



TWIN STATE ENVIRONMENTAL CORP.

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Phase (check one)	Type (check one)
<input checked="" type="checkbox"/> Initial Site Investigation	<input type="checkbox"/> Work Scope
<input type="checkbox"/> Corrective Action Feasibility Investigation	<input checked="" type="checkbox"/> Technical Report
<input type="checkbox"/> Corrective Action Plan	<input type="checkbox"/> PCF Reimbursement Request
<input type="checkbox"/> Corrective Action Summary Rpt	<input type="checkbox"/> General Correspondence
<input type="checkbox"/> Operations & Monitoring Report	

SUPPLEMENTAL SITE CHARACTERIZATION REPORT

Newfane Service Center
Route 30
Newfane, Vermont

SMS Site # 89-0453
TSEC # 96056

Date Prepared: July 8, 1997

Prepared for:
R.L. Valice Inc.
280 South Main Street
St. Albans, Vermont 05478
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Written By:
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Reviewed By:
John R. Diego
Vice President

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July 8, 1997

Mr. Timothy Vallee
R.L. Vallee Inc.
280 South Main Street
St. Albans, Vermont 05478

**RE: Supplemental Site Characterization Report - Newfane Service Center
Newfane, Vermont
TSEC Project #96056**

Dear Tim:

Twin State Environmental Corporation (TSEC) has completed the recent Supplemental Site Characterization Program at the above-referenced SITE. This report has been prepared to satisfy the requirements of the State of Vermont Sites Management Section (SMS) pertaining to the characterization and potential remediation of on- and off-SITE contamination.

Please review and familiarize yourself with this report and feel free to call and discuss any questions or comments you may have. TSEC would be pleased to provide further assistance to issues pertaining to this SITE.

Sincerely,
TWIN STATE ENVIRONMENTAL CORPORATION

Kenneth J. Bisceglia
Project Manager

*cc: Mr. Robert Haslam, VTSMAS.
Brian & Patrice St. Germain*

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1.0 INTRODUCTION

Twin State Environmental Corporation (TSEC), on behalf of R.L. Vallee Inc. (Vallee), is submitting the following report to address the contamination issues related to the Newfane Service Station SITE in Newfane, Vermont (SMS #89-0453). The SITE is owned and operated by Brian and Patrice St. Germain. Vallee has been the wholesale supplier of gasoline to the St. Germain's since February 1990.

The SITE is a retail gasoline service station and convenience store located on the western side of Route 30 just to the north of downtown Newfane in Windham County, Vermont. The SITE is listed with the State of Vermont Department of Environmental Conservation (DEC Site #89-0453), Waste Management Division (WMD). See SITE Location Map, **Figure 1** and the SITE Plan, **Figure 2**.

Mr. Bob Haslam (Hazardous Materials Specialist) from the State of Vermont, Sites Management Section (SMS), requested that TSEC perform the tasks as identified in our May 2, 1997 Site Characterization Proposal to address the gasoline impact at the SITE and surrounding residential properties. This phase of work and report focused predominantly on a rapid SITE characterization program (SCP) to gather data necessary for providing remedial corrective measures at the SITE.

1.1 SITE Description and Setting

The SITE is comprised of a retail gasoline station that dispenses various grades of gasoline and has service bays for automobile repair. The building is of single-story wooden-framed construction that is slab on grade. Power and telephone service to the building is from overhead lines. The building is heated with two (2) forced hot air systems using # 2 fuel oil. The fuel oil is stored on the west side of the building in two (2) 275-gal aboveground steel tanks. Water is supplied to the SITE from a drilled well located to the northwest of the building and septic waste is managed with a lift pump, tank and leach field system located to the southwest of the building.

Gasoline for the retail gasoline dispensing is stored in underground tanks of 8,000 gal and 10,000 gal capacities just to the south of the building. There is one (1) pump island, located between the southeast corner of the building and Route 30, that is used to dispense regular-, mid- and super-grades of gasoline. This system was installed in 1990 following a release of the former system. Piping of the new system was replaced in August 1995 due to a suspected leak.

The SITE topography slopes down from west to east at about 7% to Route 30. From Route 30 the local topography slopes down variably and radially to the north, east and south. A small unnamed stream flowing from north to south is located about 250 ft to the east of the SITE. The stream appears to be seasonal and there are also some bedrock outcrops adjacent to the stream.

2.0 SCOPE OF WORK

The objective of the May 2, 1997 proposal included the following items (refer to **Figure 3**, Sampling Location Plan):

- perform a file review of the SITE at the State of Vermont SMS;
- obtain soil gas samples at 34 sampling locations (28 actually completed);

- vertical soil probing at 7 locations (12 actually completed);
- the installation of 4 new groundwater monitoring wells (5 completed);
- slug testing of 3 new monitoring wells (4 completed);
- sampling and testing of existing groundwater monitoring wells and residential water supplies; and,
- reporting and recommendations.

A copy of the SITE Characterization Proposal dated May 2, 1997, pertaining to this report is located in **Attachment 1**.

3.0 STATE FILE REVIEW

TSEC performed a file review for the SITE at the State of Vermont SMS on May 20, 1997. Information was gathered regarding previous site investigations performed and incorporated into the SITE work and this report as necessary. Based on previous drilling methods used by others, TSEC opted to use air rotary drilling rather than hollow-stem. Historical boring logs are also included in this report.

While reviewing the file, TSEC noticed a March 1990 report by Griffin International, Inc. entitled "Report of the Investigation of Subsurface Petroleum Contamination." Item 6.0 in Section 4.0 indicates that:

"There is a significant concentration of subsurface petroleum contamination centered in the immediate vicinity of the pump island at the Service Center. The contamination has been determined to be gasoline, due to the high concentration of BTEX and MTBE detected in the subsurface. The contamination exists mostly in the dissolved phase, although there may be significant concentrations of free floating and adsorbed hydrocarbons in the subsurface.:"

These findings appear to be similar to what has been recently found.

4.0 FIELD INVESTIGATION

TSEC performed intrusive field investigations during May 27, 28 and 29, 1997. A sampling grid was established to locate areas for the soil gas survey, soil boring program and installation of groundwater monitoring wells (see **Figure 3**). A great deal of data was generated during a short period of time. Work days were generally in excess of 12 hours per day. Attempts were made by TSEC to contact Mr. Bob Haslam during the investigation to provide updates.

4.1 Soil Gas Survey

A soil gas survey (SGS) was performed using TSEC's Geoprobe[®]. The original plan proposed 34 sampling points; however, based on SITE conditions, 28 were completed and the soil boring portion of the field work was expanded.

Soil gas probes were installed in the vadose zone near the water table at depths between 0.5 ft to 2.0 ft below ground surface (bgs). Vapors from the interstitial soil pores were extracted using a variable rate GAST vacuum pump attached to polyethylene tubing. A dual in-line sample tee allowed for monitoring volatile organic compound (VOC) concentrations using a photoionization detector (PID).

At the point where the PID levels were found to be at their highest level, a sample was withdrawn from the adjacent sampling tee using a 5 ml gas-tight syringe. A 100 ul aliquot of the soil gas was then directly injected into an SRI 8610 gas chromatograph (GC) for on-SITE analysis in TSEC's mobile laboratory. The soil gas samples were tested for benzene, toluene, ethylbenzene and xylenes (BTEX) and methyl-tertiary-butyl ether (MTBE). Results from the GC analysis and PID screening are shown on **Appendix A** and **Figures 3** and **4**.

The area of highest soil gas concentrations was found to be surrounding the pump island. Soil gas point SG-11, just north of well MW-6 that has historically contained separate-phase product, was found to contain the highest BTEX levels at 74 parts-per-million volume (ppmv) with a PID reading of 345 ppmv. The highest concentration of MTBE (15 ppmv) was found at SG-5, just to the northeast of the pump island, with a PID reading of 308 ppmv. The highest PID reading was encountered at SG-12, just south of MW-6, at 450 ppmv.

No appreciable levels of VOCs were detected with the GC or PID surrounding the underground storage tanks (USTs) or on the eastern side of Route 30.

4.2 Soil Boring Survey

A soil boring survey (SBS) was performed using TSEC's Geoprobe[®] following the SGS. The original plan proposed 7 soil boring locations; however, due to the results of the SGS and high water table encountered, 12 borings were actually completed to provide adequate characterization for this phase of the project (see **Figures 3** and **4**). TSEC felt that the high water table may have been suppressing some of the VOCs.

Soils were collected using a Macrocore sampler combined with the Geoprobe[®]. The Macrocore sampler allowed for collecting continuous 4 ft soil cores contained in a clear acetate liner. Soils were logged for soil type and homogenized for field screening with a PID, and selective testing in TSEC's on-SITE mobile lab and at Endyne, Inc. in Williston, Vermont. All soil samples that were not immediately tested were stored on ice in a cooler located in the shade. Analytical data from TSEC's mobile lab and Endyne is presented in **Appendix B**; soil boring logs are located in **Appendix C**; data summary tables of chemical concentration data in soils are shown on **Tables 1** and **2**; and, **Figure 4** depicts the contaminant distribution in the soils.

Two (2) of the soil boring locations were advanced using manual sampling equipment. SB-7, located inside the building, was advanced through the concrete slab floor. A core drill was used with a 3" diameter bit and clean supply of water to penetrate the slab to allow for sampling. Following the collection of soils from the soil boring, the hole was backfilled, compacted with a flat-headed 30 lb steel bar, and sealed flush to the top of the slab with Octoplug[™]. SB-12 was performed manually in the swale north of the Innes Residence since the Geoprobe[®] could not access that location.

Based on the SBS, an area similar to the SGS was identified as being the most contaminated portion of the SITE (surrounding the pump island). Based on the presence of product, mobile lab data and PID data, SB-4 (4 to 8ft) was found to have the highest levels of BTEX, MTBE and VOCs. At SB-4, BTEX was detected at 2,500 ug/kg, MTBE at 560 ug/kg and PID readings of 1,254 ppmv. Results

from a sample submitted to Endyne yielded BTEX at 19,613 ug/kg and total petroleum hydrocarbons (TPH) at 487,000 ug/kg. MTBE was not detected (<400 ug/kg).

SB-8 (0 to 4ft), located north of the pump island was found to have the highest concentrations based on data from Endyne. BTEX was detected at 331,800 ug/kg and TPH at 3,890,000 ug/kg. MTBE was not detected (<2,000 ug/kg). Mobile lab data detected BTEX at 852 ug/kg. MTBE was not detected (<10 ug/kg) and PID readings were 676 ppmv. In either case, the area immediately surrounding the pump island was the most contaminated area.

The area surrounding the USTs, within the perimeter of the building, and across Route 30 were found to be very low level or non detect based on this study.

4.2.1 Geology

The area soils were predominately silty fine sand with a more permeable fill material within the first few feet of ground surface. Refusal was encountered in several locations at less than 10 ft bgs. It is not known if these refusals were related to bedrock conditions. Several wells that have been installed with air rotary drilling methods encountered bedrock at 14 ft bgs +/- . A more permeable sand and gravel is located between the pump island and Route 30. A cross section from west to east has been prepared and is depicted as (Figure 5).

A bedrock outcrop located 250 ft +/- to the east of the SITE (see Figure 3 and Site Photographs in Appendix D), adjacent to a seasonal stream, and 30 ft +/- lower in elevation, was determined to be of the Moretown Member of the Missisquoi Formation. The orientation of the bedrock surface (strike and dip) were measured with a Brunton[®] pocket transit. The general bedrock orientation in the outcrop was from northeast to southwest, with the bedrock surface dipping to the east (N49°E, 38°E). A joint system was also found in this outcrop with an orientation of N55°W, 72°W.

Published References:

Surficial deposits in the area consist of fluvial outwash and ice contact deposits. These deposits are both well sorted sands and gravels that are generally less than 10 feet thick in the SITE vicinity. Materials are well drained above the water table, and tend to yield significant amounts of water below the water table.

The bedrock geology of the region surrounding the SITE is comprised of Ordovician age rocks, specifically the Moretown Member and the Barnard Volcanic Member of the Missisquoi Formation. These rocks were formed over 425 million years ago and were originally deposited as a series of interbedded quartzite sands, graywackie sands, muds, and volcanic deposits. The SITE is located in a transitional zone between the two formations, where differentiation of the formations is difficult. Structurally, these formations are relatively simple on a large scale, yet complex on a smaller scale. These formations all trend north to northeast, dipping to the southeast.

References:

1. Hepburn, J.C., Trask, N.J., Rosenfeld, J.L., and Thompson, J.B., Jr., 1984, *Bedrock Geology of the Brattleboro Quadrangle, Vermont-New Hampshire:VT. Geol. Survey Bull., no. 32, 162 p.*
2. Stewart, David P., 1975, *Geology for Environmental Planning in the Brattleboro-Windsor Region, Vermont: Vt. Geol. Survey Env. Geol., no. 7, 47p.*

Groundwater in the bedrock aquifer most likely flows to the southeast, along the above-mentioned bedding planes. Surface water in the immediate vicinity also follows the strike of the bedrock. Additionally, the bedrock aquifer will tend to flow downgradient with surface water features.

4.3 Monitoring Well Installation

Five (5) groundwater monitoring wells were installed on Thursday, May 29, 1997. Two (2) of the wells were a nested couplet located across Route 30 to the southeast. The wells have been denoted as MW-11, MW-12S, MW-12D, MW-13 and MW-14 (refer to **Figure 2** for locations). The shallow and deep nested couplet are MW-12S (shallow) and MW-12D (deep). Cushing & Son's, Inc. of Keene, New Hampshire were contracted to install all of the wells except MW-14 which was installed manually by TSEC north of the Innes Residence. Due to bouldery conditions, six (6) attempts were made to install MW-14 with refusal encountered at 1 to 2 ft bgs. The well was finally installed with a total depth of 2.5 ft bgs with water at 0.81 ft bgs.

Based on historical drilling techniques used on SITE, air rotary was chosen for advancing the borings. A 6 inch air hammer was used and casing was driven to secure competency of the borehole when necessary to provide for an adequate sand packed in the monitoring wells. All wells were constructed with flush-coupled schedule 40 PVC pipe. Wells MW-11, MW-12S, MW-12D and MW-13 are constructed of 2" diameter pipe with 0.020" machine-slotted screen and 2" riser. These wells were completed with flush-grade curb boxes.

Well MW-14 was constructed with 1" PVC diameter PVC pipe with 0.010" machine-slotted screen and 1" riser. This well was completed with a riser pipe extending 2 ft+/- above ground in the swale and capped with an expansion plug.

Following completion, the wells were developed using manual surge and purge techniques with clean dedicated bailers.

4.4 Slug Testing

Slug tests were conducted on June 10, 1997 to obtain hydraulic conductivities (k) at wells MW-11, MW-12S, MW-12D and MW-13. The tests were performed by using a slug designed from PVC pipe of 1.5" in diameter and 5' in length. In-slug and out-slug tests were performed. Due to limited water in well MW-12S a slug test was performed by adding a known volume of water. Changes in water table measurements were recorded using an In-Situ, Inc. Hermit Environmental Data Logger Model SE1000SC with a submersible pressure transducer (30 psi). Data, worksheets and calculations are presented in detail in **Appendix E**.

Aquifer k values were calculated using the Bouwer and Rice Slug-Test Method (Bouwer & Rice 1976; Bouwer 1989). This test method was designed as a baildown test in which the water level is lowered to allow water to flow from the aquifer into the well until equilibrium is reached. The equation

$$k = \frac{r_c^2 \ln\left(\frac{R_e}{R}\right)}{2L_e} \frac{1}{t} \ln \frac{H_i}{H_0}$$

is used to calculate k from collected data. Further explanation of variables and can be found in Bouwer & Rice (1979). Although the Bouwer and Rice method is defined as a baildown test, inserting and removing a slug to induce a gradient in and around the well is an accepted modification to the method. Analyses were performed on this data for QA/QC purposes.

Published k values (Fetter, 1994) for silty fine sands are approximately 0.28 to 28 feet per day (ft/d), which is consistent with the k values calculated. Average k values for the overburden aquifer beneath the SITE were calculated to be approximately 9 ft/d +/- (see table below). This average is calculated from the data obtained from monitoring wells MW-11, MW-12D, and MW-13.

Note:

The data points used for the calculation of k for MW-11 were selectively chosen due to a falling trend in the water table which was evident throughout the slug-test. MW-12S did not contain sufficient water to correctly conduct the baildown test, and efforts to conduct a falling head permeability test were not successful.

Results of the slug test were used to calculate hydraulic conductivities, groundwater velocities (V_{gw}) and contaminant transport velocities. Ranges that are presented below have inherent variability due to the physical, chemical and biological properties characteristic of groundwater flow, contaminant transport and degradation in the subsurface.

<i>Monitoring Well</i>	<i>k (ft/day)</i>	<i>V_{gw} (ft/day)</i>	<i>V_{benzene} (ft/day)</i>	<i>V_{n-xylene} (ft/day)</i>
MW-11	10.3	1.5	0.9	0.4
MW-12S	nc	--	--	--
MW-12D	7.0	1.0	0.6	0.3
MW-13	8.9	1.3	0.8	0.4
AVERAGE	8.8	1.3	0.8	0.3

Notes:

- Parameter values used to estimate contaminant transport velocities were obtained from risk-based corrective action look-up tables in ASTM E1739, "Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites" and the Illinois Environmental Protection Agency Bureau of Land "Tiered Approach to Cleanup Objectives Guidance Document."*

4.5 Elevation Survey

TSEC performed a limited elevation survey of all monitoring wells associated with the SITE using a Topcon AT-G6 auto level. The new data was used in calculating groundwater elevations and estimating groundwater flow direction. New wells and other features were added to the SITE Plan and additional figures. Horizontal distances were measured off a 100 ft tape reel. The base plan that TSEC has adopted was originally prepared by others in the early 1990s.

4.6 Groundwater Sampling

Groundwater sampling of fourteen (14) monitoring wells was performed on June 10, 1997. Prior to sampling all wells were gauged for depth to fluid measurements and purged of at least three (3) standing volumes of water. Purging and sampling was performed with dedicated bailers and chord. One (1) field blank (FB-1) and one (1) duplicate sample (DUP-1) of well MW-1 was collected to provide quality assurance and quality control (QA/QC). The samples were preserved with hydrochloric acid (HCL), stored in a cooler on ice and delivered to Endyne under chain of custody. The samples were analyzed for BTEX and MTBE using EPA Method 8020. Wells MW-11, MW-12D and MW-13 were also tested for total iron, hardness and manganese via EPA Method 200.7.

Depth to groundwater was found to range from 1.98 to 5.97 ft below top of casing (btoc) in wells GP-1 and MW-3. Depth to water measurements and water table elevations are presented in **Table 3**. Groundwater has been calculated to be flowing generally to the east with a 0.04 to 0.06 ft/ft horizontal hydraulic gradient (see Groundwater Contour Plan, **Figure 6**).

The area around the pump island was found to have the highest impact to water quality which is consistent with the other phases of investigation of this SCP (see **Table 4** and **5** and BTEX Isopleth Plan, **Figure 7**). Laboratory data from Endyne is located in **Appendix F**.

The maximum levels of BTEX were found in well GP-2 at 93,420 ug/l with GP-1 (45,930 ug/l) and MW-6 (41,750 ug/l) also highly impacted. Since there was an adsorbent skimmer sock in well MW-6, no separate-phase layer was encountered; however, during bailing some globules of product were encountered. Although the groundwater sample was collected without product, the analytical results for MW-6 should be used with caution.

Conditions upgradient of the USTs were non detect in MW-11. Across Route 30 to the east, MW-13 was the most impacted with BTEX at 177 ug/l; of that, benzene was 171 ug/l. MTBE was detected at 35 ug/l. In the MW-12 couplet, the upper well was nondetect while the well screened deeper contained 6.5 ug/l of benzene and 21 ug/l of MTBE. Similar conditions where contaminant concentrations were greater with depth were found at MW-2 and MW-3. MW-2 is the bedrock well and had benzene at 7.9 ug/l and MTBE at 40 ug/l, while MW-3, the overburden well, had benzene at 2.4 ug/l and MTBE at 23 ug/l.

4.7 Water Supply Sampling

Residential water supply samples were collected on June 10, 1997. The original plan was estimated based on 11 water supplies; however, 18 were collected in order to expand the historical sampling program. The original work scope, based on 11 supplies, was used as a basis of estimating the project.

For the most part, water samples were collected from tap sources with the exception of Lots #23, 27, 65 and 78 which were collected from the outdoor faucet. The samples were stored on ice in a separate cooler from the groundwater samples, preserved with HCL and delivered under COC to Endyne to be tested via EPA Method 8020 for BTEX and MTBE compounds. **Table 6**, summarizes the results of the laboratory results and laboratory data is in **Appendix F**.

The predominate compound detected in the local water supplies was MTBE. Four (4) water supplies were found to contain levels of MTBE between 11.1 to 31.1 ug/l. The Lamoria (Lot #78) supply had the highest level of MTBE at 31.1 ug/l. Three (3) water supplies had trace levels detected less than the quantitation limit of 10 ug/l. The Innes supply (Lot #66) was the only sample collected that contained benzene, with a concentration of 2.3 ug/l.

5.0 CONCLUSIONS

Based on the information gathered during this investigation, others conducted by TSEC, and information reviewed from the State file review, TSEC offers the following conclusions:

- there are several residential water supply wells impacted with MTBE near the SITE with concentrations from trace levels to 31.1 ug/l. The Vermont Health Advisory level for MTBE is 40 ug/l. Based on historical data in the State file, the concentration of MTBE in the water supplies appears to be relatively stable.

In contrast, during the early 1990s, groundwater in the bedrock monitoring well MW-2 had BTEX and MTBE levels in the low parts-per-million (mg/l) range, while the last two (2) sampling rounds indicate levels less than 50 parts-per-billion (ug/l). Thus, there has been a significant decrease in concentration directly across Route 30, downgradient of the pump island on SITE.

Based on preliminary review of bedrock conditions in the area, groundwater in the bedrock aquifer most likely flows to the southeast. This is consistent with the contaminant concentrations observed in water supplies at and around the SITE.

- Soils encountered during boring activities were found to be mainly a dense silty fine sand with a 2 to 3 ft layer of overlying loose fill. Bedrock throughout the area has been observed to be at about 14 ft bgs.
- Depth to groundwater has been measured to range from 1.60 to 5.97 ft btoc. Groundwater in the pump island area encroaches into the upper fill material at 1.5 - 2.0 ft bgs +/- . During this past spring, water and some product was found to be seeping from pump island and nearby breaks in the pavement. Groundwater in the overburden is migrating generally to the east with a horizontal gradient of 0.04 - 0.06 ft/ft.

Water table elevations in the nested couplet MW-12S and MW-12D were within 0.01 ft of each other and in the overburden and bedrock wells MW-3 and MW-2 were within 0.25 ft of each other. Based on this limited data it does not appear that at this time of the year there is an appreciable vertical gradient that would transmit contaminants into the bedrock. In fact, the potentiometric head of the bedrock well was higher than the overburden well. This condition will likely not remain constant as precipitation changes throughout the year.

- This investigation has identified that most of the gasoline impact to the subsurface is located at and adjacent to the pump island. This area has historically been reported to have a fairly high impact as evidenced by reports from others in 1990. The vertical extent of the impact is questionable due to refusal encountered around the pump island. Refusal was encountered with the Geoprobe® in

this area between 4 to 10 ft bgs while monitoring well MW-6, drilled with an air-rotary rig, encountered bedrock at about 14 ft bgs. Although the depth to bedrock in this area is questionable, gasoline impact was observed at fairly high levels to refusal.

PID levels from field screening ranged from roughly 400 to 1,200 ppmv in soil samples from the pump island area. The deepest soil sample in this area was collected at SB-6 between 8 - 10 ft bgs which had a PID level of 424 ppmv. Product was encountered in soils at SB-4 from 2 to 6 ft bgs +/- and at SB-8 in a limited band at 1.5 ft bgs +/- . Groundwater at MW-6 has consistently been found to contain a small amount (<0.5") of separate-phase product.

- Contaminant conditions to the east of Route 30 appear to be fairly low level. A significant amount of attenuation is occurring between the pump island area and the eastern right of way of Route 30. To the west of Route 30, dissolved levels of contaminants in the groundwater at GP-1 and GP-2 have BTEX levels of 45,000 to 93,000 ug/l +/-; while to the east, levels are less than 200 ug/l (MW-13).

Factors influencing the local shallow hydrology (<6 ft bgs) are Route 30, a NYNEX fiber optic utility trench, a stormwater catch basin at the northeast corner of the SITE and a drainage swale across Route 30 to the east of the catch basin. The fiber optic utility trench, which is 2.5 to 3.0 ft deep, is located between the pump island and Route 30. During high water table conditions as evidenced this past spring, the water table likely intercepts the trench. Gasoline impact just upgradient of the NYNEX trench at GP-1 and GP-2 between 0 - 4 ft bgs had soil PID levels of greater than 1,000 ppmv and product at SB-8 was encountered at 1.5 ft bgs +/- . Depth to water in these wells were between 1 - 2 ft bgs in March 1997 and 2 ft bgs +/- in June 1997.

- The overall impact from the SITE to the bedrock water supplies is questionable, based on historical conditions and recent findings. It appears since 1990, the concentrations in all groundwater wells have generally been decreasing; however, there is still a persistence of product in the soils adjacent to the pump island. Last September (1996), the product was age dated from MW-6 and was found to be predominately gasoline of 1980s vintage. A further analysis of conditions at MW-6, even though the levels are suspect due to product in the well, is as follows:

Date	benzene	toluene	ethylbenzene	xylenes	MTBE
03/14/90	16,000	36,700	4,400	20,900	12,000
08/09/90	nd	nd	nd	nd	nd
05/11/93	5,600	34,200	2,800	15,500	nd
09/04/96	1,470	10,800	2,390	11,700	<300
06/10/97	1,970	21,600	2,780	15,400	<2,500

These levels show a greater decline in the benzene and MTBE concentrations versus other compounds. This pattern is typical due to their greater mobility in the subsurface. Concentrations in MW-6 do not appear to indicate worsening conditions at this location.

The recently installed wells GP-1 and GP-2, just downgradient of the pump island are highly impacted; however, there is no historical data for comparison.

- Based on an areal extent of about 1,900 +/- square feet and assuming that as a worst case scenario the depth to bedrock is 14 ft bgs, the area to be considered the source is estimated at 985 +/- cubic yards (see **Figure 8**). Of this amount 362 cu.yds. is located under the NYNEX fiber optics and Route 30. This area has not yet been characterized and is based on an extrapolation of current data. Contamination levels in this 362 cu.yd. volume may not be of the same magnitude as directly surrounding the pump island.

6.0 RECOMMENDATIONS

Based on our findings and interpretations of conditions at the SITE and surroundings, TSEC offers the following recommendations:

- Although the threat to the bedrock water supplies based on current conditions has not been determined, it has been shown in the past that there was a connection between the overburden and bedrock that caused impact to several local drilled water supply wells. Due to the historical impact; levels of contamination present at the SITE; and, reliance of the localized bedrock water from drinking water supply wells in the town of Newfane, TSEC feels that all feasible limits of contamination should be removed to reduce further threat to the local water supplies.
- Since the depth to bedrock is 14 ft or less, and there is separate-phase product in MW-6 and adsorbed product in the soils to the north and south of the pump island, TSEC does not consider remediation by natural attenuation (RNA) to be a viable remedial candidate at this SITE.

Due to the elevation of the water table, vapor extraction would not be effective without a dewatering program. Dewatering is not recommended due to the shallow nature of the bedrock surface. It would not be prudent to pull the contaminants closer to the bedrock surface.

Air sparging is not recommended due to the separate-phase product present; shallow nature of the bedrock and local topography; and, hydrogeology of the SITE. Also, vapors could not be extracted due to the limited vadose zone.

In-situ biological treatment would require a groundwater control system of recovery and infiltration zones. The SITE does not logistically have the space for such a system. Many other factors could be discussed, however, would be in haste.

- The viable remedial efforts comprise excavation and disposal of the soils; a dual-phase extraction (DPE) system; or, a combination of the two (2). Due to the SITE's proximity to Route 30, the NYNEX fiber optic trench and the on-SITE building, remediation of the entire extent of contaminated soils will be difficult, not feasible and/or not necessary. Conditions in the area of the NYNEX fiber optic trench and Route 30 are not known. In either remedial option, some contamination may remain on SITE. Based on discussions with NYNEX, if the fiber optic line were to be moved to an overhead service for this project, the cost would be between \$50K to \$100K.

Excavation would provide effective cleanup of the most impacted area around the pump island. The time frame for excavation would be on the order of several weeks versus one (1) year for DPE.

DPE would also be a good candidate for remediation due to the level of control it would provide, along with recovering liquid and vapor-phase contaminants; however, the time frame is longer. In TSEC's opinion, excavation would be the option of choice due to its expeditious nature.

- Since the impacted soils encroach the building and Route 30, it is likely that sheet piling would need to be driven to provide structural stability so the maximum quantity of soils could be removed. Overhead utility lines run along the property line next to Route 30 and may need to be shielded while performing construction activities.

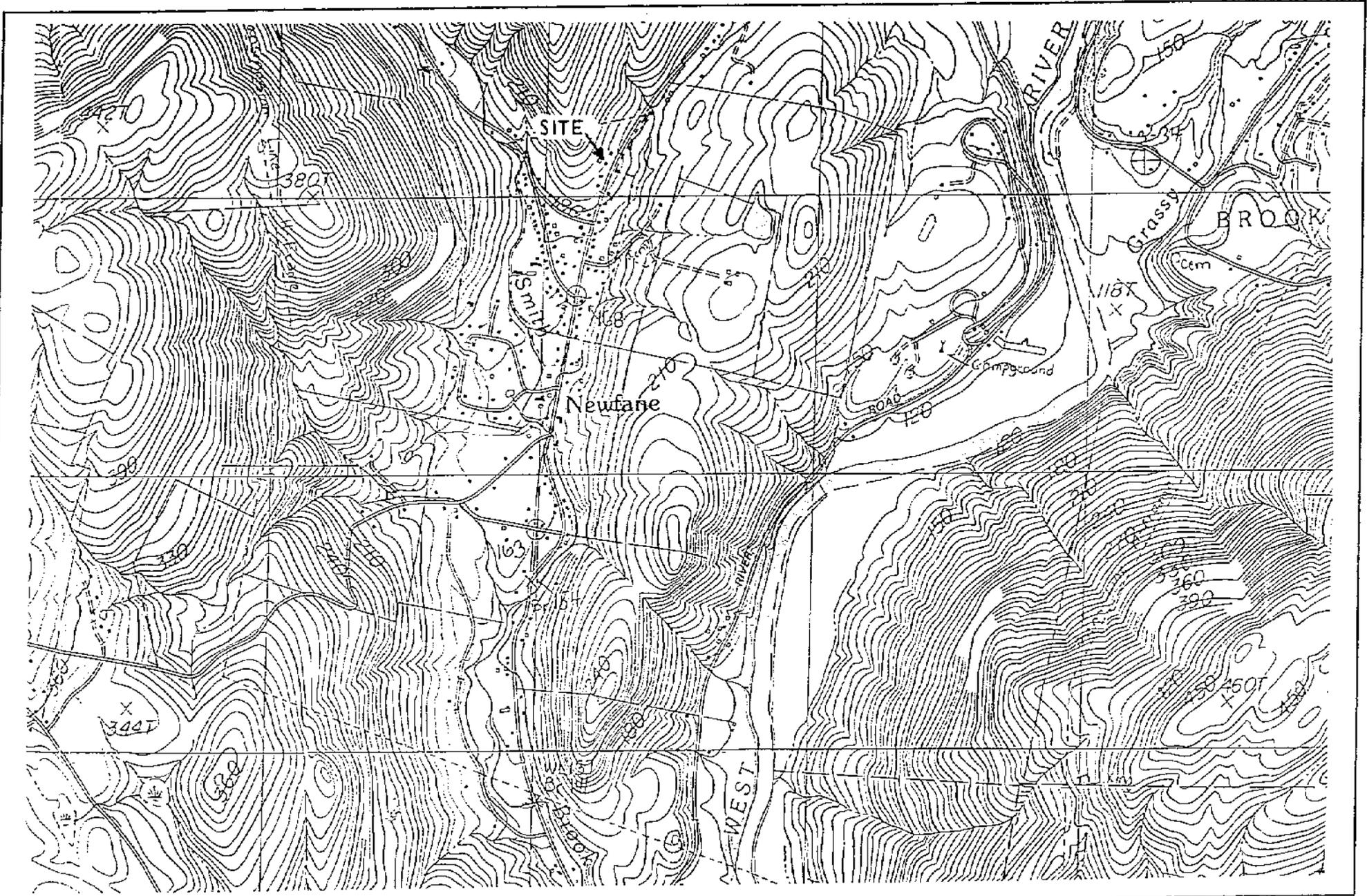
Contraindications of excavation would be leaving some of the contaminated soils in place adjacent to the building, under the NYNEX trench and under Route 30. Based on soil volume estimates, approximately 63% would be excavated and 37% would remain. However, if it assumed that the contaminant density under Route 30 is half of that around the pump island, then based on contaminant distribution, 74% would be removed and 26% would remain (see **Figure 8** and **Table 7**). If in the future it was found that still further remediation is necessary at the SITE, then DPE could then be applied to the fringe areas not captured by excavation.

Excavation would also require that the pump island and lines be removed. The USTs could remain in place. TSEC and Mr. Haslam of the SMS have researched issues involving the removal and replacement of the pump island with the State of Vermont Underground Storage Tank Division, Department of Labor and Industry (L&I) and Agency of Transportation (AOT). It appears that L&I will require, per NFPA 30A, 4-1.1 (1993), "*...all parts of the vehicle being serviced shall be so located that all parts of the vehicle being serviced will be on the premises.*" The AOT will require that the pump island must be located at least 23.75 ft from the center line of Route 30. TSEC is not sure of the property line but likely this should not be an issue. The distance from the center line of Route 30 to the pump island is 30 ft +/-.

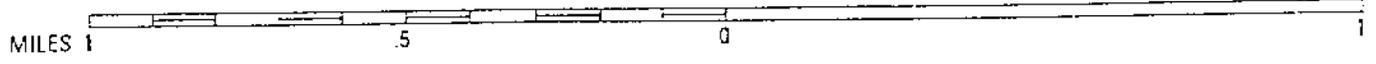
- If allowed by the AOT, it would be prudent to install three (3) soil borings in Route 30 between the center line and NYNEX trench to evaluate conditions in this area. Investigation of the NYNEX utility trench poses significant challenges if it were necessary to investigate it's effects on contaminant migration. Since it's depth is less than 3 ft bgs then only the upper portion of the water table will intercept the trench during high water conditions. The trench likely causes increased contaminant flow to be directed to the north or south but not necessarily increase the threat to the bedrock. Investigations could be performed; however, TSEC does not feel it is warranted at this time.

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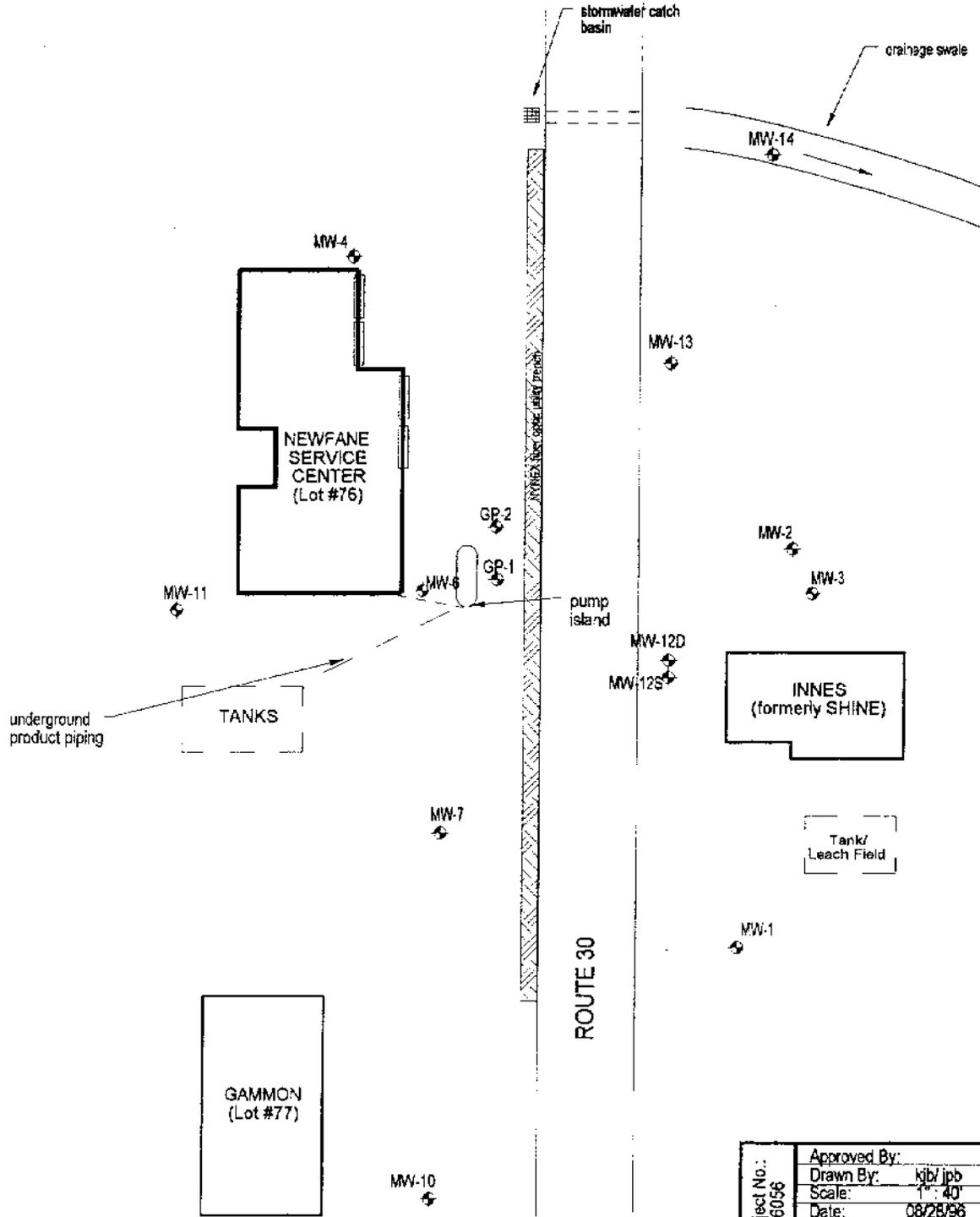
FIGURES



Source: USGS Newfane, VT Quadrangles.



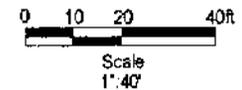
Project No: 56066	Designed By: kib	TWIN STATE ENVIRONMENTAL CORP. 1A Huntington Rd. P.O. Box 719 Richmond, Vermont (802) 434-3350	FIGURE 1 SITE LOCATION MAP Newfane Service Center Newfane, Vermont
	Checked By:		
	Approved by:		
	Drawn By:		
	Scale: as shown		
	Date: 01/03/96		



LEGEND

- MW-1 monitoring well location
- survey bench mark location.

NOTES:
 1. Monitoring wells surveyed by TSEC on 06/10/97.



Project No.: 96056	Approved By:	TWIN STATE ENVIRONMENTAL CORP. 1A Huntington Rd. P.O. Box 719 Richmond, Vermont (802) 434-3360	FIGURE 2 SITE PLAN Newfane Service Center Newfane, Vermont
	Drawn By: kjb/jpb		
	Scale: 1" = 40'		
	Date: 08/28/96		
	Revised: 06/25/97		
	Revised By: kjb		



MORRILL
(Lot #75)

15' x 15' sampling grid

NEWFANE SERVICE CENTER
(Lot #76)

underground product piping

TANKS

GAMMON
(Lot #77)

ROUTE 30

INNES
(formerly SHINE)

Tank/
Leach Field

stormwater catch basin

drainage swale

top of slope - 1 to 1 pitch down to railroad bed

former railroad bed

small streams - appear to be seasonal

features to the east are approximate in size and location

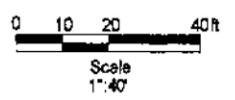
pool of standing water due to encroaching hillside and railroad bed

BEDROCK OUTCROP

LEGEND

- MW-1 monitoring well location
- MW-11 groundwater monitoring wells installed 05/97
- soil gas point
- survey bench mark location
- soil gas/soil boring location

NOTES:
1. Monitoring wells surveyed by TSEC on 08/10/97.

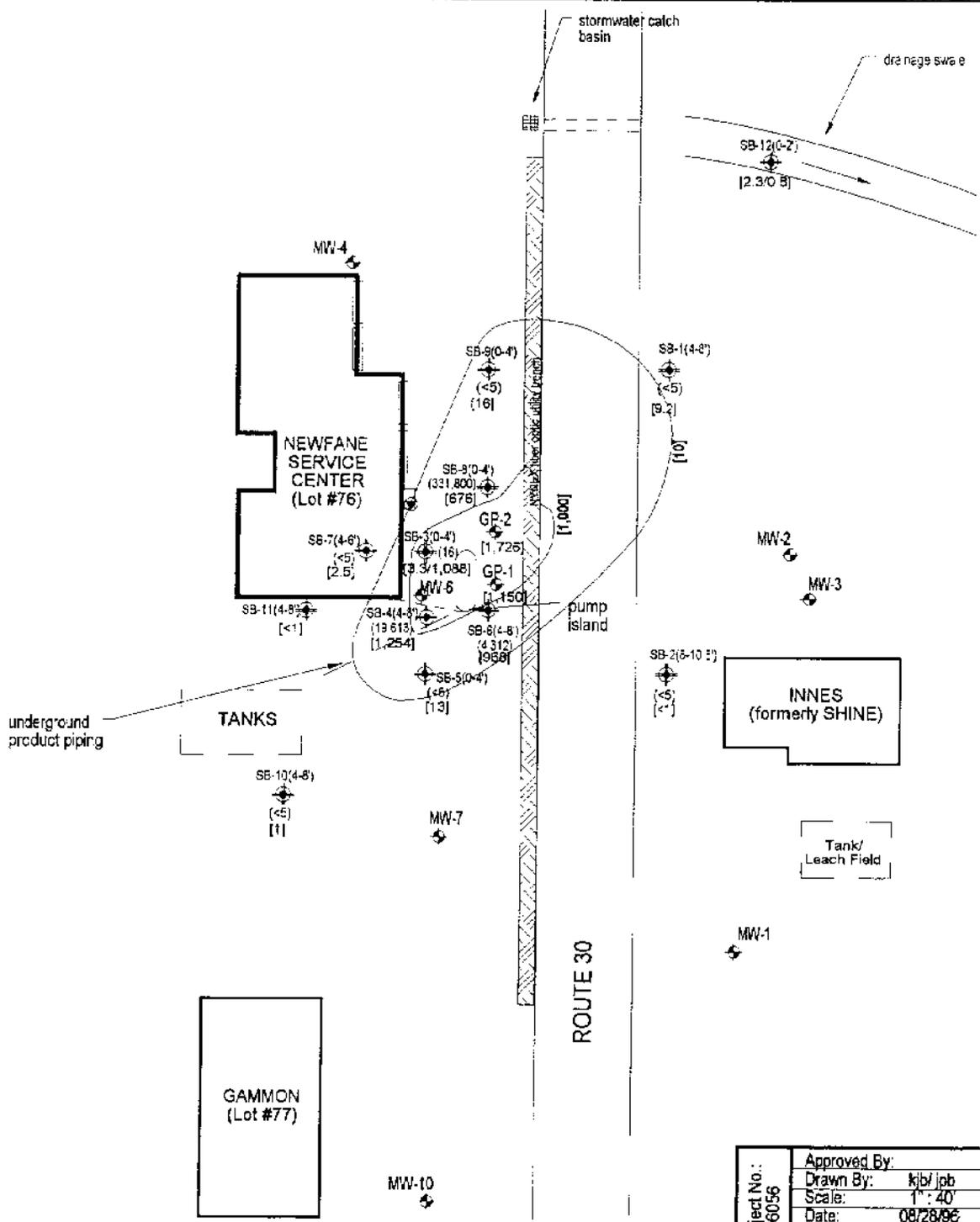


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Project No.:	96056
Approved By:	
Drawn By:	kjb/job
Scale:	1" = 40'
Date:	08/28/96
Revised:	06/25/97
Revised By:	kjb

TWIN STATE ENVIRONMENTAL CORP.
1A Huntington Rd.
P.O. Box 719
Richmond, Vermont
(802) 434-3350

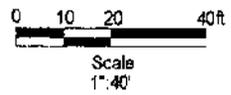
FIGURE 3
Sampling Location Plan
Newfane Service Center
Newfane, Vermont



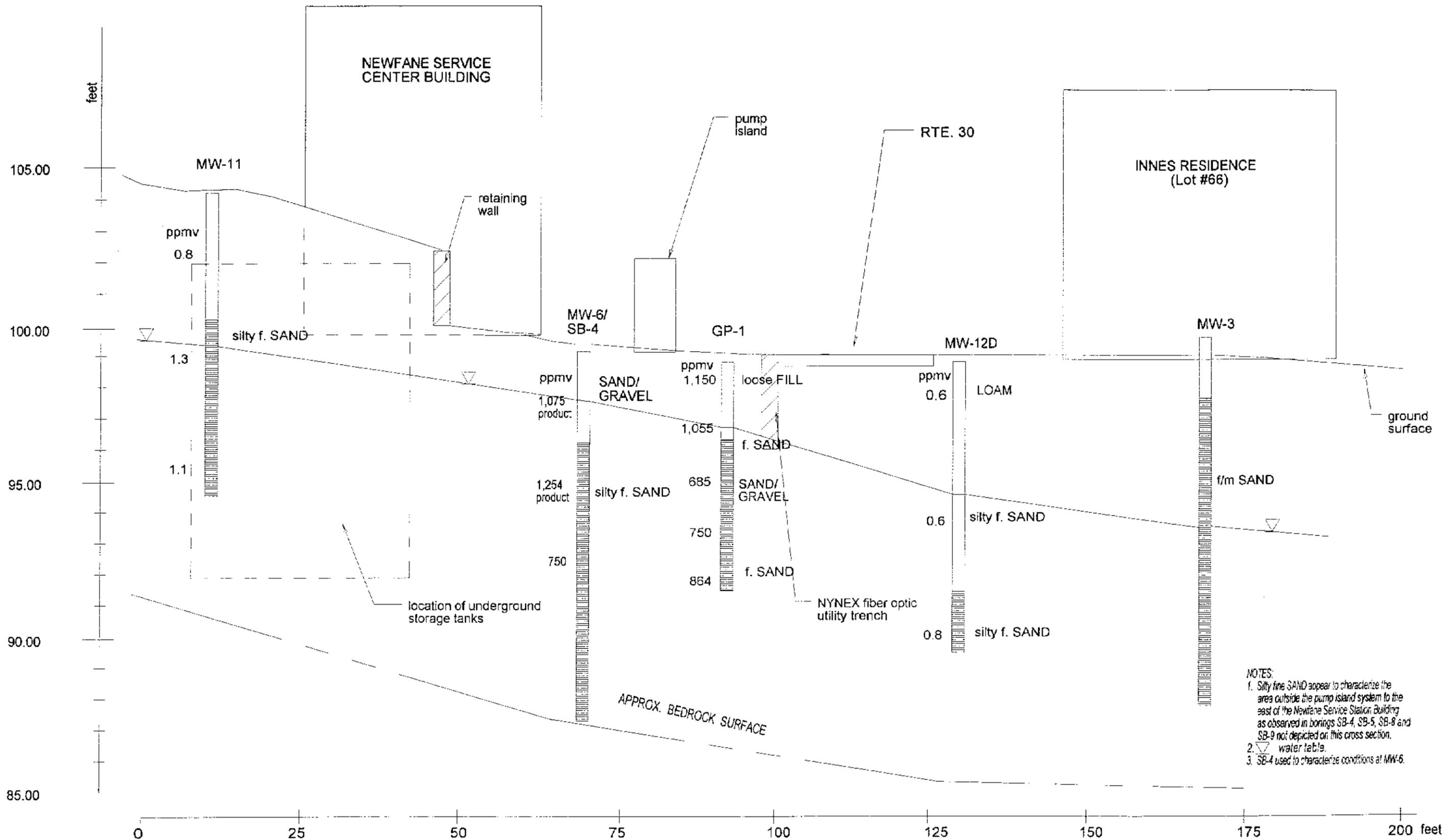
LEGEND

- MW-1 monitoring well location
- (15,000) BTEX concentration (ug/kg) in soil on May 27, 28 and 29, 1997. Concentrations compiled from Endyne, TSEC's mobil lab and Field screening data where applicable.
- [1,000] PID concentrations (ppmv) from headspace field screening.
- survey bench mark location.

- NOTES:
1. Monitoring wells surveyed by TSEC on 06/10/97.
 2. Conditions in NYNEX trench and under road are rough estimates based on limited data.
 3. Headspace levels for SB-3 (3 3/1,088) are from 0-4' and 4-1' (weathered rock).

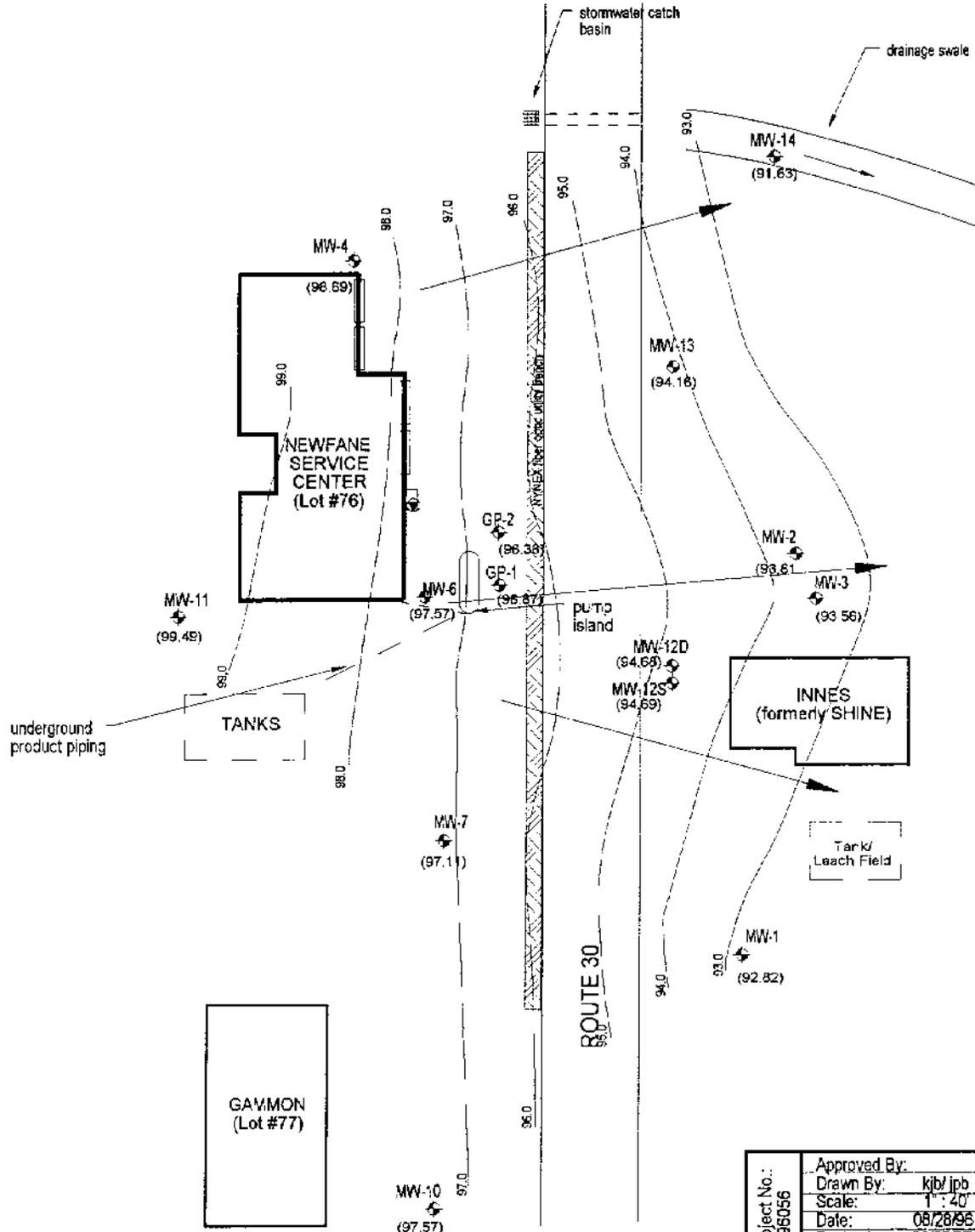


Project No.: 96056	Approved By:	TWIN STATE ENVIRONMENTAL CORP. 1A Huntington Rd. P.O. Box 719 Richmond, Vermont (802) 434-3360	FIGURE 4 BTEX/VOC Distribution in Soils Newfane Service Center Newfane, Vermont
	Drawn By: kjb/jpb		
	Scale: 1" = 40'		
	Date: 08/28/96		
	Revised: 06/25/97		
	Revised By: kjb		



- NOTES:
1. Silty fine SAND appear to characterize the area outside the pump island system to the east of the Newfane Service Station Building as observed in borings SB-4, SB-5, SB-8 and SB-9 not depicted on this cross section.
 2. ▽ water table.
 3. SB-4 used to characterize conditions at MW-6.

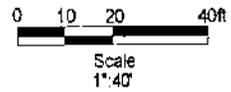
Project No: 96066	Designed By: kjb	TWIN STATE ENVIRONMENTAL CORP. 1A Huntington Rd. P.O. Box 719 Richmond, Vermont 05477 (802) 434-3360	FIGURE 5 Cross Section A - A' Newfane Service Center Newfane, Vermont
	Approved By:		
	Drawn By: kjb		
	Scale: as shown		
	Date: 06/27/97		
Revised:			



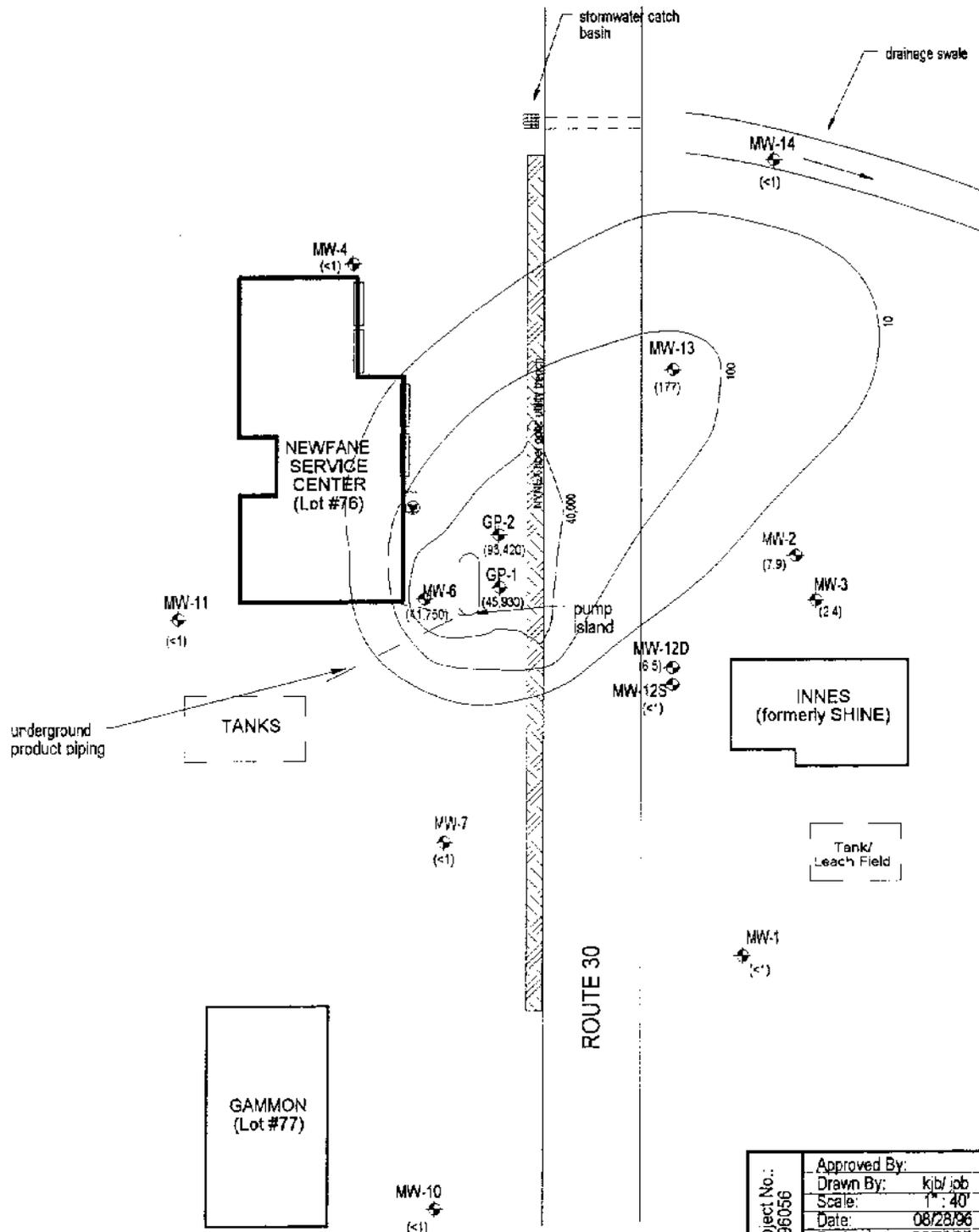
LEGEND

- MW-1  monitoring well location
- (93.00) Groundwater elev. on 06/10/97 in units of feet ref. to a TBM
-  groundwater flow direction based on limited data
-  survey bench mark location.

NOTES:
 1. Monitoring wells surveyed by TSEC on 06/10/97.



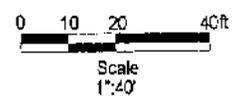
Project No.: 96056	Approved By:	TWIN STATE ENVIRONMENTAL CORP. 1A Huntington Rd. P.O. Box 719 Richmond, Vermont (802) 434-3360	FIGURE 6 Groundwater Elevation Plan Newfane Service Center Newfane, Vermont
	Drawn By: kjb/jpb		
	Scale: 1" = 40'		
	Date: 08/28/96		
	Revised: 06/25/97		
	Revised By: kjb		



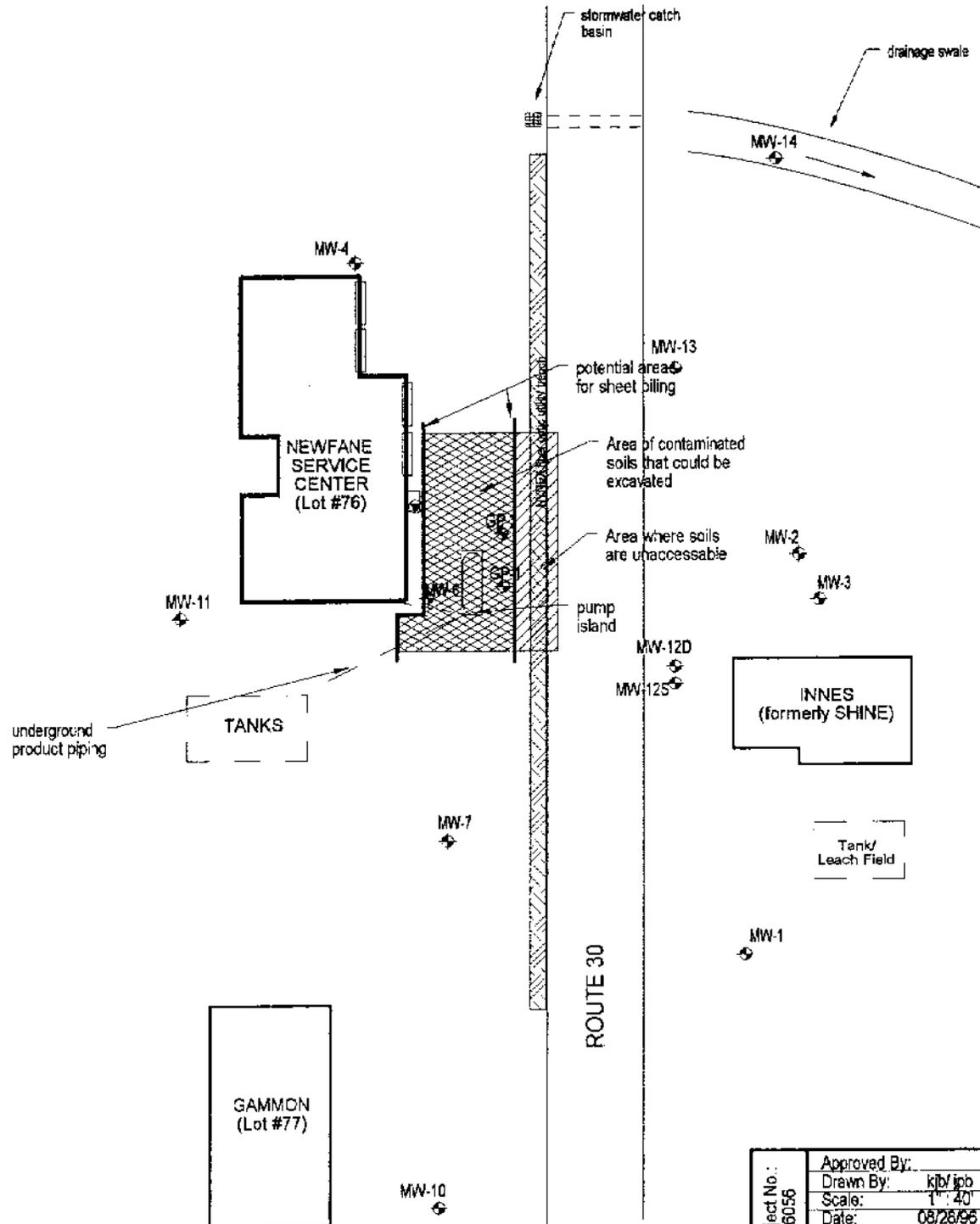
LEGEND

- MW-1 monitoring well location
- (40,000) BTEX concentration (ug/l) on 06/10/97. Isopleths based on limited analytical data.
- survey bench mark location.

NOTES:
 1. Monitoring wells surveyed by TSEC on 06/10/97.



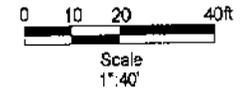
Project No.: 96056	Approved By:	TWIN STATE ENVIRONMENTAL CORP. 1A Huntington Rd. P.O. Box 719 Richmond, Vermont (802) 434-3350	FIGURE 7 BTEX Isopleth Plan Newfane Service Center Newfane, Vermont
	Drawn By: kjb/ job		
	Scale: 1" = 40'		
	Date: 06/28/96		
	Revised: 06/25/97		
	Revised By: kjb		



LEGEND

- MW-1  monitoring well location
-  survey bench mark location.

- NOTES:**
1. Monitoring wells surveyed by TSEC on 05/10/97.
 2. See Table 7 for removal estimates.



Project No.: 96056	Approved By: _____	TWIN STATE ENVIRONMENTAL CORP. 1A Huntington Rd. P.O. Box 719 Richmond, Vermont (802) 434-3360	FIGURE B Estimated Remedial Area Newfane Service Center Newfane, Vermont
	Drawn By: kjb/jpb		
	Scale: 1" = 40'		
	Date: 08/28/96		
	Revised: 06/25/97		
	Revised By: kjb		

TABLES

TABLE 1

HEADSPACE FIELD SCREENING SUMMARY

Newfane Service Station
Newfane Vermont

May 28 and 29, 1997

Sample ID	Depth, ft bgs		
	0 - 4	4 - 8	8 - 12
	Concentration, ppmv		
SB-1	1	9	4
SB-2	<1.0	<1.0	<1.0
SB-3	3	1,088	nc
SB-4	1,075 (product)	1,254 (product)	nc
SB-5	13	7	nc
SB-6	420	968	424
SB-7	2	3	nc
SB-8	676	675	nc
SB-9	16	3	3
SB-10	1	1	nc
SB-11	<1.0	<1.0	<1.0
SB-12	2.3/0.8	nc	nc

Notes:

1. ppmv - parts-per-million volume.
2. Volatile organic compounds measured with a Thermo Environmental Instruments Model 580B photoionization detector (PID) with a 10.6 eV lamp. The instrument was calibrated with an isobutylene standard, and a quality control check sample was also tested to ensure the accuracy of the data.
3. nc - not collected

TABLE 2

SOIL GAS AND SOIL SAMPLING SUMMARY TABLE

Newfane Service Station

Newfane Vermont

May 27, 28 and 29, 1997

Sample ID	SB-3/SG-11 0 - 4	SB-4/SG-12 4 - 8	SB-5/SG-13 0 - 4	SB-6/SG-3 4 - 8	SB-8/SG-5 0 - 4	SB-8 4 - 8	SB-9/SG-7 0 - 4
Soil Data from Endyne, Inc., ug/kg							
benzene	<10	<200	<10	<100	<1,000	<50	<10
toluene	<10	423	<10	229	40,600	440	<10
ethylbenzene	<10	1,790	<10	453	30,200	323	<10
xylene	<20	17,400	<20	3,630	261,000	2,090	<20
BTEX	--	19,613	--	4,312	331,800	2,853	--
MTBE	<20	<400	<20	<200	<2,000	<100	<20
TPH	<1,000	487,000	<1,000	644,000	3,890,000	42,200	<1,000
Soil Data from on-site mobile lab, ug/kg							
benzene	<5	33	<5	18	<5	<5	<5
toluene	<5	210	<5	160	62	46	<5
ethylbenzene	<5	680	<5	11	370	150	<5
xylene	16	1,600	<5	190	420	450	<5
BTEX	16	2,500	--	380	852	646	--
MTBE	<10	560	<10	341	<10	<10	<10
PID	3.3/1,088*	1,254	13.0	968	676	675	16
Soil Gas Data from on-site mobile lab, ppmv							
depth (ft bgs)	0.5	0.5	1.0	1.3	0.7	nt	1.0
benzene	57	4.7	<1	<1	20	nt	<1
toluene	14	20	<1	<1	23	nt	<1
ethylbenzene	<1	<1.0	<1	<1	<1	nt	<1
xylene	3	7.8	<1	<1	5	nt	<1
BTEX	74	33	--	--	48	nt	--
MTBE	7.4	9	<1	<1	15	nt	<1
PID	345	450	5.0	22	308	nt	12
Product Detected	no	yes	no	no	no	no	no

Notes:

1. Lab testing by EPA Method 8020/8260.
2. Mobile lab data by Mod. EPA Method 8020(GC, purge and trap with PID and FID).
3. Field screening of soil and soil gas samples using a Thermo Environmental Instruments Model 580B photoionization detector (PID) with a 10.6 eV lamp.
4. nt - not tested.
5. * - conc. of 3.3 ppmv from 0-4 ft sample, conc. of 1,088 ppmv from rock refusal at 4.1 ft bgs.

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TABLE 3
SUMMARY OF GROUNDWATER ELEVATIONS
 Newfane Service Center
 Newfane, Vermont

June 10, 1997

Well Identification	Top of Riser Elev.	Depth to Product	Depth to Water toc	Depth of Well toc	Thickness of Water Table in Well	Water Table Elev.
MW-1	97.58	nd	4.76	8.83	4.07	92.82
MW-2	98.21	nd	4.40	39.60	35.20	93.81
MW-3	99.53	nd	5.97	11.73	5.76	93.56
MW-4	105.12	nd	6.43	12.50	6.07	98.69
MW-6	99.17	sheen	1.60	11.84	10.24	97.57
MW-7	100.67	nd	3.56	11.00	7.44	97.11
MW-10	102.12	nd	4.55	10.72	6.17	97.57
MW-11	104.36	nd	4.87	9.60	4.73	99.49
MW-12S	98.91	nd	4.22	4.42	0.20	94.69
MW-12D	98.86	nd	4.18	9.20	5.02	94.68
MW-13	97.42	nd	3.26	11.20	7.94	94.16
MW-14	94.44	nd	2.81	4.52	1.71	91.63
GP-1	98.85	nd	1.98	6.90	4.92	96.87
GP-2	98.59	nd	2.21	7.00	4.79	96.38

Notes:

1. Elevation data are referenced to a TBM and are in units of feet. Survey data from TSEC on 06/10/97.
2. ND - Not detected.
3. NA - Not applicable.
4. Measurements recorded are referenced to a marking on top of PVC riser for each well.
5. Depth to fluid measurements were obtained using an ART Interface probe.
6. MW-2 is a bedrock well.

TABLE 4

GROUNDWATER MONITORING WELL SUMMARY TABLE

Newfane Service Center
Newfane, Vermont

June 10, 1997

Test	Benzene	Toluene	Ethyl- benzene	Total Xylenes	Total BTEX	MTBE
Sample ID	Concentration, ug/l					
MW-1	<1	<1	<1	<1	--	<10
MW-2	7.9	<1	<1	<1	7.9	40.3
MW-3	2.4	<1	<1	<1	2.4	22.6
MW-4	<1	<1	<1	<1	--	27.8
MW-6	1,970	21,600	2,780	15,400	41,750	<2,500
MW-7	<1	<1	<1	<1	--	TBQ<10
MW-10	<1	<1	<1	<1	--	<10
MW-11	<1	<1	<1	<1	--	TBQ<10
MW-12S	<1	<1	<1	<1	--	<10
MW-12D	6.5	<1	<1	<1	6.5	20.8
MW-13	171	<2	<2	6.4	177	34.8
MW-14	<1	<1	<1	<1	--	TBQ<10
GP-1	8,830	25,700	1,420	9,980	45,930	TBQ<5,000
GP-2	6,490	62,000	3,830	21,100	93,420	<10,000
DUP-1(MW-1)	<1	<1	<1	<1	--	<10
FB-1	<1	<1	<1	<1	--	<10
MCL	5.0	1,000	700	10,000	--	40 (1)

Notes:

1. MCL - Maximum Contaminant Level established by the USEPA.
2. (1) - Vermont Health Advisory (VHA) standard for MTBE.
3. All samples were tested using EPA Method 602, 8020 or 8260.
4. Bold and italicised numbers indicate MCL or VHA exceedence.
5. TBQ - Trace below quantitation limit of laboratory methodology.
7. MW-2 is a bedrock well.

TABLE 5

GROUNDWATER SUMMARY TABLE

Newfane Service Center
Newfane, Vermont

June 10, 1997

Test	pH	Total Iron	Total Hardness	Total Manganese
Sample ID		Concentration, mg/l		
MW-11	6.28	0.118	55.6	0.207
MW-12D	6.33	0.103	54.2	0.505
MW-13	6.65	0.236	78.2	1.820
Limits	6.5-8.5	0.300	(see 3)	0.050

Notes:

- 1. Tested using EPA Method 200.7.*
- 2. Limits - EPA secondary drinking water levels.*
- 3. Per American Society of Agricultural Engineers these levels are considered slightly/moderately hard.*

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TABLE 6

WATER SUPPLY SUMMARY TABLE

Newfane Service Center
Newfane, Vermont

June 10, 1997

Test		Benzene	Toluene	Ethyl- benzene	Total Xylenes	Total BTEX	MTBE
Sample ID	Lot #	Concentration, ug/l					
Graham	16	<1	<1	<1	<1	--	TBQ<10
Mann	17	<1	<1	<1	<1	--	<10
Golding	18	<1	<1	<1	<1	--	TBQ<10
Hall	21	<1	<1	<1	<1	--	<10
Wright	23	<1	<1	<1	<1	--	<10
Brooks	24	<1	<1	<1	<1	--	<10
Casanova	25	<1	<1	<1	<1	--	<10
Lawley	26	<1	<1	<1	<1	--	12.9
McGourty	27	<1	<1	<1	<1	--	<10
Vorce	65	<1	<1	<1	<1	--	13.0
Innes Pre Filter	66	2.3	<1	<1	<1	2.3	11.1
Innes Post Filter	66	<1	<1	<1	<1	--	<10
Marx	67	<1	5.6	<1	<1	5.6	<10
Krivanec	68	<1	<1	<1	<1	--	<10
Morrill	74	<1	<1	<1	<1	--	<10
Morrill	75	<1	<1	<1	<1	--	<10
Store	76	<1	<1	<1	<1	--	<10
Gammon	77	<1	<1	<1	<1	--	TBQ<10
Lamoria	78	TBQ<1	<1	<1	<1	--	31.1
Trip Blank	--	<1	<1	<1	<1	--	<10
MCL		5.0	1,000	700	10,000	--	40 (1)

Notes:

1. MCL - Maximum Contaminant Level established by the USEPA.
2. (1) - Vermont Health Advisory (VHA) standard for MTBE.
3. All samples were tested using EPA Method 502, 8020 or 8260
4. Bold and italicised numbers indicate MCL or VHA exceedence.
5. Refer to Receptor Map (Figure 3) for lot # and residence sampled.
6. TBQ - trace below quantitation limit of laboratory methodology.

**TABLE 7
SOURCE AREA REMOVAL VOLUME ESTIMATE**

**Newfane Service Center
Newfane, Vermont**

Based on soil volume

Total Volume			Under Rte 30	Adjacent to building	Effective Removal Volume	Volume Left In place	% Removed	% Remaining
Surface area	depth	volume	volume	volume				
sq.ft.	ft	cu.yds.	cu.yds.	cu.yds.				
1,900	14	985	285	78	622	363	63%	37%

Under Rte 30

Surface area	depth	volume
sq.ft.	ft	cu.yds.
550	14	285

Adjacent to building

Surface area	depth	volume
sq.ft.	ft	cu.yds.
150	14	78

Based on contaminant distribution

Total Volume			Under Rte 30	Adjacent to building	Effective Removal Volume	Volume Left In place	% Removed	% Remaining
Surface area	depth	volume	volume	volume				
sq.ft.	ft	cu.yds.	cu.yds.	cu.yds.				
1,900	14	843	143	78	623	220	74%	26%

Under Rte 30

Surface area	depth	volume
sq.ft.	ft	cu.yds.
550	14	143

figuring this area has half the contaminant mass per volume of soil

Adjacent to building

Surface area	depth	volume
sq.ft.	ft	cu.yds.
150	14	78

APPENDIX A

SOIL GAS SURVEY RESULTS
Twin State Environmental Corporation Mobile Laboratory
 Analytical Results
 Volatile Organic Compounds by GC/PID/FID
 Soil Vapor Results in ppmv

Sample ID	SG-1/1.75'	SG-2/1.75'	SG-3/1.3'	SG-4/1.3'	SG-5/0-8"	SG-6/1.0'	SG-7/1.0	SG-8/0-8"	R.L.
Date Sampled	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	
Date Extracted	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	
Date Analyzed	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	
Compound									
Benzene	<1.0	<1.0	<1.0	18	20	9.2	<1.0	<1.0	1.0
Toluene	<1.0	<1.0	<1.0	17	23	2.1	<1.0	<1.0	1.0
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
Xylenes	<1.0	<1.0	<1.0	<1.0	5.0	<1.0	<1.0	<1.0	1.0
Total BTEX	--	--	--	35	48	11	--	--	--
MTBE	<1.0	<1.0	<1.0	9.4	15	13	<1.0	<1.0	1.0
GRO	--	--	--	--	--	--	--	--	
Field PID	29	12	22	330	308	220	12	4.0	

Field PID measurements were taken with a Thermo Environmental Instruments 580B photoionization detector.

SOIL GAS SURVEY RESULTS
Twin State Environmental Corporation Mobile Laboratory
 Analytical Results
 Volatile Organic Compounds by GC/PID/FID
 Soil Vapor Results in ppmv

Sample ID	SG-9/0-4"	SG-10/ 0-8"	SG-11/ 0-6"	SG-12/ 0-6"	SG-13/ 1.0'	SG-14/ 1.0'	SG-15/ 2.0'	SG-16/ 2.0'	R.L.
Date Sampled	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	
Date Extracted	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	
Date Analyzed	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	
Compound									
Benzene	<1.0	<1.0	57	4.7	<1.0	<1.0	<1.0	<1.0	1.0
Toluene	<1.0	<1.0	14	20	<1.0	<1.0	<1.0	<1.0	1.0
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
Xylenes	<1.0	<1.0	3.0	7.8	<1.0	<1.0	<1.0	<1.0	1.0
Total BTEX	--	--	74	33	--	--	--	--	--
MTBE	<1.0	<1.0	7.4	8.9	<1.0	<1.0	<1.0	<1.0	1.0
GRO	--	--	--	--	--	--	--	--	
Field PID	2.8	3.7	345	450	5.0	200	14	1.0	

Field PID measurements were taken with a Thermo Environmental Instruments 580B photoionization detector.

SOIL GAS SURVEY RESULTS
Twin State Environmental Corporation Mobile Laboratory
 Analytical Results
 Volatile Organic Compounds by GC/PID/FID
 Soil Vapor Results in ppmv

Sample ID	SG-17/ 2'	SG-18/ 2'	SG-19/ 2'	SG-20/ 2'	SG-21/ 2'	SG-22/ 2'	SG-23/ 2'	SG-24/ 2'	R.L.
Date Sampled	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	
Date Extracted	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	
Date Analyzed	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	05/27/97	
Compound									
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
Xylenes	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
Total BTEX	--	--	--	--	--	--	--	--	--
MTBE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
GRO	--	--	--	--	--	--	--	--	
Field PID	3.1	19	70	0.2	16	16	12	9	

Field PID measurements were taken with a Thermo Environmental Instruments 580B photoionization detector.

SOIL GAS SURVEY RESULTS
Twin State Environmental Corporation Mobile Laboratory
 Analytical Results
 Volatile Organic Compounds by GC/PID/FID
 Soil Vapor Results in ppmv

Sample ID	SG-25/ 2'	SG-26/ 2'	SG-28/ 2'						R.L.
Date Sampled	05/27/97	05/27/97	05/27/97						
Date Extracted	05/27/97	05/27/97	05/27/97						
Date Analyzed	05/27/97	05/27/97	05/27/97						
Compound									
Benzene	<1.0	<1.0	<1.0						1.0
Toluene	<1.0	<1.0	<1.0						1.0
Ethylbenzene	<1.0	<1.0	<1.0						1.0
Xylenes	<1.0	<1.0	<1.0						1.0
Total BTEX	--	--	--						--
MTBE	<1.0	<1.0	<1.0						1.0
GRO	--	--	--						
Field PID	9	16	6						

Field PID measurements were taken with a Thermo Environmental Instruments 580B photoionization detector.

APPENDIX B

SOIL SAMPLE RESULTS
Twin State Environmental Corporation Mobile Laboratory
 Analytical Results
 Volatile Organic Compounds by GC/PID/FID
 Soil Results in ug/kg (ppb)

Sample ID	SB-1/4-8'	SB-2/8-10.5'	SB-3/0-4'	SB-4/4-8'	SB-5/0-4'	SB-6/4-8'	SB-7/4-6'	SB-8/0-4'	R.L.
Date Sampled	05/28/97	05/28/97	05/28/97	05/28/97	05/28/97	05/28/97	05/28/97	05/28/97	
Date Extracted	05/28/97	05/28/97	05/28/97	05/28/97	05/28/97	05/28/97	05/28/97	05/28/97	
Date Analyzed	05/28/97	05/28/97	05/28/97	05/28/97	05/28/97	05/28/97	05/28/97	05/28/97	
Compound									
Benzene	<5.0	<5.0	<5.0	33	<5.0	18	<5.0	<5.0	5.0
Toluene	<5.0	<5.0	<5.0	210	<5.0	160	<5.0	62	5.0
Ethylbenzene	<5.0	<5.0	<5.0	680	<5.0	11	<5.0	370	5.0
Xylenes	<5.0	<5.0	16	1600	<5.0	190	<5.0	420	5.0
Total BTEX	--	--	16	2500	--	380	--	850	--
MTBE	<10	<10	<10	560	<10	341	<10	<10	10
GRO	--	--	--	--	--	--	--	--	--
Field PID	9.2	0.8	3.3/1,088*	1254	13	968	2.5	676	

Field PID measurements were taken with a Thermo Environmental Instruments 580B photoionization detector.

* - PID reading of 1,088 ppmv was at 4.1' in weathered rock.

SOIL SAMPLE RESULTS
Twin State Environmental Corporation Mobile Laboratory
 Analytical Results
 Volatile Organic Compounds by GC/PID/FID
 Soil Results in ug/kg (ppb)

Sample ID	SB-8/4-8'	SB-9/0-4'	--	--	--	--	--	--	--	R.L.
Date Sampled	05/28/97	05/28/97	--	--	--	--	--	--	--	
Date Extracted	05/28/97	05/28/97	--	--	--	--	--	--	--	
Date Analyzed	05/28/97	05/28/97	--	--	--	--	--	--	--	
Compound										
Benzene	<5.0	<5.0	--	--	--	--	--	--	--	5.0
Toluene	46	<5.0	--	--	--	--	--	--	--	5.0
Ethylbenzene	150	<5.0	--	--	--	--	--	--	--	5.0
Xylenes	450	<5.0	--	--	--	--	--	--	--	5.0
Total BTEX	650	--	--	--	--	--	--	--	--	--
MTBE	<10	<10	--	--	--	--	--	--	--	10
GRO	--	--	--	--	--	--	--	--	--	
Field PID	675	16	--	--	--	--	--	--	--	

Field PID measurements were taken with a Thermo Environmental Instruments 580B photoionization detector.



ENDYNE, INC.

JUN 20 REC'D

Laboratory Services

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

REPORT OF LABORATORY ANALYSIS

CLIENT: Twin State Environmental Corp.
PROJECT NAME: Newfane Service Ctr.
DATE REPORTED: June 16, 1997
DATE SAMPLED: May 28, 1997

PROJECT CODE: TSEC1463
REF. #: 104,672 - 104,675;
104,677 - 104,679

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

Chain of custody indicated proper sample preservation.

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

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

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

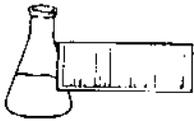
Analytical method precision and accuracy were monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

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ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 8020 COMPOUNDS BY EPA METHOD 8260

CLIENT: Twin State Environmental Corp.
PROJECT NAME: Newfane Service Center
REPORT DATE: June 16, 1997
SAMPLER: Ken Bisceglia
DATE SAMPLED: May 28, 1997
DATE RECEIVED: May 30, 1997

PROJECT CODE: TSEC1463
ANALYSIS DATE: June 11, 1997
STATION: SB-3 0-4
REF.#: 104,672
TIME SAMPLED: Not Indicated

<u>Parameter</u>	<u>Detection Limit (ug/kg)</u>	<u>Concentration As Received (ug/kg)</u>
Benzene	10	ND ¹
Chlorobenzene	10	ND
1,2-Dichlorobenzene	10	ND
1,3-Dichlorobenzene	10	ND
1,4-Dichlorobenzene	10	ND
Ethylbenzene	10	ND
Toluene	10	ND
Xylene	20	ND
MTBE	20	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

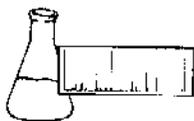
ANALYTICAL SURROGATE RECOVERY:

Dibromofluoromethane: 88.%
Toluene-d8: 108.%
4-Bromofluorobenzene: 100.%

PERCENT SOLIDS: 87.%

NOTES:

1 None Detected



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Laboratory Services

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FAX 879-7103

LABORATORY REPORT

EPA METHOD 8020 COMPOUNDS BY EPA METHOD 8260

CLIENT: Twin State Environmental Corp.
PROJECT NAME: Newfane Service Center
REPORT DATE: June 16, 1997
SAMPLER: Ken Bisceglia
DATE SAMPLED: May 28, 1997
DATE RECEIVED: May 30, 1997

PROJECT CODE: TSEC1463
ANALYSIS DATE: June 11, 1997
STATION: SB-4 4-8
REF.#: 104,673
TIME SAMPLED: Not Indicated

<u>Parameter</u>	<u>Detection Limit (ug/kg)¹</u>	<u>Concentration As Received (ug/kg)</u>
Benzene	200	ND ²
Chlorobenzene	200	ND
1,2-Dichlorobenzene	200	ND
1,3-Dichlorobenzene	200	ND
1,4-Dichlorobenzene	200	ND
Ethylbenzene	200	1,790.
Toluene	200	423.
Xylene	400	17,400.
MTBE	400	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

ANALYTICAL SURROGATE RECOVERY:

Dibromofluoromethane: 102.%
Toluene-d8: 96.%
4-Bromofluorobenzene: 108.%

PERCENT SOLIDS: 78.%

NOTES:

- 1 Detection limit increased due to high levels of contaminants. Sample run at a 5% dilution.
- 2 None Detected



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LABORATORY REPORT

EPA METHOD 8020 COMPOUNDS BY EPA METHOD 8260

CLIENT: Twin State Environmental Corp.
PROJECT NAME: Newfane Service Center
REPORT DATE: June 16, 1997
SAMPLER: Ken Bisceglia
DATE SAMPLED: May 28, 1997
DATE RECEIVED: May 30, 1997

PROJECT CODE: TSEC1463
ANALYSIS DATE: June 11, 1997
STATION: SB-5 0-4
REF.#: 104,674
TIME SAMPLED: Not Indicated

<u>Parameter</u>	<u>Detection Limit (ug/kg)</u>	<u>Concentration As Received (ug/kg)</u>
Benzene	10	ND ¹
Chlorobenzene	10	ND
1,2-Dichlorobenzene	10	ND
1,3-Dichlorobenzene	10	ND
1,4-Dichlorobenzene	10	ND
Ethylbenzene	10	ND
Toluene	10	ND
Xylene	20	ND
MTBE	20	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

ANALYTICAL SURROGATE RECOVERY:

Dibromofluoromethane: 80.%
Toluene-d8: 110.%
4-Bromofluorobenzene: 97.%

PERCENT SOLIDS: 86.%

NOTES:

1 None Detected



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LABORATORY REPORT

EPA METHOD 8020 COMPOUNDS BY EPA METHOD 8260

CLIENT: Twin State Environmental Corp.
PROJECT NAME: Newfane Service Center
REPORT DATE: June 16, 1997
SAMPLER: Ken Bisceglia
DATE SAMPLED: May 28, 1997
DATE RECEIVED: May 30, 1997

PROJECT CODE: TSEC1463
ANALYSIS DATE: June 11, 1997
STATION: SB-6 4-8
REF.#: 104,675
TIME SAMPLED: Not Indicated

<u>Parameter</u>	<u>Detection Limit (ug/kg)¹</u>	<u>Concentration As Received (ug/kg)</u>
Benzene	100	ND ¹
Chlorobenzene	100	ND
1,2-Dichlorobenzene	100	ND
1,3-Dichlorobenzene	100	ND
1,4-Dichlorobenzene	100	ND
Ethylbenzene	100	453.
Toluene	100	229.
Xylene	200	3,630.
MTBE	200	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

ANALYTICAL SURROGATE RECOVERY:

Dibromofluoromethane: 103.%
Toluene-d8: 99.%
4-Bromofluorobenzene: 102.%

PERCENT SOLIDS: 83.%

NOTES:

- 1 Detection limit increased due to high levels of contaminants. Sample run at a 10.% dilution.
- 2 None Detected



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LABORATORY REPORT

EPA METHOD 8020 COMPOUNDS BY EPA METHOD 8260

CLIENT: Twin State Environmental Corp.
PROJECT NAME: Newfane Service Center
REPORT DATE: June 16, 1997
SAMPLER: Ken Bisceglia
DATE SAMPLED: May 28, 1997
DATE RECEIVED: May 30, 1997

PROJECT CODE: TSEC1463
ANALYSIS DATE: June 11, 1997
STATION: SB-8 0-4
REF.#: 104,677
TIME SAMPLED: Not Indicated

<u>Parameter</u>	<u>Detection Limit (ug/kg)¹</u>	<u>Concentration As Received (ug/kg)</u>
Benzene	1000	ND ²
Chlorobenzene	1000	ND
1,2-Dichlorobenzene	1000	ND
1,3-Dichlorobenzene	1000	ND
1,4-Dichlorobenzene	1000	ND
Ethylbenzene	1000	30,200.
Toluene	1000	40,600.
Xylene	2000	261,000.
MTBE	2000	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

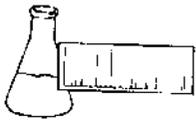
ANALYTICAL SURROGATE RECOVERY:

Dibromofluoromethane: 106.%
Toluene-d8: 94.%
4-Bromofluorobenzene: 103.%

PERCENT SOLIDS: 79.%

NOTES:

- 1 Detection limit increased due to high levels of contaminants. Sample run at a 1.% dilution.
- 2 None Detected



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LABORATORY REPORT

EPA METHOD 8020 COMPOUNDS BY EPA METHOD 8260

CLIENT: Twin State Environmental Corp.
PROJECT NAME: Newfane Service Center
REPORT DATE: June 16, 1997
SAMPLER: Ken Bisceglia
DATE SAMPLED: May 28, 1997
DATE RECEIVED: May 30, 1997

PROJECT CODE: TSEC1463
ANALYSIS DATE: June 11, 1997
STATION: SB-8 4-8
REF.#: 104,678
TIME SAMPLED: Not Indicated

<u>Parameter</u>	<u>Detection Limit (ug/kg)¹</u>	<u>Concentration As Received (ug/kg)</u>
Benzene	50	ND ²
Chlorobenzene	50	ND
1,2-Dichlorobenzene	50	ND
1,3-Dichlorobenzene	50	ND
1,4-Dichlorobenzene	50	ND
Ethylbenzene	50	323.
Toluene	50	440.
Xylene	100	2,090.
MTBE	100	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

ANALYTICAL SURROGATE RECOVERY:

Dibromofluoromethane: 102.%
Toluene-d8: 99.%
4-Bromofluorobenzene: 101.%

PERCENT SOLIDS: 77.%

NOTES:

- 1 Detection limit increased due to high levels of contaminants. Sample run at a 20.% dilution.
- 2 None Detected



ENDYNE, INC.

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LABORATORY REPORT

EPA METHOD 8020 COMPOUNDS BY EPA METHOD 8260

CLIENT: Twin State Environmental Corp.
PROJECT NAME: Newfane Service Center
REPORT DATE: June 16, 1997
SAMPLER: Ken Bisceglia
DATE SAMPLED: May 28, 1997
DATE RECEIVED: May 30, 1997

PROJECT CODE: TSEC1463
ANALYSIS DATE: June 11, 1997
STATION: SB-9 0-4
REF.#: 104,679
TIME SAMPLED: Not Indicated

<u>Parameter</u>	<u>Detection Limit (ug/kg)</u>	<u>Concentration As Received (ug/kg)</u>
Benzene	10	ND ¹
Chlorobenzene	10	ND
1,2-Dichlorobenzene	10	ND
1,3-Dichlorobenzene	10	ND
1,4-Dichlorobenzene	10	ND
Ethylbenzene	10	ND
Toluene	10	ND
Xylene	20	ND
MTBE	20	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

ANALYTICAL SURROGATE RECOVERY:

Dibromofluoromethane: 83.%
Toluene-d8: 111.%
4-Bromofluorobenzene: 101.%

PERCENT SOLIDS: 81.%

NOTES:

1 None Detected

'SE' 14' W

CHAIN-OF-CUSTODY RECORD

21298

96-056 104,670 — 104,689

Project Name: <i>NEWFANE SERVICE CTR.</i>	Reporting Address: <i>P.O. Box 719 Richmond, VT 05477</i>	Billing Address: <i>SAME</i>
Site Location: <i>NEWFANE, VT</i>		
Endyne Project Number: <i>TSEC1463</i>	Company: <i>TSEC</i>	Sampler Name: <i>Ken Bisceglia</i>
	Contact Name/Phone #: <i>Ken Bisceglia</i>	Phone #: <i>SAME</i>

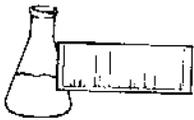
Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
104,670	SB-1 4-8'	SO		✓	5/28/97	1	40 ML VOA	Cancelled as per Ken	8030/7500 as req.	ICE	N
104,671	SB-2 8-10.5'	SO		✓	5/28/97	1	40 ML VOA	Cancelled as per Ken			
104,672	SB-3 0-4	SO		✓	5/28/97	1	40 ML VOA				
104,673	SB-4 4-8										
104,674	SB-5 0-4										
104,675	SB-6 4-8										
104,676	SB-7 4-6							Cancelled as per Ken			
104,677	SB-8 0-4										
104,678	SB-8 4-8										
104,679	SB-9 0-4										

Relinquished by: Signature <i>Ken J. Bisceglia</i>	Received by: Signature <i>Roman Wagner</i>	Date/Time <i>5/30/97 0900</i>
Relinquished by: Signature <i>Roman Wagner</i>	Received by: Signature <i>[Signature]</i>	Date/Time <i>5/30/97 5:30</i>

New York State Project: Yes No

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrite N	9	BOD ₅	14	Turbidity	19	BTEX	24	EPA 606 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.

JUN 20 REC'D

Laboratory Services

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

REPORT OF LABORATORY ANALYSIS

CLIENT: Twin State Environmental Corp.
PROJECT NAME: Newfane Service Center
DATE REPORTED: June 16, 1997
DATE SAMPLED: May 28, 1997

PROJECT CODE: TSEC1464
REF. #: 104,682 - 104,685;
104,687 - 104,689

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

Chain of custody indicated proper sample preservation.

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

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

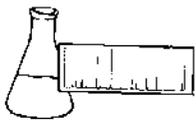
Blank contamination was not observed at levels affecting the analytical results.

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

TOTAL PETROLEUM HYDROCARBONS (TPH) BY MODIFIED EPA METHOD 8015

DATE: June 16, 1997
CLIENT: Twin State Environmental Corp.
PROJECT: Newfane Service Center
PROJECT CODE: TSEC1464
COLLECTED BY: Ken Bisceglia
DATE SAMPLED: May 28, 1997
DATE RECEIVED: May 30, 1997

Reference #	Sample ID	Concentration As Received (mg/kg) ¹
104,682	SB-3; 0-4	ND ²
104,683	SB-4 4-8	487.
104,684	SB-5 0-4	ND
104,685	SB-6 4-8	644.
104,687	SB-8 0-4	3,890.
104,688	SB-8 4-8	42.2
104,689	SB-9 0-4	ND

Notes:

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

NEWFANE SOILS / SOIL GAS
ENGINE
MOBILE LAB

Laboratory Data Validation Checklist

Job Name: NEWFANE SERVICE CTR.

Job Number: 96-056

Receive Date: 5/30/99

Sample Date: 5/28/97 - soil borings

Sample ID's: soil borings - ✓

Analysis Date: soil borings - analyzed on 14th day

Reporting Units: ✓

DLM: ✓

MS Recovery: N/A

MSD Recovery: ↓

% RSD: ↓

Surrogate Rec: ✓

COC Attached: ✓

Sensibility:

TB/EB/FB <DL N/A

Duplicate match N/A

Past History Anomalies -

APPENDIX C



TWIN STATE ENVIRONMENTAL CORPORATION

1A Huntington Road, P.O. Box 719 Richmond, Vermont 05477
 (802) 434-3350 FAX: (802) 434-4478

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	MW-11	WELL DEPTH:	10.0ft	BORING DEPTH:	10.0ft
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	4.87ft		
PROJECT NO:	96056	SCREEN DIA:	2in.	DEPTH:	4.0 to 10.0ft
INSTALL DATE:	05/29/97	SCREEN TYPE/SIZE:	sch. 40 PVC/0.020in slot		
TSEC REP:	Ken Bisceglia	RISER TYPE:	sch. 40 PVC		
DRILLING CO:	Cushing & Sons	RISER DIA.:	2in	DEPTH:	0.5 to 4.0ft
DRILLING METHOD:	Air Rotary	GUARD TYPE:	8in. steel		
SAMPLING METHOD:		RISER CAP:	expansion plug		
REMARKS:					

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND	
0							
1							
2							
3							
4			4	0.8		grab from drill cuttings	
5							
6							
7							
8			8	1.3		grab from drill cuttings	
9							
10		10	1.1		grab from drill cuttings		
11							
12							

GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 M.DENSE 30-50 DENSE >50 V.DENSE	COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD	PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%	NOTES: 1. Drilling was performed by Cushing & Sons of Keene, NH. 2. PID readings were obtained using a Thermo Environmental Instruments Model 580B PID equipped with a 10.6eV lamp and jar heads/jar sampling technique.
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TWIN STATE ENVIRONMENTAL CORPORATION

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 (802) 434-3350 FAX: (802) 434-4478

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	MW-12S/MW-12D/ SB-2	WELL DEPTH:	5.0/10.0ft	BORING DEPTH:	11.0ft
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	4.22/4.18ft BTOC		
PROJECT NO:	96056	SCREEN DIA:	2in.	DEPTH:	3-5ft/8-10ft
INSTALL DATE:	05/29/97	SCREEN TYPE/SIZE:	sch. 40 PVC/0.020in slot		
TSEC REP:	Ken Bisceglia	RISER TYPE:	sch. 40 PVC		
DRILLING CO:	TSEC/Cushing & Sons	RISER DIA:	2in	DEPTH:	0.5-3/0.5-8ft
DRILLING METHOD:	Air Rotary	GUARD TYPE:	8in. steel		
SAMPLING METHOD:	Geoprobe® 05/28/97 4ft Macrocore	RISER CAP:	expansion plugs		
REMARKS:					

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND	
0	12D 12S					CEMENT GROUT NATIVE BACKFILL BENTONITE SEAL SAND PACK WELL SCREEN RISER PIPE	
1							
2		0 - 4	0.6	3.5	brn. LOAM, some decayed wood, silty f. sand, gravel, tr. clay, loose/s. dense, damp		
3							
4							
5		4 - 8	0.6	3.5	brn. SILTY F. SAND, some gravel & rock frags. & m/c sand, m. dense, damp		
6							
7							
8							
9		8 - 10.5	0.6	2.5	brn. SILTY F. SAND, some gravel & rock frags. & m/c sand, m. dense, moist		
10							
11							
12					refusal at 10.5 with Geoprobe®		
GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 MDENSE 30-50 DENSE >50 V.DENSE		COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 LIQID		PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		NOTES: 1. Soils were characterized using TSEC's Geoprobe®. Drilling was performed by Cushing & Sons of Keene, NH. 2. PID readings were obtained using a Thermo Environmental Instruments Model 580B PID equipped with a 10.6eV lamp and jar headspace sampling technique	



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MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	MW-13/SB-1	WELL DEPTH:	12.0ft	BORING DEPTH:	14.0ft
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	3.26ft		
PROJECT NO:	96056	SCREEN DIA:	2in.	DEPTH:	4.0 to 12.0ft
INSTALL DATE:	05/29/97	SCREEN TYPE/SIZE:	sch. 40 PVC/0.020in slot		
TSEC REP:	Ken Bisceglia	RISER TYPE:	sch. 40 PVC		
DRILLING CO:	TSEC/Cushing & Sons	RISER DIA.:	2in	DEPTH:	0.5 to 4.0ft
DRILLING METHOD:	Air Rotary	GUARD TYPE:	8in. steel		
SAMPLING METHOD:	Geoprobe® 05/28/97 4ft Macrocore	RISER CAP:	expansion plug		
REMARKS:					

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND	
0							
1							
2		0 - 4	1.0	2.5	poorly sorted FILL over brn. SILTY FINE SAND, some m/c sand & gravel, loose, damp, no odor		
3							
4							
5							
6		4 - 8	9.2	3.0	top 2 ft: lt. brn. SILTY FINE SAND, some m/c sand, gravel & rock frags, m. dense, moist/wet bottom 1 ft: gray SILTY FINE SAND and rock frags., moist		
7							
8							
9							
10		8 - 12	3.5	3.5	brn. f/m/c SAND and ROCK FRAGS., some silt, loose/s. dense, moist		
11							
12							
13							
14					Bedrock encountered at 14ft		
GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 M.DENSE 30-50 DENSE >50 V.DENSE		COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD		PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		NOTES: 1. Soils were characterized using TSEC's Geoprobe®. Drilling was performed by Cushing & Sons of Keene, NH. 2. PID readings were obtained using a Thermo Environmental Instruments Model 580B PID equipped with a 10.6eV lamp and jar headspace sampling technique.	



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MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	MW-14/SB-12	WELL DEPTH:	2.5ft	BORING DEPTH:	2.7ft
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	0.81ft		
PROJECT NO:	96056	SCREEN DIA:	1in.	DEPTH:	1.5 to 2.5ft
INSTALL DATE:	05/29/97	SCREEN TYPE/SIZE:	sch. 40 PVC/0.010in slot		
TSEC REP:	Ken Bisceglia	RISER TYPE:	sch. 40 PVC		
DRILLING CO:	TSEC	RISER DIA.:	1in	DEPTH:	2.0ags to 1.5ft
DRILLING METHOD:	direct push hand tools	GUARD TYPE:	none		
SAMPLING METHOD:	Geoprobe® 05/29/97 2ft Largebore	RISER CAP:	expansion plug		
REMARKS:					

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND	
3		0 - 2	2.3	1.8	brn. LOAM, loose, saturated	CEMENT GROUT NATIVE BACKFILL BENTONITE SEAL	
2		2 - 3	0.8	1.0	brn. f/m/c SAND, some gravel, loose, saturated	SAND PACK WELL SCREEN RISER PIPE	
1							
0							
1							
2							
3							
4							
5							
6							
7							
GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 M.DENSE 30-50 DENSE >50 V.DENSE		COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD		PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		NOTES: 1. Soils were characterized using TSEC's Geoprobe®. 2. PID readings were obtained using a Thermo Environmental Instruments Model 58013 PID equipped with a 10.6eV lamp and jar headspace sampling technique.	

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MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	SB-3	WELL DEPTH:	BORING DEPTH:	4.1 FT
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	NA	
PROJECT NO:	96056	SCREEN DIA:	DEPTH:	
INSTALL DATE:		SCREEN TYPE/SIZE:		
TSEC REP:	Ken Bisceglia	RISER TYPE:		
DRILLING CO.:		RISER DIA.:	DEPTH:	
DRILLING METHOD:		GUARD TYPE:		
SAMPLING METHOD:	Geoprobe® 05/28/97 4ft Macrocore	RISER CAP:		
REMARKS:				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND
0		0 - 4	3.3	3.5	TOP 3.0ft: COARSE FILL, loose, saturated Bottom 0.5ft: brn. SILTY F. SAND, some m/c sand & gravel, weathered rock 1" in tip, m. dense, moist	CEMENT GROUT
1			723			NATIVE BACKFILL
2		4 - 4.1	1088	0.1	weathered rock, strong gas odor	BENTONITE SEAL
3						
4					Refusal at 4.1 ft	SAND PACK
5						WELL SCREEN
6						RISER PIPE
7						
8						
9						
10						
11						
12						

GRANULAR SOILS		COHESIVE SOILS		PROPORTIONS USED	
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	TRACE	0-10%
0-4	V.LOOSE	<2	V.SOFT	LITTLE	10-20%
4-10	LOOSE	2-4	SOFT	SOME	20-35%
10-30	M.DENSE	4-8	M.STIFF	AND	35-50%
30-50	DENSE	8-15	STIFF		
>50	V.DENSE	15-30	V.STIFF		
		>30	HARD		

NOTES:
 1. Soils were characterized using TSEC's Geoprobe®.
 2. PID readings were obtained using a Thermo Environmental Instruments Model 5803 PID equipped with a 10.6eV lamp and jar headspace sampling technique.

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MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	SB-4	WELL DEPTH:	BORING DEPTH:	7.5 FT
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	NA	
PROJECT NO:	96056	SCREEN DIA:	DEPTH:	
INSTALL DATE:		SCREEN TYPE/SIZE:		
TSEC REP:	Ken Bisceglia	RISER TYPE:		
DRILLING CO:		RISER DIA.:	DEPTH:	
DRILLING METHOD:		GUARD TYPE:		
SAMPLING METHOD:	Geoprobe® 05/28/97 4ft Macrocore	RISER CAP:		
REMARKS:				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND	
0						CEMENT GROUT NATIVE BACKFILL BENTONITE SEAL SAND PACK WELL SCREEN RISER PIPE	
1		0 - 4	1075 product	1	f/m/c SAND & GRAVEL, loose, wet		
2							
3							
4							
5		4 - 7.5	1254 product	3.5	brn. SILTY F. SAND, some m/c sand & rock frags., dense, damp		
6							
7		7.5	750	0.1	weathered rock		
8							
9							
10							
11							
12							
GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 MDENSE 30-50 DENSE >50 V.DENSE		COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD		PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		NOTES: 1. Soils were characterized using TSEC's Geoprobe®. 2. PID readings were obtained using a Thermo Environmental Instruments Model 580B PID equipped with a 10.6eV lamp and jar headspace sampling technique.	

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MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	SB-5	WELL DEPTH:	BORING DEPTH:	5.0 FT
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	NA	
PROJECT NO:	96056	SCREEN DIA:	DEPTH:	
INSTALL DATE:		SCREEN TYPE/SIZE:		
TSEC REP:	Ken Bisceglia	RISER TYPE:		
DRILLING CO:		RISER DIA:	DEPTH:	
DRILLING METHOD:		GUARD TYPE:		
SAMPLING METHOD:	Geoprobe® 05/28/97 4ft Macrocore	RISER CAP:		
REMARKS:				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND
0						
1		0 - 4	13	2.0	top 1.0 ft: SAND & GRAVEL, loose, wet bottom 1.0 ft: brn. SILTY F. SAND, some m/c sand & gravel & rock frags., m. dense/dense, damp	
2						
3						
4		1 - 5	7.0	1.0	gray SILTY F. SAND, some m/c sand & gravel & rock frags., dense, moist	
5					Refusal at 5.0ft	
6						
7						
8						
9						
10						
11						
12						

GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 MDENSE 30-50 DENSE >50 V.DENSE		COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD		PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		NOTES: 1. Soils were characterized using TSEC's Geoprobe®. 2. PID readings were obtained using a Thermo Environmental Instruments Model 580B PID equipped with a 10.6eV lamp and jar headspace sampling technique.
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MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	SB-6	WELL DEPTH:	BORING DEPTH:	10.0 FT
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	NA	
PROJECT NO:	96056	SCREEN DIA:	DEPTH:	
INSTALL DATE:		SCREEN TYPE/SIZE:		
TSEC REP:	Ken Bisceglia	RISER TYPE:		
DRILLING CO:		RISER DIA:	DEPTH:	
DRILLING METHOD:		GUARD TYPE:		
SAMPLING METHOD:	Geoprobe® 05/28/97 4ft Macrocore	RISER CAP:		
REMARKS:				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND
0						
1						
2		0 - 4	420	3.5	top 1.0 ft: SAND & GRAVEL, loose, moist bottom 2.5 ft: brn./gray SILTY F. SAND, some m/c sand & gravel & rock frags., m. dense moist	
3						
4						
5						
6		4 - 8	968	3.0	brn. SILTY F. SAND, some m/c sand & gravel & rock frags., tr. clay, dense, moist	
7						
8						
9		8 - 10	424	2.0	brn. SILTY F. SAND, some m/c sand & gravel & rock frags., tr. clay, dense, moist	
10						
11						
12						
GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 M.DENSE 30-50 DENSE >50 V.DENSE		COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD		PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		NOTES: 1 Soils were characterized using TSEC's Geoprobe®. 2. PID readings were obtained using a Thermo Environmental Instruments Model 5803 PID equipped with a 10.6eV lamp and jar headspace sampling technique.

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MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	SB-7	WELL DEPTH:	BORING DEPTH:	6.0 FT
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	NA	
PROJECT NO:	96056	SCREEN DIA:	DEPTH:	
INSTALL DATE:		SCREEN TYPE/SIZE:		
TSEC REP:	Ken Bisceglia	RISER TYPE:		
DRILLING CO:		RISER DIA.:	DEPTH:	
DRILLING METHOD:		GUARD TYPE:		
SAMPLING METHOD:	Geoprobe® 05/28/97 2ft Largebore	RISER CAP:		
REMARKS:				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND
0						CEMENT GROUT NATIVE BACKFILL BENTONITE SEAL SAND PACK WELL SCREEN RISER PIPE
1		0 - 2	2.0	1.8	FILL, loose, wet	
2						
3		2 - 4	2.0	1.0	FILL, loose, wet	
4						
5	4 - 6	2.5	1.0	FILL, loose, wet		
6						
7						
8						
9						
10						
11						
12						

GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 M.DENSE 30-50 DENSE >50 V.DENSE	COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD	PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 33-50%	NOTES: 1. Soils were characterized using TSEC's Geoprobe® 2. PID readings were obtained using a Thermo Environmental Instruments Model 580B PID equipped with a 10.6eV lamp and jar headspace sampling technique.
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MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	SB-8	WELL DEPTH:	BORING DEPTH:	7.0 FT
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	NA	
PROJECT NO:	96056	SCREEN DIA:	DEPTH:	
INSTALL DATE:		SCREEN TYPE/SIZE:		
TSEC REP:	Ken Bisceglia	RISER TYPE:		
DRILLING CO:		RISER DIA.:	DEPTH:	
DRILLING METHOD:		GUARD TYPE:		
SAMPLING METHOD:	Geoprobe® 05/28/97 4ft Macrocore	RISER CAP:		
REMARKS:				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND	
0						CEMENT GROUT NATIVE BACKFILL BENTONITE SEAL SAND PACK WELL SCREEN RISER PIPE	
1							
2		0 - 4	676/975 tr. product at 1.5ft	2.5		top 1.0 ft: FILL, loose, wet bottom 1.5 ft: gray SILTY F. SAND, some m/c sand & gravel & rock frags., loose/m. dense, moist	
3							
4							
5		4 - 7	1193 793	3.0 rock on tip		gray/brn. SILTY F. SAND, some m/c sand & gravel & rock frags., loose/m. dense, moist	
6							
7							
8							
9							
10							
11							
GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 M.DENSE 30-50 DENSE >50 V.DENSE		COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD		PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		NOTES: 1. Soils were characterized using TSEC's Geoprobe®. 2. PID readings were obtained using a Thermo Environmental Instruments Model 580R PID equipped with a 10.6eV lamp and jar headspace sampling technique.	

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MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	SB-9	WELL DEPTH:	BORING DEPTH:	9.0 FT
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	NA	
PROJECT NO:	96056	SCREEN DIA:	DEPTH:	
INSTALL DATE:		SCREEN TYPE/SIZE:		
TSEC REP:	Ken Bisceglia	RISER TYPE:		
DRILLING CO:		RISER DIA:	DEPTH:	
DRILLING METHOD:		GUARD TYPE:		
SAMPLING METHOD:	Geoprobe® 05/28/97 4ft Macrocore	RISER CAP:		
REMARKS:				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND	
0							
1							
2		0 - 4	1.6	1.0	FILL, loose, wet		
3							
4							
5							
6		4 - 8	2.5	3.2	brn. SILTY F. SAND, some m/c sand & gravel, dense, moist		
7							
8		8 - 9	2.5	1.0	brn. SILTY F. SAND, some m/c sand & gravel, dense, damp		
9							
10							
11							
GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 M.DENSE 30-50 DENSE >50 V.DENSE		COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD		PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		NOTES: 1. Soils were characterized using TSEC's Geoprobe®. 2. PID readings were obtained using a Thermo Environmental Instruments Model 580B PID equipped with a 10.6eV lamp and jar headspace sampling technique.	
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MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	SB-10	WELL DEPTH:	BORING DEPTH:	5.0 FT
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	NA	
PROJECT NO:	96056	SCREEN DIA:	DEPTH:	
INSTALL DATE:		SCREEN TYPE/SIZE:		
TSEC REP:	Ken Bisceglia	RISER TYPE:		
DRILLING CO:		RISER DIA:	DEPTH:	
DRILLING METHOD:		GUARD TYPE:		
SAMPLING METHOD:	Geoprobe® 05/28/97 4ft Macrocore	RISER CAP:		
REMARKS:				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND	
0							
1							
2		0 - 4	1	3.0	orange/brn. F. SAND, some rock frags., loose, damp		
3							
4		4 - 5	1	1.0	brn. SILTY F. SAND, some m/c sand & gravel & rock frags., m. dense, damp		
5					Refusal at 5.0 ft		
6							
7							
8							
9							
10							
11							
GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 M.DENSE 30-50 DENSE >50 V.DENSE		COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD		PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		NOTES: 1. Soils were characterized using TSEC's Geoprobe®. 2. PID readings were obtained using a Thermo Environmental Instruments Model 580B PID equipped with a 10.6eV lamp and jet headspace sampling technique.	

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MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	SB-11	WELL DEPTH:	BORING DEPTH:	8.2 FT
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	NA	
PROJECT NO:	96056	SCREEN DIA:	DEPTH:	
INSTALL DATE:		SCREEN TYPE/SIZE:		
TSEC REP:	Ken Bisceglia	RISER TYPE:		
DRILLING CO:		RISER DIA:	DEPTH:	
DRILLING METHOD:		GUARD TYPE:		
SAMPLING METHOD:	Geoprobe® 05/28/97 4ft Macrocore	RISER CAP:		
REMARKS:				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND	
0		0 - 4	<1.0	2.5	brn. FILL over SILTY F. SAND, some m/c sand & gravel, loose, damp	<ul style="list-style-type: none"> CEMENT GROUT NATIVE BACKFILL BENTONITE SEAL SAND PACK WELL SCREEN RISER PIPE 	
1							
2							
3							
4							
5		4 - 8	<1.0	3.0	top 2.0 ft: brn. SILTY F. SAND, some m/c sand, loose, saturated bottom 2.0 ft: gray/brn. TILL, m. dense, moist		
6							
7							
8		8 - 8.2	<1.0	0.2	TILL & ROCK FRAGMENTS, dense, moist		
9							
10							
11							
GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 MDENSE 30-50 DENSE >50 V.DENSE		COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD		PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		NOTES: 1. Soils were characterized using TSEC's Geoprobe®. 2. PID readings were obtained using a Thermo Environmental Instruments Model 580B PID equipped with a 10.6eV lamp and jar headspace sampling technique.	

kjb:\project\96056ms\sb11.bl



TWIN STATE ENVIRONMENTAL CORPORATION

1A Huntington Road, P.O. Box 719 Richmond, Vermont 05477
 (802) 434-3350 FAX: (802) 434-4478

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	GP-1	WELL DEPTH:	7.5ft	BORING DEPTH:	7.8ft
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	0.5ft		
PROJECT NO:	96056	SCREEN DIA:	1/2in	DEPTH:	2.5 to 7.5ftbgs
INSTALL DATE:	03/12/97	SCREEN TYPE/SIZE:	sch. 40 PVC/0.010in slot/prepack		
TSEC REP:	Ken Bisceglia	RISER TYPE:	sch. 40 PVC		
DRILLING CO:	TSEC	RISER DIA:	1/2in	DEPTH:	0.5 to 2.5ftbgs
DRILLING METHOD:	Geoprobe	GUARD TYPE:	4in aluminum		
SAMPLING METHOD:	4ft Macrocore	RISER CAP:	expansion plug		
REMARKS:	high water table, sheen on water				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND	
0						CEMENT GROUT NATIVE BACKFILL BENTONITE SEAL SAND PACK WELL SCREEN RISER PIPE NATIVE MATERIAL	
1		0-3.8	1150/670	20/46"	0.5-2.0ft: brown to gray SAND & GRAVEL (fill), loose damp, slight gas odor		
2							
3			1055/630			2.0-3.8ft: gray f. SAND, some gravel, tr. silt, loose/med. dense, damp, gas odor	
4							
5		3.8-7.5	242/685	30/45"	3.8-4.5ft: brown/gray SAND & GRAVEL, loose, saturated, black staining, gas odor		
6			750/377			4.5-6.0: brown/gray SAND & GRAVEL, dense, moist/wet, gas odor	
7			864/81			6.0-7.5: brown/gray f. SAND, some m. sand & gravel, med. dense, damp/moist, slight odor	
8							
9							
10							
GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 M.DENSE 30-50 DENSE >50 V.DENSE		COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD		PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		NOTES: 1. Well located east of Super Unleaded pump. 2. PID readings were obtained using a Thermo Environmental Instruments Model 580B PID equipped with a 10.6eV lamp and jar headspace sampling technique. 3. Well construction is a prepacked PVC system with 1/2" inner screen and 1-1/2" outer screen.	

kjh:\project\96056ns\ep1.bl



TWIN STATE ENVIRONMENTAL CORPORATION

1A Huntington Road, P.O. Box 719 Richmond, Vermont 05477
 (802) 434-3350 FAX: (802) 434-4478

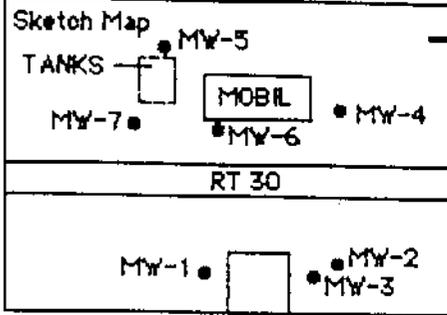
MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	GP-2	WELL DEPTH:	7.5ft	BORING DEPTH:	7.8ft
PROJECT NAME:	Newfane Service Center	DEPTH TO WATER:	0.5ft		
PROJECT NO:	96056	SCREEN DIA:	1in	DEPTH:	2.5 to 7.5ftbgs
INSTALL DATE:	03/12/97	SCREEN TYPE/SIZE:	sch. 40 PVC/0.010in slot		
TSEC REP:	Ken Bisceglia	RISER TYPE:	sch. 40 PVC		
DRILLING CO:	TSEC	RISER DIA:	1in	DEPTH:	0.5 to 2.5ftbgs
DRILLING METHOD:	Geoprobe	GUARD TYPE:	4in aluminum		
SAMPLING METHOD:	4ft Macrocore	RISER CAP:	expansion plug		
REMARKS:	high water table, sheen on water				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND	
0						CEMENT GROUT NATIVE BACKFILL BENTONITE SEAL SAND PACK WELL SCREEN RISER PIPE NATIVE MATERIAL	
1		0-3.8	1033	36/46"	0.5-2.0ft: dk. brown, f. SAND & GRAVEL, loose, dry, slight gas odor		
2			1050		2.0-3.0ft: gray/brown SAND & GRAVEL, loose, moist, strong gas odor		
3			1465		3.0-3.8ft: gray f. SAND, some gravel, loose to med. dense, moist, strong gas odor		
4							
5		3.8-7.5	1726	36/46"	3.8-4.5ft: gray/brown SAND & GRAVEL, loose, saturated, gas odor		
6			1089		4.5-6.0ft: tan silty f. SAND, tr. c. sand & gravel, med. dense, damp, slight gas odor		
7			289		6.0-7.5ft: gray/black(stained) silty f. SAND, tr. sand & gravel, dense, moist, weathered gas odor		
8							
9							
10							
GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 MDENSE 30-50 DENSE >50 V.DENSE		COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD		PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		NOTES: 1. Well located northeast of pump island. 2. PID readings were obtained using a Thermo Environmental Instruments Model 580B PID equipped with a 10.6eV lamp and jar headspace sampling technique. 3. Well is a standard construction PVC system with 1" pipe, filter sand and bentonite seal. <i>kjb:\project\96056\ngp2.bl</i>	

PROJECT VT DEC
 LOCATION NEWFANE, VT
 DATE DRILLED 3/1/90 TOTAL DEPTH OF HOLE 10'
 DIAMETER 6"
 SCREEN DIA. 2" LENGTH 8' SLOT SIZE .010"
 CASING DIA. 2" LENGTH 2' TYPE PVC
 DRILLING CO. FROST DRILLING METHOD AIR ROTARY
 DRILLER JODY LOG BY P. MURRAY

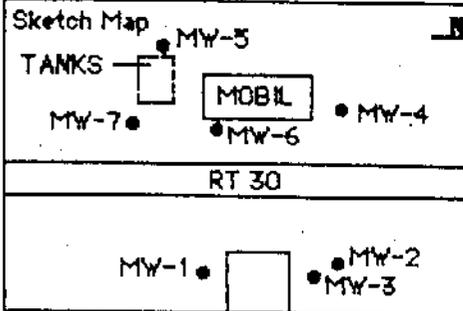
WELL NUMBER MW-1



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX		
1		TOP CAP		
2		CONCRETE		
2		BENTONITE		
3		WELL CASING		
4				
5		GRAVEL PACK		
6				
7				
8				
9				
10		BOTTOM CAP		
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

PROJECT VT DEC
 LOCATION NEWFANE, VT
 DATE DRILLED 3/1/90 TOTAL DEPTH OF HOLE 40'
 DIAMETER 6"
 SCREEN DIA. 2" LENGTH 10' SLOT SIZE .010"
 CASING DIA. 2" LENGTH 30' TYPE PVC
 DRILLING CO. FROST DRILLING METHOD AIR ROTARY
 DRILLER JODY LOG BY P. MURRAY

WELL NUMBER MW-2



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX		
2		TOP CAP		
2		CONCRETE		
4				Brown, fine to medium SAND, some gravel, few cobbles, little silt
6				
8		NATIVE BACKFILL		
10				WATER TABLE ▼
12		WELL CASING		Wet SAND, GRAVEL and COBBLES, some silt NO PETROLEUM ODOR
14				
16		BENTONITE		
18				
20				
22				
24		NATIVE BACKFILL		BEDROCK (Gneiss)
26				
28				
30				NO PETRO ODOR
32				
34		GRAVEL PACK		
36		WELL SCREEN		
38				WATER AT 38'
40		BOTTOM CAP		BASE OF EXPLORATION AT 40'

text of report indicates gravel to 19' bgs

PROJECT VT DEC

LOCATION NEWFANE, VT

DATE DRILLED 3/1/90 TOTAL DEPTH OF HOLE 2'

DIAMETER 6"

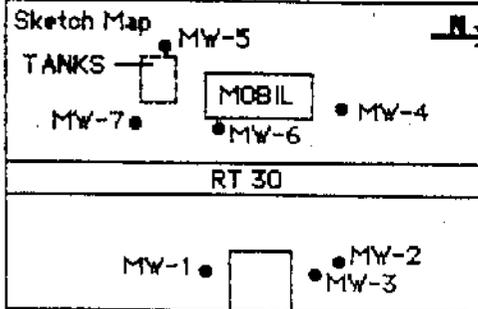
SCREEN DIA. 2" LENGTH 10' SLOT SIZE .010"

CASING DIA. 2" LENGTH 2' TYPE PVC

DRILLING CO. FROST DRILLING METHOD AIR ROTARY

DRILLER JODY LOG BY P. MURRAY

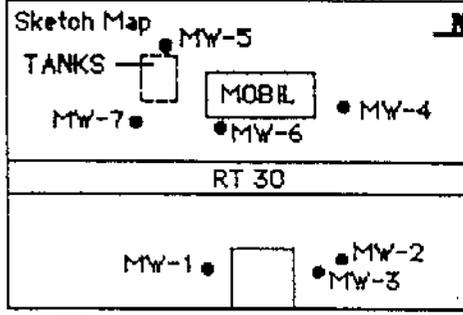
WELL NUMBER MW-3



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX		
1		TOP CAP		
2		CONCRETE WELL CASING		
2		BENTONITE		
3				Light brown, fine to medium SAND, some gravel and cobbles, little silt
4				
5				WATER TABLE
6		WELL SCREEN		
7				NO PETRO ODOR
8		GRAVEL PACK		
9				
10				
11				
12		BOTTOM CAP		BASE OF EXPLORATION AT 12'
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

PROJECT VT DEC
 LOCATION NEWFANE, VT
 DATE DRILLED 3/1/90 TOTAL DEPTH OF HOLE 12'
 DIAMETER 6"
 SCREEN DIA. 2" LENGTH 10' SLOT SIZE .010"
 CASING DIA. 2" LENGTH 2' TYPE PVC
 DRILLING CO. FROST DRILLING METHOD AIR ROTARY
 DRILLER JODY LOG BY P. MURRAY

WELL NUMBER MW-4



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX		
1		TOP CAP		
1		CONCRETE		
2		WELL CASING		
2		BENTONITE		
3				
4				
5		WELL SCREEN		
6				
7		GRAVEL PACK		
8				
9				
10				
11				
12		BOTTOM CAP		
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

WATER TABLE

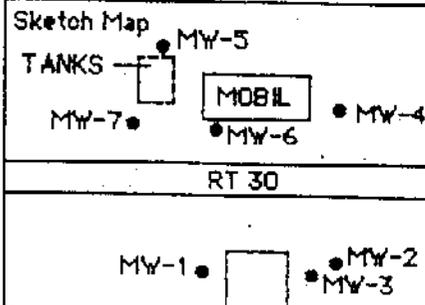
Gray to brown, fine SAND and SILT, some gravel, few cobbles

NO PETROLEUM ODOR

BASE OF EXPLORATION AT 12'

PROJECT VT DEC
 LOCATION NEWFANE, VT
 DATE DRILLED 3/8/90 TOTAL DEPTH OF HOLE 13'
 DIAMETER 6"
 SCREEN DIA. 2" LENGTH 10' SLOT SIZE .010"
 CASING DIA. 2" LENGTH 3' TYPE PVC
 DRILLING CO. FROST DRILLING METHOD AIR ROTARY
 DRILLER JODY LOG BY P. MURRAY

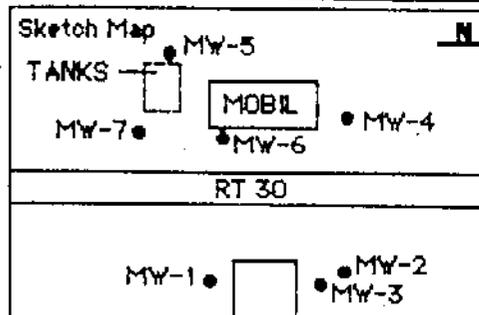
WELL NUMBER MW-5



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX		
1		TOP CAP		
2		CONCRETE		
3		BENTONITE		
4		WELL CASING		
5				WATER TABLE
6		WELL SCREEN		Fine, light brown, SAND and GRAVEL, some cobbles
7				
8		GRAVEL PACK		NO PETROLEUM ODOR 2 PPM ON HNU
9				
10				
11				
12				
13		BOTTOM CAP		BASE OF EXPLORATION AT 13'
14				
15				
16				
17				BEDROCK
18				
19				
20				
21				
22				
23				
24				
25				
26				

PROJECT VT DEC
 LOCATION NEWFANE, VT
 DATE DRILLED 3/8/90 TOTAL DEPTH OF HOLE 13'
 DIAMETER 6"
 SCREEN DIA. 2" LENGTH 10' SLOT SIZE .010"
 CASING DIA. 2" LENGTH 3' TYPE PVC
 DRILLING CO. FROST DRILLING METHOD AIR ROTARY
 DRILLER JODY LOG BY P. MURRAY

WELL NUMBER MW-6



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX		
0.5		TOP CAP		
1		CONCRETE		
2		BENTONITE		
3		WELL CASING		
4				
5				
6		WELL SCREEN		
7				
8				
9		GRAVEL PACK		
10				
11				
12				
13		BOTTOM CAP		
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

WATER TABLE

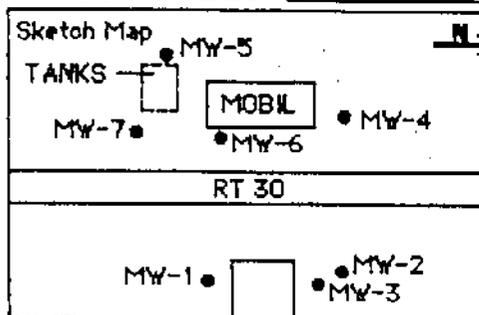
Brown, fine to medium SAND, GRAVEL, some cobbles, some silt

HEAVY PETRO ODOR FROM 2' to 13'
110 PPM ON HNU

BASE OF EXPLORATION AT 13'

PROJECT VT DEC
 LOCATION NEWFANE, VT
 DATE DRILLED 3/8/90 TOTAL DEPTH OF HOLE 13'
 DIAMETER 6"
 SCREEN DIA. 2" LENGTH 10' SLOT SIZE .010"
 CASING DIA. 2" LENGTH 3' TYPE PVC
 DRILLING CO. FROST DRILLING METHOD AIR ROTARY
 DRILLER JODY LOG BY P. MURRAY

WELL NUMBER MW-7



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX		
1		TOP CAP		
1		CONCRETE		
2		BENTONITE		
2		WELL CASING		
3				
4				
5				
6		GRAVEL PACK		
7				
8		WELL SCREEN		
9				
10				
11				
12				
13		BOTTOM CAP		
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

WATER TABLE

Light brown, fine to medium SAND, GRAVEL and COBBLES, some silt

NO PETRO ODOR

Wet, fine to medium SAND, GRAVEL and COBBLES, some silt

BASE OF EXPLORATION AT 13'

CLIENT STATE OF VERMONT AND
PROJECT NAME NEWFAVE
LOCATION ROUTE 30 NEWFAVE, VT.

BORING
NUMBER
MW-8
SHEET
No. 1
of 1

DRILLER GREEN MOUNTAIN
WELL COMPANY

ARCHITECT
ENGINEER

FILE NO. 934

INSPECTOR PAUL MILLER

Casing PVC Sampler — Core Barrel AIR ROTARY
TYPE — SIZE I.D. 2" 6 1/4" O.D.
HAMMER WT —
HAMMER FALL —

SURFACE ELEV. —

DATE START 8/2/90

DATE FINISH 8/2/90

BORING LOCATION SOUTH-EAST OF
SHINE HOME
(SEE SITE MAP)

DEPTH	SAMPLE						REC. (INCHES)	OVM READINGS (PPM)	FIELD CLASSIFICATION AND REMARKS	
	NO.	DEPTH	RANGE	BLOWS PER 6" ON SAMPLER						
				0-6	6-12	12-18				18-24
5'								NO	LIGHT BROWN FINE TO MED. SAND AND FINE GRAVEL, SOME BOULDERS, LITTLE SILT	
10'								NO	BROWN FINE GRAVEL, SOME FINE TO MED. SAND	
15'								NO	LIGHT BROWN FINE TO MED. SAND AND FINE GRAVEL, SOME BOULDERS AND SILT	
20'									BEDROCK	
									END OF BORING	

NOTES 1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.
2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of ground-water may occur due to other factors than those present at the time measurements were made.

SAMPLE PENETRATION RESISTANCE
140 lb. Wt. falling 30" on 2" O.D. Sampler

Coneless Density		Coneless Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	Med. Stiff
30-49	Dense	9-15	Stiff
50+	Very Dense	16-30	V-Stiff
		31+	Hard

PROPORTIONS

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS:
NO = NONE DETECTED

WELL INSTALLATION RECORD

CLIENT: VT. STATE ANR PROJECT: NEWFANE FILE NO: 934

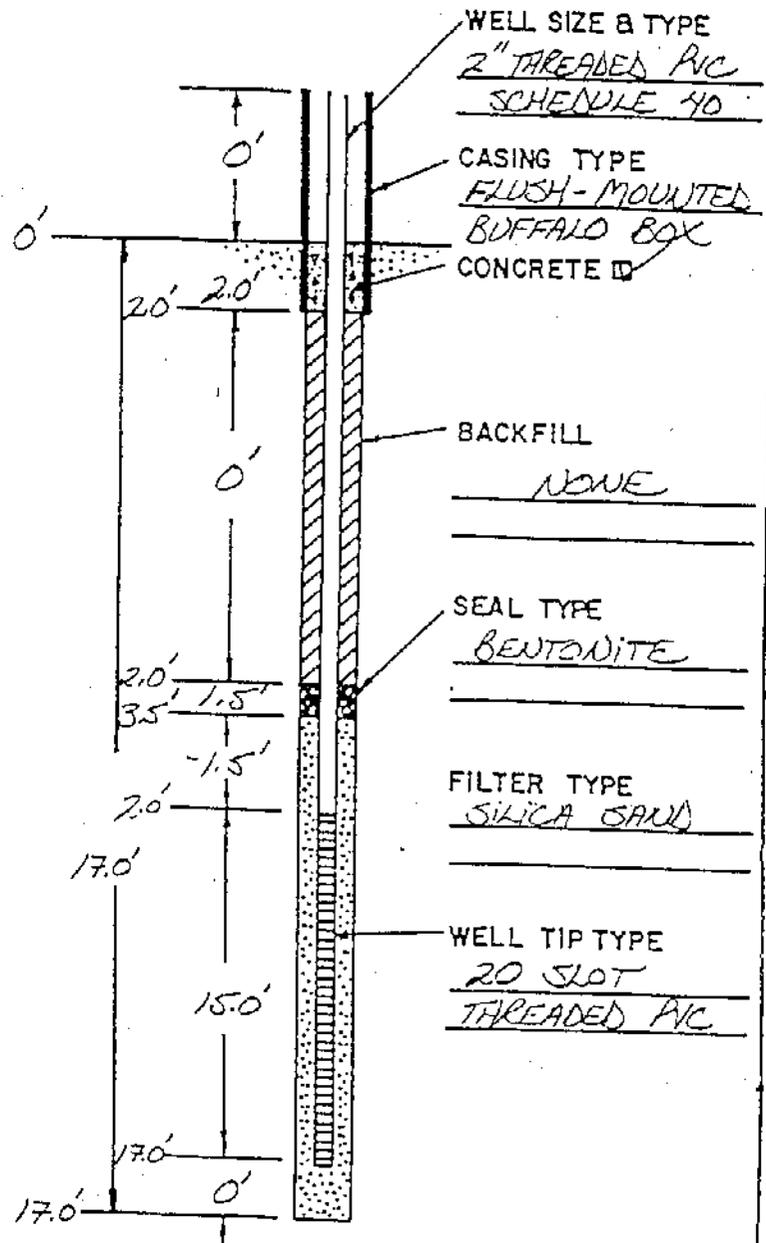
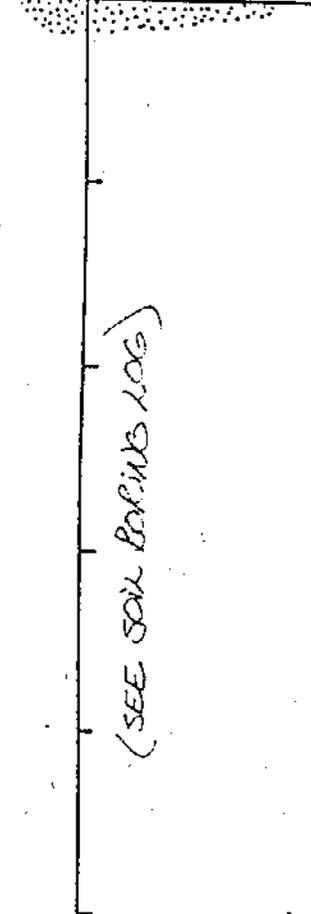
STATION NO: _____ WELL NO. MW-8

CREW SUPERVISOR: PAUL MILLER DATE INSTALLED: 8/2/90

WELL LOCATION: SOUTH-EAST OF SHINE HOME (SEE SITE MAP)

GROUND ELEV: _____ WELL TOP ELEV: _____
PVC ELEV: _____

DEPTH -
FEET SOIL PROFILE



DRILLER GREEN MOUNTAIN WELL COMPANY
 INSPECTOR PAUL MILLER
 DATE START 8/2/90
 DATE FINISH 8/2/90

ARCHITECT ENGINEER
 TYPE PVC
 SIZE I.D. 2"
 HAMMER WT -
 HAMMER FALL -
 Sampler -
 Core Barrel AIR ROTARY
6 1/4" O.D.

FILE NO. 934
 SURFACE ELEV. _____
 BORING LOCATION BACKYARD OF HOUSE BEHIND MOBIL STATION (SEE SITE MAP)

DEPTH	SAMPLE				REC. (FOOT)	OVM READINGS (PPM)	FIELD CLASSIFICATION AND REMARKS		
	NO.	DEPTH RANGE	BLOWS PER 6" ON SAMPLER						
			0-6	6-12				12-18	18-24
5'						NO	LIGHT BROWN FINE TO MED. SAND AND FINE GRAVEL, SOME BOULDERS.		
10'						NO			
5'							BED ROCK (WEATHERED) END OF BORING		
							SANDY FRACTURE ENCOUNTERED FROM 11.4 - 11.6'		

NOTES: 1) The classification lines represent the approximate boundary between soil types. Transitions may be gradual.
 2) Water level readings have been made in the drill holes at times and under conditions listed on the boring logs. Fluctuations in the level of groundwater may occur due to other factors than those noted if the same measurement was made.

SAMPLE PENETRATION RESISTANCE
 140 lb. Wt. falling 30" on 2" O.D. Sampler

Coneless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	Med-Stiff
30-49	Dense	9-15	Stiff
50+	Very Dense	16-30	V-Stiff
		31+	Hard

PROPORTIONS

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS:
NO = NONE DETECTED

WELL INSTALLATION RECORD

CLIENT: VT. STATE ANR PROJECT: NEWFAVE FILE NO: 934

STATION NO: _____ WELL NO. MW-9

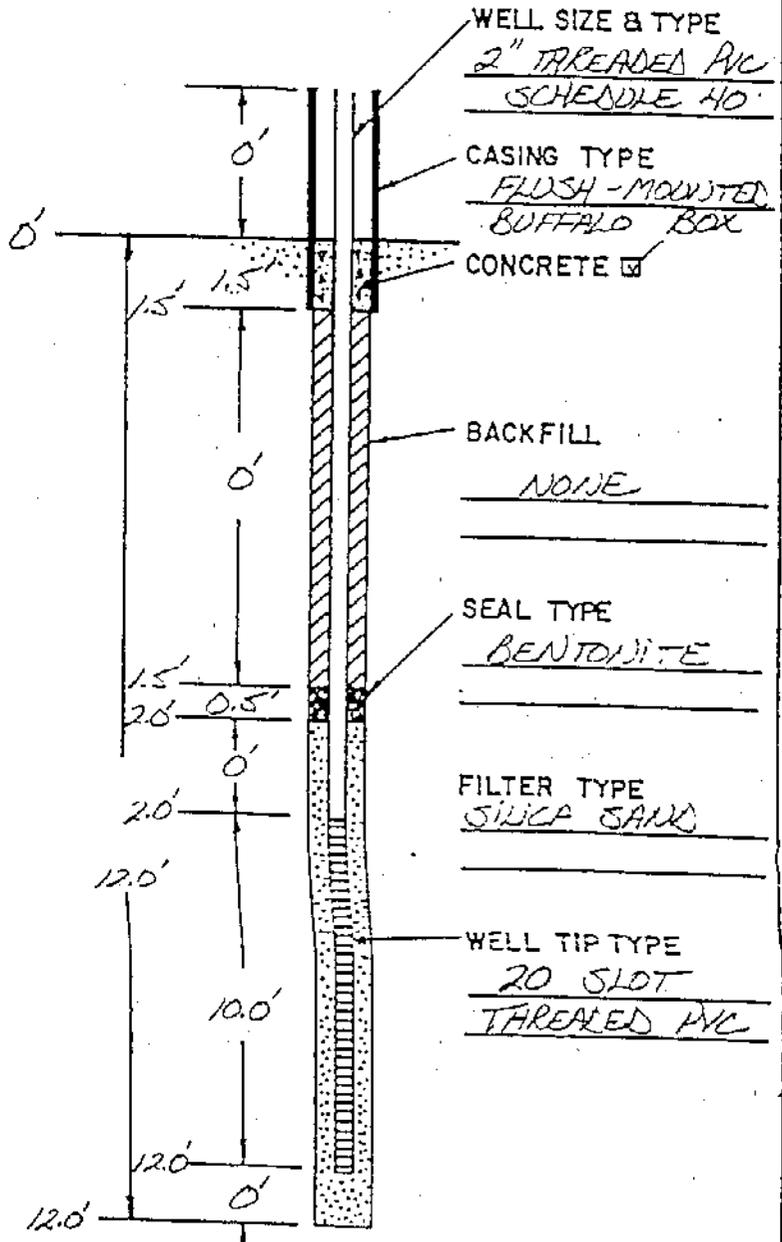
CREW SUPERVISOR: PAUL MILLER DATE INSTALLED: 8/2/90

WELL LOCATION: BACKYARD OF HOUSE BEHIND MOBIL STATION
(SEE SITE MAP)

GROUND ELEV: _____ WELL TOP ELEV: _____
PVC ELEV: _____

DEPTH-
FEET SOIL PROFILE

(SEE SOIL BORING LOG)



WELL SIZE & TYPE
2" TREADED PVC
SCHEDULE 40

CASING TYPE
FLUSH-MOUNTED
BUFFALO BOX

CONCRETE

BACKFILL
NONE

SEAL TYPE
BENTONITE

FILTER TYPE
SILICA SAND

WELL TIP TYPE
20 SLOT
TREADED PVC

CLIENT STATE OF VERMONT
 PROJECT NAME NEWFAVE
 LOCATION ROUTE 30 NEWFAVE, VT.

NUMBER MW-10
 SHEET No. 1 of 1

DRILLER GREEN MOUNTAIN WELL COMPANY
 INSPECTOR PAUL MILLER
 DATE START 8/2/90
 DATE FINISH 8/2/90

ARCHITECT ENGINEER
 TYPE WC Casing WC Sampler --- Core Barrel AIR ROTARY
 SIZE I.D. 2" --- 6 1/4" O.D.
 HAMMER WT --- ---
 HAMMER FALL --- ---

FILE NO. 934
 SURFACE ELEV. _____
 BORING LOCATION PARKING AREA TO EAST OF GAMON RESIDENCE (SEE SITE MAP)

DEPTH	SAMPLE				REC. (GKHS)	OVM READINGS (PPM)	FIELD CLASSIFICATION AND REMARKS
	NO.	DEPTH RANGE	BLOWS PER 6" ON SAMPLER				
		0-6	6-12	12-18	18-24		
5'						ND	LIGHT BROWN FINE TO MED. SAND AND FINE TO COARSE GRAVEL
10'						ND	
15'							BEDROCK
							END OF BORING

NOTES: 1) The stratification lines represent the approximate boundary between soil types; transitions may be gradual.
 2) Water level readings have been made in the drill holes at times and under conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those present at the time the measurements were made.

SAMPLE PENETRATION RESISTANCE
 140 lb. Wt. falling 30" on 2" O.D. Sampler

Coneless Density		Coneless Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	Med. Stiff
30-49	Dense	9-15	Stiff
50+	Very Dense	16-30	V-Stiff
		31+	Hard

PROPORTIONS

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS:
ND = NONE DETECTED

WELL INSTALLATION RECORD

CLIENT: VT. STATE ANR PROJECT: NEWFAVE FILE NO: 934

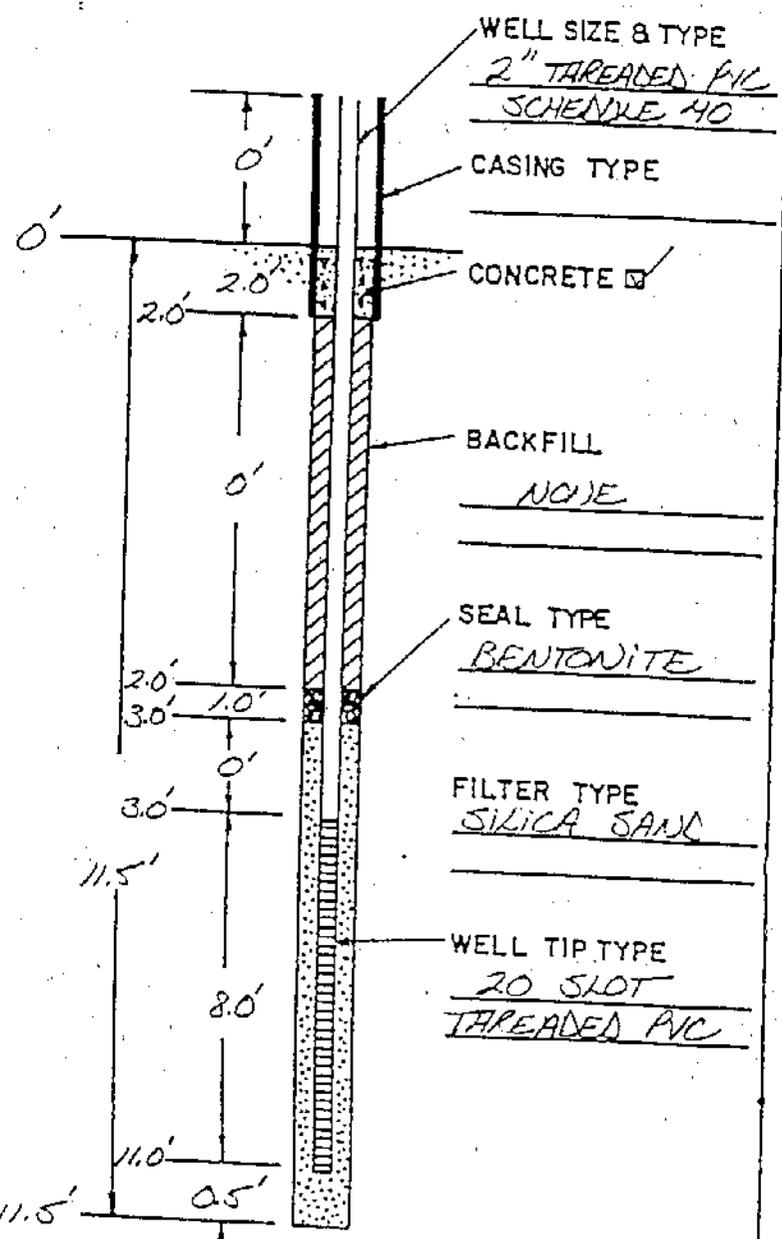
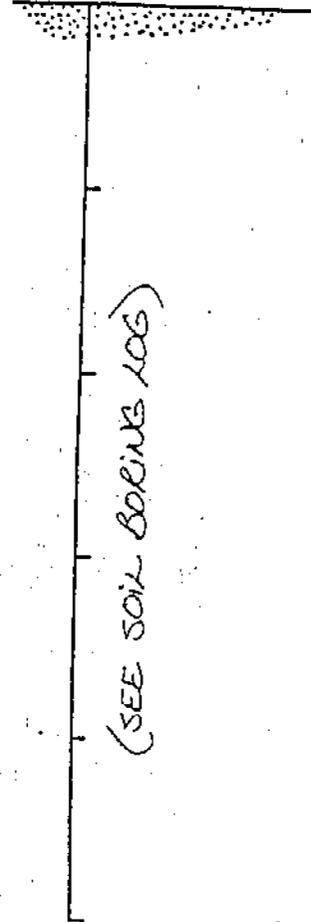
STATION NO: _____ WELL NO. MW-10

CREW SUPERVISOR: PAUL MILLER DATE INSTALLED: 8/2/90

WELL LOCATION: PARKING AREA TO EAST OF GAMON RESIDENCE
(SEE SITE MAP)

GROUND ELEV: _____ WELL TOP ELEV: _____
PVC ELEV: _____

DEPTH-
FEET SOIL PROFILE

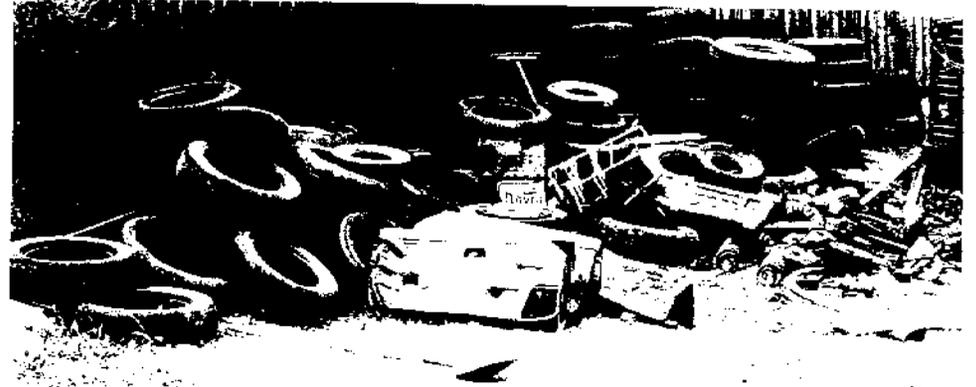


APPENDIX D

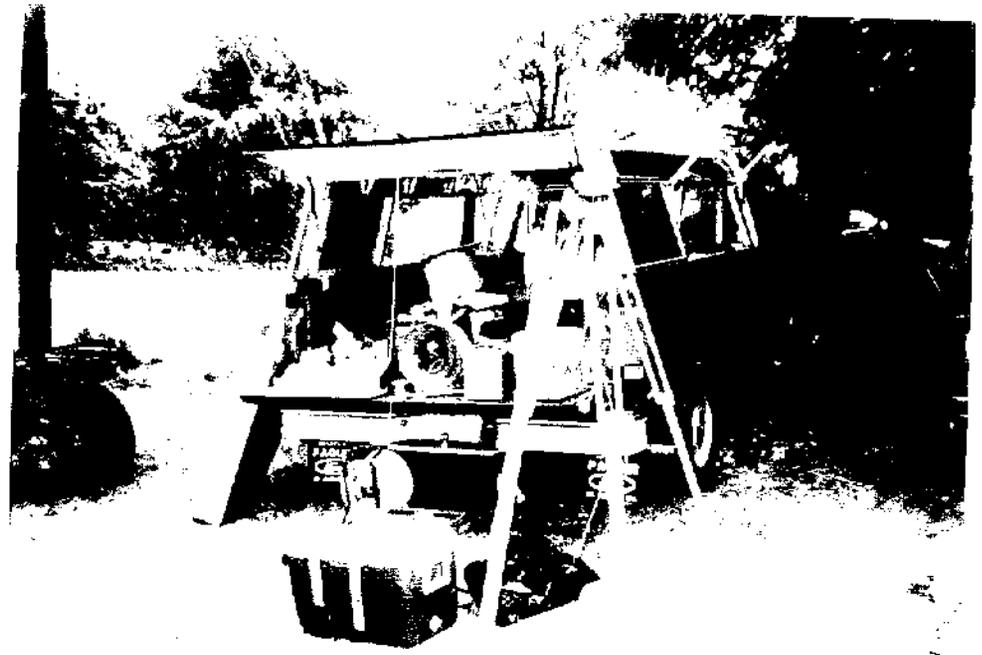
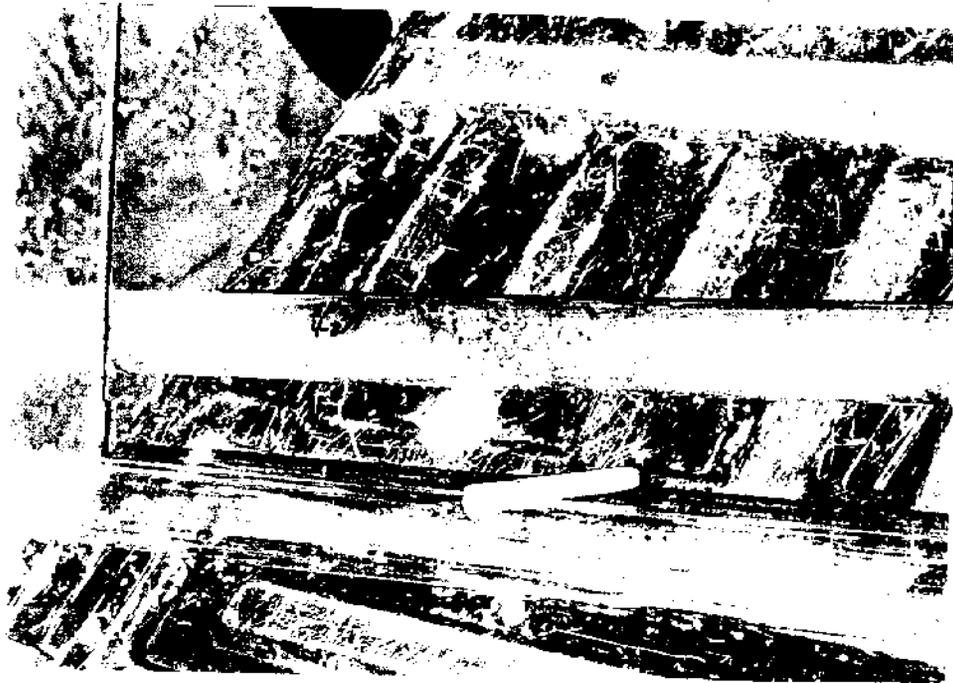
Newfane Service Center
Newfane, Vermont



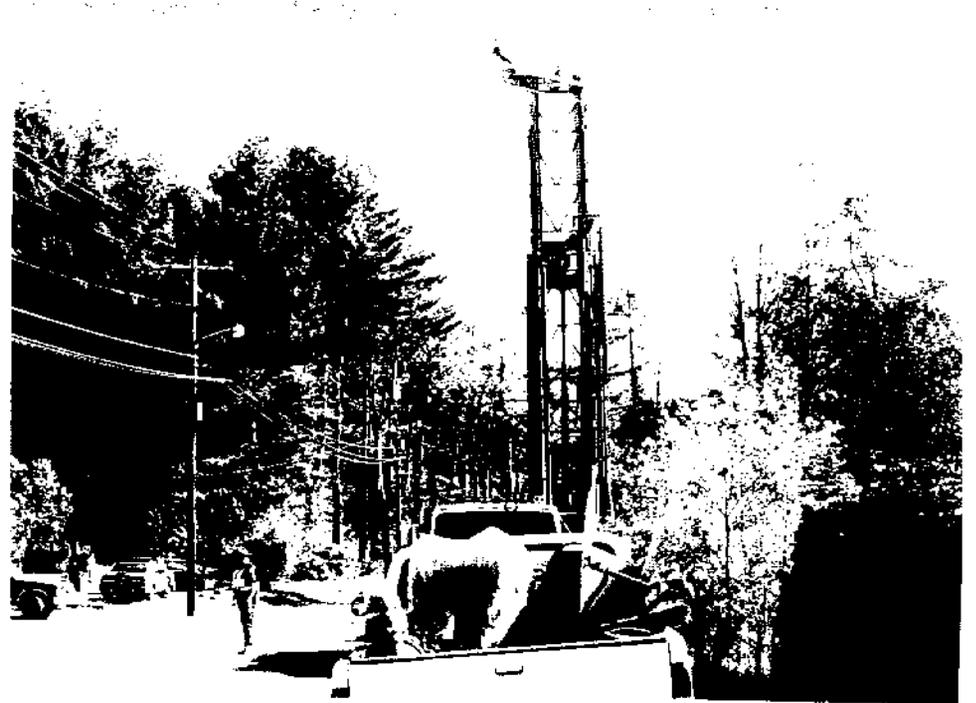
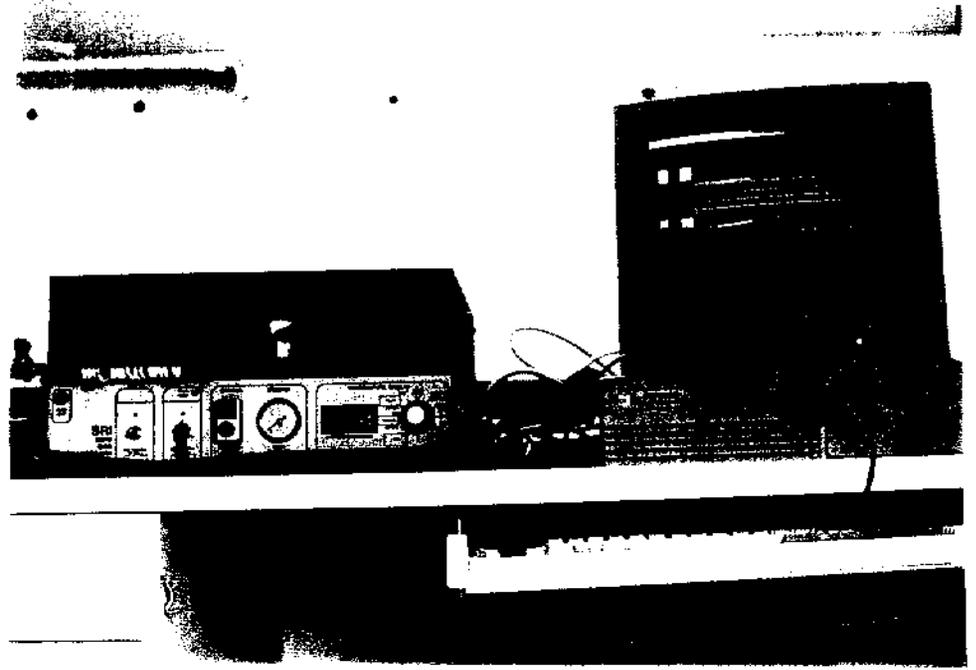
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Newfane Vermont



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Newfane, Vermont



Newfane Service Center
Newfane, Vermont



APPENDIX E

**FATE, TRANSPORT ESTIMATES
AVERAGE - MW-11, MW-12D, MW-13**

Project Name: Newfane Service Center
 Project Number: 96056
 Prepared By: Ken Bisceglia
 Date: 07/03/97

Groundwater Velocity ($V_{gw} = ki/n$)

	value	
hydraulic conductivity (K)	8.75	ft/day
hydraulic gradient (i)	0.05	
porosity (n)	0.35	
groundwater velocity (V_{gw})	1.250	ft/day

Velocity of Contaminant of Concern ($V_{coc} = V_{gw}/R$)

	value	Benzene	O-Xylene	Naphthalene
carbon/water sorption coefficient (K_{oc})	--	57	255	964
fraction of organic carbon in soil (F_{oc})	0.002	0.002	0.002	0.002
soil water distribution coefficient ($K_d = K_{oc} * F_{oc}$)	--	0.114	0.510	1.928

	value			
soil bulk density (P_s)	1.8	1.8	1.8	1.8
porosity (n)	0.35	0.35	0.35	0.35
Retardation Factor ($R = 1 + K_d * P_s / n$)	--	1.59	3.62	10.92

	Benzene	O-Xylene	Naphthalene	
groundwater velocity (V_{gw})	1.250	1.250	1.250	ft/day
Velocity of Contaminant of Concern ($V_{coc} = V_{gw}/R$)	0.788	0.345	0.115	ft/day

**FATE, TRANSPORT ESTIMATES
MW-11**

Project Name: Newfane Service Center
 Project Number: 96056
 Prepared By: Ken Bisceglia
 Date: 07/03/97

Groundwater Velocity ($V_{gw} = ki/n$)

	value	
hydraulic conductivity (K)	10.32	ft/day
hydraulic gradient (i)	0.05	
porosity (n)	0.35	
groundwater velocity (V_{gw})	1.474	ft/day

Velocity of Contaminant of Concern ($V_{coc} = V_{gw}/R$)

	value	Benzene	O-Xylene	Naphthalene
carbon/water sorption coefficient (K_{oc})	--	57	255	964
fraction of organic carbon in soil (F_{oc})	0.002	0.002	0.002	0.002
soil water distribution coefficient ($K_d = K_{oc} * F_{oc}$)	--	0.114	0.510	1.928

	value			
soil bulk density (P_s)	1.8	1.8	1.8	1.8
porosity (n)	0.35	0.35	0.35	0.35
Retardation Factor ($R = 1 + K_d * P_s / n$)	--	1.59	3.62	10.92

	Benzene	O-Xylene	Naphthalene	
groundwater velocity (V_{gw})	1.474	1.474	1.474	ft/day
Velocity of Contaminant of Concern ($V_{coc} = V_{gw}/R$)	0.929	0.407	0.135	ft/day

**FATE, TRANSPORT ESTIMATES
MW-12D**

Project Name: Newfane Service Center
 Project Number: 96056
 Prepared By: Ken Bisceglia
 Date: 07/03/97

Groundwater Velocity ($V_{gw} = ki/n$)

	value	
hydraulic conductivity (K)	7.01	ft/day
hydraulic gradient (i)	0.05	
porosity (n)	0.35	
groundwater velocity (V_{gw})	1.001	ft/day

Velocity of Contaminant of Concern ($V_{coc} = V_{gw}/R$)

	value	Benzene	O-Xylene	Naphthalene
carbon/water sorption coefficient (K_{oc})	--	57	255	964
fraction of organic carbon in soil (F_{oc})	0.002	0.002	0.002	0.002
soil water distribution coefficient ($K_d = K_{oc} * F_{oc}$)	--	0.114	0.510	1.928

	value			
soil bulk density (P_s)	1.8	1.8	1.8	1.8
porosity (n)	0.35	0.35	0.35	0.35
Retardation Factor ($R = 1 + K_d * P_s / n$)	--	1.59	3.62	10.92

	Benzene	O-Xylene	Naphthalene	
groundwater velocity (V_{gw})	1.001	1.001	1.001	ft/day
Velocity of Contaminant of Concern ($V_{coc} = V_{gw}/R$)	0.631	0.276	0.092	ft/day

**FATE, TRANSPORT ESTIMATES
MW-13**

Project Name: Newfane Service Center
 Project Number: 96056
 Prepared By: Ken Bisceglia
 Date: 07/03/97

Groundwater Velocity ($V_{gw} = ki/n$)

	value	
hydraulic conductivity (K)	8.92	ft/day
hydraulic gradient (i)	0.05	
porosity (n)	0.35	
groundwater velocity (V_{gw})	1.274	ft/day

Velocity of Contaminant of Concern ($V_{coc} = V_{gw}/R$)

	value	Benzene	O-Xylene	Naphthalene
carbon/water sorption coefficient (K_{oc})	--	57	255	964
fraction of organic carbon in soil (F_{oc})	0.002	0.002	0.002	0.002
soil water distribution coefficient ($K_d = K_{oc} * F_{oc}$)	--	0.114	0.510	1.928

	value			
soil bulk density (P_s)	1.8	1.8	1.8	1.8
porosity (n)	0.35	0.35	0.35	0.35
Retardation Factor ($R = 1 + K_d * P_s / n$)	--	1.59	3.62	10.92

	Benzene	O-Xylene	Naphthalene	
groundwater velocity (V_{gw})	1.274	1.274	1.274	ft/day
Velocity of Contaminant of Concern ($V_{coc} = V_{gw}/R$)	0.803	0.352	0.117	ft/day

Bouwer and Rice equation:

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{R}\right)}{2L_e} \frac{1}{t} \ln \frac{H_i}{H_0}$$

r_c = radius of well casing = _____

dtw = _____, Well Depth = _____ L_w = _____

R = radius of the gravel envelope, and R_e = effective radial distance over which head is dissipated. Ratio calculated by:

If L_w is less than h, then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln\left(\frac{L_w}{R}\right)} + \frac{A + B \ln\left[\frac{(h - L_w)}{R}\right]}{L_e / r_c} \right]^{-1}$$

If L_w is equal to h, then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln\left(\frac{L_w}{R}\right)} + \frac{C}{L_e / R} \right]^{-1} \quad C = \underline{\hspace{2cm}}$$

L_e = length of the open section of well through which water can enter = _____

H_0 = drawdown at $t=0$ = _____

H_i = drawdown at $t=t$ = _____

t = time since $H = H_0$ = _____

where A , B , and C are dimensionless numbers that can be found from Figure 7.25 where they are plotted as a function of L_e/R .

The value of H_t as a function of t is plotted on semilogarithmic paper, H_t on the logarithmic axis. The data pairs will fall on a straight line from s

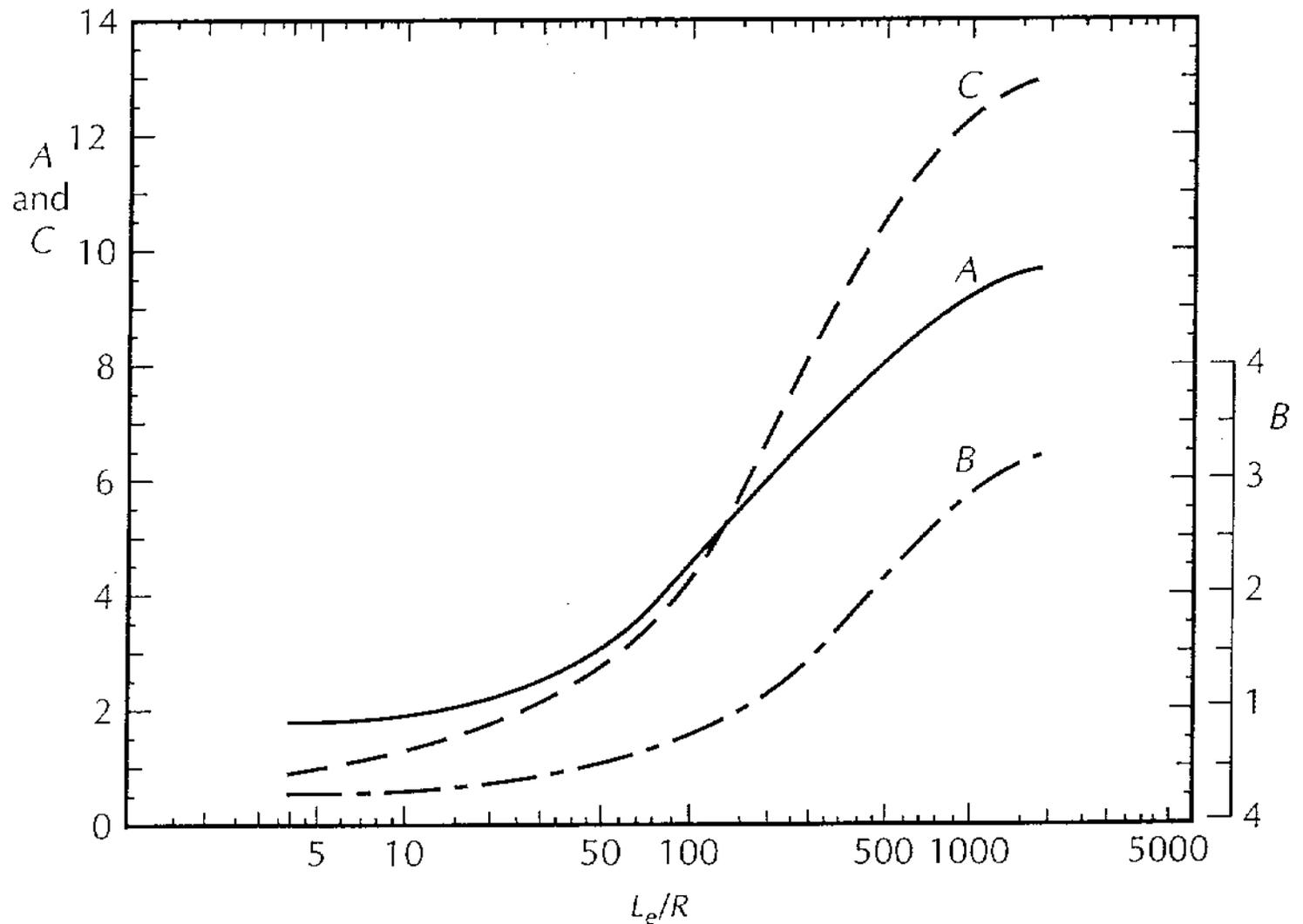


FIGURE 7.25 Dimensionless parameters A , B , and C plotted as a function of L_e/R . The parameters are used in the determination of $\ln(R_e/R)$ in Equations 7-87 and 7-88. See

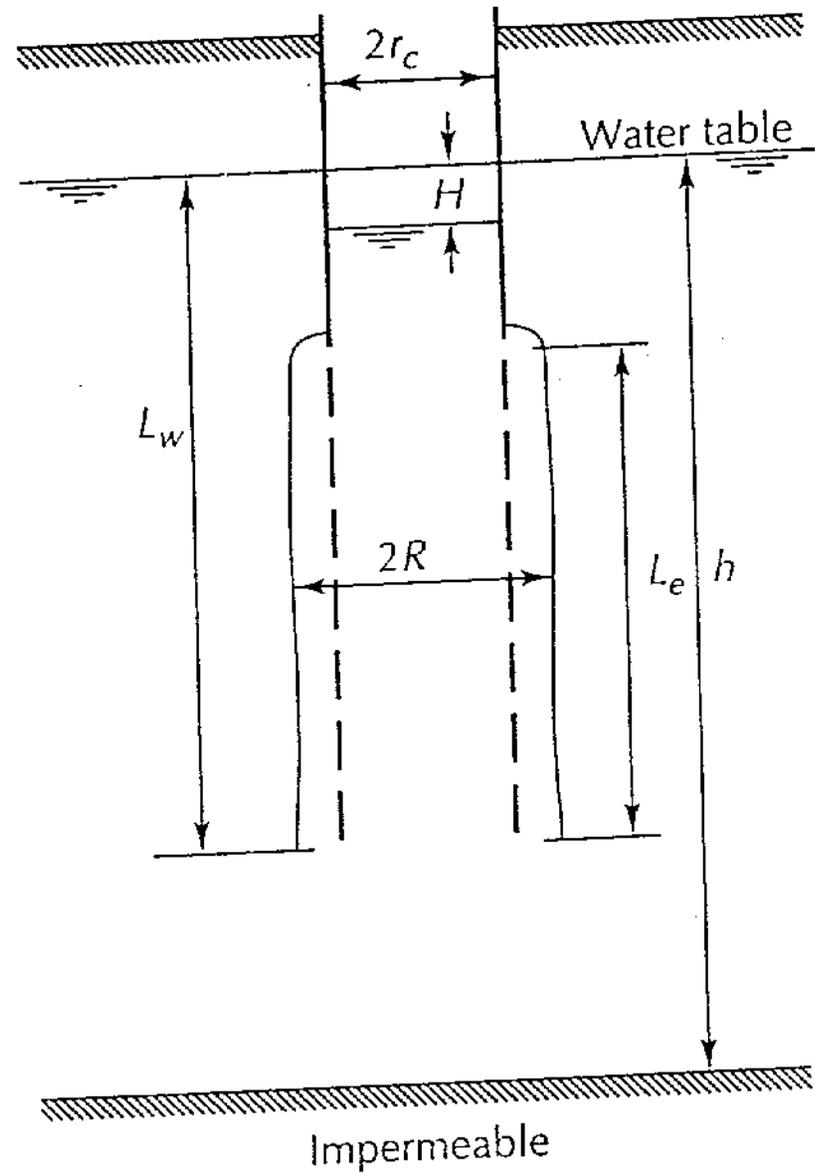


FIGURE 7.24 Geometry and symbols for a slug test on a partially penetrating screened well in an unconfined aquifer with a gravel pack around the screen. Source: Herman Bouwer, *Ground Water* 27 (1989): 304–309. Used with permission. © 1989, Ground Water Publish-

OUTPUT FROM BR SLUG

WELL MW-11 Introduce Slug 6/10/97

D = 5.13 feet
H = 5.13 feet
L = 5.13 feet
rce = .173356 feet
rw = .29 feet
re = 2.416768 feet
yo = .6 feet
yt = 9.000001E-02 feet
t = 90 seconds
K = 1.309125E-04 feet/sec
K = 84.60508 gal/day/ft²
K = 11.31084 feet/day
K = 3.990213E-03 cm/sec

WELL MW-12 Introduce Slug (2) 6/10/97

D = 5.82 feet
H = 5.82 feet
L = 2 feet
rc = .083 feet
rw = .29 feet
re = 1.481026 feet
yo = 1.12 feet
yt = .004 feet
t = 90 seconds
K = 1.758253E-04 feet/sec
K = 113.631 gal/day/ft²
K = 15.1913 feet/day
K = 5.359155E-03 cm/sec

WELL MW-11 Remove Slug 6/10/97

D = 5.13 feet
H = 5.13 feet
L = 5.13 feet
rce = .173356 feet
rw = .29 feet
re = 2.416768 feet
yo = .3 feet
yt = .037 feet
t = 15 seconds
K = 8.665202E-04 feet/sec
K = 560.0078 gal/day/ft²
K = 74.86735 feet/day
K = 2.641154E-02 cm/sec

WELL MW-12 Remove Slug 6/10/97

D = 5.82 feet
H = 5.82 feet
L = 2 feet
rc = .083 feet
rw = .29 feet
re = 1.481026 feet
yo = 1.11 feet
yt = .4 feet
t = 180 seconds
K = 1.592395E-05 feet/sec
K = 10.2912 gal/day/ft²
K = 1.375829 feet/day
K = 4.85362E-04 cm/sec

WELL MW-12 Introduce Slug 6/10/97

D = 5.82 feet
H = 5.82 feet
L = 2 feet
rc = .083 feet
rw = .29 feet
re = 1.481026 feet
yo = 1.12 feet
yt = .1 feet
t = 270 seconds
K = 2.512834E-05 feet/sec
K = 16.23974 gal/day/ft²
K = 2.171089 feet/day
K = 7.659118E-04 cm/sec

WELL MW-12 Remove Slug (2) 6/10/97

D = 5.82 feet
H = 5.82 feet
L = 2 feet
rc = .083 feet
rw = .29 feet
re = 1.481026 feet
yo = 1.11 feet
yt = .02 feet
t = 90 seconds
K = 1.253253E-04 feet/sec
K = 80.99425 gal/day/ft²
K = 10.82811 feet/day
K = 3.819916E-03 cm/sec

WELL MW-13 Introduce Slug 6/10/97

D = 8.74 feet
H = 8.74 feet
L = 8 feet
rc = .083 feet
rw = .29 feet
re = 3.635327 feet
yo = 1.1 feet
yt = .02 feet
t = 88 seconds
K = 4.957749E-05 feet/sec
K = 32.04054 gal/day/ft²
K = 4.283496 feet/day
K = 1.511122E-03 cm/sec

WELL MW-13 Remove Slug 6/10/97

D = 8.74 feet
H = 8.74 feet
L = 8 feet
rc = .083 feet
rw = .29 feet
re = 3.635327 feet
yo = 1 feet
yt = .01 feet
t = 30 seconds
K = 1.67123E-04 feet/sec
K = 108.0069 gal/day/ft²
K = 14.43943 feet/day
K = 5.093909E-03 cm/sec

MW-11
1n-Slug

Bouwer and Rice equation:

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{R}\right)}{2L_w} \frac{1}{t} \ln \frac{H_i}{H_0}$$

r_c = radius of well casing = 0.083 ft

dtw = 4.87 ft, Well Depth = 10.0 ft, L_w = 5.13

R = radius of the gravel envelope, and R_e = effective radial distance over which head is dissipated. Ratio calculated by: 0.29 ft

If L_w is less than h , then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln\left(\frac{L_w}{R}\right)} + \frac{A + B \ln\left[\frac{(h - L_w)/R}{L_e/r_c}\right]}{L_e/r_c} \right]^{-1}$$

$$\frac{L_w}{R} = 17.69$$

from

If L_w is equal to h , then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln\left(\frac{L_w}{R}\right)} + \frac{C}{L_e/R} \right]^{-1} = 2.13 \quad C = 1.57$$

L_e = length of the open section of well through which water can enter = 6.0 ft

H_0 = drawdown at $t=0$ = 0.6 ft

H_i = drawdown at $t=t$ = 0.09 ft

t = time since $H = H_0$ = 90 seconds

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln(L_w/R)} + \frac{C}{L_e/R} \right]^{-1} = \left[\frac{1.1}{\ln 17.69} + \frac{1.57}{17.69} \right]^{-1} = \left[\frac{1.1}{2.9} + \frac{1.57}{17.69} \right]^{-1} = 2.13$$

$$K = \frac{(0.083 \text{ ft})^2 (2.13)}{2(5.13)} \times \frac{1}{90 \text{ sec}} \times \ln \left(\frac{0.09 \text{ ft}}{0.6 \text{ ft}} \right) = (1.43 \times 10^{-3} \text{ ft}) (0.01/\text{sec}) (-1.90) = 2.717 \times 10^{-5}$$

$$2.717 \times 10^{-5} \text{ ft/sec} \times \frac{24 \text{ hr}}{\text{day}} \times \frac{60 \text{ min}}{\text{hr}} \times \frac{60 \text{ sec}}{\text{min}} = 2.717 \times 10^{-5} \text{ ft/sec} \times 86,400 \text{ sec/day}$$

$$K = 2.35 \text{ ft/day}$$

$$K_{\text{AVE-Slug 1N}} = 6.83 \text{ ft/d}$$

BR Slug $\rightarrow K_1 = 11.31 \text{ ft/day}$

NOTE: Corrected well radius used in calculation by BR Slug

Bouwer and Rice equation:

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{R}\right)}{2L_w} \frac{1}{t} \ln \frac{H_t}{H_0}$$

0.29' r_c = radius of well casing = 0.083 ft
 dtw = 4.87, Well Depth = 10.0, L_w = 5.13
 R = radius of the gravel envelope, and R_e = effective radial distance over which head is dissipated. Ratio calculated by:

If L_w is less than h , then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln\left(\frac{L_w}{R}\right)} + \frac{A + B \ln\left[\frac{(h - L_w)}{R}\right]}{L_w/r_c} \right]^{-1}$$

$\frac{L_w}{R} = 17.69$

If L_w is equal to h , then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln\left(\frac{L_w}{R}\right)} + \frac{C}{L_w/R} \right]^{-1} = 2.13 \quad C = \underline{1.57}$$

L_w = length of the open section of well through which water can enter = 6.0

H_0 = drawdown at $t=0$ = 0.3

H_t = drawdown at $t=t$ = 0.037

t = time since $H = H_0$ = 15 seconds

$\ln \frac{R_e}{R}$, from In-Slug = 2.13

$$K = \frac{(0.083 \text{ ft})^2 \times (2.13)}{2(5.13)} \times \left(\frac{1}{15 \text{ sec}}\right) \times \ln\left(\frac{0.037}{0.3}\right) = (1.43 \times 10^{-3} \text{ ft}) \times (0.067/\text{sec}) \times (2)$$

$K = 2.00 \times 10^{-4} \text{ ft/sec} \times 86400 \text{ sec/d} = \boxed{17.30 \text{ ft/d} = K} = \text{SLUG K}_{\text{OUT}}$

$K = 74.86 \text{ ft/day} \text{ BR Slug}$

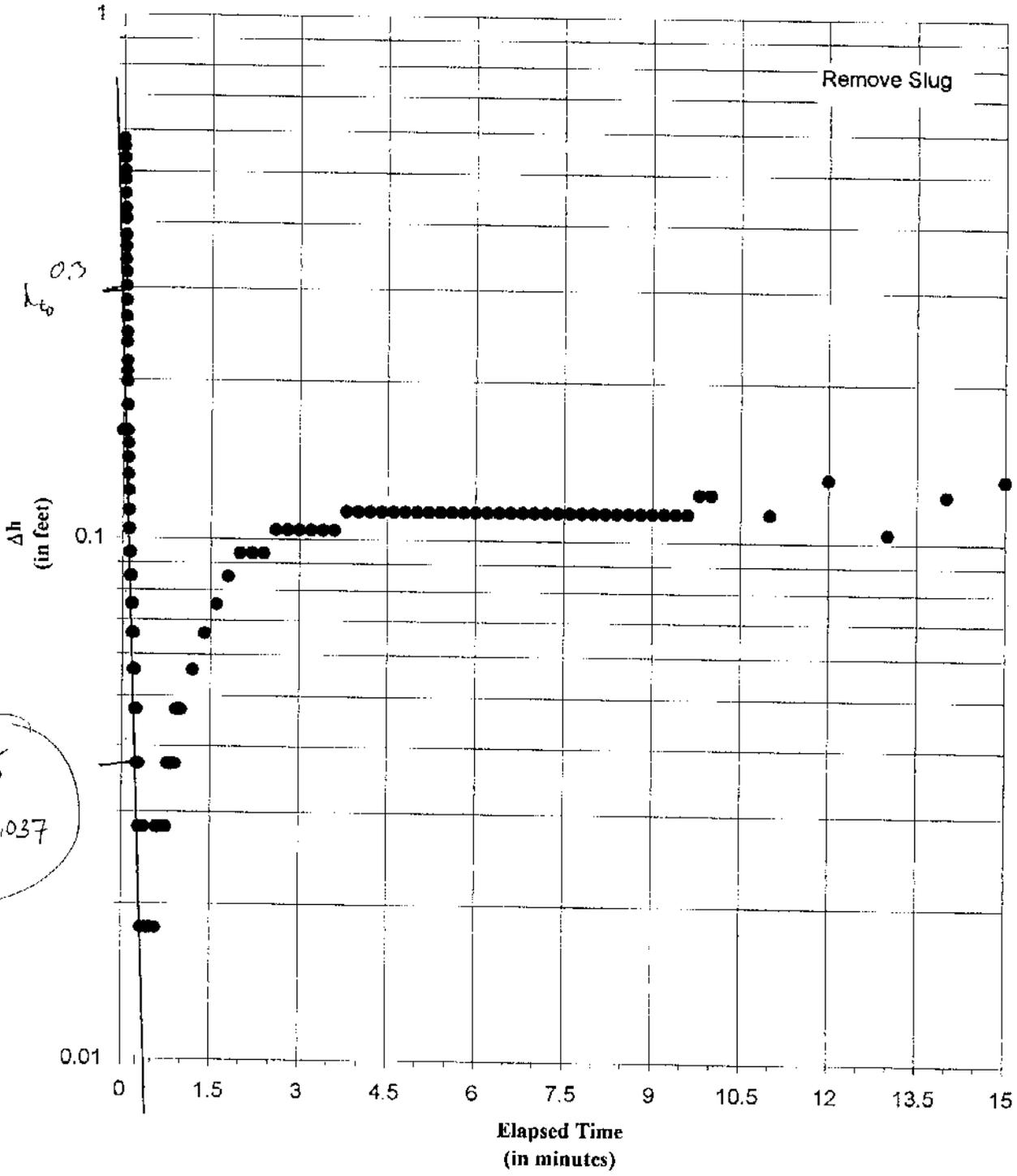
VALUE TOO HIGH. DOES NOT ACCOUNT FOR FALLING TREND IN WATER TABLE. SEE FIGURE. DROP FOR CALCS. OF AVE ETC.

$K_{\text{AVE}} = \frac{2.35 \text{ ft/d} + 11.31 \text{ ft/d} + 17.30 \text{ ft/d}}{3} = \frac{30.96 \text{ ft/d}}{3}$

$K_{\text{AVE}} = 10.32 \text{ ft/d}$

NEWFANE SERVICE CENTER
NEWFANE, VERMONT

SLUG TEST, WELL MW-11
JUNE 10, 1997



Bouwer and Rice equation:

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{R}\right)}{2L_w} \frac{1}{t} \ln \frac{H_i}{H_0}$$

r_c = radius of well casing = 0.083
 dtw = 4.18, Well Depth = 10.0 ft, L_w = 5.82
 0.25 R = radius of the gravel envelope, and R_e = effective radial distance over which head is dissipated. Ratio calculated by:

If L_w is less than h , then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln\left(\frac{L_w}{R}\right)} + \frac{A + B \ln\left[\frac{(h - L_w)}{R}\right]}{L_w/r_c} \right]^{-1}$$

$$\frac{L_w}{R} = \frac{5.82 \text{ ft}}{0.29 \text{ ft}} = 20$$

If L_w is equal to h , then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln\left(\frac{L_w}{R}\right)} + \frac{C}{L_w/R} \right]^{-1} = \left[\frac{1.1}{3.09} + \frac{1.70}{2.29} \right]^{-1} = [0.37 + 0.25]^{-1} = [0.62]^{-1} = 1.61$$

L_w = length of the open section of well through which water can enter = 2.0 ft

H_0 = drawdown at $t=0$ = 1.12 ft

H_i = drawdown at $t=t$ = 0.1 / 0.004

t = time since $H = H_0$ = 270 / 90

$$K = \frac{(0.083 \text{ ft})^2 (1.61)}{2(2.0)} \times \frac{1}{270 \text{ sec}} \times \ln\left(\frac{0.1}{1.12}\right)$$

$$K = (2.77 \times 10^{-3} \text{ ft}) \times (3.70 \times 10^{-3} \text{ sec}) \times (2.42)$$

$$K = 2.48 \times 10^{-5} \text{ ft/sec} \times 86,400 \text{ sec/d}$$

$$K = 2.14 \text{ ft/day}$$

$$K = 2.17 \text{ ft/day BR Slug}$$

$$K = \frac{(0.083 \text{ ft})^2 (1.61)}{2(2.0)} \times \frac{1}{90 \text{ sec}} \times \ln\left(\frac{0.004}{1.12}\right)$$

$$K = (2.77 \times 10^{-3} \text{ ft}) \times (0.01 \text{ sec}) \times (5.6)$$

$$K = 1.55 \times 10^{-4} \text{ ft/sec} \times 86,400 \text{ sec/d}$$

$$K = 13.40 \text{ ft/day}$$

$$K = 15.19 \text{ ft/day BR Slug}$$

IN SLUG AVG = 8.225 ft/d

Bouwer and Rice equation:

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{R}\right)}{2L_w} \frac{1}{t} \ln \frac{H_t}{H_0}$$

r_c = radius of well casing = 0.083

dtw = 4.18', Well Depth = 10.0' $L_w =$ 5.82

0.29' R = radius of the gravel envelope, and R_e = effective radial distance over which head is dissipated. Ratio calculated by:

If L_w is less than h, then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln\left(\frac{L_w}{R}\right)} + \frac{A + B \ln\left[\frac{(h - L_w)}{R}\right]}{L_w/r_c} \right]^{-1}$$

$$\frac{L_w}{R} = \frac{5.82}{0.29} = 20.06$$

If L_w is equal to h, then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln\left(\frac{L_w}{R}\right)} + \frac{C}{L_w/R} \right]^{-1} = 1.61 \quad C = \underline{1.70} \quad (\text{from in-slug})$$

L_w = length of the open section of well through which water can enter = 2.0 ft

H_0 = drawdown at $t=0$ = 1.11 ft

H_t = drawdown at $t=t$ = 0.4 / 0.02

t = time since $H = H_0$ = 180 / 90

$$K = \frac{(0.083 \text{ ft})^2 (1.61)}{2(2.0)} \times \frac{1}{180 \text{ sec}} \times \ln \frac{0.4}{1.11}$$

$$K = 2.77 \times 10^{-3} \text{ ft} \times 0.0056 \text{ /sec} \times (-1.02)$$

$$K = 1.58 \times 10^{-5} \text{ ft/sec} = \boxed{1.37 \text{ ft/day}}$$

BRSlug $\boxed{K = 1.37 \text{ ft/day}}$

$$K = \frac{(0.083 \text{ ft})^2 (1.61)}{2(2.0)} \times \frac{1}{90 \text{ sec}} \times \ln \frac{0.02}{1.11}$$

$$K = 2.77 \times 10^{-3} \text{ ft} \times 0.011 \text{ /sec} \times (-4.02)$$

$$K = 1.11 \times 10^{-4} \text{ ft/sec} = \boxed{9.62 \text{ ft/day}}$$

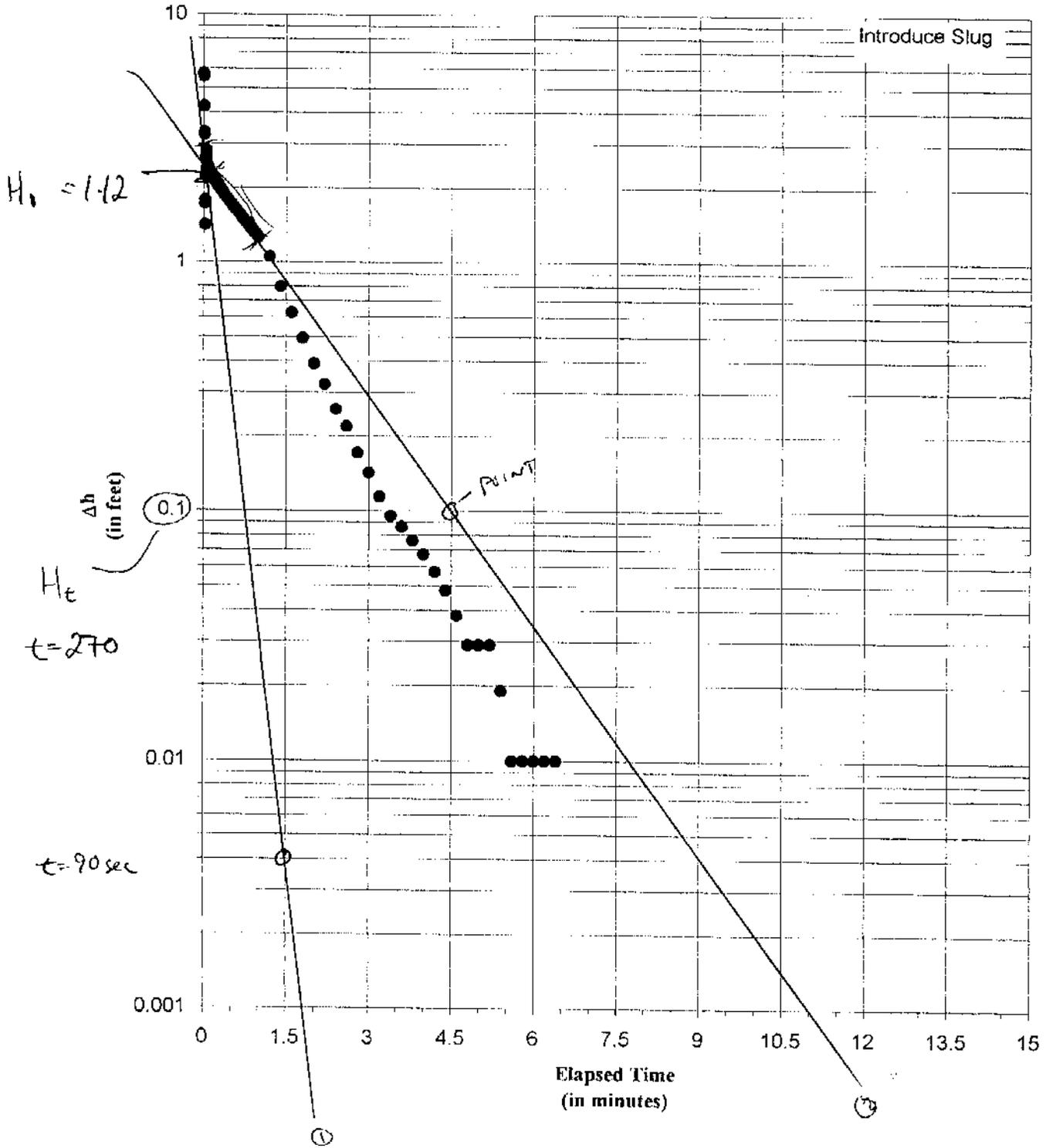
$\boxed{K = 10.83 \text{ ft/d}}$ BRSlug

OUT SLUG AVG = 5.80 ft/d

MW-12D- K_{avg} = 7.01 ft/d

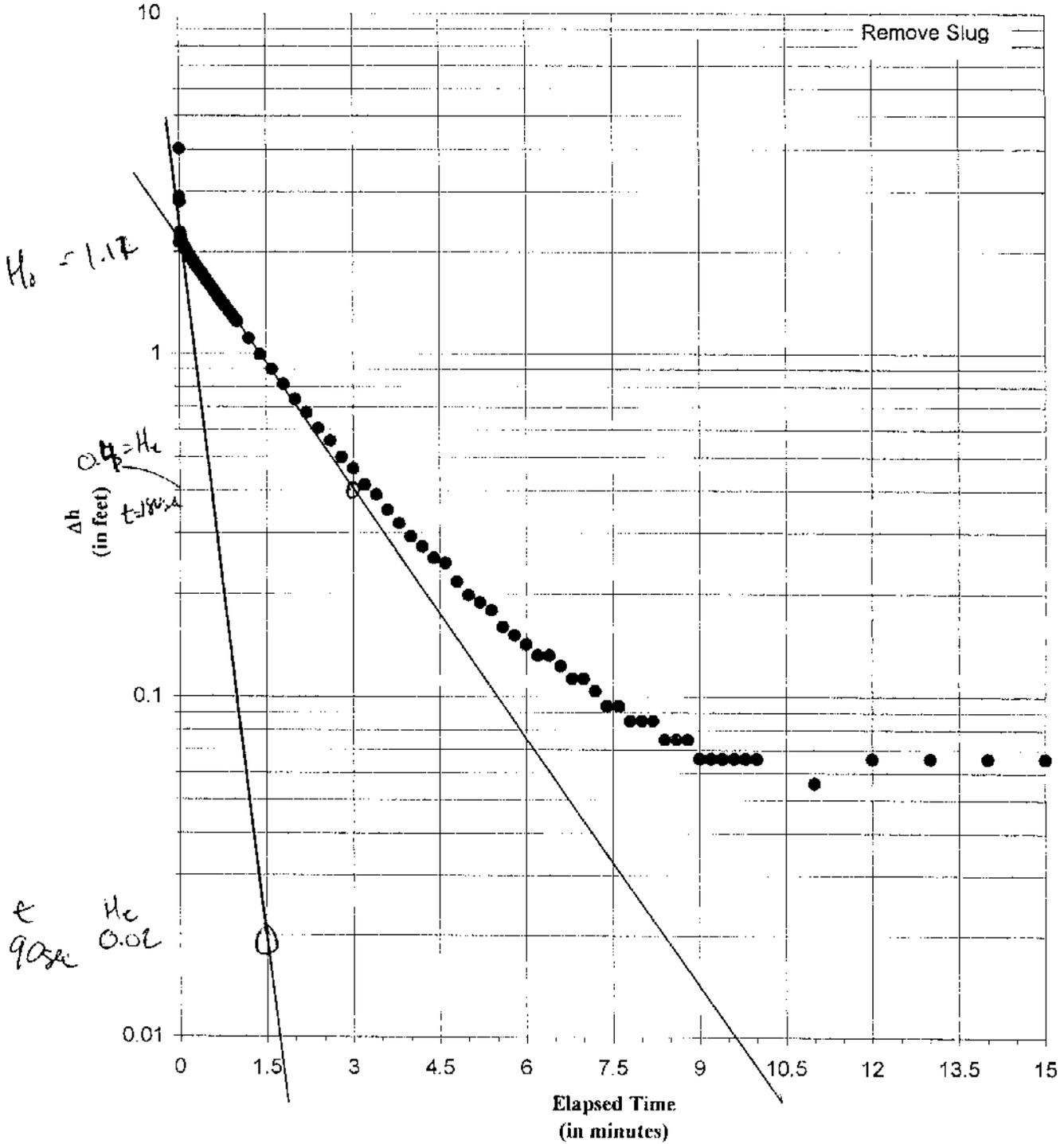
NEWFANE SERVICE CENTER
NEWFANE, VERMONT

SLUG TEST, WELL MW-12D
JUNE 10, 1997



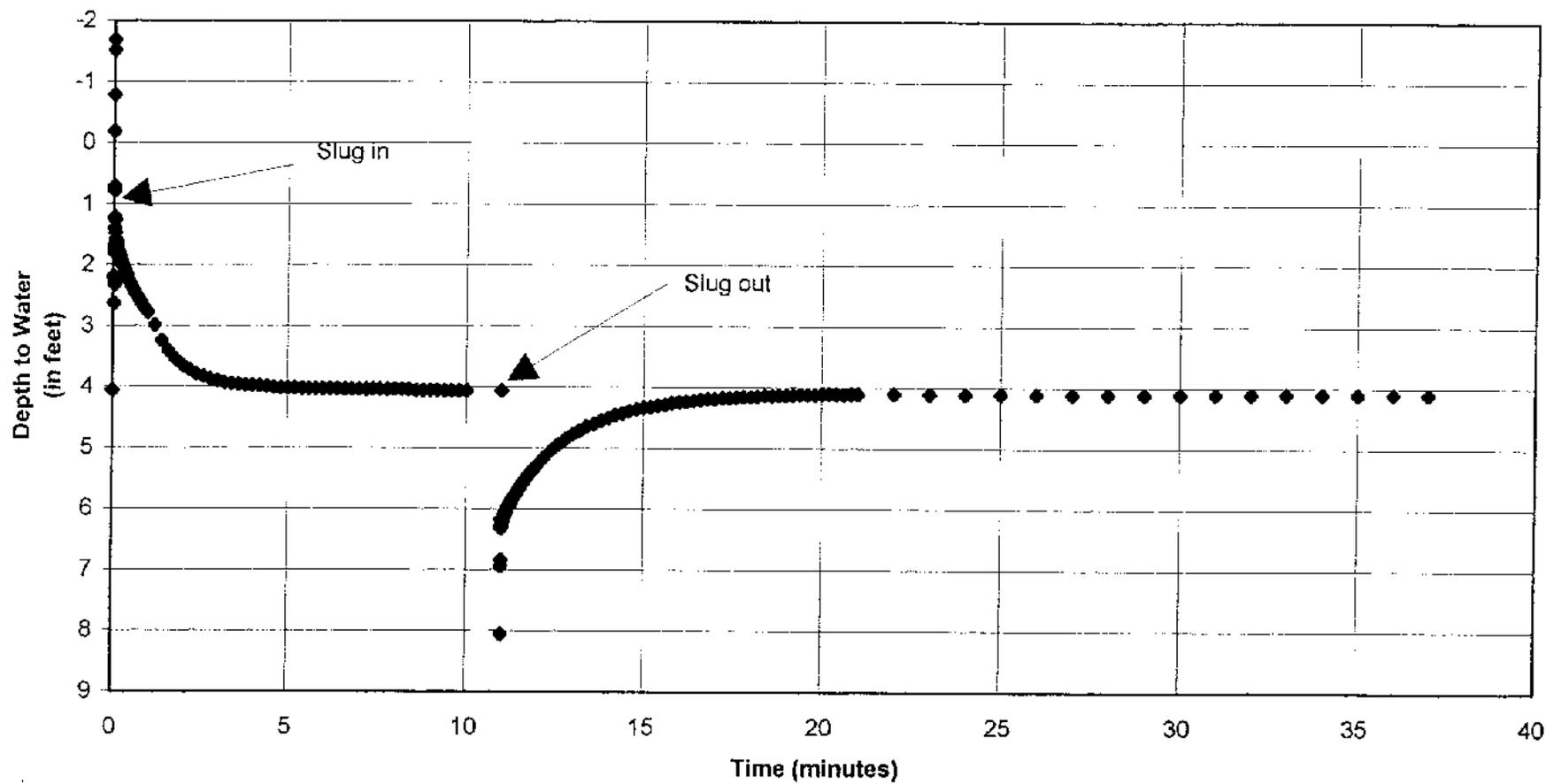
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NEWFANE, VERMONT

SLUG TEST, WELL MW-12D
JUNE 10, 1997



NEWFANE SERVICE CENTER
NEWFANE, VERMONT

Depth To Water Graph
MW-12
June 10, 1997



Bouwer and Rice equation:

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{R}\right)}{2L_w} \frac{1}{t} \ln \frac{H_1}{H_0}$$

r_c = radius of well casing = 0.083'
 dtw = 3.26 ft, Well Depth = 12.0 ft, L_w = 8.74
 R = radius of the gravel envelope, and R_e = effective radial distance over which head is dissipated. Ratio calculated by:

If L_w is less than h , then

$$L_w/R = \frac{8.74}{0.29} = 30$$

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln(L_w/R)} + \frac{A + B \ln\left[\frac{(h - L_w)/R}{L_w/r_c}\right]}{L_w/r_c} \right]^{-1}$$

If L_w is equal to h , then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln(L_w/R)} + \frac{C}{L_w/R} \right]^{-1} = \left[\frac{1.1}{\ln(30)} + \frac{2.0}{\left(\frac{8.74}{0.29}\right)} \right]^{-1} = [0.32 + 0.07]^{-1} = 0.39^{-1} = 2.5$$

L_w = length of the open section of well through which water can enter = 8.0 ft

H_0 = drawdown at $t=0$ = 1.10 ft

H_1 = drawdown at $t=t$ = 0.02

t = time since $H = H_0$ = 88 seconds

$$K = \frac{(0.083 \text{ ft})^2 (2.56)}{2(8.0)} \times \frac{1}{88 \text{ sec}} \times \ln \frac{0.02}{1.10} =$$

$$K = 1.10 \times 10^{-3} \times 0.011_{\text{sec}} \times 4.01 = 4.41 \times 10^{-5} \text{ ft/sec}$$

$$K = 3.81 \text{ ft/day}$$

$$K = 4.28 \text{ ft/day BR Slug}$$

$$K_{\text{AVE}} - 1^{\text{st}} \text{ Slug} = 4.645 \text{ ft/d}$$

MW-13
out slug

Bouwer and Rice equation:

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{R}\right)}{2L_e} \frac{1}{t} \ln \frac{H_0}{H_t}$$

r_c = radius of well casing = 0.083

dtw = 3.26 ft, Well Depth = 12.0 ft, L_w = 8.74 ft

Q. 2c) R = radius of the gravel envelope, and R_e = effective radial distance over which head is dissipated. Ratio calculated by:

If L_w is less than h, then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln\left(\frac{L_w}{R}\right)} + \frac{A + B \ln\left[\frac{(h - L_w)}{R}\right]}{\frac{L_e}{r_c}} \right]^{-1}$$

If L_w is equal to h, then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln\left(\frac{L_w}{R}\right)} + \frac{C}{\frac{L_e}{R}} \right]^{-1} = 2.56 \text{ (from in-slug)} \quad C = \underline{2.0}$$

L_e = length of the open section of well through which water can enter = 8.0

H_0 = drawdown at $t=0$ = 1.00

H_t = drawdown at $t=t$ = 0.01

t = time since $H = H_0$ = 30 seconds

$$K = \frac{(0.083 \text{ ft})^2 (2.56)}{2(8.0)} \times \frac{1}{30 \text{ sec}} \times \ln \frac{0.01}{1.00} =$$

$$K = 1.10 \times 10^{-3} \times 0.03/\text{sec} \times 4.61 = 1.52 \times 10^{-4} \text{ ft/sec}$$

$$K = 13.14 \text{ ft/day}$$

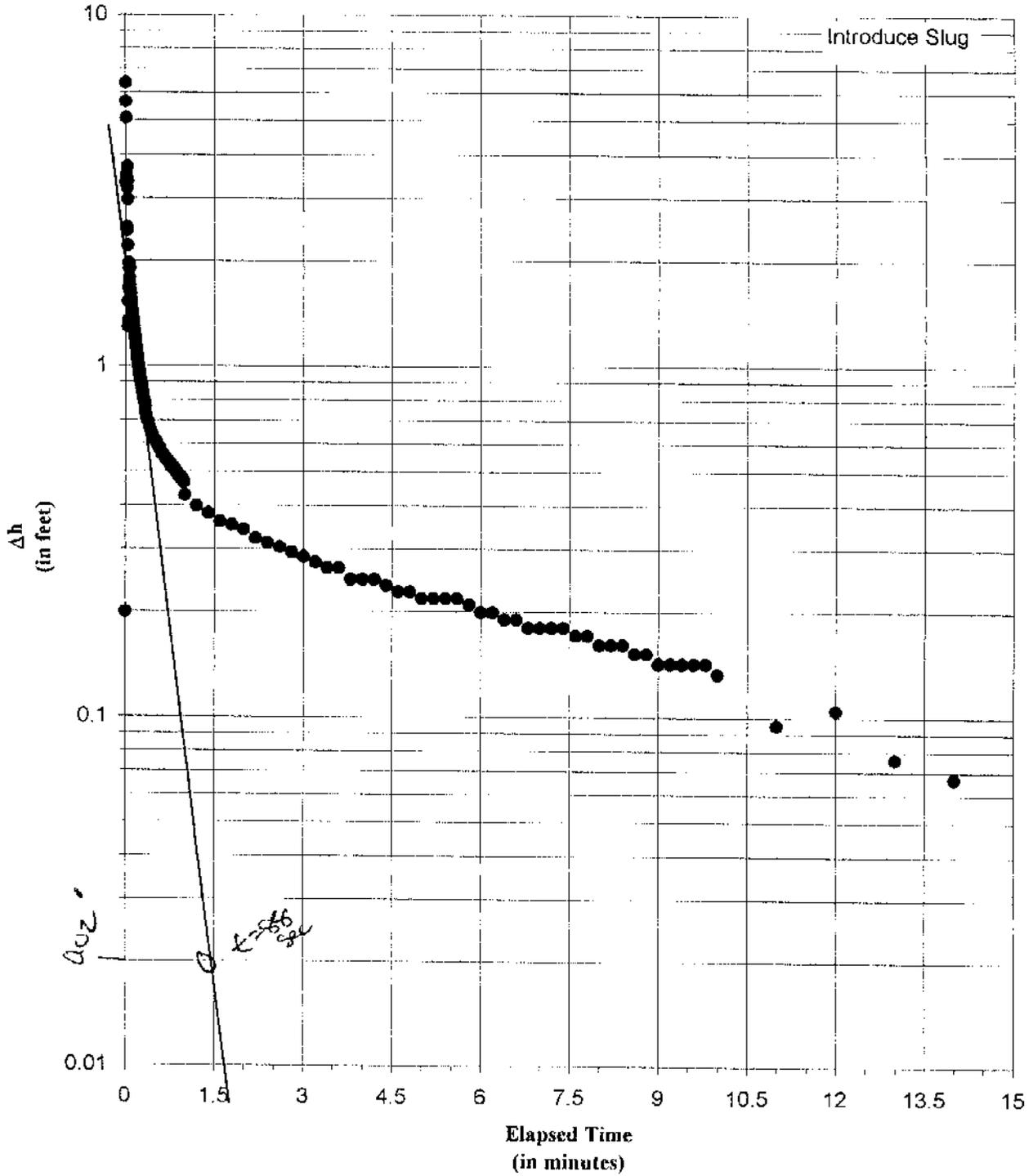
$$K_{\text{AVE-OUT-Slug}} = 13.79 \text{ ft/day}$$

$$K = 14.44 \text{ ft/day BR Slug}$$

$$K_{\text{AVE}} = 8.92 \text{ ft/d}$$

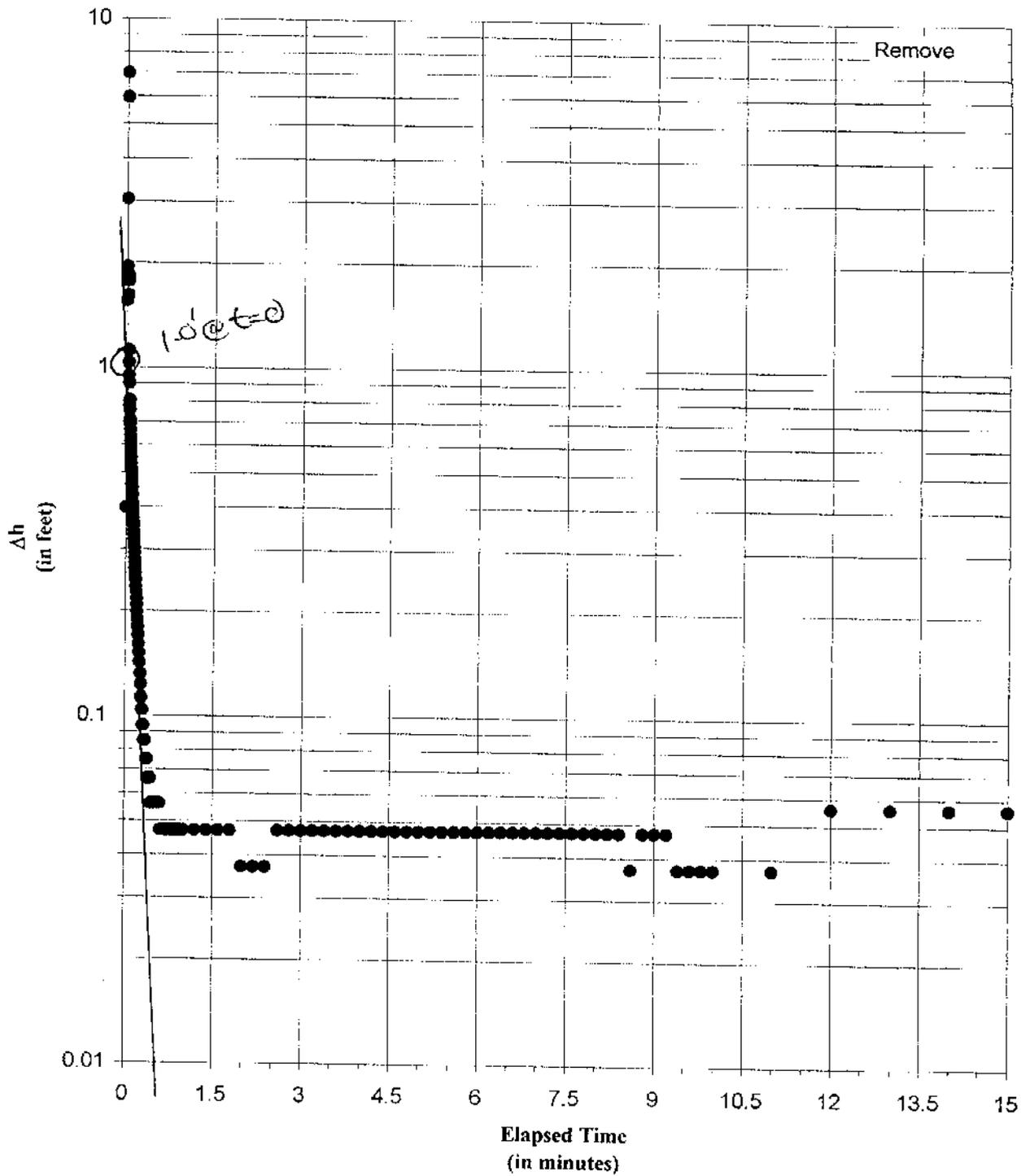
NEWFANE SERVICE CENTER
NEWFANE, VERMONT

SLUG TEST, WELL MW-13
JUNE 10, 1997



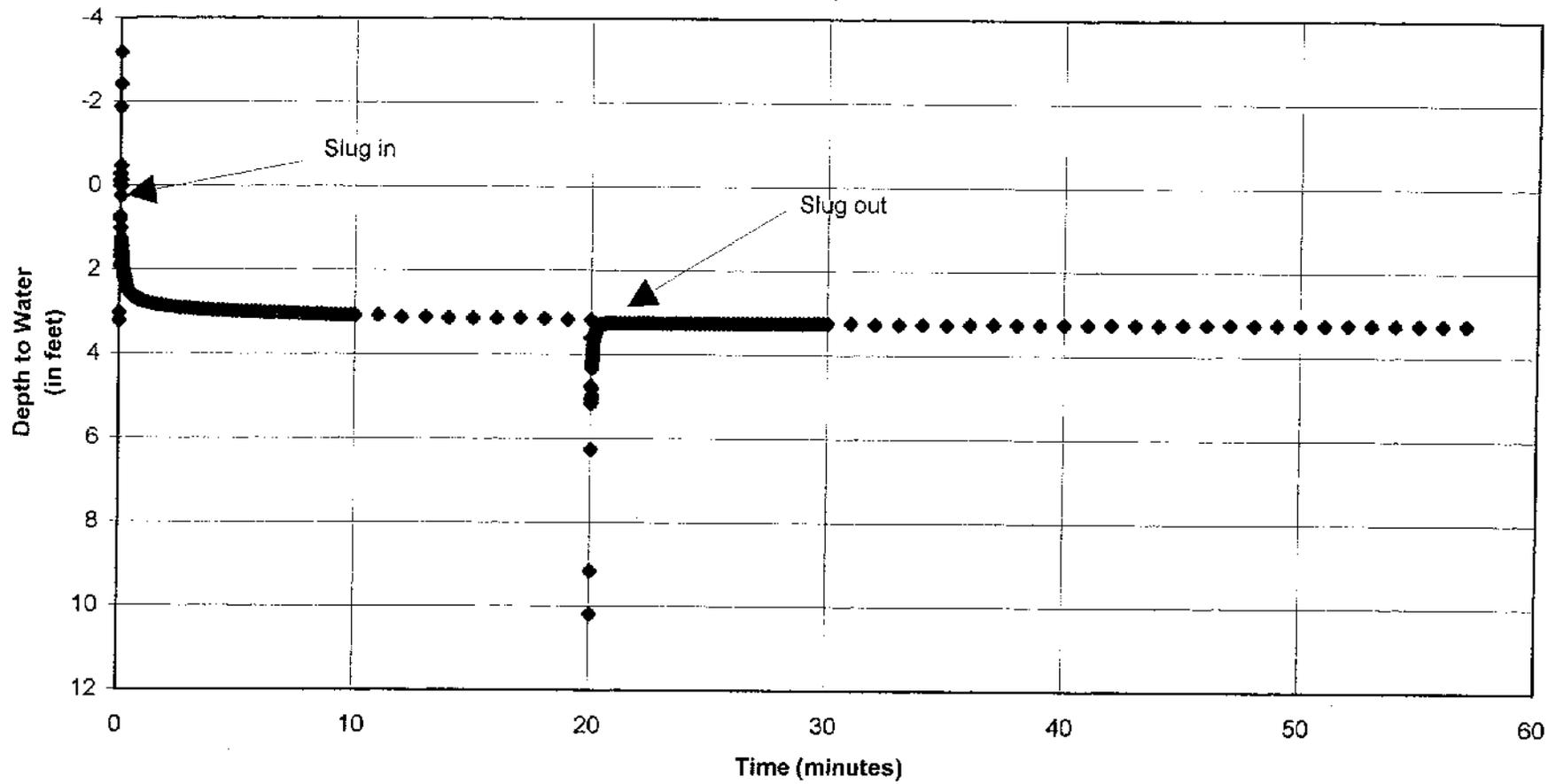
NEWFANE SERVICE CENTER
NEWFANE, VERMONT

SLUG TEST, WELL MW-13
JUNE 10, 1997



**NEWFANE SERVICE CENTER
NEWFANE, VERMONT**

Depth To Water Graph
MW-13
June 10, 1997



Bouwer and Rice equation:

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{R}\right)}{2L_e} \frac{1}{t} \ln \frac{H_i}{H_0}$$

r_c = radius of well casing = 0.083

dtw = 4.22 ft, Well Depth = 5.0 ft, L_w = 0.78

R = radius of the gravel envelope, and R_e = effective radial distance over which head is dissipated. Ratio calculated by:

→ If L_w is less than h , then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln\left(\frac{L_w}{R}\right)} + \frac{A + B \ln\left[\frac{(h - L_w)}{R}\right]}{L_w / r_c} \right]^{-1}$$

If L_w is equal to h , then

$$\ln \frac{R_e}{R} = \left[\frac{1.1}{\ln\left(\frac{L_w}{R}\right)} + \frac{C}{L_w / R} \right]^{-1}$$

L_e = length of the open section of well through which water can enter = _____

H_0 = drawdown at $t=0$ = _____

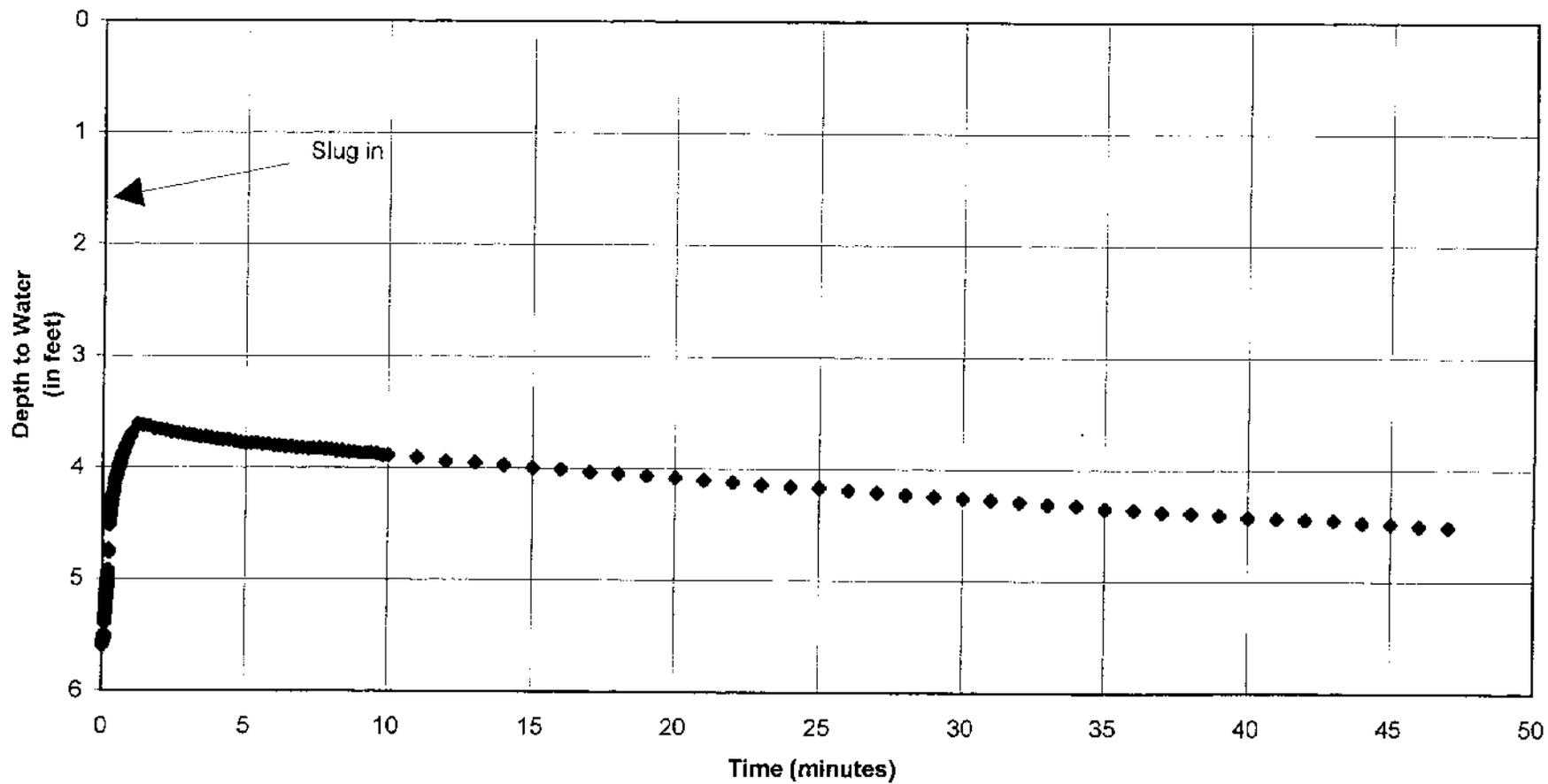
H_t = drawdown at $t=t$ = _____

t = time since $H = H_0$ = _____

Can not calculate, based on graph. Can not establish a line of best fit. Water was not added to well fast enough.

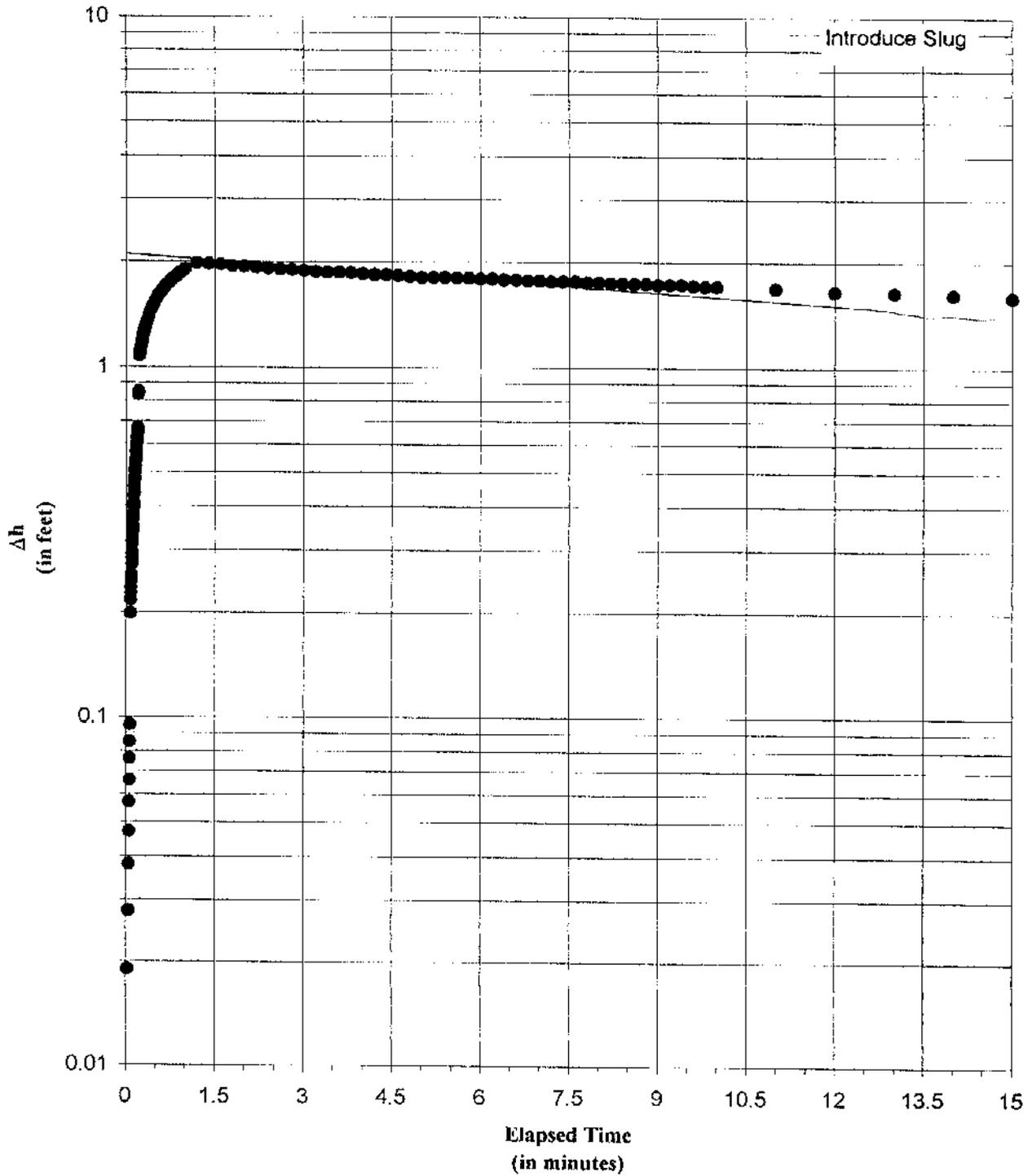
**NEWFANE SERVICE CENTER
NEWFANE, VERMONT**

Depth To Water Graph
MW-12S
June 10, 1997

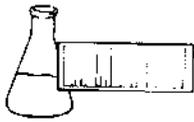


NEWFANE SERVICE CENTER
NEWFANE, VERMONT

SLUG TEST, WELL MW-12S
JUNE 10, 1997



APPENDIX F



ENDYNE, INC.

Laboratory Services

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

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Twin State Environmental Corp.

DATE RECEIVED: June 11, 1997

PROJECT NAME: Newfane #96056

REPORT DATE: June 19, 1997

CLIENT PROJ. #: 96056

PROJECT CODE: TSEC1621

Ref. #:	105,296	105,297	105,298	105,299	105,300
Site:	MW-12S	MW-12D	MW-11	MW-7	MW-10
Date Sampled:	6/10/97	6/10/97	6/10/97	6/10/97	6/10/97
Time Sampled:	12:15	12:30	14:15	14:40	14:50
Sampler:	K.B./J.B.	K.B./J.B.	K.B./J.B.	K.B./J.B.	K.B./J.B.
Date Analyzed:	6/17/97	6/17/97	6/17/97	6/17/97	6/17/97
UIP Count:	0	0	0	0	0
Dil. Factor (%):	100	100	100	100	100
Surr % Rec. (%):	97	98	98	99	98
Parameter	Conc. (ug/L)				
Benzene	<1	6.5	<1	<1	<1
Chlorobenzene	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	<1
Xylenes	<1	<1	<1	<1	<1
MTBE	<10	20.8	TBQ <10	TBQ <10	<10

Ref. #:	105,301	105,302	105,303	105,304	105,305
Site:	MW-4	GP-1	GP-2	MW-14	MW-2
Date Sampled:	6/10/97	6/10/97	6/10/97	6/10/97	6/10/97
Time Sampled:	15:10	15:30	15:45	15:35	15:37
Sampler:	K.B./J.B.	K.B./J.B.	K.B./J.B.	K.B./J.B.	K.B./J.B.
Date Analyzed:	6/17/97	6/18/97	6/18/97	6/17/97	6/17/97
UIP Count:	0	>10	>10	0	0
Dil. Factor (%):	100	0.2	0.1	100	100
Surr % Rec. (%):	100	98	97	97	96
Parameter	Conc. (ug/L)				
Benzene	<1	8,830.	6,490.	<1	7.9
Chlorobenzene	<1	<500	<1000	<1	<1
1,2-Dichlorobenzene	<1	<500	<1000	<1	<1
1,3-Dichlorobenzene	<1	<500	<1000	<1	<1
1,4-Dichlorobenzene	<1	<500	<1000	<1	<1
Ethylbenzene	<1	1,420.	3,830.	<1	<1
Toluene	<1	25,700.	62,000.	<1	<1
Xylenes	<1	9,980.	21,100.	<1	<1
MTBE	27.8	TBQ <5000	<10000	TBQ <10	40.3

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



ENDYNE, INC.

Laboratory Services

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FAX 879-7103

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Twin State Environmental Corp.

DATE RECEIVED: June 11, 1997

PROJECT NAME: Newfane #96056

REPORT DATE: June 19, 1997

CLIENT PROJ. #: 96056

PROJECT CODE: TSEC1621

Ref. #:	105,306	105,307	105,308	105,309	105,310
Site:	MW-3	MW-13	MW-1	MW-6	FB-1
Date Sampled:	6/10/97	6/10/97	6/10/97	6/10/97	6/10/97
Time Sampled:	15:43	15:50	16:00	16:00	16:10
Sampler:	K.B./J.B.	K.B./J.B.	K.B./J.B.	K.B./J.B.	K.B./J.B.
Date Analyzed:	6/17/97	6/18/97	6/17/97	6/18/97	6/18/97
UIP Count:	0	> 10	0	> 10	0
Dil. Factor (%):	100	50	100	0.4	100
Surr % Rec. (%):	96	102	95	99	92
Parameter	Conc. (ug/L)				
Benzene	2.4	171.	<1	1,970.	<1
Chlorobenzene	<1	<2	<1	<250	<1
1,2-Dichlorobenzene	<1	<2	<1	<250	<1
1,3-Dichlorobenzene	<1	<2	<1	<250	<1
1,4-Dichlorobenzene	<1	<2	<1	<250	<1
Ethylbenzene	<1	<2	<1	2,780.	<1
Toluene	<1	<2	<1	21,600.	<1
Xylenes	<1	6.4	<1	15,400.	<1
MTBE	22.6	34.8	<10	<2500	<10

Ref. #:	105,311				
Site:	Dup-1				
Date Sampled:	6/10/97				
Time Sampled:	16:00				
Sampler:	K.B./J.B.				
Date Analyzed:	6/18/97				
UIP Count:	0				
Dil. Factor (%):	100				
Surr % Rec. (%):	92				
Parameter	Conc. (ug/L)				
Benzene	<1				
Chlorobenzene	<1				
1,2-Dichlorobenzene	<1				
1,3-Dichlorobenzene	<1				
1,4-Dichlorobenzene	<1				
Ethylbenzene	<1				
Toluene	<1				
Xylenes	<1				
MTBE	<10				

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



ENDYNE, INC.

Laboratory Services

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EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Twin State Environmental Corp.

DATE RECEIVED: June 11, 1997

PROJECT NAME: Newfane #96056

REPORT DATE: June 19, 1997

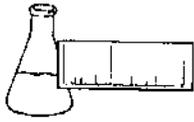
CLIENT PROJ. #: 96056

PROJECT CODE: TSEC1621

Ref. #:	105,286	105,287	105,288	105,289	105,290
Site:	Lawley (Lot 26)	Casanova (Lot 25)	Brooks (Lot 24)	Wright (Lot 23)	Hall (Lot 21)
Date Sampled:	6/10/97	6/10/97	6/10/97	6/10/97	6/10/97
Time Sampled:	17:15	17:30	17:45	18:00	18:15
Sampler:	K.B./J.B.	K.B./J.B.	K.B./J.B.	K.B./J.B.	K.B./J.B.
Date Analyzed:	6/16/97	6/16/97	6/17/97	6/17/97	6/17/97
UIP Count:	0	0	0	0	0
Dil. Factor (%):	100	100	100	100	100
Surr % Rec. (%):	95	96	100	97	96
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)
Benzene	<1	<1	<1	<1	<1
Chlorobenzene	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	<1
Xylenes	<1	<1	<1	<1	<1
MTBE	12.9	<10	<10	<10	<10

Ref. #:	105,291	105,292	105,293	105,294	105,295
Site:	Golding (Lot 18)	Mann (Lot 17)	Lot 16	McGourty (Lot 27)	TB-1
Date Sampled:	6/10/97	6/10/97	6/10/97	6/10/97	6/10/97
Time Sampled:	18:30	18:45	19:00	19:15	16:15
Sampler:	K.B./J.B.	K.B./J.B.	K.B./J.B.	K.B./J.B.	K.B./J.B.
Date Analyzed:	6/17/97	6/17/97	6/17/97	6/17/97	6/17/97
UIP Count:	0	0	0	0	0
Dil. Factor (%):	100	100	100	100	100
Surr % Rec. (%):	100	95	95	96	96
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)
Benzene	<1	<1	<1	<1	<1
Chlorobenzene	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	<1
Xylenes	<1	<1	<1	<1	<1
MTBE	TBO<10	<10	TBO<10	<10	<10

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



ENDYNE, INC.

Laboratory Services

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

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Twin State Environmental Corp.

DATE RECEIVED: June 11, 1997

PROJECT NAME: Newfane #96056

REPORT DATE: June 19, 1997

CLIENT PROJ. #: 96056

PROJECT CODE: TSEC1621

Ref. #:	Lot 66		105,278	105,279	105,280
	105,276	105,277			
Site:	Innes Pre-Filter	Innes Post-Filter	Store (Lot 76)	Morrill (Lot 75)	Marx (Lot 67)
Date Sampled:	6/10/97	6/10/97	6/10/97	6/10/97	6/10/97
Time Sampled:	8:00	8:05	11:45	12:00	16:00
Sampler:	K.B./J.B.	K.B./J.B.	K.B./J.B.	K.B./J.B.	K.B./J.B.
Date Analyzed:	6/16/97	6/16/97	6/16/97	6/16/97	6/16/97
UIP Count:	> 10	0	0	0	0
Dil. Factor (%):	100	100	100	100	100
Surr % Rec. (%):	101	100	102	99	95
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)
Benzene	2.3	<1	<1	<1	<1
Chlorobenzene	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	5.6
Xylenes	<1	<1	<1	<1	<1
MTBE	11.1	<10	<10	<10	<10

Ref. #:	105,281	105,282	105,283	105,284	105,285
Date Sampled:	6/10/97	6/10/97	6/10/97	6/10/97	6/10/97
Time Sampled:	16:15	16:10	16:30	16:45	17:00
Sampler:	K.B./J.B.	K.B./J.B.	K.B./J.B.	K.B./J.B.	K.B./J.B.
Date Analyzed:	6/16/97	6/16/97	6/16/97	6/16/97	6/16/97
UIP Count:	0	0	0	0	0
Dil. Factor (%):	100	100	100	100	100
Surr % Rec. (%):	94	94	95	96	96
Parameter	Conc. (ug/L)				
Benzene	<1	<1	<1	<1	TBQ <1
Chlorobenzene	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	<1
Xylenes	<1	<1	<1	<1	<1
MTBE	<10	<10	TBQ <10	13.0	31.1

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



ENDYNE, INC.

JUN 18 1997

Laboratory Services

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

LABORATORY REPORT

DATE: June 16, 1997
CLIENT: Twin State Environmental Corp.
PROJECT: Newfane #96056
PROJECT CODE: TSEC2623
COLLECTED BY: Ken Bisceglia/Jon Berntsen
DATE SAMPLED: June 10, 1997
DATE RECEIVED: June 11, 1997

Parameter

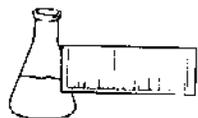
Reference Number

	<u>105,315</u>	<u>105,316</u>	<u>105,317</u>
pH (Standard Units)	6.28	6.33	6.65

Sample ID:

105,315: MW-11; 1920
105,316: MW-12D; 1935
105,317: MW-13; 1946

Reviewed by: _____



ENDYNE, INC.

Laboratory Services

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(802) 879-4333
FAX 879-7103

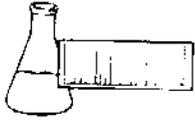
LABORATORY REPORT

CLIENT: Twin State Environmental Corp.
PROJECT NAME: Newfane #96056
REPORT DATE: June 25, 1997
DATE SAMPLED: June 10, 1997
DATE RECEIVED: June 11, 1997

PROJECT CODE: TSEC3622
REF. #: 105,312
STATION: MW-11
TIME SAMPLED: 19:20
SAMPLER: Ken Bisceglia

Digestion was performed by EPA Method 3010/3020.

<u>Parameter</u>	<u>Concentration</u> <u>(mg/L, ppm)</u>	<u>Reporting Limit</u> <u>(mg/L, ppm)</u>	<u>Analytical Method</u>	<u>Analysis Date</u>
Total Iron	0.118	0.010	EPA 200.7	6/24/97
Total Hardness	56.0	0.660	EPA 200.7	6/24/97
Total Manganese	0.207	0.005	EPA 200.7	6/24/97



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
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LABORATORY REPORT

CLIENT: Twin State Environmental Corp.
PROJECT NAME: Newfane #96056
REPORT DATE: June 25, 1997
DATE SAMPLED: June 10, 1997
DATE RECEIVED: June 11, 1997

PROJECT CODE: TSEC3622
REF. #: 105,313
STATION: MW-12D
TIME SAMPLED: 19:35
SAMPLER: Ken Bisceglia

Digestion was performed by EPA Method 3010/3020.

<u>Parameter</u>	<u>Concentration</u> (mg/L, ppm)	<u>Reporting Limit</u> (mg/L, ppm)	<u>Analytical Method</u>	<u>Analysis Date</u>
Total Iron	0.103	0.010	EPA 200.7	6/24/97
Total Hardness	54.2	0.660	EPA 200.7	6/24/97
Total Manganese	0.505	0.005	EPA 200.7	6/24/97



ENDYNE, INC.

Laboratory Services

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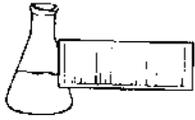
LABORATORY REPORT

CLIENT: Twin State Environmental Corp.
PROJECT NAME: Newfane #96056
REPORT DATE: June 25, 1997
DATE SAMPLED: June 10, 1997
DATE RECEIVED: June 11, 1997

PROJECT CODE: TSEC3622
REF. #: 105,314
STATION: MW-13
TIME SAMPLED: 19:46
SAMPLER: Ken Bisceglia

Digestion was performed by EPA Method 3010/3020.

<u>Parameter</u>	<u>Concentration</u> (mg/L, ppm)	<u>Reporting Limit</u> (mg/L, ppm)	<u>Analytical Method</u>	<u>Analysis Date</u>
Total Iron	0.236	0.010	EPA 200.7	6/24/97
Total Hardness	78.2	0.660	EPA 200.7	6/24/97
Total Manganese	1.82	0.005	EPA 200.7	6/24/97



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

DUPLICATE CONTROL DATA

CLIENT: Twin State Environmental Corp.
PROJECT NAME: Newfanc #96056
REPORT DATE: June 25, 1997
DATE SAMPLED: June 10, 1997
DATE RECEIVED: June 11, 1997

PROJECT CODE: TSEC3622
REF. #: 105,312
STATION: MW-11
TIME SAMPLED: 19:20
SAMPLER: Ken Bisceglia

<u>Parameter</u>	Dup 1 (mg/L)	Dup 2 (mg/L)	<u>Rel. % Diff.</u>
Total Iron	0.118	0.117	1.
Total Hardness	55.6	56.5	1.
Total Manganese	0.207	0.207	0.



ENDYNE, INC.

Laboratory Services

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

METALS LABORATORY REPORT

SPIKE CONTROL DATA

CLIENT: Twin State Environmental Corp.
PROJECT NAME: Newfane #96056
REPORT DATE: June 25, 1997
DATE SAMPLED: June 10, 1997
DATE RECEIVED: June 11, 1997

PROJECT CODE: TSEC3622
REF. #: 105,313
STATION: MW-12D
TIME SAMPLED: 19:35
SAMPLER: Ken Bisceglia

<u>Parameter</u>	<u>Concentration</u> <u>(mg/L)</u>	<u>Target</u> <u>(mg/L)</u>	<u>Spike Result</u> <u>(mg/L)</u>	<u>% Rec.</u>
Total Iron	0.103	0.400	0.489	96.
Total Manganese	0.505	0.400	0.870	91.

TO: ENDYNE INC
WILLISTON VT
802-879-4333

CHAIN OF CUSTODY RECORD

Company of Endynde
CO# 21301B

Aqua Air **A2**
Analytical

25 Mathewson Drive Weymouth, MA 02189-2364
617 337-9334 / FAX 617-337-7642

WORK ORDER NO. _____

5 Johnson Drive, P.O. Box 130, Raritan, NJ 08869
908-526-1000 / FAX 908-526-7886

DUE DATE _____

TSEC1621

COMPANY: TSEC
PO Box 719
Richmond VT 05477
PHONE: (879 434-3352) FAX #: ()
SITE ~~TO:~~ Newfane # 96056
CLIENT CONTACT: KEN B.

SAMPLE TYPE
1. WATER
2. SOIL
3. SLUDGE
4. OIL
5. CHIPS
6. WIPES
7. AIR CASSETTE
8. OTHER

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

8020 BTEX/MTBE

Sample pH at Login

A² PROJECT # _____

A ² SAMPLE #	CLIENT SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER			SAMPLING INFORMATION			PRESERVATIVES
			SIZE	TYPE	#	DATE	TIME	TECH	
105,296	MW-12S	L	40ml	G	2	6-10-97	1215	KJB/JPB	X
105,297	MW-12D						1230		
105,298	MW-11						1415		
105,299	MW-7						1440		
105,300	MW-10						1450		
105,301	MW-4						1510		
105,302	GP-1						1530		
105,303	GP-2						1545		
105,304	MW-14						1535		
105,305	MW-2						1537		
105,306	MW-3						1543		

- REPORT PACKAGES
- MWRA
- NJPDES
- RDR
- MA. DEP
- NJDEP (AIR)
- COMPLIANCE
- OTHER

SAMPLED BY <u>KEN BISCEGLIO +</u> <u>JON BERNTSEN</u>	DATE: <u>6-10-97</u>	RECEIVED BY	DATE:
RELINQUISHED BY: <u>Ken Bisceglia</u>	TIME: <u>15:48</u>	RECEIVED BY <u>Jon B...</u>	DATE: <u>6/11/97</u>
RELINQUISHED BY:	DATE:	RECEIVED BY <u>Toni M. Charben</u>	DATE: <u>6-11-97</u>
	TIME:		TIME: <u>1:00</u>

Temperature upon receipt _____

SPECIAL INSTRUCTIONS

RUSH DATE REQUIRED
(ADDITIONAL COST MAY APPLY)

REGULAR UST-TAT
(10 BUSINESS DAYS) (5 DAY VERBAL)

Shade areas for laboratory use only.

CHAIN-OF-CUSTODY RECORD

21301B

Project Name: <i>Newfane #96054</i> Site Location:	Reporting Address: <i>Box 719 Richmond VT 05477</i>	Billing Address:
Endyne Project Number: <i>TSEC1621</i>	Company: <i>TSEC</i> Contact Name/Phone #: <i>Ken B.</i>	Sampler Name: <i>KEN BISCAGGIO/JON BERNTSEN</i> Phone #: <i>434-2250</i>

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				
105,307	MW-13	L	X		6-10-97 1550	2	40 ml	BTEX / MTBE	8020	HCL/ICE	
105,308	MW-1	L	X		1600	1	40 ml		8020	HCL/ICE	
105,309	MW-6	L	X		1600	2	40 ml		5020	HCL/ICE	
105,310	FB-1	L	X		1610	2	40 ml		8020	HCL/ICE	
105,311	DUP-1	L	X		1600	1	40 ml		8020	HCL/ICE	

	MW-11	L	X		1920	1	1L	Total Iron, Hardness & Manganese		PH/ICE	
	MW-12D	L	X		1935	1	1L				
	MW-13	L	X		1946	1	1L	↓		↓	

Relinquished by: Signature <i>Kenneth Biscaggio</i>	Received by: Signature <i>Jon Berntsen</i>	Date/Time <i>6/11/97 1135</i>
---	--	-------------------------------

Relinquished by: Signature <i>Jon Berntsen</i>	Received by: Signature <i>Tom M. Chamberlain</i>	Date/Time <i>6-11-97 1:00</i>
--	--	-------------------------------

New York State Project: Yes No Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8060 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):										

TO: ENDYNE, INC
WILLISTON VT

802-879-4333

7306-2001-000002
105,276-105,317

CHAIN OF CUSTODY RECORD

Combine w/ Endyng
COC # 21301A



25 Mathewson Drive Weymouth, MA 02189-2364
617 337-9334 / FAX 617 337-7642
3 Johnson Drive, P.O. Box 130, Baritan, NJ 08869
908 526-1000 / FAX 908 526-7886

WORK ORDER NO. _____

DUE DATE _____

TSEC 1621

COMPANY: TSEC
PERCEY 719
Richmond VT 05477
PHONE: () 434 FAX #: () _____
SITE # Newfane #96056
CLIENT CONTACT: _____

- SAMPLE TYPE
- 1. WATER
 - 2. SOIL
 - 3. SLUDGE
 - 4. OIL
 - 5. CHIPS
 - 6. WIPES
 - 7. AIR CASSETTE
 - 8. OTHER

Water Supplies

- CONTAINER TYPE
- P - PLASTIC
 - G - GLASS
 - V - VOA

BTEX/MTBE 8020

Sample pH at Login

A² PROJECT #: _____

A ² SAMPLE #	CLIENT SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER			SAMPLING INFORMATION			PRESERVATIVES
			SIZE	TYPE	#	DATE	TIME	TECH	
105,276	Innes Pre-Filter	L	40	G	2	6-10-97	0800	KJB	HCL
105,277	Innes Post-Filter	L	40	G	2		0805		
105,278	Store (Lot 74)	L	40				11:45		
105,279	Morrell (Lot 75)						12:00		
105,280	Maxx (Lot 67)						16:00		
105,281	Krivance (Lot 68)						16:15		
105,282	Morrell (Lot 74)						16:10		
105,283	Gannon (Lot 77)						16:30		
105,284	Voice (Lot 65)						16:45		
105,285	La Moia (Lot 78)						17:00		
105,286	Lawley (Lot 26)						17:15		

REPORT PACKAGES

- MWRA
- NJPDES
- RDR
- MA. DEP
- NJDEP (AIR)
- COMPLIANCE
- OTHER

SAMPLED BY <u>KEN BISCEGLIO</u>	DATE: <u>6-10-97</u> TIME: <u>17:16</u>	RECEIVED BY <u>Jon Be...</u>	DATE: _____ TIME: _____
RELINQUISHED BY: <u>Kenneth Bisceglia</u>	DATE: _____ TIME: _____	RECEIVED BY <u>Jon Be...</u>	DATE: <u>6/11/97</u> TIME: <u>1:35</u>
RELINQUISHED BY: <u>Jon Be...</u>	DATE: _____ TIME: _____	RECEIVED BY <u>Tonia M. Chambers</u>	DATE: <u>6-11-97</u> TIME: <u>1:00</u>

Temperature upon receipt _____

SPECIAL INSTRUCTIONS

- RUSH DATE REQUIRED (ADDITIONAL COST MAY APPLY)
- REGULAR UST-TAT (10 BUSINESS DAYS) (5 DAY VERBAL)

Shade areas for laboratory use only.

CHAIN-OF-CUSTODY RECORD

21301A

Project Name: <i>Newfane #96056</i>	Reporting Address: <i>PO Box 719 Richmond VT 05477</i>	Billing Address: _____
Site Location: <i>Newfane VT</i>		
Endyne Project Number: <i>TSEC1621</i>	Company: <i>TSEC</i>	Sampler Name: <i>KEN BISCIONE</i>
	Contact Name/Phone #: <i>KEN B</i>	Phone #: <i>434-3350</i>

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				
105,287	Casanova (Lot 25)	L	X		<u>6-10-97</u> 1730	2	40L	<i>water supplies</i>	<i>8020</i>	<i>HCL/ICE</i>	
105,288	Brooks (Lot 24)				1745						
105,289	Wright (Lot 23)				1800						
105,290	Hall (Lot 21)				1815						
105,291	Golding (Lot 18)				1830						
105,292	Mann (Lot 17)				1845						
105,293	Lot 16				1900						
105,294	McGourty (Lot 27)				1915						
105,295	TB-1				1615						

Relinquished by: Signature <i>[Signature]</i>	Received by: Signature <i>[Signature]</i>	Date/Time <i>6/11/97 11:35</i>
Relinquished by: Signature <i>[Signature]</i>	Received by: Signature <i>[Signature]</i>	Date/Time <i>6-11-97 1:00</i>

New York State Project: Yes No

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrite N	9	BOD ₅	14	Turbidity	19	BTEX	24	EPA 608 Pest/PCB		
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 82-0		
29	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)										
30	Other (Specify):										

ATTACHMENT 1



TWIN STATE ENVIRONMENTAL CORP.

P.O. Box 719, Commercial Park, 1A Huntington Road, Richmond, VT 05477

Tel.: (802) 434-3350 • Fax: (802) 434-4478 • Email: tsefs@together.net

Phase (check one)	Type (check one)
<input checked="" type="checkbox"/> Initial Site Investigation	<input type="checkbox"/> Work Scope
<input type="checkbox"/> Corrective Action Feasibility Investigation	<input checked="" type="checkbox"/> Technical Report
<input type="checkbox"/> Corrective Action Plan	<input type="checkbox"/> PCF Reimbursement Request
<input type="checkbox"/> Corrective Action Summary Rpt	<input type="checkbox"/> General Correspondence
<input type="checkbox"/> Operations & Monitoring Report	

SITE CHARACTERIZATION PROPOSAL

Newfane Service Center
Route 30
Newfane, Vermont

SMS Site # 89-0453
TSEC # 96056

Date Prepared: May 2, 1997

Prepared for:
R.L. Vallee Inc.
280 South Main Street
St. Albans, Vermont 05478
(802) 524-8710

Written By:
Kenneth J. Bisceglia _____
Project Manager

Reviewed By:
John R. Diego _____
Vice President



TWIN STATE ENVIRONMENTAL CORP.

P.O. Box 719, Commercial Park, 1A Huntington Road, Richmond, VT 05477

Tel.: (802) 434-3350 • Fax: (802) 434-4478 • Email: tsefs@together.net

May 2, 1997

Mr. Timothy Vallee
R.L. Valice Inc.
280 South Main Street
St. Albans, Vermont 05478

**RE: Site Characterization Proposal - Newfane Service Center
Newfane, Vermont
TSEC Project #96056**

Dear Tim:

Twin State Environmental Corporation (TSEC) has completed a Work Scope/Cost Estimate for a Site Characterization Program at the above-referenced SITE. This proposal has been prepared to satisfy the requirements of the State of Vermont Sites Management Section (SMS) pertaining to the characterization and remediation of on- and off-SITE contamination.

This proposal has been submitted for review, comment and approval. No work will be performed until TSEC attains approval from the SMS. This phase of work is eligible for reimbursement under the Petroleum Cleanup Fund (PCF) once the deductible has been met.

TSEC will be submitting an access agreement to the current SITE owners (Brian & Patrice St. Germain) prior to performing any work on SITE.

Please call if you have any questions regarding this proposal or other matters of concern.

Sincerely,
TWIN STATE ENVIRONMENTAL CORPORATION

Kenneth J. Bisceglia
Project Manager

cc: *Mr. Robert Haslam, VTSMSS,
Brian & Patrice St. Germain*

kjb:\project\96056ns\0597wsce.doc

1.0 INTRODUCTION

Twin State Environmental Corporation (TSEC), on behalf of R.L. Vallee Inc. (Vallee), is submitting the following Work Scope/Cost Estimate (WSCE) to address the contamination issues related to the Newfane Service Station SITE in Newfane, Vermont (SMS #89-0453). The SITE is owned and operated by Brian and Patrice St. Germain. Vallee has been the wholesale supplier of gasoline to the St. Germain's since February 1990.

The SITE is a retail gasoline service station and convenience store located on the western side of Route 30 just to the north of downtown Newfane in Windham County, Vermont. The SITE is listed with the State of Vermont Department of Environmental Conservation (DEC Site #89-0453), Waste Management Division (WMD). See SITE Location Map, **Figure 1** and the SITE Plan, **Figure 2**.

Mr. Bob Haslam (Hazardous Materials Specialist) from the State of Vermont, Sites Management Section (SMS), requested that TSEC prepare a work scope to address the gasoline impact at the SITE and surrounding residential properties. The work scope presented here focuses predominantly on a rapid SITE characterization program to gather data necessary for the development of a Corrective Action Plan.

2.0 CONCEPTUAL MODEL

The contaminant source that has impacted the subsurface soil, groundwater and bedrock at the SITE and surrounding properties appears to have resulted from a former underground storage tank (UST) system on SITE. The predominant source area is located near the southeastern corner of the service station building (see **Figure 2**).

Small amounts of product (<0.5 ft) have been historically found in well MW-6 and identified in a previous study to be a mixture of 85-90% gasoline and 10-15% diesel/fuel oil. The gasoline was age dated to be pre-1985 vintage and the diesel/fuel oil is estimated to be less than five (5) years old. Groundwater conditions between the pump island and Rte. 30 have fairly high dissolved levels of BTEX at 85,330 ug/l and MTBE at 1,380 ug/l in March 1997.

The local groundwater flow on SITE has been calculated to be towards the east and northeast with a horizontal gradient of 0.04 to 0.06 ft/ft. Groundwater quality to the north and south of the SITE appears relatively clean; and, downgradient across Rte. 30, the Innes Residence has been low level with BTEX and MTBE less than 100 ug/l in September 1996.

The bedrock geology of the region surrounding the SITE is comprised of Ordovician age rocks, specifically the Moretown Member and the Barnard Volcanic Member of the Missisquoi Formation. These rocks were formed over 425 million years ago and were originally deposited as a series of interbedded quartzite sands, graywackie sands, muds, and volcanic deposits. The SITE is located in a transitional zone between the two formations, where differentiation of the formations is difficult. Structurally, these formations are relatively simple on a large scale, yet complex on a smaller scale. These formations all trend north to northeast, dipping to the southeast.

Surficial deposits in the area consist of fluvial outwash and ice contact deposits. These deposits are both well sorted sands and gravels that are generally less than 10 feet thick in the SITE vicinity. Materials are well drained above the water table, and tend to yield significant amounts of water below the water table.

References:

1. Hepburn, J.C., Trask, N.J., Rosenfeld, J.L., and Thompson, J.B., Jr., 1984, *Bedrock Geology of the Brattleboro Quadrangle, Vermont-New Hampshire: VT. Geol. Survey Bull., no. 32, 162 p.*
2. Stewart, David P., 1975, *Geology for Environmental Planning in the Brattleboro-Windsor Region, Vermont: Vt. Geol. Survey Env. Geol., no. 7, 47p.*

Gasoline-impact to the underlying bedrock formation has occurred as evidenced by the bedrock monitoring well MW-2 and surrounding drilled private water supply wells. The former and current UST excavations have likely come close to the bedrock surface and may have provided the transport mechanism between the impacted overburden and bedrock. Drilling by others indicated that weathered bedrock was encountered at MW-9 at 11ft bgs.

During the UST replacement program in February 1990, about 90 cu.yds. of contaminated soil was removed from the SITE. Groundwater quality following the soil removal reportedly had a positive effect on the surrounding water quality; however, complete remediation of the source does not appear to have occurred.

3.0 SCOPE OF WORK

The proposed work scope for a SITE characterization program (SCP) is detailed in this section and highlighted with a cost breakdown in Table 1 and Proposed Sampling Location Plan shown on Figure 3. The objective of the SCP includes:

- sampling and testing of existing groundwater monitoring wells and residential water supplies;
- obtaining soil gas samples at 34 sampling locations;
- vertical soil probing at 7 locations;
- the installation of 4 new groundwater monitoring wells;
- slug testing of 3 new monitoring wells; and,
- reporting and recommendations.

The specific items in task format as shown in Table 1 are as follows:

<i>Task #</i>	<i>Description</i>
8	Preparation of work scope and cost estimate
9	Project coordination, preliminary SITE visit, correspondence with State, clear SITE (Dig Safe), update HASP, Obtain VAOT Permit
10	State file review
11	Field investigation - soil gas survey, soil borings, install monitoring wells
12	Slug test on 3 wells, sample 14 groundwater monitoring wells, sample 11 residential water supply wells
13	Reporting, data evaluation, update site plan, recommendations

(Tasks 1 through 7 were associated with the previous two (2) investigations.)

Prior to performing the field activities of this SCP, TSEC feels that a file review of historical investigations and a preliminary SITE visit be conducted. These activities will be used to modify the Proposed Sampling Location Plan prior to conducting field activities based upon previously collected data by others. Well logs, hopefully containing adequate geologic descriptions, will be used to develop cross sections A-A' and B-B' as proposed on **Figure 3**.

3.1 Field Investigation

A 15 ft spaced sampling grid was established as a basis of formulating the proposed sampling locations on **Figure 3**. The field investigation portion of this SCP (Task 11) is planned to be conducted over a 3 consecutive day period which will require two (2) over night per diems for field personnel. A permit from the Vermont Agency of Transportation (VAOT) for work performed along the eastern and western sides of Rte. 30 will be needed prior to conducting this field investigation.

A soil gas survey (SGS) was chosen to provide preliminary characterization of subsurface conditions on and off SITE. The SGS should work well since gasoline is readily volatile and easily detected in the vapor phase. Also, the depth to water is fairly shallow (typically less than 10 ft bgs); therefore, the vadose zone is limited. The soil gas sampling location will be collected within 3 ft of the water table.

Thirty four (34) soil gas samples will be collected using TSEC's Geoprobe[®] sampling equipment. Three (3) sampling locations will be conducted inside the service station building. Prior to using the Geoprobe[®] hand tools, the concrete slab will be breached using a core drill with a 4" bit.

Following the SGS, seven (7) locations as proposed on **Figure 3** will be further investigated using a Geoprobe[®] macrocore sampler to obtain geological and geochemical data. The soils will be logged in accordance with the Unified Soil Classification System (USCS) and field screened for volatile organic compounds (VOCs) using a photoionization instrument with a 10.6 eV UV lamp.

All vapor and soil samples will be tested on SITE using TSEC's mobile laboratory. The mobile laboratory will provide testing for BTEX, MTBE and TVPH. The SGS and soil delineation program is scheduled to take place in a period of two (2) consecutive days. One (1) soil sample from each of the seven (7) vertical soil probe locations will be submitted for laboratory testing at Endyne, Inc. in Williston, Vermont to detect BTEX, MTBE and total volatile petroleum hydrocarbons (TVPH) via EPA modified methods 8020 and 8015.

During the third day, four (4) groundwater monitoring wells (denoted as PMWs on **Figure 3**) will be installed, surveyed and developed using a standard surge and purge technique. All purge water will be discharged on the ground surface adjacent to it's well unless separate-phase product is encountered. Any separate phase encountered will be stored on SITE in a 55-gal drum in accordance with State regulations. As temporary measures, an absorbent skimmer sock will be placed in any well found to contain separate-phase product.

Three (3) of the PMWs (PMW-11, PMW-12 and PMW-13) will be installed by T&K Drilling, Inc. of Troy, New Hampshire. The wells will provide water quality and water table data upgradient of the source area and directly across Rte. 30 to the east. These wells will be installed using a 4.25" ID hollow-stem auger and completed using standard well construction techniques with 2" PVC well pipe,

machine slotted well screen, sand filter pack, bentonite seal and flush-grade road boxes. Since these three (3) wells will be used to obtain hydraulic characteristics at the SITE (via slug testing), conventional drilling and well installation techniques were chosen over small diameter wells to provide a better estimate of hydraulic conductivity values.

The fourth well (PMW-14) will be installed using Geoprobe® hand tools and completed with a pre-packed well screen system comprised of an inner (5/8" ID) and outer (1-5/8" ID) 0.010" machine-slotted PVC screen that has sand filter pack and will be finished with a standpipe cover. This well will provide groundwater quality and water table data north of the Innes Residence near the Scep-1 location (see Figure 3).

The new monitoring wells will be developed on the same day following installation. All new and existing wells will be surveyed for location and elevation. The surveyed elevation will be to an arbitrary bench mark (100.00 ft) that will be set on SITE for future use.

3.2 Slug Test

An aquifer "slug" test at PMW-11, PMW-12 and PMW-13 will be performed to provide an estimate of the hydraulic conductivity of the overburden deposits. The tests will be performed during the same day as sampling of the groundwater monitoring wells and residential water supplies.

The method, as described by Bouwer and Rice (1976), consists of quickly lowering the water level in a well or borehole from equilibrium, and measuring its subsequent rate of rise. This will be accomplished by lowering a solid "slug" of known volume into the well, allowing the well to equilibrate, and removing the "slug", thus lowering the water level in the well.

Data will be collected during both the introduction and removal of the "slug" using a pressure transducer and data logger, which will allow collection of necessary early time data that can not be collected manually. The data will be analyzed and compared using the equations presented in Bouwer and Rice (1976), values generated using the software program BRSLUG (1991), and compared against published book values.

3.3 Sampling of Groundwater Monitoring Wells and Residential Water Supplies

Prior to sampling the groundwater monitoring wells: water levels will be obtained; the above-referenced slug testing will be performed; and, 3 volumes of standing water in the wells will be bailed. All fourteen (14) monitoring wells will be sampled and tested at Endyne for BTEX and MTBE via EPA modified method 8020. Groundwater from wells PMW-11, MW-6 and GP-1 will also be tested at Endyne for iron, hardness and manganese. All groundwater samples will be field screened for pH, temperature, specific conductivity and dissolved oxygen. A duplicate and trip blank sample will be collected for QA/QC for BTEX and MTBE compounds.

There have been ten (10) water supplies that have been tested intermittently over the past seven (7) years. Of these, the Innes Residence has a treatment system with an influent and effluent sample taken. The total number of samples are eleven (11) and will be tested at Endyne for BTEX and MTBE via EPA modified method 8020 as a substitute for EPA Method 524.2. A trip blank will be collected

Newfane Service Center
Newfane, Vermont

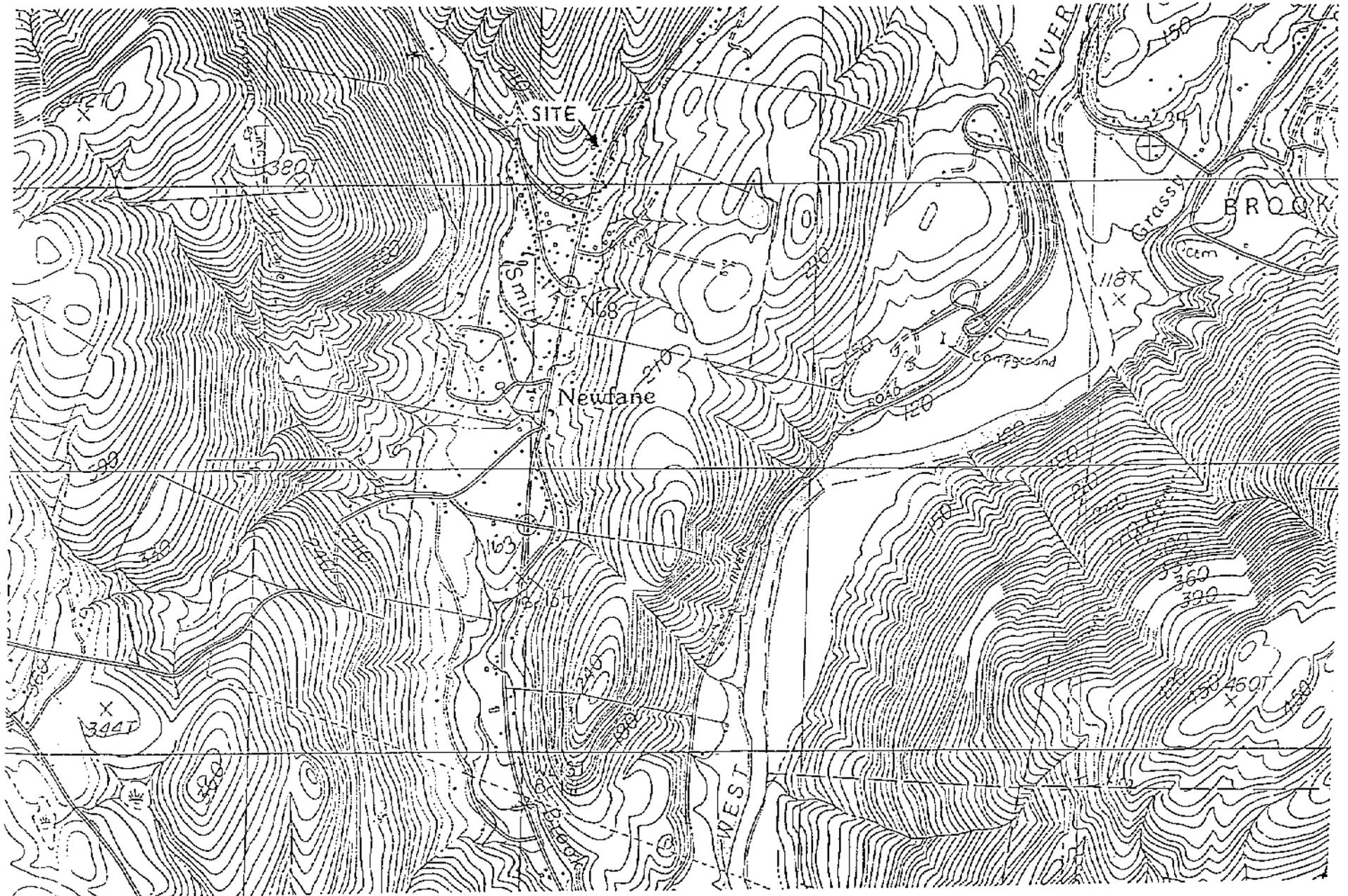
for QA/QC and all water supply samples will be stored in a dedicated cooler that will not contain samples from the monitoring wells.

Since there have been reports of a historical gasoline release north of the SITE on the eastern side of Rte. 30 at the County Seat Market, TSEC recommends extending the current water supply sampling program further north of the Marx Residence, Lot #67 (see **Figure 4**). Also, the sampling program should be expanded radially towards the south, based on MTBE levels in water supplies. Lot #78 contained 15 ug/l and Lot #24 contained 4.9 ug/l in samples tested in September 1996.

3.4 Reporting

A detailed report of items collected during this SCP will be furnished, along with our professional recommendations for corrective action at the SITE.

kjb:\project\96056ns\0597wsce.doc



MILES 1

.5

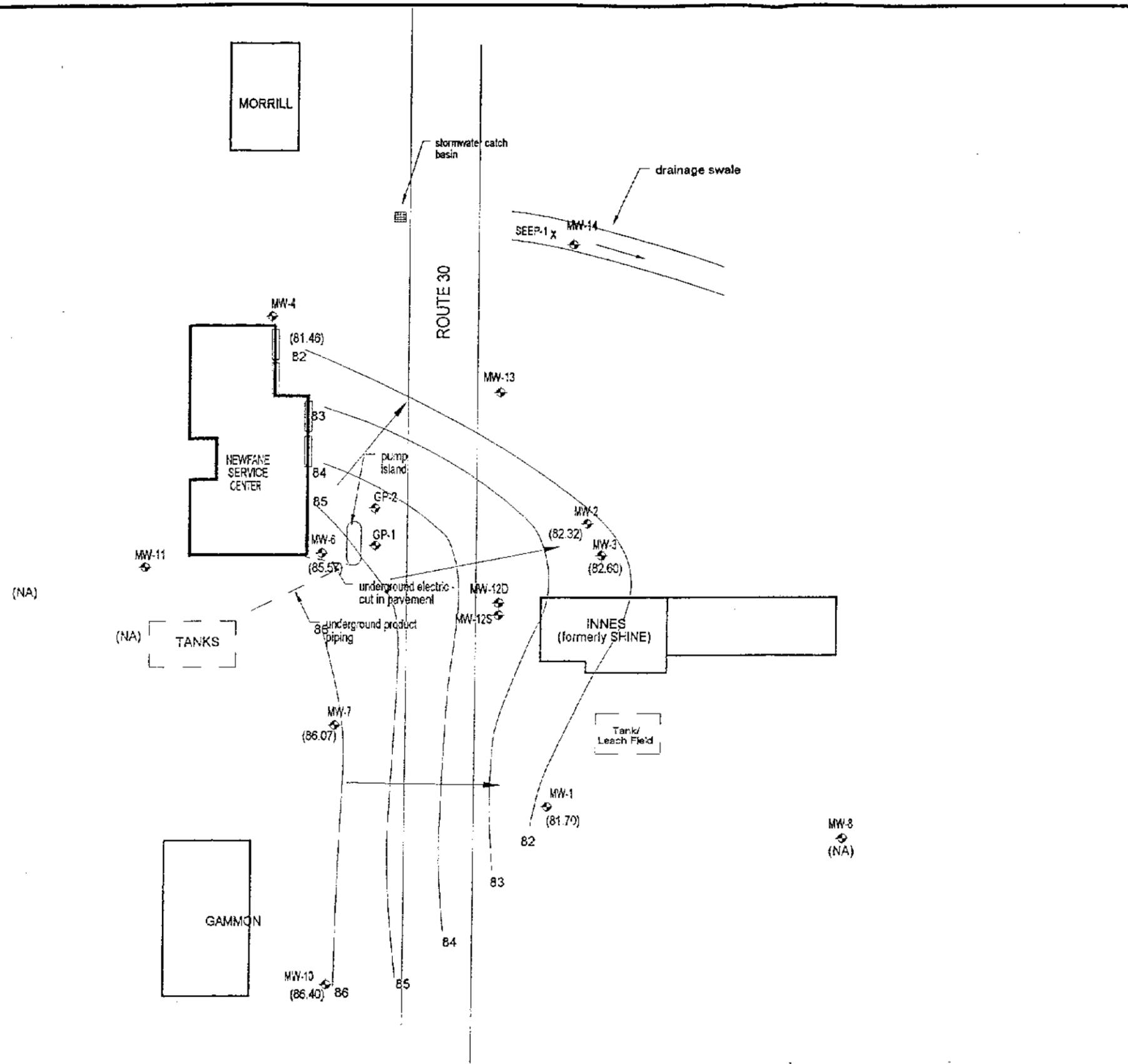
0

1

Project No: 96056
 Designed By: kjb
 Checked By:
 Approved By:
 Drawn By:
 Scale: as shown
 Date: 01/03/96

TWIN STATE ENVIRONMENTAL CORP.
 1A Huntington Rd.
 P.O. Box 719
 Richmond, Vermont
 (802) 434-3360

FIGURE 1
 SITE LOCATION MAP
 Newfane Service Center
 Newfane, Vermont



LEGEND

MW-1
(95.00) Monitoring Well Location
Water table elevation on 09/04/96 in units of ft.

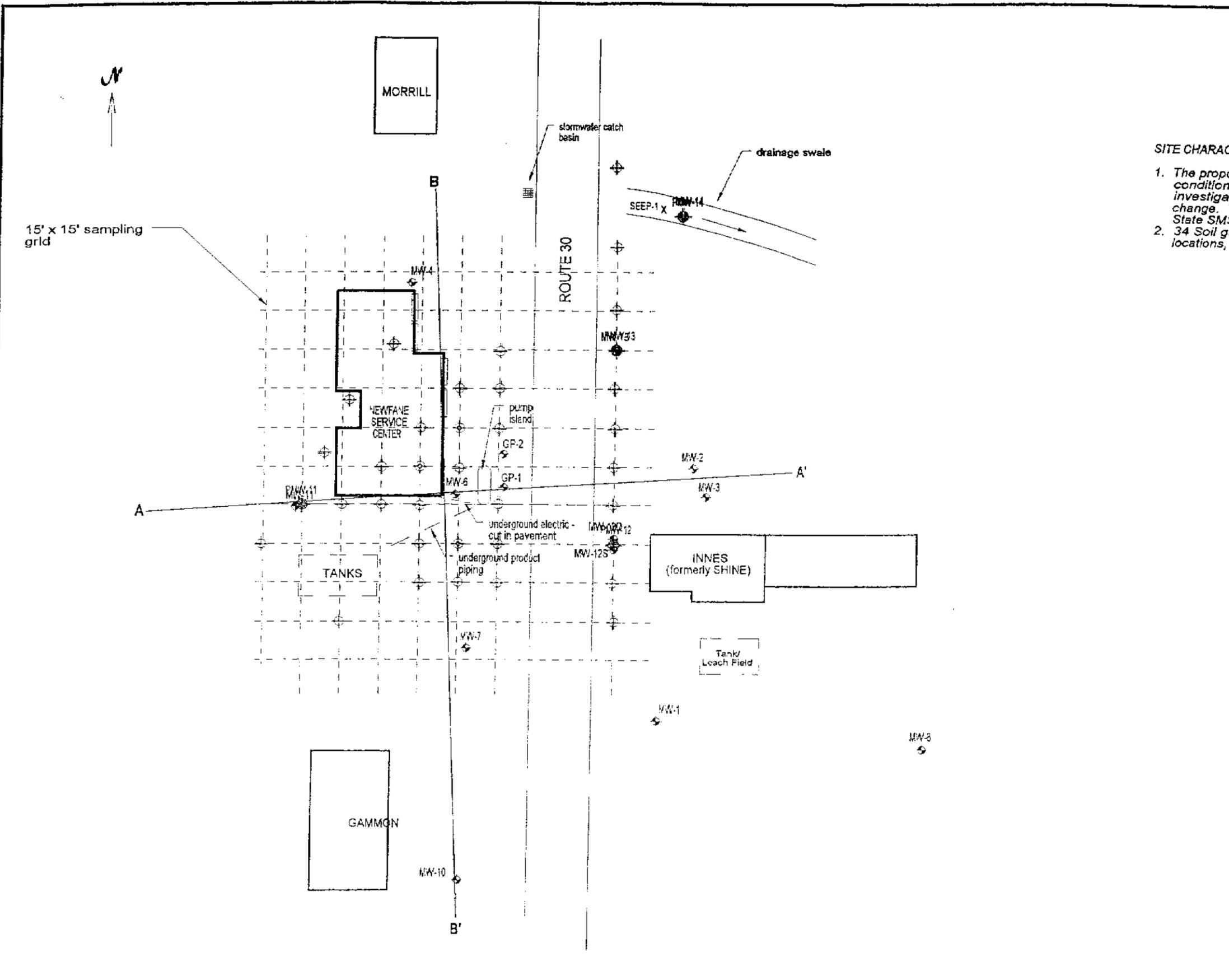
← Interpreted groundwater flow direction based on limited data.

NOTES:

- Monitoring well survey elevation of top of PVC by Tri-S Environmental, Inc.
- Locations on map are approximate.
- Source of Map from Tri-S Environmental, Inc. 1990.

0 10 20 40ft
Scale
1"=40'

Project No.: 96058	Approved By:	TWIN STATE ENVIRONMENTAL CORP 1A Huntington Rd. P.O. Box 719 Richmond, Vermont (802) 434-3350	FIGURE 2 SITE PLAN Newfane Service Center Newfane, Vermont
	Drawn By: jpb		
	Scale: 1" = 40'		
	Date: 08/28/96		
	Revised By: jpb		
	Revised: 05/01/97		



- SITE CHARACTERIZATION NOTES:**
1. The proposed locations will be dependent on conditions observed during the field investigation. Actual locations are subject to change. TSEC will maintain contact with the State SMS Project Manager.
 2. 34 Soil gas points, 7 vertical soil probe locations, 4 new monitoring wells.

LEGEND

- MW-1 Monitoring Well Location
- PMW-11 PROPOSED groundwater monitoring well (4)
- PROPOSED soil gas point (34)
- PROPOSED soil gas/solubility location (7)
- A---A' PROPOSED cross section detail

NOTES:

1. Monitoring well survey elevation of top of PVC by Tri-S Environmental, Inc.
2. Locations on map are approximate.
3. Source of Map from Tri-S Environmental, Inc. 1990.

0 10 20 40
Scale
1"=40'

Project No.: 96056	Approved By:	TWIN STATE ENVIRONMENTAL CORP 1A Huntington Rd. P.O. Box 719 Richmond, Vermont (802) 434-3350	FIGURE 3 Proposed Sampling Location Plan Newfane Service Center Newfane, Vermont
	Drawn By: jps		
	Scale: 1" = 40'		
	Date: 08/28/96		
	Revised: 05/01/97		
Revised By: kjb			