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H M



December 6, 1995

Mr. Richard Spiese
Vermont ANR/DEC
Hazardous Materials Management Division
103 South Main Street / West Building
Waterbury, VT 05671-0404

RE: Investigation of Subsurface Petroleum Contamination at Caledonia Kiln
Corporation in St. Johnsbury, Vermont (VTDEC Site #95-1851)

1860

Dear Mr. Spiese

Please find enclosed the summary report for a site investigation conducted at the above referenced site. This investigation has been conducted for the Caledonia Kiln Corp. in accordance with the VTDEC Site Expressway Procedure.

Please feel free to contact me if you have any questions or are in need of additional information.

Sincerely,

Erik C. Sandblom
Engineer

Enclosure

cc: Henri Jaquet, Caledonia Kiln Corp. (w/o enclosure)

**REPORT ON THE INVESTIGATION OF SUBSURFACE
PETROLEUM CONTAMINATION**

DECEMBER 4, 1995

Site Location:

**CALEDONIA KILN CORPORATION
U.S. ROUTE 5 NORTH
ST. JOHNSBURY, VERMONT
(VT DEC Site #95-185T)**

1860

Prepared For:

**CALEDONIA KILN CORPORATION
P.O. BOX 266
ST. JOHNSBURY, VT 05819**

Prepared By:



P.O. Box 943 / 19 Commerce Street Williston, VT 05495 (802) 865-4288

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I. INTRODUCTION

The following report summarizes the investigation of subsurface petroleum contamination that took place at the Caledonia Kiln Corporation located on Route 5 North in St. Johnsbury, Vermont. This work has been conducted by Griffin International, Inc. for the Caledonia Kiln Corporation. This work has been done under the Vermont Department of Environmental Conservation (VTDEC) Site Investigation Expressway Procedure in response to petroleum contamination detected in the subsurface during an underground storage tank (UST) removal inspection. The UST removal inspection report was forwarded to the VTDEC, as required, on August 7, 1995. All work at the site was conducted in accordance with the August 11, 1995 Work Plan and Cost Estimate prepared by Griffin, which was approved by the Caledonia Kiln Corporation in a telephone conversation between Mr. Henri Jacquet of the Caledonia Kiln Corp. and Erik Sandblom of Griffin on August 14, 1995.

Work conducted at the site includes the installation of three groundwater monitoring wells, and subsequent sample collection and analysis, and the determination of groundwater flow direction and gradient at the site. A sample of water was collected from the on-site supply well for analysis. In addition, a sensitive receptor risk assessment was conducted to assess the risk that subsurface petroleum contamination at the site may pose to sensitive receptors.

II. SITE BACKGROUND

A. Site History

On August 3, 1995, a 10,000 gallon capacity underground storage tank (UST) was permanently closed and removed from the ground at the site. The UST was used for the storage of No. 6 fuel oil, which is used to heat the kilns at the site. The UST was removed and replaced as the result of a suspected leak from the tank. The leak was discovered approximately one month prior to the UST removal during the repair of a water pipe buried adjacent to the tank. During the UST removal inspection, evidence of petroleum contamination was detected in soils located beneath the former UST.

During the UST removal, an attempt was made to define the extent of vertical petroleum contamination by excavation. Petroleum contaminated soils were removed from the excavation and stockpiled on-site and completely encapsulated in a polyethylene liner. The extent of petroleum contamination could not be defined, and all petroleum contaminated soils could not be removed. No groundwater was encountered during the UST removal.

It was determined that, since petroleum contamination levels above action limits were detected in the subsurface, and that the extent of subsurface petroleum contamination had not been defined, that the VTDEC would require further action at the site. Therefore, the Caledonia Kiln Corporation elected to participate in the Site Investigation Expressway Procedure. The following report summarizes this Site Investigation.

B. Site Description

Caledonia Kiln Corp. is a lumber drying company located in St. Johnsbury, Vermont, north of the village, on the east side of Route 5. The site consists of two kiln buildings, warehouses, and two office trailers. The site is located along a bank of the Passumpsic River Valley. The site is bordered to the west by a railroad, Route 5, and a golf course, and to the east by a steep embankment leading down to a low-lying wetland in the river valley. Land to the north and south is currently undeveloped. The Passumpsic River is located 350 to 400 feet to the east of the UST at the site. An on-site drilled bedrock supply well is located to the east of the two kiln buildings at the site. The land use in this vicinity is primarily commercial and industrial.

The location of the current 10,000 gallon No. 6 oil UST is directly to the north of the northerly kiln building at the site, an approximately 20 feet west of the steep embankment. The former UST was located in the same position as the current UST. An aboveground storage tank (AST) containing No. 2 fuel oil is also located at the site to the east of the northern kiln building.

Soils at the site consist primarily of littoral sediments consisting of well sorted, medium grained sand. The water table in the overburden at the site is approximately 22 feet below grade and slopes toward the river.

III. INVESTIGATIVE PROCEDURES

A. Monitoring Well Installation

On August 22, 1995, three groundwater monitoring wells (MW-1, MW-2, and MW-3) were installed to determine the extent and degree of subsurface contamination in the vicinity of the No. 6 oil UST. The locations of the wells are displayed on the Site Map in Appendix A. The company conducting the drilling services was Tri-State Drilling & Boring, Inc. of West Burke, Vermont, who was under the direct supervision of a Griffin engineer. The wells were constructed in soil borings advanced with a 4.25 inch inner diameter hollow stem auger drill rig. Undisturbed soil samples were collected with the use of a split spoon sampler at five foot intervals. Soil types from each boring were classified and logged in detail. Each soil sample was screened for volatile organic compounds (VOCs) with an H-Nu PI-101 photoionization detector (PID). All wells were developed by hand using a bailer immediately following installation.

The wells were constructed of factory slotted, two-inch diameter PVC pipe with a slot size of 0.010 inch and a schedule 40 PVC riser. The length of the screen and solid PVC riser varied depending on the depth of the well and the location of the water table in the bore hole. Specific well construction details are displayed in the detailed well logs included in Appendix B. All wells were installed in accordance with Griffin protocols which comply with State and industry standards.

Soils encountered in all three bore holes were medium to fine grained sand with a trace of silt from the ground surface to approximately 12 feet below grade. Below 12 feet, the overburden consisted of very fine sand with a trace of silt. The water table was encountered at 22 to 23 feet below grade. Below the water table, the sediments in the overburden aquifer consisted of medium to fine sand with a trace of silt.

Screening of the soil samples from MW-1 and MW-2 indicated that VOC concentrations in the soil from these bore holes are less than 0.2 parts per million (ppm). No petroleum odors or visual evidence of petroleum contamination were observed in any of the samples collected from MW-1 or MW-2. Screening of soil samples collected from MW-3 indicated no detectable VOCs from grade to 17 feet below grade. At 18 to 20 feet below grade, some staining was observed in the soil sample and a VOC concentration of 58 ppm was detected with the PID. VOC concentrations in the soil dropped to 0.4 ppm at 25 to 27 feet below grade.

B. Determination of Groundwater Flow Direction and Gradient

Once the monitoring wells were installed, they were allowed to stabilize for a period of approximately one week. After this period, depth to water measurements were taken with the use of a Keck interface probe for all three site related wells. These measurements were subtracted from the top of casing elevations, which were determined relative to an arbitrary datum of 100 feet at top of the casing for MW-1, to determine the water table elevation at each of the wells. From the monitoring well water table elevation data, the groundwater contours were interpolated onto the site map and the groundwater direction and gradient determined.

As displayed on the groundwater contour map included in Appendix A, the regional groundwater flow direction for August 29, 1995 was generally to the northwest at a gradient of 3.1 %. This flow pattern is very likely given the local unconsolidated soil types and surface water drainage patterns to the Passumpsic River.

C. Groundwater Sample Collection and Analysis

Immediately following depth to water data collection on August 29, 1995, samples of the groundwater were collected from all three of the site related monitoring wells. No free phase petroleum product was observed in any of the monitoring wells. All samples were analyzed for benzene, toluene, ethyl benzene, and xylenes (BTEX), and methyl tertiary butyl ether (MTBE), common constituents of petroleum contamination, per EPA Method 602 and for total petroleum hydrocarbons (TPH) per modified EPA Method 8100. Results of the laboratory analyses for those wells sampled on this date are summarized in Appendix C.

According to the results of the analyses, none of the samples collected from the wells at the site contained petroleum contamination at levels above Vermont Groundwater Enforcement Standards. None of compounds tested for in the analysis were detected in the samples collected from MW-1 or MW-2. Low levels of dissolved petroleum contamination was detected in the water sample collected from MW-3. TPH was not detected in any of the samples collected from the site.

All samples were collected according to Griffin's groundwater sampling protocol which complies with industry and state standards. Results from the analyses of the duplicate, trip blank and equipment blank samples indicate that adequate quality assurance and control (QA/QC) were maintained during sample collection and analysis.

D. Stockpiled Soil Screening

A total of approximately 60 cubic yards of petroleum contaminated soil was stockpiled at the site during the UST removal. The location of the soil stockpile is to the south of the warehouses and outdoor lumber storage area (approximately 400 feet to the south of the UST). These soils were screened for VOCs with a PID on the day of groundwater sample collection. A total of eight soil samples were collected from within the pile with the use of a hand auger. The samples were placed in plastic bags and the headspace was screened in accordance with Griffin's Jar/Polyethylene Bag Headspace Protocol, which complies with industry and state standards. The results of the screening are summarized below.

Soil Screening Results for Caledonia Kiln Corporation, St. Johnsbury, VT: September 29, 1995		
Soil Sample	Depth (ft)	VOC Concentration (ppm)
1	3.0	36
2	3.0	48
3	4.0	44
4	3.0	28
5	2.0	46
6	2.5	24
7	3.0	18
8	3.0	18

E. Sensitive Receptor Risk Assessment

A receptor risk assessment was conducted to identify known and potential receptors of contamination detected at Caledonia Kiln Corporation. A visual survey was conducted at the time of monitoring well installation, and a determination of the potential risk to identified receptors was conducted based on proximity, groundwater flow direction, and contaminant concentration levels. Interviews and historical research was also conducted as part of the survey.

Water Supplies

The on-site water supply well is located on the east side of the northern kiln building at the site, approximately 200 feet south southeast of the former UST. A search of VTDEC Water Supply Division records was conducted in order to determine construction details for the well. According to the well completion report, the water supply well at the site is a bedrock well drilled to a total depth of 205 feet. Bedrock is located at 80 feet below grade and the static water

level is at 20 feet. No information regarding casing length was available. According to the groundwater contour map prepared for the site, the well is located cross gradient, and slightly up-gradient from the former UST, and MW-3, where low levels of dissolved petroleum contamination have been detected. Based on the construction of the water supply well, its location relative to the former UST, and the low levels of petroleum contamination detected in the overburden aquifer in the vicinity of the former UST, this well is not likely at a significant risk of impact from petroleum contamination.

A water supply pipe that is buried from the supply well, to the kiln building, and then to the site offices, is located on the east side of the replacement UST, between the embankment and the UST. The section of pipe that was located beside the former UST was constructed of polyethylene, and required frequent repair. It is assumed that the pipe was weakened by heat generated by the UST, or by heated oil coming in contact with the pipe, which caused the pipe to break. Since the installation of the replacement UST, the polyethylene pipe has been replaced by a copper pipe in the vicinity of the UST. This pipe does not likely pass through contaminated soil, as all contaminated soil from the depth of the water pipe (approximately 5 feet below grade) to approximately 10 feet below grade, has been removed and stockpiled. Based on these factors, and that the water in the pipe is under pressure, it is not likely that there is a significant risk of petroleum contamination impact to water delivered by the pipe.

A sample of the on-site water supply well was collected on the same day as groundwater sample collection. The sample was analyzed for BTEX, MTBE, and TPH. According to the analysis results, no compounds tested for in the analysis were detected in the sample. The water sample was collected from the office trailer at the site. This indicated that neither the water supply well, nor the distribution pipe have been impacted with petroleum contamination.

No other water supply wells were identified in the vicinity of the site which could be potentially at risk of petroleum, contamination.

The Passumpsic River and Low Lying Wetland

Directly to the west of the site is a steep embankment, approximately 30 feet in vertical height, which leads down to a forested wetland. The Passumpsic River is located approximately 350 feet to the west of the former UST at the site. According to the groundwater elevation data collected from monitoring wells at the site, the groundwater flows from the site, across the low lying wetland, towards the river. The entire section of the steep bank downgradient of the former UST and the wetland was inspected for evidence of petroleum contamination. No seepage of any sort or any stains were detected along the slope of the bank. No sheens were observed in standing water at the bottom of the bank. No stressed vegetation was observed in the vicinity nor were any petroleum odors detected. No VOCs were detected in soils along the bank that were screened with a PID. It is evident that groundwater in the vicinity of the site flows towards and likely into the adjacent low-lying wetland, meaning that there is a risk of impact of petroleum contaminated groundwater to the wetland. However, based on the sample analysis results from the well located downgradient of the former UST (MW-3), contamination to the groundwater is below Vermont Groundwater Enforcement Standards. Groundwater contamination at these low

levels could not likely significantly impact the water quality in the wetland or the Passumpsic River.

Buildings in the Vicinity

One building on-site has been identified to be potentially at risk of petroleum contamination impact based on the proximity of its location to petroleum contamination detected in the subsurface. This building is the kiln building located to the south of the former UST. The risk of petroleum vapor impact to the building is considered to be very low, however, since contamination in the subsurface at the site has been detected only below approximately 12 feet below grade, and that No. 6 oil produces very low vapor concentrations. The Kiln building is constructed upon a concrete slab foundation at grade. In addition, no petroleum contamination was detected in soil or water samples collected from MW-2, the monitoring well located closest in proximity to the building. The kiln building was not screened at the time of monitoring well installation, as the kiln was in operation at that time.

IV. CONCLUSIONS

Based on the data collected from Caledonia Kiln Corporation, Inc. and vicinity in St. Johnsbury, Vermont, the following conclusions are made:

- 1) There was a release of No. 6 oil from the former 10,000 gallon UST. The amount and duration of the release are unknown.
- 2) Resulting petroleum contamination exists in the soils (adsorbed) and at very low levels in the groundwater (dissolved) in the vicinity immediately downgradient of the former No. 6 oil UST. None of the groundwater samples collected from monitoring wells at the site contained petroleum contaminants at concentrations above groundwater enforcement standards
- 3) It is believed that the bulk of subsurface contamination was removed with soils that were excavated from the vicinity of the former UST at the time of the UST removal. These soils remain stockpiled at the site and completely encapsulated in a polyethylene liner.
- 4) None of the identified sensitive receptors in the vicinity of the former UST appear to be at significant risk of petroleum contamination impact. This is based on the concentration of contamination detected at the site, proximity to the supply well and other potential receptors, and the local groundwater flow direction at the site.
- 5) No. 6 oil contains relatively low concentrations of the more water soluble petroleum compounds. Even direct contact between No. 6 oil and water results in very low dissolved VOC concentrations. The solubility of these compounds will decrease as the latent heat in the No. 6 oil diminishes.

- 6) Given the characteristic of No. 6 oil, it is not likely that the petroleum contamination detected in the subsurface will naturally degrade in a reasonable period of time. However, it is also not likely that the petroleum contamination detected in the subsurface will ever migrate from the site.

V. RECOMMENDATIONS

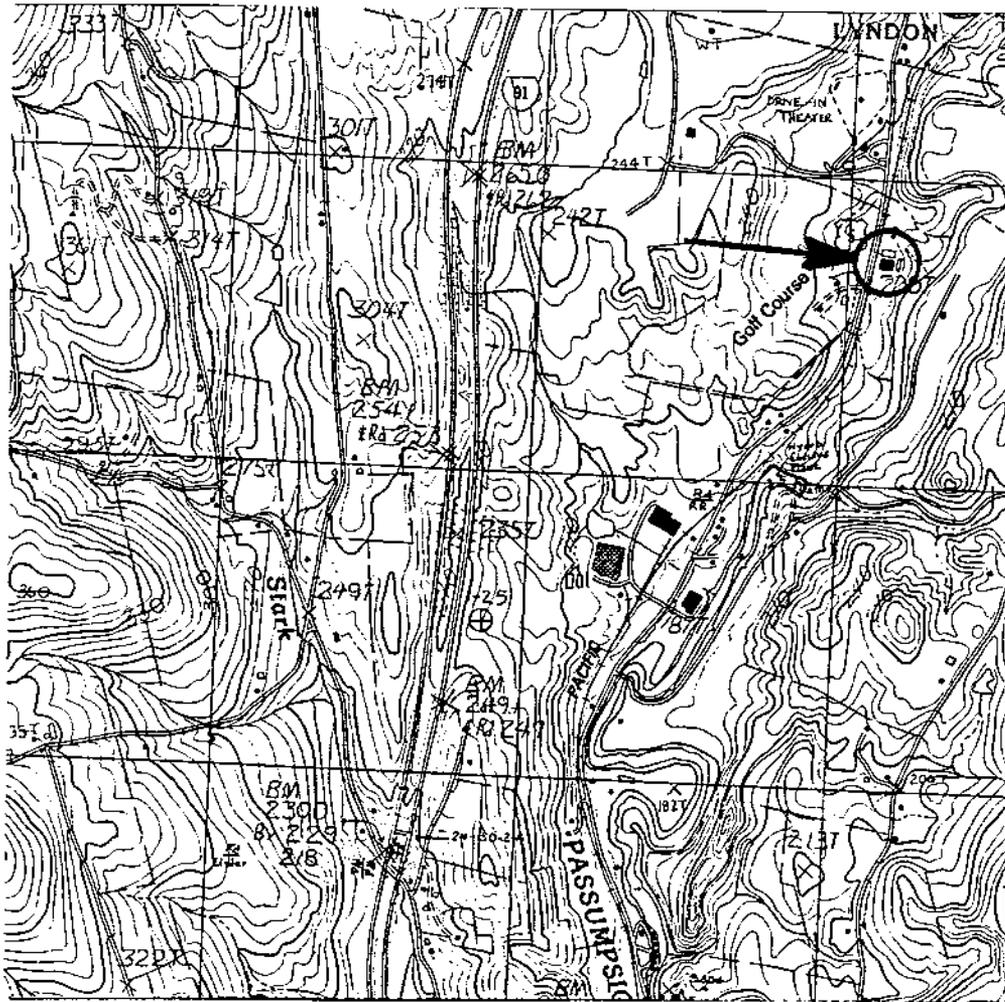
Based on the above conclusions, the following recommendations are made concerning petroleum contamination detected in the subsurface at Caledonia Kiln Corporation located in St. Johnsbury, Vermont:

- 1) It is expected that the petroleum contamination in the subsurface is contained in the immediate vicinity of the former UST. These levels will likely decrease over time or remain stable, but should not increase. In order to verify this assumption, the groundwater at the site should be monitored again in one year. A sample of the groundwater should be collected from all three site related groundwater monitoring wells and submitted for laboratory analysis. Each sample should be analyzed for BTEX and MTBE per EPA Method 602 and for TPH per modified Method 8100. After this time, if the downgradient well continues to contain petroleum contaminants in concentrations less than Vermont Groundwater Enforcement Standards, then the site should be recommended for Site Management Activity Competed status and the site should be removed from the Vermont Active Hazardous Waste Sites List.
- 2) The stockpile of petroleum contaminated soil currently at the site, should be monitored for VOCs with a PID at least on an annual basis. The soils may be monitored on a regular basis until VOC concentrations reach non-detect (less than 1.0 ppm) and no olfactory or visual evidence of petroleum contamination is observed, at which time they may be spread on-site, following VTDEC approval. However, given the type of contaminant this is not anticipated to occur within a reasonable amount of time. Therefore, it is recommended that consideration be made to have the soils disposed of by a method accepted by the VTDEC, such as landfarming or soil-asphalt batching. The site will not be considered eligible for SMAC status until the soils are completely treated or disposed.

APPENDIX A

SITE MAPS

- 1) Site Location Map**
- 2) Site Map**
- 3) Groundwater Contour Map**



JOB #: 8954732

SOURCE: USGS- ST. JOHNSBURY, VERMONT QUADRANGLE



CALEDONIA KILN CO.

ST. JOHNSBURY,

VERMONT

SITE LOCATION MAP

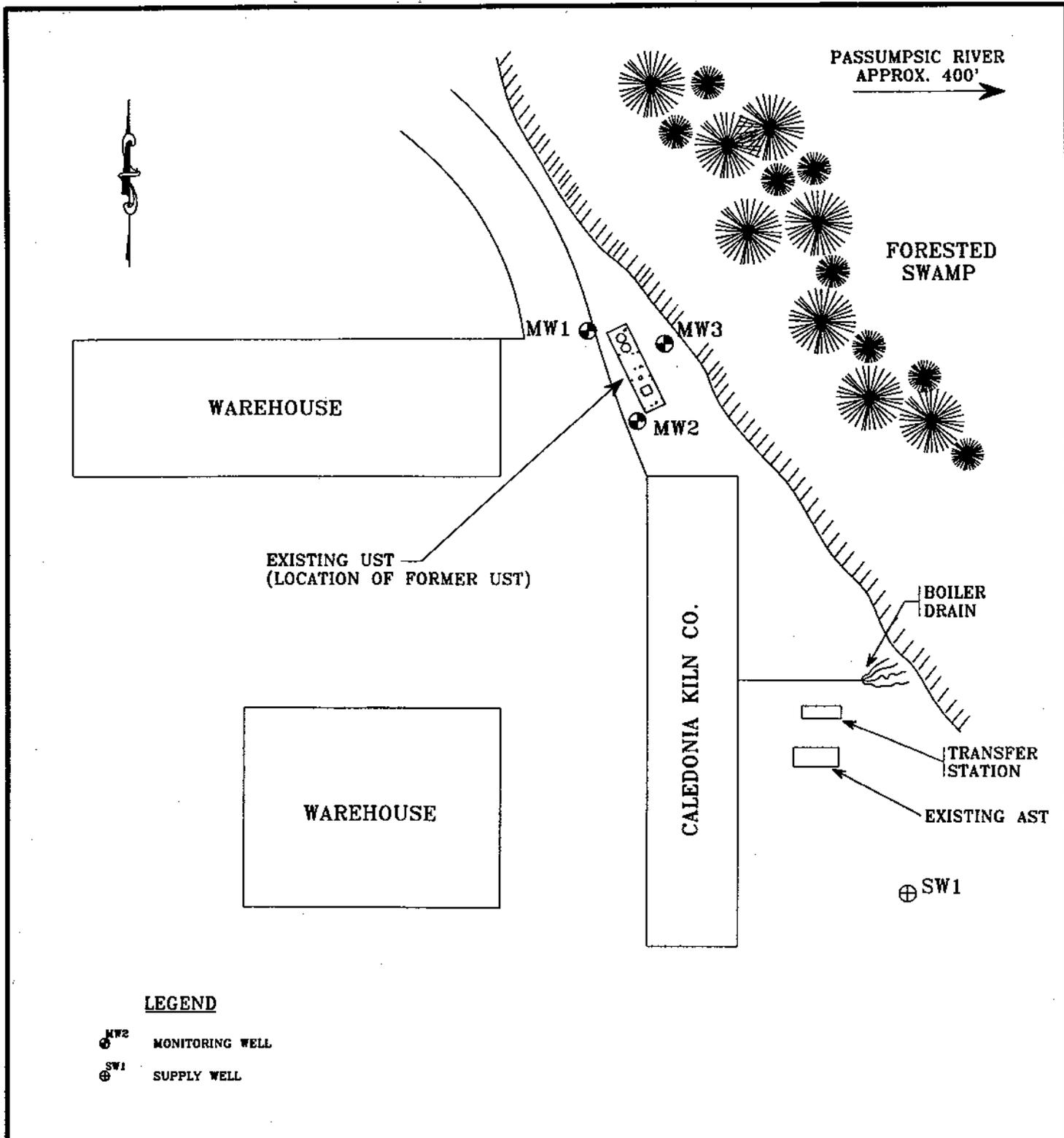
DATE: 8/23/95

DWG.#:1

SCALE: 1:25000

DRN.:SB

APP.:ES



LEGEND

- MW2 MONITORING WELL
- SW1 SUPPLY WELL

JOB #: 8954732

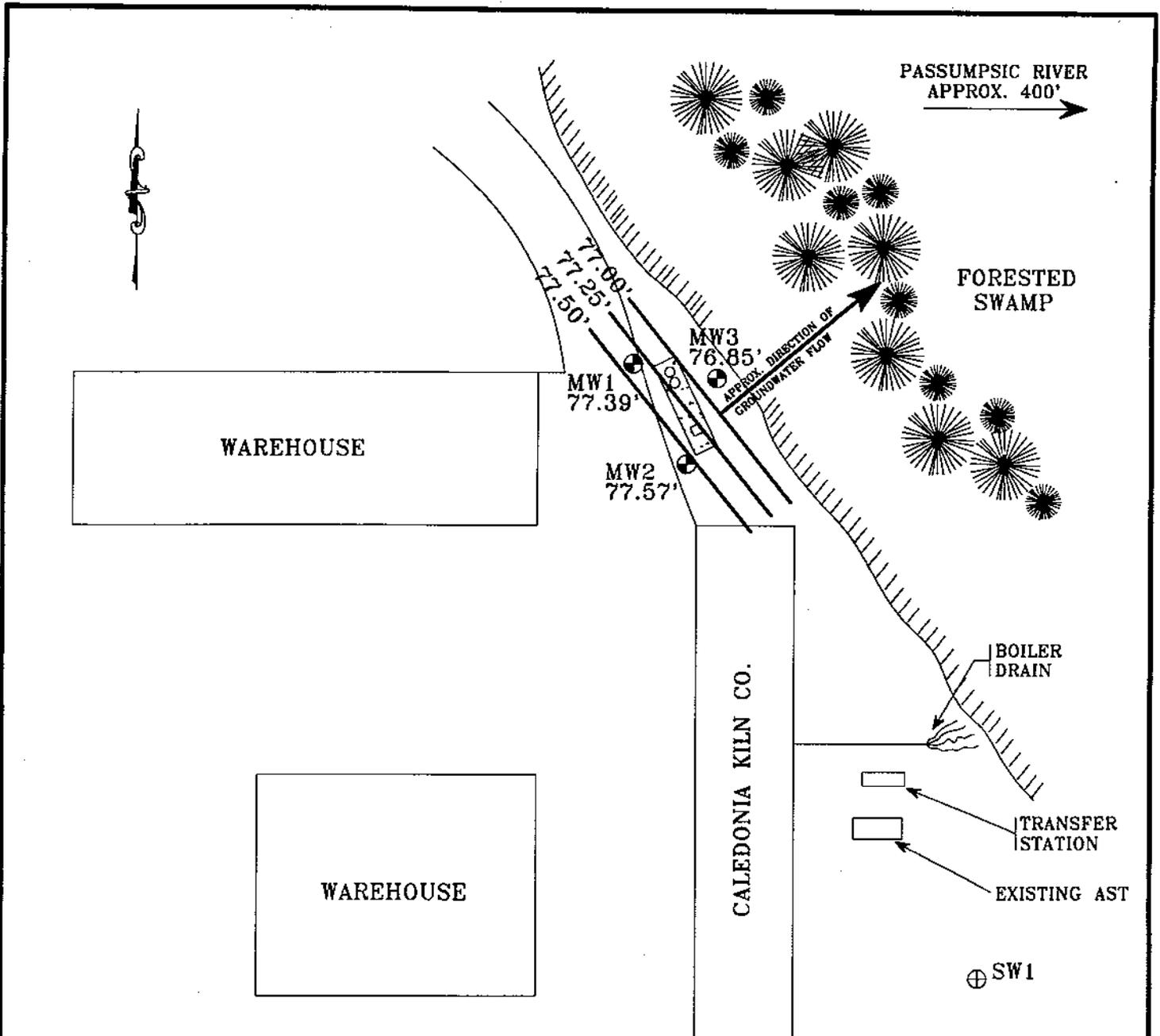


CALEDONIA KILN CO.

ST. JOHNSBURY, VERMONT

SITE MAP

DATE: 8/23/95	DWG.#: 2	SCALE: 1"=50'	DRN.:SB	APP.:ES
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LEGEND

- ⊕ XXX MW2 MONITORING WELL AND WATER TABLE ELEVATION IN FEET
- 77.0' GROUNDWATER CONTOUR IN FEET (DASHED WHERE INFERRED)
- ⊕ SW1 SUPPLY WELL

JOB #: 8954732
 MEASUREMENT DATE: 8/29/95



CALEDONIA KILN CO.

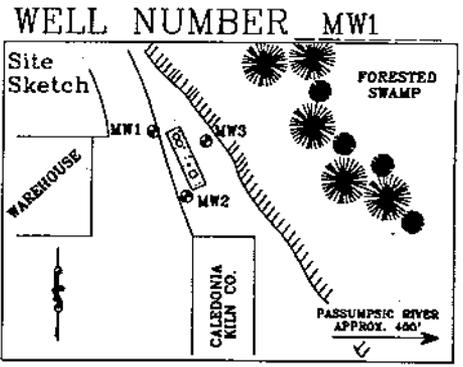
ST. JOHNSBURY, VERMONT

GROUNDWATER CONTOUR MAP

DATE: 9/19/95 DWG.#: 3 SCALE: 1"=50' DRN.:SB APP.:ES

APPENDIX B
MONITORING WELL LOGS

PROJECT CALEDONIA KILN CO.
 LOCATION ST. JOHNSBURY, VERMONT
 DATE DRILLED 8/23/95 TOTAL DEPTH OF HOLE 27'
 DIAMETER 4.25"
 SCREEN DIA. 2" LENGTH 10' SLOT SIZE 0.010"
 CASING DIA. 2" LENGTH 16.5' TYPE sch 40 pvc
 DRILLING CO. TRI-STATE DRILLING METHOD HSA
 DRILLER NEIL FAULKNER LOG BY E. SANDBLOM



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0	ROAD BOX				0
0	LOCKING WELL CAP				0
2	CONCRETE				2
2	NATIVE BACKFILL			Brown medium to fine SAND, with trace of silt, dry.	2
4	BENTONITE				4
6	NATIVE BACKFILL		5'-7'- 2/2/4/6 0.1 ppm	Brown medium to fine SAND, over very fine sand and silt, dry, no petroleum odor	6
8					8
10					10
12	WELL RISER		10'-12'- 8/8/12/10 0.1 ppm	Brown medium to fine SAND over very porous light orange medium to fine sand with some fine to medium gravel, dry, no petroleum odor.	12
14	BENTONITE				14
16			15'-17'- 5/5/6/8 0.2 ppm	Light brown very fine SAND and trace of silt, no petroleum odor.	16
18	SAND PACK				18
20			20'-22'- 6/6/5/2 0.2 ppm	Light brown very fine SAND and some silt, damp, over very fine SAND and SILT, saturated, no petroleum odor.	20
22	WELL SCREEN			21.5' WATER TABLE	22
24	BOTTOM CAP				24
26	UNDISTURBED NATIVE SOIL		25'-27'- 5/5/6/5 0 ppm	Brown medium to fine SAND with trace silt, saturated, orange colored varve at 26.5', no petroleum odor.	26
28				BASE OF WELL AT 27' END OF EXPLORATION AT 27'	28
30					30
32					32
34					34
36					36
38					38
40					40
42					42
44					44
46					46
48					48
50					50

PROJECT CALEDONIA KILN CO.

LOCATION ST. JOHNSBURY, VERMONT

DATE DRILLED 8/23/95 TOTAL DEPTH OF HOLE 27'

DIAMETER 4.25"

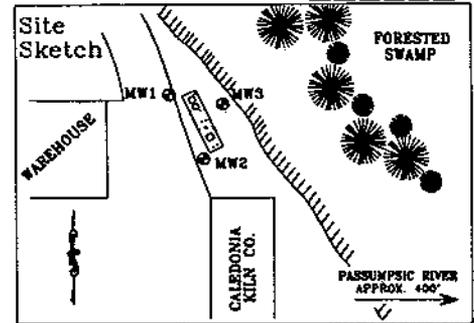
SCREEN DIA. 2" LENGTH 10' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 16.5' TYPE sch 40 pvc

DRILLING CO. TRI-STATE DRILLING METHOD HSA

DRILLER NEIL FAULKNER LOG BY E. SANDBLOM

WELL NUMBER MW2



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX			0
0		LOCKING WELL CAP			0
2		CONCRETE		Brown medium SAND, dry.	2
2		NATIVE BACKFILL			2
4		BENTONITE			4
6		NATIVE BACKFILL	5'-7'- 1/1/1/1 0.1 ppm	Brown medium SAND, with trace of silt, dry, no petroleum odor.	6
8					8
10		WELL RISER	10'-12'- 1/1/1/2 0 ppm	Brown medium to coarse SAND with trace of silt, dry, no petroleum odor.	10
12					12
14		BENTONITE			14
16			15'-17'- 3/3/5/6 0 ppm	Light brown very fine SAND and little silt, dry, no petroleum odor.	16
18		SAND PACK			18
20			20'-22'- 3/4/2/2 0 ppm	Brown very fine SAND and trace of silt, saturated.	20
22		WELL SCREEN		21.5' WATER TABLE	22
24		BOTTOM CAP			24
26		UNDISTURBED NATIVE SOIL	25'-27'- 4/5/5/6 0 ppm	Brown very fine SAND with trace of silt, saturated.	26
28				BASE OF WELL AT 27' END OF EXPLORATION AT 27'	28
30					30
32					32
34					34
36					36
38					38
40					40
42					42
44					44
46					46
48					48
50					50

PROJECT CALEDONIA KILN CO.

LOCATION ST. JOHNSBURY, VERMONT

DATE DRILLED 8/23/95 TOTAL DEPTH OF HOLE 27'

DIAMETER 4.25"

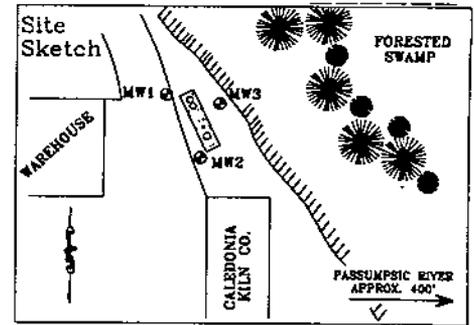
SCREEN DIA. 2" LENGTH 10' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 16.5' TYPE sch 40 pvc

DRILLING CO. TRI-STATE DRILLING METHOD HSA

DRILLER NEIL FAULKNER LOG BY E. SANDBLOM

WELL NUMBER MW3



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0	ROAD BOX LOCKING WELL CAP CONCRETE				0
2	NATIVE BACKFILL			Brown medium to fine SAND, dry.	2
4	BENTONITE				4
6	NATIVE BACKFILL		5'-7'- 4/5/3/4 0 ppm	Brown/rust medium to fine SAND, with some silt & gravel, dry, no petroleum odor.	6
8					8
10	WELL RISER		10'-12'- 2/1/1/2 0 ppm	Brown/black/white medium to coarse SAND, w/some silt and trace gravel, dry, no petroleum odor, some black clumps of silty soil.	10
12					12
14	BENTONITE				14
16			15'-17'- 2/1/2/3	Light brown very fine SAND and trace of silt, dry.	16
18	SAND PACK		18'-20' 58 ppm	Black soil, strong petroleum odor.	18
20	WELL SCREEN		20'-22'- 3/4/3/3	Medium brown, medium coarse grained SAND w/some silt dry, over saturated material of the same description.	20
22				21.5' WATER TABLE	22
24	BOTTOM CAP		25'-27'- 6/7/9/9 0.4 ppm	Very fine SAND with some silt, saturated.	24
26	UNDISTURBED NATIVE SOIL				26
28				BASE OF WELL AT 27' END OF EXPLORATION AT 27'	28
30					30
32					32
34					34
36					36
38					38
40					40
42					42
44					44
46					46
48					48
50					50

APPENDIX C
GROUNDWATER QUALITY SUMMARY DATA

Groundwater Quality Summary Caledonia Kiln Corporation St. Johnsbury, Vermont

Monitoring Well 1 (MW-1)

PARAMETER	Date of Sample Collection						
	8/29/95						
TPH (ppm)	ND						
Benzene	ND						
Chlorobenzene	ND						
1,2-DCB	ND						
1,3-DCB	ND						
1,4-DCB	ND						
Ethylbenzene	ND						
Toluene	ND						
Xylenes	ND						
Total BTEX	ND						
MTBE	ND						
BTEX + MTBE	ND						

Monitoring Well 2 (MW-2)

PARAMETER	Date of Sample Collection						
	8/29/95						
TPH (ppm)	ND						
Benzene	ND						
Chlorobenzene	ND						
1,2-DCB	ND						
1,3-DCB	ND						
1,4-DCB	ND						
Ethylbenzene	ND						
Toluene	ND						
Xylenes	ND						
Total BTEX	ND						
MTBE	ND						
BTEX + MTBE	ND						

All values reported in ug/L (ppb) except TPH (reported in ppm)
ND - None Detected

TBQ - Trace below quantitation limit

Groundwater Quality Summary Caledonia Kiln Corporation St. Johnsbury, Vermont

Monitoring Well 3 (MW-3)

PARAMETER	Date of Sample Collection					
	8/29/95					
TPH (ppm)	ND					
Benzene	1.7					
Chlorobenzene	ND					
1,2-DCB	ND					
1,3-DCB	ND					
1,4-DCB	ND					
Ethylbenzene	2.0					
Toluene	5.0					
Xylenes	8.6					
Total BTEX	17.3					
MTBE	ND < 10					
BTEX + MTBE	17.3					

Vermont Drinking Water Standards and Quality Assurance and Control Samples

25-Jul-95

PARAMETER	Equip. Blank	Trip Blank	Duplicate (MW-3)	Vermont Drinking Water Standards
TPH (ppm)	N/A	N/A	N/A	
Benzene	ND	ND	2.0	5.0*
Chlorobenzene	ND	ND	ND	100*
1,2-DCB	ND	ND	ND	600*
1,3-DCB	ND	ND	ND	600**
1,4-DCB	ND	ND	ND	75*
Ethylbenzene	ND	ND	1.8	700*
Toluene	ND	ND	4.0	1,000*
Xylenes	ND	ND	7.3	10,000*
Total BTEX	ND	ND	15.1	-
MTBE	ND	ND	ND < 10	40**
BTEX + MTBE	ND	ND	15.1	-

* - EPA Established Maximum Contaminant Level

** - Vermont Health Advisory Level

All values reported in ug/L (ppb) except TPH (reported in ppm)
ND - None Detected

TBQ - Trace below quantitation limit

**Groundwater Quality Summary
Caledonia Kiln Corporation
St. Johnsbury, Vermont**

Site Supply Well

PARAMETER	Date of Sample Collection					
	8/29/95					
TPH (ppm)	ND					
Benzene	ND					
Chlorobenzene	ND					
1,2-DCB	ND					
1,3-DCB	ND					
1,4-DCB	ND					
Ethylbenzene	ND					
Toluene	ND					
Xylenes	ND					
Total BTEX	0.0					
MTBE	ND < 10					
BTEX + MTBE	0.0					

All values reported in ug/L (ppb) except TPH (reported in ppm)
ND - None Detected

TBQ-Trace Below Quantitation Limit

APPENDIX D

GROUNDWATER LIQUID LEVEL DATA

9/28/95

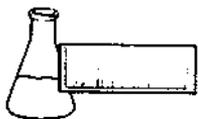
**Groundwater Level Data
Caledonia Kiln Corporation
St. Johnsbury, Vermont**

Monitoring Date: 8/29/95

Well I.D.	Well Depth	Top of Casing Elevation	Depth to Product	Depth to Water	Product Thickness	Specific Gravity of Product	Hydro Equivalent	Corrected Depth to Water	Corrected Water Table Elevation
MW-1	27.0	100.00		22.61				22.61	77.39
MW-2	27.0	99.79		22.22				22.22	77.57
MW-3	27.0	99.39		22.54				22.54	76.85

All values reported in feet

APPENDIX E
LABORATORY ANALYSIS REPORTS



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Griffin International
PROJECT NAME: Caledonia Kiln Co.
REPORT DATE: September 11, 1995
DATE SAMPLED: August 29, 1995

PROJECT CODE: GICK1996
REF.#: 78,802 - 78,808

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated samples were preserved with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

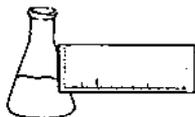
Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

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Laboratory Services

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(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Caledonia Kiln Co.
REPORT DATE: September 11, 1995
DATE SAMPLED: August 29, 1995
DATE RECEIVED: August 30, 1995
DATE ANALYZED: September 7, 1995

PROJECT CODE: GICK1996
REF.#: 78,802
STATION: Trip Blank
TIME SAMPLED: 7:18
SAMPLER: R. Higgins

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

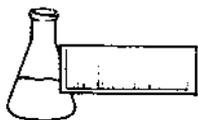
Bromobenzene Surrogate Recovery: 100%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Caledonia Kiln Co.
REPORT DATE: September 11, 1995
DATE SAMPLED: August 29, 1995
DATE RECEIVED: August 30, 1995
DATE ANALYZED: September 7, 1995

PROJECT CODE: GICK1996
REF.#: 78,807
STATION: Equip. Blank
TIME SAMPLED: 11:32
SAMPLER: R. Higgins

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

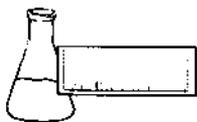
Bromobenzene Surrogate Recovery: 102%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Caledonia Kiln Co.
REPORT DATE: September 11, 1995
DATE SAMPLED: August 29, 1995
DATE RECEIVED: August 30, 1995
DATE ANALYZED: September 7, 1995

PROJECT CODE: GICK1996
REF.#: 78,806
STATION: Duplicate MW3
TIME SAMPLED: 11:20
SAMPLER: R. Higgins

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	2.0
Chlorobenzene	1	ND ¹
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	1.8
Toluene	1	4.0
Xylenes	1	7.3
MTBE	10	ND

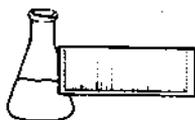
Bromobenzene Surrogate Recovery: 101%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 1

NOTES:

1 None detected

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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Caledonia Kiln Co.
REPORT DATE: September 11, 1995
DATE SAMPLED: August 29, 1995
DATE RECEIVED: August 30, 1995
DATE ANALYZED: September 7, 1995

PROJECT CODE: GICK1996
REF.#: 78,803
STATION: MW1
TIME SAMPLED: 10:32
SAMPLER: R. Higgins

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

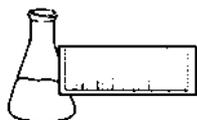
Bromobenzene Surrogate Recovery: 101%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Caledonia Kiln Co.
REPORT DATE: September 11, 1995
DATE SAMPLED: August 29, 1995
DATE RECEIVED: August 30, 1995
DATE ANALYZED: September 7, 1995

PROJECT CODE: GICK1996
REF.#: 78,804
STATION: MW2
TIME SAMPLED: 10:55
SAMPLER: R. Higgins

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

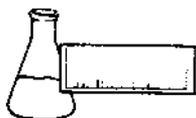
Bromobenzene Surrogate Recovery: 105%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Caledonia Kiln Co.
REPORT DATE: September 11, 1995
DATE SAMPLED: August 29, 1995
DATE RECEIVED: August 30, 1995
DATE ANALYZED: September 7, 1995

PROJECT CODE: GICK1996
REF.#: 78,805
STATION: MW3
TIME SAMPLED: 11:20
SAMPLER: R. Higgins

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	1.7
Chlorobenzene	1	ND ¹
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	2.0
Toluene	1	5.0
Xylenes	1	8.6
MTBE	10	ND

Bromobenzene Surrogate Recovery: 102%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 1

NOTES:

1 None detected

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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Caledonia Kiln Co.
REPORT DATE: September 11, 1995
DATE SAMPLED: August 29, 1995
DATE RECEIVED: August 30, 1995
DATE ANALYZED: September 7, 1995

PROJECT CODE: GICK1996
REF.#: 78,808
STATION: Supply Well
TIME SAMPLED: 11:45
SAMPLER: R. Higgins

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

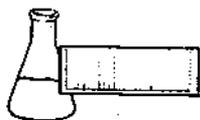
Bromobenzene Surrogate Recovery: 103%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

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EPA METHOD 602 LABORATORY REPORT

MATRIX SPIKE AND DUPLICATE LABORATORY CONTROL DATA

CLIENT: Griffin International
PROJECT NAME: Caledonia Kiln Co.
REPORT DATE: September 11, 1995
DATE SAMPLED: August 29, 1995
DATE RECEIVED: August 30, 1995
DATE ANALYZED: September 7, 1995

PROJECT CODE: GICK1996
REF.#: 78,803
STATION: MW1
TIME SAMPLED: 10:32
SAMPLER: R. Higgins

<u>Parameter</u>	<u>Sample(ug/L)</u>	<u>Spike(ug/L)</u>	<u>Dup1(ug/L)</u>	<u>Dup2(ug/L)</u>	<u>Avg % Rec</u>
Benzene	ND ¹	10	10.8	10.8	108%
Toluene	ND	10	11.5	11.4	114%
Ethylbenzene	ND	10	11.4	11.7	115%
Xylenes	ND	30	34.3	34.6	115%

NOTES:

1 None detected

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CHAIN-OF-CUSTODY RECORD

15134

Project Name: CALEDONIA KIN CO.	Reporting Address: GRIFFIN WTC	Billing Address: GRIFFIN WTC
Site Location:		
Endyne Project Number: GUCK 1996	Company: GRIFFIN WTC E. SANDBLUM Contact Name/Phone #: (802) 865-4298	Sampler Name: R. HATHAWAY Phone #: (802) 865-4298

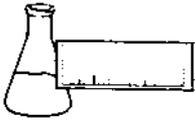
Lab #	Sample Location	Matrix	GRA B	COMP	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
78,802	TRIP BLANK	H ₂ O	✓		8/30/95 7:18	2	40mL G		602	HCl	
78,803	MW1				10:32						
78,804	MW2				10:55						
78,805	MW3				11:20						
78,806	DUPLICATE MW3				11:20						
78,807	EQUIP BLANK				11:30						
78,808	SUPPLY WELL				11:45						

Relinquished by: Signature <i>[Signature]</i>	Received by: Signature <i>Beth Ward</i>	Date/Time 8/30/95 9:55
Relinquished by: Signature <i>Beth Ward</i>	Received by: Signature <i>[Signature]</i>	Date/Time 8/30/95 10:10 A.M.

 New York State Project: Yes No
Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrite N	9	BOD ₅	14	Turbidity	19	BTEX	24	EPA 608 Pest/PCB		
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 8240		
29	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)										
30	Other (Specify):										

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Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Griffin International
PROJECT NAME: Caledonia Kiln Co.
DATE REPORTED: September 22, 1995
DATE SAMPLED: August 29, 1995
REVISED REPORT: October 2, 1995

PROJECT CODE: GICK1998
REF. #: 78,834 - 78,837

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody record.

Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

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LABORATORY REPORT

TOTAL PETROLEUM HYDROCARBONS (TPH) BY MODIFIED EPA METHOD 8100

DATE: September 22, 1995
CLIENT: Griffin International
PROJECT: Caledonia Kiln Co.
PROJECT CODE: GICK1998
COLLECTED BY: R. Higgins
DATE SAMPLED: August 29, 1995
DATE RECEIVED: August 30, 1995

<u>Reference #</u>	<u>Sample ID</u>	<u>Concentration (mg/L)¹</u>
78,834	MW1; 10:32	ND ²
78,835	MW2; 11:55	ND
78,836	MW3; 11:20	ND
78,837	Supply Well; 11:45	ND

Notes:

- 1 Method detection limit is 1.0 mg/L.
- 2 None detected

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