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**INITIAL SITE INVESTIGATION REPORT**

**PARKVIEW GARAGE  
U. S. Route 5  
Barton, Vermont**

**5 February, 1997**

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## EXECUTIVE SUMMARY

Ground Water of Vermont (GWV) has conducted an initial site investigation at Parkview Garage located on U.S. Route 5 in Barton, Vermont and has concluded the following:

- Gasoline appears to have been released to the subsurface at the site. Soils in the vicinity of the removed gasoline underground storage tanks (USTs) and pump island had elevated photoionization detector (PID) readings and gasoline compounds were detected at levels above Vermont Ground Water Enforcement Standards (VGES) in ground water at the site.
- Observations made during the UST closure and recent ground-water sample results from on-site monitoring wells suggest the source of contamination is the former USTs and pump island.
- No free-phase gasoline was observed in any of the on-site monitoring wells.
- The VGESs for benzene and xylenes were exceeded in the samples collected from MW-1 and MW-2.
- The Vermont Health advisory (VHA) for methyl-tertiary butyl ether (MTBE) was exceeded in the samples collected from MW-1 and MW-2.
- Low concentrations (2 parts per billion or less) of benzene, toluene, and xylenes were detected in the on-site gravel supply well. This well, reported to be 86 feet deep, is not used as a drinking-water supply.
- Ground-water contamination in the surficial aquifer does not appear to have migrated off-site.
- Subsurface contamination at the site does not appear to pose a threat to the Barton River, located 200 feet northeast (downgradient) of the site. Analysis of ground-water samples from monitoring wells situated between the former USTs and pump island and the river did not detect the presence of gasoline contamination.
- Both on-site buildings are constructed on at-grade slab-foundations and are not likely to be impacted by on-site contamination.
- No underground utility lines are known to pass through the observed dissolved-phase plume.
- No off-site drinking-water supplies appear to be at risk from the residual soil or ground water contamination at the site.
- Ground-water elevation data for 24 November 1996 indicates a north-northeasterly trending flow direction, toward the Barton River.

On the basis of the results of this investigation, GWV makes the following recommendations:

1. The four on-site monitoring wells and the supply well should be resampled to confirm the November 1996 analytical results. The samples should be analyzed for BTEX compounds and MTBE by EPA Method 8020.
2. The source of contamination in the on-site supply well should be further evaluated. This evaluation should include a review of the driller's log of the supply well for information on subsurface materials and assessment of other potential contaminant sources, such as floor drains or the septic system, in the vicinity of the well. If necessary one or more soil borings/monitoring wells should be installed between the on-site supply well and the former UST location and pump island to evaluate the route of contaminant entry/migration pathway. Soil samples should be collected continuously to characterize lithology and screened for the possible presence of VOCs using a portable PID. Based on the subsurface soil conditions and PID screening results, monitoring wells should be installed for water quality monitoring. The new monitoring wells, if installed, should be sampled along with the existing monitoring wells for BTEX compounds and MTBE by EPA Method 8020.
3. The on-site soil stockpile should be monitored semi-annually with a photoionization detector (PID), and the integrity of the stockpile cover maintained. When PID readings have decreased to below one part per million (ppm), permission should be sought from the VT DEC to thin-spread the soils on site, in accordance with VT DEC guidelines.

## 1.0 INTRODUCTION

This report details the results of an initial site investigation conducted at Parkview Garage located on U.S. Route 5 in the town of Barton, Vermont (Figure 1). This report has been prepared by Ground Water of Vermont (GWV) under the direction of Marcel Locke, current owner of the property. The site investigation was initiated with Vermont Department of Environmental Conservation (VT DEC) approval following the discovery of subsurface petroleum contamination during the removal of two underground storage tanks (USTs) on 30 September 1996.

### 1.1 Site Location and Physical Setting

The site is occupied by two buildings; a four-bay automotive service garage and an auto parts warehouse. A new canopy and 12,000-gallon partitioned UST are located between the garage and U.S. Route 5 to the west. The ground surface around the garage has an average elevation of about 700 feet above mean sea level and slopes toward the north-northeast. Surface drainage appears to be controlled by the slope of the ground surface. The presumed direction of ground-water flow in the area is toward the north-northeast in the direction of the Barton River, which is located approximately 200 feet northeast of the property (USGS, 1986).

The garage and all nearby buildings are served by private supply wells and on-site septic systems. The site's on-site septic system is located approximately 20 feet east of the rear of the garage and an on-site non-potable gravel supply well is located approximately 10 feet south of the garage. According to Marcel Locke, the site owner, the water is not used for drinking due to the presence of sulfur, which is a common problem in the Barton River valley. The Parkview Garage supply well is approximately 86 feet deep and has a reported yield of 35 gallons per minute (gpm). The nearest off-site supply well is located approximately 1,000 feet south of the garage, in the presumed upgradient direction. The nearest building in the presumed downgradient direction receives drinking water from a spring located over 1,000 feet northwest of the garage, on the opposite side of Interstate Route 91.

Native surficial materials in the vicinity of the garage are mapped as recent alluvium consisting of fluvial sands and gravel and kame terrace deposits consisting of ice contact outwash gravel (Stewart and MacClintock, 1970). Bedrock in the area is mapped as the Waits River Formation, which is composed of gray quartzose and micaceous crystalline limestone of Lower Devonian age (Doll, 1961). Bedrock outcrops were not observed on or near the site.

### 1.2 Site History

The property has been owned and operated by Marcel Locke since 1968. According to Mr. Locke, the site was occupied by a school house prior to the mid-1960s and was occupied by a small automotive garage during the few years before he purchased the property. Mr.

Locke added that the original USTs were installed in 1968, shortly after he purchased the property.

On 30 September 1996, GWV supervised the removal of two underground storage tanks (USTs) — a 2,000-gallon regular-leaded gasoline UST (UST #1), and a 3,000-gallon unleaded gasoline UST, (UST #2). At the time of removal, both tanks were approximately 28 years old.

The 2,000-gallon regular-leaded gasoline UST (UST #1) was found to be in good condition upon removal, with no evidence of holes or pits, and with little rust. The 3,000-gallon unleaded gasoline tank (UST #2) was found to be in very good condition upon removal, with no evidence of holes or pits, and very little rust.

Minor piping leaks were noted beneath the regular gasoline fuel pump and at piping unions associated with the submersible pump assemblies. All other tank piping appeared to be in fair condition with no evidence of leaks.

Soils in the UST excavation consisted of brown coarse-to-medium sand and gravel with some cobbles from the surface downward to a total depth of approximately 10 feet. Soils from beneath the 2,000-gallon tank (UST #1) had a black appearance characteristic of weathered petroleum, and had a slight petroleum odor. Soils in the pump-island excavation were similar to those found in the UST excavation, but appeared to be saturated with petroleum. Soils around the fill pipes and submersible pump assemblies for both tanks were stained with petroleum and exhibited strong petroleum odors.

Ground water was observed in the UST and pump-island excavations at depths of ten and seven feet below ground surface (bgs), respectively. A petroleum sheen and strong petroleum odor were evident in both excavations; however, no free product was observed at either location.

Photoionization detector (PID) readings on soil samples collected from the UST excavation ranged from 24 to over 1,000 parts per million (ppm). The PID readings on soils from around the 2,000-gallon tank (UST # 1) were between 260 and 1,013 ppm, with the highest concentrations at about 9 feet bgs. The PID readings on soils from around the 3,000-gallon tank (UST # 2) were between 24 and 812 ppm, with the highest concentrations at about 6 feet bgs. VOC concentrations averaged approximately 915 ppm in the UST excavation. PID readings on soil samples collected from the pump-island excavation ranged from 983 to over 1,600 ppm. The highest VOC concentrations detected beneath the pump island were between 5 and 7 feet bgs. Soils inspected from beneath the pump island at about 7 feet bgs appeared to be saturated with petroleum.

Installation of the new 12,000-gallon partitioned UST and pump island, located adjacent to the former pump island, required the removal of approximately 80 cubic yards of soil. This soil was stockpiled and polyencapsulated on site behind the garage to the east.

During the installation of the replacement tank and new pump-island, Fred's Plumbing and Heating assisted GWV by installing one monitoring well (MW-1) adjacent to the former pump-island, where the highest PID readings were recorded and petroleum saturated soils were observed.

GWV initiated an initial site investigation under the VT DEC "Expressway" process after receiving approval on 16 October 1996 from Mr. Marcel Locke, owner of the Parkview Garage and the VT DEC.

### 1.3 Objectives and Scope of Work

The objectives of this initial site investigation were to:

- Evaluate the degree and extent of petroleum contamination in soil and ground-water;
- Qualitatively assess the risks to environmental and public health via relevant sensitive receptors and potential contaminant migration pathways; and
- Identify potentially appropriate monitoring and/or remedial actions based on the site conditions.

To accomplish these purposes, GWV has:

- Reviewed existing historical site data.
- Supervised the installation of three additional soil borings/monitoring wells, and determined the lateral extent of petroleum contamination, and the local ground-water flow direction, gradient and approximate velocity.
- Screened subsurface soils from the soil borings for the possible presence of volatile organic compounds (VOCs) using a photoionization detector (PID).
- Collected and submitted ground-water samples from the on-site monitoring wells and supply well for laboratory analysis of volatile petroleum compounds.
- Identified sensitive receptors in the area, and assessed the risk posed by the contamination to these potential receptors.
- Evaluated the need for treatment and/or a long-term monitoring plan for the site.
- Prepared this summary report, which details the work performed, qualitatively assesses risks, provides conclusions and offers recommendations for further action.

## 2.0 INVESTIGATIVE PROCEDURES AND RESULTS

### 2.1 Soil Boring / Monitoring Well Installation

During the tank removal activities on 30 September 1996, one monitoring well (MW-1) was placed within the excavation at the former pump island. The monitoring well consisted of a five-foot section of two-inch-diameter machine-slotted PVC with solid riser extending to ground surface. The bottom of the well was set at approximately 10 feet below ground surface (bgs) and backfilled with soil from the excavation. The completed monitoring well was protected by a flush-mounted steel roadbox cemented into place at ground surface. A water-tight compression cap was placed on top of the PVC riser.

On 11 November 1996, a GWV environmental geologist supervised the completion of three soil borings/monitoring wells (MW-2, MW-3, and MW-4). Approximate monitoring well locations are shown on Figure 2. The soil borings were installed using vibratory drilling technique by Adams Engineering of Underhill, Vermont.

The soils encountered in each boring generally consisted of alternating layers of light brown medium sand and light-to-dark gray silty sand. All of the borings were completed to approximately 15 feet bgs. Ground water was encountered at approximately 10 feet bgs at the time of drilling. Soil samples were collected continuously from each boring using a five-foot long core tube lined with polyethylene. Soil recovery was generally fair to good, ranging between 40 and 80 percent. The soil samples were screened for the possible presence of volatile organic compounds (VOCs) with a photo-ionization detector (PID) and logged for lithology by a GWV field geologist. All downhole drilling and sampling equipment was decontaminated during use as appropriate.

Two-inch-diameter PVC monitoring wells with 10 feet of 0.010-inch factory-slotted screens were installed to 14 feet bgs at each location. The bottoms of the screen sections were set about four to five feet below the ground water level. Sections of solid PVC were added to bring the tops of the well casings to approximately 0.5 feet bgs. Clean silica #1 filter sand was placed in the borehole annulus around each well to nominally one foot above the slotted interval. A bentonite pellet seal, approximately 1.5 feet thick, was set above the sand pack and the remainder of the annular space was backfilled with native material. Each completed monitoring well was protected by a flush-mounted steel roadbox cemented into place. Each well casing was topped with a water-tight compression cap. All four of the monitoring wells were developed on 11 November 1996 using a peristaltic pump. Monitoring-well construction details are included on the soil-boring and well-construction logs in Appendix A.

### 2.2 Soil-Screening Results

PID readings on soils collected during the UST closure ranged between 24 to 1,680 ppm, with an average of about 915 ppm. The highest PID readings were detected on soils beneath the former pump island. PID readings at monitoring well MW-1, located inside the excavated area of the former pump island, ranged between 1,028 to 1,680 ppm.

During the completion of soil borings on 11 November 1996, PID field-screening results of the soil samples collected from the three soil borings ranged between 1.1 and 1,646 parts per million (ppm) with the highest PID readings (greater than 1,000 ppm) encountered in the boring (MW-2) completed at the location of the former USTs. The PID readings in the borings completed downgradient of the former USTs and pump island (MW-3 and MW-4) were between 1.1 and 6.3 ppm. Strong petroleum odors were noted at the soil boring location for MW-2. PID screening results are included on the boring logs in Appendix A.

The GWV field geologist screened soil samples from each soil boring for the possible presence of volatile organic compounds (VOCs) using a Photovac Tip II portable PID. The PID was calibrated with an isobutylene standard gas to a benzene reference.

### 2.3 Determination of Ground-Water Flow Direction and Gradient

Ground water in the unconfined surficial aquifer directly beneath the site appears to be flowing in a north-northeasterly direction, toward the Barton River. The average gradient of the local ground-water table on 24 November 1996 was about 0.7 percent. Average flow velocities in the ground water moving through the light-brown medium sand and silty sand deposits are estimated to be in the range of 0.01 to 1.7 feet per day (ft/day). Water-level measurements and elevation calculations for 24 November 1996 are presented in Table 1. The ground-water contour map in Figure 3 was prepared using this data.

TABLE 1. Ground-Water Elevation Data

Well I. D.	Top of Casing Elevation *	Depth to Water (feet, TOC)	Ground Water Elevation
MW-1	97.64	6.08	91.56
MW-2	100.00	8.72	91.28
MW-3	98.34	7.62	90.72
MW-4	99.46	8.24	91.22

\*Top of casing (TOC) and ground water elevations are relative to an arbitrary site datum of 100.00 feet.

Fluid levels were measured in the four monitoring wells on 24 November 1996. The depth to water varied from 6.08 feet (MW-1) to 8.72 feet (MW-2) below top-of-casing. No free-phase petroleum was observed in any of the on-site monitoring wells. Static water-table elevations were computed for each monitoring well by subtracting the measured depth-to-water readings from the surveyed top-of-casing elevations, which are relative to an arbitrary site datum of 100.00 feet.

The shallow aquifer at the site consists of alternating layers of light-brown medium sand and light-to-dark gray silty sand, which typically exhibit effective porosities of about 0.2 to 0.4 and hydraulic conductivities of about 0.25 to 50 ft/day (Fetter, 1994). Assuming Darcian flow, these estimated ranges of porosity and conductivity combine with the calculated ground-water gradient of 0.7 percent to yield an estimated range of ground-water flow velocities in the surficial aquifer of between 0.01 and 1.7 ft/day.

## 2.4 Ground-Water Sampling and Analysis

Review of the ground-water analytical results indicates that the Vermont Groundwater Enforcement Standards (VGESs) for benzene and xylenes and the Vermont Health Advisory for methyl-tertiary butyl ether (MTBE) were exceeded in the ground-water samples collected from MW-1 and MW-2. The sample collected from the on-site supply well contained trace levels of benzene (less than 1 parts per billion - ppb), 1.0 ppb of toluene, and 2.0 ppb of total xylenes. No volatile petroleum compounds were detected in the ground-water samples collected from the two downgradient monitoring wells, MW-3 and MW-4. Ground-water analytical results are summarized in Table 2 and the contaminant distribution is shown on Figure 4. Laboratory report forms are included in Appendix B.

**TABLE 2. Ground-Water Analytical Results**

Well I.D.	Benzene	Ethyl benzene	Toluene	Xylenes	Total BTEX	MTBE
MW-1	71.2	161	145	1,940	2,317.2	89.9
MW-2	58.3	194	76	2,420	2,748.3	135
MW-3	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1
MW-4	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1
Supply Well	TBQ <1	ND <1	1.0	2.0	3.0	ND <1
duplicate	45.3	137	57.6	1,750	1,989.9	108
trip blank	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1
VGES*	5	680	2,240	400	40	---

Results reported as parts per billion (ppb), unless noted otherwise.

ND = Compound not detected above indicated detection limit.

TBQ = Compound detected at trace levels below quantitation limit indicated.

Duplicate sample collected from MW-2.

VGES = Vermont Groundwater Enforcement Standard. \* Vermont Health Advisory for MTBE.

Ground-water samples were collected from the four monitoring wells on 24 November 1996 and from the on-site supply well on 26 December 1996. Each monitoring well was purged and then sampled using the dedicated bailer and dropline. Purge water was discharged directly to the ground in the vicinity of each well. The supply-well sample was collected from the bathroom faucet of the garage after allowing the water to run for about 10 minutes. Trip blank and duplicate samples were collected during the sampling event for quality assurance/quality control (QA/QC) purposes. All field procedures were conducted in accordance with GWV standard protocols.

The ground-water samples were transported under chain-of-custody in an ice-filled cooler to Endyne, Inc. of Williston, Vermont where they were analyzed for the possible presence of benzene, toluene, ethylbenzene, xylenes (BTEX) and methyl-tertiary butyl ether (MTBE) by EPA Method 8020. Analytical results from the QA/QC samples indicate that adequate QA/QC was maintained during sample collection and analysis. The analytical results for the blind field-duplicate sample were within 30 percent of the original results and none of the BTEX compounds or MTBE were detected in the trip-blank sample.

### 3.0 SENSITIVE RECEPTOR SURVEY AND RISK ASSESSMENT

#### 3.1 Sensitive Receptor Survey

GWV conducted a survey to identify sensitive receptors in the vicinity of the Parkview Garage that could potentially be impacted by residual soil and ground water contamination. The following sensitive receptors were identified in the vicinity of the site:

- The on-site gravel supply well, located approximately 80 feet southeast of the former USTs and pump island. Water from this well is reportedly not used for drinking.
- The Barton River, located approximately 200 feet north-northeast of the former USTs and pump island.

Both on-site buildings are constructed on at-grade slab-foundations and are not likely to be impacted by on-site contamination. No off-site drinking water supply wells are located on adjacent properties—the nearest off-site supply well is located approximately 1,000 feet south of the garage, in the upgradient direction. No subsurface utility lines are known to exist in the vicinity of the area of contamination.

#### 3.2 Risk Assessment

GWV assessed the risks that the residual subsurface contamination poses to the receptors identified above. In general, human exposure to petroleum related contamination is possible through inhalation, ingestion, or direct contact while impacts to environmental receptors are due either to a direct release or contaminant migration through one receptor to another or along a preferential pathway.

The findings of our risk assessment indicate that the risk posed to human health and the environment by the residual contamination is low. Although the residual subsurface petroleum contamination at the site may be the source of low-level volatile petroleum contamination detected in the on-site non-potable gravel supply well; this well is not currently used for drinking, and is unlikely to be used for drinking in the future due to a sulfur odor. The other nearby sensitive receptors; including the on-site buildings and the Barton River, do not appear to be threatened by the residual subsurface petroleum contamination identified on-site at this time.

##### 3.2.1 Drinking-Water Supplies

Drinking water for the Barton area around the Parkview Garage is supplied primarily by individual supply wells. An on-site non-potable gravel supply well is located approximately 10 feet south of the garage, which is approximately 80 feet upgradient of the former USTs and pump island. According to Marcel Locke, the site owner, the water is not used for drinking due to the presence of sulfur, which is a common problem in the Barton River valley. The Parkview Garage supply well is approximately 86 feet deep and has a reported yield of 35 gallons per minute (gpm). The nearest off-site supply well is located approximately 1,000 feet south of the garage, in the presumed upgradient

direction. The nearest building in the presumed downgradient direction receives drinking water from a spring located over 1,000 feet northwest of the garage, on the opposite side of Interstate Route 91.

Analysis of the sample collected from the on-site supply well on 26 December 1996 detected the presence of trace levels of benzene (less than 1 part per billion - ppb), 1.0 ppb of toluene, and 2.0 ppb of total xylenes, which indicates that none of the Vermont drinking-water standards for volatile petroleum compounds were exceeded. The residual contamination at the location of the former USTs and pump island is a possible source of the contamination detected in the on-site supply well; however additional work is necessary to determine the possible connection between the source area and the on-site supply well.

### **3.2.2 Confined Spaces and Underground Utilities**

The accumulation of gasoline vapors in confined spaces or underground utilities such as basements, crawl spaces and sewer lines, could be an explosion hazard, if a significant amount of vapors were to accumulate and an ignition source was also present. The risk that vapor-phase contamination would accumulate in the on-site buildings is considered to be very low due to the fact that both on-site buildings are constructed on at-grade slab-foundations. No underground utility lines are known to pass through the observed dissolved-phase plume.

### **3.2.3 Surface-Water Quality**

In general, human exposure through direct contact or ingestion (direct or indirect) of contaminated surface water or sediment is possible through recreational activities such as swimming, fishing, or boating. The nearest downgradient surface water body is the Barton River, located approximately 200 feet north-northeast of the site. Current information indicates that contamination from the site has not migrated to this surface-water body — analysis of ground-water samples from monitoring wells situated between the source area and the river did not detect the presence of gasoline contamination.

### **3.2.4 Direct Soil / Ground-Water Contact**

The risk of human exposure through direct contact with contaminated soils is considered to be low at the site, considering that the majority of the petroleum contaminated soils are located beneath a parking lot. However, direct contact with potentially contaminated soil is possible if any subsurface exploratory or construction work is conducted in the vicinity of the former USTs or pump island.

The risk of human exposure through direct contact with contaminated ground water is possible through the use of water from the on-site non-potable gravel supply well, which was found to contain low-level volatile petroleum contamination.

#### 4.0 CONCLUSIONS

Based on the results of the site investigation described above, GWV concludes the following:

- Gasoline appears to have been released to the subsurface at the site. Soils in the vicinity of the removed gasoline underground storage tanks (USTs) and pump island had elevated photoionization detector (PID) readings and gasoline compounds were detected at levels above Vermont Ground Water Enforcement Standards (VGES) in ground water at the site.
- Observations made during the UST closure and recent ground-water sample results from on-site monitoring wells suggest the source of contamination is the former USTs and pump island.
- No free-phase gasoline was observed in any of the on-site monitoring wells.
- The VGESs for benzene and xylenes were exceeded in the samples collected from MW-1 and MW-2.
- The Vermont Health advisory (VHA) for methyl-tertiary butyl ether (MTBE) was exceeded in the samples collected from MW-1 and MW-2.
- Low concentrations (2 parts per billion or less) of benzene, toluene, and xylenes were detected in the on-site gravel supply well. This well, reported to be 86 feet deep, is not used as a drinking-water supply.
- Ground-water contamination in the surficial aquifer does not appear to have migrated off-site.
- Subsurface contamination at the site does not appear to pose a threat to the Barton River, located 200 feet northeast (downgradient) of the site. Analysis of ground-water samples from monitoring wells situated between the former USTs and pump island and the river did not detect the presence of gasoline contamination.
- Both on-site buildings are constructed on at-grade slab-foundations and are not likely to be impacted by on-site contamination.
- No underground utility lines are known to pass through the observed dissolved-phase plume.
- No off-site drinking-water supplies appear to be at risk from the residual soil or ground water contamination at the site.
- Surficial materials at the site consist of alternating layers of light brown medium sand and light-to-dark gray silty sand. On 24 November 1996, the water table was found to be about 6 to 9 feet below ground surface, and exhibited a north-northeasterly trending gradient, toward the Barton River, of about 0.7 percent. The representative range of ground-water flow velocities are expected to be between 0.01 and 1.7 feet per day.

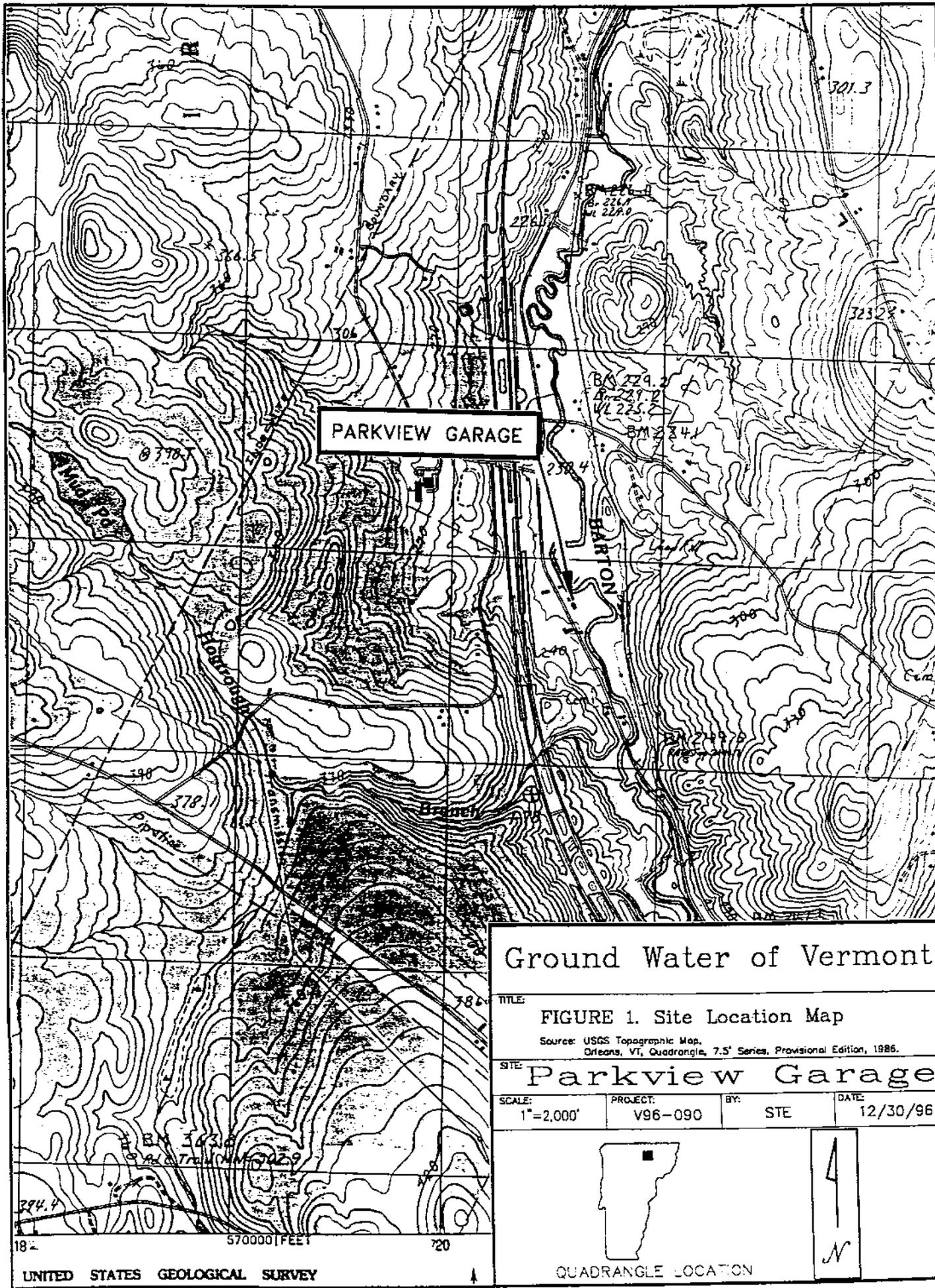
## 5.0 RECOMMENDATIONS

On the basis of the results of this investigation and the conclusions stated above, Ground Water of Vermont recommends the following:

1. The four on-site monitoring wells and the supply well should be resampled to confirm the November 1996 analytical results. The samples should be analyzed for BTEX compounds and MTBE by EPA Method 8020.
2. The source of contamination in the on-site supply well should be further evaluated. This evaluation should include a review of the driller's log of the supply well for information on subsurface materials and assessment of other potential contaminant sources, such as floor drains or the septic system, in the vicinity of the well. If necessary one or more soil borings/monitoring wells should be installed between the on-site supply well and the former UST location and pump island to evaluate the route of contaminant entry/migration pathway. Soil samples should be collected continuously to characterize lithology and screened for the possible presence of VOCs using a portable PID. Based on the subsurface soil conditions and PID screening results, monitoring wells should be installed for water quality monitoring. The new monitoring wells, if installed, should be sampled along with the existing monitoring wells for BTEX compounds and MTBE by EPA Method 8020.
3. Upon completion of the work described above, evaluate the appropriateness of long-term monitoring or active remediation of the site.
4. The on-site soil stockpile should be monitored semi-annually with a photoionization detector (PID), and the integrity of the stockpile cover maintained. When PID readings have decreased to below one part per million (ppm), permission should be sought from the VT DEC to thin-spread the soils on site, in accordance with VT DEC guidelines.

## 6.0 REFERENCES

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PARKVIEW GARAGE

# Ground Water of Vermont

TITLE: **FIGURE 1. Site Location Map**  
 Source: USGS Topographic Map, Orleans, VT, Quadrangle, 7.5' Series, Provisional Edition, 1986.

SITE: **Parkview Garage**

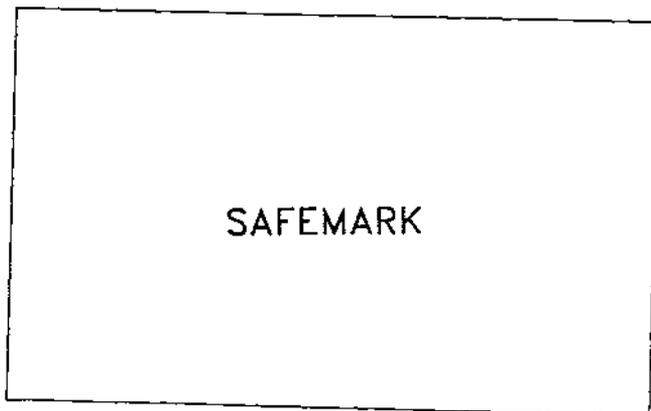
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QUADRANGLE LOCATION



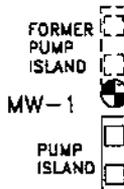
BARTON RIVER  
APPROX. 100'

MW-3



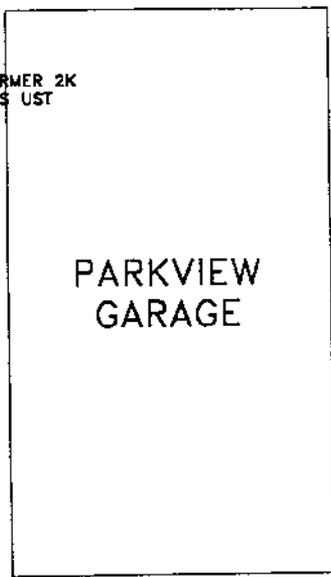
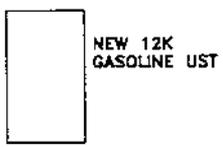
MW-4

U.S. ROUTE 5



FORMER 3K  
GAS UST

FORMER 2K  
GAS UST



GRAVEL  
SUPPLY  
WELL



Ground Water of Vermont

1 Mill St., Box C-5  
Burlington, VT 05401  
(802) 860-6065

PARKVIEW GARAGE  
BARTON, VT

FIGURE 2.  
SITE MAP  
WITH MONITORING WELL LOCATIONS

LEGEND:

● MONITORING WELL



DRAWN BY: STE

DATE: NOV 1996

APPROVED BY: RM

FILE No.: 96090

ALL LOCATIONS ARE APPROXIMATE



BARTON RIVER  
APPROX. 100'

90.72'  
MW-3

90.8'

90.9'

91.0'

91.1'

91.2'

91.3'

91.4'

91.5'

91.56'  
MW-1

MW-2  
91.28'

MW-4  
91.22'

SAFEMARK

PARKVIEW  
GARAGE

GRAVEL  
SUPPLY  
WELL

U.S. ROUTE 5

APPROXIMATE  
DIRECTION OF  
GROUND-WATER FLOW



*Ground Water of Vermont*

1 Mill St., Box C-5  
Burlington, VT 05401  
(802) 860-6065

PARKVIEW GARAGE  
BARTON, VT

FIGURE 3.  
GROUND-WATER CONTOUR MAP  
MONITORING DATE: 24 NOVEMBER 1996

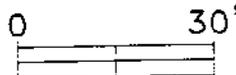
LEGEND: — GROUND-WATER CONTOUR  
● MONITORING WELL

DRAWN BY: STE

DATE: NOV 1996

APPROVED BY: RM

FILE No.: 96090



ALL LOCATIONS ARE APPROXIMATE

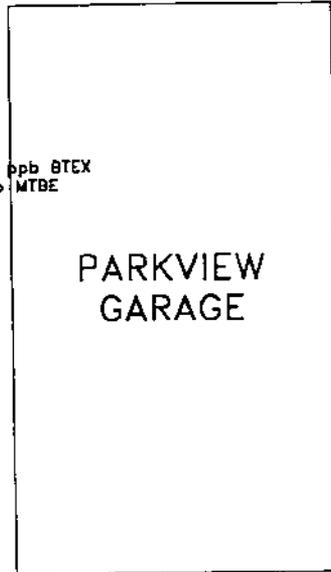


BARTON RIVER  
APPROX. 100'

MW-3  
●  
ND ppb BTEX  
ND<1 ppb MTBE

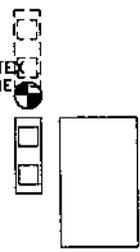


MW-4  
●  
ND ppb BTEX  
ND<1 ppb MTBE



MW-2  
●  
2,748.3 ppb BTEX  
135 ppb MTBE

2,317.2 ppb BTEX  
89.9 ppb MTBE  
MW-1  
●



3 ppb BTEX  
ND<1 ppb MTBE  
●  
GRAVEL  
SUPPLY  
WELL

U.S. ROUTE 5



*Ground Water of Vermont*

1 Mill St., Box C-5  
Burlington, VT 05401  
(802) 860-6065

PARKVIEW GARAGE  
BARTON, VT

FIGURE 4.  
CONTAMINANT DISTRIBUTION MAP  
MONITORING DATE: 24 NOVEMBER 1996

LEGEND:

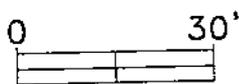
● MONITORING WELL  
ND NONE DETECTED

DRAWN BY: STE

DATE: NOV 1996

APPROVED BY: RM

FILE No.: 96090



ALL LOCATIONS ARE APPROXIMATE

**APPENDIX A**

**Soil Boring and Well Construction Logs**





# Ground Water of Vermont

FIELD SUPERVISOR Bruce Hamilton  
 CONTRACTOR Adams Engineering  
 DRILLERS J. Adams

JOB LOCATION  
Parkview Garage  
 DATE 11/11/96

RILLING METHOD Vibratory		BORING LOCATION						
BORING DIAMETER 2.375"		BORING # 2						
AND 40 - 50%		sketch on back or on-site plan						
SOME 10 - 40%		with measurements						
TRACE 0 - 10%		TOTAL DEPTH 15'						
DEF. "	SAMPLES	BLOWS PER 6"	REC.	SAMPLE DESCRIPTION	STRAT CHG	PID Readings in ppm GENERAL DESCRIPTION ppm = parts per million	WELL DETAIL	DEPTH
	SAMPLE NUMBER	0 6 12 18 24						
			2	Blacktop				
5'				Dark brown loamy sand and gravel backfill		Dry Strong petroleum odor 1646 ppm	Riser	5'
			2	Dark brown med/coarse sand Dark brown med/coarse sand Dark black petro. staining		Dry, strong petro. odor Strong petr. odor moist 1011 ppm	Screen	10'
10'			3.5	Dark gray med sand Dark gray/black med/coarse sand and gravel, petro. staining		wet, strong petro odor 1015 ppm wet, strong odor 1120 ppm		15'
15'								
20'						Road box at grade Bentonite seal; GW recorded at 9.5' bgs Depth well 13.7' Screen 3.7' - 13.7' bgs Screen noted on GW well developed well with peristaltic pump.		20'
25'								25'
30'								30'
35'								35'
40'								40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	2" PVC	10'	GROUT		Yes
SLOT SIZE	0.10" / PVC		BACKFILL		Yes
RISER PIPE	2" PVC	3'	WATER USED		no
GRADED SAND	#1	2 gal	STEAM CLEANER		Yes
PELLET BENTONITE					
GRANULAR BENTONITE	Yes				



# Ground Water of Vermont

FIELD SUPERVISOR B. Hamilton  
CONTRACTOR Adams Engineering  
DRILLERS J. Adams

JOB LOCATION  
Parkview Garage  
DATE 11/11/96

DRILLING METHOD *vibratory*  
BORING DIAMETER 2.375"

AND 40 - 50%  
SOME 10 - 40%  
TRACE 0 - 10%

BORING LOCATION BORING #3  
sketch on back or on-site plan MW-3  
with measurements TOTAL DEPTH  
15'

DEPTH	SAMPLE NUMBER	BLOWS PER 6"					REC.	SAMPLE DESCRIPTION	STRAT CHG	PID Readings in ppm GENERAL DESCRIPTION ppm = PARTS per million	WELL DETAIL	DEPTH
		0	6	12	18	24						
							2	Blanktop				
								0-1' Dark brown sand and gravel fill		dry, no odor	1.1 ppm	
								1-2' light brown med. sand		dry, no odor		
5'							4.5	0-1' light brown med. sand		dry, no odor	1.4 ppm	
								1-2' Dark gray fine silty sand		dry, no odor	2.0 ppm	
								light gray fine silty sand		mo. st, no odor	1.5 ppm	
10'							4	light gray fine silty sand		wet, no odor	2.8 ppm	
								dark gray fine silty sand		wet, musty odor	3.2 ppm	
15'								Dark gray med sand		wet, musty odor	5.1 ppm	
20'												
25'												
30'												
35'												
40'												

GW recorded at 7.3' bgs  
Screen 14.7' - 4.7' bgs  
Depth well 14.7' bgs

Road box at-grade  
Bentonite seal  
Well developed with peristaltic pump

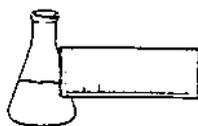
1 1/2" Screen / 1 1/2" Riser  
Sand

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	2" PVC	10'	GROUT		Yes
SLOT SIZE	0.10" PVC		BACKFILL		Yes
RISER PIPE	2" PVC	4'	WATER USED		No
GRADED SAND	W1	2 gal	STEAM CLEANER		Yes
PELLET BENTONITE					
GRANULAR BENTONITE					



**APPENDIX B**

**Laboratory Report Forms**



### EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: GroundWater of Vermont

DATE RECEIVED: November 25, 1996

PROJECT NAME: Parkview Garage

REPORT DATE: December 3, 1996

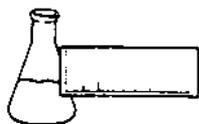
CLIENT PROJ. #: V96-090

PROJECT CODE: GWVT1100

Ref. #:	97,083	97,084	97,085	97,086	97,087
Site:	Trip Blank	MW-1	MW-2	MW-3	MW-4
Date Sampled:	11/24/96	11/24/96	11/24/96	11/24/96	11/24/96
Time Sampled:	10:30	11:02	11:14	10:53	10:42
Sampler:	B. Hamilton				
Date Analyzed:	12/2/96	11/28/96	12/2/96	12/2/96	12/3/96
UIP Count:	0	>10	>10	0	0
Dil. Factor (%):	100	5	5	100	100
Surr % Rec. (%):	94	95	115	92	90
Parameter	Conc. (ug/L)				
Benzene	<1	71.2	58.3	<1	<1
Chlorobenzene	<1	<20	<20	<1	<1
1,2-Dichlorobenzene	<1	<20	<20	<1	<1
1,3-Dichlorobenzene	<1	<20	<20	<1	<1
1,4-Dichlorobenzene	<1	<20	<20	<1	<1
Ethylbenzene	<1	161.	194.	<1	<1
Xylenes	<1	145.	76.	<1	<1
MTBE	<1	1,940.	2,420.	<1	<1
		89.9	135.	<1	<1

Ref. #:	97,088				
Site:	Duplicate				
Date Sampled:	11/24/96				
Time Sampled:	NI				
Sampler:	B. Hamilton				
Date Analyzed:	12/3/96				
UIP Count:	>10				
Dil. Factor (%):	5				
Surr % Rec. (%):	100				
Parameter	Conc. (ug/L)				
Benzene	45.3				
Chlorobenzene	<20				
1,2-Dichlorobenzene	<20				
1,3-Dichlorobenzene	<20				
1,4-Dichlorobenzene	<20				
Ethylbenzene	137.				
Toluene	57.6				
Xylenes	1,750.				
MTBE	108.0				

Note: UIP = Unidentified Peaks    TBQ = Trace Below Quantitation    NI = Not Indicated



**ENDYNE, INC.**

**Laboratory Services**

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

**EPA METHOD 8020-PURGEABLE AROMATICS**

CLIENT: GroundWater of Vermont  
PROJECT NAME: Park View Garage  
CLIENT PROJ. #: V96-090

DATE RECEIVED: December 27, 1996  
REPORT DATE: January 3, 1997  
PROJECT CODE: GWVT1569

Ref. #:	98,368				
Site:	Supply Well				
Date Sampled:	12/26/96				
Time Sampled:	10:07				
Sampler:	B. Hamilton				
Date Analyzed:	1/3/97				
UIP Count:	0				
Dil. Factor (%):	100				
Surr % Rec. (%):	89				
Parameter	Conc. (ug/L)				
Benzene	TBQ <1				
Chlorobenzene	<1				
1,2-Dichlorobenzene	<1				
1,3-Dichlorobenzene	<1				
1,4-Dichlorobenzene	<1				
Ethylbenzene	<1				
Toluene	1.0				
Xylenes	2.0				
MTBE	<1				

Note: UIP = Unidentified Peaks    TBQ = Trace Below Quantitation    NI = Not Indicated

**CHAIN-OF-CUSTODY RECORD**

V96090

Project Name: <b>Parkview Garage</b> Site Location: <b>Barton VT</b>	Reporting Address: <b>GWV</b> <b>1 Mill St Box C-5 Burlington, VT</b>	Billing Address:
Endyne Project Number: <b>GWVT 1100</b>	Company: <b>Ground Water of VT</b> Contact Name/Phone #:	Sampler Name: <b>B. HAMILTON</b> Phone #: <b>(802) 860-6065</b>

Lab #	Sample Location	Matrix	GRA B	COMP	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
97,083	Trip BLANK	water			11/24/96 1030	2	GLASS 40cc		30	I, HCl	
97,084	MW-1	↓	↓		1102	↓	↓		↓	↓	
97,085	MW-2	↓	↓		1114	↓	↓		↓	↓	
97,086	MW-3	↓	↓		1053	↓	↓		↓	↓	
97,087	MW-4	↓	↓		1042	↓	↓		↓	↓	
97,088	Duplicate										

Relinquished by: Signature <i>Bruce H... ..</i>	Received by: Signature <i>Tania M. ... ..</i>	Date/Time <b>11-25-96</b> <b>8:50</b>
Relinquished by: Signature	Received by: Signature	Date/Time

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	Nitric N	9	BOD <sub>5</sub>	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): <b>8020 + MTBE</b>										

