REPORT

HYDROGEOLOGICAL INVESTIGATION

NESCO PRODUCTS, INC.
650 CONKLIN ROAD
BINGHAMTON, NEW YORK

AUGUST, 1982

O'BRIEN & GERE ENGINEERS, INC.
1304 BUCKLEY ROAD
SYRACUSE, NEW YORK 13221

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SECTION 1 - INTRODUCTION

1.01 Consent Order

On August 12, 1981, the New York State Department of Environmental Conservation (NYSDEC) issued a Consent Order to Nesco Products, Inc., located in the Town of Conklin, indicating alleged violations of Article 17 of the Environmental Conservation Law (ECL). The Consent Order stated that since Nesco Products, Inc., has a permitted point source discharge into the groundwaters of the State, and since the discharge area was located approximately 1,000 feet from the Town of Conklin water supply Well No. 1, and since the Town of Conklin Well No. 1 had been tested and found to contain 1,1,1-trichlorethane (Methylchloroform) (sic) which had been allegedly handled, stored, or otherwise used by Nesco Products, Inc., that a hydrogeological study should be conducted. This report is the result of the hydrogeological study and addresses the five (5) issues outlined in the Consent Order, which is included as Appendix A.

The Consent Order stipulated that the hydrogeological study shall provide the information, pursuant to 6NYCRR Part 703 - Groundwater Classifications, Quality Standards, and Effluent Standards and/or Limitations, relative to Nesco Products, Inc., (Respondent) as follows:

"1. A statement of the property affected by any discharge on Respondent's property in the Town of Conklin and the extent to which such property is under the control of the person responsible for such discharge.

2. A geohydrologic analysis of the acquifer(s) (sic) which may be affected; to include the results of drilling and sampling techniques.

3. A determination of the direction and rate of movement of the discharge and the natural ground water (sic).
4. An evaluation of the adverse effects a discharge may have on any acquifer (sic), sources of potable water supply or other surface or groundwaters of the State.
5. An evaluation of the ability of unconsolidated deposits, consolidated rock or bedrock and the groundwaters to attenuate potential pollutants such that the best usage of the groundwaters is maintained."

1.02 Authorization and Scope

On October 7, 1981, Savin Corporation, on behalf of Nesco Products, Inc., an inactive subsidiary, authorized O'Brien & Gere Engineers, Inc., to perform a hydrogeological study consisting of two phases of work, which involved the installation of groundwater monitoring or test wells, soil and groundwater analyses, determination of hydrogeologic information, and the submission of a report. A draft interim report was submitted to NYSDEC in February, 1982, which indicated that additional field investigations and analytical work were necessary to develop the hydrogeologic information being requested and to adequately address the five issues in the Consent Order.

On May 19, 1982, Savin Corporation, who had purchased Magnetic Laboratories, Inc. (MLI), of which Nesco Products, Inc. was a subsidiary, authorized O'Brien & Gere Engineers, Inc., to conduct a Phase III, Hydrogeological Investigation and to prepare a report summarizing the results of the field efforts and to respond to the various issues raised in the Consent Order.

1.03 General Historical Background

Nesco Products, Inc., began the manufacturing operation at 650 Conklin Road, in the Town of Conklin, New York, in November, 1977. At that time manufacturing operations began, Nesco was a wholly owned subsidiary of Magnetic Laboratories, Inc. On December 29, 1979 Magnetic Laboratories, Inc. was acquired by the Savin Corporation. However, the operational management of Nesco Products, Inc. was not affected by the acquisition.

The manufacturing operation at this facility consisted of cleaning metal frying pans, toasters, steamers, and other stainless steel and non-stainless metal products, and the subsequent assemblying of the component parts, packing, and shipping of the products. The cleaning of the metal products was conducted through a machanized conveyor system, with a separate conveyor system utilized for the washing and rinsing of the metal products prior to the assembly of the component parts. The employment ranged from 50 to 180 employees at the facility at various times during the manufacturing process. The building, which contained the manufacturing operation is approximately 100,000 square feet in area.

Nesco Products, Inc., was issued a New York State Department of Environmental Conservation State Pollutant Discharge Elimination System (SPDES) Discharge Permit, Number NY 010 6836, effective August 1, 1979. This discharge permit authorized a discharge into the receiving groundwaters, which are tributory to the Susquehanna River at an allowed discharge not to exceed a daily maximum of 0.05 milligrams per liter (mg/l), which is equivalent to 50 parts per billion (ppb) of 1,1,1-trichlorethane, (sic) as well as other substances.

In December, 1980, Nesco Products, Inc., ceased its manufacturing operation at the Conklin Road facility. The structure is now being used as a warehouse. Neither Nesco Products, Inc., nor Savin Corporation have any plans to resume manufacturing operations at this site.

1.04 Site Description

The Nesco Products, Inc., facility is located on the south side of New York State Route 7, also known as Conklin Road, in the Town of Conklin, Broome County, New York. The building was originally constructed as a warehouse for Jewell Tea Company and is located approximately one-half mile east of the City of Binghamton corporation boundary. The facility is bounded on the southwest by the Conrail and the Erie-Lackawanna Railroad tracks, and is served by a railroad siding from these railroad lines. The Susquehanna River flows East to West near the Nesco Products, Inc., facility and is located approximately 800 feet north of the Nesco Products, Inc., building. The property was purchased by Magnetic Laboratories, Inc., of which Nesco Products, Inc. is a subsidiary, by a contract dated December 11, 1978.

The subsurface wastewater disposal system was designed for Nesco Products, Inc., in engineering plans dated January, 1979, and was constructed during some time in the first six months of 1979. The subsurface wastewater disposal system was designed to consist of a precast concrete pump pit, two (2) concrete distribution boxes, and twelve (12) four-inch perforated Polyvinyl chloride (PVC) distribution laterals to serve as the leach field. The total leach field area is 72 feet wide by 100 feet long. A three-foot layer of 1/2" to 1-1/2" crushed stone was designed to be installed to a depth of at least four feet below original grade, and the 4" perforated pipe was specified to be placed upon this layer of crushed stone. The design plans also called for a 4" PVC vent pipe to be located at the westerly end of the subsurface wastewater disposal area. This vent pipe was located during the topographic survey and served as an indicator for the location of soil borings, which were installed within the limits of the subsurface wastewater disposal field, or leach field. The location of the leach field is depicted on Figure 1.

O'BRIEN & GERE

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AUG 09 1982

Dept. of Environmental Conservation
Region 7 Binghamton Sub. Office

August 5, 1982

New York State Department of
Environmental Conservation
Route 11 RD #1
Kirkwood, New York 13795

Attn: Mario M. Nirchi

Re: Phase III Hydrogeological Investigation
NESCO Products Inc.
Report Submission

File: 2465.002 #2

Dear Mr. Nirchi:

In accordance with recent telephone conversations, enclosed please find four (4) copies of the report entitled "Hydrogeological Investigation, NESCO Products, Inc.", August, 1982.

We are submitting this report for your review and comments. As you had suggested, we would be pleased to discuss the technical considerations of this report during the first week in September. We suggest that such a meeting be limited to the technical review of the report. Please give us seven to ten days notice prior to establishing a meeting date so that we can make appropriate commitments.

Should you have any questions concerning the report, or if we may answer any questions, please feel free to contact the undersigned at your convenience.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.

G. W. Lee, Jr., C.P.G.S.

GWL:GDK/djb

cc: Mr. Allen Johnson, Savin

O'BRIEN & GERE

August 11, 1982

New York State Department
of Environmental Conservation
Route 11, R. D. #1
Kirkwood, NY 13795

Attn: Mr. Mario M. Nirchi

Re: Phase III Hydrogeological Investigation
NESCO Products, Inc.
Additional Copy of Report

File: 2465.002 #2

Dear Mr. Nirchi:

In accordance with our telephone conversation of August 9, 1982, please find enclosed an additional copy of the report "Hydrogeological Investigation, NESCO Products, Inc." August 1982.

We look forward to a technical review meeting on this report in early September.

Should you have any questions regarding this submission, or if we may answer any questions, please feel free to contact the undersigned at your convenience.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.

G. David Knowles

G. David Knowles, P.E., L.S.

GDK/nlb
Enc.
cc: Mr. Allen Johnson, Savin

SECTION 2 - FIELD INVESTIGATIONS

2.01 General

This section presents the method of approach and the procedures used to conduct the field investigations at Nesco Products, Inc., from November 23, 1981 through June 28, 1982. The field investigations included the following:

1. Drilling of test borings to determine underlying soil profile and aquifer characteristics;
2. Installation of groundwater monitoring wells to establish a groundwater profile, to determine groundwater flow rates and direction, and to establish the distribution and concentration of 1,1,1-trichloroethane, if detected, migrating from the site;
3. Collection of surface water, sediment and residential groundwater samples to ascertain if 1,1,1-trichloroethane had migrated beyond the property of Nesco Products, Inc.
4. Performance of aquifer pump tests in order to measure the transmissivity of the aquifer in question;
5. Topographic survey to determine the location and elevation of the significant features at the Nesco Products, Inc., facility.

2.02 Installation of Groundwater Monitoring Wells

A total of eleven (11) groundwater monitoring wells were installed between November 23, 1981, and May 26, 1982, for the hydrogeological investigation for Nesco Products, Inc. These groundwater monitoring wells serve to establish a groundwater profile, the flow rate and direction of groundwater movement, and to provide information regarding the geology of the site, as well as to provide sampling points from which representative samples of the groundwater could be withdrawn. A map showing the location of the wells is included as Figure 1, Site Plan.

The monitoring wells were installed using a Central Mine Equipment 3-1/4 inch inside diameter hollow stem auger with a well screen integrated into the bottom 5-foot section. This unique approach to drilling enabled the collection and analyses of groundwater samples at various depths during the drilling process so that the stainless steel well screen could be placed in the vertical zone which had the greatest apparent contamination.

All groundwater monitoring wells were constructed of 2 inch O.D. stainless steel well screen and riser pipe. The riser pipe on all wells was extended above the ground surface and a locking cap was installed on the riser pipe to prevent unauthorized entry. The stainless steel well screens were installed at the selected depth and were backfilled with Size 3-Q Rok Silica sand to an elevation of just above the top of the well screen. The remaining annulus area was backfilled with the auger cuttings to an elevation of approximately 2 feet below existing ground surface. A bentonite seal was then extended to the ground surface. Auger cuttings were then mounded around the riser pipe(s) to protect the well installation from surface water intrusion.

Well nests were constructed in several borings (B-5, B-7, and B-8) where two stainless steel well screens and stainless steel riser pipes were installed. The well screen to be installed at the lower elevation was placed first at the selected depth, and the Size 3-Q Rok Silica sand placed around the well screen to an elevation of just above the top of the well screen. The well screen at the lowest elevation was denoted with the well number followed by the letter B, i.e., 5B, 7B, and 8B. Auger cuttings were then placed in the boring to the lower elevation of where the upper well screen was to be placed. Installation of this well screen and riser pipe then proceeded as described in the previous paragraph. The well installed at the upper elevation was designated by the well number followed by the letter A, i.e., 5A, 7A, 8A. Well B-3A was installed in a separate boring from Well 3B, and is the only exception to this method of notation.

Exact elevation of all groundwater monitoring wells were established and groundwater surface elevations were recorded as part of this investigation. The ground elevation at each of the groundwater monitoring wells was also established using U.S.G.S. datum, as determined from the topographical survey. This information is presented in Table I.

Augers and miscellaneous tools used in the installation of groundwater monitoring wells were thoroughly cleaned by rinsing with soap and water, rinsing a second time with hexane, and a third rinse with distilled water. The equipment was then dried under a heat lamp prior to reuse. This cleaning and rinsing process was conducted to prevent cross-contamination of the borings by the equipment.

The soil boring logs of the groundwater monitoring wells installed for this project are shown in Appendix B.

2.03 Soil Borings in Subsurface Disposal Area

Four (4) soil borings were drilled into the subsurface disposal area on the lands of Nesco Products, Inc., between May 20, and May 21, 1982 (Borings B-A, B-B, B-C, B-D). The purpose of installing these borings was to obtain an undisturbed soil sample beneath the leach field. Soil samples were then analyzed to determine if a reservoir of 1,1,1-trichloroethane resided in the soils beneath the leach field. The borings were located at various locations within the leach field, which was constructed west of the Nesco Products, Inc. building, as shown on Figure 2. The test borings were completed using conventional hollow stem augers. Split spoon samples were taken continuously from the lower elevation of the crushed stone, making up the leach field (approximately five feet beneath the existing ground surface), to the groundwater table. The soil samples were obtained with a 24-inch long, 3" O.D. split spoon sampler driven by a 140-pound hammer falling 30 inches.

The soil boring logs, shown in Appendix C, present the results of visual interpretations made by representatives of Parratt-Wolff, Inc., of the subsurface material samples recovered during the soil boring program. In addition, all samples recovered were re-examined visually by O'Brien & Gere Engineers, Inc., geologists.

Four (4) split spoon samples were chosen (one sample from each boring) for chemical analyses for Volatile Halogenated Organics (VHO) as indicated with an asterisk on the boring logs. The locations selected for analyses were as follows:

Boring	Sample	Depth Beneath Ground Surface
B-A	S-1	5.0' - 7.0'
B-B	S-4	11.0' - 13'0'
B-C	S-6	15.0' - 17.0'
B-D	S-1	5.0' - 7.0'

These locations were selected to determine if 1,1,1-trichloroethane was attenuated or adhered to the soil particles beneath the leach field. These soil samples were analyzed for Volatile Halogenated Organics (VHO) utilizing gas chromatography techniques, and quantified for 1,1,1-trichloroethane.

2.04 Aquifer Pump Test

Two pump tests were performed to determine aquifer characteristics by O'Brien & Gere Engineers on June 3, 1982, and June 17, 1982. These pump tests were conducted on groundwater monitoring well No. B-6, a 4-inch diameter (nominal), PVC well installed for this purpose. The soil boring log for this well is included in Appendix B. This well was installed using a well screen with a 0.20 slot size positioned from 25' to 30' below the ground surface.

On June 3, 1982, well No. B-6 was pumped at a constant rate of 4.00 gallons per minute (gpm) for 4 hours which resulted in a steady-state drawdown of 6.5 feet. Analysis of this data was made using Jacob's equation, as shown in Appendix D. The calculated value of transmissivity was 1,390 gpd/ft. Soil samples obtained from the soil borings of this well indicate an interbedded silty sand and gravel and compares reasonably well with the calculated transmissivity value based upon the above described pump test.

The water transmitting capacity or transmissivity of the aquifer is a measure of the rate at which water would flow through a vertical strip of specified width extending from the top to the bottom of the aquifer, assuming a unit hydraulic gradient. In glacial aquifers, transmissivity values can vary widely and variations are usually associated with abrupt changes in thickness or lithology.

On June 17, 1982, well No. B-6 was pumped at 3.5 gpm and then allowed to recover, during which time the residual drawdown was monitored. The data plot for this test is shown in Appendix D. The data was analyzed using Jacob's equation. The calculated value of transmissivity is 74 gpd/ft. This value is significantly lower than that determined for the earlier pump test, because there was greater than 6.5 feet of drawdown while discharging 3.5 gpm. Since the well yield during the second test was lower than the first test, it is believed that the well screen became partially blocked by fines. Therefore, the value of transmissivity determined during the second pump test is not considered reliable.

The transmissivity as determined by the pump tests on well No. B-6 is about 1,400 gpd/ft. The pump test performed on the Town of Conklin Well No. 1, also included in Appendix D, provided an estimation of the transmissivity of 130,000 gpd/ft. This is two orders of magnitude higher than was determined on Well No. B-6, and is probably a result of coarser lithology tapped by the town well.

2.05 Topographic Survey

A topographic survey of the facility was performed between May 26, 1982 and May 28, 1982, to establish elevations and locations of groundwater monitoring wells and soil borings installed by O'Brien & Gere Engineers, Inc., and other significant land features. Results of this survey are incorporated in Figure 2 of this report. The datum that was used for establishing the elevations was taken from U.S.G.S. benchmarks, 1929 datum. The two benchmarks used are A-109, located on the west abutment of the bridge over Brandywine Avenue in Binghamton and Z-137 located on the south side of the bridge over Robinson Street in Binghamton.

2.06 Safety Protocol

The safety protocol implemented during the course of the field investigation at Nesco Products, Inc., facility was as follows:

1. During drilling operations and installation of groundwater monitoring wells, the safety equipment available for use as necessary included:
   - Protective goggles
   - Rubber gloves
   - Rubber boots,
   - Acid-resistant suits,
   - Hard hat(s) and/or
   - Dual carbon filter respirators
2. During groundwater, soil, surface water and sediment sampling, the equipment listed above was utilized; however, rubber gloves were disposed of after each sample was collected to avoid any possible cross-contamination of samples.

SECTION 3 - HYDROGEOLOGICAL INVESTIGATION

3.01 General

The hydrogeological investigation was conducted in four segments which included:

1. A review of hydrogeological literature
2. Drilling of test borings and installation of monitoring wells
3. Analysis of water table elevation data to determine direction of groundwater flow, hydraulic gradient of the aquifer, and velocity of groundwater movement.
4. Analysis of pump test data from the Town of Conklin Well No. 1 and the 4" test well, B-6, installed as a part of this investigation. The pump test data was useful in interpreting aquifer coefficients including transmissivity, permeability, and the radius of the cone of depression.

The information and data collected during this investigation were evaluated with respect to the potential impact(s), the effluent from the Nesco Products, Inc., facility may have had on the local groundwater system.

3.02 Geology and Aquifer Characteristics

The Nesco Products, Inc., facility is located in the Susquehanna River Valley and overlies glacial deposits formed over 15,000 years ago, when the last glacier of the Pleistocene Epoch retreated from South-Central New York State.

The glacial deposits consist chiefly of permeable sand and gravel, although intermixtures with silt and clay are locally common. The sand

and gravel deposits of the Susquehanna River basin, form productive unconfined aquifers, and are locally important sources of municipal water supply. The Susquehanna River provides a constant source of recharge to these aquifers and well yields of over one million gallons a day (1 MGD) are not uncommon. (McNish, etal.)

The aquifer system in the vicinity of Nesco Products, Inc., is defined by the configuration of the valley walls and valley floor and is approximately 1,000 feet wide and 45 feet thick (saturated thickness). Well logs from borings for the groundwater monitoring wells installed as a part of this investigation, included in Appendix B, and a review of the Town of Conklin municipal well records indicate that the aquifer consists chiefly of sand and gravel with varying amounts of silt noted. The water table is presently 12 to 15 feet below land surface. The depth to bedrock ranges from 64 to 57 feet in this area, resulting in an average saturated thickness of the aquifer of 47 feet.

Published reports by McNish, etal., on aquifer systems within the Susquehanna River Basin, identify transmissivity values (T) in a range from 10,000 gallons per day per foot (gpd/ft.) to 100,000 gpd/ft. Aquifer performance data evaluated during this investigation suggest that local aquifer transmissivity may range from approximately 1,400 gpd/ft. to 130,000 gpd/ft. The value of 1,400 gpd/ft. was obtained at a 4" test well installed in the upper portion of the aquifer, as described in Section 2.04. The higher transmissivity value of 130,000 gpd/ft. included as Appendix D, was calculated from pump test data on Town of Conklin Well No. 1 obtained from Town of Conklin records. Each value calculated during this investigation is consistent with other reported values of transmissivity for the Susquehanna River Basin in the Binghamton area (McNish, etal.).

3.03 Groundwater Flow, Gradient and Velocity

The natural direction and rate of movement of subsurface discharges away from Nesco Product's, Inc. leach field are governed primarily by the water transmitting capacity of the water table or the unconfined aquifer, local topography and the Susquehanna River.

The surface expression of water table aquifers (the type found in this area) commonly follow the topography by rising under hills and falling under valleys. On flood plain or flat-lying areas, such as the topography surrounding the Nesco Products, Inc. facility, one would expect a gentle slope or gradient to the water table surface. It is also known that in large river valleys, in which the streams are hydraulically connected to the gravel aquifers, such as the Susquehanna River, the direction of flow of the river often influences the direction of flow of the groundwater. Therefore, it was not unexpected that the direction of groundwater flow in the vicinity of the Nesco Products, Inc. facility was determined to be to the northwest (Figure 4) and the gradient was relatively flat, with a natural gradient of 0.001 ft/ft., without the Town of Conklin Well being pumped.

The Town of Conklin Well No. 1 lies approximately 1,000 feet in a northwesterly direction from the subsurface wastewater disposal system constructed by Nesco Products, Inc. in accordance with approved plans. The soil borings indicate that both the Town of Conklin well site and the subsurface wastewater disposal system lie within the same hydraulically connected aquifer system. It is, therefore, possible that discharges from the subsurface wastewater disposal system could have travelled towards the Town of Conklin well.

The velocity or rate of travel of uncontaminated groundwater can be approximated using Darcy's law in combination with the basic velocity equation of hydraulics and a correction factor for porosity. The velocity determination of contaminated groundwater cannot be precisely calculated, but for organic compounds, such as 1,1,1-trichloroethane, in groundwater, the velocity is usually less than that of the uncontaminated groundwater.

Therefore, for use as an estimate of groundwater velocity in this aquifer without the Town of Conklin Well pumping, the Darcy formula is:

$$V = \frac{K\ (dh/dL)}{7.5a}$$

V = Velocity, in feet per day

K = Permeability, in gpd/square foot
(1000 gpd/square foot assumed)

dh/dL = Water Table Gradient (.001 ft/ft)

a = Porosity (0.30 assumed)

The velocity, therefore, is calculated to be 0.44 feet per day or 161 feet per year. The values for permeability and porosity substituted in this equation are generally average values estimated for this aquifer. Wide variations may occur in both values in a granular deposit such as this aquifer. Actual velocities along some flow paths may be greater or lesser than calculated.

However, if it is assumed that the above calculated velocity is correct, then the distance that the subsurface wastewater discharges from the Nesco Products, Inc., manufacturing facility may have travelled can be calculated from the time discharges began until the time the Town of Conklin Well No. 1 was sampled and levels of 1,1,1-trichloroethane were detected. Records indicate this period of time is approximately three (3) years. Therefore, the groundwater flow would have travelled approximately 483 feet, or about one-half the distance to the Town of Conklin well. These data suggest that the subsurface wastewater which had been discharged could not have travelled from Nesco Products, Inc. property to impact the Town of Conklin well during a three-year timeframe of concern. This, however, assumes that static conditions were in existence during the discharge to the subsurface disposal system.

However, the above analysis assumes a groundwater condition that was not in existence during the time from January, 1978 to January, 1981 and, therefore, is not a valid representation of the dynamic groundwater condition that did exist. To model the system during the timeframe when the Nesco Products, Inc. was in the manufacturing operation, the influence of the pumping from Well No. 1 must be evaluated. The next section discusses the well hydraulics in more detail and the impact of pumping on the aquifer system.

3.04 Radius of Cone of Depression, Town of Conklin Well No. 1

When a well is pumped in a water table aquifer, the water table surface is depressed causing an increase in the hydraulic gradient. The shape of the water table surface is like a funnel and is called the cone of depression. In an aquifer of infinite areal extent, the cone radiates out from the well to a point of equilibrium in which recharge to the area of the cone equals the discharge from the well.

The aquifer, from which Town of Conklin Well No. 1 pumps, is not of infinite areal extent. Finite physical and hydraulic boundaries exist that control the shape of the cone of depression developed from Well No. 1. As previously stated, the aquifer is a sand and gravel deposit located in the trough or valley of the Susquehanna River, approximately 1,000 feet wide, 45 to 50 feet in saturated thickness, and extends great distances along the course of the Susquehanna River. The sides and bottom of the trough are composed of materials of low permeability, i.e., either till or shale bedrock, and are therefore considered hydrologic boundaries which limit the growth of the cone of depression. The Town of Conklin Well No. 1 is located approximately in the middle of the trough, about 30 feet from the south bank of the Susquehanna River.

Utilizing the pump test data, performed by the Town of Conklin during the construction and testing of Well No. 1, an estimate of the radius of the cone of depression was made and is included as part of Appendix D. If the aquifer was considered to be of infinite areal extent, the radius of the cone of depression could extend from 3,000 ft. to 9,000 ft. from the well. A more exact estimate is not necessary at this time because this information clearly demonstrates that the theoretical cone exceeds the known boundary conditions of this aquifer. Therefore, for Town of Conklin Well No. 1 to sustain its yield of 600 gpm, the cone of depression must receive recharge from areas that are not hydraulically limited. Since the aquifer extends along the course of the Susquehanna River, the cone of depression expands in this direction until the combined recharge of the aquifer and the induced recharge from the Susquehanna River equals the discharge of the Town of Conklin Well. The resulting shape of the cone of depression should be elliptically shaped with the long axis running parallel to the Susquehanna River.

The impact of this analysis is two-fold. First, the analysis establishes that cone of depression established by the Town of Conklin Well No. 1, pumping at 600 gpm, extends to and beyond the Nesco

Products, Inc. property by as much as 3,000 feet. Thus, any spill or subsurface discharge within this area of the cone of depression could potentially contaminate the groundwater and thus impair the quality of water being pumped from Well No. 1.

Secondly, the pumping of the well increases the hydraulic gradient towards the well and therefore the velocity of the water traveling towards the well increases. A six-foot drawdown at the Town of Conklin Well No. 1, which was the result of the pump test on this well, which is included in Appendix D, increases the regional gradient from .001 ft./ft. to .006 ft./ft., or a six-fold increase. Therefore, the average velocity of the groundwater would increase from 0.44 feet per day to 2.65 feet per day, or approximately 1,000 feet per year. This evaluation suggests that it is possible for groundwater beneath the subsurface wastewater disposal system to have travelled to the Town of Conklin Well No. 1 in approximately one year.

3.05 Discussion of Impact

The field work and evaluations performed during the hydrogeological investigation have established the necessary framework for understanding the cause and effect relationships in the groundwater system in the vicinity of the Nesco Products, Inc., facility.

This unconfined aquifer is not protected by an overlying confining layer so any material spilled, deposited in, or discharged to the Susquehanna River has the potential to impact the quality of this groundwater system. Nesco Products, Inc., has a SPDES permit to discharge effluent into a subsurface wastewater disposal system. Subsurface wastewater disposal methods are commonly used throughout the area, since there are no municipal sewer facilities available to handle sewage effluent. All subsurface discharges into this aquifer have the potential to migrate to the groundwater table and become a part of the groundwater.

The principal water supply user that taps this aquifer is the Town of Conklin. There are three wells utilized in the Town of Conklin's total water supply system and Well No. 1 is located approximately 1,000 feet northwest of the Nesco Products, Inc., facility. The other two wells are a large distance away from this facility. This well has the capacity to withdraw over 600 gpm from the aquifer, and this high yield is possible because the aquifer has a high transmissivity and receives recharge from the Susquehanna River. The other reported users that draw from this aquifer (within the area of investigation) are a few residential dwellings.

The pumping of Town of Conklin Well No. 1 creates an elliptical shaped cone of depression that probably extends to the valley walls or about 600 feet in a north-south direction, and over 3,000 feet east and west from the well. The subsurface disposal area of Nesco Products, Inc., is suspected to lie within the cone of depression of this well, when it is pumping at a rate of 600 gpm. During the course of this investigation, when the well was not pumping, the direction of flow is to the northwest at .001 ft/ft of gradient.

Groundwater velocity rates in the aquifer without Town of Conklin Well No. 1 pumping were calculated to be approximately 0.44 ft. per day, and with the well pumping, the velocity was calculated to be approximately 2.65 feet per day. At these velocity rates and conditions the groundwater discharges from the Nesco Products, Inc. subsurface wastewater disposal system had been moving through an aquifer that is a source of groundwater supply. The rate of movement is increased when the supply well No. 1 is pumping; however, the direction of movement appears to be the same whether the pump is on or off.

The Town of Conklin Well No. 1 has a definite impact upon groundwater flow to distances in excess of 3,000 feet from its discharge point. Any plume of contaminated groundwater within this radius of depression should eventually be drawn to the well. At 600 gpm flow, the travel time from the Nesco Products, Inc., facility could approach one year. Since this time period includes a similar time period during which Nesco Products, Inc., had discharged process effluent containing 1,1,1-trichloroethane, it appears that Nesco Products, Inc., could have contributed to the elevated level of 1,1,1-trichloroethane measured in Well No. 1. It is not known if there exists other potential point source discharges of this chemical to the aquifer within the cone of depression of Well No. 1. It is possible that because the area of influence is so large, other contributors may affect the Town of Conklin Well. The railroad switching yards may be a source of contamination, but an exhaustive search of the geographic area was not conducted.

To measure the potential impact of the discharge from the Nesco process on the groundwater, additional studies were pursued. These studies included:

1. A review of the manufacturing process and calculation of mass balance;
2. Sampling and analysis of soils and groundwater in the area of Nesco Products, Inc., facility as well as at select locations in the vicinity;

3. A literature search on the environmental fate of 1,1,1-trichloroethane;

4. A bench scale soil isotherm experiment to evaluate the attenuation as a possible mechanism to limit migration of 1,1,1-trichloroethane.

These studies appear in the next sections of this Report.

SECTION 4 - MANUFACTURING PROCESS

4.01 Review of Manufacturing Process

In order to identify the discharges that may have occurred to the subsurface wastewater disposal system, a review of the manufacturing process was undertaken to determine where probable losses in the process could occur.

The manufacturing process at Nesco Products, Inc., commenced in November, 1977, and ceased in December, 1980, for a total maximum operating time of 36 months. The manufacturing process operated under a variable number of shifts, for varied periods of time, and for certain time periods no manufacturing occurred. Records were not kept with respect to operating times or the number of shifts operated daily, but estimates have been made based upon monthly employment records, and production records. Purchasing records were reviewed to quantify the amount of 1,1,1-trichloroethane (Methylchloroform), having the trade name of Tri-Ethane$_R$, that was received at the facility. The purchasing records indicated that during the manufacturing period from November 9, 1977 until November 26, 1980, a total of 344 drums or 18,576 gallons of 1,1,1-trichloroethane were purchased. A Material Safety Data Sheet for 1,1,1-trichloroethane is included in Appendix G.

A schematic of the manufacturing process is shown as Figure 6. The equipment for this process is now dismantled, but a review of records indentifies the sizes and types of equipment. The method of operation at Nesco Products, Inc., was to place the metal products to be cleaned on a mechanised continuous conveyor system. The metal products passed through a degreasing tank, where a mist of 1,1,1-trichloroethane was sprayed onto the metal products and the metal products were also submerged in a bath of 1,1,1-trichloroethane. The products remained in contact with the 1,1,1-trichloroethane for approximately 2 minutes. The purpose of this was to remove any cutting oil or metal shavings attached to the metal products. The temperature of the 1,1,1-trichloroethane was maintained at approximately 150°F at all times, including during the weekends. The metal products were unloaded from the conveyor system after the metal products had been removed from the degreasing tank, placed on stacking trays, and eventually placed on another conveyor system in the washing and rinsing operation. There were no wastewater discharges from the degreasing tank.

There were two air vents on the degreasing tank. A forced air vent on the discharge end of the degreasing tank was powered by a 1/3 horsepower motor with an 8" diameter discharge pipe. The second vent on the degreasing tank was an 8" air vent which had an 8" diameter discharge pipe. There was also a rectangular opening on the top of the degreasing tank through which the 1,1,1-trichloroethane was introduced into the degreasing tank. This opening was 28" wide and 64" long.

In a separate area in the manufacturing facility, there was a polishing department where some of the metal products were polished. As the final step in this process, the metal products were manually dipped into one of two tanks, each tank being 16" x 16" x 16" in size. Each tank contained 1,1,1-trichloroethane, and the tanks were maintained at normal room temperature. However, the metal products were very hot from the polishing process. The metal products were then placed upon stacking trays, and eventually taken to the washing and rinsing operation. The two tanks in the polishing department contained a lip exhaust system with a 1/3 horsepower exhaust fan and a 5" diameter pipe. There were also several large exhaust fans located throughout the manufacturing facility, which exhausted internal air.

The metal products from the degreasing tank and from the polishing department tanks were eventually placed on a conveyor in the washing and rinsing operation, where the metal products were cleaned. The metal products placed on this continuous conveyor were first washed in hot water solution containing Oakite 96. The tank in which the metal products were washed was 6.0 feet long, 1.25 feet wide and 1.33 feet deep. Water temperatures were maintained at 120°F to 130°F in each of the wash cycles. A Material Safety Data Sheet for the Oakite 96 is shown in Appendix G. The purpose of this first washing cycle was to emulsify and remove oils and any metal shavings remaining on the metal products.

The metal products travelled from the first wash cycle on the conveyor through a heavy cold water rinse. The metal products then entered the second wash tank made up of hot water (120°-130°F) and a mild Alkali cleaning material known as Oakite 12. A Material Safety Data Sheet for Oakite 12 is also shown in Appendix G. The tank was of the same dimensions as the first wash tank. The metal products continued on the conveyer through a second heavy cold rinse, followed by a rinse in a tank containing hot water only, which was maintained at a temperature of 120°F to 130°F. This tank was also the same size as the two wash tanks. All wastewaters from the washing and rinsing operations flowed into a sump area and were then discharged to the subsurface wastewater disposal system. The metal products continued on the conveyor to a blower, where the metal products were dried at 150°F. Metal products were then removed from the conveyor and taken to an assembly area where the products were assembled, tested, packed, and shipped.

The majority of the total wastewater discharges to the subsurface wastewater disposal system were from the restroom facilities, located in the northerly part of the manufacturing facility, and from the washing and rinsing operation. An additional small quantity of wastewater discharge to the subsurface disposal area came from cooling waters generated in the polishing department. These wastewaters flowed through a small drain, constructed through the concrete wall of the building, and into a settling tank with a weir. This wastewater was then settled prior to being discharged into the subsurface wastewater disposal system. There were no other floor drains constructed at this manufacturing facility.

4.02 Materials Mass Balance

The review of the manufacturing process identified specific areas where possible volatilization and wastewater discharges to the subsurface wastewater disposal system could occur. In order to quantify these discharges, a materials mass balance was conducted using estimates from the personnel who were familiar with the manufacturing process, the records that were available, and emission rates cited from the literature.

From the raw material purchasing records from November 9, 1977 through November 26, 1980, it was determined that 18,576 gallons, or 101 tons, of 1,1,1-trichloroethane had been purchased by Nesco Products, Inc. A Material Safety Data Sheet, included in Appendix G, identifies various physical data of this compound. Discussions with manufacturing representatives of 1,1,1-trichloroethane indicate that there are other halogenated organics which are incorporated during the manufacturing process are considered contaminants in the 1,1,1-trichloroethane, and that they constitute less than 1 percent by volume of the final product. In addition, these representatives of the manufacturing firms have also indicated that the 1,1,1-trichloroethane may contain as much as 5 percent, by volume, of stabilizers, which are mainly alcohols and other materials. These latter contaminants are generally thought to be easily degraded.

In addition to the purchasing records, the personnel at the manufacturing facility, who were familiar with the processes, have estimated that approximately five (5) drums of spent 1,1,1-trichloroethane from the degreasing tank were sent from the Nesco Products, Inc. facility to a recovery/recycling processer each week, and that three (3) drums of this reclaimed material were returned each week to Nesco Products, Inc. It was further assumed that the two (2) drums of spent material which were not returned to Nesco Products, Inc. contained oils and greases, metal shavings and sludges, and that there were negligible quantities of 1,1,1-trichloroethane. These drums were returned to the chemical manufacturer for ultimate disposal.

It was also estimated that, at the cessation of the manufacturing operations at Nesco Products, Inc., approximately 75 drums of 1,1,1-trichloroethane were transported to the recovery/recycling processer and were not returned to Nesco Products, Inc. It was also estimated that 90 percent of this material was 1,1,1-trichloroethane. Therefore, it has been calculated that a total of approximately 20 tons of 1,1,1-trichloroethane were transported to the recovery/recycling processer and were not returned to Nesco Products, Inc.

In order to calculate the quantity of 1,1,1-trichloroethane that may have been volatilized during the processes, the operating times of the various pieces of equipment containing 1,1,1-trichloroethane were also estimated, using the monthly employment records, and the production records as a reference. Estimates were made of the total number of operating hours, idling hours and weekend idling hours based upon the information concerning the number of shifts and length of each shift which were provided by various personnel at the Nesco Products, Inc., facility. From this information it was calculated that there were approximately 13,550 operating hours, 5,450 idling hours, and 5,180 weekend idling hours, during which the equipment using 1,1,1-trichloroethane was utilized.

The degreasing tank had a possible total air emission surface area of 33.9 square feet, which included the two vents, and the cover in the center of the tank. From an Environmental Protection Agency (EPA) publication, Controlling Pollution from the Manufacturing and Coating of Metal Products, Solvent Metal Cleaning Air Pollution Control - II, 625/3-77-009, May 1977, the emission rates have been derived. The conveyorized degreasing tank emission rates are determined to be 0.2 lbs/square foot/hour during the operating hours and 0.04 lbs/square foot/hour during the idling hours.

The two manual dip tanks in the polishing department had a total air emission surface area of 3.38 square feet. The emission rates, again derived from EPA publication 625/3-77-009, were 1.0 lb/square foot/hour during operating hours, and 0.2 lbs/square foot/hour during idling hours.

From these data, it has been calculated that a total of 79.8 tons of 1,1,1-trichloroethane may have volatilized from the degreasing tank and the two tanks in the polishing department during the manufacturing process.

The number of variables and inaccuracy in calculating volatilization during the wash, rinse, and blow drying cycles have made it impossible to calculate volatilization losses during these phases of the operation, but it is assumed that any 1,1,1-trichloroethane, remaining on the metal products as the metal products entered the wash and rinse cycles, would have been solublized and discharged with the wastewaters to the subsurface wastewater disposal system. The total quantity of water purchased at Nesco Products, Inc. from January 1978 to January 1981 was recorded as 24.9 million gallons.

Wastewater discharges were sampled on nine (9) separate occasions between May 24, 1979 and October 13, 1980. The wastewater analyses, conducted in accordance with the NYSPDES permit requirements, were completed by Southern Tier Analytical laboratory. The range of results for 1,1,1-trichloroethane varied from 735 ppb (July 6, 1980) to less than 1 ppb (May 24, 1979). The SPDES permit allowed a discharge of 0.05 mg/liter, or 50 parts per billion (ppb). Based upon the quantity of water used by Nesco Products, Inc., from the water purchase records, or 24.9 million gallons, over the operating period, and assuming that all of this water was used in the washing and rinsing operations, the total permitted discharge allowable at the rate of 0.05 mg/l under the provisions of the SPDES permit would have been 0.0052 tons of 1,1,1 - trichloroethane.

In summary, the purchasing records indicated that approximately 101 tons of 1,1,1-trichloroethane had been purchased by Nesco Products, Inc. Of this quantity it is estimated that 20 tons of 1,1,1-trichloroethane were returned to the chemical manufacturer from the recovery/recycling processer. From the mass balance analysis, it had been calculated that approximately 79.8 tons of 1,1,1-trichloroethane had volatilized during the manufacturing process. Therefore, the balance of the 1,1,1-trichloroethane, or approximately 1.2 tons of 1,1,1-trichloroethane may have been discharged into the subsurface disposal area during the manufacturing process.

SECTION 5 - SAMPLING, ANALYSES, AND RESEARCH

5.01 General

The purpose of obtaining samples at the Nesco Products, Inc., facility for chemical analyses was to determine if any 1,1,1-trichloroethane was present, and the possible or probable extent to which any 1,1,1-trichloroethane may have migrated. Chemical analyses were performed on various media, including:

- Samples of groundwater, downgradient and upgradient of the Nesco Products, Inc. subsurface wastewater disposal system;
- Samples of groundwater, obtained from individual water supply wells serving residences located near the Nesco Products, Inc., facility;
- Samples of surface water, including samples from a lagoon located just south of the leach field and from the Susquehanna River, at points upgradient and downgradient of the Nesco Products, Inc., facility;
- Samples of sediments, taken from the bottom of the lagoon located just south of the leach field; and
- Samples of soil, taken from the test borings drilled at pre-selected locations within the leach field area.

A literature review was also conducted to determine the possible and probable mechanisms for the environmental fate of 1,1,1-trichloroethane in the groundwaters. A soil isotherm experiment was also conducted to determine if the soils in and around the Nesco Products, Inc. facility were capable of attenuating 1,1,1-trichloroethane. These research efforts were used to support the sampling and analyses efforts.

The following sections present the results of the sampling and analyses, and the program undertaken at the Nesco Products, Inc., facility during the field investigation.

5.02 Groundwater Sampling and Analyses

During the sampling of groundwater, a strict sampling protocol was implemented to eliminate inadvertent introduction into the well (or sample) of substances which could lead to interferences, and thus inaccurate results from subsequent laboratory analyses. A description of the groundwater sampling procedure is given in Appendix E.

Groundwater samples were collected from all but two (2) wells (Nos. B-2 and B-4) during their installation by use of a hollow stem, screened auger, as previously described, which allowed for sampling the groundwaters at various depths. Wells were pumped for a period of time necessary to remove 3 to 5 well volumes to obtain a groundwater sample. Rapid analyses of these groundwater samples by O'Brien & Gere Engineers' laboratory, enabled the placement of the stainless steel well screen(s) at the depth which, as a result of the chemical analyses, exhibited the greatest level(s) of 1,1,1-trichloroethane contamination. The concentrations of contamination found at the various locations and depths during drilling is shown on Table 2A.

Subsequent groundwater samples were obtained from Well Nos. B-1, -2, -3A, -3B, -4, -5A, -5B, -6, -7A, -7B, -8A, and -8B on June 3 and 4, 1982. In addition, a sample was taken from Well No. B-6 on June 17, 1982, following the performance of the second pump test on that well. Groundwater samples were obtained by bailing the groundwater. Two well volumes of groundwater were removed from each monitoring well, the well allowed to recover, and then a groundwater sample was collected in sample vial(s). The vial(s) were filled completely to an overflow condition, a teflon cap slid into place, and the cap secured. Air was prevented from being introduced into the sample vial(s).

Groundwater samples were collected, placed on ice, and promptly transported to the O'Brien & Gere laboratory in Syracuse, New York, where they were analyzed for Volatile Halogenated Organics (VHO). EPA Method 601, a Purge-Trap technique, analyzing for volatile organic compounds, was performed using a gas chromatograph to identify and quantify 1,1,1-trichloroethane. The detection limit for this analysis is 1.0 part per billion (ppb). Results of these analyses confirmed the presence of 1,1,1-trichloroethane beneath the property owned by Nesco Products, Inc. These results are presented in Table 2B.

The groundwater sample results obtained during the drilling process were used for placement of the stainless steel well screens. The subsequent groundwater sampling effort indicated that the concentration of 1,1,1-trichloroethane was less than observed during the drilling and sampling operation. Although strict sampling protocol and consistent sampling procedures were followed, the reason(s) for this dichotomy cannot be explained. Two sets of groundwater samples, taken on June 3 and 4, 1982 and on June 28, 1982 show reasonably consistent results.

The analytical sample results from wells located between the Nesco Products, Inc., subsurface disposal facility and the Town of Conklin Well No. 1, i.e., Wells No. 5A, 5B, 8A, and 8B indicate two (2) separate samplings with decreased concentrations of 1,1,1-trichloroethane. However, there are apparent increased concentrations in other wells, i.e., Wells No. 1, 2, and 3A, which cannot be explained. At the very least, the analytical results are variable and inconsistent, but tend to be decreasing over time.

From the limited number of samples collected and analyzed, elevated concentrations of 1,1,1-trichloroethane were detected in Wells No. B-1 and B-3A. These wells are located hydraulically downgradient of, and closest to the subsurface wastewater disposal area. Results of analyses from the four separate samplings of these two wells derived an average concentration of 1,1,1-trichloroethane of 435 ppb in Well No. B-1 and 450 ppb in Well No. 3A. Well screen placement for Wells B-1 and B-3A were 27 feet and 31 feet below the ground surface respectively. This is apparently the depth of greatest contamination, or approximately 12 to 16 feet into the groundwater table.

The concentration of 1,1,1-trichloroethane which had been detected in groundwater from Well No. B-1 were also analyzed for purgeable priority pollutant scan to be assured that no other volatile organic substances were masking the detection of 1,1,1-trichloroethane. The analysis was selected based upon the information determined from representatives of the manufacturers of 1,1,1-trichloroethane identifying certain organic contaminants in the manufactured product. The chemicals analyzed for in this scan are shown in Appendix F, Purgeable Priority Pollutants. Results of this analysis are included in Table 2B. Constituents found in this single groundwater sample include 1,1,1-trichloroethane, trichloroethylene, and 1,1-dichloroethane. The latter two compounds are known to be found in commercial grades of 1,1,1-trichloroethane, as contaminants from the manufacturing process of 1,1,1-trichloroethane and, therefore, their presence in the groundwater is not considered unusual.

Although the data base is not large, levels of 1,1,1-trichloroethane were identified using Gas Chromatograph/Mass Spectroscopy (GC/MS) techniques as a confirmatory tool. The levels of 1,1-dichloroethane and trichloroethylene were substantiated using this technique. This method was employed to be assured that other volatile organic compounds were not masking the presence of and detection of 1,1,1-trichloroethane.

5.03 Residential Well Sampling and Analyses

Tap water samples were obtained from residential water supply wells from private residences in the Town of Conklin located adjacent to the Nesco Products, Inc., plant by representatives of O'Brien & Gere Engineers, Inc., on November 12, 1981 and June 4, 1982.

These groundwater samples were taken to compare with analytical results of groundwater samples obtained from the residences by the Broome County Health Department in May, 1981. The results of the chemical analyses performed on residential water supply samples are presented in Table 2C.

The Cline residential well was not resampled by O'Brien & Gere since it was reported to contain less than 1.0 ppb of 1,1,1-trichloroethane in the May, 1981 Broome County sampling effort.

It was learned, after the November 12, 1981 sampling effort, that the Wesscott, Kostick, and Prospect residences had abandoned their private wells and had been connected to the Town of Conklin water system. The June 5, 1982 sampling effort indicated that the Sheridan residence was unoccupied, and thus the individual water supply was not being used. A groundwater sample from the well was therefore not possible at this time. The Kostick well appeared to be abandoned and covered so that additional samples could not be obtained. The Bedell residence was resampled on June 5, 1982. This was the only residential well to be sampled on this date, since all others were connected to the Town water supply by this date, were abandoned, or in the case of the Sheridan residence, was unoccupied.

The analytical results for the Bedell and Sheridan water supply samples are consistent and show concentrations of 1,1,1-trichloroethane in the 20 to 50 ppb range.

5.04 Surface Water Sampling and Analyses

Surface water samples were obtained at two (2) locations in the lagoon located south of the leach field on the Nesco Products, Inc. property on May 5, 1982. The surface water samples were taken from this lagoon to determine if the surface waters within this lagoon could contain sufficient quantities of 1,1,1-trichloroethane to be a source of recharge to the groundwater. Locations of these surface water samples are shown on Figure 1. Surface water samples were taken from three (3) separate depths at each location. One sample was taken at the surface of the water, one approximately 6 inches below the surface,and one near the bottom, taking extreme care not to disturb the sediments. The samples were then placed on ice and transported to the O'Brien & Gere Engineers laboratory where the three (3) surface water samples from each location were composited to obtain a representative sample of that location. This was done in accordance with procedures outlined by the EPA, which minimized the volatilization of any 1,1,1-trichloroethane present.

These surface water samples were analyzed at the O'Brien & Gere laboratory for the presence of Volatile Halogenated Organics (VHO) and quantified for 1,1,1-trichloroethane. Results of these analyses, shown in Table 3, do not indicate the presence of 1,1,1-trichloroethane in either of the surface water samples. It, therefore, appears that the lagoon at the Nesco Products, Inc. facility would not contribute to additional discharges of 1,1,1-trichloroethane to the groundwater.

Two (2) surface water samples were also obtained from the Susquehanna River on May 5, 1982. The purpose in collecting these surface water samples was to ascertain if levels of 1,1,1-trichloroethane were present in other recharge areas to the groundwater aquifer. One sample was taken upstream from the Nesco Products, Inc., facility in the Susquehanna River near the Temple Israel Riverside Cemetery, approximately at the downstream corner of the fence. The second surface water sample was taken, approximately 100 feet downstream from the Town of Conklin Well No. 1, at a point on the southerly bank of the Susquehanna River. Approximate sample locations are shown on Figure 1. Samples were transported to O'Brien & Gere laboratory and analyzed as described in the previous paragraph.

Results of these analyses, shown on Table 3, do not indicate the presence of 1,1,1-trichloroethane in these samples. However, one round of sample collection is not an exhaustive determination that the Susquehanna River is or has not been a potential source of contamination. These data can suggest, however, that the probability of the Susquehanna River as a source of 1,1,1-trichloroethane is minimal.

5.05 Sediment Sampling and Analyses

Samples of the sediment were obtained from the bottom of the lagoon located south of leach field on May 5, 1982. The purpose of collecting these bottom sediment samples was to determine if the sediments had attenuated 1,1,1-trichloroethane and may have served as a reservoir for discharge of 1,1,1-trichloroethane to the groundwater. Two (2) samples were taken on that date at the locations shown on Figure 1. The method of sample collection consisted of removing a sufficient amount of sediment directly beneath the bottom of the water with a shovel and placing the sediment sample in sealed, glass jars for transportation to the O'Brien & Gere Engineers, Inc., laboratory in Syracuse, New York.

Three (3) additional bottom sediment samples were obtained from the lagoon on June 4, 1982. Their location is also shown on Figure 1. The location for these samples was selected because it had been learned that there was a drainage ditch, located directly south of the Nesco Products, Inc. building, which flowed toward the lagoon. The sediment samples were obtained at the confluence of this ditch with the lagoon. The samples were obtained by driving a three-foot length of Lexan tubing for a total depth of approximately 18 inches, into the sediment, then removing the tubing and sealing with aluminum foil. The sample, once secured, was transported to the O'Brien & Gere laboratory. The bottom 8-inch portion of the sediment sample in the Lexan tube was denoted as sediment sample 3A. The three inch portion of the sediment sample above sediment 3A was denoted 3B. The remainder of the sediment was discarded, since it was assumed to be of the same nature as sediments samples No. 1 and No. 2, described previously. Sediment sample 3A appeared to be brownish in color and of the same structure as the underlying soil. Sediment sample 3B appeared to be grayish in color.

All sediment samples (1, 2, 3A, and 3B) were analyzed for the presence of VHO and quantified for 1,1,1-trichloroethane in the same manner as groundwater samples (EPA Method 601), following an extraction procedure.

Results of these analyses, shown on Table 3, do not indicate the presence of any 1,1,1-trichloroethane in any sediment samples analyzed. It, therefore, appears that the bottom sediments in the lagoon do not contribute to any additional discharges of 1,1,1-trichloroethane to the groundwater.

5.06 Soil Sampling and Analyses

Three-inch split spoon samples were obtained ahead of the auger from three (3) of the eleven (11) groundwater monitoring wells installed during this investigation (Wells No. B-2, -3B, and -4). These samples were visually inspected by O'Brien & Gere Engineers, Inc. geologists to confirm the visual observations made by the drillers. In addition, a soil sample was obtained from test Well No.B-6, at 25 to 31 feet below ground surface. This sample was analyzed for grain size distribution to compare with the results of the pump tests in deriving transmissivity of the aquifer.

Split spoon samples were also collected from the four (4) test borings (B-A, B-B, B-C, and B-D) placed within the horizontal limits of the leach field, located west of the Nesco Products, Inc., facility. The location of these soil borings is shown on Figure 2.

The soil boring logs, located in Appendix C, present the results of visual interpretations made by representatives of Parratt-Wolff, Inc., of the subsurface material samples recovered during the soil boring program. Four soil samples, one from each boring, were selected for chemical analyses for 1,1,1-trichloroethane. The purpose of this effort was to determine if, through the subsurface disposal of the wastewaters, the 1,1,1-trichloroethane was attenuated on the soil beneath the leach field. The soil samples directly beneath the crushed stone in Borings A and D were selected, which were the soil borings closest to the distribution boxes. The soil samples in Borings B and C were selected because they were the soils directly above the groundwater table, and it was anticipated that the 1,1,1-trichloroethane could reside in the soil at this interface.

The soil samples were placed on ice, transported to the O'Brien & Gere Laboratory, and analyzed for Volatile Halogenated Organics (VHO) utilizing gas chromatography techniques as previously cited and quantified for 1,1,1-trichloroethane. The results of these analyses, presented in Table 3, indicate that no 1,1,1-trichloroethane was present in any soil samples analyzed. Therefore, from this work effort, it was determined that the soils beneath the leach field had not attenuated any of the 1,1,1-trichloroethane and did not serve as a supply of 1,1,1-trichloroethane which would be discharged to the groundwater system. The following two sections identify the research efforts that were conducted to determine the environmental fate of 1,1,1-trichloroethane.

5.07 Environmental Fate

As a portion of the research effort for this project, a literature review was conducted to determine the environmental fate of 1,1,1-trichloroethane. This literature review employed computer searches through Chemical Abstracts from 1967 through 1982 and Pollution Abstracts from 1970 through 1982. The literature review reference list is included as Appendix H. The goal was to determine if 1,1,1-

trichloroethane underwent a change or transformation after it had been deposited into the groundwater system via the subsurface disposal system.

Although published information on the environmental fate, particularly in groundwater, was limited, some information was available on the mechanisms by which 1,1,1-trichloroethane in water may be removed or degraded. Attenuation of 1,1,1-trichloroethane by sorption and/or degradation by biological processes, hydrolysis and/or oxidation is possible in the groundwaters. Mechanisms such as volatilization and photolysis are not expected to be significant in groundwaters, but may be significant in surface waters.

The fact that 1,1,1-trichloroethane is easily volatilized has led to aeration of waters as a treatment mechanism. There are several installations in the United States where aeration equipment has been installed to treat waters.

The four mechanisms that appeared to have possible significance in the removal or degradation of 1,1,1-trichloroethane within the groundwaters are:

1. Sorption
2. Biodegradation and Bioaccumulation
3. Hydrolysis
4. Oxidation

Available published information suggest that sorption, biodegradation, and hydrolysis may play a significant role in the fate of 1,1,1-trichloroethane. The biological pathway could be important to the fate of 1,1,1-trichloroethane in both surface water and groundwater, since it can be biodegradable under either aerobic or anaerobic conditions. However, in the groundwater system, the reaction would be limited by nutrient availability. The quantitative effects of hydrolysis are predicted to be very slow, with a half-life of hydrolysis of 6 months at 25°C for 1,1,1-trichloroethane in a closed system in the dark (EPA-1980). Significant chemical oxidation is not likely to occur in the groundwater system, since there is a limited amount of oxygen available. In addition, the molecular structure of 1,1,1-trichloroethane contains three, single C-Cl bonds, which require a significant amount of energy to break.

Sorption via ion exchange or hydrophobic bonding are probably the most important environmental processes affecting the fate of 1,1,1-trichloroethane in the groundwaters. The literature suggests that as the clay content of the soil increases, the sorption of 1,1,1-trichloroethane increases. Since there is very little clay in the soil samples recovered, it is expected that there will be very little sorption. The literature also indicates that 1,1,1-trichloroethane is slightly adsorbed by limestone. The bedrock geology in the area indicates that the bedrock is composed of shale and that there is little or no limestone in the area.

From the literature review, therefore, there was very little evidence that any of the aforementioned processes would dramatically limit the migration of 1,1,1-trichloroethane in groundwater. The literature, however, indicated that volatilization and photolysis would be very important factors of the environmental fate of l,l,l-trichloroethane in surface waters.

In order to substantiate the theory that sorption was not a mechanism, which would attenuate the 1,1,1-trichloroethane, a soil isotherm experiment was conducted in the laboratory to determine if 1,1,1-trichloroethane was attenuated by the existing soils near the Nesco

Products, Inc., facility. The following section discusses the reason for conducting, procedures utilized, and the results of the soil isotherm experiment.

5.08 Soil Isotherm Experiment

The review of the literature indicated that ion exchange, hydrophobic bonding, and sorption are probably the most important environmental processes affecting the fate of 1,1,1-trichloroethane in groundwater, but that very little quantitative evidence was available. Attenuation due to sorption on overburden soils may reduce the concentration in the groundwater for a short time; but as the groundwater concentration decreases, the equilibrium will be affected and it is possible for desorption to occur.

The literature review did not establish the rate of sorption on soils which were equivalent to or similar to the local soils near the Nesco Products, Inc., facility. In order to determine the amount of sorption, soil isotherm experiments were conducted using local soil and a groundwater sample known to contain a significant concentration of 1,1,1-trichloroethane. The goal was to determine whether significant attenuation, as a result of sorption, could be expected in the existing soils.

A soil sample collected during the installation of well No. B-4, a groundwater monitoring well considered to be upgradient of the subsurface wastewater disposal system, was used to represent an uncontaminated soil. The groundwater samples that had been collected from groundwater monitoring well B-4 indicated low levels of 1,1,1-trichloroethane approaching background readings. The soil sample was taken from the soil boring sample from well B-4 at the depth of 15.0 to 16.0 feet, which was considered to be the same type of soil that was observed just above the groundwater table in the downgradient wells and beneath the leach field. The soils were generally described as a brown, moist, very dense coarse-to-fine sand and fine-to-medium gravel, with some silt. The groundwater sample that was used was taken from Well B-1 on June 17, 1982 and contained a concentration of 520 ppb of 1,1,1-trichloroethane.

Prior to weighing the various soil samples, the soil was passed through a 1/2" sieve to remove the few stones large enough to disrupt the stir bar. Each pre-weighed soil portion was added to a 300 ml BOD bottle, along with a teflon stir bar. One bottle served as a blank and contained no soil. The quantities of groundwater, soil and deionized water added are presented in Table 4. A water seal and cap were added to each bottle to minimize the impact of volatilization which could have occurred during stirring. The magnetic stirring was conducted for a 24 hour period to provide some assurance that the system was in equilibrium. At the end of the 24 hour period, each sample was transferred to a syringe and pressure filtered through Glass Fibre filters (GF/C) into 40 ml glass volatile vials. The samples were then analyzed using the EPA method 601 as previously described.

The analytical results of this experiment are presented in Table 4. The final column shows the concentration of the 1,1,1-trichloroethane remaining in the groundwater sample and indicates that the amount of sorption of 1,1,1-trichloroethane from contaminated groundwater onto local soil would be negligible. The nature of the local soils, predominantly sand, are such that significant sorption was unexpected.

This experiment, along with the previous literature review, support the soil sampling results and indicate that 1,1,1-trichloroethane is not readily attenuated on the unconsolidated deposits at the Nesco Products, Inc., facility.

SECTION 6 - SUMMARY OF RESPONSES TO CONSENT ORDER

6.01 General

The Consent Order, File No. 7-0490, issued on August 12, 1981 to Nesco Products, Inc., required that Nesco Products, Inc., prepare a report which contained information addressing the issues raised in the five items identified in Section 1.01. This section summarizes the findings of this report in the same order that the Consent Order identified the issues.

6.02 Discussion

Requirement: A statement of the property affected by any discharge on Respondent's property in the Town of Conklin and the extent to which such property is under the control of the person responsible for such discharge.

Response: This study has determined that 1,1,1-trichloroethane exists in the groundwater regime in an area hydraulically downgradient from the Nesco Products, Inc., facility.

Based upon the information available to date, an iso-concentration line of 1,1,1-trichloroethane with a concentration of 35 ppb, identifying the groundwater standards, would extend across Gee Street and run approximately parallel to the Susquehanna River, running westerly to a location just north of the Town of Conklin Well No. 1; running thence southeasterly to a point west of the subsurface disposal area, running thence northeasterly, south of Well No. B-2 and between Well Nos. B-3 and B-4 to the intersection of Barbara Avenue and New York State Route 7; running thence approximately parallel to Barbara Street to an area near the Susquehanna River, running thence westerly to Gee Street and approximately 200 feet south of the Susquehanna River. While the data generated to date is limited, this appears to be an approximation of the property affected by the discharge. The Town of Conklin Well should have influenced the discharge by increasing the groundwater gradient and velocity. Therefore, the discharges were impacted by conditions beyond the control of Nesco Products, Inc.

Requirement: A geohydrologic analyses of the adquifer(s) (sic) which may be affected, to include the results of drilling and sampling techniques.

Response: The soils and geology in this general area are described in Section 3.02, and the soil boring logs are presented in Appendices B and C. The method of drilling and sampling of the soils has been described in Section 2.02, 3.03, and Section 5.06; and aquifer characteristics are as described in Section 3.02 and Appendix D.

Requirement: A determination of the direction and rate of movement of the discharge and the natural groundwater.

Response: The groundwater flow, gradient, and velocity are discussed in Section 3.03. The groundwater elevations observed in the groundwater monitoring wells are shown on Table 1. The gradient of water table under the present conditions is calculated to be 0.001 ft./ft., and the direction of groundwater flow is generally to the northwest from the Nesco Products, Inc., facility toward the Susquehanna River. A velocity of 0.44 ft. per day has been calculated for the groundwater flow with the existing conditions. Since the results of the manufacturing process have made the 1,1,1-trichloroethane more soluble in groundwater, and since the attenuation on the unconsolidated deposits are considered to be negligible, the discharge or plume is calculated as the same as the natural groundwater flow.

The situation that existed during the study period was a static groundwater system since the Town of Conklin Well No. 1 was not pumping and did not create a cone of depression. This was not the situation, when the Town Well is pumping, the groundwater gradient could increase to 0.006 ft./ft. and the velocity could increase to 2.65± feet per day with the Town of Conklin Well No. 1 pumping at a rate of 600 gpm.

Requirement: An evaluation of the adverse effects a discharge may have on any adquifer (sic), sources of potable water supply or other surface or groundwaters of the State.

Response: The wastewater discharge that had occurred to the subsurface wastewater disposal area at Nesco Products, Inc., had terminated on or about December, 1980. While the levels of concentration of 1,1,1-trichloroethane now residing in the groundwaters as described above appear to be above the acceptable groundwater standard of 35 ppb, the situation will ultimately improve with time, as the 1,1,1-trichloroethane ultimately moves toward the Susquehanna River and is volatilized harmlessly to the atmosphere. The limited number of samples taken from the potable water supplies being used by residents downgradient of Nesco Products, Inc., indicates a concentration of 1,1,1-trichloroethane in the 20 to 50 ppb range.

While there can be little dispute that the groundwaters have concentrations in excess of groundwater standards, and that for a period of time these levels of concentration will be observed, the only public potable water supply that may be affected in the Town of Conklin Well No.

1. The basis for closure of that water supply well appears to be only one water quality sample which was taken while the well was pumping. The other private potable water supplies which may have been affected have either converted to Town water, been abandoned, or have not been used as a drinking water source. The chronology of the abandonment of these wells has not been established.

No detectable concentrations of 1,1,1-trichloroethane were observed in the surface water samples collected from the Susquehanna River or from samples collected from the lagoon, located just south of the Nesco Products, Inc., subsurface disposal system. This data suggests that subsurface wastewater discharge does not have any measurable impact upon these surface waters.

Requirement: An evaluation of the ability of unconsolidated deposits, consolidated rock or bedrock and the groundwaters to attenuate potential pollutants such that the best usage of the groundwaters is maintained.

Response: The potential pollutant that was the focus of this investigation was 1,1,1-trichloroethane. An evaluation of the unconsolidated deposits was conducted in the laboratory by conducting a soil isotherm experiment. This experiment is discussed in Section 5.08 and in Table 4. The results of this experiment indicate that there is little or no attenuation of the 1,1,1-trichloroethane on the unconsolidated soil deposits.

The underlying bedrock is identified in the literature as being a shale. Since the literature only cites limestone as effectively attenuating 1,1,1-trichloroethane, and since the soils and groundwater evaluated in this investigation do not appear to attenuate 1,1,1-trichloroethane, it is unlikely that the bedrock would attenuate the 1,1,1-trichloroethane.

A literature review was conducted to determine the environmental fate of 1,1,1-trichloroethane. This literature review, employing computer searches through Chemical Abstracts (1967-1982) and Pollution Abstracts (1970-1982) is included as Appendix H. Based upon this literature review, biodegradation, sorption and hydrolysis should play a significant role in the fate of 1,1,1-trichloroethane. Oxidation, volatilization, and photolysis are not expected to be significant pathways in groundwaters, but each may be significant in surface water.

The conclusion, based upon the soil isotherm experiment, the literature review, and the results of chemical analyses of soil samples taken beneath the leach field are that the soils and bedrock in the area, do not appear to attenuate the 1,1,1-trichloroethane. Therefore, the 1,1,1-trichloroethane will migrate through the aquifer and diminish due to dilution of the natural groundwater or incorporation with the surface waters of the Susquehanna River. Once discharged to the Susquehanna River, mechanisms such as volatilization and photolysis would be expected to occur to essentially eliminate any environmental impacts.

SECTION 7 - SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

7.01 Summary

The following work efforts were completed and incorporated into this report:

1. Installation of eleven (11) two-inch O.D. stainless steel groundwater monitoring wells;
2. Installation of one four-inch diameter polyvinyl chloride (PVC) test well;
3. Installation of four soil borings through the subsurface disposal area, or leach field;
4. Collection of groundwater elevation data and groundwater quality samples for chemical analyses from the groundwater monitoring wells and the test well;
5. Collection of groundwater samples taken from the individual potable water supplies, which were located northerly and westerly from Nesco Products, Inc.;
6. Collection of surface water samples from Susquehanna River and from the lagoon adjacent to Nesco Products, Inc. facility;
7. Collection of sediment samples from the lagoon located adjacent to Nesco Products, Inc. facility;
8. Conductance of a mass balance analyses to determine the possible and probable quantities of 1,1,1-trichloroethane that could have been discharged into the subsurface wastewater disposal system;
9. Conductance of a literature review employing computer abstract searches to determine possible mechanisms of the environmental fate of 1,1,1-trichloroethane in the groundwater;

10. Conductance of a soil isotherm experiment to determine if 1,1,1-trichloroethane is attenuated on the soil;

11. Preparation of a report incorporating the above work items and responding to the five issues raised in the Consent order.

7.02 Conclusions

The following conclusions have been established as a result of this study effort:

1. The information developed from the mass balance analysis, and the information of the effluent wastewater chemical analytical results suggests that the Nesco Products, Inc. facility exceeded the SPDES permit discharges for 1,1,1-trichloroethane.

2. The industrial wastewater effluent resulting from the manufacturing process ceased being discharged to the subsurface disposal system in December, 1980. There are no additional sources of industrial wastewater effluent at the Nesco Products, Inc. facility nor are there any future sources of industrial wastewater contemplated being discharged to the groundwaters from this facility.

3. From the limited data base generated to date, it appears that groundwater quality has begun to improve since the wells located hydraulically downgradient, i.e., Well Nos. 5 and 8, from the Nesco Products, Inc. facility, subsurface wastewater disposal system and upgradient from the Town of Conklin Well have shown two successive analytical results of 1,1,1-trichloroethane with concentrations of less than 1 ppb.

4. When pumping at approximately 1 MGD, the Town of Conklin Well No. 1 is expected to create a cone of depression that extends at least 3,000 feet east and west from the pumping well and 600 feet north and south of the pumping well. The Nesco Products, Inc. facility, located approximately 1,000 feet southeast of the Town of Conklin Week, is therefore apparently within the radius cone of influence of Well No. 1, and the discharges to the subsurface wastewater disposal system were affected by the pumping of the Town of Conklin Well.
5. The increase in the water table gradient created by the pumping of the Town of Conklin Well No. 1 could have accelerated groundwater flow to the well such that the discharges, which may have exceeded the SPDES permit conditions for the discharge of 1,1,1-trichloroethane from Nesco Products, Inc., could have reached Well No. 1 while Nesco Products, Inc., was in operation as a manufacturing facility.
6. Since the cone of depression is calculated to be quite large (6,000' by 1,200'), Nesco Products, Inc. should only be considered as a contributory source of 1,1,1-trichloroethane found in the groundwater downgradient from the subsurface disposal system on Conklin Road. The entire geographical area of 6,000 feet by 1,200 feet was not exhaustively researched to ascertain if there may have been an abandoned landfill, a spill in the railroad switching area, a midnight hauler disposal location or another contributory source.
7. The analytical results of soil boring samples from the leach field and the sediment samples and surface water samples from the

adjacent lagoon area indicate no residual sources of 1,1,1-trichloroethane in the soils, sediments, or surface waters at these locations.

8. The analytical results of groundwater quality samples collected from groundwater monitoring wells indicates that 1,1,1-trichloroethane has entered the groundwater from the subsurface wastewater disposal system and is flowing with the groundwater in the same direction as the groundwater. The direction of groundwater flow without the Town of Conklin Well No. 1 pumping has been determined to be in a northwesterly direction from the Nesco property. Water table gradient is calculated to be approximately 0.001 ft/ft., with a velocity of 0.44 feet per day.

9. A literature search of the environmental fate of 1,1,1-trichloroethane and the soil isotherm study conclude that 1,1,1-trichloroethane in the groundwater is not measurably attenuated by the soil types that compose this aquifer.

7.03 Recommendations

Based upon the study effort to date, the following recommendations are being made to better define the extent of the impact of the Nesco Products Inc. facility upon the water table aquifer system and to allow mitigation measures to be reviewed downgradient of its facility on Conklin Road:

1. A program for monitoring the groundwater quality should be established. It is recommended that groundwater quality samples be collected and groundwater elevations be monitored

during the next calendar year. Groundwater quality samples should be collected monthly from selected wells for six months, and then collected quarterly during the remaining six months. These samples should be analyzed for 1,1,1-trichloroethane following the same procedure as developed in this report. Groundwater elevations should also be established using the same time schedule from all of the groundwater monitoring wells installed to date. In addition to this effort, the elevation of the surface waters in the Susquehanna River should be established at the same frequency to determine the impact of the Susquehanna River upon the groundwater regime.

2. Model the groundwater flow system in static and dynamic situations to better define the impact of the Nesco Products, Inc. subsurface wastewater disposal system upon the water quality of the water table aquifer. Various groundwater computer programs could be utilized, including groundwater flow and solute transport models, to predict water quality changes with time and to predict if other sources of contamination may be possible.

3. The Town of Conklin Well should have a pump test conducted for up to 72 hours. Water quality samples should be collected at 6-hour intervals and analyzed for 1,1,1-trichloroethane. During the pump test, water level elevations should be monitored in the adjacent observation wells. These data should be incorporated in the groundwater modeling effort described in Recommendation 2. above.

4. It is also recommended that a report be prepared which will identify various alternatives and the feasibility of restoring the Town of Conklin Well No. 1 to service. This report should identify capital costs, operation and maintenance costs, time schedules, and impacts upon the environment of each of the feasibility alternatives.

5. The New York State Department of Environmental Conservation (NYSDEC) should prepare a written report of their evaluation of findings presented herein, and submit copies of their report for review by the Town of Conklin, Broome County Health Department, and Nesco Products, Inc. After review of such report by all parties, a meeting should be scheduled to discuss this Report, the NYSDEC's evaluation, and any future activities.

Respectfully submitted,

O'BRIEN & GERE ENGINEERS, INC.

George W. Lee, Jr., C.P.G.S.
Groundwater Geologist

Prepared by:

George W. Lee, Jr., C.P.G.S.
Groundwater Geologist

G. David Knowles, P.E., L.S.
Senior Project Engineer

Scott J. Adamowski
Design Engineer

Guy A. Swenson
Geologist

Tables

O'BRIEN & GERE

TABLE 1

GROUNDWATER ELEVATIONS

Well No.	Grade Elevation[1]	Top of Casing Elevation[1]	Screen Bottom Elevation	Screen Length (ft)[2]	Date of Measurement & Groundwater Elevations: 12/2/81	12/7/81	5/5/82	6/28/82
1	846.40	847.08	819.4	3.0'	833.08	834.13	834.38	833.58
2	847.20	849.08	820.7	3.0'	832.93	834.23	834.63	835.63
3A	849.27	852.07	811.7	3.0'	833.97	833.97	834.17	833.37
3B	849.25	851.07	786.0	3.0'	---	---	---	833.47
4	848.50	849.81	825.3	3.0'	834.51	834.11	834.51	833.71
5A	844.60	847.01	823.6	3.0'	---	---	---	832.71
5B	844.30	847.09	806.3	3.0'	---	---	---	832.79
6 (3)	844.60	844.77	815.6	10.0'	---	---	---	833.42
7A	849.60	850.86	827.1	3.0'	---	---	---	833.36
7B	849.60	850.88	812.1	3.0'	---	---	---	833.38
8A	850.10	851.77	828.1	3.0'	---	---	---	833.27
8B	850.10	851.82	813.1	3.0'	---	---	---	833.32

NOTES:

--- Indicates groundwater monitoring well not installed.
1. Elevations established using U.S.G.S., 1929 datum.
2. Indicates length of well screen.
3. All groundwater monitoring wells constructed of 2" stainless steel well screen and riser, except Well #6 which is constructed of 4" polyvinyl chloride (PVC) well screen and riser pipe.

TABLE 2A

GROUNDWATER QUALITY RESULTS
FOR 1,1,1-TRICHLOROETHANE
FROM GROUNDWATER MONITORING WELLS

Obtained during Well Installation

Well No.	Sample Depth (Ft. Below Ground Surface)	Concentration (ppb)(3)	Date of Sample
1	26.	970.	11/23/81
	45.	680.	11/23/81
	65.	320.	11/23/81
2	---(1)	---	
3A	25.	790.	11/30/81
	60.	<1.	11/30/81
4	---(1)	---	
5(4)	21.	94.	5/18/82
	36.	45.	5/18/82
	57.	<1.	5/18/82
6	---(2)	---	
7(4)	23.	180.	5/24/82
	36.	20.	5/24/82
	56.	7.	5/24/82
8(4)	22.5	80.	5/25/82
	38.	39.	5/25/82
	60.	2.	5/25/82

NOTES:

(1) Well No. 2 and No. 4 - not sampled for determination of screen placement.

(2) Well No. 6 - test well, not sampled for determination of screen placement.

(3) Detection limit - 1.0 ppb

(4) The analytical results allowed the placement of well screens at the elevations of apparent highest concentration. In Well No. 5, 7, and 8, nested weels were installed using an "A" designation for the upper well screen and the "B" designation for the lower well screen. Well 3A is screened in a separate boring from Well 3B.

TABLE 2B

GROUNDWATER QUALITY RESULTS
FOR 1,1,1-TRICHLOROETHANE
FROM GROUNDWATER MONITORING WELLS

Sample Location(1)	Date Sampled	Concentration (ppb)(2)
Well 1	12/02/81	340.
	12/07/81	280.
	6/03/82	350.(3)
	6/28/82	680.
Well 2	12/02/81	29.
	12/07/81	40.
	6/03/82	130.
	6/28/82	390.
Well 3A(4)	12/02/81	450.
	12/07/81	330.
	6/03/82	460.
	6/28/82	570.
Well 3B	6/03/82	98.
	6/28/82	67.
Well 4	12/02/81	13.
	12/07/81	13.
	6/03/82	8.
	6/28/82	12.
Well 5A(4)	6/04/82	$<$ 1.
	6/28/82	$<$ 1.
Well 5B	6/04/82	$<$ 1.
	6/28/82	$<$ 1.
Well 6	6/03/82	29.
	6/17/82	14.
	6/28/82	$<$ 1.
Well 7A(4)	6/04/82	6.
	6/28/82	120.
Well 7B	6/04/82	17.
	6/28/82	$<$ 1.
Well 8A(4)	6/04/82	$<$ 1.
	6/28/82	$<$ 1.
Well 8B	6/04/82	$<$ 1.
	6/28/82	$<$ 1.

NOTES:

1. For groundwater monitoring well locations, see Figure 1, Site Plan. All wells installed by O'Brien & Gere Engineers, Inc.
2. Detection limit for 1,1,1-trichloroethane was 1.0 ppb.
3. Sample also analyzed for Purgeable Priority Pollutants. Pollutants detected consist of:
    - 1,1-dichloroethane - 104 ppb
    - trichloroethylene - 92 ppb

   Purgeable Priority Pollutants (listed in Appendix F, and not listed above) were not detected or quantified at the detection limits established for the sample.
4. The designation of the "A" and "B" symbol, together with a numeral indicates that nested wells were installed in a single boring. The "A" designated well is screened in the upper zone of the aquifer, and the "B" designation indicates a lower elevation of screen placement. Well 3A is screened in a separate boring from Well 3B.

TABLE 2C

GROUNDWATER QUALITY RESULTS
FOR 1,1,1-TRICHLOROETHANE

From Residential Wells

Resident Name	Analyses By	Date	Concentration (ppb)
WESSCOTT	NYSDOH (1)	5/07/81	15.
WESSCOTT	OB&G (2)	11/12/81	<1. (3)
FALLBROOK	NYSDOH	5/07/81	3.
FALLBROOK	OB&G	11/12/81	<1 (3)
BEDELL	GALSON (4)	5/07/81	46.
BEDELL	OB&G	11/12/81	33.
BEDELL (5)	OB&G	6/05/82	19.
SHERIDAN	NYSDOH	5/07/81	44.
SHERIDAN (6)	OB&G	11/12/81	37.
KOSTICK	GALSON	5/11/81	586.
KOSTICK	OB&G	11/12/81	<1. (3)
PROSPECT	GALSON	5/11/81	95.
PROSPECT	OB&G	11/12/81	<1. (3)
CLINE (7)	GALSON	5/11/81	<1.

NOTES:

(1) NYSDOH - New York State Department of Health (for the Broome County Health Department.)
(2) OB&G - O'Brien & Gere Engineers, Inc. Detection limit for 1,1,1-trichloroethane - 1.0 ppb.
(3) Indicates that residence was connected to the Town water supply at time of sampling.
(4) GALSON - Galson Technical Services, Inc. (for the Broome County Health Department).
(5) BEDELL and SHERIDAN remain on private wells as of 6/5/82. Other owners are connected to Town water supply.
(6) SHERIDAN residence was unoccupied on the 6/5/82 sampling date, therefore, a sample could not be obtained.
(7) CLINE residential well was not resampled by O'Brien & Gere Engineers since it was reported to contain less than 1.0 ppb.

TABLE 3

ANALYTICAL RESULTS OF SURFACE WATER, SEDIMENT & SOIL SAMPLES
FOR 1,1,1-TRICHLOROETHANE

Sample Type	Sample Method	Sample Location[1]	Sample Date	Concentration (ppb)[2]
Surface Water 1	Grab/Composite	East end of lagoon	5/5/82	< 1.
Surface Water 2	Grab/Composite	West end of lagoon	5/5/82	< 1.
Surface Water 3	Grab	Susquehanna River Upgradient	5/5/82	< 1.
Surface Water 4	Grab	Susquehanna River Downgradient	5/5/82	< 1.
Sediment 1	Grab	East end of lagoon	5/5/82	< 1.
Sediment 2	Grab	West end of lagoon	5/5/82	< 1.
Sediment 3A	Core w/Lexan	Southeast end of lagoon (4"-7" into sediment)	6/2/82	< 1.
Sediment 3B	Core w/Lexan	Southeast end of lagoon (7"-15" into sediment)	6/2/82	< 1.
Soil Boring B-A	Split Spoon	Southeast corner of leach field (5'-7' below ground surface)	5/20/82	< 1.
Soil Boring B-B	Split Spoon	Southwest corner of leach field (11'-13' below ground surface)	5/21/82	< 1.
Soil Boring B-C	Split Spoon	Northwest corner of leach field (15'-17' below ground surface)	5/21/82	< 1.
Soil Boring B-D	Split Spoon	Northeast corner of leach field (5'-7' below ground surface)	5/21/82	< 1.

NOTES:

1. For sample locations, see Figure 1, Site Plan, for surface water and sediment sample locations and Figure 2, Leach Field Boring, for location of soil boring sample locations.
2. Detection limit - 1.0 ppb.

TABLE 4

SOIL SORPTION EXPERIMENT

Sample Number	Soil[1] Quantity (gm)	Groundwater Quantity (ml)	Deionized Water Quantity (ml)	Concentration of 1,1,1-trichloroethane ug/l (ppb)
70348	1.02	0	300	1
70349	0	300[2]	0	520
70350	0.50	300	0	500
70351	1.03	300	0	480
70352	2.04	300	0	520
70354	10.00	300	0	520

NOTES:

(1) Wet weight basis

(2) pH of groundwater sample was 6.8

Figures

O'BRIEN & GERE

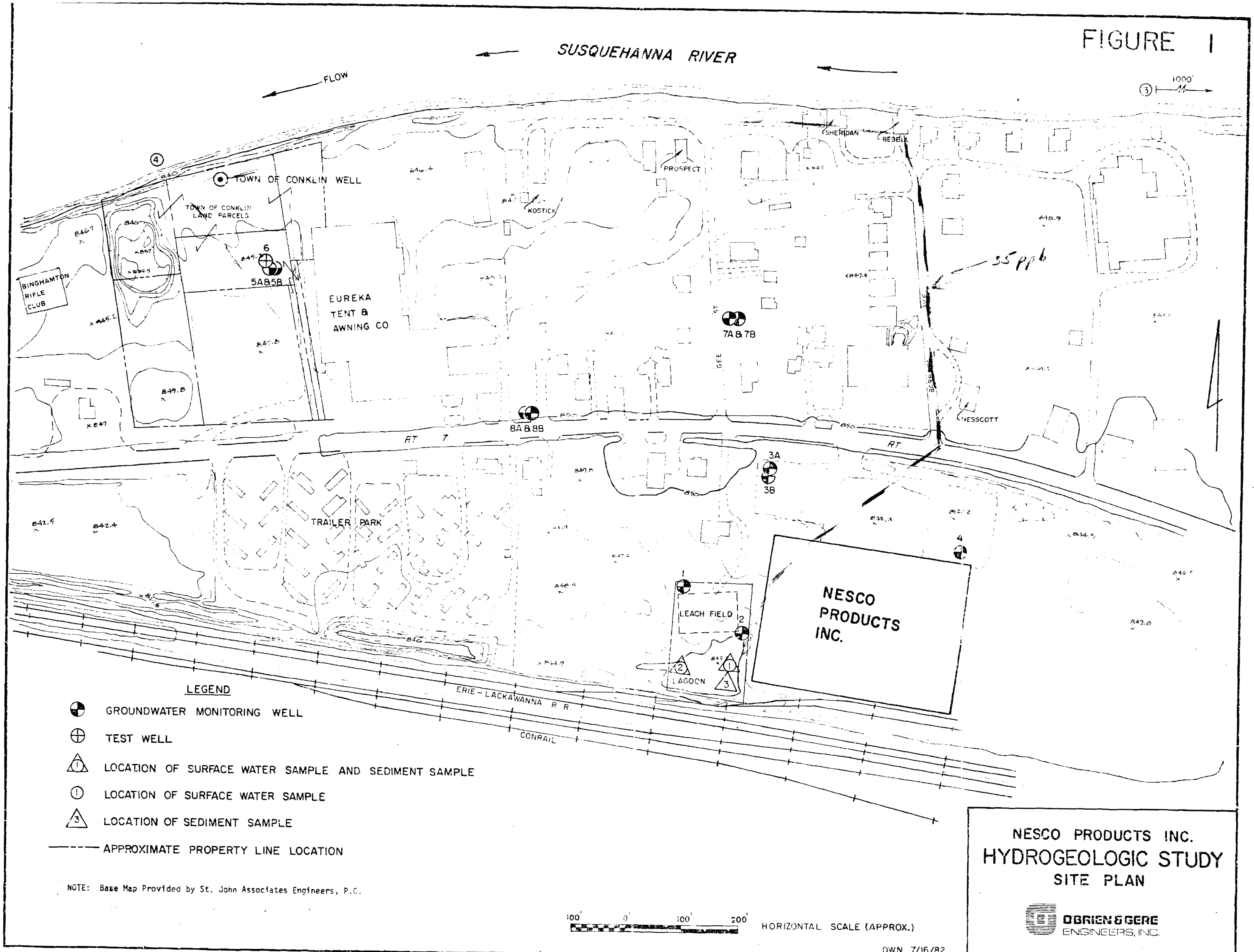
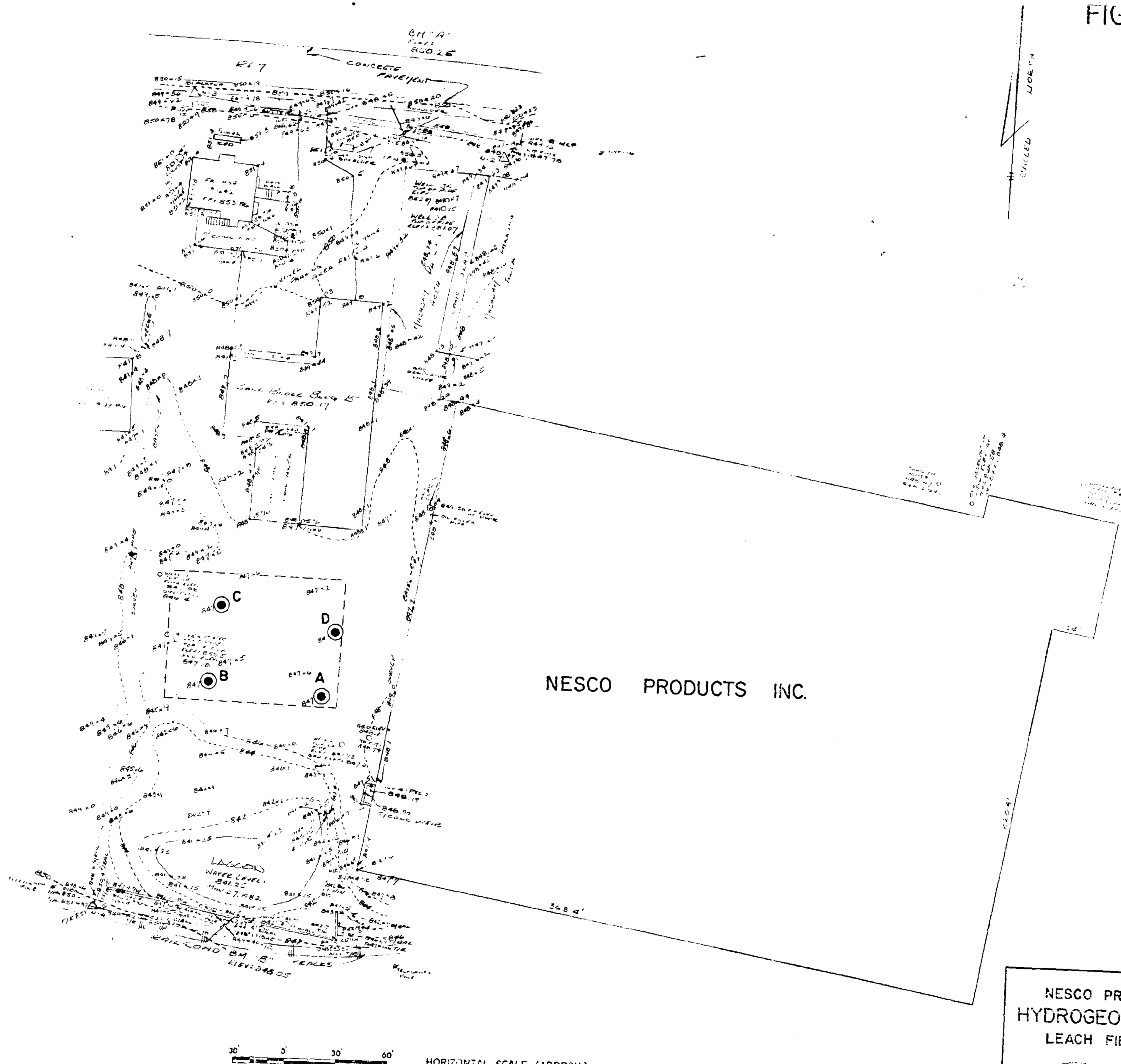


FIGURE 1
SUSQUEHANNA RIVER
FLOW
TOWN OF CONKLIN WELL
TOWN OF CONKLIN LAND PARCELS
BINGHAMTON RIFLE CLUB
EUREKA TENT & AWNING CO
5A&5B
6
7A & 7B
8A & 8B
3A
3B
4
1
2
SHERIDAN
BEDELL
PROSPECT
KOSTICK
GEE ST
WESSCOTT
RT 7
RT
35 ppb
TRAILER PARK
LEACH FIELD
LAGOON
NESCO PRODUCTS INC.
ERIE-LACKAWANNA R.R.
CONRAIL
LEGEND
GROUNDWATER MONITORING WELL
TEST WELL
LOCATION OF SURFACE WATER SAMPLE AND SEDIMENT SAMPLE
LOCATION OF SURFACE WATER SAMPLE
LOCATION OF SEDIMENT SAMPLE
APPROXIMATE PROPERTY LINE LOCATION
NOTE: Base Map Provided by St. John Associates Engineers, P.C.
100' 0' 100' 200'
HORIZONTAL SCALE (APPROX.)
NESCO PRODUCTS INC.
HYDROGEOLOGIC STUDY
SITE PLAN
O'BRIEN & GERE ENGINEERS, INC.
DWN. 7/16/82

FIGUR



HORIZONTAL SCALE (APPROX)

LEGEND

◉ TEST BORING LOCATION

---- LIMITS OF LEACH FIELD

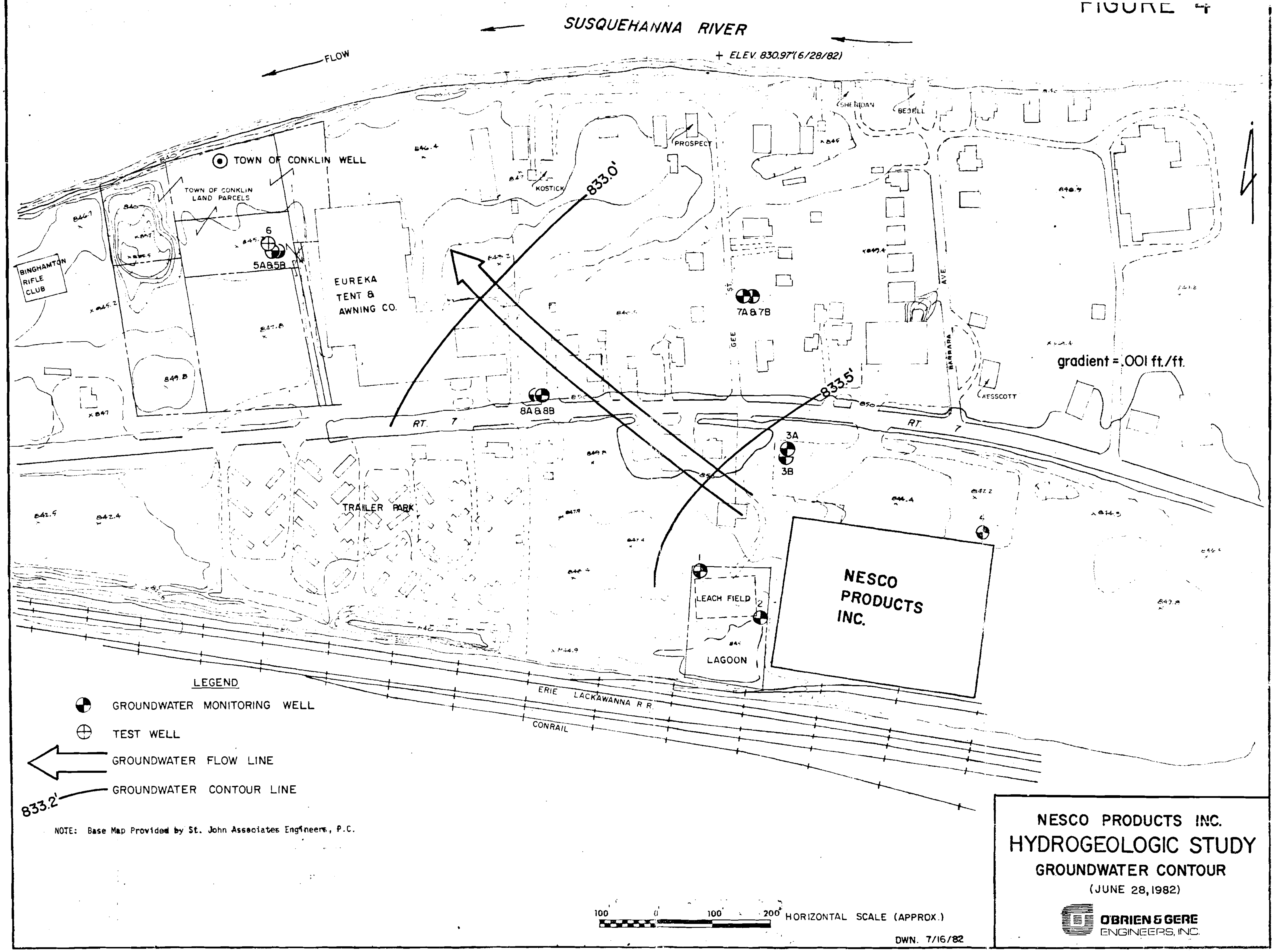
NOTE: Survey Work and Base Map Provided by Phillips and Associates Surveyors, P.C.

NESCO PRODUCT
HYDROGEOLOGIC
LEACH FIELD BO

OBRIEN&GE
ENGINEERS

DWN. 7/16/82

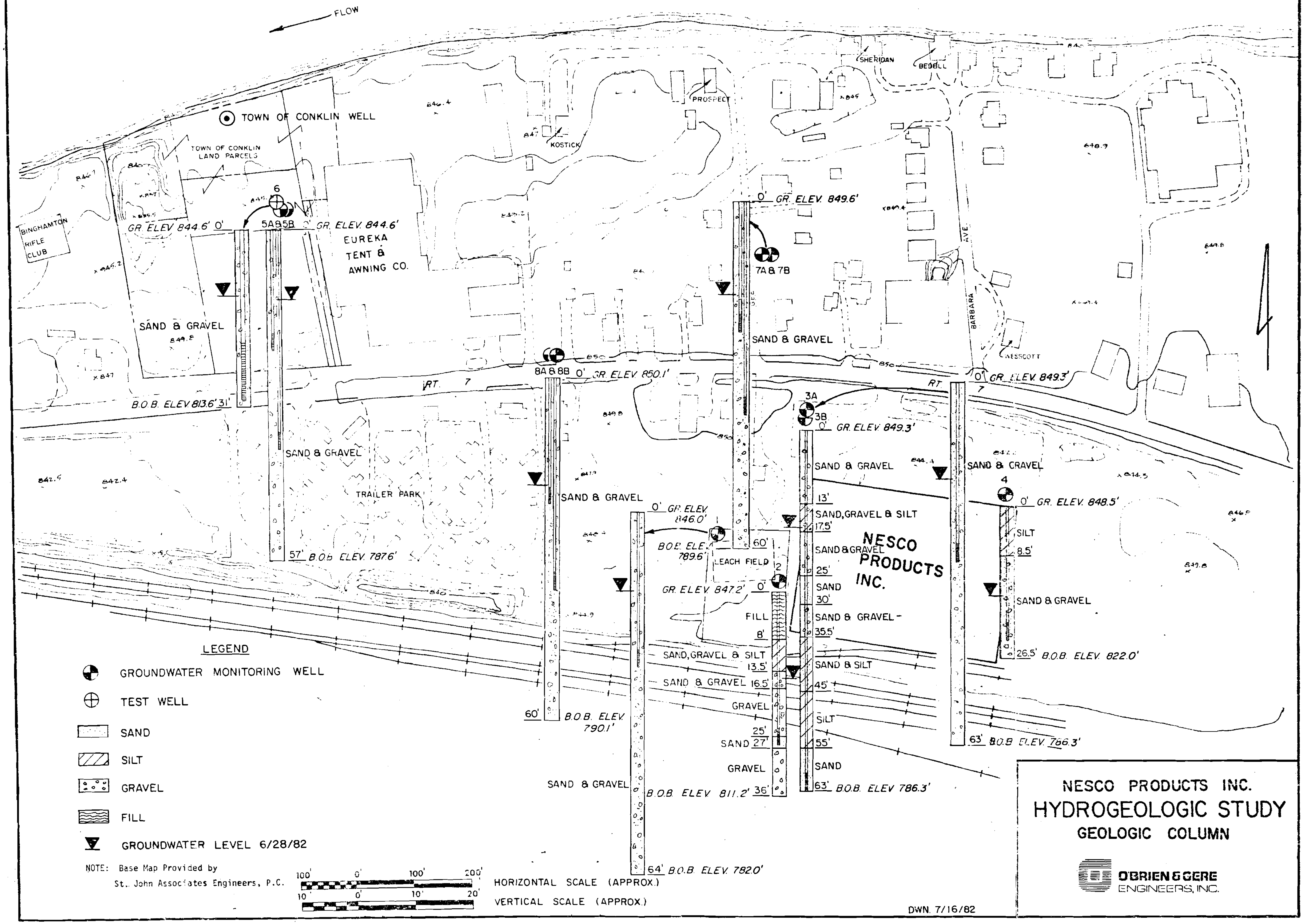
FIGURE 4



NESCO PRODUCTS INC.
HYDROGEOLOGIC STUDY
GROUNDWATER CONTOUR
(JUNE 28, 1982)

O'BRIEN & GERE ENGINEERS, INC.

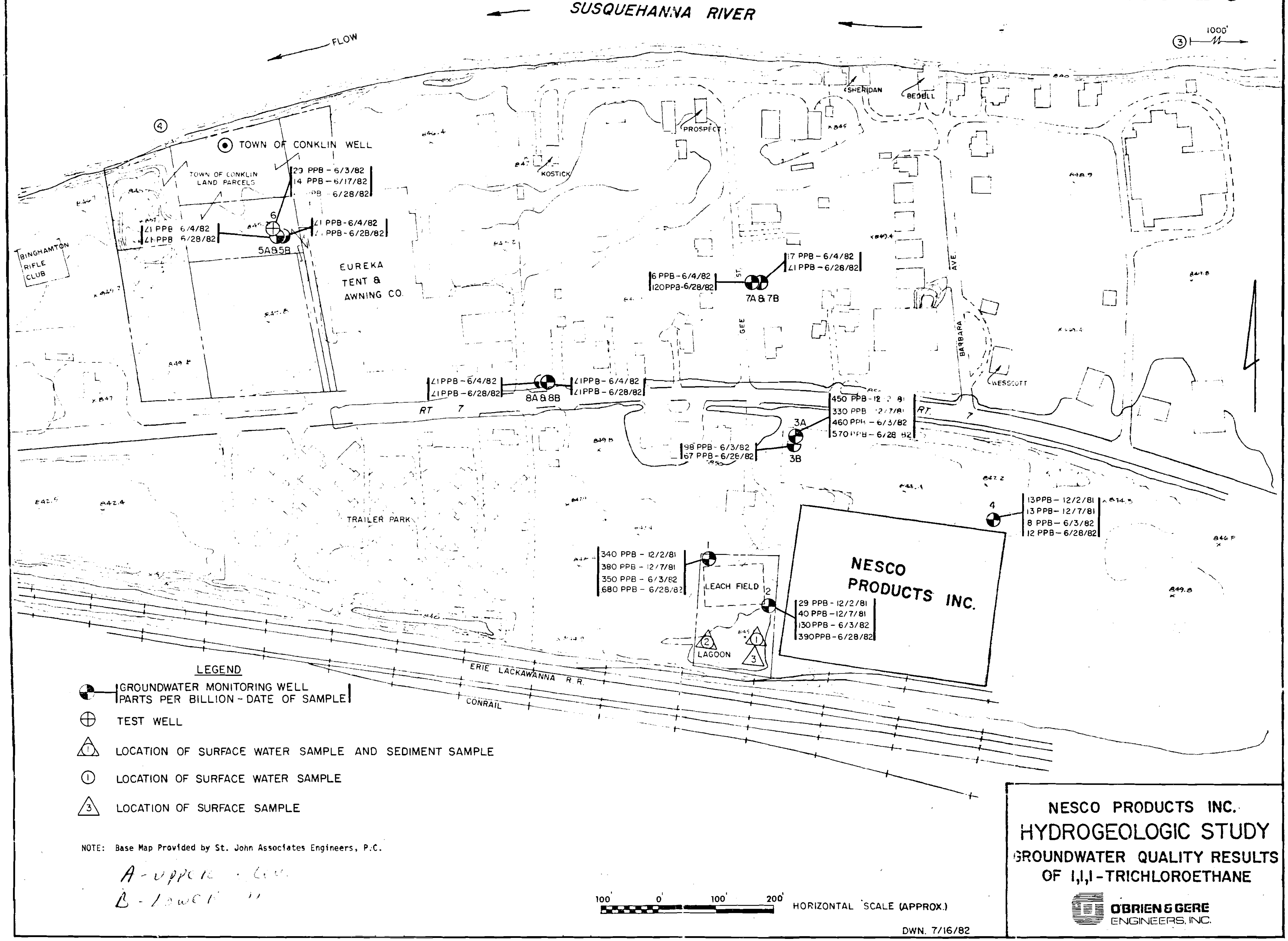
FIGURE 3



NESCO PRODUCTS INC.
HYDROGEOLOGIC STUDY
GEOLOGIC COLUMN

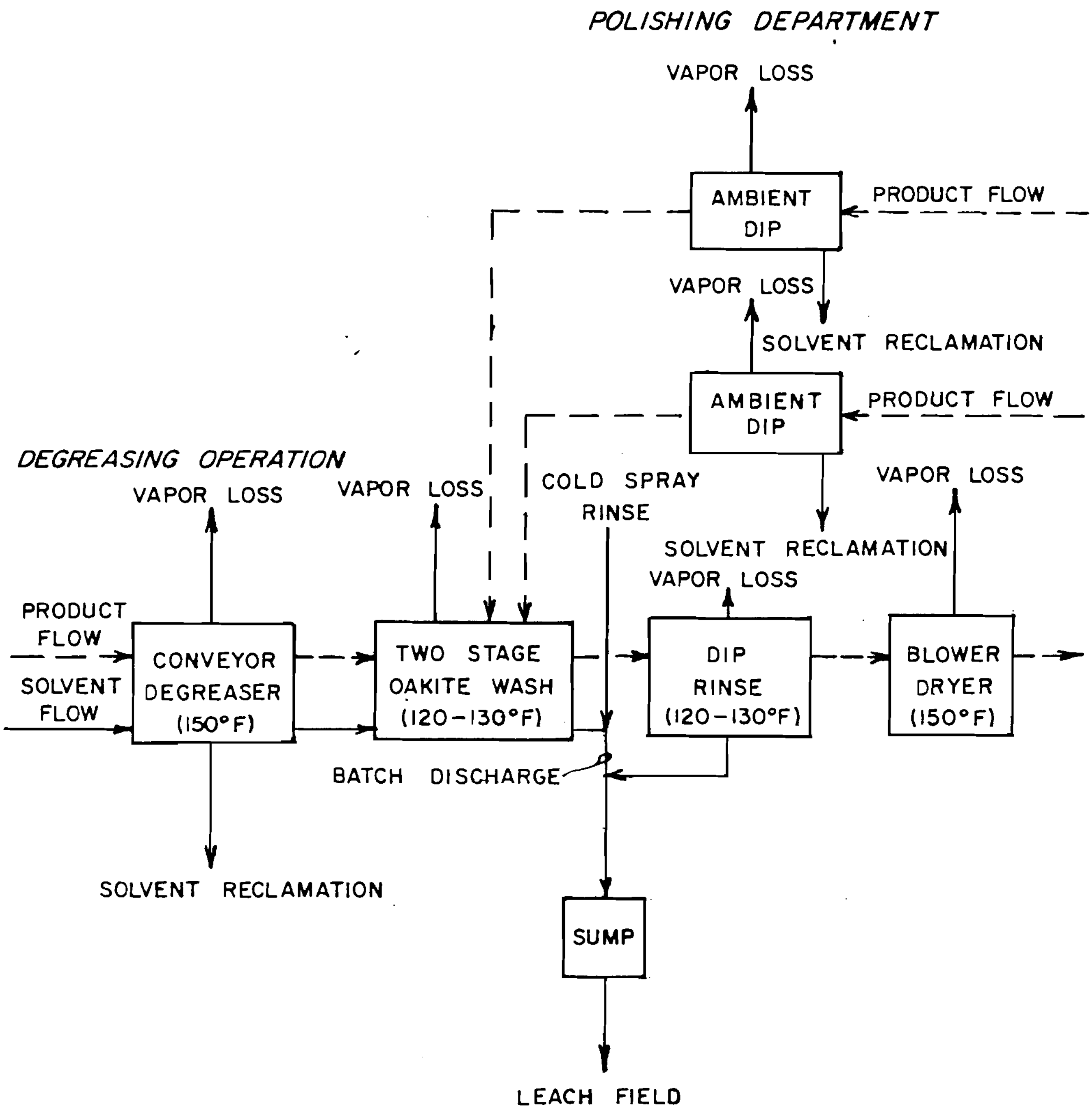
O'BRIEN & GERE ENGINEERS, INC.

FIGURE 5



SUSQUEHANNA RIVER
FLOW
1000'
TOWN OF CONKLIN WELL
TOWN OF CONKLIN LAND PARCELS
29 PPB - 6/3/82
14 PPB - 6/17/82
PB - 6/28/82
<1 PPB 6/4/82
<1 PPB 6/28/82
<1 PPB-6/4/82
<1 PPB-6/28/82
6
5A&5B
BINGHAMTON RIFLE CLUB
EUREKA TENT & AWNING CO.
KOSTICK
PROSPECT
SHERIDAN
BEDELL
GEE ST.
BARBARA AVE.
WESSCOTT
17 PPB - 6/4/82
<1 PPB - 6/28/82
6 PPB-6/4/82
120PPB-6/28/82
7A & 7B
<1PPB-6/4/82
<1PPB-6/28/82
<1PPB-6/4/82
<1PPB-6/28/82
8A & 8B
RT 7
450 PPB - 12/2/81
330 PPB - 12/7/81
460 PPB - 6/3/82
570 PPB - 6/28/82
3A
98 PPB - 6/3/82
67 PPB - 6/28/82
3B
TRAILER PARK
4
13PPB - 12/2/81
13 PPB - 12/7/81
8 PPB - 6/3/82
12 PPB - 6/28/82
1
340 PPB - 12/2/81
380 PPB - 12/7/81
350 PPB - 6/3/82
680 PPB - 6/28/82
LEACH FIELD
2
29 PPB - 12/2/81
40 PPB - 12/7/81
130 PPB - 6/3/82
390PPB - 6/28/82
LAGOON
NESCO PRODUCTS INC.
ERIE LACKAWANNA R.R.
CONRAIL
LEGEND
GROUNDWATER MONITORING WELL
PARTS PER BILLION - DATE OF SAMPLE
TEST WELL
LOCATION OF SURFACE WATER SAMPLE AND SEDIMENT SAMPLE
LOCATION OF SURFACE WATER SAMPLE
LOCATION OF SURFACE SAMPLE
NOTE: Base Map Provided by St. John Associates Engineers, P.C.
A - upper
B - lower
100' 0' 100' 200' HORIZONTAL SCALE (APPROX.)
DWN. 7/16/82
NESCO PRODUCTS INC.
HYDROGEOLOGIC STUDY
GROUNDWATER QUALITY RESULTS OF 1,1,1-TRICHLOROETHANE
O'BRIEN & GERE ENGINEERS, INC.

FIGURE 6



PROCESS SCHEMATIC
NESCO PRODUCTS INC.

O'BRIEN & GERE ENGINEERS, INC.

Appendices

O'BRIEN & GERE

APPENDIX A

NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION

CONSENT ORDER

FILE NO. 7-0490

STATE OF NEW YORK : DEPARTMENT OF ENVIRONMENTAL CONSERVATION

In the Matter of Alleged Violations of the Environmental Conservation Law Article 17 by

NESCO PRODUCTS, INC.
Binghamton (C), Broome County,

Respondent.

CONSENT ORDER

FILE NO. 7-0490

SPDES NO. NY 0106836

WHEREAS:

1. The New York State Department of Environmental Conservation (hereinafter "Department") issues State Pollution Discharge Elimination (SPDES) permits to point source discharges and is also responsible for the enforcement of Article 17 of the Environmental Conservation Law (ECL) of the State of New York and 6NYCRR, Parts 703 and 756 and

2. The Nesco Products, Inc. (hereinafter "Respondent"), 650 Conklin Road, Binghamton, New York, has a point source discharge into the ground waters of the State; and

3. Respondent has obtained a SPDES permit No. NY 0106836; and

4. Respondent's point source discharge is located approximately 1000 feet from Town of Conklin Well No. 1; and

5. Town of Conklin Well No. 1 has been tested and found to contain 111 Trichlorethane (methylchloroform) and Trichloroethylene; and

6. Respondent handled, stored or otherwise used 111 Trichlorethane at its facility in the Town of Conklin.

7. Respondent, to promote the best interests of all parties, has affirmatively waived its rights to a hearing on this matter as provided by law, and without any admissions on its part has consented to the issuing and entering of this Order and agreed to be bound by the provisions, terms and conditions contained herein.

NOW, having considered this matter and being duly advised, IT IS ORDERED:

I. THAT, Respondent shall retain a geohydrologist and submit to the Department a comprehensive plan for the completion of a study to be conducted pursuant to 6NYCRR Part 703.9. Respondent shall submit this plan for Department approval by August 15, 1981.

II. THAT, Respondent shall commence the study within thirty (30) days of notice of approval by the Department. Should the Department disapprove Respondent's plan for the required study, Respondent shall submit a revised plan within fourteen (14) days of notice of such approval.

III. THAT, pursuant to 6NYCRR Part 703 and New YOrk State SPDES Permit No. 0106836, Respondent shall prepare the study and provide the Department with a report or reports containing the following information:

1. A statement of the property affected by any discharge on Respondent's property in the Town of Conklin and the extent to which such property is under the control of the person responsible for such discharge.
2. A geohydrologic analysis of the acquifer(s) which may be affected; to include the results of drilling and sampling techniques.
3. A determination of the direction and rate of movement of the discharge and the natural ground water.
4. An evaluation of the adverse effects a discharge may have on any acquifer, sources of potable water supply or other surface or groundwaters of the State.
5. An evaluation of the ability of unconsolidated deposits, consolidated rock or bedrock and the groundwaters to attenuate potential pollutants such that the best usage

of the groundwaters is maintained.

IV. THAT, Respondent shall make available, in a timely manner, all testing data upon request from the Department.

V. THAT, if Respondent is determined to be the source of the 111 Trichlorethane contamination of the Town of Conklin Well No. 1, Respondent and Department staff shall meet to negotiate further action within thirty (30) days of notice to Respondent of such determination.

VI. THAT, no change in this Order shall be made or become effective except as specifically set forth by a further written Order of the Departments, a written Order being made either on written application to this Department by the Respondent, setting forth the grounds for the relief sought, or upon the Department's own findings after the opportunity for the Department, and

VII. THAT, the provisions, terms and conditions of this Order shall bind Respondent, its agents, servants, employees, successors and assigns and all persons, firms and corporations acting under or for it.

DATED: Liverpool, New York
~~July 7~~ 8/12, 1981

ROBERT F. FLACKE, COMMISSIONER
New York State Department of
Environmental Conservation

BY William A. Hicks
WILLIAM A. HICKS
REGIONAL DIRECTOR

TO: Nesco Products, Inc.
Attn: Robert A. Simon
President
650 Conklin Road
Binghamton, New York 13901

CONSENT BY RESPONDENT

Respondent hereby consents to the issuing and entering of the foregoing Order without further notice and waives its right to a hearing herein and agrees to be bound by the provisions, terms and conditions contained therein.

NESCO PRODUCTS, INC.

BY [signature]

TITLE Pres.

DATE 8/6/81

CORPORATE ACKNOWLEDGEMENT

STATE OF New York)
) SS:
COUNTY OF Broome)

On this 6th of August 1981, before me personally came Robert A. Simon to me known, who being by me duly sworn did depose and say that he resides at RD #3 Box 118 A Montrose, Pa. that he is the President of Nesco Products Inc. the corporation described in and which executed the foregoing instrument, and that he signed his name as authorized by said corporation.

Carol A. Osterhout
NOTARY PUBLIC

CAROL A. OSTERHOUT
Notary Public, State of New York
No. 4662963
Residing in Broome County
My Commission Expires March 30, 1982

APPENDIX B

GROUNDWATER MONITORING WELL BORING LOGS

parratt wolff inc
FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT NESCO Products, Inc.
LOCATION Town of Conklin, Binghamton, New York
DATE STARTED 11/23/81 DATE COMPLETED 11/23/81

HOLE NO. B-1-81-663
SURF. EL.
JOB NO. 81146
GROUND WATER DEPTH WHILE DRILLING
BEFORE CASING REMOVED
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 1
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						Drilled to 64.0' with well screen auger.	
						Performed pumping tests @ 64.0', 42.0' and 26.0'.	
						Installed observation well to 27.0'.	

parratt wolff inc
FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT NESCO Products, Inc.
LOCATION Town of Conklin
Binghamton, New York
DATE STARTED 11/25/81 DATE COMPLETED 11/25/81

HOLE NO. B-2-81-665
SURF. EL.
JOB NO. 81146
GROUND WATER DEPTH
WHILE DRILLING 8.0' & 13.5'
BEFORE CASING REMOVED
AFTER CASING REMOVED

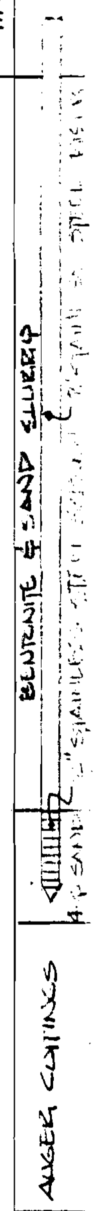
N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 1
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						Granular fill	
5.0							
WL ▼							8.0'
10.0						Brown moist very dense fine to coarse GRAVEL, fine to coarse SAND and SILT	
	10.0'-	1		7/20			
	11.5'			45	65		
WL ▼							13.5'
15.0						Brown moist dense fine to coarse SAND and fine to medium GRAVEL, little silt	
	15.0'-	2		20/29			
	16.0'						16.5'
						Brown wet medium dense coarse to fine GRAVEL, some coarse to fine sand, trace silt	
20.0							
	20.0'-	3		9/10			
	21.5'			12	22		
25.0							25.0'
	25.0'-	4		10/12		Gray wet medium dense coarse to fine SAND, trace fine gravel	
	26.5'			16	28		27.0'
						Gray wet dense to very dense coarse to fine GRAVEL, some coarse to fine sand, trace silt	
30.0							
	30.0'-	5		12/29			
	31.0'						
35.0							
	35.0'-	6		29/31			
	36.0'					Bottom of Boring Note: Installed observation well to 26.5' on completion of boring.	36.0'
40.0							



parratt wolff inc
FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT: NESCO Products, Inc.

LOCATION: Town of Conklin, Binghamton, New York

DATE STARTED: 11/30/81 DATE COMPLETED: 12/1/81

HOLE NO. B-3-81-666

SURF. EL.

JOB NO. 81146

GROUND WATER DEPTH WHILE DRILLING

BEFORE CASING REMOVED

AFTER CASING REMOVED

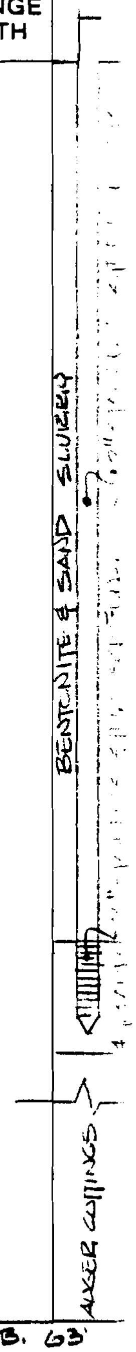
N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 1
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						Drilled to 63.0' with well screen auger. Performed pumping tests at 63.0', 47.0' and 27.0'. Installed observation well to 31.0'. (Pumping difficulty at 47.0'. Recovered jar sample from water at this depth.)	



parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT: NESCO Products, Inc.
LOCATION: Town of Conklin, Binghamton, New York
DATE STARTED: 5/20/82   DATE COMPLETED: 5/20/82

HOLE NO. B-3B-82-392
SURF. EL.
JOB NO. 81146
GROUND WATER DEPTH
WHILE DRILLING 17.5'
BEFORE CASING REMOVED
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER - 3'' O.D. SAMPLER

SHEET 1 OF 2
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	1.0'- 3.0'	1		Auger Sample		Brown moist medium dense to dense fine to coarse GRAVEL and fine to coarse SAND, little silt, few boulders	
5.0	5.0'- 6.5'	2		19/26 20	46		
10.0	10.0'- 11.5'	3		10/17 25	42		13.0'
15.0	15.0'- 16.5'	4		24/47 36	82	Brown moist very dense fine to coarse SAND, fine to coarse GRAVEL and SILT	
WL ▼							17.5'
20.0	20.0'- 21.5'	5		8/11 16	27	Brown wet medium dense fine to coarse GRAVEL and fine to coarse SAND, little silt	
25.0							25.0'
	25.0'- 26.5'	6		13/8 9	17	Brown wet medium dense coarse to fine SAND, little fine to coarse gravel, trace silt	
30.0							30.0'
	30.0'- 31.5'	7		12/18 11	29	Brown wet medium dense to very dense fine to coarse SAND and fine to coarse GRAVEL, trace silt	
35.0							35.5'
	35.0'- 36.5'	8		17/30 29	59	Gray wet very dense fine SAND and SILT	
40.0							

parratt wolff inc
FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT	NESCO Products, Inc.	HOLE NO.	B-3B-82-392
LOCATION	Town of Conklin Binghamton, New York	SURF. EL.	
DATE STARTED	5/20/82 DATE COMPLETED 5/20/82	JOB NO.	81146
		GROUND WATER DEPTH WHILE DRILLING	17.5'
		BEFORE CASING REMOVED	
		AFTER CASING REMOVED	

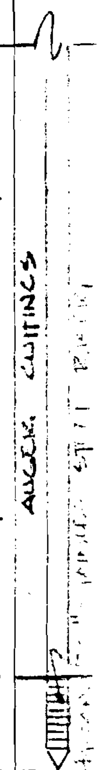
N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER - 3" O.D. SAMPLER

SHEET 2 OF 2
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	40.0'-	9		7/10		Gray wet very dense fine SAND and SILT	
	41.5'			14	24		
45.0							45.0'
	45.0'-	10		7/11		Gray wet medium dense to dense SILT	
	46.5'			18	29	with lenses of fine sand	
50.0							
	50.0'-	11		10/18			
	51.5'			24	42		
55.0							55.0'
	55.0'-	12		27/54		Brown wet very dense fine to medium	
	56.5'			47	101	SAND, some silt, trace fine to coarse	
						gravel	
60.0							60.0'
	60.0'-	13		27/28		Brown wet very dense fine to medium	
	61.5'			32	60	SAND, some coarse to fine gravel, some	
						silt	
						Bottom of Boring	63.0'
65.0							
						Note: Installed observation well to 63.0' on completion.	



parratt wolff inc
FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT: NESCO Products, Inc.

LOCATION: Town of Conklin, Binghamton, New York

DATE STARTED: 11/25/81 DATE COMPLETED: 11/25/81

HOLE NO. B-4-81-664

SURF. EL.

JOB NO. 81146

GROUND WATER DEPTH WHILE DRILLING: 15.0'

BEFORE CASING REMOVED

AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 1
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						Brown moist stiff SILT, some coarse to fine gravel, little fine to coarse sand, trace clay	
5.0							
	5.0'-	1		7/7			
	6.5'			8	15		
	8'-8.5'	2A		8/20			8.5'
10.0	8.5-9.5'	2B		22	42	Brown moist dense coarse to fine GRAVEL and fine to coarse SAND, some silt, some boulders	9.5'
	10.0'-	3		8/50			
	11.0'						
						Brown moist medium dense fine to coarse SAND	10.5'
15.0 WL	15.0'-	4		20/29		Brown moist very dense fine to coarse SAND and fine to medium GRAVEL, some silt	15.0'
	16.0'						
						Brown wet dense coarse to fine GRAVEL and coarse to fine SAND, little silt	
20.0							
	20.0'-	5		12/15			
	21.5'			20	35		
25.0							
	25.0'-	6		13/16			
	26.5'			20	36	Bottom of Boring	26.5'
						Note: Installed observation well to 23.0' on completion of boring.	
30.0							

parratt wolff inc
FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT NESCO Products, Inc.

LOCATION Town of Conklin Binghamton, New York

DATE STARTED 5/18/82 DATE COMPLETED 5/19/82

HOLE NO. B-5-82-393

SURF. EL.

JOB NO. 81146

GROUND WATER DEPTH WHILE DRILLING

BEFORE CASING REMOVED

AFTER CASING REMOVED

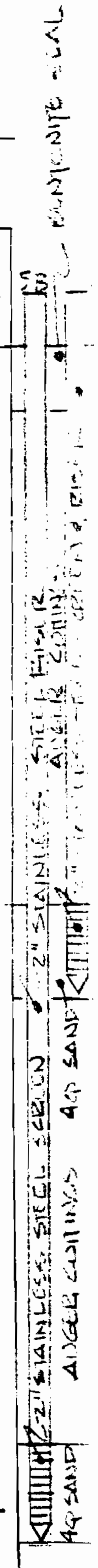
N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER WITH WELL SCREEN LEAD AUGER

SHEET 1 OF 2
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
5.0							
10.0							
15.0							
20.0							
						Developed water flow @ 22.0' for water quality sample	22.0'
25.0							
30.0							
35.0							
						Developed water flow at 37.0' for water quality sample	37.0'
40.0							



parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT NESCO Products, Inc.

LOCATION Town of Conklin
Binghamton, New York

DATE STARTED 5/18/82 DATE COMPLETED 5/19/82

HOLE NO. B-5-82-393

SURF. EL.

JOB NO. 81146

GROUND WATER DEPTH
WHILE DRILLING

BEFORE CASING
REMOVED

AFTER CASING
REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER WITH WELL SCREEN LEAD AUGER

SHEET 2 OF 2
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
45.0							
50.0							
55.0						Developed water flow at 57.0' for water quality sample	
						Bottom of Boring	57.0'
60.0						Note: Installed observation well at 38.0' and @ 21.0'.	

AUGER CUTTINGS

parratt wolff inc
FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT	NESCO Products, Inc.	HOLE NO.	B-6-82-394
LOCATION	Town of Conklin Binghamton, New York	SURF. EL.	
DATE STARTED	5/20/82 DATE COMPLETED 5/20/82	JOB NO.	81146

GROUND WATER DEPTH
WHILE DRILLING
BEFORE CASING REMOVED
AFTER CASING REMOVED

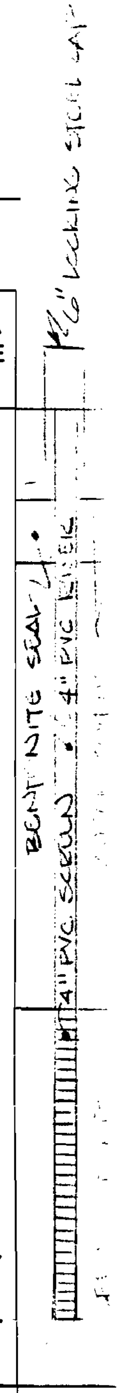
N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - 6" I.D. HOLLOW STEM AUGER

SHEET 1 OF 1
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
5.0							
10.0							
15.0							
20.0							
25.0						Brown wet dense to medium dense fine to	
	25.0'-	1		10/30		coarse GRAVEL and fine to coarse SAND,	
	27.0'			20/19	50	little silt	27.0'
	27.0'-	2		8/7		Brown wet medium dense fine to medium	
	29.0'			9/9	16	SAND, trace silt	29.0'
30.0	29.0'-	3		10/14		Brown moist dense fine to coarse SAND,	
	31.0'			28/18	42	SILT and fine to medium GRAVEL	
						Bottom of Boring	31.0'
						Note: Installed 4" P.V.C. well to 29.0'. Used 10.0' 0.10 slotted screen and 21.0' riser.	
35.0							



parratt wolff inc
FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT	NESCO Products, Inc.	HOLE NO.	B-7-82-395
LOCATION	Town of Conklin Binghamton, New York	SURF. EL.	
DATE STARTED	5/24/82 DATE COMPLETED 5/25/82	JOB NO.	81146
		GROUND WATER DEPTH WHILE DRILLING	17.0'
		BEFORE CASING REMOVED	
		AFTER CASING REMOVED	

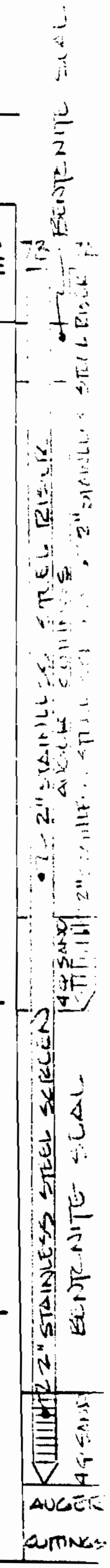
N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER WITH WELL SCREEN LEAD AUGER

SHEET 1 OF 2
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
5.0							
10.0							
15.0							
WL							
20.0							
						Developed water flow @ 22.0' for water quality sample	22.0'
25.0							
30.0							
						Developed water flow at 32.0' for water quality sample	32.0'
35.0							
40.0							



parratt wolff inc
FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT: NESCO Products, Inc.
LOCATION: Town of Conklin, Binghamton, New York
DATE STARTED: 5/24/82 DATE COMPLETED: 5/25/82

HOLE NO. B-7
SURF. EL.
JOB NO. 81146
GROUND WATER DEPTH WHILE DRILLING 17.0'
BEFORE CASING REMOVED
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER WITH WELL SCREEN LEAD AUGER

SHEET 2 OF 2
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
45.0							
50.0							
55.0							
						Developed water flow at 57.0' for water quality sample.	57.0'
60.0						Bottom of Boring	60.0'
						Note: Installed observation well at 37.5' and @ 22.5'.	

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT NESCO Products, Inc.
LOCATION Town of Conklin
Binghamton, New York
DATE STARTED 5/25/82 DATE COMPLETED 5/26/82

HOLE NO. B-8-82-396
SURF. EL.
JOB NO. 81146

GROUND WATER DEPTH
WHILE DRILLING
BEFORE CASING REMOVED
AFTER CASING REMOVED

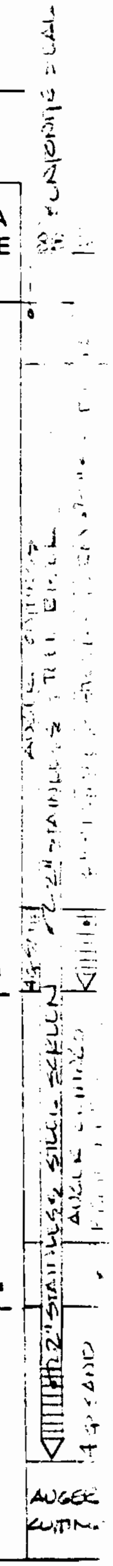
N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER WITH WELL SCREEN LEAD AUGER

SHEET 1 OF 2
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
5.0							
10.0							
15.0							
20.0							
						Developed water flow at 22.0' for water quality sample	22.0'
25.0							
30.0							
						Developed water flow at 32.0' for water quality sample	32.0'
35.0							
40.0							



parratt wolff inc

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT: NESCO Products, Inc.

LOCATION: Town of Conklin, Binghamton, New York

DATE STARTED: 5/25/82 DATE COMPLETED: 5/26/82

HOLE NO. B-8-82-396

SURF. EL.

JOB NO. 81146

GROUND WATER DEPTH WHILE DRILLING

BEFORE CASING REMOVED

AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER WITH WELL SCREEN LEAD AUGER

SHEET 2 OF 2
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
45.0							
50.0							
55.0						Developed water flow at 57.0' for water quality sample	57.0'
60.0						Bottom of Boring	60.0'
						Note: Installed observation well @ 37.0; and @ 22.0'.	

AUGER CUTTINGS

APPENDIX C

SOIL BORING LOGS

parratt wolff inc

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT NESCO Products, Inc.
LOCATION Town of Conklin, Binghamton, New York
DATE STARTED 5/20/82 DATE COMPLETED 5/20/82

HOLE NO. B-A
SURF. EL.
JOB NO. 81146

GROUND WATER DEPTH
WHILE DRILLING 16.0'
BEFORE CASING REMOVED 14.7'
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER - 3'' O.D. SAMPLER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						GRAVEL leach field	
5.0							5.0'
	5.0'-	1	*	8/11		Gray moist very stiff SILT, some fine	
	7.0'			9/10	20	to coarse gravel	7.0'
	7.0'-	2		8/7		Brown moist very stiff SILT, some fine	
	9.0'			15/16	22	to coarse gravel, little fine sand	9.0'
10.0	9.0'-	3		8/12		Brown moist very stiff SILT and fine to	
	11.0'			17/22	29	coarse GRAVEL, some fine to coarse sand	
	11.0'-	4		15/18			
	13.0'			28/20	46		
	13.0'-	5		15/28			
15.0	15.0'			18/23	46		15.0'
	15.0'-	6		11/12		Brown wet dense fine to coarse SAND and	
WL	17.0'			16/15	28	fine to coarse GRAVEL	
						Bottom of Boring	17.0'
20.0							

* This sample was analyzed for Volatile Halogenated Organics (VHO)

parratt wolff inc
FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT: NESCO Products, Inc.
LOCATION: Town of Conklin, Binghamton, New York
DATE STARTED: 5/21/82 DATE COMPLETED: 5/21/82

HOLE NO. B-B-82-389
SURF. EL.
JOB NO. 81146
GROUND WATER DEPTH
WHILE DRILLING 14.0'
BEFORE CASING REMOVED
AFTER CASING REMOVED Hole Caved at 8.8'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER - 3" O.D. SAMPLER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						GRAVEL leach field	
5.0							5.0'
	5.0'-	1		22/24		Brown moist dense fine to coarse SAND	
	7.0'			18/15	42	and fine to coarse GRAVEL, trace silt	
	7.0'-	2		12/14			
	9.0'			18/22	32		
10.0	9.0'-	3		26/23			
	11.0'			20/15	43		
	11.0'-	4	*	17/19			
	13.0'			17/21	36		
WL ▼	13.0'-	5		23/30			14.0'
15.0	15.0'			29/19	59	Brown wet dense fine to coarse SAND	
						and fine to coarse GRAVEL, trace silt	
						Bottom of Boring	15.0'
						* This sample was analyzed for Volatile Halogenated Organics (VHO)	

parratt wolff inc
FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT NESCO Products, Inc.

LOCATION Town of Conklin Binghamton, New York

DATE STARTED 5/21/82 DATE COMPLETED 5/21/82

HOLE NO. B-C-82-390

SURF. EL.

JOB NO. 81146

GROUND WATER DEPTH
WHILE DRILLING 15.6'

BEFORE CASING REMOVED 15.0'

AFTER CASING REMOVED Hole Caved at 7.3'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER - 3'' O.D. SAMPLER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						GRAVEL leach field	
5.0							5.0'
	5.0'-	1		9/22		Brown moist dense fine to coarse SAND	
	7.0'			18/10	40	and fine to coarse GRAVEL	7.0'
	7.0'-	2		12/9		Brown moist very dense fine to coarse	
	9.0'			22/31	31	SAND, little fine to coarse gravel,	
10.0	9.0'-	3		33/24		trace silt	
	11.0'			34/36	58		
	11.0'-	4		16/24			
	12.0'			50-.0'			13.0'
	13.0'-	5		37/26		Brown moist very dense fine to coarse	
15.0	15.0'			21/27	47	SAND and fine to coarse GRAVEL, trace	
WL	15.0'-	6	*	9/5		silt	15.0'
	17.0'			7/16	12	Brown wet medium dense fine to coarse	
						SAND and fine to coarse GRAVEL	
						Bottom of Boring	17.0'
20.0							

* This sample was analyzed for Volatile Halogenated Organics (VHO).

parratt wolff inc
FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT: NESCO Products, Inc.
LOCATION: Town of Conklin, Binghamton, New York
DATE STARTED: 5/21/82 DATE COMPLETED: 5/21/82

HOLE NO. B-D-82-391
SURF. EL.
JOB NO. 81146
GROUND WATER DEPTH WHILE DRILLING 15.5'
BEFORE CASING REMOVED 15.1'
AFTER CASING REMOVED Hole Caved at 12.2'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER - 3'' O.D. SAMPLER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #2395.001

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						GRAVEL leach field	
5.0							5.0'
	5.0'-	1	*	5/10		Brown moist medium dense fine to medium	
	7.0'			11/12	21	SAND, some silt, some fine to medium	
	7.0'-	2		9/14		gravel	7.0'
	9.0'			16/13	30	Brown moist medium dense fine to coarse	
10.0	9.0'-	3		25/23		SAND, little fine to medium gravel,	
	11.0'			36/34	59	trace silt	
	11.0'-	4		10/16			
	13.0'			38/38	54		
	13.0'-	5		20/23			
15.0	15.0'			49/45	72		15.0'
WL	15.0'-	6		15/29		Brown wet dense fine to coarse SAND,	
	17.0'			28/26	57	some fine to medium gravel, trace silt	
						Bottom of Boring	17.0'
20.0							

* This sample was analyzed for Volatile Halogenated Organics (VHO).

APPENDIX D

AQUIFER EVALUATIONS

APPENDIX D

AQUIFER EVALUATIONS

Evaluation of Pump Test Well No. 6
Test on June 3, 1982

Q = 3.85 gpm

Static water level = 13.0 feet

Drawdown, S* = 6.5 feet

S = 6 feet

S_y = .25

r = 17 feet

Jacob's Equation: $$S = \frac{2.30}{4 \pi T} \log \frac{2.25\ Tt}{r^2\ S_y}$$

T = 365 days

Est. T	Calculated S
1,400 gpd/ft.	5.94 ft.
1,300 gpd/ft.	6.38 ft.
1,390 gpd/ft.	5.99 ft.

T = 1390 gpd/ft.

T = 4 hours

Est. T	Calculated S
800	5.86
700	6.61
750	6.21
780	5.99

T = 780 gpd/ft.

The calculated r_o, where s is less than 1 ft. = 600 feet

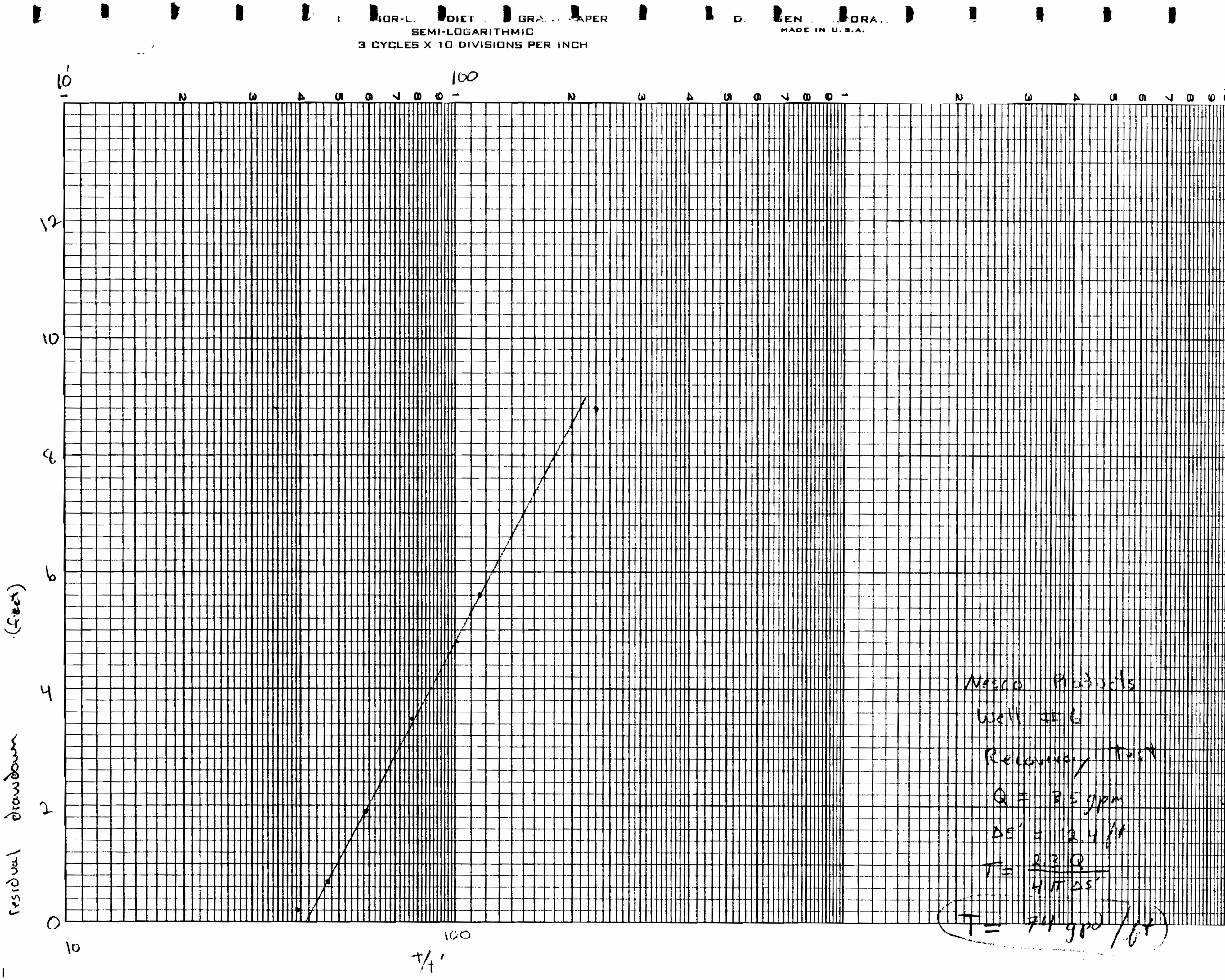
For T = 1,000 gpd/ft.

Steady State

$$H^2 - h^2 = \frac{Q}{\pi K} \ln \frac{r_o}{r}$$

K = 32 - 35

T = 1,600 gpd/ft.



APPENDIX D
Page 2 of 7

AQUIFER TEST DATA

DRAWDOWN ☐
RECOVERY ☑

(STATIC H_2O LEVEL 14.1' BELOW T.O.C.)
Q = 3.5 gpm
[illegible] 4in dia.

CUSTOMER NESCO PRODUCTS
PUMPING WELL (PW) #6
DISCHARGE RATE ______ GPM
TEST WELL NO. ______
OBSERVATION WELL (OW) ______
DISTANCE TO PW ______ FT
TEST WELL NO. ______

Date/Time	Lapsed Time	Water Level	Drawdown	Correction	True Drawdown
started	Pumping at	1:00 PM			
6/17/82 /				t/t'	
3:50	0	26.5'	12.4		
3:51	1	22.9'	8.8	231	
:52	2	19.7'	5.6	[illegible]6	
:53	3	17.6'	3.5	[illegible]	
:54	4	16.0'	1.9	58.5	
:55	5	14.8'	0.7	47	
:56	6	14.3'	0.2	[illegible]	
:57	~~8~~ 7	14.1'	0	[illegible]	
:58	~~10~~ 8	14.05'	0		
	12				
	15				
	18				
	22				
	26				
	30				
	35				
	40				
	45				
	50				
	60				

Date/Time	Lapsed Time	Water Level	Drawdown	Correction	True Drawdown
	70				
	85				
	100				
	120				
	150				
	180				
	220				
	260				
	300				
	360				
	420				
	480				
	540				
	600				
	660				
	720				
	780				
	840				
	900				
	960				
	1020				
	1080				
	1140				
	1200				
	1260				
	1320				
	1380				
	1440				

APPENDIX D

AQUIFER EVALUATIONS

Discussion of Well Yield and Radius of Cone of Influence on Town of Conklin Well #4

CASE 1 - CALCULATE TRANSMISSIVITY AND RADIUS OF CONE OF INFLUENCE WITHOUT RECHARGE WELL

Data reportedly indicated that the well was pumped at 660 gpm for 18 hours with a drawdown of 6 feet for the entire 18 hours.

If we assume a S_y = .25 and t = 365 days and use Jacobs equation:

$$S = \frac{2.30}{4 \pi T} \log \frac{2.25\, Tt}{r^2\, S_y}$$

We can calculate the transmissivity:

r = rw .55 ft (design drawing)

$s = s^* - \frac{(s^*)^2}{2b} = 5.63$ ft.

S^* = 6 feet

b = 48.2 feet (design drawing)

Est. T	Calculated S
295,000 gpd/ft.	5.61 ft.
290,000 gpd/ft.	5.70 ft.
293,000 gpd/ft.	5.64 ft.

Assume T = 293,000 gpd/ft.

The report on the pump test of Well #4 recommended that the town well be pumped at 600 gpm with a drawdown of 5.0 ft. (S*). S = 4.74 ft. Using these values the transmissivity can again be calculated.

Est. T	Calculated S
320,000 gpd/ft.	4.71 ft.
315,000 gpd/ft.	4.79 ft.
318,000 gpd/ft.	4.74 ft.

T = 318,000 gpd/ft.

Assume the T = 300,000 gpd/ft.

Using this value, the calculated cone of influent, where the drawdown s is less than 1 ft, Q = 600 gpm.

r_o = 3000 ft

CASE 2 - CALCULATE TRANSMISSIVITY AND RADIUS OF CONE OF INFLUENCE WITH RECHARGE WELL

Data reportedly indicates that the Town of Conklin well was pumped at 660 gpm for 18 hours with a steady drawdown of 6 ft.

The well is located about 30 feet from the Susquehanna River from which it should receive recharge. Therefore, let us assume a recharging image well located 60 feet away.

Assume S_y = .25 (typical)

Jacob's Equation:

$$S = \frac{2.30}{4\pi T} \quad \log \frac{2.25\ Tt}{r_w^2\ S_y} \quad + \quad \log \frac{2.25\ Tt}{r_i^2\ S_y}$$

t = 18 hours (.75 days)

r_w = .55 ft (design drawing)

r_i = 60 feet

$s = s^* - \frac{(S^*)^2}{2b} = 5.63$ ft.

S* = 6 feet

b = 48.2 feet (design drawing)

Q = 660 gpm

Est. T	Calculated S
125,000 gpd/ft.	5.67 ft.
130,000 gpd/ft.	5.45 ft.
125,500 gpd/ft.	5.65 ft.
125,900 gpd/ft.	5.63 ft.

Assume T = 125,900 gpd/ft.

The report on the pump test of Well #1 recommended that the town well be pumped at 600 gpm with a drawdown of 5.0 ft (S*) s = 4.74 ft. Using these values, the transmissivity can again be calculated.

Est. T	Calculated S
130,000 gpd/ft.	4.96 ft.
140,000 gpd/ft.	4.60 ft.
135,000 gpd/ft.	4.77 ft.
136,000 gpd/ft.	4.74 ft.

Assume T = 136,000 gpd/ft.

Average T = 130,000 gpd/ft.

The estimated cone of influence (r_o), at t = 365 days, where $s < 1$ ft. is approximately 8,000 ft. The estimated cone of influence (r_o) at t = 100, where $s < 1$ ft is approximately 4,300 ft.

CASE 3 - ESTIMATE RADIUS OF INFLUENCE UTILIZING RECHARGE RATES

$Q = \pi R^2 W$ = The amount of water in gallons per day which can be captured from accretion by a cone of radius "R". Assume W = 500,000 gpd/sq. mile

$600 \times 1,440 = (3.14) R^2 (500,000)$

$R^2 = .55$

R = .74 miles

R = 3,900 feet

APPENDIX E

GROUNDWATER SAMPLING PROCEDURE

GROUNDWATER SAMPLING PROCEDURES

I. MATERIALS

1. Disposable gloves
2. Plastic sheeting
3. Bailers - (top filling) 1-1/2 inch O.D. stainless steel (reusable)
4. Polypropylene rope
5. Distilled water
6. Hexane solvent
7. Clean disposal rags
8. Groundwater level meter
9. Insulated transport containers
10. Graduated pail
11. Dual carbon respirators with organic vapor filters
12. Safety glasses or goggles
13. Appropriate sampling containers
14. Disposable rubber boots
15. Chemical-resistant suits

II. GENERAL NOTES

The following general notes must be adhered to during all well developing and sampling operations:

1. Safety glasses or goggles will be worn as necessary during well development or sampling to prevent splashing of potentially contaminated water into the eyes.

2. Respirators must be worn if a distinct chemical odor is observed.

3. Sampling of wells must be discontinued during precipitation periods (rain or snow).

III. GROUNDWATER WELL DEVELOPMENT

Prior to obtaining groundwater samples for laboratory analysis, all monitoring wells must be developed as described in the following paragraphs:

To obtain representative samples of groundwater from a groundwater monitoring well, all fine grained material and sediments that have settled in or around the well during installation should first be removed from the well (well development). This is accomplished by air surging, pumping or bailing groundwater from the well until it yields relatively sediment-free water.

The main precaution taken during well development is the use of new equipment and accessories for developing each well to avoid cross contamination of the wells. (i.e., during air surging, new lengths of polypropylene tubing and hose are required for each well; during pumping, new polypropylene tubing is required for each well and during bailing, a new bailer (and rope) is required for each well).

NOTE: Wells developed by air surging must be allowed to stabilize after development for a minimum of 10 days prior to sampling. Wells developed by bailing must be allowed to stabilize after development a minimum of three days prior to sampling.

IV. PROCEDURES

The procedure utilized for the sampling of the groundwater observation wells was the bailing procedure. This procedure is explained in detail below.

Sampling Procedure (BAILER)

1. Identify the well and record the location on the Groundwater Sampling Field Log.
2. Cut a slit in one side of the plastic sheet, and slip it over and around the well creating a clean surface onto which the sampling equipment can be positioned. This clean working area should be approximately 10 feet by 10 feet. Use disposable rubber boots to prevent potential contamination material from contacting the plastic sheet. Do not kick, transfer, drop, or in any way let soils or other materials fall onto this sheet unless it comes from inside the well. Do not place meters, tools, equipment, etc., on the sheet unless they have been cleaned first with a clean rag.
3. Put on a new pair of disposable gloves.
4. Clean the well cap with a clean rag, remove the well cap, and place on the plastic sheet.
5. Clean the water level meter with a hexane soaked rag then rinse with distilled water, and measure the depth to the water table. Record this information.
6. Compute the volume of water in teh well and record this volume.
7. Attach enough polypropylene rope to a bailer to reach the bottom of the well, and lower the bailer slowly into the well

making certain to submerge it only far enough to fill it completely.

8. Pull the bailer out of the well keeping the polypropylene rope on the plastic sheet. Empty the groundwater from the bailer into a new glass container and observe its appearance. Return the glass jar to its proper transport container. NOTE: This sample will not undergo laboratory analysis, and is collected to observe the physical appearance of the groundwater only.
9. Record the physical appearance of the groundwater.
10. Lower the bailer to the bottom of the well, and agitate the bailer up and down to resuspend any material settled in the well.
11. Initiate bailing the well from the well bottom making certain to keep the polypropylene rope on the plastic sheet. All groundwater should be dumped from the bailer into a graduated pail to measure the quantity of water removed from the well.
12. Continue bailing the well from the bottom until two times the volume of groundwater in the well has been removed or until the well is bailed dry. If the well is bailed dry, allow sufficient time (several hours to overnnight) for the well to recovery before proceeding with Step 13. Record this information in the field book.
13. Remove the sampling bottles from their transport containers, and prepare the bottles for receiving sampling. Inspect all labels to insure proper sample identification. Sample bottles should be kept cool with their caps on until they are ready to receive samples. Arrange the sampling containers to allow for

convenient filling. Always fill the containers labeled Purgeable Priority Pollutant analysis first.

14. Initiate sampling by lowering the bailer slowly into the well making certain to submerge it only far enough to fill it completely. Minimize agitation of the water in the well as best as possible. Fill each sample container and return each sample bottle to its proper transport container.

15. If the sample bottle cannot be filled quickly, keep them cool with their caps on until they are filled. The vials (3) labeled Purgeable Priority Pollutant analysis should be filled from one bailer then securely capped. NOTE: Samples must not be allowed to freeze or contain air bubbles.

16. Record the physical appearance of the groundwater observed during sampling in the field book.

17. After the last sample has been collected, record the date and time.

18. Replace the well cover and lock the well protection assembly before leaving the well location.

19. Place the bailer, polypropylene rope, gloves, rags, and plastic sheeting into a plastic bag. The plastic bag should then be buried on-site at a preselected location.

APPENDIX F

PURGEABLE PRIORITY POLLUTANTS

APPENDIX F

PURGEABLE PRIORITY POLLUTANTS

1) Chloromethane
2) Vinyl chloride
3) Chloroethane
4) Benzene
5) Methylene chloride
6) Toluene
7) Bromomethane
8) 1,1-Dichloroethylene
9) t-1,2-Dichloroethylene
10) 1,1-Dichloroethane
11) 1,2-Dichloroethane
12) Ethylbenzene
13) 2-chloroethylvinyl ether
14) t-1,3-Dichloropropene
15) c-1,3-Dichloropropene
16) 1,2-dichloropropane
17) Chlorobenzene
18) Chloroform
19) 1,4-dichlorobutane
20) Bromochloromethane
21) Trichloroethylene
22) 1,1,1-Trichloroethane
23) 1,1,2-Trichloroethane
24) Trichlorofluoromethane
25) Carbon tetrachloride
26) 2-bromo-1-chloropropane
27) Bromodichloromethane
28) Tetrachloroethylene
29) 1,1,2,2-Tetrachloroethane
30) Chlorodibromomethane
31) Bromoform

APPENDIX G

MATERIAL SAFETY DATA INFORMATION

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

16

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

December 1977

SECTION I

MANUFACTURER'S NAME PPG Industries, Inc.	EMERGENCY TELEPHONE NO. (304) 843-1300
ADDRESS *(Number, Street, City, State, and ZIP Code)* One Gateway Center, Pittsburgh, PA 15222	
[redacted]	TRADE NAME AND SYNONYMS TRI-ETHANE®
CHEMICAL FAMILY Halogenated Hydrocarbons	FORMULA CH_3CCl_3

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Stabilized 1,1,1-trichloroethane	100	350 ppm

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	165.4	SPECIFIC GRAVITY (H_2O=1)	1.31
VAPOR PRESSURE (mm Hg.)	120	PERCENT, VOLATILE BY VOLUME (%)	100
VAPOR DENSITY (AIR=1)	4.54	EVAPORATION RATE (ethyl ether =1)	0.35
SOLUBILITY IN WATER	Negligible	Molecular Weight	132
APPEARANCE AND ODOR	Clear, colorless liquid; ether-like odor		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) See attached sheet.	FLAMMABLE LIMITS See attached sheet.	Lel	Uel

EXTINGUISHING MEDIA
Water, dry chemical or carbon dioxide

SPECIAL FIRE FIGHTING PROCEDURES
Wear pressure-demand self-contained breathing apparatus for possible exposure to hydrogen chloride and phosgene.

UNUSUAL FIRE AND EXPLOSION HAZARDS
Vapors can be ignited by high intensity source of ignition. Can decompose or burn to form hydrogen chloride and traces of phosgene.

(Continued on reverse side)

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: 350 ppm -- 8-hour TWA (OSHA -- 29 CFR 1910.1000)

EFFECTS OF OVEREXPOSURE: See attached sheet.

EMERGENCY AND FIRST AID PROCEDURES: See attached sheet.

SECTION VI - REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		Avoid open flames, hot glowing surfaces and electric arcs.
	STABLE	X	

INCOMPATABILITY *(Materials to avoid)*: Avoid mixing with caustic soda, caustic potash or oxidizing materials.

HAZARDOUS DECOMPOSITION PRODUCTS: HCl and possible traces of phosgene.

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Immediately evacuate area and provide maximum ventilation. Only personnel equipped with proper respiratory and skin/eye protection should be allowed in area. Collect spilled material on sawdust or vermiculite and sweep into closed containers for disposal. Then flush area with plenty of water and maintain ventilation until vapors are eliminated.

WASTE DISPOSAL METHOD: EPA-approved incineration or contact local waste disposal contractor.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*: See attached sheet.

VENTILATION		
	LOCAL EXHAUST	SPECIAL
	MECHANICAL *(General)* Sufficient to maintain workplace concentration below TLV.	OTHER

PROTECTIVE GLOVES: Polyethylene, neoprene, or polyvinyl alcohol.

EYE PROTECTION: Splash-proof goggles used in accordance with 20 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: Safety shoes, eye-wash fountain.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: See attached sheet.

OTHER PRECAUTIONS: See attached sheet.

GPO 934-110

ADDENDUM TO MATERIAL SAFETY DATA SHEET

ON TRI-ETHANE® 1,1,1-TRICHLOROETHANE (December, 1977)

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point - None when tested in accordance with standard accepted laboratory techniques; however, 1,1,1-trichloroethane vapors concentrated in a confined or poorly ventilated area can be ignited upon contact with a spark, flame or high-intensity source of heat. This can occur at concentrations ranging between 8 percent and 15 percent by volume.

SECTION V -- HEALTH HAZARD DATA

Acute Toxicity Values(1) - Oral LD_{50} (rat): 10 - 12 gm/kg.
Oral LD_{50} (rabbit, guinea pig): 5.6 - 9.5 gm/kg
Inhalation LC_{50} (rat): 8,000 ppm/7 hours

Effects of Overexposure

Acute: Primarily a central nervous system depressant. Inhalation can cause irritation of the respiratory system, dizziness, nausea, lightheadedness, headache, loss of coordination and equilibrium, unconsciousness, and even death in confined or poorly ventilated areas. Depression of the circulatory system has been reported as a result of overexposure to methyl chloroform. Ventricular arrhythmia may be induced after sensitization to epinephrine.

Eye contact can result in discomfort, pain and irritation. Prolonged or repeated contact with the skin can cause irritation and dermatitis.

Chronic: Torkelson, et. al. (1959) reported that female guinea pigs had slight inflammation of lungs and fatty changes in liver at chronic exposure concentrations of 2,000 ppm, although no evidence can presently be found to confirm any chronic exposure hazard to humans.

Emergency and First Aid Procedures

Inhalation Overexposure: Remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.

Note to Physician: Avoid use of adrenalin in any case where a person has been overcome by 1,1,1-trichloroethane.

Eye Contact: Flush with plenty of water for at least fifteen minutes. If irritation occurs, consult a physician.

Skin Contact: Wash thoroughly with plenty of soap and water. If irritation occurs, consult a physician.

Swallowing: If conscious, drink a quart of water then induce vomiting by placing a finger far back in the throat. Call a physician. If vomiting cannot be induced, take immediately to a hospital or physician. If unconscious, or in convulsions, take immediately to a hospital or physician. DO NOT induce vomiting or give anything by mouth.

SECTION VIII -- SPECIAL PROTECTION INFORMATION

Respiratory Protection -- NIOSH/MESA approved organic vapor respirator for concentrations below 1000 ppm. For 1000 ppm and above, use air-supplied respiratory protection. Consult 29 CFR 1910.134 for details.

SECTION IX -- SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing

- Do not use in poorly ventilated or confined spaces.
- Keep containers tightly closed when not in use.
- Do not store in open, unlabeled or mislabled containers.
- Do not store degreaser clean-out sludge in tightly sealed containers.
- Sludge containing finely divided aluminum residues should be stored out of doors away from combustible materials.
- Liquid oxygen or other strong oxidizers may form explosive mixtures with 1,1,1-trichloroethane when mixed in confined areas.
- Under certain conditions, decomposition may occur followed by release of hydrogen chloride vapors when 1,1,1-trichloroethane is blended with other organic materials such as toluene. Before performing any such blending operations, consult with PPG on potential hazards involved.

Other Precautions

- Avoid prolonged or repeated breathing of vapor.
- Use only with ventilation sufficient to limit employee exposure below OSHA permissible exposure limit.
- Avoid contact with eyes.
- Avoid prolonged or repeated contact with skin.
- Do not take internally.

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(3) Dangerous Properties of Industrial Materials, Fourth Edition, N. I. Sax, 1975.

(4) Industrial Toxicology, Hamilton and Hardy, 1974.

(5) Toxicity and Metabolisms of Industrial Solvents, Browning, 1965.

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U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME: OAKITE PRODUCTS, INC.	EMERGENCY TELEPHONE NO.: 201-464-6900
ADDRESS (Number, Street, City, State, and ZIP Code): 50 Valley Road, Berkeley Heights, New Jersey 07922	
CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS: Oakite 96
CHEMICAL FAMILY: Solvent	FORMULA: Proprietary

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS Kerosene	85	*500PPM	FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

This data pertains to undiluted product, not dilutions of product.

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Refined mineral oil	10	5mg/M3 for oil mist.

* OSHA, 100-200 PPM ACGIH

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	Unknown	SPECIFIC GRAVITY (H_2O=1)	0.830
VAPOR PRESSURE (mm Hg.)	Unknown	PERCENT, VOLATILE BY VOLUME (%)	90
VAPOR DENSITY (AIR=1)	Unknown	EVAPORATION RATE (butyl acetate =1)	< 1
SOLUBILITY IN WATER Emulsifies	2% to 5% (Moderate)	pH @ 5% by volume	8.5
APPEARANCE AND ODOR Clear, yellow to amber liquid; mild kerosene type odor.			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) 120-130°F. Tag Closed Cup	FLAMMABLE LIMITS Unknown	Lel	Uel

EXTINGUISHING MEDIA
Water spray, dry chemical, foam, or carbon dioxide.

SPECIAL FIRE FIGHTING PROCEDURES
Use water to keep fire-exposed containers cool. Use water spray to disperse vapors and flush spills away from exposures. Wear adequate respiratory protection.

UNUSUAL FIRE AND EXPLOSION HAZARDS
Can react with oxidizing materials.

Oakite 96

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE	Estimated 500 PPM based on kerosene. (See also Section II.)
EFFECTS OF OVEREXPOSURE	Inhalation of high concentrations of vapor may cause headache and dizziness. Contact with eyes causes irritation. Prolonged contact with skin may cause drying and/or irritation.
EMERGENCY AND FIRST AID PROCEDURES	If inhaled, remove to fresh air. For eyes, flush with plenty of water for at least 15 minutes; get medical attention. For skin, wash thoroughly with soap and water.

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID Heat, sparks, and open flame.
	STABLE	X	
INCOMPATABILITY (Materials to avoid)	Oxidizing materials.		
HAZARDOUS DECOMPOSITION PRODUCTS	Incomplete combustion may yield carbon monoxide.		
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID Not applicable
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED	Provide adequate ventilation. For concentrate: remove sources of ignition. Recover free liquid. Absorb with straw, sawdust or other absorbing material, sweep up, haul away or incinerate. Then wash area with soap and water. For emulsions: flush area with plenty of water and wash with soap and water.
WASTE DISPOSAL METHOD	For water emulsions, follow federal, state and local regulations. Either haul away in its entirety or split oil emulsion with strong acid, skim off oil and haul away or burn, then neutralize the remaining acidic liquid with alkaline material, dilute and discharge. Solvent mixtures should be hauled away or incinerated under safe conditions.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)	Not required under normal use conditions.	
VENTILATION	LOCAL EXHAUST	SPECIAL Provide adequate ventilation.
	MECHANICAL (General)	OTHER
PROTECTIVE GLOVES	Rubber or other impervious material.	EYE PROTECTION Safety goggles
OTHER PROTECTIVE EQUIPMENT	Apron	

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING	Avoid prolonged or repeated breathing of vapor. Do not get in eyes. Avoid prolonged or repeated skin contact. Wash thoroughly after handling. Store at moderate temperature out of direct sunlight and away from heat, sparks and open flames.
OTHER PRECAUTIONS	May separate below 0°F. (Restores when warmed to room temperature and agitated.) Keep away from oxidizing materials. Before opening, relieve any pressure build-up in drum by loosening bung slowly. Keep container closed when not in use.

The information herein is given in good faith, but no warranty, expressed or implied is made.

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
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SECTION I

MANUFACTURER'S NAME: OAKITE PRODUCTS, INC.	EMERGENCY TELEPHONE NO.: 201-464-6900
ADDRESS (Number, Street, City, State, and ZIP Code): 50 Valley Road, Berkeley Heights, New Jersey 07922	
CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS: Oakite 12
CHEMICAL FAMILY: Alkali (Mild)	FORMULA: Proprietary

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Not applicable		

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	Unknown	SPECIFIC GRAVITY (H_2O=1)	1.002
VAPOR PRESSURE (mm Hg.)	Unknown	PERCENT, VOLATILE BY VOLUME (%)	N/A
VAPOR DENSITY (AIR=1)	Unknown	EVAPORATION RATE (________ =1)	N/A
SOLUBILITY IN WATER	Complete	pH (1/4% by volume to full strength)	9.5
APPEARANCE AND ODOR	Yellowish-green liquid; no odor.		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used): None.	FLAMMABLE LIMITS: N/A	Lel	Uel
EXTINGUISHING MEDIA: Will not burn or support combustion.			
SPECIAL FIRE FIGHTING PROCEDURES: N/A			
UNUSUAL FIRE AND EXPLOSION HAZARDS: None.			

Oakite 12

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: Not applicable

EFFECTS OF OVEREXPOSURE: Direct contact with eyes may cause irritation. Prolonged skin contact may cause irritation.

EMERGENCY AND FIRST AID PROCEDURES: For eyes, flush with plenty of water for at least 15 minutes; get medical attention if eyes are irritated. For skin, flush with water.

SECTION VI - REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		N/A
	STABLE	X	

INCOMPATABILITY *(Materials to avoid)*: None known.

HAZARDOUS DECOMPOSITION PRODUCTS: None known.

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		N/A
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Flush area with plenty of water.

WASTE DISPOSAL METHOD: Generally, no special treatment is necessary. Discharge according to federal, state and local regulations. Dilution with water may be necessary.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*: N/A

VENTILATION	LOCAL EXHAUST	SPECIAL
N/A	MECHANICAL *(General)*	OTHER

PROTECTIVE GLOVES: Rubber for prolonged contact.

EYE PROTECTION: Safety goggles if subject to splash.

OTHER PROTECTIVE EQUIPMENT: N/A

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Suitable for general indoor storage. Keep from freezing (freezes at 24°F., restores on thawing.) Keep container closed when not in use.

OTHER PRECAUTIONS: Do not get in eyes. Avoid prolonged skin contact. Wash thoroughly after handling.

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APPENDIX H

LITERATURE REVIEW OF ENVIRONMENTAL FATE OF 1,1,1-TRICHLOROETHANE

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APPENDIX I

SOURCES OF INFORMATION

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