• Consulting Hydrogeologists
• Engineers
• Environmental Scientists

Heindel and Noyes

P.O. Box 64709 Burlington, Vermont 05406-4709

802-658-0820
Fax 802-860-1014

DEC 8 2000
DEC 18 2000

December 18, 2000

Mr. Charles Schwer
Ms. Maria Stadlmayer
Hazardous Materials Management Division
Agency of Natural Resources
103 South Main Street
Waterbury, VT 05671-0404

RE: OMYA Florence Plant, Spill Investigation

Dear Chuck and Maria:

Enclosed please find Heindel and Noyes' report of the spill at OMYA's Verpol plant in Florence.

If you have comments or questions, please feel welcome to call me at (802) 658-0820.

Sincerely,

Jeffrey Noyes
Chief Hydrogeologist

cc: Neal Jordan

Enclosure

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OMYA, INC.
VERPOL PLANT

CONTAMINANT SPILL INVESTIGATION

December 18, 2000

HEINDEL AND NOYES

Consulting Hydrogeologists, Engineers, and Environmental Scientists

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OMYA, Inc.
Verpol Plant
Florence, Vermont

CONTAMINANT SPILL INVESTIGATION

November 2000

Prepared by:

Heindel and Noyes

Prepared for:

OMYA, Incorporated

December 18, 2000

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OMYA, Inc.
Verpol Plant
Florence, Vermont

CONTAMINANT SPILL INVESTIGATION

TABLE OF CONTENTS

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OMYA, Inc.
Verpol Plant
Florence, Vermont

CONTAMINANT SPILL INVESTIGATION

TABLE OF APPENDICES

EXECUTIVE SUMMARY

- A release of 4,500 gallons of Biocide occurred on November 18, 2000, due to an equipment failure at OMYA's Verpol plant in Pittsford, VT.
- The release entered the Dogleg Quarry, an open rock quarry currently used for settling of solids from wash water.
- OMYA and Heindel & Noyes have been investigating the chemistry of the biocide and studying its transport and distribution at the site.
- The released chemical, ortho-phenylphenol (OPP), degrades naturally into carbon dioxide and water. During the breakdown process, intermediate compounds may be formed.
- Water contaminated with OPP from the Dogleg Quarry has circulated to two other quarries used for solids settling and water storage: the Dolomite Quarry and the Pittsford-Italian Quarry (PIQ or East Quarry).
- OPP and possible intermediate breakdown substances have been detected in the Dogleg Quarry and the Dolomite Quarry. OPP alone has been detected in the Pittsford-Italian Quarry.
- Declining OPP levels in all quarries indicate degradation of OPP, and possible formation of temporary byproducts in very low levels.
- Groundwater monitoring has detected no evidence to date of the release impacting groundwater.
- Three private wells and a public community well are being monitored; no impact has been discerned in these wells.
- Additional monitoring is proposed, including installation of monitor wells in locations where no groundwater data exists, and continued analysis of surface water, groundwater, private wells, and the public community well.
- A site wide remediation plan has been developed in the event surface water or groundwater treatment becomes necessary.

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OMYA, Inc.
Verpol Plant
Florence, Vermont

CONTAMINANT SPILL INVESTIGATION

I. BACKGROUND

A. OMYA, Inc. Plant Overview

The OMYA, Inc. Verpol plant in Florence, Vermont produces fine ground calcium carbonate. Quarried marble ore is delivered to the plant in tractor trailer trucks; it is ground into powder and purified. The finished product is shipped off-site as a water-based slurry and as a dry powder in rail cars and trucks. See Site Location Map included in Appendix 1, page 1.

OMYA, Inc. uses water in the purification process. Impurities are floated out of a mixture of water and rock powder, with a flotation reagent. Water from this flotation process and from plant wash water is conveyed through a series of settling ponds and former quarries. Water from these quarries is reclaimed for use in the flotation process, and as the process water that makes up the slurry product.

B. History of Release

On Saturday, November 18, 2000, OMYA's Verpol plant experienced an equipment failure that allowed approximated 4,500 gallons of a calcium carbonate slurry product preservative (P-1 Preservative 20% solution) to enter an on-site wash water quarry (Dogleg Quarry). None of the material or water left the OMYA site via surface water routes.

OMYA personnel immediately investigated and responded to the event. The State of Vermont was notified at about 2:00 a.m. the morning of November 19th via telephone, as soon as the details of the situation were determined. Later that same morning, representatives of the State Agency of Natural Resources and the Town of Pittsford met on site with OMYA representatives to review the situation. OMYA representatives have since been in regular contact with both state and town officials.

Subsequent to the release event, in-plant use of the Dogleg Quarry water was suspended until the night of November 21, 2000. On November 22, Dogleg Quarry water levels had risen such that it was necessary to transfer water into the west settling cell via the flotation launderers. Water balance issues arose as a result of this strategy, and on November 28, the flotation waste (partially consisting of Dogleg Quarry water) was transferred from the west settling cell to the Dolomite Quarry and from there to the Pittsford-Italian Quarry. The switch back from the Dolomite Quarry to the west settling cell occurred on December 4, 2000. Quarry locations are shown on the maps included in Appendix 1.

Plant biocide piping was audited on November 20, 2000 and non-standard piping replaced. Additional change-in-tank-level detection and alarming was added to the plant control system. The biocide storage area sump pump control strategy was modified to incorporate the additional tank level detection. Other system changes designed to enhance environmental protection and safety have been started. Further enhancement of the existing monitor systems is occurring with a project budget request expected to be solidified before the end of December 2000.

In addition to conducting its own investigation, OMYA retained Heindel & Noyes to conduct a hydrogeologic investigation. The Heindel & Noyes (H&N) study included the following:

- Analyze the occurrence and distribution of contaminant release;
- Assess the degradation pathways of contaminant (aerobic and anaerobic conditions);
- Assess the movement of contaminant in the environment (surface water and groundwater);
- Develop a groundwater monitoring plan; and

- Develop a backup remediation strategy, should corrective measures become necessary.

Heindel & Noyes toured the OMYA facility and reviewed engineering drawings to determine the flow path of the contaminant through the plant and surrounding quarries. Water and sediment samples were collected from various quarries and wells on site to determine the extent of contamination resulting from the spill event. Extensive research and laboratory analysis were conducted to determine degradation pathways of the preservative (ortho-phenylphenol, or OPP). Regional surface water and groundwater flow paths were determined to assess the potential movement of the contaminant and to develop a groundwater monitoring program. Finally, a groundwater remediation strategy was developed.

The following sections detail the work conducted and conclusions and recommendations drawn from that work.

II. GEOLOGY AND ENVIRONMENTAL SETTING

A. Location and Topography

The OMYA plant is situated in the community of Florence, within the town of Pittsford, Vermont. The USGS map (page 1 of Appendix 1) shows the site location.

OMYA is located in the foothills at the eastern margin of the Taconic Mountain Range. This region is considered the northern end of the Vermont Valley, which runs north to south between the Green Mountains and the Taconics. The Otter Creek, flowing north, is east of the site. The topography generally slopes east to the Creek, although due to the numerous hills and knolls, slope and topography are highly varied .The OMYA plant itself is located on a promontory of bedrock, surrounded on the west, north, and east by lowlands, swamp, and streams.

B. Geology

Surficial Geology

Surficial materials vary between the upper locations at the plant site, and the valleys on the west, north, and east. At the plant proper, thin layers of glacial till cover bedrock, and at many locations, the bedrock surface is exposed. Drilling logs from water wells in this area indicate till thicknesses from 1 to 3 feet on the higher terrain. In the valleys

surrounding the OMYA site, gravel wells have been drilled into a confined aquifer which is covered by 60 to 70 feet of clay, peat, and silty clay. The confined gravel aquifers are underlain by glacial till.

The glacial till at the OMYA plant and beneath the gravel aquifers would have been deposited during glaciation. As glaciers began to melt, the gravel was deposited by the meltwater which flowed through the valleys. Later, as glacial lakes developed, the valleys were submerged, and the clays and silty clays were deposited. The higher terrain at the OMYA plant proper was above the level of the lakes, and had not received any depositional materials following glaciation. (See Surficial Map, page 2 of appendix 1, and well logs, appendix 2, pages 1-25).

Bedrock Geology

Bedrock is close to the ground surface at the OMYA plant, so structure will determine the flow of contaminants from the spill. Carbonate bedrock with karst features underlies the site, and fractures run sub-parallel with the valley, in a north-northwest to south-southeast orientation.

Because of the use of the site for bedrock mining, the geology has been well studied. According to reports by Geomapping Associates, the carbonate rocks have solution voids (karst features), which have been filled with clay minerals and sediments. The solution voids are the results of erosion and dissolution of the rock material by groundwater.

Although several bedrock formations are mapped at the site, the rock types in all of these are carbonates: dolomite, limestone, and marble. Beneath the spill location and the plant proper, Ordovician Shelburne limestone has been mapped. This "limestone" has technically been metamorphosed into marble; but the degree of metamorphism is so minor that it resembles the sedimentary rock limestone. A formation of Cambrian-age Clarendon Springs dolomite lies to the east, with Cambrian-age Danby quartzite/dolomite beyond. West of the plant, the Ordovician-age Bascom formation is mapped. This formation is reported to consist of dolomite, marble, and quartzite. (See Bedrock Map and Legend, pages 3-4 of Appendix 1).

To the east of the plant, wells #4, #1, #3, #2, and a second #2 are shown on the map (from north to south). Geomapping reported that these wells penetrate the actual location of the bedrock contact between the Shelburne marble and the Clarendon Springs dolomite. Well #5 lies just east of this contact zone. Along the contact, bedrock

fractures are apparently well developed, as wells #1, #2, and #3 have high yields and interfere with one another.

Generally, the carbonate bedrock can result in high yielding wells and wide-reaching, well-developed fracture networks due to the presence of karst features. However, two of the wells drilled at the site (96-1, 96-1A) have low yields (<5 gpm), suggesting that the fractured zones are not pervasive. The analysis of the existing wells indicates that the fracture zones at bedrock contacts are well developed, while other areas are only slightly fractured. Generalized geologic cross-sections (Centennial Geologic Map of Vermont, 1961) of the area show shallow bedding angles to the rock strata, meaning that fractures should not dip significantly away from the plane of the land surface.

Following the bedrock contacts, major fractures run in a north-northwest to south-southeast direction. We have evaluated two fracture trace analyses: one conducted by Geomapping Associates from unknown photographs, and one performed by Heindel and Noyes using three series of aerial photographs.[1]

Fractures in the Geomapping Associates analysis are scattered and show no particular orientation. Because wells drilled at fracture intersections (i.e. 96-1, 96-1A) yielded very low amounts of water, the accuracy of the Geomapping fracture trace cannot be verified. From the Heindel and Noyes fracture trace analysis, the dominant fracture pattern is clearly north-northwest to south-southeast, following the trend of the valley and of the bedrock formations. Some weaker transverse fractures cross the valley.

Although this fracture orientation would be a primary direction for groundwater flow, the topography slopes perpendicular to this orientation. Thus under non-pumping conditions, groundwater flow would be preferentially to the northeast, at a restricted rate due to the lack of fractures trending in that direction. The disparity between fracture orientation and topography creates a highly anisotropic condition.

Due to the use of the plant, the regional groundwater flow trend may have been disrupted. Significant volumes of plant water are recycled through the Dogleg, Dolomite, and Pittsford-Italian Quarries. However, these quarries do not likely discharge or draw water from the aquifer, due to the presence of dozens of feet of impermeable sediment, deposited from settling of waste rock fines. Water overflows from the Dolomite Quarry to the Pittsford-Italian Quarry (PIQ), which has no overland outlet, and is pumped to supply

[1] US Army COE, 1977, Infrared 1:80,000 series. Flown at 40,000 ft. Photos 1-165, 1-164
VT Mapping Program, 1962, VT-62-H 1:18,000 series. Flown at 9,000 ft. Photos 21-92, 21-91
NASA, 1974, VT 7420 1:20,000 series. Flown at 10,000 ft. Photos 7-214, 7-215, 7-216

the plant with process water. As a result, this quarry could act either as a collection basin or a recharge zone for the aquifer, depending on the balance of pumping versus inflow. More monitoring points have been proposed (see Section VI below) to determine the water balance between the quarries and the aquifer.

C. The OMYA Plant

The OMYA plant itself is an important factor in local environmental conditions because of its scale, and uses of rock and water. The orthophoto map (page 5 of appendix 1) shows the plant.

Water Circulation Processes

The two gravel wells (Gravel well #1 and Gravel well #2) and town water are used to supply the plant with water. The gravel wells are located beyond the high ridgeline to the west of the spill site. Because of this geographic separation, and because the wells tap into a gravel aquifer not present at the plant site, these wells are unlikely to be affected by conditions near the spill site.

Water from the Dogleg Quarry, where the spilled OPP collected, is used for the flotation system and for washing plant floors. Floor wash water returns to the Dogleg quarry. Water from the Pittsford-Italian Quarry is pumped to the plant and used for making the slurry product. Some of the water which flows into the Pittsford-Italian Quarry is the overflow of the Dolomite Quarry.

The flotation system separates the heavier carbonate product from the unwanted mica and schist. The ground marble slurry is mixed with a flotation reagent, and air bubbles in a tank. The waste material from the flotation system is sent either to the Dolomite Quarry, or to the two settling cells adjacent to the Dogleg Quarry.

A boom across the Dolomite quarry facilitates settling and separation of floating debris. When the Dolomite Quarry is receiving flotation waste, its outflow discharges over a weir, to a gravity culvert/penstock, to the Pittsford-Italian Quarry. When it is not receiving flotation waste, its outflow discharges over a weir, following its natural course to a gravity drainage swale, where it mixes with stormwater for eventual flow off-site.

Immediately following the spill, the Dogleg Quarry was not used for flotation water or process water; this water was instead obtained from the gravel wells, the town water, and the PIQ. Use of the Dogleg Quarry water was resumed on November 21, 2000.

There is also a storm water system on site; a settling pond north of the plant receives the water and discharges to a stream. Sanitary wastes are collected in a septic system and discharged to a leachfield located northwest of the main plant. Neither of these systems influence the distribution of the OPP.

Wells

Of the many wells shown on maps, only a few are still serviceable. Due to silty and ochre-colored water, many wells have been abandoned in accordance with the Vermont Water Supply Rule procedures for well abandonment.

Well 96-1A has been filled in with gravel, and capped with bentonite. Wells #2 (from CV104) and #3 are buried and cannot be located. Well #1 has also been filled in. Well #4 cannot be located. Well #2 (the southern #2) exists, but a soft bottom was encountered at 22' while the well is reported as 150 feet deep.[2] This well was reported to have produced silty, ochre-colored water during production. The silt originated from one of the karst cavities which had filled with clay minerals and sediment; the well may have silted in naturally.

Existing and Abandoned Well Details at OMYA Property

Well	Type	Total Depth	Yield, gpm	Notes
96-1	Bedrock	500	5	Unused, sampled 12/4/2000
96-1A	Bedrock	300	5	Abandoned; muddy water
96-2	Bedrock	590	15	Not examined, 2300 feet from Dogleg. Unused.
Gravel #1	gravel	71	20	Used as plant water supply. Drillers yield = 62 gpm
Gravel #2	gravel	82	70	Used as plant water supply. Drillers yield = 124 gpm
#1	bedrock	?	70 ?	Abandoned
#2 (CV104)	bedrock	?	?	Abandoned
#2 (S)	bedrock	150 ?	50 ?	Unused, buried. Sampled 12/4/2000. Measured depth of 22' BTC.
#3	bedrock	?	30 ?	Abandoned
#4	gravel	76	75 ?	Abandoned
#5	bedrock	?	30 ?	Supplies a contractor's trailer. Sampled by OMYA.

Shaded wells = abandoned
? = Information unknown or uncertain

[2] Geomapping Associates, ltd. *Verpol Plant Process Water Supply Groundwater Development: Phase I Evaluation.* January 7, 1997.

D. Sensitive Environmental Receptors

A survey of sensitive receptors within a 2 ½ mile radius of the spill site was performed. The map on page 6 of Appendix 1 shows mapped Class II wetlands, rivers and streams, and water supply wells. Upon OMYA's initiative, the three nearest private wells are being sampled. Wells serving the Pittsford-Florence Public Community Water System are also being tested.

Bedrock Aquifers

The quarries where the contamination has been detected are excavated into bedrock. Water may discharge from the quarries into the aquifers, depending on water use patterns at the plant. Therefore the potential for contamination of bedrock groundwater exists. At all three quarries, the presence of a thick, impermeable layer of settled mineral fines should inhibit the exfiltration of contaminated water. Permeability testing conducted on sediment cores indicated a very low permeability (see Section IV.3 below). Possible flows from the quarries into the bedrock aquifer could occur where the sediment layer does not extend up the sidewalls to the water surface. Accordingly, no OPP or breakdown products have been found to date in groundwater. Additionally, because of the dilution in the Pittsford-Italian Quarry, contaminant levels within it are fairly low.

Because the possibility of groundwater contamination remains, we are proposing a monitoring program, including the installation of more wells, to verify that the impermeable sediment layers, dilution, and contaminant breakdown are preventing migration of contaminants to the bedrock aquifer. Additional wells will also be used to determine whether groundwater flows into or out from each of the quarries. Additional discussion of the monitoring system is contained in Section VI of the report.

Confined Gravel Aquifers

The confined gravel aquifers are distinct from the bedrock aquifer. A layer of glacial till beneath the gravel is likely to inhibit communication between the two aquifers under natural conditions. However, because both aquifers are confined, it is possible that significant pumping of gravel wells could depressurize the gravel aquifer to the extent that the bedrock aquifer would discharge to it. As the gravel aquifer is located in the low valleys, it is at a lower elevation than the portions of the rock aquifer at the OMYA plant. The proposed monitoring plan will evaluate the potential for this connection (Section VI).

Public Community Water System

The Pittsford-Florence Water System (WSID #5226) operates a pair of gravel wells near the Otter Creek, east of the plant. The main and emergency backup well are located adjacent to each other. According to the water system operator, the wells produce up to 600,000 gallons on peak days. Average production is 200,000 gallons to 350,000 gallons per day. Demand depends upon OMYA's use of municipal water to supplement its own sources.

The wells are approximately 3,300 feet northeast from the Dogleg Quarry, 3,400 feet northeast from the Dolomite Quarry, and 2000 feet east from the Pittsford-Italian Quarry. The wellhead protection area (WHPA) extends to the ridgeline east of the Pittsford-Italian Quarry; none of the three quarries nor the spill site are within the WHPA.

The Public Community Wells are not believed to be at risk from the spill. Because the primary fracture trend runs northwest, contaminant flow is unlikely to move towards the wells. The presence of a ridgeline between the OMYA site and the wells should also direct groundwater flow away from the wells. To date, no OPP has been detected in these wells, or in any other groundwater. Additionally, the wells are located in a gravel aquifer, which is separate from the bedrock aquifer present at the spill area. Because the wells are adjacent to the Otter Creek in a gravel aquifer, recharge water to this aquifer may come from the Creek.

However, because the regional topography slopes from the OMYA site towards these wells, groundwater is likely to flow slowly in this direction. It is also possible that the gravel aquifer could draw water under pumping conditions, from the bedrock aquifer. Therefore, the monitoring program will investigate these wells and the gravel aquifer.

Private Wells

Three private bedrock wells exist in the vicinity of the spill site. These are shown on the sensitive receptor map (page 6 of Appendix 1). The wells are between 2,500 and 2,900 feet from the Dogleg Quarry, at lower elevations. No fracture traces were observed connecting the quarries and the private wells. Sampling to date has found no contamination (see Section IV.6 below).

Mapped Class II Wetlands

Numerous Class II wetlands exist on and off of the OMYA property within a 2 ½ mile radius. Some of these are located northwest from the spill area and the quarries. These wetlands could potentially receive contaminated groundwater discharge from the quarries if such contamination were to enter groundwater. However, no groundwater contamination has been detected to date.

The Pittsford-Italian Quarry is the downstream-most quarry in the series. It has no overland outflow and is instead pumped into the plant for use as process water, or is pumped to downstream settling ponds for offsite discharge in accordance with the OMYA East Plant's NPDES permit. This offsite discharge is conducted infrequently, only when necessitated by spring runoff. Therefore, direct overland flow to wetlands is not possible. To date, only low levels of OPP contamination have been detected in this quarry. Therefore, it is not likely that significantly contaminated groundwater would emanate from the Quarry and move towards the wetlands.

Natural Heritage Areas

From the Vermont Center for Geographic Information files, we have located one site which has been listed as a state natural heritage area. A rare/threatened/or endangered vascular dicot plant species has been identified near the village of Pittsford. Because this location is approximately 2 miles upgradient from the spill site, it is unlikely to be impacted.

Surface waters

The Otter Creek and its tributary streams are present near the OMYA plant. These surface waters could potentially receive contaminated groundwater discharge from the quarries if such contamination were to enter groundwater. However, no groundwater contamination has been detected to date.

Because the contamination has been contaminated in the settling ponds and quarries, and because the Pittsford-Italian Quarry, the downstream-most quarry, does not currently outflow, it is unlikely that contaminated surface waters could flow from the OMYA site to the Otter Creek or its tributaries.

III. CONTAMINANT CHARACTERIZATION

The industrial process undertaken at OMYA involves the use of P-1 Preservative (20% solution) with the active ingredient ortho-phenylphenol (99.9%) and inert ingredients (0.1%). P-1 is a product of Verichem Inc. of Pittsburgh, Pennsylvania. P-1 is effective against a wide variety of mold fungi and bacteria. P-1 is used for the preservation of polymer emulsions, (coating, PVA systems and rubber), thickeners (starch, cellulose, guar), paper, starches, clay slurries and slurries (See MSDS included in Appendix 3, pages 1-15).

Normally, P-1 preservative is added to the OMYA product as it is loaded into rail tankers; it is not introduced to the water stream anywhere on site. The preservative is used to prevent bacterial growth in the slurry; bacteria cause the slurry to separate and form a concrete-like mass inside the rail cars.

Ortho-Phenylphenol

Physical and chemical properties of ortho-phenylphenol (OPP) include the following:

- Appearance and odor: white flakes; mild, distinct odor
- Boiling point: 547° F/ 286° C
- Melting point: 134° F/ 56-58° C
- Specific gravity: 1.26 at 68° F/ 20° C
- pH: 6.1 of a saturated solution
- Solubility in water: 2,000 mg/l @ 68°F/ 20°
- Molecular formula: $C_{12}H_{10}O$
- Reactivity: oxidizing materials
- pH saturated water solution: 12.0-13.5 @25°
- Biodegradation: After 3 weeks of adaptation of 10-40mg/l at 22° C, 100% degradation under aerobic and anaerobic conditions, as sole carbon source or with synthetic sewage

OPP is soluble in fixed alkali hydroxide solutions and most organic solvents, and is nearly insoluble in water.[3] OPP fact sheets are included in Appendix 3, pages 16-28. Diagrams of the molecular structure of OPP and breakdown products are provided on page 29 of appendix 3.

[3] Windholz et al, 1983.

OPP Breakdown Products

Given the highly reactive characteristics of OPP, much attention has been given to the potential breakdown pathways of OPP and potential intermediate degradation. Biodegradation depends on many factors including physical and chemical properties, concentrations, diffusion rates, bioavailability, nutrient availability, other chemicals in the matrix, pH, temperature and other seasonal effects.[4]

There are a number of naturally occurring microorganisms capable of degrading OPP through a myriad of potential pathways and intermediates. Generally aerobic breakdown of phenolic compounds results in the production of catechols which are easily degraded via mineralization to carbon dioxide and water. The most likely intermediate breakdown products include oxygenated hydrocarbons (carboxylic acids, ethers, esters, ketones and etc.) of 12 carbons and less. The breakdown pathways are facilitated by the bacterial enzymes used to transfer electrons from the contaminant to an "electron acceptor". The most common electron acceptors are oxygen, and dissolved metals species such as iron and manganese. Dissolved nitrate, sulfates and carbon dioxide can also act as electron acceptors.

H&N's research also indicates that anaerobic degradation of phenolic compounds is common. Anaerobic degradation depends on the presence of an electron donor for enzymes to facilitate reduction of the contaminant. The presence of calcium carbonate in the process waters provides a direct source of electron donor via the negatively charged carbonate ion.

All of the degradation pathways evaluated for phenolic compounds indicate complete degradation of the parent compound without the creation of significant hazardous end products. All of the intermediate compounds are relatively unstable and quickly degraded. Due to rapid decay, the intermediate compounds are unlikely to exist in significant concentrations.

Estimated degradation half life's for OPP are presented in the Handbook of Environmental Degradation Rates[5] for unacclimated aerobic and anaerobic aqueous systems ranging from 1 to 28 days. These rapid degradation rates are based on field data acquired from a spill into a river. Research on OPP and metabolic products

[4] Sutherland et al., 1995.
[5] Howard et al, Lewis Pub., 1991.

continues and will be used to specify the test methods to detect both aerobic and anaerobic metabolics.

IV. DATA COLLECTON

A. Sampling Methods

OMYA commenced daily surface water monitoring of the Dogleg, Dolomite and Pittsford Italian Quarries on November 18. Groundwater monitoring of the on site "CDP" bedrock well (well #5 on map), the gravel well serving the Pittsford-Florence Water System, and three nearest residential wells commenced on November 20. Samples were submitted to Verichem, Inc. for analysis of OPP and pH. Data summary sheets compiled by OMYA are included in Appendix 4, pages 53-55.

H&N also collected surface water, sediment and groundwater samples at the OMYA facility. On November 21, surface water and sediment samples were collected from the Dogleg quarry. On December 4, water samples were collected from the Dolomite Quarry and on site groundwater wells 96-1 and well #2. Samples were submitted to Endyne, Inc. in Williston, Vermont. Individual laboratory data sheets are included in Appendix 4, pages 1-52.

Surface Water Sampling

Surface water samples were collected using a disposable bailer. Samples were preserved with ice prior to delivery to Endyne, Inc..

Groundwater Sampling

Bedrock wells were selected for on-site groundwater sampling. Wells were examined which were located downgradient from, and within 1,000 feet of the Dogleg Quarry. Well #5 ("CDP") is currently in use, and was sampled at the tap. Wells #2 (from CV104), #3, #1, and 96-1A have been abandoned (filled in), and could not be sampled although they were in the area of interest. Wells 96-1 and #2 (the southern well #2) were unused, and were sampled by purging with a portable sampling pump. Sample locations are presented on the Orthophoto Map in Appendix 1, page 5.

Test well 96-1 was sampled with a Redi-Flow pump set at a depth of 300 feet, which is the maximum length of power cable for the pump. The well was purged for 50 minutes, until temperature and specific conductance readings stabilized. This well is a modern bedrock well with an 8-inch casing and a 6-inch borehole, and is located by the

500,000-gallon water tank, at a site which is laterally downgradient from the Dogleg Quarry.

Well #2 (the southern of the two well's #2) was also sampled with the Redi-Flow pump. This well had been buried in a truck trailer drop area, and was reportedly a 150 foot deep bedrock well. It is located between the Dogleg Quarry and the Dolomite Quarry. A soft bottom was encountered in the well at only 22 feet below the top of the casing, and tan-brown sand particles were entrained in the initial purge water. Because the well was able to produce over 1 gpm with virtually no drawdown, it is likely that water from the bedrock fractures was able to flow up through the sand fill. A sample was collected after 55 minutes, when temperature and conductivity had stabilized. Water from this well had a faint odor of peat or muck.

A previous consultant's report[6] indicated that well #2 produced silty, ochre-colored water during production. This water originated from one of the karst cavities which had filled with clay minerals and sediment. We suspect that the well may have silted in naturally because of this cavity.

Off-site groundwater sampling has been performed at the Pittsford-Florence gravel well, and at the three residential wells identified in the sensitive receptor survey. These wells have been sampled at the taps, using the existing pumps in the wells.

Sediment Coring

Sediment core samples were collected from four locations in the Dogleg quarry. Sample locations are indicated on the Site Investigation Map in Appendix 1, page 7. A clear acetate liner/tube (3ft long and 1.75" diameter) was connected to PVC pipes that were advanced by hand into the quarry sediment. Access to the sample points was by rowboat. The acetate liners were plugged and transported back to H&N's office in Burlington where samples were extracted from the tubes for laboratory analysis. Sample collection depths are presented in the following table.

Boring Location	Depth (below water surface)
SS#1	15-18'
SS#3	6'
SS#4	25-28'
SS#5	12-15'

[6] Geomapping Associates, LTD. Verpol Plant Process Water Supply Groundwater Source Development: Phase I Evaluation. January 7, 1997.

B. Laboratory Methods

Samples have been analyzed by Verichem and by Endyne laboratories.

Endyne, Inc. of Williston, Vermont, an EPA and VTDEC certified analytical laboratory, analyzed all samples collected by H&N. In order to reasonably document ortho-phenylphenol (OPP) concentrations and potential OPP degradation products, several laboratory test methods were employed.

EPA Method 642 (an HPLC method) is applicable to the determination of OPP in municipal and industrial discharges. Ortho-phenylphenol is extracted at neutral pH into an organic solvent. After extraction, quantitation is performed by high performance liquid chromatography (HPLC) with an ultra-violet (UV) detector.

The OPP analytical method via EPA Method 642 has inherent limitations due to the specified neutral pH extraction protocols and the generally poor peak resolution. High calcium carbonate and emulsifier/flocculent concentrations in the sample matrix tend to interfere with the extraction efficiency and the ability for the instrumentation to adequately resolve individual compounds. Initial analytical results tentatively identified both phenol and OPP in the HPLC analysis of Dogleg Quarry water. See December 4, 2000 Memo from Endyne, Inc. included in Appendix 4, page 1.

Confirmation of the EPA Method 642 results was performed at Endyne, by using gas chromatography/mass spectroscopy techniques (EPA Method 8270C). EPA Method 8270C for semi-volatile organic compounds (SVOCs) includes OPP and phenol as target compounds. Method 8270C specifies both acidic and basic pH extraction with GC/MS analysis using mass spectral fingerprinting of resolved compound peaks. Gas chromatography/mass spectroscopy techniques (GC/MS) SVOC analysis confirmed the OPP in one of the samples (SS#1) but did not confirm the phenol tentatively identified in the HPLC analysis of the same sample. Based on this finding, identifications of phenol and other degradation products via EPA Method 642 were changed to non detect (see Endyne Memo dated 12/07/00 in Appendix 4, page 3-4). Therefore, EPA Method 8270C is the preferred method for detection of phenol and other potential degradation products in this sample matrix.

A final laboratory test method (EPA Method 8260) was employed for the volatile fraction of the potential OPP breakdown products. Since the microbial breakdowns of OPP into smaller potential intermediate compounds are likely, analysis of the more

volatile fraction of organic compounds was necessary to determine breakdown product characterization and concentration. EPA Method 8260 for volatile organic compounds (VOCs) specifies using a purge and trap sample concentration system and a GC/MS separation and detection system to measure VOCs in various matrices. The mass spectral detector can also estimate the identity non-target compounds ("unidentified peaks") by their spectral fingerprint based on a large compound database.

C. Laboratory Results

1. Dogleg Quarry: Surface Water

OMYA commenced surface water sampling at the north and south ends of the Dogleg Quarry on November 18, 2000. Samples were submitted to Verichem, Inc. for analysis of OPP and pH. The laboratory results are summarized in the following table.

Dogleg Quarry: Surface Water Sampling (Verichem)

Sample Date	OPP (ppm) Dogleg Quarry South End (Plant Discharge End)	pH	OPP (ppm) Dogleg Quarry North End (Plant Intake End)	pH	Laboratory
11/18/00	650	9.81	950	10.04	Verichem
11/19/00	550	9.64	950	10.06	Verichem
11/20/00	108	7.76	391	9.14	Verichem
11/21/00	360	9.59	518	9.59	Verichem
11/22/00	187	7.77	167	9.27	Verichem
11/23/00	100	7.59	153	7.44	Verichem
11/24/00	55	7.36	145	7.36	Verichem
11/25/00	123	7.54	47	7.43	Verichem
11/26/00	86	7.52	57	7.53	Verichem
11/27/00	19	7.35	37	7.51	Verichem
11/28/00	40	7.42	51	7.9	Verichem
11/29/00	<0.040	7.43	26	7.55	Verichem
11/30/00	11	7.45	25	7.33	Verichem
12/1/00	<0.040	7.53	14	7.31	Verichem
12/4/00	<0.040	--	7	--	Verichem
	--	--	0.283	--	Endyne

Water samples were also collected for analysis of aerobic bacteria and pH. Laboratory results are summarized in the following table.

Bacteria and pH Data: Dogleg Quarry (Verichem)

Date	Dogleg Quarry Plant Intake End pH	Aerobic Bacteria (cfu/ml)	Dogleg Quarry Plant Discharge End pH	Aerobic Bacteria (cfu/ml)
11/20/00	8.22	510000	9.29	12000
11/21/00	8.09	2500000	9.73	900
11/22/00	8.19	40000	9.12	120000
11/23/00	8.03	80000	8.08	520000
11/24/00	7.97	370000	7.94	700000
11/25/00	7.78	400000	8.05	**
11/26/00	7.58	>1000000	7.86	800000
11/27/00	7.53	*	7.66	***
11/28/00	7.85	250000	7.82	****
11/29/00	7.39	650000	7.55	380000
11/30/00	7.91	800000	7.65	860000
12/1/00	7.79	8000000	7.67	1250000
12/2/00	7.73	4000000	7.67	2000000
12/3/00	7.54	1500000	7.5	600000

*Notes: *= Data Questionable ($10^4 - 10^6$)*
***= Data Questionable (10^5-10^6)*
****= Data Questionable (10^5-10^6)*
*****= Data Questionable (10^5-10^6)*

Surface water samples collected at SS#1 and SS#2 on November 21, 2000 were submitted for laboratory analysis via EPA Method 8260 for VOCs, EPA Method 642 for OPP, and EPA Method 8270C for semi-volatile organic compounds. Compounds which have been detected via these analysis are presented in the following table. (See appendix 3 for information of the properties and structure of these substances.)

SS#1: Surface Water

Sample Date	Test Method	Compound	Concentration (ppm)
11/21/00	EPA 642	OPP	97
11/21/00	EPA 8260	Acetone*	0.950
11/21/00	EPA 8270C	Benzoic Acid*	0.015
		1-Phenyl ethanone*	0.005
		2-Methoxy-1, 1-Biphenyl*	0.002
		1-Methyl-4-1-(1-methylethenyl)-cyclohexanol*	0.002

*Substance was detected as an Unidentified Peak in spectral analysis. Identification and quantitation of substance are based on a best match to library data and are not confirmed.

SS#2: Surface Water

Test Method	Compound	Concentration (ppm)
EPA 642	OPP	5.32

2. Dogleg Quarry: Sediment Coring

Water separated from the top of the sediment core collected at SS#1 (15-18' below water surface) was submitted to Endyne, Inc. for analysis via EPA Method 8260 for VOCs , and EPA Method 642 for OPP. Compounds detected via these analysis are presented in the following table.

SS#1 (15-18' below water surface): Sediment Core Water

Sample Date	Test Method	Compound	Detection (ppm)
11/21/00	EPA 642	OPP	168
11/21/00	EPA 8260	Acetone*	0.550
		Toluene	0.0023

*Substance was detected as an Unidentified Peak in spectral analysis. Identification and quantitation of substance are based on a best match to library data and are not confirmed.

The top 4 inches (0-4") of the solid phase of the sediment core on SS#1 (15-18' below water surface) was sampled and analyzed for VOCs and OPP. This sample was approximately 56% solids. Compounds detected via these analysis are presented in the following table.

SS#1 (15-18' below water surface) 0-4" Sediment

Sample Date	Test Method	Compound	Detection (ppm)
11/21/00	EPA 642	OPP	42.3
11/21/00	EPA 8260	Acetone*	0.470

*Substance was detected as an Unidentified Peak in spectral analysis. Identification and quantitation of substance are based on a best match to library data and are not confirmed.

3. Sediment Permeability Test (K Test): Dogleg Quarry

The permeability of a sediment core from the Dogleg quarry was tested with a constant-head permeability experiment. This test was conducted to assess the rate at which contaminated water could discharge through the quarry walls and floor into the rock aquifer. The permeability ranges from 0.01 to 0.08 ft/day, which is within the low end of the range reported for silt in hydrology texts (Freeze and Cherry, 1979). Calculation briefs are included in Appendix 4, pages 56-57.

The experiment was conducted on a core sample of sediment obtained from a depth of 25-28 feet. The sediment was compact and had a distinct odor. The core was contained

in a 3-foot long, 1.75" diameter (4.267 cm) clear acetate liner/tube. The tube was fitted with a filter fabric sleeve to allow water to permeate through the base of the column, while retaining the sediment. This soil column was vertically oriented in a constant-head basin. Water was then added to the core tube, and the level kept at a mark near the top, thus creating the constant head condition. Because the core was already saturated, the flow rate could be immediately measured at the outflow from the constant head basin. A schematic of the test device is shown in Appendix 4, page 56.

During the 22-hour test, water levels in the core tube, and discharge volumes in the beaker were checked periodically. Discharge volumes were accurately measured with a graduated cylinder, and an equal volume was added to the core tube to maintain constant head conditions.

Permeability was calculated using Darcy's law, rearranged to solve for permeability (K) when cross-sectional area (A), gradient (dH/dL), and flow (Q) are known. See the calculation sheet (Appendix 4, pages 56-57).

The flow rate through the sediment sample was not steady during the entire test; at its fastest, 3.5 mL were collected in about two hours, while over the following 15 hours, only 0.1 mL flowed through the core. Small reductions in the outflow rate are most likely related to gas formation (CO_2) in the soil column. Therefore, two analyses of the results were performed:

1) The maximum permeability was calculated from the fastest measured flow rate. This result was 0.080 ft/day.

2) The average permeability was calculated from the average flow rate over the entire test. This result was 0.0112 ft/day.

4. Dolomite Quarry: Surface Water

OMYA commenced surface water sampling of the Dolomite Quarry on November 18, 2000. Samples have been analyzed for OPP and pH by Verichem, Inc. Samples collected by Heindel and Noyes on December 4, 2000 were submitted to Endyne Inc. for laboratory analysis via EPA Methods 642, 8260 and 8270C. Laboratory results are summarized in the following table. Individual laboratory reports are included in Appendix 4, pages 1-52.

Dolomite Quarry: Surface Water

Sample Date	Test Method	Laboratory	Compound	Detection (ppm)
11/18/00		Verichem	OPP pH	<0.040 8.02
11/19/00		Verichem	OPP pH	<0.040 7.94
11/20/00		Verichem	OPP pH	<0.040 7.77
11/21/00		Verichem	OPP	0.067
11/23/00		Verichem	OPP	<0.040
11/24/00		Verichem	OPP pH	<0.040 7.54
11/27/00		Verichem	OPP pH	<0.040 7.8
11/28/00		Verichem	OPP pH	<0.040 7.37
11/29/00		Verichem	OPP pH	<0.040 7.8
11/30/00		Verichem	OPP PH	10 7.86
12/1/00		Verichem	OPP pH	<0.040 7.59
12/4/00		Verichem	OPP	<0.040
12/4/00	EPA 642	Endyne, Inc.	OPP	4.75
12/4/00	EPA 8270C	Endyne, Inc.	OPP Phenol Crotonic Acid* 2-Heptanone* 2-Piperidinone* 1-Phenyl ethanone* 2-Dibenzofuranol* 3-Amino Phenol* Unknown*	4.99 TBQ <0.005 0.002 0.002 0.003 0.001 0.002 0.005 0.010
12/4/00	EPA 8260	Endyne, Inc.	Chloroform Acetone* 2-Butanone* Toluene*	0.0019 0.230 0.033 TBQ <0.0009
12/6/00	EPA 642	Endyne, Inc.	OPP	3.57
12/12/00	EPA 8720C	Endyne, Inc.	OPP	5.36

Laboratory results from the 8270C analysis of samples collected on December 4 indicated a concentration of 4.99 ppm OPP. In addition, the EPA 8270C analysis indicated a trace below quantitation (TBQ) concentration (<5ppb) phenol and seven unidentified peaks. The unidentified peaks were tentatively characterized based on the best match of the sample peak and library spectral data. The seven peaks best match were crotonic acid, 2- heptanone, 2-piperidinone, 1-phenyl ethanone, 2-dibenzofuranol, 3-amino phenol, and an unknown with no reliable spectral match. Information on the structure and properties of these substances is contained in appendix 3.

Surface water samples from the Dolomite Quarry were also analyzed for aerobic bacteria levels. Laboratory results are summarized in the following table.

Dolomite Quarry Discharge: Bacteria and pH Data (Verichem)

Date	pH	Aerobic Bacteria (cfu/ml)
11/20/00	8.13	720000
11/21/00	8.07	600000
11/22/00	8.01	630000
11/23/00	7.95	960000
11/24/00	7.91	250000
11/25/00	8.01	300000
11/26/00	7.9	270000
11/27/00	7.8	90000
11/28/00	7.95	160000
11/29/00	8.02	190000
11/30/00	7.96	90000
12/1/00	7.94	140000
12/2/00	7.95	330000
12/3/00	7.69	390000

5. Pittsford-Italian Quarry

OMYA commenced surface water sampling of the Pittsford-Italian Quarry on November 18, 2000. Samples have been analyzed for OPP and pH. Laboratory results are summarized in the following table.

Date Sampled	OPP (ppm)	pH	Laboratory
11/18/00	<0.040	7.92	Verichem
11/19/00	<0.040	8.0	Verichem
11/20/00	<0.040	7.84	Verichem
11/21/00	<0.040	7.8	Verichem
11/22/00	<0.040	7.74	Verichem
11/23/00	<0.040	7.79	Verichem
11/23/00	<0.040	7.9	Verichem
11/24/00	<0.040	7.71	Verichem
11/25/00	<0.040	7.78	Verichem
11/27/00	<0.040	7.86	Verichem
11/28/00	<0.040	7.84	Verichem
11/29/00	<0.040	7.8	Verichem
11/30/00	<0.040	7.86	Verichem
12/1/00	<0.040	7.82	Verichem
12/4/00	<0.040		Verichem
12/6/00	1.96	----	Endyne
12/12/00	2.62	----	Endyne

6. Groundwater Sampling Results

OMYA commenced groundwater monitoring of well #5 (the CDP well), the Pittsford-Florence gravel well, and neighboring residential wells on November 20, 2000. Samples were submitted to Verichem, Inc. for analysis of OPP and pH. Laboratory results are presented in the following summary table.

Sample Date	Location	OPP Result (ppm)	pH	Laboratory
11/20/00	Well #5	<0.040	--	Verichem
11/21/00	Well #5	<0.040	--	Verichem
11/21/00	Town	<0.040	--	Verichem
11/22/00	1261 W. Creek Rd	<0.040	7.44	Verichem
11/22/00	7797 Whipple Hollow Rd	<0.040	7.56	Verichem
11/22/00	1377 W. Creek Rd	<0.040	7.61	Verichem
11/22/00	Well #5	<0.040	7.36	Verichem
11/22/00	Town	<0.040	7.51	Verichem
11/23/00	Town	<0.040	7.6	Verichem
11/24/00	Town	<0.040	8.26	Verichem
11/25/00	Town	<0.040	7.49	Verichem
11/26/00	Town	<0.040	7.57	Verichem
11/27/00	Well #5	<0.040	7.43	Verichem
11/29/00	Well #5	<0.040	7.38	Verichem
11/30/00	Well #5	<0.040	7.38	Verichem
11/30/00	Town	<0.040	7.55	Verichem
12/1/00	Well #5	<0.040	7.34	Verichem
12/1/00	Town	<0.040	7.57	Verichem
12/6/00	Well #5	<0.002	----	Endyne

Note: The lowest concentration detectable by Verichem, Inc. is 40 ppb.

Groundwater samples collected by H&N from on site wells 96-1 and well #2 were submitted to Endyne, Inc. for laboratory analysis via EPA Methods 8260, 8270C and 642.

Groundwater collected from well 96-1 on December 4, 2000 contained no VOCs, no OPP, and no SVOCs as analyzed by EPA methods 8260, 8270C, and 642 testing. No unidentified peaks were detected by any analysis.

Well 96-1

Sample Date	Test Method	Compound	Detection (ppm)
12/4/00	EPA 642	OPP	<0.001
12/4/00	EPA 8270C	OPP	<0.005

Groundwater collected from well #2 on December 4, 2000 contained no OPP and no target or non-target compounds by EPA 8260. However, two non-target compounds were detected during the 8270C analysis that were characterized as dimethyl-1,4-dioxane (about 15 ppb) and 2-methyl-3-buten-2-ol (about 5 ppb). These compounds are not believed to be OPP breakdown products, but may have originated in petroleum compounds from the historical industrial activity in the area where the well is located.

Well #2

Sample Date	Test Method	Compound	Detection (ppm)
12/4/00	EPA 642	OPP	<0.001
12/4/00	EPA 8270C	OPP	<0.005
		Dimethyl-1,4-Dioxane*	0.015
		2-Methyl-3-buten-2-ol*	0.005

*Substance was detected as an Unidentified Peak in spectral analysis. Identification and quantitation of substance are based on a best match to library data and are not confirmed.

V. CONCEPTUAL MODEL

OPP is present in all of the lagoons and quarries at the OMYA site. It is degrading rapidly, through aerobic and anaerobic processes. The end products of degradation are nonhazardous, although intermediate products may be formed, including some hazardous organic chemicals. Such intermediate chemicals would be very short-lived, however, and exist only in very low concentrations. Migration of OPP and breakdown products into groundwater and surface waters is unlikely, except possibly in low levels close to the quarries.

A. Contaminant Distribution

The OPP spill entered the Dogleg Quarry, and high levels of 500 to 650 ppm were initially observed. Because OPP is poorly soluble in water with a pH of less than 12, a portion of the chemical partitioned onto the sediment covering the quarry bottom. Levels detected in the sediment core sample indicate that the concentrations decreased quickly with depth into the sediment layer. In the core sample at SS-1, taken from near the sediment surface (15 feet below the water surface), the OPP concentration of 42.3 ppm contrasts with the 97 to 168 ppm concentration in quarry water at the same location.

When it became necessary to discharge flotation water to the Dolomite Quarry, OPP was introduced to it. OPP levels were first detected there at 10.0 ppm, but declined due to degradation and dilution with inflowing water after the discharge ended, to under 5

ppm. This water discharges through a culvert/penstock to the Pittsford Italian Quarry (PIQ). Following the cessation of discharge to the Dolomite Quarry, OPP was present in lower levels near 2 ppm in the PIQ.

Groundwater sampling at wells 96-1, #2, and #5 indicates that the bedrock aquifer in these regions contains no OPP or breakdown products. The well #5 data, collected from a point downgradient from both the Dogleg and Dolomite Quarries, shows no OPP, including results from an analysis performed by Endyne. It is unlikely that the bedrock aquifer downgradient from the Dogleg, Dolomite or Pittsford-Italian Quarries would be contaminated, because all of these quarries contain significant depths of relatively impermeable sediment. Significant exfiltration into the aquifer could only occur if portions of the quarry sidewalls are above the sediment layer.

B. Contaminant Transport

Contaminants are being transported from the Dogleg Quarry to the Dolomite Quarry to the Pittsford-Italian Quarry and back to the Dogleg Quarry via OMYA's surface water circulation system.

The permeability test conducted on the sediment core from the Dogleg Quarry indicates a low permeability, equivalent to the low end of the range associated with silts. This indicates that pure water could migrate through the sediment at a rate of 0.023 ft/day, assuming a porosity of 0.35 and a gradient of 10% as reflected by surface topography. At this rate, it would take over two years for pure water to travel through the sediment layer, with an estimated thickness of 20 feet.

Travel of dissolved contaminants would be retarded because of OPP's poor solubility and greater affinity for carbon-based material. The factors needed to quantify retardation are unknown, but would likely increase the travel time for OPP and breakdown products to well over two years. With a half-life ranging from 1 to 28 days, concentrations would be reduced by a factor of at least 2×10^9 before leaving the system. Similar conditions are believed to exist in the Pittsford-Italian and Dolomite Quarries. Depth soundings from the Dolomite Quarry show a 20 to 30 foot depth of sediment (Appendix 1, page 8), which is the same material as found in the Dogleg.

Contaminated water from the Dogleg Quarry enters the Dolomite Quarry after it is first pumped into the flotation system, and then flotation wastewater is sent to the Dolomite Quarry. This only occurs when the Dogleg Quarry becomes full, and wastewater must be directed elsewhere. From the Dolomite Quarry, water overflows at a weir into a

culvert/penstock which leads to the Pittsford-Italian Quarry. After mixing with the clean water in the PIQ, levels of 1 – 2.6 ppm have resulted. This water is then pumped back to the plant for use in process water.

Whether flow out of the quarries occurs is uncertain, and will be verified via further groundwater sampling at well 96-2 and a proposed well. The ability of water to enter the aquifer depends in part on the water balances in the quarries, piezometric conditions of the rock aquifer, the extent to which flotation waste sediment covers the sidewalls, and whether OMYA pumps more out than flows in.

Insufficient data currently exists to understand the flow regimes between the quarries and the aquifers. Whether flow is from a quarry to the adjacent aquifer, or vice-versa can be determined from the water elevations. The table below summarizes the available information.

Site	Elevation*	ws. Depth, Ft	ws Elevation, Ft
Well 96-1	543	47.75	495.25
Well #2 (S)	520	6.38	513.62
Dogleg Quarry	511	--	511
Dolomite Quarry	501	--	501
PIQ	471	--	471

* Elevations are from Vermont Center for Geographic Information, Digital Elevation Model, and are not field verified or surveyed.

From this elevation data, well 96-1 can be considered to be downgradient of the Dolomite and Dogleg Quarries, and well #2 is higher in elevation than either. Site observations suggest that the Digital Elevation data may not be accurate, as the Dogleg Quarry appeared to be higher in elevation than both well #2 and well 96-1. The Digital Elevation data suggest that groundwater discharges from the Dogleg, to the aquifer near 96-1, and that the Dolomite receives water from the aquifer near well #2. More monitoring points, and surveyed elevations, around the three quarries are needed to make a conclusion regarding the water balances. Such wells are proposed (see section VI below).

In the unlikely event that the bedrock aquifer were to be contaminated, it is possible for the gravel aquifers to become contaminated. Because the OMYA gravel wells #1 and #2, and the Pittsford-Florence Water System gravel well are consistently pumped at high rates, they could induce the flow of water from the bedrock aquifer to the confined gravel layer. These wells are quite distant from the OMYA site, so the possibility of contamination is remote.

The town well is adjacent to the Otter Creek, which is likely to be a significant source of recharge water to the gravel aquifer. Therefore, pumping the town well is unlikely to influence flow from the bedrock aquifer.

C. Contaminant Degradation

Laboratory results from the Dogleg Quarry and the Dolomite Quarry indicate steadily declining levels of OPP. Low concentrations of possible breakdown products indicate that intermediate products may be forming, but they are not persistent. Research indicates that OPP probably degrades into numerous intermediate products – oxygenated hydrocarbons – which are ultimately broken down to carbon dioxide and water.

In the north end of the Dogleg Quarry, OPP levels declined from 950 ppm to 51 ppm in 10 days before water was transferred to the Dolomite Quarry. Dilution with fresh flotation wastewater accounted for only a small fraction of this reduction. Natural degradation resulted in the majority of the decrease in OPP levels. With high levels of aerobic bacteria in the quarry, and available electron acceptors in the form of oxygen dissolving from the atmosphere, biodegradation could occur rapidly. Further degradation has occurred, so that less than a month after the release, OPP levels in the Dogleg Quarry have decayed to less than 0.3 ppm.

Similarly, in the Dolomite Quarry, OPP levels declined from a high of 10 ppm following the first discharge of contaminated water to that quarry, to 3.57 ppm six days later.

Potential breakdown products are present in only very low levels, indicating their instability. The most prevalent likely breakdown product is acetone, which has been tentatively detected at levels ranging from 0.23 ppm to 0.95 ppm. Compared to the OPP levels, the acetone concentrations clearly show that breakdown products are not accumulating. Other possible degradation products: phenols, ketones, and catechols, have been present at concentrations of less than 0.05 ppm, despite the presence of the parent OPP at over 900 ppm.

If OPP and breakdown products were to migrate into the groundwater, the degradation reactions would continue. Groundwater contains moderate levels of dissolved oxygen which could support aerobic degradation. Other electron acceptors should also be readily available, including iron and manganese which are probably present in high concentrations, given the description of the bedrock water as ochre-colored. In the

event that anoxic conditions exist in groundwater or in the quarry sediments, anaerobic degradation would occur, with the abundant calcium carbonate behaving as the electron donor required for such a reaction.

D. Conceptual Model Summary

OPP is distributed in the lagoons and quarries at the site, and travels primarily through OMYA's water circulation system. It is degrading rapidly, through aerobic and anaerobic processes. Intermediate breakdown products are short-lived, and may exist only in very low concentrations. Water and carbon dioxide are the ultimate end products. Migration of OPP and breakdown products into groundwater and surface waters is minimized by the impermeable sediments in the Dogleg, Dolomite and Pittsford-Italian Quarries. Further testing and well installation is needed to verify flow patterns between the quarries and the aquifer.

VI. MONITORING PROGRAM

It is necessary to further characterize the degree and extent of contamination, the direction of contaminant flow, and the chemical breakdown processes which are occurring, including the formation of daughter products. The proposed monitoring program involves sampling of surface water from the open-water quarries and groundwater from bedrock wells, private wells, and the town well. A test will be performed to determine if the bedrock aquifer could communicate with the gravel aquifer, and sampling of gravel wells will occur if a communication exists. Monitoring will be conducted periodically until it can be assured that the contamination has attenuated.

A. Groundwater Monitoring

A groundwater monitoring program is necessary to investigate whether the bedrock and gravel aquifers have been, or will be, contaminated with OPP or its breakdown products. Bedrock aquifer contamination could occur if contaminated water were to exfiltrate from the settling ponds, the Dogleg Quarry, the Dolomite Quarry, or the Pittsford-Italian Quarry. To date, wells 96-1, #2, and #5 have been sampled with no detections of OPP or breakdown products. For gravel aquifer contamination to occur, the bedrock aquifer would first need to become contaminated. Then, pumping of gravel wells would need to occur at a high enough rate to depressurize the gravel aquifer, allowing water to flow from the bedrock aquifer.

There are six wells at the OMYA property that have not been filled in or abandoned. Bedrock wells 96-1, #2, #5, and 96-2 are useful for groundwater sampling. However, they do not provide a complete picture of the aquifer. Additional wells are needed to determine whether certain areas downgradient from the quarries have been contaminated, and to ascertain the direction of flow between the aquifer and the three quarries.

1. Current Well Network

Well 96-1, with a depth of 500 feet and a 5 gpm drillers yield, is unused. It can be sampled with a portable pump, with sufficient purging to acquire a valid sample. The well drillers log indicates that a single water-bearing fracture was encountered, at the depth of 420 feet. The well is located near to a H&N fracture trace which runs to the Dogleg Quarry. Because of the low yield, it is doubtful that the well intersected the fracture. This well is located laterally downgradient from the Dogleg Quarry. Therefore, water from the well could manifest effects to the aquifer from the Dogleg Quarry. However, because well 96-1 is only laterally downgradient, and because the sole fracture is 420 feet deep, it is probable that aquifer contamination could exist, but not be detectable at this well.

Well #2 (the southern of the two wells #2) is also unused. Like well 96-1, it may be sampled with a field pump. No drillers log exists; however the Geomapping report describes a 150 foot total depth and a 50 gpm yield. The well is reported to tap into a solution cavity which produced silty water, hence it is now silted in to a depth of only 22 feet. The well is topographically downgradient from the Dogleg Quarry, but with a higher water elevation, and adjacent to the Dolomite Quarry, and thus could manifest aquifer contamination from either of these sources.

Well #5 probably provides the most useful data of the existing wells. As it is used to supply a contractors trailer-office, the well is pumped regularly and thus would be likely to draw in contamination. Sampling is conducted at the tap. The well is located topographically downgradient from both the Dogleg and Dolomite Quarries; it is aligned in the dominant fracture direction with the Dolomite Quarry.

Well 96-2, currently unused, could also be sampled with a field pump. This well would indicate the effects of the Pittsford-Italian Quarry, since it is located topographically downgradient from that quarry, along a fracture trace which represents the contact between the Shelburne Limestone and the Clarendon Springs Dolomite. Measurement of water levels in this well will help to determine the water balance at the PIQ.

Gravel wells #1 and #2, located in the valley west of the plant, could be sampled at the taps if evidence indicates that the gravel aquifer is at risk of contamination. They will be used to test for communication with the bedrock aquifer, by being pumped, while water levels in the unused bedrock wells are continuously recorded.

2. Gaps in the Current Well Network and Proposed Wells

The current well network does not test the bedrock aquifer at locations directly downgradient from the Dogleg Quarry, nor in the direction of the PCWS wells. No wells exist on the east side of the Dolomite Quarry. Insufficient wells exist surrounding the three quarries to determine whether they are gaining or losing water to the aquifer.

Three bedrock wells are proposed. The first, located downhill of the Dogleg Quarry, is situated on a strong fracture trace leading to the Dogleg. A well at this site would best show the water quality and flow effects of the Dogleg Quarry on the aquifer.

A second well, east of the Dolomite Quarry, would check for exfiltration into the aquifer on that side of the quarry, where no monitoring points currently exist. This will provide key data on groundwater flow into or out of that quarry.

A third well site is shown south of the Pittsford-Italian Quarry, on the east-west trending fracture traces. This well would serve as an early warning system for the Public Community Wells, as it is located between them and the spill area. Based on the general west to east regional groundwater flow, this well site is probably downgradient from the quarries. Depth measurements at this well would indicate the flow relationship between the PIQ and the aquifer. Proposed bedrock monitor well locations are shown on the Orthophoto Map in Appendix 1, page 5.

3. Monitoring Program

We propose to install the three monitoring wells using an air-rotary drill rig to a depth of 300 feet. We believe that deeper fractures could not be affected by the contamination, due to the shallow bedding angle of the bedrock and the depths of the quarries. Lithology will be carefully logged during drilling. Elevations of all existing and proposed onsite well casings will be surveyed, as will measurement points at each quarry.

Once the proposed wells are drilled, water level monitoring will indicate whether the gravel wells communicate with the bedrock aquifer. The monitoring would compare

water level fluctuations in the bedrock wells with pumping cycles in the OMYA gravel wells #1 and #2, and the Pittsford-Florence Water System well. Water quality sampling at the OMYA gravel wells (nonpotable water) would occur if a hydraulic connection with the bedrock aquifer were observed. The town well will continue to be sampled periodically.

We propose to conduct rounds of well sampling monthly, at first. The sampling frequency will be phased, as shown in the monitoring summary below. The following wells would be tested: 96-1, #2, #5, 96-2, the three proposed wells, the three private wells, and the active PCWS well. The OMYA gravel wells would be included in the program if the testing indicates a hydraulic connection. The wells in use would be sampled at the taps. Other wells, not in use, would be purged with a field pump until groundwater conductivity and temperature readings stabilized. Samples would be analyzed by Endyne for OPP and potential breakdown products by EPA methods 642, 8270C, and 8260.

The three private wells and the Pittsford-Florence water system well have been resampled for analysis by Sci-Test, and results will be reported when available. These wells will be included in the sampling routine.

Additional data on the flow between the Dogleg, Dolomite, and PIQ Quarries and the bedrock aquifer will be collected by installing multi-level piezometers into the sediment. A measurement of gradient will indicate whether the quarry is discharging or receiving water.

B. Surface Water Monitoring

Water quality monitoring in the three onsite quarries will continue. Water will be sampled and tested by Endyne for OPP and potential breakdown products by EPA methods 642, 8270C, and 8260. Samples will be acquired every other week from the quarries until such time as it becomes apparent that concentrations have declined to non-detectable levels.

Currently, we do not plan to sample nearby streams and wetlands since there is no likely risk of contamination.

C. *Monitoring Summary*

Monitoring will be conducted monthly at first, and will be scaled back through time. We propose a two-year long monitoring program, which will encompass two full hydrologic cycles.

The table below summarizes the monitoring proposal.

Activity	Location	Schedule
Install bedrock monitor wells	3 locations (See maps)	Early 2001
Test for communication between gravel aquifer and bedrock aquifer	3 proposed bedrock wells, OMYA gravel wells, PCWS town well	Following well installation
Install piezometers in Dogleg and Dolomite Quarries	Sediment at edge of the quarries	December 2000
Sample water quality for OPP and potential breakdown products	Dogleg, Dolomite, PIQ	Every other week until contaminants are below detectable levels, then follow schedule for wells, below.
	Wells 96-1, 96-2, #2, #5; 3 proposed wells, 3 private wells, PCWS well.	Monthly for 4 months; quarterly for balance of 1 year; semi-annually for 2nd year.
Sample water quality for OPP and potential breakdown products	Gravel wells #1 and #2	Monthly for 4 months; quarterly for balance of 1 year; semi-annually for 2nd year, if communication with bedrock is detected..
Measure water levels / gradient	Bedrock wells, 3 quarries, quarry piezometers	Monthly for 4 months; quarterly for balance of 1 year; semi-annually for 2nd year.

VII. REMEDIATION PROGRAM

The design and feasibility of an active remediation system is currently being evaluated. A remediation plan will be implemented in the event that a plume of OPP is detected in on-site and/or off-site groundwater monitor wells. The results of groundwater monitoring to date do not indicate the need for active remediation.

Potassium permanganate was identified as a potential chemical oxidant for OPP. H&N has utilized potassium permanganate to chemically oxidize other types of organic compound plumes. A laboratory bench treatment test was conducted to determine the effectiveness of potassium permanganate as a chemical oxidant for OPP. The details of the test are presented below.

A. Potassium Permanganate Bench Treatment Test

A sediment core sample from the Dogleg Quarry was split to conduct a laboratory bench test of a potential treatment scheme for chemically oxidizing OPP into inert breakdown products. Core sample SS#1(0-4") from (15-18') was split into two aliquots. One 20-gram aliquot was reacted with 2.5 milliliters of a 5% potassium permanganate solution ($KMnO_4$) for 90 minutes. The other 20-gram aliquot was untreated. Each aliquot (about 56% solids) was extracted with methylene chloride as a soil with an ultrasonic disruptor to break up any solid clumps.

Sample ID	Resulting [OPP] (mg/kg)	% Reduction
Control: SS#1 (0-4")	10.6	0
Test: SS#1 (0-4") + $KMnO_4$	<0.10	>99.06

OPP in the untreated portion was detected at 10.6 mg/kg, while less than 0.1 mg/kg was detected in the permanganate treated aliquot. The treatment resulted in greater than 99% reduction of OPP concentration in the sludge layer tested, in 90 minutes. Evaluation of the chemical mass balance indicates that significantly more potassium permanganate was added than necessary to oxidize the OPP. Additional testing will be performed to fine tune the ratio of potassium permanganate needed to oxidize the OPP with minimal excess permanganate remaining.

B. Additional Investigation

On December 12, 2000, additional surface water samples were collected from the Dolomite Quarry and submitted to Endyne, Inc. for analysis of OPP and total organic carbon (TOC). The water samples will also be utilized for further testing of the proposed potassium permanganate remediation plan.

The additional investigation will focus on determining potassium permanganate consumption by degradation of TOC and OPP. The presence of varying concentrations of TOC can significantly impact the mass of potassium permanganate utilized to oxidize OPP. Therefore, strict stoichiometric calculations will underestimate the concentration of permanganate necessary to oxidize the OPP. Testing of the waters potentially requiring treatment will provide the most accurate permanganate concentration estimates.

A series of empirical tests utilizing various concentrations of potassium permanganate will be performed to determine the optimal concentration necessary to adequately treat

the OPP. The data generated from the additional testing will be utilized to develop a full-scale remediation plan if it becomes necessary.

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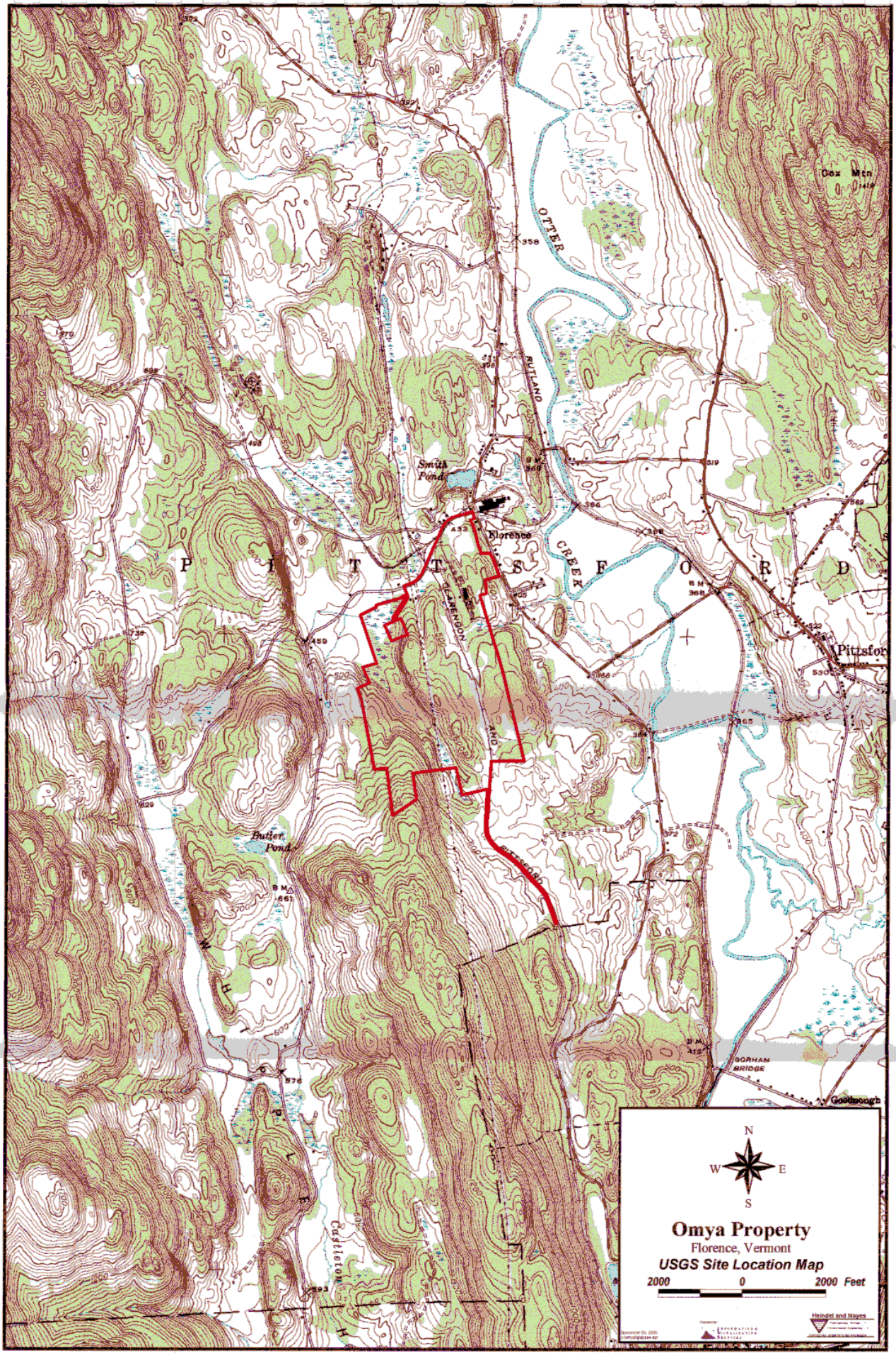
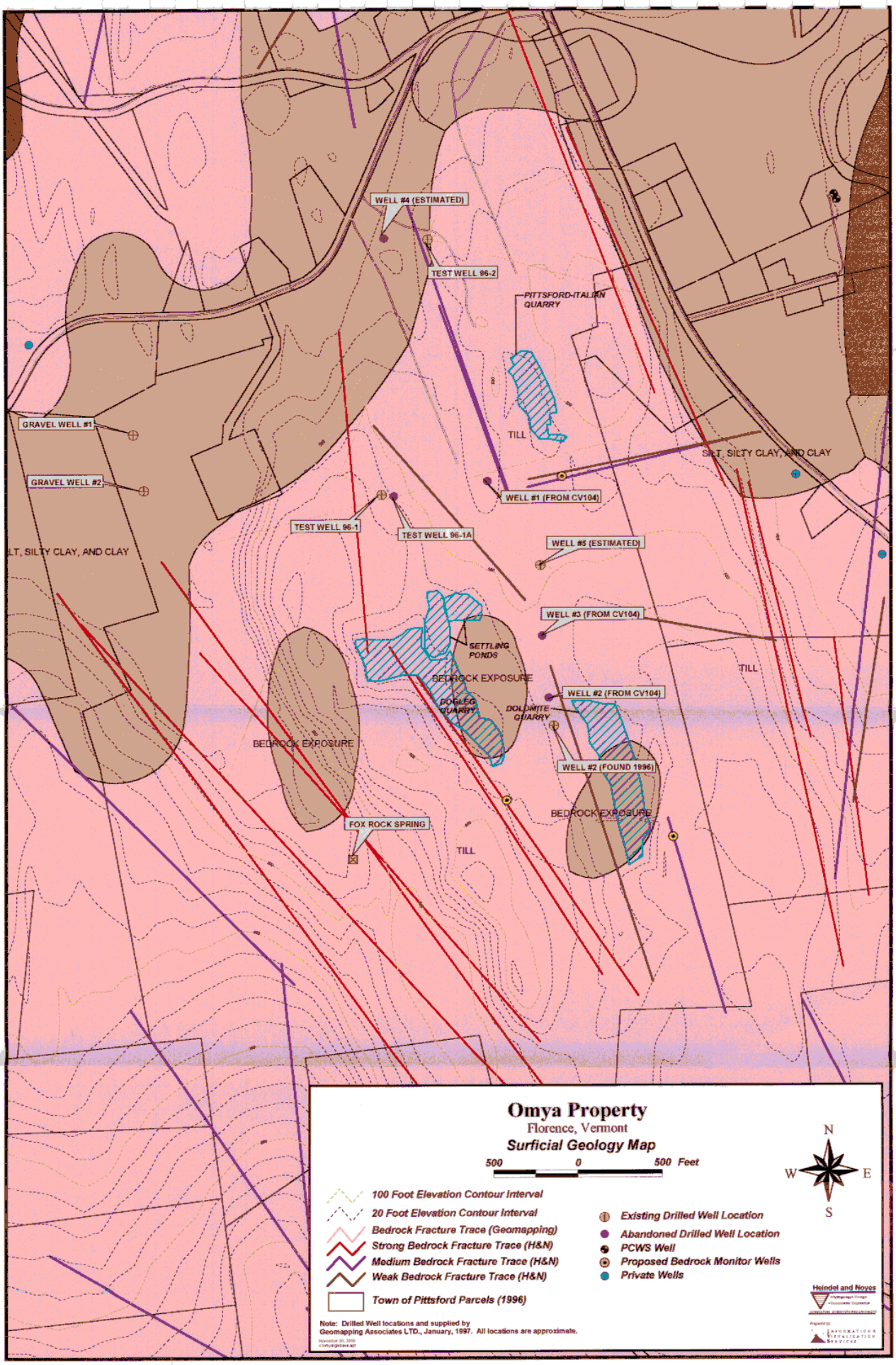
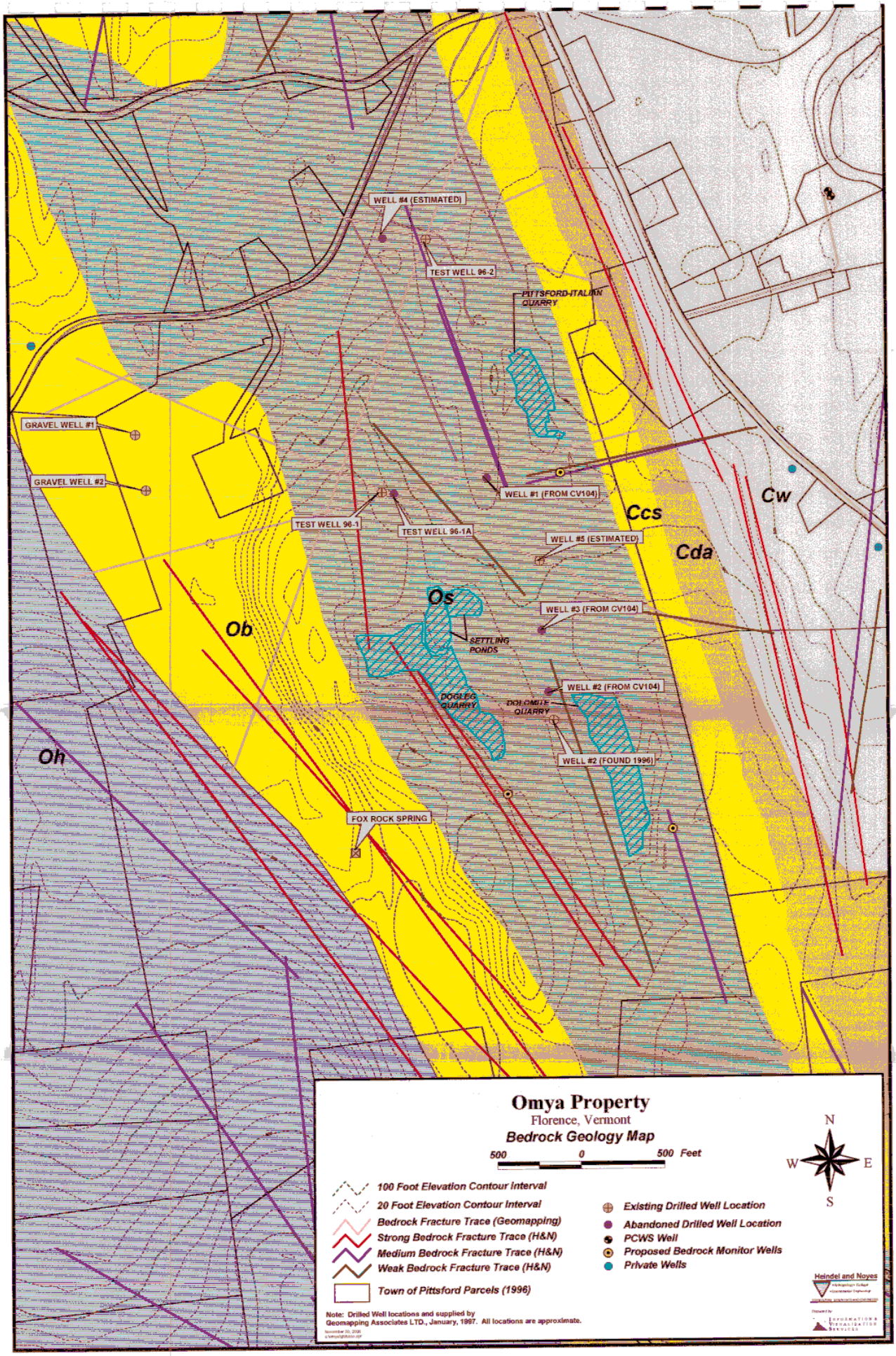
Winholz, M., Budavari, S., Blumetti, R.F., and Otterbein, E.S., 1983. The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals Merck & Co., Inc.:Rahway, NJ.


Cox Mtn
1414
OTTER
CREEK
RUTLAND
Smith Pond
Florence
CLARENDON
Butler Pond
Castleton
GORHAM BRIDGE
Pittsfor
N
W
E
S
Omya Property
Florence, Vermont
USGS Site Location Map
2000 0 2000 Feet
Heindel and Noyes


WELL #4 (ESTIMATED)
TEST WELL 96-2
PITTSFORD-ITALIAN QUARRY
TILL
SILT, SILTY CLAY, AND CLAY
GRAVEL WELL #1
GRAVEL WELL #2
WELL #1 (FROM CV104)
TEST WELL 96-1
TEST WELL 96-1A
LT, SILTY CLAY, AND CLAY
WELL #5 (ESTIMATED)
WELL #3 (FROM CV104)
SETTLING PONDS
BEDROCK EXPOSURE
TILL
WELL #2 (FROM CV104)
DOGLEG QUARRY
DOLOMITE QUARRY
BEDROCK EXPOSURE
WELL #2 (FOUND 1996)
BEDROCK EXPOSURE
FOX ROCK SPRING
TILL
Omya Property
Florence, Vermont
Surficial Geology Map
500 0 500 Feet
N
W E
S
100 Foot Elevation Contour Interval
20 Foot Elevation Contour Interval
Bedrock Fracture Trace (Geomapping)
Strong Bedrock Fracture Trace (H&N)
Medium Bedrock Fracture Trace (H&N)
Weak Bedrock Fracture Trace (H&N)
Town of Pittsford Parcels (1996)
Existing Drilled Well Location
Abandoned Drilled Well Location
PCWS Well
Proposed Bedrock Monitor Wells
Private Wells
Note: Drilled Well locations and supplied by Geomapping Associates LTD., January, 1997. All locations are approximate.
Heindel and Noyes
Prepared by
INTERNATIONAL HYDROLOGIC SERVICES


WELL #4 (ESTIMATED)
TEST WELL 96-2
PITTSFORD-ITALIAN QUARRY
GRAVEL WELL #1
GRAVEL WELL #2
WELL #1 (FROM CV104)
TEST WELL 96-1
TEST WELL 96-1A
WELL #5 (ESTIMATED)
Ccs
Cda
Cw
Os
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WELL #3 (FROM CV104)
SETTLING PONDS
WELL #2 (FROM CV104)
DOGLEG QUARRY
DOLOMITE QUARRY
WELL #2 (FOUND 1996)
Oh
FOX ROCK SPRING
Omya Property
Florence, Vermont
Bedrock Geology Map
500 0 500 Feet
N
W
E
S
100 Foot Elevation Contour Interval
20 Foot Elevation Contour Interval
Bedrock Fracture Trace (Geomapping)
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BEDROCK GEOLOGY LEGEND

Road Centerline
Town Boundary

No Label
Features with no label were not attributed on the original source maps.

Surface Water

Topographic Contours

100 Foot Intervals
500 Feet Above Sea Level
1000 Feet Above Sea Level
1500 Feet Above Sea Level
2000 Feet Above Sea Level
2500 Feet Above Sea Level
3000 Feet Above Sea Level
3500 Feet Above Sea Level
4000 Feet Above Sea Level

Faults

Thrust Fault; Upper Plate is West
Thrust Fault; Upper Plate is East
Uncertain Thrust Fault; Upper Plate is West
Uncertain Thrust Fault; Upper Plate is East
Reverse Fault; Upthrown Side is West
Reverse Fault; Upthrown Side is East
Reverse Fault; Location Uncertain
Normal Fault; Downthrown Side is West
Normal Fault; Downthrown Side is East
Normal Fault; Location Uncertain

PLUTONIC ROCKS

PERMIAN OR TRIASSIC
White Mountain Plutonic-Volcanic Series

wle
Bostonite - Many small leucophyres and lamprophyres not shown

wg
Biotite and hornblende granites

ws
Hornblende, biotite, quartz and augite syenites

wn
Nepheline syenite and pulaskite

wd
Hornblende-biotite Gerlite; gabbro

ww
Foyaite

wv
Volcanic breccia, breccia tuff, and flows

DEVONIAN
New Hampshire Plutonic Series

Bethlehem Gneiss - Two-mica granodiorite gneiss

nhu
Undifferentiated granitic rocks
Small dikes and sills do not show

nhd
Metadiorite - Metagabbro, metadiabase and meta-adesite, too small to show are chiefly in the Mascoma, Albee and Orfordville formations.

Oliverian Plutonic Series

ou
Biotite quartz and biotite gneiss

ORDOVICIAN
Highlandcroft Plutonic Series

hc
Undifferentiated granitic rocks

udp Ue Cuc
Ultramafic rocks
udp - Dunite, peridotite and serpentinite, ue - serpentinite, carbonate rock, talc-carbonate rock and steatite.
uu - Undifferentiated ultramafic rocks.

CAMBRIAN ROCKS

Bridgeman Hill Formation
Undifferentiated dolomite, slate and conglomerate.

Cbr Cbrc
Breezee formation
Cbr - phyllite with beds of dolomite, marble, amphibolite; beds of massive dolomite locally.
Cbrc - quartzose green phyllite.

Cc
Cheshire Quartzite

?Ccr ?Ccg ?Ccm
Cavendish Formation
?Ccr - Brandon Member: quartz-muscovite-schist.
?Ccg - Bull Hill Gneiss: quartz-plagioclase-muscovite-biotite gneiss.
?Ccm - buff dolostone.

Ccs
Clarendon Springs, Ticonderoga, and Rock River Dolomites; Genne Formation

Cd
Dunham Dolomite

Cda
Danby and Potsdam Formations
Interbedded quartzite and dolomite.

Cdt
Dalton Formation
Schistose quartzite, impure dolomite, and conglomerate.

Cf
Forestdale Marble

Ch Chb Chm Chg
Hazens Notch Formation
Ch - interbedded calcareous and noncalcareous schist.
Chb - Belvidere Mountain Amphibolite Member
Chm - schist.
Chg - gneiss.

Cho Chop Chl Chog
Hoosac Formation
Cho - quartz-sericite schist
Chop - Plymouth Member: quartzite and calcareous phyllite.
Chl - Tatley Mountain Member: amphibolite and greenstone.
Chog - amphibolite and greenstone.

Chw
The Hatch Hill and West Castleton Formations
Hatch Hill - calcareous quartzite.
West Castleton - siliceous, calcareous slate.

Cm
Monkton Quartzite

Cmo
Moosalamoo Phyllite

Co Ceg
Ottauquechee Formation
Carbonaceous phyllite or schist containing beds of massive quartzite.

Cp Cpl
Pinnacle Formation
Cp - schistose greywacke.
Cpl - Tibbit Hill Volcanic Member

Cpa
Parker Slate

Cph Cpeg Cpg Cpc
Pinney Hollow Formation
Cph - Pale green phyllite with abundant magnetite.
Cpeg - Chester Amphibolite Member.
Cpg - greenstone and schistose greenstone.
Cpc - carbonaceous phyllite and schist.

Cro
Rugg Brook Formation
Dolomite, conglomerate, and sandstone.

Cch Cm Cs Cbc
Sweetsburg Formation
Cch - carbonaceous slate.
Cm - Hungerford Member
Cs - Rockledge Conglomerate Member.
Cbrc - Steede Corner Slate and Hill River Conglomerate members undifferentiated.
Cbs - St. Albans Slate Member.

Csx
Saxe Brook Dolomite

Csc Cscb Cscz
St. Catherine formation
Csc - slate and phyllite.
Cscb - Bascomb's Quarry member.
Cscz - Zion Hill Member: quartzite and greenstone.

Ct
Tyson Formation
Schist, conglomerate of base, phyllite and dolomite in upper portion.

Cub Cuf Cuh Cug Cut Cuc Cuw Cuv Cuw
Underhill Formation
Cu - grey-green schist.
Cuf? - Fairfield Pond Member: quartzitic schist
Cug - greenstone.
Cuc - carbonaceous schist and phyllite.
Cuw - White Brook Member: sandy dolomite and limestone.
Cuf - Perkinsville Member: sandy dolomite and limestone.
Cuj - Jay Peak Member: schist, locally quartzitic.
Cuh - Pool Brook Member: schist, minor carbonaceous interbeds.
Cus - Mount Abraham Schist Member.
Cub - Bellatt Member: carbonaceous schist and subordinate quartzite.
Cup - Peaked Mountain Member: greenstone.

Cw
Winooski Dolomite
Buff-weathered, pink, buff, and gray dolomite with thin protruding siliceous partings.

ORDOVICIAN ROCKS

OCs OCsg OCag
Stowe Formation
OCs - phyllite and schist.
OCsg - carbonaceous schist and phyllite.
OCag - greenstone and amphibolite.

OCp
Pinney Hollow, Ottauquechee, and Stowe Formations, undifferentiated
Quartz schist, carbonaceous schist, and schistose quartzite.

Oa
Ammonoosuc Volcanics

Oal
Albee Formation
Quartzite interbedded with slate and phyllite.

Ob Obb
Bascom Formation, and undifferentiated Luke Hill, Naylor Ledge and Hastings Creek Limestones
Ob - interbedded dolomite, limestone or calcite, amphibolite, quartzite and limestone breccia.
Obb - Brownell Mountain Phyllite Member.

Oc
Cutting dolomite, and undifferentiated Morgan Corner and Wallace Creek Formations

Ocbr Ocbw Ocw Ocb
Chipman, Bridport, and Beldens Formations; Providence Island Dolomite
Ocbr - Bridport Dolomite Member.
Ocbw - Wallace Member: dolomite with limestone and marble overlay.
Ocw - Weybridge Member: limestone.
Ocb - Buel's Hill Member: limestone with spots of dolomite.

Och
Cumberland Head Formation
Interbedded shale and limestone.

Ogo
Glens Falls and Orwell Limestones, undifferentiated

Ogfs Ogl
Glens Falls Formation
Highly fossiliferous limestone.

Oho
Hortonville Formation
Pyritic slate and phyllite with limy beds.

Oha
Hathaway Formation
Argillite and fetid carbonaceous chert.

Ohg
Hortonville, or Cumberland Head, and Glens Falls Formations, undifferentiated

Ol
Iberville Formation
Nonsiliceous black shale interbedded with dolomite.

Ohl
Highgate Formation
Banded limestone and carbonaceous slate.

Mississquoi Formation
NORTHERN VERMONT
Omcr Omhl Omvca Omc Omu
SOUTHERN VERMONT
Omc Omb Omu
STATEWIDE
Omm
Omsr - Dunn Hill Member: phyllite, grades locally to dark slate.
Omb - Harbor Bridge Quartzite Member.
Omm - Caldwin Hill Volcanic Member: greenstone and amphibolite, includes pillow lavas.
Omc - carbonaceous phyllite and slate.
Omu - Umbrella Hill Member: quartz and slate pebble conglomerate.
Omc - carbonaceous mica schist, quartzite and micaceous quartzite.
Omb - Bernard Volcanic Member: gneiss and amphibolite.
Omsr - Whetstone Hill Member: carbonaceous phyllite and schist.
Omms - Mendones Member: quartzite and quartz plagioclase granulite.

Omh
Mount Hamilton Formation
Hard slates, some interbedded with quartzites and chert.

Omw Omsb Omt
Middlebury and Chazy Limestones; undifferentiated Youngman and Carman Formations
Omt - Barnumian member and granular limestone with dolomite and shaly interbeds.
Omw - Whitehall Member: dark-gray calcareous succeeded by coquinal limestone.
Omc - Crown Point Member: fossiliferous limestone.
Omd - Day Point Member: calcareous quartz sandstone and calcarenite.

Omm
Moreas Line Formation
Calcareous and noncalcareous slate, locally with limestone interbeds.

Oo Oor
Orwell Limestone, and Isle La Motte and Lowville Limestones

Oot Ogw Oop
Ordville Formation
Oot - interbedded phyllite.
Ogw - Sunday Mountain Volcanics: greenstone and schists.
Oop - Pearl Pond Volcanics: greenstone and schist.

Op Opv
Partridge Formation
Op - NE VT - black carbonaceous slate and phyllite with beds of rhyolite tuff. SE VT - carbonaceous mica schist.
Opv - volcanics: mafic gneiss and amphibolite.

Opa
Pawlet Formation
Locally carbonaceous and pyritiferous micaceous slate.

Os
Shelburne, Whitehall, and Sarles Pond Formations
Chiefly a white marble or limestone with gray dolomite lineations.

Osp
Stony Point Formation
Calcareous black shale grading upward into argillaceous limestone.

SILURIAN ROCKS

Sc
Clough Formation
NE VT - conglomerate with pebbles of quartzite and schist, quartzite and schist matrix.
SE VT - quartzite, quartz conglomerate and mica schist.

Sf
Fitch Formation
NE VT - weathered, sandy limestone.
SW VT - greenlite, impure limestone and dolomite, and mica schist.

Ss
Shaw Mountain Formation
N VT - quartzose limestone and calcareous quartzite.
S VT - quartzite, quartz conglomerate, conglomeratic schist, amphibolite and schist.

DEVONIAN ROCKS

DSn
Northfield Formation
Quartz arenite zone of phyllite with siltstone and limestone interbeds.

Dg Dgh Dga Dgm
Gile Mountain Formation
Dg - quartz arenaceous phyllite or schist.
Dgh - Hall Stream Member: feldspathic grit, probably volcanic, schist and amphibolite.
Dga - amphibolite.
Dgm - Meetinghouse Slate Member.

Dl
Littleton Formation
Gray slate and phyllite with interbeds of schistose quartzite.

Dw Dwc Dwc Dwb Dwa
Waits River Formation
Dw - quartzose and micaceous crystalline limestone.
Dwa - Standing Pond Volcanic Member: amphibolite and garnet schist.
Dwc - Chow Hill Member: beige-gray quartzite of St. Albans region.
Dwb - Barton River Member: brecciated limestone and phyllite; dolomite.
Dwa - Ayers Cliff Limestone Member.

PRECAMBRIAN ROCKS

pC pCeg pCm
Mount Holly Complex
pC - biotite gneiss, and in western areas chloritic.
pCeg - quartzite, micaceous quartzite, and quartz-mica schist.
pCm - calcite and dolomite marbles.

pCgr
Undifferentiated gneissic biotite granite, quartz monzonite, and granodiorite

pCgn
Gneiss, quartzite, calc-silicate granulite

pCsg
Stamford Gneiss
Granitic biotite gneiss with megacrysts of microcline.

SOURCE NOTES:
Bedrock Geology was digitized and scanned, by Wagner, Heindel, and Noyes, into a PC ARC/INFO database from 1:62500 original State of Vermont bedrock geology base maps (1956-1966). These maps were made available by Dr. Barry Doolan, Geology Department Chairperson, University of Vermont. Bedrock data for most of the state is available, in 15 minute quads, from IVS (802) 865-0437.
Road Centerlines were generated from pre-1990 1:5000 orthophotos (or better). Road data (RDSnn) is available from the Vermont Center for Geographic Information, VCGI (802) 658-4277.
Linear Surface Waters are Digital Line Graph Data, generated from 1:24,000 USGS topographic maps. This data is available from VGIS.
Town Boundaries were digitized from pre-1990 1:24000 USGS topographic maps. This coverage was created by the EPA and is available through VGIS.

INFORMATION & VISUALIZATION SERVICES
P.O. Box 64798 - Burlington, Vermont - 05406-4798 - Tel: (802) 865-0437 - Fax: (802) 865-4554


WELL #4 (ESTIMATED)
TEST WELL 96-2
PITTSFORD TALUM QUARRY
GRAVEL WELL #1
GRAVEL WELL #2
WELL #1 (FROM CV104)
TEST WELL 96-1
TEST WELL 96-1A
WELL #5 (ESTIMATED)
WELL #3 (FROM CV104)
SETTLING PONDS
DOGLEG QUARRY
DOLOMITE QUARRY
WELL #2 (FROM CV104)
WELL #2 (FOUND 1996)
FOX ROCK SPRING
Omya Property
Florence, Vermont
Orthophoto Base from 1994
500 0 500 Feet
N
W E
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100 Foot Elevation Contour Interval
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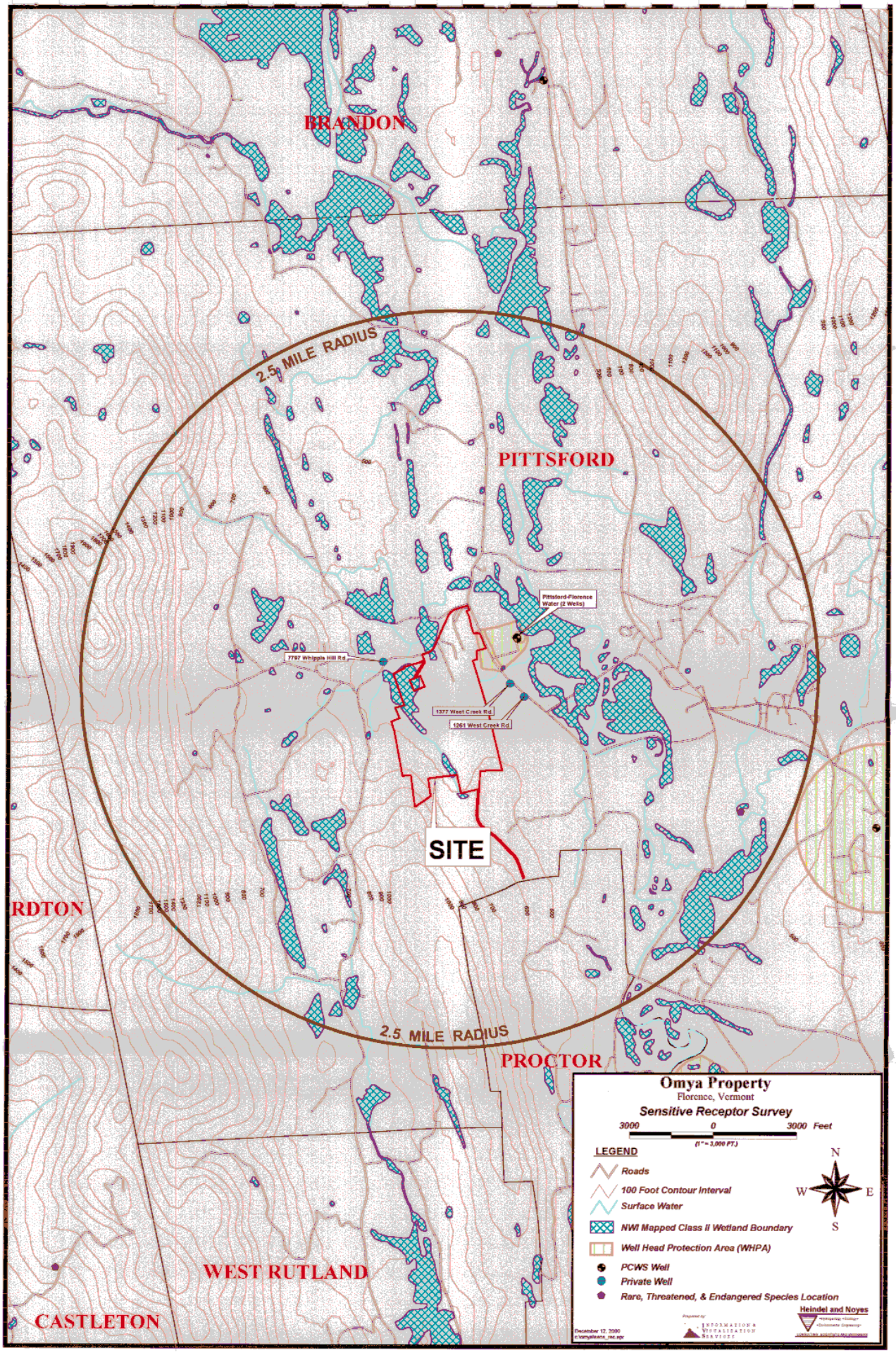
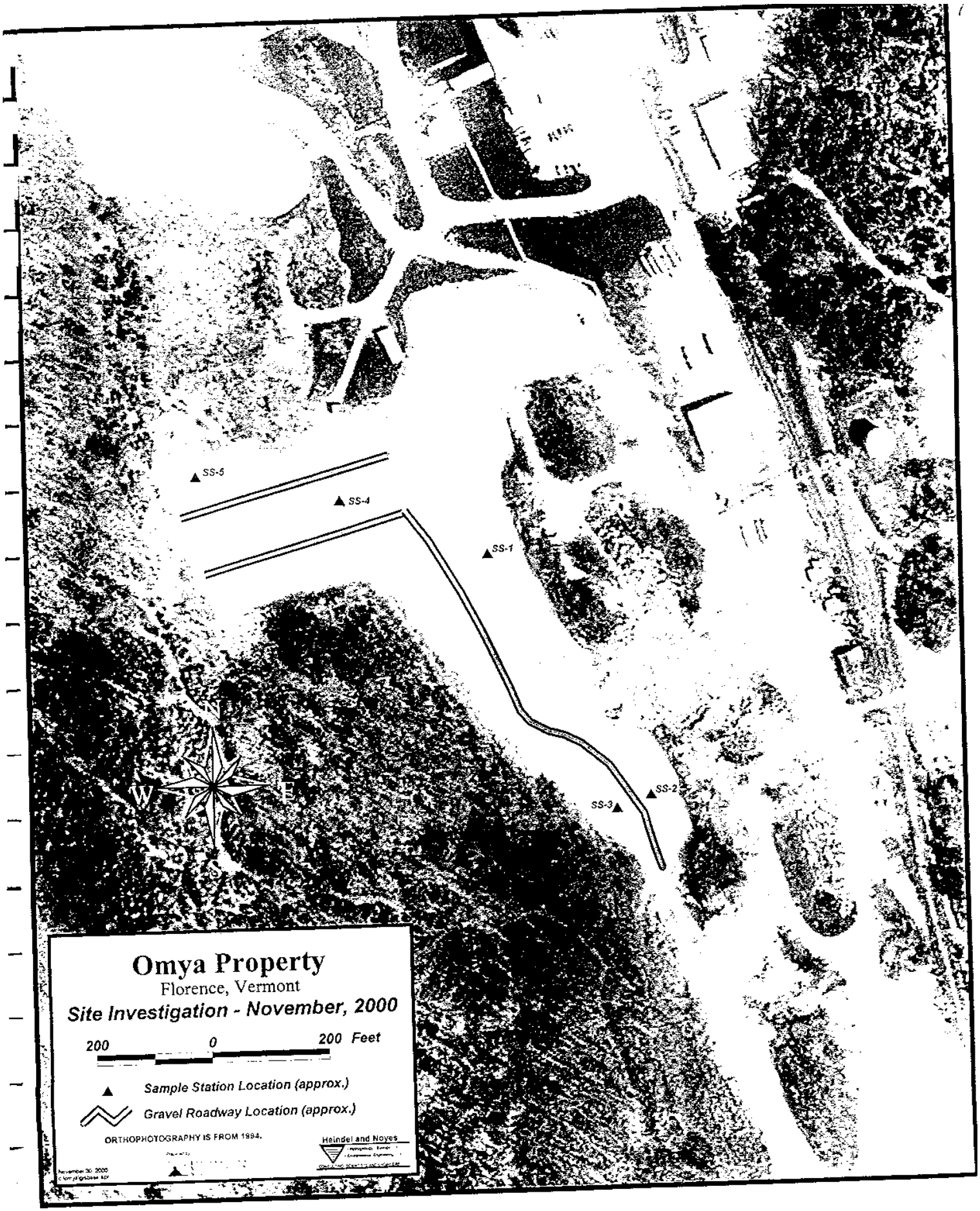
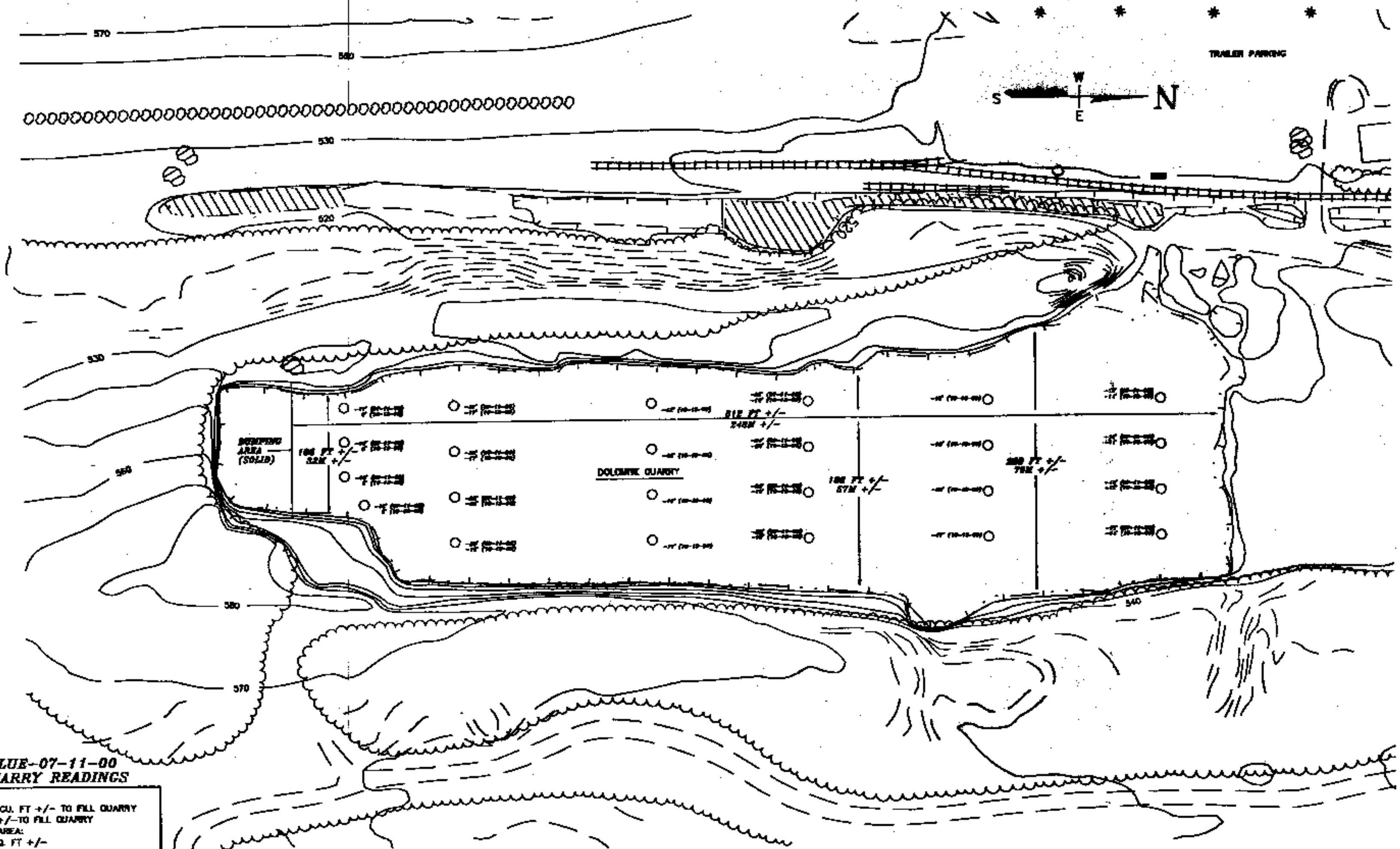

BRANDON
2.5 MILE RADIUS
PITTSFORD
Pittsford-Florence Water (2 Wells)
7797 Whipple Hill Rd
1377 West Creek Rd
1261 West Creek Rd
SITE
RDTON
2.5 MILE RADIUS
PROCTOR
WEST RUTLAND
CASTLETON
Omya Property
Florence, Vermont
Sensitive Receptor Survey
3000 0 3000 Feet
(1" = 3,000 FT.)
LEGEND
Roads
100 Foot Contour Interval
Surface Water
NWI Mapped Class II Wetland Boundary
Well Head Protection Area (WHPA)
PCWS Well
Private Well
Rare, Threatened, & Endangered Species Location
N
W
E
S
Heindel and Noyes
December 12, 2000
c:\omya\lance_rec.apr


SS-5
SS-4
SS-1
SS-2
SS-3
W
E
Omya Property
Florence, Vermont
Site Investigation - November, 2000
200
0
200 Feet
Sample Station Location (approx.)
Gravel Roadway Location (approx.)
ORTHOPHOTOGRAPHY IS FROM 1994.
Heindel and Noyes



VALUE-07-11-00
QUARRY READINGS

VOLUME:
2,414,137 CU. FT +/- TO FILL QUARRY
68370M³ +/-TO FILL QUARRY
SURFACE AREA:
161,375 SQ. FT +/-
14998M² +/-

VALUE-10-13-00
QUARRY READINGS

VOLUME:
2,268,168 CU. FT +/- TO FILL QUARRY
64236M³ +/-TO FILL QUARRY
SURFACE AREA:
143,856 SQ. FT +/-
13370M² +/-

FILE# 99008
DOLOMITE QUARRY

REVISIONS
REV. 1
REV.
REV.
REV.
REV.

OMYA

PROJECT NAME: DOLOMITE QUARRY FILLING
LOCATION: FLORENCE, VT
DRAWING NO. CV.098.21
DRAWN BY: PITTS
PLAN OF DOLOMITE QUARRY MEASUREMENTS AND NEW EMBANKMENTS
SCALE: 1" = 40'
DATE: 07-26-00
REV. 1

WELL NUMBER
1977-44
(For Driller's Use)

Map label: Well #4

Form WR-59
Rev. 7-22

State of Vermont
DEPARTMENT OF WATER RESOURCES

WELL COMPLETION REPORT

(This report must be completed and submitted to the Department of Water Resources, State Office Building, Montpelier, Vermont 05602, no later than 60 days after completion of well. Complete or line out all blanks.)

DO NOT FILL IN

WELL #4

WELL OWNER White Pigment Corp. (Name) Florence, Vt. (Mailing Address)

TOWN IN WHICH WELL IS LOCATED: Florence

(Please locate well on a large scale map to accompany this report. Maps are available on request.)

DATE WELL WAS COMPLETED: 9-1-77

PROPOSED USE OF WELL: ☐ Domestic ☐ Agricultural ☐ Business Establishment ☐ Municipal ☒ Industrial ☐ Other (Specify) .....

DRILLING EQUIPMENT: ☐ Cable Tool ☒ Rotary ☐ Air Percussion ☐ Other (Specify) .....

TOTAL DEPTH OF WELL: 76 STATIC WATER 15

CASING DETAILS: Length 79 ft. Diameter 6 in. Material Steel Weight 17 lb./ft. Length ____ ft.

SCREEN DETAILS: Make ____ Material ____ Diameter ____ in. Slot Size ____

METHOD OF SEALING CASING TO SCREEN OR BEDROCK: Grout Well

FINAL YIELD TEST: ☐ Bailed, or ☐ Pumped, or ☒ Compressed Air 2 Hours at 75 gallons per minute

Water level during yield test .....

WELL LOG

Depth From Ground Surface

Give description of formations penetrated, such as: peat, silt, sand, gravel, clay, hardpan, shale, limestone, granite, etc. Include size of gravel (diameter) and sand (fine, medium, coarse, color of material, structure (loose, packed, cemented, hard). For example: Surface to 27 ft. fine, packed, yellow sand; 27 ft. to 134 ft. gray granite.

Surface to 4 ft. Fill
4 to 15 ft. Sand
15 to 70 ft. Clay
70 to 76 ft. Coarse Gravel

YIELD TEST DATA IN G.P.M.
If yield was tested at different depths during drilling, List Below

G.P.M. @	ft.	G.P.M. @	ft.
G.P.M. @	ft.	G.P.M. @	ft.

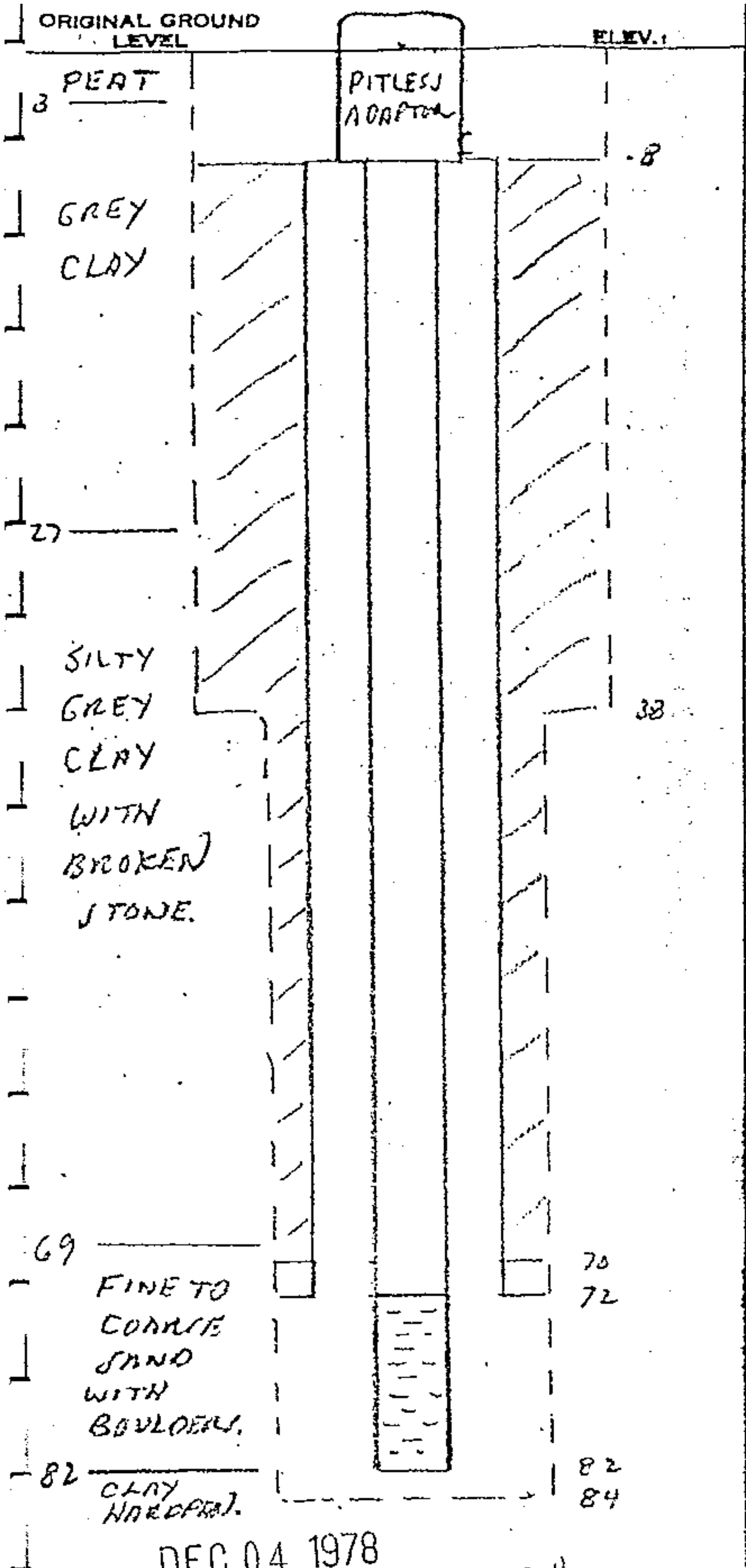
WATER ANALYSIS: Has water been analyzed? ☐ Yes ☒ No If Yes, Where ..... Include Analysis

DRILLED BY: Raymond L. Lamarche Jr. (Signature)

DOING BUSINESS AS: Green Mt. Drilling Co. Inc. (Company)

DATE OF REPORT: 12-17-77 WELL DRILLERS LICENSE NO. 51

5M 6-78



DEC 04 1978

80 # 5002

ALL DRAWINGS ARE APPROVED FOR GENERAL LAYOUT ONLY. Final correctness in dimensions and quantities is the responsibility of respective suppliers or sub-contractors.
Date 11/29/78 By J. Dellivenezi

PIPE: 64'X16"X3/8 STEEL
64'X 6" X 3/8" STEEL

NOV 27 1978

SCREEN: 10'X 80 SLOT JOHNSON STAINLESS STEEL
PLUG: STAINLESS STEEL PLATE
GRAVEL: #5 CAPE MAY
SEAL: CONCRETE - 7 TO - 70

Map Label: Gravel Well #2

PUMP

SIZE		NUMBER	
STAGES		TYPE	
SETTING		COLUMN	
TUBING		SHAFTING	
BOWLS		IMPELLERS	
IMP. SHAFT		SUCTION	
STRAINER		PRESS. B.P.	
HEAD		AIR LINE	

MOTOR

MAKE		TYPE	
VOLTS		CYCLE	
PHASE		AMP.	
H. P.		RPM	
FRAME		NON REV.	
MODEL		SERIAL NO.	
UPPER BRG.		LOWER BRG.	

GEAR DRIVE

MFG.		MODEL	
RATIO		SERIAL NO.	
HVY. THRUST		NON-REV.	

ENGINE

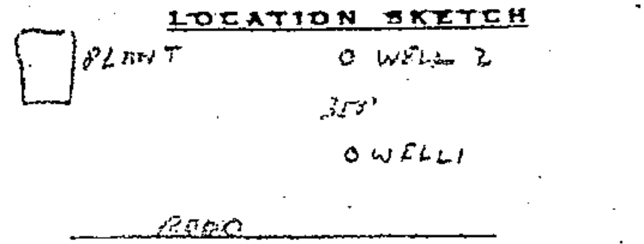
MFG.		MODEL	
RPM		CONTINUOUS H. P.	
FUEL		SERIAL NO.	

WELL

STARTED	10/22/78	CLEAR DEPTH	82' BG.
FIRST TEST	11/16/78	METHOD	CABLE TOOL
FINAL TEST		GUAR. CAP.	—
ACCEPTED		GUAR. PRESS.	—
H. P. ELEV.		FORMATION	OUTWASH
DIST. TO G.W.		DRILLER	J. CARPENTER

DATE	11/16/78			
STATIC LEV.	+3'0			
PRODUCTION	124			
PUMP. LEVEL	64'			
WATER TEMP.	50			

LOCATION SKETCH



LAYNE-NEW YORK CO., INC. – LINDEN, N. J.
WATER SUPPLY CONTRACTORS

VERMONT MARBLE CO.

DRAWN BY
LAYNE WELL # 2

STATE #
CUSTOMER WELL #

Gravel Well #2

PUMPING TEST RECORD Sheet #1

Layne NEW YORK CO., INC

FOR: Vermont Marble Co. DATES: Nov. 14, ~~15~~, ~~16~~, 1978.

LOCATION: Florence, VT. PUMPING WELL: #2 6"x16" Gravel Packed

WELL NO. 2 JOB NO.

TIME	AIR PRESS.	PUMPING LEVEL	OBS. WELL 6'	OBS. WELL 50'	OBS. WELL	~~OBS.~~ 6" WELL #2	OBS. WELL 3.5'	OBS. WELL 40'	TEMP.	ORIFICE INCHES
STATIC 7:00	LEVEL	Flowing	2.74	2.51'		Flowing	2.82'	2.47'	—	2½"&4"
7:01		11.00'	10.05'	5.58'						4"
7:02		11.50'	10.45'							4"
7:03		11.80'	10.71'							
7:04		12.00'	11.09'							
7:05		12.10'	11.24'							
7:06		12.30'	11.42'							
7:10		12.30'	11.58'	7.08'						
7:15		13.25'	12.33'	7.26'		.1'	3.57'	3.24'		
7:20		13.90'	12.94'	8.34'		.45'	3.88'	3.53'		
7:30		14.95'	13.68'	9.06'		.90'	4.35'	4.03'		
8:00		16.55'	15.33'	10.67'		2.05'	5.46'	5.12'		4"
8:01		21.80'	18.62'							9"
8:02		22.15'	18.88'							
8:03		22.50'	19.12'							
8:04		22.80'	19.24'							
8:05		22.80'	19.44'	12.94'						
8:10		23.20'	19.83'	13.28'						
8:15		24.00'	20.35'	13.82'						
8:20		24.25'	20.65'	14.11'		3.50'	6.90'	6.56'		
8:30		24.95'	21.34'	14.28'		3.95'	7.34'	6.98'		
9:00		25.80'	22.32'	15.25'		4.72'	8.11'	7.76'		9"
9:01		33.00'	25.76'							16"
9:02		33.25'	26.18'							
9:03		33.50'	26.34'							
9:04		33.75'	26.47'							
9:05		33.90'	26.68'	18.18'						

QUALITY: TIME FE MN HARD PH ODOR TASTE

ORIFICE 2½" IN. ON 4" IN. PIPE AIR LINE 720' FT.

PUMP TYPE — SIZE 4" STAGES 12

SETTING 28' of 2½" FT. TO SUCTION FLANGE

SUCTION 0 FT. OF — IN PIPE/HOSE

OBS. WELL	DIST. FROM PUMP. WELL	ELEV.	OBS. WELL	DIST. FROM PUMP. WELL

FOR PURCHASER

FOR LAYNE - NEW YORK CO., INC.

PUMPING TEST RECORD Sheet #2

Layne NEW YORK CO., INC

FOR: Vermont Marble Co. DATES: Nov. 14, 15, 1978.

LOCATION: Florence, VT. PUMPING WELL: 60" X 16" Gravel Pack

WELL NO. 2 JOB NO.

TIME	AIR PRESS.	PUMPING LEVEL	OBS. WELL 10'	OBS. WELL 50'	OBS. WELL	OBS. WELL #2 6"	OBS. WELL 25'	OBS. WELL 4'	TEMP.	ORIFICE INCHES	
STATIC	LEVEL								—	°	
9:10		34.00'	21.11'	18.58'						16"	1
9:15		34.50'	22.53'	19.16						"	
9:20		35.00'	23.13'	19.41'		6.42'	9.83'	9.50'		"	
9:30		35.60'	28.68'	20.18'		6.95'	10.30'	9.99'		"	
10:00		36.50'	29.85'	21.41'		8.00'	11.35'	11.03'		"	
11:00		38.80'	31.59'	23.25		9.65	12.98'	12.64'		16"	1
11:01		43.50'	35.10'							24"	1
11:02		44.00'	35.29'							"	
11:03		44.50'	35.50							"	
11:04		44.50'	35.64							"	
11:05		44.25'	35.71'	25.63'						"	
11:10		45.00'	36.16'	26.00'						"	
11:15		45.50'	36.38'	26.20'						"	
11:20		45.75'	36.55'	26.44'		11.10'	14.40'	14.08		"	
11:30		46.00'	36.62'	27.01'		11.50'	14.62'	14.42'		"	
12:00		46.25'	37.20'	27.20'		11.90'	15.30'	14.90'		"	
1:00		48.25'	39.18'	29.12'		13.40'	16.72'	16.42'		"	
2:00		49.25'	40.46'	30.45'		14.63'	17.94'	17.62'		"	
3:00		50.25'	41.39'	31.41		15.52'	18.84'	18.50'		"	
4:00		51.50'	42.34'	32.35'		16.30'	19.62'	19.28'		"	
5:00		52.00'	42.99'	33.03'		16.93'	20.24'	19.90'		"	
6:00		53.00'	43.60'	33.67'		17.52'	20.83'	20.49'		"	
7:00		53.50'	44.16	34.21'		18.03'	21.32'	20.98		"	
8:00		54.00'	44.61'	34.74'		18.48'	21.99'	21.45		"	
9:00		54.50'	45.02'	35.18'		19.92'	22.20'	21.86'		"	
10:00		55.00'	45.42'	35.58'		19.30'	22.59'	22.26'		"	

QUALITY: TIME FE MN HARD PH ODOR TASTE

ORIFICE IN. ON IN. PIPE AIR LINE FT.

PUMP TYPE SIZE STAGES

SETTING FT. TO SUCTION FLANGE

SUCTION FT. OF IN PIPE/HOSE

OBS. WELL	DIST. FROM PUMP. WELL	ELEV.	OBS. WELL	DIST. FROM PUMP. WELL

FOR PURCHASER

FOR LAYNE - NEW YORK CO., INC.

PUMPING TEST RECORD Sheet #3

Layne NEW YORK CO., INC

NOV 2 9 1978

5

FOR: Vermont Marble Co. DATES: Nov. 14, 15, 1978.

LOCATION: Florence, VT. PUMPING WELL: 6" X 16" Gravel Packed

WELL NO. 2 JOB NO.

TIME	AIR PRESS.	PUMPING LEVEL	OBS. WELL 60'	OBS. WELL 50'	OBS. WELL	OBS. WELL #1	OBS. WELL 35'	OBS. WELL 4'	TEMP.	ORIFICE INCHES
STATIC	LEVEL								—	°
14th 11:00		55.50'	45.73'	35.96'		19.59'	22.92'	22.56'		24"
12:00		56.00'	46.07'	36.32'		19.96'	23.24'	22.92'		"
15th 1:00		56.00'	46.38'	36.62'		20.33'	23.51'	23.29'		"
2:00		56.50'	46.65'	36.89'		20.51'	23.79'	23.44'		"
3:00		56.50'	46.90'	37.12'		20.73'	24.00	23.66'		"
4:00		57.00'	47.18'	37.43'		21.00'	24.28'	23.94'		"
5:00		57.00'	47.45'	37.64'		21.20'	24.48'	24.14'		"
6:00		57.00'	47.60'	37.84'		21.38'	24.67'	24.32'		"
7:00		57.50'	47.72'	38.00'		21.54'	24.84'	24.49'		"
8:00		57.75'	47.93'	38.22'		21.73'	25.03'	24.69'		"
9:00		58.00'	48.14'	38.43'		21.90'	25.21'	24.86'		"
10:00		58.00'	48.30'	38.62'		22.08'	25.38'	25.03'		"
11:00		58.25'	48.46'	38.79'		22.25'	25.53'	25.20'		"
12:00		58.50'	48.64'	38.97'		22.41'	25.72'	25.37'		"
1:00		58.75'	48.79'	39.13		22.57'	25.87'	25.52'		"
2:00		59.00'	48.94'	39.28'		22.71'	26.01'	25.66'		"
3:00		59.00'	49.11'	39.44'		22.86'	26.16'	25.81'		"
4:00		59.25'	49.19'	39.58'		23.00'	26.30'	25.95'		"
5:00		59.50'	49.33'	39.72'		23.04'	26.43'	26.08'		"
6:00		59.75'	49.52'	39.87'		23.26'	26.56'	26.21'		"
7:00		59.75'	49.63'	40.00'		23.39'	26.69'	26.34'		"
8:00		59.75'	49.75'	40.14'		23.53'	26.82'	26.46'		"
9:00		60.00'	49.93'	40.26'		23.62'	26.92'	26.56'		"
10:00		60.00'	49.96'	40.37'		23.73'	27.02'	26.68'		"
11:00		60.00'	50.03	40.45'		23.81'	27.12'	26.77'		"
12:00		60.00'	50.09'	40.59'		23.92'	27.22'	26.87'		"

QUALITY: TIME FE MN HARD PH ODOR TASTE

ORIFICE IN. ON IN. PIPE AIR LINE FT.

PUMP TYPE SIZE STAGES

SETTING FT. TO SUCTION FLANGE

SUCTION FT. OF IN PIPE/HOSE

OBS. WELL	DIST. FROM PUMP. WELL	ELEV.	OBS. WELL	DIST. FROM PUMP. WELL

FOR PURCHASER

FOR LAYNE - NEW YORK CO., INC.

PUMPING TEST RECORD Sheet #4

Layne NEW YORK CO., INC.

FOR: Vermont Marble Co. DATES: Nov. 16, 1978.

LOCATION: Florence, VT. PUMPING WELL: 6" X 16" Gravel Packed

WELL NO. 2 JOB NO.

TIME	AIR PRESS.	PUMPING LEVEL	OBS. WELL 6'	OBS. WELL 50'	OBS. WELL	OBS. WELL #1 6"	OBS. WELL 3.5'	OBS. WELL 4'	TEMP.	ORIFICE INCHES	GPM
STATIC	LEVEL								—	o	o
1:00		60.25'	50.16'	40.70'		24.07'	27.33'	27.00'		24"	125
2:00		60.50'	50.23'	40.78'		24.16'	27.45'	27.09'		24"	12?
3:00		60.50'	50.27'	40.88'		24.26'	27.55'	27.19'		24"	12?
4:00		60.50'	50.31'	41.00'		24.36'	27.65'	27.30'		24"	12?
5:00		60.50'	50.43'	41.12'		24.47'	27.76'	27.42'		24"	12?
6:00		60.75'	50.51'	41.21'		24.56'	27.85'	27.50'		24"	12?
7:00		61.00	50.58'	41.28'		24.64'	27.94'	27.59'		24"	12?
7:01		45.00'	39.10'							0	0
7:02		33.00'	36.05'								0
7:03		30.00'	34.84'								0
7:04		30.00'	33.82'								0
7:05		28.50'	33.07'	32.28'							0
7:10		26.00'	30.57'	30.45'		22.50'					0
7:15		24.50'	28.98'	29.05'		21.66'					0
7:20		23.50'	27.74'	27.89'		20.95'	24.20'	23.73'			0
7:30		22.65'	25.84'	25.97'		19.57'	22.83'	22.39'			0
8:00		19.50'	22.74'	22.85'		17.34'	20.67'	20.25'			0
9:00		16.19'	19.41'	19.55'		14.67'	18.03'	17.63'			0
10:00		14.08'	17.33'	17.46'		12.93'	16.31'	15.93'			0

QUALITY: TIME FE MN HARD PH ODOR TASTE

ORIFICE IN. ON IN. PIPE AIR LINE FT.

PUMP TYPE SIZE STAGES

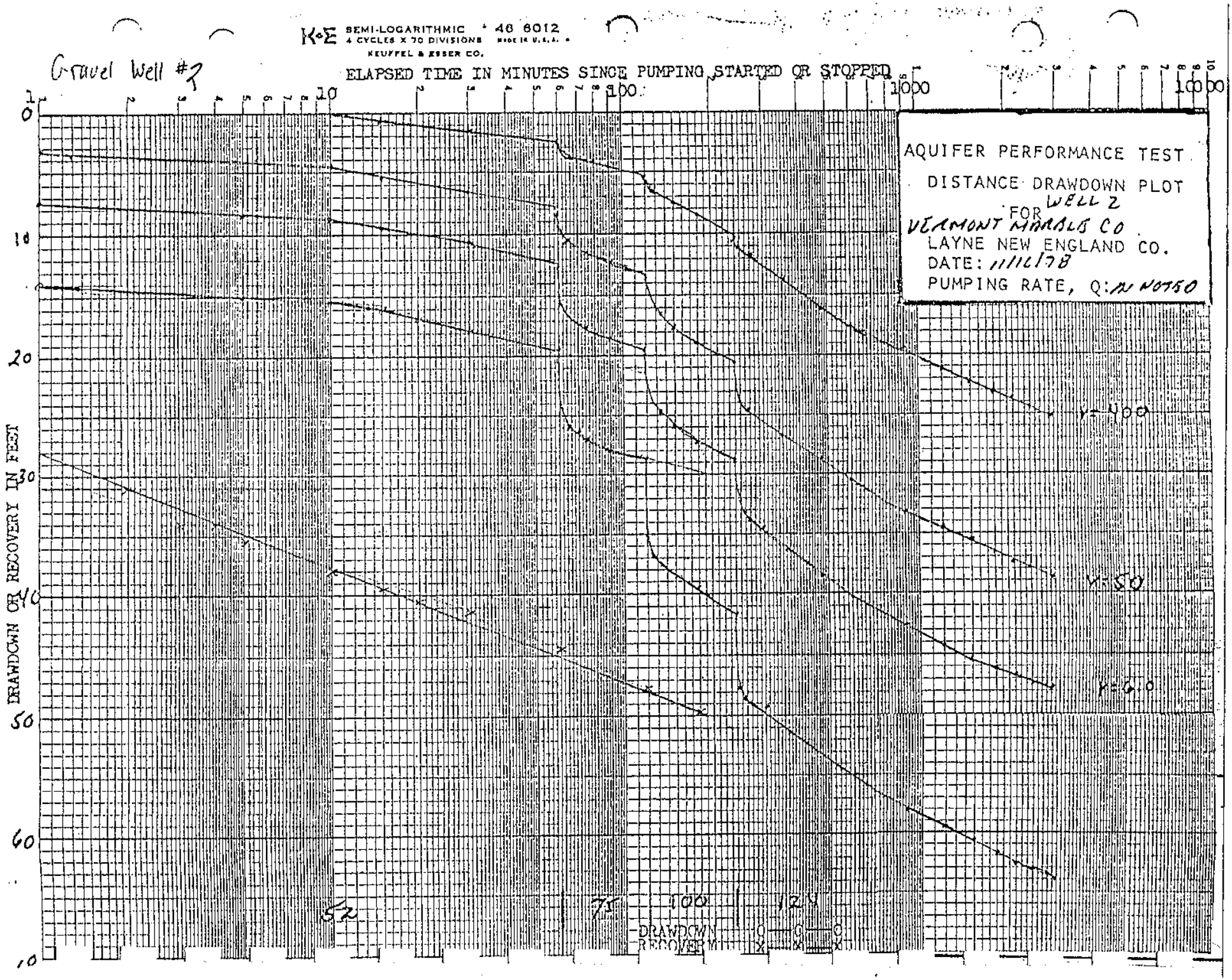
SETTING FT. TO SUCTION FLANGE

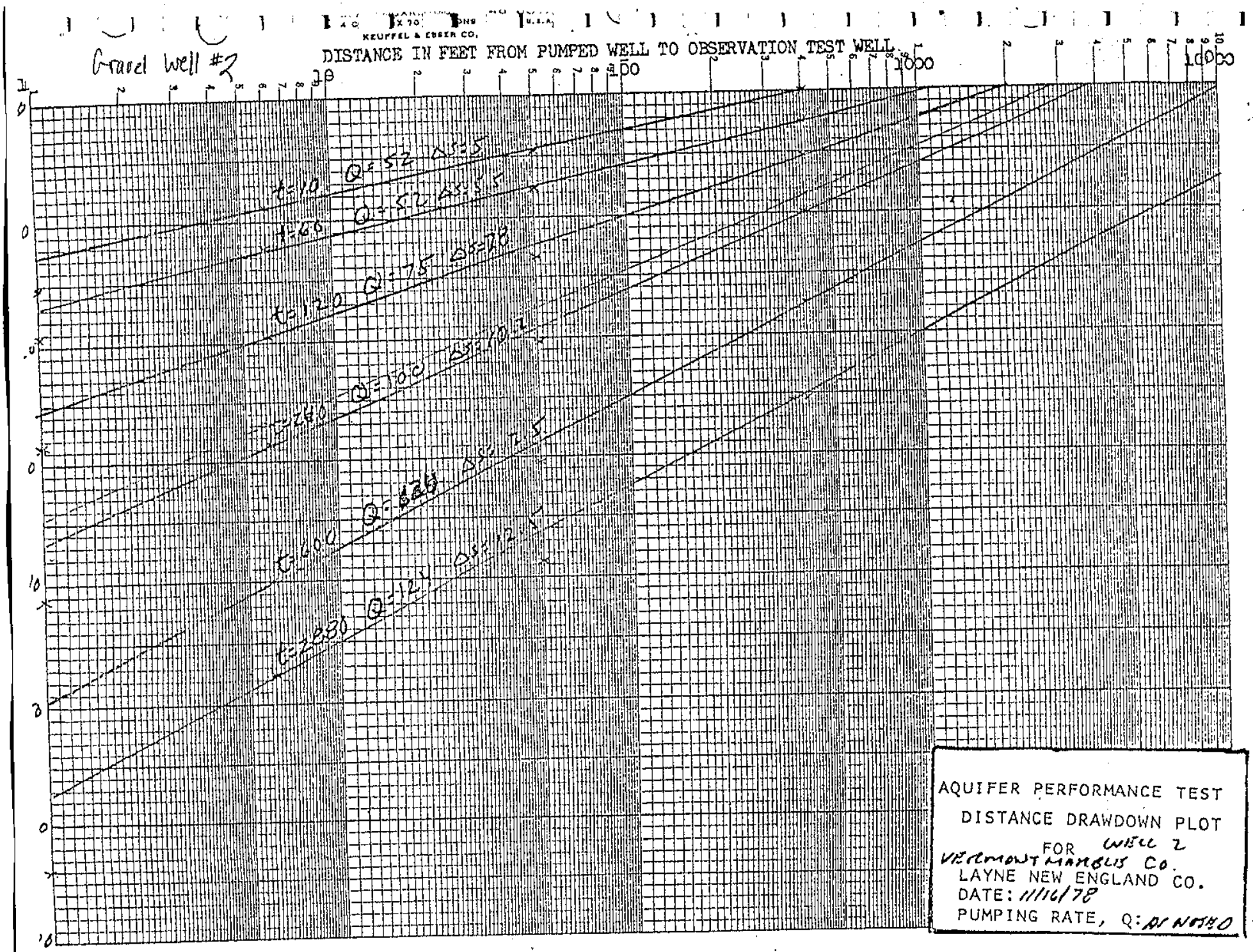
SUCTION FT. OF IN PIPE/HOSE

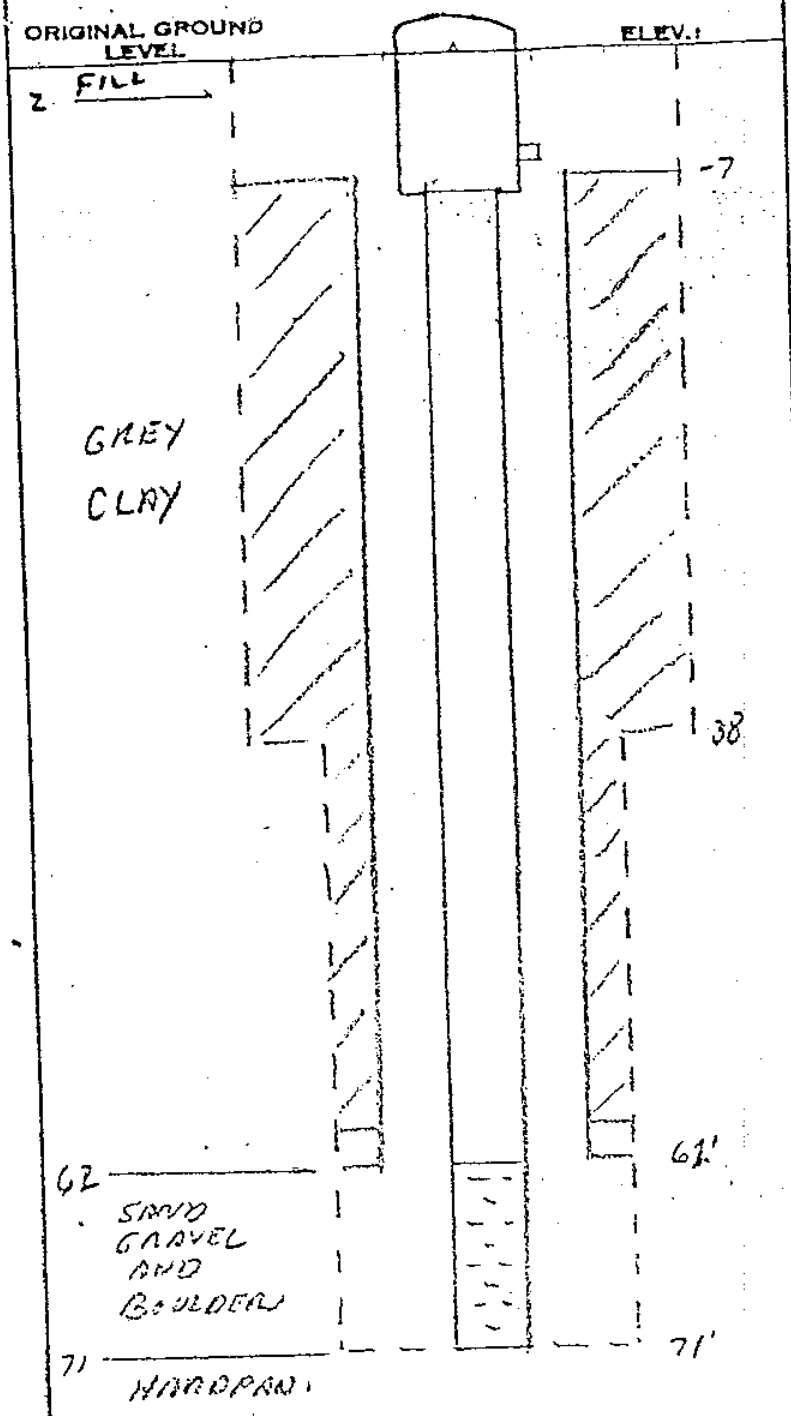
OBS. WELL	DIST. FROM PUMP. WELL	ELEV.	OBS. WELL	DIST. FROM PUMP. WELL	ELEV.

FOR PURCHASER

FOR LAYNE - NEW YORK CO., INC.


K+E SEMI-LOGARITHMIC * 46 6012
4 CYCLES X 70 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.
Gravel Well #7
ELAPSED TIME IN MINUTES SINCE PUMPING STARTED OR STOPPED
DRAWDOWN OR RECOVERY IN FEET
AQUIFER PERFORMANCE TEST
DISTANCE DRAWDOWN PLOT
FOR WELL 2
VERMONT MARBLE CO
LAYNE NEW ENGLAND CO.
DATE: 11/16/78
PUMPING RATE, Q: N NOT50
r=400
r=50
r=5.0
DRAWDOWN
RECOVERY


Gravel well #2
DISTANCE IN FEET FROM PUMPED WELL TO OBSERVATION TEST WELL
t=10 Q=52 Δs=5
t=60 Q=52 Δs=5
t=120 Q=75 Δs=7.8
t=240 Q=100 Δs=10.2
t=600 Q=120 Δs=12.5
t=2880 Q=125 Δs=12.7
AQUIFER PERFORMANCE TEST
DISTANCE DRAWDOWN PLOT
FOR WELL 2
VERMONT MARBLE CO.
LAYNE NEW ENGLAND CO.
DATE: 11/16/78
PUMPING RATE, Q: AS NOTED



MATERIAL Map label: 9

PIPE: 55' x 16" x 3/8" STEEL
55' x 6" x 3/16" STEEL Gravel Well #1

NOV 2 7 1978

SCREEN: 10' x 6" STAINLESS STEEL JOHNSON
80 SLOT

PLUG: STAINLESS STEEL PLATE

GRAVEL: #5 CAPE MAY

SEAL: CONCRETE -7 TO -61

PUMP

SIZE	NUMBER
STAGES	TYPE
SETTING	COLUMN
TUBING	SHAFTING
BOWLS	IMPELLERS
IMP. SHAFT	SUCTION
STRAINER	PRESS. B.P.
HEAD	AIR LINE

MOTOR

MAKE	TYPE
VOLTS	CYCLE
PHASE	AMP.
H. P.	RPM
FRAME	NON REV.
MODEL	SERIAL NO.
UPPER BRG.	LOWER BRG.

GEAR DRIVE

MFG.	MODEL
RATIO	SERIAL NO.
HVY. THRUST	NON-REV.

ENGINE

MFG.	MODEL
RPM	CONTINUOUS H. P.
FUEL	SERIAL NO.

WELL

STARTED 10/1/78
FIRST TEST 10/21/78
FINAL TEST
ACCEPTED
B. P. ELEV.
DIST. TO G.W.

CLEAR DEPTH 71'
METHOD CABLE TOOL
GUAR. CAP. —
GUAR. PRESS. —
FORMATION OUTWASH
DRILLER J. CARLSEN-F.

DATE	10/18/78				
STATIC LEV.	+3				
PRODUCTION	68				
PUMP. LEVEL	69				
WATER TEMP.	60				

LOCATION SKETCH

SD #5001

ALL DIMENSIONS ARE ...
Accepted ...
Date 11/29/78 J. Delliveneri

LAYNE-NEW YORK CO., INC. - LIMDEN, N. J.
WATER SUPPLY CONTRACTORS

VERMONT MARBLE CO

DRAWN BY
LAYNE WELL # 1.

STATE #
CUSTOMER WELL # 1

DEC 04 1978

PUMPING TEST RECORD

Gravel Well #1

LAYNE SINCE 1902 NEW YORK CO., INC.

FOR: Vermont Marble Co. DATES: 10/18/78 – 10/19/78

LOCATION: Florence, Vermont PUMPING WELL: #1 16"X6"

TIME	AIR PRESS.	PUMPING LEVEL	OBS. WELL 1	OBS. WELL 3	OBS. WELL 2	OBS. WELL	OBS. WELL	OBS. WELL	TEMP.	ORIFICE INCHES	G
STATIC	LEVEL	Flowing	3.20	3.30	2.90				–	0	(
8:00	58'	START of Test								7"	6
8:01	40									↑	
8:02	33		19.60								
8:03	30		21.90								
8:04	28		23.30								
8:05	26.50			3.60	3.20						
8:10	25.00		27.15							↓	
8:15	23.50			4.35	3.80					7"	6
8:20	22.00		28.00								
8:25	21.50			6.20	4.46			opened Valve		6"–7"	
8:30	18.00		30.70							7"	
8:45	16.50		32.35	6.40	5.60					7"	
9:00	16.00		33.45	7.20	6.30					7"	
10:00	12.00		35.25	9.15	8.20			opened Valve		5'–7"	
11:00	16.00		33.10	9.86	8.80					6"–7"	
12:00	12.00		35.60	10.90	9.90					↑	
1:PM	12.00		36.05	11.45	10.40						
2:00	12.00		36.55	11.95	10.95						
3:00	12.00		36.85	12.40	11.46						
4:00	11.00		37.05	12.65	11.65						
8:00	10.00		38.65	13.80	12.80						
12:AM	10.00		39.75	14.40	13.40					↓	
6:00	8.35		40.00	15.30	14.40			opened Valve		6"–7"	
8:00	2.00		41.80	15.90	14.80			Closed Valve		7'–5½"	
9:00	10.00		38.85	15.50	14.65					5½"	6
10:00	10.00		38.50	15.66	14.40					5½"	6

QUALITY: TIME ____ FE ____ MN ____ HARD ____ PH ____ ODOR ____ TASTE ____

ORIFICE 3½ IN. ON 4 IN. PIPE AIR LINE 58 FT.

PUMP TYPE Subm. SIZE ____ STAGES ____

SETTING 69.05 FT. TO SUCTION FLANGE

SUCTION 57.25 FT. OF 2¼ IN PIPE ~~HOSE~~

DISCHARGE PIPE 10 FT. OF 2 IN ~~PIPE~~, HOSE

OBS. WELL	DIST. FROM PUMP. WELL	ELEV.	OBS. WELL	DIST. FROM PUMP. WELL	E
1	4'				
2	400'				
3	350'				

FOR PURCHASER

FOR LAYNE - NEW YORK CO., INC.

PUMPING TEST RECORD

Gravel well #1

LAYNE SINCE 1907 NEW YORK CO., INC

FOR: Vermont Marble Co. DATES: 10/19/78 – 10/20/78

LOCATION: Florence, Vermont PUMPING WELL: #1 16'x6"

TIME	AIR PRESS.	PUMPING LEVEL	OBS. WELL 1	OBS. WELL 3	OBS. WELL 2	OBS. WELL	OBS. WELL	OBS. WELL	TEMP.	ORIFICE INCHES	G
STATIC	LEVEL	Flowing	3.20	3.30	2.90				–	0	
11:00	10.00		38.50	15.50	14.60					5½"	6
520 12:PM	10.00		38.30	16.60	14.50					↑	
1:00	11.00		38.10	15.65	14.60						
2:00	11.00		38.15	15.60	14.65						
3:00	11.00		38.10	15.60	14.60						
1760 4:00	11.00		38.30	16.60	14.70						
2040 8:00	11.00		38.25	16.70	14.70						
2240 12:AM 10/20	11.00		38.50	16.10	15.10						
7:00	11.00		38.75	1620	15.30					↓	
1890 8:00	11.00		38.75	16.20	15.30					5½"	6
		Shut Down and Recoveries									
8:01	31		29.50								
8:02	36		25.00								
8:03	39		22.40								
8:04	41		21.00								
8:05	42		20.10	15.75	15.05						
8:10	45		17.00								
8:15	48			15.10	14.40						
8:20	49		15.05								
8:25	49			14.35	13.75						
8:30	49		13.60								
8:45	50		12.50	13.50	12.60						
9:00	51		11.60	12.50	12.00						
10:00	52		9.55	10.05	10.50						
11:00	53		8.90	9.90	9.40						
12:PM	54		8.50	960	9.05						

QUALITY: TIME _____ FE _____ MN _____ HARD _____ PH _____ ODOR _____ TASTE _____

ORIFICE _____ IN. ON _____ IN. PIPE AIR LINE _____ FT.

PUMP TYPE _____ SIZE _____ STAGES _____

SETTING _____ FT. TO SUCTION FLANGE

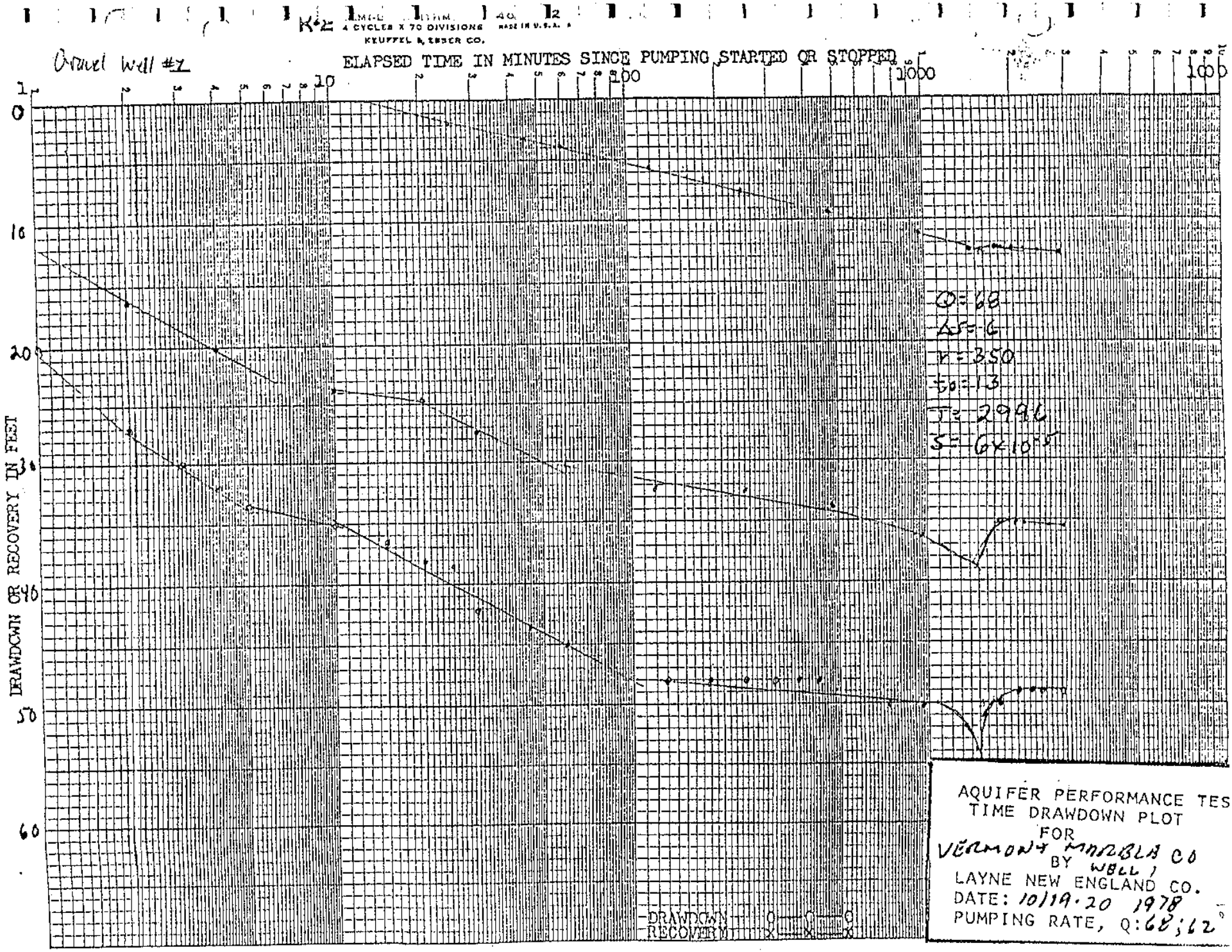
SUCTION _____ FT. OF _____ IN PIPE/HOSE

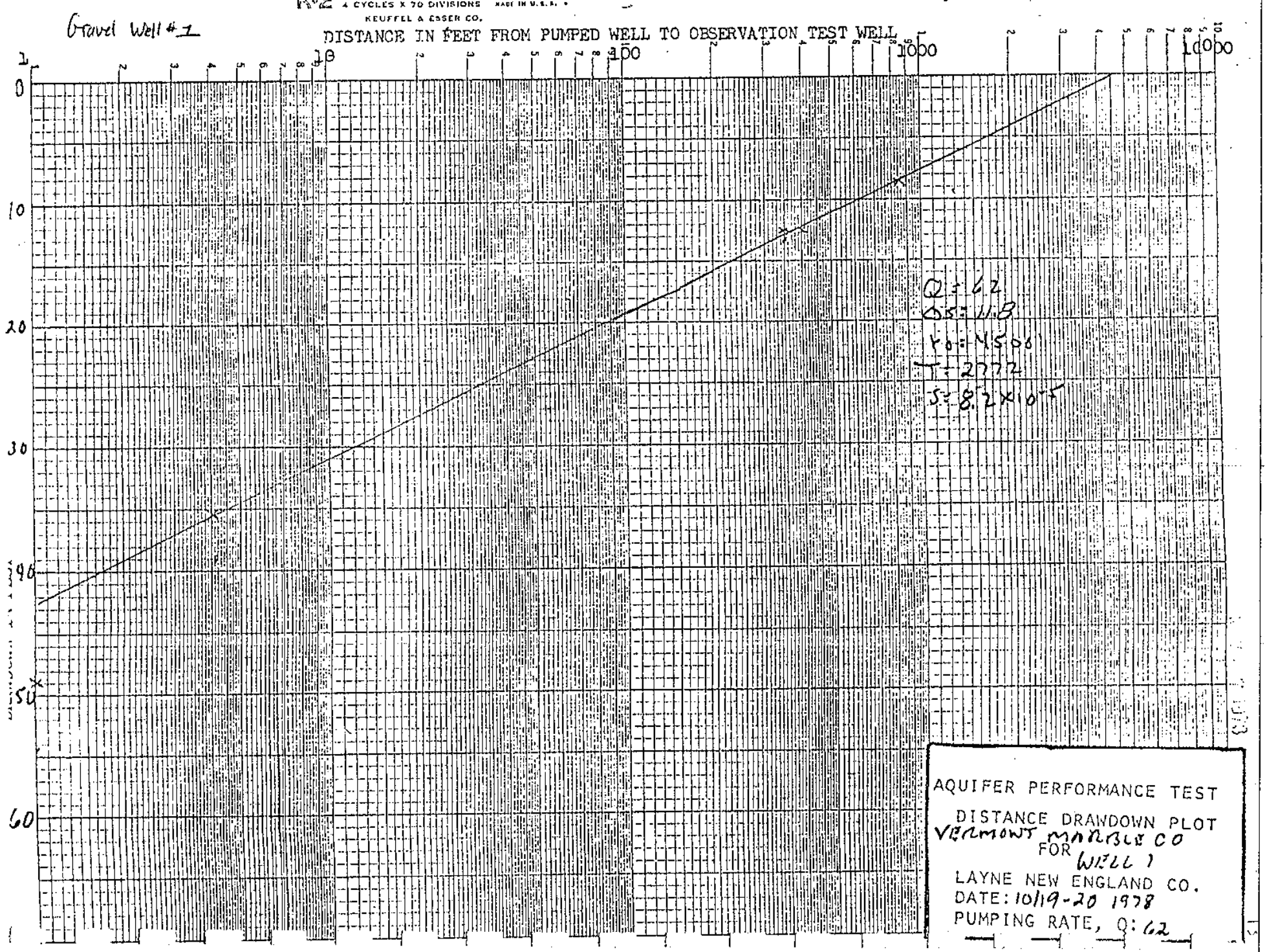
DISCHARGE PIPE _____ FT. OF _____ IN PIPE/HOSE

OBS. WELL	DIST. FROM PUMP. WELL	ELEV.	OBS. WELL	DIST. FROM PUMP. WELL	EL

FOR PURCHASER

FOR LAYNE - NEW YORK CO., INC.


Gravel Well #2
ELAPSED TIME IN MINUTES SINCE PUMPING STARTED OR STOPPED
1
10
100
1000
10000
DRAWDOWN OR RECOVERY IN FEET
0
10
20
30
40
50
60
Q=68
Δs=6
r=350
t₀=13
T=2996
S=6x10⁻⁵
DRAWDOWN
RECOVERY
AQUIFER PERFORMANCE TES
TIME DRAWDOWN PLOT
FOR
VERMONT MARBLE CO
BY WELL
LAYNE NEW ENGLAND CO.
DATE: 10/19-20 1978
PUMPING RATE, Q: 68; 62


K&E SEMI-LOGARITHMIC 46 6012
4 CYCLES X 70 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.
Gravel Well #1
DISTANCE IN FEET FROM PUMPED WELL TO OBSERVATION TEST WELL
1
10
100
1000
10000
0
10
20
30
40
50
60
Q = 62
Ds = 11.8
r₀ = 1500
T = 2772
S = 8.2 × 10⁻⁵
AQUIFER PERFORMANCE TEST
DISTANCE DRAWDOWN PLOT
VERMONT MARBLE CO
FOR WELL 1
LAYNE NEW ENGLAND CO.
DATE: 10/19-20 1978
PUMPING RATE, Q: 62

PRODUCTION WELL LOG

GEOMAPPING ASSOCIATES LTD.

map label: Well 96-1

WELL NO. 96-1	**PROPERTY:** OMYA, INC., VERPOL PLANT
COORDINATES (SCALED) N ° W °	**BOREHOLE DIAMETER:** 6"
	TOTAL DEPTH: 500'
GROUND ELEV: +/- 534	**CASING:** 8" I.D., STEEL, 29 LBS. / FT.
DATE DRILLED: 8/14/96 - 8/15/96	**DRILLING METHOD:** AIR ROTARY
DRILLER: GREEN MT. DRILLING CO., INC., CENTER RUTLAND, VT	**STATIC LEVEL:** NOT MEASURED
SITE LOCATION: ADJACENT TO 500K WATER STORAGE TANK	**SURFACE DESCRIPTION:** BLASTED BENCH IN BEDROCK, LAWN AREA
GEOLOGIST: JIM PURDY	**LOG DATE:** 8/14/96

FOOTAGE	SCALE	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS	FRACTURES	AIRLIFT DISCHARGE	CIRC. RET.	CIRC. LOSS	SAMPLE INT.
25			0 - 1' TOPSOIL FILL 1 - 50' OFF WHITE - LT. GRAY FINE GRAINED MARBLE, BLAST FRACTURED NEAR SURFACE	INSTALLED 9' OF 8" STEEL CASING W/ DRIVE SHOE, SET 8' IN COMPETENT ROCK					
50			50 - 500' WHITE - GRAY FINE GRAINED MARBLE, OXIDE STAINED, THIN HEAVILY OXIDE STAINED SCHISTOSE MARBLE	COARSE DRILL CUTTINGS (1 - 2") RETURNED AT SURFACE 50 - 450'					
75									
100									
125									
150									
175									
200									
225									
250									
275									
300									
325									
350									
375									
400									
425				WATER CLEARS WELL IN AIRLIFT DISCHARGE	420'	5 GPM			
450									
475									
500			500' END OF HOLE						

100% RETURN OF AIR / DRILLING FLUID

NOT SAMPLED, SEE WELL 96-2 LOG

map label: well 96-1

Water Supply Division Well Report
Well Statistics

Printed: 11/13/97

Well Tag Number: 1996-35
Well Report Number: 3,168
Owner's Name: OMYA, INC.
Purchaser's Name:
Town Name: Pittsford

Date Report Received: 8/27/96
Map Cell: 16C4
Date Well Was Completed: 8/16/96

Purposed Use of Well: Abandoned
Reason for Drilling Well: Test or exploration
Drilling Equipment: Rotary (AP)

☐ Well Has Screen

Total Depth of Well (in feet): 300.00
Casing Finish: Above ground, unfinished
Total Casing Length (in feet): 10.00
Casing Diameter: 8.00

☐ Not Steel Casing

Method of Sealing Casing: Drive shoe only
Yield Test Method: Compressed air
Yield Tested At (Gallons per Minute): 5.00
Static Water Level (in feet): 0.00

☐ Well is OverFlowing
☐ Has Water been Analyzed

Comments: WELL REASON: TEST OR EXPLORATION & PROVIDE ADDITIONAL SUPPLY, WELL TO BE ABANDONED.

Reason for Well Development:
Well Driller: Green Mountain Drilling Company, Inc.
Tax Map:

☐ Gravel Well

Overburden Thickness (in feet): 0

Water Supply Division Well Report

Printed: 11/13/97

Well Lithology

Town: Pittsford

Well Report Number: 3,169

Starting Depth	Ending Depth	Lithology
0	1	Clay

Driller's Description: CLAY

1	500	Rock, bedrock, ledge, etc.

Driller's Description: MARBLE (MIXED COLORS)-WATER

WELL NO. / TAG NO.
1996-34
(For Owner's Use)

This report must be completed and submitted to the Department of Environmental Conservation, Water Supply Division, 103 South Main Street, The Old Pantry, Waterbury, VT 05671-0403 no later than 90 days after completion of the well.

State of Vermont
Dept. of Environmental Conservation
103 S. Main St., The Old Pantry
Waterbury, VT 05671-0403

WELL COMPLETION REPORT

Location map attached to WCR ____

DEPARTMENT USE ONLY
E.C. ____ U.S.G.S. ____
Field Location ☐ Map area ____
Latitude ____ ° ' " Elev. ____
Longitude ____ ° ' " Topo. ____
Scale: 62,500 ☐, 25,000 ☐, 24,000 ☐
Data in Town Files ☐

1. WELL OWNER OMYA, Inc. P.O. Box 10 Florence, VT. 05744
(Name) (Permanent Mailing Address)
OR
WELL PURCHASER ____ ____
(Name) (Permanent Mailing Address)

2. LOCATION OF WELL: TOWN Pittsford SUBDIVISION ____ LOT NO. ____

3. DATE WELL WAS COMPLETED 8-15-96 P.O. # 82501

4. PROPOSED USE OF WELL: ☐ Domestic, ☒ Other Commercial

5. REASON FOR DRILLING WELL: ☐ New Supply, ☐ Replace Existing Supply, ☐ Deepen Existing Well, ☒ Test or Exploration, ☒ Provide Additional Supply, ☐ Other ____ (W-1) W96-1

6. DRILLING EQUIPMENT: ☐ Cable Tool, ☒ Rotary with A-P, ☐ Other ____

7. TYPE OF WELL: ☒ Open Hole in Bedrock, ☐ Open End Casing, ☐ Screened or Slotted, ☐ Other ____

8. TOTAL DEPTH OF WELL: 500 feet below land surface

9. CASING FINISH: ☐ Above ground, Finished, ☒ Below ground, Unfinished, ☐ Buried, ☐ In Pit, ☐ Removed, ☐ None used, ☐ Other ____

10. CASING DETAILS: Total Length 10½ ft Length below LS 9 ft Dia. 8 in. Material STEEL Wt. 29 lb./ft

11. LINER OR INNER CASING DETAILS: Length used ____ ft Diameter ____ in. Material ____ Weight ____ lb./ft

12. METHOD OF SEALING CASING TO BEDROCK: ☒ Drive Shoe, ☐ Grout - Type ____ Drilled 10 5/8 in. hole 8 ft in Bedrock
☐ Other ____

13. SCREEN DETAILS: Make and Type ____ Material ____ Length ____ ft Diameter ____ in.
Slot Size ____ Depth to top of screen in feet below land surface ____ ft. Gravel pack (if used) Gravel Size or Type ____

14. YIELD TEST: ☐ Bailed, ☐ Pumped, ☒ Compressed Air, for 1 Hours at 5 Gallons per minute
Measured by ☒ Bucket, ☐ Orifice pipe, ☐ Weir, ☐ Meter ☐ Permanent Airline installed

15. STATIC WATER LEVEL: ____ feet below land surface, Date or Time measured ____, Overflows at ____ GPM

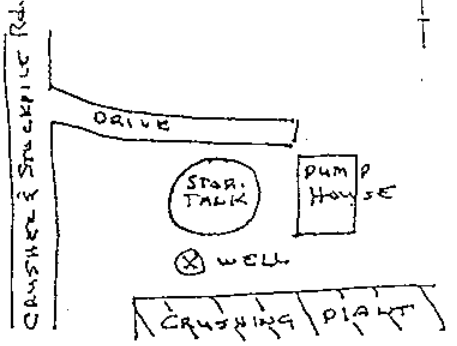
16. WATER ANALYSIS: Has the water been analyzed? ☐ Yes ☒ No. If Yes, Where ____

17. SPECIAL NOTES: ____

18. WELL LOG

Depth from Land Surface: Feet	Feet	Water Bearing	Formation Description	Source
Ground Surface	1		CLAY	
1	500	V	MARBLE (MIXED COLORS)	

19. SITE MAP
Show permanent structures such as buildings, septic tanks, and/or other land marks and indicate not less than two distances to the well. Indicate local street name and subdivision lot number.



20. TESTED YIELD
If the yield was tested at different times than during drilling, list below.

Feet	Gallons Per Minute
420	5

WELL DRILLED BY: Ray & Jeff Leonard
DOING BUSINESS AS: Green Mt. Drilling Co., Inc.
(Company or Business Name)
REPORT FILED BY: Raymond L. Leonard Jr.
(Authorized Signature)
DATE OF REPORT: 8-23-96 WELL DRILLERS LIC. NO. 51

PRODUCTION WELL LOG — GEOMATRIX ASSOCIATES LTD.

WELL NO. 96-1A	PROPERTY: OMYA, INC., VERPOL PLANT
COORDINATES (SCALED) N ° W °	BOREHOLE DIAMETER: 6"
	TOTAL DEPTH: 300'
GROUND ELEV: +/- 500	CASING: 8" I.D., STEEL, 29 LBS. / FT.
DATE DRILLED: 8/16/96	DRILLING METHOD: AIR ROTARY
DRILLER: GREEN MT. DRILLING CO., INC., CENTER RUTLAND, VT	STATIC LEVEL: NOT MEASURED
SITE LOCATION: NORTH SIDE OF CASCADE MILL LOWER LEVEL ACCESS ROAD	SURFACE DESCRIPTION: BLASTED RAMP IN BEDROCK, ASPHALT DRIVE
GEOLOGIST: JIM PURDY	LOG DATE: 8/16/96

Map label: well 96-1A

FOOTAGE	SCALE	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS	FRACTURES	AIRLIFT DISCHARGE	CIRC. RET.	CIRC. LOSS	SAMPLE INT.
25			0 - 1' FILL 1 - 45' HEAVILY WEATHERED, FRACTURED, OXIDE STAINED, WHITE, FINE GRAINED MARBLE	INSTALLED 9' OF 8" STEEL CASING W/ DRIVE SHOE, SET 8' IN COMPETENT ROCK					30' 35'
50			45' MUD SEAM, HEAVILY WEATHERED, OXIDE STAINED MARBLE, OLIVE GRAY CLAY FILLED SOLUTION FRACTURE 55 - 80' HEAVILY WEATHERED, FRACTURED, OXIDE STAINED, WHITE FINE GRAINED MARBLE	COARSE DRILL CUTTINGS (1 - 2") RETURNED AT SURFACE 0 - 300'	45'	5 GPM			45' 55'
75			80 - 90' OFF WHITE - LT. GRAY FINE GRAINED MARBLE						80' 90'
100			90 - 300' WHITE FINE GRAINED MARBLE, OXIDE STAINED, THIN, HEAVILY OXIDE STAINED SCHISTOSE MARBLE						100' 110'
125				OCHRE COLOR AND FINE SEDIMENT IN AIRLIFT DISCHARGE DOES NOT CLEAR WITH DEVELOPMENT					
150									150'
175									180'
200									200'
225									220'
250									240' 260'
275									280'
300			300' END OF HOLE						
325									
350									
375									
400									
425									
450									
475									
500									

100% RETURN OF AIR / DRILLING FLUID

WELL NO. / TAG NO. 1996-35

(For Driller's Use)

This report must be completed and submitted to the Department of Environmental Conservation, Water Supply Division, 103 South Main Street, The Old Pantry, Waterbury, VT 05671-0403 no later than 90 days after completion of the well.

State of Vermont
Dept. of Environmental Conservation
103 S. Main St., The Old Pantry
Waterbury, VT 05671-0403

WELL COMPLETION REPORT

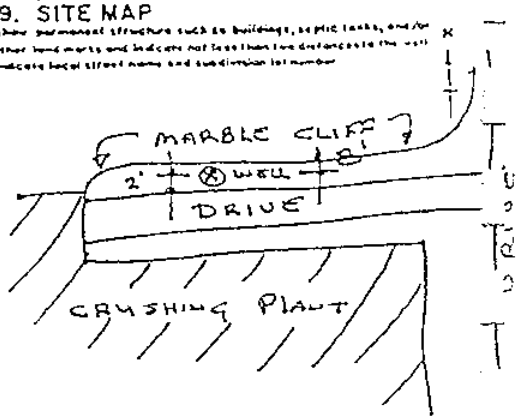
Location map attached to WCR ____

DEPARTMENT USE ONLY
E.C. ____ U.S.G.S. ____
Field Location ☐ Map area ____
Latitude ____ ° ' " Elev. ____
Longitude ____ ° ' " Topo. ____
Scale: 62,500 ☐, 25,000 ☐, 24,000 ☐
Data in Town Files ☐

1. WELL OWNER Omya, Inc (Name) P.O. Box 10 (Permanent Mailing Address) Florence, Vt. 05744
   OR
   WELL PURCHASER ____ (Name) ____ (Permanent Mailing Address)
2. LOCATION OF WELL: TOWN Pittsford SUBDIVISION ____ LOT NO. ____ P.O.# 82501
3. DATE WELL WAS COMPLETED 8-16-96
4. PROPOSED USE OF WELL: ☐ Domestic, ☒ Other Commercial (W-2) W96-1A
5. REASON FOR DRILLING WELL: ☐ New Supply, ☐ Replace Existing Supply, ☐ Deepen Existing Well, ☒ Test or Exploration, ☒ Provide Additional Supply, ☐ Other ____
6. DRILLING EQUIPMENT: ☐ Cable Tool, ☒ Rotary with A-P, ☐ Other ____
7. TYPE OF WELL: ☒ Open Hole in Bedrock, ☐ Open End Casing, ☐ Screened or Slotted, ☐ Other ____
8. TOTAL DEPTH OF WELL: 300 feet below land surface
9. CASING FINISH: ☐ Above ground, Finished, ☒ Above ground, Unfinished, ☐ Buried, ☐ In Pit, ☐ Removed, ☐ None used, ☐ Other ____
10. CASING DETAILS: Total length 10½ ft. Length below LS 9 ft. Dia. 8 in. Material STEEL Wt. 29 lb./ft.
11. LINER OR INNER CASING DETAILS: Length used ____ ft. Diameter ____ in. Material ____ Weight ____ lb./ft.
12. METHOD OF SEALING CASING TO BEDROCK: ☒ Drive Shoe, ☐ Grout – Type ____ Drilled 10⅝ in. hole 8 ft. in Bedrock ☐ Other ____
13. SCREEN DETAILS: Make and Type ____ Material ____ Length ____ ft. Diameter ____ in. Slot Size ____ Depth to top of screen in feet below land surface ____ ft. Gravel pack if used: Grosst Size or Type ____
14. YIELD TEST: ☐ Bailed, ☐ Pumped, ☒ Compressed Air, for 1 Hours at 5 Gallons per minute Measured by ☒ Bucket, ☐ Orifice plate, ☐ Weir, ☐ Meter ☐ Permanent Airline installed
15. STATIC WATER LEVEL: ____ feet below land surface, Date of Flow measured ____, Overflows at ____ G P M
16. WATER ANALYSIS: Has the water been analyzed? ☐ Yes ☒ No, If Yes, Where ____
17. SPECIAL NOTES: Well to be abandoned because of mud seam and quantity of water.
18. WELL LOG

Depth from Land Surface Feet	Feet	Water Bearing	Formation Description	Source
Ground Surface	1		Fill	
1	300	V	Marble (mixed colors)	
	45	V	Mud Seam (dirty water)	

19. SITE MAP
Show permanent structure such as buildings, septic tanks, and/or other land marks and indicate not less than two distances to the well. Indicate local street name and subdivision lot number



20. TESTED YIELD
If this yield was tested at different times during drilling, list below.

Feet	Gallons Per Minute
45	5

WELL DRILLED BY: Ray & Jeff Leonard
DOING BUSINESS AS: Green Mt. Drilling Co., Inc. (Company or Business Name)
REPORT FILED BY: Raymond L. Leonard Jr. (Authorized Signature)
DATE OF REPORT: 8-23-96 WELL DRILLERS LIC. NO. 51

well 96-1 A

Water Supply Division Well Report
Well Statistics

Printed: 11/13/97

Well Tag Number: 1996-34
Well Report Number: 3,169
Owner's Name: OMYA, INC.
Purchaser's Name:
Town Name: Pittsford

Date Report Received: 8/27/96
Map Cell: 16C4

Date Well Was Completed: 8/15/96

Purposed Use of Well: OTHER
Reason for Drilling Well: Test or exploration
Drilling Equipment: Rotary (AP)

☐ Well Has Screen

Total Depth of Well (in feet): 500.00
Casing Finish: Above ground, unfinished
Total Casing Length (in feet): 10.00
Casing Diameter: 8.00

☐ Not Steel Casing

Method of Sealing Casing: Drive shoe only
Yield Test Method: Compressed air
Yield Tested At (Gallons per Minute): 5.00
Static Water Level (in feet): 0.00

☐ Well is OverFlowing
☐ Has Water been Analyzed

Comments:

Reason for Well Development:
Well Driller: Green Mountain Drilling Company, Inc.
Tax Map:

☐ Gravel Well

Overburden Thickness (in feet): 1

Water Supply Division Well Report Printed: 11/13/97

Well Lithology

Town: Pittsford Well Report Number: 3,168

Starting Depth	Ending Depth	Lithology
0	1	Dirt, soil, topsoil, loam
Driller's Description:	FILL	
1	300	Rock, bedrock, ledge, etc.
Driller's Description:	MARBLE (MIXED COLORS)-WATER	

PRODUCTION WELL LOG — GEOMAPPING ASSOCIATES LTD.

WELL NO. 96-2	**PROPERTY:** OMYA, INC., VERPOL PLANT
COORDINATES (SCALED) N ° W °	**BOREHOLE DIAMETER:** 6"
	TOTAL DEPTH: 590'
GROUND ELEV: +/- 484	**CASING:** 8" I.D., STEEL, 29 LBS. / FT.
DATE DRILLED: 8/20/96	**DRILLING METHOD:** AIR ROTARY
DRILLER: GREEN MT. DRILLING CO., INC., CENTER RUTLAND, VT	**STATIC LEVEL:** NOT MEASURED
SITE LOCATION: CROSS-OVER ROAD, EAST - WEST PLANT AT INTERSECTION	**SURFACE DESCRIPTION:** EDGE OF WOODS, SIDE OF GRAVEL ROAD, LOW RIDGE
GEOLOGIST: JIM PURDY	**LOG DATE:** 8/20/96

Map Label: well 96-2

FOOTAGE	SCALE	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS	FRACTURES	AIRLIFT DISCHARGE	CIRC. RET.	CIRC. LOSS	SAMPLE INT.
			0 - 3' FINE SANDY LOAM, TILL	INSTALLED 9' OF 8" STEEL CASING W/ DRIVE SHOE, SET 5' IN COMPETENT ROCK					
25									
			3 - 100' LT. GRAY - BUFF DOLOMITE						40-100'
50									
75									
100			100 - 180' LT. GRAY - BUFF DOLOMITE WITH HEAVY OXIDE STAIN, FRACTURED	COARSE DRILL CUTTINGS RETURNED @ SURFACE (1-2" SIZE) 100-180', OCHRE RED STAIN					100-120'
125									
150									150-180'
175									
200			180 - 380' LT. GRAY - OFF WHITE DOLOMITE OXIDE STAINED, INTERVALS 220 - 260'	WATER BEARING INTERVAL NOT WEATHERED	196'	10 GPM			200'
225									220-260'
250									260'
275									280-380'
300				WATER BEARING INTERVAL NOT WEATHERED	290'	20 GPM			
325									
350									
375			380 - 400' REDDISH BROWN - GRAY - BUFF ALTERED DOLOMITE	ALTERATION ZONE AT DIKE CONTACT					380-400'
400			400 - 460' DK. GRAY DIABASE DIKE, FINE GRAINED	DIKE ROCK FRESH NO OXIDE STAIN					400-460'
425				PROBABLE HIGH ANGLE DIKE 70 - 90 DEG. FROM VERTICAL.					
450									
475			460 - 480' REDDISH BROWN - GRAY - BUFF ALTERED DOLOMITE	ALTERATION ZONE AT DIKE CONTACT					460'
			480 - 590' LT. GRAY - GRAY DOLOMITE	NO OXIDE STAINING					480-590'
500									
			590' END OF HOLE						

100% RETURN OF AIR / DRILLING FLUID

WELL NO. / TAG NO.
1996-36
(For Driller's Use)

This report must be completed and submitted to the Department of Environmental Conservation, Water Supply Division, 103 South Main Street, The Old Pantry, Waterbury, VT 05671-0403 no later than 90 days after completion of the well.

State of Vermont
Dept. of Environmental Conservation
103 S. Main St., The Old Pantry
Waterbury, VT 05671-0403

WELL COMPLETION REPORT

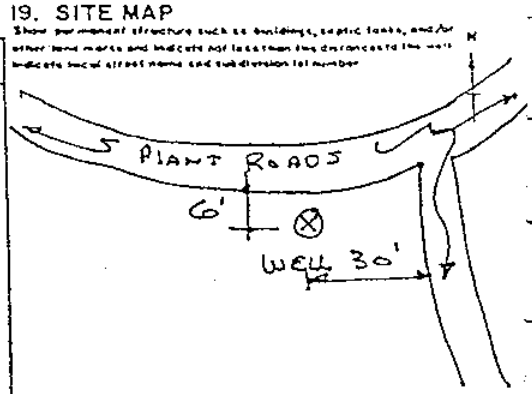
Location map attached to WCR ____

DEPARTMENT USE ONLY
E.C. ____ U.S.G.S. ____
Field Location ☐ Map area ____
Latitude ____ ° ____ ' ____ " Elev. ____
Longitude ____ ° ____ ' ____ " Topo. ____
Scale: 62,500 ☐, 25,000 ☐, 24,000 ☐
Data in Town Files ☐

1. WELL OWNER OMYA, Inc. P.O. Box 10 Florence, VT 05744
   Name — Permanent Mailing Address
   OR
   WELL PURCHASER ____ ____
   Name — Permanent Mailing Address
2. LOCATION OF WELL: TOWN Pittsford SUBDIVISION ____ LOT NO. ____
   P.O.# 82501
3. DATE WELL WAS COMPLETED 8-20-96
4. PROPOSED USE OF WELL: ☐ Domestic, ☒ Other Commercial (W-3)
5. REASON FOR DRILLING WELL: ☐ New Supply, ☐ Replace Existing Supply, ☐ Deepen Existing Well, ☒ Test or Exploration, ☒ Provide Additional Supply, ☐ Other ____ W96-2
6. DRILLING EQUIPMENT: ☐ Cable Tool, ☒ Rotary with A-P, ☐ Other ____
7. TYPE OF WELL: ☒ Open Hole in Bedrock, ☐ Open End Casing, ☐ Screened or Slotted, ☐ Other ____
8. TOTAL DEPTH OF WELL: 590 feet below land surface
9. CASING FINISH: ☐ Above ground, Finished, ☒ Below ground, Unfinished, ☐ Buried, ☐ In Pit, ☐ Removed, ☐ None used, ☐ Other ____
10. CASING DETAILS: Total Length 10½ ft Length below L.S. 9 ft Dia. 8 in. Material STEEL Wt. 29 lb./ft
11. LINER OR INNER CASING DETAILS: Length used ____ ft Diameter ____ in. Material ____ Weight ____ lb./ft
12. METHOD OF SEALING CASING TO BEDROCK: ☒ Drive Shoe, ☐ Grout - Type ____, Drilled 10 5/8 in. Into 5 ft in Bedrock
    ☐ Other ____
13. SCREEN DETAILS: Make and Type ____, Material ____, Length ____ ft, Diameter ____ in.
    Slot Size ____, Depth to top of screen in feet below land surface ____ ft, Gravel pack if used: Gravel Size or Type ____
14. YIELD TEST: ☐ Bailed, ☐ Pumped, ☒ Compressed Air, for 2 Hours at 15 Gallons per minute
    Measured by ☒ Bucket, ☐ Orifice pipe, ☐ Weir, ☐ Meter ☐ Permanent Airline installed
15. STATIC WATER LEVEL: ____ feet below land surface, Date or Time measured ____, Overflows at ____ G.P.M.
16. WATER ANALYSIS: Has the water been analyzed? ☐ Yes ☒ No. If Yes, Where ____
17. SPECIAL NOTES: ____
18. WELL LOG

Depth from Land Surface Feet	Feet	Water Bearing	Formation Description	Sketch
Ground Surface	3		CLAY	
3	390	✓	MARBLE (MIXED COLORS)	
390	490		DK. MARBLE (DIKE)	
490	590		MARBLE (MIXED COLORS)	

19. SITE MAP
Show permanent structure such as buildings, septic tanks, and/or other land marks and indicate dist. to at least two intersections of the well. Indicate local street name and subdivision lot number



20. TESTED YIELD
If this yield was tested at different times during drilling, list below.

Feet	Gallons Per Minute
200	10
300	15

WELL DRILLED BY: Ray & Jeff Leonard
DOING BUSINESS AS: Green Mt. Drilling Co., Inc.
Company or Business Name
REPORT FILED BY: Raymond L. Leonard Jr.
Authorized Signature
DATE OF REPORT: 8-23-96 WELL DRILLERS LIC. NO. 51

Well 96-2

Water Supply Division Well Report
Well Statistics

Printed: 11/13/97

Well Tag Number: 1996-36
Well Report Number: 3,167
Owner's Name: OMYA, INC.
Purchaser's Name:
Town Name: Pittsford

Date Report Received: 8/27/96
Map Cell: 16C4
Date Well Was Completed: 8/20/96

Purposed Use of Well: Domestic
Reason for Drilling Well: Test or exploration
Drilling Equipment: Rotary (AP)

☐ Well Has Screen

Total Depth of Well (in feet): 590.00
Casing Finish: Above ground, unfinished
Total Casing Length (in feet): 10.00
Casing Diameter: 8.00

☐ Not Steel Casing

Method of Sealing Casing: Drive shoe only
Yield Test Method: Compressed air
Yield Tested At (Gallons per Minute): 15.00
Static Water Level (in feet): 0.00

☐ Well is OverFlowing
☐ Has Water been Analyzed

Comments: WELL REASON: TEST OR EXPLORATION & PROVIDE ADDITIONAL SUPPLY.

Reason for Well Development:
Well Driller: Green Mountain Drilling Company, Inc.
Tax Map:

☐ Gravel Well

Overburden Thickness (in feet): 3

Well 96-2

Water Supply Division Well Report — Printed: 11/13/97

Well Lithology

Town: Pittsford — Well Report Number: 3,167

Starting Depth	Ending Depth	Lithology
0	3	Clay
Driller's Description:	CLAY	
3	390	Rock, bedrock, ledge, etc.
Driller's Description:	MARBLE (MIXED COLORS)-WATER	
390	490	Rock, bedrock, ledge, etc.
Driller's Description:	DARK MARBLE	
490	590	Rock, bedrock, ledge, etc.
Driller's Description:	MARBLE (MIXED COLORS)	

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

DANGER: Do not breathe dust. Corrosive. Causes eye and skin irritation. Do not get in eyes, skin or on clothing. Wear goggles or face shield and rubber gloves when handling. Harmful and can be fatal if swallowed or inhaled.

ENVIRONMENTAL HAZARDS

This pesticide is toxic to fish. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance, contact your local State Water Board or Regional Office of the EPA.

STATEMENT OF PRACTICAL TREATMENT

If in eyes, flush with water for at least 15 minutes. Call a physician or get medical attention.

If on skin, wash immediately with soap and water. Wash thoroughly after handling.

If inhaled, immediately remove person to fresh air. Then get immediate medical attention.

If swallowed, immediately drink large amounts of water. Do not induce vomiting. Call a physician immediately.

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

Detailed directions for use can be found in the accompanying technical brochure entitled *"P-1® Preservative Directions for Use"*.

Information on the chemical and physical properties and efficacy can be found in the accompanying brochure entitled *"P-1® Preservative - Product Information"*.

Obtain and read both the *"P-1® Preservative - Directions for Use"* and the *"P-1® Preservative - Product Information"* before undertaking the use of P-1® Preservative in order to avoid process mistakes.

NOTE TO USER: For worker protection during mixing, loading and during application, wear a hat, long sleeve shirt, and long legged trousers or overalls. In addition, during mixing and loading, wear rubber or neoprene gloves and protective goggles. Protective clothing should be laundered separately following application.

P-1® PRESERVATIVE

FOR THE PRESERVATION OF POLYMER EMULSIONS, (COATING, PVA SYSTEMS AND RUBBER), THICKENERS (STARCH, CELLULOSE, GUAR, ETC.), PAPER, STARCRES, CLAY SLURRIES AND SLURRIES.

Active Ingredient:	
o-Phenylphenol	99.9%
Inert Ingredients	0.1%
	100%

STOP • READ LABEL BEFORE USE

DANGER

• KEEP OUT OF REACH OF CHILDREN

LOT NO. _____

EPA Reg. No. 39967-11-67869

EPA Est. No.: ☐ 39967-DEU-01

_____ **LB. NET WT.** _____ **kg**

Made in U.S.A.

SOLD BY:

VERICHEM INC.
3499 Grand Avenue
Pittsburgh, PA 15225

REV. 11/98

PESTICIDE STORAGE AND DISPOSAL

PESTICIDE STORAGE: Keep containers tightly and securely closed. Do not contaminate water, food or feed by storage. Store below 122°F (50°C), protect from exposure to light and moisture. The product has unlimited shelf life if protected from light and moisture. The flakes agglomerate if the storage temperature is too high. See Verichem's Material Safety Data Sheet "P-1® Preservative" for additional instructions.

PESTICIDE DISPOSAL: Do not contaminate water, food or feed by storage and disposal. Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

CONTAINER DISPOSAL: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

CHEMICAL OR PHYSICAL HAZARDS

Do not store near heat or open flame. Store in a cool, dry place away from open flame and extreme heat. Store in original container and out of reach of children preferably in a locked storage area. Handle and open container in a manner as to prevent spillage. If container is leaking, invert to prevent leakage. If the container is leaking or material is spilled for any reason or cause, carefully dam up spilled material to prevent runoff. Refer to Precautionary Statements on label for hazards associated with the handling of this material. Do not walk through spilled material. Absorb spilled material with absorbing type compounds, and dispose of as directed for pesticides above. In spill or leak incidents, keep unauthorized people away. In case of emergency, call CHEMTREC at 800-424-9300.

SEE SIDE PANEL FOR STATEMENTS OF PRACTICAL TREATMENT AND PRECAUTIONARY STATEMENTS.

NONWARRANTY: Seller (whether manufacturer, distributor or other) makes no warranty express or implied, including the implied warranty of merchantability, regarding this product except the composition as set forth in the ingredient statement herein, and shall not be liable for special or consequential damages, the exclusive remedy being replacement of the product. Buyer or user assumes all risk of possession, handling or use of this material when such use and/or handling is contrary to label instructions.

P-1® Preservative is a registered TM of Verichem Inc., Pgh., PA.

VERICHEM

MATERIAL SAFETY DATA SHEET

CAS NO: 90-43-7
DATE: 1/01/98
SUPERSEDES: Original

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: P-1 PRESERVATIVE
SYNONYMS: Ortho phenyl phenol, ortho hydroxy biphenyl, 2-phenyl phenol
CHEMICAL FAMILY: Phenol
MOLECULAR FORMULA: $C_{12}H_{10}O$
MOLECULAR WEIGHT: 170

VERICHEM, 3499 Grand Avenue, Pittsburgh, PA, USA, 15225
(412-331-7299, 8:30 am to 5:00 pm; 412-521-6393 24 hours).

EMERGENCY PHONE: For any emergency involving spill, leak, fire, exposure, or accident call CHEMTREC: 1-800-424-9300.
Outside the USA and Canada call: 202-483-7616.

2. COMPOSITION/INFORMATION ON INGREDIENTS

REGULATED COMPONENTS

COMPONENT	CAS NUMBER	PERCENT	WORKER EXPOSURE	REFERENCE
O-phenylphenol	90-43-7	99.9%	None Established	

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE AND ODOR: White flakes with phenolic odor.
EFFECTS OF OVEREXPOSURE: May cause skin and respiratory irritation. Causes eye burns. Harmful if swallowed.
PHYSICAL/CHEMICAL HAZARDS:

4. FIRST AID MEASURES (IN CASE OF CONTACT)

EYE: Immediately flush with plenty of water for at least 15 minute and get medical attention.
SKIN: Immediately flush with plenty of water for at least 15 minutes, wash following rinse with soap and water. If irritation persists, consult a physician.
ORAL: If swallowed, do not induce vomiting. Give victim glass of water. Call a physician immediately. Never give anything by mouth to an unconscious person.
DERMAL:
INHALATION: Remove to fresh air, administer oxygen, and artificial respiration. Call a physician immediately. Never give anything by mouth to an unconscious person.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:	280°F/138°C.
FLAMMABLE LIMITS (% BY VOLUME):	Lower explosive limit 1.4% Upper explosive limit 9.5%
AUTOIGNITION TEMPERATURE:	968°F/ >520°C.
DECOMPOSITION TEMPERATURE:	

EXTINGUISHING MEDIA AND FIRE FIGHTING INSTRUCTION

In case of fire use water spray, alcohol foam, carbon dioxide, or dry chemicals. Exercise caution when fighting fires involving chemical substances. Respiratory protection is required. Burning will produce toxic fumes. Containers exposed to heat will result in pressure increase in containers. Cool hot containers with cool water.

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Immediately dike material to keep away from water sources. Absorb with vermiculite or other suitable absorbent. Discard in accordance with Federal, State, and local regulations. Residual amounts left on surface maybe cleaned with soap and water. Rinse residuals to municipal treatment plant.

7. HANDLING AND STORAGE

EXPOSURE GUIDELINE(S): Avoid breathing dirt. Avoid contact with eyes and skin. Wash thoroughly after handling. Reseal containers after use.
VENTILATION: General recommended.
SHELF LIFE: Greater 2 years.

8. PERSONAL PROTECTION

EYE PROTECTION REQUIREMENTS: Chemical goggles or face shield.
SKIN PROTECTION REQUIREMENTS: Rubber gloves with long sleeved shirt to minimize contact.
VENTILATION REQUIREMENTS: Use local and general exhaust ventilation to control levels of exposure.
RESPIRATOR REQUIREMENTS: An air-purifying particulate/organic vapor cartridge respirator is required any time inhalation of dust or vapor is possible Observe OSHA regulations for respirator use (29 CFR 1910.134).

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR:	White flakes.
BOILING POINT:	547°F/286°C.
MELTING POINT:	134°F/56-58°C.
VAPOR PRESSURE:	0.0007 _____ @ 68°F/20°C;
	1.0 _____ 212°F/100°C.
SPECIFIC GRAVITY:	1.26 at 68°F/20°C.
VAPOR DENSITY:	Unknown.
PERCENT VOLATILE (BY WEIGHT):	Negative.
pH:	6.1 of a saturated solution.
SATURATION IN AIR (PERCENT BY VOLUME):	Unknown.
EVAPORATION RATE:	Unknown.
SOLUBILITY IN WATER:	2,000 mg/l @ 68°F/20°C.

VERICHEM

TECHNICAL DATA SHEETS

P - 1® PRESERVATIVE

DESCRIPTION

P-1 PRESERVATIVE is effective against a wide variety of mold fungi and bacteria for the preservation of glues and adhesives, polymer emulsions (coatings, PVA systems and rubber), thickeners (starch, cellulose, guar, etc.), paper, textiles, dyes, temporary sapstain control for fresh cut lumber, concrete additives / masonry, metalworking fluids, air filter oils, starches, clay slurries, slurries, printing inks, graphite, and hard surface treatment products (polishes, waxes and ceramic glazes).

The following guidance is given as an approximation for each use pattern, but field testing is recommended to achieve optimum effectiveness.

RECOMMENDED USES AND APPLICATIONS

GLUES AND ADHESIVES

P-1 PRESERVATIVE can be dissolved in suitable systems such as ethanol or 1,2-propanediol, or an alkaline homogeneous concentrate can be prepared and added to the substrate for the effective preservation of glues and adhesives. P-1 PRESERVATIVE can be directly mixed until homogeneous into to dry glues before they are concentrated.

Recommended Dosages:

Bone Glues	0.10-0.15%
Skin Glues	0.15-0.40%
Leather Glues	0.15-0.40%
Fish Glues	0.15-0.40%
Plant Glues	0.10-0.25%
Gelatin-Based Blues	0.15-0.30%
Albumin-Containing Glues	0.20-0.40%
Starch-Based Glues (Liquid)	0.10-0.25%
Starch-Based Glues (Solid)	0.15-1.00%
Polymer Dispersion-Based Adhesives	0.10-0.30%
Dextrin-Based Adhesives	0.10-0.30%
Cellulose-Based Adhesives	0.10-0.30%
Casein-Containing Adhesives	0.20-0.40%

STAINS AND PAINTS

P-1 PRESERVATIVE is generally incorporated into pigments and fillers, but it can also be first dissolved in a suitable solvent or added directly to the pre-heated binder systems. For best results, the preservative should be homogeneously incorporated into the stain or paint. Discoloration may occur, and should be evaluated.

RECOMMENDED USES AND APPLICATIONS (CONT)

STAINS AND PAINTS (cont)

Recommended Dosages:

Latex-Based Systems	0.15-0.25%
Casein-Systems	0.20-0.40%
Oil-Containing Systems	0.25-0.50%
Alkyd Resin-Based Systems	0.25-0.50%
Synthetic Resin Dispersions	0.10-0.25%

TEMPORARY SAPSTAIN CONTROL FOR FRESH CUT LUMBER AND OTHER LUMBER

P-1 PRESERVATIVE is converted to alkaline liquid and water dilutable formulations by adding sodium hydroxide or other bases or by preparing emulsion concentrates of **P-1 PRESERVATIVE**. Auxiliaries may also be added. For the temporary protection of freshly sawn lumber against staining and molding, **P-1 PRESERVATIVE** solutions as prepared above are applied to the freshly sawn lumber by either dipping or spraying.

Recommended Dosages:

Fresh Cut Lumber	1.00-4.00%
Fruit and Vegetable Containers	1.00-3.00%
Pallets	1.00-4.00%
Construction Woods	1.00-4.00%

DYES, PIGMENTS AND FILLER SUSPENSIONS

P-1 PRESERVATIVE should be evenly mixed with dispersing agents for processes where the temperature does not exceed 100°C. For all other processes, **P-1 PRESERVATIVE** is metered directly into the material to be preserved during the cooling step after the temperature falls below 50°C and homogeneously distributed by stirring.

Recommended Dosages:

Clay Slurries	0.05-0.20%
Kaolin Slurries	0.05-0.20%
Starch Slurries	0.05-0.20%
Other Filler Suspensions	0.05-0.30%
Calcium Carbonate Slurries	0.05-0.20%
Iron Oxide Pigment Slurries	0.05-0.20%
Carbon Black Pigment Slurries	0.05-0.20%
Titanium Dioxide Pigment Slurries	0.05-0.20%
Organic Dyes and Pigment Slurries	0.05-0.30%

POLYMER DISPERSIONS AND EMULSIONS

P-1 PRESERVATIVE is added immediately after the preparation of the polymer dispersion or emulsion during the cooling process. Losses of active ingredient caused by elevated temperatures should be avoided. For homogeneous distribution, P-1 PRESERVATIVE should be dissolved in suitable solvents such as ethanol, 1,2-propanediol, water dilutable alkaline solutions then added to emulsion concentrates or polymer dispersions.

RECOMMENDED USES AND APPLICATIONS (CONT)

POLYMER DISPERSIONS AND EMULSIONS (cont)

Recommended Dosages:

Acrylic Systems	0.05-0.30%
Polyvinylacetate (PVA) System	0.05-0.30%
Vinyl / Acrylic-Based Systems	0.05-0.30%
Styrene Butadiene Systems	0.05-0.30%
Polyester-Based Systems	0.05-0.30%
Polyurethane-Based Systems	0.05-0.30%
Other Polymer Dispersions	0.05-0.30%

LEATHER

P-1 PRESERVATIVE may be dissolved in five times the amount of alcohol and then stirred into pickle solutions. In the case of chrome leather, an effective protection against mold attack may be obtained without additional labor by stirring **P-1 PRESERVATIVE** together with soda into the basifying solution, since **P-1 PRESERVATIVE** dissolves freely in the alkaline solution.

The oil-soluble **P-1 PRESERVATIVE** can also be dissolved in the fat liquor and applied in the drum simultaneously. Finished vegetable-tanned leathers and chrome leathers may also be protected against mold attack by a treatment on both sides of the material with an 0.2-0.4% solution of **P-1 PRESERVATIVE.**

Recommended Dosages:

Pickle Solutions/Pickled Hides	0.15-0.25%
Chrome Leather (calculated on pelt wt)	0.10-0.25%
Leather Pasting Adhesives	0.05-0.10%
Leather Pigment Finishes	0.20-0.40%

TEXTILES

P-1 PRESERVATIVE should be dissolved in suitable solvents such as ethanol, 1,2-propanediol, mineral spirits, or paraffins or can be converted to a water dilutable alkaline concentrate and applied directly to the textile normally by dipping or spraying. The preservative is affixed to the fiber with a suitable acid like acetic acid. For the preservation of auxiliaries, **P-1 PRESERVATIVE** is diluted in solvents as mentioned above or is homogeneously distributed with the aid of alkaline solutions or emulsion concentrates. Print thickeners are preserved by adding **P-1 PRESERVATIVE** directly to the emulsion or homogeneously metered directly into the dried product. Milling may be necessary in order to obtain consistent particulate sizes.

Recommended Dosages:

Awnings and Tarpaulins	0.50-5.00%
Geotextiles	0.50-5.00%
Shower Curtains	0.50-2.00%
Jute, Sisal	0.50-2.50%
Felts	0.50-2.50%
Carpets	0.50-2.00%
Upholstery	0.50-2.00%

RECOMMENDED USES AND APPLICATIONS (CONT)

TEXTILES (cont)

Recommended Dosages:

Cotton Production	0.50-1.50%
Wood Production	0.50-1.50%
Fire Hoses	1.00- 3.00%
Auxiliaries (Sizing Agents, Finishing Agents, Spinning Preparations, Wetting Agents)	0.05-0.25%

LUBRICOOLANTS AND MINERAL OIL BASED PRODUCTS

P-1 PRESERVATIVE is dissolved in the necessary amount of mineral oil, auxiliary (for example dispersing agent), solvents such as Ethanol, Glycols or water dilutable alkaline concentrates, and added to form a homogeneous mixture in the substrates (metalworking fluids, etc.,) by stirring.

Recommended Dosages:

Mineral Oil-Based Products

Cooling Fluids - Concentrate	1.00-5.00%
Ready for Use	0.05-0.25%
Boring and Cutting Oils	0.05-0.20%
Fuel Oils	0.02-0.15%
Hydraulic Oils	0.05-0.25%

Non-Mineral Oil-Based Products

Cutting Oils	0.05-0.30%
Cooling Fluids	0.05-0.30%

OTHER APPLICATIONS

Recommended Dosages:

Concrete and Masonry Additives	0.10-0.30%
Biopolymers (e.g. Xanthan)	0.05-0.20%
Fire Extinguishing Medium	0.10-0.30%
Photographic Gelatins	0.05-0.25%
Tints	0.05-0.20%
Cleaning Solutions	0.05-0.40%
Wax Emulsions	0.05-0.40%
Chemical Cleaning Solutions	0.02-0.15%
Concrete	0.10-0.50%
Caulking Materials	0.10-0.50%
Rubber Systems	0.20-1.00%
Ceramic Glazes	0.10-0.50%
Polishes	0.05-0.20%
Paper Auxiliaries	0.05-0.30%
Paper Slurries	0.07-0.10%

ACTIVITY

MINIMUM INHIBITION CONCENTRATIONS OF O-PHENYLPHENOL, DETERMINED ON SPECIAL NUTRIENT MEDIA

Microorganisms	Minimum Inhibition Concentration mg/liter
Bacillus punctatus	200
Bacillus subtilis	100
Bacterium vulgare	100
Escherichia coli	200
Leuconostoc mesenterioides	100
Pseudomonas aeruginosa	1500
Pseudomonas fluorescens	1500
Staphylococcu aureus	100
Candida albicans	100
Saccharomyces cerevisiae	200
Saccharomyces acidifaciens	200
Torula rubra	100
Aspergillus flavus Link	85
Asperillus niger	30
Chaetomium globosum	60
Cladosporium herbarum link and fries	60
Cladosporium sphaerospermum	40
Coniophora cerebella	30
Lentinus tigrinus	100
Penicillium citrinum	35
Penicillium digitatum	35
Penicillum fumicolosum QECD F 10	75
Penicillum italicum	85
Polyporus versicolor	65
Pullularia pullulans Fusey	35
Trichiphyton pedis	22
Trichoderma viride	75

TYPICAL PROPERTIES

Physical Form	Flakes, colorless to light yellow with slight phenolic odor.
Composition	2-Phenylphenol, active ingredient content 99.9%
Density	1.2 g/cm^3
Bulk Density	0.60 – 0.65
Molecular Weight	170
Melting Point	56 - 58°C
Boiling Point	286°C
Vapor Pressure	0.5 torr at 100°C
Flash Point	138°C

TYPICAL PROPERTIES (CONT)

Solubility (in g/100 g solvent at 25°C)

Methanol	800
Acetone	660
Ethanol	590
Ether	490
Benzene	270
Pine Oil	200
Propylene Glycol	300
Ethylene Glycol	275
Carbon Tetrachloride	105
NaOH, 10%	50
White Spirit	20
Water	0.07

PRECAUTIONS AND HANDLING

PESTICIDE STORAGE AND DISPOSAL

Pesticide Storage

Keep containers tightly and securely closed. Do not contaminate water, food or feed by storage and disposal. Store below 122°F (50°C). Protect from exposure to light and moisture. The product has a shelf life of at least two (2) years if protected from light and moisture. The flakes agglomerate if the storage temperature is too high. See Material Safety Data Sheet for additional instructions.

Pesticide Disposal

Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

Container Disposal

Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities by burning. If burned, stay out of smoke.

HEALTH AND SAFETY INFORMATION

Appropriate literature has been assembled which provides information pertaining to health and safety concerns that must be observed when handling Verichem products, appropriate industrial hygiene and other safety precautions recommended by their manufacturer should be followed. Before working with any product mentioned in this publication, you must read and become familiar with available information concerning its hazards, proper use and handling. This cannot be overemphasized. Information is available in several forms, such as Material Safety Data Sheets and Product Labels. Consult your Verichem representative or contact the Product Safety Manager.

GOVERNMENT APPROVALS

F&DA

175.105 (Adhesives) for use as a preservative in the manufacture of complying adhesives

176.210 (Defoaming agents used in the manufacture of paper and paperboard)

177.1632 (Poly(phenyleneterephthalamide)resins), for use as a fungicide, not to exceed 0.01 wt% based on the base polymer

177.2600 (Rubber articles intended for repeated use) for use as an antioxidant and antiozonant, total antioxidants and antiozonants not to exceed 5 wt% of rubber product

178.1010 (Sanitizing solutions) for use in sanitizing solutions specifically listed in 178.1010

AVAILABILITY

P-1 PRESERVATIVE is available in commercial quantities.

Standard Packing .....55 pound Paper Sack
Shipping Weight .....55.9 pounds
DOT Shipping Name .....N/A

NOTICE: This product is for industrial use only by persons having technical skill in formulating coatings, adhesives, elastomers, paints and the like. VERICHEM MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH RESPECT TO THE GOODS WHEN NOT USED IN STRICT ACCORDANCE WITH DIRECTIONS AND RECOMMENDATIONS GIVEN HEREWITH. Recommendations for the use of this product are based on laboratory tests that Verichem considers to be reliable. The performance of this product varies from application to application. Verichem is not responsible for results when the product is used with incompatible or contaminated raw materials; when the product is used under unsanitary conditions; or when manufacturing equipment is constructed of such raw materials as to inactivate this product. Under no circumstances will Verichem be liable for consequential damages or damages to anyone in excess of the purchase price of the product. User assumes all risks of use, storage and handling, not in strict accordance with the precautionary statements and storage recommendations of the labeling.

EFFECTIVE DATE: 1/1/98
REPLACES: ORIGINAL

VERICHEM

MATERIAL SAFETY DATA SHEET

MATERIAL SAFETY DATA SHEET

CAS NO: 6152-33-6
DATE: 7/21/99
SUPERSEDES: Original

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:	**P-1 PRESERVATIVE 20% Solution**
SYNONYMS:	Sodium O-phenylphenate
CHEMICAL FAMILY:	Phenol
MOLECULAR FORMULA:	$C_{12}H_9ONa$
MOLECULAR WEIGHT:	192

VERICHEM, 3499 Grand Avenue, Pittsburgh, PA, USA, 15225
(412-331-7299, 8:30 am to 5:00 pm; 412-521-6393 24 hours).

EMERGENCY PHONE: For any emergency involving spill, leak, fire, exposure, or accident call CHEMTREC: 1-800-424-9300.
Outside the USA and Canada call: 202-483-7616.

2. COMPOSITION/INFORMATION ON INGREDIENTS

REGULATED COMPONENTS

COMPONENT	CAS NUMBER	PERCENT	WORKER EXPOSURE	REFERENCE
Sodium Orthophenylphenate	132-27-4	20%	None Established	

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE AND ODOR: Clear Pale to Dark Yellow Solution
EFFECTS OF OVEREXPOSURE: Na OPP has been shown to cause bladder tumors in mice fed high doses.
PHYSICAL/CHEMICAL HAZARDS: **Not regulated for transportation.**

4. FIRST AID MEASURES (IN CASE OF CONTACT)

EYE: Flush with plenty of water for at least 15 minutes. Consult a physician.
SKIN: Flush with plenty of water for at least 15 minutes, wash with soap and water. If irritation persists, consult a physician.
INGESTION: Do not induce vomiting. Call a physician immediately. Never give anything by mouth to an unconscious person.
INHALATION: No toxic effects expected.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:	Not flammable.
FLAMMABLE LIMITS (% BY VOLUME):	Not applicable.
AUTOIGNITION TEMPERATURE:	Not applicable.
DECOMPOSITION TEMPERATURE:	Not applicable

EXTINGUISHING MEDIA AND FIRE FIGHTING INSTRUCTION

In case of fire use water spray, alcohol foam, carbon dioxide, or dry chemicals. Exercise caution when fighting fires involving chemical substances. Respiratory protection is required. Burning will produce toxic fumes. Containers exposed to heat will result in pressure increase in containers. Cool hot containers with cool water.

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Immediately dike material to keep away from water sources. Absorb with vermiculite or other suitable absorbent. Discard in accordance with Federal, State, and local regulations. Residual amounts left on surface maybe cleaned with soap and water. Rinse residuals to municipal treatment plant.

7. HANDLING AND STORAGE

HANDLING: Avoid breathing vapors. Avoid getting in eyes or on skin. Wash thoroughly after handling.

STORAGE: Store in a cool place.

8. PERSONAL PROTECTION

EYE PROTECTION REQUIREMENTS: Chemical safety glasses or face shield.
SKIN PROTECTION REQUIREMENTS: Rubber gloves, long sleeve shirts and pants.
VENTILATION REQUIREMENTS: Local and general exhaust ventilation to control levels of exposure.
RESPIRATOR REQUIREMENTS: Air purifying particulate / organic vapor cartridge respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR:	Clear light yellow to dark brown.
BOILING POINT:	Similar to water.
MELTING POINT:	Not applicable.
VAPOR PRESSURE:	Unknown.
SPECIFIC GRAVITY:	1.068 ± 0.010
VAPOR DENSITY:	Unknown.
PERCENT VOLATILE (BY WEIGHT):	80%
pH:	12 – 12.5
SATURATION IN AIR (PERCENT BY VOLUME):	Unknown.
EVAPORATION RATE:	Unknown.
SOLUBILITY IN WATER:	Complete.

10. STABILITY AND REACTIVITY

STABILITY (CONDITIONS TO AVOID):	Stable.
POLYMERIZATION (CONDITIONS TO AVOID):	Not applicable.
INCOMPATIBLE MATERIALS:	Oxidizing material.
HAZARDOUS DECOMPOSITION PRODUCTS:	Thermal decomposition may produce CO, CO_2 and other toxic fumes.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

DANGER

Corrosive. May be fatal if inhaled.
Harmful if swallowed or absorbed through skin.
Causes skin burns and irreversible eye damage. Do not get in eyes, on skin or on clothing. Do not breathe vapor or mist. Wear protective eyewear (goggles, faceshield or safety glasses). Wear protective clothing and gloves. Wear a mask or pesticide respirator approved by the National Institute for Occupational Safety and Health. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash clothing before reuse.

ENVIRONMENTAL HAZARDS

This pesticide is toxic to fish. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your local State Water Board or Regional Office of the EPA.

PHYSICAL OR CHEMICAL HAZARDS

Corrosive to skin and eyes.

STORAGE AND DISPOSAL

PESTICIDE STORAGE: Keep containers tightly and securely closed. Do not contaminate water, food or feed by storage. Store below 122°F (50°C), protect from exposure to light and moisture. The product has unlimited shelf life if protected from light and moisture. See Verichem's Material Safety Data Sheet for additional instructions.

PESTICIDE DISPOSAL: Do not contaminate water, food or feed by storage and disposal. Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

CONTAINER DISPOSAL: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

NONWARRANTY: Seller (whether manufacturer, distributor or other) makes no warranty express or implied, including the implied warranty of merchantability, regarding this product except the composition as set forth in the ingredient statement herein, and shall not be liable for special or consequential damages, the exclusive remedy being replacement of the product. Buyer or user assumes all risk of possession, handling or use of this material when such use and/or handling is contrary to label instructions.

P-1® PRESERVATIVE SOLUTION

FOR THE PRESERVATION OF GLUES AND ADHESIVES, POLYMER EMULSIONS, (COATING, PVA SYSTEMS AND RUBBER), THICKENERS (STARCH, CELLULOSE, GUAR, ETC.), LEATHER, PAPER, TEXTILES, DYES, TEMPORARY SAPSTAIN CONTROL FOR FRESH CUT LUMBER, CONCRETE ADDITIVES/MASONRY, METALWORKING FLUIDS, AIR FILTER OILS, STARCHES, CLAY SLURRIES, SLURRIES, PRINTING INKS, GRAPHITE, AND HARD SURFACE TREATMENT PRODUCTS (POLISHES, WAXES AND CERAMIC GLAZES).

Active Ingredient:	
Sodium Orthophenylphenate	20.0%
Inert Ingredients	80.0%
TOTAL	100.0%

• KEEP OUT OF REACH OF CHILDREN •

DANGER

If Swallowed: Call a doctor or get medical attention. Do not induce vomiting or give anything by mouth to an unconcious person. Drink promptly a large quantity of milk, egg whites, gelatin solution, or if not available, drink large quantities of water. Avoid alcohol.

If Inhaled: Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth to mouth. Get medical attention.

If on Skin: Wash with plenty of soap and water. Get medical attention.

If in Eyes: Hold eyelids open and flush with a steady, gentle stream of water for 15 minutes. Get medical attention.

See side panel for additional precautionary statements.

LOT NO. _____

EPA Registration No. 67869-24 **EPA Est. No.: 67869-PA-01**

_____ **LB. NET WT.** _____ **kg**

Made in U.S.A.

SOLD BY:

VERICHEM

VERICHEM INC.
3499 Grand Avenue
Pittsburgh, PA 15225

Final Approved 5-5/99

DIRECTIONS FOR USE

It is a violation of federal law to use P-1® Preservative Solution is effecti preservation of glues and adhesives thickeners (starch, cellulose, guar, fresh cut lumber, concrete additives slurries, slurries, printing inks, graph and ceramic glazes).
The following guidance is given as recommended to achieve optimum

ADHESIVES AND GLUES

P-1® Preservative Solutions can be 1,2-propanediol, or an alkaline boir substrate for the effective preservat be directly mixed until homogeneou

Recommended Dosages:
- Albumin-Containing Glues
- Bone Glues
- Casein-Containing Adhesiv
- Cellulose-Based Adhesives
- Dextrin-Based Adhesives
- Fish Glues
- Gelatin-Based Glues
- Leather Glues
- Plant Glues
- Polymer Dispersion-Based
- Skin Glues
- Starch-Based Glues (Liquic
- Starch-Based Glues (Solid)

HOUSEHOLD PRODUCTS & (

Recommended Dosages:
- Biopolymers (e.g. Xanthan)
- Caulking Materials
- Ceramic Glazes
- Chemical Cleaning Solutior
- Cleaning Solutions
- Concrete
- Concrete and Masonry Add
- Fire Extinguishing Medium
- Photographic Gelatins
- Plasters
- Polishes
- Rubber Systems
- Tints
- Wax Emulsions

Paper
- Paper Auxiliaries
- Paper Slurries

LEATHER TANNING

P-1® Preservative Solution may be (into pickle solutions. In the case of may be obtained without additional soda into the basifying solution. Fin also be protected against mold attac - 2.26% solution of P-1® Preservat

Recommended Dosages:
- Chrome leather (calculated
- Leather pasting adhesives
- Leather pigment finishes
- Pickle solutions and pickled

METAL WORKING FLUIDS, LUBI

Recommended Dosages:
Mineral Oil-Based Products
- Boring and Cutting Oils
- Cooling Fluids - Concentrat
  Ready for Use
- Fuel Oils
- Hydraulic Oils

Non-Mineral Oil-Based Produc
- Cooling Fluids
- Cutting Oils

S FOR USE

ol federal law to use this product in a manner inconsistent with its labeling.

live Solution is effective against a wide variety of mold fungi and bacteria for the glues and adhesives, polymer emulsions (coatings, PVA systems and rubber), rch, cellulose, guar, etc.), paper, textiles, dyes, temporary starch control for ar, concrete additives/masonry, metalworking fluids, air filter oils, starches, clay s, printing inks, graphite, and hard surface treatment products (polishes, waxes azes).

guidance is given as an approximation for each use pattern, but field testing is to achieve optimum effectiveness.

AND GLUES

tive Solutions can be dissolved in suitable solvent systems such as ethanol or ol, or an alkaline homogeneous concentrate can be prepared and added to the e effective preservation of glues and adhesives. P-10® Preservative Solution can ed until homogeneous into to dry glues before they are concentrated.

nded Dosages:

n-Containing Glues	1.1 - 2.3%
Glues	0.6 - 0.9%
-Containing Adhesives	1.1 - 2.3%
se-Based Adhesives	0.6 - 1.7%
-Based Adhesives	0.6 - 1.7%
ves	0.2 - 2.3%
-Based Glues	0.9 - 1.7%
r Glues	0.2 - 2.3%
ilues	0.6 - 1.4%
r Dispersion-Based Adhesives	0.6 - 1.7%
ues	0.9 - 2.3%
Based Glues (Liquid)	0.6 - 1.4%
Based Glues (Solid)	0.9 - 5.7%

D PRODUCTS & CONSTRUCTION PRODUCTS

nded Dosages:

mers (e.g. Xanthan)	0.3 - 1.1%
g Materials	0.6 - 2.8%
c Glazes	0.6 - 2.8%
al Cleaning Solutions	0.1 - 0.8%
g Solutions	0.3 - 2.3%
te	0.6 - 2.8%
te and Masonry Additives	0.6 - 1.7%
tinguishing Medium	0.6 - 1.7%
raphic Gelatins	0.3 - 1.4%
s	0.6 - 2.8%
s	0.3 - 1.1%
Systems	0.1 - 5.7%
	0.3 - 1.1%
nulsions	0.3 - 2.3%
Auxiliaries	0.28 - 1.7%
Slurries	0.4 - 0.5%

ANNING

ive Solution may be dissolved in five times the amount of alcohol and then stirred tions. In the case of chrome leather, an effective protection against mold attack ed without additional labor by stirring P-10® Preservative Solution together with asifying solution. Finished vegetable-tanned leathers and chrome leathers may ted against mold attack by a treatment on both sides of the material with an 1:13 n os P-10® Preservative Solution.

nded Dosages:

e leather (calculated on pelt weight)	0.6 - 1.4%
r pasting adhesives	0.3 - 0.6%
r pigment finishes	1.2 - 2.3%
solutions and pickled hides	0.9 - 1.4%

KING FLUIDS, LUBRICOOLANTS AND MINERAL OIL BASED PRODUCTS

nded Dosages:

l-Based Products	
and Cutting Oils	0.3 - 1.1%
Fluids - Concentrate	5.7 - 26.3%
y for Use	0.3 - 1.4%
ls	0.1 - 0.8%
Te Oils	0.3 - 1.4%
al OB-Based Products	
Fluids	0.3 - 1.7%
O's	0.3 - 1.7%

PAINTS, COATINGS & STAINS

P-10® Preservatives Solution is generally incorporated directly into pigments and fillers, but it can also be first dissolved in a suitable solvent or added directly to the pre-heated binder systems. For best results, the preservative should be homogeneously incorporated into the stain or paint. Discoloration may occur, and should be evaluated.

Recommended Dosages:

Alkyd Resin-Based Systems	1.4 - 2.8%
Casein-Systems	1.1 - 2.3%
Latex-Based Systems	0.9 - 1.4%
Oil-Containing Systems	1.4 - 2.8%
Synthetic Resin Dispersions	0.6 - 1.4%

PIGMENTS, DYES AND FILLER SUSPENSIONS

P-10® Preservative Solution should be evenly mixed with dispersing agents for processes where the temperature does not exceed 100°C. For all other processes, P-10® Preservative Solution is metered directly into the material to be preserved during the cooling step after the temperature falls below 50°C and homogeneously distributed by stirring.

Recommended Dosages:

Calcium Carbonate Slurries	0.3 - 1.1%
Carbon Black Pigment Slurries	0.3 - 1.1%
Clay Slurries	0.3 - 1.1%
Iron Oxide Pigment Slurries	0.3 - 1.1%
Kaolin Slurries	0.3 - 1.1%
Organic Dyes and Pigment Slurries	0.3 - 1.1%
Other Filler Suspensions	0.3 - 1.7%
Starch Slurries	0.3 - 1.7%

POLYMER DISPERSIONS AND EMULSIONS

P-10® Preservative Solution is added immediately after the preparation of the polymer dispersion or emulsion during the cooling process. Losses of active ingredient caused by elevated temperatures should be avoided.

Recommended Dosages (Polymer Dispersions and Emulsions):

Acrylic-Systems	0.3 - 1.7%
Other Polymer Dispersions	0.3 - 1.7%
Polyester-Based Systems	0.3 - 1.7%
Polyurethane-Based Systems	0.3 - 1.7%
Polyvinylacetate (PVA) Systems	0.3 - 1.7%
Styrene Butadiene Systems	0.3 - 1.7%
Vinyl/Acrylic-Based Systems	0.3 - 1.7%

TEXTILES

P-10® Preservative Solution should be dissolved in suitable solvents such as ethanol, 2-propanediol, mineral spirits, or paraffins or can be converted to a water dilutable alkaline concentrate and applied directly to the textile normally by dipping or spraying. The preservative is affixed to the fiber with a suitable acid like acetic acid. For the preservation of auxiliaries, P-10® Preservative Solution is diluted in solvents added directly to textile. Print thickeners are preserved by adding P-10® Preservative Solution directly to the emulsion or homogeneously metered directly into the dried product. Milling may be necessary in order to obtain consistent particulate sizes.

Recommended Dosages:

Auxiliaries (Sizing Agents, Finishing Agents, Spinning Preparations, Wetting Agents)	0.1 - 0.3%
Awnings and Tarpaulines	2.8 - 28.3%
Carpets	2.8 - 11.3%
Cotton Production	2.8 - 5.5%
Felts	2.8 - 14.1%
Fire Hoses	2.8 - 17.0%
Geotextiles	2.8 - 28.3%
Jute, Sisal	2.8 - 14.1%
Shower Curtains	2.8 - 11.3%
Upholstery	2.8 - 11.3%
Wool Production	2.8 - 8.5%

WOOD PRESERVATION

For the temporary protection of freshly sawn lumber against staining and molding, P-10® Preservative Solutions are applied to the freshly sawn lumber by either dipping or spraying.

Recommended Dosages:

Construction Woods	5.7 - 22.6%
Fresh Cut Lumber	5.7 - 22.6%
Fruit and Vegetable Containers	5.7 - 17.0%
Pallets	5.7 - 17.0%

NTP CHEMICAL REPOSITORY (RADIAN CORPORATION, AUGUST 29, 1991)
O-PHENYLPHENOL

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000575

*CAS NUMBER: 90-43-7

*BASE CHEMICAL NAME: PHENYLPHENOL,O-

*PRIMARY NAME: O-PHENYLPHENOL

*CHEMICAL FORMULA: C12H10O

*STRUCTURAL FORMULA:

*WLN: QR BR

*SYNONYMS:
(1,1'-BIPHENYL)-2-OL
2-BIPHENYLOL
O-BIPHENYLOL
2-DIPHENYLOL
2-HYDROXYBIPHENYL
O-DIPHENYLOL
DOWICIDE 1
DOWCIDE 1
O-HYDROXYBIPHENYL
O-HYDROXYDIPHENYL
NCI-C50351
2-PHENYLPHENOL
ORTHOHYDROXYDIPBENYL
ORTHOPHENYLPHENOL
ORTHOXENOL
TORSITE
USAF EK-2219
O-XENOL
2-HYDROXYDIPHENYL

-PHYSICAL CHEMICAL DATA
======================

*PHYSICAL DESCRIPTIONS: Literature: Light purple colored crystals.
Repository: Light lavender crystalline solid.

*MOLECULAR WEIGHT: 170.21

*SPECIFIC GRAVITY: 1.213 @ 25/4 C

*DENSITY:Not available

*MP (DEG C): 55.5 - 57.5 C

*BP (DEG C): 275 C

*SOLUBILITIES:
WATER : <0.1 mg/mL @ 20.5 C (RAD)

DMSO : >=100 mg/mL @ 22 C (RAD)

95% ETHANOL : >=100 mg/mL @ 22 C (RAD)

METHANOL : Not available

ACETONE : >=100 mg/mL @ 22 C (RAD)

TOLUENE : Not available

OTHER SOLVENTS:
Ligroin: Soluble
Fixed Alkali Hydroxide Solution: Soluble
ETHER : Soluble
BENZENE: Soluble

*VOLATILITY : Vapor pressure: 1 mm Hg @ 100 C

*FLAMMABILITY(FLASH POINT):
This chemical has a flash point of 124 C (255 F). It is combustible. Fires involving this chemical can be controlled with a dry chemical, carbon dioxide, foam or Halon extinguisher.

*UEL: Not available LEL: Not available

*REACTIVITY: This compound can react with oxidizing materials.

*STABILITY: This chemical is stable under normal laboratory conditions.

*OTHER PHYSICAL DATA:
Boiling point: 145 C @ 14 mm Hg
Volatile in steam

-TOXICITY
========

*NIOSH REGISTRY NUMBER: DV5775000

*TOXICITY:

typ. dose	mode	specie	amount	unit	other
LD50	orl	rat	2000	mg/kg	
LD50	unk	rat	2700	mg/kg	
LD50	orl	mus	900	mg/kg	
LD50	ipr	mus	50	mg/kg	
LD50	orl	rat	2.48	g/kg	

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION: THR: MODERATE via oral route.

*CARCINOGENICITY:
Review: IARC Cancer Review: Animal Inadequate Evidence
IARC: Not classifiable as a human carcinogen (Group 3) [610]
Status: NCI Carcinogenesis Bioassay (Dermal); No Evidence: Male and Female Mouse [620]

*MUTAGENICITY:
Mutagenic Data: mmo-sat 100 ug/plate
dnr-esc 1 mg/disc

cyt-hmn:fbr 200 ug/L

*TERATOGENICITY:
Reproductive Effects Data:
TDLo orl-rat 6 gm/kg (6-15D preg)
TDLo orl-rat 7 gm/kg (6-15D preg)
TDLo orl-mus 13050 mg/kg (7-15D preg)
TDLo orl-mus 13050 mg/kg (7-15D preg)

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: None
ACGIH: None
NIOSH Criteria Document: None
NFPA Hazard Rating: Health (H): 1
Flammability (F): 1
Reactivity (R): 0
H1: Materials only slightly hazardous to health (see NFPA for details).
F1: Materials that must be preheated before ignition can occur (see NFPA for details).
R0: Materials which are normally stable even under fire exposure conditions and which are not reactive with water (see NFPA for details).

*OTHER TOXICITY DATA:
Skin and Eye Irritation Data:
skn-rbt 25 mg/24H SEV
eye-rbt 50 ug/24H SEV
Status: Reported in EPA TSCA Inventory, 1980
Meets criteria for proposed OSHA Medical Records Rule

-OTHER DATA (Regulatory)
==========

*PROPER SHIPPING NAME (IATA): Other regulated substances

*UN/ID NUMBER: ID8027

*HAZARD CLASS: 9 SUBSIDIARY RISK: None PACKING GROUP: None

*LABELS REQUIRED: Miscellaneous

*PACKAGING: PASSENGER: PKG. INSTR.: 906 MAXIMUM QUANTITY: No limit
CARGO : PKG. INSTR.: 906 MAXIMUM QUANTITY: No limit

*SPECIAL PROVISIONS: None

*USES:
Intermediate for dyes and resins, rubber chemicals, fungicide, germicide, preservative, food packaging. Disinfectant and fungicide for impregnation of fruit wrappers and disinfection of seed boxes. Applied during dormant period to control apple canker. Reagent for the determination of trioses. Household disinfectant; dishwashing formulations.

*COMMENTS: Not available

-HANDLING PROCEDURES
==========

*ACUTE/CHRONIC HAZARDS:
This chemical is a skin and eye irritant. Corneal damage is possible upon eye contact.

First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.

Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.

IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*MINIMUM PROTECTIVE CLOTHING:

If Tyvek-type disposable protective clothing is not worn during handling of this chemical, wear disposable Tyvek-type sleeves taped to your gloves.

*RECOMMENDED GLOVE MATERIALS: Not available

*RECOMMENDED RESPIRATOR:

Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with an organic vapor/acid gas cartridge (specific for organic vapors, HCl, acid gas and SO2) with a dust/mist filter.

*OTHER: Not available

*STORAGE PRECAUTIONS:

You should store this chemical under refrigerated temperatures, and keep it away from oxidizing materials.

*SPILLS AND LEAKAGE:

Should a spill occur while you are handling this chemical, you should dampen the solid spill material with alcohol, then transfer the dampened material to a suitable container. Use absorbent paper dampened with alcohol to pick up any remaining material. Seal the absorbent paper, and any of your clothes, which may be contaminated,in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with alcohol followed by washing with a strong soap and water solution. Do not reenter the contaminate area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT:

You should dispose of all waste and contaminated materials associated with this chemical as specified by existing local, state and federal regulations concerning hazardous waste disposal. It is suggested that your contaminated materials should be destroyed by incineration in a special, high temperature (>2000 degrees F), chemical incinerator facility.

-EMERGENCY PROCEDURES

*SKIN CONTACT:

IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.

IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop.

IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.

*INHALATION:

IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in

the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital.

Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:

Check for contact lenses and remove them at once if present. You should then immediately flush eyes with water from any source for 15 minutes. Do not use oil or ointment in eyes. Arrange immediate transportation to a medical facility.

*INGESTION:

DO NOT INDUCE VOMITING. Phenols are very toxic poisons AND corrosive and irritating, so that inducing vomiting may make medical problems worse. IMMEDIATELY call a hospital or poison control center and locate activated charcoal, egg whites, or milk in case the medical advisor recommends administering one of them.

If advice from a physician is not readily available and the victim is conscious and not convulsing, give the victim a glass of activated charcoal slurry in water or, if this is not available, a glass of milk, or beaten egg whites and IMMEDIATELY transport victim to a hospital.

If the victim is convulsing or unconscious, do not give anything by mouth, assure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:

Symptoms of exposure to this compound include eye irritation with possible corneal injury (necrosis); paleness, cyanosis, weakness, sweating, headache, diarrhea, nausea, vomiting, diarrhea, dizziness, fainting, dark urine, central nervous system depression, and deoxyribonuclease inhibition. Chronic exposure may include irritation and lesions of the respiratory system.

*FIREFIGHTING: Not available

-SOURCES

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*SOURCES:

Clayton, G.D. and F.E. Clayton, Eds. Patty's Industrial Hygiene and Toxicology. Vol. 2. Third Revised Edition. John Wiley and Sons. New York. 1981. pp. 2616-7.

Weiss, G., Ed. Hazardous Chemicals Data Book. Noyes Data Corporation. Park Ridge, NJ. 1980. p. 1070.

Occupational Safety and Health Administration. Tentative OSHA Listing of Confirmed and Suspected Carcinogens by Category. Occupational Safety and Health Administration. Washington, DC. 1979. Not listed.

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[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Update, p. xxiii.

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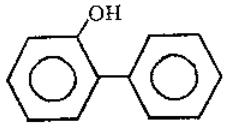
2-PHENYLPHENOL

CAS Registry Number: 90-43-7

Molecular Formula: $C_{12}H_{10}O$



2-Phenylphenol consists of white, flaky, crystals which have a mild, distinct odor. It is soluble in fixed alkali hydroxide solutions and most organic solvents, and is insoluble in water (Merck, 1989). 2-Phenylphenol emits acrid smoke and irritating fumes when it is heated to decomposition (Sax, 1989).

Physical Properties of 2-Phenylphenol

Synonyms: 2-biphenylol; o-biphenylol; o-phenylphenol; o-hydroxydiphenyl; orthoxenol; 2-hydroxydiphenyl

Molecular Weight:	170.20
Boiling Point:	280 - 284 °C
Melting Point:	55.5 - 57.5 °C
Density/Specific Gravity:	1.213 at 25/4 °C (water = 1)
Vapor Pressure:	1 mm Hg at 100 °C
Conversion Factor:	1 ppm = 6.96 mg/m^3

(HSDB, 1993; Merck, 1989)

SOURCES AND EMISSIONS

A. Sources

2-Phenylphenol is used as a preservative in water-oil emulsions, in vegetable wax in dishwashing formulations, and in paper used for food storage. It is also used in the rubber industry and as a laboratory reagent (HSDB, 1993).

2-Phenylphenol (ortho-phenylphenol) is registered as a disinfectant, bactericide, and virucide. It is registered for agricultural use in disinfecting fruits, vegetables, and eggs. 2-Phenylphenol is registered for use as a general surface disinfectant in hospitals, nursing homes, veterinary hospitals, poultry farms, dairy farms, commercial laundries, barbershops, and food processing plants. It is also used to sterilize hospital and veterinary equipment (DPR, 1996).

The licensing and regulation of pesticides for sale and use in California are the responsibility of the Department of Pesticide Regulation (DPR). Information presented in this fact sheet regarding the permitted pesticidal uses of 2-phenylphenol has been collected from pesticide labels registered for use in California and from DPR's pesticide databases. This information reflects pesticide use and permitted uses in California as of October 15, 1996. For further information regarding the pesticidal uses of this compound, please contact the Pesticide Registration Branch of DPR (DPR, 1996).

The primary sources of 2-phenylphenol emissions in California reported in the United States Environmental Protection Agency's (U.S. EPA) 1995 Toxics Release Inventory (TRI) Public Data Release Report were the chemical and allied products industries (U.S. EPA, 1996b).

B. Emissions

In California, approximately 10 pounds of 2-phenylphenol emissions were reported in the U.S. EPA 1995 TRI Public Data Release Report (U.S. EPA, 1996b).

C. Natural Occurrence

2-Phenylphenol is not known to occur as a natural product (HSDB, 1993).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of 2-phenylphenol.

INDOOR SOURCES AND CONCENTRATIONS

2-Phenylphenol is a common ingredient used in certain disinfectant products. In a U.S. EPA non-occupational pesticide exposure study, 32 household pesticides were measured in homes in three cities over several seasons from 1986-1988 (Immerman and Schaum, 1990). The indoor concentrations of 2-phenylphenol were moderately elevated. The mean indoor concentrations of 2-phenylphenol for homes in Springfield/Chicopee, Massachusetts for spring and winter were 22.8 and 44.5 nanograms per cubic meter (ng/m^3), respectively. The mean indoor concentrations for homes in Jacksonville, Florida over three seasons ranged from 59.0 to 96.0 ng/m^3. In contrast, outdoor concentrations of 2-phenylphenol were much lower and ranged from below 0.05 to 1.6 ng/m^3.

ATMOSPHERIC PERSISTENCE

Based on its vapor pressure, 2-phenylphenol can be expected to exist primarily in the gas phase in the ambient atmosphere, although a small percentage may be associated with the particulate phase. The calculated half-life and lifetime of 2-phenylphenol due to reaction with the hydroxyl radical are 10 hours and 14 hours, respectively (Atkinson, 1995). It may also degrade

very rapidly in nighttime air by the reaction with nitrate radicals. The particulate phase of 2-phenylphenol may be physically removed from air via wet and dry deposition (HSDB, 1993).

AB 2588 RISK ASSESSMENT INFORMATION

2-phenylphenol emissions are not reported from stationary sources in California under the AB 2588 program. It is also not listed in the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines as having health values (cancer or non-cancer) for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to 2-phenylphenol are inhalation, and dermal contact.

Non-Cancer: 2-Phenylphenol or the sodium salt is irritating to the eyes, skin, and respiratory tract (Clayton and Clayton, 1981; HSDB, 1995). The U.S. EPA has not established a Reference Concentration (RfC) or an oral Reference Dose (RfD) for 2-phenylphenol (U.S. EPA, 1995a). It is fetotoxic in rodents, but it is not teratogenic in mice or rats (HSDB, 1995; Reprotox, 1995).

Cancer: The sodium salt of 2-phenylphenol causes bladder cancer in rats (HSDB, 1995). The U.S. EPA has not evaluated 2-phenylphenol for its carcinogenicity (U.S. EPA, 1995a). The International Agency for Research on Cancer has classified 2-phenylphenol (ortho-phenylphenol) in Group 3: Unclassifiable as to its carcinogenicity, based on no data in humans and inadequate data in experimental animals (IARC, 1987a).

O-PHENYLPHENOL

CASNO: 90-43-7

FORMULA: C12-H10-O

SYNONYMS/COMMON NAMES

- (1,1'-BIPHENYL)-2-OL (9CI)

KNOWN USES:

- FUNGICIDE. GERMICIDE. HOUSEHOLD DISINFECTANT. PRESERVATIVE IN WATER-OIL EMULSIONS. DISH-WASHING FORMULATIONS.RUBBER INDUSTRY. PRODUCED FROM COAL TARS (TDB)

CHEMICAL HEALTH AND SAFETY INFORMATION:

SHORT-TERM TOXICITY

- 14-DAY (Topical) (C50351), COMPLETED
  - MICE:SWISS

LONG-TERM CARCINOGENICITY

- 2-YEAR (Topical) (C50351)
  - TR-301 (NTIS # PB86-217239) (PEER REVIEW 03/85)
  - MICE:SWISS
  - CARCINOGENESIS RESULTS (see RESULTS definitions)
    - MALE MICE = NO EVIDENCE
    - FEMALE MICE = NO EVIDENCE
  - DOSE: 55.5 MG/0.1 ML/50 PER GROUP

GENETIC TOXICOLOGY

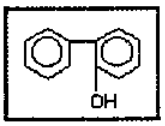
- IN VITRO CYTOGENETICS
  - NEGATIVE (CHROMOSOME ABERRATIONS)
  - WEAKLY POSITIVE (SISTER CHROMATID EXCHANGES)
- DROSOPHILA (SEX-LINKED RECESSIVE LETHAL/RECIPROCAL TRANSLOCATION)
  - NEGATIVE
  - **CITATION** Woodruff, R.C., Mason, J.M., Valencia, R., and Zimmering, S. Chemical mutagenesis testing in Drosophila: V. Results of 53 coded compounds tested for the National Toxicology Program. Environ. Mutagen. 7 (1985): 677-702.
- MOUSE LYMPHOMA
  - POSITIVE
- MOUSE LYMPHOMA
  - POSITIVE
- SALMONELLA

- NEGATIVE

- SALMONELLA
  - WEAKLY POSITIVE
  - **CITATION** Haworth, S., Lawlor, T., Mortelmans, K., Speck, W., and Zeiger, E. Salmonella mutagenicity test results for 250 chemicals. Environ. Mutagen. 5(Suppl 1) (1983): 3-142.

Last Updated 11/13/00

2-Hydroxybiphenyl



- Formula: $C_{12}H_{10}O$
- MW: 170.21
- SMILES String: Oc1ccccc1c2ccccc2
- Synonyms: o-Hydroxybiphenyl; o-Hydroxydiphenyl; 2-Hydroxydiphenyl; 2-Phenylphenol; Torsite; Orthoxenol; 2-Biphenylol; o-Xonal; 1,1'-Biphenyl-2-ol; (1,1-Biphenyl)-2-ol; orthohydroxydipbenyl; biphenyl-2-ol; Biphenylol; Dowicide 1; Hydroxdiphenyl
- CAS Reg. 90-43-7
- ChemFinder Entry
- UM-BBD reactions whose *product* is **2-Hydroxybiphenyl**
  - 2'-Hydroxybiphenyl-2-sulfinate -----> 2-Hydroxybiphenyl (reacID# r0236)

[Dibenzothiophene Desulfurization] [BBD Main Menu]

Page Author(s): Margie Romine
March 15, 1998 6:14:11 PM CST BBDMaster@email.labmed.umn.edu

This is the UM-BBD compound page for ***compID# c0269.***
It was generated on December 6, 2000 3:15:39 PM CST.

The UM-BBD Biphenyl Pathway

- Reactions in the **Biphenyl** Pathway
  - Biphenyl -----> *cis*-2,3-Dihydro-2,3-dihydroxybiphenyl (reacID# r0388)
  - *cis*-2,3-Dihydro-2,3-dihydroxybiphenyl -----> 2,3-Dihydroxybiphenyl (reacID# r0389)
  - 2,3-Dihydroxybiphenyl -----> 2-Hydroxy-6-oxo-6-phenylhexa-2,4-dienoate (reacID# r0390)
  - 2-Hydroxy-6-oxo-6-phenylhexa-2,4-dienoate -----> Benzoate + *cis*-2-Hydroxypenta-2,4-dienoate (reacID# r0391)

- Compounds in the **Biphenyl** Pathway
  - Benzoate (compID# c0121)
  - Biphenyl (compID# c0371)
  - *cis*-2,3-Dihydro-2,3-dihydroxybiphenyl (compID# c0372)
  - *cis*-2-Hydroxypenta-2,4-dienoate (compID# c0102)
  - 2,3-Dihydroxybiphenyl (compID# c0373)
  - 2-Hydroxy-6-oxo-6-phenylhexa-2,4-dienoate (compID# c0374)

- Enzymes in the **Biphenyl** Pathway
  - EC 1.3.1.56 2,3-dihydro-2,3-dihydroxybiphenyl dehydrogenase (enzymeID# **e0134**)
  - EC 1.13.11.39 2,3-dihydroxybiphenyl 1,2-dioxygenase (enzymeID# **e0127**)
  - EC 1.14.99.- biphenyl dioxygenase (enzymeID# **e0089**)
  - EC 3.7.1.8 2-hydroxy-6-oxo-6-phenylhexa-2,4-dienoate hydrolase (enzymeID# **e0033**)

[Biphenyl Pathway Map] [BBD Main Menu]

Page Author(s): David Linden and Zhifu Sun
April 21, 1998 2:51:46 PM CDT BBDMaster@email.labmed.umn.edu

*This is the UM-BBD compounds and reactions page for the **Biphenyl** Pathway.*
It was generated on December 6, 2000 3:19:53 PM CST.

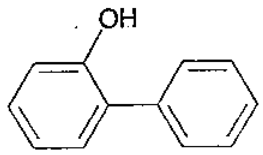
Wagner, Heindel, and Noyes, Inc.
Consulting Geologists
434 Shelburne Rd.
Burlington, VT 05401

PROJECT: _____

DATE: _____

CAS #: 000090-43-7 — 2-PHENYLPHENOL

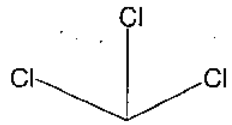
Formula: $C_{12}H_{10}O$
Mol Weight: 170.21
MP (deg C): 57
FP (deg C):
BP (deg C): 286
BP pressure (mm Hg):



Property/ Value	Units	Temp	Data Type	Reference
WS 7.00E+002	mg/L	25	EXP	ARC (1983)
logP 3.09			EXP	HANSCH,C ET AL. (1995)
VP 2.00E-003	mm Hg	25	EXT	KUNDEL,H ET AL. (1975)
OC 9.92	pKa	25	EST	LIPNICK,RL ET AL. (1986)
HL 1.05E-006	atm m3/mol	25	EST	VP/WSOL
OH 2.90E-011	cm3/molc sec	25	EST	MEYLAN,WM & HOWARD,PH (1993)

CAS #: 000067-66-3 — CHLOROFORM

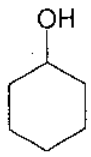
Formula: $CHCl_3$
Mol Weight: 119.38
MP (deg C): -63.52
FP (deg C):
BP (deg C): 61.18
BP pressure (mm Hg):



Property/ Value	Units	Temp	Data Type	Reference
WS 7.95E+003	mg/L	25	EXP	MACKAY,D ET AL. (1980)
logP 1.97			EXP	HANSCH,C & LEO,AJ (1985)
VP 1.97E+002	mm Hg	25	EXP	BOUBLIK,T ET AL. (1984)
OC	pKa			
HL 3.67E-003	atm m3/mol	24	EXP	GOSSETT,JM (1987)
OH 1.03E-013	cm3/molc sec	25	EXP	ATKINSON,R (1989)

CAS #: 000108-93-0 — CYCLOHEXANOL

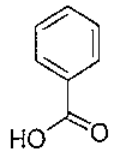
Formula: $C_6H_{12}O$
Mol Weight: 100.16
MP (deg C): 23-25
FP (deg C):
BP (deg C): 161
BP pressure (mm Hg):



Property/ Value	Units	Temp	Data Type	Reference
WS 3.75E+004	mg/L	25	EXP	RIDDICK,JA ET AL. (1986)
logP 1.23			EXP	HANSCH,C & LEO,AJ (1985)
VP 8.00E-001	mm Hg	25	EXP	DAUBERT,TE & DANNER,RP (1989)
OC	pKa			
HL 2.81E-006	atm m3/mol	25	EST	VP/WSOL
OH 1.74E-011	cm3/molc sec	25	EST	ATKINSON,R (1988)

CAS #: 000065-85-0 — BENZOIC ACID

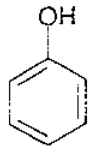
Formula: $C_7H_6O_2$
Mol Weight: 122.12
MP (deg C): 122.4
FP (deg C):
BP (deg C): 249.2
BP pressure (mm Hg):



Property/ Value	Units	Temp	Data Type	Reference
WS 3.40E+003	mg/L	25	EXP	YALKOWSKY,SH & DANNENFELSER,RM (1992)
logP 1.87			EXP	HANSCH,C & LEO,AJ (1985)
VP 1.20E-003	mm Hg	25	EXT	MALASPINA,L ET AL. (1973)
OC 4.21	pKa	25	EXP	SERJEANT,EP & DEMPSEY,B (1979)
HL 1.08E-007	atm m3/mol	25	EST	MEYLAN,WM & HOWARD,PH (1991)
OH 1.15E-012	cm3/molc sec	25	EST	MEYLAN,WM & HOWARD,PH (1993)

CAS #: 000108-95-2 — PHENOL

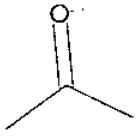
Formula: C_6H_6O
Mol Weight: 94.11
MP (deg C): 40.90
FP (deg C):
BP (deg C): 181.839
BP pressure (mm Hg):



Property/ Value	Units	Temp	Data Type	Reference
WS 8.28E+004	mg/L	25	EXP	SOUTHWORTH,GR & KELLER,JL (1986)
logP 1.46			EXP	HANSCH,C & LEO,AJ (1985)
VP 3.50E-001	mm Hg	25	EXP	JONES,AH (1960)
OC 9.99	pKa	25	EXP	SERJEANT,EP & DEMPSEY,B (1979)
HL 3.33E-007	atm m3/mol	25	EXP	GAFFNEY,JS ET AL. (1987)
OH 2.63E-011	cm3/molc sec	25	EXP	ATKINSON,R (1989)

CAS #: 000067-64-1 — ACETONE

Formula: C_3H_6O
Mol Weight: 58.08
MP (deg C): -94.7
FP (deg C):
BP (deg C): 56.07
BP pressure (mm Hg):



Property/ Value	Units	Temp	Data Type	Reference
WS 1.00E+006	mg/L		EXP	RIDDICK,JA ET AL. (1986)
logP -0.24			EXP	HANSCH,C & LEO,AJ (1985)
VP 2.31E+002	mm Hg	25	EXP	BOUBLIK,T ET AL. (1984)
OC 20.00	pKa		EXP	SERJEANT,EP & DEMPSEY,B (1979)
HL 3.97E-005	atm m3/mol	25	EXP	TAFT,RW ET AL. (1985)
OH 2.26E-013	cm3/molc sec	25	EXP	ATKINSON,R (1989)

ENDYNE, INC.

Laboratory Services

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

MEMORANDUM

TO: **Jon Wilkinson**
FR: **Harry Locker**
DT: December 4, 2000
RE: Omya Draft

On November 27, 2000 Endyne received samples for chemical analysis from H&N for a project identified as OMYA. The samples were collected on 11/21/00 and consisted of varying concentrations of carbonate sludge in an aqueous matrix. The lab was requested to focus on samples SS#1 (166075), SS #2 (166076), SS-1 (core), 15-18' (166047), SS-1 (core) 0-4" (166051). Specifically, Endyne was tasked to analyze these samples for o-phenyl phenol (OPP) and potential breakdown metabolites including phenol, by EPA method 642.

Samples 166075, 166076, and 166047 each settled into two distinct fractions, carbonate sludge and a floating aqueous layer - when allowed to sit idle for several hours. The water phase of these samples was decanted and processed via EPA method 642. Sample 166051, however, did not separate into 2 phases when allowed to settle; and as such, was processed like a solid sample. This sample 166051 was determined to be 56% solid.

The following table summarizes the EPA 642 results.

Sample ID	Ref #	OPP	Phenol*
SS #1	166075	97.0 mg/L	6.36 mg/L
SS #2	166076	5.32 mg/L	0.6 mg/L
SS-1 (core) 15-18'	166047	168 mg/L	26.4 mg/L
SS-1 (core) 0-4"	166051**	42.3 mg/Kg	5.75 mg/Kg

* Due to limitations inherent in HPLC/UV analyses, values reported for phenol are tentative. The early portion of the HPLC chromatogram is susceptible to potential interferences and as such, with ID by retention time only, we must note the detection as tentative.

** Sample 166051 was extracted using an 18 hr soxlet procedure for this result.

ENDYNE, INC.

Laboratory Services

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The lab was also requested to evaluate the effect of KM_nO4 on the contaminants present in the sludge material. Specifically, we were instructed to react sample 166051 with 0.5% by weight KM_nO4.

A 40 ml vial of the sample (166051) was split into 2 aliquots. One approximately 20g aliquot was extracted inside a soxlet sock with approximately 20 g of sodium sulfate. This mixture was extracted with $MeCl_2$ and the aid of ultrasonic disruption. The other approximate 20 g aliquot was reacted with 2.5 ml of a 5% solution of KM_nO4 and allowed to react at room temperature for 90 min. This sample was then extracted as described above for the split sample. The results of this area as follows:

Sample ID	Ref #	OPP	Phenol*
SS-1 (core) 0-4"	166051	10.6 mg/kg	3.78 mg/kg
SS-1 (core) reacted with KM_nO4	166051 K	< 0.100	< 0.500

The extraction procedure used for these samples may not be as comprehensive as the 18hr soxlet procedure used on the original analysis. This most likely explains the reduced total concentration of OPP on the control sample relative to the previous result obtained using the 18 hr extraction.

Analysis of the extracts by GC/MS is ongoing in an effort to confirm tentative phenol detections.

U:\PROJECTS\OMYA\DOG LEG SPILL\ENDYNEMEMO1.DOC

ENDYNE, INC.
Laboratory Services

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

MEMORANDUM

To: Jeff, Jon, Dori and Meddie
Fr: H Locker
Dt: 12/07/2000
Re: OMYA OPP

Previously, Endyne Inc. has reported tentative detection of Phenol in OMYA samples 166075, 166076, 166047, 166051 by EPA Method 642. Analysis of sample 166075 by SW 846 Method 8270C - where phenol is a target compound – did not detect the presence of phenol in this sample. Based on this finding, we must change our previous tentative identification to non detects for phenol for each of these samples analyzed by Method 642. This method, as we have it implemented, can not reliably be used for the determination of phenol.

As noted in the preliminary report, EPA Method 642 with UV detection has inherent limitations specifically with respect to non-target analytes. UV detection is a one dimensional technique with compound identification by retention time only. In addition to these instrumental limitations, the Method 642 extraction procedure may not be well suited for phenol analysis. Method 642 employs a liquid/liquid extraction of water samples at neutral pH. The reduced aromaticity of phenol with respect to OPP may result in a reduced extraction efficiency of phenol by Method 642. Additionally, the presence of other organics such as emulsifiers or flocculants may further impair the extraction efficiency of phenol by this pH neutral extraction procedure.

Therefore, to definitively evaluate these samples for the presence of phenol requires analysis by Method 8270C. This method employs a serial liquid / liquid extraction of the sample at pH <2 and pH > 12. This procedure would be expected to have an improved specificity for the extraction of Phenol. In fact, phenol is a target compound by method 8270C. Method 8270C utilizes GC/MS as the analytical technique. This analytical methodology provides a two dimensional characterization utilizing both retention time and mass spectral fingerprint. This procedure will also better address sample matrix effects because it utilizes an isotopically labeled d5 phenol analog as an extraction surrogate. This extraction surrogate will provide insight into the extraction efficiency of phenol for each individual sample.

We regret any inconvenience this retraction may cause; in our haste to deliver timely results, we were unable to identify all the complexities inherent in the analytical methodology and the unique sample matrix.

Currently the lab is evaluating the addition of OPP as a target compound to Method 8270C. Preliminary results show excellent correlation of results of OPP by Method 8270C with Method 642 results.

Much concern has been given to the potential breakdown pathway of OPP and potential intermediate metabolites. Obviously the plethora of potential bacteria each with its own

ENDYNE, INC.

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Currently the lab is evaluating the addition of OPP as a target compound to Method 8270C. Preliminary results show excellent correlation of results of OPP by Method 8270C with Method 642 results.

Much concern has been given to the potential breakdown pathway of OPP and potential intermediate metabolites. Obviously the plethora of potential bacteria each with its own specific enzymatic weaponry, combined with potential chemical and photochemical routes, could result in a myriad of potential pathways and intermediates. In the absence of a known and definitive pathway it would seem prudent to continue with an 8260 and 8270 testing regime. Together, these methods provide a comprehensive screen for potential metabolites. Although this may not be the most scientifically rigorous solution, it does provide a pragmatic approach to detecting the presence of a broad array of potential intermediates. The most likely intermediates would include oxygenated (carboxcylic acids, ethers,esters, ketones etc.) hydrocarbons of 12 carbons or less which are readily detected by these methods. Since each of these methods employs GC/MS detection, UIP characterization can provide an extremely comprehensive screen for potential metabolites.

ENDYNE, INC.

Laboratory Services

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

Special Report

Client: Heindel & Noyes
Project: OMYA
Date Sampled: November 21, 2000

Order Id: 10366
Analysis Date: December 4, 2000

The laboratory was requested to evaluate the effect of $KMnO_4$ addition on the o-Phenyl phenol contaminate present in the sludge material of sample SS-1(core) 0-4"(reference #166051).

A 40 ml vial of the sample (166051) was split into 2 aliquots. One approximately 20g aliquot was extracted inside a soxlet thimble with approximately 20g of sodium sulfate. This mixture was extracted with $MeCl_2$ and the aid of ultrasonic disruption. The other approximate 20g aliquot was reacted with 2.5ml of 5% solution $KMnO_4$ and allowed to react at room temperature for 90 min. This sample was then extracted as described above for the split sample. The results of this analysis follows:

Sample ID	Ref #	OPP
SS-1 (core) 0-4"	166051	10.6 mg/kg
SS-1 (core) reacted with KMnO4	166051K	< 0.100 mg/kg

Sincerely,

Harry B. Locker, Ph.D.
Laboratory Director

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

Heindel & Noyes
PO Box 64709,
Burlington, VT 05406-4709
Attn: J Noyes

PROJECT: OMYA
ORDER ID: 10376
RECEIVE DATE: November 27, 2000
REPORT DATE: December 4, 2000

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

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

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

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

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

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ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

SW 8260

CLIENT: Heindel & Noyes
PROJECT: OMYA
SITE: SS #1
DATE RECEIVED: November 27, 2000
REPORT DATE: December 4, 2000
ANALYSIS DATE: November 27, 2000

ORDER ID: 10376
REFERENCE NUMBER: 166075
DATE SAMPLED: November 21, 2000
TIME SAMPLED: 11:30 AM
SAMPLER: DB/CA
ANALYST: 725

Parameter	Result ug/L
Benzene	< 1.0
Bromobenzene	< 1.0
Bromochloromethane	< 2.0
Bromodichloromethane	< 1.0
Bromoform	< 1.0
Bromomethane	< 5.0
n-Butylbenzene	< 1.0
sec-Butylbenzene	< 1.0
tert-Butylbenzene	< 1.0
Carbon Tetrachloride	< 1.0
Chlorobenzene	< 1.0
Chloroethane	< 5.0
Chloroform	< 1.0
Chloromethane	< 10.0
2-Chlorotoluene	< 1.0
4-Chlorotoluene	< 1.0
Dibromochloromethane	< 1.0
1,2-Dibromo-3-Chloropropane	< 2.0
1,2-Dibromoethane	< 2.0
Dibromomethane	< 2.0
1,2-Dichlorobenzene	< 1.0
1,3-Dichlorobenzene	< 1.0
1,4-Dichlorobenzene	< 1.0
Dichlorodifluoromethane	< 10.0
1,1-Dichloroethane	< 1.0
1,2-Dichloroethane	< 1.0
1,1-Dichloroethene	< 1.0
cis-1,2-Dichloroethene	< 1.0
trans-1,2-Dichloroethene	< 1.0
1,2-Dichloropropane	< 1.0
1,3-Dichloropropane	< 1.0
2,2-Dichloropropane	< 1.0

Parameter	Result ug/L
1,1-Dichloropropene	< 1.0
cis-1,3-Dichloropropene	< 1.0
trans-1,3-Dichloropropene	< 1.0
Ethylbenzene	< 1.0
Hexachlorobutadiene	< 5.0
Isopropylbenzene	< 1.0
p-Isopropyltoluene	< 1.0
Methylene Chloride	< 5.0
MTBE	< 2.0
Naphthalene	< 5.0
n-Propylbenzene	< 1.0
Styrene	< 1.0
1,1,1,2-Tetrachloroethane	< 2.0
1,1,2,2-Tetrachloroethane	< 2.0
Tetrachloroethene	< 1.0
Toluene	< 1.0
1,2,3-Trichlorobenzene	< 2.0
1,2,4-Trichlorobenzene	< 2.0
1,1,1-Trichloroethane	< 1.0
1,1,2-Trichloroethane	< 1.0
Trichloroethene	< 1.0
Trichlorofluoromethane	< 2.0
1,2,3-Trichloropropane	< 2.0
1,2,4-Trimethylbenzene	< 1.0
1,3,5-Trimethylbenzene	< 1.0
Vinyl Chloride	< 2.0
Xylenes, Total	< 2.0
Surrogate 1	100.%
Surrogate 2	100.%
Surrogate 3	98.%
UIP's	1.

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

CHARACTERIZATION OF UNIDENTIFIED PEAKS

CLIENT: Heindel & Noyes
PROJECT NAME: OMYA
REPORT DATE: November 28, 2000
DATE RECEIVED: November 27, 2000
ORDER ID: 10376
SAMPLER: DB/CA

Unidentified peak characterization is achieved by direct comparison of sample and library spectral data:

REFERENCE NUMBER: 166,075
SITE: SS #1
NUMBER UIPs: 1
CHARACTERIZATION: Unidentified peak is Acetone at approximately 950 ug/L.

— ENDYNE, INC.
160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

CHAIN-OF-CUSTODY-RECORD

41178

Project Name: OMYA	Reporting Address: H&N	Billing Address: H&N
Endyne Order ID: (Lab Use Only) 10376 (-O, -I, -S)	Company: H&N Contact Name/Phone #:	Sampler Name: DB & CA Phone #: 658-0820

Ref # (Lab Use Only)	Sample Identification	Matrix	GRAB	COMP	Date/Time	Sample Containers No.	Sample Containers Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
1660075	SS #1	H_2O	✓		11:30	2	1L amber	HPLC only	Hold	None	24h
						2	40mL	Voa 8260			
						1	16oz	Plastic			
1660076	SS #2	H_2O	✓		12:10	2	1L amber	HPLC only			
						2	40mL		✓	✓	
						1	16oz	Plastic			
								As requested by JPW			
								telcon 11/27 3:00 HBL			

Relinquished by:	Date/Time	Received by:	Date/Time	Received by:	Date/Time
	11/27/00		11/27 12:30		

New York State Project: Yes ____ No ____

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	PP13 Metals
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	RCRA8 Metals
4	Nitrite N	9	BOD	14	Turbidity	19	8021B	24	8260/8260B	29	
5	Nitrate N	10	Alkalinity	15	Conductivity	20	8010/8020	25	8270 B/N or Acid	30	
31	Metals (As Is, Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sr, Ti, Tl, V, Zn										
32	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)					33					
34	Other										

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ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

Heindel & Noyes
PO Box 64709,
Burlington, VT 05406-4709
Attn: J Noyes

PROJECT: OMYA
ORDER ID: 10366
RECEIVE DATE: November 27, 2000
REPORT DATE: December 4, 2000

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

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

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

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

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

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ENDYNE, INC.

Laboratory Services

160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
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LABORATORY REPORT

SW 8260

CLIENT: Heindel & Noyes
PROJECT: OMYA
SITE: SS-1(core) 15-18'
DATE RECEIVED: November 27, 2000
REPORT DATE: December 4, 2000
ANALYSIS DATE: November 27, 2000

ORDER ID: 10366
REFERENCE NUMBER: 166047
DATE SAMPLED: November 21, 2000
TIME SAMPLED: NI
SAMPLER: DB/CA
ANALYST: 725

Parameter	Result ug/L
Benzene	< 1.0
Bromobenzene	< 1.0
Bromochloromethane	< 2.0
Bromodichloromethane	< 1.0
Bromoform	< 1.0
Bromomethane	< 5.0
n-Butylbenzene	< 1.0
sec-Butylbenzene	< 1.0
tert-Butylbenzene	< 1.0
Carbon Tetrachloride	< 1.0
Chlorobenzene	< 1.0
Chloroethane	< 5.0
Chloroform	< 1.0
Chloromethane	< 10.0
2-Chlorotoluene	< 1.0
4-Chlorotoluene	< 1.0
Dibromochloromethane	< 1.0
1,2-Dibromo-3-Chloropropane	< 2.0
1,2-Dibromoethane	< 2.0
Dibromomethane	< 2.0
1,2-Dichlorobenzene	< 1.0
1,3-Dichlorobenzene	< 1.0
1,4-Dichlorobenzene	< 1.0
Dichlorodifluoromethane	< 10.0
1,1-Dichloroethane	< 1.0
1,2-Dichloroethane	< 1.0
1,1-Dichloroethene	< 1.0
cis-1,2-Dichloroethene	< 1.0
trans-1,2-Dichloroethene	< 1.0
1,2-Dichloropropane	< 1.0
1,3-Dichloropropane	< 1.0
2,2-Dichloropropane	< 1.0

Parameter	Result ug/L
1,1-Dichloropropene	< 1.0
cis-1,3-Dichloropropene	< 1.0
trans-1,3-Dichloropropene	< 1.0
Ethylbenzene	< 1.0
Hexachlorobutadiene	< 5.0
Isopropylbenzene	< 1.0
p-Isopropyltoluene	< 1.0
Methylene Chloride	< 5.0
MTBE	< 2.0
Naphthalene	< 5.0
n-Propylbenzene	< 1.0
Styrene	< 1.0
1,1,1,2-Tetrachloroethane	< 2.0
1,1,2,2-Tetrachloroethane	< 2.0
Tetrachloroethene	< 1.0
Toluene	2.3
1,2,3-Trichlorobenzene	< 2.0
1,2,4-Trichlorobenzene	< 2.0
1,1,1-Trichloroethane	< 1.0
1,1,2-Trichloroethane	< 1.0
Trichloroethene	< 1.0
Trichlorofluoromethane	< 2.0
1,2,3-Trichloropropane	< 2.0
1,2,4-Trimethylbenzene	< 1.0
1,3,5-Trimethylbenzene	< 1.0
Vinyl Chloride	< 2.0
Xylenes, Total	< 2.0
Surrogate 1	96.%
Surrogate 2	102.%
Surrogate 3	100.%
UIP's	1.

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

SW 8260

CLIENT: Heindel & Noyes
PROJECT: OMYA
SITE: SS-1(core) 0-4"
DATE RECEIVED: November 27, 2000
REPORT DATE: December 4, 2000
ANALYSIS DATE: November 27, 2000

ORDER ID: 10366
REFERENCE NUMBER: 166051
DATE SAMPLED: November 21, 2000
TIME SAMPLED: NI
SAMPLER: DB/CA
ANALYST: 725

Parameter	Result ug/kg, as received
Benzene	< 5.0
Bromobenzene	< 5.0
Bromochloromethane	< 10.0
Bromodichloromethane	< 5.0
Bromoform	< 5.0
Bromomethane	< 25.0
n-Butylbenzene	< 5.0
sec-Butylbenzene	< 5.0
tert-Butylbenzene	< 5.0
Carbon Tetrachloride	< 5.0
Chlorobenzene	< 5.0
Chloroethane	< 25.0
Chloroform	< 5.0
Chloromethane	< 50.0
4-Chlorotoluene	< 5.0
2-Chlorotoluene	< 5.0
Dibromochloromethane	< 5.0
1,2-Dibromo-3-Chloropropane	< 10.0
1,2-Dibromoethane	< 10.0
Dibromomethane	< 10.0
1,2-Dichlorobenzene	< 5.0
1,3-Dichlorobenzene	< 5.0
1,4-Dichlorobenzene	< 5.0
Dichlorodifluoromethane	< 50.0
1,1-Dichloroethane	< 5.0
1,2-Dichloroethane	< 5.0
1,1-Dichloroethene	< 5.0
cis-1,2-Dichloroethene	< 5.0
trans-1,2-Dichloroethene	< 5.0
1,2-Dichloropropane	< 5.0
1,3-Dichloropropane	< 5.0
2,2-Dichloropropane	< 5.0

Parameter	Result ug/kg, as received
1,1-Dichloropropene	< 5.0
cis-1,3-Dichloropropene	< 5.0
trans-1,3-Dichloropropene	< 5.0
Ethylbenzene	< 5.0
Hexachlorobutadiene	< 25.0
Isopropylbenzene	< 5.0
p-Isopropyltoluene	< 5.0
Methylene Chloride	< 25.0
MTBE	< 10.0
Naphthalene	< 25.0
n-Propylbenzene	< 5.0
Styrene	< 5.0
1,1,1,2-Tetrachloroethane	< 10.0
1,1,2,2-Tetrachloroethane	< 10.0
Tetrachloroethene	< 5.0
Toluene	< 5.0
1,2,3-Trichlorobenzene	< 10.0
1,2,4-Trichlorobenzene	< 10.0
1,1,1-Trichloroethane	< 5.0
1,1,2-Trichloroethane	< 5.0
Trichloroethene	< 5.0
Trichlorofluoromethane	< 10.0
1,2,3-Trichloropropane	< 10.0
1,2,4-Trimethylbenzene	< 5.0
1,3,5-Trimethylbenzene	< 5.0
Vinyl Chloride	< 10.0
Xylenes, Total	< 10.0
Surrogate 1	106.%
Surrogate 2	104.%
Surrogate 3	100.%
UIP's	1.
Percent Solids	NA

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

CHARACTERIZATION OF UNIDENTIFIED PEAKS

CLIENT: Heindel & Noyes
PROJECT NAME: OMYA
REPORT DATE: November 28, 2000
DATE RECEIVED: November 27, 2000
ORDER ID: 10366
SAMPLER: DB/CA

Unidentified peak characterization is achieved by direct comparison of sample and library spectral data:

REFERENCE NUMBER: 166,047
SITE: SS - 1 (core) 15-18'
NUMBER UIPs: 1
CHARACTERIZATION: Unidentified peak is Acetone at approximately 550 ug/L.

REFERENCE NUMBER: 166,051
SITE: SS - 1 (core) 0-4"
NUMBER UIPs: 1
CHARACTERIZATION: Unidentified peak is Acetone at approximately 470 ug/kg.

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To JPW | From CAB
Co./Dept. | Co.
Phone # | Phone #
Fax # | Fax #

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

Project Name: OMYA	Reporting Address: H+N	Billing Address: H+N
Endyne Order ID: (Lab Use Only) 103665 (-O, -I, -S)	Company: H+N Contact Name/Phone #: J. Noyes	Sampler Name: DB + CA Phone #: 658 0820

Ref # (Lab Use Only)	Sample Identification	Matrix	GRAB	COMP	Date/Time 11/21/00	Sample Containers No.	Sample Containers Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
1660047	SS-1 (Core) 15-18'	H2O	X			6	40ml VOA	8260 + HPLC		2 - 8260 = HCl 4 - HPLC = None	24
1660048	SS-3 (Core) 6-9'					3	"			1 - 8260 HCl 2 - HPLC = None	
1660049	SS-4 (Core) 25-28'					2	"			1 - HCl 1 - None	
1660050	SS-5 (Core) 12-15'					3	"			1 - HCl 2 - None	
1660051	SS-1 (Core) 0-4"	Sludge				4		8260+HPLC+%Solids	None		
1660052	SS-3 Core 0-4"										
1660053	SS-4 Core 0-4"										
1660054	SS-5 Core 0-4"										

Relinquished by:	Date/Time	Received by:	Date/Time	Received by:	Date/Time
	11/27/00 1150		11/27 12:30		

New York State Project: Yes ____ No X

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	PP13 Metals
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	RCRA8 Metals
4	Nitrite N	9	BOD	14	Turbidity	19	8021B	24	8260/8260B	29	
5	Nitrate N	10	Alkalinity	15	Conductivity	20	8010/8020	25	8270 B/N or Acid	30	
31	Metals (As Is, Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sr, Ti, Tl, V, Zn										
32	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)					33					
34	Other										

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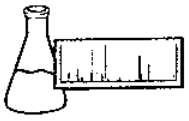

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

Heindel & Noyes
PO Box 64709,
Burlington, VT 05406-4709
Attn: Jeff Noyes

PROJECT: OMYA-Dogleg Spill
ORDER ID: 10502
RECEIVE DATE: December 5, 2000
REPORT DATE: December 6, 2000

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

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

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

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

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

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ENDYNE, INC.

Laboratory Services

160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
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LABORATORY REPORT

SW 8260

CLIENT: Heindel & Noyes
PROJECT: OMYA-Dogleg Spill
SITE: Well 96-1
DATE RECEIVED: December 5, 2000
REPORT DATE: December 6, 2000
ANALYSIS DATE: December 5, 2000

ORDER ID: 10502
REFERENCE NUMBER: 166509
DATE SAMPLED: December 4, 2000
TIME SAMPLED: 12:45 PM
SAMPLER: AP
ANALYST: 725

Parameter	Result ug/L
Benzene	< 1.0
Bromobenzene	< 1.0
Bromochloromethane	< 2.0
Bromodichloromethane	< 1.0
Bromoform	< 1.0
Bromomethane	< 5.0
n-Butylbenzene	< 1.0
sec-Butylbenzene	< 1.0
tert-Butylbenzene	< 1.0
Carbon Tetrachloride	< 1.0
Chlorobenzene	< 1.0
Chloroethane	< 5.0
Chloroform	< 1.0
Chloromethane	< 10.0
2-Chlorotoluene	< 1.0
4-Chlorotoluene	< 1.0
Dibromochloromethane	< 1.0
1,2-Dibromo-3-Chloropropane	< 2.0
1,2-Dibromoethane	< 2.0
Dibromomethane	< 2.0
1,2-Dichlorobenzene	< 1.0
1,3-Dichlorobenzene	< 1.0
1,4-Dichlorobenzene	< 1.0
Dichlorodifluoromethane	< 10.0
1,1-Dichloroethane	< 1.0
1,2-Dichloroethane	< 1.0
1,1-Dichloroethene	< 1.0
cis-1,2-Dichloroethene	< 1.0
trans-1,2-Dichloroethene	< 1.0
1,2-Dichloropropane	< 1.0
1,3-Dichloropropane	< 1.0
2,2-Dichloropropane	< 1.0

Parameter	Result ug/L
1,1-Dichloropropene	< 1.0
cis-1,3-Dichloropropene	< 1.0
trans-1,3-Dichloropropene	< 1.0
Ethylbenzene	< 1.0
Hexachlorobutadiene	< 5.0
Isopropylbenzene	< 1.0
p-Isopropyltoluene	< 1.0
Methylene Chloride	< 5.0
MTBE	< 2.0
Naphthalene	< 5.0
n-Propylbenzene	< 1.0
Styrene	< 1.0
1,1,1,2-Tetrachloroethane	< 2.0
1,1,2,2-Tetrachloroethane	< 2.0
Tetrachloroethene	< 1.0
Toluene	< 1.0
1,2,3-Trichlorobenzene	< 2.0
1,2,4-Trichlorobenzene	< 2.0
1,1,1-Trichloroethane	< 1.0
1,1,2-Trichloroethane	< 1.0
Trichloroethene	< 1.0
Trichlorofluoromethane	< 2.0
1,2,3-Trichloropropane	< 2.0
1,2,4-Trimethylbenzene	< 1.0
1,3,5-Trimethylbenzene	< 1.0
Vinyl Chloride	< 2.0
Xylenes, Total	< 2.0
Surrogate 1	100.%
Surrogate 2	97.%
Surrogate 3	91.%
UIP's	0.

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

SW 8260

CLIENT: Heindel & Noyes
PROJECT: OMYA-Dogleg Spill
SITE: Well #2
DATE RECEIVED: December 5, 2000
REPORT DATE: December 6, 2000
ANALYSIS DATE: December 5, 2000

ORDER ID: 10502
REFERENCE NUMBER: 166510
DATE SAMPLED: December 4, 2000
TIME SAMPLED: 3:45 PM
SAMPLER: AP
ANALYST: 725

Parameter	Result ug/L
Benzene	< 1.0
Bromobenzene	< 1.0
Bromochloromethane	< 2.0
Bromodichloromethane	< 1.0
Bromoform	< 1.0
Bromomethane	< 5.0
n-Butylbenzene	< 1.0
sec-Butylbenzene	< 1.0
tert-Butylbenzene	< 1.0
Carbon Tetrachloride	< 1.0
Chlorobenzene	< 1.0
Chloroethane	< 5.0
Chloroform	< 1.0
Chloromethane	< 10.0
4-Chlorotoluene	< 1.0
2-Chlorotoluene	< 1.0
Dibromochloromethane	< 1.0
1,2-Dibromo-3-Chloropropane	< 2.0
1,2-Dibromoethane	< 2.0
Dibromomethane	< 2.0
1,2-Dichlorobenzene	< 1.0
1,3-Dichlorobenzene	< 1.0
1,4-Dichlorobenzene	< 1.0
Dichlorodifluoromethane	< 10.0
1,1-Dichloroethane	< 1.0
1,2-Dichloroethane	< 1.0
1,1-Dichloroethene	< 1.0
cis-1,2-Dichloroethene	< 1.0
trans-1,2-Dichloroethene	< 1.0
1,2-Dichloropropane	< 1.0
1,3-Dichloropropane	< 1.0
2,2-Dichloropropane	< 1.0

Parameter	Result ug/L
1,1-Dichloropropene	< 1.0
cis-1,3-Dichloropropene	< 1.0
trans-1,3-Dichloropropene	< 1.0
Ethylbenzene	< 1.0
Hexachlorobutadiene	< 5.0
Isopropylbenzene	< 1.0
p-Isopropyltoluene	< 1.0
Methylene Chloride	< 5.0
MTBE	< 2.0
Naphthalene	< 5.0
n-Propylbenzene	< 1.0
Styrene	< 1.0
1,1,1,2-Tetrachloroethane	< 2.0
1,1,2,2-Tetrachloroethane	< 2.0
Tetrachloroethene	< 1.0
Toluene	< 1.0
1,2,3-Trichlorobenzene	< 2.0
1,2,4-Trichlorobenzene	< 2.0
1,1,1-Trichloroethane	< 1.0
1,1,2-Trichloroethane	< 1.0
Trichloroethene	< 1.0
Trichlorofluoromethane	< 2.0
1,2,3-Trichloropropane	< 2.0
1,2,4-Trimethylbenzene	< 1.0
1,3,5-Trimethylbenzene	< 1.0
Vinyl Chloride	< 2.0
Xylenes, Total	< 2.0
Surrogate 1	101.%
Surrogate 2	97.%
Surrogate 3	92.%
UIP's	0.

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

SW 8260

CLIENT: Heindel & Noyes
PROJECT: OMYA-Dogleg Spill
SITE: Dolomite Quarry
DATE RECEIVED: December 5, 2000
REPORT DATE: December 6, 2000
ANALYSIS DATE: December 5, 2000

ORDER ID: 10502
REFERENCE NUMBER: 166511
DATE SAMPLED: December 4, 2000
TIME SAMPLED: 3:30 PM
SAMPLER: AP
ANALYST: 725

Parameter	Result ug/L
Benzene	< 1.0
Bromobenzene	< 1.0
Bromochloromethane	< 2.0
Bromodichloromethane	< 1.0
Bromoform	< 1.0
Bromomethane	< 5.0
n-Butylbenzene	< 1.0
sec-Butylbenzene	< 1.0
tert-Butylbenzene	< 1.0
Carbon Tetrachloride	< 1.0
Chlorobenzene	< 1.0
Chloroethane	< 5.0
Chloroform	1.9
Chloromethane	< 10.0
4-Chlorotoluene	< 1.0
2-Chlorotoluene	< 1.0
Dibromochloromethane	< 1.0
1,2-Dibromo-3-Chloropropane	< 2.0
1,2-Dibromoethane	< 2.0
Dibromomethane	< 2.0
1,2-Dichlorobenzene	< 1.0
1,3-Dichlorobenzene	< 1.0
1,4-Dichlorobenzene	< 1.0
Dichlorodifluoromethane	< 10.0
1,1-Dichloroethane	< 1.0
1,2-Dichloroethane	< 1 0
1,1-Dichloroethene	< 1.0
cis-1,2-Dichloroethene	< 1.0
trans-1,2-Dichloroethene	< 1.0
1,2-Dichloropropane	< 1.0
1,3-Dichloropropane	< 1.0
2,2-Dichloropropane	< 1.0

Parameter	Result ug/L
1,1-Dichloropropene	< 1.0
cis-1,3-Dichloropropene	< 1.0
trans-1,3-Dichloropropene	< 1.0
Ethylbenzene	< 1.0
Hexachlorobutadiene	< 5.0
Isopropylbenzene	< 1.0
p-Isopropyltoluene	< 1.0
Methylene Chloride	< 5.0
MTBE	< 2.0
Naphthalene	< 5.0
n-Propylbenzene	< 1.0
Styrene	< 1.0
1,1,1,2-Tetrachloroethane	< 2.0
1,1,2,2-Tetrachloroethane	< 2.0
Tetrachloroethene	< 1.0
Toluene	< 1.0
1,2,3-Trichlorobenzene	< 2.0
1,2,4-Trichlorobenzene	< 2.0
1,1,1-Trichloroethane	< 1.0
1,1,2-Trichloroethane	< 1.0
Trichloroethene	< 1.0
Trichlorofluoromethane	< 2.0
1,2,3-Trichloropropane	< 2.0
1,2,4-Trimethylbenzene	< 1.0
1,3,5-Trimethylbenzene	< 1.0
Vinyl Chloride	< 2.0
Xylenes, Total	< 2.0
Surrogate 1	103.%
Surrogate 2	97.%
Surrogate 3	91.%
UIP's	2.

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Laboratory Services

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LABORATORY REPORT

CHARACTERIZATION OF UNIDENTIFIED PEAKS

CLIENT: Heindel & Noyes
PROJECT NAME: OMYA
REPORT DATE: December 6, 2000
DATE RECEIVED: December 5, 2000
ORDER ID: 10502
SAMPLER: AP

Unidentified peak characterization is achieved by direct comparison of sample and library spectral data:

REFERENCE NUMBER: 166,511
SITE: Dolomite Quarry
NUMBER UIPs: 2
CHARACTERIZATION: Unidentified peaks are Acetone at 230 ug/L and 2-Butanone at 33 ug/L. Toluene was observed at trace levels, below the quantitation limit (approximately 0.9 ug/L).

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CHAIN-OF-CUSTODY-RECORD

41139

Project Name: OMYA - Dogleg Spill	Reporting Address: HWN	Billing Address: HWN #00171
Endyne Order ID: (Lab Use Only) 10502 — Z-O / I / -S	Company: HWN Contact Name/Phone #: Jeff Noyes	Sampler Name: Amedia Perry Phone #: 658-0820

Ref # (Lab Use Only)	Sample Identification	Matrix	GRAB	COMP	Date/Time	Sample Containers No.	Sample Containers Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
1606509	Well 96-1	H2O	X		12:45	1 each	3 40ml 2 1lt		34	cool HCl	✓
1606510	Well #2		X		15:45						✓
1606511	Dolomite Quarry	↓	X		15:30	↓	↓		↓	↓	✓

Relinquished by:	Date/Time	Received by:	Date/Time	Received by:	Date/Time
			12/5/00 11:50am		

New York State Project: Yes ___ No ___

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	PP13 Metals
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	RCRA8 Metals
4	Nitrite N	9	BOD	14	Turbidity	19	8021B	(24)	8260/8260B	29	
5	Nitrate N	10	Alkalinity	15	Conductivity	20	8010/8020	25	8270 B/N or Acid	30	
31	Metals (As Is, Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sr, Ti, Tl, V, Zn										
32	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)					33					
(34)	Other O.P.P. by HPLC and Phenols by 8270 and VOCs by 8260										

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Laboratory Services

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LABORATORY REPORT

Heindel & Noyes
PO Box 64709,
Burlington, VT 05406-4709
Attn: J Noyes

PROJECT: OMYA
ORDER ID: 10376
RECEIVE DATE: November 27, 2000
REPORT DATE: December 11, 2000

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

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

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

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

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures

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Laboratory Services

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LABORATORY REPORT

SW 8270C

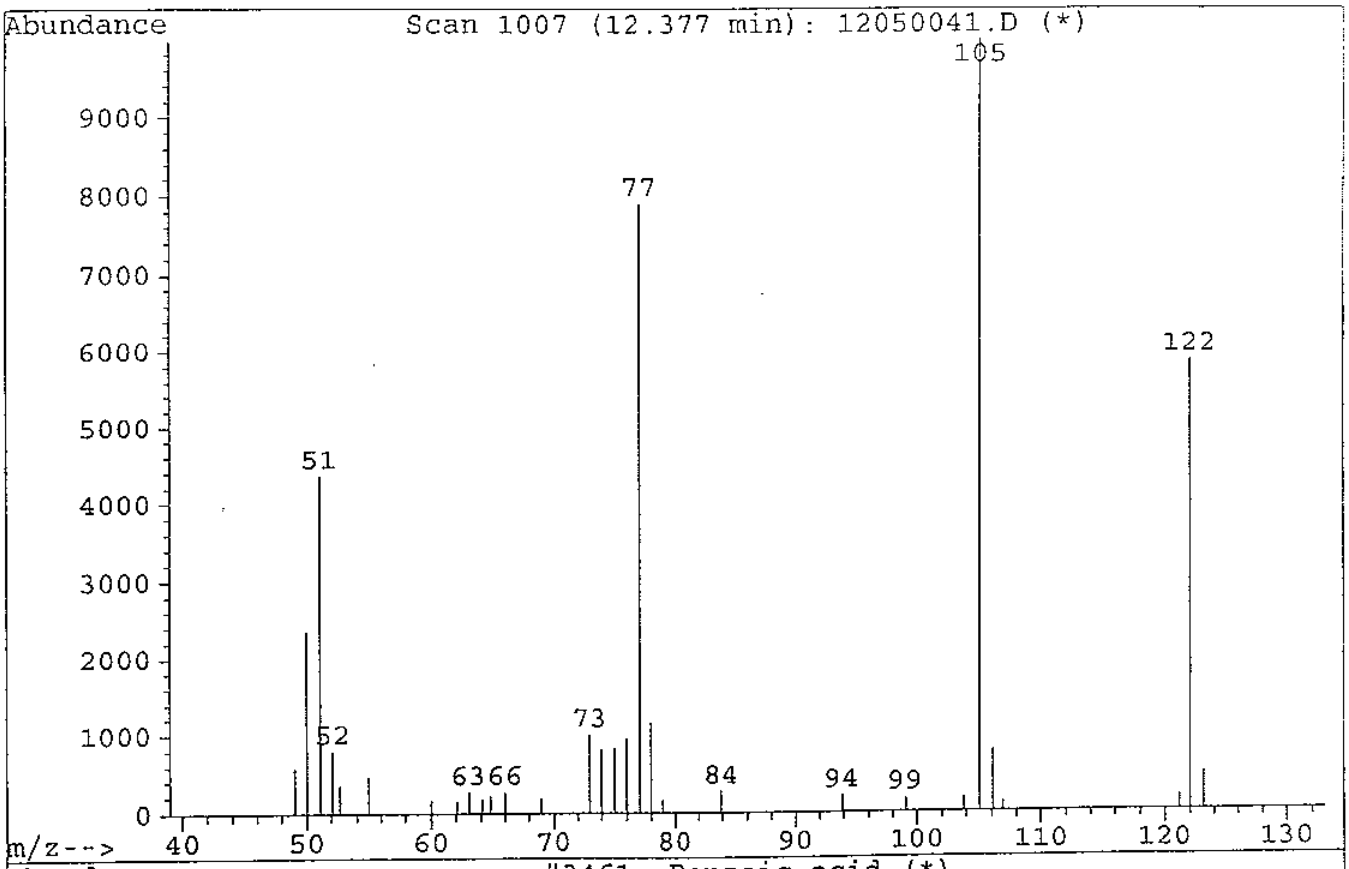
CLIENT: Heindel & Noyes
PROJECT: OMYA
SITE: SS #1
DATE RECEIVED: November 27, 2000
REPORT DATE: December 11, 2000
ANALYSIS DATE: December 6, 2000

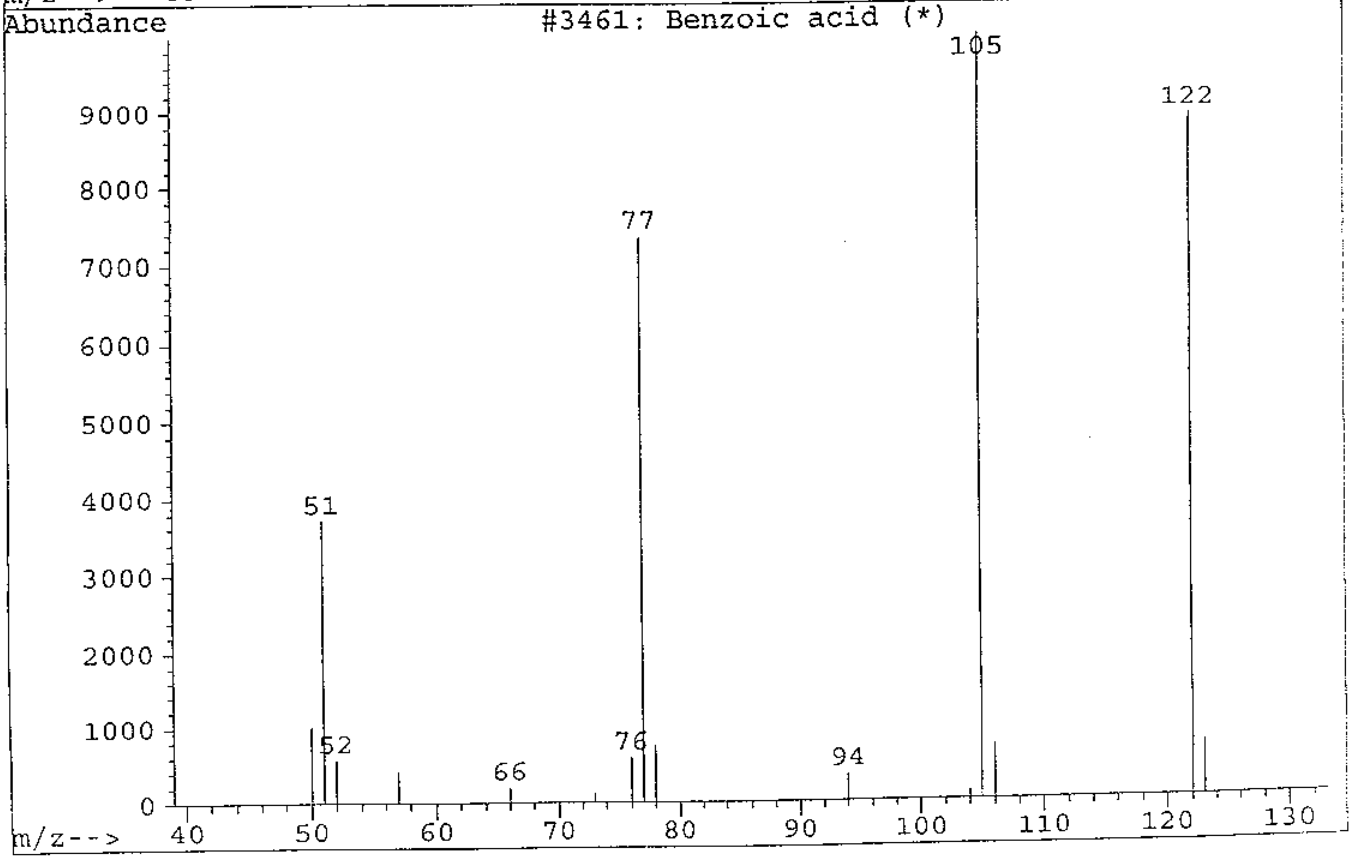
ORDER ID: 10376
REFERENCE NUMBER: 166075
DATE SAMPLED: November 21, 2000
TIME SAMPLED: 11:30 AM
SAMPLER: DB/CA
ANALYST: 917

Parameter	Result ug/L
Acenaphthene	< 20.0
Acenaphthylene	< 20.0
Aniline	< 100.
Anthracene	< 20.0
Azobenzene	< 50.0
Benzidine	< 100.
Benzo(a)anthracene	< 20.0
Benzo(b&k)fluoranthene	< 20.0
Benzo(a)pyrene	< 20.0
Benzo(g,h,i)perylene	< 20.0
Bis(2-chloroethyl)ether	< 50.0
Bis(2-chloroethoxy)methane	< 50.0
Bis(2-ethylhexyl)phthalate	< 100.
Bis(2-chloroisopropyl)ether	< 100.
4-Bromophenyl phenyl ether	< 20.0
Butyl benzyl phthalate	< 100.
Carbazole	< 100.
4-Chloroaniline	< 50.0
1-Chloronaphthalene	< 20.0
2-Chloronaphthalene	< 20.0
4-Chlorophenyl phenyl ether	< 20.0
Chrysene	< 20.0
Dibenzofuran	< 20.0
Dibenzo(a,h)anthracene	< 20.0
Di-n-butylphthalate	< 100.
1,2-Dichlorobenzene	< 20.0
1,3-Dichlorobenzene	< 20.0
1,4-Dichlorobenzene	< 20.0
3,3'-Dichlorobenzidine	< 50.0
Diethyl phthalate	< 100.
Dimethyl phthalate	< 100.
2,4-Dinitrotoluene	< 50.0
2,6-Dinitrotoluene	< 50.0
Di-n-octylphthalate	< 100.
Fluoranthene	< 20.0
Fluorene	< 20.0
Hexachlorobenzene	< 50.0
Hexachlorobutadiene	< 50.0
Hexachlorocyclopentadiene	< 200.
Hexachloroethane	< 50.0
Indeno(1,2,3-cd)pyrene	< 20.0
Isophorone	< 20.0

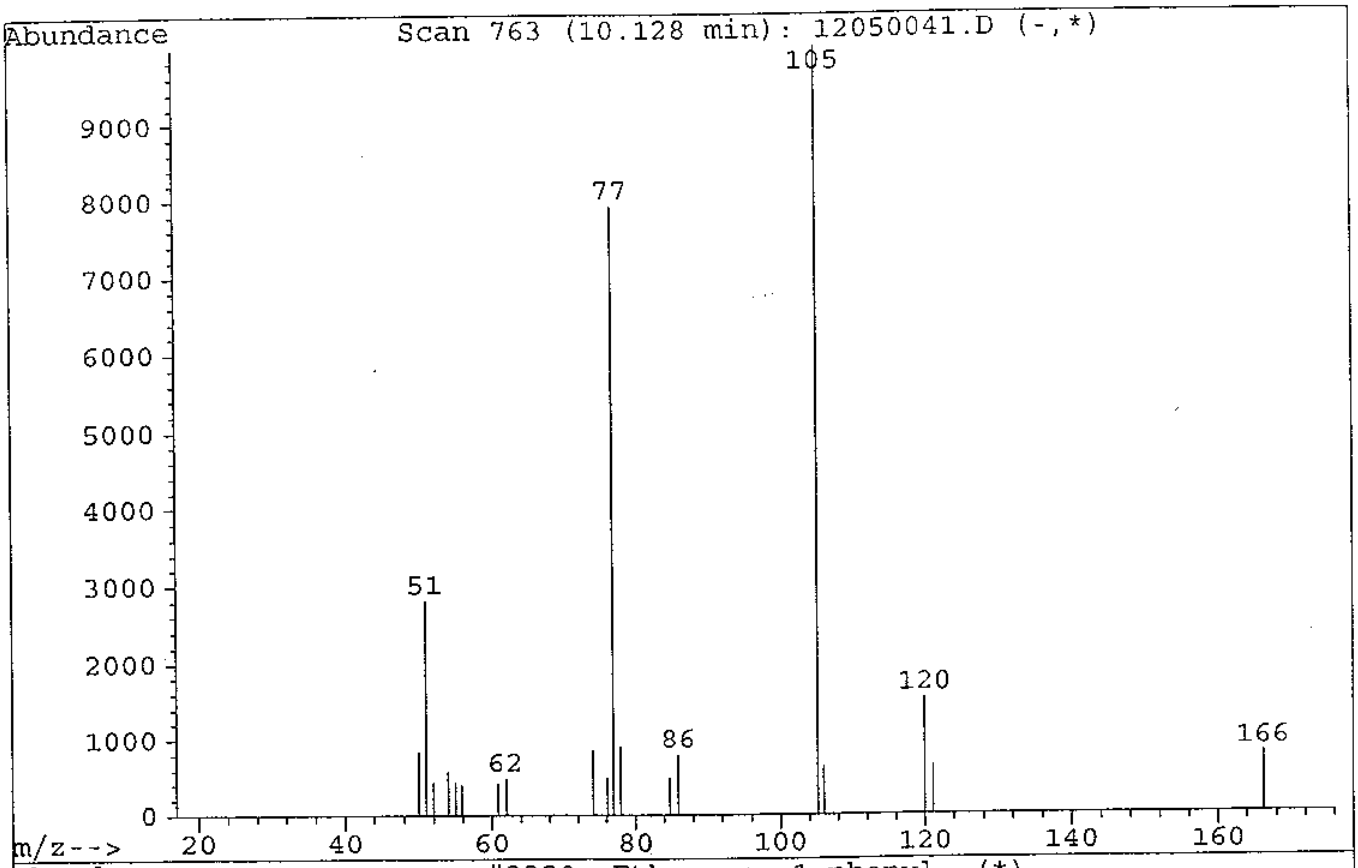
Parameter	Result ug/L
1-Methylnaphthalene	< 20.0
2-Methylnaphthalene	< 20.0
Naphthalene	< 20.0
1-Naphthylamine	< 100.
2-Naphthylamine	< 100.
2-Nitroaniline	< 200.
3-Nitroaniline	< 200.
4-Nitroaniline	< 200.
Nitrobenzene	< 50.0
N-Nitroso-di-n-butylamine	< 50.0
N-Nitrosodiphenylamine	< 50.0
N-Nitrosodimethylamine	< 100.
N-Nitrosodi-n-propylamine	< 100.
N-Nitrosopiperidine	< 100.
Phenanthrene	< 20.0
Pyrene	< 20.0
Pyridine	< 100.
1,2,4-Trichlorobenzene	< 20.0
Benzyl alcohol	< 100.
4-Chloro-3-methylphenol	< 100.
2-Chlorophenol	< 50.0
2,4-Dichlorophenol	< 50.0
2,6-Dichlorophenol	< 50.0
2,4-Dimethylphenol	< 50.0
4,6-Dinitro-2-methylphenol	< 500.
2,4-Dinitrophenol	< 100.
2-Methylphenol (o-cresol)	< 50.0
3&4-Methylphenol (m&p-cresol)	< 50.0
2-Nitrophenol	< 100.
4-Nitrophenol	< 100.
Pentachlorophenol	< 150.
Phenol	< 50.0
2,4,5-Trichlorophenol	< 100.
2,4,6-Trichlorophenol	< 100.
Acid Surrogate 1	51.%
Acid Surrogate 2	62.%
Acid Surrogate 3	95.%
Base/Neutral Surrogate 1	119.%
Base/Neutral Surrogate 2	127.%
Base/Neutral Surrogate 3	149.%
UIP's	4.

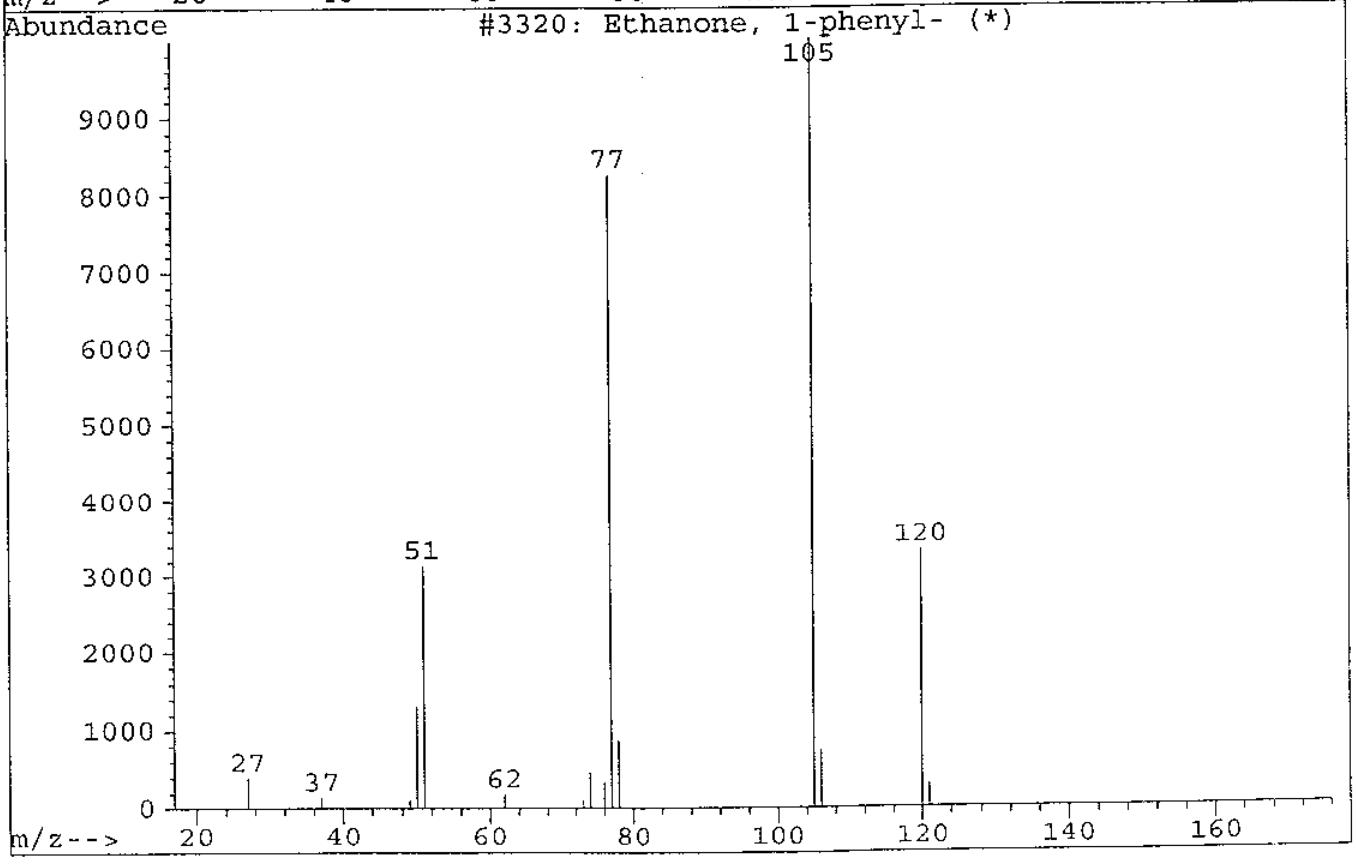
Library Searched : C:\HPCHEM\DATABASE\NBS54K.L
Quality : 90
ID : Benzoic acid



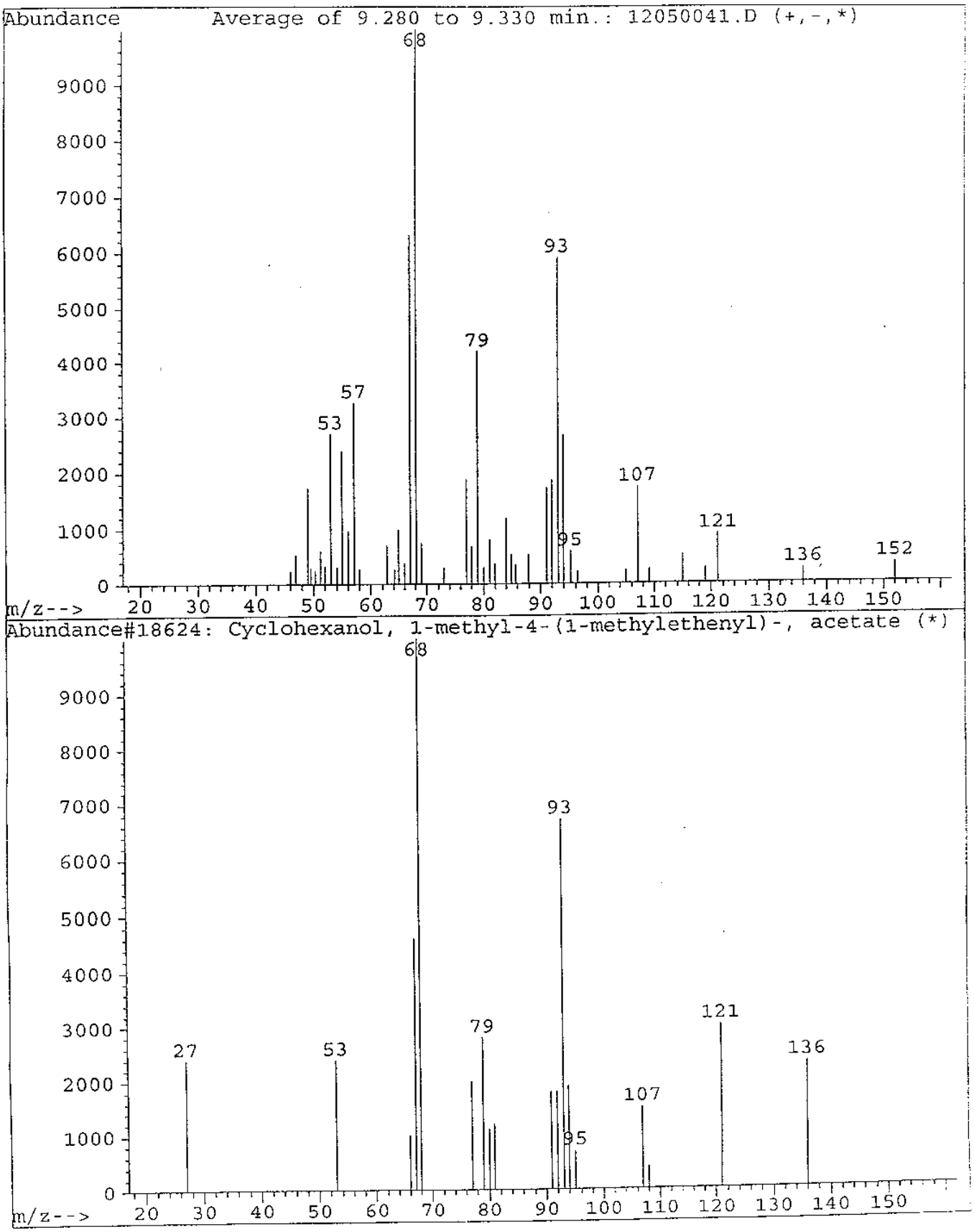


Library Searched : C:\HPCHEM\DATABASE\NBS54K.L
Quality : 45
ID : Ethanone, 1-phenyl-

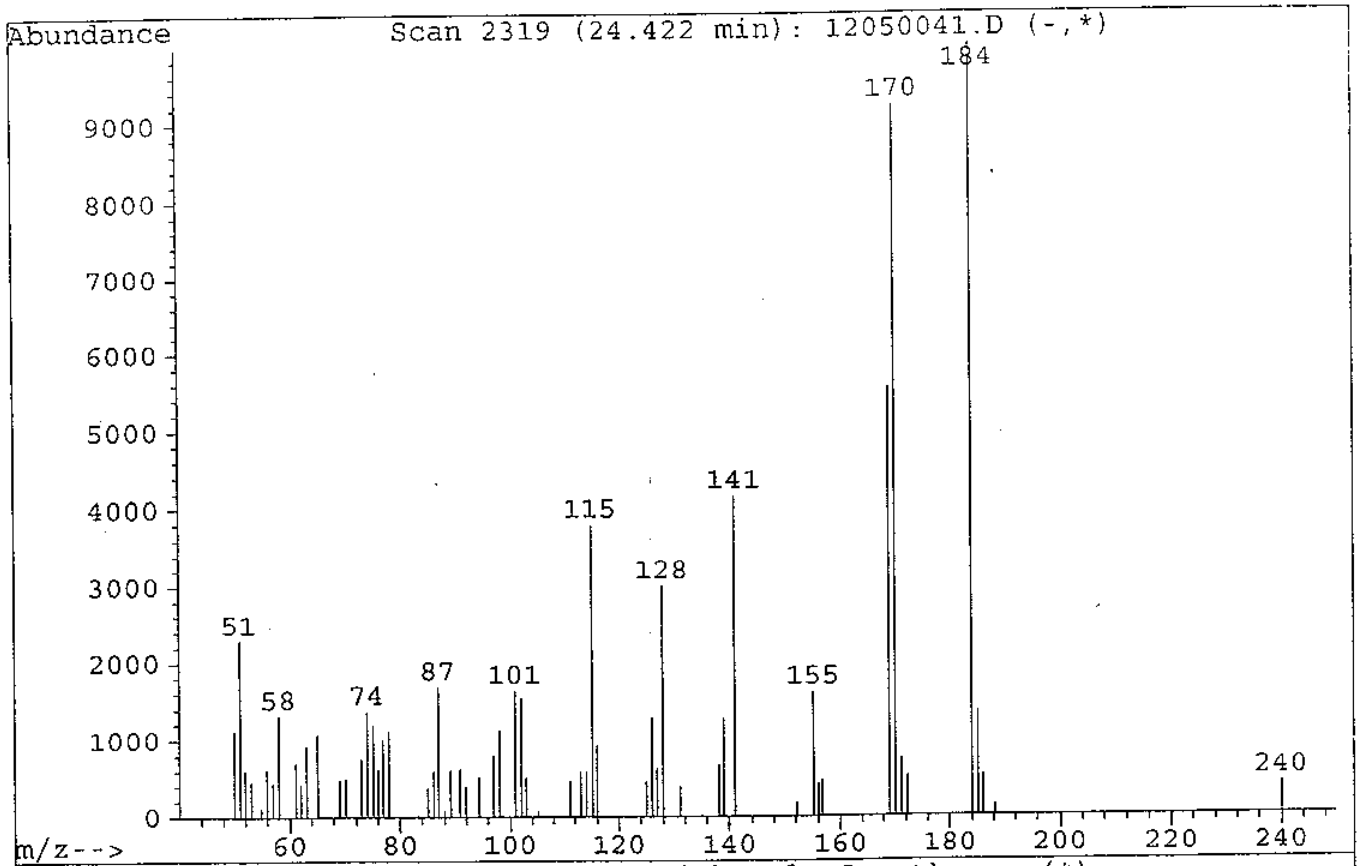


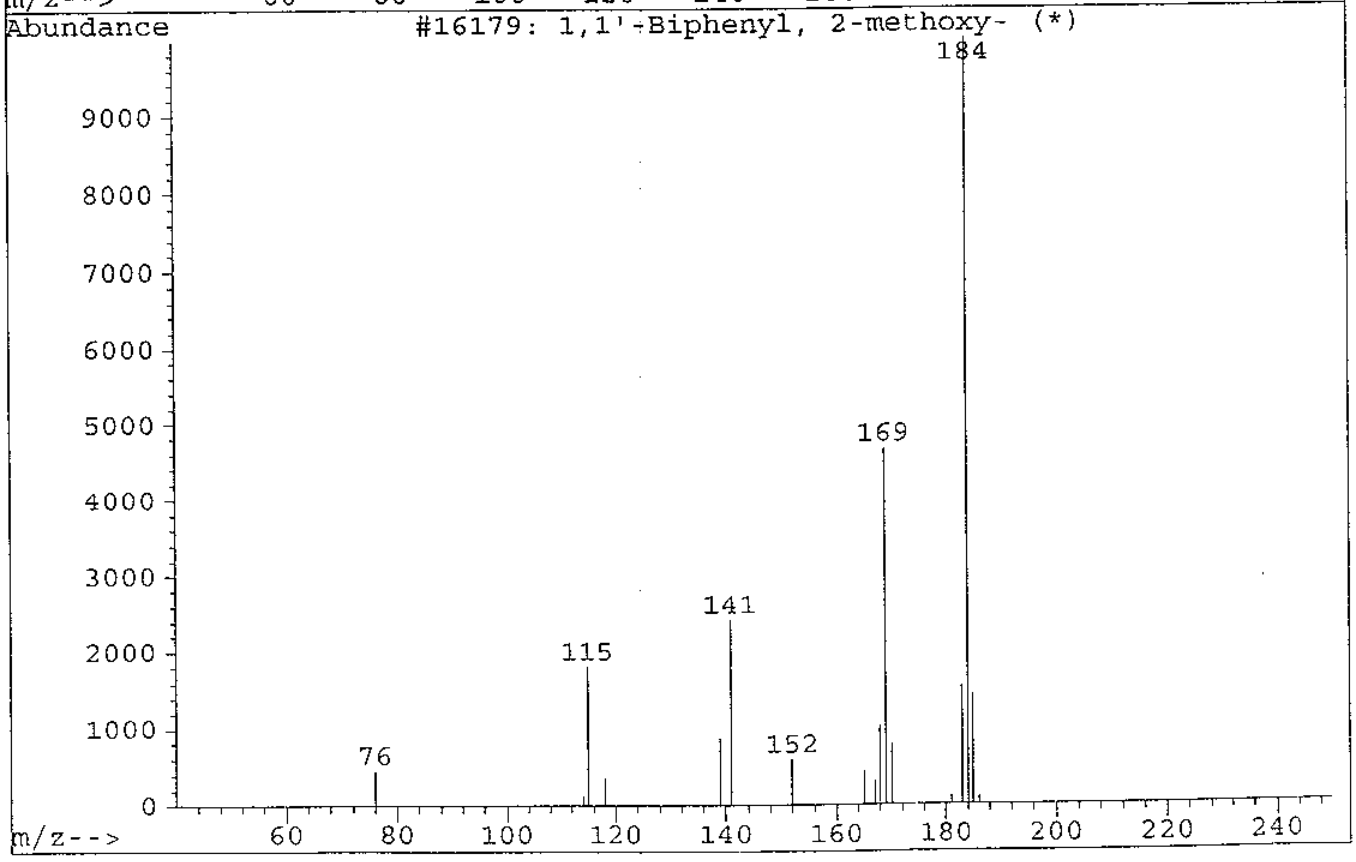


Library Searched : C:\HPCHEM\DATABASE\NBS54K.L
Quality : 50
ID : Cyclohexanol, 1-methyl-4-(1-methylethenyl)-, acetate



Library Searched : C:\HPCHEM\DATABASE\NBS54K.L
Quality : 47
ID : 1,1'-Biphenyl, 2-methoxy-





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Laboratory Services

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LABORATORY REPORT

CHARACTERIZATION OF UNIDENTIFIED PEAKS

CLIENT: Heindel & Noyes
PROJECT NAME: OMYA
REPORT DATE: December 10, 2000
DATE RECEIVED: November 27, 2000
ORDER ID: 10376
SAMPLER: DB/CA

Unidentified peak characterization is achieved by direct comparison of sample and library spectral data:

REFERENCE NUMBER: 166,075
SITE: Dolomite Quarry
NUMBER UIPs: 4
CHARACTERIZATION:

	Best Library match	Estimated Concentration ug/L
1	Benzoic Acid	15
2	1-Phenyl ethanone	5.
3	2-Methoxy-1,1-Biphenyl	2.
4	1-Methyl-4-(1-methylethenyl) cyclohexanol	2.

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41178

Project Name: OMYA	Reporting Address: H&N		Billing Address: H&N
Endyne Order ID: (Lab Use Only) 10376	-O / -I / -S	Company: H&N Contact Name/Phone #:	Sampler Name: DB & CA Phone #: 658-0820

Ref # (Lab Use Only)	Sample Identification	Matrix	GRAB	COMP	Date/Time 11/21/00	Sample Containers No.	Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
1660075	SS #1	H_2O	✓		11:30	2	1L amber	HPLC opp	Hold	None	24h
						2	40mL	Voa 8260			
						1	16oz	Plastic			
1660076	SS #2	H_2O	✓		12:10	2	1L amber	HPLC opp			
						2	40mL		✓	✓	
						1	16oz	Plastic			
								As requested by JPLW			
								telcon 11/27 3:00 HBL			

Relinquished by:	Date/Time	Received by:	Date/Time	Received by:	Date/Time
	11/27/00		11/27 12:30		

New York State Project: Yes ___ No ___

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	PP13 Metals
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	RCRA8 Metals
4	Nitrite N	9	BOD	14	Turbidity	19	8021B	24	8260/8260B	29	
5	Nitrate N	10	Alkalinity	15	Conductivity	20	8010/8020	25	8270 B/N or Acid	30	
31	Metals (As Is, Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sr, Ti, Tl, V, Zn										
32	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)					33					
34	Other										

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LABORATORY REPORT

Heindel & Noyes
PO Box 64709,
Burlington, VT 05406-4709
Attn: Jeff Noyes

PROJECT: OMYA-Dogleg Spill
ORDER ID: 10502
RECEIVE DATE: December 5, 2000
REPORT DATE: December 7, 2000

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

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

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

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

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

Asterisk in results column indicates calculated value based on single point calibration using external standard calibration.

NA in results column indicates data was not available, surrogate compounds not added to sample matrix.

TBQ in results column indicates trace below quantitation limit.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

Enclosures

ENDYNE, INC.

Laboratory Services

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LABORATORY REPORT
SW 8270C

CLIENT: Heindel & Noyes
PROJECT: OMYA-Dogleg Spill
SITE: Well 96-1
DATE RECEIVED: December 5, 2000
REPORT DATE: December 7, 2000
ANALYSIS DATE: December 6, 2000

ORDER ID: 10502
REFERENCE NUMBER: 166509
DATE SAMPLED: December 4, 2000
TIME SAMPLED: 12:45 PM
SAMPLER: AP
ANALYST: 917

Parameter	Result ug/L
Acenaphthene	< 2.0
Acenaphthylene	< 2.0
Aniline	< 10.0
Anthracene	< 2.0
Azobenzene	< 5.0
Benzidine	< 10.0
Benzo(a)anthracene	< 2.0
Benzo(b&k)fluoranthene	< 2.0
Benzo(a)pyrene	< 2.0
Benzo(g,h,i)perylene	< 2.0
Bis(2-chloroethyl)ether	< 5.0
Bis(2-chloroethoxy)methane	< 5.0
Bis(2-ethylhexyl)phthalate	< 10.0
Bis(2-chloroisopropyl)ether	< 10.0
4-Bromophenyl phenyl ether	< 2.0
Butyl benzyl phthalate	< 10.0
Carbazole	< 10.0
4-Chloroaniline	< 5.0
1-Chloronaphthalene	< 2.0
2-Chloronaphthalene	< 2.0
4-Chlorophenyl phenyl ether	< 2.0
Chrysene	< 2.0
Dibenzofuran	< 2.0
Dibenzo(a,h)anthracene	< 2.0
Di-n-butylphthalate	< 10.0
1,2-Dichlorobenzene	< 2.0
1,3-Dichlorobenzene	< 2.0
1,4-Dichlorobenzene	< 2.0
3,3'-Dichlorobenzidine	< 5.0
Diethyl phthalate	< 10.0
Dimethyl phthalate	< 10.0
2,4-Dinitrotoluene	< 5.0
2,6-Dinitrotoluene	< 5.0
Di-n-octylphthalate	< 10.0
Fluoranthene	< 2.0
Fluorene	< 2.0
Hexachlorobenzene	< 5.0
Hexachlorobutadiene	< 5.0
Hexachlorocyclopentadiene	< 20.0
Hexachloroethane	< 5.0
Indeno(1,2,3-cd)pyrene	< 2.0
Isophorone	< 2.0

Parameter	Result ug/L
1-Methylnaphthalene	< 2.0
2-Methylnaphthalene	< 2.0
Naphthalene	< 2.0
1-Naphthylamine	< 10.0
2-Naphthylamine	< 10.0
2-Nitroaniline	< 20.0
3-Nitroaniline	< 20.0
4-Nitroaniline	< 20.0
Nitrobenzene	< 5.0
N-Nitroso-di-n-butylamine	< 5.0
N-Nitrosodiphenylamine	< 5.0
N-Nitrosodimethylamine	< 10.0
N-Nitrosodi-n-propylamine	< 10.0
N-Nitrosopiperidine	< 10.0
Phenanthrene	< 2.0
Pyrene	< 2.0
Pyridine	< 10.0
1,2,4-Trichlorobenzene	< 2.0
Benzyl alcohol	< 10.0
4-Chloro-3-methylphenol	< 10.0
2-Chlorophenol	< 5.0
2,4-Dichlorophenol	< 5.0
2,6-Dichlorophenol	< 5.0
2,4-Dimethylphenol	< 5.0
4,6-Dinitro-2-methylphenol	< 50.0
2,4-Dinitrophenol	< 10.0
2-Methylphenol (o-cresol)	< 5.0
3&4-Methylphenol	< 5.0
2-Nitrophenol	< 10.0
4-Nitrophenol	< 10.0
Pentachlorophenol	< 15.0
Phenol	< 5.0
2,4,5-Trichlorophenol	< 10.0
2,4,6-Trichlorophenol	< 10.0
Acid Surrogate 1	NA
Acid Surrogate 2	NA
Acid Surrogate 3	NA
Base/Neutral Surrogate 1	NA
Base/Neutral Surrogate 2	NA
Base/Neutral Surrogate 3	NA
UIP's	0.
ortho-Phenyl phenol	< 5.0

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT
SW 8270C

CLIENT: Heindel & Noyes
PROJECT: OMYA-Dogleg Spill
SITE: Well #2
DATE RECEIVED: December 5, 2000
REPORT DATE: December 7, 2000
ANALYSIS DATE: December 6, 2000

ORDER ID: 10502
REFERENCE NUMBER: 166510
DATE SAMPLED: December 4, 2000
TIME SAMPLED: 3:45 PM
SAMPLER: AP
ANALYST: 917

Parameter	Result ug/L
Acenaphthene	< 2.0
Acenaphthylene	< 2.0
Aniline	< 10.0
Anthracene	< 2.0
Azobenzene	< 5.0
Benzidine	< 10.0
Benzo(a)anthracene	< 2.0
Benzo(b&k)fluoranthene	< 2.0
Benzo(a)pyrene	< 2.0
Benzo(g,h,i)perylene	< 2.0
Bis(2-chloroethyl)ether	< 5.0
Bis(2-chloroethoxy)methane	< 5.0
Bis(2-ethylhexyl)phthalate	< 10.0
Bis(2-chloroisopropyl)ether	< 10.0
4-Bromophenyl phenyl ether	< 2.0
Butyl benzyl phthalate	< 10.0
Carbazole	< 10.0
4-Chloroaniline	< 5.0
1-Chloronaphthalene	< 2.0
2-Chloronaphthalene	< 2.0
4-Chlorophenyl phenyl ether	< 2.0
Chrysene	< 2.0
Dibenzofuran	< 2.0
Dibenzo(a,h)anthracene	< 2.0
Di-n-butylphthalate	< 10.0
1,2-Dichlorobenzene	< 2.0
1,3-Dichlorobenzene	< 2.0
1,4-Dichlorobenzene	< 2.0
3,3'-Dichlorobenzidine	< 5.0
Diethyl phthalate	< 10.0
Dimethyl phthalate	< 10.0
2,4-Dinitrotoluene	< 5.0
2,6-Dinitrotoluene	< 5.0
Di-n-octylphthalate	< 10.0
Fluoranthene	< 2.0
Fluorene	< 2.0
Hexachlorobenzene	< 5.0
Hexachlorobutadiene	< 5.0
Hexachlorocyclopentadiene	< 20.0
Hexachloroethane	< 5.0
Indeno(1,2,3-cd)pyrene	< 2.0
Isophorone	< 2.0

Parameter	Result ug/L
1-Methylnaphthalene	< 2.0
2-Methylnaphthalene	< 2.0
Naphthalene	< 2.0
1-Naphthylamine	< 10.0
2-Naphthylamine	< 10.0
2-Nitroaniline	< 20.0
3-Nitroaniline	< 20.0
4-Nitroaniline	< 20.0
Nitrobenzene	< 5.0
N-Nitroso-di-n-butylamine	< 5.0
N-Nitrosodiphenylamine	< 5.0
N-Nitrosodimethylamine	< 10.0
N-Nitrosodi-n-propylamine	< 10.0
N-Nitrosopiperidine	< 10.0
Phenanthrene	< 2.0
Pyrene	< 2.0
Pyridine	< 10.0
1,2,4-Trichlorobenzene	< 2.0
Benzyl alcohol	< 10.0
4-Chloro-3-methylphenol	< 10.0
2-Chlorophenol	< 5.0
2,4-Dichlorophenol	< 5.0
2,6-Dichlorophenol	< 5.0
2,4-Dimethylphenol	< 5.0
4,6-Dinitro-2-methylphenol	< 50.0
2,4-Dinitrophenol	< 10.0
2-Methylphenol (o-cresol)	< 5.0
3&4-Methylphenol	< 5.0
2-Nitrophenol	< 10.0
4-Nitrophenol	< 10.0
Pentachlorophenol	< 15.0
Phenol	< 5.0
2,4,5-Trichlorophenol	< 10.0
2,4,6-Trichlorophenol	< 10.0
Acid Surrogate 1	NA
Acid Surrogate 2	NA
Acid Surrogate 3	NA
Base/Neutral Surrogate 1	NA
Base/Neutral Surrogate 2	NA
Base/Neutral Surrogate 3	NA
UIP's	2.
ortho-Phenyl phenol	< 5.0

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT
SW 8270C

CLIENT: Heindel & Noyes
PROJECT: OMYA-Dogleg Spill
SITE: Dolomite Quarry
DATE RECEIVED: December 5, 2000
REPORT DATE: December 7, 2000
ANALYSIS DATE: December 6, 2000

ORDER ID: 10502
REFERENCE NUMBER: 166511
DATE SAMPLED: December 4, 2000
TIME SAMPLED: 3:30 PM
SAMPLER: AP
ANALYST: 917

Parameter	Result ug/L
Acenaphthene	< 2.0
Acenaphthylene	< 2.0
Aniline	< 10.0
Anthracene	< 2.0
Azobenzene	< 5.0
Benzidine	< 10.0
Benzo(a)anthracene	< 2.0
Benzo(b&k)fluoranthene	< 2.0
Benzo(a)pyrene	< 2.0
Benzo(g,h,i)perylene	< 2.0
Bis(2-chloroethyl)ether	< 5.0
Bis(2-chloroethoxy)methane	< 5.0
Bis(2-ethylhexyl)phthalate	< 10.0
Bis(2-chloroisopropyl)ether	< 10.0
4-Bromophenyl phenyl ether	< 2.0
Butyl benzyl phthalate	< 10.0
Carbazole	< 10.0
4-Chloroaniline	< 5.0
1-Chloronaphthalene	< 2.0
2-Chloronaphthalene	< 2.0
4-Chlorophenyl phenyl ether	< 2.0
Chrysene	< 2.0
Dibenzofuran	< 2.0
Dibenzo(a,h)anthracene	< 2.0
Di-n-butylphthalate	< 10.0
1,2-Dichlorobenzene	< 2.0
1,3-Dichlorobenzene	< 2.0
1,4-Dichlorobenzene	< 2.0
3,3'-Dichlorobenzidine	< 5.0
Diethyl phthalate	< 10.0
Dimethyl phthalate	< 10.0
2,4-Dinitrotoluene	< 5.0
2,6-Dinitrotoluene	< 5.0
Di-n-octylphthalate	< 10.0
Fluoranthene	< 2.0
Fluorene	< 2.0
Hexachlorobenzene	< 5.0
Hexachlorobutadiene	< 5.0
Hexachlorocyclopentadiene	< 20.0
Hexachloroethane	< 5.0
Indeno(1,2,3-cd)pyrene	< 2.0
Isophorone	< 2.0

Parameter	Result ug/L
1-Methylnaphthalene	< 2.0
2-Methylnaphthalene	< 2.0
Naphthalene	< 2.0
1-Naphthylamine	< 10.0
2-Naphthylamine	< 10.0
2-Nitroaniline	< 20.0
3-Nitroaniline	< 20.0
4-Nitroaniline	< 20.0
Nitrobenzene	< 5.0
N-Nitroso-di-n-butylamine	< 5.0
N-Nitrosodiphenylamine	< 5.0
N-Nitrosodimethylamine	< 10.0
N-Nitrosodi-n-propylamine	< 10.0
N-Nitrosopiperidine	< 10.0
Phenanthrene	< 2.0
Pyrene	< 2.0
Pyridine	< 10.0
1,2,4-Trichlorobenzene	< 2.0
Benzyl alcohol	< 10.0
4-Chloro-3-methylphenol	< 10.0
2-Chlorophenol	< 5.0
2,4-Dichlorophenol	< 5.0
2,6-Dichlorophenol	< 5.0
2,4-Dimethylphenol	< 5.0
4,6-Dinitro-2-methylphenol	< 50.0
2,4-Dinitrophenol	< 10.0
2-Methylphenol (o-cresol)	< 5.0
3&4-Methylphenol	< 5.0
2-Nitrophenol	< 10.0
4-Nitrophenol	< 10.0
Pentachlorophenol	< 15.0
Phenol	TBQ < 5.0
2,4,5-Trichlorophenol	< 10.0
2,4,6-Trichlorophenol	< 10.0
Acid Surrogate 1	NA
Acid Surrogate 2	NA
Acid Surrogate 3	NA
Base/Neutral Surrogate 1	NA
Base/Neutral Surrogate 2	NA
Base/Neutral Surrogate 3	NA
UIP's	7.
ortho-Phenyl phenol	4,990.*

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

CHARACTERIZATION OF UNIDENTIFIED PEAKS

CLIENT: Heindel & Noyes
PROJECT NAME: OMYA
REPORT DATE: December 6, 2000
DATE RECEIVED: December 5, 2000
ORDER ID: 10502
SAMPLER: AP

Unidentified peak characterization is achieved by direct comparison of sample and library spectral data:

REFERENCE NUMBER: 166,510
SITE: Well #2
NUMBER UIPs: 2
CHARACTERIZATION:

	Best Library match	Estimated Concentration ug/L
1	Dimethyl-1,4-Dioxane	15.
2	2-Methyl-3-buten-2-ol	5.

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LABORATORY REPORT

CHARACTERIZATION OF UNIDENTIFIED PEAKS

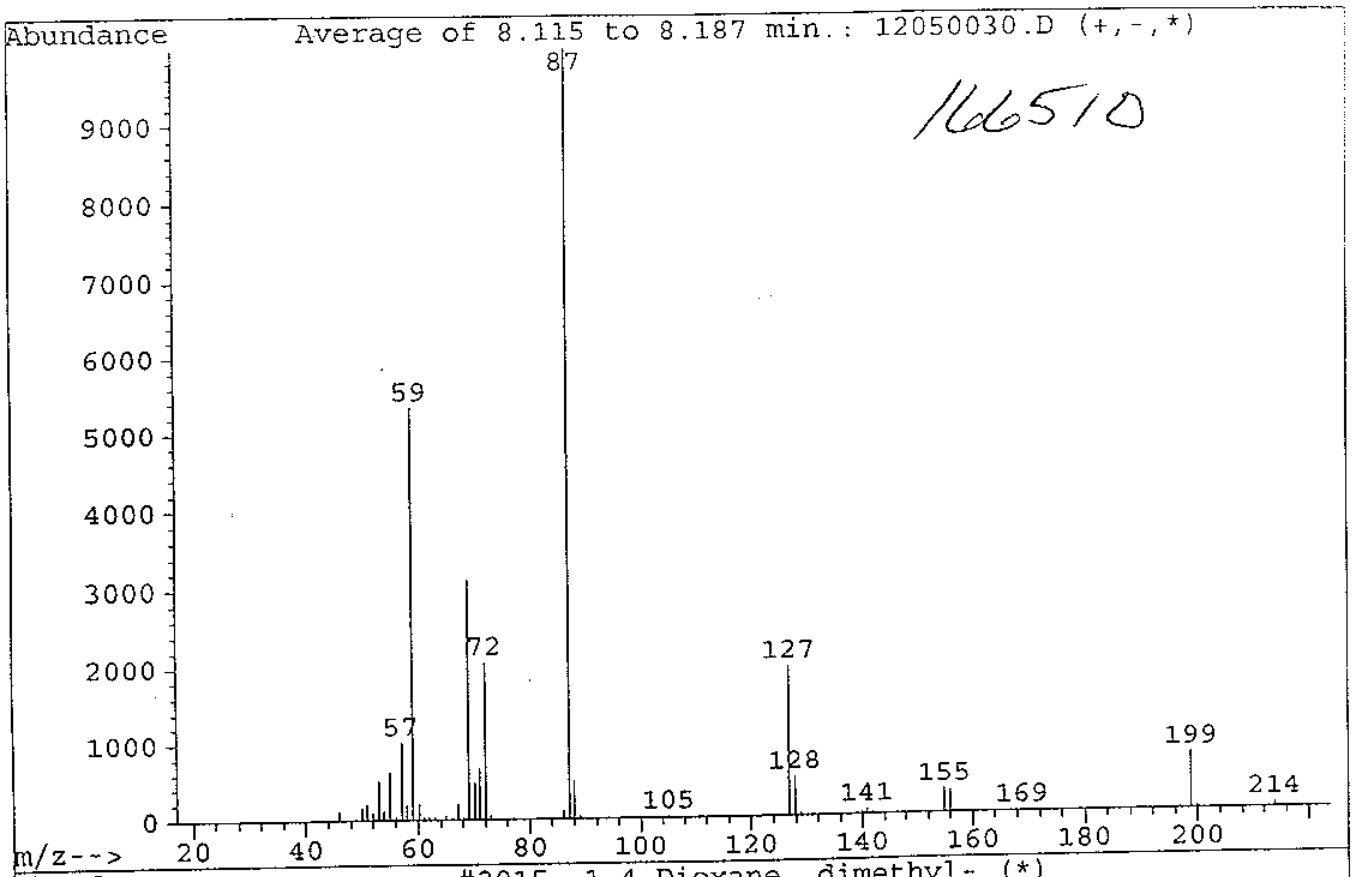
CLIENT: Heindel & Noyes
PROJECT NAME: OMYA
REPORT DATE: December 6, 2000
DATE RECEIVED: December 5, 2000
ORDER ID: 10502
SAMPLER: AP

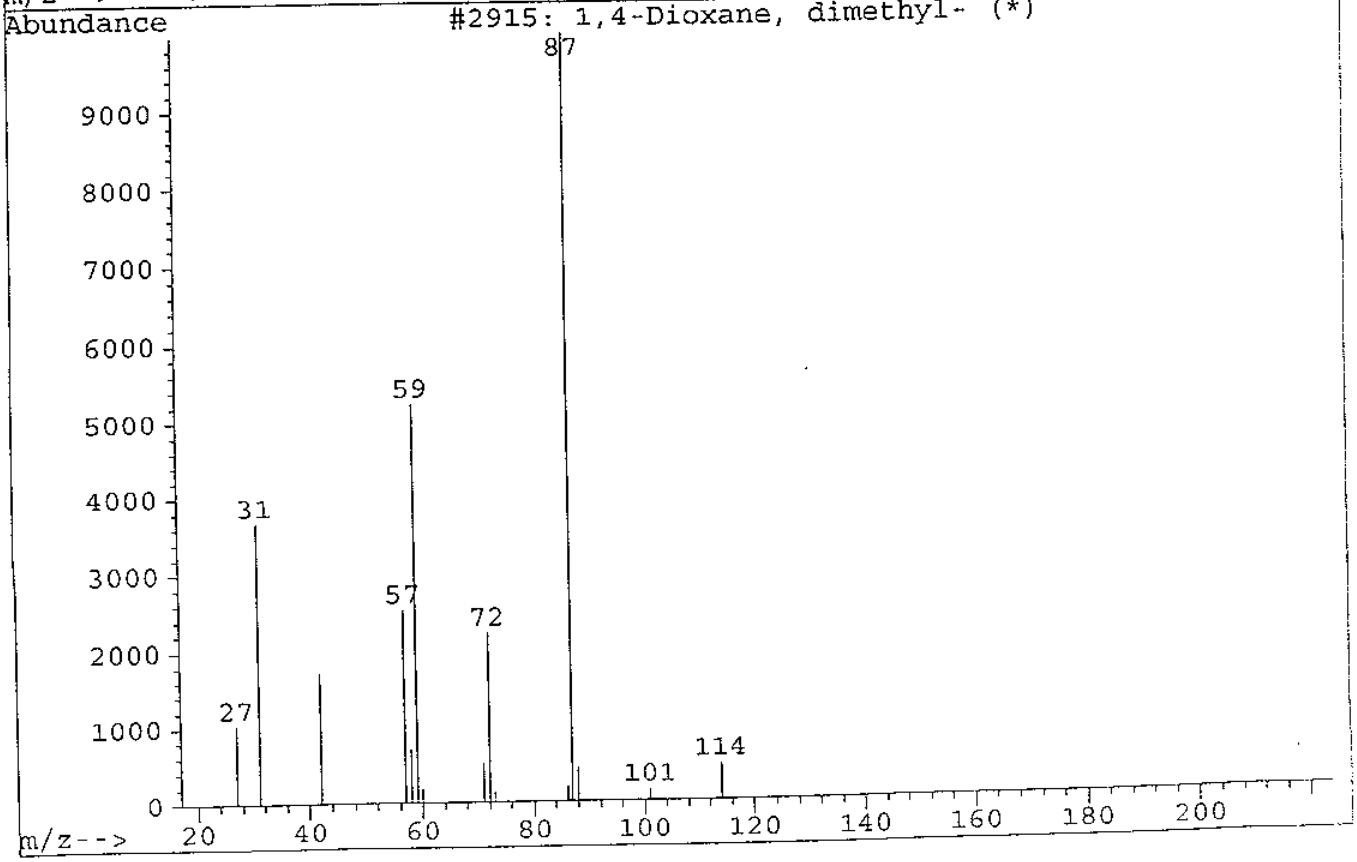
Unidentified peak characterization is achieved by direct comparison of sample and library spectral data:

REFERENCE NUMBER: 166,511
SITE: Dolomite Quarry
NUMBER UIPs: 7
CHARACTERIZATION:

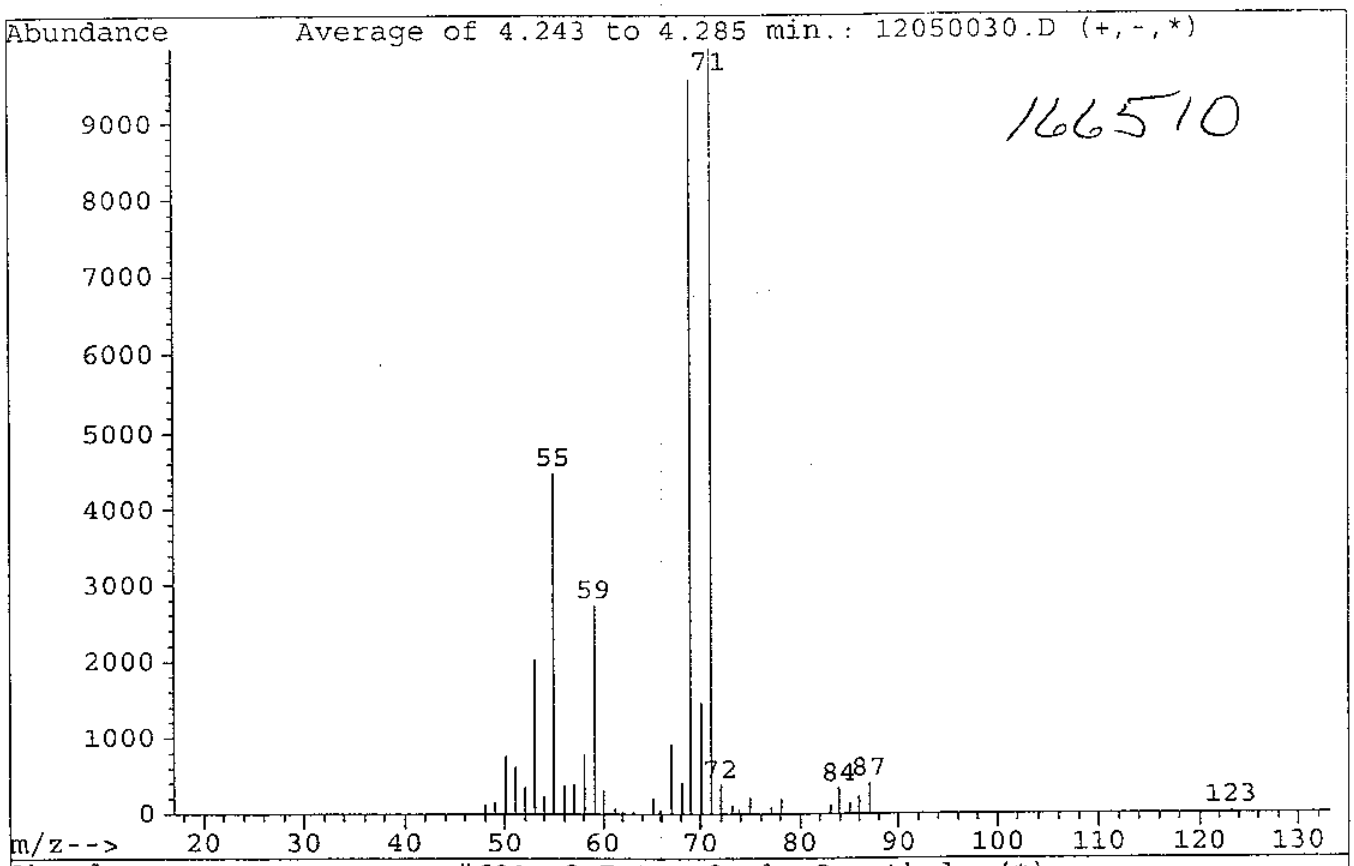
	Best Library match	Estimated Concentration ug/L
1	Crotonic Acid	2.
2	2-Heptanone	2.
3	2-Piperidinone	3.
4	1-Phenyl ethanone	1.
5	2-Dibenzofuranol	2.
6	3-Amino Phenol	5.
7	UnKnown (no match)	10.

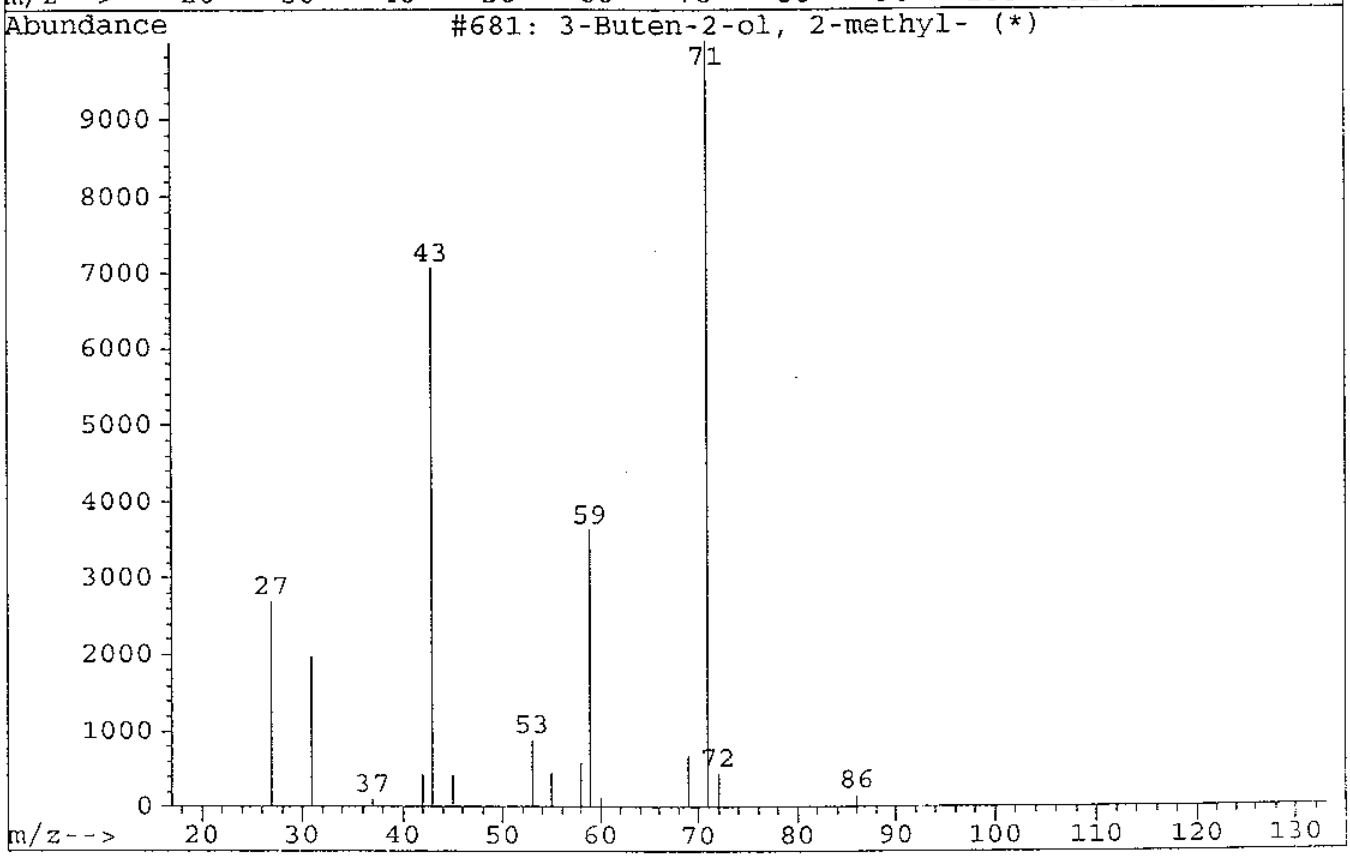
Library Searched : C:\HPCHEM\DATABASE\NBS54K.L
Quality : 59
ID : 1,4-Dioxane, dimethyl-





Library Searched : C:\HPCHEM\DATABASE\NBS54K.L
Quality : 25
ID : 3-Buten-2-ol, 2-methyl-





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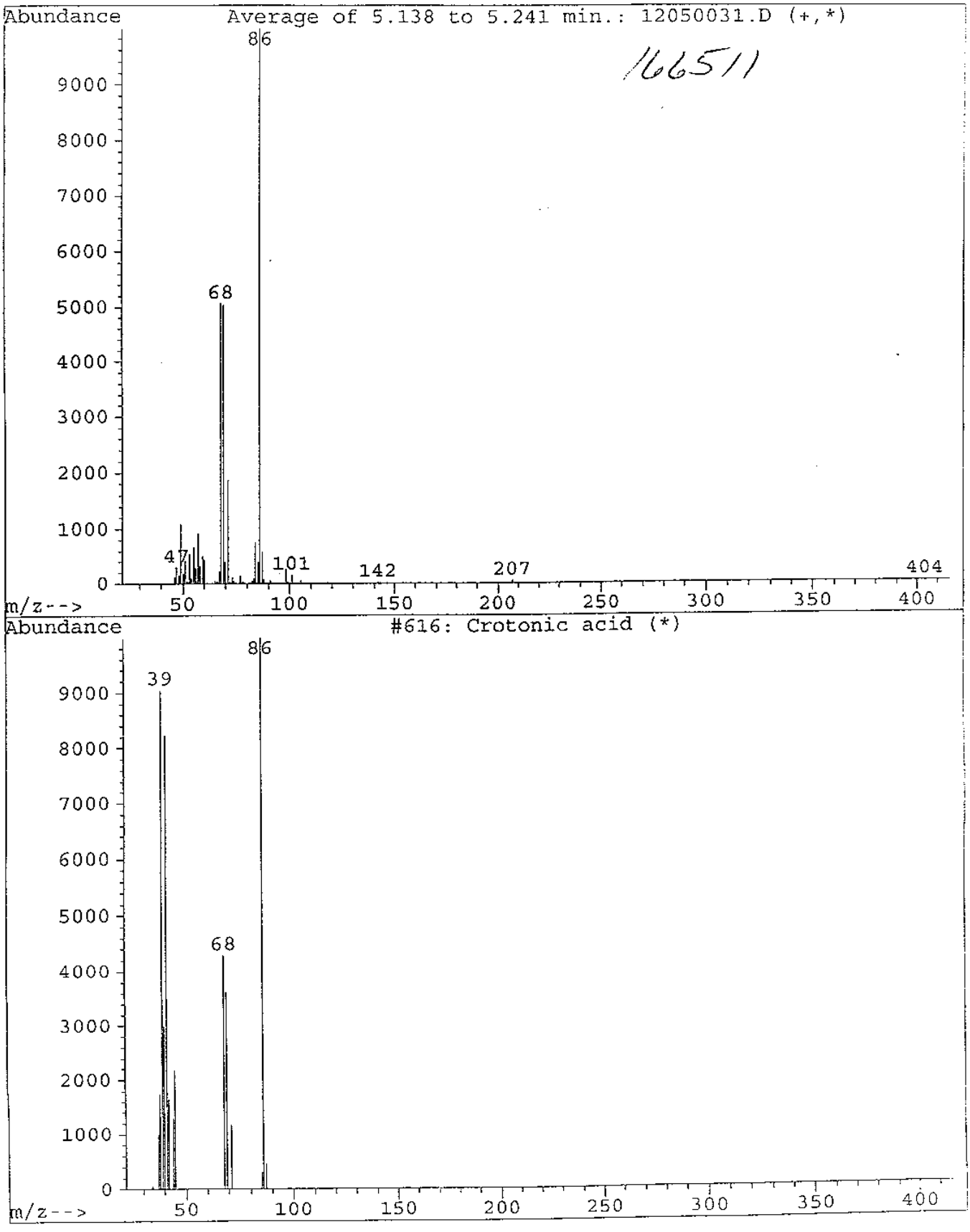
Quality : 72
ID : Crotonic acid



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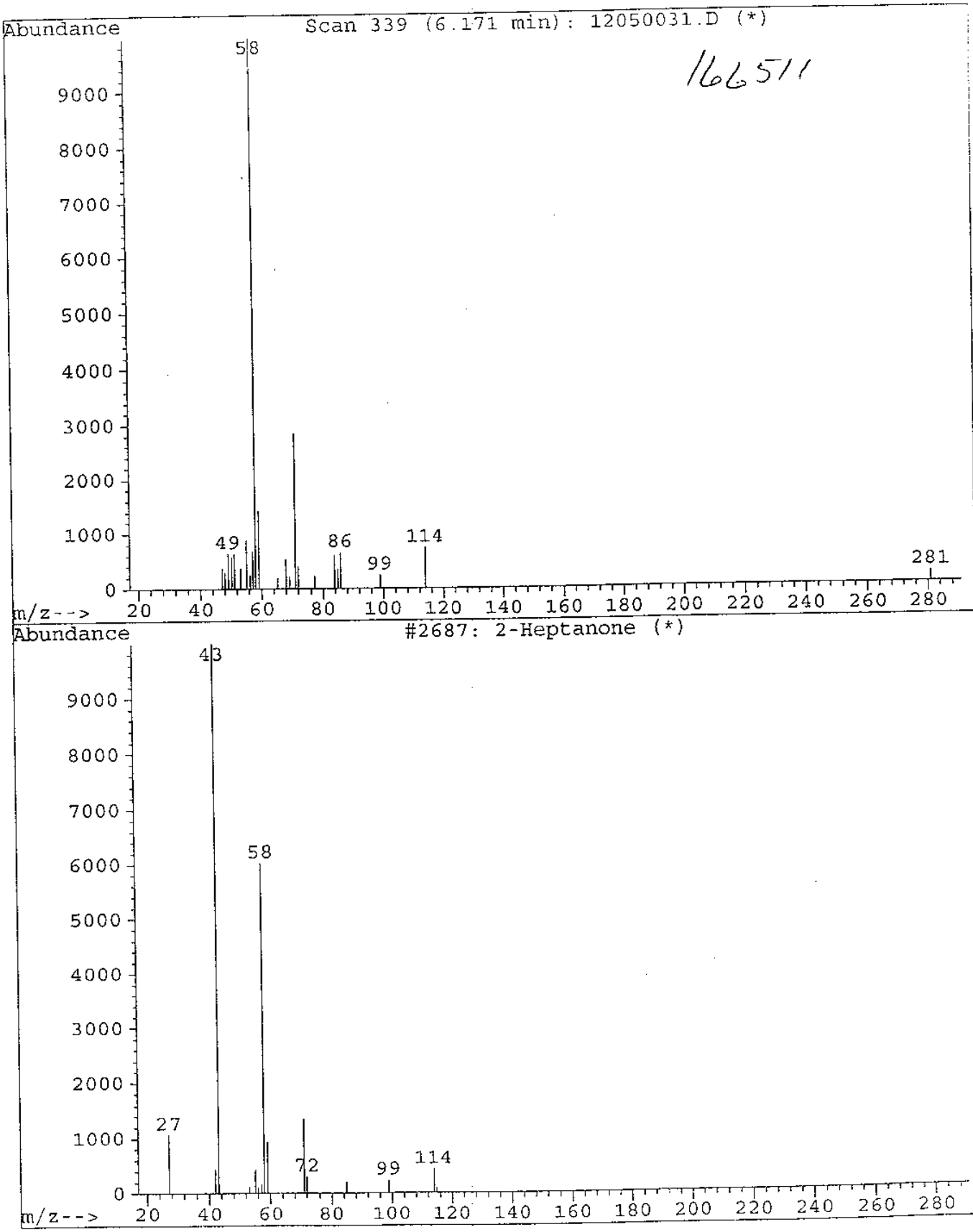
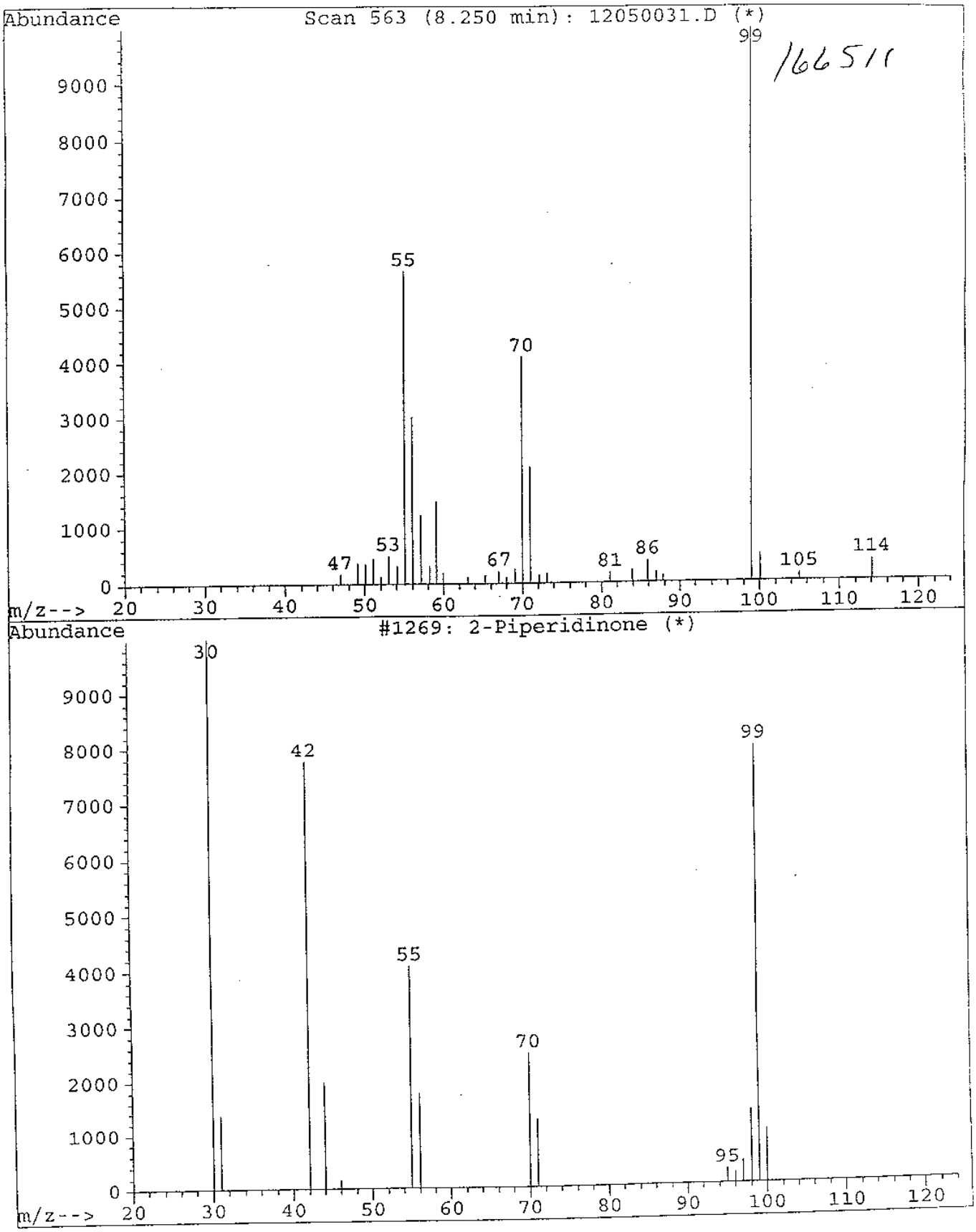
ID : 2-Heptanone

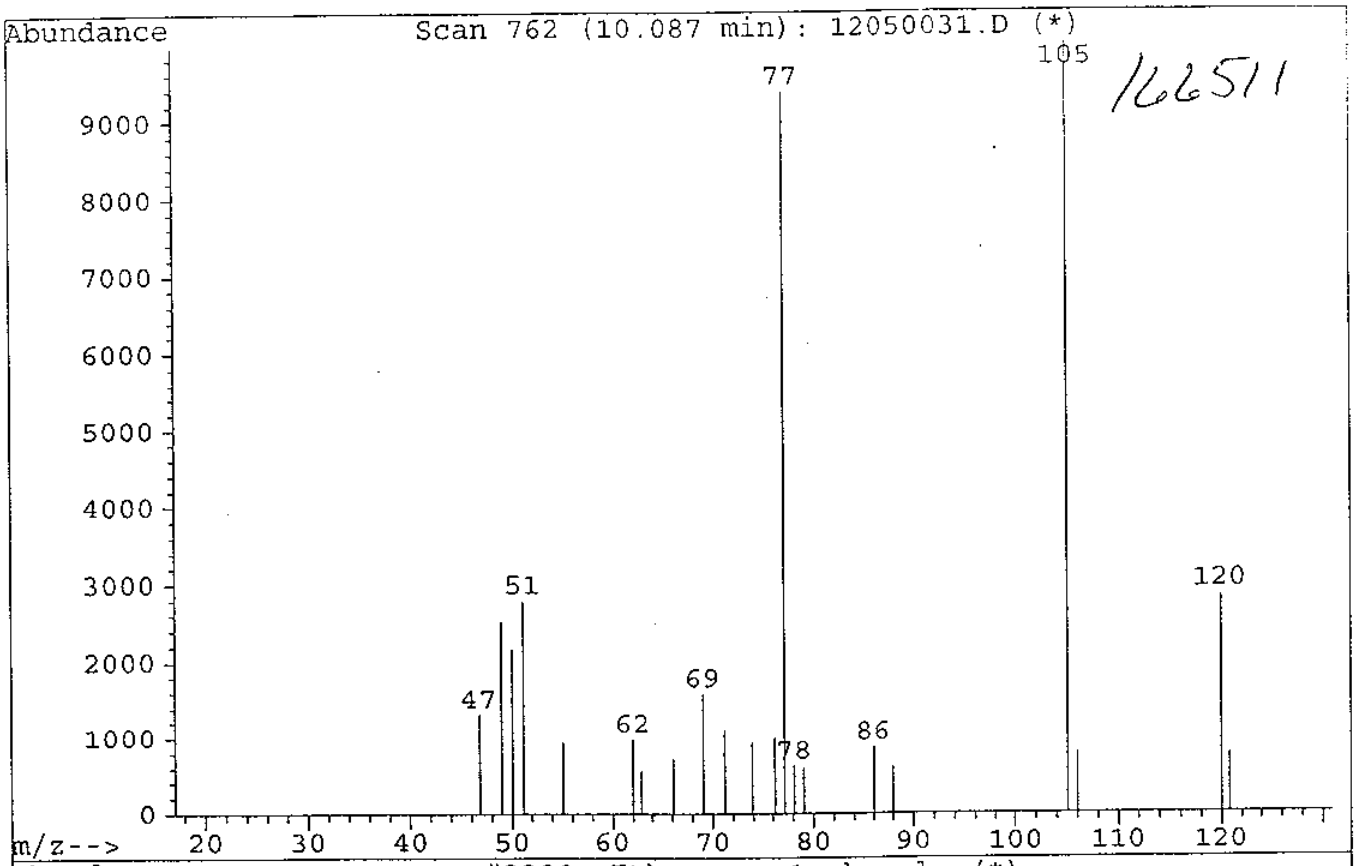


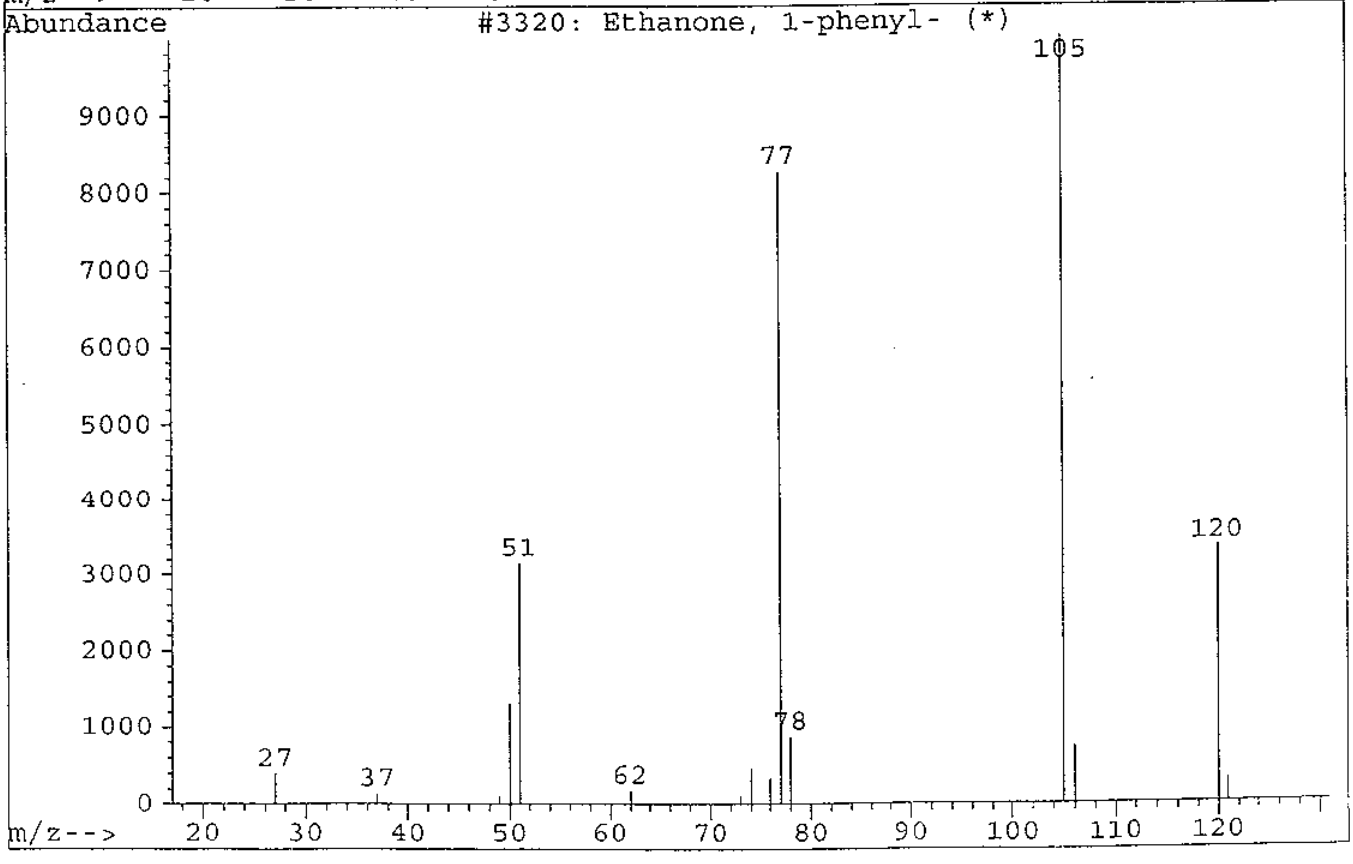
Library Searched : C:\HPCHEM\DATABASE\NBS54K.L
Quality : 64
ID : 2-Piperidinone



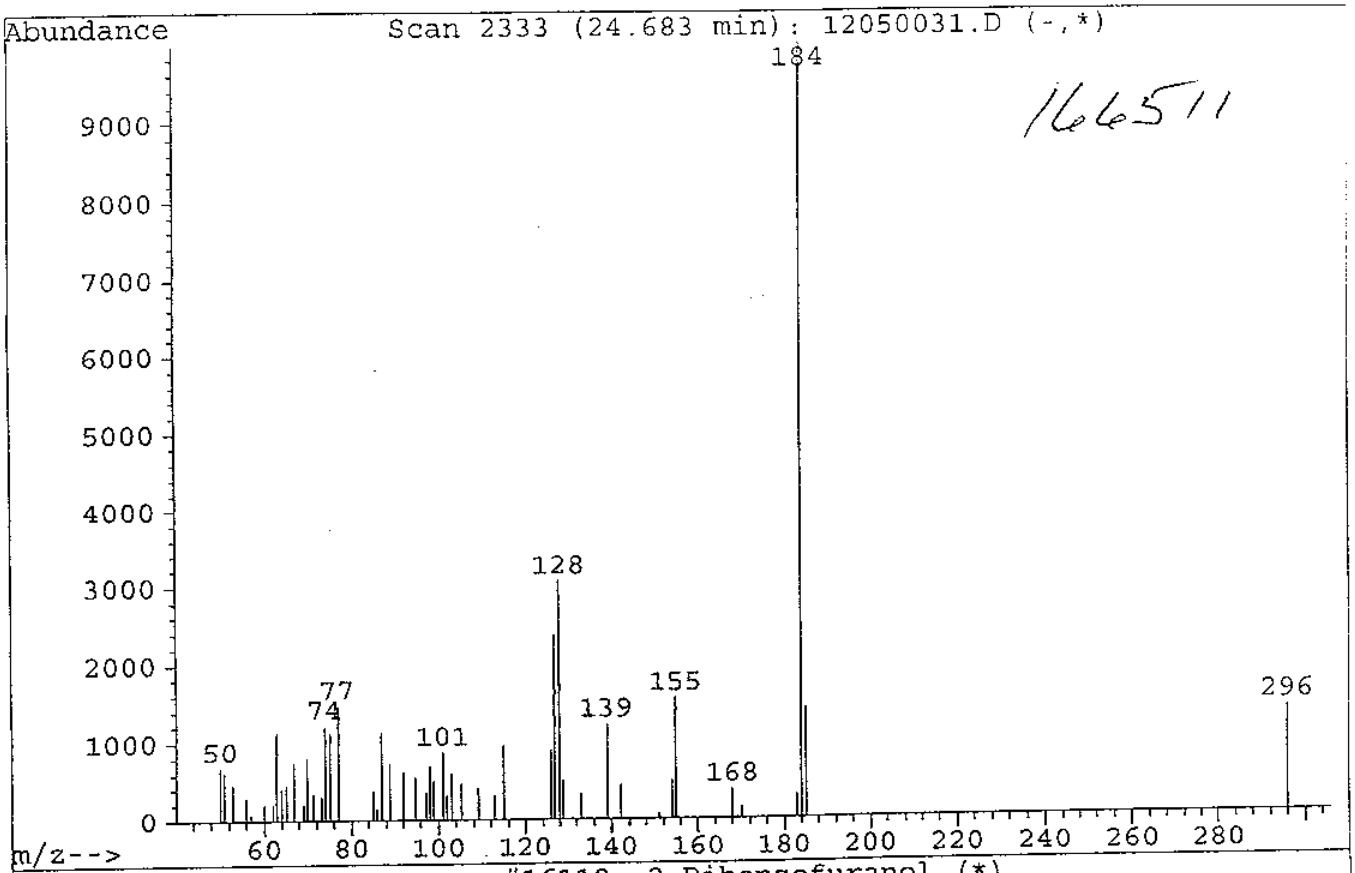
166511

Library Searched : C:\HPCHEM\DATABASE\NBS54K.L
Quality : 22
ID : Ethanone, 1-phenyl-





Library Searched : C:\HPCHEM\DATABASE\NBS54K.L
Quality : 53
ID : 2-Dibenzofuranol



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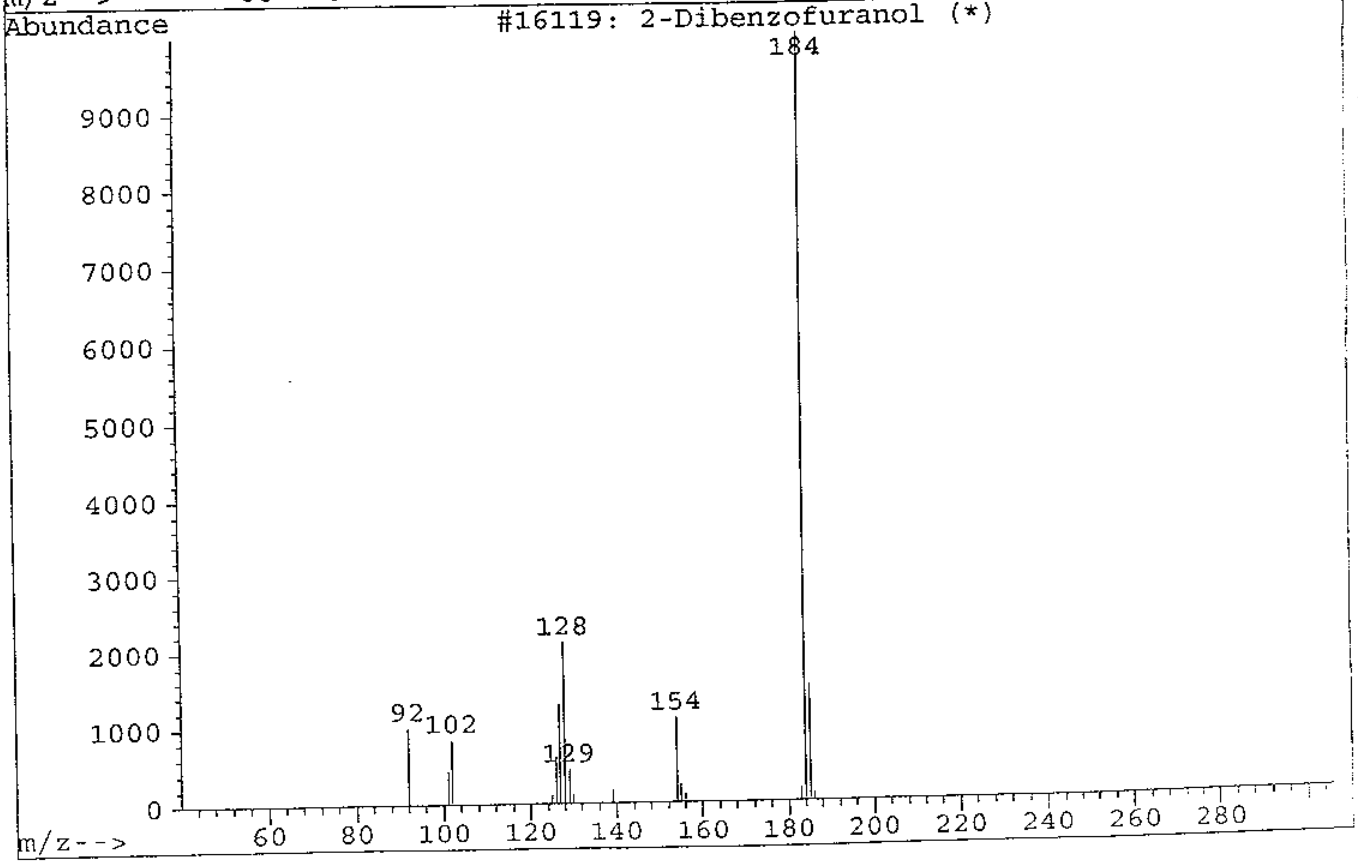

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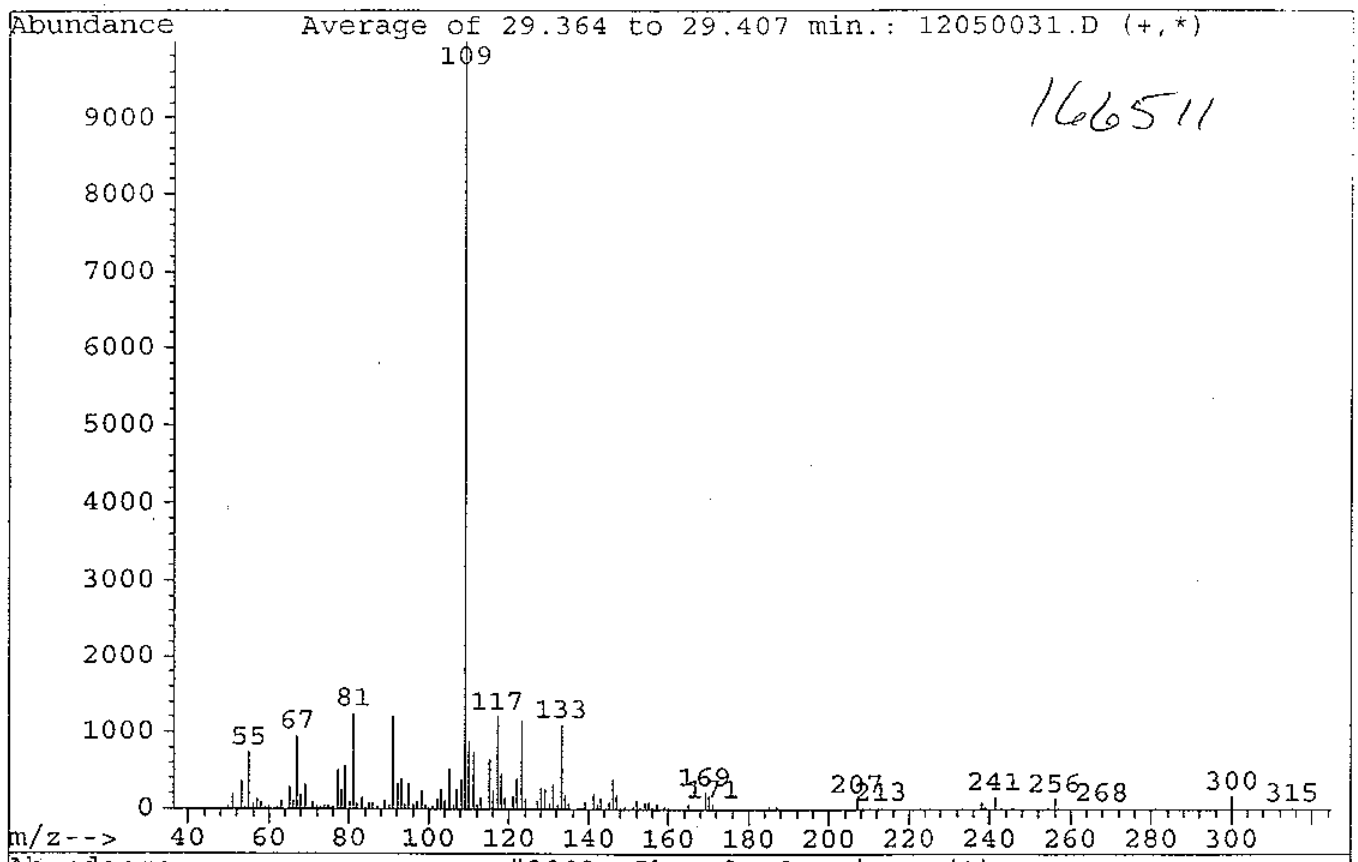
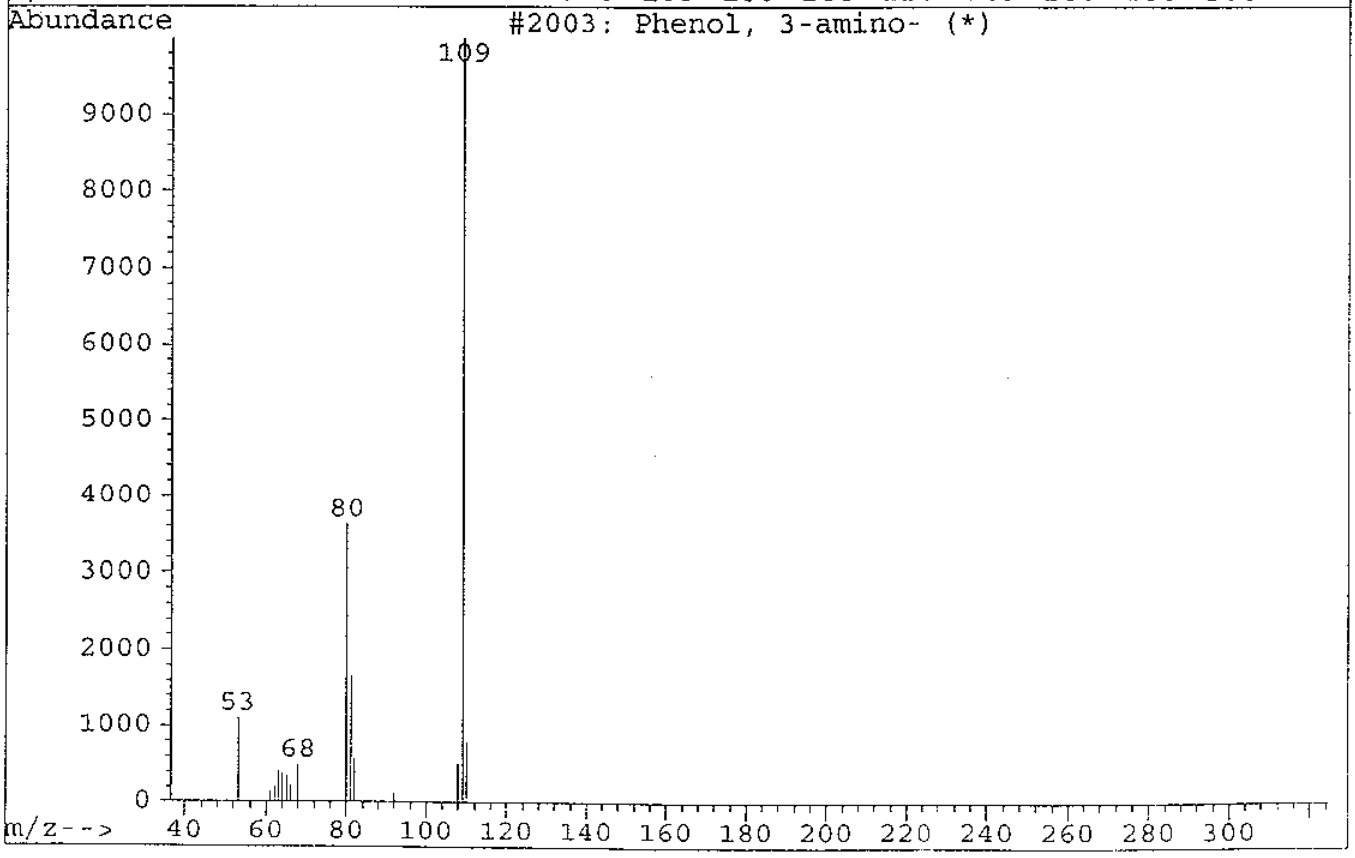
Quality : 47
ID : Phenol, 3-amino-



166511



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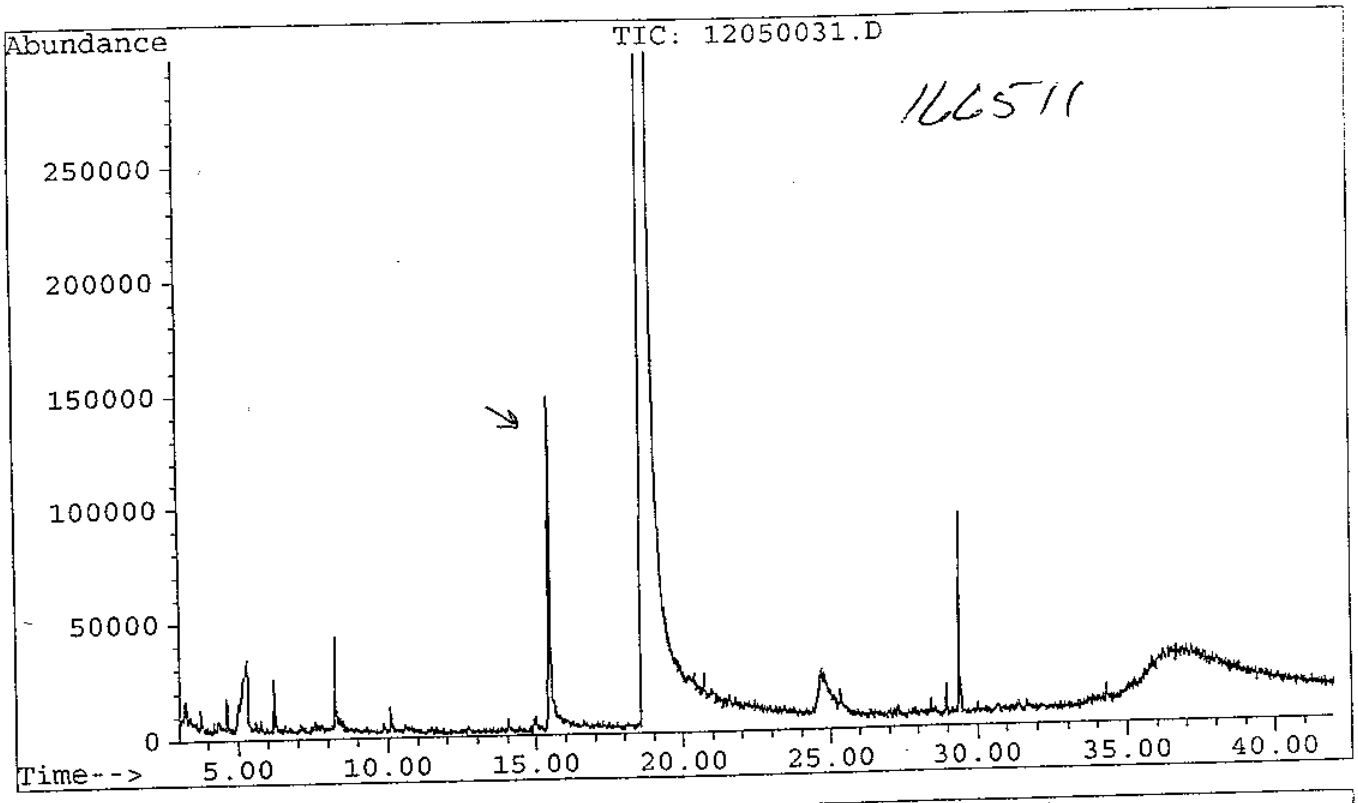
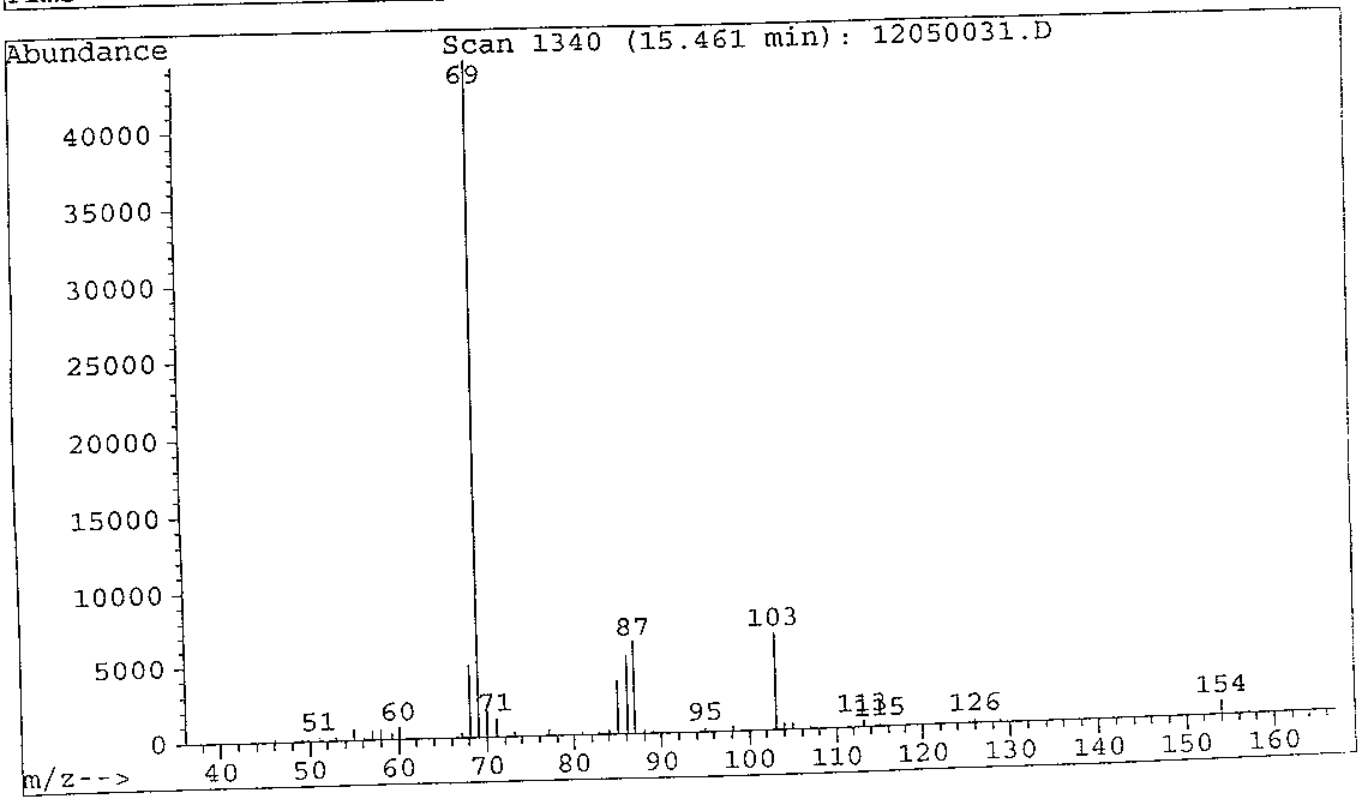
Operator :
Acquired : 6 Dec 100 1:42 pm using AcqMethod AQ-82-2.M
Instrument : 5971 - In
Sample Name: 166511 925ul 910ml 12/5/00
Misc Info :
Vial Number: 31





ENDYNE, INC.
160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

CHAIN-OF-CUSTODY-RECORD

41139

Project Name: OMYA - Dogleg Spill	Reporting Address: HWW	Billing Address: HWW #00171
Endyne Order ID: (Lab Use Only) 10502 (2-O / 1-I / -S)	Company: HWW Contact Name/Phone #: Jeff Noyes	Sampler Name: Amelia Perry Phone #: 658-0820

Ref # (Lab Use Only)	Sample Identification	Matrix	GRAB	COMP	Date/Time	Sample Containers No.	Sample Containers Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
1606509	Well 96-1	H2O	X		12/4 12:45	1 each	2 40ml 1 250		34	HCl/Ice	✓
1606510	Well #2	↓	X		15:45	↓	↓		↓	↓	✓
1606511	Dolomite Quarry	↓	X		15:30	↓	↓		↓	↓	✓

Relinquished by:	Date/Time	Received by:	Date/Time	Received by:	Date/Time
			12/5/00 11:50am		

New York State Project: Yes ___ No ___

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	PP13 Metals
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	RCRA8 Metals
4	Nitrite N	9	BOD	14	Turbidity	19	8021B	24	8260/8260B	29	
5	Nitrate N	10	Alkalinity	15	Conductivity	20	8010/8020	25	8270 B/N or Acid	30	
31	Metals (As Is, Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sr, Ti, Tl, V, Zn										
32	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)			33							
34	Other O.P.P. by HPLC and Phenols by 8270 and VOCs by 8260										

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ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

Heindel & Noyes
PO Box 64709,
Burlington, VT 05406-4709
Attn: Jeff Noyes

PROJECT: OMYA-Dogleg Spill
ORDER ID: 10502
RECEIVE DATE: December 5, 2000
REPORT DATE: December 7, 2000

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

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

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

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

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

Enclosures

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

CLIENT: Heindel & Noyes
PROJECT: OMYA-Dogleg Spill
REPORT DATE: December 7, 2000

ORDER ID: 10502
DATE RECEIVED: December 5, 2000
SAMPLER: AP

Ref. Number: 166509 | Site: Well 96-1 | Date Sampled: December 4, 2000 | Time: 12:45 PM

Parameter	Result	Unit	Method	Analysis Date	Analyst
ortho-Phenyl phenol	< 0.001	mg/L	EPA 642	12/5/00	515

Ref. Number: 166510 | Site: Well #2 | Date Sampled: December 4, 2000 | Time: 3:45 PM

Parameter	Result	Unit	Method	Analysis Date	Analyst
ortho-Phenyl phenol	< 0.001	mg/L	EPA 642	12/5/00	515

Ref. Number: 166511 | Site: Dolomite Quarry | Date Sampled: December 4, 2000 | Time: 3:30 PM

Parameter	Result	Unit	Method	Analysis Date	Analyst
ortho-Phenyl phenol	4.75	mg/L	EPA 642	12/6/00	515

4½

ENDYNE, INC.
160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

CHAIN-OF-CUSTODY-RECORD

41139

Project Name: OMYA - Dogleg Spill	Reporting Address: HWN	Billing Address: HWN #00171
Endyne Order ID: (Lab Use Only) 10502 — 2-0 / 1-I / -S	Company: HWN Contact Name/Phone #: Jeff Noyes	Sampler Name: Amedia Perry Phone #: 658-0820

Ref # (Lab Use Only)	Sample Identification	Matrix	GRAB	COMP	Date/Time	Sample Containers No.	Sample Containers Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
166509	Well 96-1	H_2O	X		12/4 12:45	1 each	2 40ml / 2 1L		34	cool / HCl/Vial	✓
166510	Well #2	↓	X		15:45	↓	↓		↓	↓	✓
166511	Dolomite Quarry	↓	X		15:30	↓	↓		↓	↓	✓

Relinquished by:	Date/Time	Received by:	Date/Time	Received by:	Date/Time
[signature]		M. Farrell	12/5/00 11:50am		

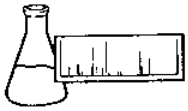
New York State Project: Yes ___ No ___ (No circled)

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	PP13 Metals
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	RCRA8 Metals
4	Nitrite N	9	BOD	14	Turbidity	19	8021B	(24)	8260/8260B	29	
5	Nitrate N	10	Alkalinity	15	Conductivity	20	8010/8020	25	8270 B/N or Acid	30	

31	Metals (As Is, Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sr, Ti, Tl, V, Zn
32	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides) — 33
(34)	Other O.P.P. by HPLC and Phenols by 8270 and VOCs by 8260

(White, Yellow, Pink Copy - Laboratory / Goldenrod Copy - Client)



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

Heindel & Noyes
PO Box 64709,
Burlington, VT 05406-4709
Attn: J Noyes

PROJECT: OMYA
ORDER ID: 10366
RECEIVE DATE: November 27, 2000
REPORT DATE: December 7, 2000

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

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

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

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

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

Enclosures

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

CLIENT: Heindel & Noyes
PROJECT: OMYA
REPORT DATE: December 7, 2000

ORDER ID: 10366
DATE RECEIVED: November 27, 2000
SAMPLER: DB/CA

Ref. Number: 166047 Site: SS-1(core) 15-18' Date Sampled: November 21, 2000 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
ortho-Phenyl phenol	168.	mg/L	EPA 642	12/2/00	515

Ref. Number: 166051 Site: SS-1(core) 0-4" Date Sampled: November 21, 2000 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
ortho-Phenyl phenol	42.3	mg/Kg	EPA 642	12/2/00	515

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

Project Name: OMYA	Reporting Address: H+N	Billing Address: H+N
Endyne Order ID: (Lab Use Only) 103608 (1-O, 1-I, -S)	Company: H+N Contact Name/Phone #: J. Noyes	Sampler Name: DB + CA Phone #: 658 0820

Ref # (Lab Use Only)	Sample Identification	Matrix	GRAB	COMP	Date/Time 11/21/00	Sample Containers No.	Sample Containers Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
1660047	SS-1 (Core) 15-18'	H2O	X			6	40ml VOA	8260	+ HPLC	2+8260=HCl 4+HPLC=NaOH	24
1660048	SS-3 (Core) 6-9'					3	"			1-8260 HCl 2-HPLC=None	
1660049	SS-4 (Core) 25-28'					2	"			1-HCL 1-None	
1660050	SS-5 (Core) 12-15'					3	"			1-HCl 2-None	
1660051	SS-1 (Core) 0-4"	Sludge				4		8260+HPLC+%Solids		None	
1660052	SS-3 Core 0-4"										
1660053	SS-4 Core 0-4"										
1660054	SS-5 Core 0-4"										

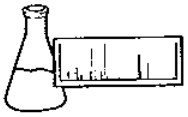
Relinquished by:	Date/Time	Received by:	Date/Time	Received by:	Date/Time
	11/27/00 1150		11/27 (2:30		

New York State Project: Yes ___ No X

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	PP13 Metals
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	RCRA8 Metals
4	Nitrite N	9	BOD	14	Turbidity	19	8021B	24	8260/8260B	29	
5	Nitrate N	10	Alkalinity	15	Conductivity	20	8010/8020	25	8270 B/N or Acid	30	
31	Metals (As Is, Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sr, Ti, Tl, V, Zn										
32	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)					33					
34	Other										

(White, Yellow, Pink Copy - Laboratory / Goldenrod Copy - Client)



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

Heindel & Noyes
PO Box 64709,
Burlington, VT 05406-4709
Attn: J Noyes

PROJECT: OMYA
ORDER ID: 10376
RECEIVE DATE: November 27, 2000
REPORT DATE: December 7, 2000

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

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

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

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

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

Enclosures

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

CLIENT: Heindel & Noyes
PROJECT: OMYA
REPORT DATE: December 7, 2000

ORDER ID: 10376
DATE RECEIVED: November 27, 2000
SAMPLER: DB/CA

Ref. Number: 166075 Site: SS #1 Date Sampled: November 21, 2000 Time: 11:30 AM

Parameter	Result	Unit	Method	Analysis Date	Analyst
ortho-Phenyl phenol	97.0	mg/L	EPA 642	12/2/00	515

Ref. Number: 166076 Site: SS #2 Date Sampled: November 21, 2000 Time: 12:10 PM

Parameter	Result	Unit	Method	Analysis Date	Analyst
ortho-Phenyl phenol	5.32	mg/L	EPA 642	12/2/00	515

— ENDYNE, INC.
160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

CHAIN-OF-CUSTODY RECORD

41178

Project Name: OMYA	Reporting Address: H&N		Billing Address: H&N
Endyne Order ID: (Lab Use Only) 10376	L-O / L-I / -S	Company: H&N Contact Name/Phone #:	Sampler Name: DB & CA Phone #: 658-0820

Ref # (Lab Use Only)	Sample Identification	Matrix	GRAB	COMP	Date/Time	Sample Containers No.	Sample Containers Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
1660075	SS #1	H_2O	✓		11:30	2	1L amber	HPLC only	Hold	None	24h
						2	40mL	Voa 8260			
						1	16oz	Plastic			
1660076	SS #2	H_2O	✓		12:10	2	1L amber	HPLC only			
						2	40mL		✓	✓	X
						1	16oz	Plastic			
								As requested by JPW			
								telcon 11/27 3:00 HBL			

Relinquished by:	Date/Time	Received by:	Date/Time	Received by:	Date/Time
[signature]	11/27/00	[signature]	11/27 12:30		

New York State Project: Yes ___ No ___

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	PP13 Metals
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	RCRA8 Metals
4	Nitrite N	9	BOD	14	Turbidity	19	8021B	24	8260/8260B	29	
5	Nitrate N	10	Alkalinity	15	Conductivity	20	8010/8020	25	8270 B/N or Acid	30	
31	Metals (As Is, Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sr, Ti, Tl, V, Zn										
32	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)					33					
34	Other										

(White, Yellow, Pink Copy - Laboratory / Goldenrod Copy - Client)

Well Water Samples

Tested for OPP

Compiled 12/8/00

Date	Location	Result	pH
11/20/00	CDP On-Site	< 40 ppb	
11/21/00	CDP On-Site	< 40 ppb	
11/21/00	Town	< 40 ppb	
11/22/00	LaFlamme	<40 ppb	7.44
11/22/00	O'Keefe	<40 ppb	7.56
11/22/00	Sandillo	<40 ppb	7.61
11/22/00	CDP On-Site	<40 ppb	7.36
11/22/00	Town	<40 ppb	7.51
11/23/00	Town	<40 ppb	7.6
11/24/00	Town	<40 ppb	8.26
11/25/00	Town	<40 ppb	7.49
11/26/00	Town	<40 ppb	7.57
11/27/00	CDP On-Site	<40 ppb	7.43
11/29/00	CDP On-Site	<40 ppb	7.38
11/30/00	CDP On-Site	<40 ppb	7.38
11/30/00	Town	<40 ppb	7.55
12/1/00	CDP On-Site	<40 ppb	7.34
12/1/00	Town	<40 ppb	7.57

40 ppb is the lowest concentration detectable by Verichem testing.

Water Sample Data

Tested for OPP
Compiled 12/8/00

Verichem Analysis Sample Date	Dolomite Quarry Discharge	pH	East Quarry (PIQ) Discharge	pH	11K Tank Process Water	pH	Dog Leg Quarry South End (Plant Discharge End)	pH	Dog Leg Quarry North End (Plant Intake End)	pH	Primary Discharge West Settling Cell	pH
11/18/00	< 40 ppb	8.02	< 40 ppb	7.92	< 40 ppb	8.13	650 ppm	9.81	950 ppm	10.04		
11/19/00	< 40 ppb	7.94	< 40 ppb	8	< 40 ppb	8.1	550 ppm	9.84	950 ppm	10.06		
11/20/00	< 40 ppb	7.77	< 40 ppb	7.84	< 40 ppb	8.04	108 ppm	7.76	391 ppm	9.14		
11/21/00	67 ppb		< 40 ppb	7.8	< 40 ppb	8.12	360 ppm	9.59	518 ppm	9.58		
11/22/00			< 40 ppb	7.74			187 ppm	7.77	167 ppm	9.27	11 ppm	7.58
11/23/00	< 40 ppb	7.53	< 40 ppb	7.79	< 40 ppb	8.1	100 ppm	7.59	153 ppm	7.44	< 40 ppb	7.63
11/23/00			< 40 ppb	7.9								
11/24/00	< 40 ppb	7.54	< 40 ppb	7.71	< 40 ppb	8.1	55 ppm	7.36	145 ppm	7.36	< 40 ppb	7.63
11/25/00			< 40 ppb	7.78	< 40 ppb	8.02	123 ppm	7.54	47 ppm	7.43	6 ppm	7.59
11/26/00					< 40 ppb	8.26	86 ppm	7.52	57 ppm	7.53	9 ppm	7.61
11/27/00	< 40 ppb	7.8	< 40 ppb	7.86	11 ppm	8.12	19 ppm	7.35	37 ppm	7.51	25 ppm	7.49
11/28/00	< 40 ppb	7.37	< 40 ppb	7.84	9 ppm	8.09	40 ppm	7.42	51 ppm	7.9	12 ppm	7.82
11/29/00	< 40 ppb	7.45	< 40 ppb	7.8	< 40 ppb	8.08	< 40 ppb	7.43	26 ppm	7.55	11 ppm	7.78
11/30/00	10 ppm	7.86	< 40 ppb	7.86			11 ppm	7.45	25 ppm	7.33	6 ppm	7.94
12/1/00	< 40 ppb	7.59	< 40 ppb	7.82	< 40 ppb	7.97	< 40 ppb	7.53	14 ppm	7.31	< 40 ppb	7.71
12/4/00	< 40 ppb		< 40 ppb		< 40 ppb		< 40 ppb		7 ppm		< 40 ppb	

Ed Nohus of Verichem reports that occasionally a sample will be cloudy one day and clear the next. Plant personnel observe this same effect when much washing is performed in the plant one day and not the next.

Endyne Analysis Sample Date	Dolomite Quarry Discharge	East Quarry (PIQ) Discharge	CDP Well	Well # 2 Near Trailer Drop Area	Well # 96-1 Near 500K Tank
12/4/00	4.75 ppm			< 1 ppb	< 1 ppb
12/6/00	3.57 ppm	1.96 ppm	< 2 ppb		

1. A small amount of material actually passed through flotation and out to the dolomite quarry the night of the spill.
It took a couple days before the material passed out of the Dolomite quarry in a concentration high enough to measure, i.e. 67 ppb.
2. Dog leg samples on 11/20 show less concentration than on 11/21. This may be due to either precipitation or fresh water from railcar rinse.
3. Concentration levels in the dog leg quarry continued to fluctuate slightly, again either due to precipitation or fresh water from railcar rinse.
4. The 11/22 sample for the west settling cell was taken after the flotation waste/dog leg quarry water mixture began entering the cell.
5. On 11/28, water balance issues caused the plant to switch the flotation waste/dog leg quarry water mixture from the west settling cell to the dolomite quarry, resulting in a value on 11/30.
Flow was switched back to the west settling cell on 12/4.
6. The two west settling cell samples on 11/23 & 11/24 were delayed in transit by Fed Ex to the lab. We question the validity of these two samples due to this delay.

OMYA Verpol Water -- Bacteria and pH Data

Date	Dog Leg Quarry Plant Intake End		Dog Leg Quarry Plant Discharge End		Dolomite Quarry Discharge	
	pH	Aerobic Bacteria (cfu/ml)	pH	Aerobic Bacteria (cfu/ml)	pH	Aerobic Bacteria (cfu/ml)
11/20/00	8.22	510000	9.29	12000	8.13	720000
11/21/00	8.09	2500000	9.73	900	8.07	600000
11/22/00	8.19	40000	9.12	120000	8.01	630000
11/23/00	8.03	80000	8.08	520000	7.95	960000
11/24/00	7.97	370000	7.94	700000	7.91	250000
11/25/00	7.78	400000	8.05	Data Questionable (10^5 - 10^6)	8.01	300000
11/26/00	7.58	>1000000	7.86	800000	7.90	270000
11/27/00	7.53	Data Questionable (10^4 - 10^6)	7.66	Data Questionable (10^5 - 10^6)	7.8	90000
11/28/00	7.85	250000	7.82	Data Questionable (10^5 - 10^6)	7.95	160000
11/29/00	7.39	650000	7.55	380000	8.02	190000
11/30/00	7.91	800000	7.65	860000	7.96	90000
12/1/00	7.79	8000000	7.67	1250000	7.94	140000
12/2/00	7.73	4000000	7.67	2000000	7.95	330000
12/3/00	7.54	1500000	7.5	600000	7.69	390000

H
W N
Wagner, Heindel, and Noyes, Inc.
Consulting Geologists
434 Shelburne Rd.
Burlington, VT 05401

PAGE _____ OF _____
PROJECT: Orford
DATE: 11/30/2000

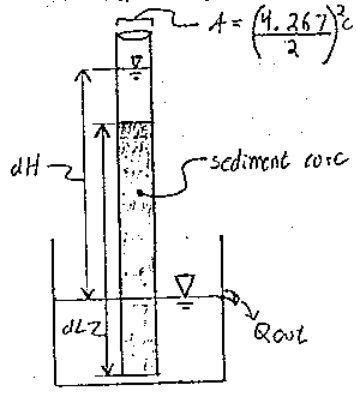
Determine Permeability of Lagoon Sediment

- use constant-head permeameter test:

Darcy's law: $Q = K \frac{dH}{dL} A$, where

Q = discharge
K = Permeability
$\frac{dH}{dL}$ = gradient

A = cross-section area
$A = \left(\frac{4.267}{2}\right)^2 cm \times \pi = 14.23\ cm^2$, where core diameter = 4.267 cm



dH = 96.5 cm = constant head
dL = 86.4 cm = constant

Q_{out} = 38.77 mL/day max rate
Q_{out} = 5.44 mL/day average
(see next page)

solve for K: $K = \frac{Q}{A \frac{dH}{dL}}$

- Maximum: $K = \frac{38.77\ mL/day}{(14.23\ cm^2) \times (96.5/86.4)} = 2.44\ mL/day/cm^2$

$2.44\ mL/day/cm^2 \div 3785\ mL/gal \times 929\ cm^2/ft^2 \div 7.48\ gal/ft^3 = 0.080\ ft/day$

MAX K = 0.080 ft/day

- average: $K = \frac{5.44\ mL/day}{(14.23\ cm^2) \times (96.5/86.4)} = 0.342\ mL/day/cm^2$

$0.342\ mL/day/cm^2 \div 3785\ mL/gal \times 929\ cm^2/ft^2 \div 7.48\ gal/ft^3 = 0.0112\ ft/day$

AVERAGE K = 0.0112 ft/day

Wagner, Heindel, and Noyes, Inc.
Consulting Geologists
434 Shelburne Rd.
Burlington, VT 05401

PAGE _____ OF _____
PROJECT: _____
DATE: _____

SEDIMENT CORE PERMEABILITY TEST
CONSTANT-HEAD TEST: FLOW MEASUREMENTS

date/time	Elapsed Days	vol out (mL)	Q (mL/day)
11/29/00 9:20	0.000	0	
11/29/00 10:20	0.042	0	0.000
11/29/00 11:20	0.083	0	0.000
11/29/00 12:40	0.139	0	0.000
11/29/00 14:35	0.219	1.5	18.783
11/29/00 16:45	0.309	3.5	38.769
11/30/00 7:50	0.938	0.1	0.159
TOTAL / AVERAGE:		5.1	5.440

← Highest flow rate during test

← Average flow rate for entire test

58

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

Heindel & Noyes
PO Box 64709,
Burlington, VT 05406-4709
Attn: Jen

PROJECT: OMYA
ORDER ID: 10622
RECEIVE DATE: December 13, 2000
REPORT DATE: December 15, 2000

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

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

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

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

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

Enclosures

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT
SW 8270C

CLIENT: Heindel & Noyes
PROJECT: OMYA
SITE: P1Q Quarry
DATE RECEIVED: December 13, 2000
REPORT DATE: December 15, 2000
ANALYSIS DATE: December 14, 2000

ORDER ID: 10622
REFERENCE NUMBER: 166934
DATE SAMPLED: December 12, 2000
TIME SAMPLED: 10:10 AM
SAMPLER: JPW
ANALYST: 917

Parameter	Result ug/L
Acenaphthene	< 20.0
Acenaphthylene	< 20.0
Aniline	< 100.
Anthracene	< 20.0
Azobenzene	< 50.0
Benzidine	< 100.
Benzo(a)anthracene	< 20.0
Benzo(b&k)fluoranthene	< 20.0
Benzo(a)pyrene	< 20.0
Benzo(g,h,i)perylene	< 20.0
Bis(2-chloroethyl)ether	< 50.0
Bis(2-chloroethoxy)methane	< 50.0
Bis(2-ethylhexyl)phthalate	< 100.
Bis(2-chloroisopropyl)ether	< 100.
4-Bromophenyl phenyl ether	< 20.0
Butyl benzyl pthalate	< 100.
Carbazole	< 100.
4-Chloroaniline	< 50.0
1-Chloronaphthalene	< 20.0
2-Chloronaphthalene	< 20.0
4-Chlorophenyl phenyl ether	< 20.0
Chrysene	< 20.0
Dibenzofuran	< 20.0
Dibenzo(a,h)anthracene	< 20.0
Di-n-butylphthalate	< 100.
1,2-Dichlorobenzene	< 20.0
1,3-Dichlorobenzene	< 20.0
1,4-Dichlorobenzene	< 20.0
3,3'-Dichlorobenzidine	< 50.0
Diethyl phthalate	< 100.
Dimethyl phthalate	< 100.
2,4-Dinitrotoluene	< 50.0
2,6-Dinitrotoluene	< 50.0
Di-n-octylphthalate	< 100.
Fluoranthene	< 20.0
Fluorene	< 20.0
Hexachlorobenzene	< 50.0
Hexachlorobutadiene	< 50.0
Hexachlorocyclopentadiene	< 200.
Hexachloroethane	< 50.0
Indeno(1,2,3-cd)pyrene	< 20.0
Isophorone	< 20.0

Parameter	Result ug/L
1-Methylnaphthalene	< 20.0
2-Methylnaphthalene	< 20.0
Naphthalene	< 20.0
1-Naphthylamine	< 100.
2-Naphthylamine	< 100.
2-Nitroaniline	< 200.
3-Nitroaniline	< 200.
4-Nitroaniline	< 200.
Nitrobenzene	< 50.0
N-Nitroso-di-n-butylamine	< 50.0
N-Nitrosodiphenylamine	< 50.0
N-Nitrosodimethylamine	< 100.
N-Nitrosodi-n-propylamine	< 100.
N-Nitrosopiperidine	< 100.
Phenanthrene	< 20.0
Pyrene	< 20.0
Pyridine	< 100.
1,2,4-Trichlorobenzene	< 20.0
Benzyl alcohol	< 100.
4-Chloro-3-methylphenol	< 100.
2-Chlorophenol	< 50.0
2,4-Dichlorophenol	< 50.0
2,6-Dichlorophenol	< 50.0
2,4-Dimethylphenol	< 50.0
4,6-Dinitro-2-methylphenol	< 500.
2,4-Dinitrophenol	< 100.
2-Methylphenol (o-cresol)	< 50.0
3&4-Methylphenol	< 50.0
2-Nitrophenol	< 100.
4-Nitrophenol	< 100.
Pentachlorophenol	< 150.
Phenol	< 50.0
2,4,5-Trichlorophenol	< 100.
2,4,6-Trichlorophenol	< 100.
Acid Surrogate 1	45.%
Acid Surrogate 2	41.%
Acid Surrogate 3	81.%
Base/Neutral Surrogate 1	81.%
Base/Neutral Surrogate 2	81.%
Base/Neutral Surrogate 3	103.%
UIP's	0
orthophenylphenol	2,620.

60

ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT
SW 8270C

CLIENT: Heindel & Noyes
PROJECT: OMYA
SITE: Dolomite Quarry
DATE RECEIVED: December 13, 2000
REPORT DATE: December 15, 2000
ANALYSIS DATE: December 14, 2000

ORDER ID: 10622
REFERENCE NUMBER: 166933
DATE SAMPLED: December 12, 2000
TIME SAMPLED: 9:45 AM
SAMPLER: JPW
ANALYST: 917

Parameter	Result ug/L
Acenaphthene	< 2.0
Acenaphthylene	< 2.0
Aniline	< 10.0
Anthracene	< 2.0
Azobenzene	< 5.0
Benzidine	< 10.0
Benzo(a)anthracene	< 2.0
Benzo(b&k)fluoranthene	< 2.0
Benzo(a)pyrene	< 2.0
Benzo(g,h,i)perylene	< 2.0
Bis(2-chloroethyl)ether	< 5.0
Bis(2-chloroethoxy)methane	< 5.0
Bis(2-ethylhexyl)phthalate	< 10.0
Bis(2-chloroisopropyl)ether	< 10.0
4-Bromophenyl phenyl ether	< 2.0
Butyl benzyl phthalate	< 10.0
Carbazole	< 10.0
4-Chloroaniline	< 5.0
1-Chloronaphthalene	< 2.0
2-Chloronaphthalene	< 2.0
4-Chlorophenyl phenyl ether	< 2.0
Chrysene	< 2.0
Dibenzofuran	< 2.0
Dibenzo(a,h)anthracene	< 2.0
Di-n-butylphthalate	< 10.0
1,2-Dichlorobenzene	< 2.0
1,3-Dichlorobenzene	< 2.0
1,4-Dichlorobenzene	< 2.0
3,3'-Dichlorobenzidine	< 5.0
Diethyl phthalate	< 10.0
Dimethyl phthalate	< 10.0
2,4-Dinitrotoluene	< 5.0
2,6-Dinitrotoluene	< 5.0
Di-n-octylphthalate	< 10.0
Fluoranthene	< 2.0
Fluorene	< 2.0
Hexachlorobenzene	< 5.0
Hexachlorobutadiene	< 5.0
Hexachlorocyclopentadiene	< 20.0
Hexachloroethane	< 5.0
Indeno(1,2,3-cd)pyrene	< 2.0
Isophorone	< 2.0

Parameter	Result ug/L
1-Methylnaphthalene	< 2.0
2-Methylnaphthalene	< 2.0
Naphthalene	< 2.0
1-Naphthylamine	< 10.0
2-Naphthylamine	< 10.0
2-Nitroaniline	< 20.0
3-Nitroaniline	< 20.0
4-Nitroaniline	< 20.0
Nitrobenzene	< 5.0
N-Nitroso-di-n-butylamine	< 5.0
N-Nitrosodiphenylamine	< 5.0
N-Nitrosodimethylamine	< 10.0
N-Nitrosodi-n-propylamine	< 10.0
N-Nitrosopiperidine	< 10.0
Phenanthrene	< 2.0
Pyrene	< 2.0
Pyridine	< 10.0
1,2,4-Trichlorobenzene	< 2.0
Benzyl alcohol	< 10.0
4-Chloro-3-methylphenol	< 10.0
2-Chlorophenol	< 5.0
2,4-Dichlorophenol	< 5.0
2,6-Dichlorophenol	< 5.0
2,4-Dimethylphenol	< 5.0
4,6-Dinitro-2-methylphenol	< 50.0
2,4-Dinitrophenol	< 10.0
2-Methylphenol (o-cresol)	< 5.0
3&4-Methylphenol	< 5.0
2-Nitrophenol	< 10.0
4-Nitrophenol	< 10.0
Pentachlorophenol	< 15.0
Phenol	< 5.0
2,4,5-Trichlorophenol	< 10.0
2,4,6-Trichlorophenol	< 10.0
Acid Surrogate 1	46.%
Acid Surrogate 2	34.%
Acid Surrogate 3	129.%
Base/Neutral Surrogate 1	88.%
Base/Neutral Surrogate 2	85.%
Base/Neutral Surrogate 3	99.%
UIP's	2.
orthophenylphenol	5,360.

ENDYNE, INC.

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LABORATORY REPORT
SW 8270C

CLIENT: Heindel & Noyes
PROJECT: OMYA
SITE: Dogleg Quarry
DATE RECEIVED: December 13, 2000
REPORT DATE: December 15, 2000
ANALYSIS DATE: December 14, 2000

ORDER ID: 10622
REFERENCE NUMBER: 166935
DATE SAMPLED: December 12, 2000
TIME SAMPLED: 5:53 PM
SAMPLER: JPW
ANALYST: 917

Parameter	Result ug/L	Parameter	Result ug/L
Acenaphthene	< 20.0	1-Methylnaphthalene	< 20.0
Acenaphthylene	< 20.0	2-Methylnaphthalene	< 20.0
Aniline	< 100.	Naphthalene	< 20.0
Anthracene	< 20.0	1-Naphthylamine	< 100.
Azobenzene	< 50.0	2-Naphthylamine	< 100.
Benzidine	< 100.	2-Nitroaniline	< 200.
Benzo(a)anthracene	< 20.0	3-Nitroaniline	< 200.
Benzo(b&k)fluoranthene	< 20.0	4-Nitroaniline	< 200.
Benzo(a)pyrene	< 20.0	Nitrobenzene	< 50.0
Benzo(g,h,i)perylene	< 20.0	N-Nitroso-di-n-butylamine	< 50.0
Bis(2-chloroethyl)ether	< 50.0	N-Nitrosodiphenylamine	< 50.0
Bis(2-chloroethoxy)methane	< 50.0	N-Nitrosodimethylamine	< 100.
Bis(2-ethylhexyl)phthalate	< 100.	N-Nitrosodi-n-propylamine	< 100.
Bis(2-chloroisopropyl)ether	< 100.	N-Nitrosopiperidine	< 100.
4-Bromophenyl phenyl ether	< 20.0	Phenanthrene	< 20.0
Butyl benzyl phthalate	< 100.	Pyrene	< 20.0
Carbazole	< 100.	Pyridine	< 100.
4-Chloroaniline	< 50.0	1,2,4-Trichlorobenzene	< 20.0
1-Chloronaphthalene	< 20.0	Benzyl alcohol	< 100.
2-Chloronaphthalene	< 20.0	4-Chloro-3-methylphenol	< 100.
4-Chlorophenyl phenyl ether	< 20.0	2-Chlorophenol	< 50.0
Chrysene	< 20.0	2,4-Dichlorophenol	< 50.0
Dibenzofuran	< 20.0	2,6-Dichlorophenol	< 50.0
Dibenzo(a,h)anthracene	< 20.0	2,4-Dimethylphenol	< 50.0
Di-n-butylphthalate	< 100.	4,6-Dinitro-2-methylphenol	< 500.
1,2-Dichlorobenzene	< 20.0	2,4-Dinitrophenol	< 100.
1,3-Dichlorobenzene	< 20.0	2-Methylphenol (o-cresol)	< 50.0
1,4-Dichlorobenzene	< 20.0	3&4-Methylphenol	< 50.0
3,3'-Dichlorobenzidine	< 50.0	2-Nitrophenol	< 100.
Diethyl phthalate	< 100.	4-Nitrophenol	< 100.
Dimethyl phthalate	< 100.	Pentachlorophenol	< 150.
2,4-Dinitrotoluene	< 50.0	Phenol	< 50.0
2,6-Dinitrotoluene	< 50.0	2,4,5-Trichlorophenol	< 100.
Di-n-octylphthalate	< 100.	2,4,6-Trichlorophenol	< 100.
Fluoranthene	< 20.0	Acid Surrogate 1	48.%
Fluorene	< 20.0	Acid Surrogate 2	40.%
Hexachlorobenzene	< 50.0	Acid Surrogate 3	99.%
Hexachlorobutadiene	< 50.0	Base/Neutral Surrogate 1	90.%
Hexachlorocyclopentadiene	< 200.	Base/Neutral Surrogate 2	87.%
Hexachloroethane	< 50.0	Base/Neutral Surrogate 3	93.%
Indeno(1,2,3-cd)pyrene	< 20.0	UIP's	0.
Isophorone	< 20.0	orthophenylphenol	283.

PHOTO LOG: 11/21/00

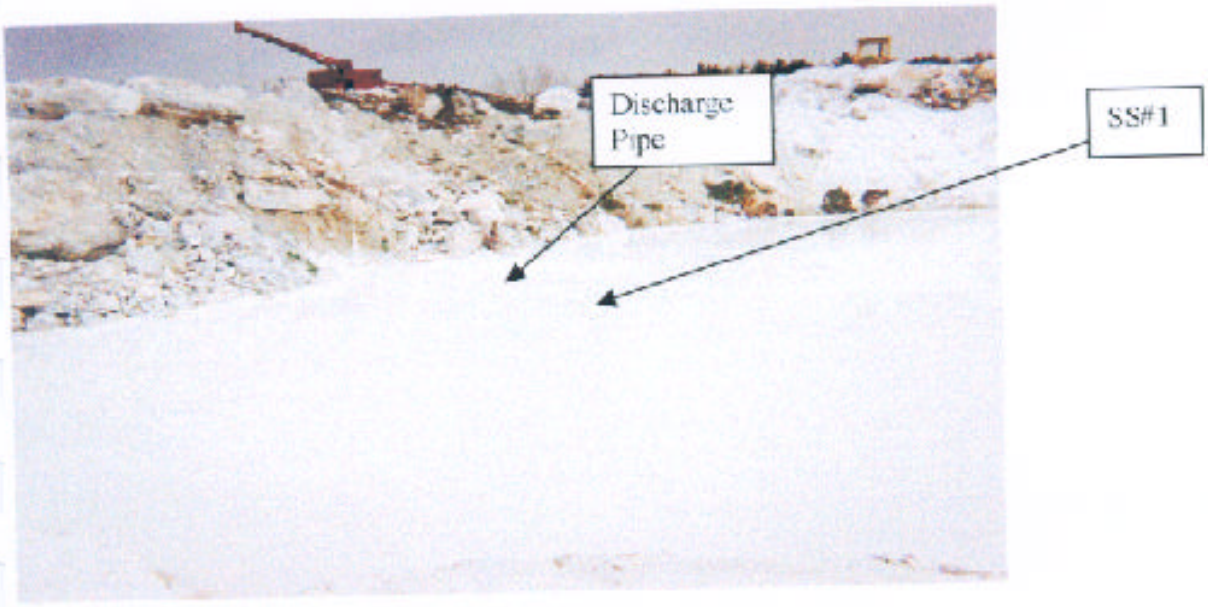

Photo #1: Discharge location into first lagoon.

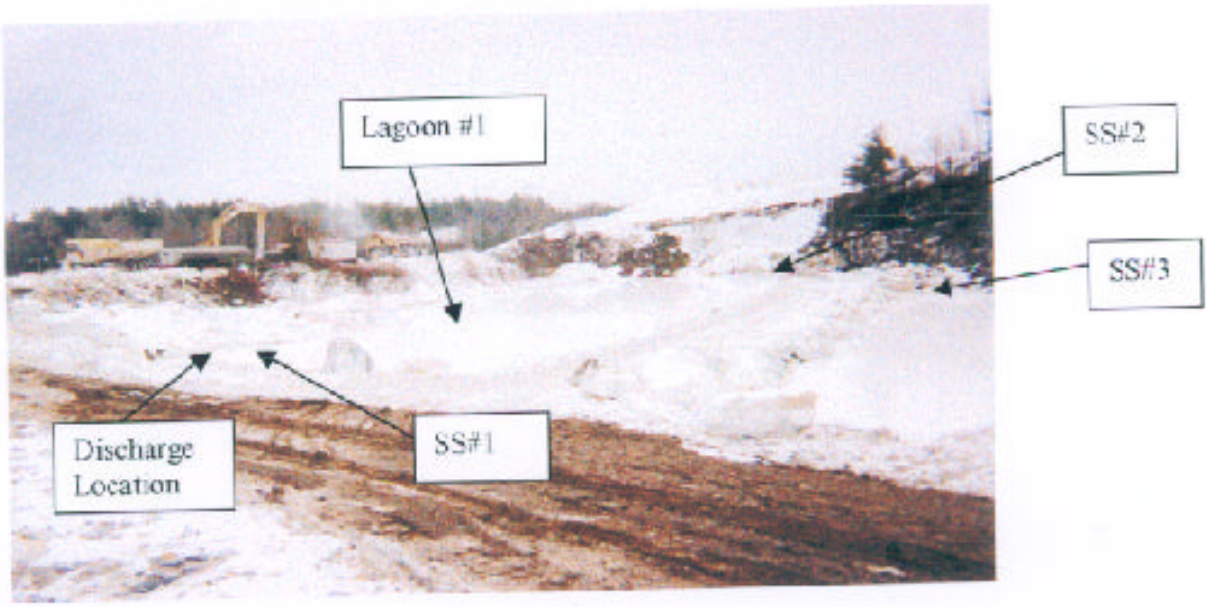

Photo #2: View of lagoon #1 and southern extent of lagoon #2

Photo #3: North/South view of Lagoon #2

Photo #4: Northern extent of lagoon #2.

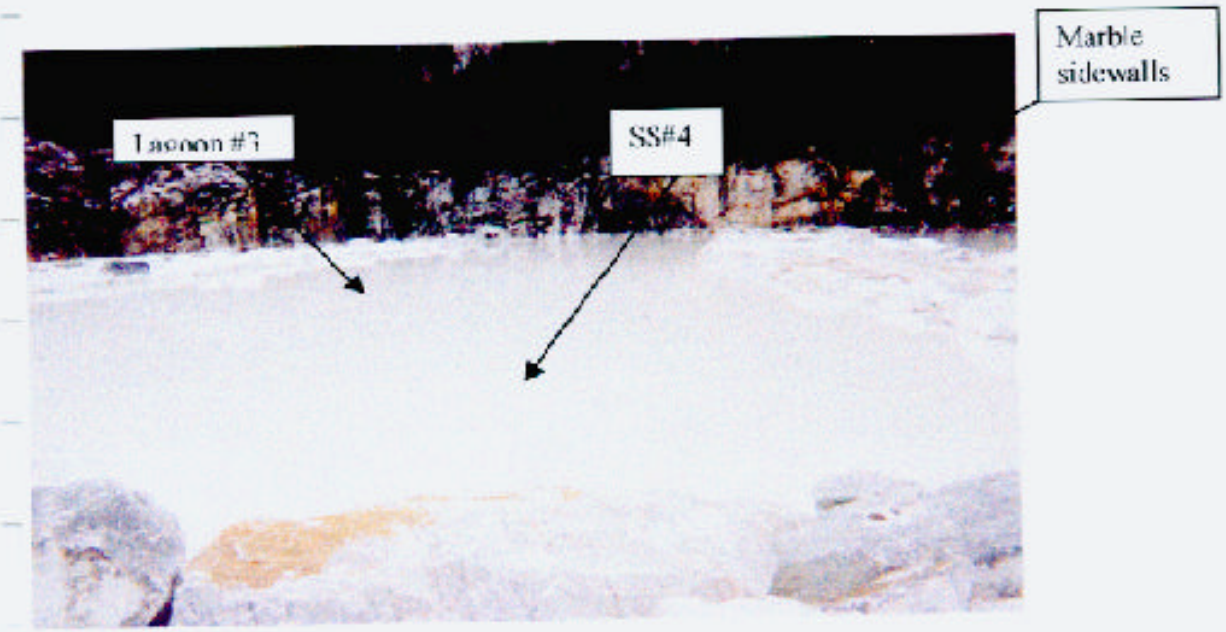

Photo #5: Lagoon #3

Photo #6: Lagoon #6

Photo #7. Outtake pipe location at northern end of lagoon #4.