



WASTE MANAGEMENT  
DIVISION

JUN 16 9 41 AM '98

June 11, 1998

Mr. Chuck Schwer  
State of Vermont  
Department of Environmental Conservation  
Sites Management Section  
103 South Main Street  
Waterbury, VT 05671-0404

98-2344

RE: Reports on the Site Investigations and Corrective Actions at Stone Gate Farm,  
Shaftsbury, VT

Dear Chuck:

Enclosed please find two reports regarding Stone Gate Farm in Shaftsbury. The first report, entitled *Report on the Site Investigation and Corrective Action: USTs #1, 2, and 3*, describes the excavations which were performed to determine the extent of petroleum-impacted soils in the vicinity of the three former USTs. This report also describes the limited site investigation regarding UST #1. The second report entitled *Report on the Site Investigation of Subsurface Petroleum Contamination in the Vicinity of UST #3*, details the investigation regarding UST #3 only. This investigation was conducted using the Site Investigation Expressway process.

If you have any questions regarding these investigations and remedial actions, please call.

Sincerely,

Kevin McGraw  
Hydrogeologist

Enclosure

cc: GI #29841181

**REPORT ON THE  
SITE INVESTIGATION AND  
CORRECTIVE ACTION:  
USTs #1, 2, and 3**

at  
**Stone Gate Farm  
586 Maple Hill Road  
Shaftsbury, Vermont**

June 11, 1998

*Prepared for*

Jerome Construction  
Box 1660, West Road  
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*Prepared by*



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## I. INTRODUCTION

This report provides a summary of limited additional investigations and corrective action efforts conducted in the vicinity of three former gasoline underground storage tanks (USTs) at the Stone Gate Farm property located at 586 Maple Hill Road in Shaftsbury, Vermont (see Appendix A, Site Location Map). This work was conducted by Griffin International, Inc. (Griffin) under contract to Jerome Construction of Bennington, Vermont, agent for the property owner.

## II. PROJECT HISTORY

Griffin inspected the removal and permanent closure of three (3) petroleum underground storage tanks (USTs) at the Stone Gate Farm on March 4 and March 9, 1998. Ms. Sue Thayer of the VTDEC Waste Management Division, UST Program was notified verbally of the results of the UST closures on March 10, 1998 [1]. A UST closure report, including the completed State of Vermont Permanent UST Closure Forms, was submitted to the Waste Management Division on March 18, 1998 [2].

The three USTs removed from the site are identified as follows:

<u>UST No.</u>	<u>Capacity (gallons)</u>	<u>Age (yrs)</u>	<u>Contents</u>	<u>Construction</u>
UST #1	2,000	20 years	Gasoline	Single-walled steel, unprotected
UST #2	1,000	20 years	Gasoline	Single-walled steel, unprotected
UST #3	1,000	20 years	Gasoline	Single-walled steel, unprotected

The former UST locations are identified on the attached Property Sketch Map (Appendix A).

Limited concentrations of petroleum impact to soils were detected through on-site screening with a portable photoionization detector (PID) during the UST closure inspections. Consequently, the property owner directed Jerome Construction and Griffin to proceed with immediate response actions to mitigate the degree and extent of contamination and, where appropriate, to follow through with a site investigation on the Expressway Program in accordance with VTDEC guidelines.

Mr. Chuck Schwer of the Waste Management Division, Sites Management Section, was notified verbally on March 10, 1998 [3] and in a letter from Ms. Kristen Underwood of Griffin, dated March 11, 1998 [4], of the status of the UST closures, the proposed conceptual approach for corrective action procedures for the three UST basins, and the intent of the property owner to proceed with a site investigation(s), where warranted, on the Expressway Program. In a March 12, 1998 letter to Ms. Underwood [5], Mr. Schwer granted approval of the plan to excavate petroleum impacted soils from the Stone Gate Farm site with subsequent treatment and disposal by thermal incineration, and subsequent site investigation, where warranted.

The following sections detail the additional excavations conducted at each of the basins for former USTs #1, #2, and #3, and the limited site investigation relative to UST #1. In addition,

excavated soil treatment and disposal procedures are summarized. As petroleum impact was determined for soils from the elevation of the regional groundwater table in the vicinity of former UST #3, a site investigation was conducted under the Expressway Program for this UST basin. This site investigation is summarized in a report submitted under separate cover (see *Report on the Site Investigation of Subsurface Petroleum Contamination in the Vicinity of UST #3 at Stone Gate Farm*).

### **III. EXCAVATIONS TO DETERMINE THE EXTENT OF PETROLEUM-IMPACTED SOILS**

The condition of USTs #1, #2, and #3 and their associated piping and the degree of petroleum impact to soils in their immediate vicinities, as screened with a PID, were summarized in the UST closure report dated March 18, 1998 [2]. These results have been summarized below, along with results of soil sampling for PID screening and laboratory analysis conducted during additional excavations in the former UST basins on March 10, March 12, March 13, and March 16, 1998. The objectives of these additional excavation activities were multiple.

Additional excavation was conducted to:

- 1) define the lateral and vertical extents of petroleum impact to soils;
- 2) where possible, accomplish the complete removal of petroleum impacted soils from the UST source area (with appropriate off-site treatment/disposal of excavated soils);
- 3) determine the elevation of groundwater and evaluate the potential petroleum impact to groundwater in the direct vicinity of each former UST.

In the case where petroleum impact was identified in groundwater saturated soils, and thus, the complete removal of petroleum-impacted soils was not possible, soil excavation was conducted to mitigate source area contaminant levels and significantly reduce the need for future monitoring of soils and groundwater at the site.

Native soils encountered at the Stone Gate Farm property during excavation of the three UST basins, consisted generally of dense glacial till comprised predominantly of silt, small percentages of fine sand, with local cobbles and boulders. Some of the boulders encountered in the UST #3 basin were very large, greater than five feet in long-axis diameter. The Surficial Geologic Map of Vermont [6] maps the surrounding area as glacial till. Bedrock underlying the site consists of Monkton Quartzite according to the Centennial Geologic Map of Vermont [7]. Given the relatively low permeability of dense glacial till soils of this nature, it is likely that left in place, residual petroleum contaminants adsorbed to soils in the vadose zone and dissolved in the groundwater saturated zone would receive limited natural treatment via natural mitigative processes including dilution, dispersion, and biodegradation. Moreover, the limited permeability of surficial materials at this site would likely preclude establishment of cost effective and practical in-situ remediation methods such as soil vapor extraction, air sparging, or enhanced

bioremediation, which under more favorable hydrogeologic settings have proven very efficient for remediation of gasoline-related subsurface petroleum contamination.

Limited soil excavation was determined to be a prudent approach at the site for reducing the bulk of the petroleum impacted soils, with the overall objective of reducing or eliminating the need for ongoing soil and groundwater monitoring at the site. This corrective action approach was consistent with the wishes of the property owner to, where feasible, remove petroleum-impacted soils from the subject property for ex-situ treatment/ disposal.

#### **A. Evaluation of UST #1 Basin**

UST #1 was removed on March 4, 1998. The total depth of excavation was approximately 8 feet upon removal of the tank. The UST was in poor condition, exhibiting moderate rust, severe pitting, and one pinhole located on the in-situ southeast end of the tank near the base. Associated vent and dispenser piping was in fair condition, exhibiting moderate rust and scaling [2].

Soils in the excavation for UST #1 consisted of medium yellowish-brown, fine- to coarse-grained sand and gravel with some silt from grade to approximately 4.5 feet. Orange-brown, fine sand and clay with local cobbles were present from 4.5 feet to 8 feet at extent of excavation. A very limited volume of perched groundwater was observed at an approximate depth of 5.5 feet below grade, positioned above the vertical extent of petroleum impacted soils. As the full extent of petroleum impact to soils surrounding UST #1 could not be determined on the date of the site assessment, soils were returned to the excavation pending later assessment

On March 12, 1998, the soils in the vicinity of former UST #1 were re-excavated. Soils were screened with a PID and petroleum impacted soils were stockpiled on plastic and covered with plastic at a temporary location on the east side of the open-bay garage located south of the caretakers house (Petroleum-Contaminated Soil [PCS] Stockpile #3 depicted on the Stockpile Location Map in Appendix A). Additional impacted soils were removed from UST #1 basin on March 13, 1998 and on March 16, 1998. A new polyencapsulated stockpile (PCS Stockpile #2, as depicted on the figure in Appendix A) was established on the north side of the garage on March 16, 1998.

The following soil screening results were recorded for the UST #1 basin excavation on March 4 during the UST closure assessment (sample numbers designated with a prefix of "UCA") and on March 12 and 13, during follow-on exploratory excavations. Soil sample locations are indicated on the attached UST #1 Basin Sketch Map (Appendix A).

**UST #1 Basin Soil Sample Headspace Screening Results  
March 4\*, 1998; March 12-13\*\*, 1998**

Sample No.	Depth (ft)	Total VOCs (ppm)
UCA-1	3	0.0
UCA-2	4	3.
UCA-3	8	200
UCA-4	8	100.
UCA-5	6	150.
UCA-6	6	0.9
1	11.5	230
2	13.5	280
3	14	230
4	18	210
5	19	55
6	20	55

\*Hnu Model PI-101 PID [2]

\*\*Hnu Model PI-101 PID

Other than the limited volume of perched water noted above at a depth of approximately 5.5 feet below grade, groundwater was not encountered in the exploratory excavations of UST #1 Basin to a total depth of approximately 25 feet below grade. As this depth was approaching the maximum reach of the on-site excavator, a decision was made to:

- 1) Continue excavations of the bulk of petroleum-impacted soils from this basin which exhibited VOC readings of 50 ppm or greater with the PID;
- 2) Install a soil boring/ monitoring well (see Section V) in the direct downgradient vicinity of the UST #1 basin with the objectives of:
  - a) determining the depth to regional groundwater in this location; and
  - b) evaluating the potential petroleum impact to groundwater in that location.

Excavation of petroleum-impacted soils from the UST #1 basin continued on March 12th, 13th, and 16<sup>th</sup>. Soils were excavated to a depth of 25 feet directly beneath the footprint of the former UST. In an area approximately 10 feet wide by 15 feet long immediately north (and topographically downgradient) of the former UST footprint, soils from depths ranging from 6 to 15 feet below grade were removed from the excavation. Contaminant concentrations, as measured by PID and by olfactory senses, were lessening with depth from approximately 12 to 15 feet below grade. A total of approximately 164 cubic yards of petroleum-impacted soils was removed from the vicinity of former UST #1 from depths ranging from 6 to 25 feet below grade. Soils obtained from elevations above a depth of approximately 6 feet below grade did not exhibit elevated VOCs as measured with the PID. These soils were segregated from the impacted soils and were used, along with additional clean fill material, to backfill the excavation.

## B. Evaluation of UST #2 Basin

UST #2 was removed on March 9, 1998. The total depth of the excavation for UST #2 was approximately 8 feet upon removal of the tank. The UST was in poor condition, exhibiting moderate rust, severe pitting, and one pinhole (upon tank removal) located on the in-situ southwest end of the tank at the base. Associated vent and dispenser piping was in fair condition, exhibiting moderate rust and scaling [2].

Soils in the excavation for UST #2 consisted of light brown sand with some gravel from two inches (at the base of pavement) to one foot below grade (likely fill material), light brown silt with a little gravel and local cobbles from one foot to 6 feet below grade, and greenish gray silt and local cobbles from 6 to 8 feet below grade. Generally coarse to fine sands were encountered as fill material immediately surrounding the UST. A very limited volume of water was observed at an approximate depth of 5.5 feet below grade directly beneath the UST. This water had apparently collected in a "bathtub effect" in the relatively loose, unconsolidated fill materials surrounding the UST and had perched on the denser, undisturbed sediments which comprised the bottom of the UST basin. As the full extent of petroleum impact to soils surrounding UST #2 could not be determined, soils were returned to the excavation on March 9, 1998, pending later assessment.

On March 12, 1998, the soils in the vicinity of former UST #2 were re-excavated. Soils were screened by the bucket with a PID. Clean soils (i.e., with non-detectable VOCs by PID) were segregated from impacted soils, and spread on site approximately 200 feet up-topographic slope from the UST basin. Impacted soils (with a detection of VOCs 1 ppm or greater) were stockpiled on plastic and covered with plastic at a temporary location on the east side of the open-bay garage located south of the Gate House (PCS Stockpile #3 depicted on the Area Map).

The following soil screening results were recorded for the UST #2 basin excavation on March 9 during the UST closure assessment (sample numbers designated with a prefix of "UCA") and on March 12, during follow-on exploratory excavations. Soil sample locations are indicated on the attached UST#2 Basin Sketch Map (Appendix A).

### UST #2 Basin Soil Sample Headspace Screening Results March 9\*, 1998; March 12\*\*, 1998

Sample No.	Depth (ft)	Total VOCs (ppm)
UCA-1	3	1.7
UCA-2	4	1.8
UCA-3	8	10.
1	1.5	0.0
2	3.0	0.0
3	4.5	0.0
4	5	0.0

5	5	0.0
6	6.5	0.0
7	5	0.0
8	7	8.0
9	7.5	0.5
10	8	0.4
11	8.5	0.8
12	9.5	1.0
13	11.0	0.1
14	12.5	0.0
15	12	0.0
16	12	0.0

\*Hnu Model HW-101 PID [2]

\*\*Hnu Model PI-101 PID

The extent of petroleum impacted soils was defined through the excavation process on March 12, 1998. Neither bedrock nor groundwater, other than the limited volume of perched water noted above, was encountered in the excavation to the maximum depth of excavation (i.e., 12.5 feet below grade). Soils encountered in the excavation from approximately 8 feet to 12.5 feet below grade were generally greenish-gray silt with local cobbles.

Approximately 4 cubic yards of impacted soils were excavated from the UST #2 basin and polyencapsulated at the PCS Stockpile #3 location. In accordance with November 1997 *Underground Storage Tank Closure And Site Assessment Requirements* published by the VTDEC Waste Management Division [8], a soil sample for laboratory confirmation analysis was collected from the full extent of the excavation of UST #2 basin. The location of this soil sample (SS-1) is indicated on the UST Basin #2 Sketch Map (Appendix A). The depth of collection of SS-1 was approximately 12.5 feet below grade. SS-1 was submitted to Endyne, Inc. laboratory in Williston, Vermont for analysis of target VOCs by EPA Method 8020 and for Total Petroleum Hydrocarbons (TPHs) via modified EPA Method 8015. None of the constituents targeted by these analyses were reported above detection limits. The laboratory analysis report is contained in Appendix C.

### C. Evaluation of UST #3 Basin

UST #3 was removed on March 9, 1998. The total depth of the excavation for UST #3 was approximately 6 feet upon removal of the tank. The UST was in poor condition, exhibiting moderate rust and severe pitting. Petroleum staining was observed on the tank exterior surrounding a welded seam near the bottom of the tank on the in-situ east end. Associated vent and dispenser piping was in fair condition, exhibiting moderate rust and scaling [2].

Soils in the excavation for UST #3 consisted of dark to light brown silt with a little gravel and local cobbles from surface to 6 feet below grade. A very limited volume of water was observed at an approximate depth of 6 feet below grade directly beneath the UST. As in the basin for UST #2, this water had apparently collected in a "bathtub effect" in the relatively loose, unconsolidated fill materials surrounding UST #3 and had perched on the denser, undisturbed

sediments which comprised the bottom of the UST basin.

On March 10, 1998 excavation of the UST #3 basin resumed in an attempt to define the lateral and vertical extents of impacted soils and to identify the depth to regional groundwater. Soil samples from the excavation were collected for screening of VOCs by PID.

The following soil screening results were recorded for the UST #3 basin excavation on March 9 during the UST closure assessment (sample numbers designated with a prefix of "UCA") and on March 10, during follow-on exploratory excavations. Soil sample locations are indicated on the attached UST#3 Basin Sketch Map (Appendix A).

**UST #3 Basin Soil Sample Headspace Screening Results  
March 9\* and March 10\*, 1998**

Sample No.	Depth (ft)	Total VOCs (ppm)
UCA-1	3	0.3
UCA-2	3	1.2
UCA-3	6	142.
UCA-4	6	1.4
1	6	0.0
2	6	5
3	6	4.5
4	6	6.3
5	12	17
6	12	42
7	12	130
8	12	80
9	13	200
10	14	300

\*Hnu Model HW-101 PID

The lateral and vertical extents of petroleum impacted soils were not defined through these exploratory excavations which were conducted to a maximum depth of 14 feet below grade. Water saturated soils indicative of regional groundwater were encountered at an approximate depth of 14 feet below grade on March 10, 1998. Soil samples collected from this approximate depth exhibited elevated headspace PID readings, indicating that groundwater, also, was likely impacted by petroleum. Given this fact, and given the proximity of the adjacent garage foundation to the UST #3 basin, the objective of excavating the full extent of petroleum-impacted soils in this source area became impractical. Instead the focus of corrective action efforts became one of excavating the bulk of grossly impacted soils to reduce the volume of residual petroleum contamination which could serve as an ongoing source of dissolved groundwater contamination. Limited excavation of the bulk of the petroleum impacted soils was achieved and it is believed that this action will serve to greatly reduce future contaminant concentrations in subsurface soils and groundwater in this setting.

Contaminated soils (with a detection of VOCs approximately 10 ppm or greater) were stockpiled on plastic and covered with plastic at a temporary location approximately 25 feet to the east of the former UST #3 basin (PCS Stockpile #1 on Property Sketch Map). Approximately 40 cubic yards of PCSs were generated from the UST #3 basin. During the excavation process, "clean" soils (i.e., exhibiting a PID reading less than 10 ppm) were segregated from impacted soils and were used to backfill the excavation following removal of the impacted soils.

#### IV. SOIL TREATMENT AND DISPOSAL

Petroleum contaminated soils (PCSs) were temporarily stockpiled near the Gate House on the subject property in three separate polyencapsulated stockpiles (see Petroleum Contaminated Soils Stockpile Location Map, Appendix A).

The stockpiles consisted of the following:

- PCS Stockpile #1: 40 cu. yds. (approx.) generated from UST #3 basin, 3/10/98
  - PCS Stockpile #2: 48 cu. yds. (approx.) generated from UST #1 basin, 3/16/98
  - PCS Stockpile #3: 4 cu. yds. (approx.) generated from UST #2 basin, 3/12/98  
116 cu. yds. (approx.) generated from UST #1 basin, 3/12-13/98
- 208 cu. yds. (approx.) total for the property

To characterize the PCSs from each of the three UST basins for appropriate treatment and disposal, composite soil samples were collected from each of the three stockpiles on March 18, 1998, in accordance with requirements of the Environmental Soil Management, Inc. (ESMI) thermal incineration facility in Loudon, NH. Eight discrete soil samples were collected from each stockpile with a stainless steel hand auger, and composited into one sample for each pile submitted to Endyne, Inc. laboratory in Williston, Vermont. Each composite soil sample was analyzed for TPHs via modified EPA Method 8015. In addition, each sample was analyzed for total lead content via methods 3050 (digestion) and SM 3113B, for compliance with requirements of the property owner's insurance carrier to provide laboratory confirmation of soil contaminant impact. Laboratory results (see Appendix C) were acceptable for thermal incineration treatment at the ESMI facility.

Jerome Construction coordinated transport of PCSs from the Stone Gate Farm to ESMI's Loudon, NH facility on March 30 and 31, 1998, with approval from the VTDEC [5]. According to the ESMI project summary report for Stone Gate Farm, a total of 273.01 Tons of PCSs was transported to the ESMI facility over these two days [9]. Assuming an equivalency of 1.5 Tons per cubic yard of soils, one would expect the total volume of soils removed from the site (208 cu. yds.) to have registered a total weight of 312 Tons. The total estimated yardage of soils removed from the three UST basins included several large cobbles and boulders. These rocks were

segregated from the PCSs transported to the ESMI facility and left on site. The difference between the expected and actual tonnage figures can be attributed to this factor and to slight inaccuracies in the visual estimates of cubic yardage of PCSs removed from each UST basin.

The PCSs generated at the Stone Gate Farm are currently awaiting processing at the ESMI Loudon, New Hampshire facility. A certificate of destruction will be forwarded under separate cover upon receipt from ESMI.

## **V. LIMITED SITE INVESTIGATION OF UST #1 BASIN**

The potential impact to soils and groundwater in the vicinity of former UST #1 was evaluated through a limited site investigation which included the installation of a groundwater monitoring well, groundwater sampling and analysis, a qualitative sensitive receptor analysis including groundwater sampling and analysis from nearby supply wells, and groundwater flow velocity calculations.

### **A. Monitoring Well Installation**

On March 23, 1998, a soil boring/ monitoring well (T1-MW1) was installed in a direction topographically directly downgradient from, and approximately 50 feet from, the former UST #1 basin. The soil boring was advanced using a hollow stem auger rig by Technical Drilling Services, Inc. of Leominster, Massachusetts, under the direct observation of a Griffin hydrogeologist. Split-spoon samples were obtained in the boring at five-foot intervals. Soil samples were screened for VOCs using an Hnu (Model PI-101) PID. PID screening results and soil characteristics were recorded in a detailed boring log by the supervising hydrogeologist (see Appendix B).

Soils encountered in the boring for T1-MW1 consisted predominantly of silt and clay with very minor percentages of fine sand and gravel. Sediments were very dense from 10 feet to approximately 25 feet below grade, causing high blow counts and spoon refusal with the split spoon sampling methods (see Appendix B). Advancement rates of the hollow stem auger were on the order of 5 feet per hour through this interval.

No elevated VOCs were detected with the PID, and no olfactory or visual evidence of contamination was noted in soil samples collected from the boring for T1-MW1.

Sediments were moist in the sample collected from five to seven feet below grade. This condition likely represented a perched water table at this elevation, which is consistent with the apparent perched water table observed in the excavation for former UST #1. Sediments sampled at intervals below this elevation (i.e., in spoons from 10 to 12 feet, 15 to 17 feet, 20 to 22 feet, and 25 to 27 feet below grade) were dry. A moist interval was again observed in the sediments from 30 to 32 feet below grade. The sediment sample from 35 to 37 feet below grade was wet. A two-inch diameter Schedule 40 PVC well was constructed in the boring with a ten-foot screened interval from 38 to 28 feet below grade, and completed with solid, flush-threaded riser

pipe to approximately one-half foot below grade. A sand pack was installed in the annular space surrounding the screen to approximately one foot above the top of the screen. A two-foot bentonite seal was installed directly above the sand pack, and the remaining annular space was backfilled with native clay and silt soils to approximately two feet below grade. The well was completed with a flush-mounted, bolt-down, road box cover set in concrete.

Depth to water was measured in this well on March 24, 1998, approximately 14 hours following construction, at 29.76 feet below top of the PVC riser pipe. T1-MW1 was developed on this date with a bailer. Groundwater exhibited no visual or olfactory evidence of contamination.

### **B. Groundwater Sampling and Analysis**

A groundwater sample was collected from T1-MW1 on March 30, 1998 in conjunction with groundwater sampling efforts associated with the UST #3 site investigation (reported separately). The well was sampled in accordance with Griffin protocols which comply with state and industry standards.

Prior to sampling, the water level in T1-MW1 was gauged with an interface probe. No product was detected in the well. The depth to water was measured as 12.72 feet below the top of the PVC riser pipe. This result, and the soil data collected during borehole advancement, are suggestive of confined or semi-confined aquifer conditions.

The groundwater sample collected from T1-MW1 was submitted to Endyne, Inc. laboratory for analysis of target VOCs via Method 602. None of the constituents targeted by these analyses were reported above detection limits. The laboratory analysis report is contained in Appendix C.

### **C. Sensitive Receptor Assessment**

The vicinity of former UST #1 basin was inspected during the UST closure assessment and subsequently during installation of T1-MW1 for presence of sensitive receptors with potential for impact from the subsurface petroleum contamination detected in the vicinity of UST #1. The potential risk to identified receptors was evaluated in light of apparent source area strength, presumed groundwater flow direction and estimated velocities, and distance of the identified potential receptors from former UST #1.

Potentially sensitive receptors in the vicinity of former UST #1 include:

- No. 1 ♦ vicinity soils and groundwater;
- No. 1 ♦ the garage located approximately 40 ft west of former UST #1;
- ♦ area supply wells;
- ♦ the constructed pond located approximately 200 ft to the northwest of former UST #1.

### *Soils and Groundwater*

Approximately 164 cubic yards of petroleum-impacted soils were removed from the excavation immediately surrounding and down-topographic gradient from former UST #1. These soils, ranging in VOC concentration from 3 to 280 ppm, were removed for off-site treatment/ disposal. While the entire volume of impacted soils could not be removed from this basin due to physical site constraints and the limited reach of the excavator, the majority of significantly contaminated soils was removed. Soils from the lowest reaches of the excavation (to approximately 25 feet in depth) exhibited decreasing VOC concentrations with depth, as measured with PID and noted by odor.

Groundwater was noted in the immediately vicinity of former UST #1 to be perched at an approximately depth of 5.5 feet below grade. This elevation was above the in-situ base elevation of the tank (approximately 8 feet below grade) at which a pinhole was observed. Also, the elevation of the perched water was above the vertical extent of soils exhibiting VOC contamination as measured with the PID, from 6 to 25 feet below grade. Moist soils were not encountered below this perched elevation in the excavation for former UST #1 to a depth of 25 feet below grade. Groundwater from T1-MW1, located approximately 50 feet in a direction topographically directly downgradient from UST #1, had no detectable petroleum-related VOCs by EPA Method 602. These results suggest that groundwater in the vicinity of UST #1 has not been impacted by petroleum-related constituents. The excavation of a large volume of petroleum-impacted soils from the former UST #1 basin, has further reduced the potential for residual petroleum to serve as a continuing source of contaminant impact to site groundwater. In addition, published values of permeability and hydraulic conductivity for dense glacial till sediments, such as those encountered at the site, are typically very low [10]. Thus, rates of groundwater recharge through site soils containing residual petroleum, and groundwater flow velocities (and thus contaminant migration rates) in the aquifer underlying these impacted soils, would be expected to be very low (on the order of 0.01 to 10 feet per year [10]).

#### *Buildings Adjacent to Former UST #1*

The garage located approximately 40 feet west of former UST #1 is the only building in close vicinity to former UST #1. This building is constructed on a concrete slab foundation, is not regularly occupied, and does not have a full basement for the potential accumulation of petroleum vapors. No VOCs were detected above background with the PID within this building on March 4, or March 9, 1998.

#### *Area Supply Wells*

The region immediately surrounding the former UST #1 basin is part of the greater acreage comprising the Stone Gate Farm. The subject property is serviced by four supply wells (see Property Sketch Map for locations, Appendix A).

**Main House SW#1**

Location: Approx. 950 feet north of the main house (in a topographically downgradient direction)  
Construction: completed in bedrock  
Total Depth: 265 feet  
Yield: Artesian well (sometimes flowing) greater yield than house demand

**Main House SW#2 - Auxiliary**

Location: Approx. 100 feet southeast of former USTs #1 & #2 (in a topographically upgradient direction)  
Construction: completed in bedrock  
Total Depth: 370-375 feet  
Yield: 7 gpm

**Gate House SW#1**

Location: Approx. 100 ft north of Gate House residence  
Construction: completed in bedrock  
Total Depth: 277 feet  
Yield: 23 gpm

**Gate House SW#2**

Location: Approx. 300 ft south of Gate House residence  
Construction: completed in bedrock  
Total Depth: 245 feet  
Yield: Not reported

Each of the subject property supply wells was sampled on March 30, 1998. Samples were submitted to Endyne, Inc. laboratory for analysis via Method 602. None of the targeted constituents was reported above method detection limits. The laboratory report is included in Appendix C.

Remote properties surrounding the subject property are residential in nature or undeveloped forestland. Adjacent residential properties are serviced by on-site water supplies, located greater than 1500 feet from former UST #1, based upon visual observation and review of the Arlington, VT 7.5 minute USGS topographic quadrangle map. Residual subsurface petroleum contamination in the vicinity of former UST #1 likely poses no risk to these neighboring properties, given their significant distance and the limited source area strength.

*Surface Water*

The only significant surface water bodies in close vicinity to former UST #1 is the constructed pond located approximately 200 feet to the northwest in a topographically downgradient direction. The surface of the pond was frozen in early March during the UST closure assessments and follow-on soil excavation activities. On March 30, 1998 the pond had thawed and the surface water and the southern bank of the pond were inspected visually. No sheens,

staining or other evidence of petroleum impact were observed.

In summary, based on currently available data, no sensitive receptors appear to be impacted by petroleum contamination associated with former UST #1.

## VI. CONCLUSIONS

1. Three gasoline USTs and associated piping were removed from the Stone Gate Farm property on March 4 and March 9, 1998: one (1) 2000-gallon single-walled steel UST (UST #1) and two (2) 1000-gallon single-walled steel USTs (USTs #2 and #3). Each UST exhibited evidence of a leak, either through a hole(s) (i.e., USTs #1 and #2) or through a breach along a welded seam (i.e., UST #3).
2. Additional excavation and PID screening conducted on March 12, 13, and 16, 1998, in the basin for former UST #1, determined that soils had been impacted with petroleum at least to a depth of 25 feet below grade. Regional groundwater was not encountered in the excavation to this depth. Approximately 164 cubic yards of petroleum-impacted soils were excavated from this basin and temporarily stockpiled and polyencapsulated on site, pending subsequent off-site transport for treatment/disposal. Contaminant concentrations were observed to be decreasing with depth in the lower vertical elevations of this excavation.
3. A groundwater monitoring well drilled in a topographically directly downgradient location approximately 50 feet from former UST #1, encountered very dense glacial tills and a semi-confined to confined aquifer at an approximate depth of 32 feet below grade. PID screening results and visual and olfactory observations collected during advancement of the borehole for this well exhibited no evidence of petroleum impact to subsurface soils and groundwater in this location. A groundwater sample collected from this well contained no detectable petroleum-related constituents when tested via Method 602.
4. The four bedrock supply wells which service the subject property were sampled on March 30, 1998. No targeted petroleum-related VOCs were detected in the supply well samples via Method 602.
5. Based on currently available data, no sensitive receptors have been impacted by petroleum contamination associated with former UST #1.
6. The extent of soil contamination in UST #2 basin was defined through further excavation on March 12, 1998, as confirmed through PID screening and laboratory analysis, and impacted soils (totaling approximately 4 cubic yards) were removed for off-site treatment/disposal. Regional groundwater was not present at the elevations of petroleum impacted soils within this UST basin.
7. Additional excavation and PID screening conducted on March 10, 1998, in the basin for former UST #3, determined that soils had been impacted with petroleum at least to a depth of

14 feet where groundwater was encountered. Approximately 40 cubic yards of petroleum impacted soils were excavated from this basin and temporarily stockpiled and polyencapsulated on site, pending subsequent off-site transport for treatment/ disposal. The degree and extent of petroleum impact to subsurface soils and groundwater was not determined through these corrective action measures.

8. The entire volume of PCSs excavated from UST Basins #1, #2, and #3 (approximately 208 cubic yards, less large cobbles and boulders) was transported to the ESMI Loudon, NH thermal incineration facility for treatment/ disposal on March 30 and 31, 1998. A certificate of destruction will be forwarded upon receipt following processing of the soils.

## VII. RECOMMENDATIONS

Based upon the above conclusions, the following recommendations are made:

1. No further subsurface investigation or monitoring is recommended with regard to USTs #1 and #2.
2. A site investigation is warranted with regard to the conditions documented for the UST #3 basin. This site investigation has already been conducted under the Expressway Program, and has been reported under separate cover. The reader is referred to this separate report for specific recommendations relative to UST #3.

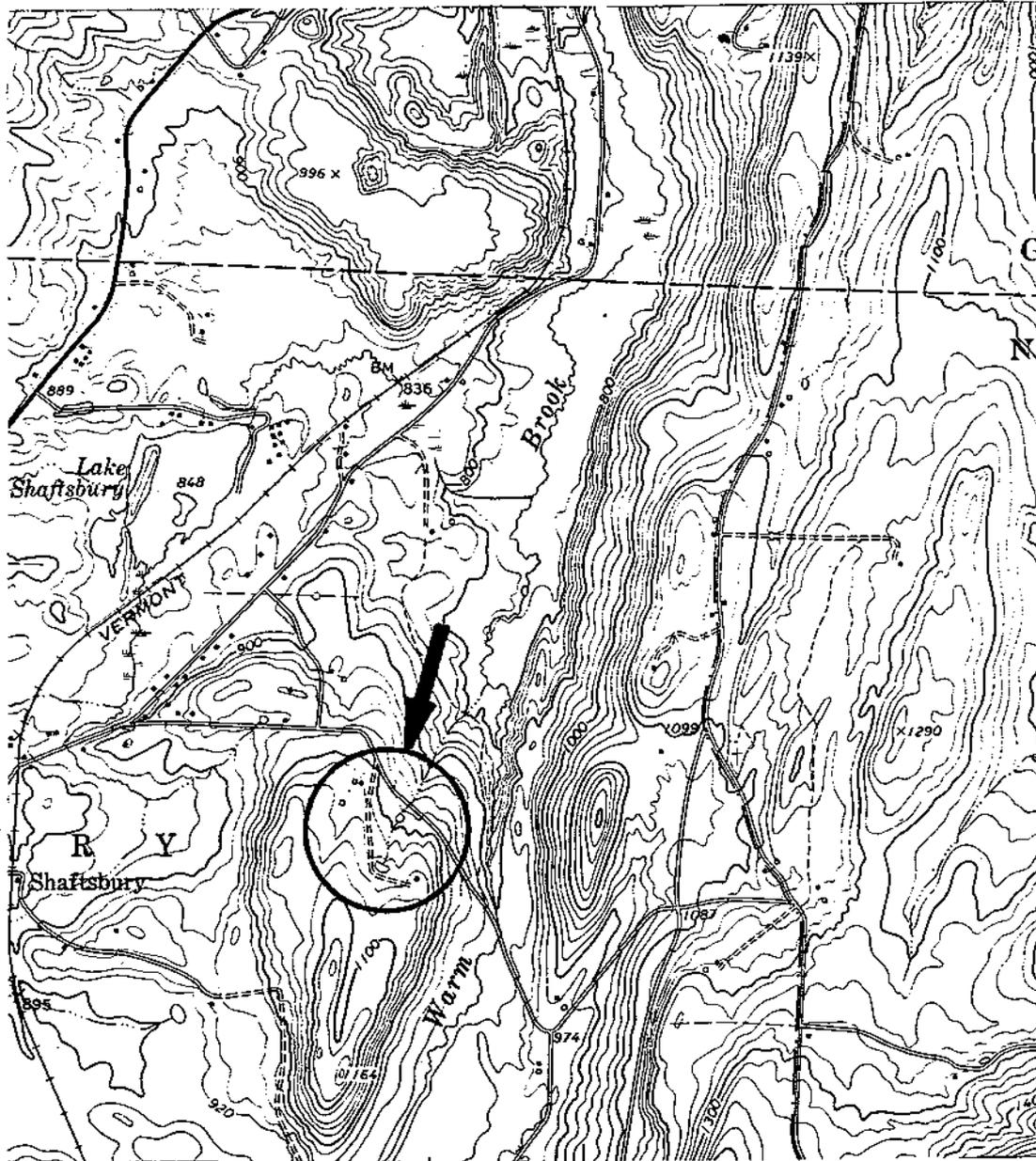
## REFERENCES

1. Kristen Underwood, Griffin International, Inc., March 10, 1998, telephone conversation with Sue Thayer, VTDEC Waste Management Division, Management and Prevention Section.
2. Griffin International, Inc., March 18, 1998, letter from Mr. Timothy Kelly to Ms. Sue Thayer, VTDEC Waste Management Division, re: UST Closure Site Assessment for Stone Gate Farm, Shaftsbury, VT (Facility ID #3756669).
3. Kristen Underwood, Griffin International, Inc., March 10, 1998, telephone conversation with Chuck Schwer, Supervisor, Sites Management Section of VTDEC Waste Management Division.
4. Kristen Underwood, Griffin International, Inc., March 11, 1998, letter to Chuck Schwer, Supervisor, Sites Management Section of VTDEC Waste Management Division.
5. Chuck Schwer, Supervisor, Sites Management Section, VTDEC WMD, March 12, 1998, letter to Kristen Underwood, Griffin International, Inc.
6. Doll, Charles G., ed., 1970, *Surficial Geologic Map of Vermont*, State of Vermont.
7. Doll, Charles G., ed., 1961, *Centennial Geologic Map of Vermont*, State of Vermont.
8. VTDEC Waste Management Division, November 1997, *Underground Storage Tank Closure And Site Assessment Requirements*.
9. ESMI, Inc., April 20, 1998, facsimile transmission of Project Summary Report for Jerome Construction Stone Gate Farm project, Shaftsbury, Vermont.
10. Domenico, Patrick A. and Franklin W. Schwartz, 1990, *Physical and Chemical Hydrogeology*. New York, NY: John Wiley & Sons.

**APPENDIX A**

**Site Maps and Sketches**

Site Location Map  
Property Sketch Map  
Petroleum Contaminated Soil Stockpile Location Map  
UST #1 Basin Sketch Map  
UST #2 Basin Sketch Map  
UST #3 Basin Sketch Map



JOB #: 29841181  
 SOURCE: USGS- ARLINGTON, VERMONT QUADRANGLE



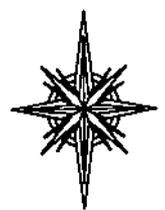
**STONE GATE FARM**

SHAFTSBURY, VERMONT

**SITE LOCATION MAP**

DATE: 3/11/98	DWG.#:1	SCALE: 1:24000	DRN.:SB	APP.:KU
---------------	---------	----------------	---------	---------

N



MAPLE HILL ROAD

GATE HOUSE SW#1

2-BAY GARAGE

T3-MW3

4-BAY GARAGE

GATE HOUSE RESIDENCE

T3-MW4

T3-MW2

T3-MW1

OPEN BAY GARAGE

GATE HOUSE SW#2

UST#3 1,000 GALLON GASOLINE; REMOVED MARCH 9, 1998

INTERMITTENT STREAM

POND

MAIN HOUSE SW#1

POND

MAIN HOUSE

T1-MW1

MAINTENANCE GARAGE

UST#1- 2,000 GALLON GASOLINE; REMOVED MARCH 4, 1998

UST#2- 1,000 GALLON GASOLINE REMOVED MARCH 9, 1998

MAIN HOUSE SW#2

JOB #: 29841181



# STONE GATE FARM

SHAFTSBURY, VERMONT

## PROPERTY SKETCH MAP

DATE: 4/17/98

DWG.#:2

NOT TO SCALE

DRN.:SB

APP.:KM



TO MAPLE HILL ROAD

GATE HOUSE SW#1 ⊕

GATE HOUSE RESIDENCE

T3-MW3  
4-BAY GARAGE  
⊕ T3-MW4  
T3-MW2

2-BAY GARAGE

UST#3 1,000 GALLON  
GASOLINE REMOVED  
MARCH 9, 1998

⊕ T3-MW1

PCS STOCKPILE#1: APPROX.  
40 YDS. GENERATED FROM  
UST#3 BASIN ON 3/10/98

PCS STOCKPILE#2: APPROX.  
48 YDS. GENERATED FROM  
UST#1 BASIN ON 3/16/98

OPEN BAY GARAGE

GATE HOUSE SW#2 ⊕

PCS STOCKPILE#3: APPROX. 120 YDS.  
TOTAL- 4 YDS. FROM UST#2 BASIN  
ON 3/12/98 AND 116 YDS. FROM  
UST#1 BASIN BETWEEN 3/12/98  
AND 3/13/98.

TO ESTATE MAIN HOUSE

JOB #: 29841181



# STONE GATE FARM

SHAFTSBURY, VERMONT

## PETROLEUM CONTAMINATED SOILS STOCKPILE LOCATION MAP

DATE: 4/20/98

DWG.#:3

SCALE: 1"=10'

DRN.:SB

APP.:KU

Approximate Footprint of  
Former UST #1

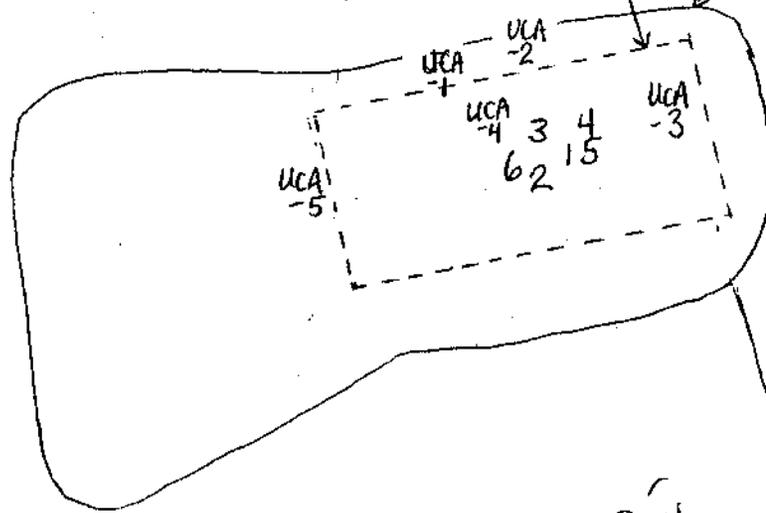
(2000-gallon gasoline  
Single-wall unprotected  
steel tank, removed 3/9/98)

Approximate Extent  
of Excavation  
3/12/98 - 3/13/98

Wooded

UCA  
-6

TEST PIT  
Excavated to ft  
below grade



Wooded

grass

paved

0 5 10 FT

APPROXIMATE SCALE

MAP VIEW

N



JOB #: 29841198

**STONE GATE FARM**

SHAFTSBURY, VERMONT

**UST #1 BASIN SKETCH MAP**

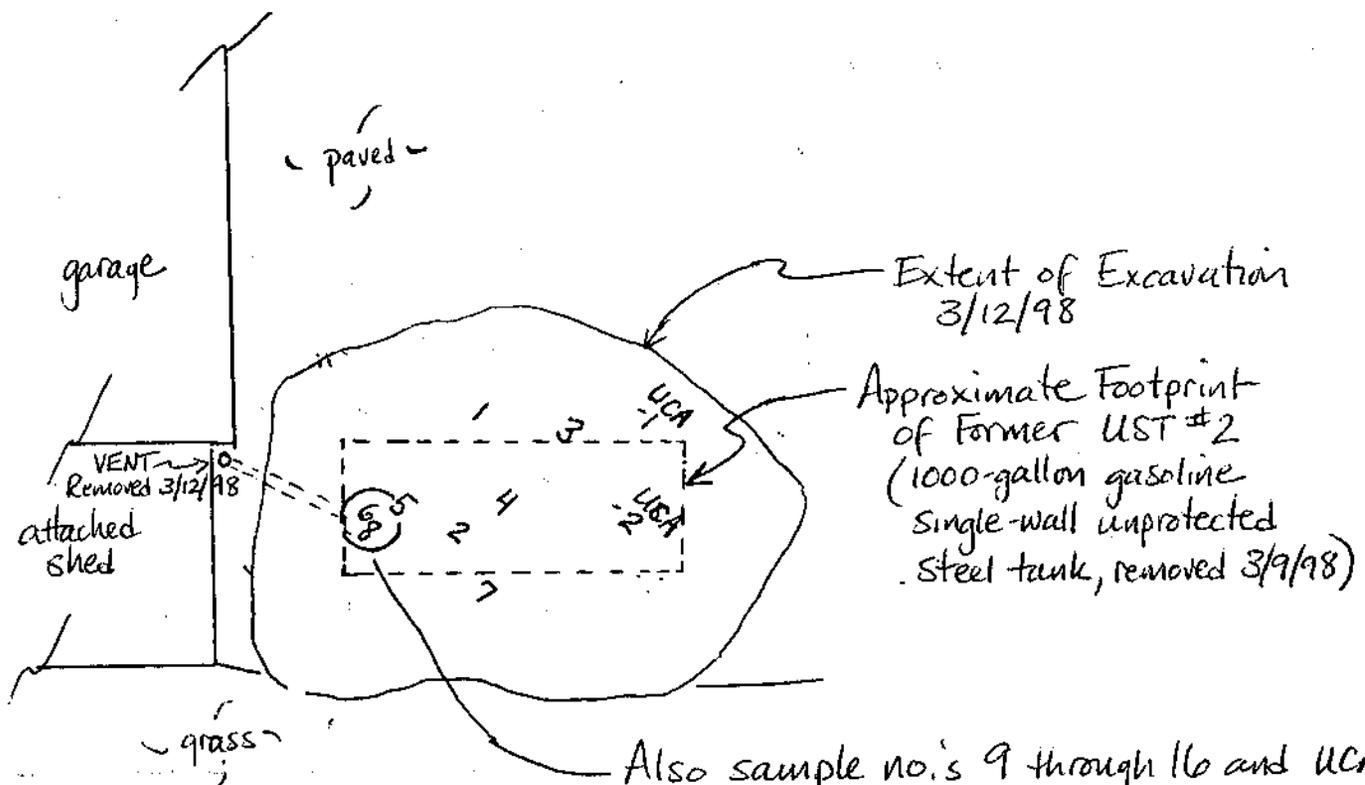
DATE: 4/20/98

DWG.#: 4

SCALE: SHOWN

DRN.:SB

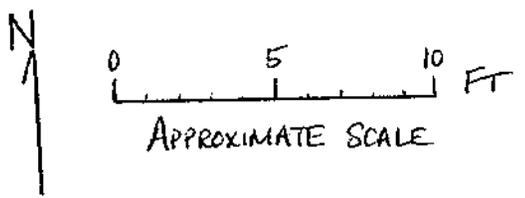
APP.:KU



Extent of Excavation  
3/12/98

Approximate Footprint  
of Former UST #2  
(1000-gallon gasoline  
single-wall unprotected  
steel tank, removed 3/9/98)

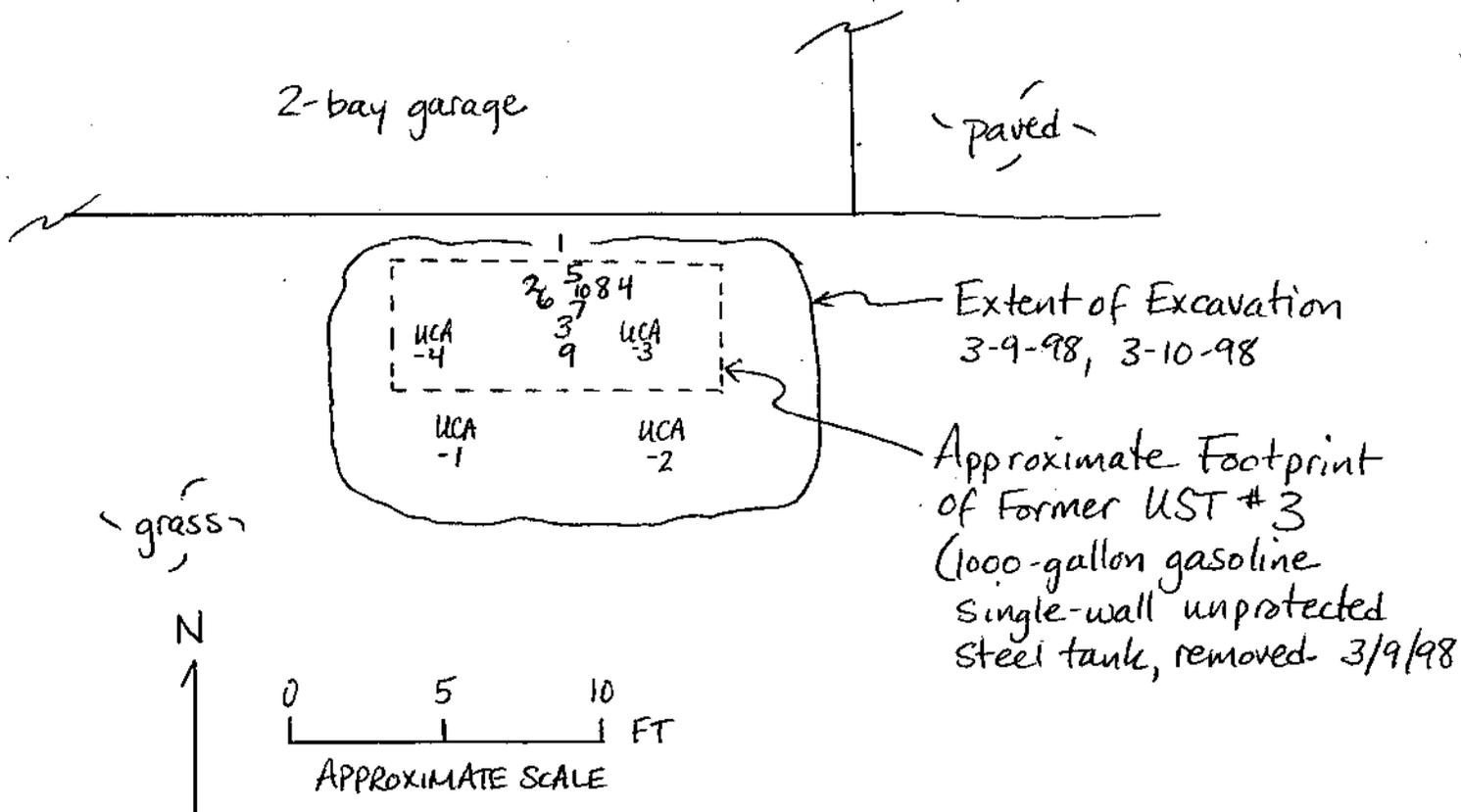
Also sample no.'s 9 through 16 and UCA-3  
collected from various depths  
at this location  
and SS-1 from 12.5 ft below grade  
for laboratory analysis.



MAP VIEW

- LEGEND
- 3 Soil Sample Location and Number for PID Headspace Screening, 3-12-98
  - UCA-2 UST Closure Assessment Soil Sample Number/Location, 3-7-98

	JOB #: 28841198		<b>STONE GATE FARM</b>	
			SHAFTSBURY, VERMONT	
			<b>UST #2 BASIN SKETCH MAP</b>	
DATE: 4/20/98		DWG. #: 5	SCALE: SHOWN	DRN.: SB APP.: KU



MAP VIEW

LEGEND

- 3 Soil Sample Location/Number for PID Headspace Screening, 3-10-98
- UCA-2 UST Closure Assessment Soil Sample Number/Location, 3-9-98

	JOB #: 29841188		<b>STONE GATE FARM</b>			
			SHAFTSBURY, VERMONT			
			<b>UST #3 BASIN SKETCH MAP</b>			
		DATE: 4/20/98	DWG. #: 6	SCALE: SHOWN	DRN.: SB	APP.: KU

**APPENDIX B**

**Soil Boring Log and Monitoring Well Construction Diagram**

PROJECT STONE GATE FARM

LOCATION SHAFTSBURY, VERMONT

DATE DRILLED 3/23/98 TOTAL DEPTH OF HOLE 38.0'

DIAMETER 4.25"

SCREEN DIA. 2" LENGTH 10.0' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 27.0' TYPE sch 40 pvc

DRILLING CO. T.D.S. DRILLING METHOD HSA

DRILLER SCOTT LOG BY K. McGRAW

WELL NUMBER T1-MW1

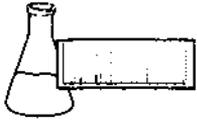
Site  
Sketch

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	0'-2'- 0 ppm	Brown SILT and fine SAND, trace gravel, dry, no odor.	2
4					4
6			5'-7'- 2/2/2/2 0 ppm	Orangish brown SILT and CLAY, little fine sand, trace gravel, moist, no odor.	6
8		NATIVE BACKFILL			8
10			10'-12'- 22/48/60/56 0 ppm	Brown SILT and CLAY, tight, dry, no odor.	10
12					12
14					14
16			15'-17'- 56/120-5" 0 ppm	Olive brown SILT and CLAY, tight, little gravel, dry, no odor.	16
18		WELL RISER			18
20			20'-22'- 56/120-6" 1.2 ppm	Olive brown SILT and CLAY with some very fine sand, trace gravel, tight, dry, no odor.	20
22					22
24					24
26		BENTONITE	25'-27'- 73/120-5" 0.1 ppm	Same as above, no odor.	26
28					28
30		SAND PACK	30'-32'- 19/22/45/53 0.1 ppm	Gray SILT and CLAY, little sand, trace gravel, moist, dense, no odor.	30
32		WELL SCREEN			32
34				33.0' WATER TABLE Upon installation	34
36		BOTTOM CAP	35'-37' 0 ppm	Gray SILT and CLAY, trace fine sand, little gravel, wet, dense, no odor.	36
38		UNDISTURBED NATIVE SOIL			38
40				BASE OF WELL AT 38' END OF EXPLORATION AT 38'	40
42					42
44					44
46					46
48					48
50					50

**APPENDIX C**

**Analytical Laboratory Data**



**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: Stone Gate Farm  
DATE REPORTED: April 2, 1998  
DATE SAMPLED: March 12, 1998

PROJECT CODE: GISG1803  
REF. #: 117,795

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

Chain of custody indicated proper sample preservation.

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.

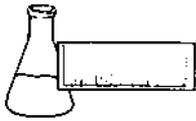
Analytical method precision and accuracy were monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

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

Reviewed by,

Harry B. Locker, Ph.D.  
Laboratory Director

enclosures



**ENDYNE, INC.**

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 8020 COMPOUNDS BY EPA METHOD 8260

CLIENT: Griffin International  
PROJECT NAME: Stone Gate/#29841181  
REPORT DATE: April 2, 1998  
SAMPLER: K. Underwood  
DATE SAMPLED: March 12, 1998  
DATE RECEIVED: March 16, 1998

PROJECT CODE: GISG1803  
ANALYSIS DATE: March 20, 1998  
STATION: SS-1  
REF.#: 117,795  
TIME SAMPLED: 12:05

<u>Parameter</u>	<u>Detection Limit (ug/kg)</u>	<u>Concentration As Received (ug/kg)</u>
Benzene	1	ND <sup>1</sup>
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylene	2	ND
MTBE	2	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

**ANALYTICAL SURROGATE RECOVERY:**

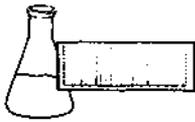
Dibromofluoromethane: 112.%  
Toluene-d8: 108.%  
4-Bromofluorobenzene: 102.%

PERCENT SOLIDS: 89.%

**NOTES:**

1 None detected





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FAX 879-7103

**REPORT OF LABORATORY ANALYSIS**

CLIENT: Griffin International  
PROJECT NAME: Stone Gate Farm/#29841181  
DATE REPORTED: April 2, 1998  
DATE SAMPLED: March 12, 1998

PROJECT CODE: GISG1804  
REF. #: 117,796

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

Chain of custody indicated proper sample preservation.

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.

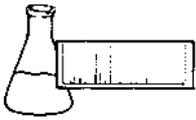
Analytical method precision and accuracy were monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

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

Reviewed by,

Harry B. Locker, Ph.D.  
Laboratory Director

enclosures



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Laboratory Services

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

LABORATORY REPORT

TOTAL PETROLEUM HYDROCARBONS (TPH) BY MODIFIED EPA METHOD 8015

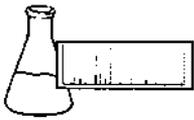
DATE: April 2, 1998  
CLIENT: Griffin International  
PROJECT: Stone Gate Farm/#29841181  
PROJECT CODE: GISG1804  
COLLECTED BY: K. Underwood  
DATE SAMPLED: March 12, 1998  
DATE RECEIVED: March 16, 1998

Reference #	Sample ID	Concentration (mg/kg) <sup>1</sup>
117,796	SS-1; 12:05	ND <sup>2</sup>

Notes:

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





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**REPORT OF LABORATORY ANALYSIS**

CLIENT: Griffin International  
PROJECT NAME: Stone Gate Farm/19841181  
DATE REPORTED: March 24, 1998  
DATE SAMPLED: March 18, 1998

PROJECT CODE: GISG1861  
REF. #: 117,932 - 117,934

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

Chain of custody indicated proper sample preservation.

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.

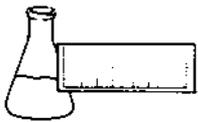
Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy were 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 Services

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FAX 879-7103

LABORATORY REPORT

TOTAL PETROLEUM HYDROCARBONS (TPH) BY MODIFIED EPA METHOD 8015

DATE: March 24, 1998  
CLIENT: Griffin International  
PROJECT: Stone Gate Farm/19841181  
PROJECT CODE: GISG1861  
COLLECTED BY: E. Sandblom  
DATE SAMPLED: March 18, 1998  
DATE RECEIVED: March 19, 1998

Reference #	Sample ID	Concentration As Received (mg/kg) <sup>1</sup>
117,932	Composite PCS #1; 10:35a.m.	625.
117,933	Composite PCS #2; 10:41a.m.	662.
117,934	Composite PCS #3; 10:46a.m.	183.

Notes:

1 Method detection limit is 1.0 mg/kg.

FE...VN...b

117932-117937

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

CHAIN-OF-CUSTODY RECORD

24942

19841181

117932-117937

Project Name: <b>STONE GATE FARM</b>	Reporting Address: <b>GRIFFIN</b>	Billing Address: <b>GRIFFIN</b>
Site Location: <b>SHAFTSBURY, VT</b>	Company: <b>GRIFFIN</b>	Sampler Name: <b>E. SANDBLOM</b>
Endyne Project Number: <b>GISG/1961</b>	Contact Name/Phone #: <b>K. UNDERWOOD</b>	Phone #: <b>865-4768</b>

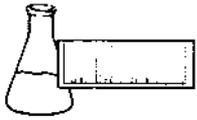
Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
117932	COMPOSITE PCS #1	SOIL		X	3/18/98 10:35	2	250 mL Glass	TPH & Lead	8015	ICE	X
117933	COMPOSITE PCS #2	↓		↓	10:41	↓	↓	↓	↓	↓	↓
117934	COMPOSITE PCS #3	↓		↓	10:46	↓	↓	↓	↓	↓	↓

Relinquished by: Signature <i>[Signature]</i>	Received by: Signature <i>M. Buskey</i>	Date/Time <b>3/19/98 9:56</b>
Relinquished by: Signature	Received by: Signature <i>[Signature]</i>	Date/Time <b>3-19-98 10:05</b>

New York State Project: Yes \_\_\_ No X

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 <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>16: Pb 30 Modified 8015 Per TPH</b>										



**ENDYNE, INC.**

Laboratory Services

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FAX 879-7103

**REPORT OF LABORATORY ANALYSIS**

**CLIENT:** Griffin International  
**PROJECT NAME:** Stone Gate Farm  
**REPORT DATE:** April 2, 1998  
**DATE SAMPLED:** March 18, 1998

**PROJECT CODE:** GISG3862  
**REF.#:** 117,935 - 117,937

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

Samples were not preserved.

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.

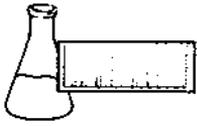
Blank contamination was not observed at levels affecting the analytical results.

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 Services**

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

**LABORATORY REPORT**

**CLIENT:** Griffin International  
**PROJECT NAME:** Stone Gate Farm  
**REPORT DATE:** April 2, 1998  
**DATE SAMPLED:** March 18, 1998  
**DATE RECEIVED:** March 19, 1998

**PROJECT CODE:** GISG3862  
**REF. #:** 117,935  
**STATION:** Composite PCS #1  
**TIME SAMPLED:** 10:35  
**SAMPLER:** E. Sandblom

Digestion was performed by EPA Method 3050.

<u>Parameter</u>	<u>Concentration</u> (mg/kg, dry wt.)	<u>Reporting Limit</u> (mg/kg, dry wt.)	<u>Analytical Method</u>	<u>Analysis Date</u>
Total Lead	0.522	0.075	SM 3113B	3/31/98



**ENDYNE, INC.**

**Laboratory Services**

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FAX 879-7103

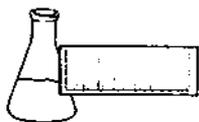
**LABORATORY REPORT**

**CLIENT:** Griffin International  
**PROJECT NAME:** Stone Gate Farm  
**REPORT DATE:** April 2, 1998  
**DATE SAMPLED:** March 18, 1998  
**DATE RECEIVED:** March 19, 1998

**PROJECT CODE:** GISG3862  
**REF. #:** 117,936  
**STATION:** Composite PCS #2  
**TIME SAMPLED:** 10:41  
**SAMPLER:** E. Sandblom

Digestion was performed by EPA Method 3050.

<u>Parameter</u>	<u>Concentration</u> (mg/kg, dry wt.)	<u>Reporting Limit</u> (mg/kg, dry wt.)	<u>Analytical Method</u>	<u>Analysis Date</u>
Total Lead	0.783	0.092	SM 3113B	3/31/98



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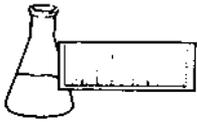
**LABORATORY REPORT**

CLIENT: Griffin International  
PROJECT NAME: Stone Gate Farm  
REPORT DATE: April 2, 1998  
DATE SAMPLED: March 18, 1998  
DATE RECEIVED: March 19, 1998

PROJECT CODE: GISG3862  
REF. #: 117,937  
STATION: Composite PCS #3  
TIME SAMPLED: 10:46  
SAMPLER: E. Sandblom

Digestion was performed by EPA Method 3050.

<u>Parameter</u>	<u>Concentration</u> (mg/kg, dry wt.)	<u>Reporting Limit</u> (mg/kg, dry wt.)	<u>Analytical Method</u>	<u>Analysis Date</u>
Total Lead	0.761	0.076	SM 3113B	3/31/98



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**LABORATORY REPORT**

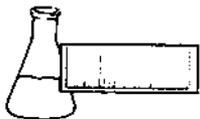
**DUPLICATE CONTROL DATA**

CLIENT: Griffin International  
PROJECT NAME: Stone Gate Farm  
REPORT DATE: April 2, 1998  
DATE SAMPLED: March 18, 1998  
DATE RECEIVED: March 19, 1998

PROJECT CODE: GISG3862  
REF. #: 117,935  
STATION: Composite PCS #1  
TIME SAMPLED: 10:35  
SAMPLER: E. Sandblom

<u>Parameter</u>	Dup 1 (mg/kg, dry wt.)	Dup 2 (mg/kg, dry wt.)	<u>Rel. % Diff.</u>
Total Lead	0.597	0.457	13.





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**REPORT OF LABORATORY ANALYSIS**

**CLIENT:** Griffin International  
**PROJECT NAME:** Stone Gate Farm  
**REPORT DATE:** April 1, 1998  
**DATE SAMPLED:** March 30, 1998

**PROJECT CODE:** GISG1995  
**REF.#:** 118,290 - 118,300

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation 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

enclosures



### EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International

DATE RECEIVED: March 31, 1998

PROJECT NAME: Stone Gate Farm

REPORT DATE: April 1, 1998

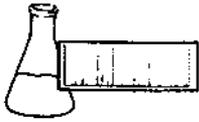
CLIENT PROJ. #: 29841181

PROJECT CODE: GISG1995

Ref. #:	118,290	118,291	118,292	118,293	118,294
Site:	Trip Blank	G. House SW#1	G. House SW#2	M. House SW#2	M. House SW#1
Date Sampled:	3/30/98	3/30/98	3/30/98	3/30/98	3/30/98
Time Sampled:	8:40	11:50	11:58	12:15	12:25
Sampler:	K. McGraw	K. McGraw	K. McGraw	K. McGraw	K. McGraw
Date Analyzed:	3/31/98	3/31/98	3/31/98	3/31/98	3/31/98
UIP Count:	0	0	0	0	0
Dil. Factor (%):	100	100	100	100	100
Surr % Rec. (%):	89	94	94	91	96
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)
Benzene	<1	<1	<1	<1	<1
Chlorobenzene	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	<1
Xylenes	<1	<1	<1	<1	<1
MTBE	<10	<10	<10	<10	<10

Ref. #:	118,295	118,296	118,297	118,298	118,299
Site:	T1-MW1	T3-MW1	T3-MW4	T3-MW3	T3-MW2
Date Sampled:	3/30/98	3/30/98	3/30/98	3/30/98	3/30/98
Time Sampled:	2:05	3:00	3:08	3:17	3:28
Sampler:	K. McGraw				
Date Analyzed:	3/31/98	3/31/98	3/31/98	4/1/98	4/1/98
UIP Count:	0	>10	2	2	2
Dil. Factor (%):	100	100	100	100	20
Surr % Rec. (%):	101	98	94	97	97
Parameter	Conc. (ug/L)				
Benzene	<1	1.8	<1	<1	9.9
Chlorobenzene	<1	<1	<1	<1	<5
1,2-Dichlorobenzene	<1	<1	<1	<1	<5
1,3-Dichlorobenzene	<1	<1	<1	<1	<5
1,4-Dichlorobenzene	<1	<1	<1	<1	<5
Ethylbenzene	<1	<1	<1	<1	<5
Toluene	<1	1.4	<1	<1	7.5
Xylenes	<1	1.6	<1	<1	6.3
MTBE	<10	<10	<10	17.7	277.

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



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**EPA METHOD 602--PURGEABLE AROMATICS**

**CLIENT: Griffin International**

**DATE RECEIVED: March 31, 1998**

**PROJECT NAME: Stone Gate Farm**

**REPORT DATE: April 1, 1998**

**CLIENT PROJ. #: 29841181**

**PROJECT CODE: GISG1995**

Ref. #:	118,300				
Site:	Duplicate				
Date Sampled:	3/30/98				
Time Sampled:	3:28				
Sampler:	K. McGraw				
Date Analyzed:	4/1/98				
UIP Count:	2				
Dil. Factor (%):	20				
Surr % Rec. (%):	105				
Parameter	Conc. (ug/L)				
Benzene	9.2				
Chlorobenzene	<5				
1,2-Dichlorobenzene	<5				
1,3-Dichlorobenzene	<5				
1,4-Dichlorobenzene	<5				
Ethylbenzene	<5				
Toluene	6.5				
Xylenes	6.1				
MTBE	334.				

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

**CHAIN-OF-CUSTODY RECORD**

**RUSH!**

Job # 29841181

26044

Project Name: Stone Gate Farm Site Location: Shaftsbury, VT	Reporting Address: Griffin Int'l	Billing Address: Griffin Int'l
Endyne Project Number: GISG1995	Company: Griffin Int'l Contact Name/Phone #: Kevin McGraw/865-4288	Sampler Name: Kevin McGraw Phone #: (802) 865-4288

Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
118,290	Trip Blank	H <sub>2</sub> O	✓		3/30/98 8:40	2	40mL		602	HCl	
118,291	Gate House SW#1		✓		11:50						
118,292	Gate House Barn SW#2		✓		11:58						
118,293	Main House SW#2		✓		12:15						
118,294	Main House SW#1		✓		12:25						
118,295	T1-MW1		✓		2:05						
118,296	T3-MW1		✓		3:00						
118,297	T3-MW4		✓		3:08						
118,298	T3-MW3		✓		3:17						
118,299	T3-MW2		✓		3:28						
118,300	Duplicate		✓		3:28	↓	↓	<b>RUSH!</b>	↓	↓	

Relinquished by: Signature <i>Kevin McGraw</i>	Received by: Signature <i>James M. Charbon</i>	Date/Time 10:00 3-31-98
Relinquished by: Signature <i>James M. Charbon</i>	Received by: Signature <i>James M. Charbon</i>	Date/Time 3-31-98 10:00

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 <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):										

RUSH - by Friday, 4/3, if possible