

LARKIN/RIVERSIDE - SITE ASSESSMENT

Burlington, Vermont

A study of the extent of contamination
of the vadose zone, surface water,
groundwater and soil.

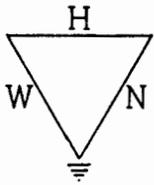
Report and Appendices A - L

July 29, 1988

WAGNER, HEINDEL, AND NOYES, INC.

CONSULTING HYDROGEOLOGISTS AND ENVIRONMENTAL SCIENTISTS





Wagner, Heindel, and Noyes, Inc. consulting geologists

P.O. Box 1629 Burlington, Vermont 05402-1629 802-658-0820

LARKIN/RIVERSIDE
SITE INVESTIGATION

Prepared by:

Dean A. Grover
Hydrogeologist

Reviewed and Approved by:

Jeffrey E. Noyes
Principal

Date: August 3, 1988

Larkin/Riverside
Site Investigation

TABLE OF CONTENTS

	<u>Page</u>
Executive Summary	i-iv
1.0 Introduction/Scope	1
2.0 Location	2
3.0 History of Land Use	3
4.0 Geology/Soils	4
5.0 Slope Stability	5
6.0 Extent of Trash and Sludge	8
7.0 Hydrogeology	10
8.0 Chemical Analysis of Vadose Zone Gases, Surface Water, Groundwater, Soils and Sludge	12
8.1 Introduction	12
8.2 Vadose Zone/Air Sampling	13
8.3 Surface Water	17
8.4 Groundwater	18
8.5 Soil	22
8.6 Sludge	24
9.0 Remediation	25
10.0 Conclusions	27

LARKIN/RIVERSIDE SITE INVESTIGATION

EXECUTIVE SUMMARY

- 1.) The Larkin/Riverside site is a 20 plus acre, moderately to steeply sloped parcel located on the south side of Riverside Avenue, opposite the Tortilla Flats Restaurant. Surficial deposits at the site consist of marine sands overlying about 40 feet of homogeneous silts. Bedrock, at about 60+ feet below ground surface, appears to be mantled by dense tills over the entire site.

- 2.) Household refuse was dumped in a pre-existing ravine on the site from about 1950 to 1961. Concrete and steel culverts were lain in the ravine while the trash was emplaced and were intended to carry stormwater to the Winooski River. The subsequent formation of Reeves Pond at the head of the culvert, and the formation of sink holes and seeps downgradient of the pond, strongly suggest that the culvert is at least partially blocked in some places, is leaking in other places, and that groundwater is "piping" around the culvert. The stability of the slopes in this area, where slides have occurred in the past, may be compromised by the poor condition of this culvert. A stormwater collection and diversion system is proposed at Reeves Pond to re-route the majority of this subsurface flow. This collection system will be designed in concert with the stormwater design for the proposed development.

- 3.) Sewage sludge from the City of Burlington wastewater treatment plant was dumped on an approximately 1/2 acre site on the Larkin/Riverside parcel from 1979 to 1980. Analysis of the sludge indicates that it is chemical relatively innocuous, and sufficiently dewatered for transport and landfilling.
- 4.) Excavation of approximately 150 test pits and 27 deep borings on the property have definitively established the limits of trash and sludge, as shown on page 42 of Appendix D. Only scattered deposits of brush and household refuse have been found outside of the trash and sludge zones.
- 5.) Surface water analyses of Reeves Pond showed no detectable concentrations of organic halocarbons (EPA 601, 602 analyses, detection limit of 1 ppb) and no elevated levels of metals. Total organic halocarbons (TOX) levels of 58 ppb and 41 ppb were detected from the culvert outfall and a seep adjacent to the outfall, respectively.

- 6.) Concentrations of toxic metals in groundwater samples taken on the property outside of the sludge and trash zones are all below the maximum contaminant levels (MCL) for drinking water established by the Vermont Department of Health. Two wells within the trash zone showed elevated levels of arsenic, chromium, cadmium, and mercury. The groundwater is high in iron and manganese throughout the site.

- 7.) Organic analyses of groundwater revealed traces (less than 1 ppb) of ethylbenzene, toluene, and xylene, common gasoline additives, in two wells, MW-117 and MW-203. These wells are not in or adjacent to the trash zone. These chemicals are likely a result of sampling or laboratory contamination.

- 8.) A radioactive analysis of groundwater detected gross alpha, gross beta, and tritium levels above natural background concentrations for this region, but below the MCLs for each constituent. Elevated levels are most likely caused by burial of low level radioactive wastes.

- 9.) Shallow soil samples were taken at six locations. Two samples within the trash zone revealed low concentrations (less than 10 ppb) of solvents (PCE & 1,1,1TCA) and traces (below 1 ppb) of halogenated methane compounds. Only halogenated methanes were found in soils outside of, but proximal to, the trash zone. These light solvents were likely transported by the methane gas produced in the trash.
- 10.) Over 40 shallow wells in the vadose zone were used to monitor gases migrating from the trash and sludge. The highest levels of methane, as measured by an MSA, were found over the trash zone, but some migration of gas is undoubtedly occurring toward the east, and upgradient of the trash. MSA levels taken during the winter with frost in the ground showed gas concentrations higher than those experienced during the summer at two locations, suggesting additional migration may be occurring while a frost "cap" is in place.
- 11.) A gas collection system is necessary to curtail the migration of explosive gases and solvents from the trash zone toward the east, where a housing development is proposed. A conceptual gas collection and burnoff system is presented in the report.

LARKIN/RIVERSIDE
SITE INVESTIGATION

1.0 INTRODUCTION/SCOPE

In January, 1987 a meeting was held between members of Larkin Realty and the Department of Environmental Conservation to discuss development potentials on the Larkin property on Riverside Avenue. Portions of the property have been contaminated by landfilling and application of sludge wastes. Mr. Reginald A. LaRosa the Chief of Operations for the Department was in attendance, as was Craig Heindel of Wagner, Heindel, and Noyes, Inc.

Mr. LaRosa summarized the agreements from the meeting in a letter dated February 2, 1987 to Craig Heindel found on pages 1-3 of Appendix A. Mr. LaRosa agreed that, upon submittal of proper evidence, the Department would define contaminated and uncontaminated portions of the total site. While the Department of Environmental Conservation does not have any direct authority to prevent development of the site, they can influence the decision-making process of the District Environmental Commission during the Act 250 hearings.

The scope of this document is to provide sufficient chemical and hydrogeological information about the air, soil, water, and sewage sludge on the Larkin property to permit the State to

divide the parcel into contaminated and uncontaminated zones. This document defines not only the limits of refuse deposited on the site, but also addresses the perceived potential for migration of contaminants via the saturated and unsaturated zones. An engineered barrier is proposed, which restricts the mobility of contaminant gases. With the proper design, construction, and operation of the barrier, the site will be suitable for habitation.

2.0 LOCATION

The Larkin/Riverside property is a 20+ acre parcel located on the south side of Riverside Avenue in the City of Burlington, Vermont. A Burlington Housing Authority residential development is cited just to the west of the Larkin property. This project is constructed on the western extension of the same landfill and does not appear to have been compromised by the adjacent trash. The Winooski River is located across Riverside Avenue approximately 500 feet to the north. Location maps are provided on pages 4 and 5 of Appendix A.

3.0 HISTORY OF LAND USE

During the years 1950 through 1961 the City of Burlington leased this site from Mr. Thomas Reeves for use as its sole repository for household and commercial/industrial wastes. The refuse was dumped into a ravine on the western side of the property, previously cut by a small stream flowing north to the Winooski River.

Hazardous waste materials that may have been potentially disposed of at the site are listed in a preliminary assessment conducted by the Vermont Agency of Environmental Conservation in May, 1987. The following companies may have deposited hazardous materials at the site between 1950 and 1961: E.B and A.C. Whiting Company, solvent soaked rags; Edlund Company, cyanide compounds, barium chloride salts; General Electric Company, solvents, corrosives, and waste oils; George Little Press, solvent based inks; Lane Press, petroleum based inks; Vermont Structural Steel, excess paints, thinners, and water soluble oils.

In 1979 the City of Burlington disposed of sewage sludge from the Burlington wastewater treatment plants on a half acre portion of the site for a one year period.

The east side of the Larkin property was used as a borrow pit, where large quantities of sands were removed from the site.

The property was purchased by Larkin Realty in 1986, with interest in developing a housing project for medium income families.

4.0 GEOLOGY/SOILS

The lower Winooski River valley was inundated by an inland sea during the Pleistocene. Active glaciation during that period produced large quantities of sands and gravels during the retreat of the ice. The pebbly sands overlying the Larkin site were probably deposited in a deltaic environment that prograded into this ancient, marine waterway. The relatively flat topography to the south of the site, where Trinity College is now located, is a characteristic topographic feature of deltas. A portion of the Surficial Geology Map of Vermont, and the map's explanation are provided on pages 1 and 2 of Appendix B. The marine sands overlie most of the Burlington, Colchester, and Essex Junction area and extend northward into Milton and beyond.

The Soil Conservation Service classifies the soils on the site as fill although borrowing activities have predominated within most of the unconsolidated materials. A copy of the SCS map and a definition for fill are provided in Appendix B, pages 3 and 4.

The deltaic sands were probably 40 to 50 feet thick over the

site, before considerable quantities were removed by human activity. Well borings at the site revealed approximately 40 feet of gray, uniform silts underlying the deltaic sands, likely laid down as lake sediments during a more quiescent period of deposition. The silts were encountered in all of the approximately 15 deep borings conducted at the site, usually found at 15 to 25 feet below the ground surface. Bedrock was evidently encountered in 3 to 4 deep borings, although rock coring was not performed to verify the presence of bedrock. A dense till mantles the bedrock over most if not all of the site. The bedrock geology map of Vermont indicates that Monkton Quartzite and/or Winooski Dolomite underlie this site. Test pits and boring logs are provided on pages 1-41 of Appendix D.

Some protection of surface waters and the bedrock aquifer is afforded by the arrangement of unconsolidated deposits at the site. The silts provide a thick "cation exchange bed" that will capture, or at least retard the flow of metals and other positively charged contaminants emanating from the trash. The dense tills may provide a very effective barrier to contamination of the deep bedrock aquifer, depending on the continuity of this layer.

5.0 SLOPE STABILITY

A comprehensive report on slope stability for the Riverside

Avenue area was developed by Knight Consulting Engineers for the Department of Streets, City of Burlington in August, 1984. This report provides detailed information about slope stabilites for the Larkin property, which is located between stations 26+00 and 39+00 in this report. A series of slides and washouts occurred in 1955 from station 28+00 to station 31+00, and is described in detail in the report. The description has been excerpted and is provided on pages 1-6 of Appendix C. Following is a summary of the events leading up to the slide in 1955:

- 1.) A stone culvert was constructed, probably around 1920 to 1930, to convey surface water in the aforementioned ravine beneath Riverside Avenue to the Winooski River.
- 2.) Approximately 50 to 60 feet of fill was placed over the culvert to bring Riverside Avenue up to its present grade.
- 3.) Beginning in 1950 trash was deposited in the ravine to the south of the avenue.
- 4.) As the ravine was filled with refuse a 42" reinforced concrete culvert was laid, section by section, in an upstream direction, and was buried with trash.
- 5.) The slides in 1955 were likely triggered by either the failure of the stone culvert, or the connection between the culvert and the reinforced concrete pipes.

6.) The slide formed a ravine approximately 80 feet deep across Riverside Avenue.

7.) A new 48" metal culvert was installed after the washout. This culvert extends from manhole #2, (located on page 1 of Appendix D), to an outfall above the south bank of the Winooski River.

A number of surface features are evident at this site to suggest that the culvert is not functioning properly at this time. A pond has developed at the inflow of the culvert, known as Reeves Pond (named after the previous landowner). The presence of the pond indicates that the culvert is blocked at the inlet, or somewhere along its length. In addition, large sink holes are found adjacent to, and 100 feet north of manhole #2. These features suggest that the connection between the old 42" reinforced concrete pipe and the new 48" metal culvert has failed and allowed entry of surface water at this point. Finally, seeps are noted beside the outfall, on the south bank of the Winooski River. The seeps indicate that not all flow is directed through the pipe, but that some flow has developed along the outside of the pipe. This "piping" through the subsurface may lead to erosion of fines and could trigger failure of the slope in the future. Correction of this problem would require either the repair or reconstruction of the culvert, a difficult and expensive task, or diversion of

stormwaters away from the area through storm drains designed to collect water at Reeves Pond. Stormwater diversion has been proposed by the developer, and design of the system will occur in parallel with the storm water design for the development. These solutions are discussed further in the Remediation section at the end of this report.

6.0 EXTENT OF TRASH AND SLUDGE

Over 150 test pits and 27 borings were used to delineate the subsurface conditions and the extent of trash and sludge on the Larkin property. Test pitting and well drilling was conducted from August, 1986 through September, 1987. The map on page 1 of Appendix D shows the locations of all test pits and borings. Test pit logs and boring logs are provided on pages 2-41 of Appendix D. Most test pits were equipped with 0.5" to 1.5" diameter, hand-slotted PVC wells, which were used to monitor the vadose zone.

The location of the sludge deposit and the boundary between the trash and no trash zone are indicated on the map on page D-42. The sludge deposit is confined to an approximately 1/2 acre, relatively flat area. The average thickness of the sludge is about three and a half feet. Cross-sections A through E, located on page D-42, and illustrated on pages D-43 through D-47 provide further information on the geometry of the sludge deposit. The total estimated volume of sludge is 2500 cubic

yards. The deposit is overlain by about 2700 cubic yards of fill for a total estimated volume of 4700 cubic yards of affected materials. Calculations are provided on page D-48 to substantiate these figures. Details of the chemical makeup of the sludge are provided later in this report.

Many dozens of test pits were used to definitively locate the eastern trash/no trash boundary. The extreme western side of the property was inaccessible to a backhoe, so the trash boundary here was inferred by topography and is obviously approximate. This should not impact any development plans for the property, as housing units will be well away from this boundary.

A sharp boundary was noted along most of the east trash boundary, especially where the trash zone abuts a steep bank near the southern end of the property and also at the extreme north end of the property. Page D-42 shows not only the trash boundary but also the locations for cross-sections F through K which provide detailed information on the geometry of the eastern trash/no trash interface. Cross-section are found on pages D-49 through D-54. A relatively thin veneer of trash is found over most of the area just west of the excavated lake (in the vicinity of cross-sections G-G' and J-J'). The trash layer is generally less than 5 feet thick in this area.

Test pits were dug in Reeves Pond after the water level was drawn down by pumping. The results showed the pond to be relatively free of trash, as delineated on the map.

Scattered piles of brush, concrete rubble and household refuse are found in the "no trash" zone. An unimproved road, constructed during borrow pit activities, provides relatively easy access to the site from Riverside Avenue. Unauthorized dumping of waste has occurred along this roadway in the recent past. Most of the refuse consists of brush and concrete rubble that is chemically benign. Small volumes of household garbage are found in some localities. No 55-gallon drums were observed, nor were any petroleum or solvent spills evident on any portion of the site. Most of the no trash zone is covered with unstabilized sand that is free of vegetation.

The trash zone is only partially covered with a thin layer of sandy fill. A relatively thick growth of pioneer poplars, willows, and hardwoods, has developed over the area.

7.0 HYDROGEOLOGY

Two rounds of water level readings were taken during late 1987 of all wells extending to the phreatic surface. Fifteen to twenty readings were taken during each round of measurements. Water table maps for September, 1987 and November, 1987 are

provided on pages E-1 and E-2 of the Appendix E with tabulated data on pages E-3 to E-5.

The general groundwater flow direction is towards the north, approximately paralleling the surface topography of the site. A water table "ridge/trough" association is notable on both maps, extending roughly along the trash boundary. The pronounced southerly deflection of water table contours along the axis of the buried stormwater conveyance is an indication that groundwater is flowing through (or immediately adjacent to) the pipe. Flow lines constructed perpendicular to the equipotential lines on the map have westerly components of flow to the west of this ridge and easterly flow components to the east. Consequently, there is a component of groundwater flow along most of the trash boundary that directs the flow away from the no trash area. Any contaminant plume arising from the trash would not be expected to move across the trash boundary.

The table on page E-6 permits a comparison of the elevation of the top of the silt layer with the phreatic surface. Groundwater flow is closely controlled by the geometry of the silt layer over the upper portions of the site, where the water table lies within only a few feet of the top of the silt. At the northern end of the site the water table extends 10 or more feet below the top of the silt. The depressed water table in this area is influenced by the loss of groundwater to the culvert at the sinkholes beside manhole #2.

Dual-level piezometers were installed at monitoring wells 210, 212, and 213, to measure vertical gradients of groundwater flow. Strong downward vertical gradients of 0.36 to 0.74 feet of head per vertical foot were found on the site. This area is characterized as a local groundwater recharge zone with short flow paths to a discharge zone. The magnitude of the vertical gradients decreases in a downgradient (or northerly) direction, as indicated on the table shown on page E-7. The vertical gradients of flow can be expected to diminish and then reverse as one moves closer to the Winooski River, which is a groundwater discharge zone evident by the presence of seeps.

There are no known private wells or springs along the groundwater flow paths from the Larkin site to the Winooski River. Burlington City water is used by all industrial/commercial enterprises along Riverside Avenue.

8.0 CHEMICAL ANALYSIS OF VADOSE ZONE GASES, SURFACE WATER, GROUNDWATER, SOILS AND SLUDGE

8.1 Introduction

Vadose zone gases, groundwater, surface water, soils, and sludge were extensively sampled and analyzed between September, 1986 and June, 1988 on the Larkin site. A complete chronological summary of the sampling activity in all media is found on pages 1-5 of Appendix F. Sampling was concentrated along the trash

boundary and on the east side of the Larkin property, where future development is anticipated. Results are provided in the following sections for each medium sampled, supported by data and maps in Appendix G through Appendix K.

8.2 Vadose Zone/Air Sampling

Both shallow vadose zone wells and groundwater monitoring wells were monitored for photoionizable contaminants (PID) during three complete rounds of measurements. An H-Nu was used for most measurements, although a Photovac TIP was also employed. The air space in these wells was monitored by quickly uncapping the well, inserting the probe of the instrument, and forming a crude air seal by placing one's hand over the top of the well.

The energy levels of the photoionizer lamps for the H-Nu and TIP are not high enough to ionize methane, and consequently methane is not detected.

To obtain measurements of methane in the wells, and measurements during the winter months, a Minigard II made by Mine Safety Appliances Company (MSA) was used to measure the lower explosive limit (LEL) of gases in the unsaturated zone and also to measure levels of oxygen. The Minigard II sensor is equipped with a catalyst which "burns" combustibles at relatively low temperatures. The slight increase in the temperature of the sensor during the burn causes an increase in its resistance,

which is then quantified electronically. Methane is detectable with the Minigard II, and in fact was used as a calibrant for the instrument. The LEL for methane is 5%, so an LEL of 100 % measured on the Minigard is equivalent to a total methane concentration of 5% in air. The Minigard also detects any other combustibles such as ethane, propane, or butane, if present.

Combustible gases in the monitoring wells were detected by attaching a suction bulb and 5 foot length of flexible tubing to the Minigard. The tube was quickly lowered down freshly uncapped wells, and a crude "seal" was formed by placing one's hand around the tube and the top of the well. Maximum %LEL levels and minimum %oxygen levels were then recorded. During nearly all measurements the %LEL declined rapidly after the maximum was recorded in the freshly uncapped well, indicating that contaminated gases had accumulated in the well over time, and that the "seal" eventually leaked and fresh air was drawn into the well during the test. This is also substantiated by the %O₂ levels, which typically start out low at the beginning of the test, then rise to ambient levels (20.8%). These measurements provide a rough estimate of the concentration of gases that might accumulate in basements and crawlspaces of buildings on the site, without remediation of the migrating gas problem. The plot of PID levels for August, 1987 is found on page G-1, and three plots of %LEL levels taken in August, 1987, January, 1988 (under frost conditions), and June, 1988 are provided on pages G-2 to G-4.

To shed additional light on the distribution of contaminated air in the vadose zone, the sampling populations were partitioned into trash/no trash subsets and averages and standard deviations were calculated for each zone. These results are tabulated on page G-5. As the table shows PID levels in the trash were much higher with an average of 22.5 ppm versus 1.8 ppm for the no trash zone. However, some relatively high values were noted in the no trash zone:

<u>Well #</u>	<u>TIP Reading (ppm)</u>
MW-736	6 ppm
MW-737	15 ppm
MW-741	9 ppm

Note that all elevated readings were taken with the Photovac TIP. The digital readout of the TIP permits the recording of very short lived elevated PID spikes. The steady state concentrations of airborne vadose zone contaminants is likely much less than the numbers shown here, since the gases accumulate in the well over time and are then quickly drawn through the TIP during measurements. The analog readout on the H-Nu tends to average the concentrations, and hence the high short-lived spikes are not detected.

As noted in the test pit logs for TP-736, a piece of rubbish was found at 3 feet below ground surface, which may be the source

for the elevated TIP reading at this well (possibly solvent soaked rags). Monitoring well 741 was installed in medium sands lying within 50 feet of the trash boundary, and the elevated PID levels are probably a result of migration of gases from the trash. The nearby sludge deposit may also have influenced the PID levels in this well.

The summary table for statistics on page G-5 also shows means and standard deviations for %LEL measurements in the trash/no trash zones, under both frost and no frost conditions. A rise in %LEL under frost conditions is evident by these statistics, with the average rising from 0.5 - 1.2% (no frost) to 9.2% (frost). These statistics are somewhat misleading, since all of the increase can be attributed to the precipitous rise in %LEL in monitoring well #206 from 0 with no frost to 165 with frost. Although limited to only one well, this increase implies that there is enhanced gas migration when a frost "cap" exists. Well 206 is located high up on the south end of the no trash zone, so upgradient gas flow is suggested by this result.

Slightly elevated %LEL levels were observed in monitoring well #305, which lies in the approximate center of the sludge. All other monitoring wells in and around the sludge showed zero levels of explosive gases. The sludge appears to be well digested with little anaerobic activity, which would otherwise release considerable quantities of methane.

The results of the analyses of the vadose zone show that a gas migration problem from the trash zone into the no trash zone currently exists on the site. A conceptual remediation system is proposed in section 9.0 of this report.

8.3 Surface Water

The culvert outfall, the seep beside the outfall, the Winooski River (upstream of the site), and Reeves Pond were analyzed for inorganic contaminants, pH, and COD in October, 1986. The results are found on pages 1 and 2 of Appendix H. It is likely that elevated levels of chloride found in the outfall and seep are caused by application of road salt along Riverside Avenue as well as Colchester Avenue and associated side streets that also lie within the drainage basin for the culvert. Arsenic, chromium, copper, mercury, selenium, and zinc were all below the MCLs for drinking water at all locations (see page H-3). pH levels ranged from 6.7 to 7.6.

Total organic halocarbons (TOX) were measured at the outfall and the seep. Elevated levels of 58 ppb and 41 ppb in the outfall and seep, respectively show some migration of low concentrations of halocarbons from the site. EPA method 601/602 analyses of Reeves Pond showed no detectable contamination (see pages H-4 and H-5).

8.4 Groundwater

Seven metals analyses, fifteen organic analyses, and one radioisotopic analysis of groundwater were taken around the site over an approximately one and one half year period. A complete summary of the groundwater sampling activities and results is provided on pages 1-3 of Appendix I. pH values and tabulated and plotted conductivity profiles of ten monitoring wells are listed on pages I-4 to I-19. Metals analyses are on pages I-20 to I-22, and all organic analyses are listed on pages I-23 to I-55. Finally, radioisotope assay results are provided with explanatory information on pages I-56 to I-59.

Elevated levels of metals were found in two wells within the trash zone. Arsenic and chromium exceed the MCLs for drinking water, established by the Vermont Department of Health, in monitoring well #201 at the extreme north end of the site. Cadmium, chromium, and mercury also exceed the MCLs in monitoring well #215, near manhole #2 at the center of the trash zone. An especially high level of total chromium was noted at this well, with a concentration of 29.8 mg/l, possibly derived from tanning or plating wastes. Research work on chromium shows that the trivalent state, Cr(III), is thermodynamically stable in the relatively neutral pH and reduced eH conditions found at this site, and that the more toxic hexavalent state, Cr(VI), is unstable (the laboratory analysis measures only total chromium). Chromium binds strongly to clays and organic

particles in the soil, "plating" onto these particles. Typical values of chromium in uncontaminated soils are as high as 20 mg/kg as reported in Soil Chemistry by Bohn, McNeal, and O'Connor, page 314. A copy of the table from this book is found on page 3 of Appendix K.

Iron and manganese levels were evaluated in seven monitoring wells. MW-206 can be considered a background well, since it is upgradient and well to the east of any dumping activity. Both total iron and total manganese levels exceed the secondary standards (0.3 mg/l-Fe, 0.05 mg/l-Mg) by about 50% in this well. A general trend of increasing concentrations of these metals is noted in the downgradient direction, with ultimate groundwater levels of 312 mg/l iron and 8 mg/l manganese at monitoring well 201 near the extreme north corner of the lot. It is interesting to note that iron and manganese are well below these levels at the culvert outfall and seep beside the outfall (see data on page H-1) although levels are still elevated.

The very high levels of iron and manganese point to the abundance of source materials, ie. buried metal objects, and the reduced, anaerobic nature of the subsurface environment made evident by the production of methane. The low redox potential allows iron to solubilize as ferric iron (Fe^{+2}) and divalent manganese (Mn^{+2}) in the groundwater. On reaching an oxygen-rich environment at the culvert outfall and associated

seep, oxidation results in the formation of precipitates, most likely $\text{Fe}(\text{OH})_3$ and MnO_2 , and a sharp drop in the dissolved concentrations of these metal ions. The culvert outfall and seep are heavily coated with iron and manganese precipitates.

In fifteen separate organic analyses collected over both the trash and not trash zones no organic contamination was noted except for traces (below the detection limit of 1 ppb) of ethylbenzene, toluene, and xylene in monitoring wells #117, and #203. The unsaturated zone is 10 to 12 feet thick at these wells so a considerable quantity of gasoline would have to be spilled before reaching the aquifer. Since the contaminants are confined to only two wells among many clean wells, postulation of a widespread petroleum spill would not match the field data. We believe that these very low levels of organic chemicals are a result of contamination either during collection of the samples, or during laboratory analyses.

Any solvents and petroleum wastes dumped at the site appear to have been either sorbed onto the abundant carbonaceous debris buried at the site, broken down during the anaerobic degradation that occurs at all landfill sites, or transported off site.

Groundwater from monitoring well #215 was analyzed for gross alpha activity, gross beta activity, tritium, and radon-222. The laboratory results and MCLs are summarized on page 3 of

Appendix I. All results are below the maximum contaminant levels for drinking water established by the EPA. Although the water is apparently safe from a radioactivity standpoint, the levels of gross alpha activity (12.30 pCi/l) and gross beta activity (20.53 pCi/l) are elevated above the natural background levels encountered in this area of Vermont. Averages of analyses taken for gross alpha and gross beta activity from approximately fifty water supplies in the Chittenden County area show an average gross alpha activity of 0.04 pCi/l (n=53) and a gross beta activity of zero (n=37). These averages are taken from data supplied by the Vermont Department of Health.

The elevated levels of gross alpha activity and gross beta activity are likely caused by burial of low level radioactive wastes, most likely hospital wastes, at the site from 1950 to 1961. All wastes, radioactive and otherwise, are currently handled and disposed of in strict accordance with EPA RECRA requirements at the Medical Center Hospital of Vermont (MCHV), but these controls on environmental release of hazardous substances were not in place during the 1950's. We are researching this matter further with the MCHV at this time.

The concentration of radon-222 at the Larkin site is below the average of approximately 1,050 pCi/l established in a statewide investigation of 366 water systems by the Vermont Department of Health.

No background tritium averages are available in Vermont Department of Health records, but the levels encountered at the Larkin Realty site (310 ± 179 pCi/l) can be accounted for by recent recharge of the site with rainwater. Background tritium levels in rainwater stood at approximately 6 to 30 pCi/l prior to 1952, at which time detonation of thermonuclear bombs increased the levels by about three orders of magnitude. The average tritium levels for the Boston area from 1963 through 1965 stood at approximately 5000 pCi/l and have been slowly declining since that time. Consequently, the concentration of tritium found in the groundwater at the Larkin Realty site can be entirely accounted for by intrusion of tritiated rainwater.

8.5 Soil

Thirteen soil samples were taken at or just east of the trash/no trash boundary at six different locations, SS1 - SS6, shown on the map on page J-2. The samples were taken 1 to 2 feet below the ground surface. A summary of the results is provided on page J-1 with data on pages J-8 through J-36. A concentration of 2.6 ppb of trichloroethylene was detected in SS2, while SS4 showed 8.8 ppb of 1,1,1 trichloroethane. Note that both SS2 and SS4 sample sites are within the trash zone. Subsequent analyses of the soil from the same general areas of SS2 and SS4 taken

about 4 months later showed no detectable concentrations of any contaminants. Many unidentified peaks were found during EPA 601/602 analyses of SS4 and SS5. However, later 624/625 analyses of these soils showed no detectable concentrations of contaminants.

The trichloroethylene and 1,1,1, trichloroethane positives appear to be localized, low concentration solvent spills, since repeat samples taken in the same general areas showed no contamination. Solvents leached from small rags laying on top of the ground surface, or buried at shallow depths would be sufficient to achieve these contaminant levels. The solvents may have been transported as gases through the vapor phase, then condensed onto the soil particles at these sites.

Traces (below the detection limit of 1 ppb for the analysis) of bromodichloromethane were found in SS1 and SS4 samples. These "light" freons are believed to have been transported with methane in the vapor phase, traces of which were absorbed onto soil particles during transport. At the very low levels measured, these chemicals may also be sampling or laboratory contaminants.

Percent LEL and PID measurements taken of split spoon samples from approximately 5 foot intervals in monitoring wells #208 through #215 are provided on pages J-3 through J-7. The split

spoon samples were analyzed for contamination by placing the soil samples in zip lock bags with freshly gloved hands, allowing them to set for a few minutes, then cracking open the bag and inserting the instrument probe for a reading.

Some scattered readings of 0.6 to 0.8 ppm were found at intervals of monitoring well #208 with the TIP, however, the H-Nu showed no response at these intervals. The operator of the TIP noted that a zero drift occurred in the instrument probably caused by moisture entering the device from the saturated silts that were being sampled at these intervals. H-Nu readings of up to 1.2 ppm were noted in monitoring well #215. As mentioned previously MW-215 is in the center of the trash zone and is recognized as a contaminated area. From the H-Nu readings contamination is evidently confined to an interval between 0 and 40 feet below ground surface, and does not extend to bedrock.

8.6 Sludge

Three samples of sludge were assayed for selected metals, nitrates plus nitrites, TKN, and pH. Results are found on pages 1 and 2 of Appendix K. High TKN values (up to 2240 mg/kg) were noted, as would be expected of a concentrated sludge. pH ranged from 7.5 to 7.8 in the samples. All metals fall within natural, apparently safe ranges reported in Soil Chemistry (see page K-3 for table and citation), except copper at 199 mg/kg found in SS2, and mercury at 1.37 mg/kg in SS3.

The results of these chemical assays were reviewed by Tom Moreau, a chemist for the Burlington Treatment Plant. He indicated that these values are equal to or less than what is normally produced at the waste treatment facility in the Burlington plant. These values, with the possible exception of TKN, do not exceed those found at other plants around the state.

Correspondence between William Ahearn of the Agency of Natural Resources, and Jeff Noyes of Wagner, Heindel, and Noyes, indicates that the sludge has an adequate solids contents, and a "relatively innocuous chemical makeup", and is suitable for landfilling. Copies of letters and an analysis of solids content are found on pages K-4 through K-7.

Larkin Realty intends to remove all sludge and sludge overburden from the site before development of the property.

9.0 REMEDIATION

Extensive sampling and analysis of soils, groundwater, and surface water shows no contamination with the exception of what appears to be localized solvent spills or redistribution via the vapor phase in the 0 to 10 ppb range in selected soil samples. The sludge is stabilized and safe for landfilling.

Methane gas migration must be controlled, since upgradient and

transgradient migration is obviously occurring at the site. A conceptual gas collection system is illustrated on pages 1-3 of Appendix L. A series of slotted sand packed wells, spaced at regular intervals of 75 to 100 feet are arrayed just east of and parallel to the trash boundary and are interconnected with a header pipe. The wells extend to within a few feet of the water table. The tee connections from the wells to the header are equipped with curb stops and flexible joints, to accommodate differential settling. The header must also be designed to withstand differential settling as will likely be encountered near the trash boundary.

The array of wells and the header will be overlain with a synthetic, air tight membrane to prevent the introduction of fresh air from the surface. Each well is sealed to the membrane at its point of penetration.

A possible alternative to an array of collection wells is a "cutoff trench" excavated parallel to the trash boundary and filled with crushed stone. PVC pipe gathers the gases, perforated at regular intervals with holes designed to provide uniform headloss.

A compressor provides suction on the header and wells to capture any mobile gases. A condensation tank upstream of the compressor removes unwanted water. An emergency shutoff valve

prevents backflow of gases when the compressor shuts down. The system is equipped with a flame arrestor to provide protection from explosion. A bypass vent is also provided for servicing the flame arrestor and burner.

If sufficiently free of contaminants and in economical volumes, the gas may be used as an auxiliary use of fuel for heating buildings, etc, otherwise gas will be flared off with a burner. An auxiliary source of propane will probably be necessary to sustain the flare.

10.0 CONCLUSIONS

- 1.) Although an absolutely complete analysis of soil, water, air, and sludge on the Larkin/Riverside site is impossible, a thorough investigation of these media has been ongoing for approximately the past 1 1/2 years, and a large data base now exists which clearly defines the limits of trash and sludge, contaminated water, and contaminated vadose zone gases.

- 2.) Chemical and radiological analyses show no gross contamination of soils or groundwater in the area east of the trash boundary and outside of the sludge disposal area. From the data collected, we foresee no adverse health impact to residents of a housing development sited in this area, provided the area is protected from potentially toxic and explosive gases emanating from the trash zone.

- 3.) A conceptual plan for a gas collection system has been presented, which should remove all explosive gases from the vadose zone within the no-trash area on the east side of the property.

- 4.) In our professional opinion, the trash zone can be safely used as an open recreational area after capping with clean fill and stabilizing with vegetation. Use of this area provides no greater potential hazard than is encountered at the adjacent Burlington Housing project.

- 5.) Areas of the trash zone just west of the excavated pit that's currently found on the site contain only 4 to 5 feet of trash, deposited near the surface. We feel that after removal of trash from this area, and subsequent filling, a stable roadway could be established. Other areas with greater thicknesses of trash could probably be traversed by road only after installing engineering support structures. Final judgement on subgrade requirements will be made during the project's design.

- 6.) Potential instabilities of those areas downgradient of Reeves Pond will be significantly reduced by diverting excess surface water from the pond into storm drains sized to adequately handle flows from large storm events. By circumventing the surface water flow from this area the potential for recurrence of a slide will be significantly reduced. This surface water diversion system will be explored further during the design phases of the housing project.

Index of Appendices

	<u>Page</u>
Appendix A - Introduction/Scope	
Letter from LaRosa to Heindel, dated	1-3
February 2, 1987	4-5
Location Maps	
Appendix B - History of Land Use	
Surficial Geology Map of Vermont	1-2
Soil Conservation Services Map	3-4
Appendix C - Slope Stability	
Knight Consulting Engineers Slope Stability	
Report (excerpts)	1-6
Appendix D - Extent of Trash and Sludge	
Test Pit and Boring Locations Map	1
Test Pit Logs	2-23
Boring Logs	24-41
Trash and Sludge Boundaries and	
Cross-section Locations Map	42
Cross-sections of Sludge, AA' to EE'	43-47
Sludge Volume and Overburden Calculations	48
Trash Boundary Cross-sections FF' to KK'	49-54
Appendix E - Hydrogeology	
Water Table Maps	1-2
Tabulated Water Table Elevations	3-5
Tabulated Water Table and Top of Silt	
Elevations	6
Vertical Groundwater Flow Gradients	7
 <u>Chemistry</u>	
Appendix F - Sampling Chronology	
Chronological Summary of Chemical Sampling	1-5
Appendix G - Vadose Zone/Gas Sampling	
PID Levels Map	1
%LEL Levels Maps	2-4
Statistical Summary of Vadose Zone Gas	
Readings	5
Tabulated Gas Measurements - PID, %LEL, %O ₂	6-11
Vadose Zone Monitoring for Specifications	12-13

Appendix H - Surface Water Chemistry	
Analysis of Metals, COD, pH,	1
Total Organic Halocarbons	2
MCLs for Metals and Drinking Water	3
EPA 601/602 - Reeves Pond	4-5
Appendix I - Groundwater Chemistry	
Summary of Chemical Results from Groundwater Sampling	1-3
pH and Conductivity/Temperature Profiles	4-9
Groundwater and Monitoring Well Profiles and Conductivity Graphs	10-19
Groundwater Analyses for Metals	20-22
Groundwater Analyses for Organics	
- EPA 601/602	23-46
Groundwater Analyses for Organics	
- EPA 624/625	47-55
Groundwater Analyses for Radioactivity	56-59
Appendix J - Soil Chemistry	
Summary of Chemical Results	1
Soil Sample Locations Map	2
Split Spoon, %LEL, %O ₂ , and PID Readings	3-7
Soil Sample Analyses - EPA 601/602	8-26
Soil Sample Analyses - EPA 624/625	26-36
Appendix K - Sludge Chemistry	
Metals Analysis of Sludge	1-2
Table of Typical Background Concentrations of Metals and Soils	3
Correspondence Between Jeffrey Noyes and William Ahearn Regarding Suitability of Sludge for Landfilling	4-6
Sludge Moisture Content Calculations	7
Appendix L - Remediation	
Schematic of Gas Collection System	1-3

APPENDIX A

INTRODUCTION/SCOPE



RECEIVED FEB 9 1986

State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Water Resources & Environmental Engineering
Natural Resources Conservation Council
State Geologist

103 South Main Street
Waterbury, Vermont 05676
Department of Water Resources
and
Environmental Engineering

February 2, 1987

Mr. Craig Heindel.
Heindel & Noyes
285 North Street
Burlington, Vermont 05402

Re: Larkin Property - Burlington,
Vermont

Dear Mr. Heindel:

On January 30, 1987 we met to discuss the proposals Larkin Realty has for the development of a 20 plus acre site adjacent to Riverside Drive in the City of Burlington. I am writing at this time to confirm the discussions we had at that meeting.

It is my understanding that the site is 20 plus acres in size. On this site there exists a shallow pond. Stormwater from abutting sections of the City of Burlington are conveyed through this pond to a culvert which extends down through an old ravine and ultimately discharges to the Winooski River. The culvert was put in place by other parties at the time the ravine was used for the deposit of refuse. Approximately 30 feet of refuse exists over the pipe. The pipe is broken and/or leaks resulting in leachate emissions, via that route. In addition, sludge from the Burlington sewage treatment plants was deposited on a portion of the site adjacent to that which currently contains the landfill materials.

Your client recognizes the contamination emanating from the site and is willing to assume appropriate responsibility for its eventual remediation.

Page 2
February 2, 1987

This site is identified on Vermont's list of uncontrolled hazardous waste sites. It is subject to further evaluation under CERCLA and determination as to whether or not it should be placed on the National Priority List for remediation under superfund. Preliminary assessment of the site has been done by this Department, however, under our priority it is not scheduled for site investigation for some time.

It is my understanding that Larkin Realty wishes to develop a portion of the site for the construction of 200 plus apartment units and is willing to adjust the layout of this development such to preclude interference with that portion of the site which is affected and subject to further investigation and possible remedial action.

I indicated at the meeting that the federal process of site evaluation and ultimate determination of stabilization is a function which we can influence but cannot control. The normal processes for us to do a preliminary assessment and site investigation of the site. Based on the information obtained from those two functions, EPA will evaluate the information and determine whether or not the contamination is of such significance to require that the site be placed on the National Priority List. Should that occur, investigation and remediation in accord with superfund protocols will have to be undertaken whether or not development of the site has occurred. I further indicated at the meeting that the Department does not have any direct authority to prevent development of the site from occurring. It could, however, influence the decisions of the Environmental District Commission through the Act 250 process.

At the meeting we addressed two specific issues. One, is the State willing to define the limits of the "uncontrolled hazardous waste site" to be less than the full tract of land if the owner will submit clear and conclusive evidence to support that determination and second, will we devote the necessary staff time to review the submittals from the consultant out of our current priority order.

The ownership of the tract of land should not be the discriminator as to the magnitude of the uncontrolled hazardous waste site. We will, upon submittal of proper evidence, define a site which is less than the total site. We are willing to devote two or three days of staff time to reviewing the submittals of the consultant and the follow up administrative work to assist in this matter. This is based upon the assumption that the owner and/or his consultant will carry out the field investigations,

Page 3
February 2, 1987

assemblage of data, analysis and evaluation of data, to a point where its review can be accomplished in the forementioned time frame. We are not in a position to devote much more time than that indicated and it is incumbent upon the owner and/or consultant to produce a complete and professional submittal.

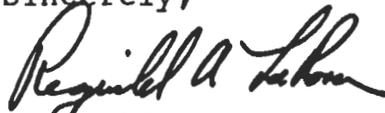
The submittal must address not only the limits of the refuse currently deposited on the site, but also must address the limits of areas that would be affected by further investigation or remediation on the site. This should include not only surface and groundwater effects but also routes of exposure via soil, vapro and air transport.

I would suggest that you maintain contact with the appropriate officials of the City of Burlington and the Department of Health so that their concerns can be integrated early into your investigations and planning.

From our discussions, you recognize that it is likely that further investigation of the site will result in the need for, as a minimum, remedial activities involving surface sealing, diversion of the outflow from the pond, and leachate collection and treatment. Depending upon what the investigations of this site show in the future, remediation may be substantially more than that.

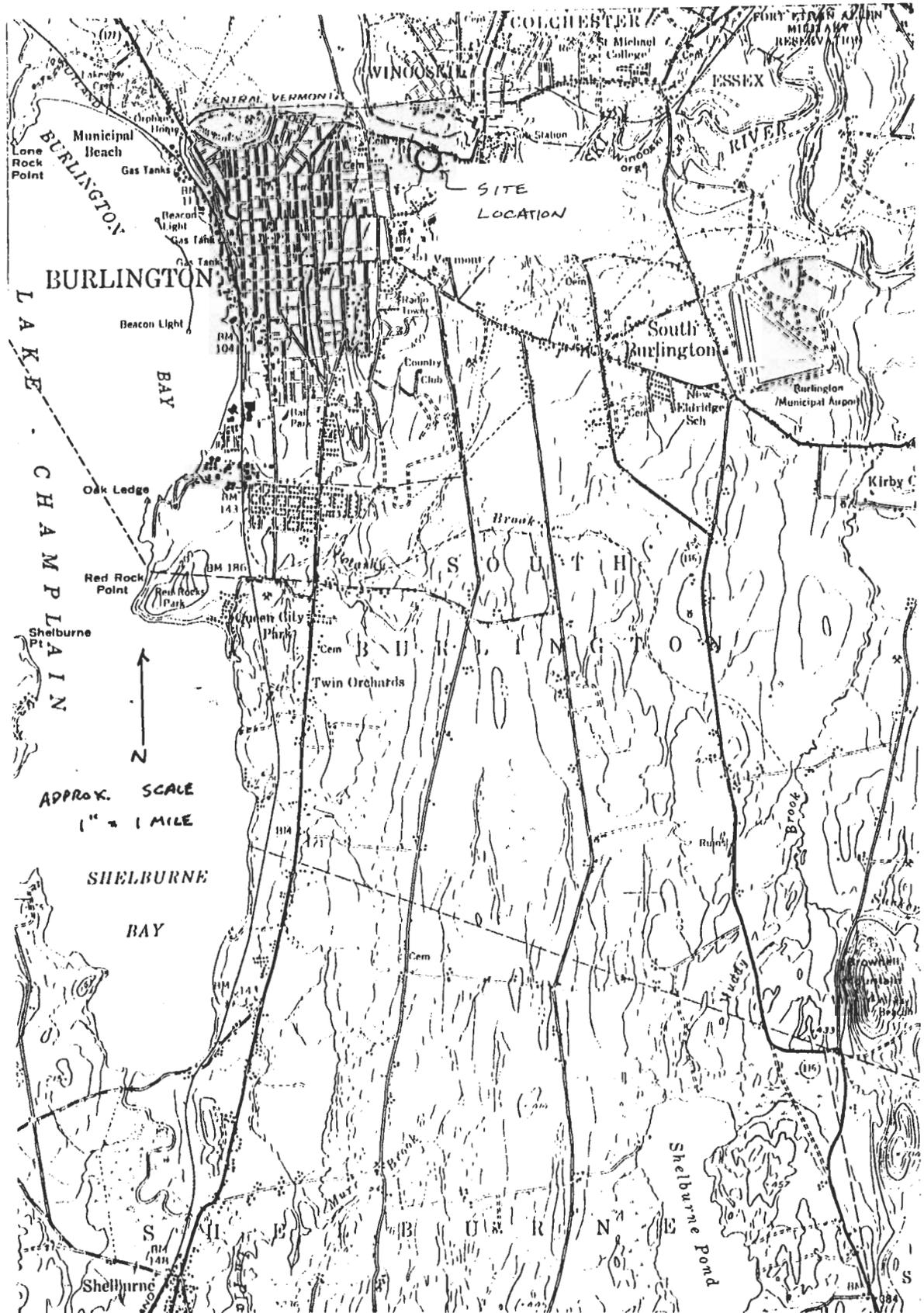
Thank you for your efforts to keep this office abreast of your proposals. If you disagree with the foregoing understandings from the meeting please do not hesitate to contact me.

Sincerely,



Reginald A. LaRosa, P.E.
Chief of Operations

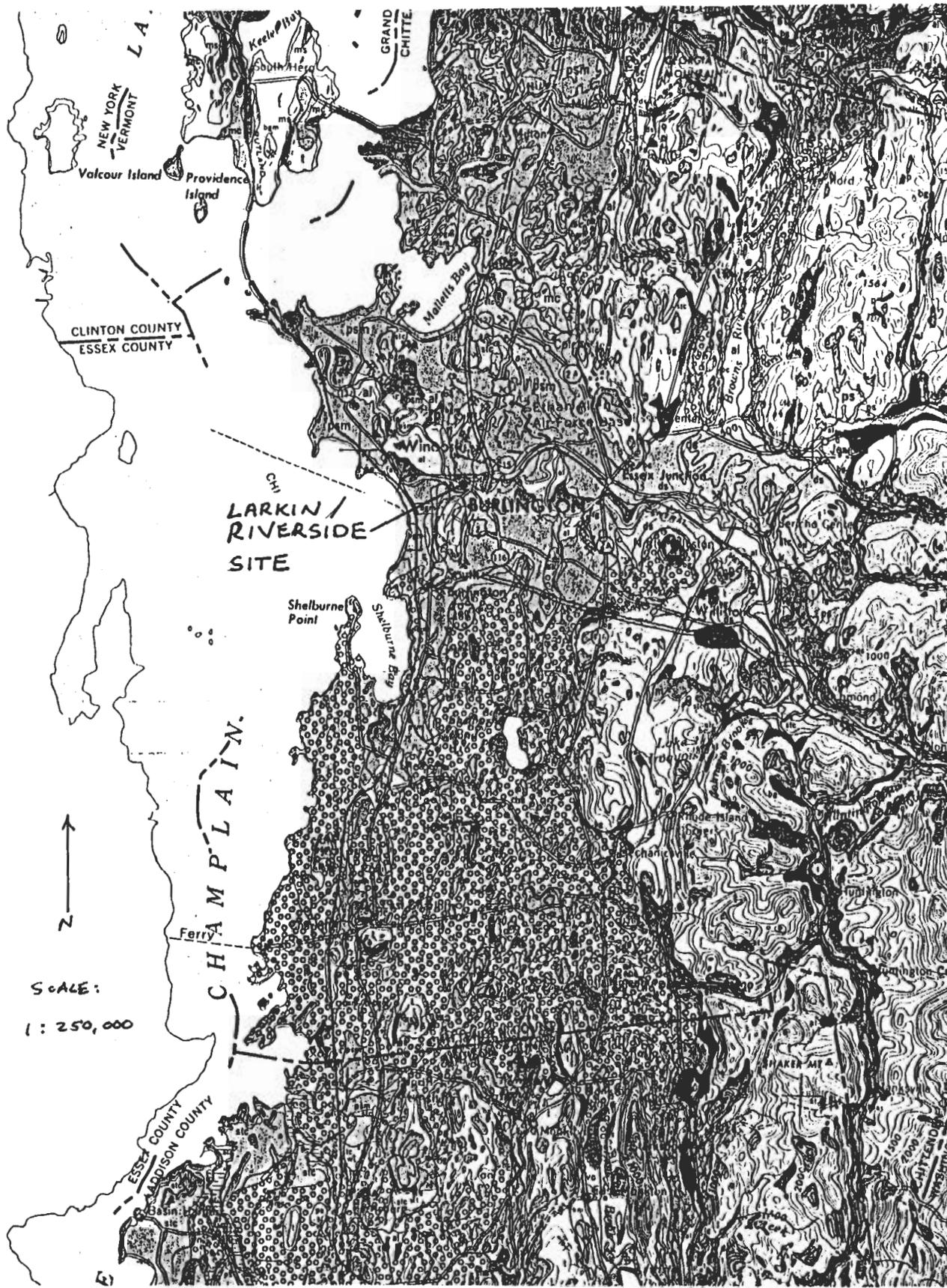
RAL:arm
2.14



FROM : U.S.G.S. TOPOGRAPHIC MAP
 15' BURLINGTON QUADRANGLE

APPENDIX B

GEOLOGY/SOILS



FROM: SURFICIAL GEOLOGY MAP OF VERMONT

EXPLANATION*

GLACIAL



TILL

Till mantling the bedrock and reflecting the topography of the underlying bedrock surface. Thicker in the valleys and thinner on the uplands. On many exposed uplands postglacial erosion has left only rubble and scattered boulders on the bedrock.



MORaine

Ice marginal till accumulations with moraine topography. m - frontal moraine assumed to be recessional. tm - terminal moraine.

GLACIOFLUVIAL



KAME GRAVEL

Ice contact outwash gravel. k - isolated kame. kt - kame terrace. km - kame moraine, kame complex with moraine topography.



OUTWASH

Horizontally bedded glaciofluvial gravel. Spillway or valley train gravel in stream valleys. May or may not have a thin veneer of postglacial alluvium.



ESKER

EOLIAN



EOLIAN SAND AND DUNES

GLACIOLACUSTRINE



LITTORAL SEDIMENT PREDOMINANTLY GRAVEL

lg - horizontally bedded gravel deposited in a shallow lake or bay or beds of deltaic gravel where no foreset bedding is exposed. lg - beach gravel. dg - delta gravel showing foreset bedding. d - small deltas composed of sand and gravel.



LITTORAL SEDIMENT PREDOMINANTLY SAND

ls - well sorted sand, no pebbles or boulders. ps - pebbly sand. ls - sand containing ice rafted boulders. ds - delta sand.



LAKE BOTTOM SEDIMENTS

slc - silt, silty clay, and clay. sc - sorted clay. bc - silt, silty clay, and/or clay containing ice rafted boulders.



WAVE-WASHED TILL

Till from the top of which the finer materials have been removed by wave action leaving boulder concentrations on the surface.



BEACH RIDGE



SHORELINE

POSTGLACIAL FLUVIAL



FLUVIAL GRAVEL



FLUVIAL SAND



RECENT ALLUVIUM

Fluvial sands and gravels were differentiated in areas where the deposits might have economic significance.

CHAMPLAIN SEA



MARINE BEACH GRAVEL



MARINE SAND

ms - marine sand without pebbles or boulders. msm - pebbly marine sand.



MARINE CLAY



GRAVEL BAR



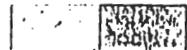
SEA CLIFF OR WAVE CUT TERRACE

FLUVIAL



SWAMP, PEAT and/or MUCK

BEDROCK

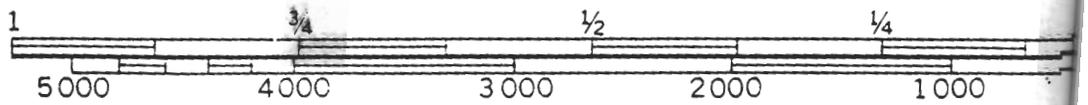
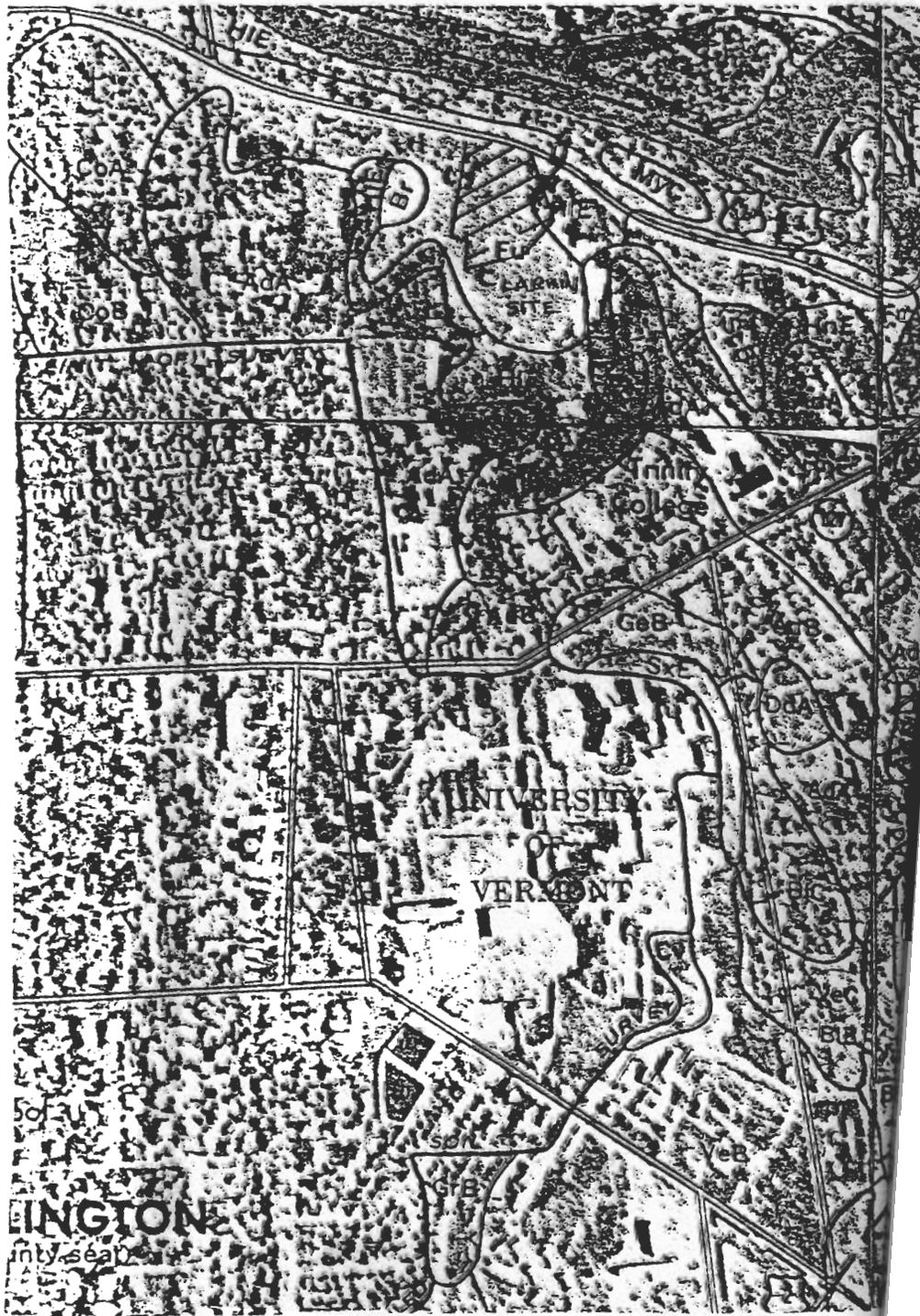


BEDROCK EXPOSURES

Significant exposures of bedrock with little or no show the thickness of the drift, or where the drift removed by erosion. No effort was made to distinguish outcrops in full areas of the uplands.

SAND OR GRAVEL PIT

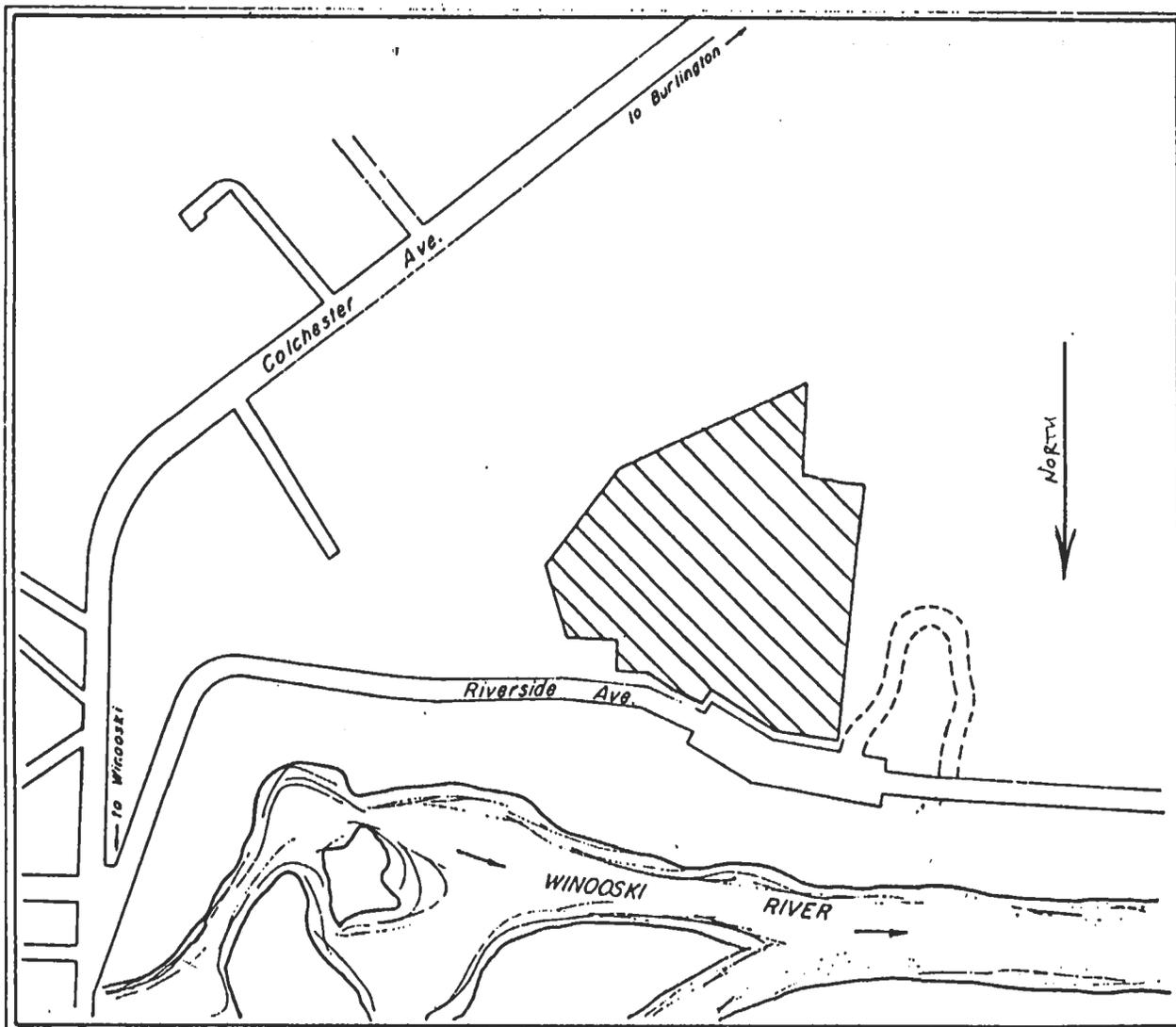
* THIS EXPLANATION GOES WITH THE SURFICIAL GEOLOGY MAP ON PAGE 1.



Fill Land

Fill land (F₀) is near highways, airports, and built-up areas. In some areas it is where soil material, normally sand or gravel, has been removed for construction purposes and the original surface soil or new topsoil has been spread over the borrow area. Many of these areas are then farmed. In some other places Fill land consists of 1 to 10 feet or more of soil that has been brought in from other areas and spread over a very rough area to level it or to build up a low area even with the surrounding land. In some areas of Fill land, the soil material at the site has been moved by equipment to reshape the landscape. Fill land material ranges from sand to clay. Most areas are used for buildings, airports, highways, rest areas, parks, and parking lots. (Capability unit and woodland suitability group not assigned)

LARKIN / RIVERSIDE PROPERTY



Location Map 1" = 600' ±

APPENDIX C

SLOPE STABILITY

REPORT ON
ENGINEERING STUDY OF SLOPE STABILITY
RIVERSIDE AVENUE
BURLINGTON, VERMONT

PREPARED FOR: Department of Streets
City of Burlington

PREPARED BY: Knight Consulting Engineers, Inc.
P. O. Box 29
Williston, Vermont 05495

August 1984

KNIGHT CONSULTING ENGINEERS, INC.

P.O. Box 19
WILLISTON, VERMONT 05495

TEL: 802-879-6343

STEPHEN C. KNIGHT, JR., P.E.

ROGER W. DORWART, P.E.
ELROY L. LANGDELL, P.E.
GILL BARLOW, P.E.
DONALD J. PARKER, P.E.
BONNIE L. CARPENTER, P.E.

August 27, 1984

Department of Streets
City of Burlington
P. O. Box 849
Burlington, VT 05402Attn: Mr. James Ogden, Superintendent
Mr. Jerry Parker, Assistant Superintendent

Gentlemen:

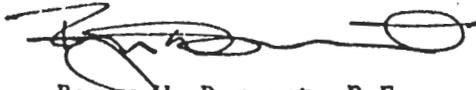
This report presents the results of a slope stability investigation between Riverside Avenue and the Winooski River, from Intervale Avenue to the Colchester Avenue Bridge.

The work was concentrated on those areas where potential problems might affect the street.

A major resource in this study was an investigation done for Burlington Electric Department for the Chace Mill Hydroelectric Development by Haley and Aldrich, Inc. of Cambridge, MA., and a related topographic survey by Aquatec, Inc. of South Burlington. Information from both works is used extensively in this report. Appreciation is extended to Burlington Electric Department for allowing access to this material and for cooperation in the use of electronic equipment owned by that department.

The work was done in accordance with an agreement, dated March 15, 1984, between the Burlington Department of Streets and this firm. We appreciate having the opportunity to do this work, and we stand ready to assist in the future.

Very truly yours,

Roger W. Dorwart, P.E.
Vice PresidentRWD:rrb
Enclosures

STATION 28 TO STATION 31

This area saw a series of major washouts and slides in 1955, resulting in closing the street for several months and re-routing traffic on a temporary road through the old dump area to the south.

A heavy storm in August of that year caused the initial washout; soon after a large cave-in took out a section of pavement. Subsequent movement broke a water line, which caused the first of three major slides from September to December. The extent of the problem can be seen in several news photos and articles in Figures 14-16. At one point the slide, centered over an old stone culvert (replaced by the 48" ACCGMP), was within several feet of the Martello house, now the west end of Tortilla Flat Restaurant, causing that family to be evacuated. The Martello garage, just west of the house in what is now the restaurant parking lot, dropped ten feet vertically, and remained temporarily perched on the edge of what had become an eighty foot deep escarpment.

Central to all of these events was the old stone culvert that carried water under Riverside Avenue from what at one time was an extensive and very deep ravine to the south. At the time of the 1955 slides this culvert was acknowledged to be 60 feet below street level. In the early 50s, the ravine was filled to the southward as the area was used as the city dump. As the filling extended away from the street, sections of 42" reinforced concrete pipe were added upstream from the stone box culvert, eventually extending approximately 800 feet to what is now a large pond on the Reeves property.

In all probability, the slides in 1955 were caused by washouts around the stone box culvert, probably initiated by a collapse of it or a failure around the connection of the newer concrete pipe to it. The new 48 inch metal culvert (ACCGMP) was installed as part of the slide repair. The outfall of that pipe is now at elevation 109, some 80 feet below street level. The junction of that pipe with the 42" concrete pipe appears to be at a deep manhole, constructed as part of the repair, some 50 feet south of the street. That manhole does not show on the Vermont Highway Department As-Built Drawing for the 1950 street reconstruction; therefore, it is assumed to be part of the repair.

Since the 1955 repair, the area immediately over the pipe has been regraded to form the present Tortilla Flat west parking lot. Two catch basins in that gravel surface lot discharge storm water via metal culverts down the slope to the river.

There does not appear to have been any recent major surface movement in the immediate area of the 1955 slide repair. Boring B-4, made near the center of the slide zone, indicates sand fill was used in the top 35 feet. B-3, to the west, shows some indication of boulders or concrete in the top 18 feet, but neither boring suggests organic soils or material from the landfill. One resident of the area recalls a junk car retaining wall being built into the fill.

The recently created 20 foot slope behind the parking lot is too steep, and may soon show instability, especially as the two parking lot culverts contribute to downslope erosion. That, however, should be the type of slope movement that will tend to restore the bank to its pre-parking lot condition, and will probably not threaten the street.

While this old slide area is now judged stable, there is concern over the condition of the deep culverts, especially as they relate to an unusual water storage condition upstream. An October 4, 1983 letter from Steven Goodkind, P.E., Burlington Public Health and Safety Administrator, to the Burlington Street Department, accurately described the pond on the Reeves property and the condition around the manholes of the pipe leading to it. Subsequent observations this spring confirm the sinkholes around Manhole #2, (Figure 4) the standing water in the two upper manholes (indicating no flow in the pipe) and the sudden fluctuations in pond level, all mentioned in Mr. Goodkind's letter. The pond, which is fed from a large watershed including several storm sewers discharging into the deep ravine to the west of Fletcher Place, obviously undergoes periodic sudden discharge into the inlet of the concrete pipe, which is not visible even in periods of low water. The drop in water level between May 7 and June 8, 1984, just after a week of heavy rainfall, is illustrated in Figures 5 and 6, taken from the same vantage point.

The obvious conclusion is that the concrete pipe line is broken and probably plugged -- the sinkholes around Manhole 2 indicate that area to be a good candidate. If that is the case, it is probable that water from the pond, especially on those occasions when the inlet unplugs enough to allow sudden flushing, escapes the pipe and flows along the outside of the pipe toward the river. This is exactly the type of condition that can lead to "piping", the creation of progressively larger void areas as silt is washed along the flow channels. It is probable that piping caused the initial washouts in 1955 that led to the major landslides.

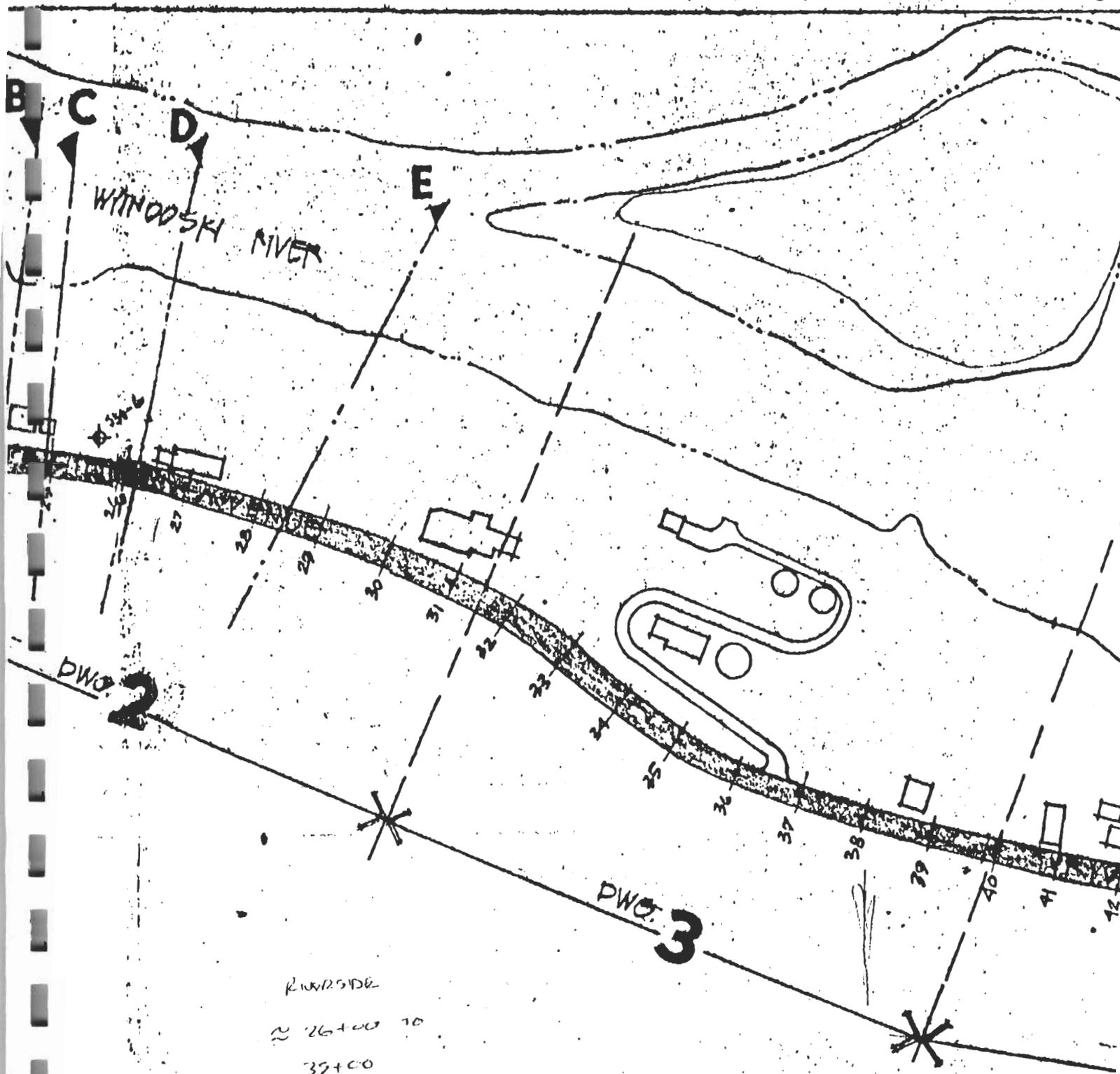
As shown by Figure 7, there is an orange stain on the ground adjacent to the 48" metal pipe outfall. Not evident in that photograph is the relatively large flow of water out of the bank at this point, an estimated 20 or 30 gallons per minute. Also, there is considerable seepage of a more general nature along the bank behind Tortilla Flat, and in one place a noticeable deposit of silt appears to have recently washed out of the slope.

Thus, while the slide area repaired in 1955 appears to have remained stable, there is good reason to be concerned about existence of the pond at the uphill end of the plugged and probably broken pipe. The pipe should be opened at the inlet and suitable means established to prevent future plugging. Damaged sections along its length should be identified and repaired and the pipe generally rendered leakproof. Sliplining the pipe with corrugated metal or plastic pipe might be a feasible means of reaching that objective.

It is understood that ownership of the pipe and the responsibility for maintaining it are in dispute. That question may have to be resolved before a major repair project is undertaken.

STATION 31 TO STATION 46

The east parking lot of Tortilla Flat is fill that forms a very steep slope near the street at the intersection with the sewage treatment plant property. Boring B-5 at that location indicates good gravel fill -- no indication of



RIVERSIDE
 ≈ 26+00 TO
 39+00

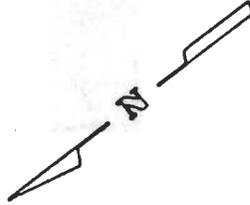
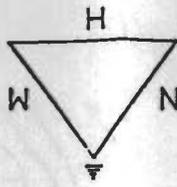
SLOPE PROFILES ———▲——— APP
 DETAILED TOPOGRAPHIC PLANS
 (DWGS 1-5) — APP
 ⊕ 51.6 SLOPE INDICATOR LOCATION

APPENDIX D

EXTENT OF TRASH AND SLUDGE

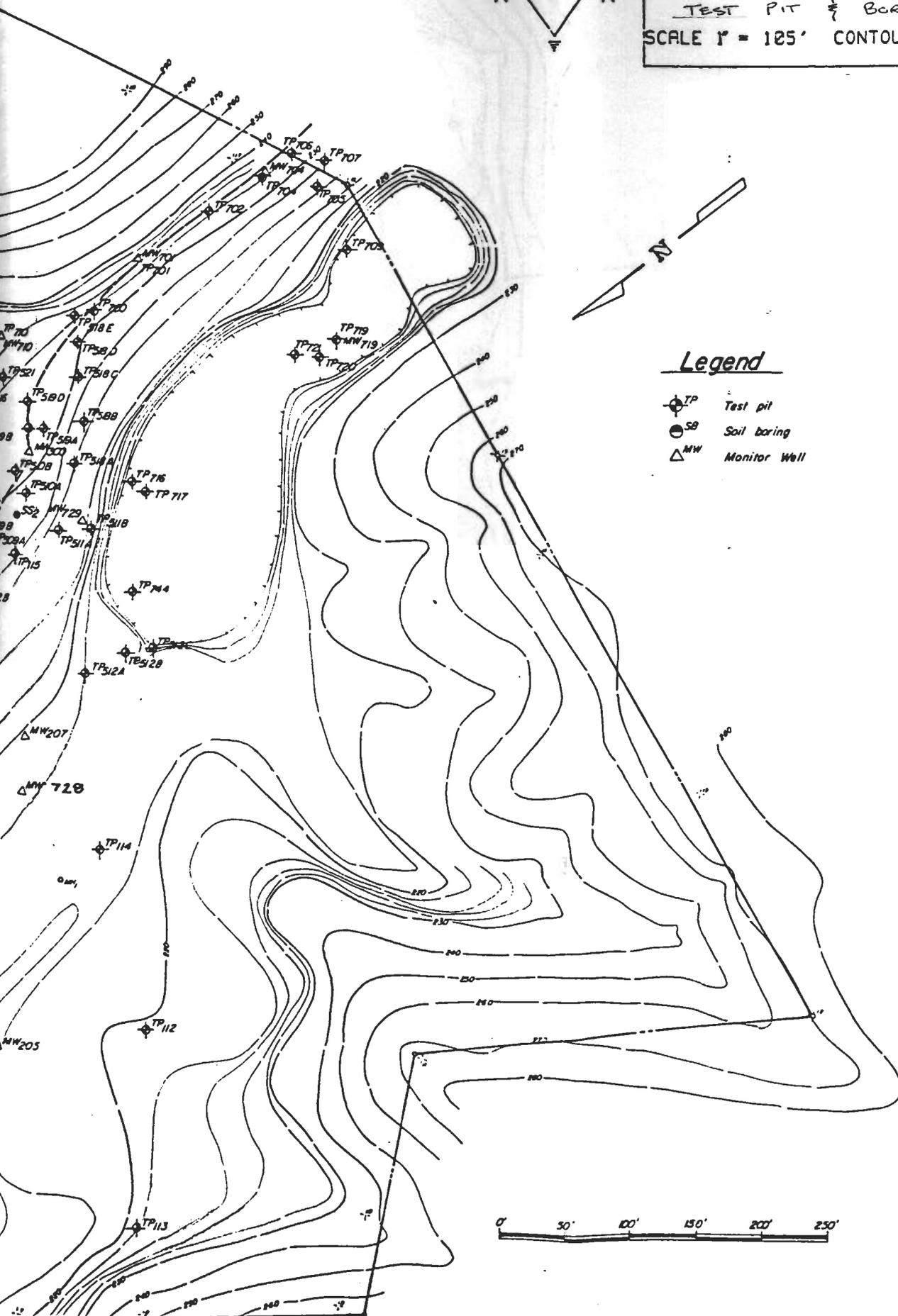
LARKIN - RIVERSIDE PROJECT

TEST PIT & BORING LOCATIONS
SCALE 1" = 125' CONTOUR INTERVAL 10 FEET



Legend

- TP Test pit
- SB Soil boring
- MW Monitor Well



LARKIN-RIVERSIDE PROPERTY
TEST PIT LOGS

TP-101 through TP-117

Test Pits excavated by backhoe on August 28 and September 5, 1986 by Craig Heindel; Wagner, Heindel, and Noyes, Inc.

Note: NLTD = No Bedrock (ledge) to Depth
NWTd = No Water to Depth
Wells are 2" solid PVC, hand-slotted with saw, slotted section wrapped with filter-fabric, so solvent-welds used, couplings joined by pressure-fit and external wrap with fiber tape (except TP-114: see log); see individual logs for well depths and slotted sections.

TP-101

0 - 14' Fine sand, with moderate silt content, very uniform, slight leachate smell
NLTD, NWTd
2" well installed to about 14', slotted 12' to 14'

TP-102

0 - 3' Brown fine and medium sand, construction rubble
3 - 3.7' Gray sand
3.7 - 10' Trash, mostly metal and wood, slight leachate smell
10' Refusal on large stump or metal object
NLTD, NWTd
No well

TP-103

0 - 2.5' Sand
2.5 - 11.5' Trash, gray sand, slight leachate smell
NLTD, NWTd
Well to about 11.5', slotted 9.5' to 11.5'

TP-104

0 - 3.5' Sand
3.5 - 14' Trash, gray sand, strong leachate smell, small seep of apparently perched water at 6' to 9.5'; 9.5': Heavy flow of groundwater from one side of excavation, which disappears out the bottom of the excavation at 14'
14' NWTd, NLTD
Well to about 13', slotted 11' to 13'

TP-105

0 - 1.3' Brown sand
 1.3 - 7.5' Gray fine sand and gray/black sludge, very strong
 sludge odor
 7.5 - 12' Silt-clay, brown, slightly moist but does not
 appear saturated
 NLTD, NWTD
 No well

TP-106

0 - 4.5' Brown silty fine and medium sand
 4.5 - 14' Gray silt and silty fine sand, moist to saturated
 Wet to saturated at 7'
 Very slight leachate smell (?)
 No standing water, NLTD
 Well to about 14', slotted 12' to 14'

TP-107

0 - 3.5' Brown silty fine and medium sand
 3.5 - 15.5' Gray silt and silty fine sand, moist to saturated
 Wet to saturated at 6.5'
 Very slight leachate smell (?)
 No standing water, NLTD
 Well to about 13', slotted 11' to 13'

TP-108

0 - 3' Dry brown silty fine and medium sand
 3 - 8.0' Moist brown to gray silty fine sand
 8.0 - 8.5' Gray silt and silty fine sand, moist to wet
 Strong sludge smell
 Possibly sludge ? or near the edge of sludge pit
 8.5 - 13.5' Moist to wet brown to gray silty fine sand
 Very slight sludge smell
 NLTD, NWTD
 No well

TP-109

0 - 8' Brown dry silty fine and medium sand
 8 - 14.5' Gray sludge mixed with silty fine sand, very
 strong sludge odor, moist to wet
 NLTD, NWTD
 No well

TP-110

0 - 2.5' Brown fine and medium sand fill
 2.5 - 16' Silt and silty fine sand, brown
 No sludge, no odor
 Moist at 6', wet but not saturated at 13.5'
 NLTD, NWTD
 No well

TP-111

0 - 12'
12 - 15.5'

Brown dry silty fine sand
Gray dense silt, moist but not saturated
No sludge, no odor
NLTD, NWT
No well

TP-112

0 - 1.5'
1.5 - 15.0'

Gray silty sand fill
Trash, domestic and construction rubble
Strong leachate odor
NLTD, NWT
No well

TP-113

0 - 0.5'
0.5 - 5.5'
5.5 - 11'

Sand fill
Trash, domestic, wet
Gray silt and silty fine sand, wet
5.5 - 6.5' brighter gray color
NLTD, NWT
No well

TP-114

0 - 15'

Trash
Water table at 11'
Well to about 13', slotted 8' to 13' (well is 2" threaded pipe with 0.020" screen, filter-fabric wrap)

TP-115

0 - 12'
12 - 14'

Trash, dry
Silty fine sand, moist
NLTD, NWT
No well

TP-116

0 - 6'
6 - 9'

Brown dry silty fine sand (appears to be close to limit of trash, because construction rubble is seen at ground surface all around the test pit)
Gray silt, wet
NLTD, NWT
No well

TP-117

0 - 6'
6 - 9.5
9.5 - 17'

Brown dry silty fine sand
Brown and gray mottled silt and silty fine sand, moist
Gray silt, moist to saturated
Saturated at about 15'
Well to about 17', slotted 14' to 17'

TEST PIT LOGS
Riverside Site
Riverside Ave., Burlington

TP-201-A through TP-210

Test pits excavated by backhoe on Jan. 26 to Feb. 4, 1987
Logged by Hugh Rose, WH&N Inc.

NLTD = No Bedrock to Depth
NWTD = No Groundwater to Depth

DATE: 2/4/87

TP-201-A

0 - 5'6" Brown fine to medium sand, occasional interbeds
 of silt
5'6" - 8' Dark brown very fine silty sand
 NLTD, NWTD, no sludge

TP-201-B

0 - 8'6" Dark brown fine sandy loam
 NLTD, NWTD, no sludge

TP-201-C

0 - 4'8" Brown sandy loam
4'8" - 8'8" Dark brown very fine sandy loam
 NLTD, NWTD, no sludge

TP-201-D

0 - 3'6" Dark brown fine sandy loam
3'6" - 8'9" Brown fine to medium sand, small pods of dark
 brown silty fine sand
 NLTD, NWTD, no sludge

TP-201-E

0 - 1'11" Brown fine silty sand
1'11" - 3'11" Black loose sludge with rusty pockets, appears to
 be on the edge of sludge.
3'11" - 4'9" Red-brown sand, roots
4'9" - 8'8" Brown fine to medium silty sand
 NLTD, NWTD, sludge to 3'11"

TP-202-A

0 - 1'10" Brown fine sandy loam, roots
1'10" - 2'8" Trash (mostly organic rubbish, wood)
2'8" - 6'3" Fine sandy loam
6'3" - 7'3" Dark brown silty fine sand
7'3" - 9'1" Brown fine sand, mottled, roots
 NLTD, NWTD, trash near surface, no sludge

TP-202-B

0 - 6'5" Brown fine sandy loam
6'5" - 8'7" Brown silty fine sand
 NLTD, NWTD, no sludge

TP-203-A

0 - 2'	Orange-brown fine sand, mottled at 1'5"
2' - 4'7"	Black sludge, very strong smell
4'7" - 7'	Gray fine to medium sand, very strong smell
7' - 11'1"	Brown very fine silty sand, mottled NLTD, NWTB, sludge to 4'7"

TP-203-B

0 - 1'8"	Brown fine sandy loam, roots
1'8" - 2'11"	Red-brown granular material
2'11" - 7'4"	Black-gray sludge, very strong smell
7'4" - 8'	Gray fine to medium sand, very strong smell
8' - 10'10"	Tan very fine silty sand NLTD, NWTB, sludge to 7'4"

TP-203-C

0 - 2'9"	Brown fine sandy loam, roots
2'9" - 6'2"	Black sludge, very strong smell
6'2" - 7'2"	Gray fine sand, strong smell
7'2" - 10'5"	Brown fine to medium sand, mottled NLTD, NWTB, sludge to 6'2"

TP-203-D

0 - 1'1"	Brown fine sand, roots
1'1" - 4'1"	Black sludge, very strong smell
4'1" - 5'4"	Gray fine sand, strong smell
5'4" - 10'5"	Tan fine to medium sand NLTD, NWTB, sludge to 4'1"

TP-203-E

0 - 2'	Brown silty fine sand, roots
2' - 2'11"	Black sludge, moderate smell, thins to zero at west end of pit
2'11" - 7'2"	Brown and gray fine sand
7'2" - 9'	Orange-brown silty fine sand NLTD, NWTB, edge of sludge

TP-204-A

0 - 2'5"	Brown fine sandy loam
2'5" - 3'2"	Black sludge, very strong smell
3'2" - 5'2"	Brown fine sandy loam
5'2" - 8'3"	Brown fine sandy loam. NLTD, NWTB, sludge to 3'2"

TP-205-A

0 - 1'8"	Brown fine sandy loam
1'8" - 3'1"	Black sludge and brown fine sand, very strong smell, sludge thins to zero at west end of pit
3'1" - 3'3"	Red-orange brown granular layer
3'3" - 6'9"	Brown sandy loam
6'9" - 8'4"	Gray silty fine sand
8'4" - 8'9"	Black silty very fine sand
8'9" - 10'	Gray silty very fine sand
Note:	NLTD, NWTB, edge of sludge

TP-205-B

0 - 2'4" Brown fine sandy loam, roots
 2'4" - 2'9" Black sludge, very strong smell
 2'9" - 3' Orange-red sand
 3' - 8' Brown silty sandy loam
 8' - 10' Gray silty very fine sand
 NLTD, NWTB, edge of sludge

TP-206-A

0 - 2'3" Brown fine sandy loam
 2'3" - 2'11" Orange-brown sandy loam, strong smell
 2'11" - 10'11" Sludge and medium brown silt-clay; very strong
 smell
 NLTD, NWTB, sludge to bottom

TP-207-A

0 - 1'7" Brown sandy loam, roots
 1'7" - 8'4" Brown silt loam
 NLTD, NWTB, no sludge

TP-208-A

0 - 1'6" Brown medium sand, mottled at 6"
 1'6" - 6' Dark brown silt and fine to medium sand layers
 NLTD, NWTB, no sludge

TP-208-B

0 - 1'6" Brown silty fine sand, mottled at 6"
 1'6" - 8'2" Layers of dark brown silt-clay and light brown
 sand
 NLTD, NWTB, no sludge

TP-208-C

0 - 4'8" Brown medium sand, roots
 4'8" - 9'6" Sludge and gray sandy fill, very strong smell
 NLTD, NWTB, sludge to 9'6"

TP-209-A

0 - 8' Brown medium sand
 8' - 11'6" Gray sand and black sludge, very strong smell
 NLTD, NWTB, sludge to 11'6"

TP-209-B

0 - 5'5" Brown sandy loam, roots to 2'
 5'5" - 10'6" Brown silty loam
 10'6" - 11'4" Gray silt-clay
 NLTD, NWTB, no sludge

TP-210

0 - 6" Brown fine sandy loam
 6" - 4'2" Black sludge, very strong smell
 4'2" - 6'4" Brown silty fine sand, mottled
 6'4" - 7'6" Brown silt-clay and very fine sand
 NLTD, NWTB, sludge to 6'4"

LARKIN RIVERSIDE PROPERTY
TEST PIT LOGS

TP-300 through TP-306

DATE: 8-28-87

TP-300

0 - 4.6'
4.6'

Light brown, fine sand and silt.
Auger refusal-sounds and feels like wood.

TP-301

0 - 2.5'
2.5 - 3.8'
3.8 - 6.0'

Light grey sandy silt.
Light brown silty fine sand
Tight brown clay

TP-302

0 - .5'
.5 - 5'
5.0 - 6.1'

Dry, crusty clayey silt
Tight brown clay
Medium brown, fine sand

TP-303

0 - 6'

Light brown, fine sand w/clay silt layers

TP-304

0 - .6'
.6 - 2.8'
.6 - 2.8'
2.8 - 4.0'
4.0 - 5.2'

Light brown silty sand
Sandy silt moist
Moist tight sandy silt
Light brown medium sand
Tight, moist sandy silt

TP-305

0 - 2.2'
2.2 - 4.0'
4.0 - 5.2'

Medium brown, silty sand
Light gray, medium to fine sand, little silt
Black, reduced clayey muck mixed w/sand,
strong odor.

TP-306

0 - 5.6'
5.6'

Light brown fine to medium silty sand
Very tight sandy silt

LARKIN-RIVERSIDE PROPERTY
TEST PIT LOGS

DATE: 1/26/87

TP-501-A

0 - 2'4" Brown-tan sandy silty loam
2'4" - 4'8" Black silty sand, strong leachate smell
4'8" - 10'9" Trash, with strong smell, construction rubble at
bottom
NLTD, NWT, trash to bottom

TP-501-B

0 - 3' Brown-tan silty loam with some sand
3' - 3'5" Gray-brown silt-clay
3'5" - 5'2" Gray-black sludge-like material, weak leachate
smell, some construction rubble mixed in
5'2" - 5'11" Trash mixed with some gray-black silt-clay,
strong smell
5'11" - 10'11" Gray-black silt-clay, strong leachate smell, some
construction rubble mixed in
NLTD, NWT, trash to bottom

TP-501-C

0 - 4'5" Medium brown silty sandy loam
4'5" - 10'4" Gray-black silt-clay, no smell
NLTD, NWT, no trash

DATE: 1/28/87

TP-502-A

0 - 1'9" Brown-tan silty sandy loam
1'9" - 7'4" Black-gray silt-clay, mild smell
7'4" - 7'9" Trash and construction rubble, some organic
material mixed in, possibly ashes; strong smell
7'9" - 9'10" Trash, with some blackish brown organic material
mixed in, strong smell
9'10" - 11' Black silt-clay
NLTD, NWT, trash to 9'10"

TP-502-B

0 - 5'5" Tan-brown silt-clay loam some sand
5'5" - 9'5" Black silt-clay
NLTD, NWT, no trash

TP-503-A

0 - 1'5" Brown fine sand fill
1'5" - 11' Trash, bottles, metal, and construction rubble,
strong smell
11' - 12' Gray-black silt-clay, leachate smell
NLTD, NWT, trash to 11'

TP-503-B

0 - 2' Brown-tan medium sand
 2' - 3' Gray-black medium sand, slight smell
 3' - 11' Trash, bottles, cans, plastic, refrigerators.
 Bottom of trash appears to slope upward in the
 southern end of the pit to 9' below ground
 surface
 11' - 12' Black-gray silt-clay, strong leachate smell
 NLTD, NWTB, trash to 11'

TP-503-C

0 - 6' Brown-tan fine sand, with tan silt-clay layers
 NLTD, NWTB, no trash

TP-504-A

0 - 1'9" Gray silty sand, mottled at 1'
 1'9" - 6'2" Trash, strong smell
 6'2" - 8'9" Black-streaked gray silty sand, strong leachate
 smell
 NLTD, NWTB, trash to 6'2"

TP-504-B

0 - 2' Brown-tan, silty fine sand
 2' - 5'5" Tan silt-clay, with abundant mottles at 5'
 5'5" - 8' Dark gray silt-clay
 NLTD, NWTB, no trash

TP-505-A

0 - 4'5" Sandy loam, many roots; a few pieces of metal and
 glass mixed in, no smell
 4'5" - 4'10" Thin layer of trash (mostly bottles and cans)
 4'10" - 6'6" Mottled tan sandy silty loam
 6'6" - 7'8" Silt-clay
 NLTD, NWTB, edge of trash

TP-505-B

0 - 11" Tan-brown silty sand
 11" - 4' Gray-black fine to medium sand, strong leachate
 smell, some garbage
 4' - 9' Trash, gray-black medium fine sand, trash is
 thinner (4'-5' in depth) at the west end of the
 hole
 NLTD, NWTB, edge of trash

TP-506-A

0 - 9" Tan-brown fine sand
 9' - 4' Trash, metal, glass, wood
 Refusal on frozen ground
 NLTD, NWTB, trash to bottom

TP-506-B

0 - 11" Tan-brown medium sand
11' - 1'4" Gray-brown fine to medium sand
1'4" - 4'6" Trash, strong smell
4'6" - 6'3" Gray-black fine to medium sand, leachate smell
6'3" - 7' Brown-tan silt-clay
NLTD, NWTB, trash to 4'6"

TP-506-C

0 - 1'1" Brown-tan fine to medium sand
1'1" - 5' Trash, mostly wood, very strong smell
5' - 6'10" Black-gray fine sand, strong smell
6'10" - 7'11" Tan-brown silt-clay, no smell
NLTD, NWTB, trash to 5'

Date: 1/29/87

TP-506-D

0 - 1'1" Brown-tan fine to medium sand
1'1" - 2'11" Gray-black fine to medium sand, slight leachate smell
2'11" - 3'2" Trash, mostly wood and glass, some metal, very strong smell
3'2" - 6'2" Gray-black silty sand and trash, leachate smell
6'2" - 7'7" Tan silt-clay, no leachate smell or discoloration
NLTD, NWTB, edge of trash

TP-506-E

0 - 9" Tan-brown fine to medium sand
9" - 1'3" Gray-black fine to medium sand, strong smell
1'3" - 2'2" Trash, strong smell
2'2" - 3'9" Black fine to medium sand, strong smell
3'9" - 5'1" Tan-brown silt-clay, with interlayers of dark gray to black silt-clay
NLTD, NWTB, trash to 2'2"

TP-506-F

0 - 9" Tan-brown fine to medium sand
9" - 1'9" Black-gray fine sand, leachate smell
1'9" - 2'6" Trash, strong leachate smell
2'6" - 3'6" Gray-brown, fine to medium sand, leachate smell
3'6" - 5'5" Brown-gray silt-clay, some sand
5'5" - 5'9" Tan-brown silty fine sand
NLTD, NWTB, edge of trash

TP-506-G

0 - 9" Brown-tan fine sand, mottled at 10", occasional pockets of dark brown silt
9" - 1'3" Dark brown layered silt with 1/2" to 1" interbeds of medium sand, mottles abundant in sand layers
1'3" - 2'4" Brown-tan fine to medium sand
2'4" - 2'10" Dark brown fine to medium silty sand, mottled
2'10" - 4' Brown fine to medium sand
4' - 6'6" Dark brown very fine sandy silt, mottled
NLTD, NWTB, no trash

TP-507-A

0 - 10" Light brown fine to medium sand
 10" - 2'2" Gray-brown medium sand, mottled, slight leachate smell
 2'2" - 4'2" Trash, strong smell
 4'2" - 7'2" Very dark gray fine sand, leachate smell
 7'2" - 8' Dark brown silty fine sand, with dark gray silt-clay interbeds
 NLTD, NWTB, trash to 4'2"

TP-507-B

0 - 1'1" Brown-tan fine sand
 1'1" - 1'9" Gray-black medium sand, brightly mottled, slight leachate smell
 1'9" - 4'10" Trash (mostly cans and bottles), strong smell
 4'10" - 9'8" Dark gray silt-clay, slight leachate smell
 NLTD, NWTB, trash to 4'10"

TP-507-C

0 - 2'1" Light brown fine to medium sand
 2'1" - 2'8" Gray fine to medium sand, mottled, strong smell
 2'8" - 5'6" Trash, very strong smell
 5'6" - 6'10" Brown-gray fine sandy silt, slight leachate smell
 6'10" - 7' Brown-tan silt-clay
 NLTD, NWTB, trash to 5'6"

TP-507-D

0 - 1'5" Light brown fine to medium sandy loam
 1'5" - 3'2" Trash, a lot of organic material, very strong smell
 3'2" - 4'3" Grey medium sand, leachate smell
 6' - 6'10" Tan fine sand and silt
 NLTD, NWTB, edge of trash

TP-507-E

(at bank on edge of excavated pit)
 0 - 2' Brown sandy loam
 2' - 4' Dark brown silt-clay
 4' - 6' Tan fine to medium sandy loam
 NLTD, NWTB, no trash

TP-508-A

0 - 2'6" Fine to medium sandy loam, mottled at 9"
 2'6" - 4'10" Dark brown silty sand
 4'10" - 7' Brown very fine sandy loam
 7' - 7'10" Light brown silt-clay
 NLTD, NWTB, no trash

TP-508-B

0 - 2' Tan medium sandy loam
 2' - 11' Trash, many metal 5-gal pails, very strong smell
 NLTD, NWTB, trash to bottom

TP-509-A

0 - 2'10" Light brown medium sandy loam, many roots
 2'10" - 6'9" Trash (mostly glass and metal), very strong smell
 6'9" - 9'9" Gray-black medium sandy loam, strong leachate
 smell
 9'9" - 12' Trash, very strong smell
 NLTD, NWTB, trash to bottom

TP-509-B

0 - 2'2" Brown fine to medium sand, mottled at 1'9"
 2'2" - 5' Dark brown silt
 5' - 9'9" Light brown very fine sand, interlayered with
 dark brown silt-clay
 9'9" - 11'2" Brown fine sand
 NLTD, NWTB, no trash

TP-510-A

0 - 2'4" Tan medium sandy loam, some gray layers
 2'4" - 2'8" Gray medium sand, leachate smell
 2'8" - 13' Trash (mostly cans, bottles, large pieces of
 metal), very strong smell
 NLTD, NWTB, trash to bottom

TP-510-B

0 - 5'5" Tan fine to medium sandy loam, roots mottled at
 5'
 5'5" - 8' Brown fine sandy silt, mottled
 8' - 9'7" Brown silt-clay, interlayers of light brown sand
 near the bottom
 NLTD, NWTB, no trash

DATE: 1/30/87

TP-511-A

0 - 1'11" Brown-gray medium sandy loam, mottled at 1'
 1'11" - 2'7" Gray-black medium sand, strong leachate smell
 2'7" - 6'11" Trash, very strong smell
 6'11" - 9'6" Dark gray medium sand, leachate smell
 9'6" - 10'9" Trash, strong smell
 NLTD, NWTB, trash to bottom

TP-511-B

0 - 3'6" Brown medium sandy loam, many roots, mottled
 at 2'
 3'6" - 6' Trash
 6' - 7' Gray sand, some intermixed trash
 7' - 11' Tan-brown medium sand, intermixed with cans and
 bottles
 11' - 13' Trash, very strong smell
 NLTD, NWTB, trash to bottom

TP-512-A

0 - 1'9" Light brown fine to medium sandy loam, mottled at 9"

1'9" - 2'3" Gray medium sand, mottled

2'3" - 6'5" Trash (cans and bottles), very strong smell

6'5" - 7'11" Dark gray medium sand, strong leachate smell

7'11" - 10'9" Trash, very strong smell
NLTD, NWTB, trash to bottom

TP-512-B

0 - 3'5" Brown-tan fine to medium sandy loam, many roots, mottled at 9"

3'5" - 4'2" Gray-black fine to medium sand, leachate smell

4'2" - 9'3" Trash, very strong smell
Groundwater at 9'3"
NLTD, trash to bottom

TP-512-C

(at edge of Reeves Pond)

0 - 3'10" Tan-orange sandy loam

3'10" - 4' Gray medium sand, leachate smell

4' - 6' Trash, very strong smell
Groundwater at 5'
(Reeves Pond appears to be at about 6')
NLTD, trash to bottom

TP-513-A

0 - 10" Tan-red coarse sand, some large cobbles

10" - 1'2" Brown-orange medium sand

1'2" - 1'5" Brown-gray very fine sandy silt, mottled

1'5" - 1'11" Very coarse sand, fine gravel, orange-brown matrix

1'11" - 3'9" Dark brown fine to medium sand

3'9" - 6' Gray very fine sandy silt loam
NLTD, NWTB, no trash

TP-514-A

0 - 1'6" Brown very fine sandy loam

1'6" - 10'9" Gray silt-clay, some sand, occasional streaks of brown and red
NLTD, NWTB, no trash

TP-514-B

0 - 7' Gray and brown-orange fine sand, mild leachate smell

7' - 10' Dark gray silt-clay
NLTD, NWTB, no trash

TP-515-A

0 - 4'3" Brown-orange fine to medium sand

4'3" - 4'11" Trash, mostly metal

4'11" - 10'3" Gray-black silty very fine sand
NLTD, NWTB, edge of trash

TP-515-B

0 - 3'5" Brown sandy loam, roots
 3'5" - 4'11" Dark brown silt-clay, with some sand
 4'11" - 6'11" Dark gray silty sand
 NLTD, NWTB, no trash

TP-516-A

0 - 1'9" Gray-brown sandy loam, mottled
 1'9" - 4' Trash, very strong smell
 4' - 6' Dark gray fine to medium sand, leachate smell
 6' - 11' Gray and brown silt-clay
 NLTD, NWTB, edge of trash

TP-516-B

0 - 1'7" Orange-brown medium sand, mottled
 1'7" - 3'8" Trash, leachate smell
 3'8" - 5' Dark gray very fine sand and silt, leachate smell
 5' - 7'2" Orange-brown silt-clay, with black streaks
 NLTD, NWTB, edge of trash

TP-517-A

0 - 1'10" Dark brown sandy loam, roots
 1'10" - 4'10" Layered orange and gray silty sands
 4'10" - 7'2" Brown and gray very fine sandy silt
 NLTD, NWTB, no trash

TP-517-B

0 - 6' Gray-brown fine to medium sand, mottled at 1'
 6' - 8'6" Trash, very strong smell
 8'6" - 10'10" Gray-black silty fine sand, strong leachate smell
 NLTD, NWTB, trash to 8'6"

DATE: 2/5/87

TP-518-A

0 - 10" Tan sandy loam, roots
 10" - 7' Trash, very strong smell
 7' - 8' Dark gray very fine sand and trash, strong smell
 8' - 11' Trash
 NLTD, NWTB, trash to bottom

TP-518-B

0 - 1'8" Tan sandy silty loam, roots
 1'8" - 2'2" Dark gray fine sand, mottled
 2'2" - 13' Trash, very strong smell
 NLTD, NWTB, trash to bottom

TP-518-C

0 - 1'4" Tan fine sandy loam, roots, mottled at 10"
 1'4" - 1'7" Gray fine sand, leachate smell
 1'7" - 11'2" Trash, very strong smell
 NLTD, NWTB, trash to bottom

TP-518-D

0 - 7'3"

Light brown sandy loam, roots to 7', mottled at 2'

7'3" - 11'6"

Trash, some fill mixed in, strong smell
NLTD, NWTB, trash to bottomTP-518-E

0 - 1'6"

Light brown silty sandy loam, roots

1'6" - 3'6"

Orange medium sand, roots

3'6" - 10'1"

Dark brown very fine sandy silt, thin layer of trash at downhill edge of pit
NLTD, NWTB, edge of trashTP-519-A

0 - 2'9"

Tan sandy loam, roots to 2'

2'9" - 3'9"

Gray-black fine to medium sand, mottled

3'9" - 11'

Trash, very strong smell
NLTD, NWTB, trash to bottomTP-519-B

0 - 5'2"

Brown fine sandy loam, roots, mottled at 4'

5'2" - 9'

Gray-brown silt-clay
NLTD, NWTB, no trashTP-519-C

0 - 7'

Brown sandy loam, roots

7' - 11'8"

Trash (tires, bottles and cans), very strong smell

Groundwater at 11'8"

NLTD, trash to bottom

TP-519-D

0 - 6'

Tan sandy loam, roots

6' - 6'8"

Gray fine to medium sand, leachate smell

6'8" - 7'11"

Trash, strong smell

7'11" - 8'8"

Gray medium sand, leachate smell

8'8" - 10'10"

Dark brown silt and sand

NLTD, NWTB, trash to 7'11"

TP-520-A

0 - 2"

Construction rubble, wood, metal and stone

2" - 4'9"

Tan sandy loam, roots

4'9" - 6'

Dark brown silt and sand

NLTD, NWTB, trash only on surface

TP-520-B

0 - 2'

Tan fine sandy loam, roots to 10"

2' - 4'10"

Brown silt-clay and sand

4'10" - 7'8"

Dark brown silt-clay

NLTD, NWTB, no trash

TP-521-A

0 - 13'

Tan fine sandy loam, trash, bottles, refrigerators

NLTD, NWTB, trash to bottom

TP-522-A

0 - 2'5"

Tan sandy loam, roots

2'5" - 2'10"

Dark brown sandy loam, mottled

2'10" - 9'10"

Alternating layers of dark brown silt-clay and brown sandy silt. Beds about 6" thick

NLTD, NWTB, no trash

TP-522-B

0 - 2'1"

Tan sandy loam

2'1" - 3'

Gray medium sand, leachate smell

3' - 9'5"

Trash, very strong smell

NLTD, NWTB, trash to bottom

LARKIN-RIVERSIDE PROPERTY
TEST PIT LOGS

TP-700 through TP-745

DATE: 9/1/87

TP-700

0 - 6' Light brown, medium sandy loam
6' Dark gray tight moist sandy clay

Trash at toe of hill

Note: This test pit is on the trash boundary.

TP-701

0 - 3' Light brown to medium sandy loam
3 - 6' Tight gray clay

Trash at toe of slope.

Note: Trash boundary.

TP-702

Log: Same as Test Pit 701

Note: Trash boundary.

TP-703

0 - 2' Light brown medium sandy loam.
2 - 9+' Gray, moist, very tight clay.

No trash.

TP-704

0 - 1' Light brown sandy loam.
1 - 2.5' Trash
2.5 - 5.5' Tight, gray moist clay.

TP-705

0 - 2.5' Medium to sandy loam
2.5 - 5' Tight, moist, gray clay
Note: Thin layer of trash approximately 2' below ground surface on the north side of the pit. This pit appears to be on the trash boundary.

TP-706

0 - 1' Medium sandy loam.
1 - 4' Tight gray clay.
Note: No trash

TP-707

0 - 1' Sandy loam
1 - 5' Tight gray clay
Note: No trash

TP-708

Log same as 707

Note:

Some trash on the landfill side of pit.

TP-709

0 - 1'

Sandy loam

1 - 2'

Trash

2 - 4'

Sandy loam

TP-710

0 - 0.5'

Thin layer of scattered trash

.5 - 2'

Sandy loam

2 - 4'

Tight gray clay

Note:

This appears to be just outside of trash area occasional trash near surface, there is a berm existing just north of this pit that is probably the edge of the landfill.

TP-711

0 - .25

Pieces of a slate roof.

.25 - 2.5

Sandy loam

2.5 - 4'

clay

TP-712

0 - 4'

Sandy loam

4 - 5.5'

Tight gray clay

Note:

No trash

TP-713

0 - 3.5'

Fine sandy loam

3.5 - 7'

Gray tight clay

Note:

No trash.

TP-714

0 - 6'

Brown sandy loam

Note:

No trash

TP-715

0 - .5'

Dark sandy soil

0.5 - 6.5'

Trash

TP-716

0 - 4'

Light brown medium sand (on pond side)

0 - 4'

Garbage, trash (away from pond)

TP-717

0 - 2'

Clayey sand

2 - 4'

Rubbish, appears burnt

Note:

This is approximately 5' from water's edge.

TP-718

0 - .5'

Fine, clayey moist mud.

.5 - 4'

Medium to course sandy loam w/some gravel
timber also present

Note:

This test pit is in the semi-dried bottom of
Reeve's pond. Water slowly seeping into pit
at 3.5' below ground surface which is
slightly below the water level in Reeves
pond. Very little trash.

TEST PITS INSTALLED SEPTEMBER 2

TP-719

0 - 3'

Approximately 1' thick light brown, fine
sandy loam, interbedded w/black clayey
organic or rich lenses approximately

5' thick.

3 - 5'

Dark gray, sandy gravel. Gravel up to four
inches in diameter. Some timber.

Note:

No trash

This pit is also in semi-dried bottom of Reeve's pond.

TP-720

Log Similar to Test Pit 719

Note:

No trash

TP-721

Log similar to test pit 719

Note:

No trash

TP-722

0 - 2'

Light brown, loose fine to medium sand

2 - 7'

Same as above w/lenses of moist tight gray
clay, 0.5 - 1' thick.

Note:

No trash

TP-723

0 - 1'

Brown, loose, medium to fine sandy loam

1 - 5.5'

Relatively tight, gray sand and clay.
Looser and sandier than clay mentioned
previously, but similar color.

Note:

No trash

TP-724

0 - 1.5' Brown, fine loose sand mixed w/clay
 1.5 - 2.5' Buff laminated fine sand with scattered
 sub-rounded pebbles approximately 1/2 inch
 in diameter
 2.5 - 4.5' Gray, sandy clay
 4.5 - 6.5' Trash

TP-725

0 - 2.5' Light buff, loose silty sand
 2.5 - 7' Gray sandy clay

TP-726

0 - 3' Light buff, silty sand. Some timber.
 3 - 8' Sandy clay.

TP-727

0 - 1' Light brown, fine sandy loam
 1 - 2' Light gray sand and clay
 trash

TP-728

0 - 2.5' Forest litter, light brown fine sand
 2.5 - 6' Trash

TP-729

0 - 1' Fine medium sandy loam
 2 - 7' Trash

TP-730

0 - 6' Light brown, tight sandy clay
 6 - 10' Gray tight clay
 Note: This test pit is adjacent to excavated pit.
 Seep at approximately 6' or less than 1
 gallon/minute. The water level in the
 adjacent pit is approximately .5' below the
 top of pit and is approximately 5' away. No
 trash.

TP-731

0 - 3' Fine to medium sand w/some clay
 3 - 6' very tight gray clay
 Note: Seep at 2' below top of pit only on the pond
 side of pit. Water elevation in pond is
 approximately .5' below top of pit. No
 trash .

TP-732

0 - 4'

Sandy clay on pond side of pit. Trash is on other side.

Note:

This pit is on the trash boundary and indicates that trash does not exist beneath the pond.

TP-733

Similar to 732. Trash boundary can be seen in this pit.

TP-734

0 - 4'

Light tan, fine sandy loam.

4 - 7'

Gray tight clay.

TP-735

0 - 7'

Light tan medium sandy loam.

TP-736

0 - .5'

Sandy, gravely fill.

.5 - 3.0'

Dark brown, tight fine sandy and silty loam.

3.0 - 7'

Gray to buff medium loose sand.

Note:

Piece of rubbish at 3'.

TP-737

0 - 2.5'

Light buff fine to medium sandy loam.

2.5 - 7'

Dark brown to gray sandy clay.

TP-738

0 - 4'

Brown, medium to fine sandy loam

4 - 8'

Gray semi-cohesive sandy clay

TP-739

0 - 2.5'

Light buff, medium sandy loam

2.5 - 8'

Light gray sandy clay

TP-740

0 - 8'

Light buff, clean medium sand interbedded w/brown silty sand. Beds are 0.5 - 3'.

TP-741

0 - 3'

Light buff, medium sand

3 - 7'

Light gray sandy clay

TP-742

Mixed sand, clay and scattered trash found to approximately 6'. At 5' a hot water tank was found. It looks like this pit is just on the edge of the landfill and has spillover trash. The pit is located approximately 5' from the water's edge of Reeve's Pond.

TP-743

0 - 5'

Note:

Silty to sandy clay. An occasional piece of trash found. This test pit is immediately adjacent to Reeve's Pond.

TP-744

0 - 4'

Sand mixed with clay. Thin layer of trash about 4" thick at 2.5 ft. This layer of trash is thinner on the pond side of the pit.

TP-745

This is a 30' long pit that followed the trash down the "road" that we installed to the pond. Trash is thick near the "road" then disappears near the pond. However, black, smelly sandy clay seems to go right to the pond. % LEL = 0 H-Nu = 0 % Oxygen = 20.4 The black sandy clay adjacent to the pond has a definite foreign odor.

Green Mountain Boring Co., Inc.

R. D. 2 - BARRE, VERMONT 05641

TO Design Associates Inc. ADDRESS Winooski, Vt.
 PROJECT NAME Riverside Apts. LOCATION Burlington, Vt.
 REPORT SENT TO Design Associates PROJ. NO. _____
 SAMPLES SENT TO _____ OUR JOB NO. 86-16

SHEET 1 OF _____
 DATE 4/18/86
 HOLE NO. SB 1
 LINE & STA. _____
 OFFSET None

GROUND WATER OBSERVATIONS Al <u>None</u> at <u>7</u> Hours Al _____ at _____ Hours	CASING SAMPLER CORE BAR. Type <u>augers split spoon</u> Size I. D. <u>2 1/2"</u> <u>1 3/8"</u> Hammer Wt. _____ <u>140#</u> BIT Hammer Fall _____ <u>30"</u>	SURFACE ELEV. _____ DATE STARTED <u>4/18/86</u> DATE COMPL. <u>4/18/86</u> BORING FOREMAN <u>R. Garneau</u> INSPECTOR _____ SOILS ENGR. _____
---	---	---

LOCATION OF BORING: Sandpit across Rd. from Tortilla Flats Rest.

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE		
				From 0-6	To 6-12	To 12-18				No.	Pen	R
		<u>5' - 6.5'</u>	<u>D</u>	<u>2</u>	<u>5</u>	<u>5</u>	<u>Dry</u>	<u>4'</u>	<u>Organic material in med. sand, changed suddenly to grey fine sand & silt</u>	<u>1</u>	<u>18"</u>	<u>14</u>
		<u>10' - 11.5'</u>		<u>10</u>	<u>12</u>	<u>13</u>	<u>Wet</u>	<u>11'</u>	<u>Medium sand into brown fine sand</u>	<u>2</u>	<u>18"</u>	<u>18</u>
		<u>15' - 16.5'</u>		<u>9</u>	<u>10</u>	<u>14</u>	<u>Wet</u>	<u>15'</u>	<u>Silty fine sand</u>	<u>3</u>	<u>18"</u>	<u>18</u>
		<u>20' - 21.5'</u>		<u>12</u>	<u>25</u>	<u>25</u>	<u>Wet</u>	<u>20'</u> <u>21'</u>	<u>Silty gray clay into gray sand</u>	<u>4</u>	<u>18"</u>	<u>18</u>
		<u>25' - 26.5'</u>		<u>7</u>	<u>14</u>	<u>18</u>	<u>Wet</u>		<u>Silty fine gray sand</u>	<u>5</u>	<u>18"</u>	<u>18</u>
		<u>30' - 31.5'</u>		<u>5</u>	<u>6</u>	<u>10</u>	<u>Wet</u>	<u>29'</u>	<u>Silty gray clay</u>	<u>6</u>	<u>18"</u>	<u>18</u>
								<u>augers</u>				

GROUND SURFACE TO <u>30'</u>	USED <u>2 1/2"</u>	TESTING: THEN <u>split spoon</u>
Sample Type D = Dry C = Cored W = Washed UP = Undisturbed Piston TP = Test Pit A = Auger V = Vane Test UT = Undisturbed Thinwall	Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% and 35 to 50%	140 lb. Wt. x 30" fall an 2" O. D. Sampler Cohesionless Density 0-10 Loose 10-30 Med. Dense 30-50 Dense 50+ Very Dense Cohesive Consistency 0-4 Soft 30+ Hard 4-8 M/Stiff 8-15 Stiff 15-30 V-Stiff
		SUMMARY: Earth Boring <u>37</u> Rock Coring <u>6</u> Samples <u>56</u>
		HOLE NO. SB

Green Mountain Boring Co., Inc.

R. D. 2 - BARRE, VERMONT 05641

SHEET 2 OF
 DATE 4/21/86
 HOLE NO. SB 2
 LINE & STA.
 OFFSET None

TO Design Associates Inc. ADDRESS Winooski, Vt.
 PROJECT NAME Riverside Apts. LOCATION Riverside Ave., Burlington
 REPORT SENT TO Design Associates PROJ. NO.
 SAMPLES SENT TO " OUR JOB NO. 86-16

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
At <u>Dry</u> at <u> </u> Hours	Type <u>Augers Split spoon</u>	Size I. D. <u>2 1/2"</u>	<u>1 3/8"</u>		DATE STARTED <u>4/21/86</u>
At <u> </u> at <u> </u> Hours	Hammer Wt. <u>140#</u>			BIT	DATE COMPL. <u>4/21/86</u>
	Hammer Fall <u>30"</u>				BORING FOREMAN <u>R. Garneau</u>
					INSPECTOR <u> </u>
					SOILS ENGR. <u> </u>

LOCATION OF BORING: Sandpit across Rd. from Restaurant

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE		
				From 0-6	To 6-12	To 12-18				No.	Pen	F
		<u>5' - 6.5'</u>		<u>3</u>	<u>5</u>	<u>8</u>	<u>Dry</u>		<u>Tan fine sand w/little silt</u>	<u>1</u>	<u>18"</u>	<u>18</u>
		<u>10' - 11.5'</u>		<u>6</u>	<u>9</u>	<u>10</u>	<u>Dry</u>		<u>Very fine grey to brown sand w/some silt</u>	<u>2</u>	<u>18"</u>	<u>18</u>
		<u>15' - 16.5'</u>		<u>7</u>	<u>11</u>	<u>16</u>	<u>Dry</u>		<u>Grey silt w/some fine sands also some fine lenses of medium sand</u>	<u>3</u>	<u>18"</u>	<u>18</u>
		<u>20' - 21.5'</u>		<u>11</u>	<u>16</u>	<u>24</u>	<u>Dry</u>		<u>Grey silt w/trace amounts of fine sand</u>	<u>4</u>	<u>18"</u>	<u>18</u>
		<u>25' - 26.5'</u>		<u>14</u>	<u>26</u>	<u>34</u>	<u>Moist</u>		<u>Grey silt w/some fine sand</u>	<u>5</u>	<u>18"</u>	<u>18</u>
		<u>30' - 31.5'</u>		<u>14</u>	<u>20</u>	<u>27</u>	<u>Dry</u>		<u>Grey silt</u>	<u>6</u>	<u>18"</u>	<u>18</u>

augers

GROUND SURFACE TO <u>30'</u>	USED <u>2 1/2"</u>	THEN <u>140 lb. Wt. x 30" fall an 2" O. D. Sampler</u>	SUMMARY
Sample Type	Proportions Used	Cohesionless Density	Earth Boring
D=Dry C=Cored W=Washed	trace 0 to 10%	0-10 Loose	Rock Coring <u>3</u>
UP=Undisturbed Piston	little 10 to 20%	10-30 Med. Dense	Samples <u>6</u>
TP=Test Pit A=Auger V=Vane Test	some 20 to 35%	30-50 Dense	
UT=Undisturbed Thinwall	and 35 to 50%	50+ Very Dense	
		Cohesive Consistency	
		0-4 Soft 30+ Hard	
		4-8 M/Stiff	
		8-15 Stiff	
		15-30 V-Stiff	

HOLE NO. SB

Green Mountain Boring Co., Inc.

R. D. 2 - BARRE, VERMONT 05641

26

SHEET 3 OF
 DATE 4/21/86
 HOLE NO. SB 3
 LINE & STA.
 OFFSET None

TO Design Associates, Inc. ADDRESS Winooski, Vt.
 PROJECT NAME Riverside Apts. LOCATION Riverside Av., Burlington
 REPORT SENT TO Design Associates PROJ. NO.
 SAMPLES SENT TO " " OUR JOB NO. 86-16

GROUND WATER OBSERVATIONS	CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
AI <u>Dry</u> at <u> </u> Hours AI <u> </u> at <u> </u> Hours	Type <u>Augers</u>	<u>Split spoon</u>		DATE STARTED <u>4/21/86</u>
	Size I. D. <u>2 1/2"</u>	<u>1 3/8"</u>		DATE COMPL. <u>4/21/86</u>
	Hammer Wt. <u> </u>	<u>140#</u>	BIT	BORING FOREMAN <u>R. Garneau</u>
	Hammer Fall <u> </u>	<u>30"</u>		INSPECTOR <u> </u>
				SOILS ENGR. <u> </u>

LOCATION OF BORING: Sandpit across from Restaurant

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE		
				From 0-6	To 6-12	To 12-18				No.	Pen	ft
		<u>5' - 6.5'</u>	<u>D</u>	<u>2</u>	<u>4</u>	<u>6</u>	<u>Dry</u>	<u>Medium sand w/fine sand</u>	<u>1</u>	<u>18"</u>	<u>15</u>	
		<u>10' - 11.5'</u>		<u>3</u>	<u>4</u>	<u>7</u>	<u>Dry</u>	<u>Medium sand w/fine sand</u>	<u>2</u>	<u>18"</u>	<u>18</u>	
		<u>15' - 16.5'</u>		<u>3</u>	<u>6</u>	<u>5</u>	<u>Wet</u>	<u>Fine sand w/little gray silt</u>	<u>3</u>	<u>18"</u>	<u>18</u>	
		<u>20' - 21.5'</u>		<u>7</u>	<u>16</u>	<u>15</u>	<u>Dry</u>	<u>Very fine gray silty sand also small lenses of oxidized medium sand</u>	<u>4</u>	<u>18"</u>	<u>18</u>	
		<u>25 - 26.5'</u>		<u>7</u>	<u>11</u>	<u>12</u>	<u>Dry</u>	<u>Grey sandy silt (very fine)</u>	<u>5</u>	<u>18"</u>	<u>14</u>	
		<u>30' - 31.5'</u>		<u>7</u>	<u>10</u>	<u>16</u>	<u>Wet</u>	<u>Grey silt w/fine sand and lenses of fine to medium sand</u>	<u>6</u>	<u>18"</u>	<u>18</u>	

augers

GROUND SURFACE TO <u>30'</u>	USED <u>2 1/2"</u>	CASING <u>xxxxxx</u>	THEN <u>split spoon</u>	SUMMARY	
Sample Type	Proportions Used	Cohesionless Density	Cohesive Consistency	Earth Boring 31	
D=Dry C=Cored W=Washed	trace 0 to 10%	0-10 Loose	0-4 Soft 30+ Hard	Rock Coring	
UP=Undisturbed Piston	little 10 to 20%	10-30 Med. Dense	4-8 M/Stiff	Samples 6	
TP=Test Pit A=Auger V=Vane Test	some 20 to 35%	30-50 Dense	8-15 Stiff		
UT=Undisturbed Thinwall	and 35 to 50%	50+ Very Dense	15-30 V-Stiff		

HOLE NO. SB

Green Mountain Boring Co., Inc.

R. D. 2 - BARRE, VERMONT 05641

SHEET 4 OF
 DATE 4/21/86
 HOLE NO. SB. 4
 LINE & STA.
 OFFSET App., 25' E.

TO Design Associates ADDRESS Winooski, Vt.
 PROJECT NAME Riverside Apts. LOCATION Riverside Ave.
 REPORT SENT TO Design Associates PROJ. NO.
 SAMPLES SENT TO " " OUR JOB NO. 86-16

GROUND WATER OBSERVATIONS	CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
At <u>Dry</u> at <u> </u> Hours Type <u>Augers Split spoon</u> Size I. D. <u>2 1/2"</u> <u>1 3/8"</u> Hammer Wt. <u> </u> <u>140#</u> BIT Hammer Fall <u> </u> <u>30"</u>				DATE STARTED <u>4/21/86</u> DATE COMPL. <u>4/21/86</u> BORING FOREMAN <u>R. Garneau</u> INSPECTOR <u> </u> SOILS ENGR. <u> </u>

LOCATION OF BORING: Sandpit across road from Tortilla Flats

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hard- ness, Drilling time, seams and etc.	SAMPLE		
				From To						No.	Pen	R
				0-6	6-12	12-18						
		<u>5' - 6.5'</u>	<u>D</u>	<u>2</u>	<u>3</u>	<u>5</u>	<u>Dry</u>	<u>Medium sand changing quickly into grey fine sand</u>	<u>1</u>	<u>18"</u>	<u>1</u>	
		<u>10' - 11.5'</u>		<u>4</u>	<u>7</u>	<u>8</u>	<u>Dry</u>	<u>Fine sand w/little silt also some lenses of med. sand</u>	<u>2</u>	<u>18"</u>	<u>1</u>	
		<u>15' - 16.5'</u>		<u>4</u>	<u>11</u>	<u>12</u>	<u>Wet</u>	<u>Grey silt w/fine sand</u>	<u>3</u>	<u>18"</u>	<u>1</u>	
		<u>20' - 21.5'</u>		<u>14</u>	<u>15</u>	<u>17</u>	<u>Wet</u>	<u>Grey silt w/trace of fine sand</u>	<u>4</u>	<u>18"</u>	<u>1</u>	
		<u>25' - 26.5'</u>		<u>10</u>	<u>13</u>	<u>17</u>	<u>Wet</u>	<u>Grey silt w/trace of very fine sand</u>	<u>5</u>	<u>18"</u>	<u>18</u>	
		<u>30' - 31.5'</u>		<u>13</u>	<u>14</u>	<u>21</u>	<u>Wet</u>	<u>Grey silt w/trace of fine sand</u>	<u>6</u>	<u>18"</u>	<u>1</u>	

GROUND SURFACE TO <u>30'</u>	USED <u>2.5"</u>	"CASING: THEN <u>split spoon</u>	140 lb. Wt. x 30" fall an 2" O. D. Sampler	SUMMARY
Sample Type	Proportions Used	Cohesionless Density	Cohesive Consistency	Earth Boring <u>37</u>
D = Dry C = Cored W = Washed	trace 0 to 10%	0-10 Loose	0-4 Soft 30 + Hard	Rock Coring
UP = Undisturbed Piston	little 10 to 20%	10-30 Med. Dense	4-8 M/Stiff	Samples <u>6</u>
TP = Test Pit A = Auger V = Vane Test	some 20 to 35%	30-50 Dense	8-15 Stiff	
UT = Undisturbed Thinwall	and 35 to 50%	50 + Very Dense	15-30 V-Stiff	

HOLE NO. SB

Green Mountain Boring Co., Inc.

R. D. 2 - BARRE, VERMONT 05641

SHEET 5 OF
 DATE 4/21/86
 HOLE NO. SB 5
 LINE & STA.
 OFFSET None

TO Design Associates ADDRESS Winooski, Vt.
 PROJECT NAME Riverside Apts. LOCATION Riverside Av., Burlington
 REPORT SENT TO Design Associates PROJ. NO.
 SAMPLES SENT TO " " OUR JOB NO. 86-16

GROUND WATER OBSERVATIONS	CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
At <u>Dry</u> at <u> </u> Hours	Type <u>Augers</u>	<u>Split spoon</u>		DATE STARTED <u>4/21/86</u>
At <u> </u> at <u> </u> Hours	Size I. D. <u>2 1/2"</u>	<u>1 3/8"</u>		DATE COMPL. <u>4/21/86</u>
	Hammer Wt. <u> </u>	<u>140#</u>	BIT	BORING FOREMAN <u> </u>
	Hammer Fall <u> </u>	<u>30"</u>		INSPECTOR <u> </u>
				SOILS ENGR. <u>None</u>

LOCATION OF BORING: Sandpit across from Restaurant

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE		
				0-6	6-12	12-18				No.	Pen	ft
		5' - 6.5'		8	10	9	Dry		Fine sand w/trace of med. sand	1	18"	11
		10' - 11.5'		9	8	10	Dry		Fine sand w/med. sand to fine sand	2	18"	11
		15' - 16.5'		5	12	14	Dry		Fine sand into very fine sand	3	18"	11
		20' - 21.5'		1	5	9			Fine sand w/grey silt	4	18"	11
							23'					
		25' - 26.5'		2	5	10			Grey silt w/trace very fine sand	5	18"	11
		30' - 31.5'		7	10	9	Dry		Grey silt w/trace of very fine sand also lenses of fine oxidized sand	6	18"	11

GROUND SURFACE TO 30' USED 2 1/2" CASING THEN split spoon
 140 lb. Wt. x 30" fall an 2" O. D. Sampler

Sample Type	Proportions Used	Cohesionless Density	Cohesive Consistency
D=Dry C=Cored W=Washed	trace 0 to 10%	0-10 Loose	0-4 Soft 30+ Hard
UP=Undisturbed Piston	little 10 to 20%	10-30 Med. Dense	4-8 M/Stiff
TP=Test Pit A=Auger V=Vane Test	some 20 to 35%	30-50 Dense	8-15 Stiff
UT=Undisturbed Thinwall	and 35 to 50%	50+ Very Dense	15-30 V-Stiff

SUMMARY
 Earth Boring 1
 Rock Coring 1
 Samples 6

HOLE NO. SB

Green Mountain Boring Co., Inc.

R. D. 2 - BARRE, VERMONT 05641

SHEET 7 OF
 DATE 4-22-86
 HOLE NO. SB-6
 LINE & STA.
 OFFSET None

TO Design Assoc. Inc. ADDRESS Winooski, Vermont
 PROJECT NAME Riverside Apts. LOCATION Riverside Ave. Burlington
 REPORT SENT TO Design Assoc. PROJ. NO.
 SAMPLES SENT TO " " " OUR JOB NO. 86-16

GROUND WATER OBSERVATIONS			CASING	SAMPLER	CORE BAR.	SURFACE ELEV.		
At <u>Dry</u>	at <u> </u>	Hours	Type <u>Augers</u>	<u>S.S.</u>	<u> </u>	DATE STARTED <u>4-22-86</u>		
At <u> </u>	at <u> </u>	Hours	Size I. D. <u>2 1/2"</u>	<u>1 3/8</u>	<u> </u>	DATE COMPL. <u>4-22-86</u>		
			Hammer Wt. <u> </u>	<u>140#</u>	<u> </u>	BORING FOREMAN <u>Garneau</u>		
			Hammer Fall <u> </u>	<u>30"</u>	<u> </u>	INSPECTOR <u> </u>		
						SOILS ENGR. <u> </u>		

LOCATION OF BORING: Sandpit across from Tortilla Flats restaurant

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE		
				From	To					No.	Pen	R
				0-6	6-12	12-18						
		<u>5 - 6.5</u>	<u>Dry</u>	<u>4</u>	<u>7</u>	<u>7</u>	<u>Dry</u>	<u>5'</u>	<u>Medium sand into fine sand</u>	<u>1</u>	<u>18</u>	<u>14</u>
		<u>10 - 11.5</u>	<u>"</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>Dry</u>		<u>Fine sand into very fine sand</u>	<u>2</u>	<u>18</u>	<u>18</u>
		<u>15 - 16.5</u>	<u>"</u>	<u>7</u>	<u>11</u>	<u>13</u>	<u>Dry</u>		<u>Gray-brown fine sand w/lenses of medium sand</u>	<u>3</u>	<u>18</u>	<u>14</u>
		<u>20 - 21.5</u>	<u>"</u>	<u>3</u>	<u>4</u>	<u>7</u>	<u>Dry</u>		<u>Fine tan sand into grey silt and fine sand</u>	<u>4</u>	<u>18</u>	<u> </u>
		<u>25 - 26.5</u>	<u>"</u>	<u>4</u>	<u>7</u>	<u>9</u>	<u>Dry</u>		<u>Grey silt with fine sand</u>	<u>5</u>	<u>18</u>	<u>18</u>
		<u>30 - 31.5</u>	<u>"</u>	<u>15</u>	<u>12</u>	<u>24</u>	<u>Dry</u>		<u>Grey silt w/trace of very fine sand</u>	<u>6</u>	<u>18</u>	<u>18</u>

GROUND SURFACE TO <u>30'</u>		USED <u>Auger</u> "CASING: THEN <u>S.S. to 31.5</u>		140 lb. Wt. x 30" fall an. 2" O. D. Sampler		SUMMARY:	
Sample Type	Proportions Used	Cohesionless Density	Cohesive Consistency	Earth Boring		Rock Coring	
D=Dry C=Cored W=Washed	trace 0 to 10%	0-10 Loose	0-4 Soft 30 + Hard	Samples		6	
UP=Undisturbed Piston	little 10 to 20%	10-30 Med. Dense	4-8 M/Stiff	HOLE NO.		SB-	
TP=Test Pit A=Auger V=Vane Test	some 20 to 35%	30-50 Dense	8-15 Stiff				
UT=Undisturbed Thinwall	and 35 to 50%	50 + Very Dense	15-30 V-Stiff				

Green Mountain Boring Co., Inc.

R. D. 2 - BARRE, VERMONT 05641

SHEET 6 OF
 DATE 4/21/86
 HOLE NO. SB-7
 LINE & STA.
 OFFSET None

TO Design Associates ADDRESS Winooski, Vt.
 PROJECT NAME Riverside Apts. LOCATION Burlington, Vt.
 REPORT SENT TO Design Associates PROJ. NO.
 SAMPLES SENT TO " " OUR JOB NO. 86-16

GROUND WATER OBSERVATIONS AI <u>Dry</u> at <u> </u> Hours AI <u> </u> at <u> </u> Hours	Type <u> </u> Size I. D. <u> </u> Hammer Wt. <u> </u> Hammer Fall <u> </u>	CASING <u>Augers</u> <u>2 1/2"</u> SAMPLER <u>Split spoon</u> <u>1 3/8"</u> CORE BAR. <u> </u> 140# BIT <u> </u> 30"	SURFACE ELEV. <u> </u> DATE STARTED <u>4/21/86</u> DATE COMPL. <u>4/21/86</u> BORING FOREMAN <u>R. Garnea</u> INSPECTOR <u> </u> SOILS ENGR. <u> </u>
---	---	---	---

LOCATION OF BORING: Sandpit across road from Restaurant

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE		
				From To		No.				Pen	I	
				0-6	6-12							12-18
		5' - 6.5'		15	15	12	Dry		Medium sand into medium sand w/trace of fine sand	1	18"	17
		10' - 11.5'		11	10	15	Dry	12'	Medium sand w/fine sand	2	18"	18
		15' - 16.5'		5	7	8	Moist		Fine sand w/trace of silt	3	18"	18
		20' - 21.5'		5	10	11	Wet	18'	Fine sand into fine sand w/gray silt	4	18"	18
		25' - 26.5'		5	5	5	Wet		Grey silt w/trace of fine sand	5	18"	18
		30' - 31.5'		3	3	6	Wet		Grey silt w/very fine sand	6	18"	18

GROUND SURFACE TO <u>30'</u>	USED <u>2 1/2"</u>	CASING <u>140 lb. Wt. x 30" fall an 2" O. D. Sampler</u>	THEN <u>split spoon</u>	SUMMARY: Earth Boring <u>31</u> Rock Coring Samples <u>6</u>
Sample Type D=Dry C=Cored W=Washed UP=Undisturbed Piston TP=Test Pit A=Auger V=Vane Test UT=Undisturbed Thinwall	Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% and 35 to 50%	Cohesionless Density 0-10 Loose 10-30 Med. Dense 30-50 Dense 50+ Very Dense	Cohesive Consistency 0-4 Soft 30+ Hard 4-8 M/Stiff 8-15 Stiff 15-30 V-Stiff	HOLE NO. <u>SB</u>

Green Mountain Boring Co., Inc.

R. D. 2 - BARRE, VERMONT 05641

SHEET9..... OF
 DATE4-22-86.....
 HOLE NO.SB-8.....
 LINE & STA.
 OFFSET None

TO Design Associates, Inc. ADDRESS Winooski, Vermont
 PROJECT NAME Riverside Apts. LOCATION Burlington, Vt.
 REPORT SENT TO Design Assoc. PROJ. NO.
 SAMPLES SENT TO " " OUR JOB NO. 86-16

GROUND WATER OBSERVATIONS	CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
At 6.5' at 1 Hours	Type Auger	S.S.		DATE STARTED 4-22-86
At at Hours	Size I. D. 2 1/2"	1 3/8		DATE COMPL. 4-22-86
	Hammer Wt.	140#	BIT	BORING FOREMAN Garneau
	Hammer Fall	30"		INSPECTOR
				SOILS ENGR.

LOCATION OF BORING: Sandpit across from Tortilla Flats

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE	
				From To		No.				Pen	
				0-6	6-12						12-18
		5 - 6.5	Dry	32	24	13	Wet	Grey medium sand w/coarse sand and refuse	1	18	
		10 - 11.5	"	10	8	13	Wet	Trash, organic & coarse sand	2	18	
		15 - 16.5	"	11	9	6	Wet	<u>NO RECOVERY</u>		18	
		20 - 21.5	"	6	14	10	Wet	Coarse sand with trash	3	18	
		25 - 26.5	"	11	13	9	Wet	Grey medium sand w/organic	4	18	
		30 - 31.5	"	10	11	9	Wet	Gray medium sand w/organic	5	18	

GROUND SURFACE TO 30'	USED Auger	"CASING" THEN S.S.	140 lb. Wt. x 30" fall an 2" O. D. Sampler	SUMMARY
Sample Type	Proportions Used	Cohesionless Density	Cohesive Consistency	Earth Boring 31
D=Dry C=Cored W=Washed	trace 0 to 10%	0-10 Loose	0-4 Soft 30 + Hard	Rock Coring 5
UP=Undisturbed Piston	little 10 to 20%	10-30 Med. Dense	4-8 M/Stiff	Samples SB
TP=Test Pit A=Auger V=Vane Test	some 20 to 35%	30-50 Dense	8-15 Stiff	
UT=Undisturbed Thinwall	and 35 to 50%	50 + Very Dense	15-30 V-Stiff	HOLE NO. SB

Green Mountain Boring Co., Inc.

R. D. 2 - BARRE, VERMONT 05641

SHEET 8 OF
 DATE 4-22-86
 HOLE NO. SB-9
 LINE & STA.
 OFFSET None

TO Design Associates Inc. ADDRESS Winooski, Vermont
 PROJECT NAME Riverside Apts. LOCATION Riverside Ave. Burlington
 REPORT SENT TO Design Assoc. PROJ. NO.
 SAMPLES SENT TO " " " OUR JOB NO. 86-16

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
At <u>Dry</u> at Hours	Type <u>Auger</u>	<u>2 1/2"</u>	<u>S.S.</u>		DATE STARTED <u>4-22-86</u>
At at Hours	Size I. D.		<u>1 3/8</u>		DATE COMPL. <u>4-22-86</u>
	Hammer Wt.		<u>140#</u>	BIT	BORING FOREMAN <u>Garneau</u>
	Hammer Fall		<u>30"</u>		INSPECTOR
					SOILS ENGR.

LOCATION OF BORING: Sandpit across from Tortilla Flats

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE		
				From	To					No.	Pen	F
				0-6	6-12	12-18						
		<u>5 - 6.5</u>	<u>Dry</u>	<u>8</u>	<u>6</u>	<u>6</u>	<u>Dry</u>	<u>5'</u>	<u>Tan medium sand into grey fine sand</u>	<u>1</u>	<u>18</u>	<u>1</u>
		<u>10 - 11.5</u>	<u>"</u>	<u>4</u>	<u>5</u>	<u>7</u>			<u>Tan very fine sand w/trace of silt</u>	<u>2</u>	<u>18</u>	<u>1</u>
		<u>15 - 16.5</u>	<u>"</u>	<u>2</u>	<u>2</u>	<u>5</u>		<u>15.5'</u>	<u>Tan very fine sand w/trace of silt, changing to grey silt w/fine sand</u>	<u>3</u>	<u>18</u>	<u>18</u>
		<u>20 - 21.5</u>	<u>"</u>	<u>3</u>	<u>5</u>	<u>9</u>			<u>Grey silt w/trace of fine sand</u>	<u>4</u>	<u>18</u>	<u>18</u>
		<u>25 - 26.5</u>	<u>"</u>	<u>8</u>	<u>9</u>	<u>15</u>			<u>Grey silt w/trace of sand</u>	<u>5</u>	<u>18</u>	<u>18</u>
		<u>30 - 31.5</u>	<u>"</u>	<u>8</u>	<u>18</u>	<u>20</u>			<u>Grey silt w/trace of fine sand</u>	<u>6</u>	<u>18</u>	<u>18</u>

GROUND SURFACE TO <u>30'</u>	USED Auger... " <u>CASING</u> ... THEN <u>S.S.</u>	140 lb. Wt. x 30" fall an 2" O. D. Sampler	SUMMARY:
Sample Type	Proportions Used	Cohesionless Density	Earth Boring 3
D=Dry C=Cored W=Washed	trace 0 to 10%	0-10 Loose	Rock Coring ..
UP=Undisturbed Piston	little 10 to 20%	10-30 Med. Dense	Samples 8
TP=Test Pit A=Auger V=Vane Test	some 20 to 35%	30-50 Dense	
UT=Undisturbed Thinwall	and 35 to 50%	50+ Very Dense	
		Cohesive Consistency	
		0-4 Soft 30+ Hard	
		4-8 M/Stiff	
		8-15 Stiff	
		15-30 V-Stiff	
			HOLE NO. <u>SB-</u>

Green Mountain Boring Co., Inc.

R. D. 2 - BARRE, VERMONT 05641

SHEET10..... OF
 DATE4-22-86.....
 HOLE NO. SB-10
 LINE & STA.
 OFFSETNone.....

TODesign Associates, Inc..... ADDRESSWinooski, Vermont.....
 PROJECT NAMERiverside Apts..... LOCATIONBurlington, Vermont.....
 REPORT SENT TODesign Assoc..... PROJ. NO.
 SAMPLES SENT TO " " " " OUR JOB NO.86-16.....

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
AI	Dry at Hours	Type Auger	S.S.		4-22-86
		Size I. D.	1 3/8		DATE STARTED 4-22-86
AI	at Hours	Hammer Wt.	140#	BIT	DATE COMPL. 4-22-86
		Hammer Fall	30"		BORING FOREMAN Garneau
					INSPECTOR
					SOILS ENGR.

LOCATION OF BORING: Sandpit across from Tortilla Flats

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE		
				From	To					No.	Pen	F
				0-6	6-12	12-18						
		5 - 6.5	Dry	6	6	6	Dry		Medium sand into fine sand	1	18	1
		10 - 11.5	"	5	5	8	Dry	11'	Tan fine sand into grey silt with fine sand	2	18	1
		15 - 16.5	"	7	10	13			Grey silt & fine sand with lenses of tan fine sand	3	18	1
		20 - 21.5	"	11	13	15			Grey silt and fine sand	4	18	1
		25 - 26.5	"	13	11	12			Grey silt with fine sand	5	18	1
		30 - 31.5	"	5	8	10			Grey silt w/trace of fine sand	6	18	18

GROUND SURFACE TO 30'	USED Auger	"CASING: THEN S.S.	140 lb. Wt. x 30" fall an 2" O. D. Sampler	SUMMARY:
Sample Type	Proportions Used	Cohesionless Density	Cohesive Consistency	Earth Boring 31
D=Dry C=Cored W=Washed	trace 0 to 10%	0-10 Loose	0-4 Soft 30 + Hard	Rock Coring
UP=Undisturbed Piston	little 10 to 20%	10-30 Med. Dense	4-8 M/Stiff	Samples 6
TP=Test Pit A=Auger V=Vane Test	some 20 to 35%	30-50 Dense	8-15 Stiff	
UT=Undisturbed Thinwall	and 35 to 50%	50 + Very Dense	15-30 V-Stiff	

HOLE NO. SB-

Green Mountain Boring Co., Inc.

R. D. 2 - BARRE, VERMONT 05641

SHEET 11 OF
 DATE 4-22-86
 HOLE NO. SB-11
 LINE & STA.
 OFFSET None

TO Design Associates, Inc. ADDRESS Winooski, Vermont
 PROJECT NAME Riverside Apts. LOCATION Burlington, Vermont
 REPORT SENT TO Design Assoc. PROJ. NO.
 SAMPLES SENT TO " " " OUR JOB NO. 86-16

GROUND WATER OBSERVATIONS	CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
At <u>8'</u> at <u>1</u> Hours	Type <u>Auger</u>	<u>S.S.</u>		DATE STARTED <u>4-22-86</u>
At <u> </u> at <u> </u> Hours	Size I. D. <u>2 1/2"</u>	<u>1.3/8</u>		DATE COMPL. <u>4-22-86</u>
	Hammer Wt. <u> </u>	<u>140#</u>	BIT	BORING FOREMAN <u>Garneau</u>
	Hammer Fall <u> </u>	<u>30"</u>		INSPECTOR <u> </u>
				SOILS ENGR. <u> </u>

LOCATION OF BORING: Sandpit across from Tortilla Flats restaurant

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE	
				From	To					No.	Pen
				0-6	6-12	12-18					
		<u>5 - 6.5</u>	<u>Dry</u>	<u>8</u>	<u>11</u>	<u>13</u>	<u>Dry</u>		<u>Grey medium sand w/trace of fine sand & some organic</u>	<u>1</u>	<u>18</u>
		<u>10 - 11.5</u>	<u>"</u>	<u>17</u>	<u>11</u>	<u>13</u>	<u>Dry</u>		<u>Grey med. sand w/refuse</u>	<u>2</u>	<u>18</u>
		<u>15 - 16.5</u>	<u>"</u>	<u>14</u>	<u>9</u>	<u>9</u>	<u>Dry</u>		<u>NO RECOVERY</u>		<u>18</u>
		<u>20 - 21.5</u>	<u>"</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>Dry</u>		<u>Grey medium fine sand with trash</u>	<u>3</u>	<u>18</u>
		<u>25 - 26.5</u>	<u>"</u>	<u>9</u>	<u>11</u>	<u>14</u>	<u>Dry</u>		<u>Tan-brown fine grained sand</u>	<u>4</u>	<u>18</u>
		<u>30 - 31.5</u>	<u>"</u>	<u>5</u>	<u>7</u>	<u>9</u>			<u>Grey silt with trace of fine sand</u>	<u>5</u>	<u>18</u>

GROUND SURFACE TO <u>30</u>	USED <u>Auger</u> THEN <u>S.S.</u>	140 lb. Wt. x 30" fall an 2" O. D. Sampler	SUMMARY
Sample Type	Proportions Used	Cohesionless Density	Earth Boring
D=Dry C=Cored W=Washed	trace 0 to 10%	0-10 Loose	Rock Coring
UP=Undisturbed Piston	little 10 to 20%	10-30 Med. Dense	Samples <u>5</u>
TP=Test Pit A=Auger V=Vane Test	some 20 to 35%	30-50 Dense	
UT=Undisturbed Thinwall	and 35 to 50%	50+ Very Dense	
		Cohesive Consistency	
		0-4 Soft 30+ Hard	
		4-8 M/Stiff	
		8-15 Stiff	
		15-30 V-Stiff	

HOLE NO. SB

1

ADAMS ENGINEERING
Gerard Adams
RD #1, Box #403
Underhill, Vt. 05489
899-4945

October 17, 1987

Mr. Michael Pottinger
Heindel & Noyes Inc.

The following are the boring logs for Larkin project conducted under your direction:

09/16/87 #208 South of pond.

Sampler pressed 0-2' & 2-4' Brown silty fine sand.

-6.5' 9,10,14,17. (blows from a #140 hammer falling 30" to drive a standard penetration sampler 6" - blow counts are not intended for load bearing information, ie; emphasis is on sample recovery). Gray brown fine sandy silt.
-11.3' 5,6,8,9. Gray brown fine sandy silt, water.
-16.4' 4,4,5,13. Blue gray very fine sandy silt.
-21.6' 2,3,4,5. Same.
-26.6' 4,8,9,16. Blue gray silt/clay over fine sandy silt.
-31.6' 6,9,9,11. Very fine sandy silt.
-41.5' 5,10,14,17. Same.

MONITOR WELL DEEP

2" Factory threaded & Slotted (.020") PVC-Deitrich.

Slotted section: 10' Solid Riser: 30' Bags Sand: 6 .49 mm
Sand Pack To below grade: -26' Betonite Plug: 30 Gallons of
Volclay Betonite slurry (2.1 lbs. betonite/gallon Water) pumped from -26'
to approx. -11'
Screened from -28.9' To -39.4' Stick up +1.5'

#209 North of pond.

Pressed Sampler 0-2', & 2-4'

-6.4' 8,11,14,19. Pale neutral silty fine sand.
-12.1' 14,19,19,13. Same. Mottled.
-17.1' 4,5,8,7. Gray brown silty fine sand. Water.
-22.6' 1,2,1,2. Gray fine sandy silt. Water.
-27.2' 2,3,4,5. Same.

MONITOR WELL SHALLOW

2" Factory threaded & Slotted (.020") PVC-Deitrich.

Slotted section: 15' Solid Riser: 10' Bags Sand: 8 .49 mm
Sand Pack To below grade: -8' Betonite Plug: 25# of granular
betonite at -7'.
Screened from -9.7' To -24.2' Stick up +1.0'
Developed by flushing & surging .

10/12/87 #210

Pressed sampler 0-2' & 2-4'. Brown silty sand.

-6.0' 8,7,8,8. Damp gray silty sand.
-11.0' 3,8,8. Saturated brown silty fine sand.

2

-17.7' 7,7,8,8. Gray fine sandy silt.
 -21.6' 2,4,3,5. Same.
 -26.6' 3,6,4,7. Grayer fine sandy silt & Saturated silty fine sand.
 -31.8' 3,4,5,6. Wet gray silt trace fine sand.
 -36.6' 5,8,8,8. Same.
 -41.5' 3,6,7,11. Same.
 -46.8' Dropped sampler, 7,9. Same.
 -51.8' 4,6,9,11. Dark gray plastic silt/clay.
 -56.8' 5,6,8,12. Same.
 -62.2' 8,10,14. Same.

MONITOR WELL DEEP

8'5.1

1.5" Hand Slotted & Welded PVC with filter fabric. Backed augers out. 35# Bentonite.

MONITOR WELL SHALLOW

2" Factory threaded & Slotted (.020") PVC-Deitrich.

Slotted section: 10' Solid Riser: 15' Bags Sand: 7 .49 mm
 Sand Pack To below grade: -8' Betonite Plug: 15# of granular
 betonite at -5'
 Stick Up: +3.0'

Deloped by flushing & surging followed by air pumping: Flow-poor, cloudy.

#211 Pressed sampler 0-2' & 2-4'

-D-1 -6.7' 3,4,5,6. Gray Brown Silty Fine sand. Damp.
 -11.6' 10,14,22,17. Gray silty fine sand damp smells of sludge.
 -16.6' 10,14,23,29. Water gray brown silty fine sand smells.
 -21.6' 6,6,10,11. Damp brown gray fine sandy silt less odor.
 -26.7' 9,7,6,12. Gray plastic fine sandy silt.
 -32.1' 3,4,5,8. same.
 -37.0' 7,10,12,16. Dark gray plastic silt/clay.
 -42.0' 4,5,7,11. Same.
 -47.0' 6,8,9,12. Same.
 -51.8' 5,8,9,11. Same.
 -57.0' 3,4,6,6. Same
 -61.7' 6,6,8,12. Same.

10/14/87

MONITOR WELL DEEP

2" Factory threaded & Slotted (.020") PVC-Deitrich.

Slotted section: 10' Solid Riser: 40' Bags Sand: 7 .49 mm
 Sand Pack To below grade: -37.5' Betonite Plug: 30 Gallons of
 Volclay Betonite slurry (2.1 lbs. betonite/gallon Water) pumped from
 -37.5' to approx. -23' and 25# of granular betonite at -23' & 10# at -5'.
 Stick Up: +1.2' Screened from -39.1' To -48.6'

#212 Bank.

-7.9' 2,3,4,8. Saturated brown fine sandy silt over gray fine sandy silt.
 -12.5' 2,3,5,7. Water brown silty fine sand over gray silt.
 -17.5' 2,4,5,7,9. Gray silty fine sand.
 -22.5' 6,10,15,16. Same.
 -27.3' 7,13,14,16. Gray fine sandy silt over silty fine sand.

3

-32.7' 12,13,19,21. Gray silty fine sand.
 -37.3' 13,18,20,34. Same.
 -42.7' 8,15,19,25. Same.
 -47.3' 5,6,8,10. Same less sand.
 -53.1' 10,11,15. Stiff Dry fine sandy silt.
 -57.6' 5,18,17,30. Same.
 -61.2' 17,55. Saturated coarse sand.
 -65.2' 68+ Refusal Gray stoney silt till.

MONITOR WELL DEEP

1.5" Hand Slotted 6 welded (No primer) Wrapped with filter fabric
 Betonite Plug: 30 Gallons of Volclay Betonite slurry (2.1 lbs.
 betonite/gallon Water) pumped from -50' to approx. -35'.
 10/14/87

MONITOR WELL SHALLOW

2" Factory threaded & Slotted (.020") PVC-Deitrich.
 Slotted section: 15' Solid Riser: 5' Bags Sand: 8.5 .49 mm
 Sand Pack To below grade:-2' Betonite Plug: 20# of granular
 betonite at -2'
 Stick Up: +1.4 Screened from -3.9' To -18.4'
 Deloped by flushing & surging followed by air pumping: Flow-poor, cloudy.

#213 At Entrance.

-6.5' 7,10,14,13. Brown becoming gray saturated silty fine
 sand.
 -10.3' 1,1,3,5. Drier gray fine sandy silt.
 -15.8' 2,3,4,4. Gray loose silty fine sand.
 -21.4' 6,5,5,4. Gray stiff fine sandy silt.
 -26.3' 2,3,6,8. Gray fine sandy silt over blue gray silt/clay
 stiff.
 -31.2' 5,9,13,17. Blue gray silt trace fine sand.
 -36.3' 11,15,14,14. Stiff fine sandy silt.
 -41.1' 5,8,11,18. Same.
 -46.2' 5,7,10,14. Same.
 -51.2' 5,5,7,7. Same trace fine sand.
 -56.2' 4,4,6. Same.
 -60' 5,8. Dry rubber silt/clay, with sub rounded stone.
 -65.8' 9,10,9. Plastic silt/clay.

MONITOR WELL DEEP

2" Factory threaded & Slotted (.020") PVC-Deitrich.
 Slotted section: 10' Solid Riser: 55' Bags Sand: 7 .49 mm
 Sand Pack To below grade:-? Betonite Plug: 30 Gallons of Volclay Betonite
 slurry (2.1 lbs. betonite/gallon Water) pumped from -40' to approx. -25'
 and 35# of granular betonite at -25'.
 Stick Up: 2' Screened from -53.3 To -62.8'.
 10/15/87

MONITOR WELL SHALLOW

2" Factory threaded & Slotted (.020") PVC-Deitrich.
 Slotted section: 15' Solid Riser: 5' Bags Sand: 8.5 .49 mm
 Sand Pack To below grade:-2' Betonite Plug: 35# of granular
 betonite at -2'.
 Deloped by flushing & surging followed by air pumping: Flow-poor, cloudy.

^{ev}
 #214 North east of pond.

4

- 6.2' 12,12,15,15. Mottled pale fine sand.
- 11.2' 6,9,10,8. Saturated brown silty fine sand.
- 16.0' 4,6,8,9. Saturated brown silty fine sand over gray damp fine sandy silt.
- 21.1' 3,3,4,4. Gray tight fine sandy silt.
- 26.2' 2,5,5,5. Gray silt/clay.

MONITOR WELL SHALLOW

2" Factory threaded & Slotted (.020") PVC-Deitrich.

Slotted section: 15' Solid Riser: 10' Bags Sand: 8.5 .49 mm
 Sand Pack To below grade:-8' Betonite Plug: 35# of granular
 betonite at -8'.

Stick Up: +1.3' Screened from -9.7' To -24.2'
 Deloped by flushing & surging followed by air pumping: Flow-poor, cloudy.

#215 West end at dump.

- 7.1' 20,30,11. Refuse.
- 11.2' 7,7,5,3. "
- 16.0' 19,15,10,14. "
- 19.8' 54,23. "
- 26.2' 5,9,5,14. Gray damp sand trash in spoil.
- 31.2' 3,10,7,18. Refuse Water.
- 36.4' 7,33,21,11. Water refuse over silt.
- 41.8' 1,1,1,2. Coarse sand some fibre over Lt. gray silt/clay.
- 46.7' 5,6,8,8. Same.
- 51.0' 8,34, Refusal. Till Stoney silt.
- 53.7' short. Same.

MONITOR WELL DEEP

2" Factory threaded & Slotted (.020") PVC-Deitrich.

Slotted section: 10' Solid Riser: 50' Bags Sand:3.8 .49 mm
 Sand Pack To below grade:-46?. Betonite Plug: 30 Gallons of
 Volclay Betonite slurry (2.1 lbs. betonite/gallon Water) pumped from -46'
 to approx. -31' and 35# of granular betonite at -20'
 Stick Up: +3' Screened from -47 To -56.5'

Gerard Adams

ADAMS ENGINEERING
 Gerard Adams
 RD #1, Box #402
 Underhill, Vt. 05489
 899-4945

September 5, 1986

Mr. Craig Seindel

The following are the boring logs for Larkin/Burlington Dump project conducted under your direction representing WF & P.:

09/02/86 #201

- 17.0' 4,5,6,7. (Blows from a #140 hammer falling 30" to drive a standard penetration sampler 6" -blow counts are not intended for load bearing information, ie; emphasis is on sample recovery) Gray, dry medium & fine sand.
- 21.9' 3,8,10,10. Gray, dry, medium & fine sand traces of silty lenses gray.
- 27.2' 5,4,3,2. Damp gray medium fine sand over 3" black sand & white gravel rust & wood over damp fine medium sand.
- 32.2' 5,4,8,5. Dark gray damp wood over rust & glass gravel & fine sand.
- 37.2' 6,5,7,8. Dark gray damp medium sand plaster & wood.
- 42.3' 7,9,14,13. Gray damp silt over oily sand & gravel over brown medium sand.
- 47.3' 11,8,4,8. Medium gray saturated silty medium sand over pale gravel, silty fine sand-water?
- 52.3' 4,7,7,6. Pale saturated Gravelly sand.
- 57.1' 4,11,9,39. Pale saturated coarse sand over silty sand & gravel over gravel Water 54.6'.
- 62.0' 13,73,74. Gray damp till tough tight sandy stoney silt over orange brown gravel-drier.

MONITOR WELL

2" Factory threaded & slotted (.020") PVC-Deitrich.

Slotted section: 10' Solid Riser: 50' Bags Sand: 6 .49 mm
 Sand Pack To below grade: - 15# Granular bentonite at 2'.
 Total Pipe: 60.7' Water Level: ? Condensation in Pipe.
 Stick Up: 1.1' Top slot +above -below water: ?
 Air surge/pump Developed: developer would not seat brown
 silty. Flow: fair.

MW #202

- 7.6' 2,4,6,5. Tan mottled damp silt.
- 12.7' 3,2,3,4. Gray Damp silt & clay.
- 18.2' 4,4,5,4. Gray saturated (water) very silty fine sand.
- 22.2' 3,7,8. Gray dry silty clay gooey on top.
- 27.5' 3,4,4,7. Gray dry silty clay.

MONITOR WELL

2" Factory threaded & slotted (.020") PVC-Deitrich.

Slotted section: 10' Solid Riser: 15' Bags Sand: 6 .49 mm
 Sand Pack To below grade: -11' 15' Granular bentonite at 10'
 Total Pipe: 23.8' Water Level: 9.2'*

Stick Up: .9' Top slot +above -below water:-5.1'
Air surge/pump Developed: no.

9/3/86 #203

0-5' From auger Damp brown silty sand.
-12' Cable sampler-Blue gray fine sandy silt saturated.
-16.5' Saturated brown brown fine sand over 4" silt/clay lense over gray fine sand water.
-21.6' 3,4,4(Drill rods) Gray saturated silty sand over over silty clay.
-25.1' 3,7,14,21. Gray silt/clay over fine sand.

MONITOR WELL

2" Factory threaded & Slotted (.020") PVC-Deitrich.

Slotted section: 10' Solid Riser: 15' Bags Sand:6 .49 mm
Sand Pack To below grade:-10' 15# Granular betonite at 8'.
Total Pipe: 25.55' Water Level: 12'
Stick Up: 2.8' Top slot +above -below water:-4.5'
Some bridging during packing causing collapse native mat'l against screen.
Air surge/pump Developed: silty gray Flow: poor.

#204

0-5' Blue gray medium sand over brown gray medium sand.
-7.0' 6,7,7,7. Mottled damp fine sandy silt.
-12.3' 2,2,3,3. Grt damp fine sandy silt.
-17.6' No blow count. Brown water at 15' silty sand spoil over gray silty fine sand.
-22.3' 5,7,10,12. Gray dry silt.
-27.5' 8,10, 12, 14. "

MONITOR WELL

2" Factory threaded & Slotted (.020") PVC-Deitrich.

Slotted section: 10' Solid Riser: 15' Bags Sand:6 .49 mm
Sand Pack To below grade:-13' 30# Granular betonite at 11'
Total Pipe: 25.5' Water Level: 12.3'*
Stick Up: 1' Top slot +above -below water:+3.7'
Air surge/pump Developed: slightly cloudy Flow: Poor.

9/4/86 #205

-7.1' 8,7,5,5. Gray dry sand & glass.
-12.3' 2,3,6,7. Gray sand & wood & rubble.
-17.0' 19,9,4,4. Gray sand & wood water at 17'.
-22.1' 7,10,6,11. Gray rubble over medium fine sand. Water.
-27.3' 3,7,6,7. Green gray medium sand wood over gray fine sand.
-30.3' 11,15,11,12. Gray water no recovery pushed large object.
Auger tailings have foul odor.

MONITOR WELL

2" Factory threaded & Slotted (.020") PVC-Deitrich.

Slotted section: 10' Solid Riser: 10' Bags Sand:9 .49 mm
Sand Pack To below grade:-11' 25# Granular betonite at 11'
Total Pipe: 30.5' Water Level: 20.5'
Stick Up: 3' Top slot +above -below water: -.5'
Air surge/pump Developed: clear, smells of hydrogen sulfide, & entrained gases. Flow: good.

#206

- 0-3' Lt. brown sand. 3-5' Blue gray clayey silt. No water!
- 7.1' 5,8,13,12. Gray brown very silty fine sand over fine sand. Water at 5.5'
- 12.3' 3,4,8,9. Gray Water lenses of fine sand & silty fine sand.
- 16.8' 5,5,8. Gray damp Fine sandy silt.
- 22.3' 5,11,14,19. Gray Dry silt.

MONITOR WELL

2" Factory threaded & Slotted (.020") PVC-Deitrich.

Slotted section: 10' Solid Riser: 7' Bags Sand: 7.5 .49 mm
 Sand Pack To below grade: -4'' 15# Granular bentonite Bridged to grade as a slurry.

Total Pipe: 17.3' Water Level: 3.7'*
 Stick Up: 1.7' Top slot +above -below water: -4.1'
 Air surge/pump Developed: clear Flow: fair to poor.
 * Slightly confined aquifer.

9/5/86 #207

- 7.0' 17,11,11,8. Gray Dry Sand & wood.
- 12.3' 3,7,10,11. Gray silty medium sand & wood over black wood & silt over gray plastic silt, water at 7.7'
- 17.2' 4,14,4,4. Brown gray silty sand & wood. water.
- 21.5' 4,3,5,11. Black silty medium sand & wood over brown gray siltier fine sand.

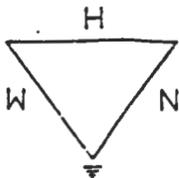
MONITOR WELL

2" Factory threaded & Slotted (.020") PVC-Deitrich.

Slotted section: 10' Solid Riser: 10' Bags Sand: 7.5 .49 mm
 Sand Pack To below grade: -6'' 15# Granular bentonite at 2'.
 Total Pipe: 20.55 Water Level: Too soon after development.

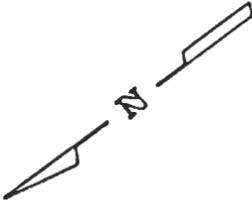
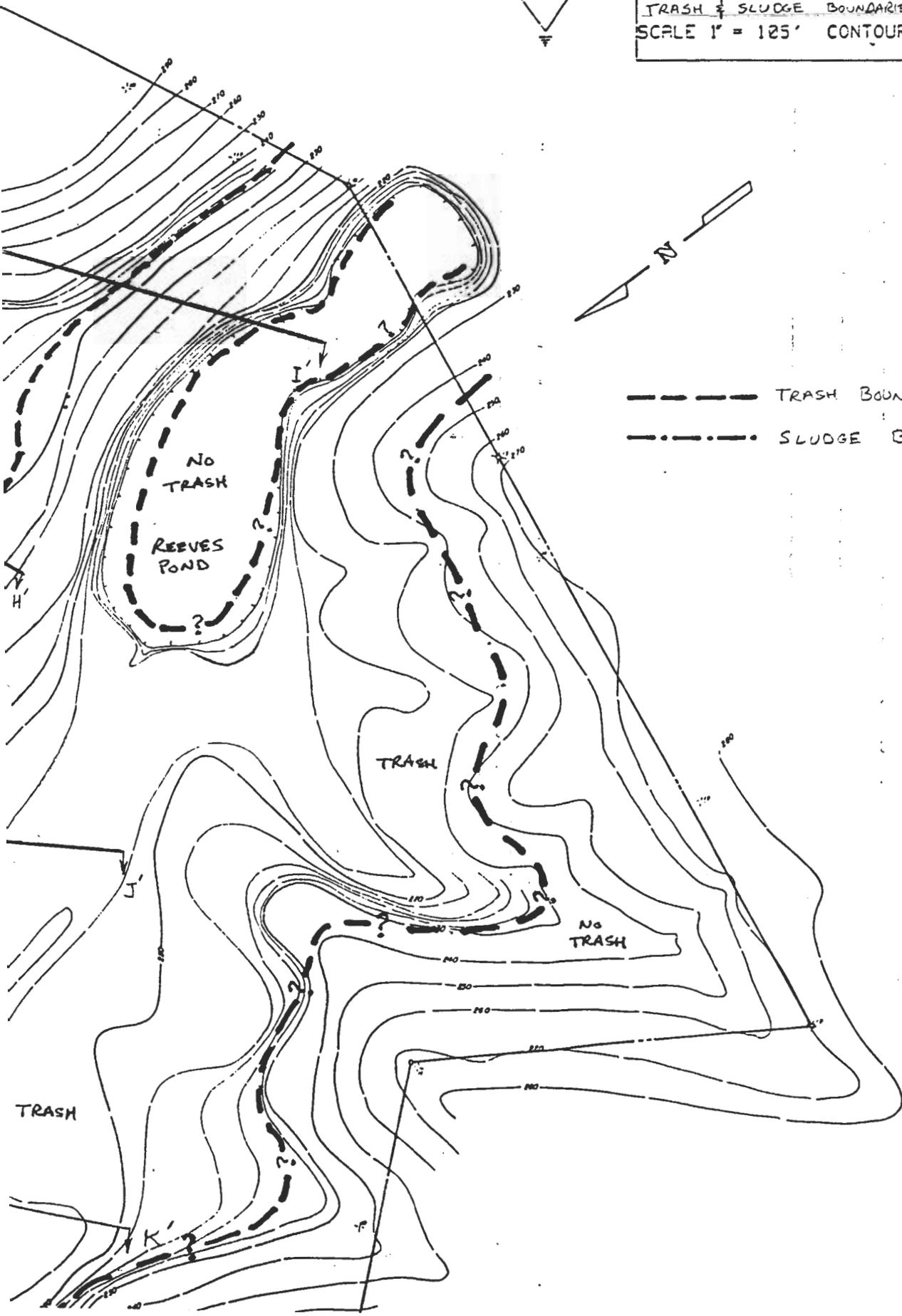
Stick Up: 2' Top slot +above -below water:
 Air surge/pump Developed: clear entrained gases. Flow good.

Gerard Adams



LARKIN - RIVERSIDE PROJECT

TRASH & SLUDGE BOUNDARIES & X-SECTION LOCATIONS
SCALE 1" = 125' CONTOUR INTERVAL 10 FEET



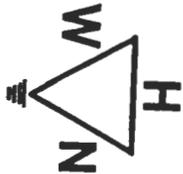
----- TRASH BOUNDARY
- · - · - · SLUDGE BOUNDARY

NO TRASH
REEVES POND

TRASH

NO TRASH

TRASH

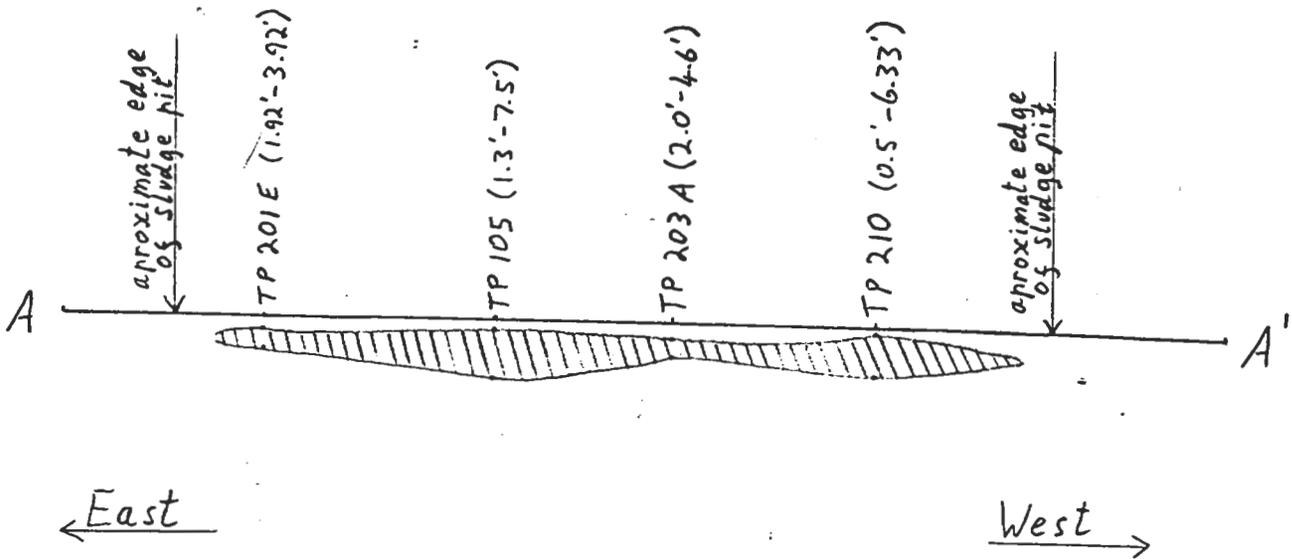


Wagner, Heindel, and Noyes, Inc.
Consulting Geologists
Burlington, Vermont

PAGE _____ OF _____
PROJECT: _____
DATE: _____

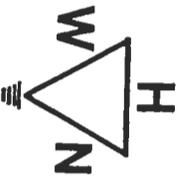
Page No.

43



CROSS SECTION, A-A, SLUDGE PIT,
LARKIN PROPERTY, RIVERSIDE AVE, BURLINGTON, VT

Scale: 1" = 25'

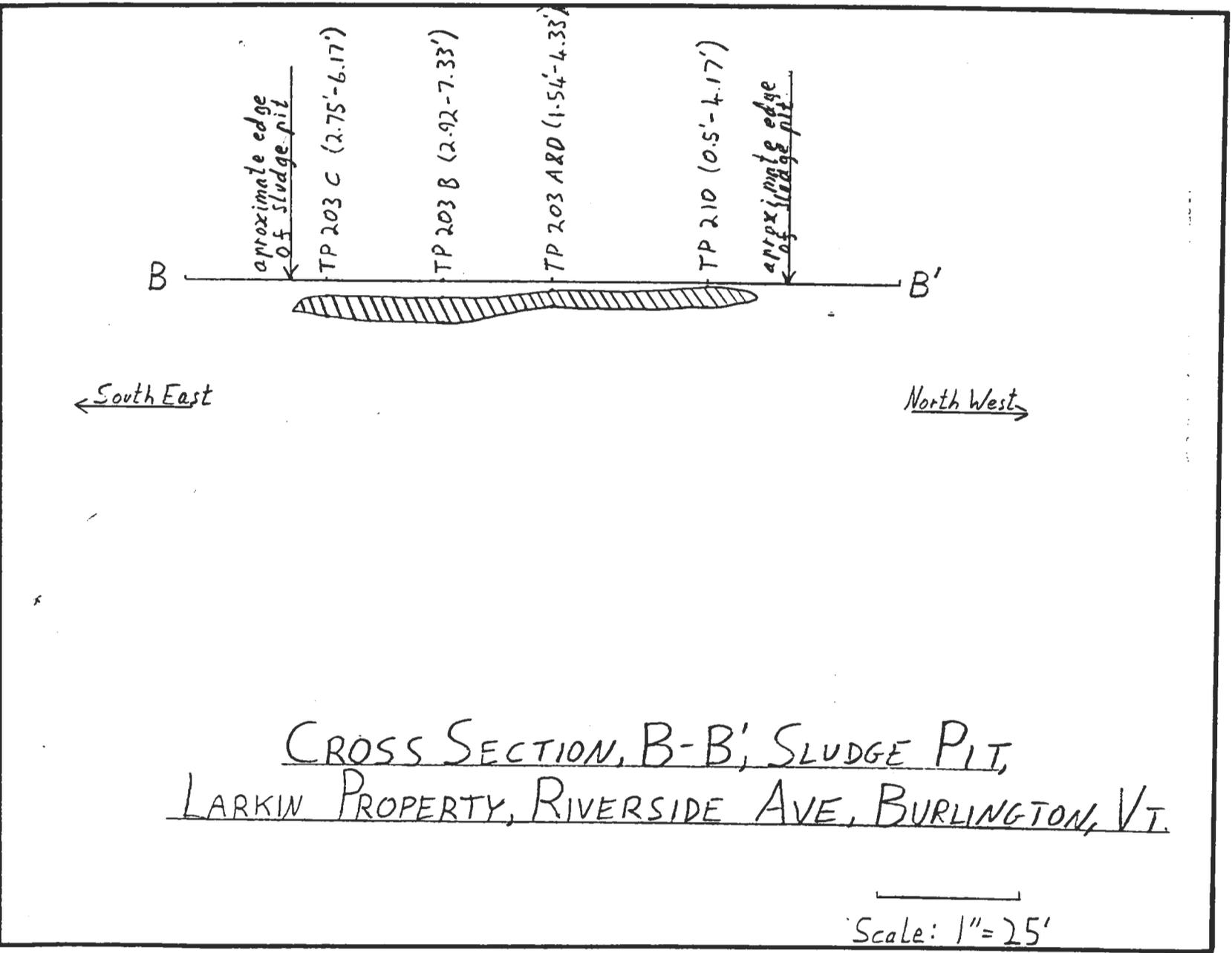


Wagner, Heindel, and Noyes, Inc.
Consulting Geologists
Burlington, Vermont

PAGE _____ OF _____
PROJECT: _____
DATE: _____

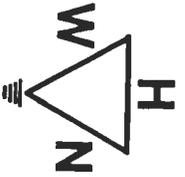
Page No.

44



**CROSS SECTION, B-B', SLUDGE PIT,
LARKIN PROPERTY, RIVERSIDE AVE, BURLINGTON, VT.**

Scale: 1" = 25'

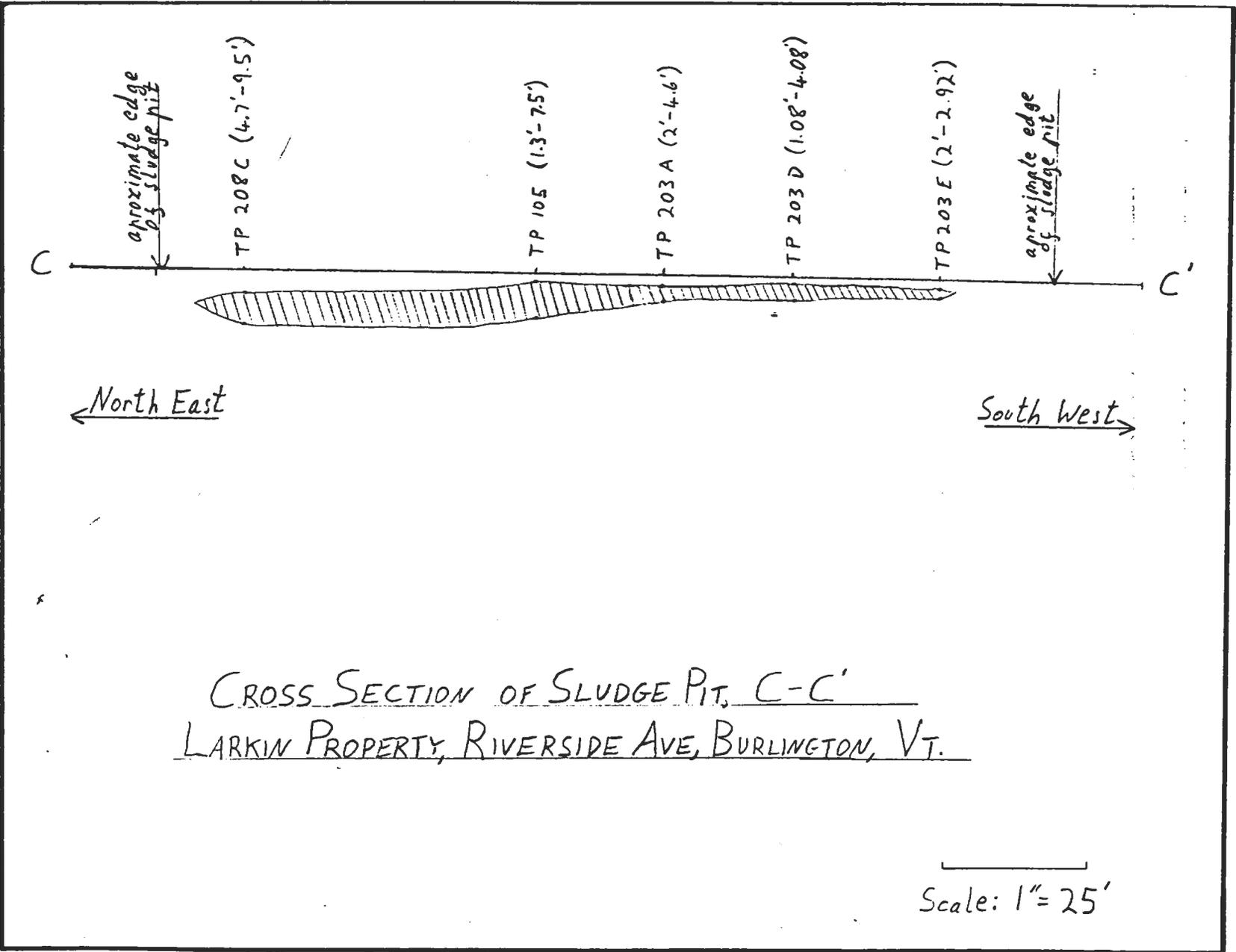


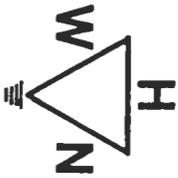
Wagner, Heindel, and Noyes, Inc.
Consulting Geologists
Burlington, Vermont

PAGE _____ OF _____
PROJECT: _____
DATE: _____

Page No.

45



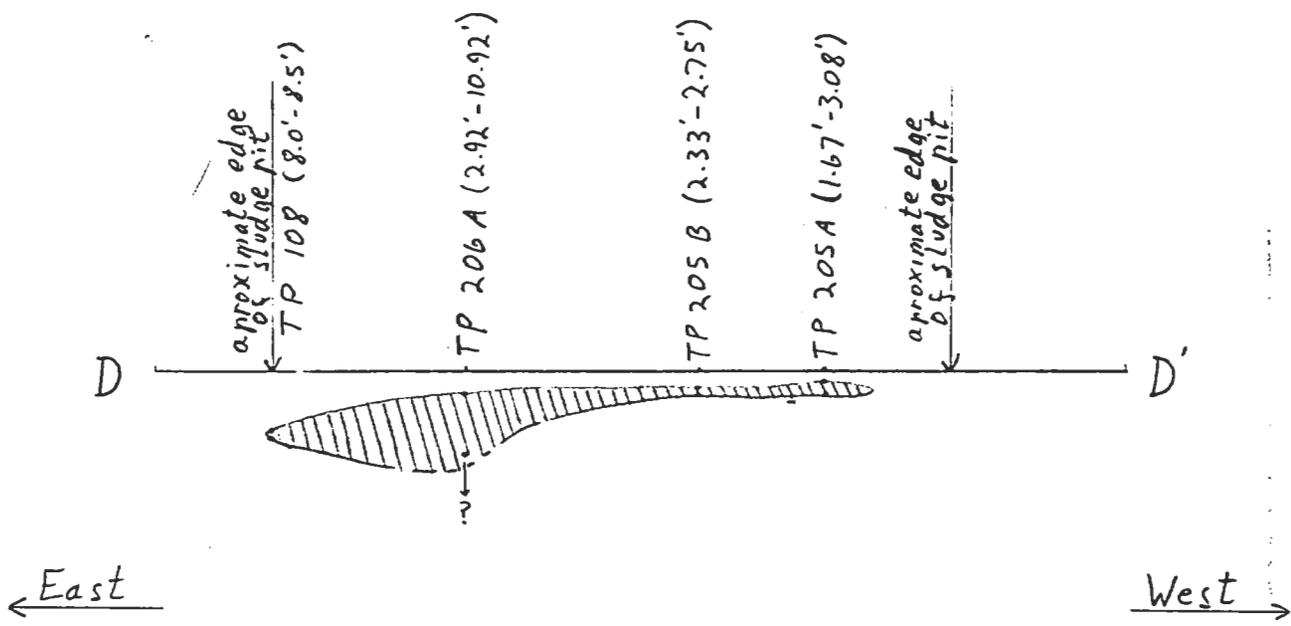


Wagner, Heindel, and Noyes, Inc.
Consulting Geologists
Burlington, Vermont

PAGE _____ OF _____
PROJECT: _____
DATE: _____

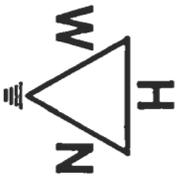
Page No.

46



CROSS SECTION, D-D', SLUDGE PIT,
LARKIN PROPERTY, RIVERSIDE AVE, BURLINGTON, VT.

Scale: 1" = 25'



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

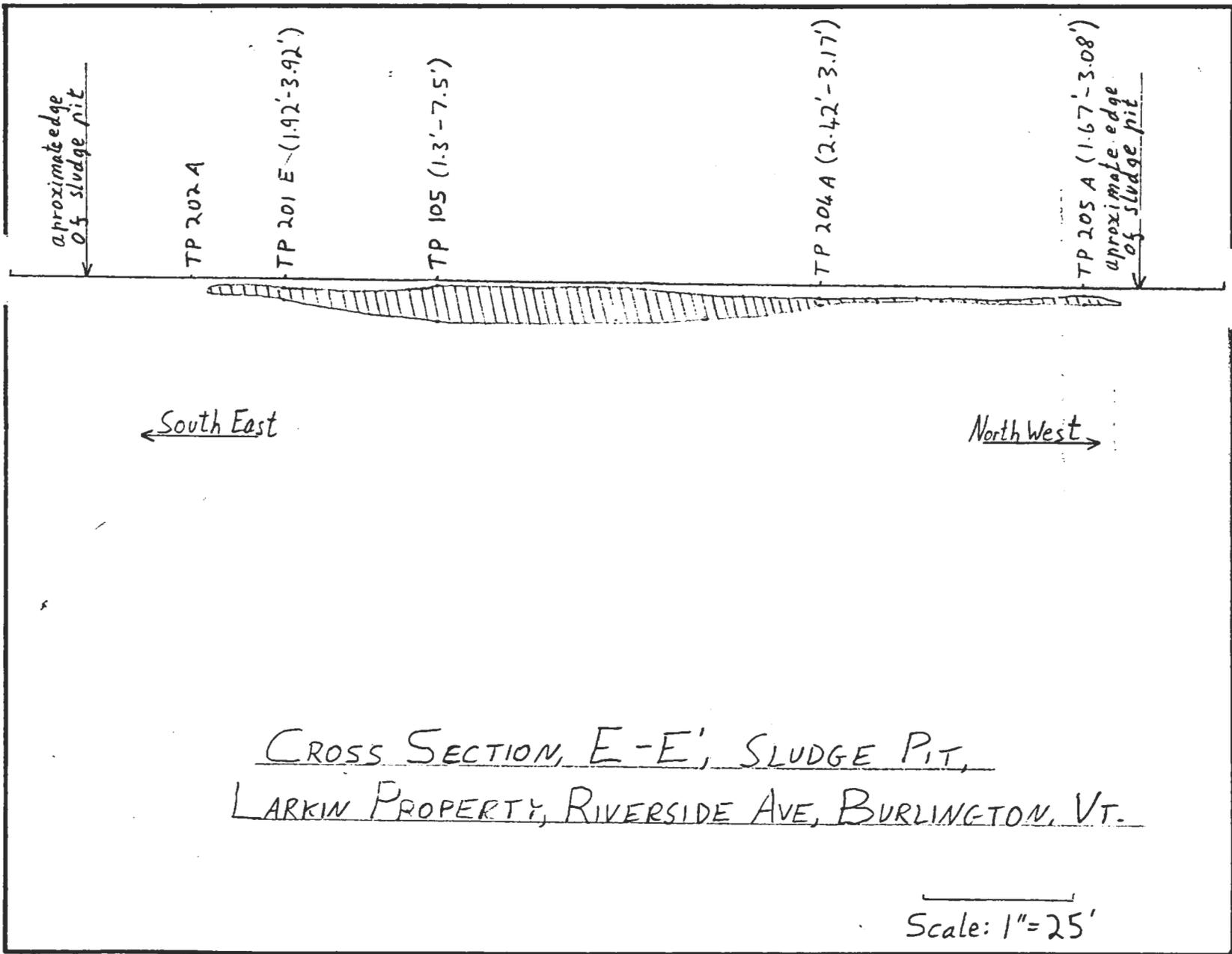
PAGE _____ OF _____

Page No.

47

PROJECT: _____

DATE: _____



CROSS SECTION, E-E', SLUDGE PIT,
LARKIN PROPERTY, RIVERSIDE AVE, BURLINGTON, VT.

Scale: 1"=25'



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

48

Page No.

PAGE ____ OF ____

PROJECT: _____

DATE: _____

Area & Volume calculations for sludge pit on Larkin property, Riverside Avenue, Burlington, VT.

Area of sludge pit = $20,575 \text{ FT}^2 = 0.472 \text{ acre}$.

From the 100 and 200 series test pit logs the average thickness of the sludge deposit is 3.39 FT.

The area of the sludge pit times the average thickness yields a volume of:

$$20,575 \text{ FT} \times 3.39 \text{ FT} = 69,749.25 \text{ FT}^3$$

this is equal to $\frac{69,749.25 \text{ FT}^3}{27 \text{ FT}^3/\text{YD}^3} = 2,583.3 \text{ YD}^3$
of sludge.

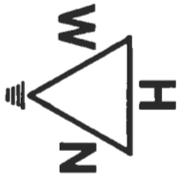
This figure may be compared to the Department of Public Works' record of sludge shipments to the Larkin property.

These shipments totalled 1,599.3 cubic yards, an amount 62% that of the volume calculated using the information based on test pits and cross sections.

The average thickness of the earthen cover overlying the sludge is 2.82 FT. This figure times the area of the pit yields the volume of the overburden.

$$2.82 \text{ FT} \times 20,575 \text{ FT}^2 = 58,021.5 \text{ FT}^3 \\ = 2,148.9 \text{ YDS}^3$$

The total volume of the sludge and the overburden can then be estimated at $4,732.2 \text{ YDS}^3$

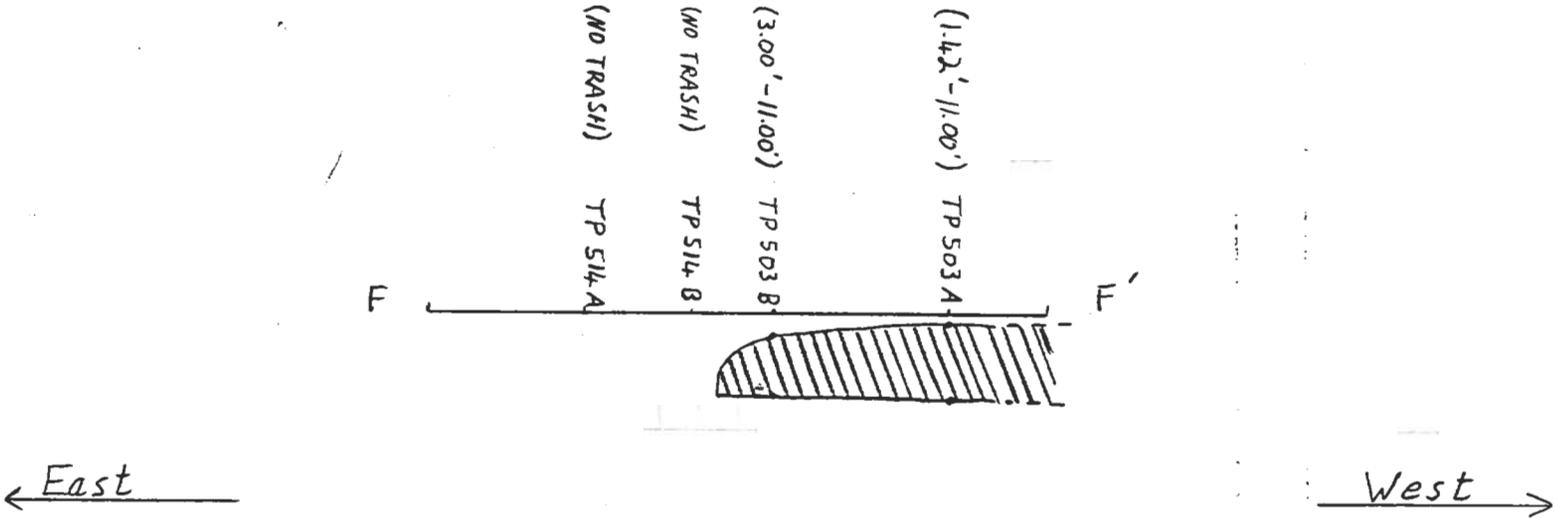


Wagner, Heindel, and Noyes, Inc.
Consulting Geologists
Burlington, Vermont

PAGE _____ OF _____
PROJECT: _____
DATE: _____

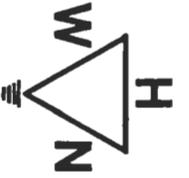
Page No.

49



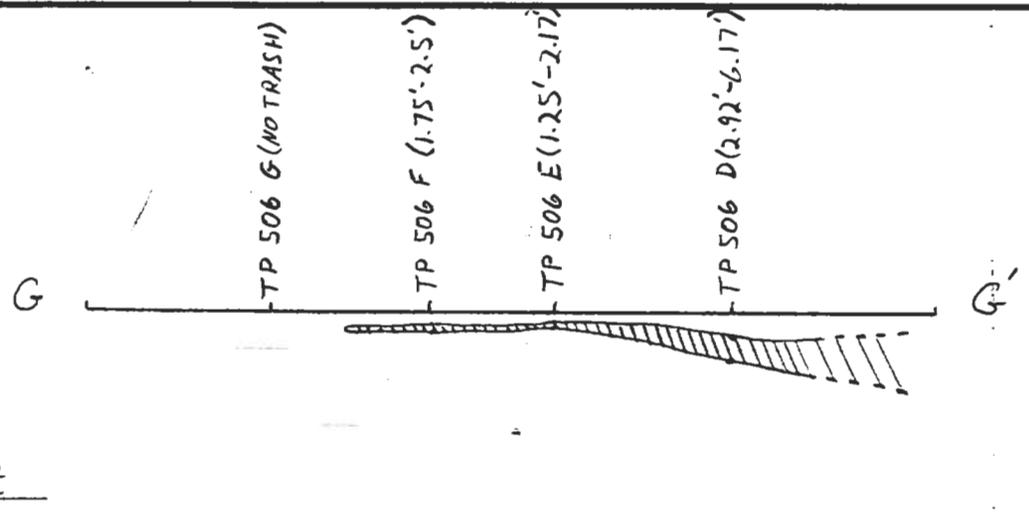
CROSS SECTION, F-F', TRASH BOUNDARY,
LARKIN PROPERTY, RIVERSIDE AVE, BURLINGTON, VT.

Scale: 1" = 25'



Wagner, Heindel, and Noyes, Inc.
Consulting Geologists
Burlington, Vermont

PAGE _____ OF _____
PROJECT: _____
DATE: _____



CROSS SECTION, G-G', TRASH BOUNDARY.
LARKIN PROPERTY, RIVERSIDE AVE., BURLINGTON, VT.

Scale: 1" = 25'



Consulting Geologists

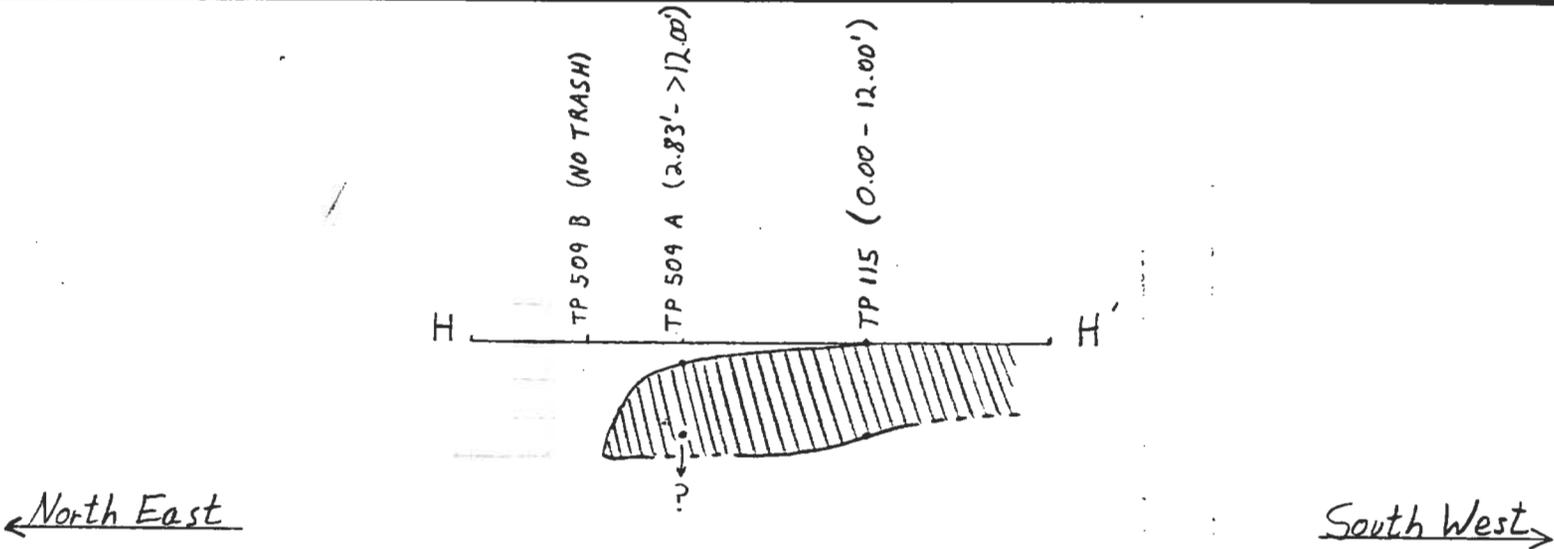
Burlington, Vermont

Wagner, Heindel, and Noyes, Inc.

PAGE _____ OF _____
PROJECT: _____
DATE: _____

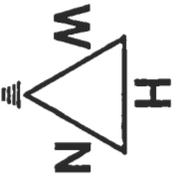
Page No.

51



CROSS SECTION, H-H', TRASH BOUNDARY.
LARKIN PROPERTY, RIVERSIDE AVE., BURLINGTON, VT.

Scale: 1" = 25'

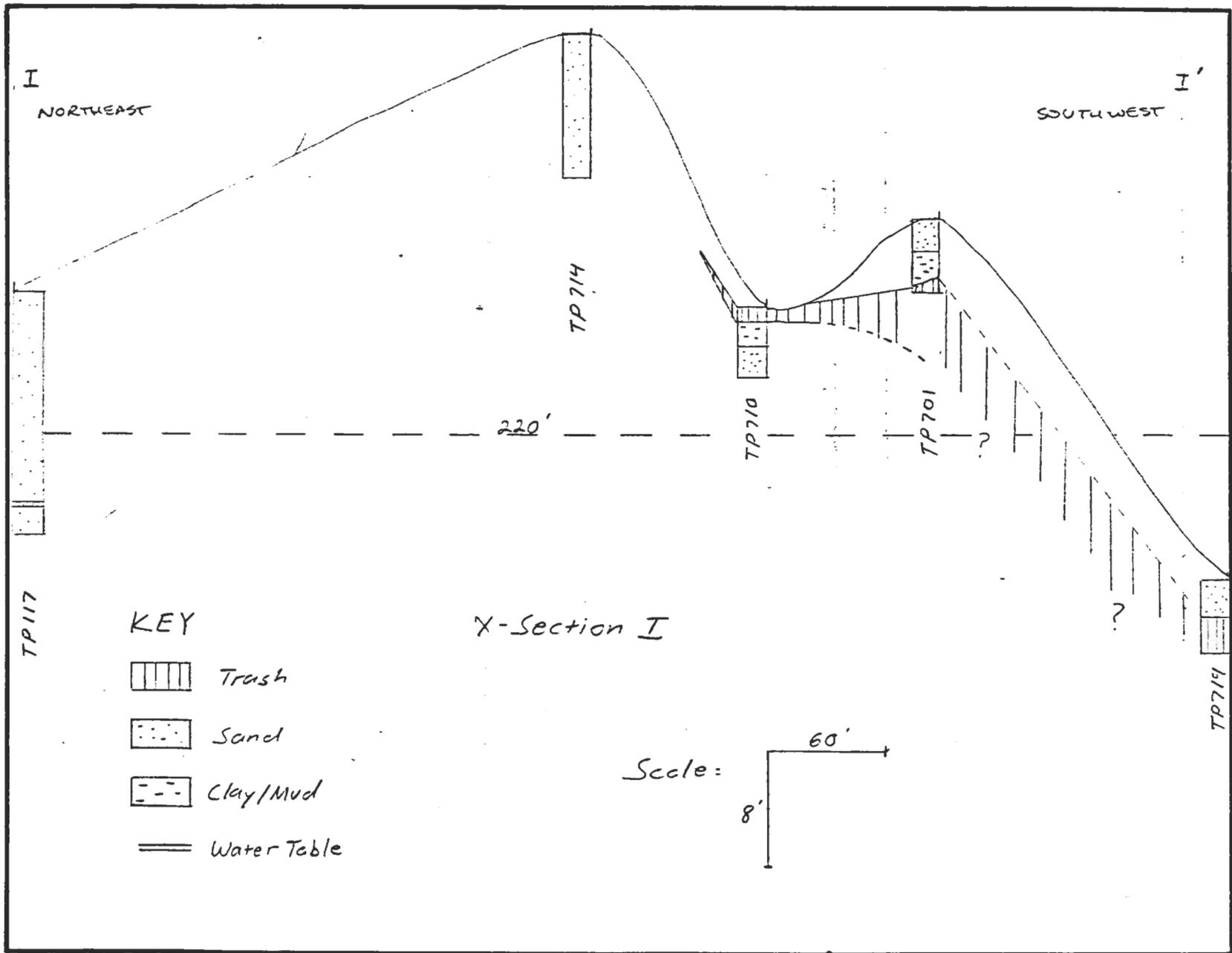


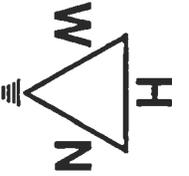
Wagner, Heindel, and Noyes, Inc.
Consulting Geologists
Burlington, Vermont

PAGE _____ OF _____
PROJECT: RiverSide
DATE: 6/18/88

Page No.

52





Wagner, Heindel, and Noyes, Inc.
Consulting Geologists
Burlington, Vermont

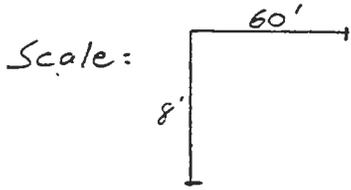
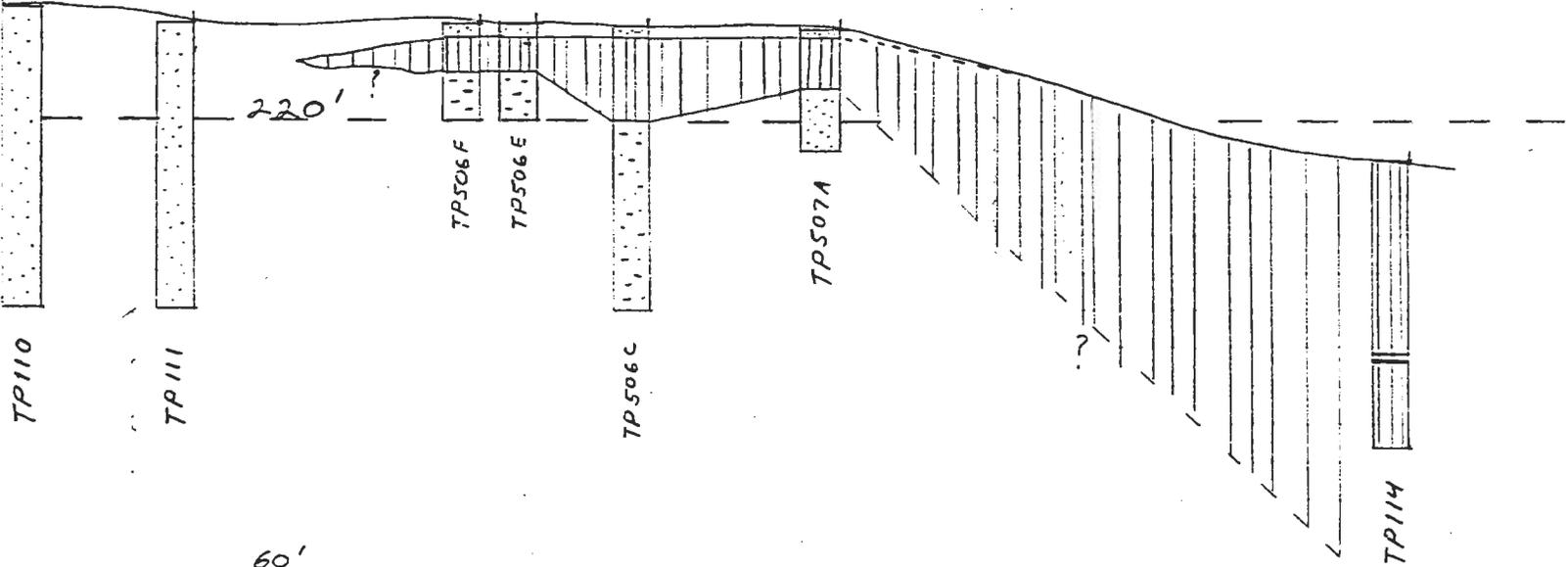
PAGE _____ OF _____
PROJECT: Riverside
DATE: 6/18/88

Page No. 53

X-Section J

J
NORTHEAST

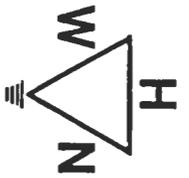
J'
SOUTH WEST



Key:

-  Trash
-  Sand
-  Clay/Mud
-  Silty Sand

 Water Table



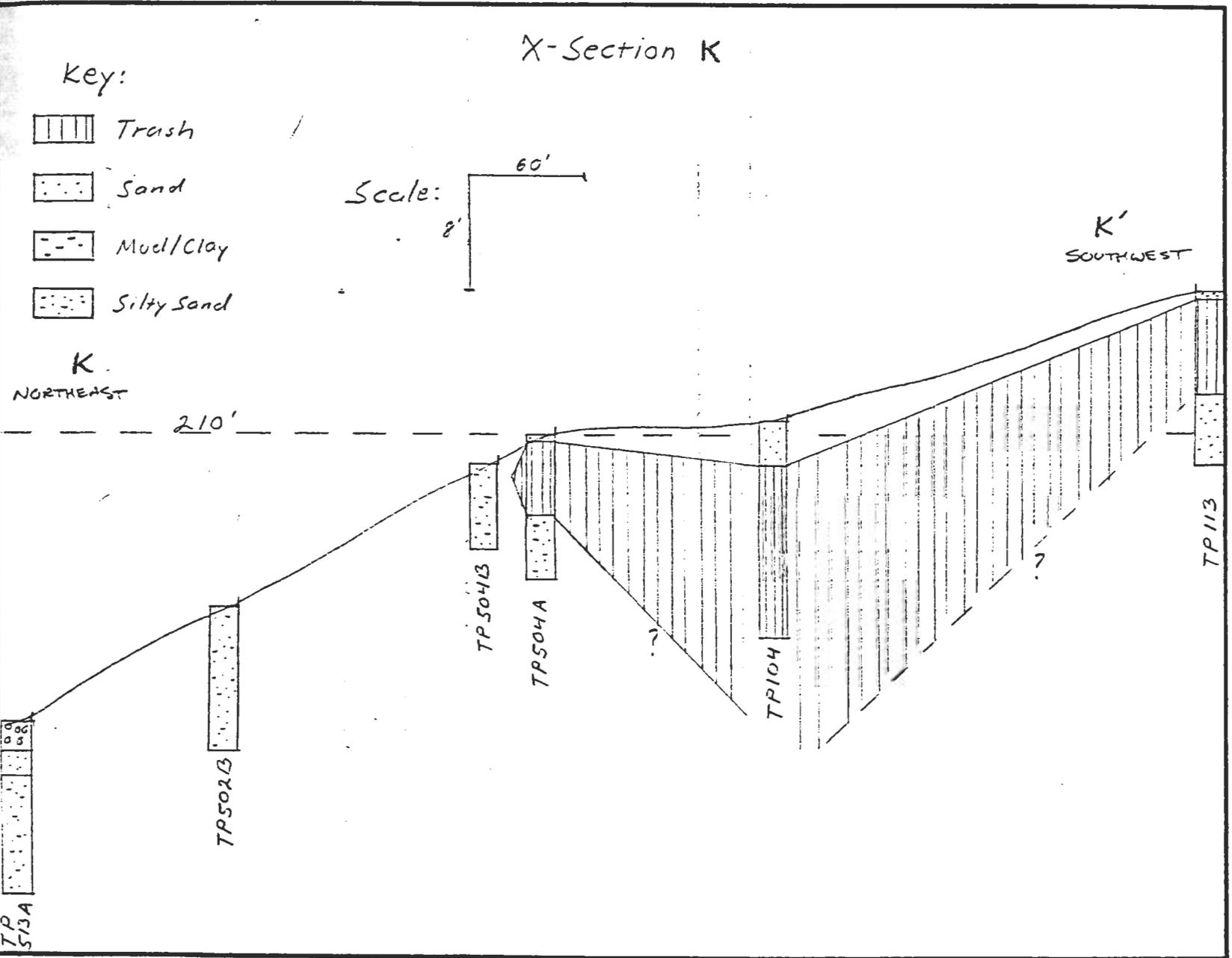
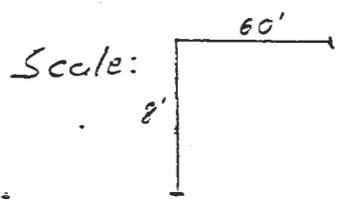
Wagner, Heindel, and Noyes, Inc.
Consulting Geologists
Burlington, Vermont

PAGE _____ OF _____
PROJECT: Riverside
DATE: 6/18/88

X-Section K

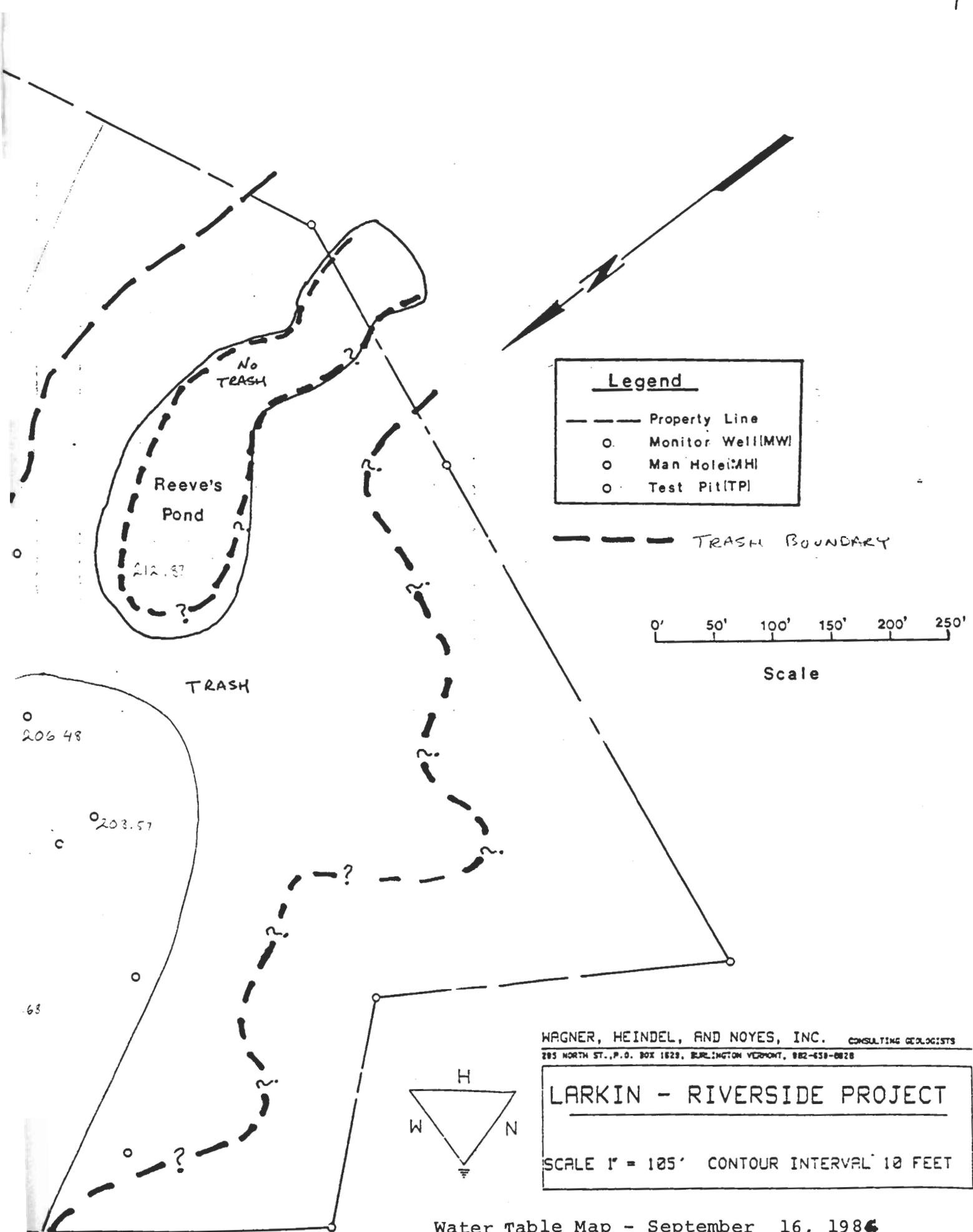
Key:

-  Trash
-  Sand
-  Mud/Clay
-  Silty Sand



APPENDIX E

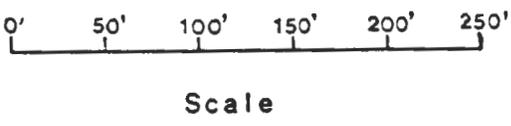
HYDROGEOLOGY



Legend

- Property Line
- Monitor Well (MW)
- Man Hole (MH)
- Test Pit (TP)

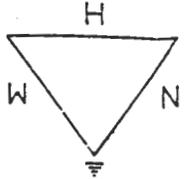
--- TRASH BOUNDARY



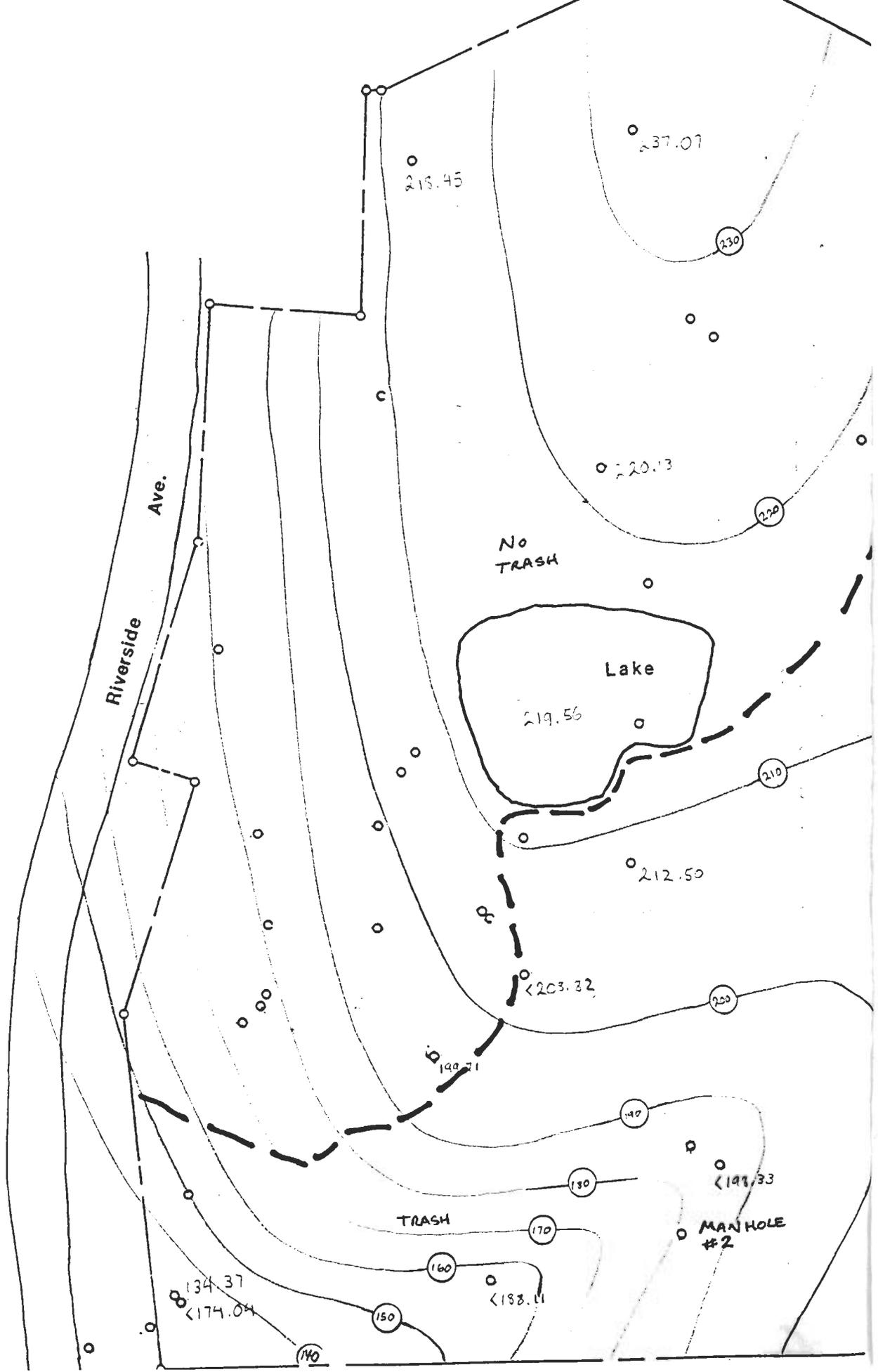
WAGNER, HEINDEL, AND NOYES, INC. CONSULTING GEOLOGISTS
 295 NORTH ST., P.O. BOX 1829, BURLINGTON VERMONT, 052-659-0828

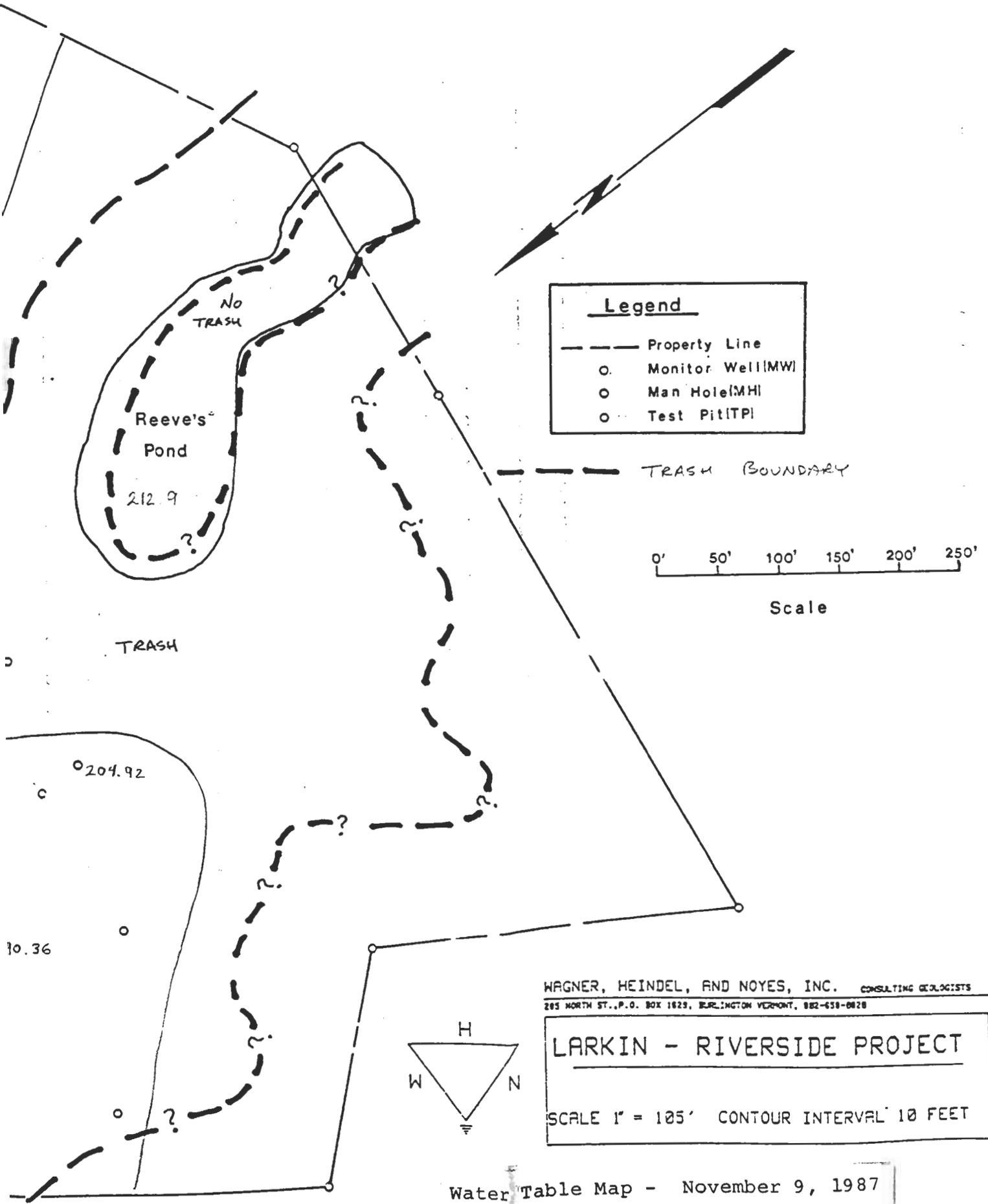
LARKIN - RIVERSIDE PROJECT

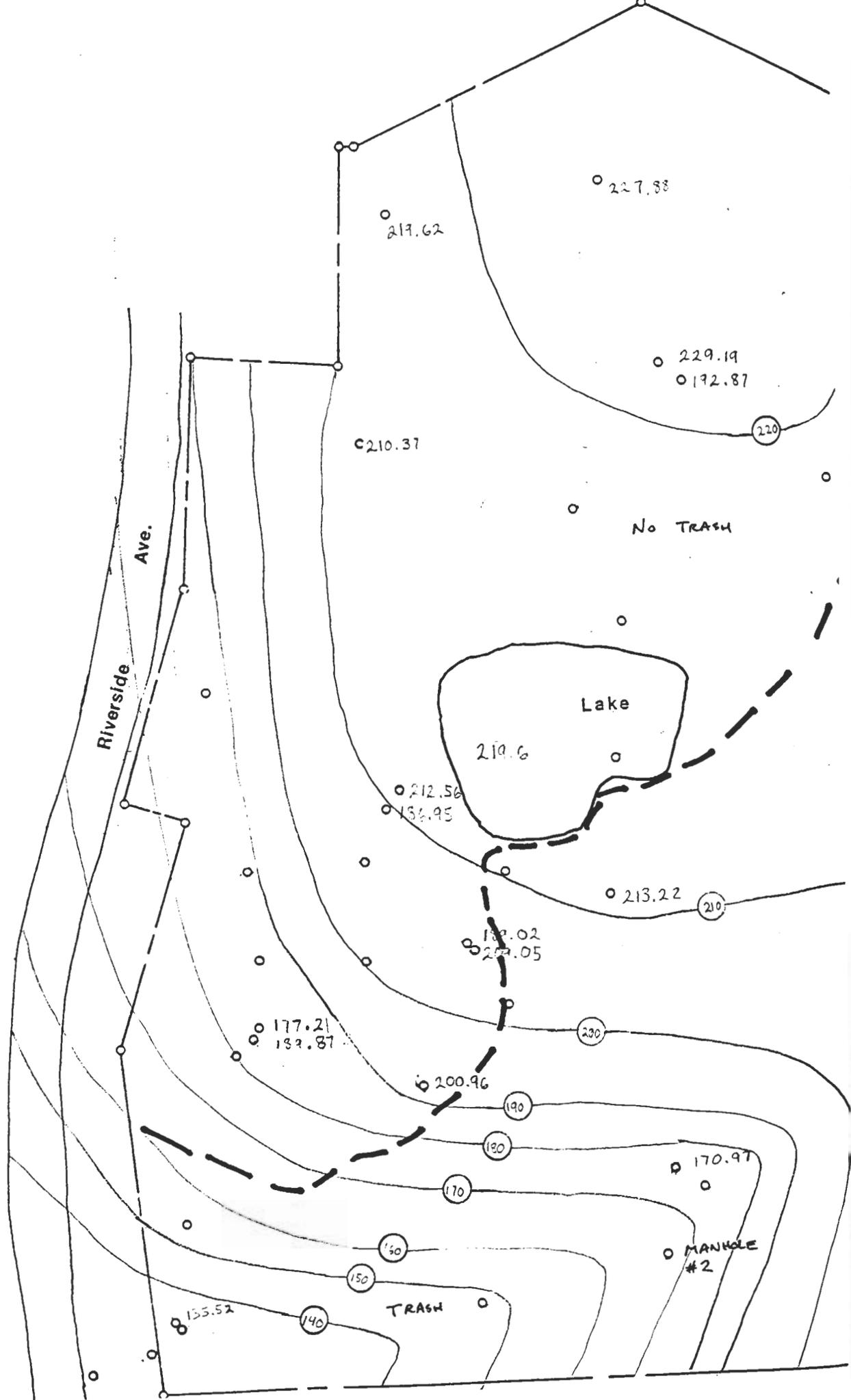
SCALE 1" = 105' CONTOUR INTERVAL 10 FEET



Water Table Map - September 16, 1986









Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

PAGE ____ OF ____

PROJECT: _____

DATE: _____

GW Elevations		Sept. 16, 1986	
Station	Elevation Top of casing (Ft.)	Depth To Water	Elevation Water Table
TP 101	190.03'	> 16.0	< 174.03
TP 103	202.11	> 14.0	< 188.11
TP 104	213.93	> 15.6	< 198.33
TP 106	211.25	11.54	199.71
TP 107	223.22	> 14.4	< 208.82
TP 114	219.54	10.97	208.57
TP 117	233.86	15.41	218.45
MW 201	188.97	53.60	135.37
MW 202	180.40	8.94	171.46
MW 203	232.65	12.52	220.13
MW 204	225.00	12.50	212.50
MW 205	220.57	21.88	198.69
MW 206	239.65	2.58	237.07
MW 207	221.28	14.80	206.48



Wagner, Heindel, and Noyes, Inc.
 Consulting Geologists Burlington, Vermont

PAGE ____ OF ____

PROJECT: _____

DATE: _____

OLD MW DATA			11-9-87
WELL #	ELEVATION TOP OF PIPE (FT)	DEPTH TO WATER (FT)	WATER TABLE ELEVATION
101	190.3	DRY	
103	202.11	DRY	
104	213.93	DRY	
106	211.25	10.29	200.96
114	* 219.35	14.43	204.92
117	233.86	14.24	219.62
201	188.97	53.45	135.52
204	225.00	11.78	213.22
205	220.57	30.21	190.36
206	239.65	11.77	227.88
207	221.78	DRY	
303	229.5	DRY	
730	224.5	DRY	

* PIPE BROKEN, ELEVATION
AS OF _____



Wagner, Heindel, and Noyes, Inc.
 Consulting Geologists Burlington, Vermont

PAGE ____ OF ____

PROJECT: _____

DATE: _____

NEW MW DATA		11-9-87	
WELL #	ELEVATION TOP OF PIPE (FT)	DEPTH TO WATER (FT)	WATER TABLE ELEVATION
208	230.6		
209	* 230.0	19.63	210.37
210-S	227.5	14.54	212.56
210-D	227.3	40.35	186.95
211-D	223.1	45.89	177.21
211-D-1	223.4	33.53	189.87
212-S	238.3	9.11	229.19
212-D	238.8	46.15	192.65
213-S	224.3	15.25	209.05
213	224.0	34.78	189.02
214	231.3	-	-
215	215.5	44.53	170.97

* Approximate Elevation

LARKIN / RIVERSIDE

TEST PIT AND WELL ELEVATIONS

					SEPT. 16, 1986			
station	TRASH (T) OR SLUDGE (S)	ground elevation	elevation top of pipe	Elevation Top of SILT ft.	Elevation Bottom of TRASH, ft.	water level Below top of casing, ft.	Elevation water table, ft.	
TP								
101	No	188.0'	190.03'	<174.0	none to 174	>16.0	<174.0	
102	T	189.6	n/a	<179.6	<179.6	-	-	
103	T	199.6	202.11	<188	<188	>14.0	<188.1	
104	T	211.3	213.93	<197	<197	>15.6	<198.3	
105	S	222.8	n/a	215.3	S: 225 top 26.3 bot	-	-	
106	No	209.4	211.25	204.9	no	11.54	199.7	
107	No	221.8	223.22	218.3	no	>14.4	<208.8	
108	S?	221.1	n/a	213	no	-	-	
109	S	225.2	n/a	<210.7	S: 217 top 210.7 bot	-	-	
110	No	226.2	n/a	223.7	no	-	-	
111	No	2247	n/a	213	no	-	-	
112	T	2203	n/a	<205	220	-	-	
113	T	220.0	n/a	214.5	214.5	-	-	
114	T	217.8	219.54	<204	<204	10.97	208.6	
115	T	228.8	n/a	217	217	-	-	
116	No	232.5	n/a	226.5	no	-	-	
117	No	230.5	233.86	221	no	15.41	218.5	
MW								
201	T	188.0	188.97	144	top: 141 bot: 146	53.60	135.4	
202	No	179.7	180.40	~179	no	8.94	171.5	
203	No	229.8	232.65	218	no	12.52	220.1	
204	No	224.0	225.00	214	no	12.50	212.5	
205	T	217.5	220.57	<187	<187	21.88	198.7	
206	No	237.9	239.65	235	no	2.58	237.1	
207	T	219.5	221.28	<198	<198	14.80	206.5	
MH								
1	T	-	222.67 (rlm)					
2	T	-	210.33 "					
3	T	-	186.55 "					
SEEP								
1	No	193.2 (at dug hole)	n/a	~192	no	0	193.2	
2	No	203.4 "	n/a	~202	no	0	203.4	
3	No	209.8 (at top bank)	n/a	~209	no	0	~208	
		206.1 (at bottom bank)						
water elevation on September 12, 1986:								
	Reeves Pond		212.87				assume: 212.9	
	Lake Larkin		219.56				219.6	

NOTES

- TP = TEST PIT
- MW = MONITOR WELL
- MH = MAN-HOLE



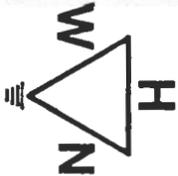
Wagner, Heindel, and Noyes, Inc.
 Consulting Geologists Burlington, Vermont

PAGE ____ OF ____
 PROJECT: LAKEW / RIVERBIDE.
 DATE: 7/88

<u>VERTICAL GROUNDWATER FLOW GRADIENTS</u>				
<u>RELATIVE WELL LOCATION</u>		<u>WELL PAIR</u>	<u>GRADIENT (FEET/FOOT)</u>	<u>FLOW DIRECTION</u>
NORTH ↓ SOUTH	UPGRADIENT ↓ DOWNGRAIENT	212S 212D	0.74	DOWNWARD
		210S 210D	0.65	DOWNWARD
		213S 213D	0.36	DOWNWARD

APPENDIX F

SAMPLING CHRONOLOGY



Wagner, Heindel, and Noyes, Inc.
Consulting Geologists
Burlington, Vermont

CHRONOLOGICAL SUMMARY OF CHEMICAL SAMPLING

1/5

PAGE _____ OF _____

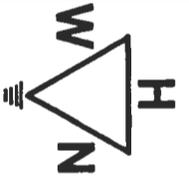
PROJECT: RIVER SIDE

DATE: _____

Page No.

1

DATE	SAMPLING LOCATION	MEDIUM SAMPLED	TYPE OF ANALYSIS	RESULTS
9-16-86 ↓	MW 106 MW 114 MW 117 MW 201 THRU MW 207	GROUND WATER ↓	pH CONDUCTIVITY TEMPERATURE ↓	pH : AVE (n=10) - 7.21 RANGE - 6.38 ≤ pH ≤ 8.59 COND: RANGE - 70 μ mhos TO 890 μ mhos TEMP: RANGE - 8.8 °C TO 20.9 °C



Wagner, Heindel, and Noyes, Inc.
 Consulting Geologists Burlington, Vermont

CHEMICAL SUMMARY OF CHEMICAL SAMPLING 2/5

DATE	SAMPLING LOCATION	MEDIUM SAMPLED	TYPE OF ANALYSIS	RESULTS
10-8-86	SS 1 SS 2 SS 3	SLUDGE ↓	Ba, Cd, Cr, Cu, Pb, Hg, Ni, NO ₂ -NO ₃ TKN, pH, Zn	Hg IN SS3 OF 1.37 mg/Kg EXCEEDS TYPICAL LEVELS OF 0.02 - 0.2 IN SOILS. ALL OTHER LEVELS BELOW TYPICAL SOIL CONCENTRATIONS
	CULVERT OUTFALL SEEP BESIDE OUTFALL W. NEWSKI R. REEVE'S PD. MW 201 MW 202 MW 206 MH-3	SURFACE WATER ↓ GROUND WATER ↓ SURFACE WATER	As, Cl, Cr COD, Cu, Fe, Hg, Hg, Ni, pH, Se, Zn	ELEVATED Cl NEAR RIVERSIDE AVE. SECONDARY STD FOR IRON & MANGANESE EXCEEDED IN CULVERT OUTFALL & SEEP. Cr EXCEEDS MCL IN MW 201. IRON & MANGANESE EXCEED SECONDARY STDs IN <u>ALL</u> MONITORING WELLS
	MW 201 MW 202 MW 206 SEEP BESIDE OUTFALL MH-3	GROUND WATER ↓ SURFACE WATER	EPA 601 & EPA 602 ↓	ALL CONSTITUENTS IN ALL SAMPLES BELOW DETECTION LIMIT OF 1 µg/L OR BELOW DRINKING WATER HEALTH ADVISORY LIMIT.

PAGE _____ OF _____

PROJECT: RIVERSIDE

DATE: _____



Wagner, Heindel, and Noyes, Inc.
 Consulting Geologists
 Burlington, Vermont

PAGE _____ OF _____
 PROJECT: RIVERSIDE
 DATE: _____

CHRONOLOGICAL SUMMARY OF CHEMICAL SAMPLING

3/5

DATE	SAMPLING LOCATION	MEDIUM SAMPLED	TYPE OF ANALYSIS	RESULTS
8-28-87 Σ 	ALL VADOSE ZONE WELLS	AIR	HNU / TIP % LEL, % O ₂	HNU / TIP : RANGE 0 - 160 PPM % LEL : RANGE 0 - 138 % % O ₂ : RANGE 4.5% - 21.0% } NO FROST IN GROUND
(1-7-88)	ALL VADOSE ZONE WELLS	AIR	HNU / TIP % LEL, % O ₂	HNU / TIP : NOT FUNCTIONAL IN COLD % LEL : RANGE 0 - 165 % % O ₂ : RANGE 0.9% - 21.5% } FROST IN GROUND
10-87 ↓	ALL GW MONITORING WELLS	AIR	HNU, %LEL % O ₂	HNU : RANGE 0.2 - 95 PPM % LEL : RANGE 0 - 12 % % O ₂ : RANGE 19.4% - 20.4%
10-29-87 ↓ ↓ ↓	MW 211-D MW 212-S MW 213-S MW 213D MW 215	GROUND WATER ↓	EPA 601, EPA 602	BELOW DETECTION LIMIT OF 14g/L FOR 601 & 44g/L FOR 602 FOR ALL CHEMICALS IN ALL WELLS. NO UNIDENTIFIED PEAKS FOUND.
11-24-87	MW 209 MW 210S REEVE'S PD.	GROUND WATER SURFACE H ₂ O	EPA 601, EPA 602	BELOW DETECTION LIMIT OF 14g/L (601 & 602) FOR ALL CHEMICALS IN ALL WELLS. TWO UNIDENTIFIED PEAKS IN BOTH 602 ANALYSES FOR MW-209 & MW-210S.
12-10-87	MW 215	GROUND WATER	EPA 624/625	TRACE METHYLENE CHLORIDE & ACETONE (LAB & SAMPLING CONTAMINANTS)

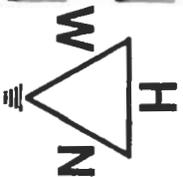


Wagner, Heindel, and Noyes, Inc.
 Consulting Geologists
 Burlington, Vermont

PAGE _____ OF _____
 PROJECT: RIVER SIDE
 DATE: _____

DATE	SAMPLING LOCATION	MEDIUM SAMPLED	TYPE OF ANALYSIS	RESULTS
12-10-87	SOIL SAMPLES 1-5	SOIL	EPA 601/602	SS1: 1 UNIDENTIFIED PEAK (602) ; SS2: 2.64g/kg TETRACHLOROMETHANE TRACE (BELOW DETECTION LIMIT) TOLUENE ; SS3: ALL BELOW DETECTION LIMIT ; SS4: 12.84g/kg METHYLENE CHLORIDE (LAB CONTAMINANT) 8.84g/kg 1,1,1-TRICHLOROETHANE, TRACE TRICHLOROFLUOROMETHANE MANY UNIDENTIFIED PEAKS (602) ; SS5: ALL BELOW DETECTION LIMIT, MANY UNIDENTIFIED PEAKS
	SS4	SOIL	EPA 624	ALL BELOW DETECTION LIMIT ; ONE UNIDENTIFIED PEAK
	SS6	SOIL	EPA 624/625	ALL BELOW DETECTION, FIVE UNIDENTIFIED PEAKS
2-3-88	MW 117 MW 203	GROUND WATER	EPA 601/602	TRACE (BELOW QUANTIFICATION) ETHYLBENZENE, TOLUENE & XYLENE IN BOTH WELLS
	MW 209 MW 210-5	GROUND WATER	EPA 624/625	SOME LAB CONTAMINANTS, TRACE CHLOROMETHANE IN MW 210-5
	SS4	SOIL	EPA 624	TRACE (BELOW QUANTIFICATION) 4-CHLORO-3-METHYLPHENOL
	SS5	SOIL	EPA 624/625	TRACE (BELOW QUANTIFICATION) METHYLENE CHLORIDE
4-1-88	SS1	SOIL	EPA 601/602	SS1: TRACE CH ₂ BrCl ₂ , CCl ₂ F ₂ , 1,1,1-TCA, CCl ₃ F (ALL BELOW QUANTIFICATION), 5.04g/kg CHLOROFORM (D.W. CONTAMINANT), ONE UNIDENTIFIED PEAK
	SS2			SS2: TRACE CHLOROFORM, 1,1,1-TCA, ONE UNIDENTIFIED PEAK
	SS4			SS4: 2.56g/kg CHLOROFORM (D.W. CONTAMINANT), TRACE CCl ₃ F C ₆ H ₆ , C ₆ H ₅ Cl, C ₆ H ₅ CH ₃
	SS5			SS5: 9.17g/kg CHLOROFORM (D.W. CONTAMINANT), TRACE CH ₂ BrCl ₂ , 1,1,1-TCA, CCl ₃ F

CHRONOLOGICAL SUMMARY OF CHEMICAL SAMPLING 4/5



Wagner, Heindel, and Noyes, Inc.
Consulting Geologists
Burlington, Vermont

CHRONOLOGICAL SUMMARY OF CHEMICAL SAMPLING 5/5

PAGE _____ OF _____
PROJECT: RIVER SIDE
DATE: _____

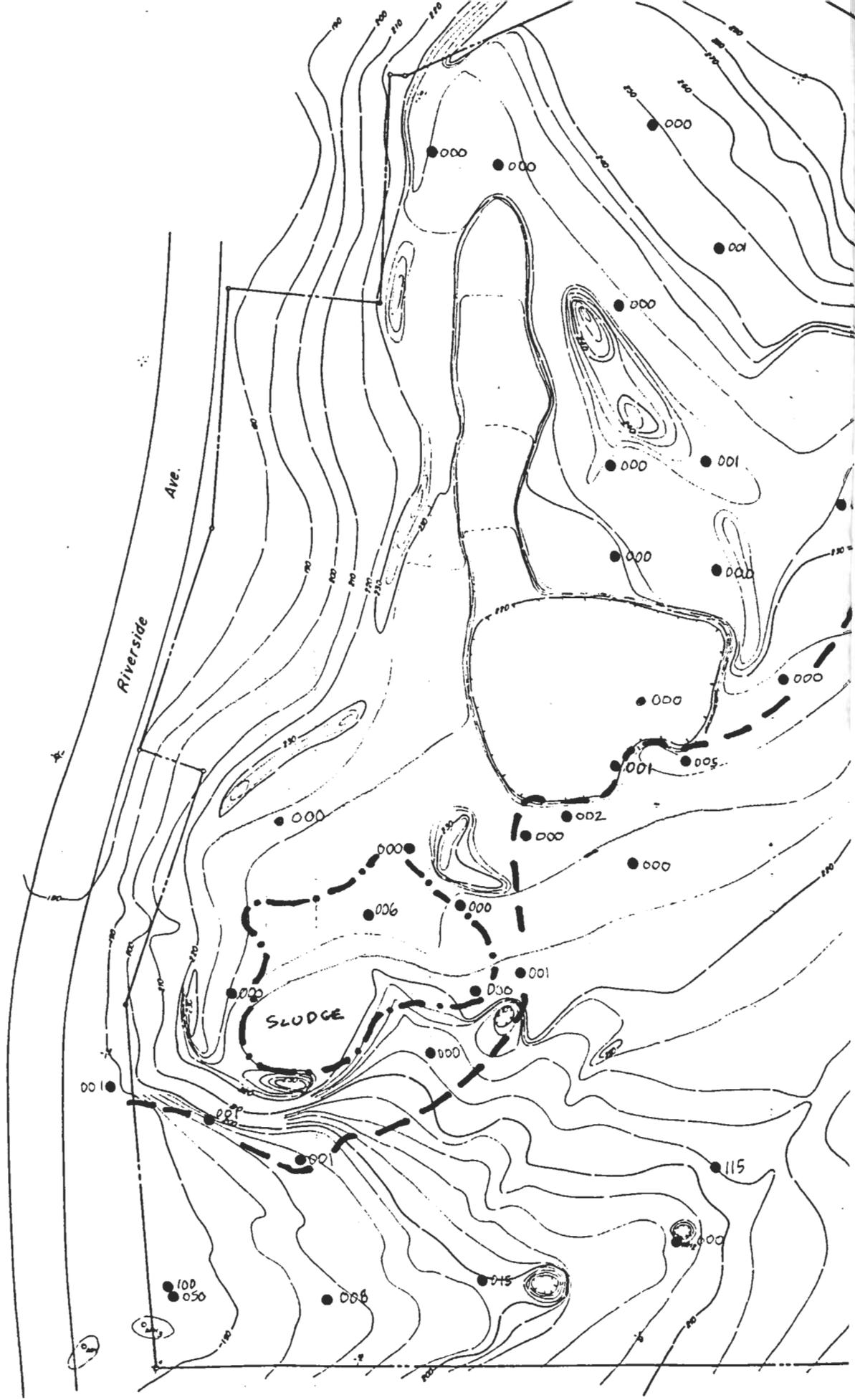
Page No.

5

DATE	SAMPLING LOCATION	MEDIUM SAMPLED	TYPE OF ANALYSIS	RESULTS																				
1-29-88	MW-215	GROUND WATER	RADIOISOTOPES	<table><tr><td>GROSS α =</td><td>12.30 ± 1.02</td><td>pCi/L</td><td>(MCL)</td></tr><tr><td>GROSS β =</td><td>20.53 ± 3.98</td><td>pCi/L</td><td>15 pCi/L</td></tr><tr><td>TRITIUM =</td><td>310 ± 179</td><td>pCi/L</td><td>50 pCi/L</td></tr><tr><td>RADON-222 =</td><td>110 ± 70</td><td>pCi/L</td><td>20,000 pCi/L</td></tr><tr><td></td><td></td><td></td><td>20,000 pCi/L</td></tr></table>	GROSS α =	12.30 ± 1.02	pCi/L	(MCL)	GROSS β =	20.53 ± 3.98	pCi/L	15 pCi/L	TRITIUM =	310 ± 179	pCi/L	50 pCi/L	RADON-222 =	110 ± 70	pCi/L	20,000 pCi/L				20,000 pCi/L
GROSS α =	12.30 ± 1.02	pCi/L	(MCL)																					
GROSS β =	20.53 ± 3.98	pCi/L	15 pCi/L																					
TRITIUM =	310 ± 179	pCi/L	50 pCi/L																					
RADON-222 =	110 ± 70	pCi/L	20,000 pCi/L																					
			20,000 pCi/L																					

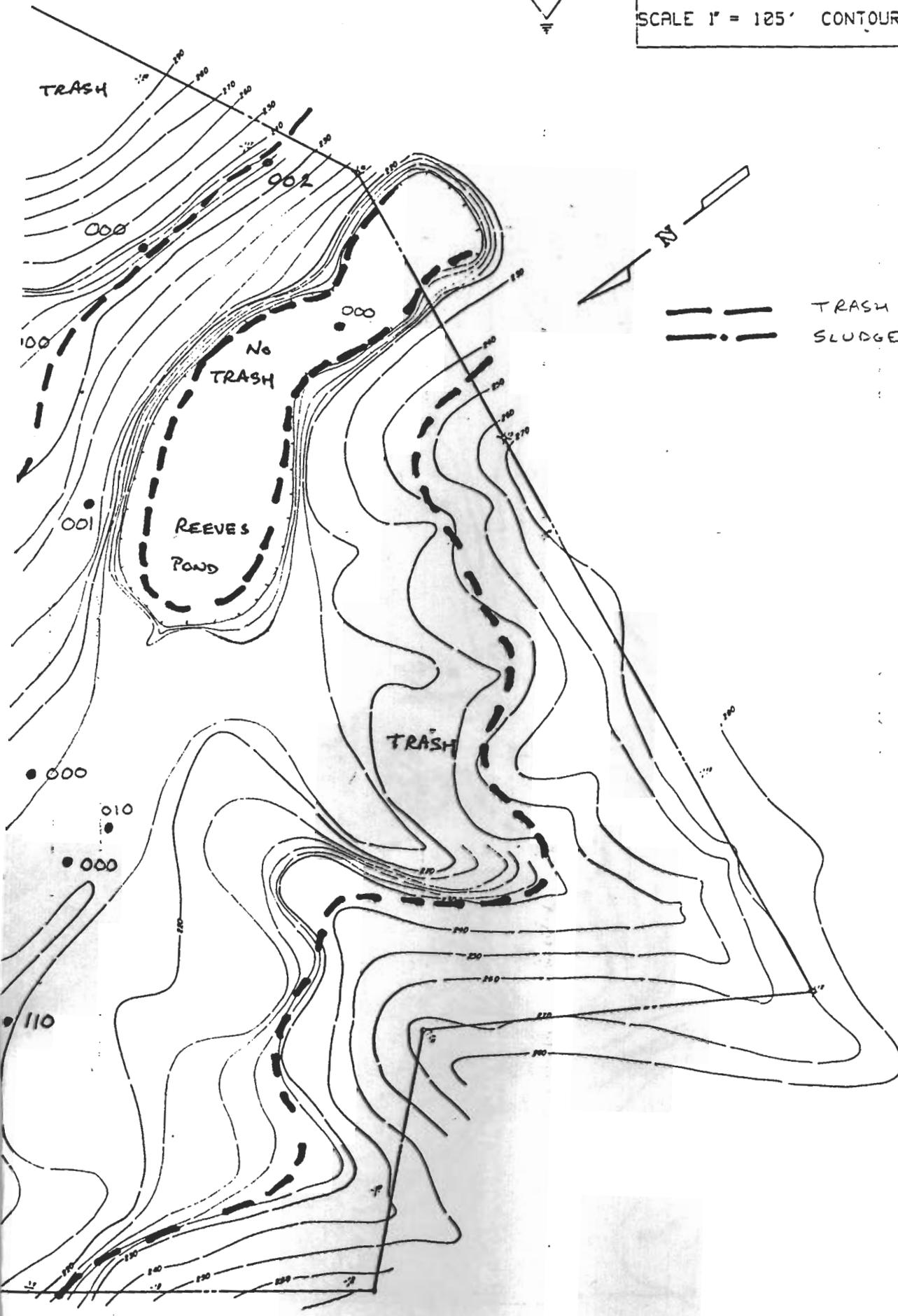
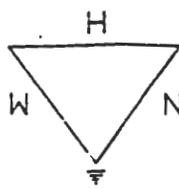
APPENDIX G

VADOSE ZONE/GAS SAMPLING

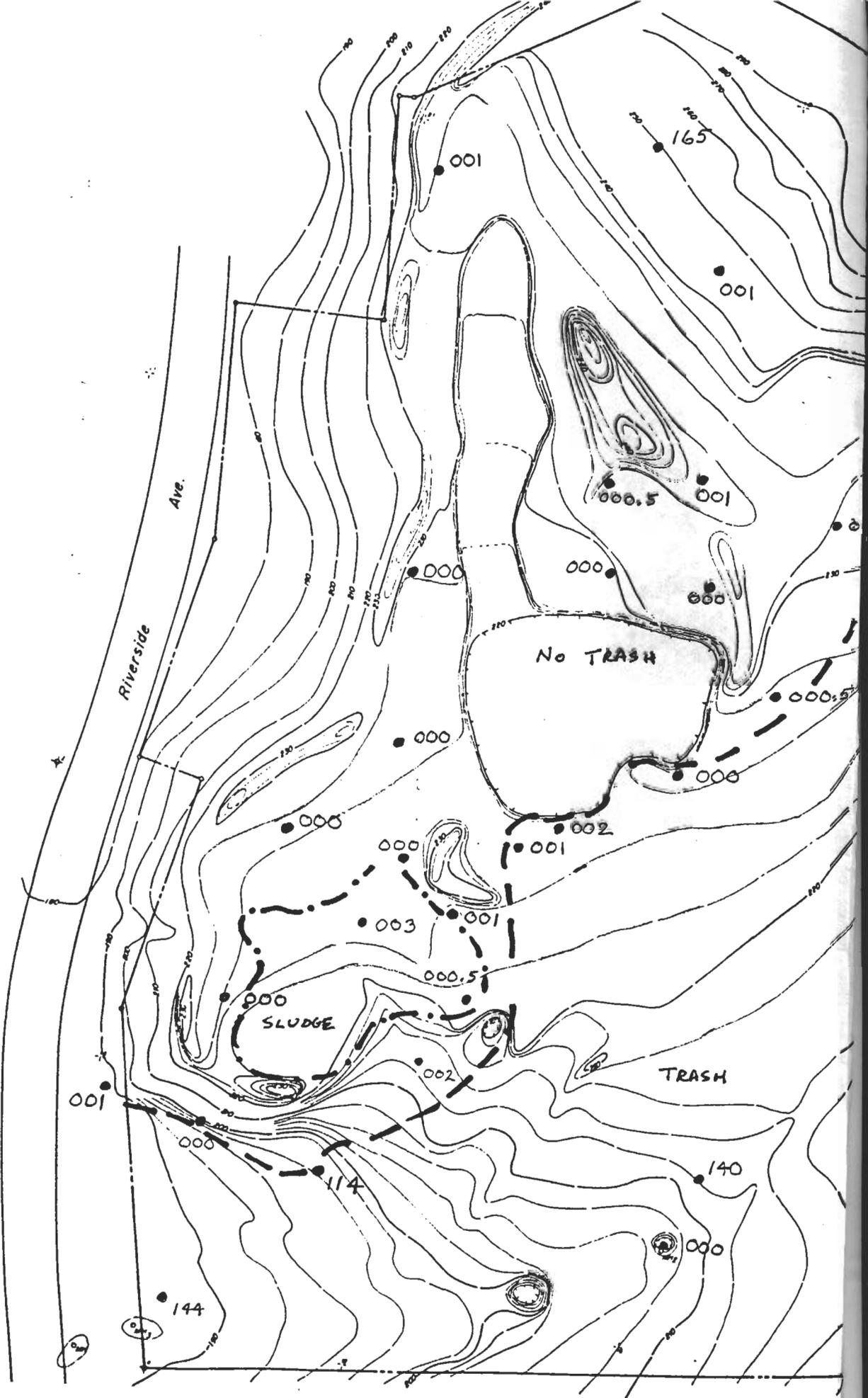


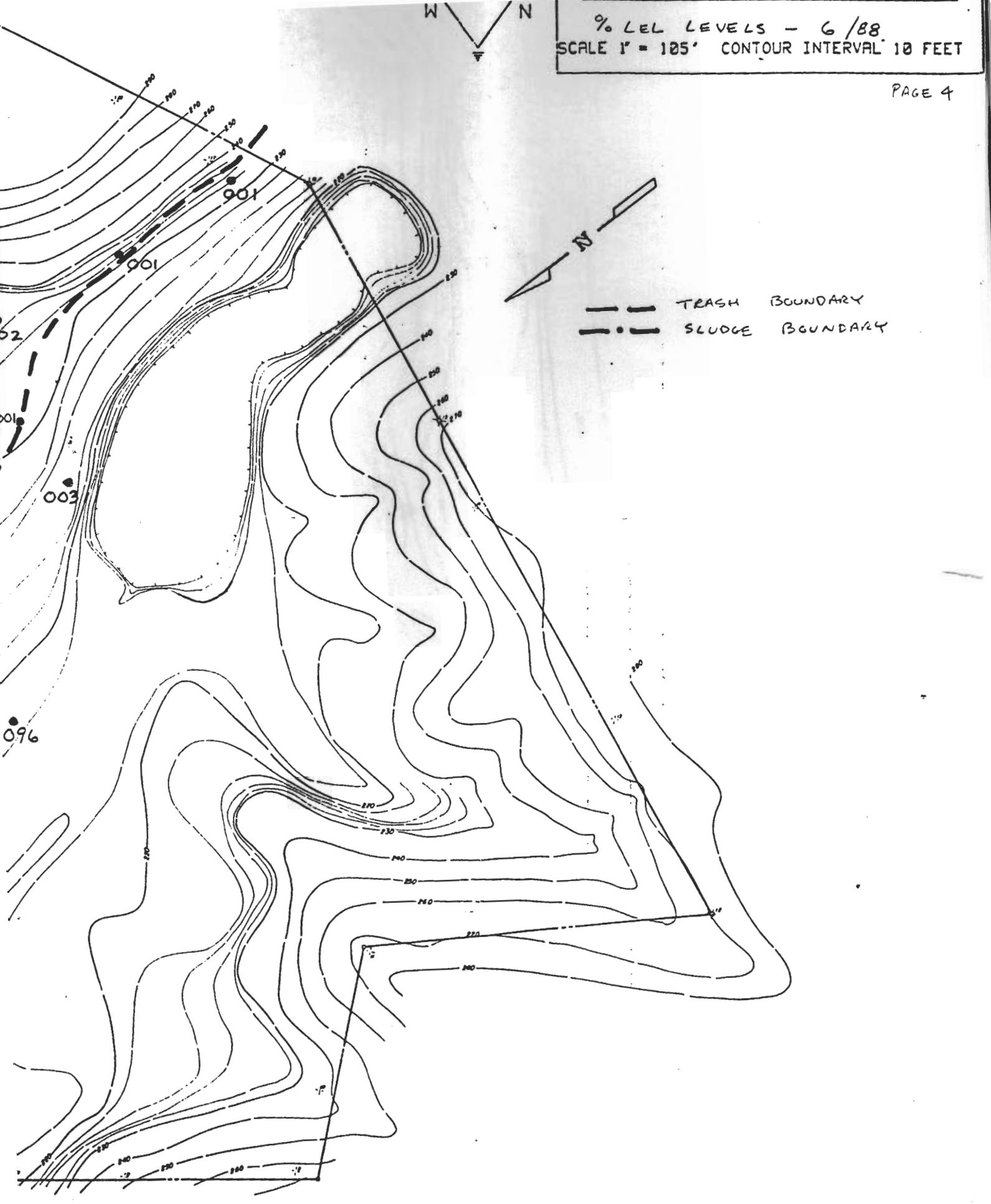
LARKIN - RIVERSIDE PROJECT

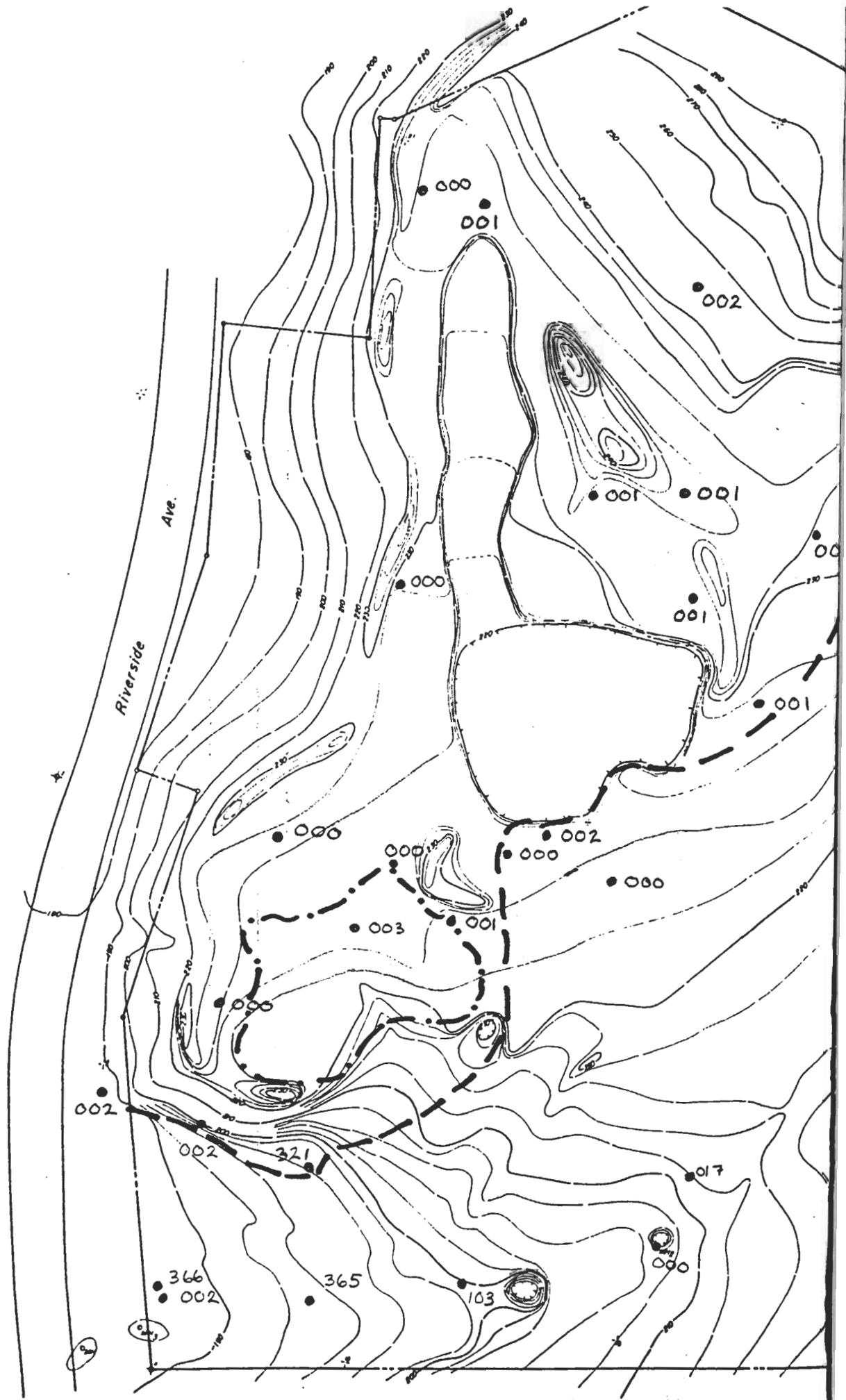
%LEL LEVELS - 1/88 (FROST)
SCALE 1" = 125' CONTOUR INTERVAL 10 FEET



--- TRASH BOUNDARY
—— SLUDGE BOUNDARY









Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

PAGE ____ OF ____

PROJECT: LARKIN/RIVERSIDE

DATE: _____

STATISTICS ON VADOSE ZONE GAS READINGS

DATE SAMPLED	TYPE OF MEASUREMENT	ZONE OF MEASUREMENT	MEAN	STANDARD DEVIATION	NO. OF OBSERVATIONS
8/87	PID (PPM)	TRASH	22.5	52.0	21
9/87 (NO FROST)		NO TRASH	1.8	3.7	22
1/88 (FROST)	% LEL	TRASH	35.0	58.0	15
		NO TRASH	9.2	37.7	19
6/88 (NO FROST)	% LEL	TRASH	85.4	141.8	15
		NO TRASH	1.2	0.8	14
8/87	% LEL	TRASH	26.6	45.8	21
9/87 (NO FROST)		NO TRASH	0.5	1.3	22



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

PAGE 1 OF

PROJECT: LARKIN / RIVERSIDE

DATE: 7/88

GAS MEASUREMENTS IN THE UNSATURATED ZONE

WELL	DATE	HNU OR TIP*		MSA	
		PID	LEVELS (PPM)	% LEL	% OXYGEN
101	8/28/87	(HNU)	0	050	12.2
103	"		.3	015	4.5
104	"		0	115	9.1
106	"		0	000	20.8
107	"		0	001	19.4
114	"		1.8	009	12.7
117	"		0	000	20.8
201	"		0	100	10.2
203	"		0	000	20.8
204	"		0	000	21.0
205	"		0	138	4.9
206	"		0.3	000	20.6
207	"		0	108	3.5
300	"		0	000	20.8
301	"		0	000	20.5
302	"		0	000	20.1
303	"		0	000	20.5
304	"		0	000	20.5
305	"		0	006	17.2
306	"		0	000	20.5
307	-		-	-	-
308	-		-	-	-
309	-		-	-	-
MH1	8/28		0	000	20.8
MH2	"	↓	0	000	20.6
701	9/1	(TIP)	2.0	001	20.6
704	"		2.8	001	20.6
710	"		1.5	000	20.4
719	"		1.2 - 4.3	001	20.6
722	"		.7	000	21.0
723	"		.7	001	21.0
724	"	↓	.7	008	20.2

NOTES: *PID READINGS ARE FROM AN H-NH WITH A 10.2 eV LAMP.
 OR A PHOTO VAC TIP WITH A 10.6 eV LAMP.
 - CONDITIONS PREVENTED MEASUREMENT



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

PAGE 2 OF _____

PROJECT: LARKIN / RIVERSIDE

DATE: 7/08

GAS MEASUREMENTS IN THE UNSATURATED ZONE

WELL	DATE	HNU OR TIP		MSA		
		PID	LEVELS (PPM)	%	% LEL	% OXYGEN
725	9/1	(TIP)	1.3		001	20.6
726	"		1.0		001	20.8
727	"		155		005	18.7
728	"		120		003	18.8
729	"		27		001	19.6
730	9/2		.4		000	20.8
731	"		-1.8		001	20.8
733	"		160		002	12.7
734	"		.7		000	21.0
735	"		.2		000	20.9
736	"		6.0		001	20.0
737	"		15.0		001	20.8
738	"		0		000	20.5
739	"		2.9		000	20.5
740	"		.9		000	20.5
741	"	∇	9.0		000	20.5

NOTES:



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

PAGE 3 OF

PROJECT: LARKIN / RIVERSIDE

DATE:

GAS MEASUREMENTS IN THE UNSATURATED ZONE POST FROST DEVELOPMENT

WELL	DATE	HNU OR TIP		MSA	
		PID	LEVELS (PPM)	% LEL	% OXYGEN
101	1/8/88	+		144	3.7
103	"	-		-	-
104	"	+		140	10.1
106	"	+		002	20.7
107	"	-		-	-
114	1/7/88	-2		010	11.7
117	2/2/88	.2		001	21.4
201	"	-		-	-
203	"	.2		000.5	21.1
204	"	-		-	-
205	1/8/88	0		110	.9
206	1/7/88	+		165	17.7
207	"	-		-	-
300	"	-		-	-
301	"	0		000	20.6
302	"	0		000.5	18.7
303	"	0		001	20.3
304	"	+		000	20.3
305	"	+		003	17.2
306	"	+		000.5	20.2
307	"	-		-	-
308	"	0		000	20.4
309	"	0		000	20.4
MH1	"	0		000	20.4
MH2	"	0		000	20.4
701	"	0		000.5	20.2
704	"	0		002	20.9
710	"	0		000	20.7
719	"	0		000	20.9
722	"	0		000	20.5
723	"	0		114	17.7
724	"	-		-	-

NOTES: + COLD WEATHER CONDITIONS CAUSED H-NH MALFUNCTION. UNABLE TO TAKE MEASUREMENT.
 - CONDITIONS PREVENTED MEASUREMENT



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

PAGE 4 OF

PROJECT: LARKIN / RIVERSIDE

DATE: 7/89

GAS MEASUREMENTS IN THE UNSATURATED ZONE POST FROST DEVELOPMENT

WELL	DATE	HNU OR TIP	MSA	
		PID LEVELS (PPM)	% LEL	% OXYGEN
725	1/7/88	0	000	20.4
726	1/8/88	0	001	20.4
727	1/7/88	+	000	20.2
728	"	0	000	20.1
729	1/8/88	0	001	20.5
730	"	-	-	-
731	1/7/88	-	-	-
733	"	0	002	19.0
734	"	0	000	20.5
735	"	-	-	-
736	2/2/88	.2	001	18.4
737	"	.2	001	21.5
738	1/2/88	-	-	-
739	1/7/88	0	000	20.4
740	"	0	000	20.4
741	"	+	001	20.0

NOTES: + COLD WEATHER CONDITIONS CAUSED H-NH MALFUNCTION.
UNABLE TO TAKE MEASUREMENT
- CONDITIONS PREVENTED MEASUREMENT



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

PAGE 6 OF

PROJECT: LARKIN / RIVERSIDE

DATE: 7/88

GAS MEASUREMENTS IN THE UNSATURATED ZONE

*MSA READINGS OF MONITOR WELLS & VADOSE WELLS

WELL	DATE	HNU OR TIP	MSA		
		PID LEVELS (PPM)	%	% LEL	% OXYGEN
208	6/30/88	—		2	—
209	"	—		1	—
210 S	"	—		0	—
210 D	"	—		1	—
211 D	"	—		0	—
211 D1	"	—		0	—
212 S	"	—		0	—
212 D	"	—		0	—
213 S	"	—		0	—
213 D	"	—		0	—
214 S	"	—		— (CAP STUCK)	—
215	"	—		0	—
101	6/14/88	—		2	—
103	"	—		103	—
104	"	—		17	—
107	"	—		—	—
114	"	—		—	—
117	"	—		0	—
201	"	—		366	—
203	"	—		1	—
204	"	—		0	—
205	"	—		—	—
206	"	GONE		—	—
207	"	—		—	—
300	"	—		1	—
301	"	—		1	—
302	"	—		1	—
303	"	—		0	—
304	"	—		0	—
305	"	—		3	—
306	"	—		—	—
307	"	GONE		—	—

NOTES: *MSA WAS CALIBRATED AS FOLLOWS:

O₂ - 20.8%, LEL - 50% WITH 2.5% CH₄ STD (100% O₂ LEL = 50% METHANE)

— MEASUREMENTS NOT TAKEN

MONITOR WELLS

VADOSE WELLS



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

PAGE 7 OF

PROJECT: LARKIN / RIVERSIDE

DATE: 7/88

GAS MEASUREMENTS IN THE UNSATURATED ZONE

*MSA READINGS OF MONITOR WELLS & VADOSE WELLS

WELL	DATE	HNU OR TIP	MSA	
		PID LEVELS (PPM)	% LEL	% OXYGEN
308	6/14/88	—	0	—
309	"	—	—	—
MH1	"	—	—	—
MH.2	"	—	0	—
701	"	—	1	—
704	"	—	1	—
710	"	—	2	—
719	"	—	—	—
722	"	GONE	—	—
723	"	—	321	—
724	"	—	365	—
725	"	—	2	—
726	"	—	2	—
727	"	—	—	—
728	"	—	96	—
729	"	—	3	—
730	"	—	—	—
731	"	—	—	—
733	"	—	2	—
734	"	—	1	—
735	"	GONE	—	—
736	"	—	2	—
737	"	—	1	—
738	"	—	1	—
739	"	—	0	—
740	"	—	0	—
741	"	—	1	—

NOTES: *MSA WAS CALIBRATED AS FOLLOWS:

O₂ - 20.8%, LEL - 50% WITH 2.5% CH₄ STD (100% LEL = 5% METHANE)

- MEASUREMENTS NOT TAKEN



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

PAGE 1 OF 2

PROJECT: RIVERSIDE

DATE: 9-8-87

RIVERSIDE VAPOSE ZONE MONITORING WELL SPECIFICATIONS

WELL	TOTAL DEPTH BELOW GROUND SURFACE	SLOTTED	STICK- UP	WELL DIAMETER
300	4.6'	4.0'	3.0'	1.5"
301	6.0'	5.0	4.0'	↓
302	6.1	5.0	3.9	
303	6.0	5.0	4.0	
304	5.2	5.0	3.0	
305	5.2	5.0	4.8	
306	5.6	5.0	4.4	
307	5.1	5.0	4.9	
308	5.6	5.0	4.4	
309	5.2	5.0	4.8	
702	5.25	5.0	4.75	
704	5.3	5.0	4.7	
710	6.3	5.0	3.7	
713	6.1	5.0	3.9	
715	6.5	5.0	3.5	
719	~ 6.5	5.0	~ 3.5	
722	6.5	5.0	3.5	
723	5.6	5.0	4.4	
724	6.7	5.0	3.3	
725	6.0	5.0	4.0	
726	7.5	5.0	2.5	
727	6.2	5.0	3.8	
728	6.5	5.0	3.5	
729	5.2	5.0	4.8	
730	5.2	5.0	4.8	
733	6.2	5.0	3.8	
734	6.5	5.0	3.5	
735	6.7	5.0	3.3	
736	6.5	5.0	3.5	



Wagner, Heindel, and Noyes, Inc.
Consulting Geologists Burlington, Vermont

13

PAGE 2 OF 2 Page No.

PROJECT: RIVERSIDE

DATE: 7-8-87

RIVERSIDE VAPOUR ZONE MONITORING WELLS SPECIFICATIONS (CONT.)

WELL	TOTAL DEPTH BELOW GROUND SURFACE	SLOTTED	STICK-UP	WELL DIAMETER
737	6.5	5.0	3.5	1.5'
738	6.5	5.0	3.5	↓
739	6.6	5.0	3.4	
740	6.5	5.0	3.5	
741	6.6	5.0	3.4	

APPENDIX H

SURFACE WATER CHEMISTRY



Industrial & Environmental Analysts, Inc.
P.O. Box 626 • Essex Junction, Vermont 05452 • 802-878-5138

ANALYSIS REPORT

Customer: Wagner, Heindel & Noyes, Inc.
Address: Box 1629
City, State, Zip: Burlington, VT 05402-1629
Attention: Craig Heindel

Date: 22 Oct 1986
Date Samples Received: 8 Oct 1986
Customer Order Number:

WATER QUALITY MONITORING RESULTS
RIVERSIDE - LARKIN

	<u>Culvert Outfall</u>	<u>Seep beside Outfall</u>	<u>100 ft. upstream Winooski R.</u>	<u>N. Reeves Pond</u>
Arsenic, total (mg/L)	<0.005	<0.005	-	-
Chloride (mg/L)	117.	551.	6.89	51.4
Chromium, total (mg/L)	<0.025	<0.025	<0.025	<0.025
COD (mg/L)	7.54	34.1	22.3	<2.0
Copper, total (mg/L)	<0.02	<0.02	<0.02	<0.02
Iron, total (mg/L)	2.80	0.30	0.35	0.52
Manganese, total (mg/L)	0.23	3.76	0.08	0.06
Mercury (mg/L)	0.0005	0.0017	0.0004	0.0020
Nickel, total (mg/L)	<0.02	0.04	0.03	<0.02
pH	7.57	6.71	7.19	7.09
Selenium, total (mg/L)	<0.005	<0.005	-	-
Zinc, total (mg/L)	0.02	<0.01	0.02	0.02

Reference: 28660

Signature *Catherine W. Cutting*



Industrial & Environmental Analysts, Inc.
P.O. Box 626 • Essex Junction, Vermont 05452 • 802-878-5138

ANALYSIS REPORT

Customer: Wagner, Heindel & Noyes, Inc.
Address: Box 1629
City, State, Zip: Burlington, VT 05402-1629
Attention: Craig Heindel

Date: 3 Nov 1986
Date Samples Received: 8 Oct 1986

WATER QUALITY MONITORING RESULTS
RIVERSIDE - LARKIN

	<u>Culvert outfall</u>	<u>Seep beside outfall</u>
TOX (µg/L)	58.	41.

Signature Catherine W. Cutting



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

3

Page No.

PAGE ____ OF ____

PROJECT: LARKIN/RIVERSIDE

DATE: _____

MAXIMUM CONTAMINANT LEVELS FOR INORGANICS IN DRINKING WATER *

PRIMARY STDS.

<u>CHEMICAL</u>	<u>MCL (PPM)</u>
ARSENIC	0.05
BARIUM	1.0
CADMIUM	0.010
CHROMIUM	0.05
LEAD	0.05
MERCURY	0.002
SELENIUM	0.01

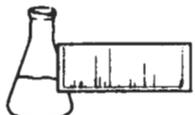
SECONDARY STDS.

<u>CHEMICAL</u>	<u>MCL (PPM)</u>
COPPER	1.0
IRON	0.3
MANGANESE	0.05
ZINC	5
PH	6.5 - 8.5
CHLORIDE	250

CHEMICALS WITH NO MCL'S ESTABLISHED

ALUMINUM
NICKEL

* FROM VT HEALTH REGULATIONS, LAST AMENDED MARCH 17, 1980



ENDDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: December 13, 1987
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Reeve's pond
SAMPLE COLLECTED BY: M. H. Pottinger REF. #: 1401
DATE SAMPLED: November 24, 1987 DATE RECEIVED: November 24, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Methylene Chloride	BDL
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl Chloride	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by William R. Leenstra



ENDDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: December 13, 1987
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Reeve's Pond
SAMPLE COLLECTED BY: M. H. Pottinger REF. #: 1401
DATE SAMPLED: November 24, 1987 DATE RECEIVED: November 24, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Benzene	BDL ²
Chlorobenzene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethylbenzene	BDL
Toluene	BDL
Xylenes	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by William L. Keenstra

APPENDIX I

GROUNDWATER CHEMISTRY



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

PAGE ____ OF ____

PROJECT: LARKIN/RIVER/DIE

DATE: 7/13/88

SUMMARY OF CHEMICAL RESULTS FROM THE SAMPLING OF GROUND WATER

SAMPLE LOCATION	SAMPLE DATE	LAB METHOD	PARAMETER	CONCENTRATION Mg/l	UNIDENTIFIED PEAKS
100 & 200 SERIES WELLS	9/16/86	-	pH	AVE = 7.21 RANGE = 6.38 - 8.59	NA
			CONDUCTIVITY	70 - 880 μ mhos	NA
			TEMPERATURE	8.8 - 20.9°C	NA
MW 201 MW 202 MW 206	10/8/86 ↓	As, Cl, Cr, COB, Cu, Fe, Mg, Hg, Ni, PH, Se, Zn	ARSENIC (MW201) CHROMIUM (MW201) (SECONDARY STOS FOR IRON & MANGANESE EXCEEDED IN ALL WELLS)	182 360	NA NA
MW-208 MW-210S MW-213D MW-215	6/7/88 ↓ 2/3/88	Al, As, Cd Cr, Cu, Fe, Pb, Mg, Hg, Ni, Se, Zn	BELOW MCL'S EXCEPT Fe IN MW-208 CADIUM CHROMIUM MERCURY IRON MANGANESE	14 29,800 8.2 2230 140	NA ↓
MW-201 MW-202 MW-206	10/8/86 ↓	EPA 601/602 ↓		ND ND ND	0 0 0



Wagner, Heindel, and Noyes, Inc.
 Consulting Geologists Burlington, Vermont

PAGE ____ OF ____
 PROJECT: LARKIN/RIVERKIDE
 DATE: 7/13/88

SUMMARY OF CHEMICAL RESULTS FROM THE SAMPLING OF GROUND WATER

SAMPLE LOCATION	SAMPLE DATE	LAB METHOD	PARAMETER	CONCENTRATION Mg/l	UNIDENTIFIED PEAKS
MW-211D	10/29/87	EPA 601/602		ND ¹	0
MW-212-S				ND	0
MW-213D				ND	0
MW-213S				ND	0
MW 215				ND	0
MW 209	11/24/87			ND	0
MW-210S	11/24/87			ND	0
MW-117	2/3/88		ETHYLBENZENE, TOLUENE, XYLENE	TBQ ²	0
MW-203	2/3/88		ETHYLBENZENE, TOLUENE, XYLENE	TBQ	0
MW-209	2/3/88	EPA 624/625		ND ³	0
MW-210S	2/3/88			CHLOROMETHANE	TBQ ³
MW-215	12/10/87			ND ³	1 (ACETONE)

¹ ND = NONE DETECTED
² TBQ = TRACE BUT BELOW QUANTIFICATION LIMIT
³ LAB CONTAMINANTS DETECTED



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

3
Page No.

PAGE ____ OF ____

PROJECT: _____

DATE: _____

SUMMARY OF ANALYSIS OF GROUNDWATER AT

LARKIN / RIVERSIDE SITE FOR RADIOISOTOPES

DATE OF SAMPLE - 1/29/88

LOCATION OF SAMPLE - MW-215

<u>ANALYSIS</u>	<u>RESULT (pCi/L)</u>	<u>MCL (pCi/L) *</u>
GROSS ALPHA	12.30 ± 1.02	15
GROSS BETA	20.53 ± 3.98	50
TRITIUM	310 ± 179	20,000
RADON-222	110 ± 70	20,000

* MAXIMUM CONTAMINANT LEVEL



ANALYSIS REPORT

Customer: Wagner, Heindel & Noyes, Inc.
Address: Box 1629
City, State, Zip: Burlington, VT 05402-1629
Attention: Craig Heindel

Date: 17 Sept 1986
Date Samples Received: 16 Sept 1986
Customer Order Number:

RIVERSIDE AVENUE LANDFILL
pH ANALYSIS

<u>Station</u>	<u>pH</u>
MW106	7.29
MW114	6.49
MW117	7.55
MW201	6.44
MW203	7.79
MW204	7.63
MW205	6.45
MW206	7.52
MW207	6.38
MW202	8.59

Signature Catherine W. Cutting

LARKIN/RIVERSIDE

5

Water Depths, Conductivity-Temperature Profiles, and pH
in Monitor Wells

Water depths, conductivity, and temperatures measured on September 16, 1986 by Hugh Rose; Wagner, Heindel, and Noyes, Inc. pH samples taken by Bob Butler (WH&N) on September 16, 1986.

Temperature and Conductivity measured in the wells by YSI Conductivity-Temperature-Salinity meter.

Depths given are from top of well casings.

Wells 101 through 107 were hand-installed in backhoe test pits.

Wells 201 through 207 were installed by Adams Engineering Inc. in hollow-stem auger holes.

pH: sampled by bailer after the wells were evacuated to dryness or 3 well volumes. Analyses were performed in lab by IEA, Inc.

MONITOR WELL NO.	TOTAL DEPTH FT.	DEPTH TO WATER, FT.	CONDUCTIVITY-TEMPERATURE PROFILE			pH
			Depth,ft.	Cond., umhos.	Temp. °C	
101	14	dry				
103	11.5	dry				
104	13	dry				
106	14	11.54'	11.54	299	15.9	7.29
			12.00	570	13.1	
			12.50	570	12.9	
			13.00	550	12.5	
			13.50	550	12.1	
			14.00	550	11.9	
			14.00+	560	11.0	
107	13	dry				

MONITOR WELL NO.	TOTAL DEPTH FT.	DEPTH TO WATER, FT.	CONDUCTIVITY-TEMPERATURE PROFILE			
			Depth, ft.	Cond., umhos.	Temp. °C	pH
114	15.50	10.97'	11.00	330	16.1	6.49
			11.50	670	14.6	
			12.00	660	14.2	
			12.50	670	14.0	
			13.00	670	14.0	
			13.50	650	14.0	
			14.00	670	13.9	
			14.50	670	13.8	
			15.00	650	13.8	
			15.50	680	13.6	
117	17	15.41	15.41	245	13.5	7.55
			15.75	249	13.0	
			16.00	249	13.0	
			16.25	248	12.9	
			16.50	248	12.4	
			16.75	246	12.1	
			17.00	247	12.0	
			17.00+	241	11.1	
201	60.7	53.60	53.60	310	12	6.44
			55.00	680	10.7	
			57.00	690	10.4	
			59.00	690	10.2	
			60.70	695	10.2	

MONITOR WELL NO.	TOTAL DEPTH FT.	DEPTH TO WATER, FT.	CONDUCTIVITY-TEMPERATURE PROFILE			pH
			Depth, ft.	Cond., umhos.	Temp. °C	
202	24.00	8.94	9.00	70	14.6	8.59
			11.00	160	12.4	
			13.00	160	11.1	
			15.00	160	10.3	
			17.00	172	9.9	
			19.00	172	9.4	
			21.00	170	9.0	
			23.00	170	8.9	
			24.00	112	8.8	
203	25.5	12.52	12.52	140	15.0	7.79
			14.50	140	13.6	
			16.50	140	12.7	
			18.50	138	12.0	
			20.50	136	11.0	
			22.50	137	10.3	
			24.50	135	10.0	
			25.50	136	10.0	
204	25.5	12.50	12.50	202	20.9	7.63
			14.50	389	13.8	
			16.50	430	12.8	
			18.50	430	12.0	
			20.50	448	11.5	
			22.50	445	11.1	
			24.50	443	10.9	
			25.50	460	10.9	

MONITOR WELL NO.	TOTAL DEPTH FT.	DEPTH TO WATER, FT.	CONDUCTIVITY-TEMPERATURE PROFILE			pH
			Depth, ft.	Cond., umhos.	Temp. °C	
205	30.5	21.88	21.88	400	16.0	6.45
			22.50	400	14.4	
			24.50	800	11.0	
			26.50	800	10.9	
			28.50	800	10.9	
			30.50	800	10.9	
206	17.50	2.58	2.58	160	15.5	7.52
			5.50	162	15.2	
			8.50	160	15.1	
			11.50	229	14.4	
			14.50	222	12.9	
			17.50	223	11.1	
207	20.55	14.80	14.80	445	16.5	6.38
			16.00	890	12.9	
			17.00	880	12.5	
			18.00	870	12.2	
			19.00	880	12.1	
			20.00	880	12.0	
			20.55	870	12.0	

Conductivity at outflow pipe from storm drain into the Winooski River.

In pipe	C = 650	T = 12.8
4' from pipe	C = 700	T = 12.8
15' from pipe	C = 750	T = 12.9

Distance from river to pipe is ~50'

After 15', conductivity stays constant in the outflow to where it enters the Winooski River. ($C = 750 \text{ umhos}$).

In the Winooski River at the outflow, $C = 600$.



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists Burlington, Vermont

PAGE ____ OF ____

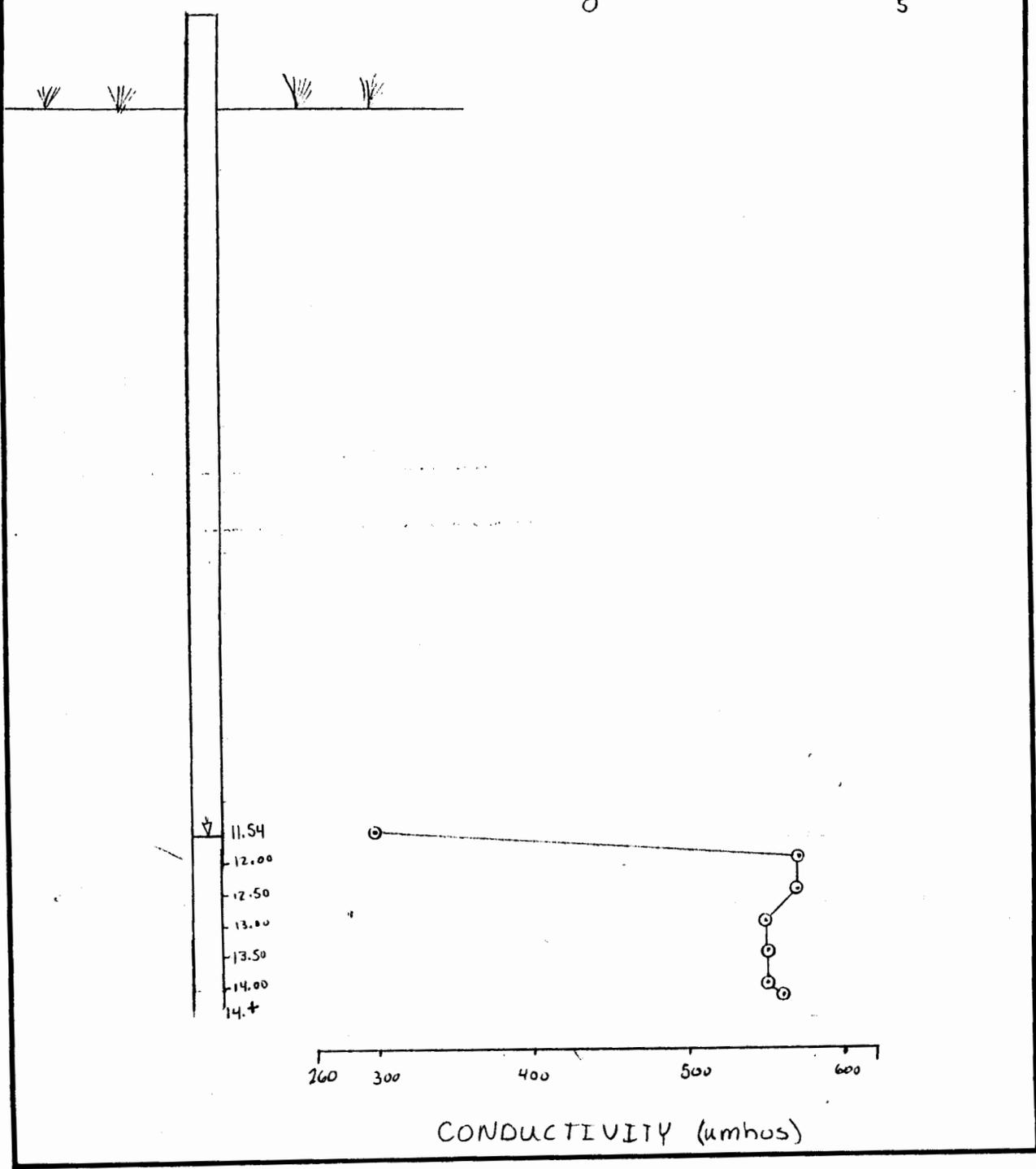
PROJECT: LADKIN/PIVERS L OF AVE

DATE: 9/25/86

MONITOR WELL # 106

TOTAL DEPTH = 14'

SCALE
1" = 2 1/2'

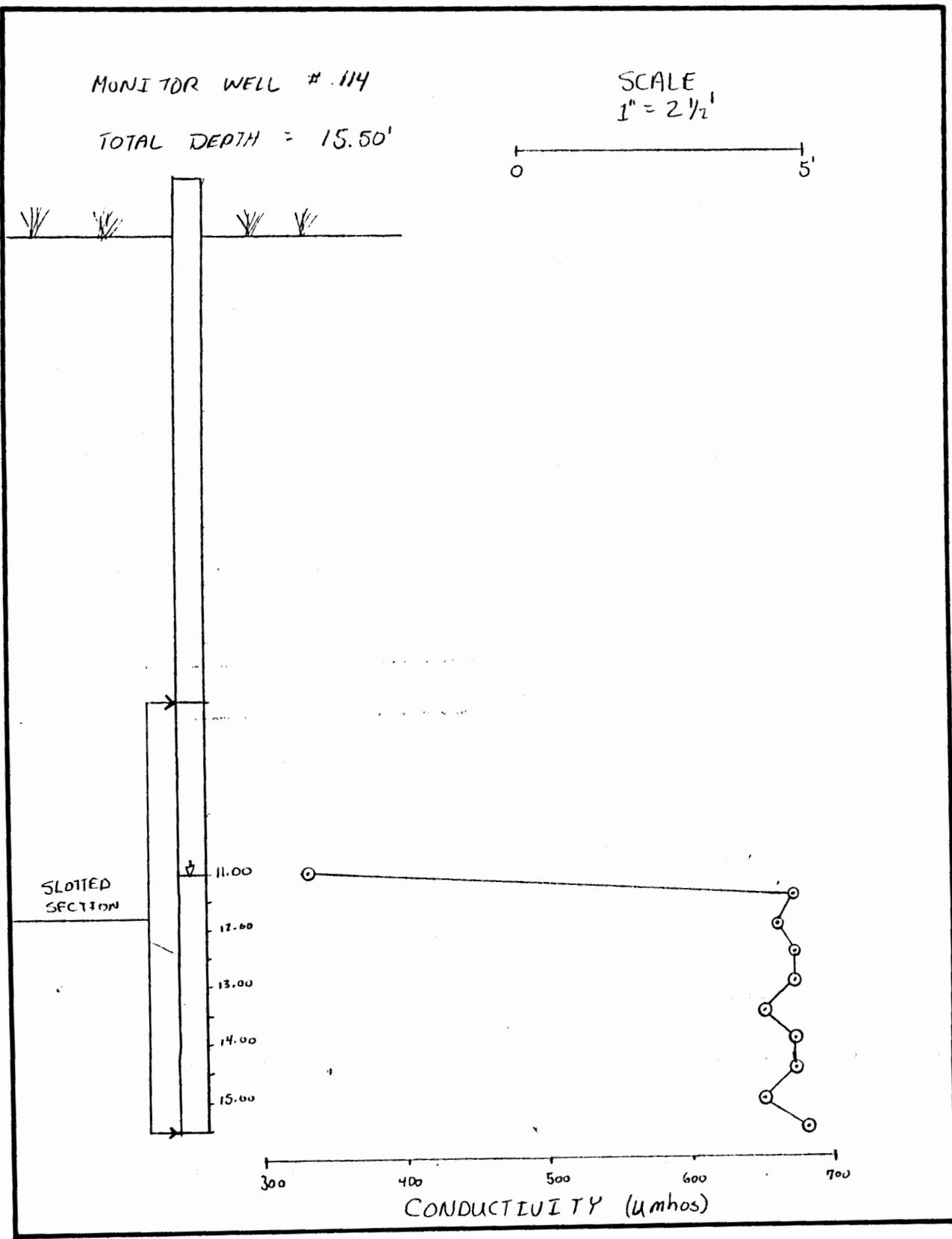


CONDUCTIVITY (umhos)



Wagner, Heindel, and Noyes, Inc.
Consulting Geologists Burlington, Vermont

PAGE ____ OF ____
PROJECT: LARKIN/RIVERSIDE AVE
DATE: 7/25/86



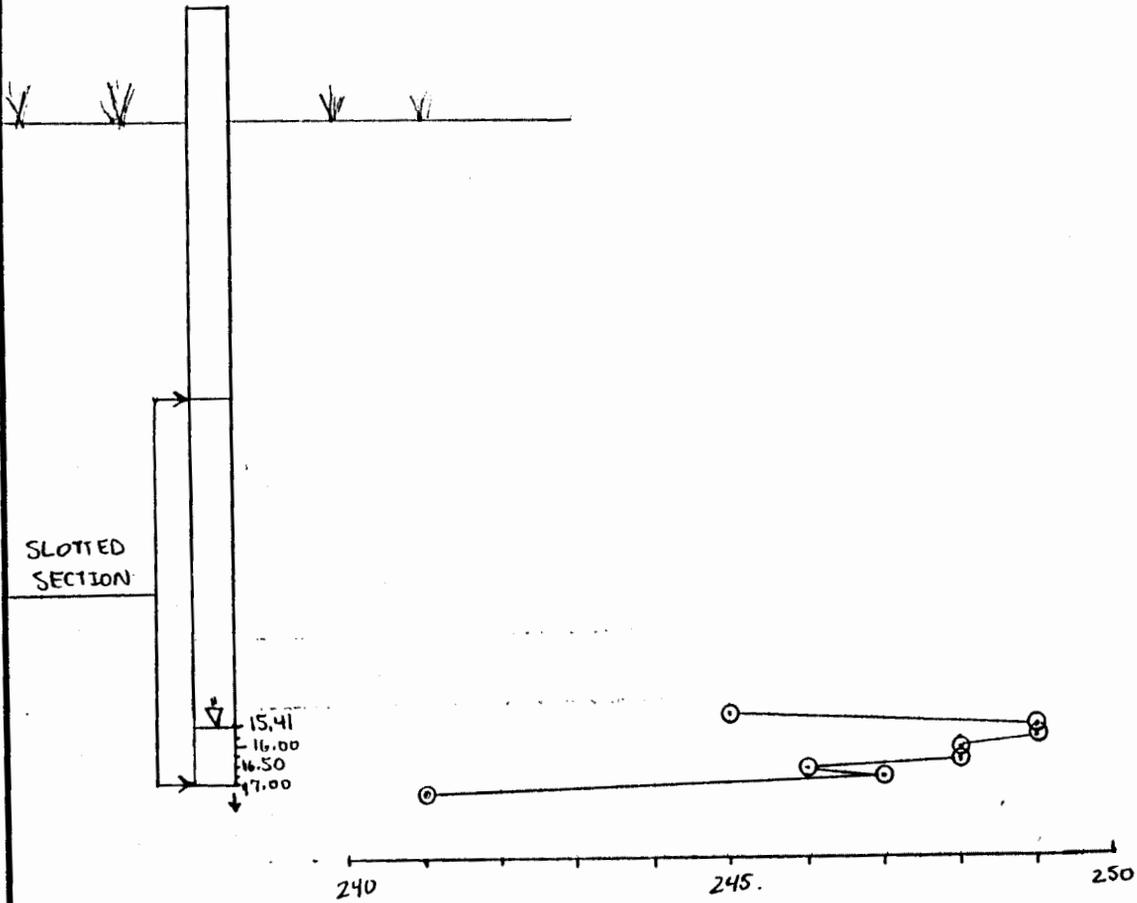
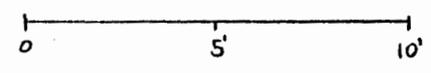


Wagner, Heindel, and Noyes, Inc.
Consulting Geologists Burlington, Vermont

PAGE ____ OF ____
PROJECT: LARKIN/REVERSID AVE
DATE: 10/3/86

MONITOR WELL # 117
TOTAL DEPTH = 17'

SCALE 1" = 5'



CONDUCTIVITY (umhos)



Wagner, Heindel, and Noyes, Inc.
Consulting Geologists Burlington, Vermont

PAGE ____ OF ____

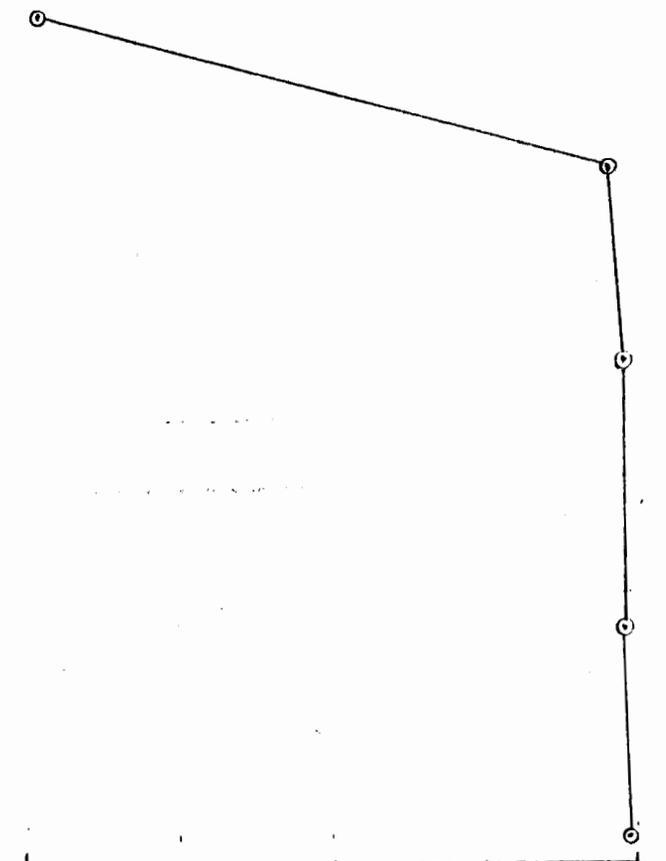
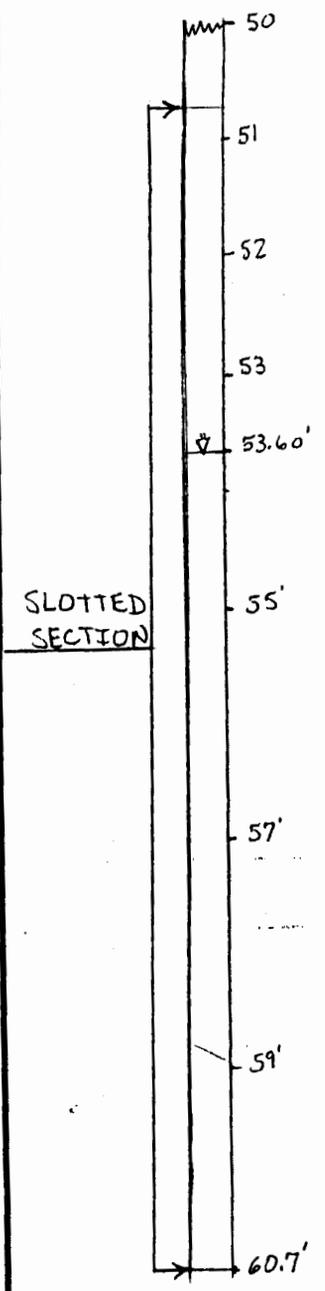
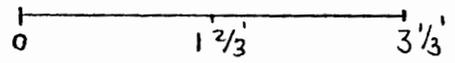
PROJECT: LARKIN/RIVERSIDE AVE

DATE: 9/23/86

MONITOR WELL # 201

TOTAL DEPTH = 60.7'

SCALE
1" = 1 2/3'



CONDUCTIVITY (umhos)

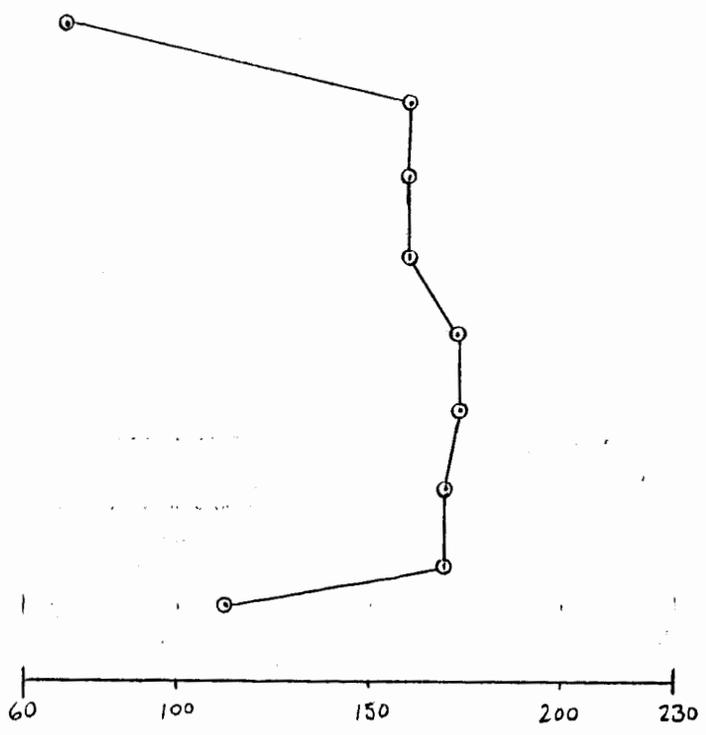
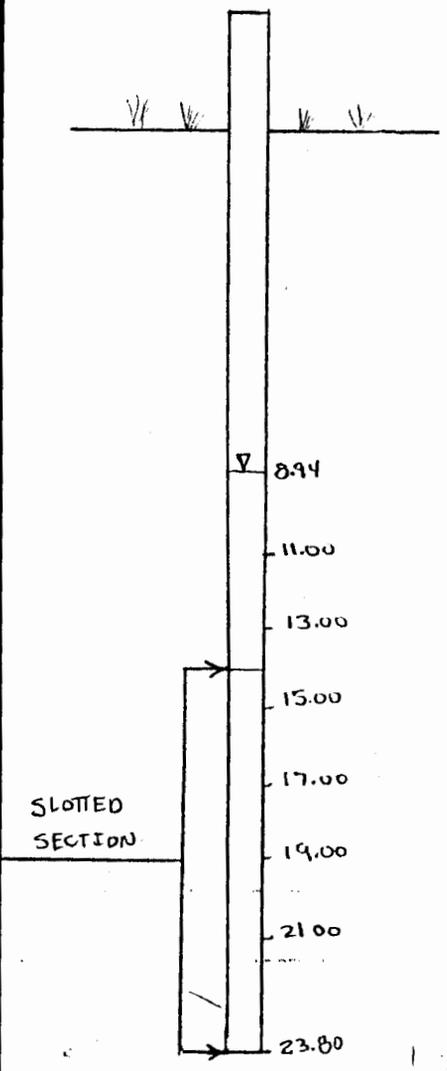
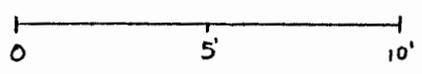


Wagner, Heindel, and Noyes, Inc.
Consulting Geologists Burlington, Vermont

PAGE ____ OF ____
PROJECT: LARKIN/RIVERSIDE AVE
DATE: 9/25/86

MONITOR WELL # 202
TOTAL DEPTH : 23.80

SCALE
1" = 5'

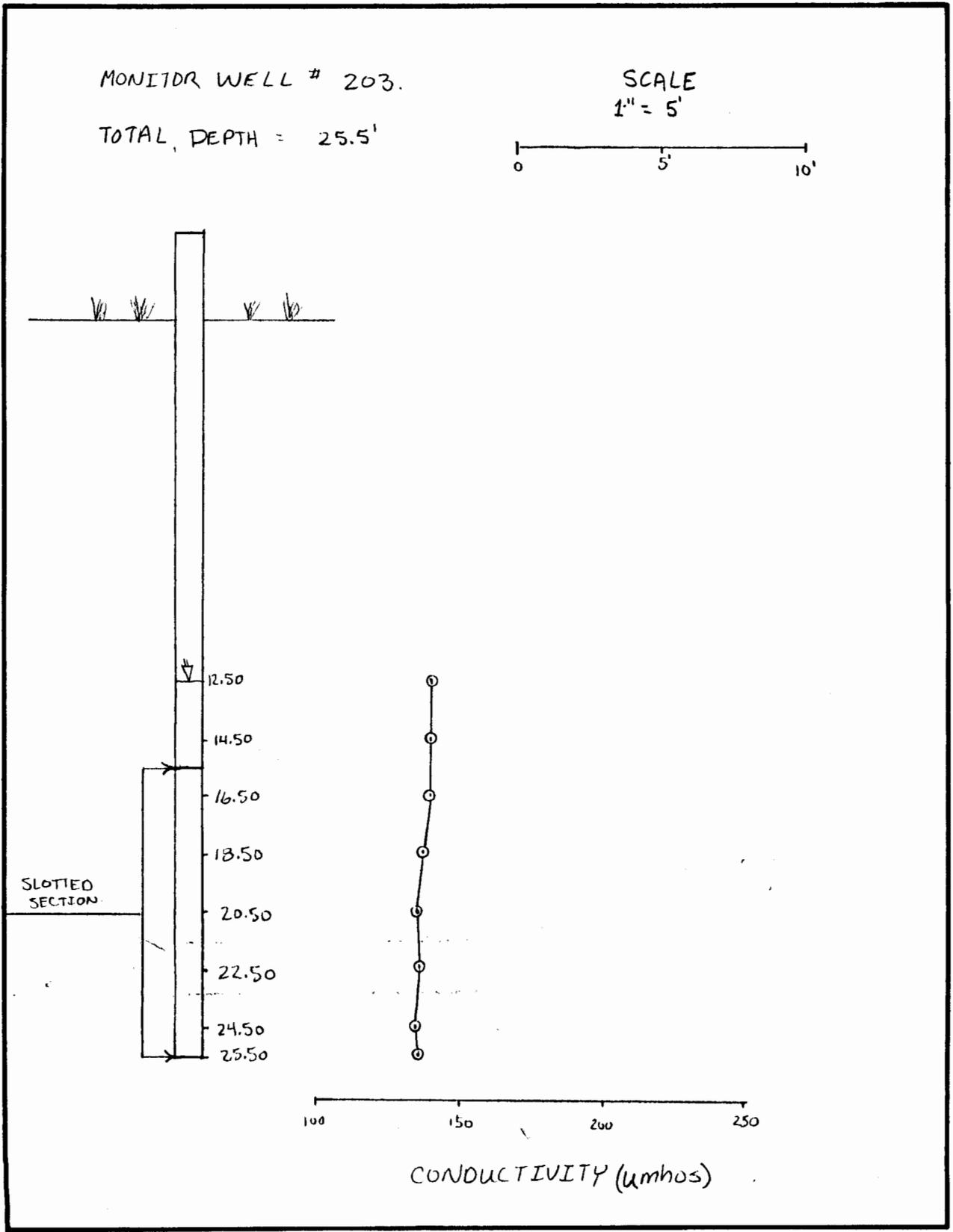


CONDUCTIVITY (μmhos)



Wagner, Heindel, and Noyes, Inc.
Consulting Geologists Burlington, Vermont

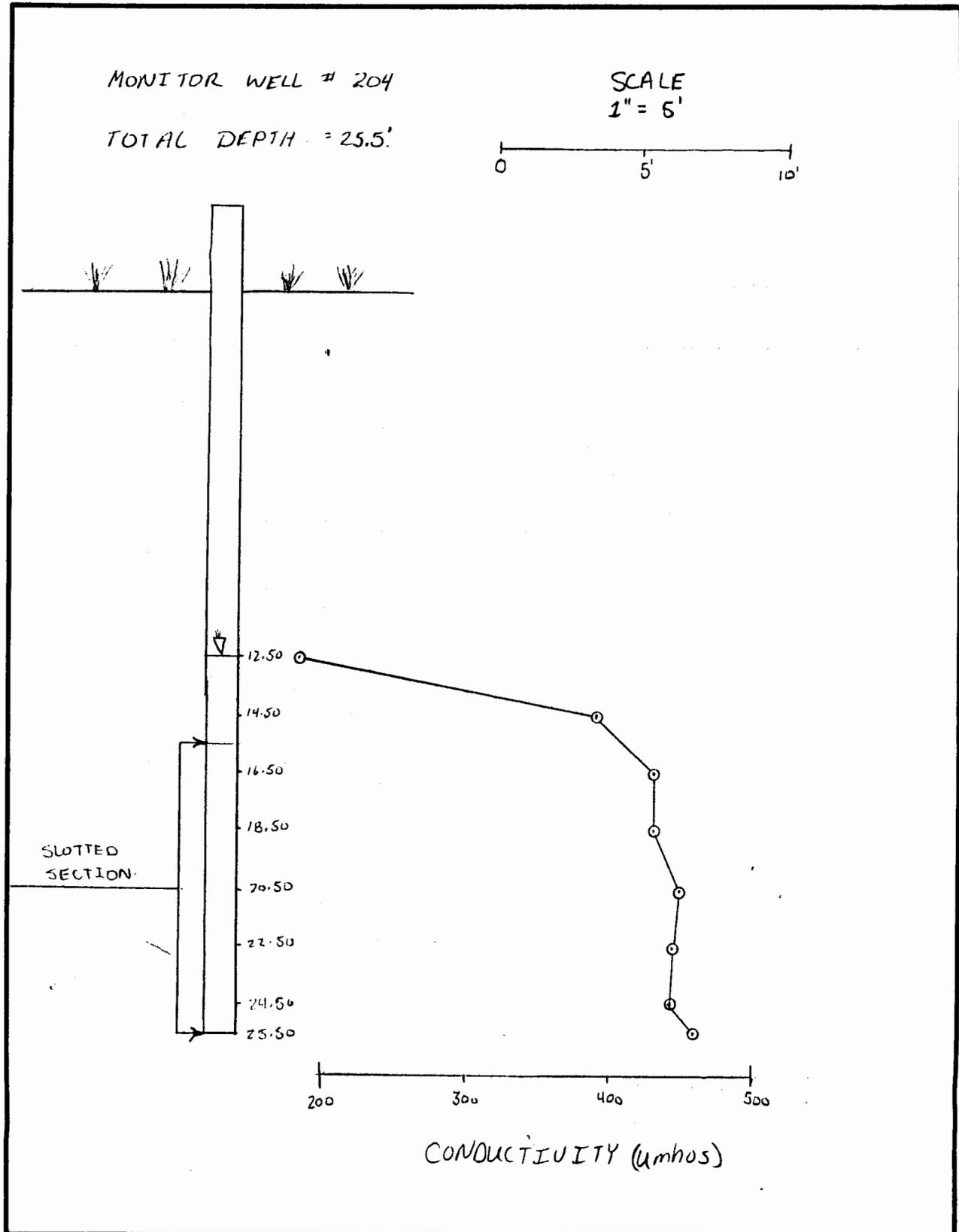
PAGE _____ OF _____
PROJECT: MARKIN/RIVERSIDE AVE
DATE: 9/25/86





Wagner, Heindel, and Noyes, Inc.
Consulting Geologists Burlington, Vermont

PAGE ____ OF ____
PROJECT: LARKIN/RIVERSIDE AVE
DATE: 7/25/86



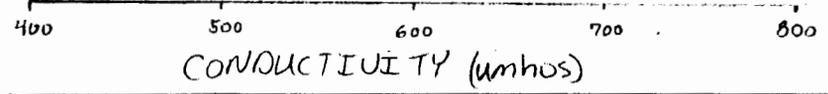
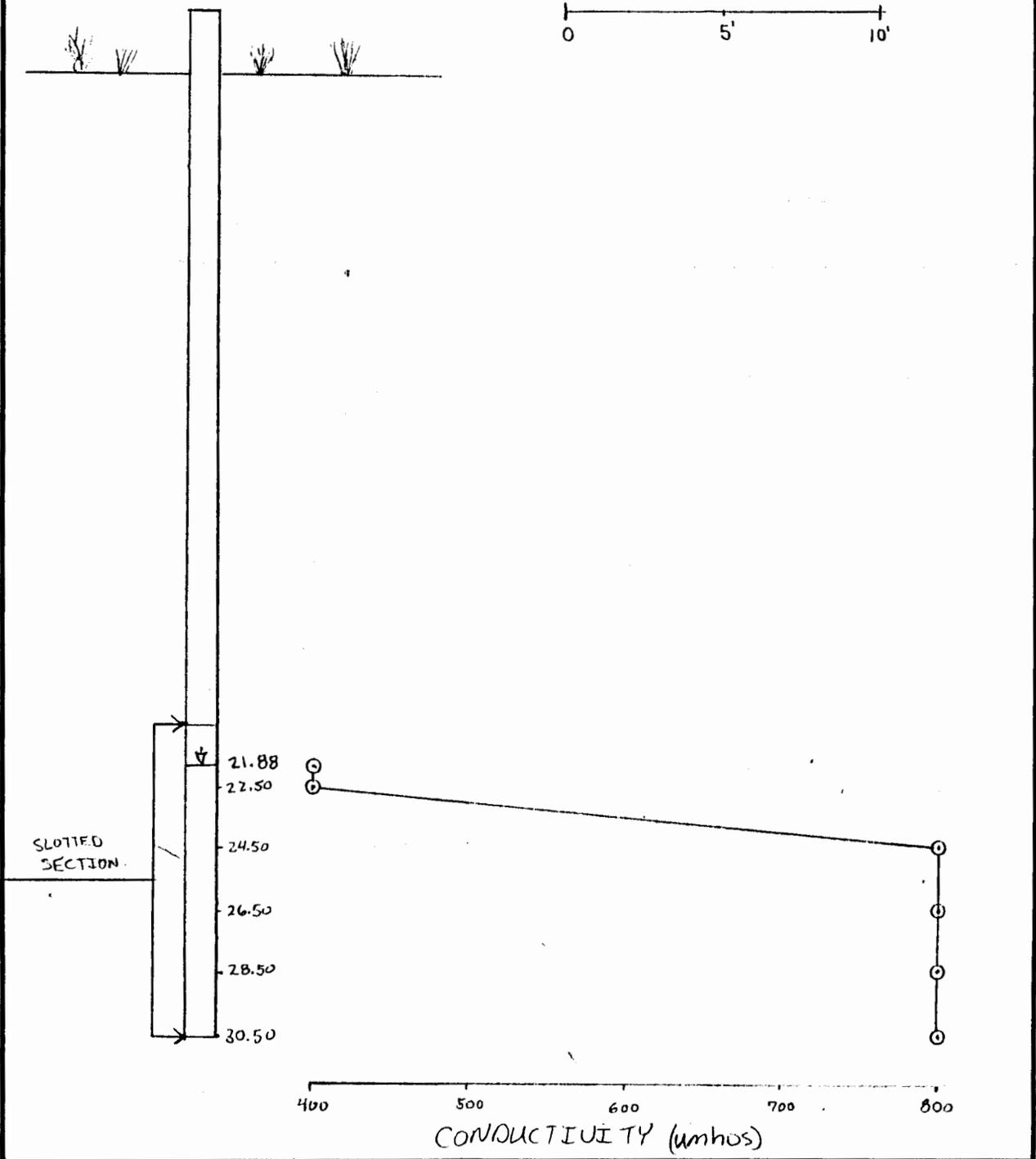
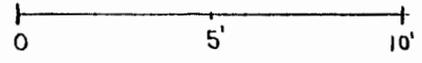


Wagner, Heindel, and Noyes, Inc.
Consulting Geologists Burlington, Vermont

PAGE ____ OF ____
PROJECT: CARLIN/OVERSIDE AVE
DATE: 9/25/86

MONITOR WELL # 205.
TOTAL DEPTH = 30.5.

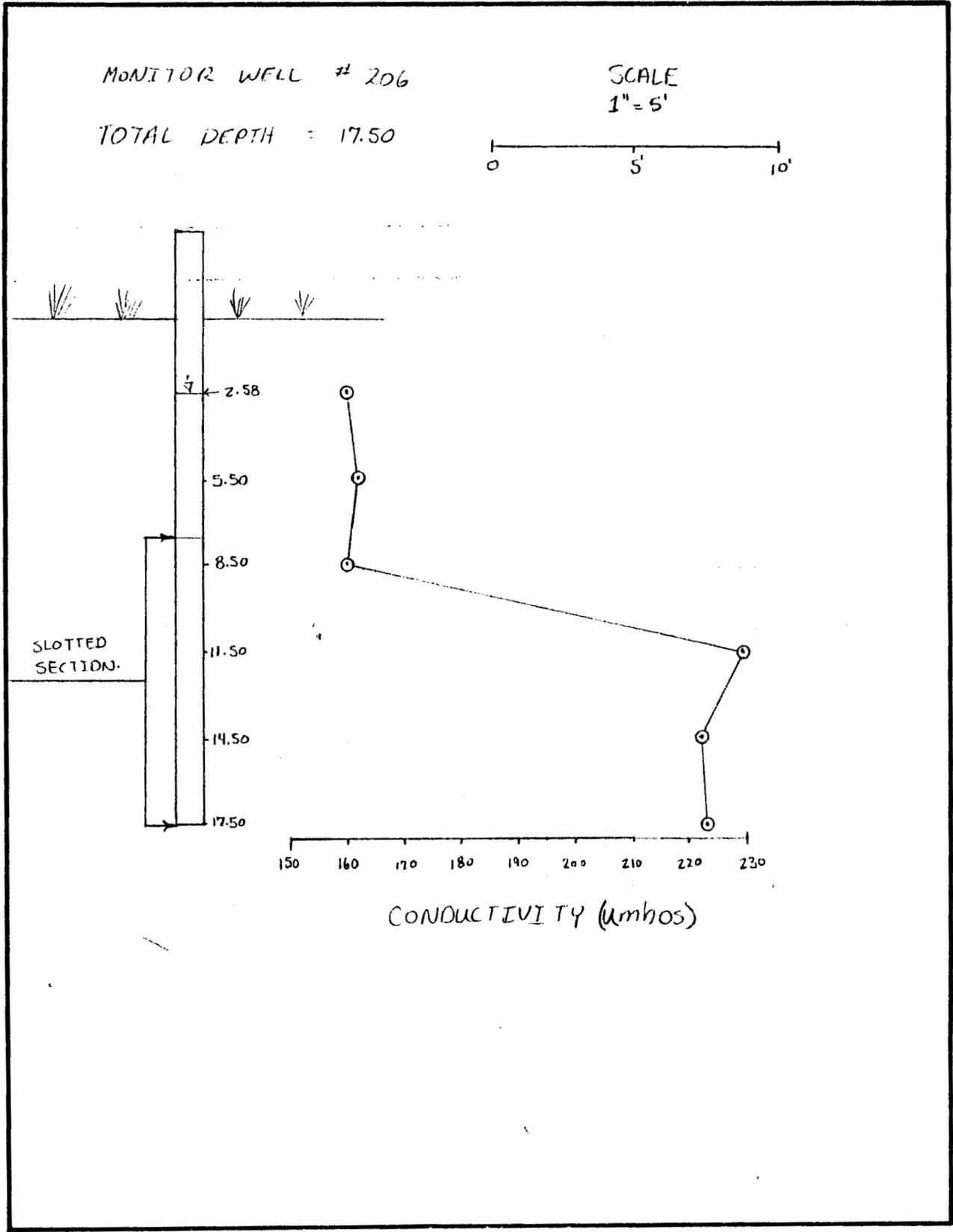
SCALE
1" = 5'





Wagner, Heindel, and Noyes, Inc.
Consulting Geologists Burlington, Vermont

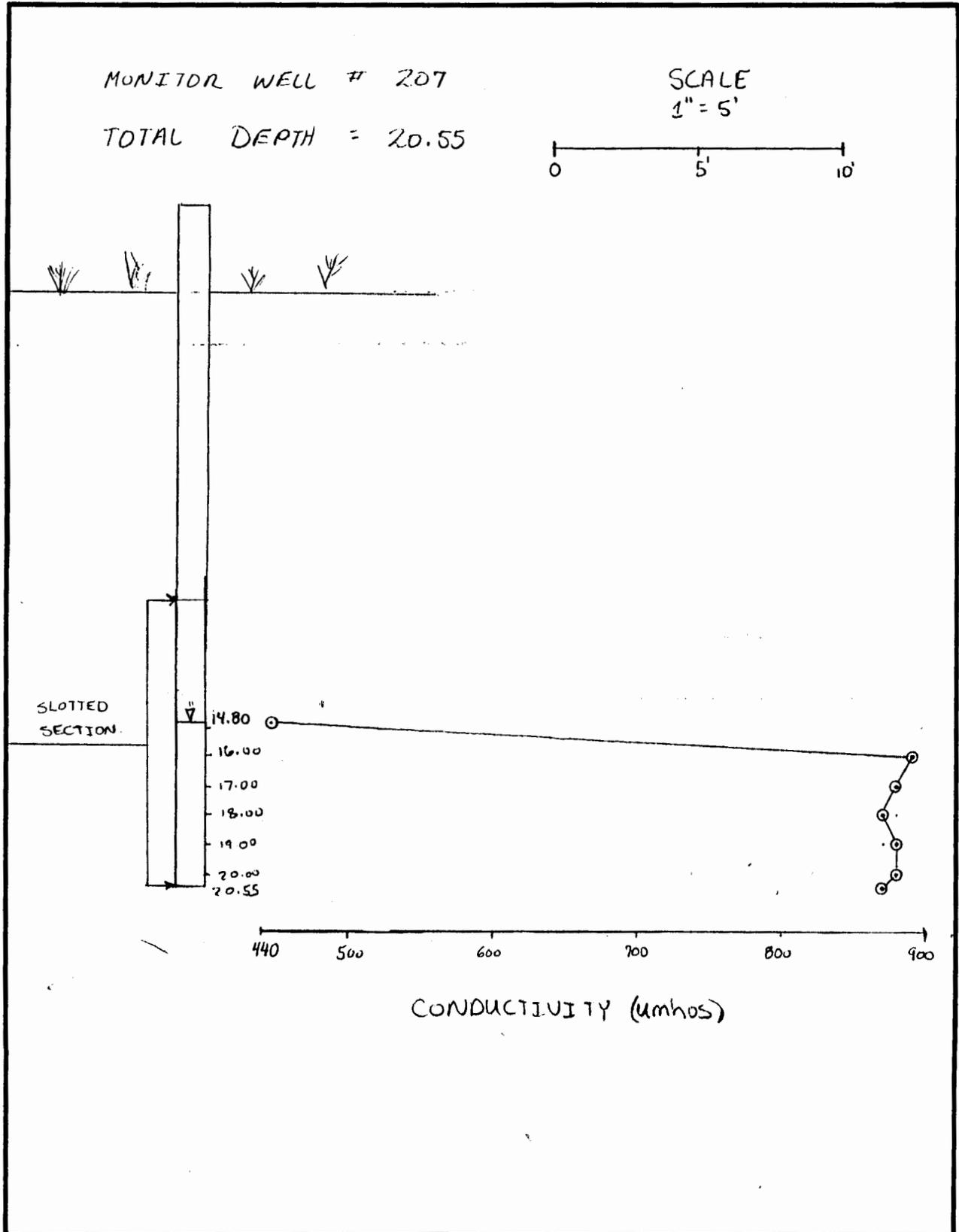
PAGE ____ OF ____
PROJECT: LARKIN/RIVERSIDE AVE
DATE: 7/25/86





Wagner, Heindel, and Noyes, Inc.
Consulting Geologists Burlington, Vermont

PAGE ____ OF ____
PROJECT: LARKIN/RIVERSIDE AVE
DATE: 9/25/86





ANALYSIS REPORT

Customer: Wagner, Heindel & Noyes, Inc.
 Address: Box 1629
 City, State, Zip: Burlington, VT 05402-1629
 Attention: Craig Heindel

Date: 22 Oct 1986
 Date Samples Received: 8 Oct 1986
 Customer Order Number:

WATER QUALITY MONITORING RESULTS

	RIVERSIDE - LARKIN			(MH-3)
	MW201	MW202	MW206	Northern-most Manhole
Arsenic, total (mg/L)	0.182	-	-	<0.005
Chloride (mg/L)	38.0	2.07	51.1	107.
Chromium, total (mg/L)	0.36	0.05	<0.025	<0.025
COD (mg/L)	398.	<2.0	6.5	91.6
Copper, total (mg/L)	0.34	0.04	0.04	<0.02
Iron, total (mg/L)	312.	10.1	0.50	50.0
Manganese, total (mg/L)	8.0	0.87	0.08	1.06
Mercury (mg/L)	<0.0002	0.0004	0.0002	<0.0002
Nickel, total (mg/L)	0.40	0.04	<0.02	0.04
pH	6.3	7.5	7.3	7.6
Selenium, total (mg/L)	<0.005	-	-	<0.005
Zinc, total (mg/L)	0.60	0.08	0.07	0.07

Signature Catherine W. Cutting

Reference: 28660



LABORATORY REPORT

DATE: June 24, 1988
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT: Larkin Riverside
SAMPLE COLLECTED BY: Dean Grover
DATE SAMPLED: June 7, 1988
DATE RECEIVED: June 7, 1988

Tested parameters are reported in milligrams per liter (ppm).

<u>Parameter</u>	<u>Reference Number</u>		
	<u>2595</u>	<u>2596</u>	<u>2597</u>
Aluminum	0.013	0.270	0.480
Arsenic	0.033	<0.010	<0.010
Barium	0.071	0.077	0.113
Cadmium	<0.001	<0.001	<0.001
Chromium	<0.005	<0.005	<0.005
Copper	<0.250	<0.250	<0.250
Iron	<0.100	<0.100	<0.100
Lead	<0.005	<0.005	<0.005
Manganese	0.203	<0.001	0.009
Mercury ¹	<0.0005	<0.0005	<0.0005
Nickel	0.069	0.011	0.012
Selenium	<0.005	<0.005	<0.005
Zinc	<0.250	<0.250	<0.250

Sample ID:

2595: MW 208
2596: MW 210S
2597: MW 213D

Note:

1 Analysis performed by outside laboratory

Reviewed by

William R. Keenstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

DATE: June 5, 1988
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT: Larkin/Riverside
SAMPLE COLLECTED BY: Jeff Prewitt
DATE SAMPLED: February 3, 1988
DATE RECEIVED: February 3, 1988

Tested parameters are reported in milligrams per liter (ppm):

<u>Sample</u> <u>[Ref#]</u>	<u>1795</u>
Aluminum	0.011
Arsenic	0.010
Cadmium	0.014
Chromium	29.8
Copper	0.25
Iron	2.23
Lead	<0.005
Manganese	0.14
Mercury ¹	0.0082
Nickel	<0.05
Selenium ¹	<0.010
Zinc	0.25

Sample ID:

1795: MW - 215, 5:31 PM

Notes:

1 Analysis performed at outside laboratory

Reviewed by:

William R. Benste

EPA METHOD 601 - PURGEABLE HALOCARBONS

Sample I. D. Riverside - MW #201 - 8 Oct 1986

23

Date Analyzed: 22 Oct 1986Analyzed by: C. Barnes

PARAMETER	CONCENTRATION ($\mu\text{g}/\text{l}$) ¹
Bromodichloromethane	BDL ²
Bromoform	5.5 ← HAL: 100
Bromomethane	BDL
Carbon tetrachloride	3.2 ← HAL: ?
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Ethylbenzene	BDL
Methylene chloride	1.0 ← HAL: 48
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
Toluene	BDL
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl chloride	BDL

¹Detection limit is 1 $\mu\text{g}/\text{l}$.²Below detection limit.

Note: Acetone 29 $\mu\text{g}/\text{L}$. Peaks that don't correlate to any 601 compounds appeared at 13.142 min. and 21.975 min.
Trichlorofluoroethane 1.0 $\mu\text{g}/\text{L}$.

u?

Sample I. D. Riverside - MW201 - 8 Oct 1986

PARAMETER	CONCENTRATION ($\mu\text{g/L}$) ¹
Benzene	BDL ²
Chlorobenzene	BDL
Chlorotoluene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethyl benzene	BDL
m-Xylene	BDL
o-Xylene	BDL
p-Xylene	BDL

¹Detection limit is 1 $\mu\text{g/L}$.

²Below detection limit.

EPA METHOD 601 - PURGEABLE HALOCARBONS

Sample I. D. Riverside - MW #202 - 8 Oct 1986

25

Date Analyzed: 22 Oct 1986Analyzed by: C. Barnes

PARAMETER	CONCENTRATION ($\mu\text{g}/\text{l}$) ¹
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	1.0 ← HAL: 600
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Ethylbenzene	BDL
Methylene chloride	BDL
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
Toluene	BDL
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl chloride	BDL

¹Detection limit is 1 $\mu\text{g}/\text{l}$.²Below detection limit.

EPA Method 602 - Purgeable Aromatics

Sample I. D. Riverside - MW202 - 8 Oct 1986

PARAMETER	CONCENTRATION ($\mu\text{g/L}$) ¹
Benzene	BDL ²
Chlorobenzene	BDL
Chlorotoluene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethyl benzene	BDL
m-Xylene	BDL
o-Xylene	BDL
p-Xylene	BDL

¹Detection limit is 1 $\mu\text{g/L}$.

²Below detection limit.

EPA METHOD 601 - PURGEABLE HALOCARBONS

27

Sample I. D. Riverside - MW #206 - 8 Oct 1986Date Analyzed: 22 Oct 1986Analyzed by: C. Barnes

PARAMETER	CONCENTRATION ($\mu\text{g}/\text{l}$) ¹
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Ethylbenzene	BDL
Methylene chloride	BDL
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
Toluene	BDL
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl chloride	BDL

¹Detection limit is 1 $\mu\text{g}/\text{l}$.²Below detection limit.

Sample I. D. Riverside - MW206 - 8 Oct 1986

PARAMETER	CONCENTRATION ($\mu\text{g/L}$) ¹
Benzene	BDL ²
Chlorobenzene	BDL
Chlorotoluene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethyl benzene	BDL
m-Xylene	BDL
o-Xylene	BDL
p-Xylene	BDL

¹Detection limit is 1 $\mu\text{g/L}$.

²Below detection limit.



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: November 18, 1987
 CLIENT: Wagner, Heindel and Noyes, Inc.
 SAMPLING LOCATION ID: Riverside/Larkin, MW 211-D REF. #: 1156
 SAMPLE COLLECTED BY: Michael H. Pottinger
 DATE SAMPLED: October 29, 1987, 11:25 AM
 DATE RECEIVED: October 30, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Methylene Chloride	BDL
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl Chloride	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by

William R. Penstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: November 18, 1987
 CLIENT: Wagner, Heindel and Noyes, Inc.
 SAMPLING LOCATION ID: Riverside/Larkin, MW 211-D REF. #:1156
 SAMPLE COLLECTED BY: Michael H. Pottinger
 DATE SAMPLED: October 29, 1987, 11:25 AM
 DATE RECEIVED: October 30, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Benzene	BDL ²
Chlorobenzene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethylbenzene	BDL
Toluene	BDL
Xylenes	BDL

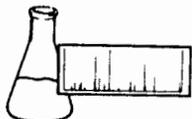
NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 602 detection limit is 4 ug/L
- 2 Below detection limit

Reviewed by

William R. Keenstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: November 18, 1987
 CLIENT: Wagner, Heindel and Noyes, Inc.
 SAMPLING LOCATION ID: Riverside/Larkin, MW 212-S REF. 1157
 SAMPLE COLLECTED BY: Michael H. Pottinger
 DATE SAMPLED: October 29, 1987, 9:10 AM
 DATE RECEIVED: October 30, 1987

<u>Parameter</u>	<u>Concentration (ug/L)</u> ¹
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Methylene Chloride	BDL
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl Chloride	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by

William L. Lester



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: November 18, 1987
 CLIENT: Wagner, Heindel and Noyes, Inc.
 SAMPLING LOCATION ID: Riverside/Larkin, MW 212-S REF. #:1157
 SAMPLE COLLECTED BY: Michael H. Pottinger
 DATE SAMPLED: October 29, 1987, 9:10 AM
 DATE RECEIVED: October 30, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Benzene	BDL ²
Chlorobenzene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethylbenzene	BDL
Toluene	BDL
Xylenes	BDL

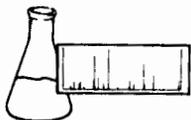
NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 602 detection limit is 4 ug/L
- 2 Below detection limit

Reviewed by

William L. Benster



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: November 18, 1987
 CLIENT: Wagner, Heindel and Noyes, Inc.
 SAMPLING LOCATION ID: Riverside/Larkin, MW 213-S REF. #: 1159
 SAMPLE COLLECTED BY: Michael H. Pottinger
 DATE SAMPLED: October 29, 1987, 1:50 PM
 DATE RECEIVED: October 30, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Methylene Chloride	BDL
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl Chloride	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by

William K. Benstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: November 18, 1987
 CLIENT: Wagner, Heindel and Noyes, Inc.
 SAMPLING LOCATION ID: Riverside/Larkin, MW 213-S REF. #:1159
 SAMPLE COLLECTED BY: Michael H. Pottinger
 DATE SAMPLED: October 29, 1987, 1:50 PM
 DATE RECEIVED: October 30, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Benzene	BDL ²
Chlorobenzene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethylbenzene	BDL
Toluene	BDL
Xylenes	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 602 detection limit is 4 ug/L
- 2 Below detection limit

Reviewed by

William R. Benster



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: November 18, 1987
 CLIENT: Wagner, Heindel and Noyes, Inc.
 SAMPLING LOCATION ID: Riverside/Larkin, MW 213-D REF. #: 1158
 SAMPLE COLLECTED BY: Michael H. Pottinger
 DATE SAMPLED: October 29, 1987, 2:00 PM
 DATE RECEIVED: October 30, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Methylene Chloride	BDL
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl Chloride	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by William R. Penstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: November 18, 1987
CLIENT: Wagner, Heindel and Noyes, Inc.
SAMPLING LOCATION ID: Riverside/Larkin, MW 213-D REF. #:1158
SAMPLE COLLECTED BY: Michael H. Pottinger
DATE SAMPLED: October 29, 1987, 2:00 PM
DATE RECEIVED: October 30, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Benzene	BDL ²
Chlorobenzene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethylbenzene	BDL
Toluene	BDL
Xylenes	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 602 detection limit is 4 ug/L
- 2 Below detection limit

Reviewed by William R. Keersta



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: November 18, 1987
CLIENT: Wagner, Heindel and Noyes, Inc.
SAMPLING LOCATION ID: Riverside/Larkin, MW 215 REF. #: 1160
SAMPLE COLLECTED BY: Michael H. Pottinger
DATE SAMPLED: October 29, 1987, 9:30 AM
DATE RECEIVED: October 30, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Methylene Chloride	BDL
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl Chloride	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by William H. Penner



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: November 18, 1987
 CLIENT: Wagner, Heindel and Noyes, Inc.
 SAMPLING LOCATION ID: Riverside/Larkin, MW 215 REF. #:1160
 SAMPLE COLLECTED BY: Michael H. Pottinger
 DATE SAMPLED: October 29, 1987, 9:30 AM
 DATE RECEIVED: October 30, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Benzene	BDL ²
Chlorobenzene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethylbenzene	BDL
Toluene	BDL
Xylenes	BDL

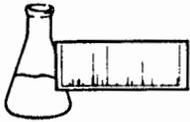
NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 602 detection limit is 4 ug/L
- 2 Below detection limit

Reviewed by

William R. Perste



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: December 13, 1987
 CLIENT: Wagner, Heindel and Noyes, Inc.
 PROJECT NAME: Larkin/Riverside STATION: MW-209
 SAMPLE COLLECTED BY: M. H. Pottinger REF. #: 1399
 DATE SAMPLED: November 24, 1987 DATE RECEIVED: November 24, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Methylene Chloride	BDL
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl Chloride	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by

William L. Heerstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: December 13, 1987
 CLIENT: Wagner, Heindel and Noyes, Inc.
 PROJECT NAME: Larkin/Riverside STATION: MW-209
 SAMPLE COLLECTED BY: M. H. Pottinger REF. #: 1399
 DATE SAMPLED: November 24, 1987 DATE RECEIVED: November 24, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Benzene	BDL ²
Chlorobenzene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethylbenzene	BDL
Toluene	BDL
Xylenes	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 2

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by

William R. Keenstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: December 13, 1987
 CLIENT: Wagner, Heindel and Noyes, Inc.
 PROJECT NAME: Larkin/Riverside STATION: MW-210-S
 SAMPLE COLLECTED BY: M. H. Pottinger REF. #: 1400
 DATE SAMPLED: November 24, 1987 DATE RECEIVED: November 24, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Methylene Chloride	BDL
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl Chloride	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by

William R. Heenstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: December 13, 1987
 CLIENT: Wagner, Heindel and Noyes, Inc.
 PROJECT NAME: Larkin/Riverside STATION: MW-210-S
 SAMPLE COLLECTED BY: M. H. Pottinger REF. #: 1400
 DATE SAMPLED: November 24, 1987 DATE RECEIVED: November 24, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Benzene	BDL ²
Chlorobenzene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethylbenzene	BDL
Toluene	BDL
Xylenes	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 2

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by

William R. Leavette



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: March 8, 1988

CLIENT: Wagner, Heindel and Noyes, Inc.

PROJECT NAME: Larkin/Riverside

SAMPLE COLLECTED BY: Jeff Prewitt

DATE SAMPLED: February 3, 1988

DATE RECEIVED: February 3, 1988

STATION: MW 117

REF. #: 1801

TIME SAMPLED: 10:00 AM

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Bromodichloromethane	ND ²
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinyl ether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Dichlorodifluoromethane	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 Method 601 detection limit is 1 ug/L

2 None detected

Analyst: B. Stearns

Reviewed by

William R. Penick



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: February 13, 1988
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: MW 117
SAMPLE COLLECTED BY: Jeff Prewitt
DATE SAMPLED: February 3, 1988 TIME SAMPLED: 10:00 AM
DATE RECEIVED: February 3, 1988 REF. #: 1801

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

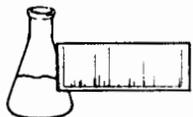
NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 None detected
- 3 Trace but below quantification limit

Analyst: B. Stearns

Reviewed by William R. Benstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: March 8, 1988

CLIENT: Wagner, Heindel and Noyes, Inc.

PROJECT NAME: Larkin/Riverside

SAMPLE COLLECTED BY: Jeff Prewitt

DATE SAMPLED: February 3, 1988

DATE RECEIVED: February 3, 1988

STATION: MW 203

REF. #: 1798

TIME SAMPLED: 11:20 AM

<u>Parameter</u>	<u>Concentration (ug/L)</u> ¹
Bromodichloromethane	ND ²
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinyl ether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Dichlorodifluoromethane	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 Method 601 detection limit is 1 ug/L

2 None detected

Analyst: B. Stearns

Reviewed by

William R. Penato



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: February 13, 1988
 CLIENT: Wagner, Heindel and Noyes, Inc.
 PROJECT NAME: Larkin/Riverside STATION: MW 203
 SAMPLE COLLECTED BY: Jeff Prewitt
 DATE SAMPLED: February 3, 1988 TIME SAMPLED: 11:20 AM
 DATE RECEIVED: February 3, 1988 REF. #: 1798

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

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 None detected
- 3 Trace but below quantification limit

Analyst: B. Stearns

Reviewed by

William R. Kenner



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT EPA METHOD 624 -- GC/MS PURGEABLES

DATE: March 8, 1988
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: MW 209
SAMPLE COLLECTED BY: Jeff Prewitt REF. #: 1799
DATE SAMPLED: February 3, 1988 DATE RECEIVED: Feb. 3, 1988

<u>Parameter</u>	<u>Quantification</u> <u>Limit (ug/L)</u>	<u>Concentration</u> <u>(ug/L)</u>
Benzene	5	ND ¹
Bromodichloromethane	5	ND
Bromoform	5	ND
Bromomethane	20	ND
Carbon tetrachloride	5	ND
Chlorobenzene	10	ND
Chloroethane	20	ND
2-Chloroethylvinyl ether	10	ND
Chloroform	5	TBQ ²
Chloromethane	20	ND
Dibromochloromethane	5	ND
1,2-Dichlorobenzene	10	ND
1,3-Dichlorobenzene	10	ND
1,4-Dichlorobenzene	10	ND
1,1-Dichloroethane	5	ND
1,2-Dichloroethane	5	ND
1,1 Dichloroethene	5	ND
trans-1,2-Dichloroethene	5	ND
1,2-Dichloropropane	10	ND
cis-1,3-Dichloropropene	10	ND
trans-1,3-Dichloropropene	10	ND
Ethyl Benzene	10	ND
Methylene Chloride	5	20.9 ³
1,1,2,2-Tetrachloroethane	10	ND
Tetrachloroethene	5	ND
Toluene	10	ND
1,1,1-Trichloroethane	5	ND
1,1,2-Trichloroethane	5	ND
Trichloroethene	5	ND
Trichlorofluoromethane	10	ND
Vinyl Chloride	20	ND

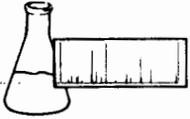
NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 None detected
- 2 Trace but below quantitation limit
- 3 Possible lab contaminant

Analyst: B. Stearns

Reviewed by



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 625 -- GC/MS BASE/NEUTRALS AND ACIDS

DATE: March 21, 1988

CLIENT: Wagner, Heindel and Noyes, Inc.

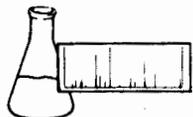
PROJECT NAME: Larkin/Riverside STATION: MW - 209

SAMPLE COLLECTED BY: M. Pottinger REF. #: 1811

DATE SAMPLED: February 4, 1988 DATE RECEIVED: Feb. 4, 1988

BASE/NEUTRAL EXTRACTABLES

<u>Parameter</u>	<u>Quantification Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Acenaphthene	1	ND ¹
Acenaphthylene	1	ND
Anthracene	1	ND
Aldrin	1	ND
Benzo(a)anthracene	1	ND
Benzo(b)fluoranthene	1	ND
Benzo(k)fluoranthene	1	ND
Benzo(a)pyrene	1	ND
Benzo(ghi)perylene	10	ND
Benzyl butyl phthalate	1	PLC ²
Bis(2-chloroethyl)ether	1	ND
Bis(2-chloroethoxyl)methane	1	ND
Bis(2-ethylhexyl)phthalate	1	PLC
Bis(2-chloroisopropyl)ether	1	ND
4-Bromophenyl phenyl ether	1	ND
2-Chloronaphthalene	1	ND
4-Chlorophenyl phenyl ether	1	ND
Chrysene	1	ND
Dibenzo(a,h)anthracene	1	ND
Di-n-butylphthalate	1	PLC
1,3-Dichlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
3,3'-Dichlorobenzidine	1	ND
Diethyl phthalate	1	ND
Dimethyl phthalate	1	ND
2,4-Dinitrotoluene	1	ND
2,6-Dinitrotoluene	1	ND
Di-n-octylphthalate	1	ND
Fluoranthene	1	ND
Fluorene	1	ND
Hexachlorobenzene	1	ND



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

REF. #: 1811

EPA METHOD 625 (continued)

<u>Parameter</u>	<u>Quantification Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Hexachlorobutadiene	1	ND
Hexachloroethane	1	ND
Indeno(1,2,3-cd)pyrene	10	ND
Isophorone	1	ND
Naphthalene	1	ND
Nitrobenzene	1	ND
N-Nitrosodi-n-propylamine	1	ND
Phenanthrene	1	ND
Pyrene	1	ND
1,2,4-Trichlorobenzene	1	ND

ACID EXTRACTABLES

4-Chloro-3-methylphenol	1	ND
2-Chlorophenol	1	ND
2,4-Dichlorophenol	1	ND
2,4-Dimethylphenol	1	ND
2,4-Dinitrophenol	1	ND
2-Methyl-4,6-dinitrophenol	1	ND
2-Nitrophenol	1	ND
4-Nitrophenol	1	ND
Pentachlorophenol	1	ND
Phenol	1	ND
2,4,6-Trichlorophenol	1	ND

ADDITIONAL EXTRACTABLE PARAMETERS

Benzidine	10	ND
Hexachlorocyclopentadiene	10	ND
N-Nitrosodimethylamine	10	ND
N-Nitrosodiphenylamine	1	ND

NOTES:

- 1 None detected
- 2 Present due to laboratory contamination

Analyst: B. Stearns

Date of analysis:

Reviewed by:

William R. Keenstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT EPA METHOD 624 -- GC/MS PURGEABLES

DATE: March 8, 1988
 CLIENT: Wagner, Heindel and Noyes, Inc.
 PROJECT NAME: Larkin/Riverside STATION: MW 210-S
 SAMPLE COLLECTED BY: Jeff Prewitt REF. #: 1800
 DATE SAMPLED: February 3, 1988 DATE RECEIVED: Feb. 3, 1988

<u>Parameter</u>	<u>Quantification</u> <u>Limit (ug/L)</u>	<u>Concentration</u> <u>(ug/L)</u>
Benzene	5	ND ¹
Bromodichloromethane	5	ND
Bromoform	5	ND
Bromomethane	20	ND
Carbon tetrachloride	5	ND
Chlorobenzene	10	ND
Chloroethane	20	ND
2-Chloroethylvinyl ether	10	ND
Chloroform	5	ND
Chloromethane	20	TBQ ²
Dibromochloromethane	5	ND
1,2-Dichlorobenzene	10	ND
1,3-Dichlorobenzene	10	ND
1,4-Dichlorobenzene	10	ND
1,1-Dichloroethane	5	ND
1,2-Dichloroethane	5	ND
1,1 Dichloroethene	5	ND
trans-1,2-Dichloroethene	5	ND
1,2-Dichloropropane	10	ND
cis-1,3-Dichloropropene	10	ND
trans-1,3-Dichloropropene	10	ND
Ethyl Benzene	10	ND
Methylene Chloride	5	16.9 ³
1,1,2,2-Tetrachloroethane	10	ND
Tetrachloroethene	5	ND
Toluene	10	ND
1,1,1-Trichloroethane	5	ND
1,1,2-Trichloroethane	5	ND
Trichloroethene	5	ND
Trichlorofluoromethane	10	ND
Vinyl Chloride	20	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

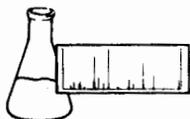
NOTES:

- 1 None detected
- 2 Trace but below quantitation limit
- 3 Possible lab contaminant

Analyst: B. Stearns

Reviewed by

William R. Penstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 625 -- GC/MS BASE/NEUTRALS AND ACIDS

DATE: March 21, 1988

CLIENT: Wagner, Heindel and Noyes, Inc.

PROJECT NAME: Larkin/Riverside STATION: MW - 210-S

SAMPLE COLLECTED BY: M. Pottinger REF. #: 1812

DATE SAMPLED: February 4, 1988 DATE RECEIVED: Feb. 4, 1988

BASE/NEUTRAL EXTRACTABLES

<u>Parameter</u>	<u>Quantification Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Acenaphthene	1	ND ¹
Acenaphthylene	1	ND
Anthracene	1	ND
Aldrin	1	ND
Benzo(a)anthracene	1	ND
Benzo(b)fluoranthene	1	ND
Benzo(k)fluoranthene	1	ND
Benzo(a)pyrene	1	ND
Benzo(ghi)perylene	10	ND
Benzyl butyl phthalate	1	PLC ²
Bis(2-chloroethyl)ether	1	ND
Bis(2-chloroethoxyl)methane	1	ND
Bis(2-ethylhexyl)phthalate	1	PLC
Bis(2-chloroisopropyl)ether	1	ND
4-Bromophenyl phenyl ether	1	ND
2-Chloronaphthalene	1	ND
4-Chlorophenyl phenyl ether	1	ND
Chrysene	1	ND
Dibenzo(a,h)anthracene	1	ND
Di-n-butylphthalate	1	PLC
1,3-Dichlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
3,3'-Dichlorobenzidine	1	ND
Diethyl phthalate	1	ND
Dimethyl phthalate	1	ND
2,4-Dinitrotoluene	1	ND
2,6-Dinitrotoluene	1	ND
Di-n-octylphthalate	1	ND
Fluoranthene	1	ND
Fluorene	1	ND
Hexachlorobenzene	1	ND



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
REF # 8791433 #1812

EPA METHOD 625 (continued)

<u>Parameter</u>	<u>Quantification Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Hexachlorobutadiene	1	ND
Hexachloroethane	1	ND
Indeno(1,2,3-cd)pyrene	10	ND
Isophorone	1	ND
Naphthalene	1	ND
Nitrobenzene	1	ND
N-Nitrosodi-n-propylamine	1	ND
Phenanthrene	1	ND
Pyrene	1	ND
1,2,4-Trichlorobenzene	1	ND

ACID EXTRACTABLES

4-Chloro-3-methylphenol	1	ND
2-Chlorophenol	1	ND
2,4-Dichlorophenol	1	ND
2,4-Dimethylphenol	1	ND
2,4-Dinitrophenol	1	ND
2-Methyl-4,6-dinitrophenol	1	ND
2-Nitrophenol	1	ND
4-Nitrophenol	1	ND
Pentachlorophenol	1	ND
Phenol	1	ND
2,4,6-Trichlorophenol	1	ND

ADDITIONAL EXTRACTABLE PARAMETERS

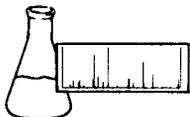
Benzidine	10	ND
Hexachlorocyclopentadiene	10	ND
N-Nitrosodimethylamine	10	ND
N-Nitrosodiphenylamine	1	ND

NOTES:

- 1 None detected
- 2 Present due to laboratory contamination

Analyst: B. Stearns Date of analysis:

Reviewed by: William R. Leustra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT EPA METHOD 624 -- GC/MS PURGEABLES

DATE: December 29, 1987
 CLIENT: Wagner, Heindel and Noyes, Inc.
 PROJECT NAME: Larkin/Riverside STATION: MW 215
 SAMPLE COLLECTED BY: M. H. Pottinger REF. #: 1512
 DATE SAMPLED: December 10, 1987 DATE RECEIVED: December 11, 1987

<u>Parameter</u>	<u>Quantification</u> <u>Limit (ug/L)</u>	<u>Concentration</u> <u>(ug/L)</u>
Benzene	5	BQL ¹
Bromodichloromethane	5	BQL
Bromoform	5	BQL
Bromomethane	20	BQL
Carbon tetrachloride	5	BQL
Chlorobenzene	10	BQL
Chloroethane	20	BQL
2-Chloroethylvinyl ether	10	BQL
Chloroform	5	BQL
Chloromethane	20	BQL
Dibromochloromethane	5	BQL
1,2-Dichlorobenzene	10	BQL
1,3-Dichlorobenzene	10	BQL
1,4-Dichlorobenzene	10	BQL
1,1-Dichloroethane	5	BQL
1,2-Dichloroethane	5	BQL
1,1 Dichloroethene	5	BQL
trans-1,2-Dichloroethene	5	BQL
1,2-Dichloropropane	10	BQL
cis-1,3-Dichloropropene	10	BQL
trans-1,3-Dichloropropene	10	BQL
Ethyl Benzene	10	BQL
Methylene Chloride	5	TBQ ²
1,1,2,2-Tetrachloroethane	10	BQL
Tetrachloroethene	5	BQL
Toluene	10	BQL
1,1,1-Trichloroethane	5	BQL
1,1,2-Trichloroethane	5	BQL
Trichloroethene	5	BQL
Trichlorofluoromethane	10	BQL
Vinyl Chloride	20	BQL

NUMBER OF ADDITIONAL PEAKS FOUND: 1 (Acetone)

NOTES:

- 1 Below quantitation limit
- 2 Trace but below quantitation limit

Reviewed by

William R. Benita



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 625 -- GC/MS BASE/NEUTRALS AND ACIDS

DATE: March 21, 1988

CLIENT: Wagner, Heindel and Noyes, Inc.

PROJECT NAME: Larkin/Riverside STATION: MW 215

SAMPLE COLLECTED BY: M. Pottinger REF. #: 1511

DATE SAMPLED: December 10, 1987 DATE RECEIVED: Dec. 11, 1987

BASE/NEUTRAL EXTRACTABLES

<u>Parameter</u>	<u>Quantification Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Acenaphthene	1	ND ¹
Acenaphthylene	1	ND
Anthracene	1	ND
Aldrin	1	ND
Benzo(a)anthracene	1	ND
Benzo(b)fluoranthene	1	ND
Benzo(k)fluoranthene	1	ND
Benzo(a)pyrene	1	ND
Benzo(ghi)perylene	10	ND
Benzyl butyl phthalate	1	ND
Bis(2-chloroethyl)ether	1	ND
Bis(2-chloroethoxyl)methane	1	ND
Bis(2-ethylhexyl)phthalate	1	ND
Bis(2-chloroisopropyl)ether	1	ND
4-Bromophenyl phenyl ether	1	ND
2-Chloronaphthalene	1	ND
4-Chlorophenyl phenyl ether	1	ND
Chrysene	1	ND
Dibenzo(a,h)anthracene	1	ND
Di-n-butylphthalate	1	ND
1,3-Dichlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
3,3'-Dichlorobenzidine	1	ND
Diethyl phthalate	1	ND
Dimethyl phthalate	1	ND
2,4-Dinitrotoluene	1	ND
2,6-Dinitrotoluene	1	ND
Di-n-octylphthalate	1	ND
Fluoranthene	1	ND
Fluorene	1	ND
Hexachlorobenzene	1	ND



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

REF. #: 1511

EPA METHOD 625 (continued)

<u>Parameter</u>	<u>Quantification Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Hexachlorobutadiene	1	ND
Hexachloroethane	1	ND
Indeno(1,2,3-cd)pyrene	10	ND
Isophorone	1	ND
Naphthalene	1	ND
Nitrobenzene	1	ND
N-Nitrosodi-n-propylamine	1	ND
Phenanthrene	1	ND
Pyrene	1	ND
1,2,4-Trichlorobenzene	1	ND

ACID EXTRACTABLES

4-Chloro-3-methylphenol	1	ND
2-Chlorophenol	1	ND
2,4-Dichlorophenol	1	ND
2,4-Dimethylphenol	1	ND
2,4-Dinitrophenol	1	ND
2-Methyl-4,6-dinitrophenol	1	ND
2-Nitrophenol	1	ND
4-Nitrophenol	1	ND
Pentachlorophenol	1	ND
Phenol	1	ND
2,4,6-Trichlorophenol	1	ND

ADDITIONAL EXTRACTABLE PARAMETERS

Benzidine	10	ND
Hexachlorocyclopentadiene	10	ND
N-Nitrosodimethylamine	10	ND
N-Nitrosodiphenylamine	1	ND

NOTES:

1 None detected

Analyst: B. Stearns

Date of analysis:

Reviewed by: William R. Keenstra

RECEIVED MAR 4 1988



John R. McKernan, Jr.
Governor

Rollin Ives
Commissioner

STATE OF MAINE
DEPARTMENT OF HUMAN SERVICES
AUGUSTA, MAINE 04333

February 29, 1988

Mike Pottinger
Wagner, Heindel & Noyes
PO Box 1629
Burlington, VT. 05402

Dear Mr. Pottinger: Case: #70667-Larkin/Riverside

On February 3, 1988 we received a water sample from you for gross alpha, gross beta, tritium and radium analysis. The results of the analyses completed thus far are as follows:

Gross Alpha	12.30 ± 1.02	picocuries/liter
Gross Beta	20.53 ± 3.98	"
Tritium	310 ± 179	"

Please note these analyses were performed on the unfiltered water sample.

Results of the radium analysis will be forwarded to you as soon as it is completed.

Sincerely,
Cheryl Baker
Cheryl Baker
Radiation Chemist
Public Health Laboratory

CB/jw

Bill: paid

GROSS ALPHA

As radioactive materials decay they emit alpha and beta particles and gamma rays. Alpha and beta decay occurs when particles are emitted from the nucleus of the atom. Gamma rays are emissions of electromagnetic radiation similar to x-rays which results in a rearrangement of the charge and current distribution within the nucleus. Uranium decays to a number of intermediate radioactive decay products including radium and radon. As these products decay alpha and beta particles and gamma rays are produced. In Maine, radon is the most commonly found alpha emitter. Since radon is a gas, the gross alpha test does not measure radon, but does measure all other alpha emitters.

DRINKING WATER STANDARDS AND HEALTH RISKS:

Radiation exposure is known to cause developmental abnormalities, cancer and death. The travel distance of an alpha particle in air is very short, less than a centimeter. The outermost skin is composed of a layer of dead cells and therefore cell damage does not occur. However, internal organs are susceptible to damage from the short traveled alpha particles, therefore, gross alpha particles are capable of doing biological damage only when inhaled or ingested.

Currently there appears to be no completely safe lower limit of exposure to radioactivity. Drinking water health risk advisories for water containing gross alpha varies depending on which alpha emitters are present. The gross alpha activity including radium, but excluding radon and uranium should not exceed 15 picocuries per liter.

POSSIBLE SOURCE OF CONTAMINATION:

Uranium is an element occurring in trace concentrations in most rocks. All decay products, including radium and radon also occur naturally.

CORRECTING THE PROBLEM:

If the gross alpha activity exceeds 5 picocuries per liter, the water supply should also be tested for radium. If gross alpha is greater than 15 picocuries per liter, the water should also be tested for uranium, and this value then should be compared with total gross alpha. The maximum acceptable concentration for uranium has not yet been established. Once the actual source of gross alpha activity has been identified, an appropriate water treatment method including softening, ion exchange, or reverse osmosis can be used to lessen or remove the radioactivity. Obtaining a new source of water from a dug well or surface water source may be preferable, if possible. Please contact the Division of Health Engineering for assistance in choosing an appropriate remedial action.

IF YOU HAVE QUESTIONS OR NEED ADVICE ON HOW TO
CORRECT THE PROBLEM, CONTACT
THE DIVISION OF HEALTH ENGINEERING AT
289-3826.



John R. McKernan, Jr.
Governor

Rollin Ives
Commissioner

STATE OF MAINE
DEPARTMENT OF HUMAN SERVICES
AUGUSTA, MAINE 04333

February 8, 1988

Mike Pottinger
Wagner, Heindel and Noyes
PO Box 1629
Burlington, VT. 05402

Subject: Sample No. 70668 - Larkin/Riverside
Radon Water Analysis

Dear Sir:

The Radon-222 concentration in your water sample is calculated to be $110 + 70$ pCi/L (picocuries of radon per liter of water). A picocurie is a standard unit for measuring radioactivity.

Although there is no level of radiation which is completely safe, the Maine Department of Human Services has determined that appropriate corrective action should be taken if the water radon level exceeds 20,000 pCi/L. The higher the radon level and the longer the exposure, the greater the risk. Please compare the results of your test with the enclosed information sheet to determine what, if anything, you should do next.

If you desire additional clarification of your report or information concerning available methods of corrective action, please contact the Occupational and Residential Health Program at the Department of Human Services, State House Station #10, Augusta, Maine 04333 or telephone (207) 289-3826.

NOTE: Sample was corrected
for decay from
collection date 1-29-88

Sincerely,

Cheryl Baker
Radiation Chemist
Public Health Laboratory

CB/jw
enc.

RECEIVED FEB 11 1988

RADON IN WATER

- (1) If your radon water level is below 20,000 pCi/L, no follow-up or corrective action is recommended.
- (2) If your radon water level is in the range 20,000 to 40,000 pCi/L, one additional sample should be analyzed within 3 months to confirm this value since natural fluctuations are common. If the average result is below 20,000, no corrective action is recommended. If the average value is above 20,000, it is recommended that action be taken to reduce this level within 1 year.
- (3) If your radon level is in the range 40,000 to 60,000 pCi/L, one additional sample should be analyzed within 3 months to confirm this value. Appropriate corrective action is recommended within six months.
- (4) If your radon level is above 60,000 pCi/L, one additional sample should be analyzed as soon as possible to confirm this value. The Department recommends minimizing exposure time plus use of an exhaust fan in areas of high water usage. Appropriate corrective action should be performed within two months.

APPENDIX J

SOIL CHEMISTRY



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

PAGE ____ OF ____

PROJECT: LARKIN/RIVERIDE

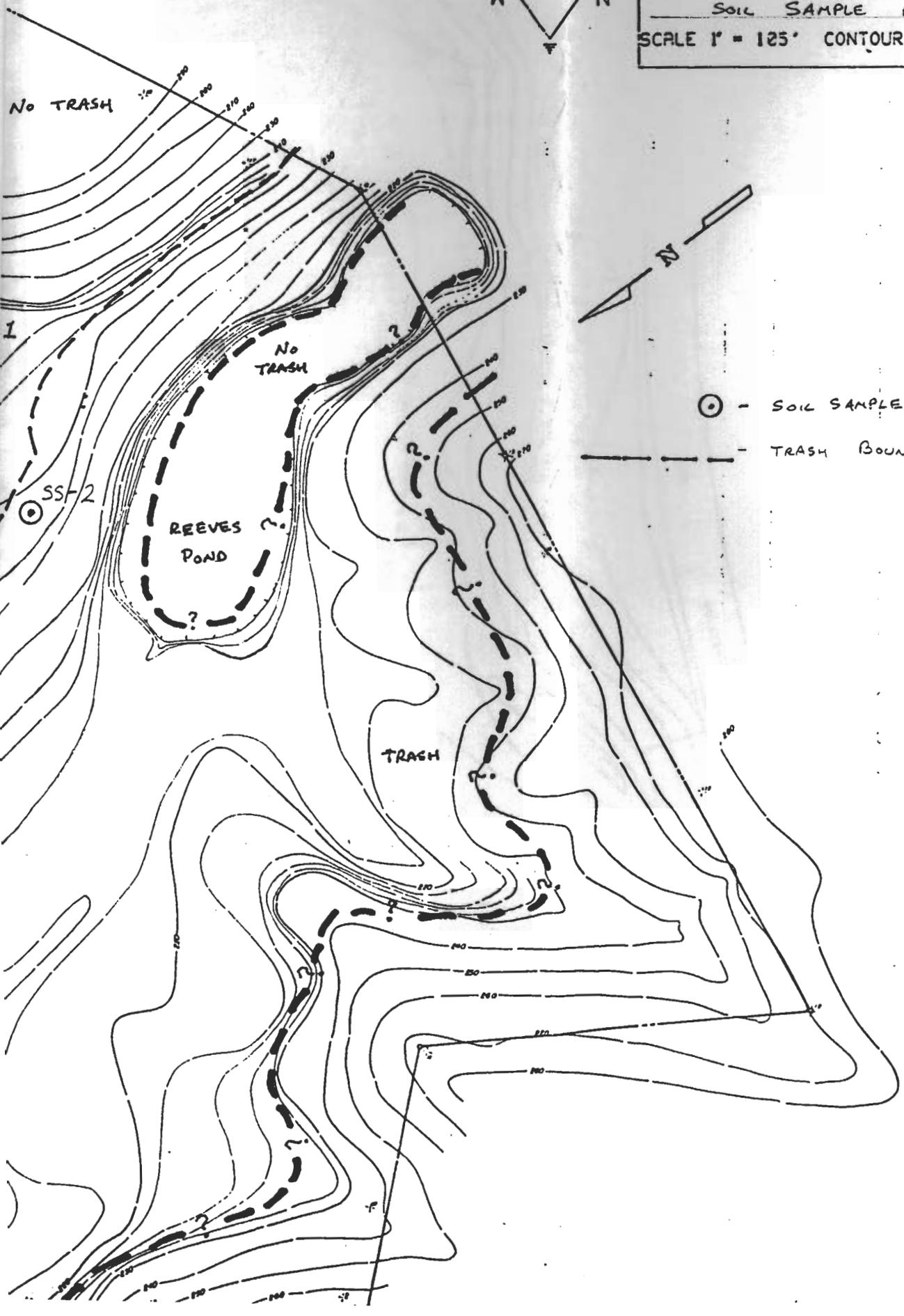
DATE: 7/13/88

SUMMARY OF CHEMICAL RESULTS FROM THE SAMPLING OF SOIL

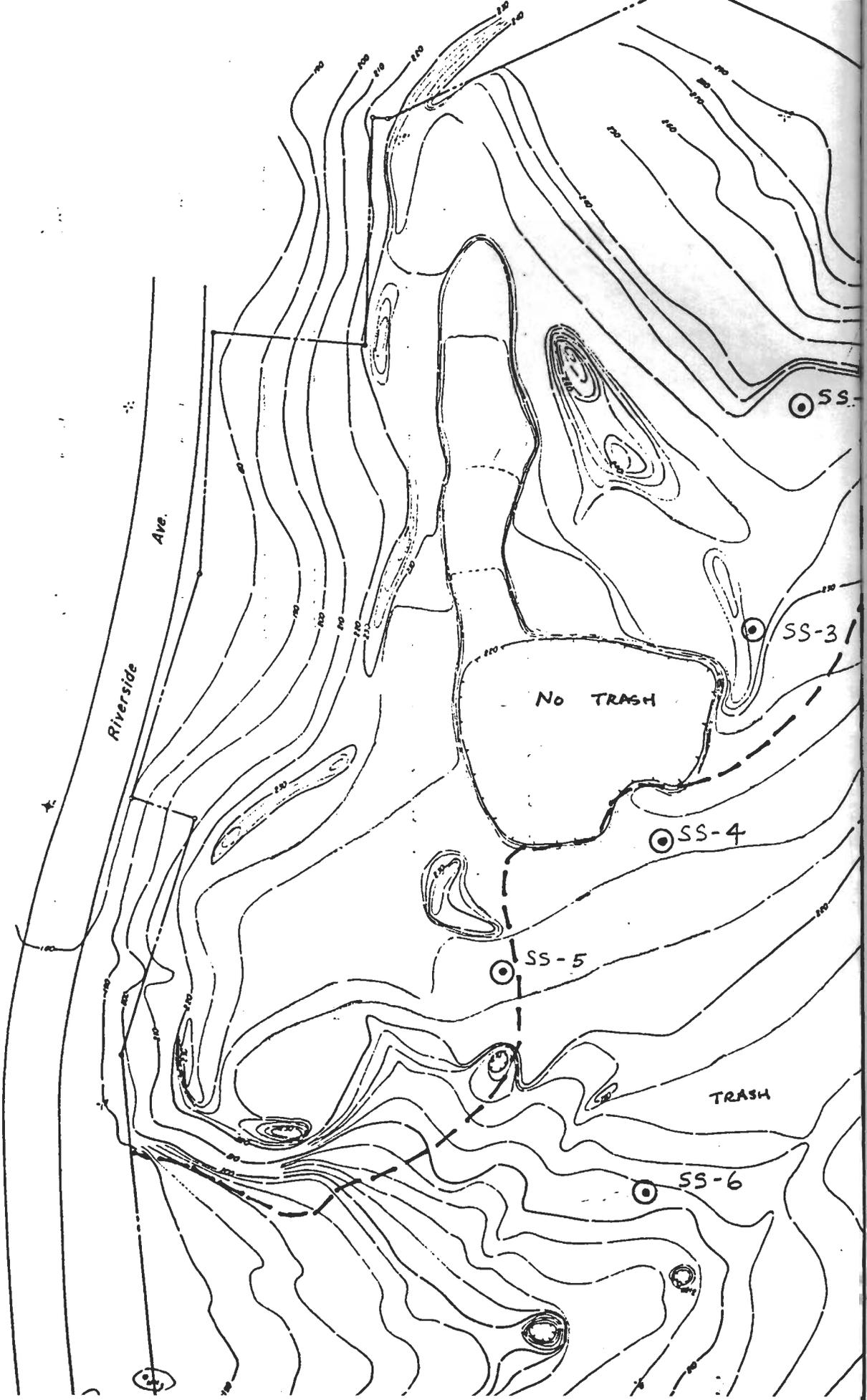
SAMPLE LOCATION	SAMPLE DATE	LAB METHOD	PARAMETER	CONCENTRATION Mg/l	UNIDENTIFIED PEAKS
SS1	12-10-87	EPA 601/602		ND ^a	0
SS2			TRICHLOROETHENE	2.6	0
SS3				ND	0
SS4*			1,1,1 - TRICHLOROETHANE	8.8	MANY ‡
SS5				ND	MANY ‡
SS4		EPA 624		ND	1
SS6		EPA 624/625		ND	5
SS4	2-3-88	EPA 624		ND	1
SS5		624/625		ND*	0
SS1	4-1-88	EPA 601/602		ND*	0
SS2				ND*	1
SS4				ND*	0
SS5				ND	0

NOTES:

- a - NONE DETECTED
- * LAB CONTAMINANT DETECTED
- ‡ SEE 624 OR 625 RESULTS FOR MORE INFORMATION



- - SOIL SAMPLE LOCATION
- - - - - TRASH BOUNDARY





Wagner, Heindel, and Noyes, Inc.
 Consulting Geologists Burlington, Vermont

PAGE 1 OF 1
 PROJECT: LAKEVIEW/12/19/88
 DATE: 1/88

MSA, TIP & HNU READINGS (TAKEN SHORTLY AFTER PIT EXCAVATION & WELL INSTALLATION)					
WELL #	INTERVAL (FT.)	% LEL ¹	% O ₂	TIP ²	HNU ³
701	NA ↓	001	20.6	2.0	
704		001	20.6	2.8	
710		000	20.4	1.5	
719		001	20.6	1.2-4.3	
721		001	20.6	1.8	
722		001	21.0	0.7	
723		001	21.0	00.7	
724		015	20.2	00.7	
MW 725		001	20.6	1.3	
726		001	20.8	1.0	
727		010	18.7	155	
728		505	18.8	120	
729		003	19.6	21	
TP 730		000	20.8	00.4	
MW 730		000	20.5	11.5	
TP 731		001	20.8	00.8	
733		005	12.7	160	
MW 734		000	21.0	00.7	
735		000	20.9	00.2	
736		003	20.0	6.0	
737		002	20.8	15.0	
738	000	20.5	00.0		
739	000	20.5	2.7		
740	000	20.5	00.7		
741	000	20.5	4.0		
REEVE'S POND		001	20.8	8-10	0.0
744		001	20.8	2-10	0.0
745		000	20.4	0.5	0.0

NOTES: SEE TEXT FOR MEASUREMENT METHODS
 1 = % LOWER EXPLOSIVITY LIMIT (5% CH₄ = 100% LEL)
 2 = PHOTOVAC TIP MEASURE OF PHOTO-IONIZABLE LEVELS (PPM)
 3 = HNU MEASURE OF PHOTO-IONIZABLE LEVELS (PPM)



Wagner, Heindel, and Noyes, Inc.
 Consulting Geologists Burlington, Vermont

PAGE 1 OF 4

PROJECT: LARVAL INVESTIGATION

DATE: 7/86

SPLIT SPOON MSA, TIP 1/3 HNU READINGS					
WELL #	INTERVAL (FT.)	% LEL ¹	% O ₂	TIP ²	HNU ³
208	0-2	0		0	0
	4.6-6.5	1		0.8	0
	9.3-11.3	0		0.1	0
	14.4-16.4	0		0	0
	19.6-21.6	0		00.6	0
	24.6-26.6	0		000-1.0	0
	29.6-31.6	0		00.0-00.4	0
	34.6-36.6	0		2.2	0
209	39.6-41.6	0		00.8	0
	0-2	0		0	0
	2-4	0		0	0
	4.9-6.9	0		0	0
	10.1-12.1	0		00.5	0
	15.1-17.1	0		00.5	0
210	20.6-22.2	0		00.0	0
	25.2-27.2	0		0	0
	0-2	0	20.8		0
	2-4	0	20.8		0
	5-7	0	20.8		0
	10-12	0	21.0		0
	16.7-17.7	0	20.9		0
	20.6-22.6	0	20.8		0
	25.6-27.6	0	20.8		0
	30.8-32.8	0	20.8		0
	35.6-37.6	0	20.8		0
	40.5-42.5	0	20.8		0
	45.8-47.8	0	20.8		0
	50.8-52.8	0	20.8		0
54.8-56.8	0	20.8		0	
61.2-63.2	0	20.8		0	

NOTES: SEE TEXT FOR MEASUREMENT METHODS
 1 = % LOWER EXPLOSIVITY LIMIT (5% CH₄ = 100% LEL)
 2 = PHOTOVAC TIP MEASURE OF PHOTO-IONIZABLE LEVELS (PPM)
 3 = HNU MEASURE OF PHOTO-IONIZABLE LEVELS (PPM)



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

PAGE 2 OF 4

PROJECT: LARWIN/RIVERSIDE

DATE: _____

SPLIT SPOON MSA, TIP $\frac{1}{2}$ HNU READINGS					
WELL #	INTERVAL (FT.)	% LEL ¹	% O ₂	TIP ²	HNU ³
211-D	0-2	0	20.8		0
	2-4	0	20.7		0
	5.7-6.7	0	20.7		0
	10.6-12.6	0	20.6		0
	15.6-17.6	0	20.6		0
	20.6-21.6	0	20.5		0
	25.6-27.6	0	20.5		0
	31.2-33.2	0	20.6		0
	35.0-36.0	0	20.6		0
	41-43	0	20.6		0
	46-48	0	20.7		0
	50.8-57.8	0	20.7		0.2
	56-58	0	20.6		0
60.7-62.7	0	20.7		0	
212-D	0-2	0	20.8		0
	2-4	0	20.8		0
	6.9-8.5	0	20.8		0
	11.5-13.5	0	20.8		0
	16.5-18.5	0	20.8		0
	21.5-23.5	0	20.8		0
	26.3-28.3	0	20.9		0
	31.7-33.7	0	20.7		0
	35.3-37.3	0	20.7		0
	41.7-43.7	0	20.8		0
	46.3-48.3	0	20.8		0
	52.1-54.1	0	20.8		0
	56.6-58.6	0	20.8		0
60.2-62.2	0	20.8		0	

NOTES: SEE TEXT FOR MEASUREMENT METHODS

- 1 = % LOWER EXPLOSIVITY LIMIT (5% CH₄ = 100% LEL)
 2 = PHOTOVAC TIP MEASURE OF PHOTO-IONIZABLE LEVELS (PPM)
 3 = HNU MEASURE OF PHOTO-IONIZABLE LEVELS (PPM)



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

WELL #	SPLIT SPOON MSA, TIP $\frac{1}{2}$ HNU READINGS INTERVAL (FT.)	% LEL ¹	% O ₂	TIP ²	HNU ³
213-D	0-2	0	20.9		0
	2-4	0	20.8		0
	5.5-7.5	0	20.6		0
	7.3-11.3	0	20.7		0
	20.4-22.4	0	20.8		0
	25.3-27.3	0	20.8		0
	30.2-32.2	0	20.8		0
	35.3-37.3	0	20.8		0
	40.1-42.1	0	20.7		0
	45.2-47.2	0	20.8		0
	50.2-52.2	0	20.8		0
	55.2-57.2	0	20.7		0
	59-60	0	20.9		0
65'	0	20.8		0	
214-S	0-2	0	20.8		0
	2-4	0	20.7		0
	5.2-6.2	0	20.8		0
	10.2-12.2	0	20.8		0
	15-17	0	20.8		0
	20.1-22.1	0	20.8		0
25.2-27.2	0	20.8		0	

NOTES: SEE TEXT FOR MEASUREMENT METHODS

1 = % LOWER EXPLOSIVITY LIMIT (5% CH₄ = 100% LEL)

2 = PHOTOVAC TIP MEASURE OF PHOTO-IONIZABLE LEVELS (PPM)

3 = HNU MEASURE OF PHOTO-IONIZABLE LEVELS (PPM)

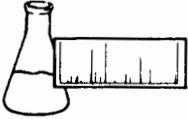


Wagner, Heindel, and Noyes, Inc.
 Consulting Geologists Burlington, Vermont

PAGE 4 OF 4
 PROJECT: LARKIN/RIVERSIDE
 DATE: _____

SPLIT SPOON MSA, TIP & HNU READINGS					
WELL #	INTERVAL (FT.)	%LEL ¹	% O ₂	TIP ²	HNU ³
215	6.1-7.1	0	20.6		0.2-0.8
	11.2-13.2	0	20.7		1.2
	16.0-18.0	0	20.8		0
	19.8-21.8	0	20.8		1
	26.2-28.2	0	20.8		0.2-0.3
	31.2-33.2	0	20.8		0.4
	36-38	0	20.8		0.3
	41.8-43.8	0	20.8		0.1
	46.7-48.7	0	20.8		0
	51.0-53.0	0	20.8		0
	53.7	0	20.8		0

NOTES: SEE TEXT FOR MEASUREMENT METHODS
 1 = % LOWER EXPLOSIVITY LIMIT (5% CH₄ = 100% LEL)
 2 = PHOTOVAC TIP MEASURE OF PHOTO-IONIZABLE LEVELS (PPM)
 3 = HNU MEASURE OF PHOTO-IONIZABLE LEVELS (PPM)



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: December 29, 1987
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample 1
SAMPLE COLLECTED BY: M. H. Pottinger REF. #: 1513
DATE SAMPLED: December 10, 1987 DATE RECEIVED: December 11, 1987

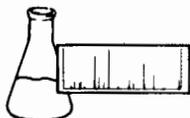
<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Methylene Chloride	BDL
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl Chloride	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by William R. Keenstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: December 29, 1987

CLIENT: Wagner, Heindel and Noyes, Inc.

PROJECT NAME: Larkin/Riverside STATION: Soil sample 1

SAMPLE COLLECTED BY: M. H. Pottinger

DATE SAMPLED: December 10, 1987

REF. #: 1513

DATE RECEIVED: December 11, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Benzene	BDL ²
Chlorobenzene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethylbenzene	BDL
Toluene	BDL
Xylenes	BDL

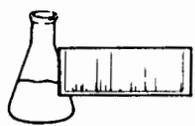
NUMBER OF UNIDENTIFIED PEAKS FOUND: 1

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by

William R. Keenstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT SOIL EXTRACTION ANALYSIS EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: May 2, 1988
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample # 1
SAMPLE COLLECTED BY: Jeff Prewitt REF. #: 2212
DATE SAMPLED: April 1, 1988 TIME SAMPLED: 2:20 PM
DATE RECEIVED: April 1, 1988

<u>Parameter</u>	<u>Concentration (ug/Kg)¹</u>
Bromodichloromethane	TBQ ⁴
Bromoform	ND ²
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinyl ether	ND
Chloroform	5.04
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Dichlorodifluoromethane	TBQ
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	PLE ³
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	TBQ
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	TBQ
Vinyl Chloride	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 None detected
- 3 Present in background laboratory environment
- 4 Trace but below quantification limit

Analyst: J. Morris

Reviewed by: William J. Leuster
300



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT
SOIL EXTRACTION ANALYSIS
EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: May 2, 1988
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample # 1
SAMPLE COLLECTED BY: Jeff Prewitt REF. #: 2212
DATE SAMPLED: April 1, 1988 TIME SAMPLED: 2:20 PM
DATE RECEIVED: April 1, 1988

<u>Parameter</u>	<u>Concentration (ug/Kg)¹</u>
Benzene	ND ²
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 1

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 None detected

Analyst: J. Morris

Reviewed by

William J. Leustra
85



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: December 29, 1987
 CLIENT: Wagner, Heindel and Noyes, Inc.
 PROJECT NAME: Larkin/Riverside STATION: Soil sample 2
 SAMPLE COLLECTED BY: M. H. Pottinger REF. #: 1514
 DATE SAMPLED: December 10, 1987 DATE RECEIVED: December 11, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Methylene Chloride	BDL
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	2.6
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl Chloride	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by

William R. Leerstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: December 29, 1987
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample 2
SAMPLE COLLECTED BY: M. H. Pottinger
DATE SAMPLED: December 10, 1987 REF. #: 1514
DATE RECEIVED: December 11, 1987

<u>Parameter</u>	<u>Concentration (ug/L)</u> ¹
Benzene	BDL ²
Chlorobenzene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethylbenzene	BDL
Toluene	TBD ³
Xylenes	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 1

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 Below detection limit
- 3 Trace but below detection limit

Reviewed by William R. Kenstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT
SOIL EXTRACTION ANALYSIS
EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: May 2, 1988
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample # 2
SAMPLE COLLECTED BY: Jeff Prewitt REF. #: 2213
DATE SAMPLED: April 1, 1988 TIME SAMPLED: 2:35 PM
DATE RECEIVED: April 1, 1988

<u>Parameter</u>	<u>Concentration (ug/Kg)¹</u>
Bromodichloromethane	ND ²
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinyl ether	ND
Chloroform	TBQ ⁴
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Dichlorodifluoromethane	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	PLE ³
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	TBQ
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 None detected
- 3 Present in background laboratory environment
- 4 Trace but below quantification limit

Analyst: J. Morris

Reviewed by: William J. Leach

863



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT
SOIL EXTRACTION ANALYSIS
EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: May 2, 1988
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample # 2
SAMPLE COLLECTED BY: Jeff Prewitt REF. #: 2213
DATE SAMPLED: April 1, 1988 TIME SAMPLED: 2:35 PM
DATE RECEIVED: April 1, 1988

<u>Parameter</u>	<u>Concentration (ug/Kg)¹</u>
Benzene	ND ²
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 1

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 None detected

Analyst: J. Morris

Reviewed by William J. Senatra

785



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: December 29, 1987
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample 3
SAMPLE COLLECTED BY: M. H. Pottinger REF. #: 1515
DATE SAMPLED: December 10, 1987 DATE RECEIVED: December 11, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Methylene Chloride	BDL
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl Chloride	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by William R. Lester



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: December 29, 1987

CLIENT: Wagner, Heindel and Noyes, Inc.

PROJECT NAME: Larkin/Riverside STATION: Soil sample 3

SAMPLE COLLECTED BY: M. H. Pottinger

DATE SAMPLED: December 10, 1987

REF. #: 1515

DATE RECEIVED: December 11, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Benzene	BDL ²
Chlorobenzene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethylbenzene	BDL
Toluene	BDL
Xylenes	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by William R. Beneta



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: December 29, 1987
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample 4
SAMPLE COLLECTED BY: M. H. Pottinger REF. #: 1516
DATE SAMPLED: December 10, 1987 DATE RECEIVED: December 11, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene'	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Methylene Chloride	12.8
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
1,1,1-Trichloroethane	8.8
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	TBD ³
Vinyl Chloride	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 Below detection limit
- 3 Trace but below detection limit

Reviewed by William R. Peneta



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: December 29, 1987

CLIENT: Wagner, Heindel and Noyes, Inc.

PROJECT NAME: Larkin/Riverside STATION: Soil sample 4

SAMPLE COLLECTED BY: M. H. Pottinger

DATE SAMPLED: December 10, 1987

REF. #: 1516

DATE RECEIVED: December 11, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Benzene	BDL ²
Chlorobenzene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethylbenzene	BDL
Toluene	BDL
Xylenes	PNI ³

NUMBER OF UNIDENTIFIED PEAKS FOUND: Many

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 Below detection limit
- 3 Present but not integrated (see Method 624 results)

Reviewed by William R. Benstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT
SOIL EXTRACTION ANALYSIS
EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: May 2, 1988
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample # 4
SAMPLE COLLECTED BY: Jeff Prewitt REF. #: 2214
DATE SAMPLED: April 1, 1988 TIME SAMPLED: 2:50 PM
DATE RECEIVED: April 1, 1988

<u>Parameter</u>	<u>Concentration (ug/Kg)</u> ¹
Bromodichloromethane	TBQ ⁴
Bromoform	ND ²
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinyl ether	ND
Chloroform	2.56
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Dichlorodifluoromethane	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	PLE ³
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	TBQ
Vinyl Chloride	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

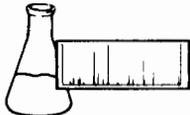
NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 None detected
- 3 Present in background laboratory environment
- 4 Trace but below quantification limit

Analyst: J. Morris

Reviewed by: William J. ...

305



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT
SOIL EXTRACTION ANALYSIS
EPA METHOD 602 -- PURGEABLE AROMATICS

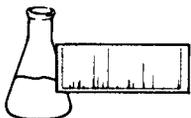
DATE: May 2, 1988
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample # 4
SAMPLE COLLECTED BY: Jeff Prewitt REF. #: 2214
DATE SAMPLED: April 1, 1988 TIME SAMPLED: 2:50 PM
DATE RECEIVED: April 1, 1988

<u>Parameter</u>	<u>Concentration (ug/Kg)¹</u>
Benzene	TBQ ³
Chlorobenzene	TBQ
1,2-Dichlorobenzene	ND ²
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	TBQ
Xylenes	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

- NOTES:
- 1 Method 602 detection limit is 1 ug/L
 - 2 None detected
 - 3 Trace but below quantification limit

Analyst: J. Morris Reviewed by William Lee/1003



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: December 29, 1987
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample 5
SAMPLE COLLECTED BY: M. H. Pottinger REF. #: 1517
DATE SAMPLED: December 10, 1987 DATE RECEIVED: December 11, 1987

<u>Parameter</u>	<u>Concentration (ug/L)¹</u>
Bromodichloromethane	BDL ²
Bromoform	BDL
Bromomethane	BDL
Carbon tetrachloride	BDL
Chlorobenzene	BDL
Chloroethane	BDL
2-Chloroethylvinyl ether	BDL
Chloroform	BDL
Chloromethane	BDL
Dibromochloromethane	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Dichlorodifluoromethane	BDL
1,1-Dichloroethane	BDL
1,2-Dichloroethane	BDL
1,1-Dichloroethene	BDL
trans-1,2-Dichloroethene	BDL
1,2-Dichloropropane	BDL
cis-1,3-Dichloropropene	BDL
trans-1,3-Dichloropropene	BDL
Methylene Chloride	BDL
1,1,2,2-Tetrachloroethane	BDL
Tetrachloroethene	BDL
1,1,1-Trichloroethane	BDL
1,1,2-Trichloroethane	BDL
Trichloroethene	BDL
Trichlorofluoromethane	BDL
Vinyl Chloride	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 1

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by William R. Beneto



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: December 29, 1987

CLIENT: Wagner, Heindel and Noyes, Inc.

PROJECT NAME: Larkin/Riverside STATION: Soil sample 5

SAMPLE COLLECTED BY: M. H. Pottinger

DATE SAMPLED: December 10, 1987

REF. #: 1517

DATE RECEIVED: December 11, 1987

<u>Parameter</u>	<u>Concentration (ug/L)</u> ¹
Benzene	BDL ²
Chlorobenzene	BDL
1,2-Dichlorobenzene	BDL
1,3-Dichlorobenzene	BDL
1,4-Dichlorobenzene	BDL
Ethylbenzene	BDL
Toluene	BDL
Xylenes	BDL

NUMBER OF UNIDENTIFIED PEAKS FOUND: Many

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 Below detection limit

Reviewed by

William R. Benstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT
SOIL EXTRACTION ANALYSIS
EPA METHOD 601 -- PURGEABLE HALOCARBONS

DATE: May 2, 1988
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample # 5
SAMPLE COLLECTED BY: Jeff Prewitt REF. #: 2215
DATE SAMPLED: April 1, 1988 TIME SAMPLED: 3:00 PM
DATE RECEIVED: April 1, 1988

<u>Parameter</u>	<u>Concentration (ug/Kg)¹</u>
Bromodichloromethane	TBQ ⁴
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinyl ether	ND
Chloroform	9.17
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Dichlorodifluoromethane	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	PLE ³
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	TBQ
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	TBQ
Vinyl Chloride	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 601 detection limit is 1 ug/L
- 2 None detected
- 3 Present in background laboratory environment
- 4 Trace but below quantification limit

Analyst: J. Morris

Reviewed by: William J. Lemstra
JCS



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT
SOIL EXTRACTION ANALYSIS
EPA METHOD 602 -- PURGEABLE AROMATICS

DATE: May 2, 1988
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample # 5
SAMPLE COLLECTED BY: Jeff Prewitt REF. #: 2215
DATE SAMPLED: April 1, 1988 TIME SAMPLED: 3:00 PM
DATE RECEIVED: April 1, 1988

<u>Parameter</u>	<u>Concentration (ug/Kg)¹</u>
Benzene	ND ²
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

- NOTES:
- 1 Method 602 detection limit is 1 ug/L
 - 2 None detected

Analyst: J. Morris Reviewed by William J. Leavitt / PEO



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT EPA METHOD 624 -- GC/MS PURGEABLES

DATE: December 29, 1987
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample 4
SAMPLE COLLECTED BY: M. H. Pottinger REF. #: 1516
DATE SAMPLED: December 10, 1987 DATE RECEIVED: December 11, 1987

<u>Parameter</u>	<u>Quantification</u> <u>Limit (ug/L)</u>	<u>Concentration</u> <u>(ug/L)</u>
Benzene	5	BQL ¹
Bromodichloromethane	5	BQL
Bromoform	5	BQL
Bromomethane	20	BQL
Carbon tetrachloride	5	BQL
Chlorobenzene	10	BQL
Chloroethane	20	BQL
2-Chloroethylvinyl ether	10	BQL
Chloroform	5	BQL
Chloromethane	20	BQL
Dibromochloromethane	5	BQL
1,2-Dichlorobenzene	10	BQL
1,3-Dichlorobenzene	10	BQL
1,4-Dichlorobenzene	10	BQL
1,1-Dichloroethane	5	BQL
1,2-Dichloroethane	5	BQL
1,1 Dichloroethene	5	BQL
trans-1,2-Dichloroethene	5	BQL
1,2-Dichloropropane	10	BQL
cis-1,3-Dichloropropene	10	BQL
trans-1,3-Dichloropropene	10	BQL
Ethyl Benzene	10	BQL
Methylene Chloride	5	BQL
1,1,2,2-Tetrachloroethane	10	BQL
Tetrachloroethene	5	BQL
Toluene	10	BQL
1,1,1-Trichloroethane	5	BQL
1,1,2-Trichloroethane	5	BQL
Trichloroethene	5	BQL
Trichlorofluoromethane	10	BQL
Vinyl Chloride	20	BQL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 1

NOTES:

- 1 Below quantitation limit
- 2 Trace but below quantitation limit

Reviewed by William R. Seneta



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 625 -- GC/MS BASE/NEUTRALS AND ACIDS

DATE: March 21, 1988
 CLIENT: Wagner, Heindel and Noyes, Inc.
 PROJECT NAME: Larkin/Riverside STATION: Soil sample 4
 SAMPLE COLLECTED BY: J. Prewitt REF. #: 1797
 DATE SAMPLED: February 3, 1988 DATE RECEIVED: Feb. 3, 1988

BASE/NEUTRAL EXTRACTABLES

<u>Parameter</u>	<u>Quantification</u> <u>Limit (ug/L)</u>	<u>Concentration</u> <u>(ug/L)</u>
Acenaphthene	1	ND ¹
Acenaphthylene	1	ND
Anthracene	1	ND
Aldrin	1	ND
Benzo(a)anthracene	1	ND
Benzo(b)fluoranthene	1	ND
Benzo(k)fluoranthene	1	ND
Benzo(a)pyrene	1	ND
Benzo(ghi)perylene	10	ND
Benzyl butyl phthalate	1	PLC ²
Bis(2-chloroethyl)ether	1	ND
Bis(2-chloroethoxyl)methane	1	ND
Bis(2-ethylhexyl)phthalate	1	PLC
Bis(2-chloroisopropyl)ether	1	ND
4-Bromophenyl phenyl ether	1	ND
2-Chloronaphthalene	1	ND
4-Chlorophenyl phenyl ether	1	ND
Chrysene	1	ND
Dibenzo(a,h)anthracene	1	ND
Di-n-butylphthalate	1	PLC
1,3-Dichlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
3,3'-Dichlorobenzidine	1	ND
Diethyl phthalate	1	ND
Dimethyl phthalate	1	ND
2,4-Dinitrotoluene	1	ND
2,6-Dinitrotoluene	1	ND
Di-n-octylphthalate	1	ND
Fluoranthene	1	ND
Fluorene	1	ND
Hexachlorobenzene	1	ND



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
RE # 8791433 #1797

EPA METHOD 625 (continued)

<u>Parameter</u>	<u>Quantification Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Hexachlorobutadiene	1	ND
Hexachloroethane	1	ND
Indeno(1,2,3-cd)pyrene	10	ND
Isophorone	1	ND
Naphthalene	1	ND
Nitrobenzene	1	ND
N-Nitrosodi-n-propylamine	1	ND
Phenanthrene	1	ND
Pyrene	1	ND
1,2,4-Trichlorobenzene	1	ND

ACID EXTRACTABLES

4-Chloro-3-methylphenol	1	TBQ ³
2-Chlorophenol	1	ND
2,4-Dichlorophenol	1	ND
2,4-Dimethylphenol	1	ND
2,4-Dinitrophenol	1	ND
2-Methyl-4,6-dinitrophenol	1	ND
2-Nitrophenol	1	ND
4-Nitrophenol	1	ND
Pentachlorophenol	1	ND
Phenol	1	ND
2,4,6-Trichlorophenol	1	ND

ADDITIONAL EXTRACTABLE PARAMETERS

Benzidine	10	ND
Hexachlorocyclopentadiene	10	ND
N-Nitrosodimethylamine	10	ND
N-Nitrosodiphenylamine	1	ND

NOTES:

- 1 None detected
- 2 Present due to laboratory contamination
- 3 Trace but below quantification limit

Analyst: B. Stearns Date of analysis:

Reviewed by: William R. Kenstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT
EPA METHOD 624 -- GC/MS PURGEABLES

DATE: March 8, 1988
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil spl.(SS 5)
SAMPLE COLLECTED BY: Jeff Prewitt REF. #: 1796
DATE SAMPLED: February 3, 1988 DATE RECEIVED: Feb. 3, 1988

<u>Parameter</u>	<u>Quantification</u> <u>Limit (ug/L)</u>	<u>Concentration</u> <u>(ug/L)</u>
Benzene	5	ND ¹
Bromodichloromethane	5	ND
Bromoform	5	ND
Bromomethane	20	ND
Carbon tetrachloride	5	ND
Chlorobenzene	10	ND
Chloroethane	20	ND
2-Chloroethylvinyl ether	10	ND
Chloroform	5	ND
Chloromethane	20	ND
Dibromochloromethane	5	ND
1,2-Dichlorobenzene	10	ND
1,3-Dichlorobenzene	10	ND
1,4-Dichlorobenzene	10	ND
1,1-Dichloroethane	5	ND
1,2-Dichloroethane	5	ND
1,1 Dichloroethene	5	ND
trans-1,2-Dichloroethene	5	ND
1,2-Dichloropropane	10	ND
cis-1,3-Dichloropropene	10	ND
trans-1,3-Dichloropropene	10	ND
Ethyl Benzene	10	ND
Methylene Chloride	5	TBQ ²
1,1,2,2-Tetrachloroethane	10	ND
Tetrachloroethene	5	ND
Toluene	10	ND
1,1,1-Trichloroethane	5	ND
1,1,2-Trichloroethane	5	ND
Trichloroethene	5	ND
Trichlorofluoromethane	10	ND
Vinyl Chloride	20	ND

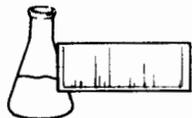
NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 None detected
- 2 Trace but below quantitation limit.

Analyst: B. Stearns

Reviewed by William D. Benetra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 625 -- GC/MS BASE/NEUTRALS AND ACIDS

DATE: March 21, 1988

CLIENT: Wagner, Heindel and Noyes, Inc.

PROJECT NAME: Larkin/Riverside

STATION: Soil sample 5

SAMPLE COLLECTED BY: J. Prewitt

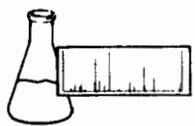
REF. #: 1796

DATE SAMPLED: February 3, 1988

DATE RECEIVED: Feb. 3, 1988

BASE/NEUTRAL EXTRACTABLES

<u>Parameter</u>	<u>Quantification</u> <u>Limit (ug/L)</u>	<u>Concentration</u> <u>(ug/L)</u>
Acenaphthene	1	ND ¹
Acenaphthylene	1	ND
Anthracene	1	ND
Aldrin	1	ND
Benzo(a)anthracene	1	ND
Benzo(b)fluoranthene	1	ND
Benzo(k)fluoranthene	1	ND
Benzo(a)pyrene	1	ND
Benzo(ghi)perylene	10	ND
Benzyl butyl phthalate	1	PLC ²
Bis(2-chloroethyl)ether	1	ND
Bis(2-chloroethoxyl)methane	1	ND
Bis(2-ethylhexyl)phthalate	1	PLC
Bis(2-chloroisopropyl)ether	1	ND
4-Bromophenyl phenyl ether	1	ND
2-Chloronaphthalene	1	ND
4-Chlorophenyl phenyl ether	1	ND
Chrysene	1	ND
Dibenzo(a,h)anthracene	1	ND
Di-n-butylphthalate	1	PLC
1,3-Dichlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
3,3'-Dichlorobenzidine	1	ND
Diethyl phthalate	1	ND
Dimethyl phthalate	1	ND
2,4-Dinitrotoluene	1	ND
2,6-Dinitrotoluene	1	ND
Di-n-octylphthalate	1	ND
Fluoranthene	1	ND
Fluorene	1	ND
Hexachlorobenzene	1	ND



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

REF. #: 1796

EPA METHOD 625 (continued)

<u>Parameter</u>	<u>Quantification Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Hexachlorobutadiene	1	ND
Hexachloroethane	1	ND
Indeno(1,2,3-cd)pyrene	10	ND
Isophorone	1	ND
Naphthalene	1	ND
Nitrobenzene	1	ND
N-Nitrosodi-n-propylamine	1	ND
Phenanthrene	1	ND
Pyrene	1	ND
1,2,4-Trichlorobenzene	1	ND

ACID EXTRACTABLES

4-Chloro-3-methylphenol	1	ND
2-Chlorophenol	1	ND
2,4-Dichlorophenol	1	ND
2,4-Dimethylphenol	1	ND
2,4-Dinitrophenol	1	ND
2-Methyl-4,6-dinitrophenol	1	ND
2-Nitrophenol	1	ND
4-Nitrophenol	1	ND
Pentachlorophenol	1	ND
Phenol	1	ND
2,4,6-Trichlorophenol	1	ND

ADDITIONAL EXTRACTABLE PARAMETERS

Benzidine	10	ND
Hexachlorocyclopentadiene	10	ND
N-Nitrosodimethylamine	10	ND
N-Nitrosodiphenylamine	1	ND

NOTES:

- 1 None detected
- 2 Present due to laboratory contamination

Analyst: B. Stearns

Date of analysis:

Reviewed by: William R. Keenstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT
EPA METHOD 624 -- GC/MS PURGEABLES

DATE: December 29, 1987
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Soil sample 6
SAMPLE COLLECTED BY: M. H. Pottinger REF. #: 1518
DATE SAMPLED: December 10, 1987 DATE RECEIVED: December 11, 1987

<u>Parameter</u>	<u>Quantification</u> <u>Limit (ug/L)</u>	<u>Concentration</u> <u>(ug/L)</u>
Benzene	5	BQL ¹
Bromodichloromethane	5	BQL
Bromoform	5	BQL
Bromomethane	20	BQL
Carbon tetrachloride	5	BQL
Chlorobenzene	10	BQL
Chloroethane	20	BQL
2-Chloroethylvinyl ether	10	BQL
Chloroform	5	BQL
Chloromethane	20	BQL
Dibromochloromethane	5	BQL
1,2-Dichlorobenzene	10	BQL
1,3-Dichlorobenzene	10	BQL
1,4-Dichlorobenzene	10	BQL
1,1-Dichloroethane	5	BQL
1,2-Dichloroethane	5	BQL
1,1 Dichloroethene	5	BQL
trans-1,2-Dichloroethene	5	BQL
1,2-Dichloropropane	10	BQL
cis-1,3-Dichloropropene	10	BQL
trans-1,3-Dichloropropene	10	BQL
Ethyl Benzene	10	BQL
Methylene Chloride	5	BQL
1,1,2,2-Tetrachloroethane	10	BQL
Tetrachloroethene	5	BQL
Toluene	10	BQL
1,1,1-Trichloroethane	5	BQL
1,1,2-Trichloroethane	5	BQL
Trichloroethene	5	BQL
Trichlorofluoromethane	10	BQL
Vinyl Chloride	20	BQL

NUMBER OF UNIDENTIFIED PEAKS FOUND: 5

NOTES:

- 1 Below quantitation limit
- 2 Trace but below quantitation limit

Reviewed by William R. Beers



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT

EPA METHOD 625 -- GC/MS BASE/NEUTRALS AND ACIDS

DATE: March 21, 1988

CLIENT: Wagner, Heindel and Noyes, Inc.

PROJECT NAME: Larkin/Riverside STATION: Soil sample 6

SAMPLE COLLECTED BY: M. Pottinger REF. #: 1518

DATE SAMPLED: December 10, 1987 DATE RECEIVED: Dec. 11, 1987

BASE/NEUTRAL EXTRACTABLES

<u>Parameter</u>	<u>Quantification Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Acenaphthene	1	ND ¹
Acenaphthylene	1	ND
Anthracene	1	ND
Aldrin	1	ND
Benzo(a)anthracene	1	ND
Benzo(b)fluoranthene	1	ND
Benzo(k)fluoranthene	1	ND
Benzo(a)pyrene	1	ND
Benzo(ghi)perylene	10	ND
Benzyl butyl phthalate	1	ND
Bis(2-chloroethyl)ether	1	ND
Bis(2-chloroethoxyl)methane	1	ND
Bis(2-ethylhexyl)phthalate	1	ND
Bis(2-chloroisopropyl)ether	1	ND
4-Bromophenyl phenyl ether	1	ND
2-Chloronaphthalene	1	ND
4-Chlorophenyl phenyl ether	1	ND
Chrysene	1	ND
Dibenzo(a,h)anthracene	1	ND
Di-n-butylphthalate	1	ND
1,3-Dichlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
3,3'-Dichlorobenzidine	1	ND
Diethyl phthalate	1	ND
Dimethyl phthalate	1	ND
2,4-Dinitrotoluene	1	ND
2,6-Dinitrotoluene	1	ND
Di-n-octylphthalate	1	ND
Fluoranthene	1	ND
Fluorene	1	ND
Hexachlorobenzene	1	ND



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

REF. #: 1518

EPA METHOD 625 (continued)

<u>Parameter</u>	<u>Quantification Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Hexachlorobutadiene	1	ND
Hexachloroethane	1	ND
Indeno(1,2,3-cd)pyrene	10	ND
Isophorone	1	ND
Naphthalene	1	ND
Nitrobenzene	1	ND
N-Nitrosodi-n-propylamine	1	ND
Phenanthrene	1	ND
Pyrene	1	ND
1,2,4-Trichlorobenzene	1	ND

ACID EXTRACTABLES

4-Chloro-3-methylphenol	1	ND
2-Chlorophenol	1	ND
2,4-Dichlorophenol	1	ND
2,4-Dimethylphenol	1	ND
2,4-Dinitrophenol	1	ND
2-Methyl-4,6-dinitrophenol	1	ND
2-Nitrophenol	1	ND
4-Nitrophenol	1	ND
Pentachlorophenol	1	ND
Phenol	1	ND
2,4,6-Trichlorophenol	1	ND

ADDITIONAL EXTRACTABLE PARAMETERS

Benzidine	10	ND
Hexachlorocyclopentadiene	10	ND
N-Nitrosodimethylamine	10	ND
N-Nitrosodiphenylamine	1	ND

NOTES:

1 None detected

Analyst: B. Stearns

Date of analysis:

Reviewed by:

William R. Penstra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT EPA METHOD 624 -- GC/MS PURGEABLES

DATE: March 8, 1988
CLIENT: Wagner, Heindel and Noyes, Inc.
PROJECT NAME: Larkin/Riverside STATION: Field blank
SAMPLE COLLECTED BY: Jeff Prewitt REF. #: 1802
DATE SAMPLED: February 3, 1988 DATE RECEIVED: Feb. 3, 1988

<u>Parameter</u>	<u>Quantification</u> <u>Limit (ug/L)</u>	<u>Concentration</u> <u>(ug/L)</u>
Benzene	5	ND ¹
Bromodichloromethane	5	ND
Bromoform	5	ND
Bromomethane	20	ND
Carbon tetrachloride	5	ND
Chlorobenzene	10	ND
Chloroethane	20	ND
2-Chloroethylvinyl ether	10	ND
Chloroform	5	TBQ ²
Chloromethane	20	ND
Dibromochloromethane	5	ND
1,2-Dichlorobenzene	10	ND
1,3-Dichlorobenzene	10	ND
1,4-Dichlorobenzene	10	ND
1,1-Dichloroethane	5	ND
1,2-Dichloroethane	5	ND
1,1 Dichloroethene	5	ND
trans-1,2-Dichloroethene	5	ND
1,2-Dichloropropane	10	ND
cis-1,3-Dichloropropene	10	ND
trans-1,3-Dichloropropene	10	ND
Ethyl Benzene	10	ND
Methylene Chloride	5	21.1 ³
1,1,2,2-Tetrachloroethane	10	ND
Tetrachloroethene	5	ND
Toluene	10	ND
1,1,1-Trichloroethane	5	ND
1,1,2-Trichloroethane	5	ND
Trichloroethene	5	ND
Trichlorofluoromethane	10	ND
Vinyl Chloride	20	ND

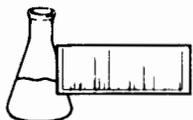
NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 None detected
- 2 Trace but below quantitation limit
- 3 Possible lab contaminant

Analyst: B. Stearns

Reviewed by William R. Penetra



ENDYNE, INC.

Laboratory Services

1 Wentworth Drive
Williston, Vermont 05495
(802) 879-4333

LABORATORY REPORT EPA METHOD 624 -- GC/MS PURGEABLES

DATE: March 8, 1988
 CLIENT: Wagner, Heindel and Noyes, Inc.
 PROJECT NAME: Larkin/Riverside STATION: Trip blank
 SAMPLE COLLECTED BY: Jeff Prewitt REF. #: 1803
 DATE SAMPLED: February 3, 1988 DATE RECEIVED: Feb. 3, 1988

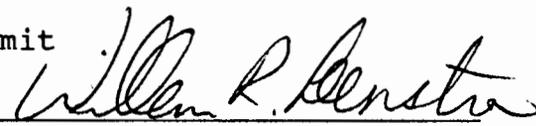
<u>Parameter</u>	<u>Quantification</u>	<u>Concentration</u>
	<u>Limit (ug/L)</u>	<u>(ug/L)</u>
Benzene	5	ND ¹
Bromodichloromethane	5	ND
Bromoform	5	ND
Bromomethane	20	ND
Carbon tetrachloride	5	ND
Chlorobenzene	10	ND
Chloroethane	20	ND
2-Chloroethylvinyl ether	10	ND
Chloroform	5	TBQ ²
Chloromethane	20	ND
Dibromochloromethane	5	ND
1,2-Dichlorobenzene	10	ND
1,3-Dichlorobenzene	10	ND
1,4-Dichlorobenzene	10	ND
1,1-Dichloroethane	5	ND
1,2-Dichloroethane	5	ND
1,1 Dichloroethene	5	ND
trans-1,2-Dichloroethene	5	ND
1,2-Dichloropropane	10	ND
cis-1,3-Dichloropropene	10	ND
trans-1,3-Dichloropropene	10	ND
Ethyl Benzene	10	ND
Methylene Chloride	5	20.9 ³
1,1,2,2-Tetrachloroethane	10	ND
Tetrachloroethene	5	ND
Toluene	10	ND
1,1,1-Trichloroethane	5	ND
1,1,2-Trichloroethane	5	ND
Trichloroethene	5	ND
Trichlorofluoromethane	10	ND
Vinyl Chloride	20	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 None detected
- 2 Trace but below quantitation limit
- 3 Possible lab contaminant

Analyst: B. Stearns

Reviewed by 

APPENDIX K

SLUDGE CHEMISTRY



Industrial & Environmental Analysts, Inc.
P.O. Box 626 • Essex Junction, Vermont 05452 • 802-878-5138

ANALYSIS REPORT

Customer: Wagner, Heindel & Noyes, Inc.
Address: Box 1629
City, State, Zip: Burlington, VT 05402-1629
Attention: Craig Heindel

Date: 22 Oct 1986
Date Samples Received: 8 Oct 1986
Customer Order Number:

SLUDGE ANALYSIS

RIVERSIDE - LARKIN

	<u>SS1</u>	<u>SS2</u>	<u>SS3</u>
Barium (mg/kg)	4.89	5.70	107.
Cadmium (mg/kg)	0.82	2.53	0.62
Chromium (mg/kg)	5.35	50.6	14.3
Copper (mg/kg)	23.0	199.	11.5
Lead (mg/kg)	6.17	85.4	4.27
Mercury (mg/kg)	$-\frac{1}{2.5}$	$-\frac{1}{2.5}$	1.37
Nickel (mg/kg)	12.1	50.9	16.6
Nitrogen, nitrate-nitrite (mg/kg)	<0.25	4.37	1.70
Nitrogen, total kjeldahl (mg/kg)	1690.	2240.	<70.
pH	7.7	7.5	7.8
Zinc (mg/kg)	24.4	146.	20.9

¹Results being confirmed.

Signature

Catherine W. Cutting

Reference: 28660

Offices and laboratories located in: Essex Junction, Vermont
Research Triangle Park, North Carolina



Industrial & Environmental Analysts, Inc.
P.O. Box 626 • Essex Junction, Vermont 05452 • 802-878-5138

ANALYSIS REPORT

Customer: Wagner, Heindel & Noyes, Inc.
Address: Box 1629
City, State, Zip: Burlington, VT 05402-1629
Attention: Craig Heindel

Date: 13 Nov 1986
Date Samples Received: 8 Oct 1986

SLUDGE ANALYSIS
RIVERSIDE - LARKIN

	<u>SS1</u>	<u>SS2</u>
Mercury (mg/kg)	<0.5	<0.5

Note: The laboratory had difficulty with these analyses due to matrix interference.

Signature Catherine W. Cutting

TABLE 11.5
Natural, and Apparently Safe, Soil and Plant Concentrations of Elements
That Have Been Designated as Being Toxic^a

ELEMENT	TOTAL SOIL			PLANTS RANGE (mg kg ⁻¹)
	TYPICAL VALUE (mg kg ⁻¹)	RANGE (mg kg ⁻¹)	SOIL SOLUTION (mg L ⁻¹)	
Aluminum	50 000	10 000-200 000	0.1-0.6	—
Arsenic	5	1-50	0.1	—
Beryllium	1	0.2-10	0.001 ^b	—
Cadmium	0.06	0.01-7	0.001 ^b	0.1-0.8
Chromium	20	5-1000	0.001 ^b	—
Cobalt	8	1-40	0.01 ^b	0.05-0.5
Copper	20	2-100	0.03-0.3	4-15
Lead	10	2-200	0.001 ^b	0.1-10
Manganese	850	100-4000	0.1-10	15-100
Mercury	0.05	0.02-0.2	0.001	—
Nickel	40	10-1000	0.05 ^b	~1
Selenium	0.5	0.1-2.0	0.001-0.01	—
Zinc	50	10-300	<0.005	8-15

^aFrom W. H. Allaway, *Advan. Agron.* 20:235 (1968); R. P. Murrman and F. R. Koutz, Special Report No. 171, U.S. Army Cold Regions Research and Engineering Lab, Hanover, New Hampshire, 1972; and G. R. Bradford, et al., *J. Environmental Quality* 4:123 (1975).

^bEstimated as 30 times its concentration in seawater.

NOTE: BARIUM - TYPICAL RANGE -
100 - 3,000 mg/kg (P. 294)

SOURCE: SOIL CHEMISTRY 2ND ED.
BOHN, Mc NEAL, & O'CONNOR
P. 314



State of Vermont

RECEIVED SEP 18 1987

AGENCY OF ENVIRONMENTAL CONSERVATION

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Water Resources & Environmental Engineering
Natural Resources Conservation Council
State Geologist

103 South Main Street
Waterbury, Vermont 05676
Department of Water Resources
and
Environmental Engineering

September 15, 1987

Mr. Jeffrey E. Noyes
Wagner, Heindel, & Noyes, Inc.
P.O. Box 1629
Burlington, VT 05402-1629

Dear Jeff:

This letter is in response to your September 10, 1987 letter requesting approval to remove sludge from the Riverside Avenue site and bring it to the Burlington sanitary landfill.

The Agency of Natural Resources, Solid Waste Management Section, grants permission to dispose of the sludge at the Burlington landfill, providing they will accept it, and contingent upon receipt of the following information and conditions:

- 1) Test results indicating a solids content of at least 20% (the requirement necessary for landfilling).
- 2) Information indicating the quantity, and quality of the sludge indicating it has a "relatively innocuous chemical makeup".

Although the Agency does indeed discourage the landfilling of municipal sludge, upon receipt of the above information indicating the sludge meets landfilling requirements, dispose of the sludge in the following manner:

- 1) Dispose of the sludge only within the present landfill area and working face at the Burlington sanitary landfill.
- 2) Ensure the disposal area will not impact surface water due to erosion of debris.
- 3) Dispose of the de-watered sludge in the same method as regular municipal solid waste. Ensure proper lift thickness, compaction, application of six (6) inches of daily cover material, and grading at the end of the disposal day. Under no circumstances will the sludge be used for daily, intermediate, or final cover material.

After receipt of the requested information by this Agency, please notify this office in writing of the date this waste was disposed.

Should you have any questions, feel free to contact me at 244-8702.

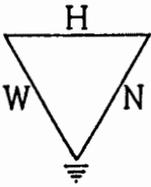
Sincerely,



William E. Ahearn, Chief
Solid Waste Management Section.

WA/BH/js

cc: John Larkin
Steve Goodkind



Wagner, Heindel, and Noyes, Inc. consulting geologists

P.O. Box 1629 Burlington, Vermont 05402-1629 802-658-0820

September 25, 1987

COPY

Mr. William E. Ahearn
Chief Solid Waste Section
Department of Water Resources
and Environmental Engineering
103 South Main Street
Waterbury, VT 05676

Dear Bill:

Thank you for your letter of September 15, 1987. In that letter you requested information on the sludge from the abandoned Riverside Avenue landfill. This included test results indicating that the solid content of the waste material is at least 20% and that the sludge has a relatively innocuous chemical make-up. I have attached for your review the information you asked for.

The results of moisture content calculations have been tabulated on the first page of the attached material. A sludge sample collected on September 21, 1987 was dried for 24 hours at 110°C and the standard procedures and calculations for moisture content completed. The results of this evaluation showed that the average moisture content in the sludge is 29.6% by weight. This means that the solid material is approximately 70% by weight. These tests showed that the solids content is greater than 20% and thus satisfies your first requirement.

With respect to the chemical characteristics of the sludge, I have attached the analytical results of samples which were collected in October of 1986. I have reviewed these data with Tom Moreau, the chemist for the Burlington treatment plant. He has told me that these values are equal to or less than what is normally produced at the waste treatment facilities. In addition, we have compared these results to characteristics of sludge samples from several other treatment plants we have worked on and find that there is nothing unusual in the chemistry of the waste stream, although TKN values are a little on the high side.

From this, we would conclude that the sludge is amenable to land fill. Thank for your rapid response to our inquiry.

Sincerely,

Jeffrey E. Noyes, Principal
Wagner, Heindel and Noyes, Inc.

JEN/hfc

Attachment



Wagner, Heindel, and Noyes, Inc.

Consulting Geologists

Burlington, Vermont

7

Page No.

PAGE _____ OF _____

PROJECT: RIVERSIDE

DATE: _____

SLUDGE MOISTURE CONTENT CALCULATIONS:

SAMPLE (A):

DEPTH: 4.0' - 4.6'

$$\begin{aligned} \text{WT}_{\text{container}} &= 8.30 \text{ g} \\ - \text{WT}_{\text{container} + \text{wet sam}} &= 84.25 \text{ g} \\ \hline \text{WT}_{\text{SAMPLE WET}} &= 75.95 \text{ g} \end{aligned}$$

$$\begin{aligned} \text{WT}_{\text{container}} &= 8.30 \text{ g} \\ \text{WT}_{\text{container} + \text{dry sam}} &= 56.50 \text{ g} \\ \hline \text{WT}_{\text{dry sample}} &= 48.20 \text{ g} \end{aligned}$$

$$\Theta_{\text{WT}} = \frac{\text{WT}_{\text{wet}} - \text{WT}_{\text{dry}}}{\text{WT}_{\text{wet}}} \times 100 = \frac{75.95 - 48.20}{75.95} \times 100 = 36.5\%$$

SAMPLE (B)

DEPTH = 4.6' - 5.0'

$$\begin{aligned} \text{WT}_{\text{container}} &= 8.20 \text{ g} \\ \text{WT}_{\text{container} + \text{wet sam}} &= 103.8 \text{ g} \\ \hline \text{WT}_{\text{wet sample}} &= 95.6 \text{ g} \end{aligned}$$

$$\begin{aligned} \text{WT}_{\text{container}} &= 8.20 \text{ g} \\ \text{WT}_{\text{container} + \text{dry sam}} &= 82.10 \text{ g} \\ \hline \text{WT}_{\text{dry sam}} &= 73.9 \text{ g} \end{aligned}$$

$$\Theta_{\text{WT}} = \frac{\text{WT}_{\text{wet}} - \text{WT}_{\text{dry}}}{\text{WT}_{\text{wet}}} \times 100 = \frac{95.6 - 73.9}{95.6} \times 100 = 22.7\%$$

NOTE: Samples collected on 9/21, after several days of wet weather.

APPENDIX L

REMEDICATION

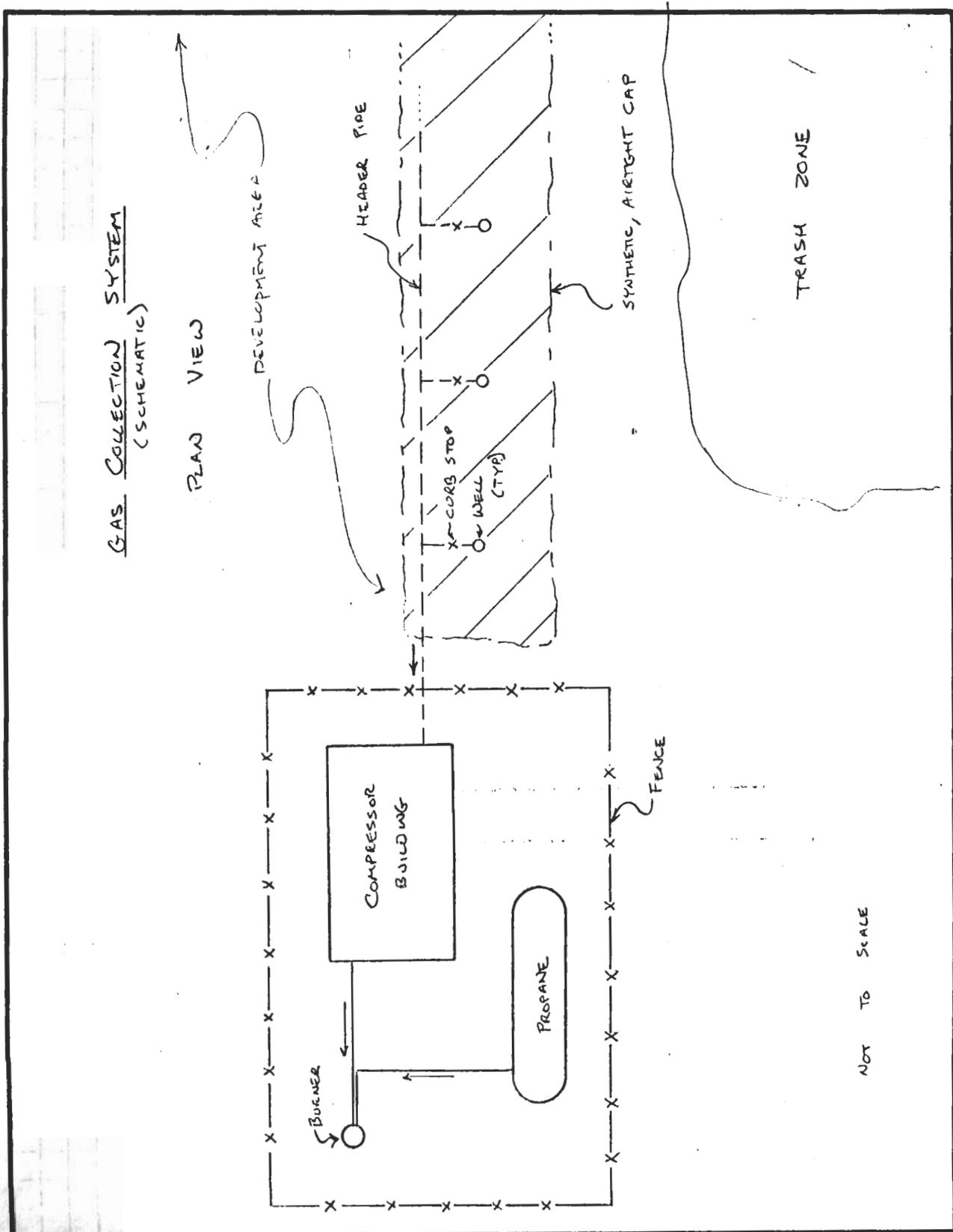


Wagner, Heindel, and Noyes, Inc.
Consulting Geologists Burlington, Vermont

PAGE ____ OF ____

PROJECT: _____

DATE: _____





Wagner, Heindel, and Noyes, Inc.

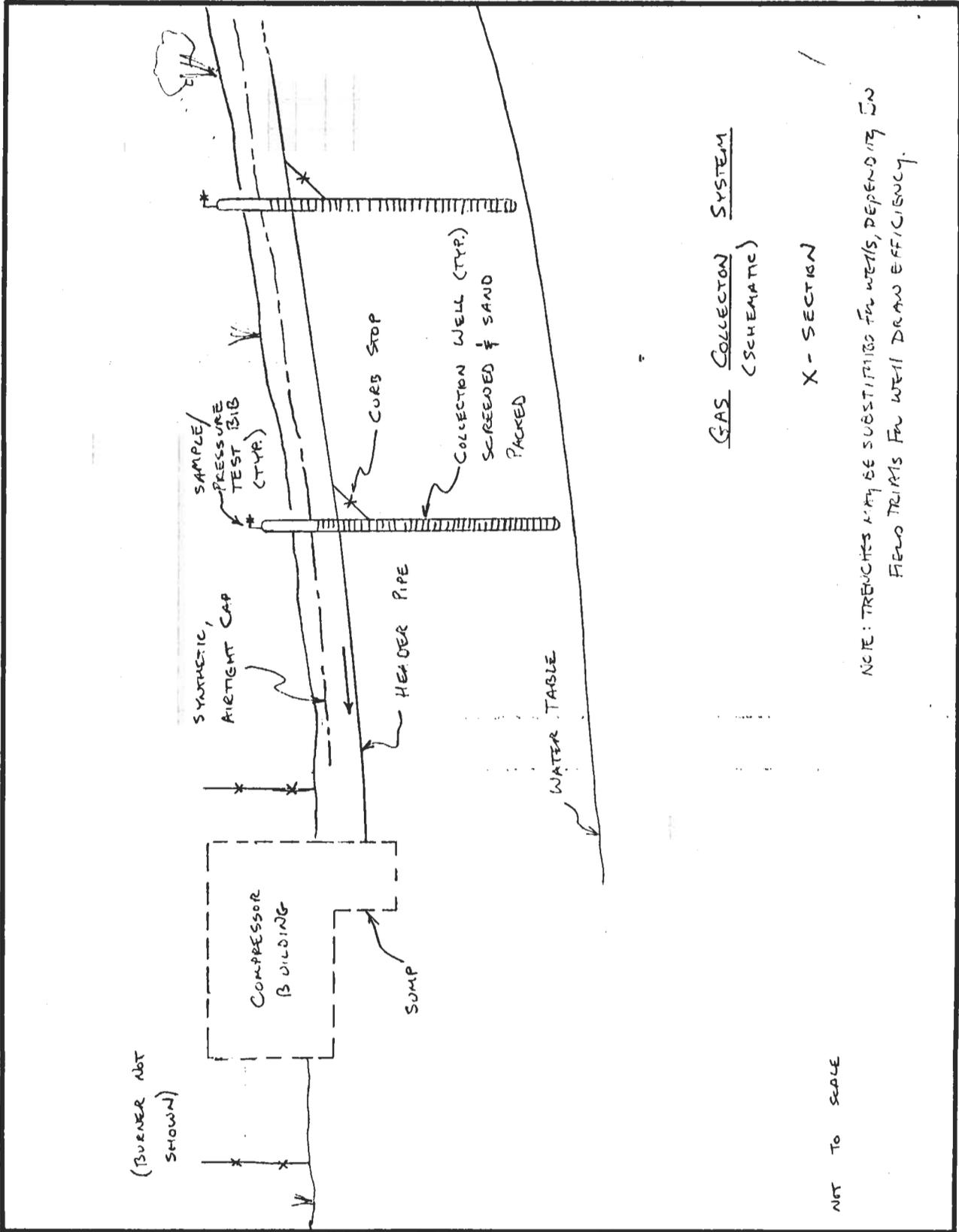
Consulting Geologists

Burlington, Vermont

PAGE ____ OF ____

PROJECT: _____

DATE: _____



(GAS COLLECTION SYSTEM
(SCHEMATIC))

X-SECTION

NOTE: TRENCHES MAY BE SUBSTITUTED FOR WELLS, DEPENDING ON FLOW TRIMMS FOR WELL DRAW EFFICIENCY.

NOT TO SCALE



Wagner, Heindel, and Noyes, Inc.

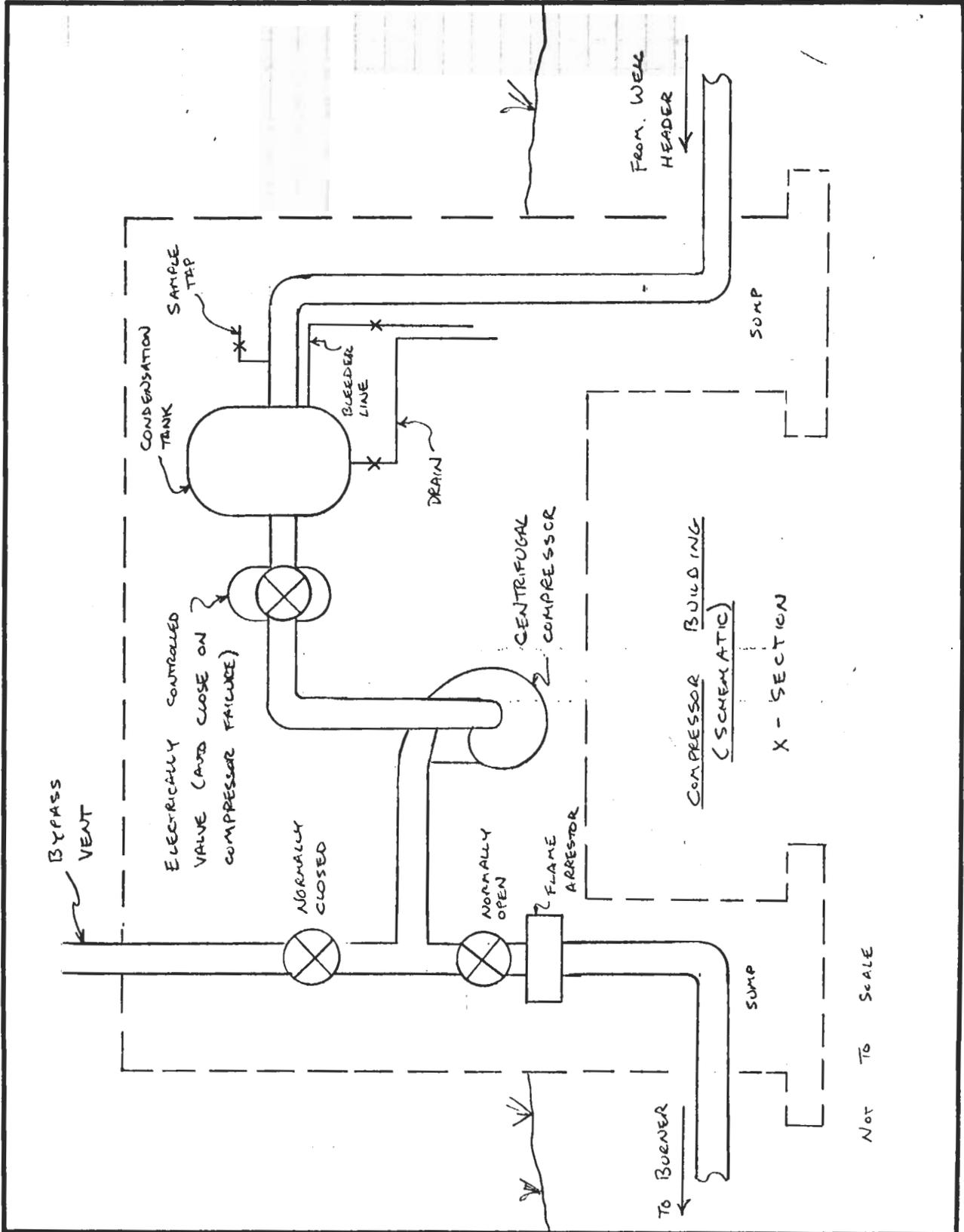
Consulting Geologists

Burlington, Vermont

PAGE ____ OF ____

PROJECT: LARKIN/RIVERSIDE

DATE: _____



NOT TO SCALE