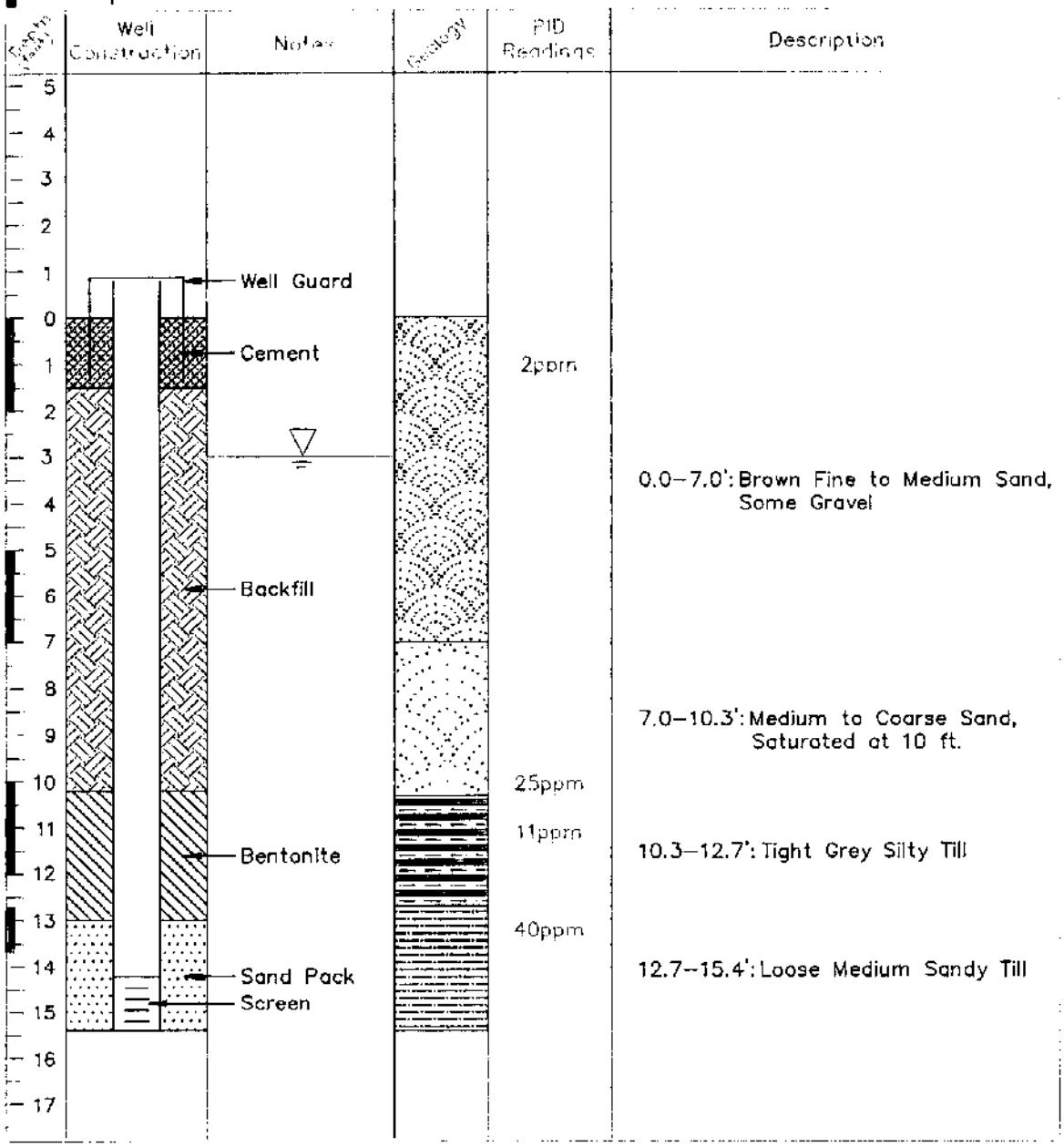
Project: Danville Grain Store
Location: Danville, VT
Job #: 1-0813-2
Logged By: MHP
Date Drilled: 8/22/89
Driller: Falcon Well Drilling
Drill Method: Hollow Stem Auger

Casing Type: PVC
Casing Diameter: 2 in.
Casing Length: 15.0 ft.
Screen Type: PVC
Screen Diameter: 2 in.
Screen Length: 0.9 ft.
Slot Size: 010

Total Pipe: 16.2 ft.
Stick Up: 0.8 ft.
Total Hole Depth: 15.4 ft.
Well Guard Length: 2.2 ft.
Initial Water Level: 3.0 ft.
Surface Elevation: -
T.O.C. Elevation: -

▮ = Sampled Interval

Sheet 1 of 1



Appendix 3

Slug Test Calculations and Plots

Test Method: Slug testing - rising and falling head

Method of analysis (Bouwer, 1978; pp. 114-116)

$$K = \frac{r_c^2 \ln (R_e/r_w)}{2 L_e} \frac{1}{t} \ln \frac{y_o}{y_t}$$

where; R_e = Effective radial distance over which the head diffenece y is dissipated
r_w = radial distance between well center and undisturbed aquifer
r_c = radius of well casing
L_e = height of screened section of well through which ground water enters
y_o = y at time zero
y_t = y at time y
t = time since y_o

All wells penetrate to bottom of aquifer, therefore;

$$\ln \frac{R_e}{r_w} = \frac{1}{\frac{1.1}{\ln(L_w/r_w)} + \frac{C}{(L_e/r_w)}}$$

where; C is a dimensionless coefficient obtained graphically

for all wells; r_c = 0.083 ft.
r_w = 0.30 ft.

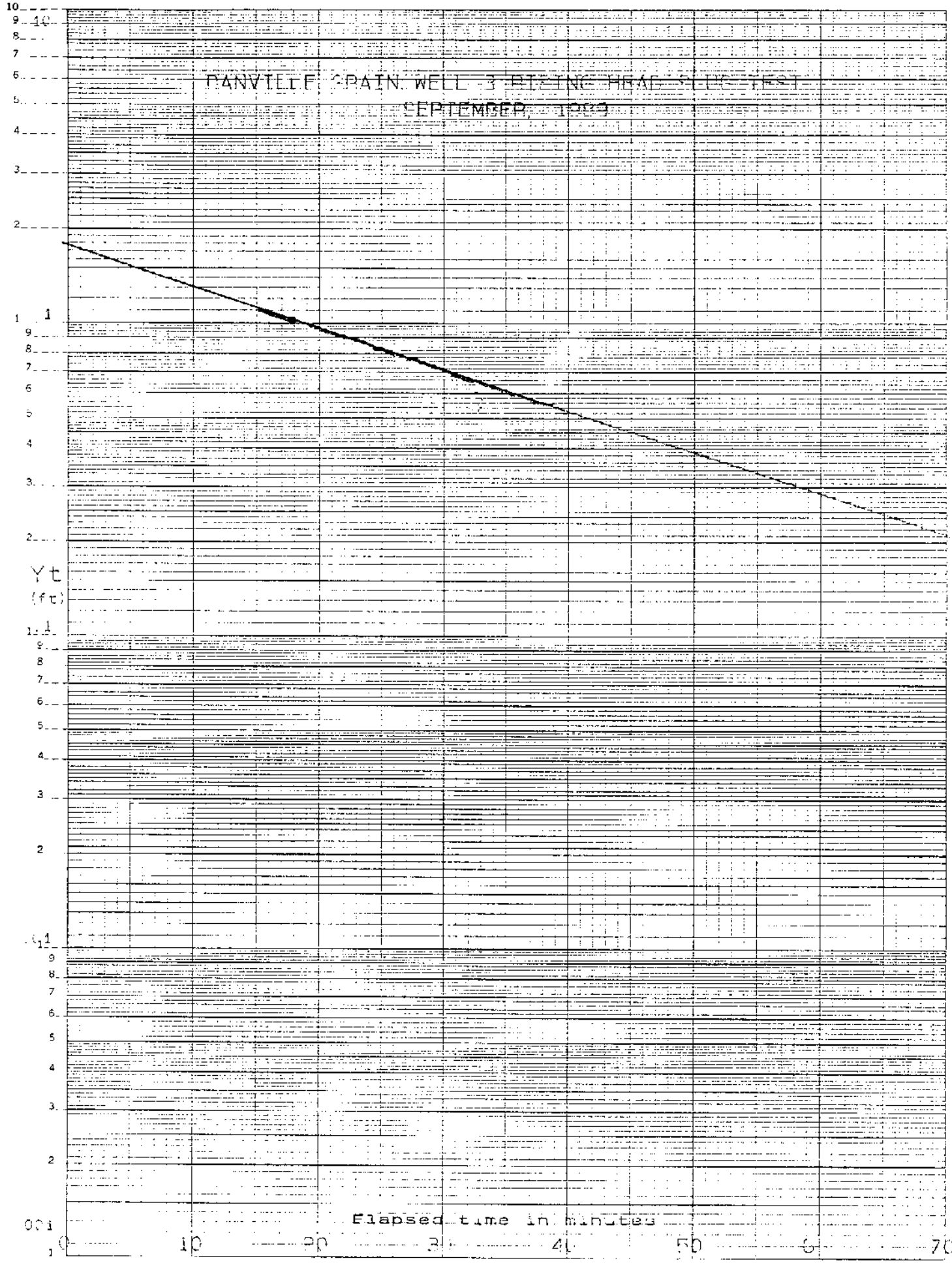
for results of testing, see slug test Summary Table

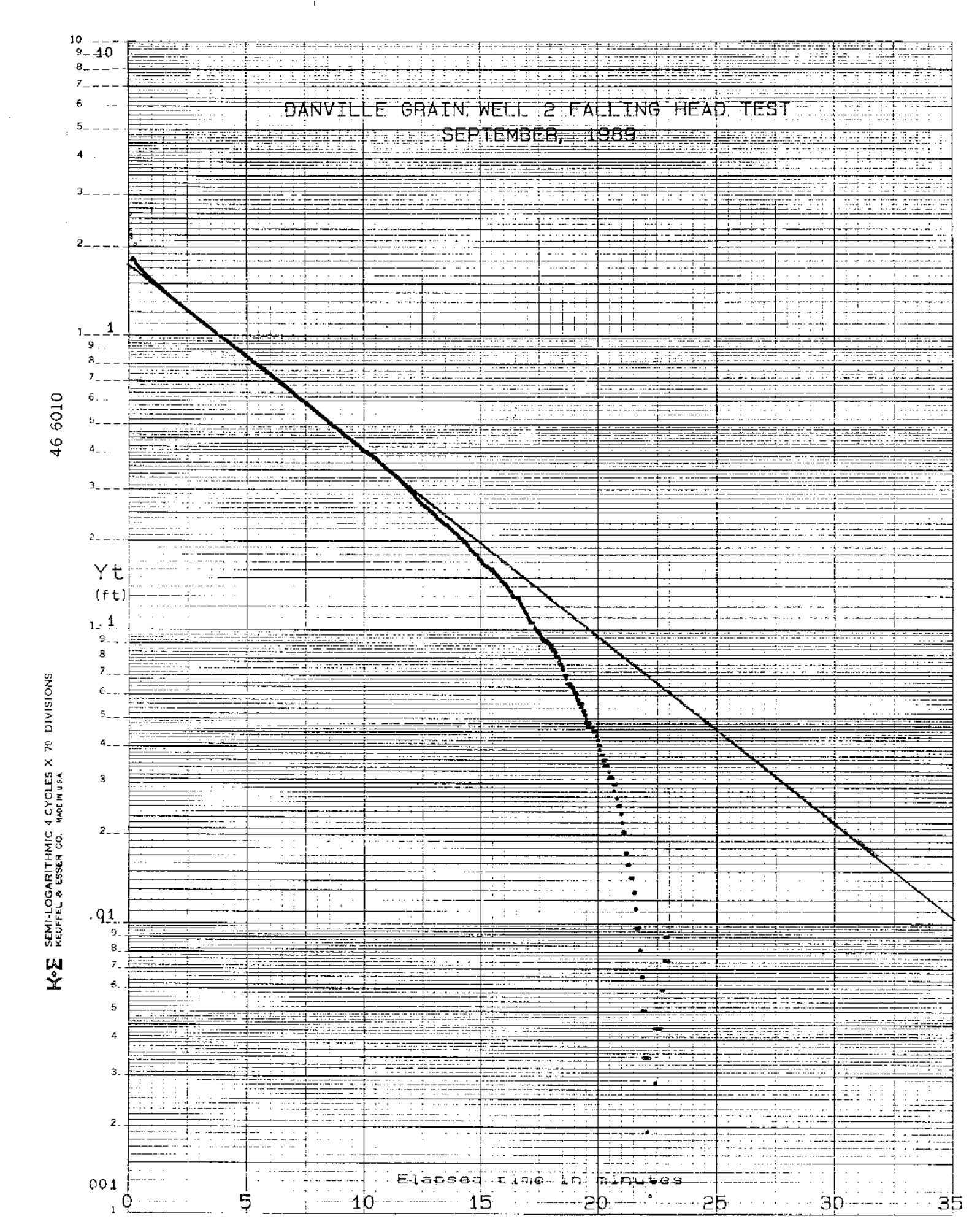
Danville Grain - Howard Bank
Slug Test Summary

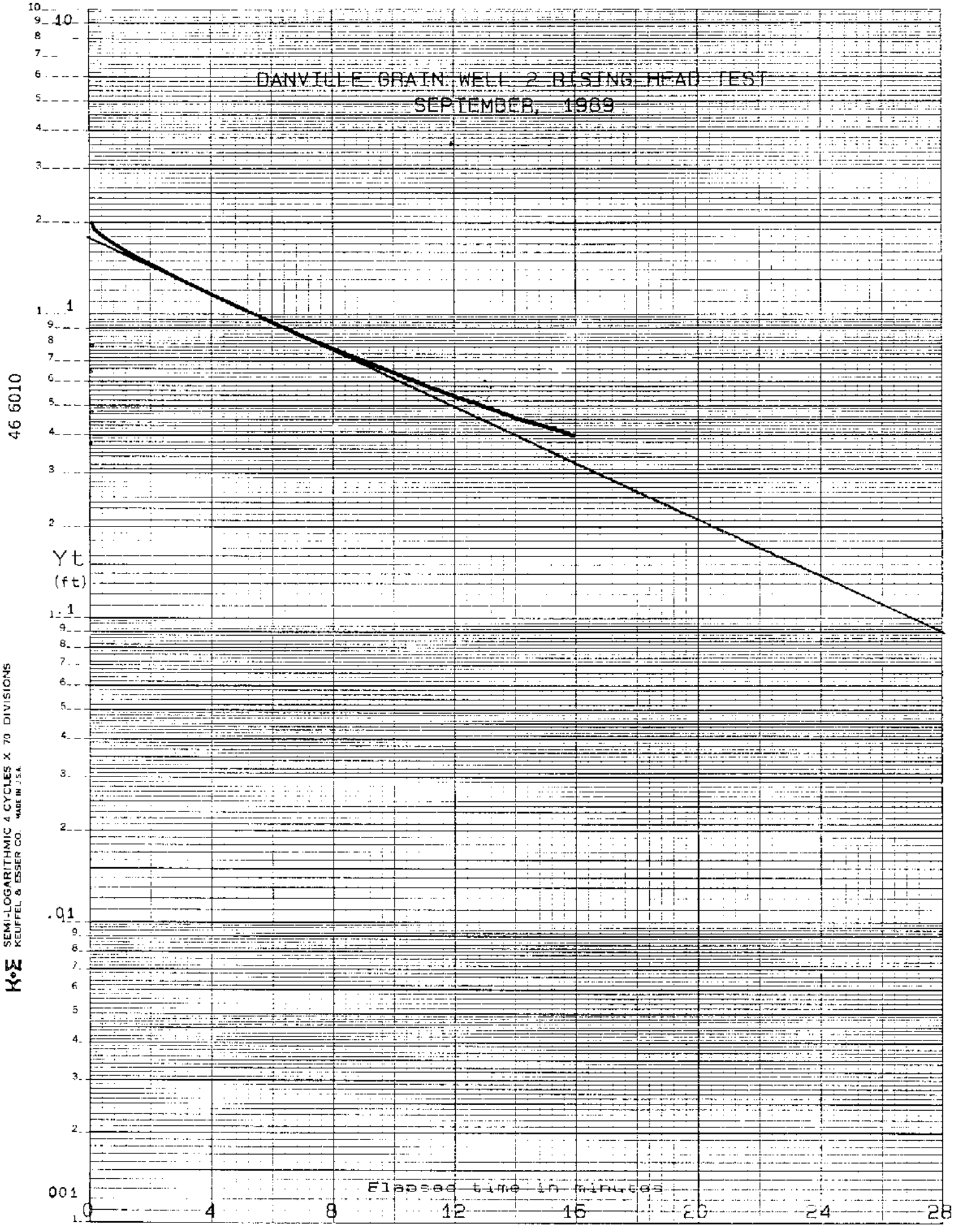
Well #	L_e(ft)	t(sec)	y_o(ft)	y_t(ft)	L_w(ft)	C	K(ft/day)
2F	4.00	35	1.73	0.0105	10.18	1.40	0.43
2R	4.00	28	1.78	0.09	9.68	1.40	0.32
3R	0.9	70	1.78	0.212	12.20	0.70	0.32

Geometric mean of K values = 0.35 ft./day

ERH:djm
1-0813-2
COND.TST


PANVILLE SPAIN WELL 3 BLEING HEAD SLUG TEST
SEPTEMBER 1983
Yt
(ft)
Elapsed time in minutes
0
10
20
30
40
50
60
70
46 6010
K&E
SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.


DANVILLE GRAIN WELL 2 FALLING HEAD TEST
SEPTEMBER, 1989
Yt
(ft)
Elapsed time in minutes
0
5
10
15
20
25
30
35
46 6010
K&E
SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.


DANVILLE GRAIN WELL 2 RISING HEAD TEST
SEPTEMBER, 1989
Yt
(ft)
Elapsed time in minutes
0
4
8
12
16
20
24
28
10
1
.1
.01
.001
46 6010
K+E
SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.