

**CORRECTIVE ACTION AND AS BUILT SUMMARY
LUDLOW MOBIL
145 MAIN STREET, LUDLOW, VERMONT**

VTDEC SITE #93-1500
GRIFFIN PROJECT #11934463

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EXECUTIVE SUMMARY

This report summarizes the corrective actions implemented from December 2, 1993, to January 17, 1994, as a result of a catastrophic release from a UST located at the Ludlow Mobil station (VT DEC Site #93-1500). The release occurred during the period November 30, 1993, through December 2, 1993. During the report period, Griffin performed extensive remediation measures to surface water (the Black River), buildings adjacent to the site and soil impacted as a result of the release. Corrective action implementation measures consisted of surface water booms, two soil ventilation systems, free product and limited groundwater recovery at the site.

A number of residences and commercial businesses were impacted by petroleum vapors as a result of the release and had to be temporarily evacuated or closed. Repeated air quality testing and photoionization detector (PID) monitoring has been performed in affected receptors at the site to document vapor levels present. As a result of the remedial effort at the site and the natural attenuation of vapors over time, the majority of impacted receptors have been able to be reoccupied or reopened. However, an individual apartment and a business are still unoccupied/closed due to the intermittent presence of petroleum vapors.

Free product seepage into the Black River has ceased but may start again during the spring thaw when the water table rises. Elevated levels of petroleum vapor still continue to be present in soils at the site as evidenced by soil venting system influent levels. Influent vapor levels in the soil vent systems installed under the Mill show marked fluctuation over time, possibly caused by the continuing migration of free product. Low levels of free product are still present in the tank basin recovery well at the site and fluctuating levels of free product are present in a monitoring well down gradient of the site. Dissolved levels of the volatile BTEX (benzene, toluene, ethylbenzene, and xylenes) gasoline constituents in monitoring wells at the site are relatively low in relationship to the magnitude of the release, indicating that free product migration from the release followed specific migration channels under affected areas of the site.

Operation of the soil vent systems at the site will continue until petroleum vapors at the site and in affected receptors are abated. PID monitoring and air quality testing will also be continued until acceptable air quality levels are achieved. Groundwater quality sampling and monitoring of the Black River for the presence of product seeps will also be continued until groundwater quality trends are established and product seepage is determined to have permanently ceased.

I. INTRODUCTION

This report details the corrective actions taken as a result of a catastrophic UST petroleum release that occurred between November 30 - December 2, 1993, at the Ludlow Mobil station, 145 Main Street, Ludlow, Vermont (DWG #1, #2 and #3). Included in this report are a chronology of events occurring at the site, a description of the subsurface, surface water and vapor migration assessment of the release, a description of corrective action measures taken as a result of the release, a receptor risk assessment, conclusions and recommendations. This work has been conducted by Griffin International, Inc. (Griffin) for Midway Oil Corporation (Midway) as requested by the Vermont Department of Environmental Conservation (VTDEC) subsequent to the release being discovered on December 2, 1993. The State of Vermont was notified on December 2, 1993, that a release had occurred at the site. This report details events occurring, data collected and corrective actions implemented at the site from December 2, 1993, to January 17, 1994.

The objectives of the corrective action effort are to remove free phase product from soils and groundwater in the vicinity of the site, to contain the impact of free product from the release to surface waters and to remove as much petroleum vapor as possible from affected receptors in the vicinity of the site. To accomplish these objectives Griffin designed, installed, and operated a river boom containment system, multiple vapor extraction systems, product and ground-water recovery systems and a building ventilation system to remove petroleum constituents from the soil and groundwater in the vicinity of the site and from interior air spaces of affected receptors.

The treatment systems consisted of a temporary product recovery system through which free product was pumped from a recovery well into product storage drums, a temporary groundwater recovery system through which groundwater was pumped from a recovery well, treated via activated carbon system and discharged to surface water and a vent system at the site. The vent system consists of five vertical soil vapor extraction (vent) points through which contaminated soil vapors are removed under vacuum for treatment. Volatile organic compounds (VOCs) are captured by this soil vapor extraction system and are then incinerated. Also installed are a vent system under the most affected receptor (The Mill on Main Street) consisting of three vent points and a carbon adsorption system to treat emissions from this system and an air removal system powered by multiple blowers and designed to induce negative pressure within specific areas of the Mill in order to reduce vapor impacts.

II. SITE BACKGROUND

A. Site Description

The Ludlow Mobil station is located at 145 Main Street, Ludlow, approximately 50 feet west of the intersection of Depot and Main Street (refer to DWG #1 and #2). Physiographically, the site is situated on the floor of the Black River valley near the top of a glacial fluvial outwash plain. The valley walls slope steeply on both the north and south

sides of the outwash plain. The nearest surface body of water is the Black River, located approximately 155 feet north of the site. The Black River flows from west to east through the town of Ludlow. Unconsolidated sediments present under the site, as determined by drilling, consist of horizontally interbedded coarse sands, gravel and granitic boulders. Bedrock was not encountered during drilling operations at the site.

Prior to the UST release, product storage at the Mobil station consisted of one (1) 8000 gallon fiberglass UST containing regular unleaded gasoline, one (1) 4000 thousand gallon single walled steel tank containing midgrade unleaded and one (1) 6000 gallon fiberglass tank containing premium unleaded (DWG #2). Three monitoring wells (MW-1, MW-2, and MW-3), installed as part of the tank monitoring system, were present in the vicinity of the tank basin (DWG #2).

The area surrounding the Ludlow Mobil station has a mixture of commercial and residential uses (DWG #2 and #3). An IGA supermarket is located directly to the west, two apartment buildings (Apt buildings #1 and #2) are located northeast of the site, a property rental agency (Strictly Rentals) borders the site's eastern property line and to the south the station property is bounded by Main Street (State Highway #103). The southern side of Main Street contains commercial businesses and a park. A former textile mill (The Mill on Main Street) is located approximately 190 feet east-northeast of the station building on the east side of Depot street. The Mill currently houses commercial businesses and condominium housing. The Mill structure is a four story brick building dating back to the 1800's. Located in the west end of the Mill basement is a preschool (Stepping Stones preschool) a bar (Christopher's), and several businesses. DWG #3 illustrates the layout of the basement floor of the mill. The second, third and fourth floors of the mill contain condominium housing. A restaurant (Cafe at DeLight) is located adjacent to the west end of the mill structure (DWG #2).

According to Mr. Dean Brown, the Ludlow town manager, all residences and businesses within the town are supplied with town water. The municipal drinking water source is located eight miles outside of the Ludlow town limits at a higher elevation than the town.

B. Site History

A brief chronological history of the emergency response and corrective action implementation occurring at the site as a result of the UST release is outlined below.

12/2/93 An inventory discrepancy of approximately 2000 gallons was discovered at the site by Midway. Free product was found in tank basin monitoring wells and was observed seeping into the Black River from the southern river banks. Midway notified the State of Vermont regarding the release and contracted Griffin to perform clean-up operations. Griffin arrived on site, installed absorbent river booms in the Black River, commenced free product recovery from existing wells and a culvert well (Tank Basin recovery well #1 (TBRW #1)) installed adjacent to the leaking tank on 12/2/93 and performed vapor monitoring of buildings adjacent to the site. Apartment 201 in the Mill

(Mill apartment 201), the Cafe at DeLight restaurant (Cafe) and the Stepping Stones preschool (preschool) were evacuated per orders of the Vermont Labor and Industry personnel who were on site, due to the presence of gasoline vapors in the Mill Building. Apt building #1 was also evacuated because of gasoline vapor impact.

12/3/93 Exploratory drilling commenced at the site. The UST which was the leak source (4000 gallon midgrade unleaded) was excavated and removed. Free product recovery was continued in the tank basin. The river boom containment system was expanded. Buildings adjacent to the site were monitored for gasoline vapors.

12/4/93 A temporary soil ventilation system (attached to two tank basin monitoring wells and a vent point drilled on 12/4/93) was installed and began operation in the vicinity of the tank basin. Building vapor monitoring was performed. Residents in apartment buildings adjacent to the site (Apt buildings #1 and 2) were reevacuated because of high levels of gasoline vapors being present in the buildings.

12/5/93 Two vent points were installed in the vicinity of the Mobil station for a future vent system (Catox system) and exploratory drilling at the site was continued.

12/6/93 - 12/10/93 A second soil ventilation system (Mill system #1) with three vertical vent points was installed under the Mill building. A vent was also installed in a small crawl space located directly underneath the Cafe. The temporary vent system at the Mobil station was removed and replaced by a permanent system (Catox). An additional vent point was installed near the Ludlow Mobil station (bringing the total number of vent points installed to four). A groundwater recovery system was installed in a well located on the west side of Depot street (RW-1). Air filtration devices were installed in apartments and businesses located in the Mill facility. The river boom containment system was extended further down stream to cope with additional product seeps into the river. Christopher's bar in the Mill Building was closed temporarily due to gasoline vapors being present. Tenant's of Apt buildings #1 and #2 were able to return to their residences. Daily monitoring of remediation systems and of businesses and residences adjacent to the site for levels of petroleum vapors was conducted. Griffin consulted with an independent engineer (Mr. Brad Horn P.E., Windam Environmental) regarding possible methods of remediating air quality problems in the Mill.

12/11/93 - 12/17/93 Completed installation of the Catox soil vapor vent system at the Mobil station. Upgraded the Mill cafe crawl space ventilation system. The Cafe reopened for business. Monitoring of remediation systems and of businesses and residences adjacent to the site for levels of petroleum vapors was conducted.

12/18/93 - 12/25/93 Removed the river booms to prevent their freezing into the ice pack and performed indoor air quality sampling of businesses and residences affected by petroleum vapors. Performed monitoring of remediation systems and indoor air spaces adjacent to the site for petroleum vapors.

12/26/93 - 12/29/93 Performed remediation system monitoring and maintenance. Griffin met with an independent engineer (Mr. Mike Gallo P.E., Visiontech Inc.) at the site to determine the feasibility of installing make-up air systems in the Cafe to control the vacuum induced by operation of the Cafe exhaust fans. Performed remediation system and indoor airspace monitoring for petroleum vapors.

01/03/94 - 01/06/94 Performed a site survey and an additional round of indoor air quality testing in locations previously tested. Performed remediation system maintenance. Performed remediation system and indoor airspace monitoring for petroleum vapors.

01/11/94 - 01/17/94 Griffin met with Midway and the VTDEC to discuss the possible implementation of further corrective action measures in the Mill building to address the continuing problem of gasoline vapors being present within the structure. Additional exploratory work was performed under and in the vicinity of the Mill building.

III. INVESTIGATIVE PROCEDURES/SITE ASSESSMENT

A. Underground Storage Tank (UST) Removal Inspection

The 4000 gallon gasoline tank, which was believed to be the release source, was removed on December 3, 1993. Upon excavation and removal, it was reasonably confirmed by the presence of a hole in the tank that this was the source. For more information pertaining to the above referenced UST removal, refer to the "UST Removal Inspection" report dated December 20, 1993, which is on file at the VTDEC.

B. Surface Water Inspection

The Black River, located 155 feet downgradient of the site, was impacted by free phase floating product migrating down gradient from the release point. Free product seeps were found to be present on the south bank of the Black River in three separate locations. As illustrated by DWG #2, the seeps were present on the west side of the Depot street bridge abutment (upstream), directly east of the bridge underneath a retaining wall below the Cafe (downstream) and approximately 50 feet east of the bridge from underneath a retaining wall. The location of the river bank seeps in relation to the source indicated that free product may have migrated underneath Apt buildings #1 & #2, Depot Street and the west end of the Mill building. Visual inspection of the seeps and adjacent river banks was performed on a daily basis from 12/2/93 - 12/10/93 and per each site visit thereafter. Seepage rates were initially observed to be relatively high (free phase product) during the first three days of observations and then showed a steady decrease until the onset of cold weather (the week of 12/26/93 - 1/1/94). After this time, visual observations of the river surface indicated that significant free product seepage from the banks had ceased. A water sample was collected approximately 30 feet down river of the last product seep on December 16, 1993. The sample was analyzed for benzene, toluene, ethyl benzene, total xylenes and methyl-tert-butyl ether (BTEX and MTBE) via EPA Method 602 and was found to contain 4.3 parts-per billion (ppb) of toluene (refer to Table 4). A discussion of

corrective action measures implemented to mitigate the surface water impact of the seepage into the Black River is contained in section IV of this report.

C. Vapor Assessment/Monitoring

Area commercial businesses and residences located directly east and northeast of the site were impacted with varying degrees of severity by gasoline vapors from the release. On the Ludlow Mobil station (West) side of Depot Street, Apt buildings #1 and #2 and the "Strictly Rentals" office were impacted. On the east side of Depot street, the Cafe and extensive areas of both the basement level and second floor of the Mill were impacted by vapors (DWG #2 and #3). Vapor concentrations and discernible odor in affected buildings, immediately after the release, were high enough to warrant evacuation or closure in some cases. Vapor concentrations in the buildings were measured by photoionization detector (PID) field screening devices (Microtip and HNU models PI-101 and HW-101) and explosimeter devices. A summary of the specific buildings affected and the length of time evacuated or closed is contained in Table 1. Hourly monitoring of vapor levels in affected buildings was conducted from 12/2/93 to 12/3/93. From 12/3/93 to 12/9/93, monitoring of affected buildings was performed on a daily basis. After 12/9/93 monitoring frequency was decreased to a per site visit basis. A summary of all PID data collected in the monitored buildings is contained in Table 2. As indicated by Table 2, the highest recorded vapor levels in affected buildings were from 12/4/93 to 12/7/93. This phenomenon is believed to have been caused by the injection of pressurized air into the subsurface from drilling operations (air rotary method) that occurred during this time. After this date (12/7/93), PID vapor levels in Apt buildings #1 and #2 and the rental agency decreased until only background levels were present. Analysis of data from areas within the Mill building shows a similar trend. However, vapor levels above background still are periodically present in the Cafe, Mill apartment 201 and a wall crack located in the west wall of the preschool. This continuing presence of vapors indicates that a vapor source (free product or petroleum saturated soil) is still present beneath these areas. A description of corrective action measures in the form of soil vapor and building ventilation installed for the purpose of vapor abatement is contained in section IV of this report.

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D. Exploratory Drilling/Monitoring Well Installation

As part of the initial response, five monitoring wells and a recovery well were installed by air rotary drilling methods at the site in an effort to both intercept and horizontally define the free product plume which resulted from the release (DWG #2). These wells are constructed of four inch diameter PVC (RW-1 being the only exception with a 6" diameter casing) with either 0.010" or 0.020" slot well screen and attached solid riser. The annulus between the borehole wall and the screened section of each well is filled with gravel pack to filter fine sediments from the groundwater entering the well. Approximately one foot above the screened section of each well, the annulus is filled with a Bentonite clay seal to prevent surface water from infiltrating into the borehole. Each well is protected at the surface by a locking well cap, a flush mounted steel well head protective casing, and a bolt down cover. Each well head protection casing is set in cement. Well construction details

are listed on the well logs in Appendix A. Three of the wells are constructed so as to be utilized as combination monitoring well/soil vapor vents (VP-2, VP-4 and MW101), one as a groundwater recovery/free product well and the remaining two as monitoring wells only. Drilling services were performed under the direct supervision of a Griffin field geologist. The locations of the wells are shown on DWG #2. The wells, (MW100, MW101, MW102, VP-2, VP-4 and RW-1) were installed between 12/3/93 and 12/7/93. Two additional soil vapor vents (VP-1 and VP-3) were also installed during this period.

Soil boring advancement at the site was performed utilizing a Ingersoll Rand T-30 air rotary drill rig. Soil samples were collected at five foot intervals from drill cuttings and screened for volatile organic compounds (VOC's) with a PID. Uniform geology typical of glacial fluvial outwash deposits was encountered in all soil borings advanced at the site. Brown poorly sorted sand and gravel were present from grade to five feet below grade. Below five feet, large quartzite cobbles and boulders were encountered until the termination of each boring (maximum depth 23 feet (RW-1)).

Soil samples collected from monitoring well 100 (MW100), which was installed to determine if free product was migrating directly north from the site to the river, had PID readings of non-detect (ND), 0.8 and 1.6 ppm at 5, 10 and 15 feet below grade. No free product was detected in this well.

Soil samples collected from MW101, which was originally intended to be a free product recovery well, had ND PID readings at all sampled depths (10,15,20 and 22 feet below grade). Due to the lack of contamination and the difficult drilling conditions (boulders) encountered, MW101 was installed as a monitoring well. No free product was detected in this well at the time of installation.

Soil samples collected from MW102, which was also intended to be a recovery well, had PID readings of ND, 1.5, 7.5, 12.2 and 10.0 ppm at depths of 5, 10, 15, 20 and 23 feet below grade. MW102 was installed as a monitoring well for the same reasons as MW101.

Recovery well-1 (RW-1) was advanced to a depth of 23 feet below grade and soil samples collected from the boring had PID readings of ND, ND, 8.5, 3.2 and 1.2 ppm at 5, 10, 15, 20, and 23 feet below grade. A petroleum sheen was present after installation on the surface of groundwater in RW-1.

A soil sample collected from VP-2 had a PID reading of 8 ppm at 15 feet below grade. Soil samples collected from VP-4 were ND for all sampled intervals but strong petroleum odors from the drilling process were observed when the boring encountered the water table. PID screening values for all soil samples collected are probably lower than their original concentrations due to sample aeration during drilling.

E. Water Table and Product Thickness Measurements

Water table elevations and product thicknesses have been measured in each monitoring well and the two site recovery wells on several occasions since their installation. The water table elevations are based on an United States Geological Survey (USGS) datum located on the east side of a bridge located west of the site on Main Street. Elevations from January 14, 1994, are plotted on DWG #4. The map indicates that groundwater is flowing north-east toward the Black River. The average hydraulic gradient in the vicinity of the monitoring wells is calculated to be 1.25 %.

Free product has been detected in MW-2, MW-3, MW101 and the tank basin recovery well. All groundwater elevation and product thickness data are recorded in Table 3. Free product levels in MW101 have fluctuated since the data was first collected from the well indicating that subsurface product migration down gradient from the site is still occurring.

F. Groundwater Sampling and Analysis

Groundwater samples were collected from on site wells MW-100, MW102, VP-2, VP-4 and RW-1 on December 16, 1993, and analyzed for BTEX and MTBE via EPA Method 602. All samples were collected according to Griffin's groundwater sampling protocol. Duplicate, trip blank, and equipment blank samples collected during the sampling indicate that adequate quality assurance/quality control was maintained during sample collection and analysis.

Groundwater samples were not collected from MW101 due to the free product being present at the time of sampling. The tank basin wells were not sampled because two of them contained free product and one was dry. Table 4 contains a summary of the results of the groundwater analysis. A copy of the laboratory results is contained in Appendix B of this report. Analysis of the results indicates that VP-2 and VP-4 are impacted above the State of Vermont's Groundwater Enforcement Standards (VTGES) for benzene, toluene, ethyl benzene and MTBE. RW-1 is impacted above VTGES for benzene and MTBE and MW100 and MW102 contain only slight concentrations of BTEX and MTBE constituents. No dissolved petroleum constituents are present in MW100 and MW102 at levels above VTGES standards.

G. Indoor Air Sampling and Analysis

Indoor air quality samples were collected on December 21, 1993, and January 6, 1993, in locations that had previously been or were continuing to be impacted by petroleum vapors. All samples were analyzed for BTEX parameters via EPA Method TO2. Table 5 contains a summary of all test results and copies of the laboratory reports are contained in Appendix B. Sample locations are illustrated on DWG #2 and #3. Further descriptions of the sampling and analysis methods, quality assurance/quality control measures and method detection limits are outlined in cover letters submitted with the above referenced laboratory reports.

The purpose of the air quality sampling was to determine if levels of benzene present in ambient air in the impacted residences and the preschool were in compliance with the Vermont Department of Health (VDOH) regulated limit of 2 ppb (as defined by the VDOH's "Residential Air Quality Monitoring" document dated 12/5/88). The Cafe was sampled in order to determine if BTEX levels were in compliance with the levels set by the VTDEC for commercial buildings (as defined by Bob Haslam of the VTDEC to be the NIOSH permissible exposure limits (PEL's) for those compounds). A summary of these levels is contained in Table 5.

The locations sampled for the first round of testing were as follows: the basements and first floor apartments in Apt. buildings #1 and #2, the Cafe (kitchen), Mill apartment 201 (bedroom), Mill apartment 301 (living room) and the preschool (center of main room). The results from the first round of sampling, except for the Apt building #2 basement, showed benzene levels that were slightly above the state's limit being present in all sampled residences and the preschool (Table 5). However, the levels of BTEX components present in the Cafe, were below the NIOSH PEL's for all the above referenced parameters.

A second round of air quality sampling was then conducted in the same locations as the first with two additional samples being collected in an attempt to document background air levels of BTEX within the Mill and outside air in downtown Ludlow. The indoor background air sample was collected in an apartment located on the third floor at the east end of the Mill (Mill apartment 311) and the outdoor sample was collected on the northwest corner of the intersection of Depot and Main streets. Results of the second round of air sampling are contained in Table 5. The outside sample was situated so as to be generally up wind of petroleum vapor emissions from soil ventilation systems installed underneath the Mill. Results from the second sampling round showed benzene levels in the Apt buildings #1 and #2 to be in compliance with the state's residential limit. Benzene levels showed an increase from the first sampling round in Mill apartment's 201 and 301 and the preschool. Benzene levels for the indoor and outdoor background samples were below the state's residential air quality standards. The concentration of BTEX compounds in the Cafe's air remained below NIOSH PEL's.

H. Mill Building Inspection/Exploration

An inspection of wall cavities and crawl spaces beneath the west end of the Mill was conducted by Griffin in an effort to determine the possible migration pathways of petroleum vapor into the building. Areas investigated included a small crawl space directly under the east side of the Cafe (accessed in the men's bathroom), a large crawl space underneath the west half of the Cafe (accessed via a power control room underneath the Cafe deck) and a space behind the west wall of the preschool. The Cafe crawl space was found to have air with relatively high vapor levels (Table 2) flowing naturally out of it from undetermined areas underneath the Mill. Pressure differential readings were collected with a Dwyer magnehelic gauge to determine the pressure differences between

the Cafe interior and the crawl space. The readings indicated that pressure within the Cafe was negative with respect to that of the crawl space (therefore natural airflow would tend to go into the Cafe). In addition, it was observed that the pressure differential increased substantially (air flow rate increased) when the oven exhaust fans present in the Cafe were operational. The restaurant at this time is not equipped with it's own source of make-up air so the operation of the exhaust fans increases the flow of vapors into the Cafe and Mill from the small crawl space.

On the basis of these inspections, PID readings and room to room differential pressure data collected by Griffin, it appears that a space between the east side of the Cafe's foundation and the west wall of the original Mill building is a conduit for the majority of the petroleum vapors entering the Cafe, Mill apartment 201 and the preschool (DWG #3 and Old Mill Vent Systems - As Built). Efforts to access this space (which is believed to be filled with loosely packed rubble) and determine it's dimensions were attempted by drilling a hole through the east interior wall of the large crawl space on January 17, 1994, but proved to be unsuccessful at that time.

An inspection of the Mill interior and exterior was also performed by an independent engineer, Mr. Brad Horn P.E., of Windam Environmental. The purpose of this inspection was to obtain a second opinion on Griffin's analysis of air flow patterns within the Mill structure and to develop methods of curtailing the flow of vapors into the Mill building. On the basis of this inspection, Mr. Horn concluded that the application of selective positive and negative pressures to interior areas of the Mill would serve to reduce vapor levels within the structure. Mr. Horn also proposed sealing a section of the rip rap located on the northwest side of the Mill and applying negative pressure to that area in an attempt to draw vapors out of the Mill building.

An independent engineer (Mike Gallo P.E., of Visiontech, Inc.) visited the site and assessed the feasibility of installing a source of makeup air in the Cafe. Preliminary assessment by Mr. Gallo, indicated that make-up air can be introduced into the Cafe at a high enough rate while the Cafe exhaust fans are running (approximately 3000 to 5000 cubic feet per minute) to make the Cafe positive with respect to the crawlspace and therefore eliminate induced air flow out of that area.

Additional exploratory work was performed at the east end of the Mill building basement in an effort to access a former sluice way which, according to maps and local persons familiar with the history of the Mill's development, ran under the building parallel to the Black River. The purpose of accessing this sluice way was to determine if it was acting as a conduit for free product migration under the Mill building. On January 17, 1994, Griffin drilled a 2" diameter boring into the sluice way via a former floor drain located at the east end of the building (DWG #3). The sluice way was screened for vapors with a PID and level of 4.5 ppm was present. At the time of screening however, odors exiting from the cavity smelled of sewer gas not petroleum. Visual observations of the sluice way determined that it was dry with no evidence of free product ever having been present in it. A sump well that is present outside of the north side of the Mill near it's eastern end

(DWG #2) has been checked for free product, product sheens or vapors on a weekly basis and as of this date, no evidence of contamination has been detected in it.

IV. CORRECTIVE ACTION MEASURES

- Initial response/corrective action measures taken to date consist of the following elements:
 - installation and operation of a river boom system to contain the surface impact of free product to the Black River.
 - installation of a product recovery well containing a product pump to capture free product floating on the water table (temporary).
 - installation of a recovery well and a groundwater recovery system to depress the local water table and possibly recover free product floating on the water table (temporary).
 - installation and operation of a soil vapor extraction system at the Ludlow Mobil station to intercept and capture petroleum vapors before they enter affected receptors and to remove vadose zone contaminants.
 - construction of a treatment compound at the Ludlow Mobil station to house a blower, an incinerator, and various other system components.
 - installation and operation of a soil vapor extraction system under the Mill to intercept and capture petroleum vapors before they enter the building complex and to remediate the vadose zone.
 - installation of a shed to house the Mill soil vapor system blower, activated carbon drums and other system components.
 - installation and operation of a multiple blower system to remove crawl space air from under the Cafe and thereby induce negative pressure in this area in an attempt to short circuit vapor migration into the Cafe and the Mill buildings.
 - repetitive air monitoring to assure that occupied spaces are safe for their intended uses.

A. Surface Water

Absorbent booms were installed in the Black River on December 2, 1993, by Griffin in an effort to contain the surface spread of free product on the river from the river bank seeps. On December 3, 1993, the boom system present was expanded by Griffin. The boom system was composed of an outer harbor type boom which was designed to float partially

submerged and thereby act as a physical barrier to the surface migration of free product. Behind the harbor boom was an inner boom made of an absorbent oleophilic material which served to remove the captured free product from the containment area. In addition, sorbent padding squares (2' X 2' sized) were placed on the open surface of the river in between the shore and the booms to absorb product present. DWG #2 illustrates the location of the booms in relation to the seeps. The booms covered a 60 foot section of river bank upstream of the Depot street bridge and a 130 foot section of bank below the bridge. The inner booms and sorbent padding were inspected on a daily basis and then on a per site visit frequency for product saturation and were changed out as needed by Griffin personnel. During the first day of operation, sorbent booms and padding were changed out hourly due to the high rate of product seepage into the river. The river boom system was removed by Griffin on December 21, 1993, due to the onset of cold weather which caused the booms to become ineffective due to ice formation and to prevent their loss due to ice movement.

Gasoline contaminated boom materials and sorbent padding removed from the river were disposed of in accordance with all pertinent VTDEC and EPA regulations.

B. Free Product Recovery

Free product recovery by two methods was initiated at the site on 12/2/93. Approximately 41 gallons of free product from the release was recovered by pumping it from MW-1 via an air operated pump. A recovery well (TBRW #1) was installed adjacent to (west of) the ruptured tank with a back hoe on 12/2/93 (DWG #2). The recovery well was constructed of 12" diameter steel culvert pipe which was hand slotted at the time of installation. The well was installed to a depth of approximately 17 feet below grade and the slotted (screened) interval of the well was from bottom to approximately 3 feet below grade (14'). A well as-built is contained in Appendix A. During excavation, contaminated soils were not encountered until 10' below grade. Below 10' increasingly impacted soils were encountered with the highest reading being present at 11.5' below grade (200 ppm with an HNU PID). Petroleum impacted soils excavated during the well installation were returned to the excavation after the removal of the source UST (which occurred on 12/3/93). On 12/2/93 Griffin installed a free product recovery system in the well and started product recovery. The product pump was a Spillbuster Junior system manufactured by Clean Earth Technology, Inc. of North Ferrisburg, Vermont. The pump was equipped with a built-in probe that senses the interface between water and product. The pump was designed to run continuously when the product intake is immersed in product and is capable of recovery down to 0.1 inches above the water-product interface. System operation is completely automated. The system was equipped with an automatic level seek device (ALS). The ALS is a compact motor driven reel which was attached to the well head. The ALS automatically raises and lowers the probe in the well to track the water table. A schematic showing the Spillbuster is included in Appendix C. Recovered product was pumped via polyethylene piping from the tank basin well into 55 gallon drums for temporary storage. Approximately 150 gallons of free product was recovered via the

spillbuster system from 12/3/93 to 12/7/93 when the pump was removed to prevent it's being damaged during soil vapor vent installation in the tank basin.

A total of 191 gallons of free product were recovered at the site via hand pumping and the tank basin recovery well.

C. Groundwater Treatment

Groundwater pumping was started from RW-1 on 12/6/93 in an attempt to depress the local water table and promote free product recovery. The groundwater depression system installed in the well consisted of a "Spillbuster" equipped with a Grundfos submersible pump for ground water recovery (Appendix C). The recovery system had a maximum pumping capacity of 20 gallons per minute (GPM). Groundwater treatment consisted of two 185 lb Filcorp liquid phase activated carbon drums (model FC-2) through which recovered ground-water was pumped. The treated system effluent was discharged directly to the Black River per approval of the VTDEC. A copy of the VTDEC correspondence regarding the matter is contained in Appendix C. Groundwater pumping was conducted until 12/10/93 when the system was shut down because it was not deemed effective in recovering free product.

A total of 1691 gallons was pumped from RW-1 and discharged to the Black river between 12/6/93 and 12/10/93. Gasoline contaminated carbon drums from the system were disposed of in accordance with all pertinent VTDEC and EPA regulations.

D. Soil Ventilation

1. Mobil Station Vent System (Catox)

Five vent points (VP-1 - VP-5) were installed at the site from 12/4/93 to 12/7/93 (DWG #2, #3 and Catox System/Treatment Compound As-built in Appendix C). Each vent point is constructed of 4" diameter, 0.020 slot, PVC well screen, of either 5 foot (VP-1, VP-2, VP-3 and VP-5) or 10 foot (VP-4) length. With the exception of VP-5, each vent screen is connected to 4" diameter PVC riser pipe which extended to approximately 0.5 feet below the surface and terminated in a 8 x 12 inch steel road box. The risers are capped with compression plugs which allow for inspection and cleaning of the vent. The annulus between each borehole wall and the vent screen is filled with clean sand. The annulus between each borehole wall and the riser section of pipe is sealed with Bentonite grout to prevent channeling of air down the borehole. VP-5, installed in the tank basin, is completed without an access port. Soil vent as built are included in Appendix A.

At 3.5 feet below grade, 4" diameter PVC transfer pipes are connected to the risers through 4 inch PVC Tees. Transfer pipes are installed and buried in two trenches with the system piping about 3.5 feet below grade. The five transfer pipes lead to the treatment compound and are connected to a 4" diameter PVC manifold. The manifold is in turn connected to a FALCO Model 100 catalytic incinerator fed with a Gast Model R5125Q-

50 two horse power blower. Each 4" transfer line is equipped with a valve and magnehelic gauge connection port for vacuum measurement, sampling, and adjustment, allowing for the flow and vacuum for the system to be adjusted centrally.

A treatment compound, 16 by 16 feet in size, is located directly adjacent (east of) the Mobil station. The compound is enclosed on all four sides by eight foot high stockade fencing with the south side abutting a retaining wall. This area contains the soil vapor treatment system and various other system components. A single phase power service provides electricity to the compound.

The vapor extraction system removes approximately 100 cubic feet per minute (CFM) of air from the subsurface through the five vent points. After being manifolded into a common pipe, the contaminated air removed from the subsurface runs through a 55-gallon capacity moisture removal drum, past a dilution valve for the catalytic oxidizer, to the Gast 2 HP sealed, explosion-proof regenerative blower. The blower delivers the contaminated air to the FALCO 100 catalytic oxidizer. The FALCO 100 system processes approximately 100 CFM and efficiently converts hydrocarbon contaminants in the air stream to carbon dioxide and water vapor by passing preheated vapors through a catalyst bed.

The above referenced system construction started on 12/4/93. The Falco unit was delivered to the site on 12/6/93 and the system was brought on-line utilizing VP-1 and VP-5 on 12/9/93. VP-2, VP-3 and VP-4 were brought on-line by 12/14/93. System construction was finished on 12/14/93. Before the above referenced vent system was brought on line, a temporary system was operated at the site from 12/4/93 to 12/7/93. The temporary system, utilizing MW-1, MW-2 and VP-1 as vent points, had vacuum provided by a 1.0 horsepower Rotron blower (Model E404). Vapors from the vent points were transferred via 2" schedule 40 PVC piping from each vent to a common manifold, which was in turn connected to a moisture trap and air filter before entering the blower. System effluent was treated by passing it through two Filcorp 185 lb activated carbon drums (Model AC-2) in series before being discharged to the atmosphere. During the initial day of operation, carbon drum breakthrough (due to high influent vapor concentrations) occurred approximately every 2 hours. Gasoline contaminated carbon drums generated during system operation were disposed of in accordance with all pertinent VTDEC and EPA regulations.

Collection of operational data from and maintenance of the system are currently being performed by Griffin personnel on a weekly basis and Table 6 contains a summary of soil venting system PID data collected at the site to date.

2. Mill Building Soil Vent and Crawl Space Air Removal System

The above referenced system is located on the east side of Depot Street in the Mill directly underneath the area occupied by the Cafe and was installed incrementally between 12/6/93 and 12/14/93. This system consists of three vertical vent points installed beneath the Mill

foundation and also removes air contamination via piping from two crawl spaces located directly beneath the Cafe (DWG #3 and Old Mill Vent Systems - As Built in Appendix C). The system has a dual purpose in that it both removes gasoline vapors from the subsurface beneath the Mill structure with the ventilation points and discourages the infiltration of vapors into the Cafe, Mill apartments and preschool by the induction of negative pressure in the Cafe crawl spaces.

The three vent points (SVV-1, SVV-2 and SVV-3) were installed on 12/6/93 (refer to Old Mill vent Systems - As Built in Appendix C for exact locations). All individual points were installed by hand digging. Soils encountered during excavation consisted of coarse sand, gravel and cobbles. Water was not encountered during the excavation but soils became visibly moist at the bottom of each hole. SVV-1 and SVV-2 are constructed of 2" diameter, 0.010" slot PVC well screens which are 2 feet in length. The vents are screened 2 feet below the bottom of the Mill foundation with the total depth of the vertical section being 5 feet below the basement crawl space floor. During vent excavation, levels of contamination were initially at background (2 ppm based on PID readings), but as the excavation proceeded beneath the bottom of the footing PID readings increased to a maximum of 230 ppm (SVV-1, 5 feet below basement floor). The vent screens are attached to 2' diameter schedule 40 PVC piping which rises above the crawl space floor level and is connected to horizontal transfer piping (2" PVC) leading back to the system blower. The annulus between each dug hole wall and the vent screen is filled with clean sand. Above the screen, the riser section of pipe is sealed with Bentonite grout to prevent channeling of air down the borehole (refer to Appendix A for as built information). In addition, to prevent short circuiting of the vent system through the crawl space floor (constructed of dirt), the floor is covered and sealed with polyethylene plastic sheeting. SVV-3 is constructed of 4" diameter, 0.020" slot PVC well screen which reduces to 2" diameter transfer piping above the screen top. The screen and riser are sealed in the same manner as SVV-1 and SVV-2. The three transfer pipes lead to a treatment system shed and are connected to a 2" diameter PVC manifold. The manifold is in turn connected to moisture knock out drum, air filter and then a Rotron 1.0 horse power blower. System effluent is then treated by passing it through two Filcorp 185 lb activated carbon drums (Model AC-2 originally and later RC-2) in series before being discharged to the atmosphere. For data collection purposes this vent system has been designated as "Mill system #1" (Table 6). Gasoline contaminated carbon drums (Model AC-2) generated as a result of system operation were disposed of in accordance with all pertinent VTDEC and EPA regulations. The current drums (Model RC-2) utilized by the system can be regenerated at the site and will be reused for system operation.

An additional vent (SVV-4) was installed under the Cafe deck area on January 17, 1994 (DWG #3). This vent will be tested for vapors and, if they are present, connected to the system. The Roton blower on the system has been replaced with a GAST 3.0 horse power in order to increase the vacuum capacity of the vents and increase soil vapor removal rates.

Two blowers serve to remove air from both the small crawl space located directly under the Cafe bathroom and the larger basement crawl space within which SVV-1 and SVV-2 are installed. A 4" diameter Schedule 40 PVC pipeline is plumbed into the small Cafe crawl space and attached to a ORS 1.0 horsepower high volume low vacuum blower (refer to Appendix C for system layout). The blower has an air removal capacity of approximately 400 CFM. Effluent from the crawl space is discharged directly to the atmosphere without treatment due to it's low petroleum vapor concentration (< 10 ppm). For data collection purposes this system has been designated as "Mill System #2" (Table 6). Additional crawl space air removal is effected with a Rotron 1.0 horse power blower. Two transfer lines, constructed of 2" diameter schedule 40 PVC and originating in both the Cafe and basement crawl spaces, are connected to this blower (Mill vent system #3, refer to Appendix C for system layout). Effluent from this blower is also discharged to the atmosphere without treatment due to low petroleum vapor concentrations. Access ports to both of the crawl spaces were sealed as effectively as possible with caulk and polyethylene sheeting subsequent to the blower lines being plumbed into them, to enhance system operation.

Collection of operational data from and maintenance of the Mill systems are currently being performed by Griffin personnel on a weekly basis. Table 6 contains a summary of soil venting system PID data collected at the site to date.

PID monitoring of Mill system influent levels from the time of system start-up show a generally decreasing trend over time until January 6, 1994, when an increase in influent concentrations was noted. System influent levels have fluctuated since this time. Possible reasons for the increase are currently being evaluated by Griffin and monitoring of the situation is continuing.

In addition to the above referenced Mill vent systems, low volume air filtering canisters (Filcorp Model S.A.U.-55) were employed in the Cafe, Mill hallway and Mill Apt's 201 and 204 for several days in an attempt to remove gasoline odors present. In addition, wall cracks and molding located in Mill apartment 201 and the preschool, were sealed with caulk in an effort to reduce vapor migration into these areas.

V. RISK ASSESSMENT

A. Surface Water Impacts

The nearest surface water body in the vicinity of the site, the Black River, has been impacted by free product as discussed in section III and IV of this report. The river continues to be at risk from free product migration and Griffin will proceed with visual monitoring of the situation during the winter and spring of 1994. If free product or sheens are observed again, new booms will be installed in the river. Although significant contamination entered the river, it is felt that all or nearly all of the petroleum was volatilized to the atmosphere by the end of the rapids east of the Mill. It is not felt that the river has been significantly impacted by the release.

B. Groundwater Impacts

Groundwater quality in the vicinity of the site is known to be impacted by dissolved phase petroleum constituents and will continue to be monitored as a result. Groundwater in areas located down gradient from the release continues to be at risk from the migration of dissolved phase hydrocarbons or free product from the release. Continued operation of the soil vent systems present at the site will help to remove the vadose zone contamination which is the source of dissolved phase hydrocarbons and free product.

The area is served by a municipal water supply and no known supply wells are within the nearby vicinity of the site. Other than serving as a possible conduit for petroleum vapor entry into nearby buildings, it is not expected that the groundwater contamination will have a significant impact on surrounding receptors.

C. Vapor Impacts

As discussed in section III and IV of this report, impact to local structures from petroleum vapors was substantial. Relative risk of elevated vapor levels is still present in the Mill facility where specific areas (the Cafe, Mill Apt. 201, the preschool and the Bar) are continuing to be impacted by low levels of elevated petroleum vapors. In addition, due to the quixotic nature of the contaminant migration under the Mill, there is a potential risk that areas of the Mill previously unaffected by petroleum vapor could become impacted.

Both the continuing high concentrations of vapors in the Catox vent system influent and the presence of free product in MW101, MW-1 and the tank basin recovery well (TBRW #1) indicates that buildings on the west side of Depot Street in the vicinity of the station are still at risk of being reimpacted by vapors. Griffin will continue monitoring the situation in both of the above referenced areas.

VI. CONCLUSIONS

On the basis of the investigation and corrective actions performed at the site, Griffin has concluded the following:

- 1) The source of the catastrophic release at the site was the single walled 4000 gallon UST located at the eastern end of the Mobil station property. Removal of this tank effectively removed the source of contamination.
- 2) Permeable glacial fluvial outwash sediments and the relatively steep ground water gradient present in the vicinity of the site promoted the rapid migration of free product from the release point to the various areas impacted by the release.
- 3) Relatively low concentrations of BTEX and MTBE contaminants in MW102 and RW-1 are indicative that free product migration at the site is relatively channelized.

4) Seepage rates of free product into the Black river, steadily decreasing since the date of discovery, have ceased. During the spring thaw, free product seepage may start-up again but is not expected to be at the heavy rates initially observed when the release was discovered.

5) Petroleum vapor levels present in buildings impacted by the release on the west side of Depot Street (Apt buildings #1 and #2 and Strictly Rentals) have been mitigated to such an extent by the soil vapor venting system (Catox) in place that they are not presently a health concern to the inhabitants of these structures.

6) Significant levels of petroleum vapors are still present in the soil in the vicinity of the tank basin, but levels will decline over time as the remediation system continues operation.

7) Residences and commercial businesses located at the west end of the Mill are continuing to be impacted by petroleum vapor migration. The source of the vapors is apparently located below the mill foundation, approximately under the northeast corner of the Cafe. The primary conduit of these vapors into the mill building is a space located in between the west end of the Mill building and the east wall of the Cafe which acts as a natural "chimney" for air flow (and vapors) from regions underneath the Mill.

8) Free product migration is still occurring from the west side of Depot Street to areas underneath the west end of the Mill. The free product is probably responsible for the fluctuation of influent vapor levels in Mill system #1.

9) Negative pressure induced by the crawl space blowers to prevent vapors from entering the Mill is overcome by the operation of the Cafe's exhaust fans. Preliminary engineering studies of the Cafe exhaust blowers indicate that they could be modified so as not to interfere with the soil vent system. The vent and blower systems in place under the Mill, while causing significant vapor abatement, cannot control the migration of vapors into the Mill while the Cafe exhaust fans are in operation. The systems would have to be upgraded by the installation of a significantly greater vacuum capacity (in the order of 3000 to 5000 additional CFM) to overcome the effect of the Cafe fans.

10) Cold weather conditions experienced during the winter months are probably aggravating the above referenced vapor impacts within the Mill building. The onset of warmer weather may cause a reduction of vapor impacts to the Mill.

11) The air rotary drilling which was required to install vent points, monitoring wells and recovery wells significantly increased petroleum vapor levels in the surrounding buildings, making some temporarily uninhabitable.

VII. RECOMMENDATIONS

Based on the conclusions of this investigation and results of subsequent corrective actions at the site, the following actions are recommended:

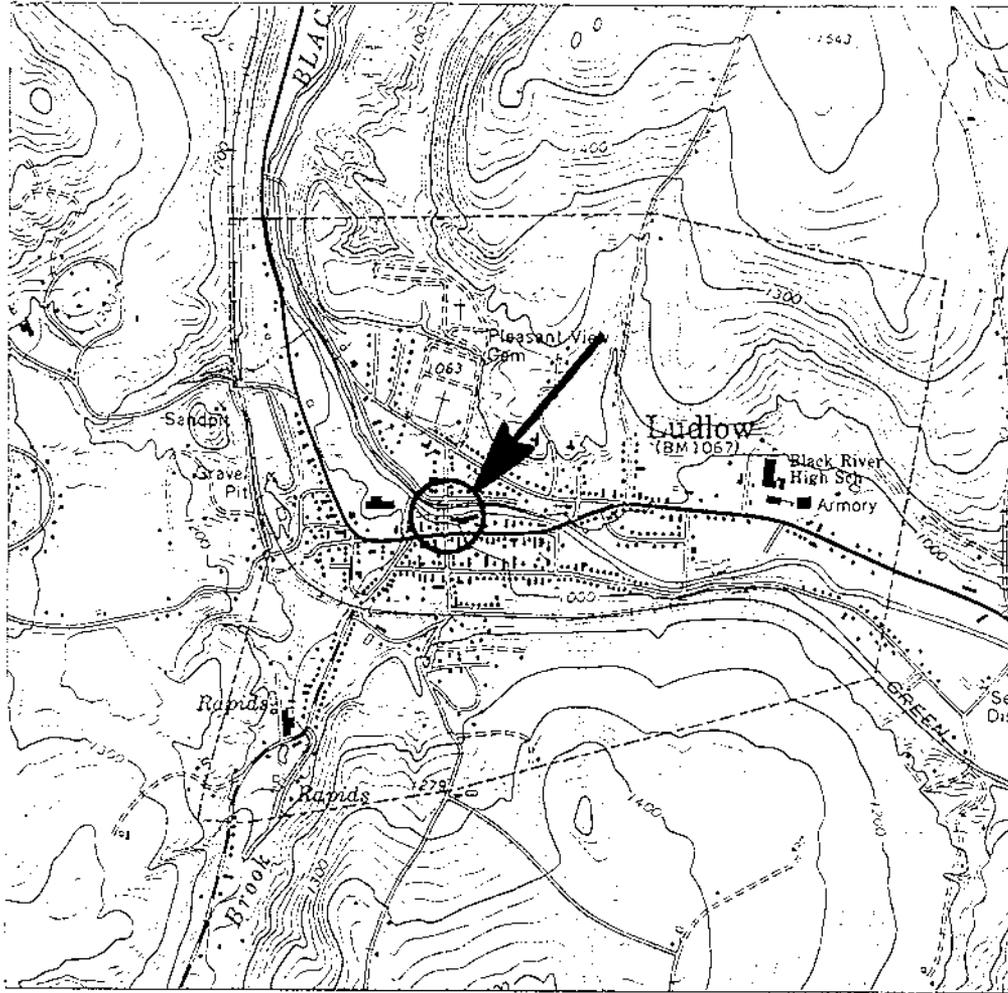
- 1) Operation of the Catox vent system adjacent to the Ludlow Mobil station should be continued until soil vapor levels decline to acceptable levels. Collection of system operational data (vacuum and PID) and adjustment of the Catox burner should be continued on a weekly basis.
- 2) Groundwater monitoring well samples from all wells without free product should be collected and analyzed for BTEX and MTBE parameters on a monthly basis until significant contaminant level trends are established (3-6 months). At this time, sampling frequency should be reevaluated. In addition, monthly sampling of the Black River just east of the Mill at the head of the rapids, should resume in the spring.
- 3) Mill vent systems operation should be continued as at present and collection of system operational data (vacuums and PID levels) should be continued on a weekly basis until vent system influent levels are below 10 ppm or non-detect for a sustained time period.
- 4) A study of the effect upon the Mill vent systems (specifically system #1) air flow rates caused by sealing off or unsealing various areas of the Mill building complex should be conducted utilizing pitot tube velocity traverse methods to measure air flow rate change. The possible need to upgrade/downgrade the air removal capacity of the crawl space blower system (system #2) should be evaluated and necessary changes enacted as a result.
- 5) PID screening and air quality sampling of the "Strictly Rentals" office and the apartment buildings on the west side of Depot street should be continued on a periodic basis until a clear trend is seen.
- 6) PID screening of vapor impacted areas in the Mill building complex (the Cafe, Apt. 201, Preschool and Christopher's Bar) should be continued on a weekly basis until a sustained period (one month minimum) of non detect readings occurs. Air quality samples should continue to be collected in previously sampled Mill locations (with the exception of Apt. 311) on an as to be determined interval until the results from two successive samplings are acceptable.
- 7) Further invasive exploratory work within the Mill building structure is not recommended at this time.
- 8) Weekly free product recovery via passive measures will be continued in the tank basin recovery well, tank basin monitoring wells and MW101.
- 9) It is recommended that the Cafe exhaust fan ventilation system be upgraded and modified per preliminary engineering report so that it does not produce a negative

pressure in the small crawl space while in operation. Otherwise, the Cafe exhaust system currently in place will continue to induce vapor entry into the Mill and Cafe.

10) After one more month of data is collected, corrective action in the Mill will be reviewed and new actions will be advanced if necessary.

11) No further air rotary drilling should be conducted at this site as the air rotary methods create significant problems of petroleum vapor impacts within surrounding structures. ✓

MAPS



CR #: 1934463
 SOURCE: USGS LUDLOW QUADRANGLE



LUDLOW MOBIL

LUDLOW,

VERMONT

SITE LOCATION MAP

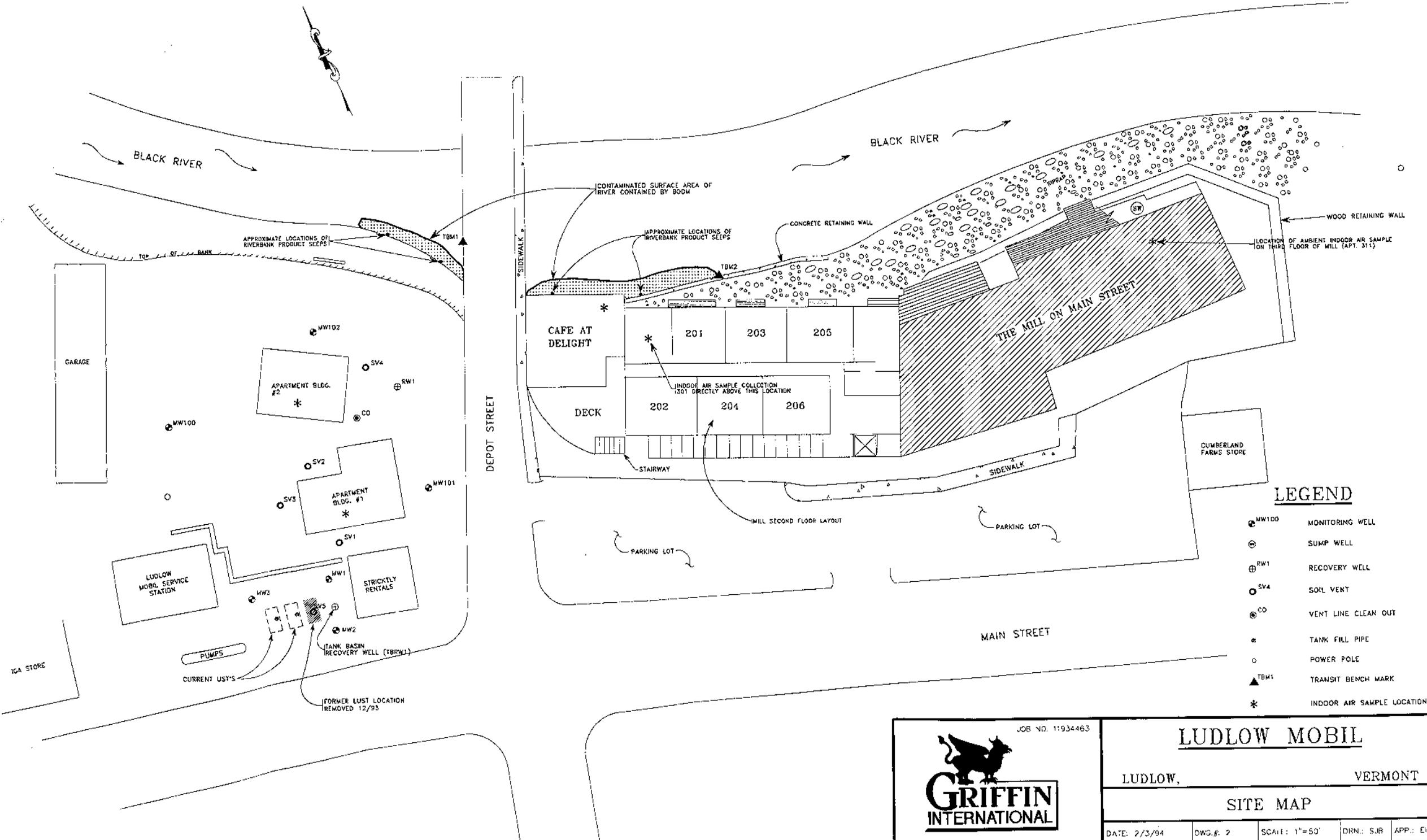
DATE: 12/20/93

DWG.#: 1

SCALE: 1:24000

DRN.: SB

APP: E-1



LEGEND

- MW100 MONITORING WELL
- ⊕ SUMP WELL
- ⊕ RW1 RECOVERY WELL
- SV4 SOIL VENT
- ⊙ CO VENT LINE CLEAN OUT
- * TANK FILL PIPE
- POWER POLE
- ▲ TBM1 TRANSIT BENCH MARK
- * INDOOR AIR SAMPLE LOCATION



JOB NO. 11934463

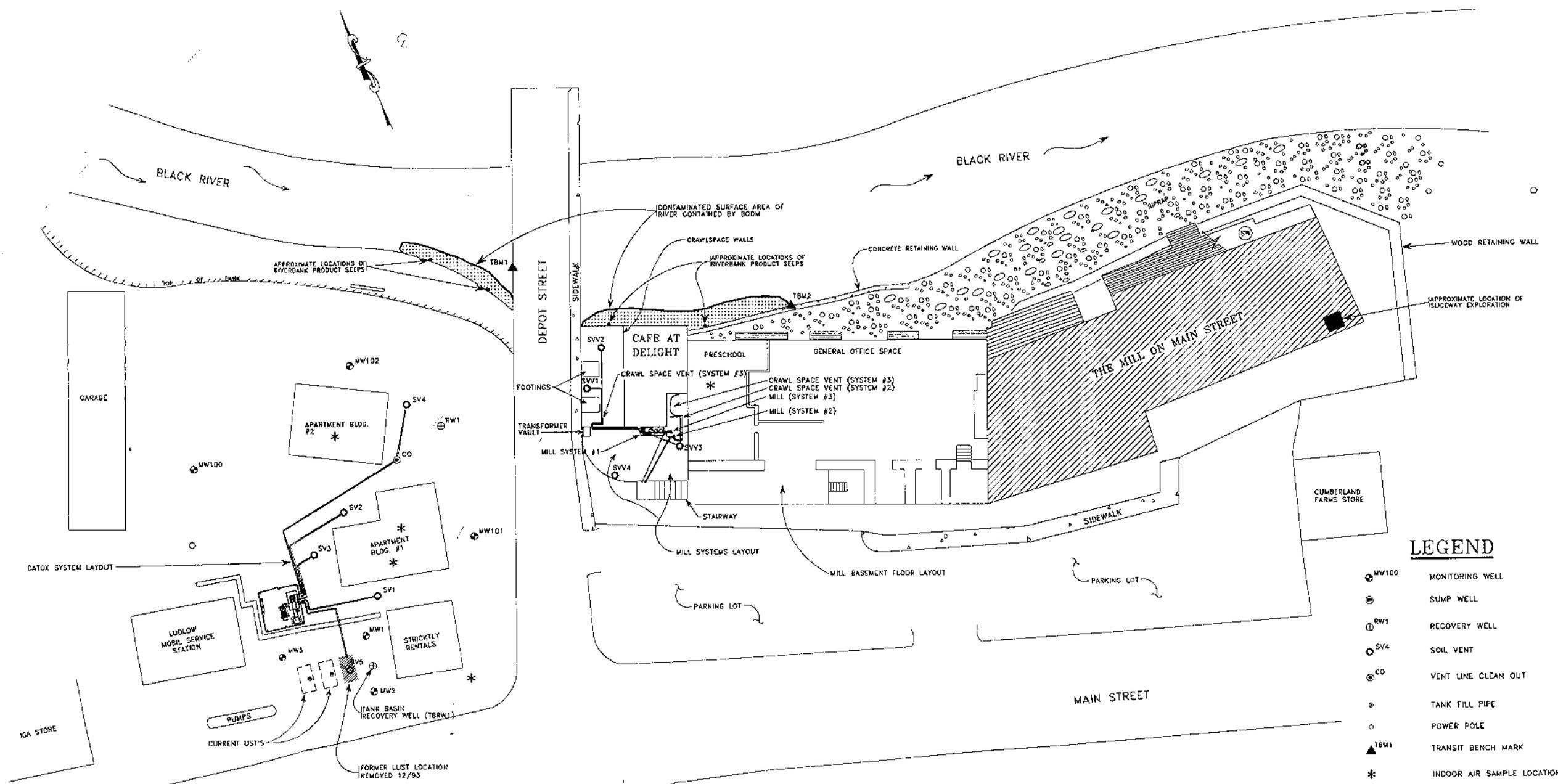
LUDLOW MOBIL

LUDLOW, VERMONT

SITE MAP

DATE: 2/3/94 DWS.#: 2 SCALE: 1"=50' DRN.: SJR APP.: EM

SITE MAP DRAWN FROM SURVEY DATA COMPILED BY WILLIAM F. DRUDE, JR. AND FIELD NOTES.



LEGEND

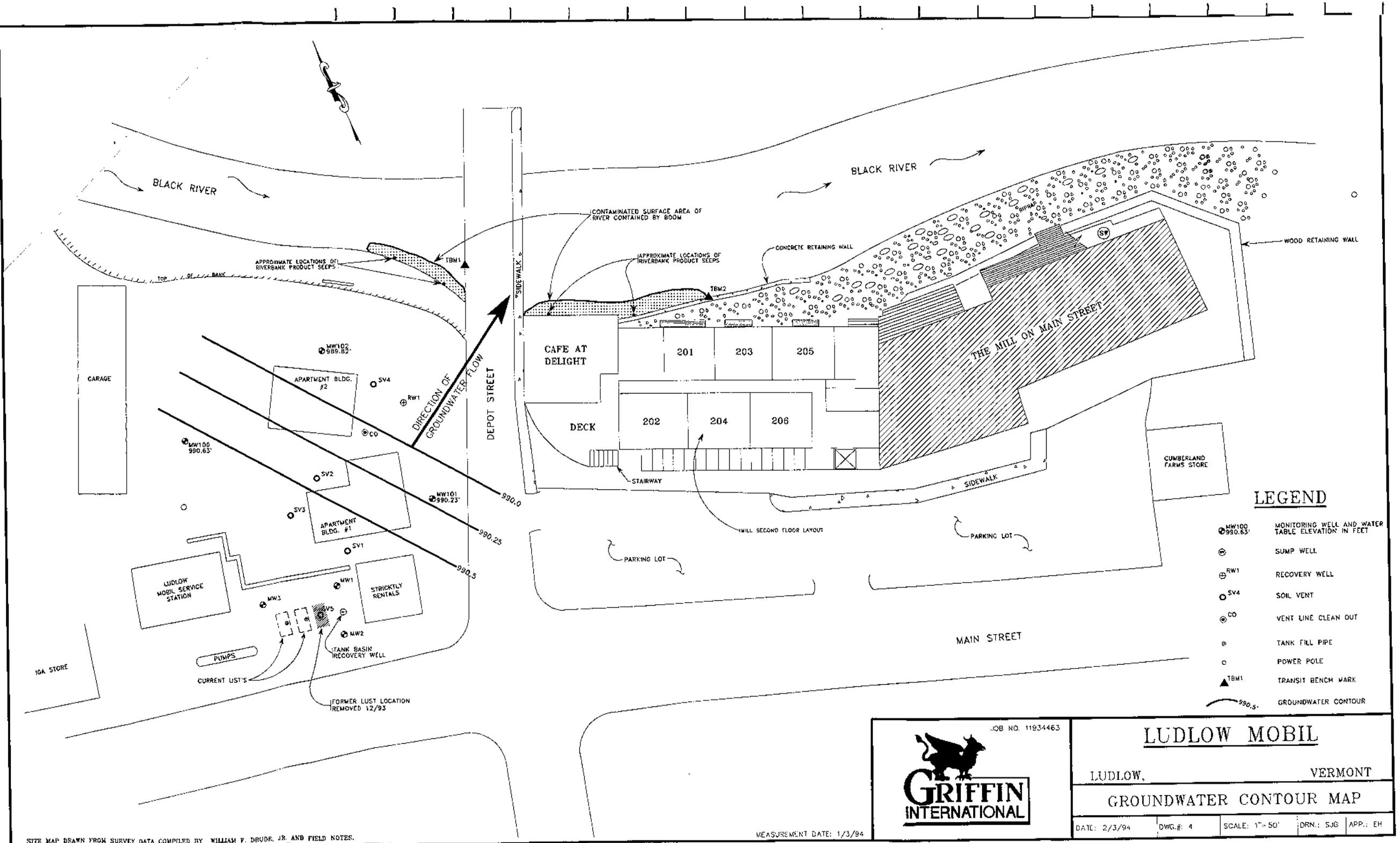
- ⊕ MW100 MONITORING WELL
- ⊙ SUMP WELL
- ⊕ RW1 RECOVERY WELL
- ⊙ SV4 SOIL VENT
- ⊙ CO VENT LINE CLEAN OUT
- ⊙ TANK FILL PIPE
- ⊙ POWER POLE
- ▲ TBW1 TRANSIT BENCH MARK
- * INDOOR AIR SAMPLE LOCATION

JOB NO. 11834463



LUDLOW MOBIL	
LUDLOW,	VERMONT
TREATMENT COMPOUND LAYOUT MAP	
DATE: 2/3/94	DWG. # 3
SCALE: 1"=50'	DRN.: SJS
APP.: EM	

SITE MAP DRAWN FROM SURVEY DATA COMPILED BY WILLIAM F. DRUFF, JR. AND FIELD NOTES.



LEGEND

- MW100 990.63' MONITORING WELL AND WATER TABLE ELEVATION IN FEET
- ⊕ SUMP WELL
- ⊕ RW1 RECOVERY WELL
- SV4 SOIL VENT
- ⊕ CO VENT LINE CLEAN OUT
- ⊕ TANK FILL PIPE
- ⊕ POWER POLE
- ▲ TBM1 TRANSIT BENCH MARK
- 990.5' GROUNDWATER CONTOUR

JOB NO. 11934463

GRIFFIN INTERNATIONAL

LUDLOW MOBIL

LUDLOW, VERMONT

GROUNDWATER CONTOUR MAP

DATE: 2/3/94	DWG.#: 4	SCALE: 1" = 50'	DRN.: SJB	APP.: EH
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SJTR MAP DRAWN FROM SURVEY DATA COMPILED BY WILLIAM F. DRUDE, JR. AND FIELD NOTES.

MEASUREMENT DATE: 1/3/94

TABLES

TABLE 1

Summary of Buildings Impacted By Petroleum Vapor

Ludlow, Vermont

	<u>Building</u>	<u>Time Period Affected</u>
1)	Apt. Building #1	Residents Evacuated 12/2/93 - 12/8/93.
2)	Apt. Building #2	Residents Evacuated 12/4/93 - 12/8/93.
3)	Stepping Stones Preschool	Closed 12/2/93. Continues to be closed as of 1/17/94 due to elevated Benzene vapor concentration.
4)	Mill Apartment 201 Owner: Mr. Don Young	Evacuated 12/2/93. Has not been reoccupied as of 1/17/94 due to elevated Benzene vapor concentration.
5)	Cafe at DeLight (Mill)	Closed 12/293 - 12/17/93.
6)	Christopher's Bar (Mill)	Closed 12/6/93 - 12/9/93

TABLE 2

PID VAPOR SCREENING DATA

Ludlow Mobil
145 Main Street, Ludlow, Vermont
Griffin Project #11934463

LOCATION	DATE											
	12/3/93*	12/4/93*	12/5/93*	12/6/93*	12/7/93*	12/8/93	12/9/93*	12/12/93*	12/13/93*	12/14/93*	12/15/93*	12/17/93*
STRICKLY RENTALS (BASEMENT)	10	1450*	14.5	8.3	17	5.6	6	NS	6.0 (5.0)	5	ND	3.2
APT #1 STAIRWELL	NS	10.5	15	NS	ND	ND	1.8	NS	ND	ND	ND	1.7 (1.5)
APT #1 BASEMENT	NS	60	56	NS	3	2.4	4	NS	ND	ND	ND	NS
APT #2 STAIRWELL	1.8	650*	50	NS	1.6	ND	0.5	ND	ND	0.7	NS	1.5 (1.5)
APT #2 BASEMENT	10	NS	24	120	21.6	ND	0.9	NS	ND	ND	ND	NS
CAFE MAIN AREA	NS	20	13	14.8	8.7	4	1	NS	14 (5.0)	2.5	3	3.8(1.5)
CAFE CRAWLSPACE	NS	50	102	57	30	15	7	NS	30.0 (5.0)	17	17	NS
CAFE KITCHEN	NS	NS	NS	NS	4	NS	NS	NS	NS	16	8	4.9 (1.5)
MILL APT 201(Bedroom)	NS	NS	72	NS	NS	NS	NS	NS	5.0 (5.0)	6.1	ND	ND
MILL HALLWAY (2END FLOOR)	NS	NS	21.1	NS	1.4	NS	1	NS	6.0 (5.0)	NS	ND	ND
MILL FOYER (BASEMENT)	NS	NS	NS	0.5	ND	NS	1.2	NS	ND (5.0)	2.5	ND	2.2 (1.7)
PRESCHOOL (MAIN AREA)	NS	5	26	5	4.1	2	1	2.3	6.0 (5.0)	2.5	ND	NS
PRESCHOOL (WALL VENT)	NS	NS	220	36	NS	5	12	3.4	6.5 (5.0)	2.5	ND	NS
CHRISTOPHERS (FLOOR SPACE)	NS	NS	NS	18.3	18	5	15	NS	NS	6	NS	NS
CHRISTOPHERS (MAIN AREA)	NS	NS	NS	1.9	ND	2	1	NS	NS	1.5	NS	NS

LOCATION	12/20/93	12/21/93*	12/23/93	12/29/93*	1/7/94	1/11/94	1/15/94
STRICKLY RENTALS (BASEMENT)	1.6 (1.2)	NS	0.6 (0.2)	NS	NS	ND	NS
APT #1 STAIRWELL	ND	NS	0.2 (0.2)	NS	0.5 (0.5)	ND	NS
APT #1 BASEMENT	NS	NS	0.2 (0.2)	NS	0.5 (0.5)	ND	NS
APT #2 STAIRWELL	ND	NS	0.3 (0.2)	NS	0.5 (0.5)	ND	NS
APT #2 BASEMENT	NS	NS	0.3 (0.3)	NS	NS	ND	NS
CAFE MAIN AREA	3.2 (1.2)	4.5 (4.0)	24 (0.2)	7.0 (7.0)	1.0 (0.5)	ND	NS
CAFE BATHROOM	6.8 (1.2)	5.5 (4.0)	24 (0.2)	NS	NS	NS	NS
CAFE KITCHEN	3.8 (1.2)	5.5 (4.0)	32 (0.2)	15 (7.0)	3.0 (0.5)	2.0 (2.0)	NS
MILL APT 201(Bedroom)	ND	ND	0.4 (0.2)	NS	NS	4.0 (2.0)	0.5 (0.5)
MILL HALLWAY (2END FLOOR)	NS	4.0 (4.0)	0.3 (0.3)	NS	0.5 (0.5)	NS	0.5 (0.5)
MILL FOYER (BASEMENT)	0.4 (0.4)	4.0 (4.0)	0.5 (0.2)	NS	0.5 (0.5)	NS	NS
PRESCHOOL (MAIN AREA)	0.4 (0.4)	ND	0.4 (0.2)	0.8	NS	ND	0.5 (0.5)
PRESCHOOL (WALL VENT)	0.4 (0.4)	4.0 (4.0)	0.5 (0.2)	0.8	NS	ND	NS
PRESCHOOL (WALL CRACK)	16 (0.4)	NS	10.2 (0.2)	NS	NS	20 (2.0)	NS
CHRISTOPHERS (FLOOR SPACE)	NS	NS	0.2 (0.2)	NS	NS	NS	NS
CHRISTOPHERS (MAIN AREA)	NS	NS	4.2 (0.2)	NS	NS	NS	NS

TABLE 2 CONTINUED

EXPLANATION: All values are in parts-per million (ppm).
ND - Non Detect.
NS - Not Sampled
() - Values indicate the instrument background level at the time of sampling.
PID - Photoionization Detector
* - Vapor screening data collected with a Photovac Microtip PID.
All other data collected with an HNU Model PI-101 or HW-101PID.

TABLE 3

Water Table Elevation and Product Thickness Data

Ludlow Mobil 145 Main Street, Ludlow, Vermont Griffin Project #11934463							
Well #	Elevation	DATE	DTP	DTW	DTB	PT	WTE
MW-1	1004.03	12/2/93	12.6	13.3	NA	0.7	991.36
	1004.03	12/3/93	11.63	13.76	NA	2.13	992.14
MW-2	1004	12/2/93	12.4	13.2	NA	0.8	991.50 ~
	1004	12/3/93	12.24	13	NA	0.76	991.67 ~
MW-3	1004.25	1/3/94	NA	DRY	NA	NA	NA
MW100	1001.24	12/8/93	NA	10.9	NA	NA	990.34
	1001.24	1/3/94	NA	10.61	NA	NA	990.63
	1001.24	1/14/94	NA	11.05	NA	NA	990.19
MW101	1004.2	12/8/93	NA	13.94	NA	NA	NA
	1004.2	1/3/94	13.94	14.19	NA	0.25	990.23
	1004.2	1/6/94	14.07	14.24	NA	0.17	990.11
	1004.2	1/7/94	14.09	14.32	NA	0.23	990.08
	1004.2	1/11/94	14.15	14.35	NA	0.2	990.03
	1004.2	1/14/94	14.33	14.6	NA	0.27	989.84
MW102	1001.86	12/8/93	NA	11.9	NA	NA	989.96
	1001.86	1/3/94	NA	12.04	NA	NA	989.82
	1001.86	1/14/94	NA	12.35	NA	NA	989.51
RW-1	1003.01	12/8/93	NA	18.3	NA	NA	984.71
	1003.01	1/3/94	NA	13.49	NA	NA	989.52
	1003.01	1/14/94	NA	13.68	NA	NA	989.33
VP-2	1002.39	1/3/94	NA	12.05	NA	NA	990.34
VP-4	1002.87	1/3/94	NA	13.03	NA	NA	989.84
TBRW #1	1007	12/3/93	16.25	16.75	NA	0.5	990.25 ~
	1007	12/7/93	16.74	16.77	NA	0.03	990.23 ~
	1007	12/8/93	16.8	16.84	NA	0.04	990.16 ~
	1007	1/3/94	16.94	17.02	NA	0.08	989.98 ~
	1007	1/6/93	17.07	17.15	NA	0.08	989.85 ~
	1007	1/7/94	17.15	17.23	NA	0.08	989.77 ~
	1007	1/14/93	17.46	17.53	NA	0.07	989.47 ~

Explanation:

All elevations are in feet mean sea level (MSL). Survey benchmark is a USGS datum located on the northeast corner of the Main street bridge.
Elevation - Elevation of the top of the monitoring well casing
DTP - Depth to product
DTW - Depth to water
DTB - Depth to bottom
PT - Product thickness
NA - Non applicable
WTE Water table elevation
~ - Well elevation has been approximated.
TBRW #1 - Tank Basin Recovery Well

TABLE 4
Ground Water Quality Data

Ludlow Mobil
145 Main Street, Ludlow, Vermont
Griffin Project #11934463

Well #	DATE	Benzene	Toluene	Ethyl B.	Xylenes	MTBE
MW100	12/16/93	ND	ND	3.9	5.2	ND
MW101	12/16/93	FP	FP	FP	FP	FP
MW102	12/16/93	ND	1.3	TBQ	ND	12.9
RW-1	12/16/93	140	343	77.3	590	1720
VP-2	12/16/93	4430	15200	1040	9920	24300
VP-4	12/16/93	2820	7260	483	2770	8580
MW-1	12/16/93	FP	FP	FP	FP	FP
MW-2	12/16/93	FP	FP	FP	FP	FP
MW-3	12/16/93	DRY	DRY	DRY	DRY	DRY
River	12/16/93	ND	4.3	ND	ND	ND

Explanation:

All values are in parts per billion (ppb).
 Ethyl B. - Ethyl Benzene
 MTBE - Methyl-Tert-Butyl Ether
 ND - Non Detect
 FP - Free product present. Well not sampled.
 TBQ - Trace Below Quantitative Limit
 Samples analysed via EPA Method 602
 Vermont Groundwater Enforcement Standards for BETX and MTBE:
 Benzene - 5 ppb Ethyl Benzene - 700 ppb
 Toluene - 1000 ppb Xylenes - 10000 ppb
 MTBE - 40 ppb

TABLE 5
Air Quality Data

Ludlow Mobil
145 Main Street, Ludlow, Vermont
Griffin Project #11934463

Location	DATE	Benzene	Toluene	Ethyl B.	Xylenes
Apt. Hse 1 Bsmt.	12/21/93	2.9*	8.5	0.9	4.7
Apt. Hse 1 Bsmt.	1/6/94	0.5	1.4	0.2	0.8
Apt. Hse 1 1st fl.	12/21/93	3.5*	11	1	5
Apt. Hse 1 1st fl.	1/6/94	0.5	1.4	<0.3	0.7
Apt. Hse 2 1st fl.	12/21/93	2.7*	20	1.5	8.4
Apt. Hse 2 1st fl.	1/6/94	<0.4	1.4	<0.3	<0.5
Apt. Hse 2 Bsmt.	12/21/93	0.6	2.5	<0.4	1.6
Apt. Hse 2 Bsmt.	1/6/94	0.5	1.3	<0.2	0.9
Delight Cafe	12/21/93	26~	110~	10~	88~
Delight Cafe	1/6/94	45~	290~	23~	250~
Mill Apt. 201	12/21/93	2.9*	11	1.5	8.8
Mill Apt. 201	1/6/94	9.6*	56	6.2	54
Mill Apt. 301	12/21/93	2.9*	7.7	1.1	6.1
Mill Apt. 301	1/6/94	6.4*	38	4	35
Mill Basement	12/21/93	3.3*	11	1.4	7.7
Mill Basement	1/6/94	4*	14	1.3	11
Mill Apt 311	1/6/94	0.6	1.2	0.2	1.1
Ambient	1/6/94	1.4	3.5	0.5	2.9

Explanation: All values are in parts per billion (ppb) as analyzed by EPA Method TOZ.
Ethyl B. - Ethyl Benzene
< - Less Than
Ambient - Sample collected on the northwest corner of the intersection of Depot and Main Street.
* - Value in excess of the Vermont Department of Health recommended residential background limit for benzene (2 ppb).
~ - Value below NIOSH permissible exposure limits (PEL's).
Benzene - 100 ppb Ethyl Benzene - 100000 ppb
Toluene - 100000 ppb Xylenes - 100000 ppb

TABLE 6

SOIL VENT SYSTEM DATA

Ludlow Mobil
145 Main Street, Ludlow, Vermont
Griffin Project #11934463

LOCATION	DATE											
	12/4/93*	12/5/93*	12/6/93*	12/7/93*	12/8/93	12/9/93*	12/10/93*	12/12/93*	12/13/93*	12/14/93*	12/15/93*	12/16/93
PRE-CATOX VENT SYSTEM												
INFLUENT	NA	988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EFFLUENT	478	416	85.5	685	NA	NA	NA	NA	NA	NA	NA	NA
CATOX VENT SYSTEM INFLUENT	NA	NA	NA	NA	NA	110	120	110	359	320	95	81.7
CATOX VENT SYSTEM EFFLUENT	NA	NA	NA	NA	NA	NA	ND	NA	ND	0.5	1	2
MILL SYSTEM #1 INFLUENT	NA	NA	NA	920	9.5	180	NA	50.1	475	365	96	105
MILL SYSTEM #1 EFFLUENT	NA	NA	NA	30.5	NA	39	NA	ND	38.7	145	3	38.2
SVV-1	NA	NA	NA	995	1010	NA	NA	NA	NA	NA	NA	NA
SVV-2	NA	NA	NA	450	NA	NA	NA	NA	NA	NA	NA	NA
SVV-3	NA	NA	NA	616	522	NA	NA	NA	NA	NA	NA	NA
MILL SYSTEM #2 INFLUENT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4	3.9
MILL SYSTEM #3 INFLUENT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	3.8
LOCATION	12/17/93	12/20/93*	12/21/93*	12/23/93	12/26/93	12/29/93*	1/6/1994*	1/7/94	1/11/94	1/15/94	1/17/94	
CATOX VENT SYSTEM INFLUENT	80	134	87.7	194	191	NA	NA	210	180	220	NA	
CATOX VENT SYSTEM EFFLUENT	3.2	0.8	8	2.5	0.5	NA	NA	2.5	1.5	1	NA	
MILL SYSTEM #1 INFLUENT	74.4	136	67	124	56	42	785	80	144	4	1	
MILL SYSTEM #1 EFFLUENT	53.3	28	30.6	0.4	28	ND	331	0.5	36	ND	0.5	
SVV-1	NA	NA	NA	NA	NA	NA	950	140	NA	NA	NA	
SVV-2	NA	NA	NA	NA	NA	NA	22	0.5	NA	NA	NA	
SVV-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
MILL SYSTEM #2 INFLUENT	2.6	2.8	4.4	6.8	NA	7	15	5.5	NA	4	4.5	
MILL SYSTEM #3 INFLUENT	3.1	1.6	3	1.4	9	ND	15	NA	NA	ND	ND	

EXPLANATION: All values are in parts-per million (ppm).
 ND - Non Detect.
 NA - Not Analysed
 PID - Photoionization Detector
 * - Vapor screening data collected with a Photovac Microtip PID.
 All other data collected with an HNU Model PI-101 or HW-101PID.
 Pre-Catox vent system installed at the Mobil station prior to CATOX system.

APPENDIX A

Well and Vent Point As Builts and Drill Logs

PROJECT LUDLOW MOBIL

LOCATION LUDLOW, VERMONT

DATE DRILLED 12/3/93 TOTAL DEPTH OF HOLE 17.5'

DIAMETER 2"

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

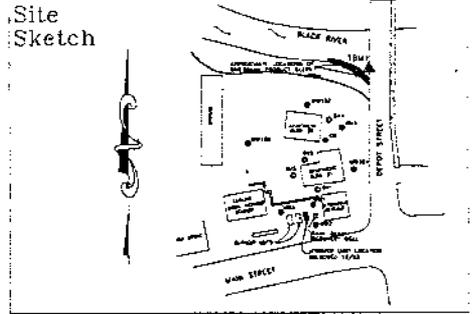
CASING DIA. 2" LENGTH 7' TYPE SCH. 40 PVC

DRILLING CO. FROST DRILLING METHOD AIR ROTARY

DRILLER MARK LOG BY L. REED

WELL NUMBER MW100

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 LOCKING WELL CAP				0
1	CONCRETE				1
2	BENTONITE				2
3					3
4	NATIVE BACKFILL			Medium to coarse SANDS, PEBBLES, small to large cobbles.	4
5			5.0' 0 ppm		5
6	WELL RISER			Kame gravel formation Glaciofluvial terrace deposit	6
7					7
8					8
9					9
10	WELL SCREEN		10.0' 0 ppm	10.5' WATER TABLE	10
11					11
12					12
13					13
14	SAND PACK				14
15			15.0' 0 ppm		15
16	BOTTOM CAP				16
17					17
18	UNDISTURBED NATIVE SOIL		17.5' 0 ppm	BASE OF WELL AT 17.5' END OF EXPLORATION AT 17.5'	18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

WELL NUMBER MW101

PROJECT LUDLOW MOBIL

LOCATION LUDLOW, VERMONT

DATE DRILLED 12/3/93 TOTAL DEPTH OF HOLE 22.0'

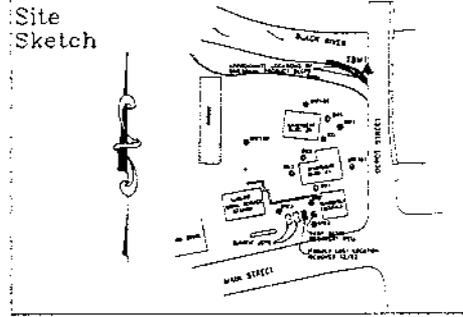
DIAMETER 4"

SCREEN DIA. 4" LENGTH 10' SLOT SIZE 0.010"

CASING DIA. 4" LENGTH 6.5' TYPE SCH. 40 PVC

DRILLING CO. FROST DRILLING METHOD AIR ROTARY

DRILLER MARK LOG BY L. REED



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX LOCKING WELL CAP			0
1		CONCRETE			1
2		BENTONITE			2
3		NATIVE BACKFILL			3
4		BENTONITE		Medium to coarse SANDS, PEBBLES, small to large cobbles.	4
5		WELL RISER	5.0' 0 ppm	Kame gravel formation Glaciofluvial terrace deposit	5
6					6
7					7
8		SAND PACK			8
9					9
10			10.0' 0 ppm		10
11		WELL SCREEN			11
12				12.0' WATER TABLE	12
13					13
14					14
15			15.0' 0 ppm		15
16		BOTTOM CAP			16
17					17
18					18
19					19
20			20.0' 0 ppm		20
21					21
22		UNDISTURBED NATIVE SOIL	22.0' 0 ppm		22
23				BASE OF WELL AT 17' END OF EXPLORATION AT 22'	23
24					24
25					25

WELL NUMBER MW102

PROJECT LUDLOW MOBIL

LOCATION LUDLOW, VERMONT

DATE DRILLED 12/7/93 TOTAL DEPTH OF HOLE 23.0'

DIAMETER 4"

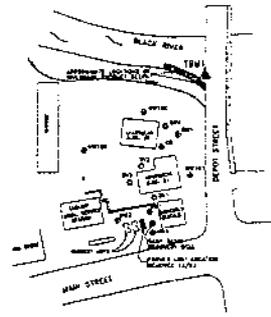
SCREEN DIA. 4" LENGTH 10' SLOT SIZE 0.010"

CASING DIA. 4" LENGTH 4.5' TYPE SCH. 40 PVC

DRILLING CO. FROST DRILLING METHOD AIR ROTARY

DRILLER MARK LOG BY L. REED

Site Sketch

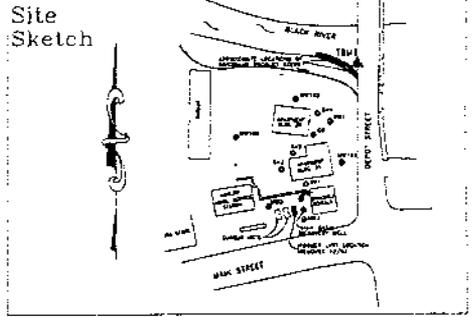


GRIFFIN INTERNATIONAL, INC

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 LOCKING WELL CAP				0
1	CONCRETE				1
2	BENTONITE				2
3	NATIVE BACKFILL				3
4				Medium to coarse SANDS, PEBBLES, small to large cobbles.	4
5			5.0' 0 ppm	Kame gravel formation Glaciofluvial terrace deposit	5
6	WELL RISER				6
7					7
8					8
9	SAND PACK				9
10			10.0' 1.5 ppm		10
11					11
12	WELL SCREEN			12.0' WATER TABLE	12
13					13
14					14
15	BOTTOM CAP		15.0' 7.5 ppm		15
16					16
17					17
18					18
19	NATIVE BACKFILL				19
20			20.0' 12.2 ppm		20
21					21
22					22
23	UNDISTURBED NATIVE SOIL		23.0' 10.0 ppm		23
24				BASE OF WELL AT 16' END OF EXPLORATION AT 23'	24
25					25

WELL NUMBER RW1

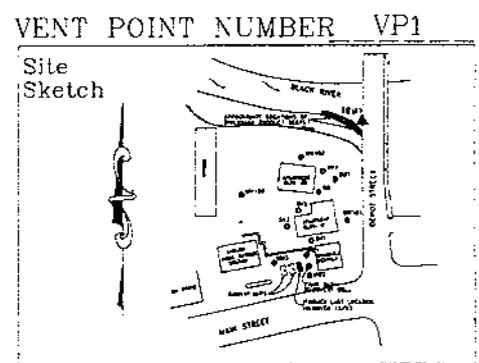
PROJECT LUDLOW MOBIL
 LOCATION LUDLOW, VERMONT
 DATE DRILLED 12/5/93 TOTAL DEPTH OF HOLE 21.0'
 DIAMETER 6"
 SCREEN DIA. 6" LENGTH 15' SLOT SIZE 0.010"
 CASING DIA. 6" LENGTH 5.5' TYPE SCH. 40 PVC
 DRILLING CO. FROST DRILLING METHOD AIR ROTARY
 DRILLER MARK LOG BY L. REED



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX LOCKING WELL CAP			0
1		CONCRETE			1
2		NATIVE BACKFILL	5.0' 0 ppm		2
3		WELL RISER			3
4		BENTONITE		Medium to coarse SANDS, PEBBLES, small to large cobbles.	4
5				Kame gravel formation Glaciofluvial terrace deposit	5
6			10.0' 0 ppm		6
7					7
8					8
9		SAND PACK			9
10					10
11		WELL SCREEN	15.0' 8.5 ppm		11
12					12
13				13.0' WATER TABLE	13
14					14
15					15
16			20.0' 3.2 ppm		16
17					17
18			23.0' 1.2 ppm		18
19					19
20		BOTTOM CAP			20
21		UNDISTURBED NATIVE SOIL		BASE OF WELL AT 21' END OF EXPLORATION AT 21'	21
22					22
23					23
24					24
25					25

PROJECT LUDLOW MOBIL
 LOCATION LUDLOW, VERMONT
 DATE DRILLED 12/4/93 TOTAL DEPTH OF HOLE 12.5'
 DIAMETER 4"
 SCREEN DIA. 4" LENGTH 5' SLOT SIZE 0.010"
 CASING DIA. 4" LENGTH 4.5' TYPE SCH. 40 PVC
 DRILLING CO. FROST DRILLING METHOD AIR ROTARY
 DRILLER MARK LOG BY L. REED

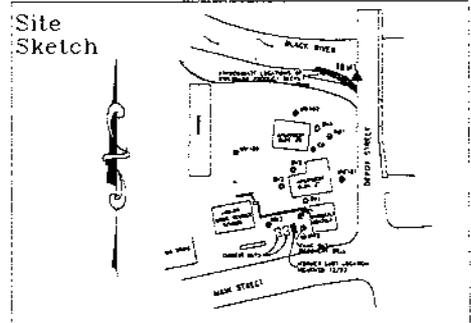


GRIFFIN INTERNATIONAL, INC

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
1		LOCKING WELL CAP			1
2		CONCRETE			2
3		BACKFILL			3
4				Medium to coarse SANDS, PEBBLES, small to large cobbles.	4
5		BENTONITE	5.0' 0 ppm	Kame gravel formation	5
6		WELL RISER		Glaciofluvial terrace deposit	6
7					7
8		WELL SCREEN			8
9					9
10		SAND	10.0' 0 ppm		10
11		BOTTOM CAP	11.5' 0 ppm		11
12				BASE OF WELL AT 12.5'	12
13		UNDISTURBED NATIVE SOIL		END OF EXPLORATION AT 12.5'	13
14					14
15					15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25
26					26

PROJECT LUDLOW MOBIL
 LOCATION LUDLOW, VERMONT
 DATE DRILLED 12/4/93 TOTAL DEPTH OF HOLE 13'
 DIAMETER 4"
 SCREEN DIA. 4" LENGTH 5' SLOT SIZE 0.010"
 CASING DIA. 4" LENGTH 7.5' TYPE SCH. 40 PVC
 DRILLING CO. FROST DRILLING METHOD AIR ROTARY
 DRILLER MARK LOG BY L. REED

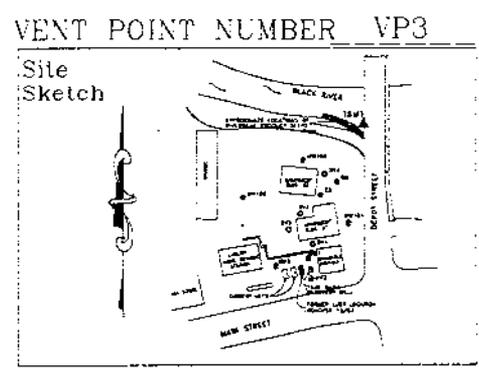
VENT POINT NUMBER VP2



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
1		CONCRETE			1
2		NATIVE BACKFILL			2
3					3
4				Medium to coarse SANDS, PEBBLES, small to large cobbles.	4
5		BENTONITE	5.0' 0 ppm	Kame gravel formation Glaciofluvial terrace deposit	5
6		WELL RISER			6
7					7
8					8
9		SAND PACK			9
10		WELL SCREEN	10.0' 0 ppm		10
11		BOTTOM CAP			11
12				12.0' WATER TABLE	12
13					13
14		NATIVE BACKFILL			14
15		UNDISTURBED NATIVE SOIL	15' 8 ppm	BASE OF WELL AT 13' END OF EXPLORATION AT 15'	15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25
26					26

PROJECT LUDLOW MOBIL
 LOCATION LUDLOW, VERMONT
 DATE DRILLED 12/4/93 TOTAL DEPTH OF HOLE 13'
 DIAMETER 4"
 SCREEN DIA. 4" LENGTH 5' SLOT SIZE 0.010"
 CASING DIA. 4" LENGTH 5' TYPE SCH. 40 PVC
 DRILLING CO. FROST DRILLING METHOD AIR ROTARY
 DRILLER MARK LOG BY L. REED



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
1		LOCKING WELL CAP			1
2		CONCRETE			2
3		BACKFILL			3
4				Medium to coarse SANDS, PEBBLES, small to large cobbles.	4
5		WELL RISER	5.0'	Kame gravel formation	5
6			0.8 ppm	Glaciofluvial terrace deposit	6
7		BENTONITE			7
8					8
9		SAND			9
10					10
11		WELL SCREEN			11
12		BOTTOM CAP			12
13		NATIVE BACKFILL			13
14					14
15		UNDISTURBED NATIVE SOIL	15'	BASE OF WELL AT 13'	15
16			2.3 ppm	END OF EXPLORATION AT 15'	16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25
26					26

VENT POINT NUMBER VP4

PROJECT LUDLOW MOBIL

LOCATION LUDLOW, VERMONT

DATE DRILLED 12/7/93 TOTAL DEPTH OF HOLE 16'

DIAMETER 4"

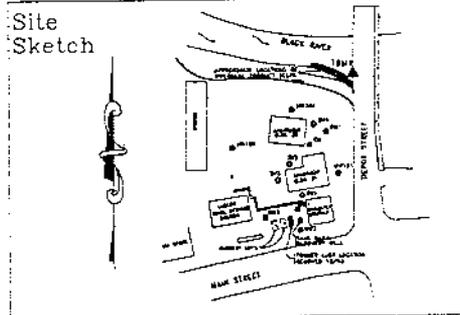
SCREEN DIA. 4" LENGTH 10' SLOT SIZE 0.010"

CASING DIA. 4" LENGTH 5.5' TYPE SCH. 40 PVC

DRILLING CO. FROST DRILLING METHOD AIR ROTARY

DRILLER MARK LOG BY L. REED

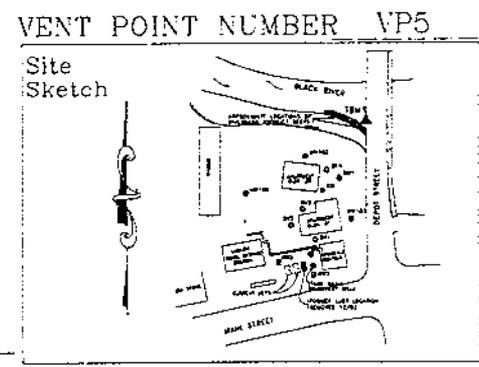
Site Sketch



GRIFFIN INTERNATIONAL, INC

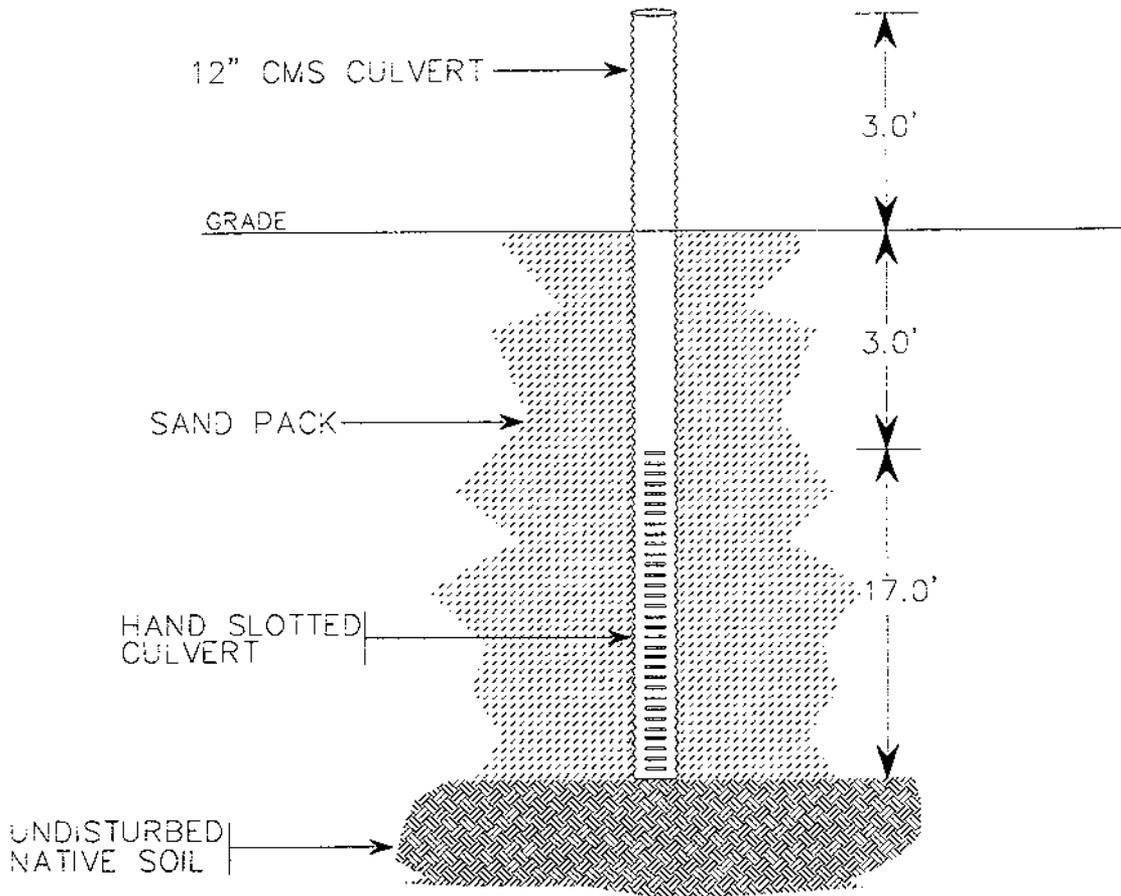
DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX			0
1		LOCKING WELL CAP			1
2		CONCRETE			2
3		NATIVE BACKFILL			3
4				Medium to coarse SANDS, PEBBLES, small to large cobbles.	4
5		BENTONITE	5.0'	Kame gravel formation	5
6		WELL RISER	0 ppm	Glaciofluvial terrace deposit	6
7					7
8					8
9					9
10		SAND PACK	10.0'		10
11		WELL SCREEN	0 ppm		11
12					12
13				13.0' WATER TABLE	13
14					14
15		BOTTOM CAP	15'		15
16			0 ppm	BASE OF WELL AT 16'	16
17		UNDISTURBED NATIVE SOIL		END OF EXPLORATION AT 16'	17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25
26					26

PROJECT LUDLOW MOBIL
 LOCATION LUDLOW, VERMONT
 DATE DRILLED 12/7/93 TOTAL DEPTH OF HOLE 9'
 DIAMETER 4"
 SCREEN DIA. 4" LENGTH 5' SLOT SIZE 0.010"
 CASING DIA. 4" LENGTH 1' TYPE SCH. 40 PVC
 DRILLING CO. GURNEY BROS. DRILLING METHOD BACK HOE
 DRILLER _____ LOG BY L. REED



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		GROUND SURFACE			0
1		BACKFILL			1
2					2
3					3
4		WELL RISER		Basin Fill Sands	4
5					5
6		WELL SCREEN			6
7					7
8		BOTTOM CAP			8
9		UNDISTURBED NATIVE SOIL		BASE OF WELL AT 9' END OF EXPLORATION AT 9'	9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25
26					26



TANK BASIN RECOVERY WELL SCHEMATIC

NOT TO SCALE

JOB #: 11934463



LUDLOW MOBIL

LUDLOW,

VERMONT

TANK BASIN RECOVERY WELL SCHEMATIC

DATE: 12/23/93

DWG. #: 13

SCALE: NONE

DRN.: SB

APP.: EH

PROJECT LUDLOW MOBIL

LOCATION LUDLOW, VERMONT

DATE DRILLED 12/3/93 TOTAL DEPTH OF HOLE 4.0'

DIAMETER 2"

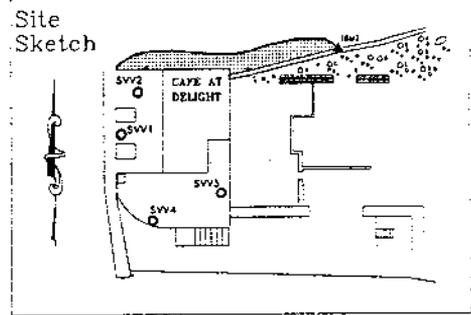
SCREEN DIA. 2" LENGTH 2' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 2' TYPE SCH. 40 PVC

DRILLING CO. GURNEY DRILLING METHOD HAND DUG

DRILLER _____ LOG BY L. REED

WELL NUMBER SVV1



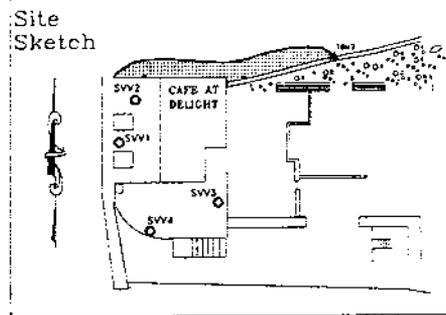
GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		GRADE			0
1		SAND PACK			1
2		WELL RISER		Coarse SAND and GRAVEL and COBBLES present	2
3		WELL SCREEN			3
4	BOTTOM CAP			BASE OF WELL AT 4.0'	4
5	UNDISTURBED NATIVE SOIL			END OF EXPLORATION AT 4.0'	5
6					6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

PROJECT LUDLOW MOBIL
 LOCATION LUDLOW, VERMONT

WELL NUMBER SVW2

DATE DRILLED 12/3/93 TOTAL DEPTH OF HOLE 4.0'
 DIAMETER 2"



SCREEN DIA. 2" LENGTH 2' SLOT SIZE 0.010"
 CASING DIA. 2" LENGTH 2' TYPE SCH. 40 PVC
 DRILLING CO. GURNEY DRILLING METHOD HAND DUG
 DRILLER _____ LOG BY L. REED

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		GRADE SAND PACK WELL RISER WELL SCREEN BOTTOM CAP		Coarse SAND and GRAVEL and COBBLES present	0
1					1
2					2
3					3
4		UNDISTURBED NATIVE SOIL		BASE OF WELL AT 4.0' END OF EXPLORATION AT 4.0'	4
5					5
6					6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

WELL NUMBER SWV3

PROJECT LUDLOW MOBIL

LOCATION LUDLOW, VERMONT

DATE DRILLED 12/3/93 TOTAL DEPTH OF HOLE 4.0'

DIAMETER 4"

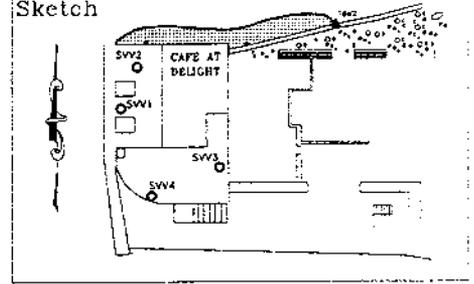
SCREEN DIA. 4" LENGTH 2' SLOT SIZE 0.020"

CASING DIA. 4" LENGTH 2' TYPE SCH. 40 PVC

DRILLING CO. GURNEY DRILLING METHOD HAND DUG

DRILLER LOG BY L REED

Site Sketch

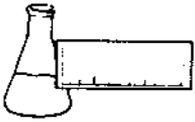


GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		GRADE			0
1		SAND PACK		Coarse SAND and GRAVEL and COBBLES present	1
2		WELL RISER			2
3		WELL SCREEN			3
4		BOTTOM CAP		BASE OF WELL AT 4.0' END OF EXPLORATION AT 4.0'	4
5		UNDISTURBED NATIVE SOIL			5
6					6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

APPENDIX B

Laboratory Reports



ENDYNE, INC.

RECEIVED DEC 29 1993

Laboratory Services

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

REPORT OF LABORATORY ANALYSIS

CLIENT: Griffin International
PROJECT NAME: Ludlow Mobil
REPORT DATE: December 28, 1993
DATE SAMPLED: December 16, 1993

PROJECT CODE: GILU1585
REF.#: 55,255 - 55,263

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

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

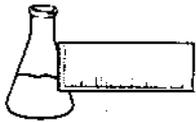
Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Ludlow Mobil
REPORT DATE: December 28, 1993
DATE SAMPLED: December 16, 1993
DATE RECEIVED: December 17, 1993
ANALYSIS DATE: December 23, 1993

PROJECT CODE: GILU1585
REF.#: 55,257
STATION: VP 4
TIME SAMPLED: 12:51
SAMPLER: Don Tourangeau

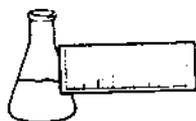
<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	50	2,820.
Chlorobenzene	50	ND ²
1,2-Dichlorobenzene	50	ND
1,3-Dichlorobenzene	50	ND
1,4-Dichlorobenzene	50	ND
Ethylbenzene	50	483.
Toluene	50	7,260.
Xylenes	50	2,770.
MTBE	500	8,580.

Bromobenzene Surrogate Recovery: 105%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

- 1 Detection limit raised due to high levels of contaminants. Sample run at 2% dilution.
- 2 None detected



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Ludlow Mobil
REPORT DATE: December 28, 1993
DATE SAMPLED: December 16, 1993
DATE RECEIVED: December 17, 1993
ANALYSIS DATE: December 23, 1993

PROJECT CODE: GILU1585
REF.#: 55,256
STATION: MW 102
TIME SAMPLED: 12:27
SAMPLER: Don Tourangeau

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	TBQ ²
Toluene	1	1.3
Xylenes	1	ND
MTBE	10	12.9

Bromobenzene Surrogate Recovery: 104%

NUMBER OF UNIDENTIFIED PEAKS FOUND: > 10

NOTES:

- 1 None detected
- 2 Trace below quantitation limit



ENDYNE, INC.

Laboratory Services

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FAX 879-7103

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Ludlow Mobil
REPORT DATE: December 28, 1993
DATE SAMPLED: December 16, 1993
DATE RECEIVED: December 17, 1993
ANALYSIS DATE: December 22, 1993

PROJECT CODE: GILU1585
REF.#: 55,255
STATION: Trip Blank
TIME SAMPLED: 7:10
SAMPLER: Don Tourangeau

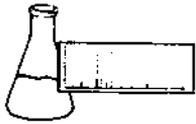
<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 104%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Ludlow Mobil
REPORT DATE: December 28, 1993
DATE SAMPLED: December 16, 1993
DATE RECEIVED: December 17, 1993
ANALYSIS DATE: December 23, 1993

PROJECT CODE: GILU1585
REF.#: 55,258
STATION: VP 2
TIME SAMPLED: 13:15
SAMPLER: Don Tourangeau

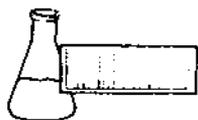
<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	200	4,430.
Chlorobenzene	200	ND ²
1,2-Dichlorobenzene	200	ND
1,3-Dichlorobenzene	200	ND
1,4-Dichlorobenzene	200	ND
Ethylbenzene	200	1,040.
Toluene	200	15,200.
Xylenes	200	9,920.
MTBE	2000	24,300.

Bromobenzene Surrogate Recovery: 104%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 7

NOTES:

- 1 Detection limit raised due to high levels of contaminants. Sample run at 0.5% dilution.
- 2 None detected



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Ludlow Mobil
REPORT DATE: December 28, 1993
DATE SAMPLED: December 16, 1993
DATE RECEIVED: December 17, 1993
ANALYSIS DATE: December 27, 1993

PROJECT CODE: GILU1585
REF.#: 55,259
STATION: RW 1
TIME SAMPLED: 13:40
SAMPLER: Don Tourangeau

<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	20	140.
Chlorobenzene	20	ND ²
1,2-Dichlorobenzene	20	ND
1,3-Dichlorobenzene	20	ND
1,4-Dichlorobenzene	20	ND
Ethylbenzene	20	77.3
Toluene	20	343.
Xylenes	20	590.
MTBE	200	1,720.

Bromobenzene Surrogate Recovery: 108%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

- 1 Detection limit raised due to high levels of contaminants. Sample run at 5% dilution.
- 2 None detected



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Ludlow Mobil
REPORT DATE: December 28, 1993
DATE SAMPLED: December 16, 1993
DATE RECEIVED: December 17, 1993
ANALYSIS DATE: December 23, 1993

PROJECT CODE: GILU1585
REF.#: 55,260
STATION: MW 100
TIME SAMPLED: 13:55
SAMPLER: Don Tourangeau

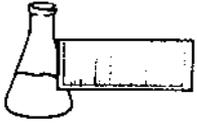
<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	3.9
Toluene	1	ND
Xylenes	1	5.2
MTBE	10	ND

Bromobenzene Surrogate Recovery: 105%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

1 None detected



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Ludlow Mobil
REPORT DATE: December 28, 1993
DATE SAMPLED: December 16, 1993
DATE RECEIVED: December 17, 1993
ANALYSIS DATE: December 23, 1993

PROJECT CODE: GILU1585
REF.#: 55,261
STATION: Duplicate
TIME SAMPLED: 13:55
SAMPLER: Don Tourangeau

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	3.8
Toluene	1	ND
Xylenes	1	4.9
MTBE	10	ND

Bromobenzene Surrogate Recovery: 99%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

1 None detected

**Laboratory Services**

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

LABORATORY REPORTEPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Ludlow Mobil
REPORT DATE: December 28, 1993
DATE SAMPLED: December 16, 1993
DATE RECEIVED: December 17, 1993
ANALYSIS DATE: December 23, 1993

PROJECT CODE: GILU1585
REF.#: 55,262
STATION: River - Down Gradient
TIME SAMPLED: 14:10
SAMPLER: Don Tourangeau

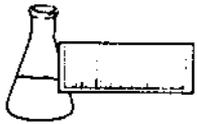
<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	4.3
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 105%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Ludlow Mobil
REPORT DATE: December 28, 1993
DATE SAMPLED: December 16, 1993
DATE RECEIVED: December 17, 1993
ANALYSIS DATE: December 23, 1993

PROJECT CODE: GILU1585
REF.#: 55,263
STATION: Equipment Blank
TIME SAMPLED: 14:18
SAMPLER: Don Tourangeau

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

Bromobenzene Surrogate Recovery: 105%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

CHAIN-OF-CUSTODY RECORD

09287

12934466

Project Name: <u>LUDLOW mobile</u>	Reporting Address: <u>Griffin</u>	Billing Address: <u>Griffin</u>
Site Location: <u>LUDLOW</u>		
Endyne Project Number: <u>GIU 1585</u>	Company: <u>ED NODGES</u>	Sampler Name: <u>Don Tourangeau</u>
	Contact Name/Phone #: <u>ED NODGES</u>	Phone #:

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				
155	TRIP BLANK	W	✓		12-16-93 07:10	2	40 mL		20	4°C	
156	MW 102				12:27						
257	VP 4				12:51						
35	VP 2				13:15						
153	RW 1				13:40						
260	MW 100				13:55						
361	DUPLICATE				13:55						
362	RIVER - Down Gradient				14:10						
363	EQUIPMENT BLANK				14:18						

Relinquished by: Signature <u>Don Tourangeau</u>	Received by: Signature <u>Miller</u>	Date/Time
Relinquished by: Signature <u>Miller</u>	Received by: Signature <u>Tonia M. Chambers</u>	Date/Time <u>12/17/93 10:50</u>

Requested Analyses

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



ENDYNE, INC.

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

09287

CHAIN-OF-CUSTODY RECORD

Project Name: Site Location:	Reporting Address:	Billing Address:
Endyne Project Number:	Company: Contact Name/Phone #:	Sampler Name: Phone #:

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				
						2					

Relinquished by: Signature	Received by: Signature	Date/Time
Relinquished by: Signature	Received by: Signature	Date/Time

Requested Analyses

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



Inchcape Testing Services

Aquatec Laboratories

55 South Park Drive
Colchester, VT 05446
Tel. 802-655-1203
Fax. 802-655-1248

January 17, 1994

Mr. Peter Schuyler
Griffin International
2-B Dorset Lane
Williston, Vermont 05495

RECEIVED JAN 18 1994

Re: Aquatec Project No. 93096
Air Monitoring in Ludlow, Vermont

Dear Mr. Schyuler:

Enclosed are analytical reports for the air tube samples and quality control (QC) samples collected at eight locations in Ludlow, Vermont, on December 21, 1993. Air samples were collected and analyzed with reference to U.S. EPA Method T02.

Air was sampled from the Delight Cafe, Mill apartment 301, Mill apartment 201, the Mill basement and the basements and first floors of apartment house 1 and apartment house 2. Air sample locations were specified in the field on 21 December 1993 by Mr. Ed Hodge from Griffin International. Sample descriptions are in Table 1.

Air was sampled at each location for approximately four continuous hours. Air was drawn directly into Carbotrap 300 air tubes using 110 volt vacuum pumps or constant flow vacuum pumps with limiting orifices. Air sample flow rates were measured every two hours with a calibrated rotameter.

One field blank, one replicate, and one method spike air tube samples were collected and analyzed with the samples. The field blank was treated the same as the samples except no air was drawn through the air tube, and it was connected to the sampling equipment for less than five minutes. The replicate air tube sample was collected simultaneously with the primary sample from the Delight Cafe. The method spike air tube was spiked by the analyst with a gas standard mixture just prior to analyses.

Air tube samples were analyzed with thermal desorption and gas chromatography/mass spectrometry procedures to quantify low levels of benzene, toluene, ethylbenzene, and xylenes.

If you have any questions, please call me or Mr. John W. Hulbert.

Sincerely,

Christopher A. Ouellette
Air Quality Field Supervisor
CAO/din
Enclosure
93096B13JAN94

Table 1. Sample descriptions for the air tube samples collected in Ludlow, Vermont on 21 December 1993.

<u>Complete Sample Description</u>	<u>Analytical Report Description</u>	<u>Lab Number</u>
Apartment House No. 1 Basement	Apt. House 1 Bsmt.	207436
Apartment House No. 1 First Floor	Apt. Hse. 1 1st fl.	207439
Apartment House No. 2 First Floor	Apt. Hse. 2 1st fl.	207441
Apartment House No. 2 Basement	Apt. House 2 Bsmt.	207437
Delight Cafe'	Delight Cafe	207443
Mill Apartment 201	Mill Apt. 201	207321
Mill Apartment 301	Mill Apt. 301	207323
Mill Basement	Mill Basement	207325



Inchcape Testing Services

Aquatec Laboratories

Laboratory Locations
55 South Park Drive
Colchester, VT 05446

75 Green Mountain Drive
South Burlington, VT 05403

150 Herman Melville Boulevard
New Bedford, MA 02740

Analytical Report

Griffin International, Inc.
2B Dorset Lane
Williston, VT 05495

Date : 01/10/94
ETR Number : 41430
Project No.: 93096
No. Samples: 13
Arrived : 12/21/93
P.O. Number: *

Attention : Peter Schuyler

Page 1

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
207434	Field Blank, 421:12/21/93 @1553(AirTube)	
QSOA	benzene	<0.4
QSOA	toluene	1.2
QSOA	ethylbenzene	0.3
QSOA	Total xylenes	<0.5
207436	Apt House 1 Bsmt, 512:12/21/93 @1125(AirTube)	
QSOA	benzene	2.9
QSOA	toluene	8.5
QSOA	ethylbenzene	0.9
QSOA	Total xylenes	4.7
207437	Apt House 2 Bsmt, 448:12/21/93 @1129(AirTube)	
QSOA	benzene	0.6
QSOA	toluene	2.5
QSOA	ethylbenzene	<0.4
QSOA	Total xylenes	1.6
207439	Apt Hse 1 1st fl, 382:12/21/93 @1116(AirTube)	
QSOA	benzene	3.5
QSOA	toluene	11
QSOA	ethylbenzene	1.0

< Cont. Next Page >



Inchcape Testing Services

Aquatec Laboratories

Laboratory Locations
 55 South Park Drive
 Colchester, VT 05446

75 Green Mountain Drive
 South Burlington, VT 05403

150 Herman Melville Boulevard
 New Bedford, MA 02740

Analytical Report

Griffin International, Inc.
 2B Dorset Lane
 Williston, VT 05495

Date : 01/10/94
 ETR Number : 41430
 Project No. : 93096
 No. Samples: 13
 Arrived : 12/21/93
 P.O. Number: *

Attention : Peter Schuyler

Page 2

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
207439 QSOA	Apt Hse 1 1st fl, 382:12/21/93 @1116(AirTube) Total xylenes	5.0
207441 QSOA QSOA QSOA QSOA	Apt Hse 2 1st fl, 372:12/21/93 @1135(AirTube) benzene toluene ethylbenzene Total xylenes	2.7 20 1.5 8.4
207443 QSOA QSOA QSOA QSOA	Delight Cafe, 403:12/21/93 @1103(AirTube) benzene toluene ethylbenzene Total xylenes	26 110 X 10 88 X
207445 QSOA QSOA QSOA QSOA	Delight Cafe Rep, 518:12/21/93 @1103(AirTube) benzene toluene ethylbenzene Total xylenes	26 120 X 9.5 84 X

< Cont. Next Page >



Inchcape Testing Services

Aquatec Laboratories

Laboratory Locations
55 South Park Drive
Colchester, VT 05446

75 Green Mountain Drive
South Burlington, VT 05403

150 Herman Melville Boulevard
New Bedford, MA 02740

Analytical Report

Griffin International, Inc.
2B Dorset Lane
Williston, VT 05495

Date : 01/10/94
ETR Number : 41430
Project No. : 93096
No. Samples: 13
Arrived : 12/21/93
P.O. Number: *

Attention : Peter Schuyler

Page 3

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
207446	Method Spike, 423:12/21/93 @1555(AirTube)	
QSOA	benzene	97%
QSOA	toluene	116%
QSOA	ethylbenzene	97%
QSOA	Total xylenes	105%

Comments/Notes

Results reported for the Method Spike are percent recoveries of the spiked compounds. Other results are in ppb(v/v) in the sampled air at 25C and one atmosphere. A sample volume of 5.09 liters was assumed for the Field Blank(Lab No. 207434).
X=Estimated concentration; reported from a response exceeding the calibration range of the standards.

< Last Page >

Submitted By :

Aquatec Inc.



Inchcape Testing Services

Aquatec Laboratories

Laboratory Locations
55 South Park Drive
Colchester, VT 05446

75 Green Mountain Drive
South Burlington, VT 05403

150 Herman Melville Boulevard
New Bedford, MA 02740

Analytical Report

Griffin International, Inc.
2B Dorset Lane
Williston, VT 05495

Date : 12/28/93
ETR Number : 41400
Project No.: 93096
No. Samples: 6
Arrived : 12/21/93
P.O. Number: *

Attention : Peter Schuyler

Page 1

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
207321	Mill Apt 201, 575:12/21/93 @1038(AirTube)	
QSOA	Benzene	2.9
QSOA	Toluene	11
QSOA	Ethylbenzene	1.5
QSOA	Total Xylenes	8.8
207323	Mill Apt 301, 561:12/21/93 @1145(AirTube)	
QSOA	Benzene	2.9
QSOA	Toluene	7.7
QSOA	Ethylbenzene	1.1
QSOA	Total Xylenes	6.1
207325	Mill Basement, 513:12/21/93 @1048(AirTube)	
QSOA	Benzene	3.3
QSOA	Toluene	11
QSOA	Ethylbenzene	1.4
QSOA	Total Xylenes	7.7

Comments/Notes

Results are reported as ppb(v/v) in the sampled air at 25C and one atmosphere.

< Last Page >

Submitted By :

Aquatec Inc.

R. Mason McKeer



Analytical Report

Griffin International, Inc.
 2B Dorset Lane
 Williston, VT 05495

Date : 12/28/93
 ETR Number : 41400
 Project No.: 93096
 No. Samples: 6
 Arrived : 12/21/93
 P.O. Number: *

Attention : Peter Schuyler

Page 1

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
207321	Mill Apt 201, 575:12/21/93 @1038(AirTube)	
QSOA	Benzene	2.9
QSOA	Toluene	11
QSOA	Ethylbenzene	1.5
QSOA	Total Xylenes	8.8
207323	Mill Apt 301, 561:12/21/93 @1145(AirTube)	
QSOA	Benzene	2.9
QSOA	Toluene	7.7
QSOA	Ethylbenzene	1.1
QSOA	Total Xylenes	6.1
207325	Mill Basement, 513:12/21/93 @1048(AirTube)	
QSOA	Benzene	3.3
QSOA	Toluene	11
QSOA	Ethylbenzene	1.4
QSOA	Total Xylenes	7.7

Comments/Notes

Results are reported as ppb(v/v) in the sampled air at 25C and one atmosphere.

< Last Page >

Submitted By :

R. Mason McNeer

Aquatec Inc.





Inchcape Testing Services

Aquatec Laboratories

55 South Park Drive
Colchester, VT 05446
Tel. 802-655-1203
Fax. 802-655-1248

RECEIVED JAN 20 1994

January 18, 1994

Mr. Peter Schuyler
Griffin International
2-B Dorset Lane
Williston, Vermont 05495

Re: Aquatec Project No. 93096
Air Monitoring in Ludlow, Vermont

Dear Mr. Schyuler:

Enclosed are analytical reports for the air tube samples and quality control (QC) samples collected at ten locations in Ludlow, Vermont, on 6 January 1994. Air samples were collected and analyzed with reference to U.S. EPA Method T02.

Air was sampled from the Delight Cafe, Mill apartments 201, 301, 311, the Mill basement, and the basements and first floors of apartment building 1 and apartment building 2. Ambient air was sampled at the northwest corner of Depot Street and Route 103. Air sample locations were specified in the field on 6 January 1994 by Mr. Ed Hodge from Griffin International. Sample descriptions are in Table 1.

Air was sampled at each location for approximately four continuous hours. Air was drawn directly into Carbotrap 300 air tubes using 110 volt vacuum pumps or constant flow vacuum pumps with limiting orifices. Air sample flow rates were measured every two hours with a calibrated rotameter.

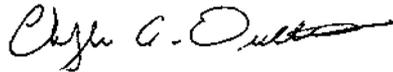
One field blank, one replicate, and one method spike air tube samples were collected and analyzed with the samples. The field blank was treated the same as the samples except no air was drawn through the air tube, and it was connected to the sampling equipment for less than five minutes. The replicate air tube sample was collected simultaneously with the primary sample from the first floor of apartment 1. The method spike air tube was spiked by the analyst with a gas standard mixture just prior to analyses.

Air tube samples were analyzed with thermal desorption and gas chromatography/mass spectrometry procedures to quantify low levels of benzene, toluene, ethylbenzene, and xylenes.

Mr. Peter Schuyler
January 18, 1994
Page 2

If you have any questions, please call me or Mr. John W. Hulbert.

Sincerely,



Christopher A. Ouellette
Air Quality Field Supervisor

CAO/din

Enclosure

93096B17JAN94

Irishcape Testing Services
Aquatec Laboratories

Table 1. Sample descriptions for the air tube samples collected in Ludlow, Vermont on 6 January 1994.

<u>Complete Sample Description</u>	<u>Analytical Report Description</u>	<u>Lab Number</u>
Ambient	Ambient	207919
Apartment Building No. 1 Basement	Apt. Bldg. 1 Bsmt.	207922
Apartment Building No. 1 First Floor	Apt. Bldg. 1 1st fl.	207923
Apartment Building No. 2 First Floor	Apt. Bldg. 2 Bsmt.	207926
Apartment Building No. 2 First Floor	Apt. Bdg. 2 1st fl.	207929
Delight Cafe'	Delight Cafe	207930
Mill Apartment 201	Mill Apt. 201	208102
Mill Apartment 301	Mill Apt. 301	208103
Mill Apartment 311	Mill Apt. 311	207937
Mill Basement	Mill Basement	207916



Inchcape Testing Services

Aquatec Laboratories

Laboratory Locations

55 South Park Drive
Colchester, VT 05446

75 Green Mountain Drive
South Burlington, VT 05403

150 Herman Melville Boulevard
New Bedford, MA 02740

Analytical Report

Griffin International, Inc.
2B Dorset Lane
Williston, VT 05495

Date : 01/14/94
ETR Number : 41597
Project No.: 93096
No. Samples: 2
Arrived : 01/06/94
P.O. Number: *

Attention : Peter Schuyler

Page 1

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
207916	Mill Basement, 512:01/06/94 @1100(AirTube)	
QSOA	benzene	4.0
QSOA	toluene	14
QSOA	ethylbenzene	1.3
QSOA	Total xylenes	11

Comments/Notes

Results are reported as ppb(v/v) in the sampled air at 25 degrees C and one atmosphere.

< Last Page >

Submitted By :

R. J. Munson Mucker

Aquatec Inc.





Inchcape Testing Services

Aquatec Laboratories

Laboratory Locations
55 South Park Drive
Colchester, VT 05446

75 Green Mountain Drive
South Burlington, VT 05403

150 Herman Melville Boulevard
New Bedford, MA 02740

Analytical Report

Griffin International, Inc.
2B Dorset Lane
Williston, VT 05495

Date : 01/14/94
ETR Number : 41599
Project No.: 93096
No. Samples: 21
Arrived : 01/06/94
P.O. Number: *

Attention : Peter Schuyler

Page 1

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
207918	Field Blank, 524:01/06/94 @1000(AirTube)	
QSOA	benzene	<0.3
QSOA	toluene	<0.3
QSOA	ethylbenzene	<0.2
QSOA	Total xylenes	<0.4
207919	Ambient, 448:01/06/94 @1150(AirTube)	
QSOA	benzene	1.4
QSOA	toluene	3.5
QSOA	ethylbenzene	0.5
QSOA	Total xylenes	2.9
207922	Apt Bldg 1 Bsmt, 547:01/06/94 @1022(AirTube)	
QSOA	benzene	0.5
QSOA	toluene	1.4
QSOA	ethylbenzene	0.2
QSOA	Total xylenes	0.8
207923	Apt Bldg 1 1st fl, 421:01/06/94 @1010(AirTube)	
QSOA	benzene	0.5
QSOA	toluene	1.4
QSOA	ethylbenzene	<0.3

< Cont. Next Page >





Inchcape Testing Services

Aquatec Laboratories

Laboratory Locations

55 South Park Drive
Colchester, VT 05446

75 Green Mountain Drive
South Burlington, VT 05403

150 Herman Melville Boulevard
New Bedford, MA 02740

Analytical Report

Griffin International, Inc.
2B Dorset Lane
Williston, VT 05495

Date : 01/14/94
ETR Number : 41599
Project No.: 93096
No. Samples: 21
Arrived : 01/06/94
P.O. Number: *

Attention : Peter Schuyler

Page 2

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
207923 QSOA	Apt Bldg 1 1st fl, 421:01/06/94 @1010(AirTube) Total xylenes	0.7
207925 QSOA QSOA QSOA QSOA	Bldg 1 1st fl rep 403:01/06/94 @1010(AirTube) benzene toluene ethylbenzene Total xylenes	0.5 1.4 <0.3 0.7
207926 QSOA QSOA QSOA QSOA	Apt Bldg 2 Bsmt 372:01/06/94 @1031(AirTube) benzene toluene ethylbenzene Total xylenes	0.5 1.3 <0.2 0.9
207929 QSOA QSOA QSOA QSOA	Apt Bdg 2 1st fl 487:01/06/94 @1040(AirTube) benzene toluene ethylbenzene Total xylenes	<0.4 1.4 <0.3 <0.5

< Cont. Next Page >





Inchcape Testing Services

Aquatec Laboratories

Laboratory Locations
55 South Park Drive
Colchester, VT 05446

75 Green Mountain Drive
South Burlington, VT 05403

150 Herman Melville Boulevard
New Bedford, MA 02740

Analytical Report

Griffin International, Inc.
2B Dorset Lane
Williston, VT 05495

Date : 01/14/94
ETR Number : 41599
Project No.: 93096
No. Samples: 21
Arrived : 01/06/94
P.O. Number: *

Attention : Peter Schuyler

Page 3

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
207930	Delight Cafe, 382:01/06/94 @1110(AirTube)	
QSOA	benzene	45
QSOA	toluene	290
QSOA	ethylbenzene	23
QSOA	Total xylenes	250
207937	Mill Apt 311, 575:01/06/94 @1128(AirTube)	
QSOA	benzene	0.6
QSOA	toluene	1.2
QSOA	ethylbenzene	0.2
QSOA	Total xylenes	1.1
207938	Method Spike, 541:01/06/94 @1000(AirTube)	
QSOA	benzene	100%
QSOA	toluene	107%
QSOA	ethylbenzene	97%
QSOA	Total xylenes	100%

Comments/Notes

Results shown for Lab No. 207938 are percent recoveries of matrix spike compounds. Other results are reported as ppb(v/v) in the sampled air at 25 degrees C and one atmosphere.

< Last Page >

Submitted By :

R. Mason Nuttall

Aquatec Inc.





Inchcape Testing Services

Aquatec Laboratories

Laboratory Locations
55 South Park Drive
Colchester, VT 05446

75 Green Mountain Drive
South Burlington, VT 05403

150 Herman Melville Boulevard
New Bedford, MA 02740

Analytical Report

Griffin International, Inc.
2B Dorset Lane
Williston, VT 05495

Date : 01/14/94
ETR Number : 41695
Project No. : 93096
No. Samples : 4
Arrived : 01/06/94
P.O. Number : *

Attention : Peter Schuyler

Page 1

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
208102	Mill Apt 201, 540:01/06/94 @1120(AirTube)	
	TO2_BTEX Benzene	9.6
	TO2_BTEX Toluene	56
	TO2_BTEX Ethylbenzene	6.2
	TO2_BTEX Xylenes, Total	54
208103	Mill Apt 301, 413:01/06/94 @1135(AirTube)	
	TO2_BTEX Benzene	6.4
	TO2_BTEX Toluene	38
	TO2_BTEX Ethylbenzene	4.0
	TO2_BTEX Xylenes, Total	35

Comments/Notes

Results are reported as ppb(v/v) in the sampled air at 25 degrees C and one atmosphere.

< Last Page >

Submitted By :

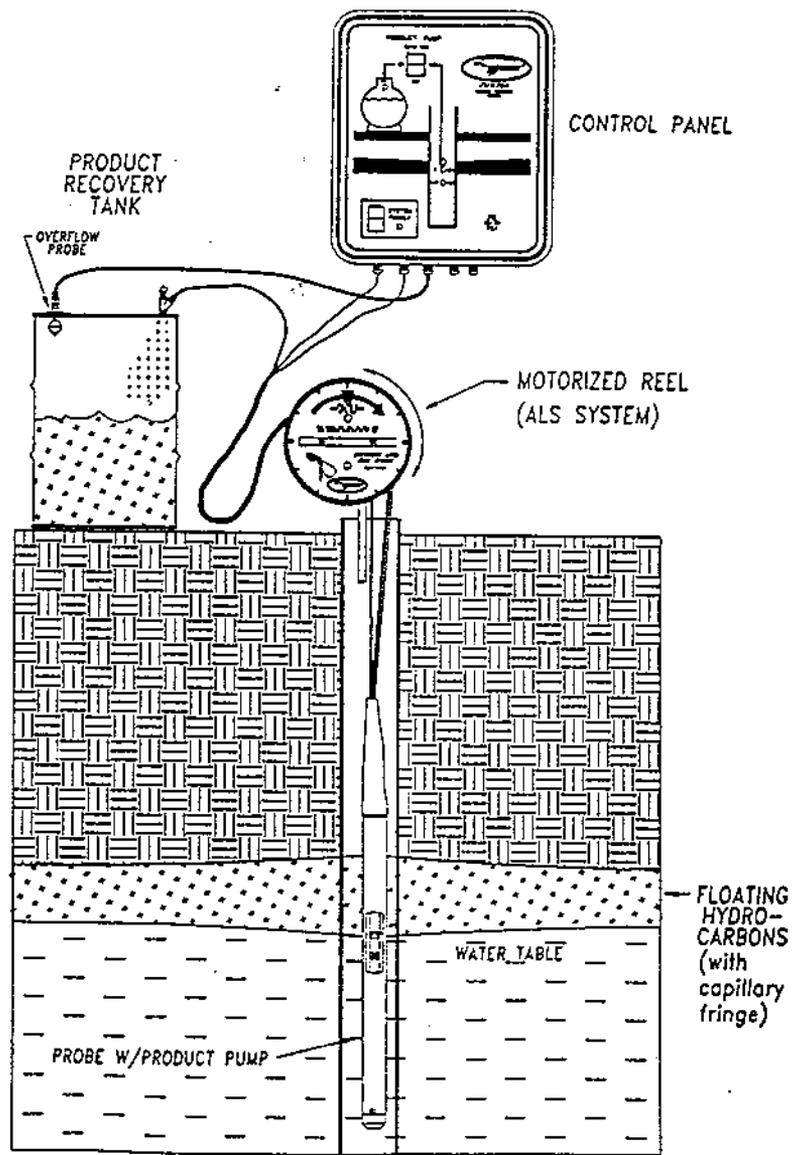
R. Marion Miller

Aquatec Inc.



APPENDIX C

Tank Basin Recovery Well Free Product Recovery System Schematic
Groundwater Recovery System Schematic
VTDEC Correspondence
Catox System/Treatment Compound As - Built
Old Mill Vent Systems - As Built



A Junior Spillbuster System set up with an Automatic Level Seek motor and reel. The ALS system is raises and lowers the probe in the well to track the water table. The ALS will track fluctuations of ten feet or more.

SPILLBUSTER JR. SCHEMATIC

NOT TO SCALE

JOB #: 1934463



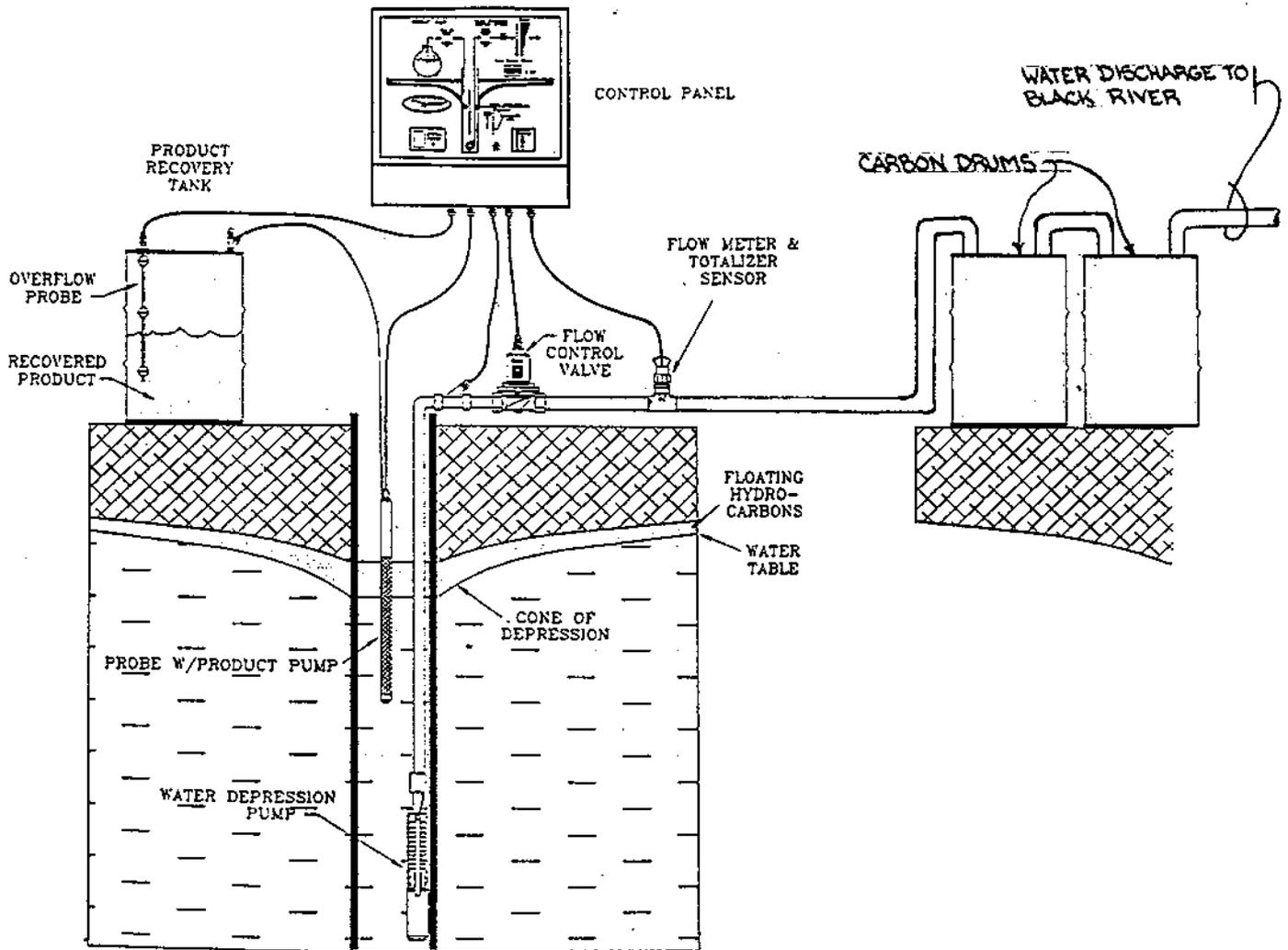
LUDLOW MOBIL

LUDLOW,

VERMONT

TANK BASIN RECOVERY WELL
FREE PRODUCT RECOVERY SYSTEM

DATE: 12/20/93	DWG.#: 6	SCALE: NONE	DRN.: SB	APP.: EH
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SPILLBUSTER SCHEMATIC

NOT TO SCALE

JOB #: 11934463



LUDLOW MOBIL

LUDLOW,

VERMONT

GROUNDWATER RECOVERY SYSTEM

DATE: 12/23/93

DWG.#: 7

SCALE: NONE

DRN.: SB

APP.: EH

RECEIVED DEC 07 1993

PM

M E M O R A N D U M

TO: Brian Kooiker, Chief, Wastewater Treatment Division

THROUGH: Gary Schultz, Director, Wastewater Treatment Division
William E. Ahearn ^{MB} Director, Hazardous Materials Management _{Ref: no} Division
George Desch, Chief, Sites Management Section
Chuck Schwer, Supervisor, Sites Management Section *CS*

FROM: *for* Bob Haslam, Sites Coordinator *RFS*
Sites Management Section

DATE: December 3, 1993

SUBJECT: Discharge to the Black River without a Permit, Ludlow Mobil,
Ludlow (site #93-1500)

Discharge of treated groundwater without a permit into the Black River will begin early next week. The reason for this discharge without a permit is that large volumes of free phase petroleum is currently emanating into the Black River from a leaking underground storage tank (UST) at Skip's Mobil in downtown Ludlow. Midway Oil is the owner of the USTs at this station, and as such they are responsible for overseeing the implementation of a 1272 permit. Midway Oil has hired Griffin International, Inc. of Williston to help them with this remediation.

The source of this petroleum contamination is from a catastrophic release from one of the USTs at Skip's Mobil, located at 195 Main Street in Ludlow. Midway Oil called the HMMD on December 2, 1993 and informed us that one of the USTs at the facility has lost 2,000 gallons of product over several days. Skip's is located approximately 300' from the Black River.

Heavy petroleum sheens and free phase product have been observed emanating into the Black River. Griffin has installed a recovery well on the station property, and there is currently over 2' of free phase gasoline in it. Griffin will be installing a curtain boom and additional sorbet materials in the river in the attempt to recover product already in the river. A product only recovery pump will also be installed in the recovery well, and should go on line today or tomorrow.

Griffin should have the proper equipment installed by next week to pump groundwater to lower the water table in the attempt to minimize the amount of product getting to the Black River. Treatment of the contaminated groundwater will consist of either an air stripper or a large bed carbon canister. Initial pump rates will be from 10 to 30 gpm. Griffin will follow-up this memo next week with a formal request for a 1272 permit.

To ensure that the treatment system is working properly and that additional contaminants are not being pumped to the river, Griffin and the DEC have agreed to sample the discharge and influent at system start-up, and then weekly until the 1272 permit can be issued. At that time it may

Brian Kooiker Memorandum
December 3, 1993
Page 2

be more appropriate to take these samples every other week.

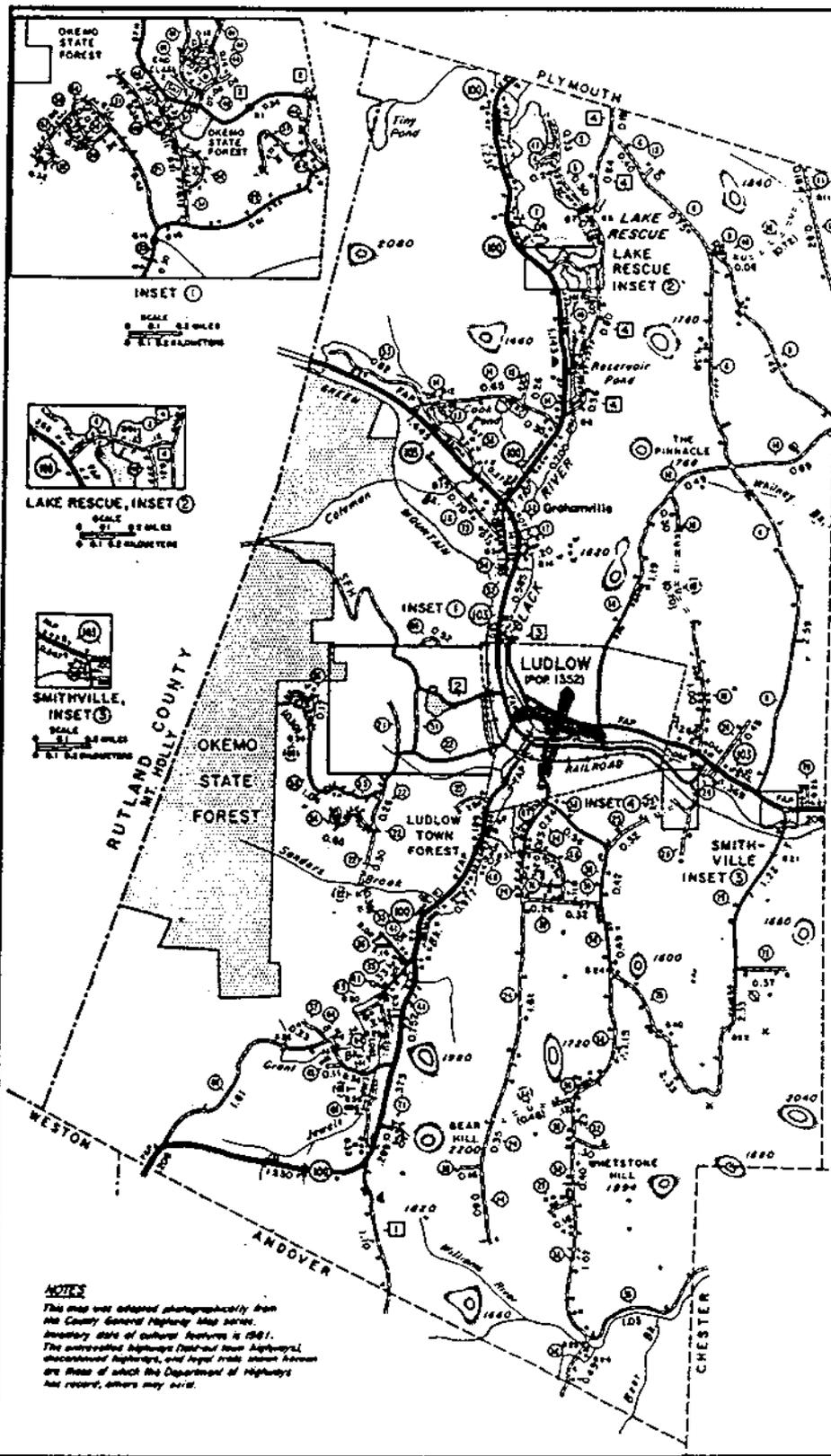
Please feel free to contact Chuck Schwer or me at 241-3888 should you have any further questions.

BH/rfs/1293ml.1500

cc: Jack Long
Peter Murray ✓
Joe Merone

104 000 1108

TOWN OF LUDLOW



- ### LEGEND
- #### HIGHWAYS
- DIVIDED HWY, INTERSTATE OR STATE INTERCHANGE NUMBER
 - 2-LANE STATE HIGHWAY
 - END OF STATE HIGHWAY
 - TOWN HIGHWAY
 - UNTRAVELED ROAD
 - PRIVATE ROAD AND NUMBER
 - DISCONTINUED HIGHWAY
 - LEGAL TRAIL FORMER TOWN HWY
 - FOOT TRAIL
 - INTERSTATE NUMBERED ROUTE
 - U.S. NUMBERED ROUTE
 - STATE NUMBERED ROUTE
 - CLASS 1 TOWN HIGHWAY
 - CLASS 2 TOWN HIGHWAY
 - CLASS 3 TOWN HIGHWAY
 - CLASS 4 TOWN HIGHWAY
 - FCA FULLY CONTROLLED ACCESS
 - FAP FEDERAL AND PRIMARY HIGHWAY
 - FAS FEDERAL AND SECONDARY HIGHWAY
 - FAS-2 FEDERAL AND SECONDARY HIGHWAY ENDS
 - NFH NATIONAL FOREST HIGHWAY
 - SFH STATE FOREST HIGHWAY

- #### ROAD SURFACE TYPES
- BITUMINOUS BIT. MACADAM BIT.
 - CONCRETE PENETRATION, CONCRETE
 - BITUMINOUS CONCRETE, BRICK OR BLOCK
 - SURFACE TREATED GRAVEL
 - GRAVEL
 - 50% SURFACE (2ND CLASS GRAVEL)
 - GRADE AND DRAINED EARTH
 - UNIMPROVED EARTH
 - PRIMITIVE

- #### BRIDGES
- BRIDGE ON CULVERT (LESS THAN 6 SPAN)
 - BRIDGE ON CULVERT (5 THROUGH 20 SPAN)
 - BRIDGE OVER 20 SPAN
 - ARCHWAY UNDERPASS
 - HIGHWAY OVERPASS
 - COVERED BRIDGE
 - BRIDGE NUMBER

- #### MISCELLANEOUS
- RAILROAD AND GRADE CROSSING
 - VILLAGE CENTER

- #### CULTURAL FEATURES
- FARM UNIT
 - SHELLS (OTHER THAN TOWN)
 - SEASONAL DWELLING
 - MOBILE DWELLING
 - TOWN CLERK'S OFFICE
 - BUSINESS
 - SCHOOL
 - CHURCH
 - POST OFFICE
 - FIRE STATION
 - CEMETERY
 - SANITARY LANDFILL
 - GRAVEL PIT
 - SUGAR HOUSE
 - WELL (TOWN, COMMUNITY, OR PRIVATE)

GENERAL HIGHWAY MAP

TOWN OF LUDLOW

1960 POPULATION: 1062

PREPARED BY
VERMONT AGENCY OF TRANSPORTATION
PLANNING DIVISION

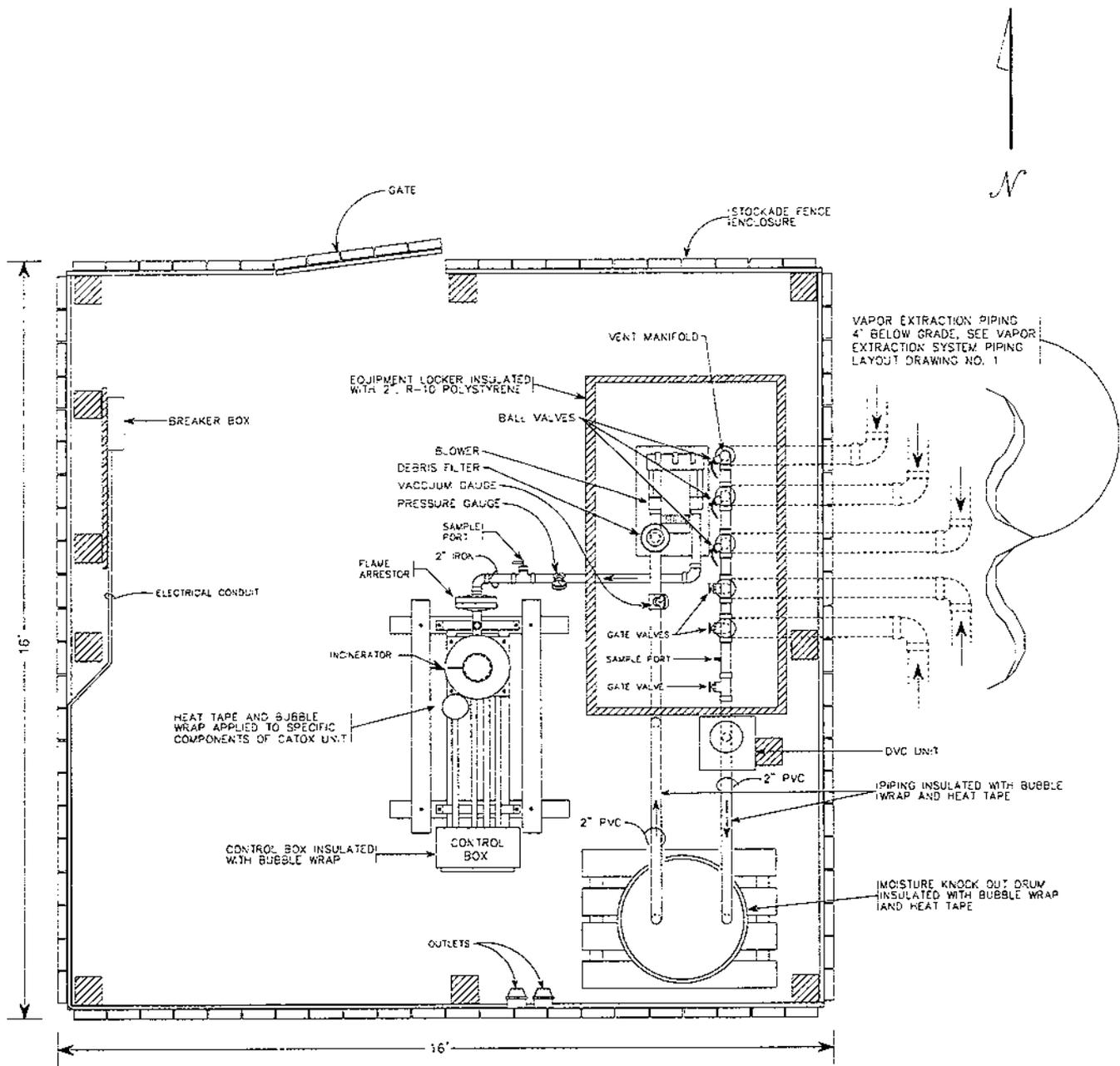


MILEAGE SUMMARY

CLASS 1 TOWN HIGHWAYS:	0.000
CLASS 2 TOWN HIGHWAYS:	
RD 1	1.10
RD 2	0.44
RD 3	0.22
RD 4	3.24
RD 5	
TOTAL, CLASS 2 TOWN HWYS.	4.98
CLASS 3 TOWN HIGHWAYS:	53.52
TOTAL, TOWN HWYS.	48.23
STATE HIGHWAYS:	
STATE HWY. VT. 100	7.748
STATE HWY. VT. 103	4.069
STATE HWY.	
TOTAL, STATE HWYS.	11.817
TOTAL TRAVELED HWYS., FEB. 10, 1965.	65.157*

* EXCLUDES CLASS 4 MILEAGE

NOTES
This map was adapted photographically from the County General Highway Map series. Boundary date of cultural features is 1961. The untraveled highways, foot trails, abandoned highways, and legal trails shown herein are those of which the Department of Highways has record, others may exist.



CATOX SYSTEM/TREATMENT COMPOUND LAYOUT PLAN
 NOT TO SCALE

JOB #: 11934463



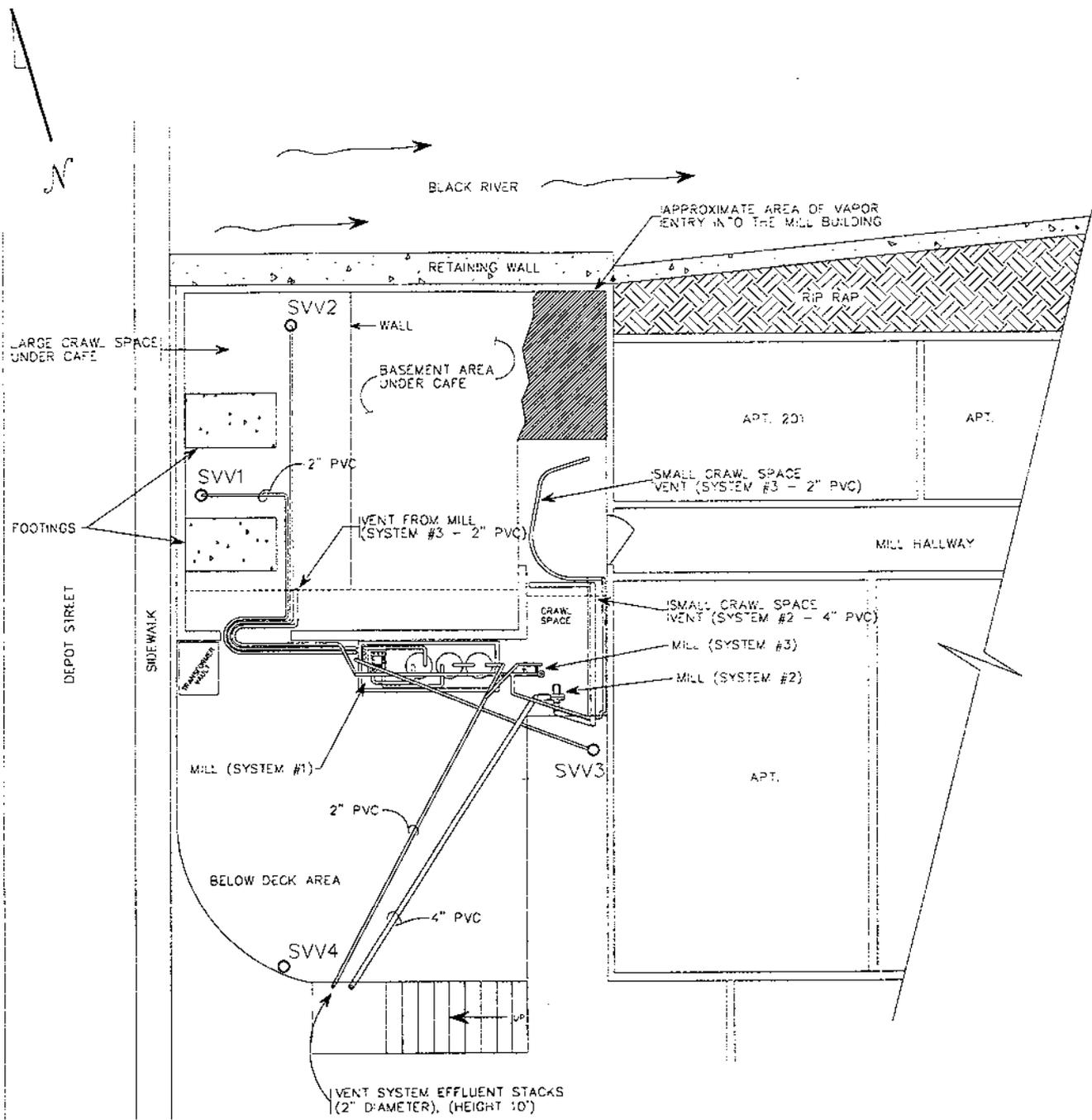
LUDLOW MOBIL

LUDLOW,

VERMONT

CATOX SYSTEM/TREATMENT COMPOUND AS-BUILT

DATE: 12/23/93	DWG. #: 5	SCALE: NONE	DRN.: SB	APP.: EH
----------------	-----------	-------------	----------	----------



OLD MILL VENT SYSTEMS BASEMENT/CRAWL SPACE LAYOUT PLAN

NOT TO SCALE

JOB #: 11934463



LUDLOW MOBIL

LUDLOW,

VERMONT

OLD MILL VENT SYSTEMS - AS BUILT

DATE: 1/3/94

DWG. #:

SCALE: NONE

DRN.: SB

APP.: E-