

MAY 22 2002

REMEDIAL EFFECTIVENESS EVALUATION REPORT

May 2002

For
Wheatley Site, Brookfield, Vermont
Vermont Site #94-1693

Prepared for:

UNIFIRST CORPORATION
68 Jonspin Road
Wilmington, Massachusetts 01887

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering

100 State Street, Suite 600
Montpelier, Vermont 05602
802.229.4600/Fax 5876

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1.0 INTRODUCTION AND OBJECTIVE

This document presents the results of a Remedial Effectiveness Evaluation (REE) for the Wheatley Site, Brookfield, Vermont (Site) conducted in accordance with paragraph 39 of the Stipulation and Consent Decree (the Consent Decree) entered on March 23, 1997, between and among the State of Vermont (State); UniFirst Corporation of Wilmington, Massachusetts (UniFirst); and the Town of Williamstown, Vermont (Town). A site location map is included as Figure 1 in Attachment 1. (Due to the number of figures referenced, all are presented in Attachment 1 to maintain clarity for the reader of the text.) The "Site", as used in this document, encompasses a portion of the valley of the Second Branch of the White River, and generally encompasses portions of property owned by Allen Wheatley, Gail Meve, and James Moorcroft as shown in Figure 3.

Paragraph 39 calls for an REE to be conducted within five years of the date of the Consent Decree for each site at which "Work" is performed. Work performed at the Wheatley Site since entry of the Consent Decree includes removal and off-site incineration of sludge and associated soils containing tetrachloroethene (also known as perchlorethylene or PCE); institution of deed restrictions that prevent excavation, construction, and installation of water supplies in and around the Area of Remedial Action; and completion of a Class IV Groundwater Reclassification Package for the Groundwater Coordinating Committee.

The primary remedial actions at this Site were selected and implemented based upon investigations performed between 1994 and 1996. In 1994 a sludge-like material exhibiting a strong odor, subsequently found to contain PCE, was unearthed during excavation of a foundation for a planned new dwelling. Wagner, Heindell and Noyes, Inc. conducted a limited investigation, including excavation of test pits and laboratory analysis of soil samples, in June 1994. Sampling and analysis of the farm water supplies indicated that they were reported to be free of contamination by volatile organic compounds.

In 1995, The Johnson Company (JCO) conducted a complete site characterization in accordance with a Work Plan approved by the Vermont Sites Management Section (VT SMS).

This comprehensive investigation included extensive groundwater and soil sampling, surface water sampling, a soil vapor survey, a ground penetrating radar survey, and a seismic refraction study. In 1996, JCO undertook additional field investigations, including excavation and sampling of seven test trenches and pits, to delineate the limits of the sludge disposal area as a predicate to removal and off-site disposal.

Data resulting from the 1995 investigation indicate that the Site is underlain by a thick silt and clay layer that is a least 100 feet thick. The hydraulic conductivity of the silt unit is approximately 10^{-6} cm/sec. The maximum depth of observed PCE dissolved in groundwater is approximately 55 feet below ground surface. The extensive data set generated from the 1995 investigation indicates that Dense Nonaqueous Phase Liquid (DNAPL) is not present at the Site, and that the silt and clay layer has effectively prevented downward migration of PCE to the bedrock. The area with dissolved volatile organic compound concentrations above Vermont Groundwater Enforcement Standards (VGES) was shown to be limited vertically to depths within 20 feet of the water table and horizontally to locations within 500 feet of the source area. Although drinking water standards and VGES are exceeded in the overburden near the Area of Remedial Action, PCE concentrations in groundwater exceeding VGES are limited to the silt aquitard, which is not capable of providing useful quantities of water.

As provided in the Management Plan, incorporated into the Consent Decree, JCO submitted a Remedial Action Work Plan for excavation and off-site incineration of the sludge and associated soils, and restoration of the remedial action area. The Work Plan was approved by the Vt. SMS on July 25, 1997. The work was completed on August 14, 1998. The Remedial Action Completion Report was submitted to the VT SMS in December, 1998.

Beginning in 1997, sampling and analysis of groundwater and indoor air has been conducted in accordance with the VT SMS approved Monitoring Plan. Long-term down-gradient monitoring wells were installed and have been monitored bi-annually since 1997. Indoor air at the Moorcroft (formerly Kibby) residence also has been monitored on a bi-annual

basis since 1997. Based on sampling results collected in the investigations conducted prior to 1997, VT SMS and JCO agreed that contaminants were not migrating either to existing water supplies or to the nearest surface water, the Second Branch. Existing drinking water supplies and surface water therefore were not included in the approved Monitoring Plan, and are not considered potentially affected receptors at this Site.

The aerial and vertical extent and the magnitude of contamination are well documented through these successive rounds of monitoring and the initial comprehensive study. The principal source of PCE and its breakdown products has been removed. Collectively, the data demonstrate that residual PCE, present as dissolved phase in groundwater and sorbed material in soil, is attenuating with time. The presence of PCE breakdown products, TCE and cis-1,2 DCE, near the Area of Remedial Action, support natural attenuation. Additionally, the one downgradient well in the long-term monitoring program that has had reported detections of PCE (all below VGES) shows declining concentrations over time. Furthermore, TCE and DCE have not been detected in the long-term monitoring wells. The absence of these compounds in the downgradient wells indicates that the extent of these compounds is not increasing, and that a dynamic equilibrium exists which prevents migration of VOCs beyond the areas protected by institutional controls.

The long-term remedial objectives at this Site, as stated in Section I:1.2 of the Management Plan, are: (1) mitigate or prevent exposure to PCE at identified receptors; (2) maintain existing land uses to prevent activities that could disturb Site conditions and/or cause additional exposure to contaminated environmental media; and (3) institute a monitoring program to measure the continuing effectiveness of remedial actions and institutional controls in meeting these objectives.

Paragraph 39 of the Consent Decree states the objectives of this Remedial Effectiveness Evaluation Report ("REER"). They are: (1) to summarize and evaluate all relevant monitoring data collected at the Site; (2) to make recommendations for continuing or modifying the Monitoring Program; and (3) to assess the effectiveness of remedial actions undertaken at the

Site, including any recommended modifications appropriate to meet the objectives of the previously selected remedy.

2.0 DESCRIPTION OF REMEDIAL ACTION

Remedial actions undertaken at the Site have been selected, approved, and documented through a series of reports and correspondence on file with the State, most recently including the Remedial Action performed in accordance with a Work Plan approved by the VT SMS on July 25, 1997, included:

1. Groundwater and soil investigations conducted at the Site by The Johnson Company in 1995 provided an initial delineation of chemical concentrations and likely exposure routes at the Site. This investigation consisted of the installation of 68 piezometers, 11 mini-piezometers, 32 soil core locations, and the collection and analysis of approximately 400 soil samples and nearly 100 groundwater and surface water samples. These sample locations are shown on Figure 5. In addition, a soil gas survey, a ground penetrating radar survey, and a seismic refraction survey were performed to confirm the three-dimensional limits of subsurface chemical concentrations.
2. In 1996, The Johnson Company conducted a test pit investigation under a Work Plan approved by the State for purposes of delineating PCE containing sludge deposits to be removed as the primary remedial action at the Site. Figure 2 shows the locations of the exploratory excavations (test pits and trenches) and the limits of the sludge deposit as delineated in the exploratory investigation. The depths to the sludge deposit varied from 2 to 7.5 feet due to an undulating ground surface.
3. In July 1997, the State approved a Workplan describing the details for the remedial action as provided for the Site in the Management Plan. The approved remedial action entailed removal of the PCE containing sludge and associated soil as delineated in the 1996 investigation, transportation of this material to a licensed facility for incineration, and restoration of the disturbed areas. This work was completed in August 1998. Figure 3 shows the area of remedial action from which the PCE containing materials were removed along with area topography.
4. A Class IV Groundwater Reclassification Package was prepared between 1999 and 2001 in support of a petition by the State of Vermont Agency of Natural Resources, Hazardous Materials Management Division, Sites Management Section (SMS) to reclassify groundwater at and near the Site to Class IV in accordance with the Vermont Groundwater Protection Rule and Strategy (GPRS). A Class IV groundwater designation is an

institutional control that will preclude the installation of new water supply wells in areas with contaminated groundwater. The groundwater reclassification process is on-going at the time of this report. The proposed Class IV area is shown on Figure 4.

5. Deed restrictions limiting future uses of all three of the separately owned properties comprising the Site were approved by the State, signed by the owners, and recorded at the appropriate title records offices. Together, these permanent deed restrictions prevent excavation, drilling, development of water supplies, and other activities within the affected area. The area protected by deed restrictions is identical to that proposed for groundwater reclassification as shown on Figure 4.

3.0 REE METHODOLOGY

3.1 OVERVIEW

This REE was conducted in March and April of 2002. The remedy was evaluated to determine the effectiveness of the corrective actions in reducing the potential for exposure of known potential receptors to PCE in environmental media in the vicinity of the Site. Existing data were used as available. Where appropriate based on the data, statistical methods required and previously employed in preparing the Groundwater Reclassification Report were extended and applied to evaluate the results of sampling and analyses conducted at specific monitoring points in successive monitoring events. Following are brief descriptions of the parameters that were examined during the REE.

3.1.1 Exposure Pathways

The Consent Decree identified potential receptors to be monitored in accordance with a monitoring work plan approved by VT SMS. The purpose of the monitoring was to document any apparent changes in exposure, and to allow development of appropriate responses to those changes.

The following section provides summaries of available historical chemical quality data for PCE and its degradation products in drinking water, groundwater, surface water, and air

quality. When sufficient data were available (more than eight reported instances of samples with non-detect results for a specific chemical) a least squares regression, best-fit approximation of the data was prepared. It should be noted that statistical analysis alone does not provide sufficient information to warrant development of additional remedial actions. The statistical analysis provides information to allow differentiation between seasonal, sampling method, or analytical method variations from long term trends. However, this analysis must be used as one piece of a weight-of-evidence evaluation in order to determine if changes in the exposure assumptions and the VT SMS approved remedial action are warranted.

3.1.2 Existing Data

Monitoring locations included in the VT SMS approved Monitoring Work Plan (and its revisions) include the following:

- overburden monitoring wells (5 monitored semi-annually)
- indoor air (two locations in the Moorcroft residence monitored semi-annually)

These locations are shown on Figure 5.

4.0 SUMMARY OF MONITORING RESULTS BY ENVIRONMENTAL MEDIA

4.1 GROUNDWATER

4.1.1 Drinking Water Supplies

Two drinking water supplies have been identified near the area of detected PCE concentrations in groundwater, the Meve/Wheatley bedrock water supply well (approximately 500 feet upgradient and northeast of the area of remedial action), and the Moorcroft water supply spring (approximately 1,200 feet west-southwest of the area of remedial action and high on the western valley wall). Analytical data from the Meve/Wheatley well indicate that it is not impacted by volatile organic compounds (VOC). Additionally, the results of the hydrogeological investigation demonstrate that the thick silt layer has prevented migration of chemicals to the

bedrock aquifer. The Moorcroft spring is well beyond the observed extent of VOC, is higher than any observed VOC in groundwater, and is across the groundwater divide located approximately below the Second Branch of the White River.

Deed restrictions limiting development and groundwater use have been implemented on the Meve, Moorcroft and Wheatley properties in the area with observed VOC concentrations above Vermont Groundwater Enforcement Standards (VGES). These restrictions preclude excavation in those areas, as well as installation of water supplies.

An area of approximately 33 acres is proposed where groundwater would be reclassified as Class IV based upon the criteria for groundwater reclassification in the Vermont Groundwater Protection Rules (GPRS), and data collected at the Site. Class IV designation will preclude the installation of new wells for sources of potable water in this area. This classification does not preclude the use of groundwater in this area for non-potable uses such as agricultural, industrial and commercial. This classification will confirm through public regulation what has already been achieved through private property restrictions. The proposed Class IV groundwater reclassification area and area with deed restrictions is shown on Figure 4.

4.1.2 Overburden Groundwater

Water quality monitoring of overburden groundwater at the Site is on-going under the direction of the SMS in accordance with the Consent Decree and the Monitoring Workplan developed under the Consent Decree. Overburden groundwater semi-annual monitoring locations include MWPL-1, MWPL-2, MW-S1, MW-S2, and MW-S3 (see Figure 5). These wells are located downgradient of the residual PCE present in soils and groundwater at the Site. TCE and DCE have not been detected at any of these wells. Well MWPL-1 is the only on-going monitoring location which has had reported concentrations of PCE above detection limits. The reported concentrations have all been less than Vermont Groundwater Enforcement Standards (VGES). The VGES for tetrachloroethylene is 5 parts per billion (ppb).

An evaluation of the trends in PCE over time for well MW-PL1 was performed using historical data and a least squares natural log best-fit equation. A graph of the data and the best-fit equation is included as Figure 6. Figure 6 shows all available data for MW-PL-1 presented on a vertical log scale of concentration versus a horizontal time scale. The dashed line is the least squares regression best fit to the data. The negative slope of the line indicates that concentrations of PCE are naturally attenuating over time.

A natural log transformation was used because it provided a better fit than the untransformed data, probably due to the natural attenuation of the contaminants over time. For statistical purposes, the one case when PCE was not detected was not included in developing the best-fit equation.

As described above, residual PCE and its degradation products are present, sorbed to soils and dissolved in groundwater, at the Site. The depth to seasonal high groundwater in the area of dissolved VOC above VGES is greater than four feet. The deed restrictions prevent excavation, construction of new buildings or structures, and other anthropogenic activities which would allow any physical contact with these residual PCE at the Site.

4.2 SURFACE WATER

Samples were collected from eleven mini-piezometers installed in the Second Branch and directly from the surface water in the Second Branch between August 16 and August 24, 1995. No contaminants were detected in any of the surface water or mini-piezometer samples. Ongoing monitoring of wells near the Second Branch indicate that VOC have not migrated to or affected surface water since the August 1995 sampling.

4.3 INDOOR AIR QUALITY

Indoor air quality has been measured semi-annually at the first floor and basement of the former Moorcroft residence since 1997 (except when access could not be attained for a sampling

event). Monitoring was performed by the State or by UniFirst. Figure 3 shows the location of the Moorcroft residence.

Reported PCE concentrations in the indoor air at the Moorcroft residence are shown on Figures 7 and 8. The majority of the sample results reported non-detectable levels of PCE. PCE was reported present on the first floor on three occasions at concentrations between 0.3 and 0.64 ppbV. However, on two of these occasions, PCE was not detected in the associated duplicate sample (no duplicate sample was collected on the third occasion). PCE was reported present on two occasions in the basement, at concentrations estimated at 0.07 ppbV and 4.8 ppbV. However, a duplicate sample collected at the same time as the 0.07 ppbV sample did not have any detectable PCE. Additionally, a duplicate sample of the reported 4.8 ppbV sample had only an estimated 0.15 ppbV PCE, and the trip blank associated with that monitoring event contained PCE as well, indicating that chemicals had entered the sample due to an inadequate bottle cleaning process, or during bottle sample/transport (and that therefore the reported detections may have been an artifact of this non-site related contamination).

DCE has not been detected during the seven indoor air monitoring events. TCE was reported present on the first floor during one event in July 2000 at an estimated concentration of 0.2 parts per billion by volume (ppbV). However, a duplicate sample collected at the same time did not have any detectable TCE.

Despite numerous inconsistencies in the air quality data, it appears that the residents of the Moorcroft residence are not being chronically exposed to PCE TCE or DCE. When PCE is occasionally reported present in the indoor air, it is at concentrations below 1 ppbV.

5.0 CONCLUSIONS

The remedial actions implemented and approved as part of the Management Plan were designed to control the potential for exposure to PCE and its breakdown products at known receptors. The remedial actions have consisted of careful delineation of chemicals and source material, soil excavation and source removal, and the implementation of institutional controls to prevent disturbance of downgradient areas.

The hydrogeological evaluations and historical data from the Site, and documentation from the Remedial Action, demonstrate the following:

- 1) All primary source material has been removed and incinerated.
- 2) The vertical and horizontal extent of residual PCE, TCE and DCE in groundwater and soils have been carefully and extensively documented. The limits of VOC in groundwater are defined by "clean" groundwater samples to the north, south, east, and west of the Remedial Action area, and between the upper portion of the overburden and the bedrock.
- 3) Groundwater monitoring over time indicates that the extent of VOC is not increasing, and concentrations in downgradient wells are stable or declining with time. Further, as a result of natural attenuation, VOC concentrations in soils and groundwater decline markedly with distance from the area of the Remedial Action.

A detailed study of the potential for degradation has not been performed. However, there is evidence that degradation is occurring. The presence of PCE breakdown products (TCE and cis-1,2-DCE) indicate that degradation in fact is occurring. That more than 90 percent of the total 1,2-DCE is cis-1,2-DCE also indicates that it is likely the result of natural degradation of PCE (EPA/600/R-98/128 Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water). Therefore the residual chemicals are likely naturally degrading in-place.

Following is a brief discussion summarizing conclusions on a media-specific basis.

5.1 DRINKING WATER

- None of the water supply wells in the vicinity of the Site are at risk of contamination from the VOCs characterized in the subsurface.
- Deed restrictions and the pending implementation of a Class IV groundwater area will prevent excavation or the drilling of any new water supplies in the contaminated area.

5.2 GROUNDWATER

- Depth to groundwater in the area of residual VOCs in soils and groundwater is greater than 4 feet. Therefore, the risk of incidental direct physical contact with contaminated groundwater is minimal.
- VOC transport is primarily via dissolved constituents in groundwater. Surface water has not been affected by migration of dissolved VOC through groundwater. Historical groundwater quality data and hydrogeological studies demonstrate that the extent of dissolved VOC in the groundwater is limited. The limits of VOC are defined by clean groundwater quality data to the north, south, east, and west. Available data further indicate that a combination of natural hydrogeologic boundaries and continuing attenuation of the residual dissolved and sorbed VOC have resulted in conditions that are preventing increases in the aerial and vertical extent of dissolved chemicals. Further, overall concentrations in downgradient groundwater monitoring wells are declining over time.
- The observed steady state or declining concentrations of PCE in the groundwater at the Site over the past 5 years indicates that, absent any unforeseen changes in hydrogeologic conditions, the potential for the exposure of receptors proximate to the Site to PCE will continue to diminish over time.

5.3 SURFACE WATER

- Groundwater and surface water quality data indicate that direct contact with contaminated surface water is not a risk.

5.4 AIR QUALITY

- Contaminated levels in the indoor air at the Moorcroft residence are predominantly non-detectable. Occasionally PCE has been reported present, but generally detections are less than 1 ppbV. Additionally, quality control samples indicate that the occasional reported presence of low concentrations of PCE may be “false positives” due to non-site-related contamination of the sample containers.

5.5 REMEDIAL ACTION CURRENT REMEDY

PCE containing sludge and adjacent soils were excavated and transported off-site for incineration. The remediated area has been successfully revegetated, and deed restrictions have been emplaced to prevent uses that could potentially expose humans to direct contact with residual contaminated soils or groundwater. Establishment of a Class IV groundwater zone at the Site will further reduce the potential for future use of the groundwater for drinking water.

6.0 RECOMMENDATIONS

Following are recommendations regarding the remedial actions at this Site:

- Semi-annual monitoring of monitoring wells and indoor air should be reduced to annual monitoring each autumn. The data collected during the last five years of monitoring indicates that there are no seasonal fluctuations in water levels, water quality and indoor air quality that will significantly affect PCE concentrations at the receptors. Annual monitoring in the future will provide sufficient data to confirm that hydrogeologic conditions do not change.
- The State should complete the groundwater reclassification process as soon as possible.

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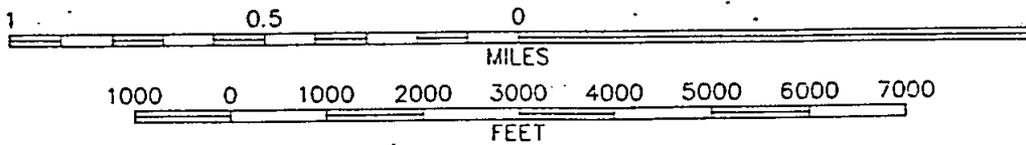
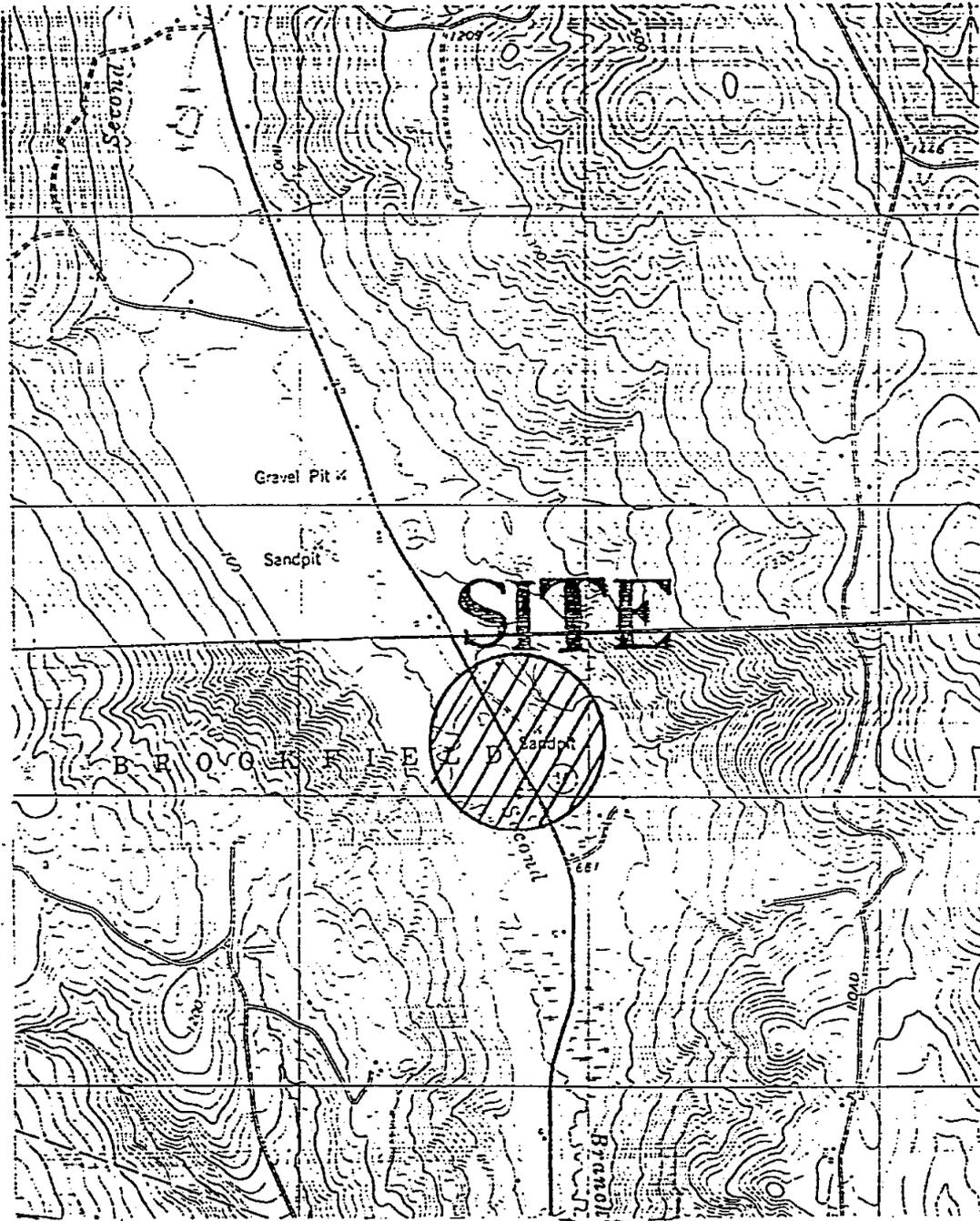
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ATTACHMENT 1

Figures



CONTOUR INTERVAL 20 FEET



MAP LOCATION

BASE MAP: USGS 7.5 Minute Topographic Quadrangle BROOKFIELD, VT. 1950 and RANDOLPH CENTER, VT 1981

FIGURE 1 : Site Location Map
 Wheatley Farm Site
 Brookfield, Vermont

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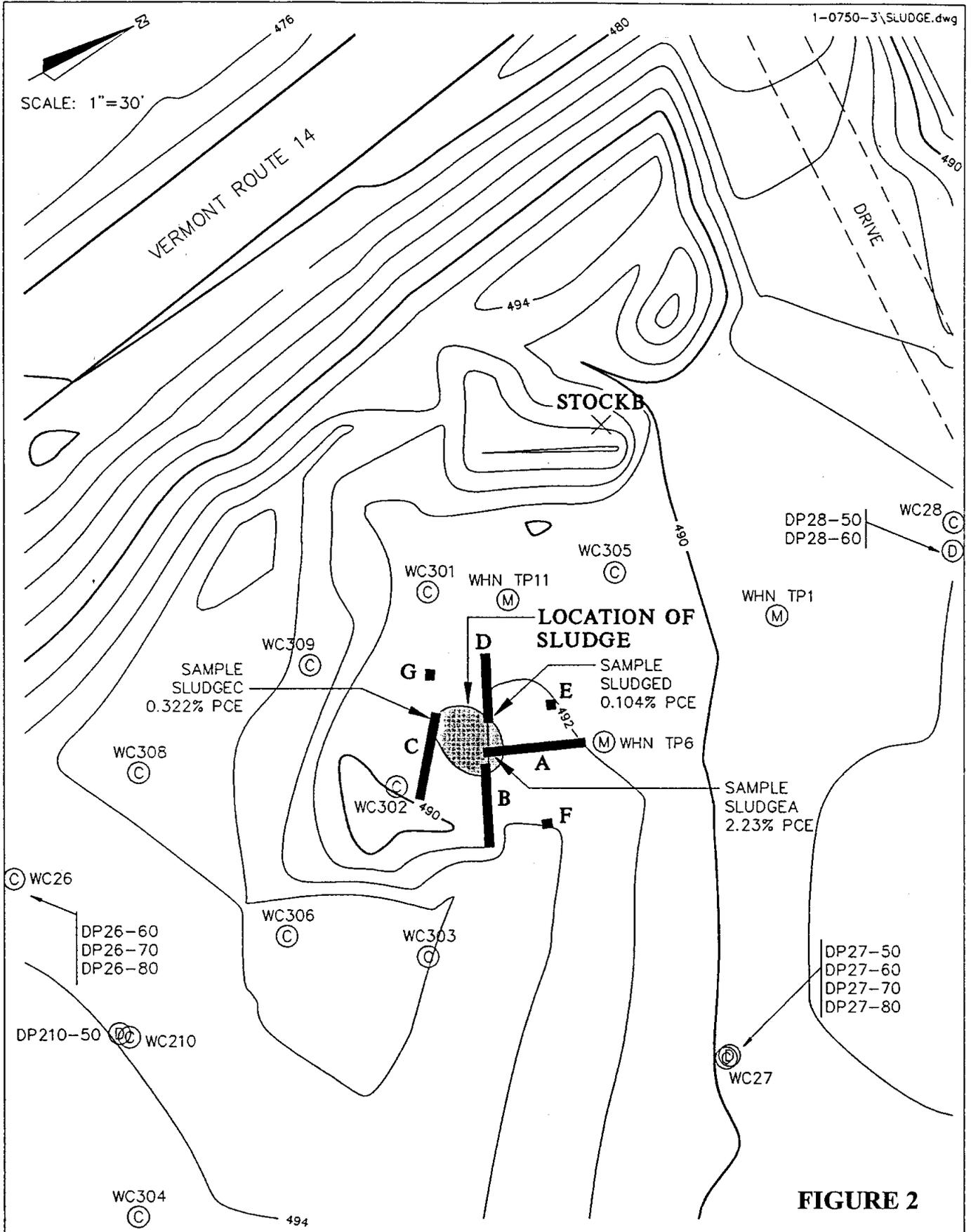


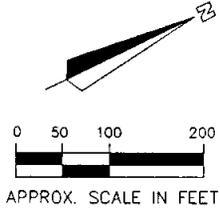
FIGURE 2

LOCATION OF SLUDGE
 WHEATLEY FARM SITE
 BROOKFIELD, VERMONT

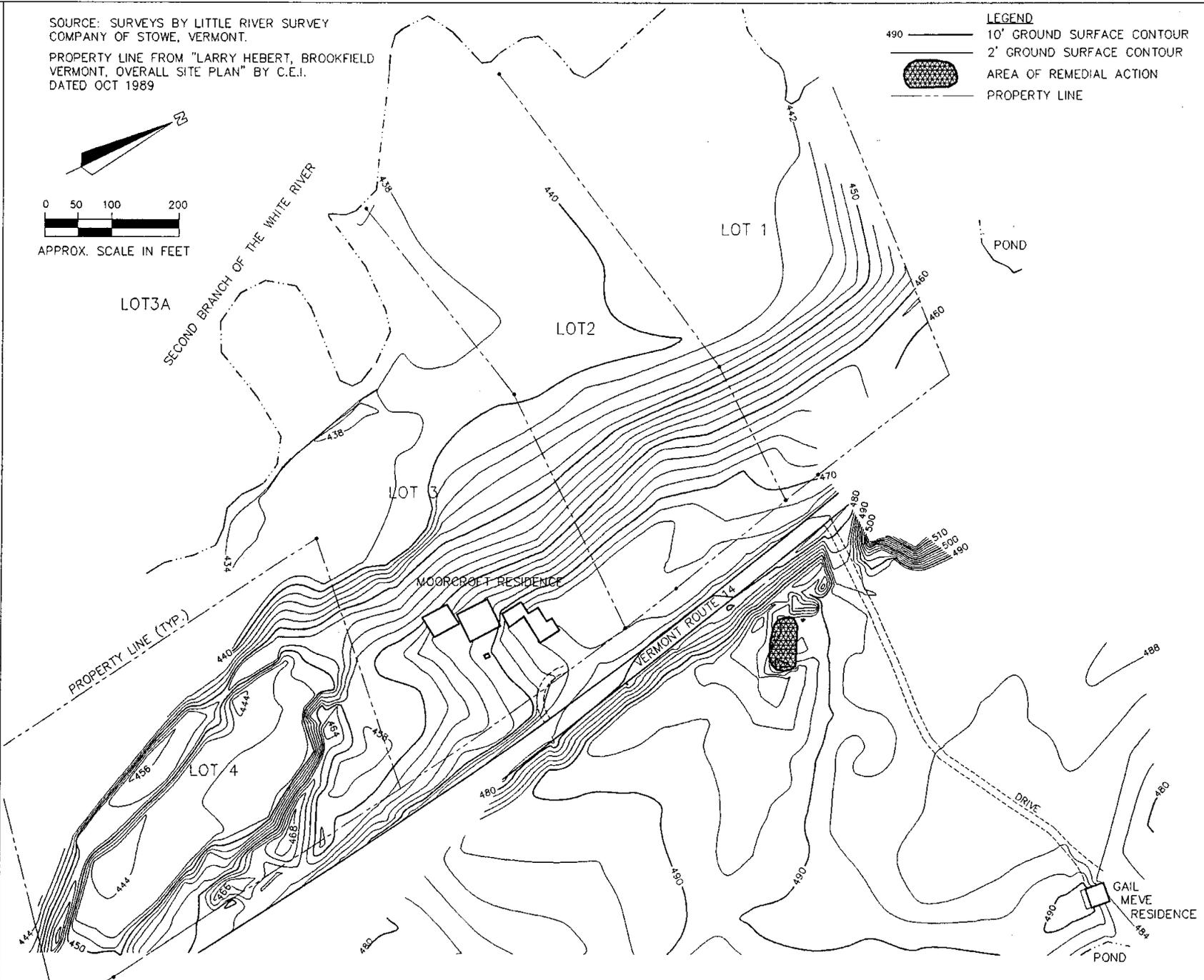
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 100 STATE STREET MONTPELIER, VT 05602

SOURCE: SURVEYS BY LITTLE RIVER SURVEY COMPANY OF STOWE, VERMONT.
 PROPERTY LINE FROM "LARRY HEBERT, BROOKFIELD VERMONT, OVERALL SITE PLAN" BY C.E.I. DATED OCT 1989

LEGEND
 490 ——— 10' GROUND SURFACE CONTOUR
 ——— 2' GROUND SURFACE CONTOUR
 AREA OF REMEDIAL ACTION
 - - - - - PROPERTY LINE



**FIGURE 3: TOPOGRAPHIC MAP
 WHEATLEY FARM SITE
 BROOKFIELD, VERMONT**



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DATE: 3/28/00 PROJECT: 1-0750-3
 DRAWN BY: TK SCALE: 1"=200'

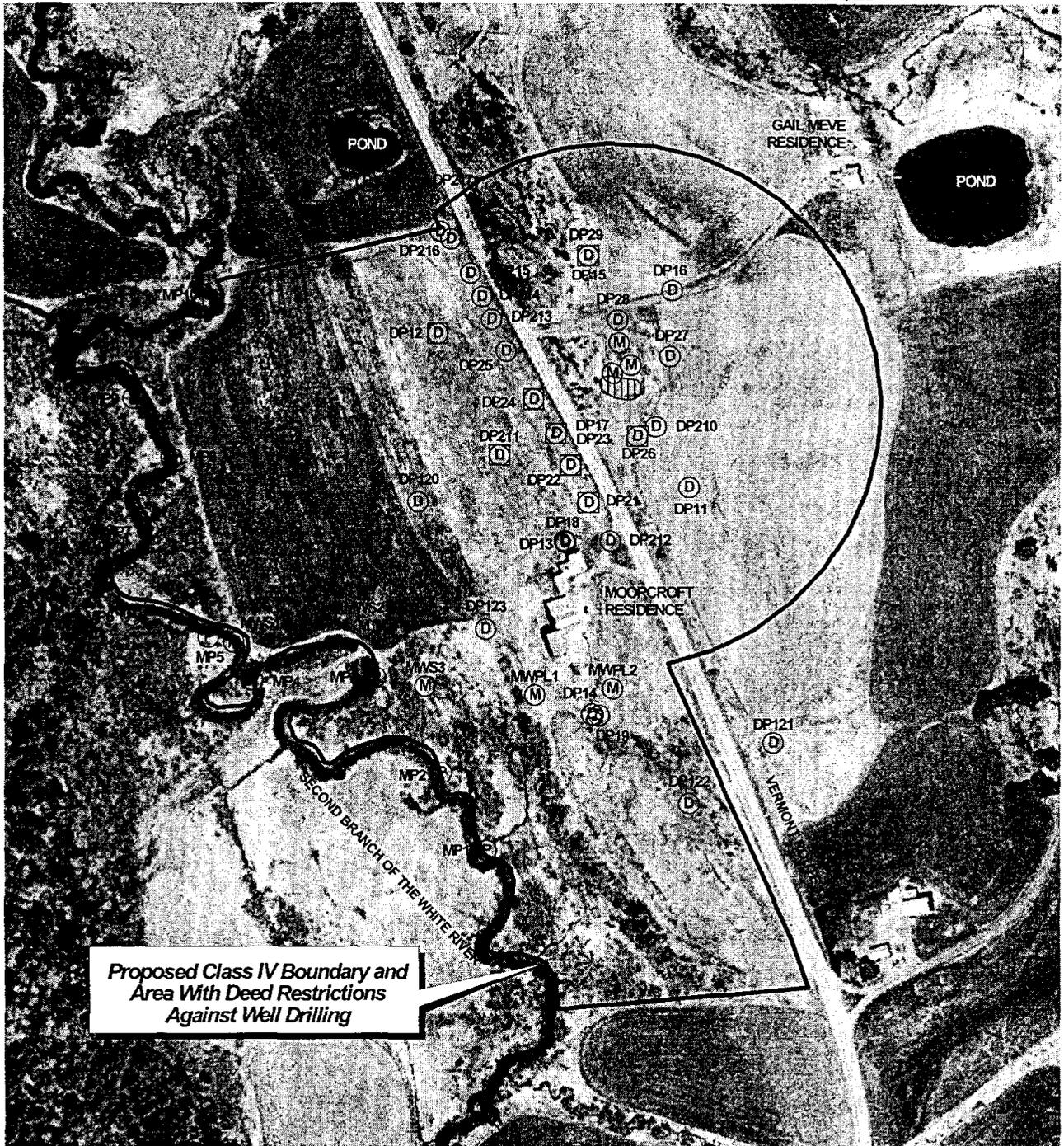
BASE.dwg



300 0 300 Feet



-  AREA OF REMEDIAL ACTION
-  MINI-PIEZOMETER LOCATION
-  PIEZOMETER LOCATION
-  MONITORING WELL LOCATION
-  CONTAMINATED LOCATION ABOVE VGES



Proposed Class IV Boundary and Area With Deed Restrictions Against Well Drilling

SOURCES: SURVEYS BY LITTLE RIVER SURVEY COMPANY OF STOWE, VERMONT
VERMONT MAPPING PROGRAM BASE MAPS #144164 & #148164

REVISED 11/19/01 TJK
REVISED 5/21/01 LBM

**FIGURE 4: PROPOSED CLASS IV GROUNDWATER BOUNDARY
WHEATLEY FARM SITE
BROOKFIELD, VERMONT**

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DATE: 3/28/00

1-0750-3\WHEATLEY.apr

Monitoring Well MW-PL1, Brookfield, Vermont Tetrachloroethene Concentrations

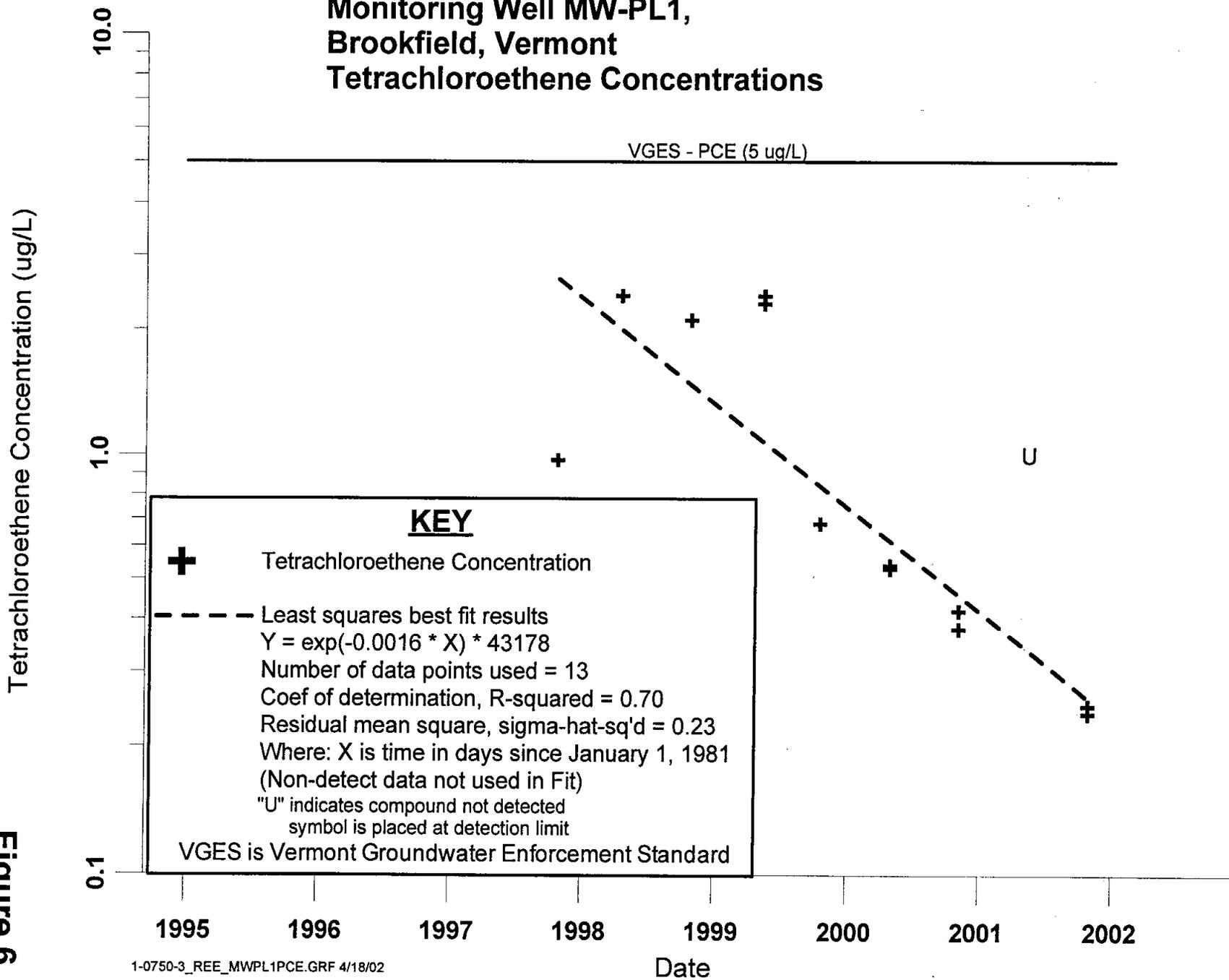


Figure 6

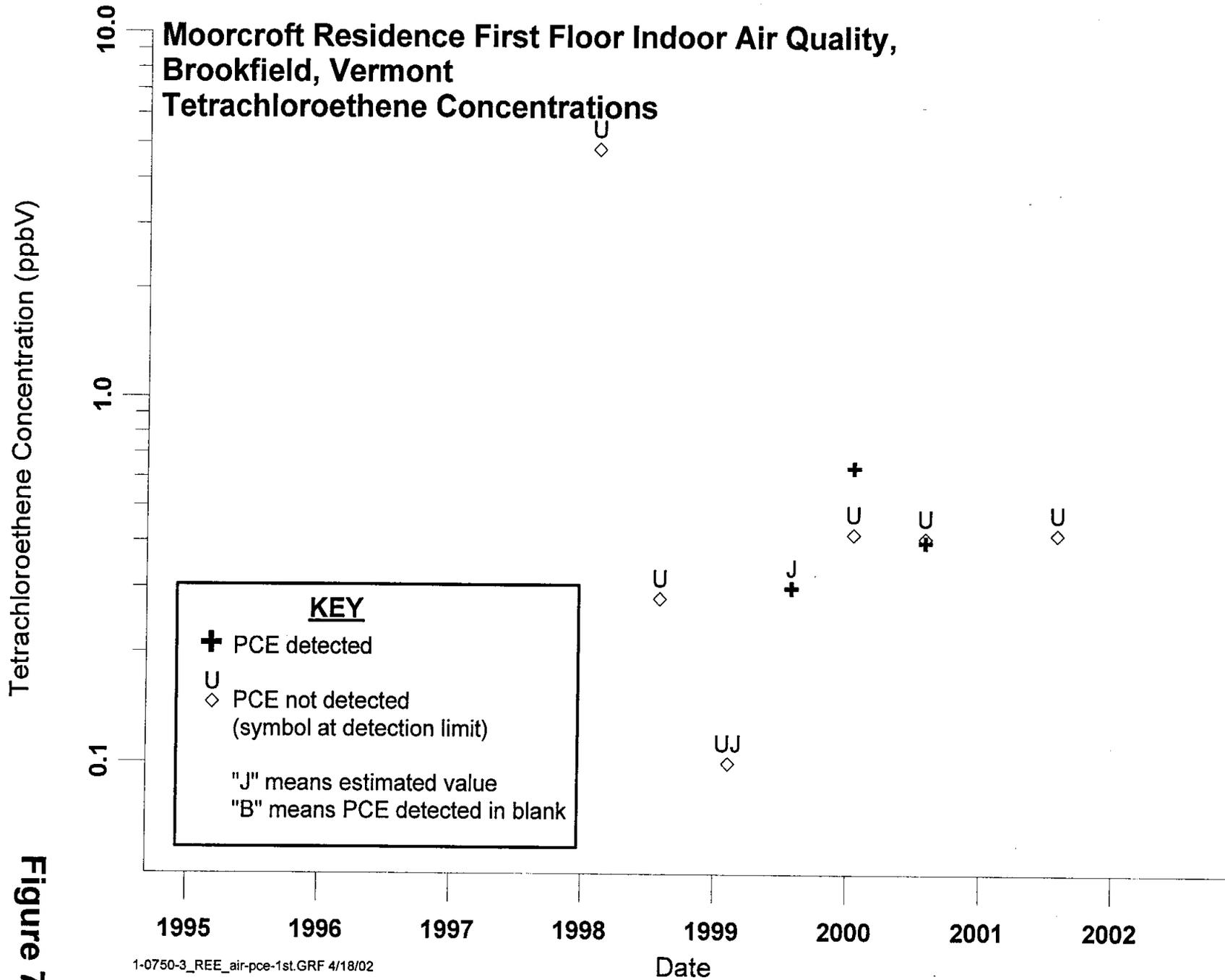


Figure 7

Tetrachloroethene Concentration (ppbV)

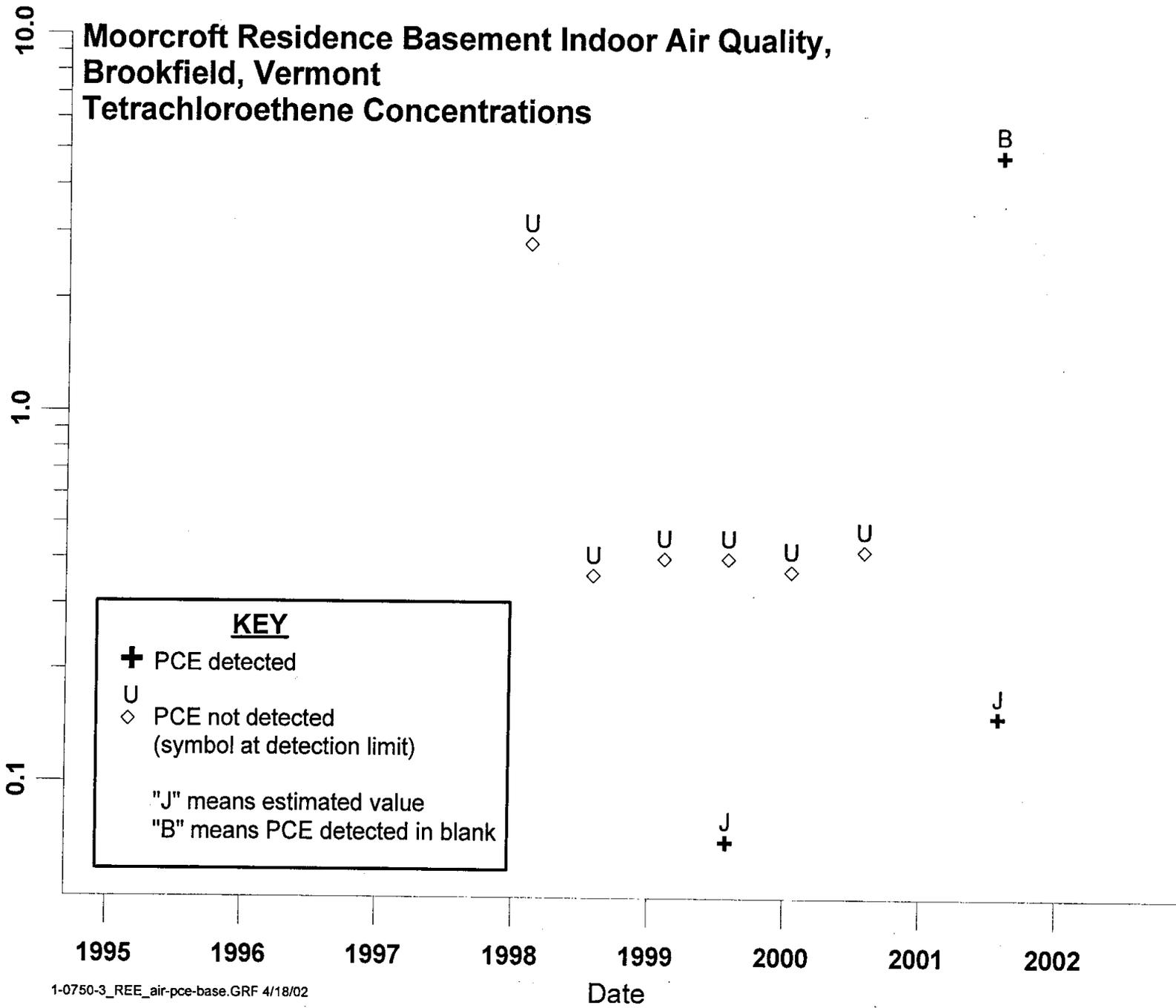


Figure 8

1-0750-3_REE_air-pce-base.GRF 4/18/02

ATTACHMENT 2

Data

Summary of Groundwater and Surface Water Quality - Wheatley Site, Brookfield, Vermont

Sample Elevation is based upon center of screen except from samples collected with Waterloo Drive Point Sampler

All concentrations presented in ug/L, "J" indicates estimated concentration, "U" indicates compound not detected

PCE = tetrachloroethene, TCE = trichloroethene, DCE = 1,2-dichloroethene QA/QC 4/6/01

Total 1,2-DCE was calculated by summing the detected concentrations values of the cis and trans isomers

If no DCE was detected, then the detection limit was set to the larger detection limit for cis or trans isomers

Note: Sample elevation data collected prior to 1997 was corrected to NGVD by adding 220.52 feet.

Sample Name	DATE	Sample Elevation	Laboratory Method	PCE	TCE	Total DCE	Cis-DCE	Trans-DCE	Vinyl chloride	COMMENTS
GROUNDWATER WELLS & PIEZOMETERS										
DP11-13	11/28/95	698.5	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP12-17	08/30/95	666.63	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP12-20	09/07/95	663.02	Aquatec GC/MS	U 1	U 1	U 1	U 1	U 1	U 1	
DP12-21	08/30/95	661.98	JCO GC/SPME	J 9	U 20	U 20	U 20	U 20	U 100	
DP12-21	09/08/95	661.98	JCO GC/SPME	J 8	U 20	U 20	U 20	U 20	U 100	Field Duplicate
DP12-21	09/08/95	661.98	Aquatec GC/MS	7	U 1	U 1	U 1	U 1	U 1	
DP12-21	09/08/95	661.98	JCO GC/SPME	J 8	U 20	U 20	U 20	U 20	U 100	
DP12-33	08/30/95	650.67	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP12-33	09/08/95	650.67	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP12-33	09/08/95	650.67	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP120-10	09/07/95	654.375	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	Field Duplicate
DP120-20	09/07/95	644.68	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP120-29	09/07/95	635.7	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP122-15	09/07/95	653.42	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	Field Duplicate
DP123-10	09/07/95	656.68	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP124-19	11/10/95	663.78	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP13-29	11/13/95	666.16	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP14-32	08/30/95	647.6	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP14-32	09/07/95	647.6	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP14-32	09/07/95	647.6	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP15-44	11/28/95	662.27	JCO GC/SPME			1700	1700			Undiluted
DP15-44	11/28/95	662.27	JCO GC/SPME	U 20	U 20	1300	1300	U 20	U 100	Diluted 12:1
DP15-54	11/28/95	652.74	JCO GC/SPME	U 20	U 20	540	540	U 20	U 100	
DP17-25	11/10/95	671.32	JCO GC/SPME	J 37	U 20	U 20	U 20	U 20	U 100	
DP17-35	09/08/95	660.94	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP21-25	10/25/95	671.46	JCO GC/SPME	J 40	U 100	U 100	U 100	U 100	U 500	Turbid, diluted 5:1
DP21-25	11/10/95	671.46	JCO GC/SPME	390	U 20	U 20	U 20	U 20	U 100	
DP21-25	11/10/95	671.46	Aquatec GC/MS	420	U 20	U 20	U 20	U 20	U 20	
DP21-40	10/25/95	656.38	JCO GC/SPME	U 100	U 100	U 100	U 100	U 100	U 500	Turbid, diluted 5:1
DP21-40	11/10/95	656.38	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP21-55	11/10/95	641.4	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP21-70	11/13/95	626.32	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP210-50	11/09/95	664.03	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP211-25	11/28/95	666.61	JCO GC/SPME	290	U 20	U 20	U 20	U 20	U 100	
DP211-30	11/28/95	661.72	JCO GC/SPME	99	U 20	U 20	U 20	U 20	U 100	
DP211-35	11/28/95	656.59	JCO GC/SPME	260	U 20	U 20	U 20	U 28	U 100	
DP211-40	11/28/95	651.57	JCO GC/SPME	150	U 20	U 20	U 20	U 28	U 100	
DP212-25	11/28/95	671.47	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	

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Sample Name	DATE	Sample Elevation	Laboratory Method	PCE	TCE	Total DCE	Cis-DCE	Trans-DCE	Vinyl chloride	COMMENTS
DP213-30	11/28/95	659.31	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP214-30	11/28/95	658.42	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP215-30	11/28/95	657.23	JCO GC/SPME	U 20	U 20	U 20	U 20	U 30	U 100	
DP215-30	11/28/95	657.23	JCO GC/SPME	U 20	U 20	U 20	U 20	U 30	U 100	
DP216-30	11/28/95	653.85	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	Field Duplicate
DP217-30	11/28/95	648.4	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP22-25	10/25/95	670.33	JCO GC/SPME	3900	31 J	18 J	18 U	20 U	100	Combined 100%/25%
DP22-25	11/10/95	670.33	Aquatec GC/MS	3100 U	140 U	140 U	140 U	140 U	140	
DP22-25	11/10/95	670.33	JCO GC/SPME	3300 U	20 U	20 U	20 U	20 U	100	Diluted 24:1
DP22-40	11/10/95	655.44	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP22-55	11/10/95	640.37	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP22-70	11/10/95	625.27	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP23-55	11/10/95	640.4	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP23-70	11/10/95	625.28	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP24-25	11/09/95	668.92	JCO GC/SPME	J 10	U 20	U 20	U 20	U 20	U 100	
DP24-40	11/10/95	654.06	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP24-55	11/13/95	638.82	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP24-70	11/10/95	624.04	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP25-25	11/09/95	666.48	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP25-40	11/09/95	651.51	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP25-55	11/09/95	636.51	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP25-70	11/10/95	621.35	Aquatec GC/MS	U 1	U 1	U 1	U 1	U 1	U 1	
DP25-70	11/10/95	621.35	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP26-50	11/09/95	664.54	Aquatec GC/MS	450 U	25	48	48 U	25 U	25	
DP26-50	11/09/95	664.54	JCO GC/SPME	410 J	9	52	52 U	20 U	100	Combined 100%/50%
DP26-60	11/13/95	654.63	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP26-70	11/13/95	644.48	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP26-80	11/13/95	634.5	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP27-50	11/09/95	659.54	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP27-60	11/13/95	649.48	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP27-70	11/13/95	639.5	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP27-80	11/09/95	630.16	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP28-50	10/16/95	658.57	JCO GC/SPME	U 100	U 100	U 100	U 100	U 100	U 500	Turbid, diluted 5:1
DP28-50	11/13/95	658.57	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP28-60	10/16/95	648.47	JCO GC/SPME	U 100	U 100	U 100	U 100	U 100	U 500	Turbid, diluted 5:1
DP28-60	11/09/95	648.47	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP28-70	11/09/95	638.29	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	
DP28-80	11/09/95	628.22	Aquatec GC/MS	U 1	U 1	U 1	U 1	U 1	U 1	
DP28-80	11/09/95	628.22	JCO GC/SPME	U 20	U 20	U 20	U 20	U 20	U 100	

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PCE = tetrachloroethene, TCE = trichloroethene, DCE = 1,2-dichloroethene QA/QC 4/6/01

Total 1,2-DCE was calculated by summing the detected concentrations values of the cis and trans isomers

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Note: Sample elevation data collected prior to 1997 was corrected to NGVD by adding 220.52 feet.

Sample Name	DATE	Sample Elevation	Laboratory Method		PCE	TCE	Total DCE	Cis-DCE	Trans-DCE	Vinyl chloride	COMMENTS	
DP29-47	11/09/95	659.94	JCO	GC/SPME	U	20	U	20	U	20	100	
DP29-70	11/13/95	636.78	JCO	GC/SPME	U	20	U	20	U	20	100	
MW-PL1	10/21/97	660.8	ITS	8260	J	0.97	U	1	U	1	1	
MW-PL1	04/14/98	660.8	ITS	8260		2.4	U	1	U	1	1	
MW-PL1	10/22/98	660.8	Sev.Trent	8260		2.1	U	1	U	1	1	
MW-PL1	05/11/99	660.8	Sev.Trent	8260	J	2.3	U	1	U	1	1	
MW-PL1	05/11/99	660.8	Sev.Trent	8260	J	2.4	U	1	U	1	1	Dup. Lable MW-D
MW-PL1	10/14/99	660.8	Sev.Trent	8260	J	0.68	U	1	U	1	1	
MW-PL1	10/14/99	660.8	Sev.Trent	8260	J	0.68	U	1	U	1	1	Dup. Lable MW-D
MW-PL1	04/25/00	660.8	Sev.Trent	8260	J	0.54	U	1	U	1	1	
MW-PL1 DP	04/25/00	660.8	Sev.Trent	8260	J	0.53	U	1	U	1	1	Dup. lable MW-4
MW-PL1	10/31/00	660.8	Sev.Trent	8260	J	0.38	U	1	U	1	1	
MW-PL1 DP	10/31/00	660.8	Sev.Trent	8260	J	0.42	U	1	U	1	1	Dup. labeled MW-K
MW-PL1	05/10/01	660.8	Sev.Trent	8260	U	1	U	1	U	1	1	
MW-PL1	10/23/01	660.8	DEC	8260	J	0.24	U	1	U	1	1	
MW-PL1 DP	10/23/01	660.8	DEC	8260	J	0.25	U	1	U	1	1	Dup. labeled MW-K
MW-PL2	10/21/97	665.8	ITS	8260	U	1	U	1	U	1	1	
MW-PL2	04/14/98	665.8	ITS	8260	U	1	U	1	U	1	1	
MW-PL2	10/22/98	665.8	Sev.Trent	8260	U	1	U	1	U	1	1	
MW-PL2	05/11/99	665.8	Sev.Trent	8260	U	1	U	1	U	1	1	
MW-PL2	10/14/99	665.8	Sev.Trent	8260	U	1	U	1	U	1	1	
MW-PL2	04/25/00	665.8	Sev.Trent	8260	U	1	U	1	U	1	1	
MW-PL2	10/31/00	665.8	Sev.Trent	8260	UJ	1	U	1	U	1	1	
MW-PL2	05/10/01	665.8	Sev.Trent	8260	U	1	U	1	U	1	1	
MW-PL2	05/10/01	665.8	DEC	8260	U	DRY	U	DRY	U	DRY	U	DRY
MW-S1	10/21/97	656.6	ITS	8260	U	1	U	1	U	1	1	
MW-S1	04/14/98	656.6	ITS	8260	U	1	U	1	U	1	1	
MW-S1	10/22/98	656.6	Sev.Trent	8260	U	1	U	1	U	1	1	
MW-S1	05/11/99	656.6	Sev.Trent	8260	U	1	U	1	U	1	1	
MW-S1	10/14/99	656.6	Sev.Trent	8260	U	1	U	1	U	1	1	
MW-S1	04/25/00	656.6	Sev.Trent	8260	U	1	U	1	U	1	1	
MW-S1	10/31/00	656.6	Sev.Trent	8260	UJ	1	U	1	U	1	1	
MW-S1	05/01/01	656.6	Sev.Trent	8260	U	1	U	1	U	1	1	
MW-S1	10/23/01	656.6	DEC	8260	UJ	1	U	1	U	1	1	
MW-S2	10/21/97	655.1	ITS	8260	U	1	U	1	U	1	1	

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Sample Name	DATE	Sample Elevation	Laboratory Method	PCE	TCE	Total DCE	Cis-DCE	Trans-DCE	Vinyl chloride	COMMENTS
MW-S2	04/14/98	655.1	ITS	8260	U	1 U	1 U	1 U	1 U	1
MW-S2	10/22/98	655.1	Sev.Trent	8260	U	1 U	1 U	1 U	1 U	1
MW-S2	05/11/99	655.1	Sev.Trent	8260	U	1 U	1 U	1 U	1 U	1
MW-S2	10/14/99	655.1	Sev.Trent	8260	U	1 U	1 U	1 U	1 U	1
MW-S2	04/25/00	655.1	Sev.Trent	8260	U	1 U	1 U	1 U	1 U	1
MW-S2	10/31/00	655.1	Sev.Trent	8260	UJ	1 U	1 U	1 U	1 U	1
MW-S2	05/10/01	655.1	Sev.Trent	8260	U	1 U	1 U	1 U	1 U	1
MW-S2	10/23/01	655.1	DEC	8260	UJ	1 U	1 U	1 U	1 U	1
MW-S3	10/21/97	647.1	ITS	8260	U	1 U	1 U	1 U	1 U	1
MW-S3	04/14/98	647.1	ITS	8260	U	1 U	1 U	1 U	1 U	1
MW-S3	10/22/98	647.1	Sev.Trent	8260	U	1 U	1 U	1 U	1 U	1
MW-S3	05/11/99	647.1	Sev.Trent	8260	U	1 U	1 U	1 U	1 U	1
MW-S3	10/14/99	647.1	Sev.Trent	8260	U	1 U	1 U	1 U	1 U	1
MW-S3	04/25/00	647.1	Sev.Trent	8260	U	1 U	1 U	1 U	1 U	1
MW-S3	10/31/00	647.1	Sev.Trent	8260	UJ	1 U	1 U	1 U	1 U	1
MW-S3	05/10/01	647.1	Sev.Trent	8260	U	1 U	1 U	1 U	1 U	1
MW-S3	10/23/01	647.1	DEC	8260	UJ	1 U	1 U	1 U	1 U	1
MINI-PIEZOMETERS INSTALLED IN BROOK										
MP-1	08/24/95	649.79	JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100
MP-10	08/24/95	653.81	JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100
MP-2	08/24/95	650.15	JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100
MP-3	08/24/95	649.91	JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100
MP-4	08/24/95	652.26	JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100
MP-5	08/24/95	651.58	JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100
MP-6	08/24/95	651.22	Aquatec	GC/MS	U	1 U	1 U	1 U	1 U	1
MP-6	08/24/95	651.22	JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100
MP-7	08/24/95	652.78	JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100
MP-8	08/24/95	653.16	JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100
MP-9	08/24/95	653.48	JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100
BROOK AND POND SURFACE WATER										
SW-1	08/16/95		JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100
SW-10	08/16/95		JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100 TCE interference -5J
SW-11	08/16/95		JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100
SW-2	08/16/95		JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100
SW-3	08/16/95		JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100
SW-5	08/16/95		JCO	GC/SPME	U	20 U	20 U	20 U	20 U	100 TCE interference -14
SW-6	08/16/95		Aquatec	GC/MS	U	1 U	1 U	1 U	1 U	1

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Sample Name	DATE	Sample Elevation	Laboratory Method	PCE		TCE		Total DCE		Cis-DCE		Trans-DCE		Vinyl chloride	COMMENTS	
SW-6	08/16/95		JCO GC/SPME	U	20	U	20	U	20	U	20	U	20	U	100	TCE interference -16
SW-7	08/16/95		JCO GC/SPME	U	20	U	20	U	20	U	20	U	20	U	100	TCE interference -16
SW-8	08/16/95		JCO GC/SPME	U	20	U	20	U	20	U	20	U	20	U	100	
SW-9	08/16/95		JCO GC/SPME	U	20	U	20	U	20	U	20	U	20	U	100	

Air Quality Monitoring Results

Wheatley Site, Brookfield, Vermont

Input DMM

K:\1-0750-3\REE\AirQualityData4-4-02.qpw

Analytical Results (ppbV)

Date				Q	Tetrachloroethene	Q	Trichloroethene	Q	Cis-1,2-Dichloroethene	Q	Trans-1,2-Dichloroethene
02/02/98	Moorcroft Residence	1st floor		U	4.8	U	4.8	U	4.8	U	4.8
07/28/98	Moorcroft Residence	1st floor		U	0.28	U	0.28	U	0.28	U	0.28
02/04/99	Moorcroft Residence	1st floor		U	0.1	U	0.4	U	0.4	U	0.4
07/27/99	Moorcroft Residence	1st floor		J	0.3	U	0.4	U	0.4	U	0.4
01/12/00	Moorcroft Residence	1st floor		U	0.42	U	0.42	U	0.42	U	0.42
01/12/00	Moorcroft Residence	1st floor	duplicate		0.64	U	0.39	U	0.39	U	0.39
07/26/00	Moorcroft Residence	1st floor			0.4	J	0.2	U	0.38	U	0.38
07/26/00	Moorcroft Residence	1st floor	duplicate	U	0.41	U	0.41	U	0.41	U	0.41
07/25/01	Moorcroft Residence	1st floor		U	0.42	U	0.42	U	0.42	U	0.42
02/02/98	Moorcroft Residence	Basement		U	2.8	U	2.8	U	2.8	U	2.8
07/28/98	Moorcroft Residence	Basement		U	0.36	U	0.36	U	0.36	U	0.36
02/04/99	Moorcroft Residence	Basement		U	0.4	U	0.4	U	0.4	U	0.4
07/27/99	Moorcroft Residence	Basement		J	0.07	U	0.3	U	0.3	U	0.3
07/27/99	Moorcroft Residence	Basement	duplicate	U	0.4	U	0.4	U	0.4	U	0.4
01/12/00	Moorcroft Residence	Basement		U	0.37	U	0.37	U	0.37	U	0.37
07/26/00	Moorcroft Residence	Basement		U	0.42	U	0.42	U	0.42	U	0.42
07/25/01	Moorcroft Residence	Basement		B	4.8	U	0.47	U	0.47	U	0.47
07/25/01	Moorcroft Residence	Basement		J	0.15	U	0.2	U	0.2	U	0.2