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[Proposed Rules]
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ENVIRONMENTAL PROTECTION AGENCY
40 CFR Part 300

[FRL-5684-8]

National Oil and Hazardous Substances Pollution Contingency Plan;
National Priorities List

AGENCY: Environmental Protection Agency.

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ACTION: Notice of intent to delete the Conklin Dumps site from the National Priorities List: Request for comments.

SUMMARY: The Environmental Protection Agency (EPA) Region II announces its intent to delete the Conklin Dumps site from the National Priorities List (NPL) and requests public comment on this action. The NPL is Appendix B of 40 CFR part 300 which is the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), which EPA promulgated pursuant to Section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended. EPA and the State of New York have determined that no further cleanup by responsible parties is appropriate under CERCLA. Moreover, EPA and the State have determined that CERCLA activities conducted at the Conklin Dumps to date have been protective of public health, welfare, and the environment.

DATES: Comments concerning the deletion of the Conklin Dumps site from the NPL may be submitted on or before March 12, 1997.

ADDRESSES: Comments concerning the deletion of the Conklin Dumps site from the NPL may be submitted to: Arnold R. Bernas, P.E., Remedial Project Manager, U.S. Environmental Protection Agency, Region II, 290 Broadway, 20th floor, New York, NY 10007-1866.

Comprehensive information on the Conklin Dumps site is contained in the EPA Region II public docket, which is located at EPA's Region II office (the 18th floor), and is available for viewing, by appointment only, from 9:00 a.m. to 5:00 p.m., Monday through Friday, excluding holidays. For further information, or to request an appointment to review the public docket, please contact Mr. Bernas at (212) 637-3964.

Background information from the Regional public docket is also available for viewing at the Conklin Dumps site's Administrative Record repository located at: Conklin Town Hall, 1271 Conklin Road, Conklin, NY 13748.

FOR FURTHER INFORMATION CONTACT: Arnold Bernas at (212) 637-3964.

SUPPLEMENTARY INFORMATION:

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I. Introduction

EPA Region II announces its intent to delete the Conklin Dumps site from the NPL and requests public comment on this action. The NPL is Appendix B to the NCP, which EPA promulgated pursuant to Section 105 of CERCLA, as amended. EPA identifies sites that appear to present a significant risk to public health, welfare, or the environment and maintains the NPL as the list of those sites. Sites on the NPL may be the subject of remedial actions (RAs) financed by the Hazardous Substances Superfund Response Trust Fund (the "Fund"). Pursuant to Sec. 300.425 (e)(3) of the NCP, any site deleted from the NPL remains eligible for Fund-financed RAs, if conditions at such site warrant action.

EPA will accept comments concerning the Conklin Dumps site for thirty (30) days after publication of this document in the Federal Register (until March 12, 1997).

Section II of this notice explains the criteria for deleting sites from the NPL. Section III discusses the procedures that EPA is using for this action. Section IV discusses how the Conklin Dumps site meets the deletion criteria.

II. NPL Deletion Criteria

The NCP establishes the criteria that the Agency uses to delete sites from the NPL. In accordance with 40 CFR Sec. 300.425 (e), sites may be deleted from the NPL where no further response is appropriate. In making this determination, EPA, in consultation with the State, will consider whether any of the following criteria have been met:

1. That responsible or other persons have implemented all appropriate response actions required; or
2. All appropriate Fund-financed responses under CERCLA have been implemented, and no further cleanup by responsible parties is appropriate; or
3. The remedial investigation has shown that the release poses no significant threat to public health or the environment and, therefore, taking remedial measures is not appropriate.

III. Deletion Procedures

The NCP provides that EPA shall not delete a site from the NPL until the State in which the release was located has concurred, and the public has been afforded an opportunity to comment on the proposed deletion. Deletion of a site from the NPL does not affect responsible party liability or impede agency efforts to recover costs associated with response efforts. The NPL is designed primarily for informational purposes and to assist agency management.

The following procedures were used for the intended deletion of the Conklin Dumps site:

1. EPA Region II has recommended deletion and has prepared the relevant documents.
2. The State of New York has concurred with the deletion decision.
3. Concurrent with this Notice of Intent to Delete, a notice has been published in local newspapers and has been distributed to appropriate federal, state and local officials, and other interested parties. This notice announces a thirty (30)-day public comment period on the deletion package starting on February 10, 1997 and concluding on March 12, 1997.
4. The Region has made all relevant documents available in the regional office and the local site information repository.

EPA Region II will accept and evaluate public comments and prepare a Responsiveness Summary, which will address the comments received, before a final decision is made. The Agency believes that deletion procedures should focus on notice and comment at the local level. Comments from the local community may be most pertinent to deletion decisions. If, after consideration of these comments, EPA decides to proceed with deletion, the EPA Regional Administrator will place a Notice of Deletion in the Federal Register. The NPL will reflect any deletions in the next update. Public notices and copies of the Responsiveness Summary will be made available to the public by EPA Region II.

IV. Basis for Intended Site Deletion

Site History and Background

The Conklin Dumps site originally consisted of two landfilled areas totaling about 37 acres, referred to as the Upper and Lower Landfills. The Lower Landfill, which was operated between 1964 and 1969, contained approximately 48,000 cubic yards of wastes before it was excavated and consolidated with the Upper Landfill. The Upper Landfill, which originally contained approximately 55,000 cubic yards of waste, was operated from 1969 until 1975, when a closure order was issued by the New York State Department of Environmental Conservation (NYSDEC). The property is currently owned by the Town of Conklin.

A two-phase hydrogeologic investigation was completed by O'Brien and Gere Engineers for the Broome County Industrial Development Agency in 1984 and 1985; additional field work was performed in 1986. In June 1986, the site was nominated for inclusion on the National Priorities List. In June 1987, a Consent Order was signed

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between the Town of Conklin and NYSDEC, which covered the performance of a remedial investigation and feasibility study (RI/FS) and the remedial design (RD)/remedial action (RA).

The RI, which was completed in December 1988, indicated limited ground-water contamination in the immediate vicinity of the Upper Landfill. Confirmatory sampling, performed in June 1990, confirmed the RI findings and provided additional validated data.

An FS report was completed in January 1991.

EPA, in consultation with NYSDEC, issued a Proposed Plan on February 3, 1991. A public comment period began on February 4, 1991 and extended until March 6, 1991. A public meeting was held at the Conklin Town Hall on February 25, 1991. A ROD, which was signed by the EPA Regional Administrator on March 29, 1991, called for, among other things, capping of the Upper Landfill and the Lower Landfill in-place, leachate collection, either on- or off-site treatment of the leachate, and long-term monitoring.

During preliminary design activities associated with the selected remedy, it was determined that the construction of a leachate collection trench and cap at the Lower Landfill would present significant engineering difficulties due to the proximity of an adjacent wetland and railroad tracks. In order to eliminate the leachate seeps at the Lower Landfill, it would be necessary to install a leachate collection system below the water table. A leachate collection system installed below the water table, however, would collect vast amounts of uncontaminated ground water and could adversely impact the adjacent wetland by dewatering a portion of it, unless hydraulic barriers were installed (which in itself could adversely impact the wetland). In addition, installing a cap on the Lower Landfill could negatively impact the adjacent wetland in that it would encroach on the wetland. Due to these technical feasibility and environmental concerns, the selected remedy was modified by an Explanation of Significant Differences (ESD) in September 1992. The modified remedy consists of the excavation of the Lower Landfill, consolidation of the excavated Lower Landfill contents onto the Upper Landfill, capping of the Upper Landfill, construction of a leachate collection system, and either on- or off-site treatment of the leachate.

Lower Landfill

The RD associated with the excavation of the Lower Landfill and consolidation of the excavated wastes onto the Upper Landfill commenced in April 1991 and was completed in September 1992.

The excavation of the Lower Landfill began in January 1993. The composition of the wastes that were encountered during the excavation was primarily soil and decomposed organic matter intermixed with scrap metal, bottles and fabric from a local tent manufacturer. Although four 55 gallon drums were encountered, they were found to be empty or contained non-hazardous debris, and were crushed and disposed of in the Upper Landfill.

The waste that was excavated from the Lower Landfill was deposited on the Upper Landfill in approximately one-foot lifts. This effort was completed in July 1993.

A Remedial Action Report, documenting the completion of the excavation of the Lower Landfill was approved on September 29, 1993.

Upper Landfill

The RD associated with the capping of the consolidated wastes on the Upper Landfill and the construction of a leachate collection, storage, and pre-treatment system commenced in April 1991 and was completed in July 1993.

The compaction and regrading of the excavated waste mass, installation of a leachate recovery system, construction of a final cover system for the Upper Landfill, and the installation of an eight-foot high chain linked fence around the Upper Landfill to restrict access, was performed from October 1993 to November 1994.

Leachate Storage and Pre-Treatment System

In June 1995, the Binghamton-Johnson City Joint Sewer Board approved the Town of Conklin's application for discharge of the leachate from the Upper Landfill into the sanitary sewer system for treatment at the Binghamton-Johnson City Joint Sewage Treatment Plant in Vestal, New York. This approval required that the Town obtain an industrial wastewater discharge permit and temporarily store the leachate in an on-site storage tank while it is sampled and analyzed to determine if it meets the discharge requirements of the permit.

The construction of a leachate storage, pre-treatment system, and pipeline to the sewer interceptor, which began in November 1995, included the installation of a 30,000 gallon horizontal steel storage tank with a secondary containment dike, installation of a leachate pre-treatment system, consisting of a series of bag filters to remove solids, and installation of a pipe to discharge the leachate from the storage and pre-treatment system to the sanitary sewer system. Although the work was completed in January 1996, a final inspection could not be conducted until after the snow melt in June 1996.

A Remedial Action Report, documenting the completion of the construction of the final cover system and leachate collection system for the Upper Landfill, leachate collection tank installation, and construction of a pipeline to the sewer interceptor was approved on July 15, 1996.

A Superfund Site Close-Out Report for the site was approved on September 13, 1996.

Summary of Operation and Maintenance and Five-Year Review Requirements

Pursuant to terms of the Consent Order signed with NYSDEC on June 12, 1987, the Town of Conklin will perform post-remediation operation and maintenance associated with the Upper Landfill's final cover system and the leachate collection and pre-treatment systems. These activities will consist of landfill cover system inspection and maintenance (including grass mowing, fence repairs, soil cover repairs); leachate collection system inspection, operation, and maintenance; and leachate pre-treatment system inspection, operation, and maintenance. In addition, groundwater, surface water, and leachate sampling and analysis will be performed.

A statutory review of the long-term monitoring and inspection program reports will be performed in January 1998, five years after the initiation of the RA, to assure that the remedy remains effective in protecting human health and the environment.

Summary of How the Deletion Criteria Has Been Met

All of the completion requirements for this site have been met as specified in OSWER Directive 9320.2-09. Specifically, based on the field observations associated with NYSDEC construction oversight, the results of the preliminary post-construction and the final post-construction inspections, and the results of samples collected during the implantation of the remedy, it has been determined that construction for the Conklin Dumps site has been completed and that the construction activities performed on-site were consistent with the RD plans and specifications and conform with the remedies selected in the ROD, as modified by the ESD.

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EPA, with concurrence from the State on December 16, 1996, has determined that the response actions undertaken at the Conklin Dumps site are protective of human health and the environment.

In accordance with 40 CFR 300.425(e), sites may be deleted from the NPL where no further response is appropriate. EPA, in consultation with the State, has determined that all appropriate responses under CERCLA have been implemented and that no further cleanup by responsible parties is appropriate. Having met the deletion criteria, EPA proposes to delete the Conklin Dumps site from the NPL.

Dated: January 17, 1997.
William J. Muszynski,
Acting Regional Administrator.
[FR Doc. 97-2994 Filed 2-7-97; 8:45 am]
BILLING CODE 6560-50-P

REF 2a

REPORT

HYDROGEOLOGIC INVESTIGATION
PROPOSED BROOME COUNTY
INDUSTRIAL PARK
CONKLIN, NEW YORK

BROOME COUNTY
INDUSTRIAL DEVELOPMENT AGENCY
BINGHAMTON, NEW YORK

MARCH, 1984

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

O'BRIEN & GERE

March 19, 1984

Mr. Peter Kay, Executive Director
Broome County Industrial Development Agency
c/o Planning Department
5th Floor
County Office Building
Government Plaza
Binghamton, New York 13903

Re: Proposed Broome County Industrial Park Hydrogeologic Investigation

File: 2733.002

Dear Mr. Kay:

Enclosed is the Hydrogeologic Investigation Report of the proposed Broome County Industrial Park which was prepared by O'Brien & Gere Engineers, Inc. for the Broome County Industrial Development Agency.

The report summarizes environmental impacts and development limitations imposed by two abandoned landfills at the proposed industrial park site located in Conklin, New York. In addition, the report includes recommendations and cost estimates of remedial actions proposed for the two landfills.

We appreciate having had this opportunity to work for the Broome County Industrial Development Agency and look forward to meeting with you to discuss the conclusions and recommendations of the report.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.

C.B. Murphy Jr.

Cornelius B. Murphy, Jr., Ph.D.
Senior Vice President

CBM/wp

Enclosures

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2 Water Budget Data for the Upper Landfill

3 Water Budget Data for the Lower Landfill

EXECUTIVE SUMMARY

O'Brien & Gere Engineers, Inc. has completed Phase I of a hydrogeologic investigation for the proposed Broome County Industrial Park in Conklin, New York. The purpose of the investigation was to evaluate the potential for contamination and development limitations of two abandoned landfills on the proposed industrial park site. Below is a summary of the findings, conclusions and recommendations of the hydrogeologic investigation.

Upper Landfill

The landfill is about 25 feet thick, may contain approximately 5 million cubic feet of refuse, and is underlain by a low permeability glacial till material which significantly restricts the migration of landfill leachate into the groundwater.

It has been estimated that approximately 1.8 million gallons of leachate is generated annually by precipitation infiltrating the landfill surface and an additional 1,000 gallons of leachate is generated each year by groundwater flowing through the refuse.

The inorganic chemical analyses of the landfill leachate is typical of what is found in municipal refuse. However, the presence of various organic chemicals indicates that some industrial waste may be present.

Groundwater flow from the landfill is in an east-northeast direction towards Carlin Creek at a relatively low rate of approximately 8×10^{-5} ft/day (.03 ft/year).

Due to the low permeability of the subsurface materials, leachate seeps may develop during wet periods of the year which may have an impact the water quality of Carlin Creek.

Although the landfill has impacted the groundwater quality immediately adjacent to the landfill, the groundwater quality poses no threat to downgradient well users.

Recommendations: It is recommended that a low permeability soil cover be installed on the landfill to eliminate leachate seeps at an estimated cost of $430,000. In addition, continued groundwater monitoring is recommended.

Lower Landfill

The lower landfill may contain approximately 1.4 million cubic feet of refuse, is underlain by highly permeable sand and gravel which promotes rapid recharge of landfill leachate to the groundwater.

It has been estimated that approximately .9 million gallons of landfill leachate is generated by precipitation infiltrating the landfill surface and up to 150,000 gallons of leachate is generated by groundwater flowing through the refuse.

The chemical analyses of leachate is typical of what is found in municipal solid waste landfill leachate.

Groundwater flow is eastward towards Route 7 and the Susquehanna River at an estimated flow rate of 3 to 30 feet per day.

Some of the homeowner wells downgradient from the landfill contain iron, manganese and arsenic levels in excess of NYSDEC Class GA

Groundwater Standards. The iron and manganese levels are believed to be attributed to the landfill, however, the source of the arsenic has not been clearly defined.

Recommendations: It is recommended that the homeowners water supplies be replaced by extending the Town of Conklins water supply system along Route 7 at an estimated cost of $300,000.

A low permeability soil cover is recommended to be installed on the landfill to minimize leachate generation at an estimated cost of $280,000.

Continued surface water monitoring and groundwater monitoring of on-site wells and homeowner wells for at least one year is recommended to evaluate long term impacts from the landfill. The estimated cost of this monitoring for one year is $20,000.

Should building construction occur over the lower landfill additional geotechnical testing is recommended. The amount of testing is dependent on the type of structures to be constructed but could include: test borings, in-situ plate loading tests, and laboratory consolidation tests.

SECTION 1 - INTRODUCTION

1.01 Project Background

During June 1983 the Broome County Department of Planning submitted a proposal to the Broome County Legislature recommending that the County actively pursue the acquisition and development of a 619 acre trace of land (Figure 1) in the Town of Conklin for the purpose of creating a major industrial park. The site is located south of Powers Road, approximately one mile north of the Kirkwood Interchange. The ultimate goal of the proposed project is to create new jobs, broaden the County's tax base and promote additional growth in Broome County. The development of the project is to be undertaken by the Broome County Industrial Development Agency (BIDA).

Included within the proposal was a Preliminary Environmental Assessment of the proposed industrial park. A major concern of the assessment was the potential impacts the project may have on local water supplies, including the Town of Conklin Well No. 3. In particular, two abandoned landfills are located on the proposed industrial park site. The impacts, if any, of these landfills on the viability of the project was determined by the BIDA to require further investigations. As a result the Broome County Industrial Development Agency requested that a hydrogeologic investigation be undertaken on the site of the proposed industrial park.

The proposed hydrogeologic investigation is to be conducted in two phases. The first phase is to include a determination of the hydrogeologic setting of and development limitations imposed by the two abandoned landfills on the site. The second phase is to provide determination of the hydrogeologic and geotechnical conditions of the entire site that would affect development of the industrial park. This report addresses only the objectives of the first phase of the hydrogeologic investigation.

1.02 Authorization and Scope

During July, 1983 the Broome County Industrial Development Agency (BIDA) authorized O'Brien & Gere Engineers, Inc. to perform Phase I of the hydrogeologic investigation at the proposed Broome County Industrial Park which includes the hydrogeologic investigation of the two abandoned landfills on site. The scope of work for the investigation is outlined in the Request for Proposal (RFP) dated June 24, 1983, and is described in detail in the proposal submitted by O'Brien & Gere Engineers, Inc. in July 1983. In general, the scope of work includes the following:

a. determination of the physical and chemical characteristics of waste deposited in the landfills, emphasizing the presence of toxic or hazardous materials and the build-up/migration of methane and volatile toxics.

b. determination of the existence of, or potential for, contamination of local groundwater and surface water by landfill leachate, and

c. recommendations and cost estimates for remedial action at the landfills, emphasizing the control of methane and volatile toxics and the prevention or elimination of groundwater and surface water contamination by landfill leachate (i.e., venting, physical containment, and/or removal measures).

The findings, conclusions and recommendations of the hydrogeologic investigation described above were submitted to the BIDA in a draft report during September, 1983. Recommendations of the report included: resampling the on-site wells and sampling the homeowner wells downgradient from the landfill sites. During November, 1983 the BIDA authorized O'Brien & Gere Engineers, Inc. to conduct this additional sampling, the results of which are incorporated into this report. In addition, the Broome County Health Department in conjunction with the State Health Department performed sampling and analyses of selected homeowner wells downgradient from the lower landfill which are also incorporated into this report.

1.03 Site Description

The two abandoned landfills on the proposed industrial park site shown on Figure 1 were operated by the Town of Conklin. The descriptions of the two sites as summarized in the Broome County Industrial Park Preliminary Environmental Assessment (Broome County Department of Planning 1983) follows:

1. The lower, or eastern-most landfill was operated from 1964 to 1969 and consists of three linear trenches situated adjacent to the D&H Railroad. Assuming an average depth of 30 feet for each trench, the lower landfill was previously estimated to contain approximately 3,700,000 cubic feet of waste material. Preliminary indications are that the landfill contains municipal solid waste (MSW), although some industrial and chemical wastes may also be present. Chemical analysis conducted in April 1983 indicated that leachate flowing from the landfill to

the adjacent off-site wetland contains purgeable volatile halogenated organic compounds (VHO), petroleum-based compounds benzene, toluene, and xylene (BTX), and heavy metals that were either undetectable or present in concentrations below the drinking water standards/guidelines set by the New York State Department of Health (NYSDOH).

2. The upper landfill was opened in 1969 by the Town of Conklin and closed in 1975 under a closure order issued by the New York State Department of Environmental Conservation (DEC). Most of the waste deposited in the landfill was placed in six unlined cells, with subsequent piling of additional waste material over the cells. The majority of the waste in the landfill is MSW, although there are unofficial reports that some industrial and chemical wastes were deposited there periodically. Assuming an average depth of 25 feet, the total filled volume of the landfill was previously estimated at 6,875,000 cubic feet. Chemical analysis of leachate conducted in April 1983 indicated that leachate emanating from the side of the landfill contains BTX that was present in trace quantities below the minimum guidelines set by NYSDOH. VHO and heavy metals were either undetectable or below the minimum standards/guidelines set by NYSDOH.

SECTION 2 - FIELD INVESTIGATIONS

2.01 General

This section presents the methods and procedures used during field investigations at the abandoned landfill sites which were conducted from July 27, 1983 through January 19, 1984. During this time the following tasks were completed:

1. Test boring completion and soil sampling.
2. Monitoring well installation and development.
3. In situ permeability testing.
4. Elevation survey of test borings/monitoring wells.
5. Static water level monitoring of completed wells.
6. Groundwater sampling and analyses.

2.02 Test Borings

A total of fifteen test borings were completed between July 27, 1983 and August 8, 1983 to evaluate the on-site subsurface hydrogeologic conditions. The locations of the borings are shown on Figure 2 All test borings were completed using a Central Mine Equipment (CME) model 55 drilling machine equipped with continuous flight hollow stem augers assembled in 5-foot sections. Samples of the encountered soils were collected at least every five feet using ASTM method D1586 Split Barrel Sampling. As the test borings were completed within the fill area of each landfill, samples were collected continuously, from the land surface through the entire depth of the borehole.

Following the retrieval of the sampling device the soil samples were monitored for organic vapor content. This was accomplished by initially isolating the sample in a 1/2 pint jar covered with aluminum foil for a ten minute period, then analyzing the head space of the jar for organics using an organic vapor analyzer manufactured by HNU, which was calibrated for benzene, and/or an organic vapor analyzer manufactured by Dreager which was calibrated for trichloroethylene. In addition the test borings completed within the fill areas were monitored using a methane gas detector. Following completion of each borehole the samples were sealed in glass jars marked with the appropriate identification and delivered to O'Brien & Gere for later inspection and/or analyses.

The field organic vapor analyses using the HNU meter and the Dreager tubes revealed that the organic levels within all the soil samples were less than detectable. Although the water quality analyses detected levels of organic chemicals (see Section 3.05) within several monitoring wells, the organics were not detected within the soil samples due to: 1) the detection limits of the HNU meter and Dreager tube are 1 mg/l and 5 mg/l respectively whereas most organics detected within the groundwater were less than 1 mg/l (1,000 ug/l), 2) the organic vapors analyzed within the head space of the sampling jar are dispersed from the water and therefore will be detected at a lower concentration than those which occur within the groundwater, and 3) the HNU meter and Dreager tubes were calibrated for benzene and trichloroethylene respectively, these parameters were not detected at high concentrations within the groundwater. Therefore, although the HNU meter and Dreager tube analyses are effective screening tools to identify gross organic contamination within soils, they did not have a high level of sensitivity to detect the organic levels found within the groundwater at the upper and lower landfills.

The lithologic logs and well details shown in Appendix A, present the visual interpretations of each boring made by the O'Brien & Gere Engineers, Inc. geologists and the well specifications for each monitoring well. Appendix B includes a detailed description of the soil sampling methods and descriptions of the subsurface materials made by the drilling subcontractors, Parratt-Wolff, Inc.

Two of the test borings were completed through the refuse of the upper landfill and three of the test borings were completed through the refuse of the lower landfill. The thicknesses of refuse encountered within each of these borings were used to re-evaluate the fill volumes previously estimated by the Broome County Planning Department (1983). Based on the fill thickness of 32 feet encountered in boring no. 2, the interpretation of the subsurface conditions (Figure 4), and the assumption that the areal extent of the landfill is the same as what was estimated by Town of Conklin, it is estimated that the fill volume of the upper landfill is approximately 5 million cubic feet. Based on the fill thickness encountered in boring nos. 7, 13, and 15 and the previously estimated areal extent of the lower landfill, it is estimated that lower landfill contains approximately 1.4 million cubic feet of refuse. It should be noted that these fill volumes are based on very limited test boring data, and assumptions on the areal extent of each landfill. Additional test borings, and a more accurate methods of defining the fill boundaries such as aerial photo analysis and magnetometer survey would be needed to provide representative volumes of fill for each landfill.

2.03 Groundwater Monitoring Well Installation

Twelve of the fifteen test borings were completed into groundwater monitoring wells. These wells serve to establish a groundwater profile, provide information on the flow rate and direction of groundwater movement, and supply sampling points from which representative samples of the groundwater can be withdrawn. A map showing the location of the wells is included as Figure 2.

All groundwater monitoring wells were constructed of 2-inch ID flush joint threaded pvc well screen and riser pipe. The riser pipe on all wells was extended to the surface and a protective steel casing or curb box with a lock was installed on the riser pipe to prevent unauthorized entry. The method of installation was to lower the screen and casing assembly into the hollow stem auger to the selected screen depths. A washed Ottawa sand pack was then placed around the well screen and extended to a minimum of 2 feet above the top of the screen. A bentonite pellet seal was then placed on top of the sand pack to a minimum of one feet above the sand pack. The remaining annular space between the borehole wall and casing was then filled with a bentonite slurry grout to an elevation of approximately 2 feet below the existing ground surface. A bentonite/portland cement grout mix was then extended to the ground surface to ensure that surface water runoff will not enter the well via the borehole. Detailed designs of the wells are included in Appendix A.

Auger soil sampling equipment and miscellaneous tools used in the installation of the groundwater monitoring wells were thoroughly cleaned by rinsing with soap and water, rinsing a second time with an acetone solution and a third time with distilled water. This cleaning process was conducted to prevent cross contamination of the wells by the drilling equipment.

Following installation, the groundwater monitoring wells were developed using a centrifugal pump. In general this involved lowering a polypropylene hose of sufficient length to the bottom of the well and pumping the well to clear the finer grained sediments from around the well screen.

2.04 Methane Gas/Leachate Monitoring Well Installation

Three of the fifteen test borings were completed into monitoring wells to monitor for methane gas and to provide samples of the leachate for chemical analysis. Although the purpose of these wells was intended primarily for monitoring methane gas, the position of the water table within the landfill refuse at each site allowed the dual use of the wells for monitoring landfill leachate and gas monitoring.

The gas/leachate monitoring wells were installed by lowering a 2" ID pvc well screen into the hollow stem auger to the desired well depth. A washed Ottawa sand pack or pea gravel was then placed around the well screen. The well screen and packing material were extended to an elevation of about 2 feet below the ground surface. A surface casing and a bentonite/portland cement grout was then extended to the ground surface to restrict surface water infiltration and prevent the escape of methane gas through the annulus of the borehole. Detailed designs of the methane gas/leachate monitoring wells (Nos. 13-15) are included on Appendix A.

2.05 Well Elevation Survey

Following completion of the monitoring wells, an elevation survey was performed during August 1983 to determine monitoring well ground elevations and top of casing elevations relative to an existing mean sea level datum. The datum that was used for establishing the elevations was taken from benchmark "y-12" on The Broome County Industrial Park Site Plan, which has an elevation of 866.481 ft above mean sea level. On August 16, and November 9, 1983, water level measurements were taken at each of the monitoring wells to assess groundwater flow patterns which are illustrated on Figure 3. The monitoring well data is summarized in Table 1.

2.06 In-Situ Permeability Test

An in-situ permeability test was conducted on monitoring well No. 1 to determine the permeability of the subsurface materials beneath the upper landfill. The test was performed by evacuating a volume of water from the well and thus creating a potential hydraulic difference between the well and the surrounding aquifer. The rate of recovery of the water level in the well is then monitored which is a function of the hydraulic conductivity of the aquifer. Values for the hydraulic conductivity were then calculated using a digital computer program by Weyer and Horwood-Brown (1982) that applies the use of Hvorslev's formulae.

2.07 Groundwater Sampling

Groundwater quality samples were collected from all monitoring wells using a stainless steel bailer. Care was taken during the sampling procedure to assure that a representative sample was being collected.

This involved calculating the volume contained in the well column and monitoring the volume of the water removed. Samples were collected following evacuation of three times the volume contained in the well. All samples were collected in properly prepared sample bottles. For example, the samples analyzed for benzene, toluene and xylene (BTX) and volatile halogenated organics (VHO) were collected in head space free glass vials secured with a teflon cap. Following completion of the sample collection, all samples were placed on ice, and promptly transported to the O'Brien & Gere laboratory in Syracuse, New York for analysis. A more detailed description of groundwater sampling methods applied at the site is included in Appendix C.

SECTION 3 – HYDROGEOLOGICAL INVESTIGATION

3.01 Geology

The Broome County Industrial Park is located within the Susquehanna section of the glaciated Appalachian Plateau. This region is characterized by moderately sloping uplands and broad flat valley floors. The landscape has been sculptured by fluvial and glacial processes which have rounded the hill tops and partially filled the Susquehanna river valley with unconsolidated deposits.

The bedrock that underlies the site consists of fine grained sediments that were deposited in a shallow sea during the late Devonian age (approximately 350 million years ago). The sediments were consolidated through time into rock formations which are composed predominantly of gray, fine grained siltstone and shale. These rock types are comprised of layers that dip gently in a southerly direction at a rate of 10 to 40 feet per mile. Small planar openings commonly develop parallel and perpendicular to the layers. These openings or fractures provide the only significant void spaces in which groundwater can be transported through the bedrock. Because the fractures comprise only a small percentage of the total rock volume, the shale/siltstone bedrock is considered to be of low permeability where flow rates are slow and well yields are generally less than a few gallons per minute out of a common household well. Test boring logs and well records from this investigation and Randall (1972) indicate that the bedrock underlies the unconsolidated deposits from a depth of 60 feet in the vicinity of the upper landfill and 114 feet beneath the lower landfill.

The unconsolidated deposits underlying the site are composed predominantly of sediments that were deposited by glaciers or glacial meltwaters several thousand years ago. The deposits vary in composition and include: glacial till, lacustrine deposits and outwash sand and gravel. The vertical and horizontal distribution of these deposits is shown on Figure 4.

Glacial till is the most wide spread unconsolidated deposit at the site. It extends from the land surface to the bedrock near the upper landfill and is overlain by other deposits in the vicinity of the lower landfill. The till is composed of a dense, unsorted mixture of silt, clay, sand, and rock fragments which were derived from the underlying siltstone and shale bedrock. Till thicknesses range from 60 feet beneath the upper landfill to 89 feet beneath the lower landfill site. Due to its high silt and clay content and unsorted nature and high density, the glacial till has a low permeability. The in-situ permeability test of Well 1 on-site indicates that the glacial till at the site has a permeability of 1.4×10^{-7} cm/sec.

Lacustrine deposits present at the site identified as the silt and clay deposits on Figure 4 were deposited from lakes associated with glaciation. These deposits are variable in thickness and reach thicknesses of up to 32 feet in the vicinity of the upper landfill site and 45 feet in the vicinity of Route 7. Because of their fine grained texture, the lacustrine deposits are of low permeability and are generally unproductive aquifers.

Coarse grained materials that were deposited by glacial meltwaters are called outwash. The outwash deposit is composed of relatively well sorted sand and gravel with lesser amounts of silt. The outwash deposit at the lower landfill site forms a continuous layer of sand and gravel that extends from Well No. 6 to the Susquehanna River (Figure 4). The thickness ranges from 5 feet in Well 6 to 20 feet in Well 1002. Due to the coarse grained texture and well sorted nature of the sand and gravel, the outwash deposit has high permeability and forms a productive groundwater aquifer within the Susquehanna River Basin. Well records (Randall, 1972) indicate that this outwash deposit is an important source of water supply to the local homeowners to the northeast of the lower landfill along Route 7 and to the Town of Conklin Well No. 3.

3.02 Groundwater Flow Conditions

Part of the precipitation falling on the land surface is transported as surface water runoff, some of it stays within the soils and is either transpired by plants or evaporated, and the remainder percolates through the ground as groundwater. Groundwater is usually considered to occur in two zones which include: (1) the zone of aeration where the pore spaces of the soil or rock are filled with both air and water and (2) the zone of saturation where the pore spaces become entirely filled with water, the top of which is called the water table.

Any groundwater that infiltrates through the refuse will percolate downward until it reaches the water table. Once the groundwater reaches the water table it enters the groundwater flow system where it flows under the influence of gravity down the slope of the water table until it reaches a point of discharge such as a spring, lake or stream. Generally, the slope of the water table is parallel to the slope of the land surface. A typical groundwater system is comprised of a small local system superimposed upon a larger regional system. In a local system, the groundwater discharges in a spring, small stream or pond, whereas in a regional flow system groundwater flows downgradient beneath the local streams then discharges into a major river or lake.

The depth to the water table at the site during August 1983 varied from 23.4 feet beneath the land surface of the upper landfill (at Well 2) to 11.7 feet below the land surface of the lower landfill at (Well 7). During November the water table elevations were 1 to 2 feet lower which may be attributed to the higher evapotranspiration rates during this time of the year. Conversely, the water table is expected to occur 1-2 feet higher during the spring when the greatest amount of groundwater recharge occurs from snowmelt. Based on these water table depths and the depths of the refuse shown in the test boring logs, it is estimated that the water table ranges from 7 to 11 feet above the base of the refuse in the upper landfill and ranges from 1 to 4 feet above the base of the refuse in the lower landfill.

The water table elevations shown on Figure 3 indicate that the groundwater flowing from the upper landfill is predominantly in an eastward direction towards the Susquehanna River. Well 12 was installed as a downgradient well to the upper landfill, however, the well was dry at both times water level measurements were collected. During installation of the Well 12 groundwater was encountered at a depth of 11 feet. The fact that the well was dry indicates that the groundwater encountered was a perched water table condition which was drained after the well was installed. The true groundwater table occurs below the well bottom which is at an elevation of 883 feet. Based on this information, the groundwater just to the north of the upper landfill may flow more in a northeast direction towards Carlin Creek than what is shown on the Groundwater Elevation Map (Figure 3). However, because the actual groundwater elevation at Well 12 was not determined for this investigation, this northeastward flow component cannot be accurately defined on Figure 3. As a result, although the Groundwater Elevation Map indicates that the groundwater flowing from upper landfill is predominantly in an eastward direction towards the Susquehanna River, some of the groundwater may flow to the northeast and discharge into Carlin Creek. The groundwater elevation map shows that the groundwater flow direction in the vicinity the lower landfill is also eastward towards the Susquehanna River and the flow direction is not influenced by the pumping of Town of Conklin's Well No. 3.

The velocity or rate of travel of uncontaminated groundwater can be approximated using Darcy's law in combination with the basic equation of hydraulics and a correction factor for porosity. The groundwater flow velocity equation is as follows:

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

where,

V = Velocity in feet per day

K = permeability, in gpd/square foot

dh/dL = water table gradient

a = porosity

To estimate the groundwater velocity in the glacial till beneath the upper landfill the permeability from the in-situ permeability test was calculated to be 1.4×10^{-7} cm/sec (.294 gpd/ft^2). This value in combination with the water table gradient of .070 (measured from the water elevation map - Figure 3) and a porosity value of .34 which is typical for glacial till (Todd, 1981) gives an estimated groundwater flow velocity for the upper landfill of 8.1×10^{-5} ft/day (.03 ft/year).

The water transmitting capacity or transmissivity of an 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 published reports on the sand and gravel aquifers within the Susquehanna River Basin (Randall, 1977) transmissivity values for sand and gravel aquifers in this area generally range from 10,000 gallons per day per foot (gpd/ft) to 100,000 gpd/ft. Pump test data on the Town of Conklin Well No. 1 (St. John Associates, 1967) indicates a higher local transmissivity of 130,000 gpd/ft. However, due to the close proximity of the Town of Conklin Well No. 1 to the Susquehanna River, the transmissivity value may be slightly high due to surface water recharge. As a result, the 10,000-100,000 gpd/ft range of transmissivity appears to be a more valid representation of the sand and gravel aquifer beneath the lower landfill. Additional pump test data would be needed to develop more refined transmissivity values for the sand and gravel aquifer beneath the lower landfill.

Dividing the transmissivity by the aquifer thickness (which is 13 feet in Well No. 8) gives an aquifer permeability range of 770 to 7700 gpd/ft^2. This value in combination with the water table gradient for the lower landfill of .010 and a porosity value of .25, which is typical for sand and gravel (Todd, 1981) gives an estimated groundwater flow velocity for the lower landfill ranging from 3 to 30 ft/day.

3.03 Water Budget

A water budget of a waste disposal area is a useful means of estimating the amount of recharge due to precipitation and predicting the amount of leachate that may be generated. The water budget of a particular area is a water balance between the income of water from precipitation and the outflow of water by evapotranspiration, runoff and percolation. In general the annual hydrogeologic budget of an area can be characterized by the following equation:

$$P = R/O + AET + ST + PERC$$

where P is the average precipitation, R/O the surface water runoff, AET the average evapotranspiration, ST the change in soil moisture storage and PERC the excess water that percolates the soils as groundwater recharge. Many of the parameters used for a hydrologic budget can be measured directly, such as precipitation, streamflow and evaporation. However, where long term data is not available, the water budget can be estimated from local climatological data and on-site hydrogeologic data through the use of the water balance method as developed by Fenn (et al., 1975). The water budget data calculated for the upper and lower landfills are summarized in Tables 2 and 3.

The proposed Broome County Industrial Park is located in a humid temperate climate with a mean annual rainfall of 39 inches. The mean monthly precipitation and temperature data from the U.S. Weather Bureau Station at the Broome County Airport were used in the water budget and are summarized in Tables 2 and 3.

Part of the precipitation that falls on the land surface will run off the site as overland flow before it has a chance to infiltrate the soils.

The amount of surface water runoff will depend on several factors, including the intensity and duration of the storm, the antecedent soil moisture conditions, the slope of the land surface, and the permeability of the soil and type of vegetative cover. The water balance method calculates the surface runoff utilizing empirical runoff coefficients which are representative of actual on-site conditions. A runoff coefficient range of .18 - .22 was selected for the upper landfill which was representative of a heavy soil with an average slope of 2-7%. A runoff coefficient range of .05 - .10 was selected for the lower landfill which is representative of a sandy soil with an average slope of 2%. The lower runoff coefficient was used for the months that the soil moisture storage did not reach field capacity, whereas the higher coefficient was used when the soil moisture storage reached its field capacity. By applying the runoff coefficients to the monthly precipitation, a monthly estimate of the surface runoff is obtained and is summarized in Tables 2 and 3.

Evapotranspiration is the amount of available water present in the soil that is lost to the atmosphere as either evaporation from the soil or transpiration by plants. The water balance method calculates the potential evapotranspiration on the basis of monthly average temperature and latitude through the use of a series of tables. The actual evapotranspiration is then calculated based on the average monthly precipitation and the soil moisture availability. The data in Tables 2 and 3 indicate that 23 inches or 47% of the average annual precipitation returns to the atmosphere as evapotranspiration.

The amount of moisture that can be stored within the soils is dependent on the available water capacity of the soils and the depth of the root zone. Soil data from the USDA Soil Survey of Broome County (1971) indicate that the upper landfill site is underlain predominantly by Volusia soils that have an average available moisture capacity of 2.22 inches/ft or soil and an average root depth of 20 inches. The lower landfill is underlain by Chenango soils that have an average available moisture capacity of 1.8 inches/ft of soil and an average root depth of 35 inches. These values in combination with Thornthwaite's soil moisture retention tables were used to calculate the average monthly soil moisture storage values shown in Tables 2 and 3. The data shows that during the months of November through May, the soil moisture storage reaches its field capacity. The soil moisture storage decreases to a low during September when evapotranspiration rates are the highest.

Once the soil moisture storage reaches its field capacity, any excess water that infiltrates the soil becomes percolation that recharges the groundwater flow system. Percolation is simply the amount of the precipitation remaining following the water lost through surface runoff, evapotranspiration and soil moisture storage. The average monthly and annual percolation rates for the upper and lower landfills are summarized in Tables 2 and 3. The average annual percolation rate for the upper landfill is 10.5 inches, which is 27% of the precipitation. The average annual percolation for the lower landfill is 13.1 inches, which is 34% of the precipitation.

3.04 Leachate Generation

The amount of leachate generated at a sanitary landfill can be estimated from calculations on the amount of precipitation that percolates through the cover material, the amount of groundwater that flows through the refuse, and the areal extent of the fill area.

Based on the average annual percolation rate of 10.5 inches and the 6.3 acre estimated areal extent of the upper landfill, it is estimated that up to 1.8 million gallons of leachate per year is generated at the upper landfill by precipitation infiltrating the landfill surface. The test drilling program revealed that the water table beneath the upper landfill is 8.6 feet above the base of the refuse. This indicates that additional leachate is generated at the landfill from groundwater flowing through the refuse. Based on the groundwater flow velocity of 8.1×10^{-5} ft/day and the saturated cross sectional area of the refuse, it is estimated that up to an additional 1,000 gallons per year of leachate may be generated at the upper landfill by groundwater flowing through the refuse.

Based on the average annual percolation rate of 13.2 inches and the 2.5 acre areal extent of the lower landfill, it is estimated that up to 0.9 million gallons of leachate per year is generated at the lower landfill by precipitation infiltrating the landfill surface. The lower landfill is also partially buried beneath the water table, resulting in leachate generation from groundwater flowing through the refuse. From the groundwater flow velocity of 3 to 30 ft/day and the saturated cross sectional area of the refuse, it is estimated that an additional 15,000 - 150,000 gallons of leachate can be generated each year at the lower landfill by groundwater flowing through the refuse.

3.05 Groundwater/Leachate Analyses

All on-site monitoring wells identified on Figure 2 have been sampled in accordance with the groundwater sampling procedures outlined in Appendix C. Following completion of the sample collection all samples were placed on ice, and promptly transported to the O'Brien & Gere laboratory in Syracuse, New York where they were analyzed.

The laboratory analyses of groundwater and leachate samples are presented in Tables 4 and 5. To evaluate the potential for contamination the analyses are compared to: (1) New York State Class GA groundwater quality standards (Table 10); (2) upgradient groundwater quality; and (3) the range in background groundwater quality found in the various aquifers within the Susquehanna River Basin (Table 9). Class GA waters are defined as fresh groundwaters that can be used as a source of potable water and are found in the saturated zone of unconsolidated deposits and consolidated rock or bedrock.

Upper Landfill

In as much as monitoring well 1 is located hydraulically upgradient to the upper landfill, the analyses of this well should be representative of the background groundwater quality adjacent to the upper landfill. The analysis of Well 1 indicates that the water quality is typical for the natural quality within a glacial till aquifer (Table 9), in that the water is of good drinking water quality, contains a moderate amount of dissolved solids, and is relatively low in iron content when compared to other aquifers. The water quality of Well 1 meets the New York State Class GA groundwater standards shown in Table 10.

Well 14 was installed within the saturated refuse of the upper landfill and Well 16 is a well point which was driven 3 feet into a leachate seep. Consequently, the analysis of these wells are indicative of the upper landfill leachate. The inorganic analyses of these wells indicate that the leachate contains relatively high concentrations of sulfate, chloride, chromium, iron, manganese, mercury, and zinc. However, when these inorganic analyses are compared to the ranges of various constituents generally found in municipal sanitary landfills (Freeze and Cherry, 1980) (Table 11) the leachate analyses of the upper landfill is typical of what is found in municipal refuse. However, the relatively high concentrations of organic compounds such as benzene, toluene, methylene chloride, trichloroethylene and vinyl chloride indicate that some industrial waste may be present within the upper landfill.

The laboratory analyses of Well 2 is representative of the groundwater quality underlying the upper landfill. The analysis of this well reveals that the groundwater quality beneath the landfill contains concentrations of arsenic, iron, manganese and mercury in excess of Class GA groundwater standards indicating that landfill is having an impact on the groundwater quality beneath the upper landfill. However, these analyses compared to the leachate analyses of Well 14 reveal that most of the chemical concentrations of the leachate have been reduced significantly before entering the groundwater beneath the landfill.

The laboratory analyses for Wells 3, 4 and 11 in Tables 4 and 5 are indicative of the groundwater quality downgradient from the upper landfill site. The analyses indicate that the parameters in excess of Class GA standards include cadmium and manganese in Well 3, mercury in Well 4, and arsenic, manganese, benzene and vinyl chloride in Well 11. In addition, organic concentrations of methylene chloride, toluene, 1,1, dichloroethane, and 1,2, dichloropropane were detected in Well 11 at levels exceeding the NYSDOH guideline of 50 ug/l for each parameter. Due to the extremely low groundwater flow rate (.03 ft/year) beneath the upper landfill, it is expected that these elevated concentrations will be restrictied within a relatively short distance downgradient from the upper landfill.

Lower Landfill

The analysis of Well 6, which is hydraulically upgradient to the lower landfill, should be representative of the background groundwater quality of the lower landfill. However, elevated levels of arsenic, iron, manganese and mercury detected within the well indicate that waste disposal practices have had an impact on the groundwater quality of Well 6. Although this study has not defined the source of the elevated chemical concentrations detected within Well 6, potential sources may include: 1) the limits of the lower landfill may extend farther upgradient than what was indicated by the Town of Conklin, 2) refuse may have been inadvertently disposed of in the vicinity of well 6, and 3) surface water runoff from the upper landfill may have impacted the well. Based on the extremely low groundwater flow rates beneath the upper landfill, it is believed that Well 6 was not impacted by groundwater flowing from the upper landfill. Due to the water quality problems associated with Well 6, it is recommended that Well 1 be utilized as a background well for both the upper and lower landfill.

Wells 13 and 15 are screened within the leachate of the lower landfill. The analyses from these wells reveals that leachate contains relatively high concentrations of copper, iron, manganese, and mercury which are typical for a landfill leachate as shown in Table 11. The leachate analysis of these two wells also detected trace organic levels of toluene, ethylbenzene, methylene chloride and 1,2, dichloropropane, which were within the NYSDOH guidelines of 50 ug/l for each parameter. Although the organic concentrations exceeded background levels, such low concentrations are common in municipal refuse due to leaching of plastics and other discarded manufactured items (Freeze and Cherry, 1980). As a result, the leachate analyses of the lower landfill do not given an indication that industrial waste is present.

The groundwater quality beneath the lower landfill is represented by the analysis of Well 7. The analysis shows that arsenic, iron and manganese are in excess of Class GA groundwater standards.

Analyses for Wells 5, 8, 9, and 10 in Tables 4 and 5 are representative of the groundwater quality hydraulically downgradient from the lower landfill. The analyses reveal that the parameters in excess of Class GA groundwater standards include: manganese in all four wells, mercury in Well 5, arsenic in Well 8, and iron in Well 8. In addition, arsenic concentrations in Well 5 exceeded background levels but were within Class GA standards.

Homeowner Wells

The preliminary hydrogeologic investigation of the proposed industrial park site revealed that the lower landfill may have a potential impact on the groundwater quality of downgradient homeowner water supply wells. As a result, seventeen homeowner wells located east of the landfill along Route 7 were sampled during November 1983 to evaluate the impacts of the lower landfill of on downgradient private water supplies. The sampling of the homeowner wells was conducted by the BIDA and the analyses were performed by O'Brien & Gere (12 wells) and the New York State Department of Health (5 wells). The location of the homeowner wells sampled are shown on Figure 2 the analyses are summarized in Tables 6 and 7, and the owners of the private wells sampled are listed in Table 8.

Inorganic chemical analyses of the homeowner wells (Table 6) revealed that of the 17 wells sampled during November, 1983, arsenic was detected in three of the wells (Tomkins, Desimone, and Johnson residences) at levels exceeding the NYSDEC Class GA groundwater standard of .025 milligrams per liter. The arsenic level of one of the homeowner wells (Johnson residence) exceeded the NYSDOH Drinking Water Standard of .05 mg/l. Due to the public health concerns of the arsenic in drinking water, the Broome County Health Department notified the three homeowners of their elevated arsenic levels and recommended to the Johnson residence that they should not drink their water. In addition, the three homeowner wells were resampled and analyzed by the NYSDOH in January, 1984. Although the second analyses detected lower levels of arsenic which were below the NYSDOH Drinking Water Standard, the levels within two of the wells (Tomkins and Johnson residences) still exceeded the NYSDEC Class GA Groundwater Standard.

The inorganic analyses of the 17 homeowner wells also indicated that the combined concentration of iron and manganese in 10 wells exceeded both the NYSDEC Class GA Groundwater Standard and NYSDOH Part 5 Drinking Water Standards of .5 milligrams per liter.

Organic analyses of homeowner wells (Table 7) shows that trace levels of trichloroethene were detected at the Lasky (9 ug/l) and Villano (4 ug/l) residences. In addition, toluene was also found at trace levels (10 ug/l) at the Lasky residence and t-1,3-dichloropropene was detected at trace levels (2 ug/l) at the Villano residence. Although these organic concentrations exceed background levels, they are within NYSDOH guidelines of 50 ug/l for each parameter. The trichloroethene levels are also within the NYSDEC Class GA Standard of 10 ug/l.

SECTION 4 - ENVIRONMENTAL IMPACTS

4.01 Groundwater Impacts

Upper Landfill

The groundwater quality immediately downgradient from the upper landfill (Wells 3, 4, and 11) contains elevated levels of arsenic, maganese, cadmium, benzene and vinyl chloride which exceeded of Class GA groundwater quality standards. In addition, the downgradient groundwater quality contains levels of organics including toluene, methylene chloride and 1,2- dichloropropane at levels either exceeding or close to the 50 ppb guideline established by the NYSDOH. This data indicates that the upper landfill is having an impact on the groundwater immediately downgradient from the landfill.

The upper landfill is underlain by soils that are favorable for the attenuation of landfill leachate. Previous studies (Roberts, et al., 1976) have revealed that soils with permeabilities less than 10^{-3} cm/sec and a silt and clay content greater than 25%, such as the soils that occur beneath the upper landfill, are favorable for the attenuation of inorganic contaminants from landfill leachate. In addition, the relatively low groundwater flow rate beneath the upper landfill is expected to restrict the migration of both organic and inorganic contaminants within a relatively short distance downgradient from the upper landfill. The attenuation of landfill leachate beneath the upper landfill is illustrated by comparing the leachate analyses of Well 14 with the groundwater quality analyses of well 2, which is located adjacent to Well 14 and screened within the underlying till from 3 to 13 feet below the base of the refuse. The comparison of the analyses reveals that the chemical concentrations of such landfill constituents as iron, manganese chlorides, sulfates, and total dissolved solids are reduced by at least one order of magnitude over a relatively short distance.

The hydrogeologic conditions beneath the upper landfill site are expected to effectively reduce the chemical concentrations detected within the downgradient groundwater over a relatively short distance due to: 1) the high silt and clay content and low permeabilities of the underlying soils, 2) the extremely low groundwater flow rates (.03 ft/year), and 3) the relatively low concentrations detected within the groundwater beneath the landfill as compared to leachate analyses. As a result, it is anticipated that the groundwater flowing from the upper landfill should not have a significant impact on downgradient groundwater or surface water supplies.

Lower Landfill

The groundwater downgradient from the lower landfill (Wells 5, 8, 9, and 10) has been found to contain concentrations of arsenic, iron manganese, and mercury in excess of Class GA groundwater quality standards. Because the lower landfill is situated in highly permeable soils where leachate attenuation is minimal and the groundwater flow rates are relatively high, the lower landfill has a potential for impacting the downgradient water supplies. The analyses of some of the downgradient homeowner wells along Conklin Road revealed that the groundwater quality exceeded Class GA standards for manganese, iron and arsenic, indicating the lower landfill may have had an impact of downgradient water supplies. The impacts of each of these parameters are described below.

Arsenic - The U.S. Environmental Protection Agency (EPA) and the New York State Department of Health have adopted an arsenic standard of .05 mg/l in drinking water as posing a hazard to human health whereas the New York State DEC Class GA Standards for arsenic is .025 mg/l. NYSDEC Class GA Standards establish maximum contaminant levels in the groundwater from pollution sources whereas the NYSDOH Part 5 Standards establish maximum contaminant levels in drinking water at which may pose a threat to human health. Arsenic levels detected in three of the seventeen homeowner wells sampled downgradient from the lower landfill exceeded the NYSDEC Class GA groundwater standard of .025 mg/l. One of the homeowner wells (Johnson residence) exceeded the NYSDOH Drinking Water Standard of .05 mg/l. Based on the elevated arsenic levels detected within the homeowner wells, the Broome County Health Department determined that an immediate health risk did occur and recommended to the Johnson residence that they not drink their water.

Arsenic can occur naturally within the groundwater in areas where phosphorite deposits or iron ore and coal bearing rock formations are present. Manmade sources of arsenic include: insecticides, herbicides, metallurgical additives, pharmaceuticals and fallout from the burning of coal. Because of geologic materials of the area do not contain phosphorous, coal or iron ore bearing rocks, it is believed that that arsenic detected in the homeowner wells is attributed to a manmade source. However, this investigation has not clearly defined the lower landfill as the source of arsenic due to the following facts: (1) leachate analyses of the lower landfill do not show any indication of either arsenic or any industrial waste being present; (2) only 1 of 4 on-site wells downgradient from the lower landfill and 3 of 15 homeowner wells downgradient from the lower landfill have detected arsenic concentration in excess of NYSDEC Class GA Standards; (3) an arsenic contaminant plume has not been identified where high arsenic concentrations would occur near the source and gradually decrease downgradient; (4) arsenic was detected in on-site Well 6 which is an upgradient well to the lower landfill and (5) one of homeoowner wells (Tamkins residence), where elevated arsenic levels were detected, is 180 feet deep. Based on this information, additional field investigated would be needed to define the source of arsenic in the homeowner wells.

Iron and Manganese - NYSDEC Class GA Groundwater Standards and NYSDOH Part 5 Drinking Water Standards require that the combined concentration of iron and manganese in groundwater shall not exceed 0.5 mg/l. This standard has been established for water usage to avoid objectionable staining of plumbing fixtures.

Iron and manganese are common constituents of the rocks and soils within the area. Although the natural groundwater quality of the aquifers within the Susquehanna River Basin commonly contain iron concentrations exceeding the groundwater standards at levels up to 5 mg/l, the natural manganese concentrations within the groundwaters generally do not exceed the standard of 0.3 mg/l. (Hollyday, 1969). Previous analyses of the Town of Conklin's three municipal wells (Town of Conlkin's files, 1982) have shown iron concentrations up to 0.6 mg/l of iron and up to .5 mg/l of manganese. Iron and manganese are also the most common constituents within a landfill leachate. Studies have shown that iron concentrations within a leachate typically range from 1-1000 mg/l and manganese concentrations range from .01-100 mg/l (Table 11; Freeze and Cherry, 1980).

The analyses of the homeowner wells downgradient from the lower landfill have shown that of the 17 wells sampled, 7 wells exceeded the 0.3 mg/l standard for manganese and 5 wells exceeded the 0.3 mg/l standard for iron. Although the iron concentrations may be attributed in part to the natural groundwater quality, the manganese concentrations all exceeded the background levels of the area. Based on this information as well as: (1) elevated levels of manganese (7-15 mg/l) were detected within the lower landfill leachate; and (2) elevated levels of iron and manganese were detected in the on-site wells downgradient from the lower landfill, it is believed that the elevated manganese and iron concentrations detected in the homeowner wells is attributed to leachate from the lower landfill.

Organic Chemicals - The analyses of two of the homeowner wells (Villano and Lasky residences) downgradient from the lower landfill have detected trace levels of trichloroethylene, toluene, and t-1,3-dichloropropene. Although the organic concentrations were within the NYSDOH guidelines of 50 ug/l for each parameter, the concentrations exceeded the background levels. However, this study has not determined that the lower landfill is the source of the organic chemicals detected within the homeowner wells due to: 1) organic chemicals were detected in only 2 of the 17 homeowner wells analyzed, 2) the organic levels detected within the lower landfill leachate were non-detectable for trichloroethylene and were relatively low for toluene and t-1,3 dichloropropene, 3) the organic chemicals found in the homeowner wells were not detected in any of the on-site wells downgradient from the lower landfill, and 4) the organic chemicals detected within the homeowner wells are commonly found in other sources: toluene is found in gasoline, fuel oil, and paint remover; trichloroethylene is found in septic tank cleaners, paints, and metal degreasers; and dichloropropene is found in pesticides and insecticides.

4.02 Surface Water Impacts

Groundwater flow data indicates that Carlin Creek may serve as a potential discharge point for groundwater flowing from the upper landfill. However, because the groundwater flow direction is predominantly eastward towards the Susquehanna River and the flow rate is extremely low (allowing considerable time for soil attenuation), it is expected that any groundwater flowing beneath the landfill and discharging into Carlin Creek should not have an impact of the surface water quality of Carlin Creek.

Section 3.04 of this report has revealed that up to 1.8 million gallons of leachate can be generated each year through precipitation infiltrating through the upper landfill. Because the upper landfill is underlain by extremely low permeable soils, a "bathtub effect" may be created where leachate will accumulate in the landfill and overflow at the lowest point in the form of leachate seeps. The iron stained rocks in the streambed of Carlin Creek give an indication that the landfill seeps are having an impact on Carlin Creek. However, because the creek was dry during the investigation, samples could not be collected to evaluate the extent of the impacts. These leachate seeps have a potential for flowing over the land surface and having an impact on the surface water quality of Carlin Creek.

The nearest potential groundwater discharge point from the lower landfill is the wetland area approximately 200 feet to the east of the landfill. However, the groundwater elevation maps (Figure 3) indicates that the groundwater flowing from the lower landfill will predominantly flow towards the Susquehanna River rather than discharge into the wetland area. Chemical analyses of surface water samples collected from the wetland during April, 1983 by the BIDA area indicated that volatile halogenated organic compounds (VHO), petroleum based chemicals (BTX) and heavy metals were either undetectable or present in concentrations below the NYSDEC and NYSDOH water quality standards. Based on this information, it is believed that the groundwater flowing from the lower landfill will not have a significant impact on the surface water quality of the adjacent wetland.

Most of the groundwater flowing from the lower landfill will have a potential to flow towards and discharge into the Susquehanna River. Therefore, the concentrations of iron, maganese, arsenic and trace organics that were detected within the groundwater downgradient from the lower landfill would have a potential for discharging into the Susquehanna River. However, due to the relatively low volumes of groundwater that are discharged into the river as compared to the relatively high flows of the Susquehanna River, it is expected that the lower landfill would not have a significant impact on the surface water quality of the Susquehanna River.

In as much as the lower landfill is underlain by highly permeable soils, there is not high potential for the development of leachate seeps at the lower landfill.

4.03 Settlement

The amount of settlement that occurs at the upper and lower landfills depends on what type of refuse was disposed of at each site and how thoroughly the waste was compacted. Settlement generally varies from 10 percent to 25 percent within six months to two years. Previous studies found that in landfills in New York, about 90 percent of the total settlement occurs in the first two to five years. The remaining 10 percent may be over a long period of time (American Public Works Association, 1970). There may be even further subsistence from expulsion of entrapped waters, particularly in water logged silty soils, as with the soils within the upper landfill. In addition, landfills that have refuse buried below the water table may settle more and at a faster rate than dry landfills because of accelerated decomposition and leaching action. As a result there are no reliable guidelines as to how much or over what period settling might be expected.

Because the upper landfill has been inactive for more than eight years and the lower landfill has been inactive for more than fourteen years, it is expected that much of the settlement has already taken place at each landfill. However, because of each of the landfills are partially below the groundwater table where further decomposition of refuse will take place, further settlement can be expected. Although it is technically feasible to construct buildings over landfills which would not be affected by differential settlement, extensive geotechnical testing and costly foundation construction is usually required. The geotechnical testing is dependent on the thickness of the landfill and the types of structures anticipated but may include: test borings to define thickness and composition of refuse, in-situ plate load tests to determine ultimate bearing capacity and laboratory consolidation tests of the refuse. The results of these tests would be compared to the loads of the anticipated structure to determine what engineering remedial measures will be needed.

Several potential uses for sanitary landfills that would require minimal geotechnial testing and engineering include nature park, recreation park, tree farm, and wild areas. Landfill uses that will require some geotechnical testing and design of a suitable cover soil of composition include: paved parking areas, tennis courts, and vehicular tracks. Future uses that will require extensive geotechnical testing are all those concerning roads and utilities, and those involving the foundation of structures. The following foundation types are generally required for increasingly heavier structures: mat foundation, spread footings, pile foundations, and piers.

4.04 Decomposition/Gas Production

Decomposition of landfills depends on many factors, including permeability of cover material, moisture content of the refuse and degree of compaction. Gases produced as a by-product during the decomposition of the refuse and are principally composed of methane and carbon dioxide. Studies of landfills (American Public Works Association, 1970) indicate that the greatest amount of gas is produced from refuse that is about one-half to two years old. However, the studies have also shown that if the refuse is buried below the water table, or if surface water percolates through the refuse, gas production can occur over a longer period of time.

The methane gas monitoring of the upper and lower landfills revealed that methane gas levels were well below combustible levels, indicating that decomposition of the landfill is presently not a problem. However, the high water table and surface water infiltration at each landfill may cause further decomposition of the refuse which may increase gas production. Therefore, continued methane gas monitoring is recommended to evaluate gas production at the landfill sites. In addition, gas venting is recommended where low permeability covers are placed over each landfill.

SECTION 5 - REMEDIAL ALTERNATIVES

The previous section of this report has identified that the only significant impacts the two landfills may have on the proposed industrial park include: (1) the development of leachate seeps at the upper landfill may have negative impacts on the water quality of Carlin Creek; and (2) leachate from the lower landfill has most likely elevated manganese and iron levels and may have elevated arsenic levels in some homeowner wells downgradient from the landfill. Based on these existing and potential environmental impacts, the following remedial alternatives may be considered. A detailed cost estimate for each remedial alternative is included in Table 12.

5.01 Recommended Remedial Measures

Replace Existing Homeowner Water Supplies

Due to the impacts of the lower landfill on downgradient homeowner water supply wells, replacement of the impacted homeowner water supplies is recommended. The most cost-effective method of replacing the homeowner water supplies would be to extend the Town of Conklins water supply system from Carlin Road, south along Route 7 and tie into the impacted homes. It is estimated that approximately 5,000 feet of water main and 25-30 connections to homes would be needed. The estimated cost for this remedial alternative is $300,000.

Groundwater Monitoring

The purpose of a groundwater monitoring system is to provide an early warning system to evaluate the potential for future contamination of downgradient water supply wells or surface waters. New York State Department of Environmental Conservation Part 360 Solid Waste Facility Guidelines recommend that a monitoring system include the following:

1. A minimum of three groundwater monitoring wells, one well located upgradient and at least two wells located downgradient from the solid waste fill area.

2. Baseline water quality conditions should be established by collecting at least two samples from each of the wells and analyze for drinking water parameters, indicator parameters and site specific constituents.

3. Routine water sampling and analyses should be conducted at least on a quarterly basis. The analyses should include indicator parameters such as: chlorides, specific conductivity, total organic carbon (TOC), total iron, total dissolved solids and site specific parameters.

The first two elements of the groundwater monitoring program described above have been completed for this investigation. A continuation of routine sampling and analyses is recommended on a quarterly basis in order to (1) monitor the potential for contamination of Carlin Creek from the upper landfill; and (2) evaluate the potential for contamination of downgradient homeowner wells from the lower landfill. The routine analyses should include the indicator parameters listed above as well as site specific parameters such as arsenic, manganese, mercury, volatile halogenated organics (VHO), benzene, toluene, and exylene (BTX).

Installation of Landfill Cover - To minimize the amount of leachate generated from precipitation infiltrating the refuse, installation of a low permeability cover may be needed at the upper and lower landfills. A low permeability cover would minimize the development of leachate seeps in the upper landfill and significantly reduce the amount of leachate that is entering the groundwater at the lower landfill.

NYSDEC Part 360 regulations requirements for a closed sanitary landfill include a minimum of 18 inches of final cover material with a permeability of 10^{-5} cm/sec and graded at a minimum slope of 2 percent. In addition, a gas venting system may be needed to minimize the potential problem associated with methane gas build-up beneath a low permeable cover. The in-situ permeability test of the glacial till material indicated a permeability of 1.4×10^{-7} cm/sec. As a result, the on-site material should be suitable as cover material.

The estimated cost for installing a low permeability cover is $430,000 for the upper landfill and $280,000 for the lower landfill. These estimates include the costs for installing the cover using the on-site till, the gas venting system, topsoil and seeding, grading, safety procedures and engineering costs. These costs are preliminary and based on very limited data on the landfills. The costs may need to be adjusted once the areal extent of fill areas are more defined, a more detailed topographic survey is performed, the thickness of the existing cover material is better defined, and the determination is made on whether local till is suitable to be used as a cover material.

5.02 Other Remedial Alternatives

Based on the magnitude and extent of the existing problems associated with the upper and lower landfills, the remedial alternatives discussed above should provide sufficient measures of minimizing the potential for surface and groundwater contamination. In addition, these remedial alternatives are expected to minimize the long term potential for contamination from the landfills. However, should future monitoring identify a greater extent of contamination, one or more of the following remedial measures may have to be considered for implementation.

Define Sources of Arsenic - This alternative should include a hydrogeologic investigation to determine whether the arsenic detected within the homeowner wells is attributed to either the lower landfill or other sources. The investigation would include drilling test borings, installing monitoring wells, and analyzing soil and groundwater samples. The estimated cost for an initial investigation is $30,000. This initial investigation would identify whether or not the landfill is the source of the arsenic. Should the investigation identify another source of arsenic, additional investigations may be required.

Installation of groundwater cutoff wall and clay cap - This remedial alternative would include installing a clay cap and soil/bentonite wall around the landfill to encapsulate the site, to prevent leachate generation and restrict leachate migration. The estimated cost for this would be $1.5 million for the upper landfill and $2.0 million for the lower landfill.

Off-site Disposal - This alternative includes the excavation of the refuse material from the site, and hauling to a local landfill for disposal. Assuming the waste is not classified as hazardous, and a local landfill would except such a large volume of wastes, it is estimated it could cost up to $4.2 million for off-site disposal for the upper landfill and $2.5 million for the off-site disposal of the lower landfill. However, it is unlikely that such a large volume of wastes would be accepted at the existing Broome County landfill.

Leachate Collection and Treatment - This alternative would include a clay cap to minimize leachate generation as well as a leachate collection trench and treatment system. The capital costs for such a system could range from $900,000 for the lower landfill to $1.1 million for the upper landfill. These costs do not include operation and maintenance costs which are dependent on the lifetime of the system.

It should be noted that the cost estimates discussed above are preliminary and based on very limited data for each landfill site. The costs may need to be adjusted once a development plan is selected for the site and the following conditions for each landfill are better defined; the topography of the fill surface, the thickness of the existing cover material, the areal extent of the fills, the groundwater flow conditions, and the suitability of the on-site till as a cover material.

SECTION 6 - CONCLUSIONS AND RECOMMENDATIONS

6.01 Conclusions

Based on the investigations described in the report the following conclusions are presented.

Upper Landfill

1. The upper landfill site is underlain by low permeability glacial till. The groundwater flowing beneath the landfill may be discharged locally into Carlin Creek, however, most of the groundwater will flow east towards the Susquehanna River at a rate of approximately 8×10^{-5} ft/day (.03 ft/year).
2. The laboratory analyses of leachate of the upper fill contains relatively high concentrations of sulfate chloride, chromium, iron, manganese, mercury and zinc in excess of NYSDEC Class GA groundwater standards, which is not uncommon for a municipal landfill leachate. However, the relatively high concentrations of organic compounds such as benzene, toluene, methylene chloride, trichloroethylene, and vinyl chloride indicate that some industrial waste may be present within the landfill. The low permeability and high silt and clay content of the underlying soils are favorable for the attenuation of the landfill leachate.
3. The groundwater immediately downgradient from the upper landfill contains concentrations of arsenic, cadmium, manganese, mercury, benzene, and vinyl chloride in excess of NYSDEC Class GA groundwater standards. In addition, organic concentrations of methylene chloride, toluene, 1,1-dichloroethane, and

1,2-dichloropropane were detected at levels exceeded the NYSDOH guidelines. However, due to the low groundwater flow rates (.03 ft/year) and high silt and clay content of the glacial till, the groundwater quality from the upper landfill should not have a significant impact on downgradient groundwater or surface water supplies.

4. It has been estimated that up to 1.8 million gallons per year of landfill leachate may be generated through precipitation infiltrating the fill surface and only 1,000 gallons per year of leachate may be generated by groundwater flowing through the base of the refuse. Due to low permeability of the underlying glacial till, this leachate may tend to accumulate in the landfill and overflow at the lowest point as a landfill seeps. These seeps may be transported as surface runoff and have a potential impact on water quality of Carlin Creek.

5. In order to minimize the amount of leachate that would be generated by precipitation infiltrating the landfill surface, a low permeability cover should be installed.

6. Methane gas monitoring of the upper landfill indicated that methane gas concentrations were below combustible levels. As a result, methane gas generation does not pose any adverse environmental impacts at the present time. However because the refuse is partially buried below the water table, future gas generation can be anticipated.

7. Because the upper landfill has been inactive for more than eight years, it is expected that most of the landfill settlement has

already occurred. However, due to the high water table within the landfill further decomposition and settlement can be expected.

Lower Landfill

1. The lower landfill is underlain by a highly permeable sand and gravel which promotes recharge of leachate to the underlying groundwater. The groundwater flow in the vicinity of the lower landfill is in an eastward direction towards the Susquehanna River at an estimated rate of 3 to 30 feet per day (1,100-11,000 feet per year).
2. The leachate of the lower landfill contains relatively high concentrations of copper, iron, manganese and mercury which is common for municipal landfill leachate. Although trace levels of toluene, methylene chloride and 1,2-dichloropropene were found in the leachate samples from wells 13 and 15, the low levels do not give a firm indication that industrial waste is present.
3. The chemical analyses of 17 homeowner wells downgradient from the lower landfill revealed that NYSDEC Class GA Groundwater Standards were exceeded for arsenic in 3 wells, manganese in 7 wells and iron in 5 wells. The arsenic level in one of the homeowner wells exceeded the NYSDOH Drinking Water Standard of .05 mg/l. Although the iron and manganese levels can be attributed to the lower landfill, the source of the arsenic levels has not been clearly defined.
4. It has been estimated that up to 0.9 million gallons of landfill leachate per year may be generated by precipitation infiltrating the landfill surface and up to 15,000 - 150,000 gallons of leachate may

be generated by groundwater flowing through the base of the landfill. Due to the high permeability of the underlying sand and gravel, this leachate will tend to recharge the groundwater rather than be discharged at the surface as landfill seeps.

5. A soil cover with a permeability less than 10^{-5} cm/sec as recommended in NYSDEC Part 360 Solid Waste Regulations would be needed to minimize the amount of leachate generated by rainfall infiltration.

6. Methane gas monitoring of the lower landfill revealed that at the present time methane gas generation does not pose any adverse environmental impacts on the proposed project. However, the landfill is partially buried below the water table where further decomposition of the refuse can take place which may result in future generation of methane gas.

7. The lower landfill site has been inactive for over fourteen years indicating that most of the landfill settlement has occurred. However, because the water table is above the base of the fill, additional settlement can be expected.

6.02 Recommendations

1. It is recommended that a low permeability soil cover be installed on the upper and lower landfills to minimize the amount of leachate generation. The estimated cost for installing a low permeability soil cover is $430,000 for the upper landfill and $280,000 for the lower landfill. The following work items are recommended to minimize the cost of the cover installation: drill test borings to define

the thickness and extent of existing cover material, conduct topographic and magnetometer surveys and aerial photo evaluations to define areal extent of landfills, conduct permeability tests of on-site till to evaluate suitability as a cover material.

2. Due to the impacts of the lower landfill on the downgradient homeowner wells, it is recommended that the homeowner water supplies be replaced. This can be accomplished most cost effectively by extending the Town of Conklin's water system from Carlin Road south along Route 7 for a distance of approximately 5,000 feet. The estimated cost for this remedial measure is $300,000.

3. Due to the potential problems of differential settlement associated with constructing on top of landfills, it is recommended that additional geotechnical testing be conducted where construction is anticipated above either the upper or lower landfill. The type of testing needed is dependent on the size of the landfill and the types of structures anticipated but may include: test borings with standard penetration tests, in-situ plate loading tests, and laboratory compaction tests. Due to much larger fill volumes within the upper landfill than within the lower landfill, more extensive geotechnical testing and higher construction costs would be required for construction to occur on the upper landfill.

4. Groundwater and surface water monitoring is recommended to continue in order: 1) monitor the potential for contamination of Carlin Creek from the upper landfill and 2) evaluate the contamination of the homeowner wells from the lower landfill. Water sampling and analyses should be conducted at least on a

quarterly basis for at least one year on: 1) the three monitoring wells downgradient from the upper landfill, 2) the four on-site monitoring wells downgradient from the lower landfill, 3) ten impacted homeowner wells downgradient from the lower landfill, 4) Carlin Creek, and 5) the wetlands just east of the lower landfill. The results of the first year's analyses should be evaluated to assess the need for additional groundwater monitoring. The analyses should include indicator parameters of landfill leachate such as : pH, chlorides, specific conductivity, total organic carbon (TOC), total iron, and total dissolved solids. In addition, the analyses should include site specific parameters such as arsenic, manganese, mercury, volatile halogenated organics (VHO) and benzene, toluene and xylene (BTX). The estimated cost for this groundwater and surface water monitoring for one year is $20,000.

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Tables

O'BRIEN & GERE

TABLE 1

MONITORING WELL DATA

Well No.	Grade Elevation	Top of Steel Casing Elevation	Top of PVC Casing Elevation	Well Depth Below Grade	Groundwater Elevations 8/16/83	Groundwater Elevations 11/9/83
1	944.4	947.41	947.30	60	937.34	933.79
2	914.8	916.16	915.93	45	891.37	890.56
3	885.8	889.20	889.11	20	881.21	879.57
4	890.9	893.58	893.42	20	881.85	881.80
5	860.31	860.31	860.24	33.5	853.25	852.17
6	868.8	868.82	868.59	17.9	861.97	860.57
7	865.2	868.37	868.27	25	853.54	852.02
8	860.2	860.24	860.08	18	853.34	851.60
9	861.3	864.21	864.11	18	853.31	851.66
10	863.8	863.76	863.47	18	853.69	851.76
11	896.2	898.97	898.82	30.5	882.31	881.82
12	898.6	901.62	901.51	16	dry	dry
13	865.7	868.62	868.55	15	853.94	
14	914.8	917.25	917.14	15	908.45	
15	873.8	876.62	876.49	18	859.76	

TABLE 2
BROOME COUNTY INDUSTRIAL PARK
WATER BUDGET DATA FOR UPPER LANDFILL

WATER BUDGET FOR YEAR = 1

PREC	PE	CR	RO	INF	I-PE	NGE	ST	DELST	AE	PERC
January 8.6	0.0	.22	1.9	6.7	6.7	0.0	9.4	0.0	0.0	6.7
February 5.7	0.0	.22	1.3	4.5	4.5	0.0	9.4	0.0	0.0	4.5
March 7.3	0.0	.22	1.6	5.7	5.7	0.0	9.4	0.0	0.0	5.7
April 8.1	3.6	.22	1.8	6.3	2.7	0.0	9.4	0.0	3.6	2.7
May 9.7	6.3	.22	2.1	7.6	1.3	0.0	9.4	0.0	6.3	1.3
June 9.1	9.4	.18	1.6	7.5	-1.9	-1.9	7.7	-1.7	9.0	0.0
July 9.7	12.8	.18	1.8	8.0	-4.8	-6.7	4.5	-3.2	8.1	0.0
August 9.2	11.6	.18	1.7	7.5	-4.1	-10.8	3.1	-1.4	6.5	0.0
September 7.7	8.0	.18	1.4	6.3	-1.8	-12.6	2.7	-.3	6.3	0.0
October 7.6	4.7	.18	1.4	6.2	1.6	0.0	4.3	1.6	4.7	0.0
November 7.9	1.3	.18	1.4	6.5	5.2	0.0	9.4	5.1	1.3	0.1
December 7.0	0.0	.22	1.5	5.4	5.4	0.0	9.4	0.0	0.0	5.4

VARIABLE SYMBOLS

Precipitation (mm)	- PREC
Potential Evapotranspiration (mm)	- PE
Runoff Coefficient	- CRO
Runoff (mm)	- RO
Infiltration (mm)	- INF
Accumulated Pot. Water Loss (mm)	- NGE
Storage (mm)	- ST
Change in Storage (mm)	- DELST
Actual Evapotranspiration (mm)	- AE
Percolation (mm)	- PERC

DATA SUMMARY

Site Latitude (Deg)
42.00
Root Depth (in), (cm)
20.00 0.00
Holding Capacity (in/ft), (mm/m)
2.22 0.00
Dry Season Runoff Coefficient
.18
Wet Season Runoff Coefficient
.22
Average Seasonal Runoff Coefficient
.20
Average Precipitation for 1 Year (cm)
8.134
Total Precipitation for Year 1 (cm)
97.612
Total Pot. Evapotranspiration (cm)
57.783
Total Infiltration (cm)
78.185
Total Storage (cm)
88.045
Total Change in Storage (cm)
0.000
Total Actual Evapotranspiration (cm)
45.679
Total Percolation (cm)
26.332

TABLE 3
BROOME COUNTY INDUSTRIAL PARK
WATER BUDGET DATA FOR LOWER LANDFILL

WATER BUDGET FOR YEAR = 1

PREC	PE	CR	RO	INF	I-PE	NGE	ST	DELST	AE	PERC
January 8.6	0.0	.10	0.9	7.8	7.8	0.0	13.3	0.0	0.0	7.8
February 5.7	0.0	.10	0.6	5.1	5.1	0.0	13.3	0.0	0.0	5.1
March 7.3	0.0	.10	0.7	6.6	6.6	0.0	13.3	0.0	0.0	6.6
April 8.1	3.6	.10	0.8	7.3	3.6	0.0	13.3	0.0	3.6	3.6
May 9.7	6.3	.10	1.0	8.8	2.4	0.0	13.3	0.0	6.3	2.4
June 9.1	9.4	.05	0.5	8.7	-.7	-.7	12.4	-.9	9.4	0.0
July 9.7	12.8	.05	0.5	9.2	-3.6	-4.3	8.3	-4.0	10.2	0.0
August 9.2	11.6	.05	0.5	8.7	-2.9	-7.2	6.1	-2.3	8.5	0.0
September 7.7	8.0	.05	0.4	7.3	-.8	-8.0	5.6	-.4	7.4	0.0
October 7.6	4.7	.05	0.4	7.2	2.5	0.0	8.2	2.5	4.7	0.0
November 7.9	1.3	.05	0.4	7.5	6.2	0.0	13.3	5.2	1.3	1.0
December 7.0	0.0	.10	0.7	6.3	6.3	0.0	13.3	0.0	0.0	6.3

VARIABLE SYMBOLS

Precipitation (mm)	- PREC
Potential Evapotranspiration (mm)	- PE
Runoff Coefficient	- CRO
Runoff (mm)	- RO
Infiltration (mm)	- INF
Accumulated Pot. Water Loss (mm)	- NGE
Storage (mm)	- ST
Change in Storage (mm)	- DELST
Actual Evapotranspiration (mm)	- AE
Percolation (mm)	- PERC

DATA SUMMARY

Site Latitude (Deg)
42.00
Root Depth (in), (cm)
35.00 0.00
Holding Capacity (in/ft), (mm/m)
1.80 0.00
Dry Season Runoff Coefficient
.05
Wet Season Runoff Coefficient
.10
Average Seasonal Runoff Coefficient
.08
Average Precipitation for 1 Year (cm)
8.134
Total Precipitation for Year 1 (cm)
97.612
Total Pot. Evapotranspiration (cm)
57.783
Total Infiltration (cm)
90.410
Total Storage (cm)
133.952
Total Change in Storage (cm)
0.000
Total Actual Evapotranspiration (cm)
51.361
Total Percolation (cm)
32.875

TABLE 4
BROOME COUNTY INDUSTRIAL PARK
INORGANIC ANALYSES - WELL SITES*

WELL	DATE	SAMPLE	AL	AS	BA	CD	CR	CU	FE	PB	MN	HG	NI	SE	NA	ZN	CA	MG	HARD	TALK	PH	SPCOND
1	08/05/83	4385	<.1	<.01		<.01	<.01	.01	<.01	<.01	.18	<.5	<.01		18.	<.01					7.8	330.
1	11/09/83	4890	<.1	<.01	<.1	<.01	<.01	<.01	<.01	<.01	.02	<.5	<.01	<.01	14.	<.01	44.	11.	160.	132.	8.3	319.
2	08/05/83	4386	<.1	<.01		<.01	<.01	.01	<.01	<.01	.31	<.5	<.01		10.	.07					7.5	310.
2	11/09/83	4891	<.1	.06	.6	<.01	<.01	.03	.38	<.01	1.9	4.6	<.01	<.01	43.	.05	56.	11.	190.	174.	7.6	420.
2	01/19/84	4137		.01																		
3	08/05/83	4387	<.1	<.01		.015	<.01	.02	<.01	<.01	.40	<.5	<.01		7.0	.05					6.7	200.
3	11/09/83	4892	<.1	.02	.1	<.01	<.01	<.01	<.01	<.01	1.3	<.5	<.01	<.01	6.2	<.01	30.	6.7	100.	61.	7.8	212.
3	01/19/84	4138		<.01																		
4	08/05/83	4388	<.1	<.01		<.01	<.01	<.01	.05	<.01	.33	<.5	<.01		11.	<.01					7.0	160.
4	11/09/83	4893	<.1	<.01	.1	<.01	<.01	<.01	.01	<.01	<.01	6.7	<.01	<.01	5.6	.02	21.	5.1	73.	42.	8.2	160.
4	01/19/84	4139		<.01																		
5	08/05/83	4389	<.1	.02		<.01	<.01	.12	<.01	<.01	1.4	<.5	<.01		13.	<.01					7.1	190.
5	11/09/83	4894	<.1	.01	.2	<.01	<.01	<.01	.02	<.01	1.9	3.9	<.01	<.01	6.7	.03	24.	3.7	75.	<1.	8.3	161.
5	01/19/84	4140		<.01																		
6	08/08/83	62892	<.1	<.01		<.01	<.01	.01	2.4	<.01	2.8	<.5	<.01		11.	.01					5.9	180.
6	11/09/83	4895	<.1	.08	.3	<.01	<.01	.01	38.	<.01	4.1	2.2	<.01	<.01	4.5	.06	11.	3.0	40.	19.	6.6	115.
6	01/19/84	4141		.01																		
7	08/05/83	4390	<.1	<.01		<.01	<.01	.05	<.01	<.01	4.1	<.5	<.01		5.0	.02					6.2	90.
7	11/09/83	4896	<.1	.07	.2	<.01	<.01	.01	7.8	<.01	4.3	<.5	<.01	<.01	3.8	.03	11.	1.9	35.	19.	7.1	94.4
7	01/19/84	4142		.01																		
8	08/05/83	4391	<.1	<.01		<.01	<.01	.05	<.01	<.01	4.4	<.5	<.01		5.0	.02					6.2	90.
8	11/09/83	4897	<.1	.08	.3	<.01	<.01	<.01	10.	<.01	4.8	<.5	<.01	<.01	3.6	.04	8.6	1.7	28.	14.	7.1	84.3
8	01/19/84	4143		.01																		
9	08/05/83	4392	<.1	<.01		<.01	<.01	.18	<.01	<.01	1.7	<.5	<.01		9.0	.02					6.2	90.
9	11/09/83	4898	<.1	<.01	.2	<.01	<.01	<.01	.03	<.01	2.0	<.5	<.01	<.01	3.7	.02	12.	2.2	39.	16.	7.0	100.
10	08/05/83	4393	<.1	<.01		<.01	<.01	.34	<.01	<.01	3.3	<.5	<.01		11.	.02					6.8	100.
10	11/09/83	4899	<.1	<.01	.2	<.01	<.01	<.01	.07	<.01	2.3	<.5	<.01	<.01	4.4	.02	14.	3.0	47.	19.	7.5	106.
10	01/19/84	4144		<.01																		
11	08/08/83	62893	<.1	<.01		<.01	<.01	.26	<.01	<.01	4.4	.6	<.01	14.6	21.	<.01					7.1	750.
11	11/09/83	4900	<.1	.06	.3	<.01	<.01	.02	3.2	<.01	11.	<.5	<.01	<.01	22.	.03	160.	39.	560.	350.	7.7	995.
11	01/19/84	4145		<.01																		
13	08/08/83	62894	.1	<.01		<.01	<.01	2.4	3.6	<.01	16.	<.5	<.01		43.	.03					6.8	430.
13	08/20/83	63217	<.1	<.01		<.01	1.9	2.5	.84	<.01	15.	25.	<.01		14.	.08					6.6	272.
14	08/08/83	62895	.4	<.01		<.01	.05	.20	190.	<.01	110.		.49		650.	23.					6.0	10342.
14	08/19/83	63218	.4	<.01		.03	.65	.2	640.	<.01	120.	5.	.43		600.	16.					5.9	11458.
15	08/08/83	62896	.2	<.01		<.01	<.01	.78	<.01	<.01	7.2	<.5	<.01		45.	.08					6.8	330.
15	08/20/83	63220	<.1						.03		15.		<.01		16.	.11						
16	08/20/83	63219	<.1	<.01		<.01	.55	.3	0.3	<.01	.80	2.	.07		560.	.20					7.7	4586.

* Chemical concentrations are in mg/l, except for Hg which is in ug/l.

TABLE 4
TROUPE COUNTY INDUSTRIAL PARK
INORGANIC ANALYSES - WELL SITES*

WELL	DATE	SAMPLE	TDS	SO4	CL	NO3N	CN	PHENOL	TOC	AG
1	08/05/83	4385	210.	9.	12.	<.01	<.05			<.01
1	11/09/83	4890	190.	8.	2.	<.01	<.5	<.001	8.	<.01
2	08/05/83	4386	240.	65.	18.	<.01	.07			<.01
2	11/09/83	4891	300.	<1.	8.	<.01	<.5	.02	390.	<.01
2	01/19/84	4137								
3	08/05/83	4387	180.	27.	23.	<.01	<.05			<.01
3	11/09/83	4892	150.	3.	1.	.03	<.5	<.001	59.	<.01
3	01/19/84	4138								
4	08/05/83	4388	170.	81.	15.	.15	<.05			<.01
4	11/09/83	4893	90.	12.	1.	.05	<.5	<.001	1.	<.01
4	01/19/84	4139								
5	08/05/83	4389	200.	31.	23.	.14	<.05			.01
5	11/09/83	4894	110.	11.	4.	<.01	<.5	<.001	14.	<.01
5	01/19/84	4140								
6	08/08/83	62892	220.	34.	27.	<.01	<.05			<.01
6	11/09/83	4895	100.	5.	4.	.02	<.5	<.001	19.	<.01
6	01/19/84	4141								
7	08/05/83	4390	90.	71.	13.	.02	<.05			<.01
7	11/09/83	4896	110.	11.	4.	.02	<.5	<.001	4.	<.01
7	01/19/84	4142								
8	08/05/83	4391	100.	35.	16.	.08	<.05			<.01
8	11/09/83	4897	80.	12.	3.	.02	<.5	<.001	4.	<.01
8	01/19/84	4143								
9	08/05/83	4392	120.	100.	21.	.05	<.05			<.01
9	11/09/83	4898	100.	14.	3.	.01	<.5	<.001	2.	<.01
10	08/05/83	4393	170.	23.	26.	.08	<.05			.01
10	11/09/83	4899	120.	37.	4.	<.01	<.5	<.001	3.	<.01
10	01/19/84	4144								
11	08/08/83	62893	360.	72.	47.	<.01	<.05			.01
11	11/09/83	4900	740.	1.	43.	<.01	<.5	.07	200.	<.01
11	01/19/84	4145								
13	08/08/83	62894	310.	41.	27.	<.01	<.05			<.01
13	08/20/83	63217	230.	13.0	90.	3.6	<.05			<.01
14	08/08/83	62895	13750.	890.	840.	.18	.5			.03
14	08/19/83	63218	15900.	814.0	860.	.4	.14			<.01
15	08/08/83	62896	280.	113.	47.	.10	<.05			.03
15	08/20/83	63220								
16	08/20/83	63219	2660.	11.0	760.	.3	<.1			<.01

* Chemical concentrations are in mg/l. except for Hg which is in ug/l.

TABLE 5
BROOME COUNTY INDUSTRIAL PARK
ORGANIC ANALYSES OF ON-SITE WELLS *
1983

	Well 1		Well 2		Well 3		Well 4		Well 5		Well 6		Well 7		Well 8		Well 9		Well 10		Well 11		Well 13		Well 14		Well 15		Well 16	
	8/5	11/10	8/5	11/10	8/5	11/10	8/5	11/9	8/5	11/9	8/5	11/9	8/5	11/9	8/5	11/9	8/5	11/9	8/5	11/9	8/5	11/9	8/8	8/20	8/8	8/19	8/8	8/20	8/20	8/20
Benzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	3	2	< 1	40	27	< 1	< 1		7
a-Trifluorotoluene		< 1		2		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
Toluene	< 1	< 1	< 1	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	110	17	13	1100	1200	< 1	< 1		8
Ethylbenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	8	5	34	59	< 1	< 1		< 1
1-Chlorocyclohexene-1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
p-Xylene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		4								
m-Xylene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
Chlorobenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	6	2	< 1	< 1	< 1	< 1	< 1		< 1
o-Xylene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
Isopropylbenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
Styrene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
p-Bromofluorobenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
n-Propylbenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
o-Chlorotoluene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
tert-Butylbenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
Bromobenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
sec-Butylbenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
1,3,5-Trimethylbenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
1,2,4-Trimethylbenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
p-Cymene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
p-Dichlorobenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
Cyclopropylbenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
n-Butylbenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
m-Dichlorobenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
2,3-Benzofuran		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
o-Dichlorobenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
Hexachloro-1,3-butadiene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
1,2,4-Trichlorobenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
Naphthalene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
1,2,3-Trichlorobenzene		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1								
Chloromethane	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1		< 1
Bromomethane	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	2	< 1	< 1			< 1	< 1		< 1
Vinyl Chloride	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	16	< 1	< 1	< 1	36	25	< 1	< 1		< 1
Chloroethane	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	5	18	< 1	< 1	19	15	< 1	< 1		< 1
Methylene chloride	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	2	32	< 1	2	1600	2100	2	4		4
1,1-Dichloroethene	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1
1,1-Dichloroethane	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	26	150	< 1	< 1	62	80	< 1	< 1		< 1
t-1,2-Dichloroethene	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	8	10	< 1	< 1		< 1
Chloroform	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1
1,2-Dichloroethane	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	3	< 1	< 1	6	10	< 1	< 1		< 1
1,1,1-Trichloroethane	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	8	< 1	2	< 1	< 1	< 1	< 1	< 1		< 1
Carbon tetrachloride	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1
Bromodichloromethane	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1
1,2-Dichloropropane	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	40	< 1	< 1	150	350	15	20		< 1
t-1,3-Dichloropropene	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1
Trichloroethene	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	23	23	< 1	< 1		< 1
Dibromochloromethane	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1
1,1,2-Trichloroethane	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1
c-1,3-Dichloropropene	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1
2-Chloroethylvinyl ether	< 10	< 10	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10		< 10
Bromoform	< 10	< 10	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10		< 10
1,1,2,2-Tetrachloroethane	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1
Tetrachloroethene	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1

* Chemical concentrations are in ug/l.

TABLE 6
BROOME COUNTY INDUSTRIAL PARK
INORGANIC ANALYSES - HOMEOWNER WELLS*

HOME	DATE	SAMPLE	AL	AS	BA	CD	CR	CU	FE	PB	MN	HG	NI	SE	NA	ZN	CA	MG	HARD	TALK	PH	SPCOND	TDS
1	11/14/83	71229	<.1	<.01	.3	<.01	<.01	<.01	2.1	<.01	1.5	<.5	<.01	<.01	10.	.02	19.	4.3	65.	70.	7.3	158.	130.
2	11/14/83	71230	<.1	.04	.2	<.01	<.01	<.01	<.01	<.01	.06	<.5	<.01	<.01	130.	.01	7.9	1.4	25.	270.	8.8	524.	340.
2	01/19/84	4146		.033																			
3	11/14/83	71231	<.1	<.01	.1	<.01	<.01	.10	<.01	<.01	.14	<.5	<.01	<.01	40.	.02	30.	6.5	100.	46.	6.3	426.	260.
4	11/14/83	71232	<.1	<.01	<.1	<.01	<.01	.01	<.01	<.01	1.1	<.5	<.01	<.01	26.	.03	53.	5.8	160.	174.	8.8	379.	250.
5	11/14/83	71233	<.1	.02	.2	<.01	<.01	<.01	.03	<.01	.45	<.5	<.01	<.01	14.	.01	34.	5.4	110.	122.	8.9	223.	180.
6	11/15/83	71234	<.1	<.01	<.1	<.01	<.01	.12	<.01	<.01	.01	<.5	<.01	<.01	6.2	.03	12.	3.0	42.	16.	5.9	112.	80.
7	11/14/83	71235	<.1	.03	.1	<.01	<.01	<.01	.04	<.01	.54	<.5	<.01	<.01	11.	.02	33.	5.4	105.	114.	7.7	236.	140.
7	01/19/84	4147		.01																			
8	11/14/83	71236	<.1	.01	.4	<.01	<.01	<.01	.01	<.01	.13	<.5	<.01	<.01	23.	.06	27.	5.0	88.	120.	8.0	248.	140.
9	11/14/83	71237	<.1	.11	.1	<.01	<.01	.01	.04	<.01	.42	<.5	<.01	<.01	75.	.03	27.	4.8	87.	224.	7.9	399.	270.
9	01/19/84	4148		.033																			
10	11/14/83	71238	<.1	<.01	.1	<.01	<.01	.33	<.01	<.01	<.01	<.5	<.01	<.01	65.	.03	26.	6.3	91.	44.	6.3	517.	320.
11	11/14/83	71239	<.1	<.01	<.1	<.01	<.01	.01	<.01	<.01	1.0	<.5	<.01	<.01	27.	.01	44.	5.1	130.	162.	7.7	348.	220.
12	11/15/83	~~71240~~	~~<.1~~	<.01	.1	<.01	<.01	.23	<.01	<.01	<.01	<.5	<.01	<.01	69.	.26	26.	4.7	84.	80.	6.2	539.	320.
13	11/15/83	50315	<.05	.023	.5	<.002	<.01	<.05	.44	<.01	.27	<.4	<.05	<.01	53.	.14			88.	190.	7.6	386.	206.
14	11/15/83	50316	<.05	<.01	<.5	<.002	<.01	<.05	6.6	<.01	1.9	<.4	<.05	<.01	12.	.09			129.	107.	7.0	281.	204.
15	11/15/83	50317	<.05	<.01	<.5	<.002	<.01	<.05	8.4	<.01	.22	<.4	<.05	<.01	5.8	<.05			57.	38.	6.5	142.	87.
16	11/15/83	50318	<.05	<.01	<.5	<.002	<.01	<.05	<.02	<.01	.08	<.4	<.05	<.01	55.	<.05			1.	105.	7.5	256.	162.
17	11/15/83	50319	<.05	<.01	<.5	<.002	<.01	<.1	.66	<.01	.20	<.4	<.05	<.01	4.7	<.05			43.	23.	6.6	118.	78.

* Chemical concentrations are in mg/l except for Hg which is in ug/l.

TABLE 6
BROOME COUNTY INDUSTRIAL PARK
INORGANIC ANALYSES - HOMEOWNER WELLS *

HOME	DATE	SAMPLE	SO4	CL	NO3N	CN	PHENOL	TOC	AG
1	11/14/83	71229	14.	6.	<.01	<.05	<.001	6.	<.01
2	11/14/83	71230	<1.	29.	<.01	<.05	<.001	14.	<.01
2	01/19/84	4146							
3	11/14/83	71231	30.	65.	4.7	<.05	<.001	8.	<.01
4	11/14/83	71232	14.	23.	<.01	<.05	<.001	10.	<.01
5	11/14/83	71233	7.	8.	<.01	<.05	<.001	7.	<.01
6	11/15/83	71234	11.	17.	1.13	<.05	<.001	4.	<.01
7	11/14/83	71235	12.	8.	<.01	<.05	<.001	8.	<.01
7	01/19/84	4147							
8	11/14/83	71236	4.	7.	<.01	<.05	<.001	9.	<.01
9	11/14/83	71237	3.	27.	<.01	<.05	<.001	11.	<.01
9	01/19/84	4148							
10	11/14/83	71238	25.	116.	5.0	<.05	<.001	8.	<.01
11	11/14/83	71239	12.	14.	<.01	<.05	<.001	9.	<.01
12	11/15/83	71240	37.	114.	4.6	<.05	<.001	6.	<.01
13	11/15/83	50315	2.2	14.					<.02
14	11/15/83	50316	20.	13.					<.02
15	11/15/83	50317	15.	11.					<.02
16	11/15/83	50318	20.	5.6					<.02
17	11/15/83	50319	18.	8.5					<.02

*Chemical concentrations are in mg/l except for Hg which is in ug/l.

TABLE 7
BROOME COUNTY INDUSTRIAL PARK
ORGANIC ANALYSES OF HOMEOWNER WELLS *

WELL NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
OWNER	D. Eckelberger	G. Tamkins	R. Edminster	M. Smith	D. Kernan	J. Villano	O. Desimone	A. Dahterle	R. Johnson	A. Allen	J. Hoover	R. Gleason	D. Hamm	Town Hall	R. Rowse	T. Butchko	S. Losky
DATE	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/15/84	11/15/84	11/15/84	11/15/84	11/15/84
Benzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
-Trifluorotoluene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10
Toluene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
-Chlorocyclohexene-1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
p-Xylene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m-Xylene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
o-Xylene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Styrene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
p-Bromofluorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-Propylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
o-Chlorotoluene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
p-Chlorotoluene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethlbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
p-Cymene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
p-Dichlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cyclopropylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m-Dichlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2,3-Benzofuran	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
o-Dichlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachloro-1,3-butadiene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloromethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Vinyl Chloride	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylene chloride	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
t-1,2-Dichloroethene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	2	<1	<1	<1
Chloroform	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
t-1,3-Dichloropropene	<1	<1	<1	<1	<1	4	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	9
Trichloroethene	<1	<1	<1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Dibromochloromethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
c-1,3-Dichloropropene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Chloroethylvinyl ether	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromoform	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

* Chemical concentrations are in ug/l.

TABLE 8
LIST OF HOMEOWNER WELLS SAMPLED

Listed below are the owners of the private wells that were sampled and analyzed for this hydrogeologic investigation. The numbers in front of each residence correspond to the well numbers on Figures 2 and 3. The numbers also correspond to the well analyses shown in Tables 6 and 7. Wells 1-12 were sampled by the Broome County Industrial Development Agency and analyzed by O'Brien & Gere. Wells 13-17 were sampled by the Broome County Health Department and analyzed by the New York State Department of Health.

1. Donald Eckelberger, Box 339 R.D. #2, Conklin Road
2. Grayden Tamkins, 1282 Conklin Road
3. Raymond Edminster, 1287 Conklin Road
4. Mike Smith, 1285 Conklin Road
5. Dennis Kernan, 1253 Conklin Road
6. Joseph Villano and Joyce Buchinski, 1262 Conklin Road
7. Onofrio Desimone, 1248 Conklin Road
8. Anthony Dattoria, 1251 Conklin Road
9. Raymond Johnson, 1281 Conklin Road
10. Adelbert Allen, 1279 Conklin Road
11. James Hoover, 1283 Conklin Road
12. Robert Gleason, Jr., Conklin Road
13. Donald Hamm, P.O. Box 53, Conklin Road
14. Town Hall, Conklin
15. Robert Rowse, 1258 Conklin Road
16. Thomas Butchko, Sr., 1269 Conklin Road
17. Sandra Lasky, 1278 Conkin Road

TABLE 9

Groundwater Quality Within the Aquifers of the Susquehanna River Basin in New York State
(values in mg/l) (from Hollyday, 1969)

*	Glacial Till and Bedrock G	Glacial Till and Bedrock M	Glacial Till and Bedrock P	Lacustrine Deposits G	Lacustrine Deposits M	Lacustrine Deposits P	Outwash Deposits G	Outwash Deposits M	Outwash Deposits P
Temperature	48	50	52	50	52	53	47	50	53
Silica	6.7	8.3	9.6	2.0	7.8	15	6.8	7.4	8.8
Iron	.08	.30	.65	.21	1.0	1.8	.03	.06	.15
Manganese	.01	.03	.05		.02		0	.01	.05
Calcium	29	41	51		30		45	50	74
Magnesium	3.8	8.3	9.7		9.0		6.0	12	19
Sodium	4.8	11	64		7.6		6.6	8.9	13
Potassium	.5	1.5	2.3		.5		1.1	1.4	1.6
Bicarbonate	140	170	250		130		150	180	230
Sulfate	3.6	12	27		15		25	31	50
Chloride	4.0	16	58		3.0		7.8	13	22
Fluoride	.1	.1	.2		.1		.05	.1	.2
Nitrate	.09	.18	.53		0		.24	1.0	2.1
Dissolved Solids	160	200	310		140		190	240	330
Calcium and Magnesium	54	90	140		120		150	200	220
Alkalinity	110	150	190		110	130	130	150	170
pH	7.3	7.7	8.1		7.5		7.4	7.6	7.8
Color	0	2	10		1		1	2	5

*Values tabulated are taken from a frequency distribution of reported chemical analysis of well water. Good (G), medium (M) and poor (P) refer to values equaled or exceeded for 75, 50 and 25 percent of available analyses, respectively.

TABLE 10

New York State Department of Environmental Conservation
Class GA Groundwater Standards
(suitable as a potable water supply)

Parameter	Maximum Allowable Concentration
Arsenic (As)	25 ppb .025 mg/l ppm
Barium (Ba)	1.0 mg/l
Cadmium (Cd)	.01 mg/l
Chloride (Cl)	250 mg/l
Chromium (Cr)	.05 mg/l
Copper (Cu)	1.0 mg/l
Cyanide (CN)	.2 mg/l
Fluoride (F)	1.5 mg/l
Foaming Agents	.5 mg/l
Iron (Fe)	.3 mg/l
Lead (Pb)	.025 mg/l
Manganese (Mn)	.3 mg/l
Mercury (Hg)	.002 mg/l
Nitrate (N)	10.0 mg/l
Phenols	.001 mg/l
Selenium (Se)	.02 mg/l
Silver (As)	.05 mg/l
Sulfate (SO_4)	250 mg/l
Zinc (Zn)	5 mg/l
pH Range	6.5 - 8.5
Chlordane	.1 ug/l
Endrin	not detectable
Heptachlor	not detectable
Lindane	not detectable
Methoxychlor	35 ug/l
Toxaphene	not detectable
2,4-Dichlorophenoxyacetic Acid	4.4 ug/l
2,4,5-Trichlorophenoxyproploric Acid	.26 ug/l
Vinyl Chloride	5 ug/l
Benzene	not detectable
Chloroform	100 ug/l
Trichloroethylene	10 ug/l

TABLE 11

Representative Ranges for Various Inorganic Constituents in Leachate from Sanitary Landfills

Parameter	Representative Range (mg/l)
K^+	200 - 1000
Na^+	200 - 1200
Ca^{2+}	100 - 3000
Mg^+	100 - 1500
Cl^-	300 - 3000
SO_4^{2-}	10 - 1000
Alkalinity	500 - 10,000
Fe (total)	1 - 1000
Mn	0.01 - 100
Cu	10
Ni	0.01 - 1
Zn	0.1 - 100
Pb	5
Hg	0.2
NO_3	0.1 - 10
NH_4^+	10 - 1000
P as PO_4	1 - 100
Ogranic nitrogen	10 - 1000
Total dissolved organic carbon	200 - 30,000
COD (chemical oxidation demand)	1000 - 90,000
Total dissolved solids	5000 - 40,000
pH	4 - 8

Sources: Griffin et al., 1976; Leckie et al., 1975.

TABLE 12
Broome County Industrial Park
Cost Estimates For Remedial Alternatives

Replace Existing Homeowner Water Supplies

5,000 feet of water main @ $50/ft	$250,000
30 connections @ $1,000 each	30,000
Engineering	20,000
	$300,000

Groundwater Monitoring

Sampling - 4 trips x $1,000/trip	$ 4,000
Analyses - 20 samples x $500/each	10,000
Data Evaluation	6,000
	$ 20,000

Installation of Landfill Cover	Upper Landfill	Lower Landfill
Install Cover	$128,000	$100,000
Topsoil and Seeding	98,000	70,000
Grading	83,000	30,000
Safety	5,000	5,000
Gas Venting System	15,000	15,000
Contingency	50,000	30,000
Engineering	50,000	30,000
	$430,000	$280,000

Define Source of Arsenic

Install/Sample Wells - 10 wells @ $2,000/well	$ 20,000
Engineering	10,000
	$ 30,000

Installation of Cutoff Wall/Clay Cap	Upper Landfill	Lower Landfill
Install Cap	$ 128,000	$ 100,000
Slurry Wall	504,000	1,161,000
Grading	83,000	39,000
Topsoil and Seeding	98,000	75,000
Safety	12,000	10,000
Gas Venting System	15,000	15,000
Contingency	330,000	300,000
Engineering	330,000	300,000
	$1,500,000	$2,000,000

Off-Site Disposal	Upper Landfill	Lower Landfill
Excavate and Remove	$ 780,000	$ 425,000
Haul	1,280,000	700,000
Dispose	265,000	1,400,100
Grading	600,000	300,000
Topsoil and Seeding	50,000	30,000
Safety	25,000	25,000
Contingency	600,000	440,000
Engineering	600,000	440,000
	$4,200,000	$2,500,000

TABLE 12 - Continued
Broome County Industrial Park
Cost Estimates for Remedial Alternatives

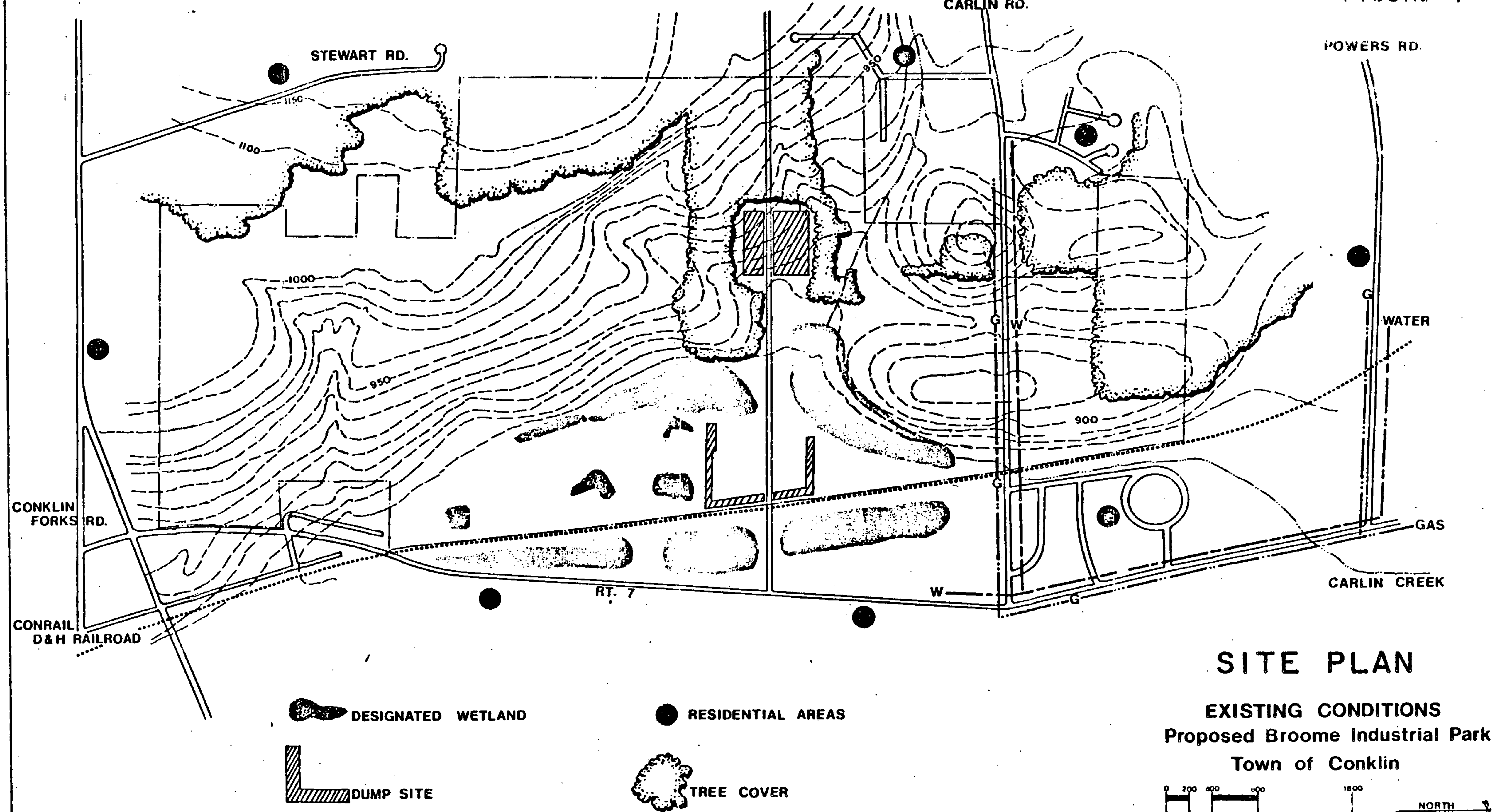
Leachate Collection and Treatment	Upper Landfill	Lower Landfill
Installation Cap	$ 129,000	$ 100,000
Collection System	85,000	117,000
Grading	83,000	30,000
Topsoil and Seeding	98,000	98,000
Safety	10,000	10,000
Gas Venting System	15,000	15,000
Treatment Plant	300,000	300,000
Contingency	190,000	115,000
Engineering	190,000	115,000
	$1,100,000	$ 900,000

It should be noted that these are preliminary engineering costs based on very limited data from the landfills. The costs may need to be adjusted when the following information is obtained: areal extent of landfills, an updated site topographic map, the thickness of existing cover, detailed estimates of fill volumes, and suitability of the on-site till as a cover material.

Figures

O'BRIEN & GERE

FIGURE 1



SITE PLAN

EXISTING CONDITIONS
Proposed Broome Industrial Park
Town of Conklin

PREPARED BY BROOME COUNTY INDUSTRIAL DEVELOPMENT AGENCY

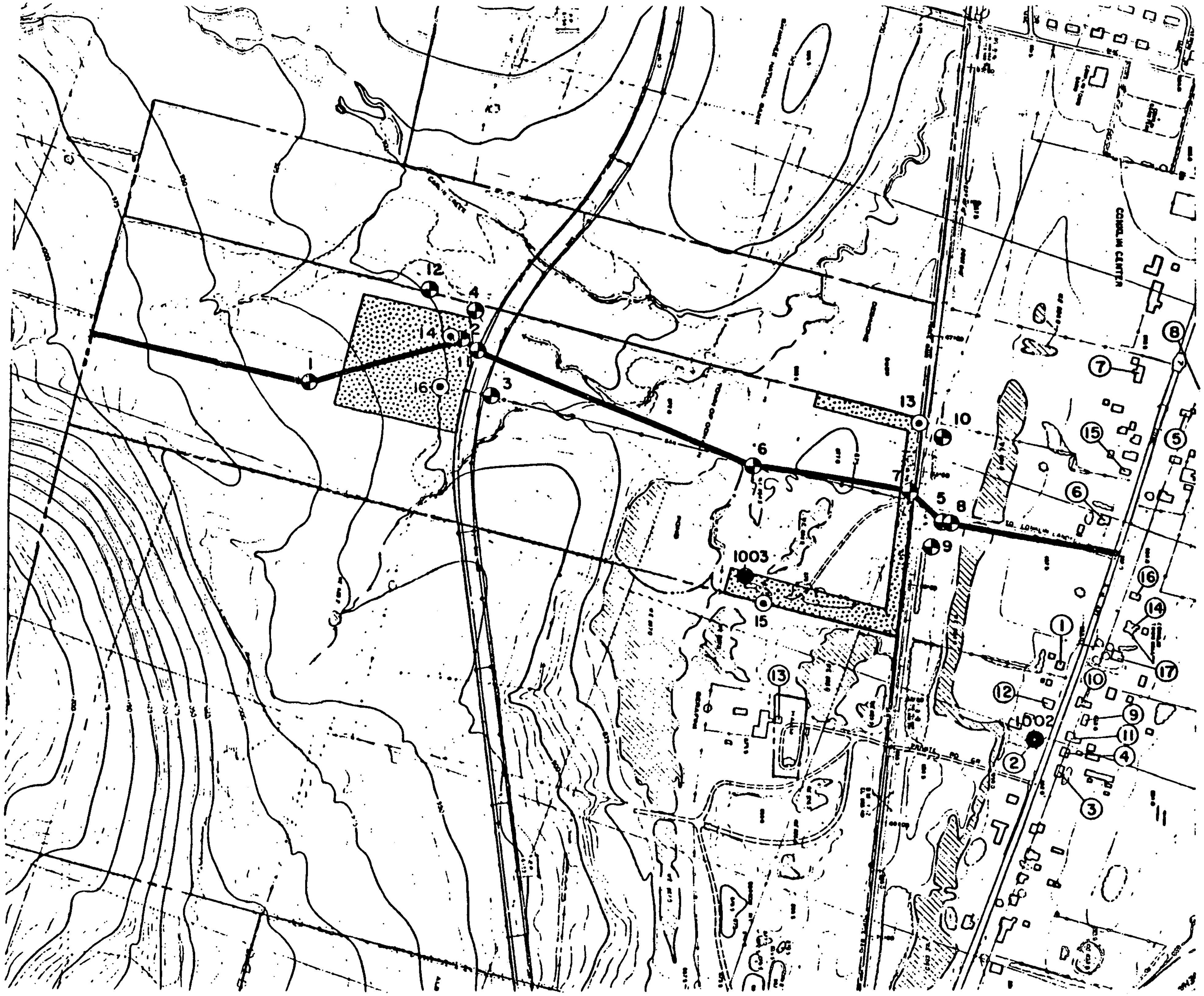


FIGURE 2

LEGEND

- GROUNDWATER MONITORING WELL
- LEACHATE / METHANE GAS MONITORING WELL
- WELLS BY OTHERS
- LITHOLOGIC CROSS SECTION LINE
- AREAL EXTENT OF LAND FILLS
- (5) HOMEOWNER WELL

BROOME COUNTY INDUSTRIAL DEVELOPMENT AGENCY

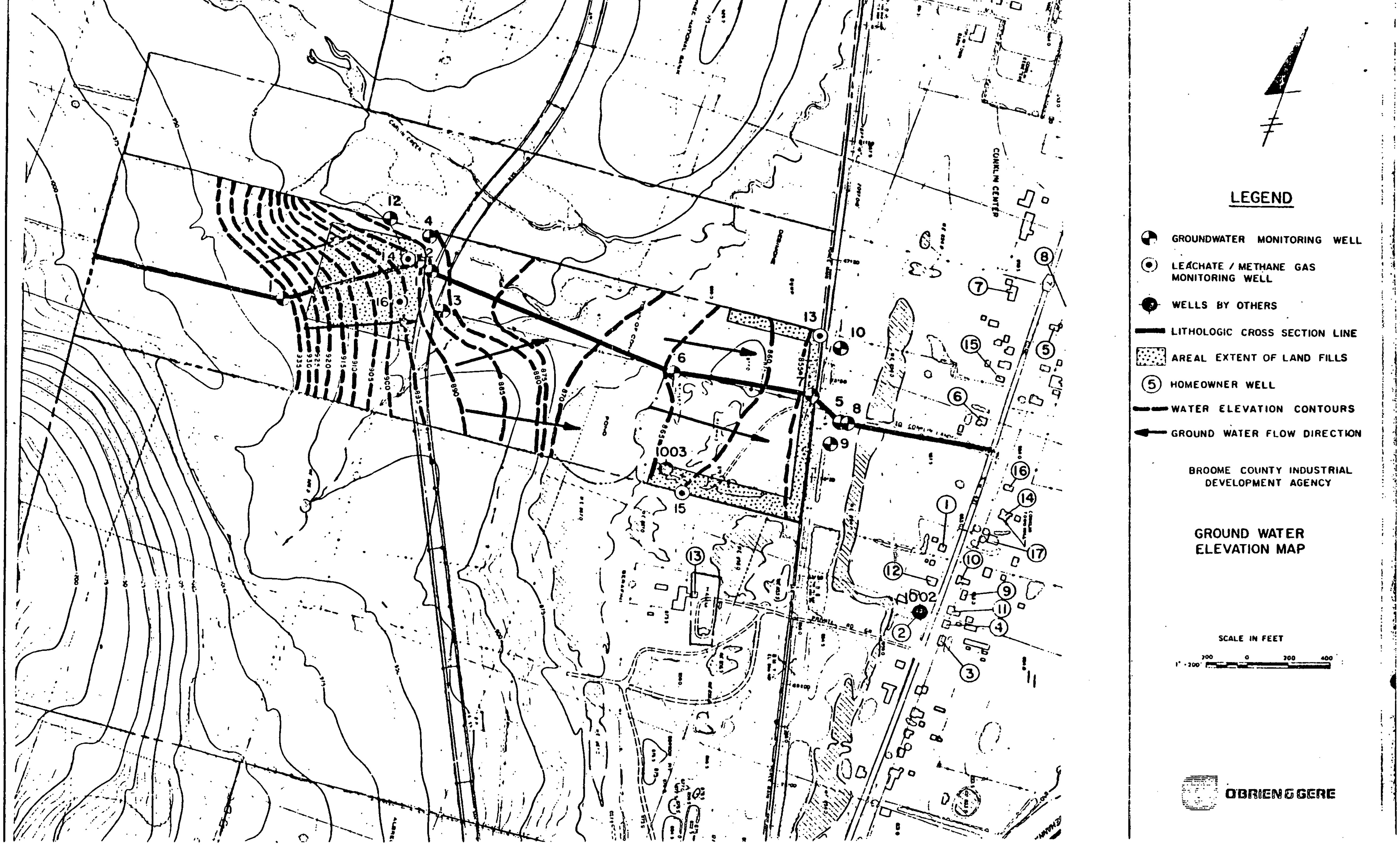
MONITORING WELL LOCATION MAP

SCALE IN FEET

1" = 200' 200 0 200 400

O'BRIEN & GERE

FIGURE 3


LEGEND
GROUNDWATER MONITORING WELL
LEACHATE / METHANE GAS MONITORING WELL
WELLS BY OTHERS
LITHOLOGIC CROSS SECTION LINE
AREAL EXTENT OF LAND FILLS
HOMEOWNER WELL
WATER ELEVATION CONTOURS
GROUND WATER FLOW DIRECTION
BROOME COUNTY INDUSTRIAL DEVELOPMENT AGENCY
GROUND WATER ELEVATION MAP
SCALE IN FEET
O'BRIEN & GERE
CONKLIN CENTER
POND

Appendices

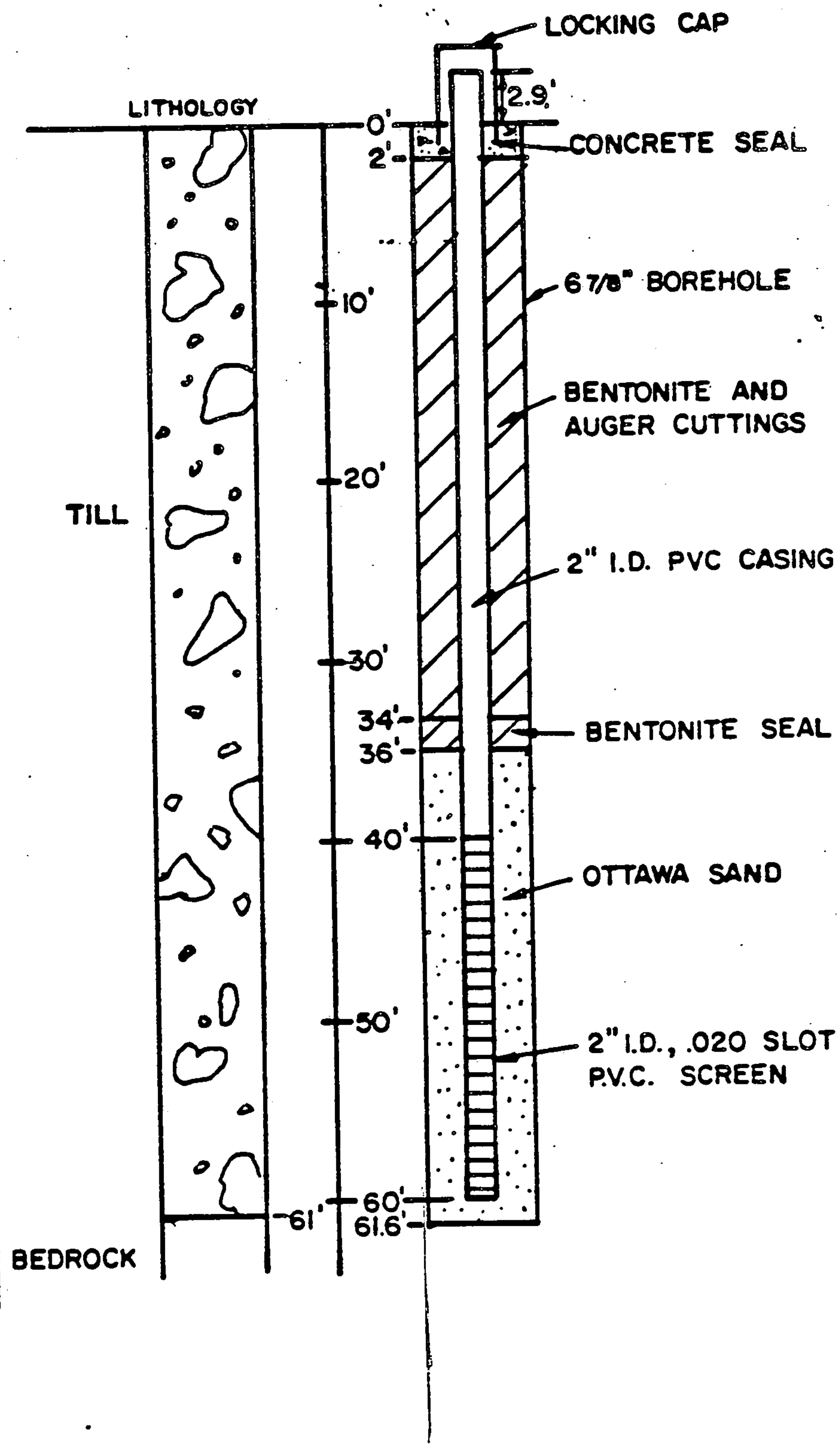
O'BRIEN & GERE

APPENDIX A

LITHOLOGIC LOGS AND MONITORING WELLS DETAILS

WELL I
BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DETH	ELEV.	DESCRIPTION
0-2	944.4- 939.4	Silt, brown, moist, little sand and gravel, very stiff
5-7	939.4- 937.4	Silt, brown, moist, little sand, trace gravel, trace clay, hard
10-12	934.4- 932.4	Same as above
15-17	929.4- 927.4	Silt, brown, moist, little clay and sand, trace gravel, hard
20-22	924.4- 922.4	Silt, gray, moist, little clay, sand and gravel, very stiff to hard
25-27	919.4- 917.4	Same as above
30-32	914.4- 912.2	Same as above
35-37	909.4-	Silt, wet, hard, trace sand and clay, hard
40-42	904.4- 883.4	Silt, gray, moist to wet little clay, sand and gravel, very stiff
45-47	899.4- 897.4	Same as above
50-52	894.4- 892.4	Same as above
55-57	889.4- 887.4	Same as above
60-61	884.4- 882.4	Same as above
61-61.6	883.4-	Silt, stone, gray, dry, hard



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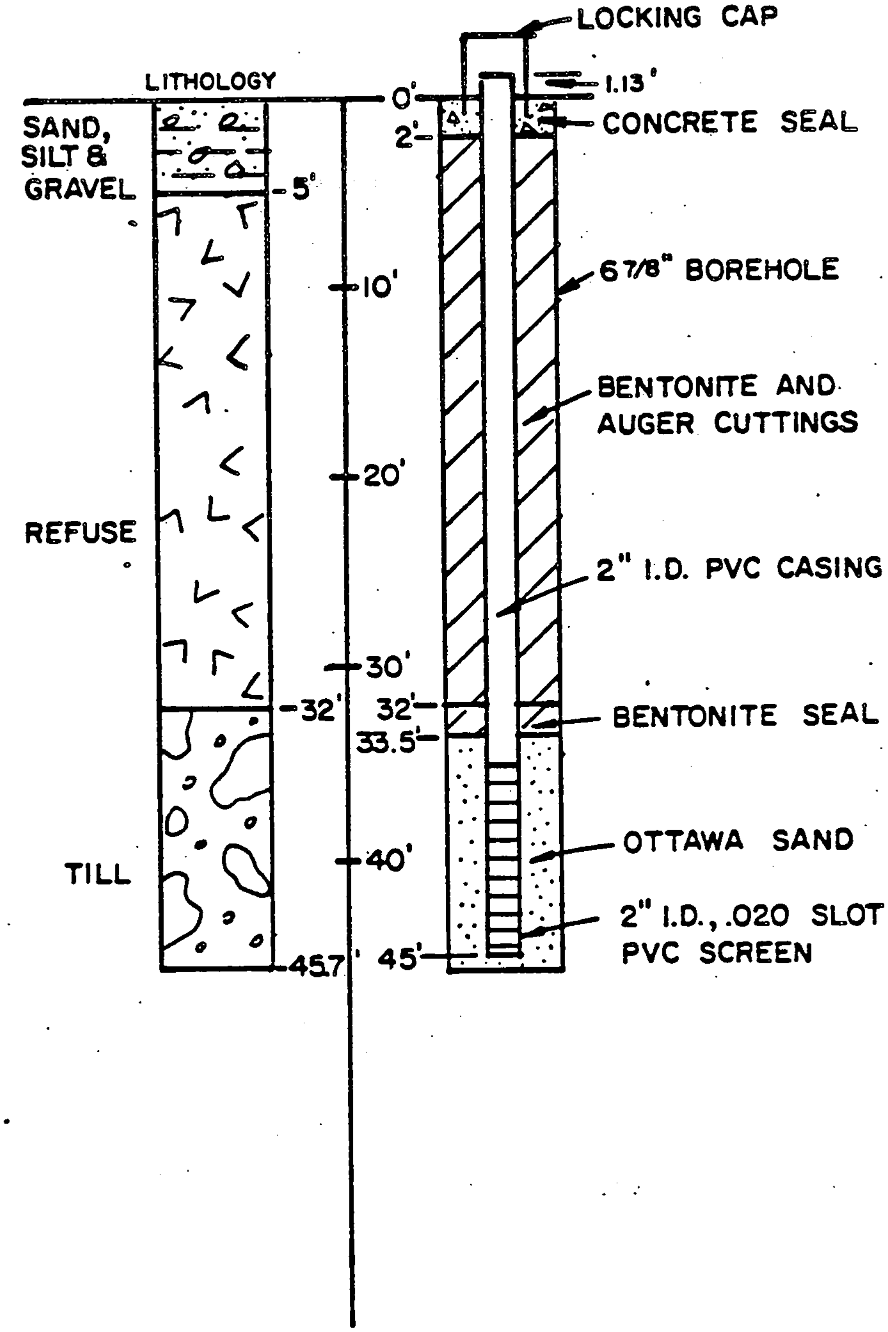
WELL 2
BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DEPTH	ELEV.	DESCRIPTION
0-5	914.8 909.8	Sand, gravel & silt, brown moist, medium dense
5-12	909.8- 902.8	Refuse, gray-brown, wet
12-26	902.8- 888.8	Refuse, gray-brown, wet, some sand, silt & gravel medium dense
26-30	888.8- 884.8	Silt & clay gray, wet little sand & gravel medium dense
30-32	884.8- 882.8	Silt, clay, gray, wet some refuse, little sand & gravel medium dense
32-45.7	882.8- 869.1	Silt, clay, gray, wet, some sand & gravel Still to hard
45.7	869.1	Refusal



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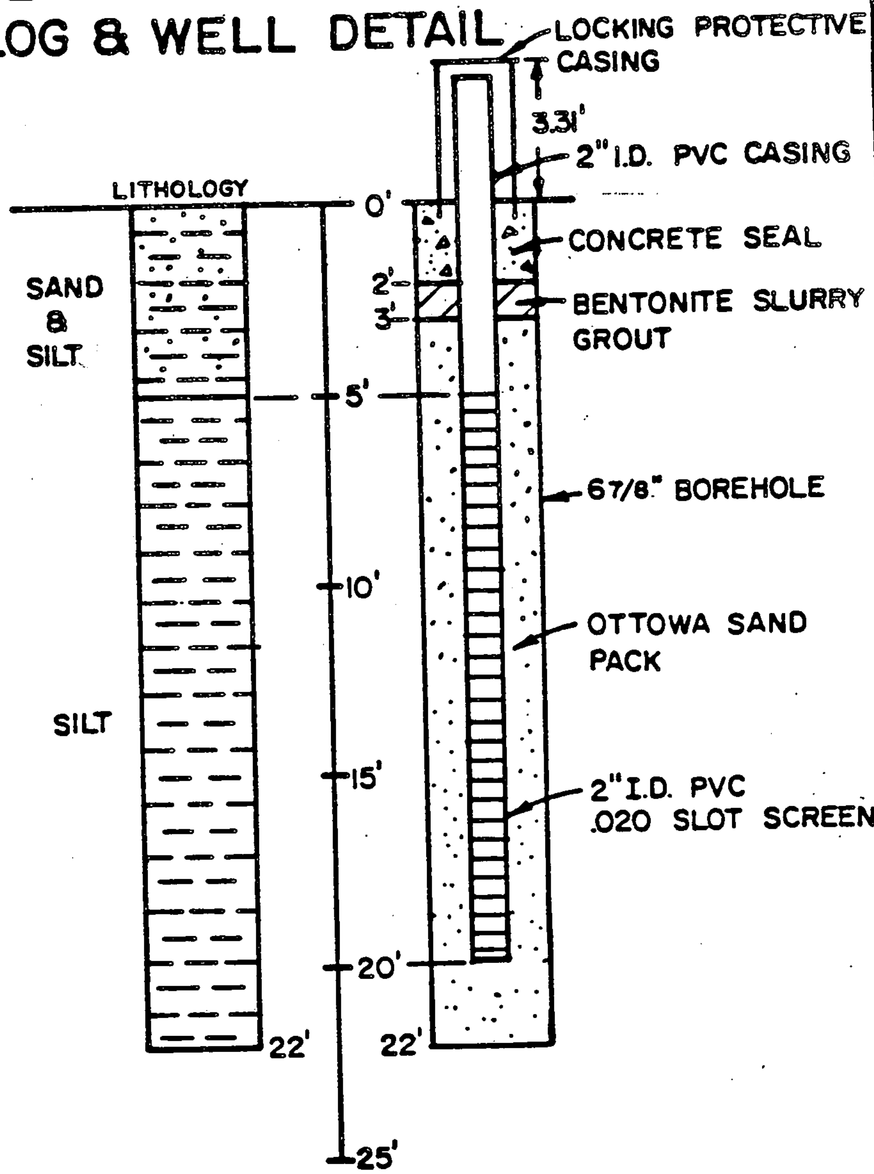
WELL 3

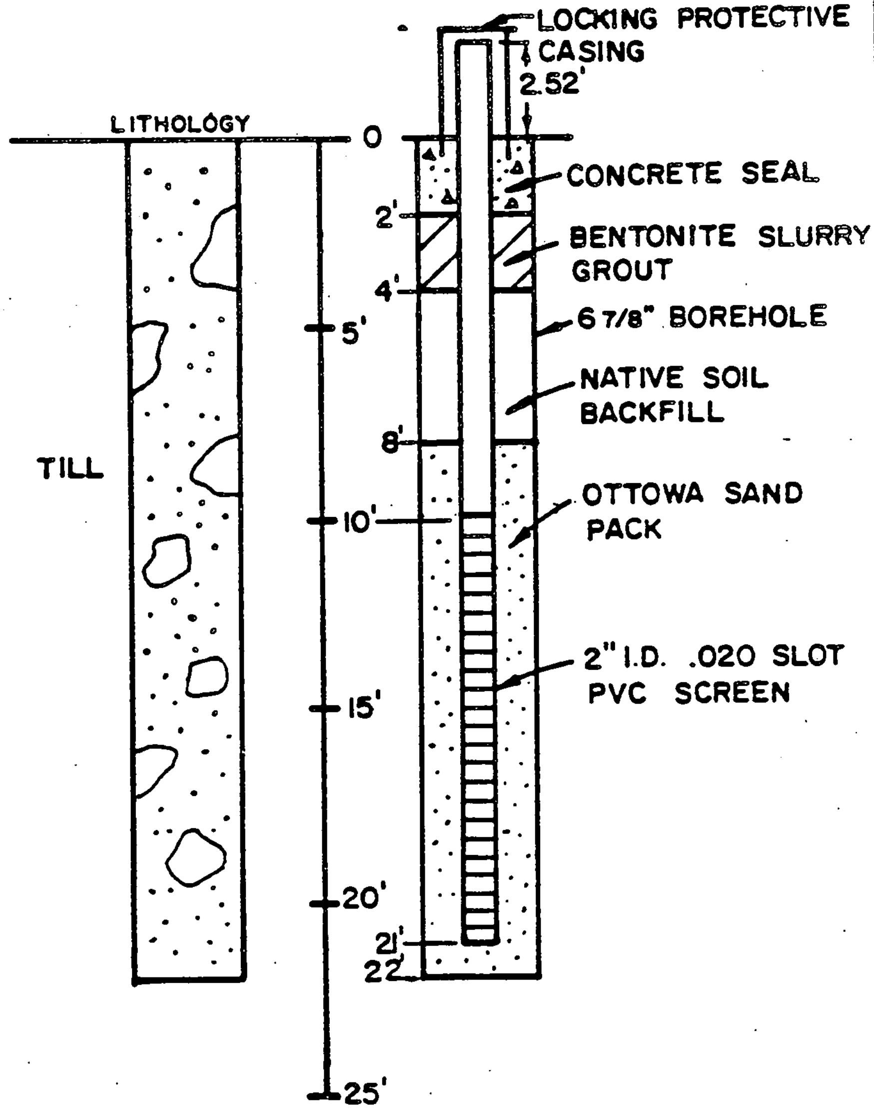
BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DEPTH	ELEV.	DESCRIPTION
0-1	885.8-883.8	Silt, brown, moist, little fine sand, stiff
5-7	880.8-878.8	Silt, brown, moist, very stiff, some rounded pebbles and angular shale gravel, little, fine sand, trace clay, stiff
10-12	875.8-873.8	Silt,-gray, wet, varred, stiff, some clay, very stiff
15-17	870.8-868.8	Silt, gray, wet varred, stiff, little clay, stiff
20-22	865.8-863.8	Silt, grey, wet, varred stiff, little clay, stiff



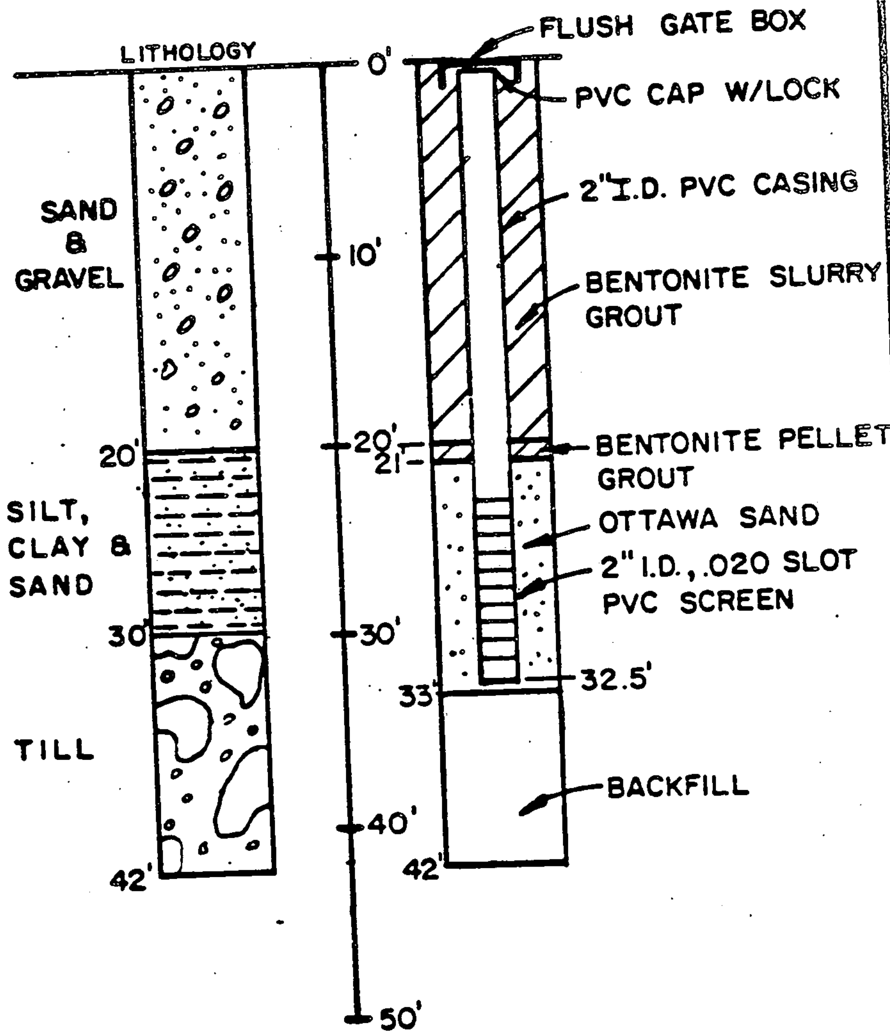
WELL 4
BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DEPTH	ELEV.	DESCRIPTION
0-2	890.9-888.9	Silt, brown moist some gravel, trace clay, stiff
5-7	885.9-883.9	Silt, gray, wet, some clay, little gravel, stiff
10-12	880.9-878.9	Silt, brown, moist, some gravel, little sand, medium dense
15-17	875.9-873.9	Silt, brown, wet, some sand and gravel, little clay
20-22	870.9-868.9	Silt, brown-gray, wet, little clay, little gravel, stiff



WELL 5
BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DEPTH	ELEV.	DESCRIPTION
0-2	860.31-858.31	Gravel, brown, dry, little sand, loose
5-7	855.31-853.31	Sand and gravel, brown, dry, little silt, very dense
10-12	850.31-848.31	Gravel and sand, gray, wet, some silt, dense
15-16	845.31-844.31	Same as above
16-17	844.31-843.31	Sand and gravel, brown, wet, medium dense
20-22	840.31-838.31	Silt, brown, wet, little clay lenses, stiff
25-27	835.31-833.31	Silt, brown, wet, some sand, little gravel, medium dense
30-32	830.31-828.31	Silt, gray, moist, some sand and gravel, stiff
35-37	825.31-823.31	Silt, gray moist, little sand and gravel
40-42		Silt, gray, moist, some sand and gravel



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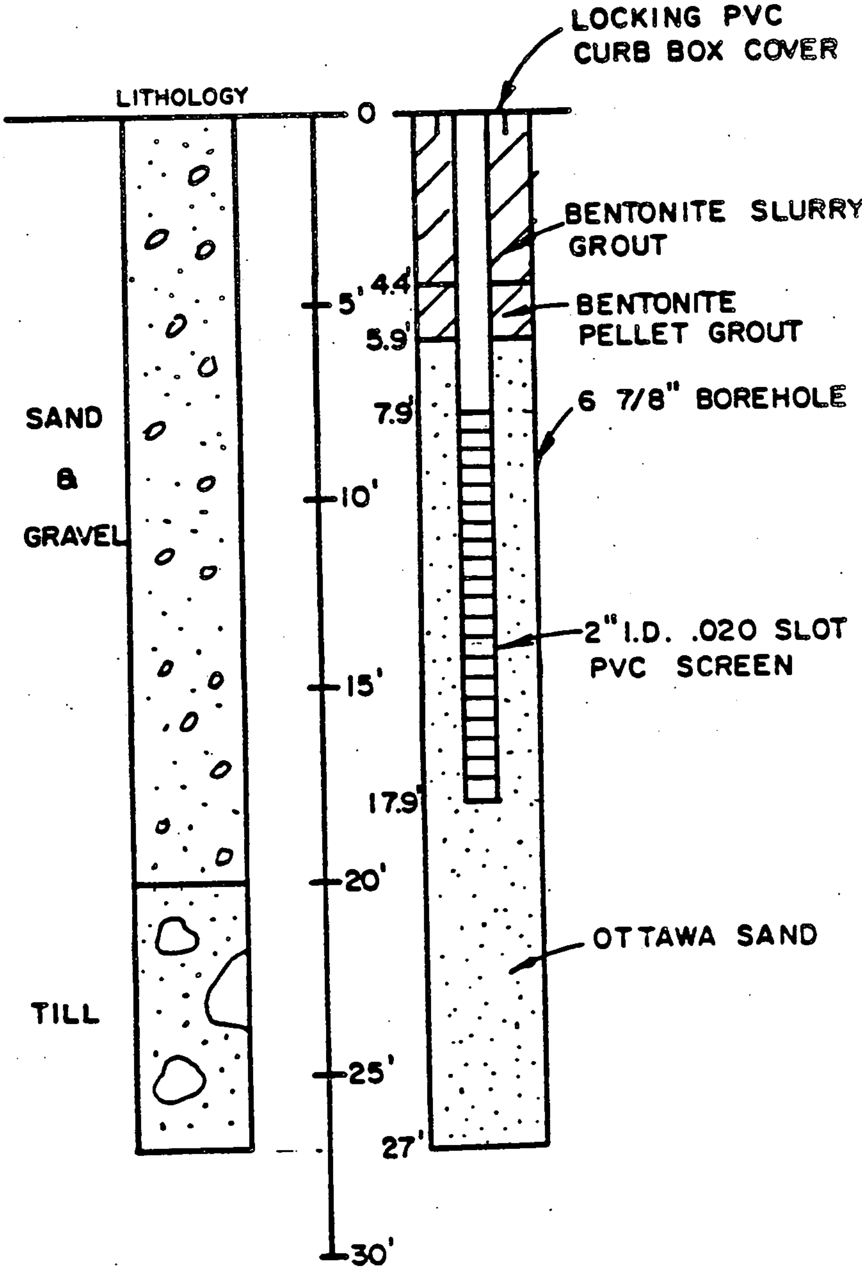
WELL 6
BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DEPTH	ELEV.	DESCRIPTION
0-2	868.82-866.82	Sand and gravel, brown, dry, medium dense
5-7	863.82-861.82	Sand, brown moist, some silt, little gravel, medium dense
10-12	858.82-856.82	Gravel and sand, gray, wet, little silt, dense
15-17	853.82-851.82	Same as above
20-22	848.82-846.82	Gravel and gray, wet, some silt very dense
25-27	843.82-851.82	Same as above



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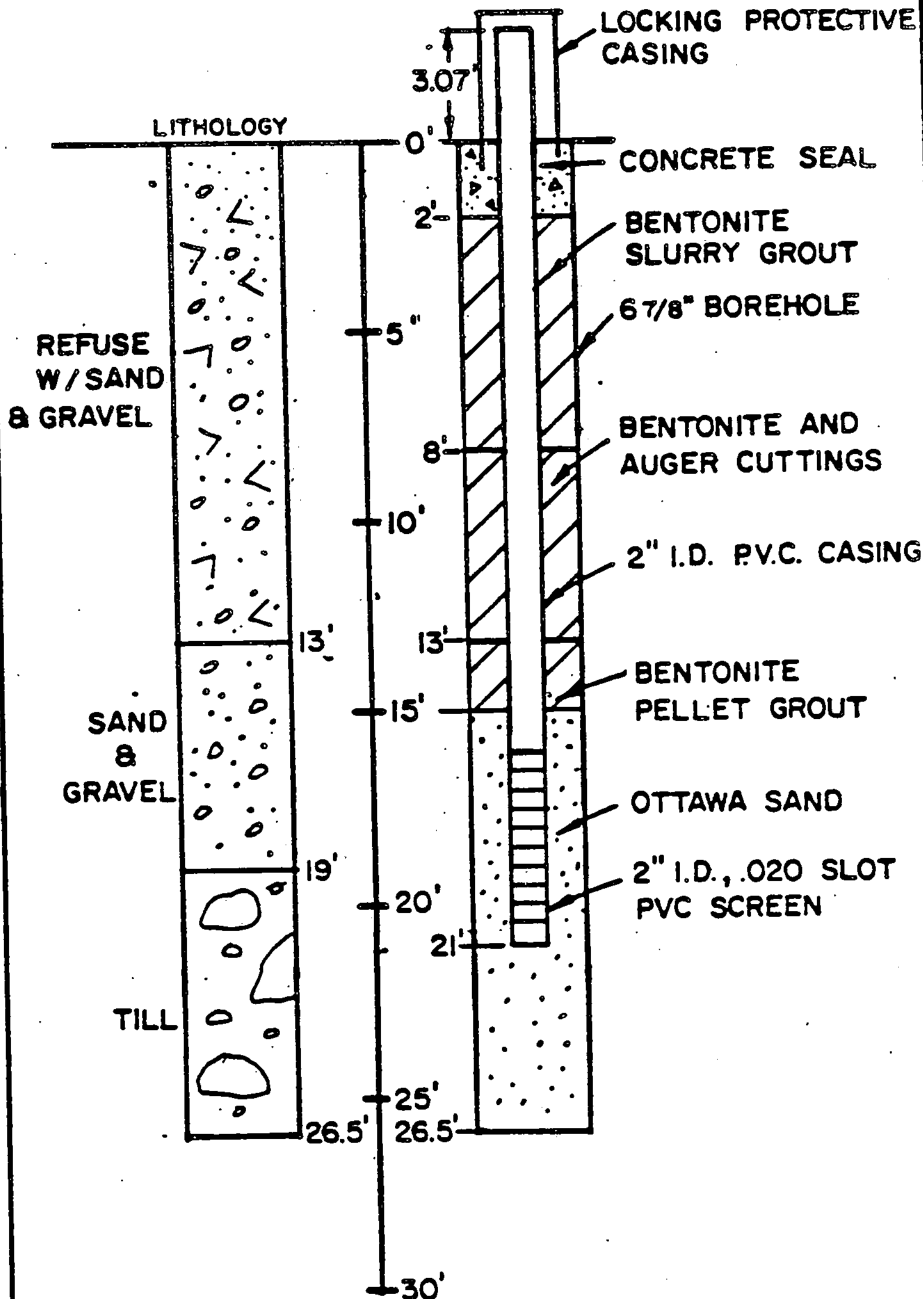
WELL 7
BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DEPTH	ELEV.	DESCRIPTION
0-2	865.2-863.2	Gravel, brown, moist, some sand and silt, dense
4-6	861.2-859.2	Refuse, black, wet, little sand, silt and gravel
6-8	859.2-857.2	Gravel, brown, wet, some refuse, little sand and silt, medium dense
8-10	857.2-	Same as above
10-12	855.2-853.2	Same as above
12-14	853.2-851.2	Same as above
14-16	851.2-849.2	Gravel, brown wet, little silt and sand, trace clay, very dense
16-18	849.2-847.2	Same as above
20-22	845.2-843.2	Silt and sand, brown, dry, little gravel, very dense
25-26.5	840.2-838.2	Silt and sand, brown, dry to wet, little gravel, very dense



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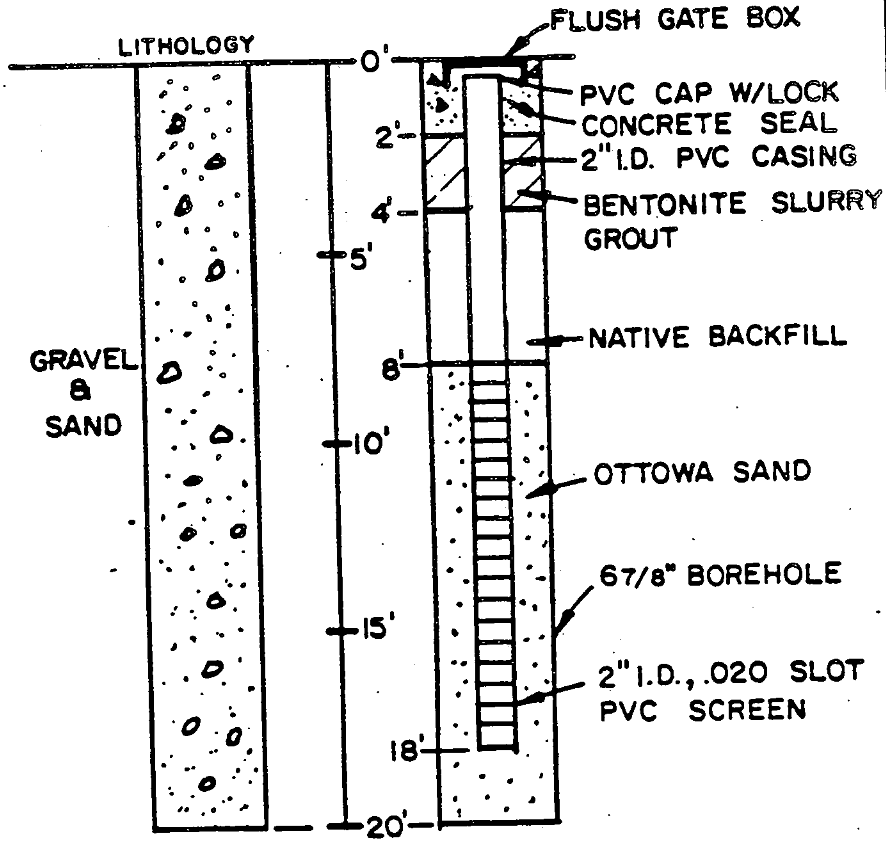
WELL 8
BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DEPTH.	ELEV.	DESCRIPTION
0-18	860.24 842.24	No Samples - same as Well #5
18-19	842.24 841.24	Gravel, brown, wet, little sand and silt, medium dense
19-20	841.24 840.24	Silt, brown, wet, trace sand & clay, stiff



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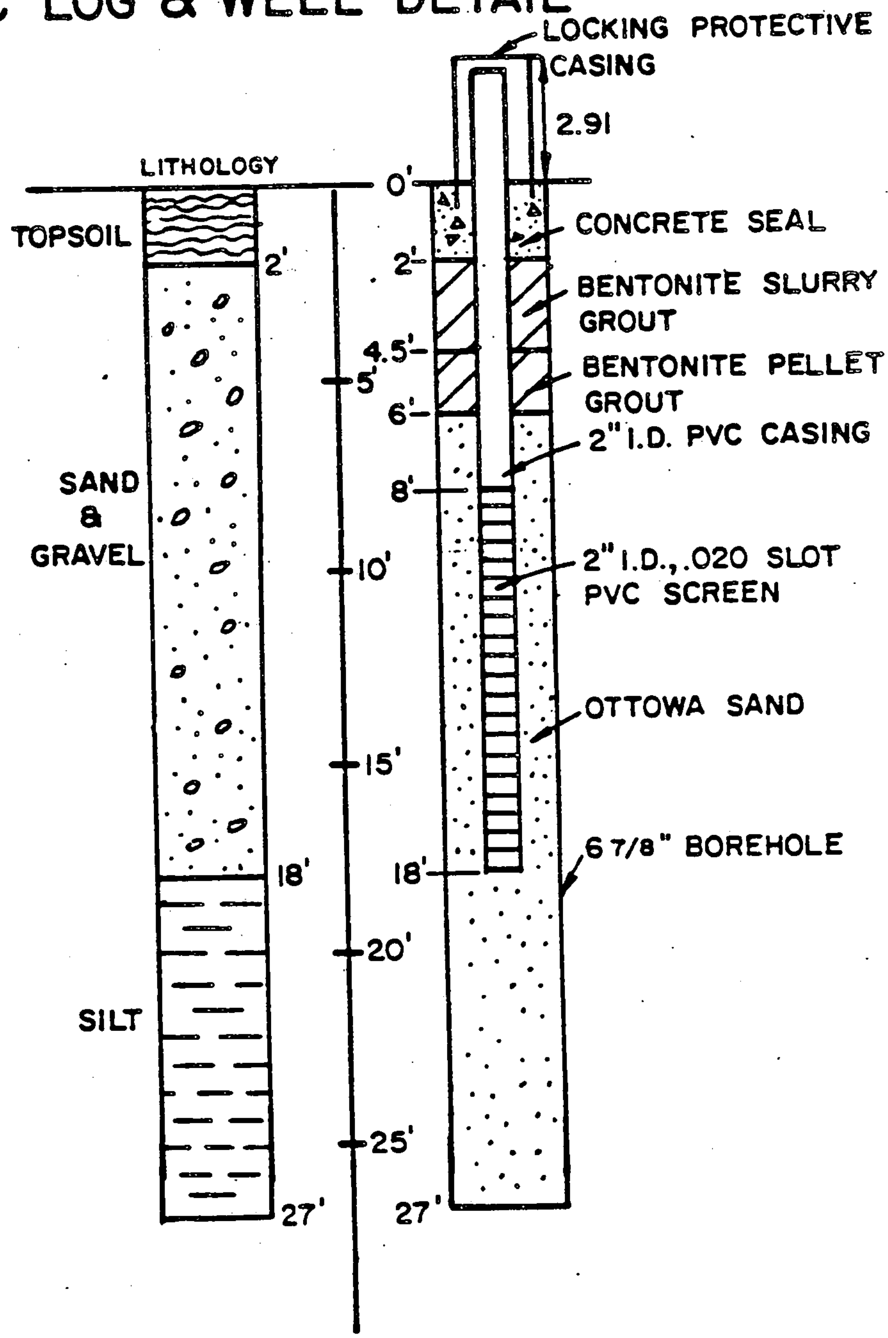
WELL 9
BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DEPTH	ELEV.	DESCRIPTION
0-2	861.3-	Gravel, brown dry, some sand, little silt, loose
5-7	856.3-	Gravel & Sand, brown, dry to wet, little silt, very dense
10-12	851.3- 849.3	Coarse sand, brown, wet, some gravel dense
15-17	846.3- 844.3	Same as above -
20-22	841.3 839.3	Silt, brown, wet, some sand, little stiff
25-27	836.3- 834.3	Silt, Brown, wet, little sand, trace gravel, stiff



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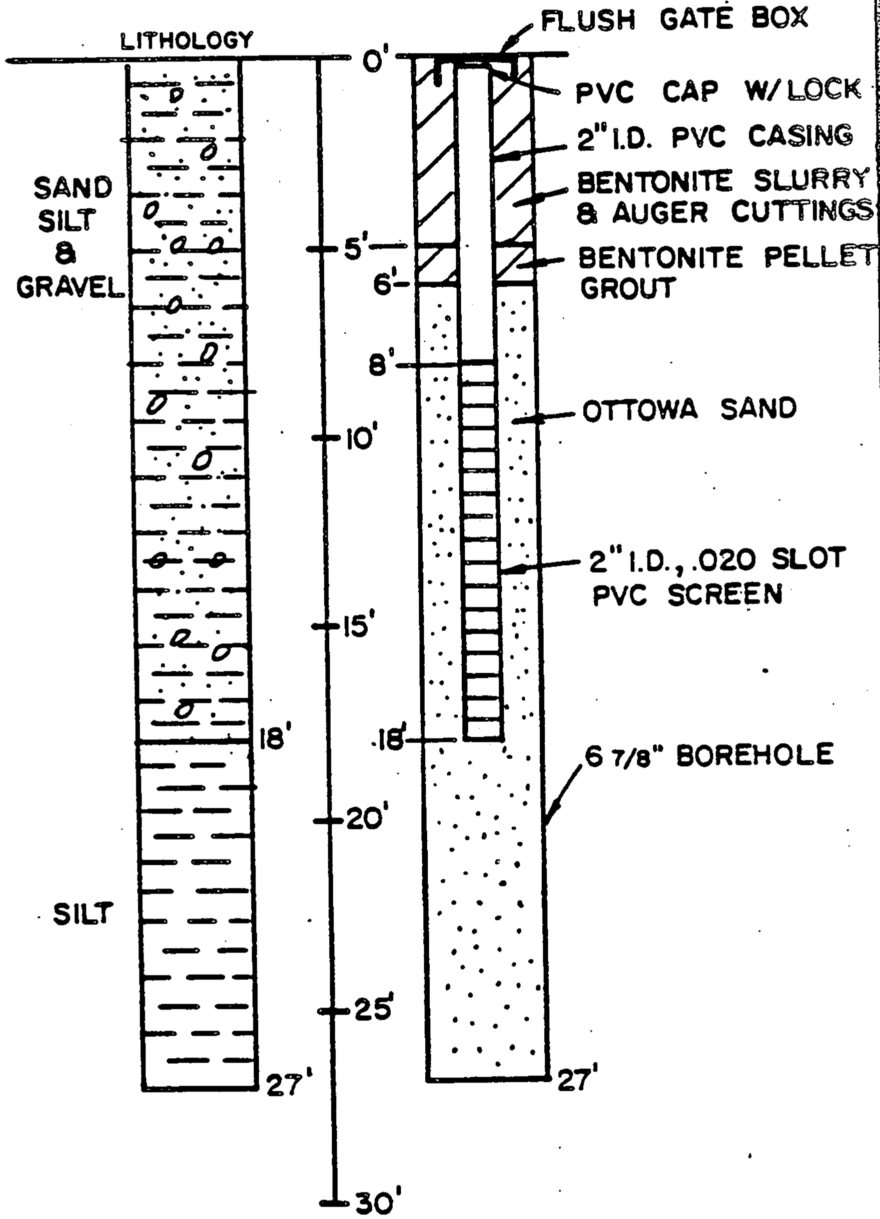
WELL 10
BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DEPTH	ELEV.	DESCRIPTION
0-2	863.76-	Silt, brown, dry, little sand and gravel, medium stiff
5-7	858.76-856.76	Same as above
10-11	853.76-852.76	Sand, brown, wet, little silt, medium dense
11-12	852.76-851.76	Sand, brown, wet, some gravel, little silt, medium dense
15-17	848.76-846.76	Same as above
20-22	843.76-841.76	Silt, brown, wet, trace fine sand, stiff
25-27	838.76-846.76	Silt, brown, wet, very stiff



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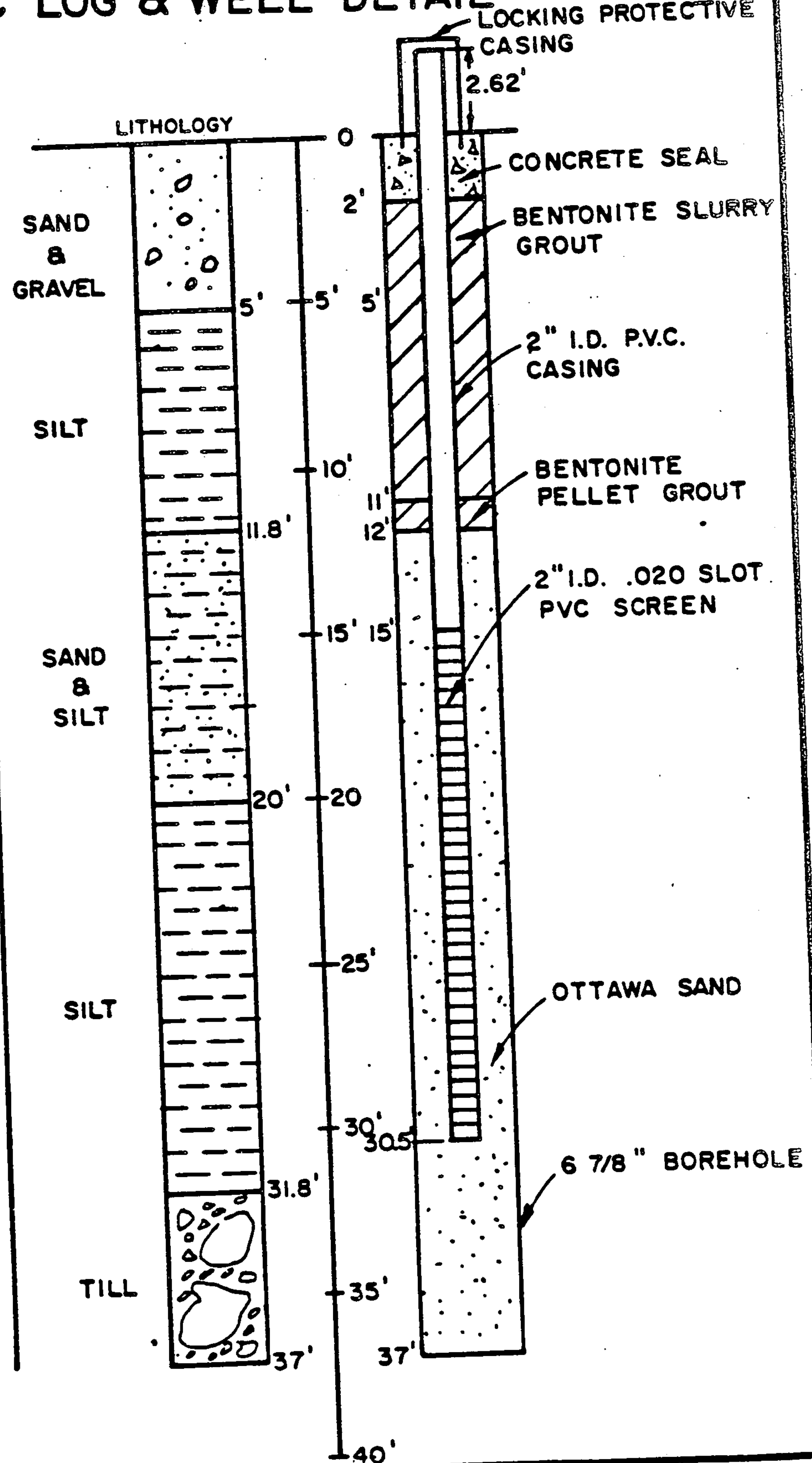
WELL 11
BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DEPTH	ELEV.	DESCRIPTION
0-2	896.2-894.2	Sand, brown, dry, some gravel, medium dense
2-4	894.2-892.2	Gravel, brown, dry, some sand, little silt, medium dense
5-7	891.2-889.2	Silt, gray, moist, little clay, stiff
7-8	889.2-888.2	Same as above
8-9	888.2-887.2	Silt, brown, moist, some sand, little clay and gravel, stiff
10-12	886.2-884.2	Same as above
15-17	881.2-879.2	Sand, brown, wet, some silt, medium dense
20-22	876.2-874.2	Silt, gray, wet, little clay, trace sand, stiff
25-27	871.2-879.2	Silt, gray, wet, very stiff
30-31.8	866.2-864.4	Same as above
31.8-32	864.4-864.2	Sand, gray, wet, some silt, medium dense
35-37	861.2-859.2	Same as above



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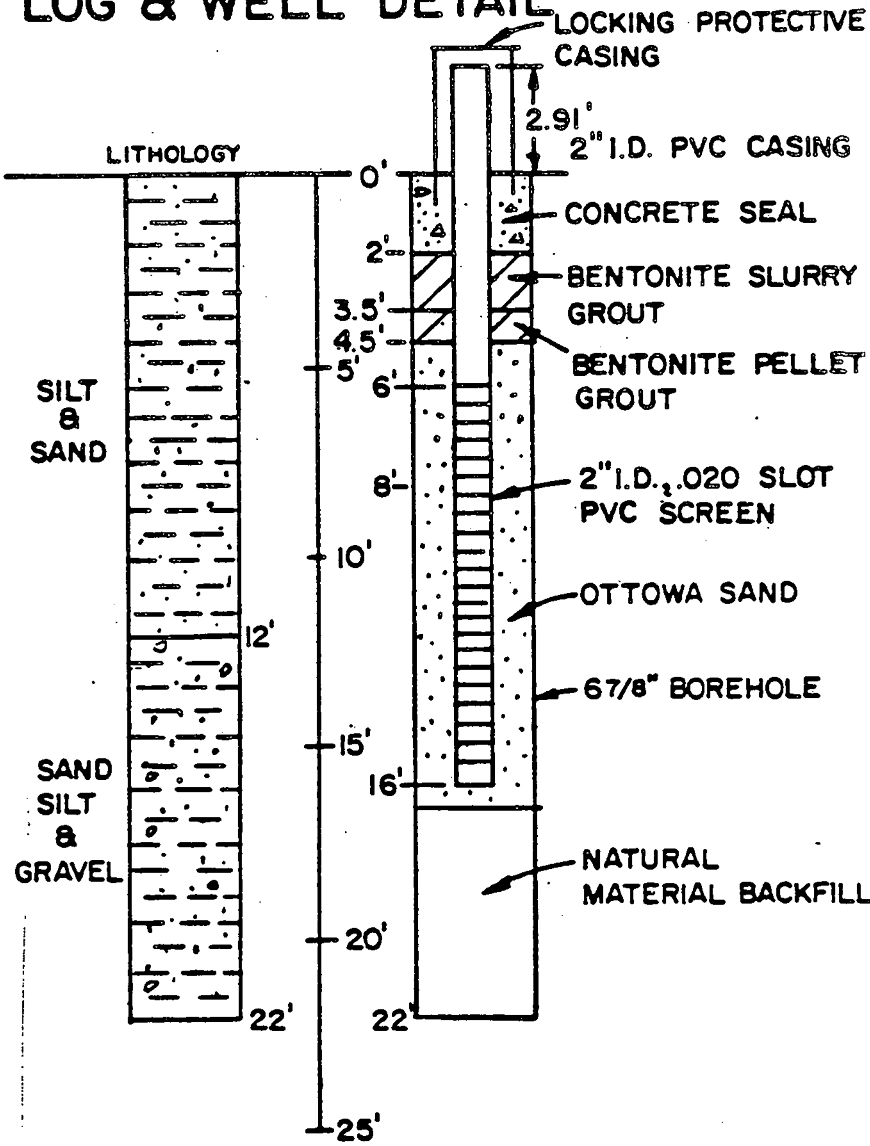
WELL 12

BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DEPTH	ELEV.	DESCRIPTION
0-2	898.6-896.6	Silt, brown, dry, trace sand and gravel, stiff
5-7	893.6-891.6	Silt, brown, dry, some sand and gravel, hard
10-11	888.6-887.6	Silt, brown, wet, some sand, trace clay, medium stiff
11-12	887.6-886.6	Sand, brown, wet, some silt and gravel, medium dense
15-17	883.6-881.6	Sand, wet, brown, some gravel, medium dense
20-22	878.6-877.6	Same as above



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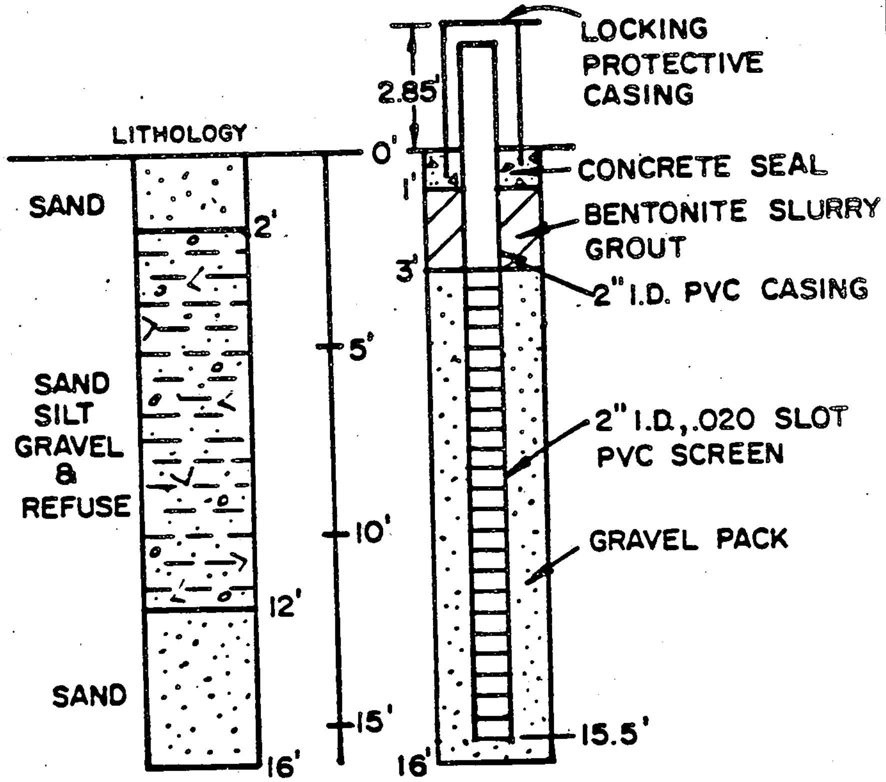
WELL 13
BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DEPTH	ELEV.	DESCRIPTION
0-2	865.7-863.7	Sand, brown, dry, little silt, trace gravel, medium dense
2-4	863.7-861.7	Sand, brown moist, trace refuse and silt, loose
4-6	861.7-859.7	Sand, brown, moist, little silt, gravel and refuse, loose
6-8	859.7-857.7	Same as above
8-10	857.7-855.7	Sand, brown gray, wet, little silt, trace gravel and refuse, medium dense
10-12	855.7-853.7	Same as above
12-14	853.7-851.7	Sand, gray, wet, little gravel and silt, medium dense
14-16	851.7-849.7	Same as above



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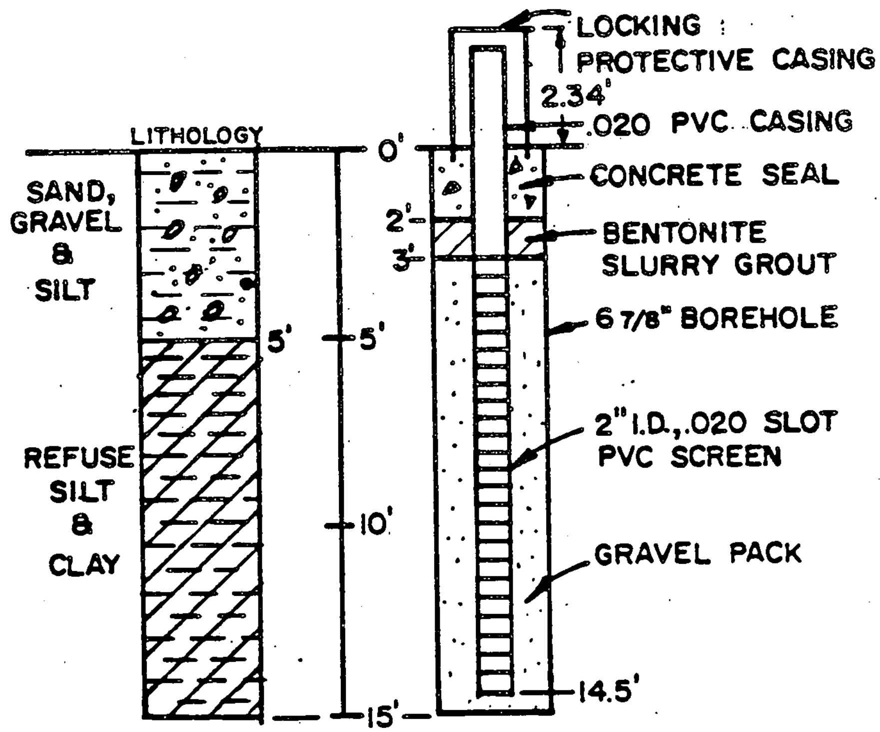
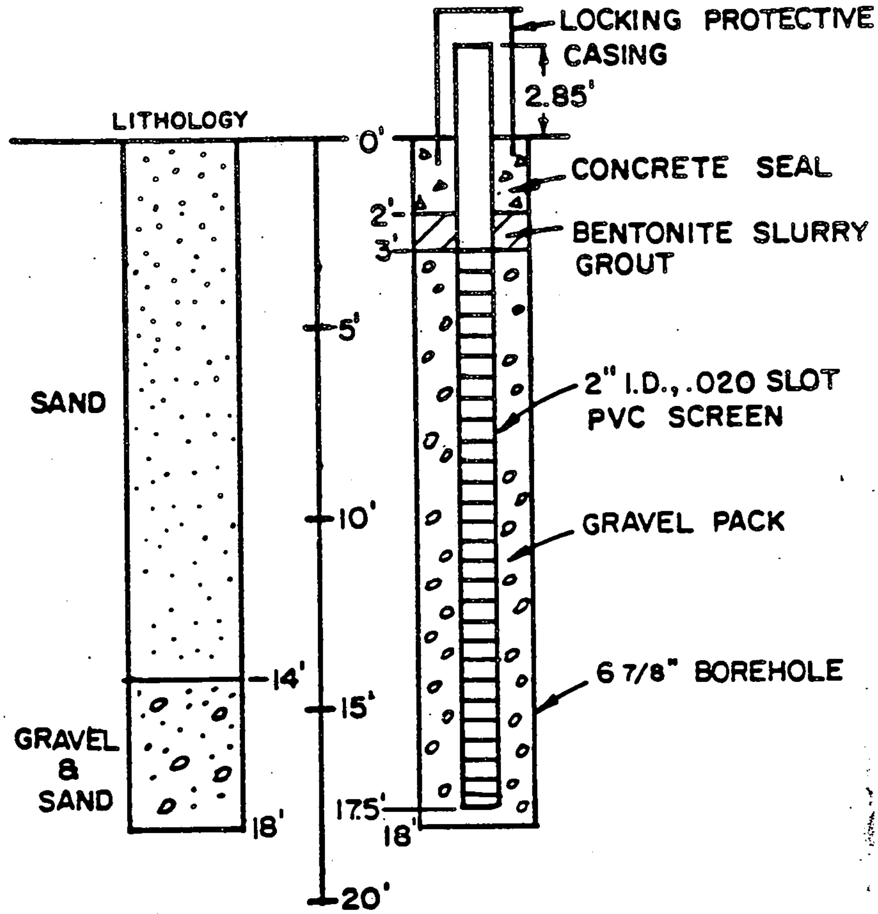
WELL 14
BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DEPTH	ELEV.	DESCRIPTION
0-5	914.8-912.8	Sand, gravel and silt, brown, moist, medium dense
5-12	909.8-902.8	Refuse, gray-brown, wet
12-15	902.8-899.8	Refuse, gray-brown, wet, some sand, silt and gravel, medium dense



WELL 15
BROOME COUNTY
INDUSTRIAL DEVELOPEMENT AGENCY
LITHOLOGIC LOG & WELL DETAIL

DEPTH	ELEV.	DESCRIPTION
0-2	873.8-871.8	Sand, brown, dry, little silt and gravel loose
2-4	871.8-869.8	Sand, brown, dry, little silt and gravel, medium dense
4-6	869.8-867.8	Same as above
6-8	867.8-865.8	Same as above
8-10	865.8-863.8	Sand, brown, moist, little silt and gravel, medium dense
10-12	863.8-861.8	Same as above
12-14	861.8-859.8	Same as above
14-16	859.8-857.8	Gravel and sand, gray, wet, trace silt, very dense
16-18	857.8-855.8	Same as above



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APPENDIX B

TEST BORING LOGS

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TELEPHONE AREA CODE 315/437-1429

A BRIEF DESCRIPTION OF THE UNIFIED SOIL SYSTEM

The Unified Classification System is an engineering soil classification that is an outgrowth of the Air-Field classification developed by Casagrande.

The system incorporates the textural characteristics of a soil into the engineering classification. All soils are classified into fifteen groups, each group being designated by two letters. These letters are as follows: G—gravel, S—sand, M—Non plastic or low plasticity fines, C—plastic fines, Pt—peat, humus and swamp soils, O—organic, W—well graded, P—poorly graded, L—low liquid limit, H—high liquid limit.

GW and SW Groups

These groups comprise well graded gravelly and sandy soils which contain less than 5% of non plastic fines passing a #200 sieve. Fines which are present must not noticeably change the strength characteristics of the coarse grain fraction and must not interfere with its free draining characteristics. In areas subject to frost action the material should not contain more than about 3% of soil grains smaller than .02 millimeters in size.

GP and SP Groups

These groups are poorly graded gravels and sands containing less than 5% non plastic fines. They may consist of uniform gravels, uniform sands, or non uniform mixtures of very coarse material and very fine sand with intermediate sizes lacking. Materials of this latter type are sometimes referred to as skip graded, cap graded, or step graded.

GM and SM Groups

In general, these groups include gravels or sands which contain more than 12% of fines having little or no plasticity. The plasticity index and liquid limit of a soil in either of these groups plot below the "A" line on a plasticity chart. Gradation is not important and both low grade and poorly graded materials are included. Some sands and gravels in these groups may have a binder composed of natural cementing agents so proportioned that the mixture shows negligible swelling or shrinkage. Thus, the dry strength is provided by a small amount of soil binder or dry cementation of calcareous materials or iron oxide. A fine fraction of non cemented materials may be composed of silts or rock flour types having little or no plasticity, and the mixture will exhibit no dry strength.

GC and SC Groups

These groups comprise gravelly or sandy soils with more than 12% of fines which exhibit either low or high plasticity. The plasticity index and liquid limit of a soil in either of these groups plot above the "A" line on the plasticity chart. Gradation of these materials is not important. Plasticity of the binder fraction has more influence on the behavior of the soils than does the variation in gradation. A fine fraction is generally composed of clays.

ML and MH Groups

These groups include predominantly silty materials and micaceous or diatomaceous soils. An arbitrary division between the two groups has been established with a liquid limit of 50. Soils in these groups are sandy silts, clayey silts or organic silts with relatively low plasticity. Also included are loessial soils and rock flours. Micaceous and diatomaceous soils generally fall within the MH group, but may extend into the ML group when their liquid limit is less than 50. The same is true for certain types of kaolin clays and some illite clays having relatively low plasticity.

CL and CH Groups

The CL and CH groups embrace clays with low and high liquid limits respectively. They are primarily inorganic clays. Low plasticity clays are classified as CL and are usually lean clays, sandy clays, and silty clays. The medium plasticity and high plasticity clays are classified as CH. These include fat clays, gumbo clays, certain volcanic clays and bentonite.

OL and OH Groups

The soils in these groups are characterized by the presence of organic matter including organic silts and clays. They have a plasticity range that corresponds with the ML and MH groups.

Pt Group

Highly organic soils which are very compressible have undesirable construction characteristics and are classified in one group with the symbol Pt. Peat, humus and swamp soils with a highly organic texture are typical of the group. Particles of leaves, grass, branches of bushes and other fibrous vegetable matter are common components of these soils.

Borderline Classification

Soils in the GW, SW, GP and SP groups are non plastic materials having less than 5% passing the #200 sieve, while GM, SM, GC, and SC soils have more than 12% passing the #200 sieve. When these coarse grain materials contain between 5% and 12% of fines they are classified as borderline, and are designated by the dual symbol such as GW-GM. Similarly coarse grain soils which have less than 5% passing the #200 sieve, but which are not free draining or in which the fine fraction exhibits plasticity are also classed as borderline and are given a dual symbol. Still another type of borderline classification occurs when a liquid limit of a fine grain soil is less than 29 and the plasticity index lies in the range of four to seven. These limits are indicated by the shaded area on the plasticity chart.

Silty and Clayey

In the Unified System, these terms are used to describe soils whose Atterberg limits plot below and above the "A" line on the plasticity chart. The adjectives silty and clayey are used to describe soils whose limits plot close to the "A" line.

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel - sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel - sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel - sand - silt mixtures.
			GC	Clayey gravels, gravel - sand - clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

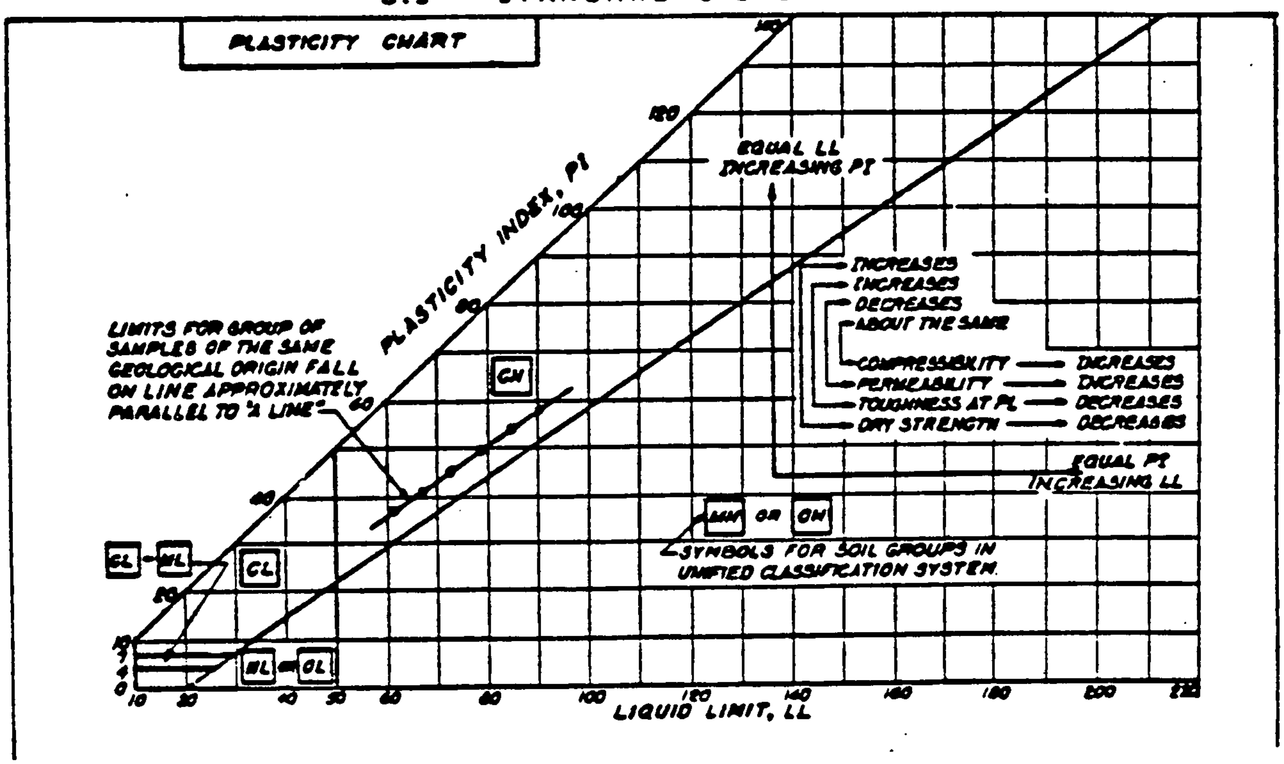
BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

PARTICLE SIZE LIMITS

SILT OR CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

No. 200 No. 40 No. 10 No. 4 ¾ in. 3 in. (12 in.)

U.S STANDARD SIEVE SIZE



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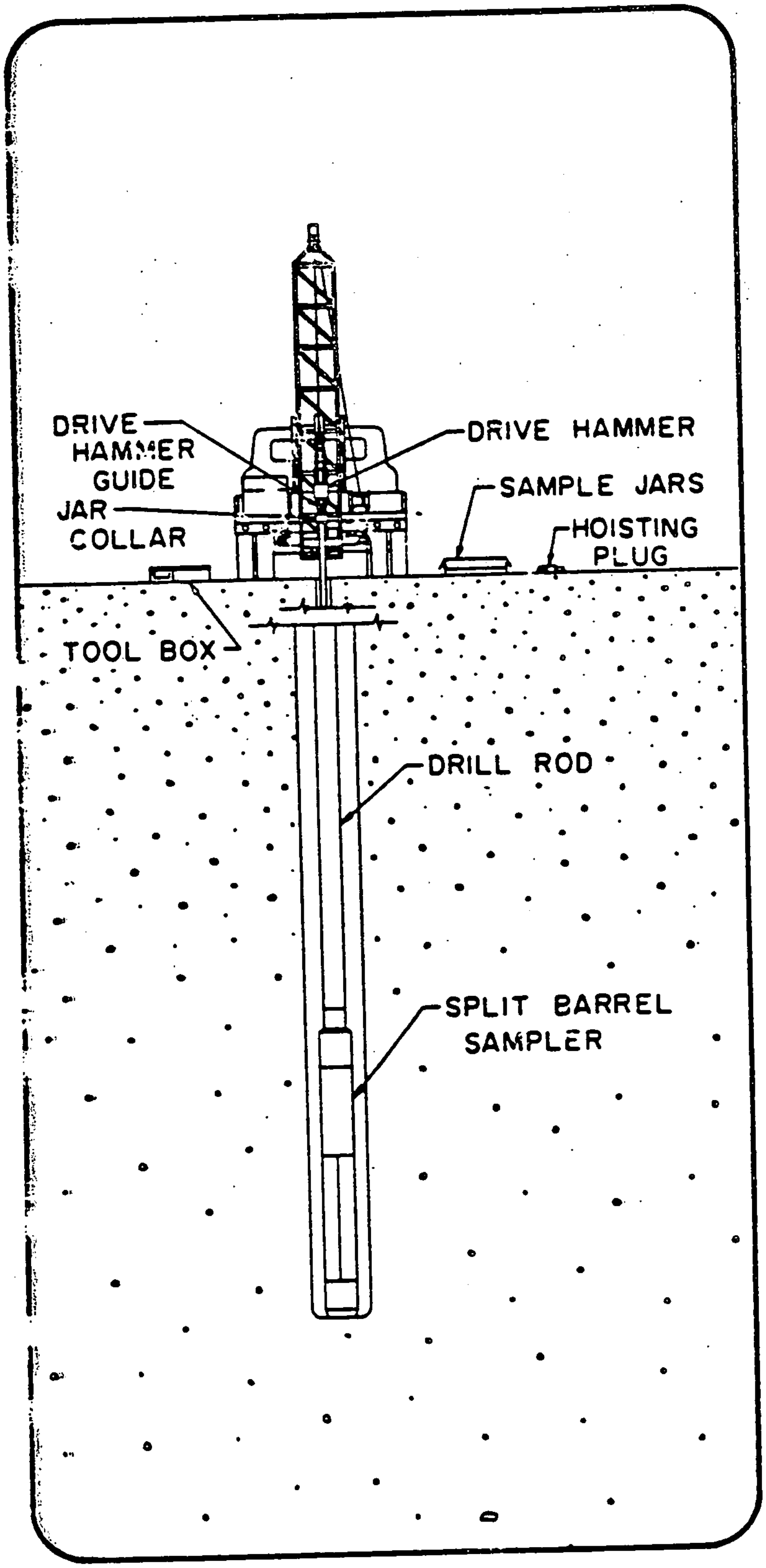
SOIL SAMPLING METHODS



Split barrel sampling

The following excerpts are from "Standard Method for penetration test and split-barrel sampling of soils."[1] (ASTM designation: D-1586-67 AASHO Designation: T-206-70.)

1. Scope

1.1 This method describes a procedure for using a split-barrel sampler to obtain respresentative samples of soil for identification purposes and other laboratory tests, and to obtain a measure of the resistance of the soil to penetration of the sampler.

2. Apparatus

2.1 Drilling Equipment — Any drilling equipment shall be acceptable that provides a reasonably clean hole before insertion of the sampler to ensure that the penetration test is performed on undisturbed soil, and that will permit the driving of the sampler to obtain the sample and penetration record in accordance with the procedure described in 3. Procedure. To avoid "whips" under the blows of the hammer, it is recommended that the drill rod have stiffness equal to or greater than the A-rod. An "A" rod is a hollow drill rod or "steel" having an outside diameter of 1-5/8 in. or 41.2 mm and an inside diameter of 1-1/8 in. or 28.5 mm, through which the rotary motion of drilling is transferred from the drilling motor to the cutting bit. A stiffer drill rod is suggested for holes deeper than 50 ft (15m). The hole shall be limited in diameter to between 2-1/4 and 6 in. (57.2 and 152mm).

2.2 Split-Barrel Sampler — The sampler shall be constructed with the dimensions indicated (in Fig. 1.) The drive shoe shall be of hardened steel and shall be replaced or repaired when it becomes dented or distorted. The coupling head shall have four 1/2-in. (12.7-mm) (minimum diameter) vent ports and shall contain a ball check valve. If sizes other than the 2-in. (50.8-mm) sampler are permitted, the size shall be conspicuously noted on all penetration records.

2.3 Drive Weight Assembly — The assembly shall consist of a 140-lb (63.5-kg) weight, a driving head, and a guide permitting a free fall of 30 in. (0.76 m). Special precautions shall be taken to ensure that the energy of the falling weight is not reduced by friction between the drive weight and the guides.

2.4 Accessory Equipment — Labels, data sheets, sample jars, paraffin, and other necessary supplies should accompany the sampling equipment.

SOIL SAMPLING METHODS

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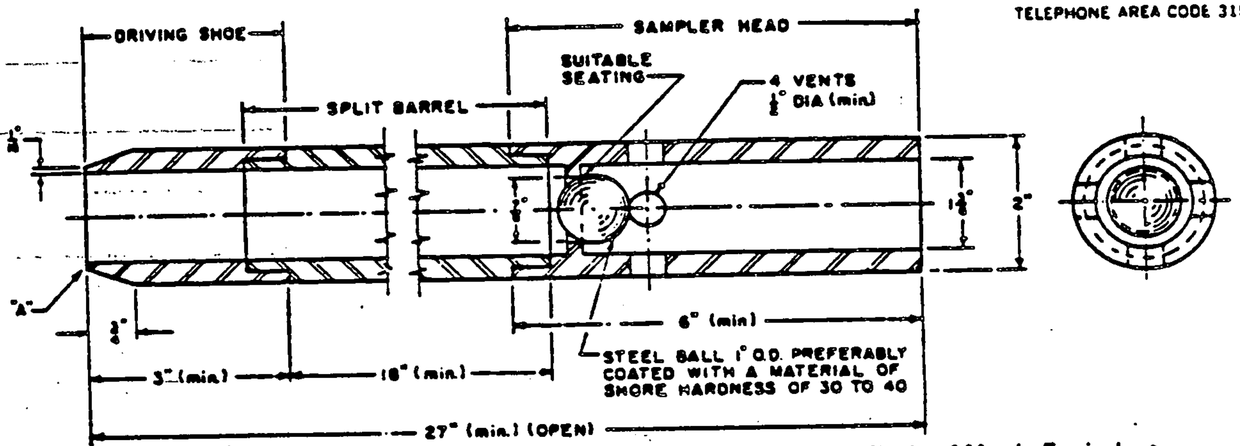

Table of Metric Equivalents.

In.	Mm	Cm	In.	Mm	Cm
1/16 (16 gage)	1.5	...	2	...	5.08
1/2	12.7	...	3	...	7.62
3/4	19.0	1.90	6	...	15.24
7/8	22.2	2.22	18	...	45.72
1-3/8	34.9	3.49	27	68.58	
1-1/2	38.1	3.81			

Note 1 – Split barrel may be 1-1/2 in. inside diameter provided it contains a liner of 16-gage wall thickness.

Note 2 – Core retainers in the driving shoe to prevent loss of sample are permitted.

Note 3 – The corners at A may be slightly rounded.

Fig. 1 – Standard Split Barrel Sampler Assembly

3. Procedure

3.1 Clear out the hole to sampling elevation using equipment that will ensure that the material to be sampled is not disturbed by the operation. In saturated sands and silts withdraw the drill bit slowly to prevent loosening of the soil around the hole. Maintain the water level in the hole at or above ground water level.

3.2 In no case shall a bottom-discharge bit be permitted. (Side-discharge bits are permissible.) The process of jetting through an open-tube sampler and then sampling when the desired depth is reached shall not be permitted. Where casing is used, it may not be driven below sampling elevation. Record any loss of circulation or excess pressure in drilling fluid during advancing of holes.

3.3 With the sampler resting on the bottom of the hole, drive the sampler with blows from the 140-lb (63.5 kg) hammer falling 30 in. (0.76 m) until either 18 in. (0.45 m) have been penetrated or 100 blows have been applied.

3.4 Repeat this operation at intervals not longer than 5 ft (1.5 m) in homogeneous strata and at every change of strata.

3.5 Record the number of blows required to effect each 6 in. (0.15 m) of penetration or fractions thereof. The first 6 in. (0.15 m) is considered to be a seating drive. The number of blows required for the second and third 6 in. (0.15 m) of penetration added is termed the penetration resistance, N. If the sampler is driven less than 18 in. (0.45 m), the penetration resistance is that for the last 1 ft (0.30 m) of penetration (if less than 1 ft (0.30 m) is penetrated, the logs shall state the number of blows and the fraction of 1 ft (0.30 m) penetrated).

3.6 Bring the sampler to the surface and open. Describe carefully typical samples of soils recovered as to composition, structure, consistency, color, and condition; then put into jars without ramming. Seal them with wax or hermetically seal to prevent evaporation of the soil moisture. Affix labels to the jar or make notations on the covers (or both) bearing job designation, boring number, sample number, depth penetration record, and length of recovery. Protect samples against extreme temperature changes.

4. Report

4.1 Data obtained in borings shall be recorded in the field and shall include the following:

4.1.1 Name and location of job,
4.1.2 Date of boring – start, finish,
4.1.3 Boring number and coordinate, if available,
4.1.4 Surface elevation, if available,
4.1.5 Sample number and depth,
4.1.6 Method of advancing sampler, penetration and recovery lengths,
4.1.7 Type and size of sampler,
4.1.8 Description of soil,
4.1.9 Thickness of layer,
4.1.10 Depth to water surface; to loss of water; to artesian head; time at which reading was made,
4.1.11 Type and make of machine,
4.1.12 Size of casing, depth of cased hole,
4.1.13 Number of blows per 6 in. (0.15 m)
4.1.14 Names of crewmen, and
4.1.15 Weather, remarks.

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[1]Under the standardization procedure of the Society, this method is under the jurisdiction of the ASTM Committee D-18 on Soil and Rock for Engineering Purposes. A list of members may be found in the ASTM Year Book.

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GENERAL NOTES

1. The soil logs, notes and other test data shown are the results of interpretations made by representatives of Parratt-Wolff Inc. from personal observations made during the exploration period of samples of subsurface materials recovered during exploration and records of exploration as prepared by the drill operator.

2. Explanation of the classifications and terms:

a. Bedrock - Natural solid mineral matter occurring in great thickness and extent in its natural location. It is classified according to geological type and structure (joints, bedding, etc.) and described as solid, weathered, broken, fragmented or decomposed depending on its condition.

b. Soils - Sediments or other unconsolidated accumulations of particles produced by the physical and chemical disintegration of rocks and which may or may not contain organic matter.

PENETRATION RESISTANCE

COHESIONLESS SOILS

Blows Per Ft.	Relative Density
0 to 4	Very Loose
4 to 10	Loose
10 to 30	Medium
30 to 50	Dense
Over 50	Very Dense

COHESIVE SOILS

Blows Per Ft.	Consistency
0 to 2	Very Soft
2 to 4	Soft
4 to 8	Medium
8 to 15	Stiff
15 to 30	Very Stiff
Over 30	Hard

Size Component Terms

Boulder		Larger than 8 inches
Cobble or Small Stone		8 inches to 3 inches
Gravel	coarse	3 inches to 3/4 inch
	medium	3/4 inch to 4.76 mm
Sand	coarse	4.76 mm to 2.00 mm (#10 sieve)
	medium	2.00 mm to 0.42 mm (#40 sieve)
	fine	0.42 mm to 0.074 mm (#200 sieve)
Silt and Clay		Finer than 0.074 mm

Proportion by Weight

Major component is shown with all letters capitalized.

Minor component percentage terms of total sample are:

and	40 to 50 percent
some	20 to 40 percent
little	10 to 20 percent
trace	1 to 10 percent

c. Gradation Terms - The terms coarse, medium and fine are used to describe gradation of Sands and Gravel.

d. The terms used to describe the various soil components and proportions are arrived at by visual estimates of the recovered soil samples. Other terms are used when the recovered samples are not truly representative of the natural materials, such as, soil containing numerous cobbles and boulders which cannot be sampled, thinly stratified soils, organic soils, and fills.

e. Ground Water - The measurement was made during exploration work or immediately after completion, unless otherwise noted. The depth recorded is influenced by exploration methods, the soil type and weather conditions during exploration. Where no water was found it is so indicated. It is anticipated that the ground water will rise during periods of wet weather. In addition, perched ground water above the water levels indicated (or above the bottom of the hole where no ground water is indicated) may be encountered at changes in soil strata or top of rock.

APPENDIX C

GROUNDWATER SAMPLING PROTOCL

GROUNDWATER SAMPLING PROCEDURES

General

Some general procedures must be adhered to during all well developing and sampling operations. Safety glasses or goggles must be worn at all times during well development or sampling to prevent splashing of potentially contaminated water into the eyes. Respirators must be worn if a distinct chemical odor is observed. Sampling of wells must be discontinued during precipitation periods (rain or snow).

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 its yields 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 bailing, a new bailer (and rope) is required for each well).

NOTE: Wells must be allowed to stabilize after development a minimum of 10 days prior to sampling.

Procedures

Use of the following procedures for the sampling of groundwater observation wells is dependent upon the depth of the well to be sampled. To obtain representative groundwater samples from wells installed to a depth greater than 25 feet, the bailing procedure should be used. To obtain representative groundwater samples from wells installed to a depth less than 25 feet, the bailing procedure or the pumping procedure can be used. Each of these procedures is explained in detail below.

A. Sampling Procedures (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 a minimum of 10 feet by 10 feet. 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, and remove the well cap and plug placing both on the plastic sheet.

5. Clean the first ten feet of the steel 100 foot tape with a hexane soaked rag, rinse with distilled water and measure the depth to the water table. Record this information on the Groundwater Sampling Field Log (Attached).

6. Compute the volume of water in the well using the formulae and information provided on the Groundwater Sampling Field Log. Record this volume on the Groundwater Field Log.

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 quart container and observe its appearance. Return the glass quart 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 on the Groundwater Sampling Field Log.

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 three 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 overnight) for the well to recover before proceeding with Step 13. Record this information on the Groundwater Sampling Field Log.

13. Remove the sampling bottles from their transport containers and prepare the bottles for receiving samples. 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 or BTX 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. Fill each sample container following the instructions listed on Attachment A - Sample Containerization Procedures. Return each sample bottle to its proper transport container.

15. If the sample bottles cannot be filled quickly, keep them cool with their caps on until they are filled. Each sample bottle for purgeable priority pollutant or BTX analysis should be filled from one bailer, then securely capped. NOTE: Samples must not be allowed to freeze.

16. Record the physical appearance of the groundwater observed during sampling on the Groundwater Sampling Field Log.

17. After the last sample has been collected, record the date and time, empty one bailer of water from the surface of the water in the well into the 200 ml flask, measure and record the pH, and measure and record the conductivity of the groundwater following the procedures outlined in the equipment operation manuals. Record this information on the Groundwater Sampling Field Log. The 200 ml flask must then be rinsed with hexane and distilled water prior to reuse.

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

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

B. Sampling Procedures (Pump)

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 a minimum of 10 feet by 10 feet. 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 and remove the well cap and plug, placing both on the plastic sheet.

5. Clean the first ten feet of the steel 100 foot tape with a hexane soaked rag, rinse with distilled water and measure the depth to

the water table. Record this information on the Groundwater Sampling Field Log.

6. Compute the volume of water in the well using the formulae and information provided on the Groundwater Sampling Field Log. Record this volume on the Field Log.

7. Prepare the peristaltic pump for operation. Replace the short length of flexible silicone tubing in the pump head between each sampling location.

8. Attach a new length of polypropylene tubing to the flexible silicone tubing at the pump head. This polypropylene tubing must be long enough to reach the well bottom. Note: The suction lift of the peristaltic pump is approximately 25 feet.

9. Start the pump and lower the suction end of the tubing into the well until the surface of the water is contacted. Remove approximately one half quart of this water from the surface of the well water into a new glass quart bottle. Observe the appearance of this water. Return this quart bottle 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.

10. Record the physical appearance of the groundwater on the Groundwater Sampling Field Log.

11. Initiate pumping from the well into a graduated pail until three times the volume of water in the well has been removed or until the well is pumped dry. The suction end of the tubing should be raised and lowered in the well during pumping to ensure that water is entering the well from the entire length of the screened well casing. If the well is pumped dry, allow sufficient time (several hours to overnight) for the well to recover before proceeding. Record this information on the Groundwater Sampling Field Log.

12. Remove the sampling bottles from their transport containers and prepare the bottles for receiving samples. 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 bottles to allow for convenient filling. Always fill the bottles labeled purgeable priority pollutant or BTX analysis first.

13. Continue pumping the well with the suction end of the tubing now at a level just below the surface of the water in the well. Fill each sample container following the instructions listed on Attachment A - Sample Containerization Procedures. Return each sampling bottle to its proper transport container.

14. If the sample bottles cannot be filled quickly, keep them cool with their caps on until they are filled. NOTE: Samples must not be allowed to freeze.

15. Record the physical appearance of the groundwater observed during sampling on the Groundwater Sampling Field Log.

16. After the last sample has been collected, record the date and time and pump from the surface of the water in the well into the 200 ml flask, filling it approximately halfway. Measure and record the pH and conductivity of the groundwater following the procedures outlines in the equipment operation manuals. Record this information on the Groundwater Sampling Field Log. The 200 ml flask must then be rinsed with hexane and distilled water prior to reuse.

17. Replace the well plug and lock the well protection assembly before leaving the well location.

18. Place the polypropylene tubing, silicone pump head tubing, gloves, rags and plastic sheet into a plastic bag. The plastic bag should then be buried on-site at a preselected location.

GROUNDWATER SAMPLING PROCEDURES

I. Materials

1. Disposable Latex Gloves
2. Plastic Sheeting - (10 ft. by 10 ft. minimum)
3. Bailers - (top filling) 1 - 1½ inch O.D. aluminum, natural cork plugs
4. Polypropylene Rope
5. Distilled Water
6. Hexane Solvent
7. Disposable Rags
8. 100 Ft. Steel Tape
9. Peristaltic Pump With Accessories
10. Polypropylene Tubing (¼ - ½ inch)
11. Insulated Transport Containers
12. Graduated Pail
13. Conductivity Meter
14. pH Meter
15. Dual Carbon Respirators with Organic Vapor Filters
16. Safety Glasses or Goggles
17. Appropriate Sampling Containers
18. 200 ml Flask

SAMPLE CONTAINERIZATION PROCEDURES

Lab Analysis	Container Description	Number of Containers	Collection Instructions
1. Purgeable Priority	40 ml Vial	3	1. The sample vial consists of 3 parts: a glass bottle, a teflonfaced septum, and a screw cap. 2. Remove the cap and septum, handling the septum by the edges only. 3. Carefully fill the vial to overflowing a slight crown of water remaining on top. 4. Slide the septum, teflon side (slippery side) down, onto the vial. 5. Replace the cap and tighten. 6. Invert the sample and lightly tap the cap on a solid surface. The absence of trapped air indicates a successful seal. If bubbles are present, open the bottle, add a few additional drops of sample and reseal the bottle as above. Continue until no trapped air is present. 7. Keep the samples refrigerated or on ice.
2. PCBs, Pesticides	glass gallon	1	Fill gallon bottle then cap.
3. Metals	glass quart with preservative added	1	Fill quart bottle then cap
4. Acid/Base Neutral Priority Pollutants	glass gallon	1	Fill gallon bottle then cap. Keep the sample refrigerated or on ice.
5. Cyanide	plastic quart with preservative added	1	Fill quart bottle then cap. Keep the sample refrigerated or on ice.
6. Phenols	plastic quart	1	Fill quart bottle then cap.

REF. 26

REPORT

PHASE II

HYDROGEOLOGIC INVESTIGATION

BROOME INDUSTRIAL PARK

CONKLIN, NEW YORK

BROOME COUNTY

INDUSTRIAL DEVELOPMENT AGENCY

BINGHAMTON, NEW YORK

FEBRUARY 1985

O'BRIEN & GERE ENGINEERS, INC.
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EXECUTIVE SUMMARY

O'Brien & Gere Engineers has completed Phase II of the hydrogeologic investigation for the proposed Broome Industrial Park site in Conklin, New York. The investigation characterizes the site wide hydrogeology and identifies the hydrogeologic conditions that will affect development of the industrial park. The results from the Phase I investigation are incorporated into this report to produce an integrated hydrogeologic assessment. The Phase I investigation included an evaluation of the contamination potential and development limitations imposed by two abandoned landfills within the proposed industrial park. Below is a summary of the findings, conclusions and recommendations of both phases of the investigation.

The surficial geology at the industrial park site is comprised predominantly of two unconsolidated deposits: glacial till and outwash. The uplands of the site, including the upper landfill, are underlain by glacial till, which is a dense, unsorted deposit of rock fragments and fine-grained sediments having an extremely low permeability (less than 4×10^{-7} cm/sec). The valley area, including the lower landfill, is underlain by outwash which is composed predominantly of sand and gravel that has a high permeability (greater than 7×10^{-2} cm/sec.)

Groundwater occurs at depths of 5 to 10 feet below the surface within the outwash and 20 to 35 feet within the glacial till. Groundwater flows predominantly in an eastward direction, towards the Susquehanna River, at a rate varying from less than 2×10^{-4} ft/day within the till to 8 to 43 ft/day within the outwash.

The upgradient background groundwater quality is generally of good drinking water quality, contains a moderate amount of hardness and dissolved solids, and is relatively low in iron, chloride and heavy metal content. However, the downgradient groundwater quality at the central and northern parts of the industrial park is not suitable for drinking water. The downgradient groundwater quality in the central part of the industrial park contains elevated levels of manganese, mercury, arsenic and iron suggesting that the groundwater quality has been impacted by the lower landfill. The downgradient groundwater quality at the northern part of the site contains elevated levels of sulfate, iron, manganese and TOC which may be attributed to impacts from the upper landfill.

Due to the existing impacts of the upper and lower landfills on groundwater quality and the potential impacts of the landfills on surface water quality of Carlin Creek, it is recommended that the remedial measures previously included in the Phase I Hydrogeologic Report be implemented. These remedial measures include: 1) installing low permeability covers on the upper and lower landfills to minimize leachate generation, 2) replacing the homeowner water supplies downgradient from the lower landfill, and 3) conducting groundwater and surface water monitoring to evaluate long-term impacts from the landfills.

Potential well yields from the glacial till and bedrock are estimated to be less than 10 gpm and insufficient for industrial supplies; whereas potential well yields within the outwash are estimated to range from 10 to 500 gpm which should be suitable for most industrial uses. However, the groundwater quality within the outwash at the central and northern parts of the site is not suitable for drinking water.

The subsurface geologic conditions across most of the industrial park site are suitable for general construction purposes. The till has a fair bearing strength and deep water table: outwash has a fair to good bearing strength, and is well drained, although the water table is within ten feet of the surface. The areas least suitable for construction are those underlain by alluvium or lacustrine deposits where the materials are poorly drained, have a low bearing strength, and contain a water table that occurs just below the land surface.

Surface water drainage within the area north of Carlin Road will flow north and have a potential for recharging the groundwater aquifer that supplies water to the Town of Conklin Well No. 3. As a result, it is recommended that any industry that is a major user of hazardous substances be either prohibited from locating within this area or designed with state of the art technology to prevent any leakage spills from occurring.

The area within the industrial park that is underlain by outwash deposits is characterized by highly permeable soils and shallow groundwater and is highly susceptible to groundwater contamination from industrial discharges at the land surface. As a result, groundwater monitoring is recommended for any major industrial user of hazardous materials that is to be located within this area.

SECTION 1 - INTRODUCTION

1.01 Project Background

Broome County is currently acquiring a 619 acre tract of land in the Town of Conklin for the purpose of creating a major industrial park. The site is located south of Powers Road approximately one mile north of the Kirkwood Interchange (Figures 1 & 2). The development of the project is presently being undertaken by the Broome County Industrial Development Agency (BIDA).

A preliminary environmental assessment of the proposed industrial park prepared by the Broome County Department of Planning in May 1983 indicated that the industrial park may pose adverse impacts on the surrounding environment. Of particular concern were the potential impacts of two abandoned landfills on the quality of surface water and groundwater leaving the site. In addition, there was concern about the potential effects of the project on the hydrogeologic environment of the surrounding area, particularly the Town of Conklin Well No. 3. Based on these concerns the Broome County Industrial Development Agency requested that a hydrogeologic investigation be undertaken at the site of the proposed industrial park.

The hydrogeologic investigation requested by the BIDA includes two phases. The first phase, completed by O'Brien & Gere Engineers, Inc. in March 1984, was a determination of the hydrogeologic setting and development limitations imposed by the two abandoned landfills. The second phase is to characterize the site wide hydrogeologic setting and identify development limitations imposed by the remainder of the site. This report addresses the objectives of the second phase of hydrogeologic investigation.

1.02 Authorization and Scope

During September 1984 the Broome County Industrial Development Agency (BIDA) authorized O'Brien & Gere Engineers, Inc. to perform Phase II of the hydrogeologic investigation at the proposed Broome County Industrial Park site. The scope of work for this investigation is outlined in the Request for Proposal (RFP) dated September 6, 1984, and is described in detail in the proposal submitted by O'Brien & Gere Engineers, Inc. on September 20, 1984. In general, the scope of work includes the following:

a. Characterization of site-wide surficial geology, including the type, thickness, extent, and permeability of soils and sediments, with particular attention given to geotechnical limitations or hazards.

b. Assessment of site-wide hydrogeology, including a potentiometric contour map showing groundwater flow directions and an evaluation of the potential for on-site groundwater supply development for industrial and consumptive use.

c. Determination of the water quality in Carlin Creek and the emergent marsh wetland located on-site (wetland BE-4 in the Binghamton East Quad Wetlands Map).

d. Determination of the eastern boundary of the lower landfill facing the Delaware and Hudson Railroad right-of-way, with particular attention to the occurrence of landfill material within the right-of-way and potential impacts the landfill could have on the construction of an 18-inch sanitary sewer line within the western portion of the right-of-way.

1.03 Summary of Phase I Investigation

O'Brien & Gere Engineers, Inc. has previously completed Phase I of a hydrogeologic investigation for the proposed Broome County Industrial Park. The purpose of the Phase I investigation was to evaluate the potential for contamination and development limitations of two abandoned landfills on the proposed industrial park site. Below is a summary of the findings, conclusions and recommendations of the Phase I Hydrogeologic Investigation.

Upper Landfill

The landfill is about 25 feet thick, may contain approximately 5 million cubic feet of refuse, and is underlain by a low permeability glacial till material which significantly restricts the migration of landfill leachate into the groundwater.

It has been estimated that approximately 1.8 million gallons of leachate is generated annually by precipitation infiltrating the landfill surface and an additional 1,000 gallons of leachate is generated each year by groundwater flowing through the refuse.

The inorganic chemical analyses of the landfill leachate (Appendix A) are typical of what is found in municipal refuse. However, the presence of various organic chemicals indicates that some industrial waste may be present.

Groundwater flow from the landfill is in an east-northeast direction towards Carlin Creek at a relatively low rate of approximately 8×10^{-5} ft/day (.03 ft/year).

Due to the low permeability of the subsurface materials, leachate seeps may develop during wet periods of the year and could have an impact on the water quality of Carlin Creek.

Although the landfill has impacted the groundwater quality immediately adjacent to the landfill, the groundwater quality poses no threat to downgradient well users.

It was recommended that a low permeability cover be installed on the landfill to eliminate leachate seeps. In addition, continued groundwater monitoring was recommended.

Lower Landfill

The lower landfill which may contain approximately 1.4 million cubic feet of refuse, is underlain by highly permeable sand and gravel which promotes rapid recharge of landfill leachate into the groundwater system.

It has been estimated that approximately .9 million gallons of landfill leachate is generated by precipitation infiltrating the landfill surface and up to 150,000 gallons of leachate is generated by groundwater flowing through the refuse.

The chemical analyses of leachate (Appendix A) are typical of what is found in municipal solid waste landfill leachate.

Groundwater flow is eastward towards Route 7 and the Susquehanna River at an estimated flow rate of 3 to 30 feet per day.

Some of the homeowner wells downgradient from the landfill contain iron, manganese and arsenic levels in excess of NYSDEC Class GA Groundwater Standards. (Appendix A) The iron and manganese levels are believed to be attributed to the landfill, however, the source of the arsenic has not been clearly defined.

It was recommended that the homeowners water supplies be replaced by extending the Town of Conklin's water supply system along Route 7.

A low permeability cover was recommended to be installed on the landfill to minimize leachate generation.

Continued surface water monitoring and groundwater monitoring of on-site wells and homeowner wells for at least one year was recommended to evaluate long term impacts from the landfill.

Should building construction occur over the lower landfill additional geotechnical testing was recommended. The amount of testing is dependent on the type of structures to be erected but could include: test borings with standard penetration tests, in-situ plate, loading tests, and laboratory consolidation tests.

SECTION 2 - FIELD INVESTIGATIONS

2.01 General

This section presents the methods and procedures used during field investigations of the Phase II Hydrogeologic Investigation at the proposed industrial park site conducted between October 31, 1984 and December 20, 1984. During this time the following tasks were completed:

1. The completion of ten test borings located throughout the proposed site.
2. The installation and development of monitoring wells in four of the ten borings.
3. The elevation survey of all test borings and groundwater monitoring wells.
4. The measurement of static water levels in all monitoring wells.
5. The sampling and analysis of groundwater and surface water.
6. The in situ permeability testing of monitoring wells.

2.02 Test Borings

A total of ten test borings were completed between October 31, 1984 and November 14, 1984 to evaluate the on-site subsurface hydrogeologic conditions. The locations of these borings are shown on Figure 3. All test borings were completed using a bulldozer-mounted drilling rig equipped with continuous flight hollow stem augers assembled in 5-foot sections. Samples of the subsurface materials were collected every five feet using ASTM method D1586 Split Barrel Sampling.

Four of the test borings were converted into groundwater monitoring wells (Wells 17-20) to assess groundwater flow conditions. Three of the borings (B1, B2, B3) were installed to define the eastern boundary of the lower landfill. Two borings (B4-B5) were installed to assess the subsurface geologic conditions along the route of the proposed primary access road. One boring (B6) was installed to define the subsurface hydrogeologic conditions at the northern part of the industrial park.

Appendix B shows the lithologic logs from each boring as interpreted by the O'Brien & Gere Engineers, Inc. geologists and the well specifications for each monitoring well.

The proposed test borings (B1, B2, B3) along the Delaware and Hudson Railroad right-of-way were inaccessible to the drilling rig due to the steep narrow drainage ditch between the railroad and the lower landfill. An attempt was made to use a tripod setup, but this proved ineffective in penetrating the subsurface below a depth of five feet due to the extremely high density of the subsurface fill materials. The surface materials along the right-of-way are a mixture of cinders and crushed stone used in railroad construction. The impenetrable nature of subsurface materials may be attributed to years of compaction and settling as trains passed through the site.

2.03 Groundwater Monitoring Wells

Four of the seven test borings were converted into groundwater monitoring wells. These wells serve to establish a groundwater profile, provide information on the flow rate and direction of groundwater movement, and supply sampling points from which representative samples of groundwater can be withdrawn. The locations of these wells are shown on Figure 3. (Wells 17-20)

All groundwater monitoring wells were constructed of 2-inch ID flush joint threaded pvc well screen and riser pipe. The riser pipe on all wells was extended to the surface and a protective steel casing or curb box with a lock was installed on the riser pipe to prevent unauthorized entry. The method of installation was to lower the screen and casing assembly into the hollow stem auger to the selected screen depths. A washed Ottawa sand pack was then placed around the well screen and extended to a minimum of 2 feet above the top of the screen. A minimum of one foot of bentonite pellet seal was then placed on top of the sand pack. The remaining annular space between the borehole wall and casing was then filled with a bentonite slurry grout to an elevation of approximately 2 feet below the existing ground surface. The final 2 feet of borehole was filled with a bentonite/portland cement grout mixture to ensure that surface water runoff will not enter the well. Detailed designs of the wells are included in Appendix B.

Following installation, the groundwater monitoring wells were developed using a centrigfugal pump. In general, this involved lowering a polypropylene hose of sufficient length to the bottom of the well to clear the finer grained sediments from around the well screen.

2.04 Well Elevation Survey

Following well installation, a field survey was performed during December 1984 to establish locations and elevations of each of the monitoring wells. Top of casing and grade elevations were measured relative to an existing mean sea level datum using benchmarks taken from the Preliminary Broome County Industrial Park Site Plan. On December 20, 1984, water level measurements were taken at each of the monitoring wells and converted to the elevations summarized on Table 1. This groundwater elevation data was used to develop the groundwater elevation map shown on Figure 4.

2.05 In-Situ Permeability Tests

In situ permeability tests were performed on the four wells installed for this investigation and on five wells installed for the Phase I investigation in order to determine in situ permeabilities of the various subsurface materials at the industrial park site. The tests were performed by evacuating a volume of water from the well, thus creating a potential hydraulic head difference between the well and the surrounding aquifer. The rate of recovery of the water level in the well is a function of the hydraulic conductivity of the aquifer. For those wells where the well evacuation did not create a sufficient hydraulic head difference; the well was pumped at a rate of 20 gallons per minute and the drawdown was measured to estimate the permeability. The results of the in-situ permeability tests are included in Appendix C.

2.06 Groundwater/Surface Water Sampling

Groundwater samples were collected from Wells 17-20 using a stainless steel bailer. Prior to sampling, three times the volume of water contained in each well were evacuated to assure the collection of representative groundwater samples. Following sample collection all groundwater samples were properly preserved and promptly transported to the O'Brien & Gere laboratory in Syracuse, New York for analysis. The groundwater samples from the four wells were chemically analyzed for the following chemical parameters: pH, total conductance, Chemical Oxygen Demand (COD), total dissolved solids, hardness, sulfate, chloride, nitrate, aluminum, arsenic, barium, cadmium, chromium (hexavalent), copper, cyanide, iron, lead, manganese, mercury, nickel, selenium, silver, sodium, zinc, and total organic carbon. The results of these analyses are shown in Table 2.

Surface water samples were collected at three separate locations and depths from the designated wetland on-site. Although surface water samples were to be collected from Carlin Creek, the creek was dry during this investigation. A Van Dorn device was used to collect the samples to ensure that representative samples were taken at specific depths. Surface water samples were collected at the locations A, B and C on Figure 3 at the depths of .5 ft., 1 ft. and 1.0 ft. respectively. Following sample collection all samples were preserved on-site and promptly transported to the O'Brien & Gere laboratory in Syracuse where they were analyzed for the same parameters as the groundwater analyses as well as for Biological Oxygen Demand (BOD) and dissolved oxygen (D.O.). The results of the analyses are shown in Table 2.

SECTION 3 - HYDROGEOLOGIC CONDITIONS

3.01 Geology

The Broome County Industrial Park is located within the Susquehanna section of the glaciated Appalachian Plateau. This region is characterized by moderately to steeply sloping uplands and broad, flat to gently undulating valley bottoms. The landscape has been sculptured primarily by fluvial processes, which have created numerous drainage systems dissecting the plateau surface. Glacial processes have further modified the region by rounding hill tops, truncating bedrock spurs, steepening valley walls, and partially filling the Susquehanna River valley with unconsolidated deposits.

The bedrock that underlies the site consists predominately of fine-grained shale and siltstone. These units were consolidated into rock formations from sediments deposited in a shallow sea during late Devonian time (approximately 350 million years ago). Individual shale and siltstone layers dip gently to the southwest at gradients of less than 20 feet per mile. Small planar openings in the rock have developed both parallel and perpendicular to the layers. These openings, or fractures, provide the only significant avenues for groundwater movement through the otherwise impermeable bedrock.

Throughout the site, bedrock is covered by varying thicknesses of unconsolidated sediments. Most of these sediments were deposited during the advance and retreat of continental ice sheets more than 10 thousand years ago, and range in composition according to their specific mode of deposition. Three basic types of glacial sediments have been recognized at the proposed site: till, outwash, and lake deposits. Till is a dense, unsorted mixture of rock fragments dispersed in a fine-grained matrix of silt, sand and clay. This material was deposited directly by the glacier, either at its margin or beneath the ice mass. Outwash is a relatively well-sorted deposit of sand and gravel, with lesser amounts of silt, that was deposited from sediment-laden meltwater streams as they flowed away from a former ice margin. Beds of lacustrine fine-grained sand, silt and clay were deposited in glacial lakes that formed due to the blockage of meltwater drainage by the retreating ice mass. Figure 5 shows the areal distribution of the surficial geology. Figure 5 shows a typical distribution of these sediments in a cross section which extends through the central part of the site.

Glacial till is the most wide spread unconsolidated deposit present at the site. Figure 5 shows that this material mantles the bedrock everywhere, but is overlain by other deposits along the valley bottom (except under the wetlands). Although the till is generally greater than 10 feet thick, it is less than 4 feet deep on the steep slopes in the west central portion of the site (Figure 3). This thin cover of till is designated as colluvium because it has been transported downslope under the influence of gravity since the time of its deposition. The till cover may also be less than 10 feet over the hill tops along Carlin Road.

Except for the small area of colluvium, till is suitable for most construction purposes. It should be noted, however, that in some locations the till is covered by 18 to 36 inches of silt and very fine sand (especially in areas to the north and west of Carlin Creek). This upper soil mantle is easily eroded and is considered poor foundation material due to low bearing strength.

The valley bottom sediments have been classified as outwash, but the composition of subsurface materials is not simple. Figure 5 shows that up to 20 feet of sand and gravel overlie beds of fine sand, silt and clay. This complex interfingering of outwash, lake beds and alluvium has been reported in valley deposits throughout the Susquehanna River valley in the Binghamton area (Randall and Holecek, 1982; Randall, 1981; Randall and Coates, 1973; Hollyday, 1969). Apparently, the retreat of glacial ice from this valley involved numerous local blockages of meltwater before free drainage was re-established. Silt, clay and very fine-grained sand collected in small glacial lakes dammed by ice. As the ice melted away, meltwater streams were able to deposit coarse-grained sands and gravel on top of and along side the lake beds.

The industrial park site is located in a stretch of the valley that would have favored the impoundment of meltwater between the hillside and ice in the valley to the east. The former presence of a glacial lake in this area would help account for the existence of the wetlands, today. This lake was fed by meltwaters coming through the cols in the bedrock spur that is traversed by Carlin Road. A col is a glacial meltuater channel that extends across an upland divide. The deposition of outwash to the east of the wetlands probably occurred in contact with receding ice. Such an environment contributed to the heterogeneous nature of these sediments.

The least abundant sediment type found at the proposed site is modern alluvium, which has been deposited by present-day streams. Alluvial sediments flank the natural drainage channels, and may be up to 5 feet thick. Alluvium overlies till to the southwest of the upper landfill, but in most cases it covers outwash or lacustrine sediments (for example, Well 18, near the intersection of Carlin Creek and Carlin Road). Construction should be avoided in alluvium due to seasonally a high water table and the possibility of flooding.

3.02 Groundwater Flow Conditions

Part of the precipitation falling on the land surface is transported as surface water runoff, some of it returns to the atmosphere as evapotranspiration, and the remainder percolates through the soils until it reaches the water table. Once infiltrating water reaches the water table it enters the groundwater flow system and flows under the influence of gravity down the slope of the water table until it reaches a point of discharge such as a wetland, stream or river. At the industrial park site the groundwater may discharge locally into the wetland or Carlin Creek but most of the groundwater will most likely flow beneath these local discharge points and discharge into the Susquehanna River.

The groundwater elevation map illustrated on Figure 4 depicts the configuration of the potentiometric surface from the groundwater elevation data collected on December 20, 1984. Although the test boring logs show that groundwater within the glacial till occurs at depths ranging from 20 to 35 feet below the land surface, Figure 4 reveals that the potentiometric surface of the till is within five feet of the land surface. The data indicate that groundwater within the till occurs under artesian conditions. The groundwater within the outwash occurs under water table conditions at a depth ranging from five to ten feet below the surface. The groundwater gradient slopes in an eastward direction towards the Susquehanna River. The hydraulic gradient is steep in the uplands and is relatively gently sloping within the valley (See Figure 4).

The water transmitting capacity, or permeability, of the various geologic formations were estimated by conducting in-situ permeability tests on several monitoring wells. The results of the tests are included in Appendix C. The permeability test data for Wells 1 and 19 which were installed within the glacial till, indicate the permeability of the till ranges from 3.8×10^{-7} to 1.4×10^{-7} cm/sec. The permeability test data for Wells 7, 8, 9, and 10 indicate a permeability for the outwash sand and gravel ranging from 7.0×10^{-2} to 3.8×10^{-1} cm/sec. Permeability tests were also conducted on Wells 5, 6, 17, 18, and 20 however, because these wells were installed within mixed deposits of sand and gravel interbedded with silts and clays, the permeabilities were highly variable and ranged from 9.63×10^{-5} cm/sec to 1.4×10^{-3} cm/sec. The velocity of groundwater at the site can be approximated using Darcy's law and estimates of the hydraulic gradient, aquifer permeability and aquifer porocity. The groundwater flow velocity equation is as follows:

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

Where V = Velocity, in feet per day

K = permeability, in $gal/day/ft^2$

dh/dL = hydraulic gradient; in ft/ft

a = porosity

The upland area of the industrial park is underlain by glacial till which has a low permeability ranging 8.66 to 2.96×10^{-3} gpd/ft^2 (3.8 to 1.4×10^{-7} cm/sec) and an estimated porosity of .34 which is typical for glacial till (Todd, 1980). Based on this information and a hydraulic gradient of .070 (measured from Figure 4) it is estimated that the groundwater flow velocity of the upland area of the industrial park ranges from 2.2×10^{-4} to 8.13×10^{-5} ft/day.

The lowland area of the industrial park is underlain by outwash sand and gravel that has a relatively high permeability ranging from 1,485 to 8,060 gpd/ft^2 (7.0×10^{-2} - 3.8×10^{-1} cm/sec) and an estimated porocity of .25. Based on this data and a hydraulic gradient of .010 (Figure 4) it is estimated that the groundwater velocity of the lowland area of the industrial park ranges form 8 to 43 ft/day.

3.03 Groundwater/Surface Water Quality

Groundwater Quality

Groundwater monitoring Wells 17, 18, 19 and 20 were installed at the perimeter of the industrial park site to determine the groundwater quality at the upgradient and downgradient boundaries of the site. The water quality analyses from the wells are shown in Table 2. In order to evaluate the site groundwater quality with respect to natural groundwater quality, the analyses are compared to the background water quality of aquifers within the Susquehanna River Basin (Table 3). In addition, the analyses are compared to NYDOH Drinking Water Standards and to NYSDEC Class GA Groundwater Standards (Table 4) to evaluate the suitability of the groundwater as a source of potable water.

Groundwater monitoring Wells 17 and 20 are located hydraulically upgradient from most of the industrial park and therefore, the analyses from these wells should be representative of the background groundwater quality. The wells are installed within glacial till and the water quality is of good drinking water quality, contains a moderate amount of dissolved solids and hardness and is relatively low in iron, chloride, and heavy metal concentrations. The groundwater quality of those wells meets NYSDOH Drinking Water Standards and NYSDEC Class GA Groundwater Standards.

Groundwater monitoring Wells 18 and 19 are at the down-gradient boundary of the north and south extremes of the industrial park. Well 19 is installed within till and the water is of good drinking water quality, similar to the background water quality described above. However, the water quality of Well 18 exceeds the background water quality and contains elevated levels of COD, sulfate iron, manganese and total organic carbon. The elevated levels of sulfate, iron and manganese exceed the NYSDOH Drinking Water Standards.

Well 18 is located adjacent to Carlin Creek and the groundwater may have been impacted by surface water infiltration from the Creek. The elevated levels of iron, manganese and sulfate may have been caused by leachate from the upper landfill discharging into Carlin Creek which in turn infiltrated into the groundwater.

Surface Water Quality

Surface water samples were collected from the designated wetland on-site at the locations shown on Figure 3. The samples were collected at depths of .5 ft at location A, 1 ft at B and 1 ft at C. The chemical analyses of the samples shown in Table 2, reveal that the water at all three locations is of drinking water quality, contains a moderate amount of dissolved solids and is relatively low in heavy metal, chlorides, and sulfate, and TOC. The turbidity varies from moderate to high.

Surface water quality is strongly dependent on the interrelationship between groundwater flow and stream flow. If the major source of surface water is runoff, the surface water will usually be relatively low in dissolved solids and high in suspended solids and turbidity. On the other hand, if the major source of the surface water is base flow from groundwater discharge, the surface water will tend to be high in dissolved solids and low in turbidity. The moderately high levels of total dissolved solids content suggests that at least part of the surface water within the wetland can be attributed to groundwater discharge. However, due to the relatively high turbidity levels and the hydrogeologic conditions beneath the wetland, the major source of the water is believed to be from runoff. The wetland is located downgradient from the upper landfill, however, the surface water quality does not appear to be impacted by groundwater flowing from the landfill.

The surface water quality of the wetland can be evaluated relative to sustaining the productivity of aquatic organisms by examining the oxygen content of the water. Dissolved oxygen (D.O.) is a measure of the oxygen available and, in appropriate concentrations, is essential to sustaining the productivity of aquatic organisms. New York State Department of Environmental Conservation has set a standard of not less than 5 mg/l D.O. for trout waters and not less than 4 mg/l for non-trout waters. The high levels of D.O. (12.7 to 17.0 mg/l) detected within the wetland are more than sufficient to sustain the productivity of most aquatic organisms. These high D.O. levels are close to the saturation levels for the temperature of the water at the time of sampling (43°F). Based on the relative shallow depths of the wetland, sufficient D.O. levels are expected to be maintained during the summer months to sustain aquatic organisms. Field inspections of the wetland area by the BIDA indicate there is low aquatic plant productivity and a limited trophic system. This is reflected by the undetectable levels of Biochemical Oxygen Demand (BOD) which measures the removal of oxygen from the water by organic materials. This information reveals that although the wetland has a limited trophic system, it has an abundance of oxygen available to sustain the year-round productivity of most aquatic organisms.

3.04 Potential Ground Water Supplies

The development of a groundwater supply for either industrial or consumptive use would require a relatively large sustained yield. It has already been noted that the bedrock underlying this site is impermeable, except for fracture openings. However, because these fractures comprise only a small percentage of the total rock volume, groundwater flow rates are slow and well yields are generally less than 10 gallons per minute out of domestic wells. Therefore, any potential groundwater supply on site would have to be developed in the unconsolidated sediments.

Till characteristically has a low permeability due to its poor sorting, fine-grained texture and high density. Rarely are there enough interconnected void spaces between particles to transmit significant amounts of groundwater. This has been confirmed at the site by in-situ permeability tests of Wells 1 and 19 which indicate that the till at this location has a permeability of only 3.8×10^{-7} to 1.4×10^{-7} cm/sec. Therefore, till should not be considered as a potential aquifer for the industrial park.

Outwash is the best potential aquifer because of its coarseness and high degree of sorting. Well records (Randall, 1972) indicate that outwash is an important source of water supply to local homeowners along Route 7 and the Town of Conklin Well No. 3. The on-site test boring logs indicate that the saturated thickness of the outwash deposits at the industrial park site generally ranges from 5 to 15 feet. Based on this range in aquifer thickness and the aquifer permeability range of 1500 to 5000 gal/day/ft^2 (estimated from the in-situ permeability tests) well yields within the outwash aquifer at the industrial park can be expected to range from 10 to 500 gallons per minute.

Fine-grained lacustrine deposits are not productive aquifers due to low permeability. In fact, silt and clay lake beds often form impermeable confining layers between outwash units.

SECTION 4 - ENVIRONMENTAL IMPACTS

4.01 Existing Impacts

Upper Landfill

The Phase I Hydrogeologic Investigation indicated that up to 1.8 million gallons of leachate is generated at the upper landfill annually by precipitation infiltrating the landfill surface and an additional 1,000 gallons of leachate is generated annually by groundwater flowing through the refuse. This leachate generation has impacted the groundwater immediately downgradient from the upper landfill by elevating the levels of arsenic, manganese cadmium, benzene, and several volatile organic compounds, including methylene, chloride, toluene, 1,1-dichloroethane and 1,2-dichloropropane. However, due to the fine grained texture and extremely low groundwater velocities of the soils beneath the upper landfill, the groundwater flowing from the landfill should not have a significant impact on downgradient groundwater or surface water supplies.

Although the soils beneath the upper landfill are favorable for minimizing groundwater impacts, they promote the development of leachate seeps which have a potential for impacting the surface water quality of Carlin Creek. Because Carlin Creek flows over permeable sand and gravel deposits, it can recharge the groundwater by infiltration through its streambed. As a result, any leachate discharging into Carlin Creek from the upper landfill, could have a potential for impacting on the groundwater quality farther downstream. The groundwater quality adjacent to Carlin

Creek (Well 18) contains elevated levels of iron, sulfate, COD and TOC which may be attributed to the infiltration of impacted surface water of Carlin Creek.

As previously stated in the Phase I investigation, a low permeability cover installed on the upper landfill would minimize the impacts on groundwater and surface water by eliminating the amount of leachate generated by precipitation infiltrating the landfill surface.

Lower Landfill

Up to 900,000 gallons of leachate is generated at the lower landfill by precipitation infiltrating the landfill surface and up to 150,000 gallons of leachate may be generated by groundwater flowing through the refuse. This leachate generation has impacted the groundwater immediately downgradient from the lower landfill by increasing the levels of arsenic, iron, manganese, and mercury. In addition, the water quality of some of the downgradient homeowner wells along Conklin Road contained elevated levels of manganese, iron, and arsenic, suggesting the landfill may be having an impact on the quality of the water supplies. Due to the coarse grained soil texture and high groundwater flow velocity beneath the lower landfill, it is anticipated that the lower landfill will continue to have an impact on groundwater quality.

A low permeability cover installed on the landfill would minimize the impacts on groundwater by eliminating the amount of leachate generated by precipitation infiltrating the landfill surface.

4.02 Potential Impacts

Contamination Potential

The Town of Conklin Well No. 3 is located approximately 2,000 feet northeast of the Broome Industrial Park. Any surface water draining the area north of Carlin Road has a potential for infiltrating the surface soils and recharging the groundwater aquifer that is a source of groundwater for Well No. 3. Therefore any contaminants discharged at the land surface within this area could have a potential for impacting the groundwater quality of Well No. 3. As a result, industrial development controls should be developed for this area to protect the municipal water supplies for the Town of Conklin.

The area within the industrial park that is underlain by outwash deposits (see Figure 3) contains highly permeable soils and a shallow water table. Therefore, this area is highly susceptible to groundwater contamination from any potential contaminant discharges that could potentially occur at the land surface. Although the area is not directly upgradient to the Town of Conklin Well No. 3, it serves as a recharge area for the aquifer that supplies water to the homeowner along Route 7, and it has a high potential for future development of industrial water supplies. As a result, industrial development controls and a groundwater monitoring program should be developed for this area to ensure the protection of the local groundwater supplies.

General Construction Conditions

The subsurface geologic conditions across most of the industrial park site are generally suitable for most construction purposes. The areas underlain by glacial till have a high bearing strength and the water table is generally greater than ten feet deep. However, along the steeper slopes bedrock occurs within five feet of the surface which may impose limitations on foundation excavations. The areas underlain by outwash sand and gravel have a high bearing strength but the water table is generally within 8 feet of the land surface. The least suitable areas are those underlain by alluvial or lacustrine deposits where bearing strength is low to moderate and the water table is within five feet of the surface. Alluvial deposits are generally underlain by more suitable glacial till or outwash deposits within ten feet of the surface.

Groundwater Supplies

Groundwater supplies developed within the glacial till, or underlying shale/siltstone bedrock generally yield less than 10 gpm and are therefore generally not sufficient for industrial water supplies. The highest potential for the development of groundwater supplies is within the outwash sand and gravel where well yields can be expected to range between 10 and 500 gpm, depending on the thickness and texture of the deposit. Although the outwash deposits would have sufficient well yields, the groundwater quality in the vicinity of the lower landfill and Carlin Creek is not suitable for drinking water purposes. As a result, groundwater supplies developed within the outwash aquifer at the central and northern sections of the industrial park may be used as a source for cooling water and process water but should not be used as a source of drinking water.

SECTION 5 - CONCLUSIONS AND RECOMMENDATIONS

5.01 Conclusions

The geology of the Broome Industrial Park is characterized by varying thicknesses of unconsolidated sediments overlying a shale and siltstone bedrock. The unconsolidated sediments include till, outwash, lacustrine deposits and alluvium. The two most widespread deposits present at the site are till and outwash. The till occurs within the upland of the site, and consists of a dense unsorted mixture of rock fragments and fine grained materials that has an extremely low permeability ranging from 3.8×10^{-7} to 1.4×10^{-7} cm/sec. Outwash occurs along the valley bottom and consists of sand and gravel which has a high permeability ranging from 7.0×10^{-2} to 3.8×10^{-1} cm/sec.

Groundwater occurs at the site at depths varying from 5 to 30 feet below the land surface. The groundwater flows predominantly in an eastward direction at a velocity ranging from 2.2×10^{-4} to 8.13×10^{-5} ft/day within the glacial till to 8 to 43 ft/day within the outwash. The groundwater may discharge locally into the wetlands or Carlin Creek but most of the groundwater flows beneath these discharge points and discharges into the Susquehanna River.

The groundwater quality upgradient to most of the industrial park is generally of good drinking water quality, contains a moderate amount of dissolved solids and hardness, and is relatively low in iron, chloride and heavy metal content. On the other hand, the downgradient groundwater quality at the central and northern sections of the industrial park is not of suitable quality for drinking water. The groundwater quality in the central part of the site is downgradient from the lower landfill and contains elevated levels of manganese, mercury, and iron. The downgradient groundwater quality at the northern part of the industrial park contains elevated levels of sulfate, iron, manganese and TOC which may be attributed to impacts from the upper landfill.

Potential well yields from the glacial till and bedrock are estimated to be less than 10 gpm and therefore are not sufficient for industrial purposes. However, the potential well yields from outwash are estimated to range from 10 to 500 gpm which is sufficient for most industrial supplies. Because the groundwater quality at the central and northern sections of the industrial park does not meet drinking water quality, the groundwater should be used only as a source of cooling or process water and not as a source of drinking water.

The subsurface geologic conditions across most of the industrial park are suitable for most construction purposes. The glacial till has a high bearing strength and deep water table; the outwash deposit has a high bearing strength and variable water table within ten feet of the surface. The least suitable areas are those underlain by alluviam or lacustrine silt and clay that have a low bearing strength and a water table close to the land surface.

Surface water drainage from the area north of Carlin Road has a potential for recharging the groundwater that supplies water to the Town of Conklin Well No. 3. As a result, any accidental chemical discharges from an industry located within this area could have a potential for impacting the quality of the Town of Conklin's water supply.

The area underlain by outwash deposits is highly susceptible to groundwater contamination and is a recharge area for the aquifer that supplies water to the homeowners along Route 7. Therefore, any accidental industrial discharges within this area would have a high potential for impacting nearby groundwater supplies.

5.02 Recommendations

1. The hydrogeologic investigations at the industrial park site have revealed that the upper and lower landfills have impacted groundwater quality and may have impacted the surface water quality of Carlin Creek. As a result, we recommend to implement the landfill remedial measures previously included within the Phase I Hydrogeologic Investigation. These remedial measures include: 1) installing low permeability covers on the upper and lower landfills to minimize leachate generation, 2) replacing the homeowner water supplies that are downgradient from the lower landfill, and 3) conducting groundwater and surface water monitoring to evaluate the long-term impacts from the landfills.
2. Industrial development controls are recommended for the area north of Carlin Road and for the area underlain by outwash deposits. These areas are recharge areas for the aquifer that supplies water to the Town of Conklin Well No. 3 and the homeowners along Route 7. Any industrial development within either of these areas should meet the following requirements: 1) any industry located within these areas shall develop a groundwater monitoring program, and 2) any industry that is

a major user of hazardous materials shall be restricted from these areas unless the facility is designed in accordance with NYSDEC Guidelines for State of the Art Technology for the Storage of Hazardous Liquids (NYSDEC, 1983) in order to prevent leaks and spills from occurring. The major users of hazardous materials shall include at a minimum 1) any permitted hazardous waste facility as defined under the Resource Conservation and Recovery Act (RCRA), 2) any bulk petroleum storage facility as defined under 6 NYCRR Part 612 and 3) any underground or aboveground storage facility with a capacity of 1,000 gallons or more used for the storage of hazardous substances.

3) Additional field investigations are recommended to be conducted within the outwash deposits to determine the maximum yield of groundwater supplies that can be developed for industrial and consumptive use. These field investigations include installing test wells and conducting aquifer performance tests. Due to the unsuitable groundwater quality within the central and northern sections of the industrial park, it is recommended that groundwater supplies developed within these areas not be used for drinking water purposes.

4) More detailed geotechnical testing is recommended where heavy construction is anticipated within areas that have severe general construction limitations. This includes the areas that are underlain by alluvial deposits or lacustrine

silts and clays. The geotechnical testing may include test drilling, standard penetration tests and laboratory testing for compaction, atterburg limits and shrink/swell potential.

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Tables

TABLE 1

BROOME COUNTY INDUSTRIAL PARK

GROUNDWATER MONITORING WELL DATA

Well No.	Grade Elevation	Top of Steel Casing Elevation	Top of PVC Casing Elevation	Well Depth Below Grade	Groundwater Elevations 12/20/84
1	944.4	947.41	947.30	60	943.16
2	914.8	916.16	915.93	45	909.84
3	885.8	889.20	889.11	20	885.60
4	890.9	893.58	893.42	20	886.80
5	860.31	860.31	860.24	33.5	853.86
6	868.8	868.82	868.59	17.9	865.59
7	865.2	868.37	868.27	25	856.22
8	860.2	860.24	860.08	18	853.89
9	861.3	864.21	864.11	18	854.66
10	863.8	863.76	863.47	18	855.29
11	896.2	898.97	898.82	30.5	890.77
12	898.6	901.62	901.51	16	889.17
13	865.7	868.62	868.55	15	860.07
14	914.8	917.25	917.14	15	---
15	873.8	876.62	876.49	18	---
16	---	---	---	2.5	---
17	948.46	950.89	950.38	30	947.06
18	861.00	863.37	862.74	15	859.97
19	912.39	914.94	914.61	31.5	908.89
20	887.89	890.05	889.64	20.5	885.70

TABLE 2
BROOME COUNTY INDUSTRIAL PARK
WATER QUALITY DATA
(Values are in mg/l)

	Groundwater				Surface Water		
Location	Well 17	Well 18	Well 19	Well 20	SW A	SW B	SW C
pH	6.7	6.2	6.1	6.7	5.8	6.3	6.4
SPCOND	250.	170.	330.	170.	46.	46.	45.
COD	180.	420.	15.	50.	74.	170.	110.
Total Dissolved Solids	200.	260.	210.	190.	80.	140.	130.
Calcium	33.	25.	57.	34.	8.8	9.3	11.
Magnesium	9.0	5.0	12.	4.7	1.8	1.7	2.3
Hardness	120.	83.	190.	100.	29.	30.	37.
Sulfate	22.	380.	32.	49.	32.	25.	34.
Chloride	3.	19.	1.	2.	1.	1.	1.
Nitrate	0.01	0.40	0.01	0.07	0.01	0.02	0.01
Aluminum	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Arsenic	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Barium	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cadmium	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Chromium-Hex.	.05	.05	.05	.05	.05	.05	0.5
Copper	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cyanide	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Iron	0.02	2.7	0.01	0.03	0.05	0.04	0.05
Lead	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Manganese	1.4	4.1	0.46	0.43	0.13	0.19	0.21
Mercury	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Nickel	.03	0.07	0.09	0.09	0.09	0.07	0.07
Selenium	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Silver	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Sodium	10.0	6.7	14.	1.8	0.7	1.1	1.1
Zinc	0.01	0.02	0.01	0.01	0.01	0.02	0.02
Total Organic Carbon	35.	139.	10.	13.	33.	55.	35.
BOD5	---	---	---	---	1.	1.	1.
TURB (Lab)	---	---	---	---	15.	120.	15.
TURB (Secchi Disc) Pond depth/disappearance depth					1'/6"	2'/8"	2'/8"
Dissolved Oxygen sample depth/D.O.					6"/14.3 13"/14.9	8"/14.9 16"/12.7 30"/15.0	8"/17.0 16"/15.7 30"/15.6

TABLE 3

Groundwater Quality Within the Aquifers of the Susquehanna River Basin in New York State
(values in mg/l) (from Hollyday, 1969)

*	Glacial Till and Bedrock			Lacustrine Deposits			Outwash Deposits		
	G	M	P	G	M	P	G	M	P
Temperature	48	50	52	50	52	53	47	50	53
Silica	6.7	8.3	9.6	2.0	7.8	15	6.8	7.4	8.8
Iron	.08	.30	.65	.21	1.0	1.8	.03	.06	.15
Manganese	.01	.03	.05		.02		0	.01	.05
Calcium	29	41	51		30		45	50	74
Magnesium	3.8	8.3	9.7		9.0		6.0	12	19
Sodium	4.8	11	64		7.6		6.6	8.9	13
Potassium	.5	1.5	2.3		.5		1.1	1.4	1.6
Bicarbonate	140	170	250		130		150	180	230
Sulfate	3.6	12	27		15		25	31	50
Chloride	4.0	16	58		3.0		7.8	13	22
Fluoride	.1	.1	.2		.1		.05	.1	.2
Nitrate	.09	.18	.53		0		.24	1.0	2.1
Dissolved Solids	160	200	310		140		190	240	330
Calcium and Magnesium	54	90	140		120		150	200	220
Alkalinity	110	150	190		110	130	130	150	170
pH	7.3	7.7	8.1		7.5		7.4	7.6	7.8
Color	0	2	10		1		1	2	5

*Values tabulated are taken from a frequency distribution of reported chemical analysis of well water. Good (G), medium (M) and poor (P) refer to values equaled or exceeded for 75, 50 and 25 percent of available analyses, respectively.

TABLE 4

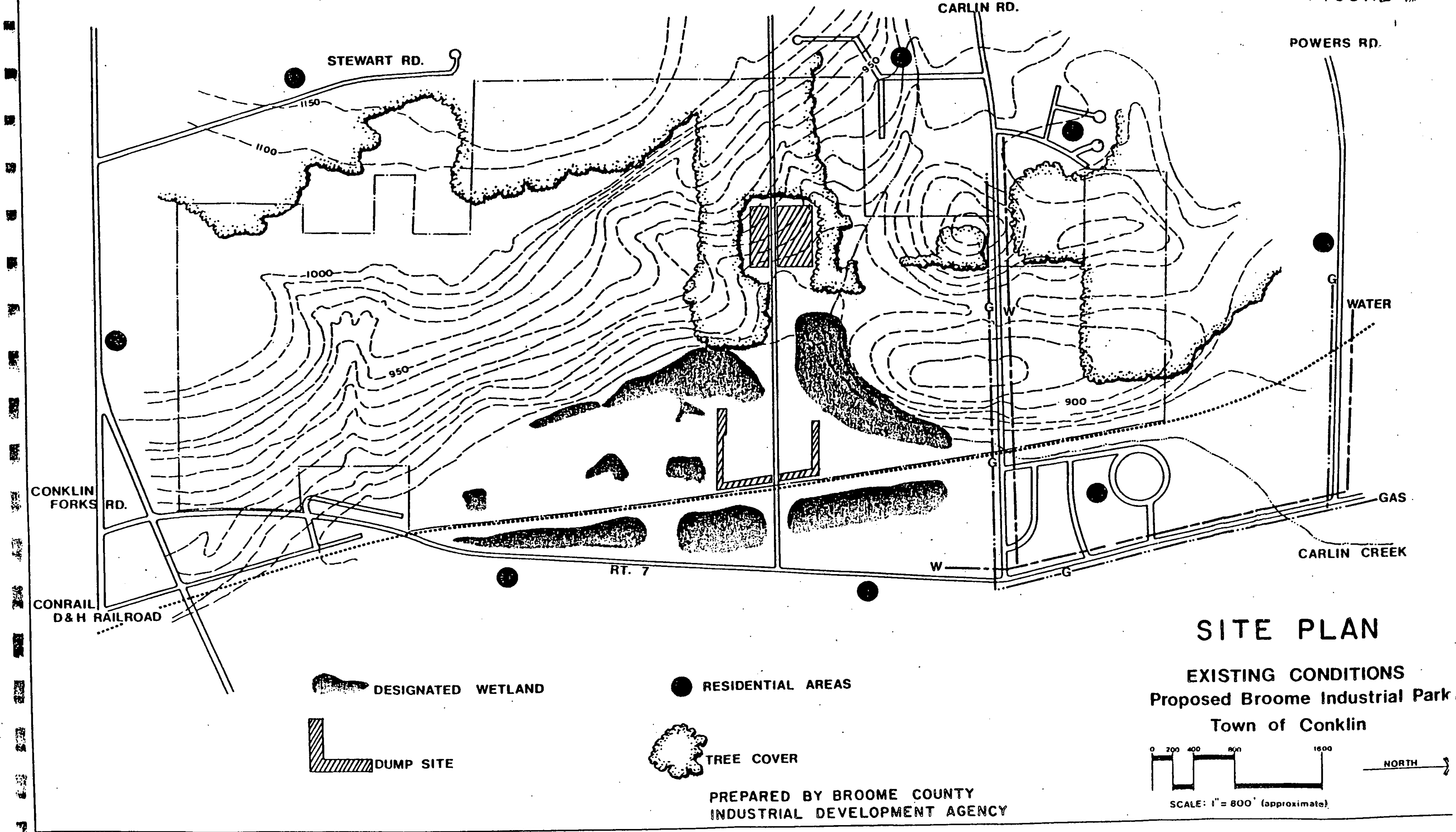
NEW YORK STATE WATER QUALITY STANDARDS

Parameter	NYSDOH Drinking Water Standards/Maximum Contaminant Level	NYSDEC Class GA Groundwater Standards/Maximum Allowable Concentration
Arsenic (As)	.05 mg/l	.025 mg/l
Barium (Ba)	1.0 mg/l	1.0 mg/l
Cadmium (Cd)	.01 mg/l	.01 mg/l
Chloride (Cl)	250. mg/l	250. mg/l
Chromium (Cr)	.05 mg/l	.05 mg/l
Copper (Cu)	1.0 mg/l	1.0 mg/l
Cyanide (CN)	- -	.2 mg/l
Fluoride (F)	2.2 mg/l	1.5 mg/l
Foaming Agents		.5 mg/l
Iron (Fe)	.3* mg/l	.3 mg/l
Lead (Pb)	.05 mg/l	.025 mg/l
Manganese (Mn)	.3* mg/l	.3 mg/l
Mercury (Hg)	.002 mg/l	.002 mg/l
Nitrate (N)	10. mg/l	10.0 mg/l
Phenols	- -	.001 mg/l
Selenium (Se)	.01 mg/l	.02 mg/l
Silver (As)	.05 mg/l	.05 mg/l
Sulfate (SO_4)	250. mg/l	250. mg/l
Zinc (Zn)	5.0 mg/l	5. mg/l
pH Range	- -	6.5 - 8.5
Chlordane		.1 ug/l
Endrin	.0002 mg/l	not detectable
Heptachlor	- -	not detectable
Lindane	.004 mg/l	not detectable
Methoxychlor	.1 mg/l	35. ug/l
Toxaphene	.005 mg/l	not detectable
2,4-Dichlorophenoxyacetic Acid	.1 mg/l	4.4 ug/l
2,4,5-Trichlorophenoxyproploric Acid	.01 mg/l	.26 ug/l
Vinyl Chloride	- -	5 ug/l
Benzene	- -	not detectable
Chloroform	- -	100 ug/l
Trichloroethylene	- -	10 ug/l

*If iron and manganese are both present, the total concentration of both substances should not exceed 0.5 milligrams per liter.

Figures

FIGURE 2

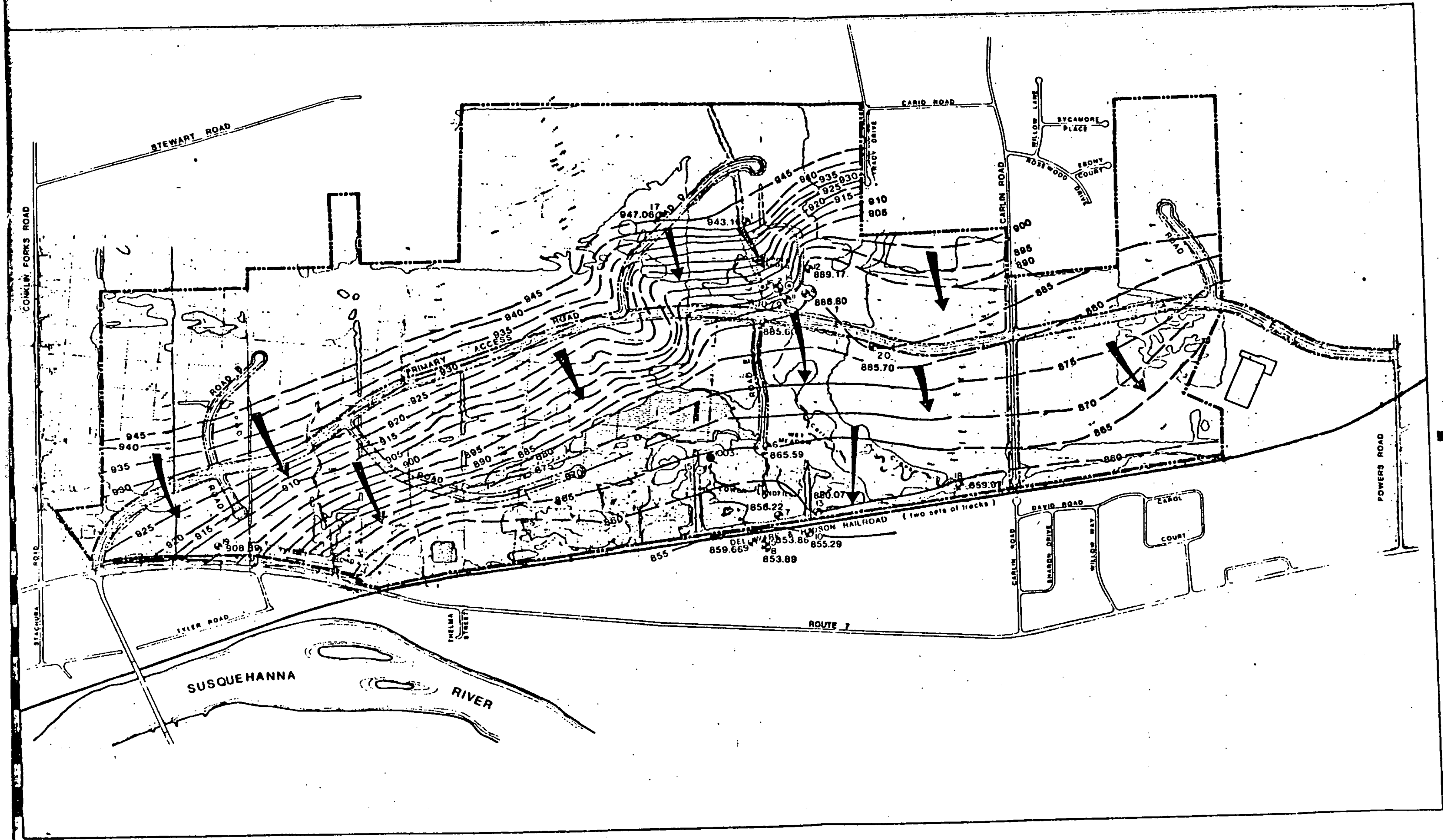


CARLIN RD.
POWERS RD.
STEWART RD.
1150
1100
1000
950
900
WATER
GAS
CARLIN CREEK
CONKLIN FORKS RD.
CONRAIL D&H RAILROAD
RT. 7
G
W
DESIGNATED WETLAND
RESIDENTIAL AREAS
DUMP SITE
TREE COVER
PREPARED BY BROOME COUNTY INDUSTRIAL DEVELOPMENT AGENCY
SITE PLAN
EXISTING CONDITIONS
Proposed Broome Industrial Park
Town of Conklin
0 200 400 800 1600
SCALE: 1" = 800' (approximate)
NORTH

FIGURE 3
Surficial Geology Map

FIGURE 4

Groundwater Elevation Map



LEGEND

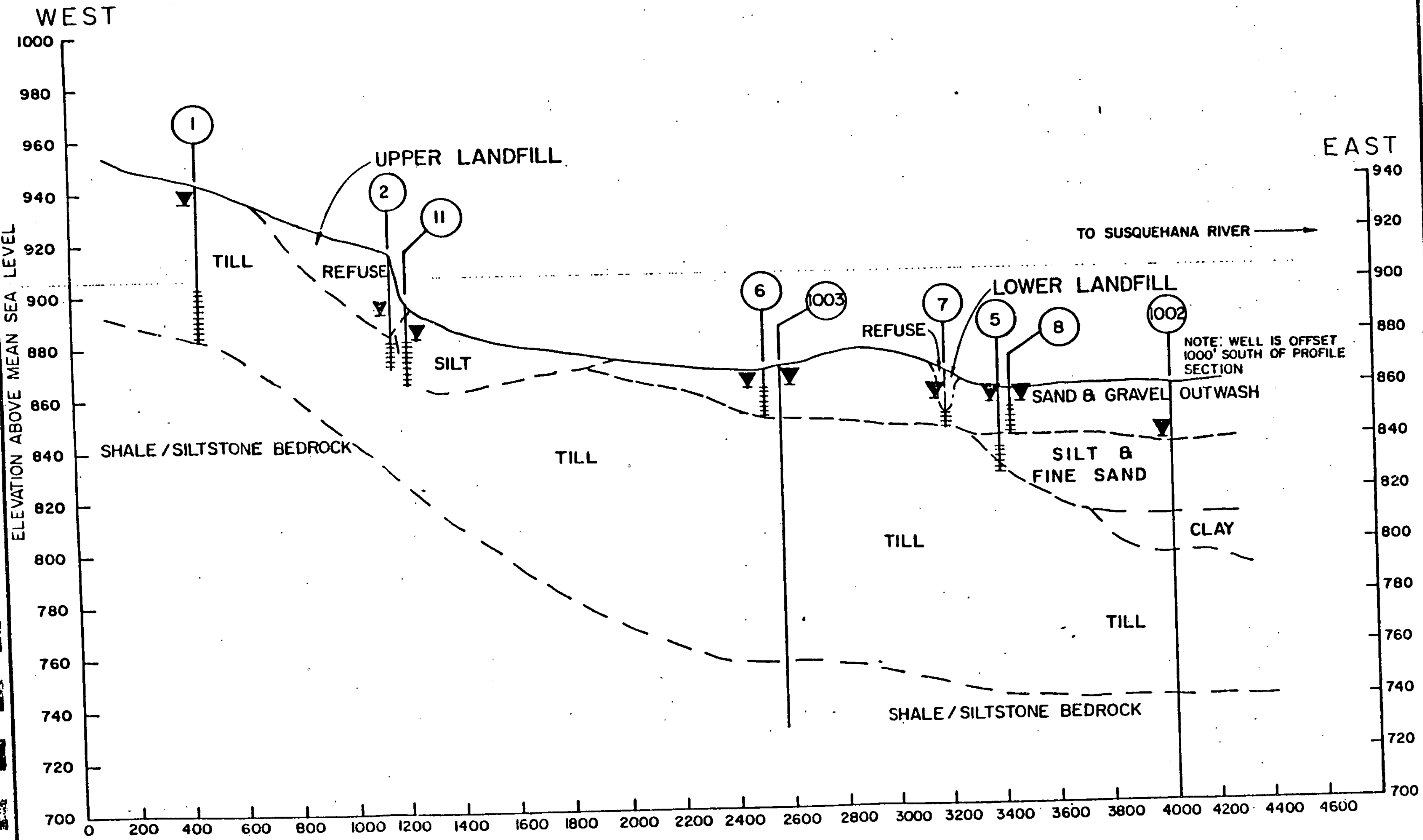
- Groundwater Monitoring Well
- Leachate/Methane Gas Monitoring Well
- Wells By Others
- Groundwater Equipotential Line (Dec. 20, 1984)
- Groundwater Flow Direction

Scale: :400

400 0 400 800

BROOME COUNTY INDUSTRIAL DEVELOPEMENT AGENCY

Geologic Cross Section



LEGEND

Groundwater Monitoring Well

Groundwater Monitoring Well Screen Interval

Groundwater Elevation

BROOME COUNTY INDUSTRIAL DEVELOPEMENT AGENCY

NOTE: Groundwater V/u8 1002 & 1003 Are Rendall 1972

O'BRIEN & GERE

O'Brien & Gere Engineers, Inc.

Appendices

O'BRIEN & GERE

APPENDIX A

WATER QUALITY DATA FROM

PHASE I HYDROGEOLOGIC INVESTIGATION

TABLE 6
BROOME COUNTY INDUSTRIAL PARK
INORGANIC ANALYSES - HOMEOWNER WELLS *

HOME	DATE	SAMPLE	SO4	CL	NO3N	CN	PHENOL	TOC	AG
1	11/14/83	71229	14.	6.	<.01	<.05	<.001	6.	<.01
2	11/14/83	71230	<1.	29.	<.01	<.05	<.001	14.	<.01
2	01/14/84	4146							
3	11/14/83	71231	30.	65.	4.7	<.05	<.001	8.	<.01
4	11/14/83	71232	14.	23.	<.01	<.05	<.001	10.	<.01
5	11/14/83	71233	7.	8.	<.01	<.05	<.001	7.	<.01
6	11/15/83	71234	11.	17.	1.13	<.05	<.001	4.	<.01
7	11/14/83	71235	12.	8.	<.01	<.05	<.001	8.	<.01
7	01/19/84	4147							
8	11/14/83	71236	4.	7.	<.01	<.05	<.001	9.	<.01
9	11/14/83	71237	3.	27.	<.01	<.05	<.001	11.	<.01
9	01/19/84	4148							
10	11/14/83	71238	25.	116.	5.0	<.05	<.001	8.	<.01
11	11/14/83	71239	12.	14.	<.01	<.05	<.001	9.	<.01
12	11/15/83	71240	37.	114.	4.6	<.05	<.001	6.	<.01
13	11/15/83	50315	2.2	14.					<.02
14	11/15/83	50316	20.	13.					<.02
15	11/15/83	50317	15.	11.					<.02
16	11/15/83	50318	20.	5.6					<.02
17	11/15/83	50319	18.	8.5					<.02

*Chemical concentrations are in mg/l except for Hg which is in ug/l.

TABLE 7
BROOME COUNTY INDUSTRIAL PARK
ORGANIC ANALYSES OF HOMEOWNER WELLS *

WELL NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
OWNER	D. Eckelberger	G. Tamkins	R. Edminster	M. Smith	D. Kernan	J. Villano	O. Desimone	A. Dahterle	R. Johnson	A. Allen	J. Hoover	R. Gleason	D. Hume	Town Hall	R. Kunse	T. Butchko	S. Lasky
DATE	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/9/83	11/15/83	11/15/83	11/15/83	11/15/83	11/15/83
Benzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
a-Trifluorotoluene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	10
Toluene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Ethylbenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
3-Chlorocyclohexene-1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
p-Xylene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
m-Xylene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chlorobenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
o-Xylene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Isopropylbenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Styrene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
p-Bromofluorobenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
n-Propylbenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
o-Chlorotoluene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
p-Chlorotoluene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
tert-Butylbenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bromobenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
sec-Butylbenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,3,5-Trimethylbenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2,4-Trimethylbenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
p-Cymene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
p-Dichlorobenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cyclopropylbenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
n-Butylbenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
m-Dichlorobenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
2,3-Benzofuran	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
o-Dichlorobenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Hexachloro-1,3-butadiene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2,4-Trichlorobenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Naphthalene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2,3-Trichlorobenzene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chloromethane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bromomethane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl Chloride	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chloroethane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Methylene chloride	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
t-1,2-Dichloroethene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chloroform	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2	2	< 1	< 1	< 1
1,2-Dichloroethane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Carbon tetrachloride	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bromodichloromethane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-Dichloropropane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
t-1,3-Dichloropropene	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trichloroethene	< 1	< 1	< 1	< 1	< 1	4	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	9
Dibromochloromethane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,2-Trichloroethane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
c-1,3-Dichloropropene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
2-Chloroethylvinyl ether	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Bromoform	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2,2-Tetrachloroethane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

* Chemical concentrations are in ug/l.

APPENDIX B

TEST BORING LOGS/WELL DETAILS

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Broome County Industrial Park

LOCATION Conklin, New York

DATE STARTED 7/27/83 DATE COMPLETED 7/28/83

HOLE NO. B-1-83-494

SURF. EL.

JOB NO. 8396

GROUND WATER DEPTH
WHILE DRILLING 35.0' (See Note)
BEFORE CASING REMOVED 10.5' (12 Hours)
AFTER CASING REMOVED 11.8'

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

SHEET 1 OF 2
File #2773.002

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		3/9		Brown dry very stiff SILT, little fine	
	2.0'			10/19	19	gravel, trace fine to medium sand	
5.0							5.0'
	5.0'-	2		51/44		Brown dry hard SILT, little fine to	
	7.0'			16/10	60	coarse sand, trace fine to coarse gravel, trace clay	
10.0							
	10.0'-	3		34/35			
	12.0'			22/29	57		
15.0							15.0'
	15.0'-	4		20/22		Brown moist hard SILT, little clay,	
	17.0'			24/25	46	little fine to coarse sand, trace fine gravel	
20.0							
	20.0'-	5		12/14			
	22.0'			20/25	34		
25.0							25.0'
	25.0'-	6		9/11		Gray moist very stiff to hard SILT,	
	27.0'			18/50	29	little clay, little fine to coarse sand, little fine to medium gravel	
30.0							
	30.0'-	7		7/9			
	32.0'			15/16	24		
35.0 ▼							35.0'
WL	35.0'-	8		12/24		Gray wet hard SILT, trace fine to	
	37.0'			22/24	46	coarse sand	
40.0							

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT: Broome County Industrial Park
LOCATION: Conklin, New York
DATE STARTED: 7/27/83 DATE COMPLETED: 7/28/83

HOLE NO. B-1-83-494
SURF. EL.
JOB NO. 8396
GROUND WATER DEPTH
WHILE DRILLING 35.0' (See Note)
BEFORE CASING REMOVED 10.5' (12 Hours)
AFTER CASING REMOVED 11.8'

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

SHEET 2 OF 2
File #2773.002

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	40.0'-	9		9/11		Gray moist very stiff SILT, little clay, little fine to coarse sand, little fine gravel	
	42.0'			18/18	29		
45.0							45.0'
	45.0'-	10		25/12		Gray moist very stiff SILT, trace fine to coarse sand, trace clay	
	47.0'			14/19	26		
50.0							50.0'
	50.0'-	11		9/21		Gray wet to moist hard SILT, little clay, little fine to coarse sand, little fine gravel	
	52.0'			24/25	45		
55.0							
	55.0'-	12		17/23			
	57.0'			27/27	50		
60.0							61.0'
	60.0'-	13		13/34		Gray moist hard silty sandy weathered SHALE	
	61.6'			100/100-.1			
						Bottom of Boring	61.6'
65.0						Notes: Installed observation well to 60.0' on completion of boring. Driller noted wet seams below 40.0'.	

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT LOCATION: Broome County Industrial Park, Conklin, New York

HOLE NO. B-2-83-495

SURF. EL.

DATE STARTED 7/28/83 DATE COMPLETED 7/29/83

JOB NO. 8396

GROUND WATER DEPTH WHILE DRILLING 4.0'

BEFORE CASING REMOVED 16.0'

AFTER CASING REMOVED 5.0'

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 2
File #2773.002

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		5/10		Brown moist medium dense fine to coarse SAND, fine to coarse GRAVEL and SILT	
	2.0'			15/12	25		
	2.0'-	2		5/8			
WL ▼	4.0'			8/12	16		
5.0	4.0'-	3		12/12			5.0'
	6.0'			21/13	33	REFUSE	
	6.0'-	4		15/17			
	8.0'			10/13	27		
	8.0'-	5		15/10			
10.0	10.0'			11/12	21		
	10.0'-	6		8/2			
	12.0'			4/4	6		
	12.0'-	7		16/8			
	14.0'			10/5	18		
15.0	14.0'-	8		8/10			
	16.0'			10/20	20		
	16.0'-	9		21/23			
	18.0'			19/30	42		
	18.0'	10		75-.0'			
20.0							
	20.0'-	11		18/12			
	22.0'			10/35	22		
	22.0'-	12		20/50-			
	22.9'			.4'			
25.0	24.0'-	13		24/17			
	26.0'			47/15	64		
	26.0'-	14		4/3			
	28.0'			7/16	10		
	28.0'-	15		13/14			
30.0	30.0'			14/16	28		
	30.0'-	16		12/14			32.0'
	32.0'			16/20	30	Gray wet very stiff to hard SILT, some clay, some fine to coarse sand	
	32.0'-	17		8/9			
	34.0'			10/12	19		
35.0							
	35.0'-	18		12/18			
	37.0'			20/17	38		
							39.0'
40.0							

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT LOCATION: Broome County Industrial Park, Conklin, New York

HOLE NO. B-2-83-495

SURF. EL.

DATE STARTED 7/28/83 DATE COMPLETED 7/29/83

JOB NO. 8396

GROUND WATER DEPTH
WHILE DRILLING 4.0'
BEFORE CASING REMOVED 16.0'
AFTER CASING REMOVED 5.0'

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 2 OF 2
File #2773.002

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	40.0'-	19		21/26		Gray dry hard SILT and SHALE GRAVEL	
	41.5'			32	58		
45.0							
	45.0'-	19		32/50-		Bottom of Boring	45.3'
	45.8'			.3'			
						Note: Installed observation well to 45.0' on completion of boring.	
50.0							

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y 13057

PROJECT / LOCATION: Broome County Industrial Park, Conklin, New York

HOLE NO. B-4-83-497

SURF. EL.

DATE STARTED 7/29/83 DATE COMPLETED 8/1/83

JOB NO. 8396

GROUND WATER DEPTH WHILE DRILLING

BEFORE CASING REMOVED 13.6' (72 Hours)

AFTER CASING REMOVED 13.6'

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 *IOR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 1
File #2773.002

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-2.0'	1		3/5 8/8	13	Brown dry stiff SILT, little fine to coarse sand, trace fine gravel	4.0'
5.0	5.0'-7.0'	2		9/13 1/3	14	Gray-brown wet stiff SILT, some fine to coarse sand, little fine gravel, trace clay	11.0'
10.0	10'-11'	3A		2/5			
	11'-12'	3B		13/15	18	Brown wet medium dense fine to coarse SAND and fine to medium GRAVEL, some silt	
WL							
15.0	15.0'-17.0'	4		9/11 18/20	29		20.0'
20.0	20.0'-22.0'	5		4/4 5/8	9	Brown-gray wet stiff SILT	22.0'
						Bottom of Boring	
25.0						Note: Installed observation well to 20.0' on completion of boring.	

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Broome County Industrial Park
LOCATION Conklin, New York
DATE STARTED 7/29/83 DATE COMPLETED 7/29/83

HOLE NO. B-3-83-496
SURF. EL.
JOB NO. 8396

GROUND WATER DEPTH
WHILE DRILLING Wet
BEFORE CASING REMOVED Wet
AFTER CASING REMOVED Wet

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 #2773.002

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		2/3		Brown dry moist fine SAND, little silt	1.5'
	2.0'			4/6	7	Brown dry stiff SILT, little fine sand	
5.0							5.0'
	5.0'-	2		6/10		Brown moist to wet very stiff SILT, little fine sand, little shale gravel, trace clay	
	7.0'			9/10	19		
10.0							10.0'
	10.0'-	3		3/5		Gray wet stiff SILT	
	12.0'			5/5	10		
15.0							
	15.0'-	4		3/5			
	17.0'			4/5	9		
20.0							
	20.0'-	5		4/4			
	22.0'			4/4	8		
						Bottom of Boring	22.0'
25.0						Note: Installed observation well to 20.0' on completion of boring.	

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT: Broome County Industrial Park
LOCATION: Conklin, New York
DATE STARTED: 8/1/83 DATE COMPLETED: 8/1/83

HOLE NO. B-5-83-498
SURF. EL.
JOB NO. 8396

GROUND WATER DEPTH
WHILE DRILLING 7.0'
BEFORE CASING REMOVED 8.7'
AFTER CASING REMOVED 7.6'

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 2
File #2773.002

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'- 2.0'	1		3/3 6/6	9	Brown dry loose fine to coarse GRAVEL, little fine to coarse sand, little silt	
5.0							5.0'
WL	5.0'- 7.0'	2		9/29 40/40	69	Brown dry very dense fine to coarse SAND and fine to coarse GRAVEL, little silt	
10.0							10.0'
	10.0'- 12.0'	3		40/21 18/25	39	Gray wet dense coarse to fine SAND and fine to coarse GRAVEL, some silt	
15.0	15'-16'	4A		15/12			16.0'
	16'-17'	4B		14/13	26	Brown wet medium dense fine to coarse SAND and fine to coarse GRAVEL, little silt	18.0'
20.0						Brown wet stiff SILT, trace clay lenses	
	20.0'- 22.0'	5		5/7 8/8	15		
25.0							25.0'
	25.0'- 27.0'	6		4/5 8/9	13	Brown wet medium dense fine to coarse SAND and fine to medium GRAVEL, little silt	26.5'
						Gray wet stiff SILT	
30.0							30.5'
	30-30.5'	7A		6/14		Gray wet dense fine to coarse SAND, SILT and fine to medium GRAVEL	
	30.5-32'	7B		18/20	32		
35.0							35.0'
	35.0'- 37.0'	8		20/27 63/92	90	Gray moist very dense fine to coarse SAND, some fine to medium gravel, little silt	
40.0							

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT: Broome County Industrial Park

LOCATION: Conklin, New York

DATE STARTED: 8/1/83 DATE COMPLETED: 8/1/83

HOLE NO. B-5-83-498

SURF. EL.

JOB NO. 8396

GROUND WATER DEPTH
WHILE DRILLING 7.0'
BEFORE CASING REMOVED 8.7'
AFTER CASING REMOVED 7.6'

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 2 OF 2
File #2773.002

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	40.0'-	9		64/47		Gray moist very dense fine to coarse	
	42.0'			46/48	93	SAND, some fine to medium gravel,	
						little silt	
						Bottom of Boring	42.0'
45.0							
						Note: Installed observation well to 33.5' on completion of boring.	

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT: Broome County Industrial Park
LOCATION: Conklin, New York
DATE STARTED: 8/2/83 DATE COMPLETED: 8/2/83

HOLE NO. B-6-83-499
SURF. EL.
JOB NO. 8396

GROUND WATER DEPTH
WHILE DRILLING 7.7'
BEFORE CASING REMOVED 8.4'
AFTER CASING REMOVED 8.2'

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

SHEET 1 OF 1
File #2773.002

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		4/6		Brown dry medium dense fine to medium	
	2.0'			6/7	12	GRAVEL, little fine to coarse sand,	
						little silt	
5.0							5.0'
	5.0'-	2		3/5		Brown moist medium dense fine to coarse	
WL	7.0'			7/7	12	SAND, some silt, some fine to medium	
						gravel	9.0'
10.0						Gray wet dense to very dense fine to	
	10.0'-	3		9/25		coarse GRAVEL, some fine to coarse sand	
	12.0'			26/21	51	little silt	
15.0							
	15.0'-	4		20/47			
	17.0'			27/49	74		
20.0							
	20.0'-	5		27/27			
	22.0'			28/27	55		
25.0							
	25.0'-	6		36/41			
	27.0'			42/37	83		
						Bottom of Boring	27.0'
30.0						Note: Installed observation well to 17.9' on completion of boring.	

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT: Broome County Industrial Park
LOCATION: Conklin, New York
DATE STARTED: 8/2/83   DATE COMPLETED: 8/2/83

HOLE NO. B-8-83-501
SURF. EL.
JOB NO. 8396

GROUND WATER DEPTH
WHILE DRILLING 7.0'
BEFORE CASING REMOVED 9.4'
AFTER CASING REMOVED 4.6'

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 #2773.002

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						Brown dry fine to coarse GRAVEL, little fine to coarse sand, little silt	
5.0							5.0'
WL ▼						Brown dry fine to coarse SAND, little silt, little fine gravel	
10.0							10.0'
						Brown wet fine GRAVEL, little fine to coarse sand, trace silt	
15.0							
	18.0'-	1		15/10			19.0'
20.0	20.0'			8/9	18	Brown wet very stiff SILT, little clay, trace fine sand	
						Bottom of Boring	20.0'
						Note: Installed observation well to 18.0' on completion of boring.	

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT: Broome County Industrial Park

LOCATION: Conklin, New York

DATE STARTED: 8/2/83 DATE COMPLETED: 8/2/83

HOLE NO. B-7

SURF. EL.

JOB NO. 8396

GROUND WATER DEPTH WHILE DRILLING 13.0'

BEFORE CASING REMOVED 21.4'

AFTER CASING REMOVED 13.4'

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 #2773.002

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		6/13		Brown moist dense fine GRAVEL, little	
	2.0'			22/22	35	fine to coarse sand, trace silt	
	2.0'-	2	No	10/5			
	4.0'		Rec.	5/2	10		4.0'
5.0	4.0'-	3		4/6		REFUSE	
	6.0'			6/15	12		6.0'
	6.0'-	4		15/9		Brown wet medium dense fine GRAVEL,	
	8.0'			7/16	16	little fine to coarse sand, little	
	8.0'-	5		4/6		silt, little refuse	
10.0	10.0'			8/7	14		
	10.0'-	6		56/3			
	12.0'			3/6	6		
WL	12.0'-	7		7/8			13.0'
	14.0'			20/21	28	Brown wet very dense fine to coarse	
15.0	14.0'-	8		32/33		GRAVEL, little silt, little fine to	
	16.0'			32/34	65	coarse sand, trace clay	
	16.0'-	9		34/42			
	18.0'			44/61			
							19.0'
20.0						Brown dry very dense fine to coarse	
	20.0'-	10		21/42		SAND, some silt, little fine gravel	
	22.0'			56/69	98		
25.0							25.0'
	25.0'-	11		31/41		Brown dry to wet very dense fine to	
	26.5'			84	125	coarse SAND, some silt, little fine	
						gravel	
						Bottom of Boring	26.5'
30.0							
						Note: Installed observation well to 21.0' on completion of boring.	

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT: Broome County Industrial Park

LOCATION: Conklin, New York

DATE STARTED: 8/3/83 DATE COMPLETED: 8/3/83

HOLE NO. B-9-83-502

SURF. EL.

JOB NO. 8396

GROUND WATER DEPTH
WHILE DRILLING 9.0'

BEFORE CASING REMOVED 8.0'

AFTER CASING REMOVED 6.3'

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

SHEET 1 OF 1
File #2773.002

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-2.0'	1		1/3 5/7	8	Brown dry loose fine to coarse GRAVEL, little fine to coarse sand, little silt	3.0'
5.0	5.0'-7.0'	2		21/34 33/47	67	Brown dry to wet very dense to dense fine to coarse GRAVEL and fine to coarse SAND, little silt	
WL 10.0	10.0'-12.0'	3		15/21 19/19	40		
15.0	15.0'-17.0'	4		31/22 15/12	37		18.0'
20.0	20.0'-22.0'	5		5/7 9/10	16	Brown wet stiff SILT, trace fine sand	25.0'
25.0	25.0'-27.0'	6		4/5 5/6	10	Brown wet stiff SILT and fine to coarse SAND, trace fine gravel	26.0'
						Gray wet stiff SILT, trace fine sand	27.0'
						Bottom of Boring	
30.0						Note: Installed observation well to 18.5' on completion of boring.	

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT / LOCATION: Broome County Industrial Park, Conklin, New York

HOLE NO. B-10-83-503

SURF. EL.

DATE STARTED 8/3/83 DATE COMPLETED 8/3/83

JOB NO. 8396

GROUND WATER DEPTH
WHILE DRILLING 8.5'
BEFORE CASING REMOVED 17.3'
AFTER CASING REMOVED 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

SHEET 1 OF 1
File #2773.002

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		2/2		Brown dry medium stiff SILT, trace	
	2.0'			3/5	5	fine to medium sand, trace roots	2.5'
						Brown dry very dense fine to medium	
						GRAVEL and fine to coarse SAND, little	
5.0						silt	
	5.0'-	2		18/31			
	7.0'			36/43	67		
WL ▼							8.5'
						Brown wet medium dense fine to coarse	
10.0						SAND, little silt	
	10-11'	3A		6/6			11.0'
	11-12'	3B		10/12	16	Gray wet medium dense to dense fine to coarse SAND and fine to coarse GRAVEL, little silt	
15.0							
	15.0'-	4		20/22			
	17.0'			26/21	48		18.0'
						Brown wet very stiff SILT, trace fine	
20.0						sand, trace clay lenses	
	20.0'-	5		7/7			
	22.0'			9/7	16		
25.0							25.0'
	25.0'-	6		3/3		Brown wet very stiff SILT, trace fine	
	27.0'			5/6	8	sand	
						Bottom of Boring	27.0'
30.0						Note: Installed observation well to 18.3' on completion of boring.	

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Broome County Industrial Park
LOCATION Conklin, New York
DATE STARTED 8/3/83 DATE COMPLETED 8/4/83

HOLE NO. B-11-83-504
SURF. EL.
JOB NO. 8396

GROUND WATER DEPTH
WHILE DRILLING 13.5'
BEFORE CASING REMOVED 19.7'
AFTER CASING REMOVED 9.7'

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 #2773.002

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		8/9		Brown dry medium dense fine to coarse	
	2.0'			10/8	19	SAND, some fine to medium gravel, little	
	2.0'-	2		9/9		silt	2.0'
	4.0'			22/12	31	Brown dry to moist medium dense fine to	
5.0						medium GRAVEL, little fine to coarse	
	5.0'-	3		4/5		sand, little silt, little wood	5.0'
	7.0'			4/5	9	Gray wet stiff SILT, some fine to coarse	
	7.0'-	4		3/2		sand, little clay, trace organic matter	7.8'
	9.0'			4/8	6	Brown wet stiff SILT, some fine to	
10.0						coarse sand, some fine gravel, trace	
	10.0'-	5		4/5		clay	11.8'
	12.0'			6/6	11	Gray wet medium dense fine SAND, some	
WL ▼						silt	
15.0							15.0'
	15.0'-	6		16/26		Brown wet dense fine GRAVEL, little silt,	
	17.0'			19/19	45	little fine to coarse sand, trace clay	
20.0							20.0'
	20.0'-	7		6/8		Gray wet very stiff SILT, trace clay	
	22.0'			10/10	18	lenses, trace fine sand	
25.0							25.0'
	25.0'-	8		3/4		Gray wet stiff SILT, little clay, trace	
	27.0'			5/5	9	fine sand	
30.0							
	30.0'-	9		2/6			31.5'
	32.0'			8/12	14	Gray wet medium dense fine to coarse	
						SAND, some silt, little fine gravel	
35.0							
	35.0'-	10		9/12			
	37.0'			18/23	30		37.0'
						Bottom of Boring	
						Note: Installed observation well to 30.5' on completion of boring.	
40.0							

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Broome County Industrial Park
LOCATION Conklin, New York
DATE STARTED 8/4/83 DATE COMPLETED 8/4/83

HOLE NO. B-12-83-505
SURF. EL.
JOB NO. 8396
GROUND WATER DEPTH WHILE DRILLING 16.0'
BEFORE CASING REMOVED 15.8'
AFTER CASING REMOVED 8.3'

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

SHEET 1 OF 1
File #2773.002

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		2/4		Brown dry stiff SILT, trace fine to coarse sand, trace fine gravel	
	2.0'			6/6	10		
5.0							5.0'
	5.0'-	2		10/15		Brown dry hard SILT, fine to coarse GRAVEL and fine to coarse SAND	
	7.0'			20/21	35		8.5'
10.0						Brown wet medium stiff SILT, some fine to medium sand, trace clay	
	10-11'	3A		2/3			11.0'
	11-12'	3B		8/12	11	Brown wet medium dense fine to coarse SAND, some fine to coarse gravel, some silt	
15.0							15.0'
WL	15.0'-	4		11/15		Brown wet medium dense to dense fine to coarse SAND and fine to coarse GRAVEL, little silt	
	17.0'			16/19	31		
20.0							
	20.0'-	5		14/12			
	22.0'			14/16	26		22.0'
						Bottom of Boring	
25.0						Note: Installed observation well to 16.0' on completion of boring.	

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT: Broome County Industrial Park
LOCATION: Conklin, New York
DATE STARTED: 8/5/83 DATE COMPLETED: 8/5/83

HOLE NO. B-13-83-506
SURF. EL.
JOB NO. 8396
GROUND WATER DEPTH
WHILE DRILLING 12.0'
BEFORE CASING REMOVED 12.2'
AFTER CASING REMOVED 4.5'

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 #2773.002

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		4/10		Brown dry medium dense fine to coarse	
	2.0'			16/10	26	SAND, little silt, trace fine gravel	2.0'
	2.0'-	2		2/2		Brown moist loose fine to coarse SAND,	
	4.0'			2/2	4	little silt, little refuse	4.0'
5.0	4.0'-	3		2/3		Brown moist loose fine to coarse SAND,	
	6.0'			2/3	5	little silt, little fine gravel, little	
	6.0'-	4		3/5		refuse	
	8.0'			4/4	9		8.0'
	8.0'-	5		6/6		Brown wet medium dense fine to coarse	
10.0	10.0'			6/10	12	SAND, little silt, trace fine gravel,	
	10.0'-	6		26/12		trace refuse	
WL ▼	12.0'			9/9	21		12.0'
	12.0'-	7		16/13		Gray wet medium dense to dense fine to	
	14.0'			20/26	33	coarse SAND, little fine gravel, little	
15.0	14.0'-	8		18/17		silt	
	16.0'			28/27	45		
						Bottom of Boring	16.0'
						Note: Installed observation well to	
20.0						15.0' on completion of boring.	

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Broome County Industrial Park
LOCATION Conklin, New York
DATE STARTED 8/5/83 DATE COMPLETED 8/8/83

HOLE NO. B-14-83-507
SURF. EL.
JOB NO. 8396
GROUND WATER DEPTH
WHILE DRILLING 6.5'
BEFORE CASING REMOVED 6.5'
AFTER CASING REMOVED 4.2'

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

SHEET 1 OF 1
File #2773.002

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						Augered to 15.0'	
5.0							
WL ▼							
10.0							
15.0						Bottom of Boring	15.0'
						Note: Installed observation well to 15.0' on completion of boring.	

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT: Broome County Industrial Park
LOCATION: Conklin, New York
DATE STARTED: 8/8/83 DATE COMPLETED: 8/8/83

HOLE NO. B-15-83-508
SURF. EL.
JOB NO. 8396
GROUND WATER DEPTH WHILE DRILLING 14.0'
BEFORE CASING REMOVED 14.0'
AFTER CASING REMOVED 14.5'

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 #2773.002

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		1/1		Brown dry very loose fine to coarse	
	2.0'			1/2	2	SAND, little silt, little fine gravel,	
	2.0'-	2		1/2		trace wood	3.0'
	4.0'			4/6	6	Brown dry medium dense fine to coarse	
5.0	4.0'-	3		6/7		SAND, little fine gravel, trace silt	
	6.0'			4/9	11		
	6.0'-	4		10/6			
	8.0'			5/4	11		8.0'
	8.0'-	5		6/7		Brown moist medium dense fine to coarse	
10.0	10.0'			5/5	12	SAND, little silt, little fine gravel	
	10.0'-	6		6/4			
	12.0'			6/4	10		
	12.0'-	7		7/13			
WL ▼	14.0'			14/11	27		14.0'
15.0	14.0'-	8		28/100+		Gray wet very dense fine GRAVEL, some	
	14.7'			.2'		fine to coarse sand, trace silt	
	16.0'-	9		29/100+			
	16.9'			.4'		Bottom of Boring	18.0'
20.0							
						Note: Installed observation well to 18.0' on completion of boring.	

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING NUMBER
SHEET 1 OF 1
DATE
FILE 2733.004.130

PROJECT LOCATION Conklin, NY
HOLE NUMBER Well 17

SAMPLER
TYPE: Split Spoon
HAMMER
FALL

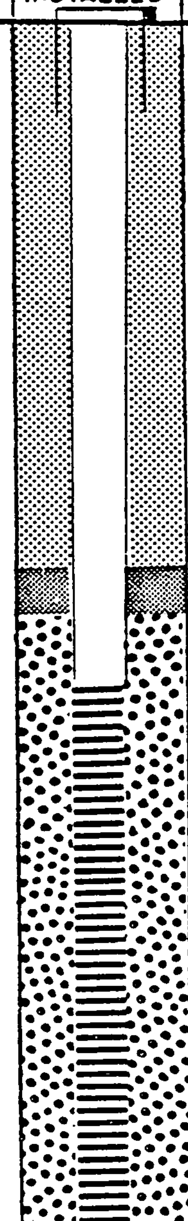
GROUNDWATER READINGS

DATE	DEPTH		
12/20	1.4		

BORING CO. Parratt Wolff
FOREMAN Mike Hurley
OBG ENGINEER D. Ozvath

BORING LOCATION See Figure 3
GROUND ELEV. 948.46
DATE STARTED 10/31/84 DATE ENDED 11/1/84

DEPTH	CAS. BL./FT.	SAMPLE NO.	SAMPLE PEN./REC.	SAMPLE DEPTH	SAMPLE BLOWS / 6"	SAMPLE DESCRIPTION	STRA. CHG. GEN. DESC.	EQUIPMENT INSTALLED	FIELD TESTING	RMKS
0'		1		0-1.5	3/5	Brown moist SILT and fine to coarse GRAVEL, trace fine SAND				
					16					
5'		2		5-6.5	16/15					
					42					
						Grey-brown moist fine to coarse GRAVEL and SILT, some fine to coarse SAND				
10'		3		10-	20/28					
				11.5	42					
15'		4		15-	8/9	Grey-brown moist SILT, trace CLAY				
				16.5	17					
						Grey-brown wet fine to coarse GRAVEL and SILT, some to trace fine to medium SAND				
20'		5		20-	16/18					
				21.5	25					
25'		6		25-	35/38					
				26.5	31					
30'		7		30-	18/28					
				31.5	42	Bottom of Boring 31.5'				



REMARKS:

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING NUMBER
SHEET 1 OF 1
DATE
FILE 2733.004.130

PROJECT LOCATION: Conklin, NY

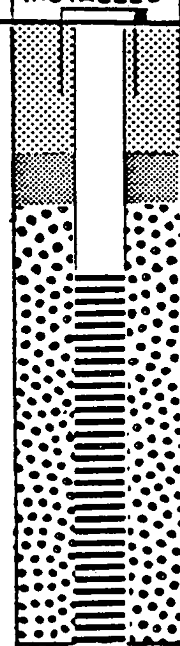
HOLE NUMBER: Well 18

SAMPLER
TYPE: Split Spoon
HAMMER FALL:

GROUNDWATER READINGS		
DATE	DEPTH	
12/20	1.03	

BORING CO.: Parratt Wolff
FOREMAN: Mike Hurley
OBG ENGINEER: D. Ozvath

BORING LOCATION: See Figure 3
GROUND ELEV.: 861.00
DATE STARTED: 11/1/84 DATE ENDED: 11/1/84

DEPTH	CAS. BL. /FT.	SAMPLE NO.	PEN./REC.	SAMPLE DEPTH	BLOWS /6"	SAMPLE DESCRIPTION	STRA. CHG. GEN. DESC.	EQUIPMENT INSTALLED	FIELD TESTING	RMKS
0'		1		0-1.5	2/3 4	Grey-brown moist SILT and fine SAND				
5'		2		5-6.5	2/1 1	Grey wet fine to coarse SAND and PEAT, trace SILT				
10'		3		10-11.5	8/8 12					
15'		4		15-16.5	10/9 13	Grey-brown wet fine to coarse SAND and fine GRAVEL, trace SILT				
						Bottom of Boring 16.5'				

REMARKS:

O'BRIEN & GERE ENGINEERS INC.

TEST BORING LOG

REPORT OF BORING NUMBER
SHEET 1 OF 1
DATE
FILE 2733.004.130

PROJECT LOCATION	Conklin, NY
HOLE NUMBER	Well 19

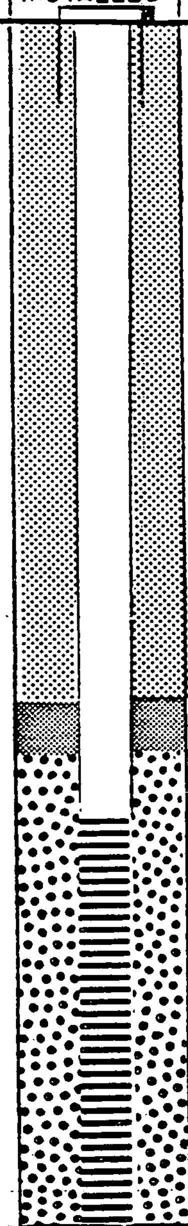
SAMPLER
TYPE: Split Spoon
HAMMER
FALL

GROUNDWATER READINGS

DATE	DEPTH
12/20	3.5

BORING CO.	Parratt Wolff	BORING LOCATION	See Figure 3
FOREMAN	Mike Hurley	GROUND ELEV.	912.39
OBG ENGINEER	D. Ozvath	DATE STARTED	11/5/84
		DATE ENDED	11/5/84

DEPTH	CAS. BL. /FT.	SAMPLE NO.	PEN./REC.	SAMPLE DEPTH	BLOWS / 6"	SAMPLE DESCRIPTION	STRA. CHG. GEN. DESC.	EQUIPMENT INSTALLED	FIELD TESTING	RMKS
0'		1		0-1.5	3/3 6	Brown moist SILT, some fine to medium SAND				
5'		2		5-6.5	9/12 15	Grey and brown moist fine to medium SAND and SILT				
10'		3		10-11.5	14/16 13	Grey moist fine to coarse GRAVEL and SILT, little fine SAND				
15'		4		15-16.5	14/13 13	Grey moist SILT, little fine to medium SAND, trace fine GRAVEL				
20'		5		20-21.5	9/13 50(.3')	Grey wet SILT and fine to coarse GRAVEL, little fine to medium SAND, trace CLAY				
25'		6		25-	50(.4')					
30'		7		30-31.5	60					
						Bottom of Boring 31.5'				



REMARKS:

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING NUMBER ______
SHEET 1 OF 1
DATE ______ FILE 2733.004.130

PROJECT LOCATION Conklin, NY

HOLE NUMBER Well 20

SAMPLER
TYPE: Split Spoon
HAMMER ______
FALL ______

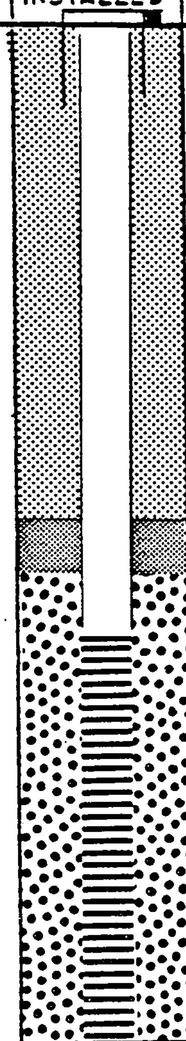
GROUNDWATER READINGS

DATE	DEPTH		
12/20	2.19		

BORING CO. Parratt Wolff
FOREMAN Mike Hurley
OBG ENGINEER D. Ozvath

BORING LOCATION See Figure 3
GROUND ELEV. 887.89
DATE STARTED 11/6/84 DATE ENDED 11/6/84

DEPTH	CAS. BL. / FT.	SAMPLE NO.	PEN./ REC.	SAMPLE DEPTH	BLOWS / 6"	SAMPLE DESCRIPTION	STRA. CHG. GEN. DESC.	EQUIPMENT INSTALLED	FIELD TESTING	RMKS
0'		1		0-1.5	3/3 4	Dark brown moist SILT and ROOTS, some fine SAND				
						Brown moist fine SAND and SILT				
5'		2		5-6.5	5/10 20					
						Brown moist fine to coarse SAND and GRAVEL, some SILT				
10'		3		10- 11.5	10/20 20	Grey-brown wet SILT and fine to coarse SAND, some fine GRAVEL				
15'		4		15- 16.5	15/11 15	Brown wet fine to coarse SAND and fine to coarse GRAVEL, little SILT				
						Brown moist SILT and CLAY				
						Brown wet fine to coarse SAND and fine to coarse GRAVEL				
20'		5		20- 21.5	8/11 19					
						Grey moist SILT, some fine to coarse GRAVEL, trace fine SAND				
25'		6		25- 26.5	15/26 67					
						Bottom of Boring 26.5'				



REMARKS:

O'BRIEN & GERE ENGINEERS INC.

TEST BORING LOG

REPORT OF BORING NUMBER
SHEET 1 OF
DATE
FILE 2733.004.130

PROJECT LOCATION Conklin, NY

HOLE NUMBER B-1

SAMPLER
TYPE: Split Spoon
HAMMER
FALL

GROUNDWATER READINGS

DATE	DEPTH		

BORING CO. Parratt Wolff
FOREMAN Mike Hurley
OBG ENGINEER D. Ozvath

BORING LOCATION
GROUND ELEV.
DATE STARTED
DATE ENDED

DEPTH	CAS. BL. /FT.	SAMPLE NO.	PEN./REC.	DEPTH	BLOWS / 6"	SAMPLE DESCRIPTION	STRA. CHG. GEN. DESC.	EQUIPMENT INSTALLED	FIELD TESTING	RMKS
0'		1		0-1.5	1/2	Black cinders and organic				
					4	matter				
						(construction fill)				
5'		2		5-5.05	50(.05)	Brown, dry, very dense				
						SAND, SILT, GRAVEL				
						Refusal at 5.05'				

REMARKS:

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING NUMBER
SHEET 1 OF 1
DATE
FILE 2733.004.130

PROJECT LOCATION Conklin, NY
HOLE NUMBER B-2

SAMPLER
TYPE: Split Spoon
HAMMER
FALL

GROUNDWATER READINGS

DATE	DEPTH		

BORING CO. Parratt-Wolff
FOREMAN Mike Hurley
OBG ENGINEER D. Ozvath

BORING LOCATION
GROUND ELEV.
DATE STARTED
DATE ENDED

DEPTH	CAS. BL. /FT.	SAMPLE NO.	SAMPLE PEN./REC.	SAMPLE DEPTH	SAMPLE BLOWS / 6"	SAMPLE DESCRIPTION	STRA. CHG. GEN. DESC.	EQUIPMENT INSTALLED	FIELD TESTING	RMKS
0'		1		0-1.5	1/1	Black cinders and organic matter				
					1	(construction fill)				
		2		3.5-	100(3')	Brown, dry, very dense				
				3.8'		SAND, SILT, GRAVEL				
5'						Refusal at 3.8'				

REMARKS:

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING NUMBER
SHEET 1 OF 1
DATE
FILE 2733.004.130

PROJECT LOCATION Conklin, NY

HOLE NUMBER B-3

SAMPLER
TYPE: Split Spoon
HAMMER FALL

GROUNDWATER READINGS

DATE	DEPTH		

BORING CO. Parratt Wolff

FOREMAN Mike Hurley

OBG ENGINEER D. Ozvath

BORING LOCATION

GROUND ELEV.

DATE STARTED

DATE ENDED

DEPTH	CAS. BL. /FT.	SAMPLE NO.	SAMPLE PEN./REC.	SAMPLE DEPTH	SAMPLE BLOWS / 6"	SAMPLE DESCRIPTION	STRA. CHG. GEN. DESC.	EQUIPMENT INSTALLED	FIELD TESTING	RMKS
0'		1		0-1.5	2/2	Black cinders and organic matter (construction fill)				
					10					
5'		2		4.8-5.2	100(.4)	Brown, dry very dense SAND, SILT, GRAVEL				
						Refusal at 5.2'				

REMARKS:

O'BRIEN & GERE ENGINEERS INC.

TEST BORING LOG

REPORT OF BORING NUMBER
SHEET 1 OF 1
DATE
FILE 2733.004.130

PROJECT LOCATION Conklin, NY
HOLE NUMBER B-4

SAMPLER
TYPE:
HAMMER FALL

GROUNDWATER READINGS

DATE	DEPTH		

BORING CO. Parratt Wolff
FOREMAN Mike Hurley
OBG ENGINEER D. Ozvath

BORING LOCATION
GROUND ELEV.
DATE STARTED 11/13/84 DATE ENDED 11/13/84

DEPTH	CAS. BL. /FT.	SAMPLE NO.	SAMPLE PEN./REC.	SAMPLE DEPTH	SAMPLE BLOWS / 6"	SAMPLE DESCRIPTION	STRA. CHG. GEN. DESC.	EQUIPMENT INSTALLED	FIELD TESTING	RMKS
0'		1		0-1.5	2/3 6	Brown dry SILT, some fine to coarse GRAVEL, little SAND				
						Grey and brown moist SILT, some fine to coarse GRAVEL, little fine to medium SAND				
5'		2		5-6.5	24/25 14					
						Grey-brown moist SILT and fine to coarse GRAVEL, trace fine SAND, trace CLAY				
10'		3		10-11.5	11/16 30					
15'		4		15-16.5	11/18 19					
20'		5		20-21.5	12/14 18					
						Brown-grey moist SILT, some fine GRAVEL, trace CLAY				
25'		6		25-26.5	18/30 44					
						Bottom of Boring 26.5'				
30'		7		30-31.5						

REMARKS:

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING NUMBER ______
SHEET 1 OF 1
DATE ______ FILE 2723.004.130

PROJECT LOCATION Conklin, NY

HOLE NUMBER B-5

SAMPLER
TYPE: ______
HAMMER FALL ______

GROUNDWATER READINGS

DATE	DEPTH		

BORING CO. Parratt Wolff
FOREMAN Mike Hurley
OBG ENGINEER D. Ozvath

BORING LOCATION ______
GROUND ELEV. ______
DATE STARTED 11/13/84 DATE ENDED 11/14/84

DEPTH	CAS. BL. /FT.	SAMPLE NO.	PEN./REC.	DEPTH	BLOWS / 6"	SAMPLE DESCRIPTION	STRA. CHG. GEN. DESC.	EQUIPMENT INSTALLED	FIELD TESTING	RMKS
0'		1		0-1.5	1/2	Brown moist SILT, some fine to coarse GRAVEL, trace CLAY				
					6					
5'		2		5-6.5	11/16	Brown moist SILT and fine to coarse GRAVEL, little fine SAND, trace CLAY				
					34					
10'		3		10-	14/14					
				11.5	16					
15'		4		15-	13/14					
				16.5	23					
20'		5		20-	13/24					
				21.5	23					
25'		6		25-	24/23					
				26.5	24	Bottom of Boring 26.5'				
30'		7		30-						
				31.5						

REMARKS:

O'BRIEN & GERE ENGINEERS INC.

TEST BORING LOG

REPORT OF BORING NUMBER
SHEET 1 OF 2
DATE
FILE 2733.004.130

PROJECT LOCATION Conklin, NY
HOLE NUMBER B-6

SAMPLER
TYPE:
HAMMER FALL

GROUNDWATER READINGS

DATE	DEPTH		

BORING CO. Parratt Wolff
FOREMAN Mike Hurley
OBG ENGINEER D. Ozvath
BORING LOCATION
GROUND ELEV.
DATE STARTED 11/2/84 DATE ENDED 11/2/84

DEPTH	CAS. BL. /FT.	SAMPLE NO.	PEN./REC.	DEPTH	BLOWS / 6"	SAMPLE DESCRIPTION	STRA. CHG. GEN. DESC.	EQUIPMENT INSTALLED	FIELD TESTING	RMKS
0'		1		0-1.5	3/4	Brown dry SILT, trace fine SAND				
					10					
						Brown dry SILT and fine SAND				
5'		2		5-6.5	12/13					
					50(.3')	Brown moist SILT and fine to coarse GRAVEL, trace to little fine SAND				
10'		3		10-11.5	11/13					
					16					
15'		4		15-16.5	18/24					
					28					
20'		5		20-21.5	50(.4')					
25'		6		25-26.5	11/26					
					21					
30'		7		30-31.5	11/13					
					16					

REMARKS:

O'BRIEN & GERE ENGINEERS INC.

TEST BORING LOG

REPORT OF BORING NUMBER
SHEET 2 OF 2
DATE
FILE 2733.004.130

PROJECT LOCATION: Conklin, NY

HOLE NUMBER: B-6

SAMPLER
TYPE:
HAMMER FALL

GROUNDWATER READINGS

DATE	DEPTH		

BORING CO. Parratt Wolff

FOREMAN Mike Hurley

OBG ENGINEER D. Ozvath

BORING LOCATION

GROUND ELEV.

DATE STARTED DATE ENDED

DEPTH	CAS. BL. /FT.	SAMPLE NO.	PEN./REC.	DEPTH	BLOWS / 6"	SAMPLE DESCRIPTION	STRA. CHG. GEN. DESC.	EQUIPMENT INSTALLED	FIELD TESTING	RMKS
35'		8			19/21 38	Grey moist SILT and fine to coarse GRAVEL, little fine to medium SAND				
40'		9			15/27 17					
45'		10			20/22 35					
						Bottom of Boring 46.5'				

REMARKS:

APPENDIX C

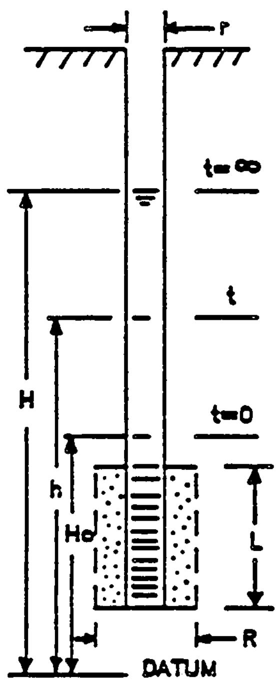
PERMEABILITY TEST LOGS

O'BRIEN & GERE

IN-SITU PERMEABILITY TEST
FIELD LOG

PROJECT BROOME CO. IDA
WELL NUMBER Well 1
DATE 12/13/84

LOCATION See Plan
ELEVATION



STATIC HEAD (H) 1,550

PIPE RADIUS (r) 2.54

SCREEN RADIUS (R) 7.62

SCREEN LENGTH (L) 609

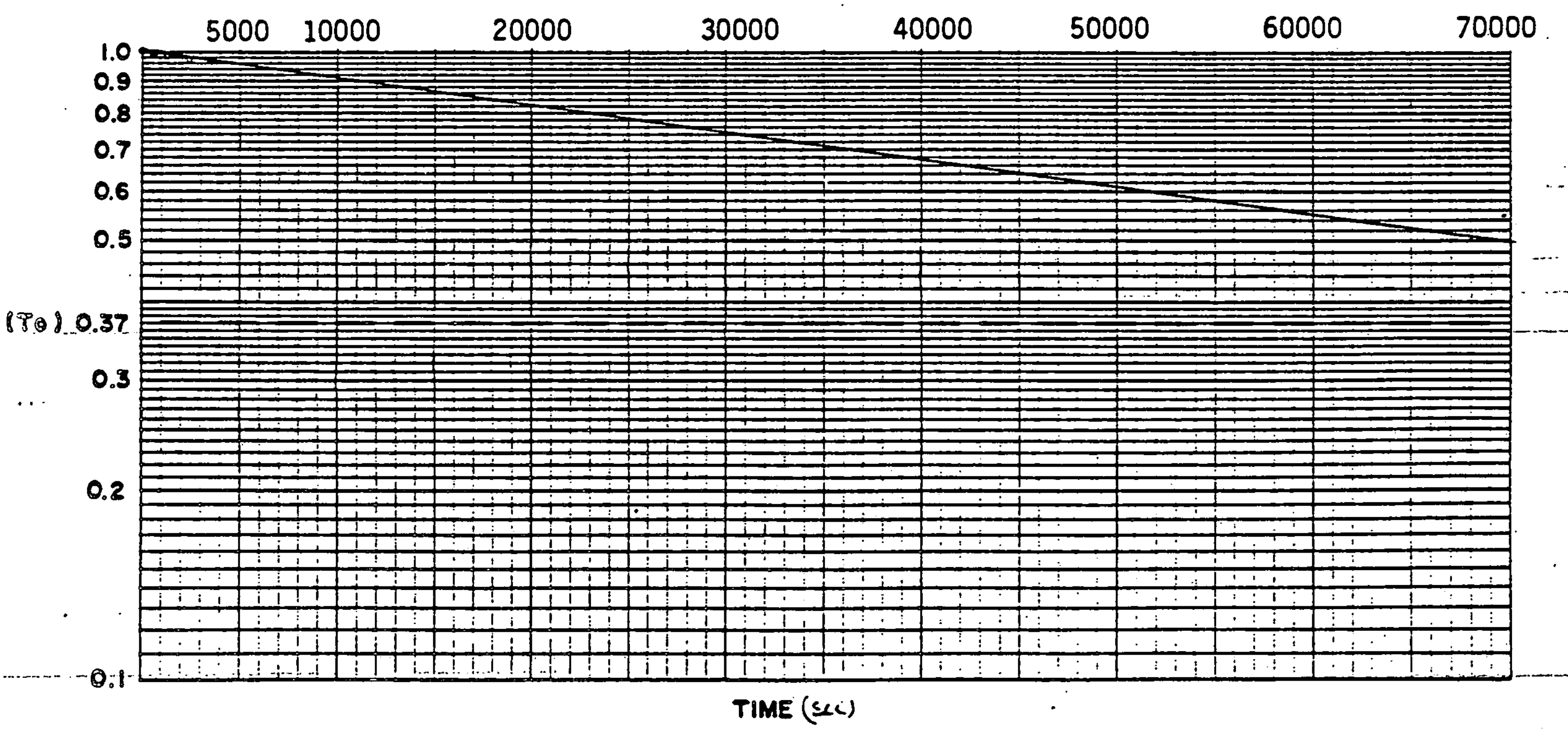
INITIAL HEAD (Ho) 415

HYDRAULIC CONDUCTIVITY :

$$K = \frac{r^2 \ln(L/R)}{2LTo} = \frac{6.45\ (609/7.62)}{2(609)101,000}$$

K= 2.29 X 10^{-7} cm/sec.

TIME	WATER DEPTH	t	h	$\frac{H-h}{H-Ho}$
1	1413	60	415	1
5	1403	300	425	.99
10	1397	600	431	.985
16	1395	960	433	.984
20	1393	1200	435	.982
30	1390	1800	438	.980
40	1387	2400	441	.976
50	1385	3000	443	.974
60	1382	3600	446	.972



O'BRIEN & GERE

IN-SITU PERMEABILITY TEST FIELD LOG

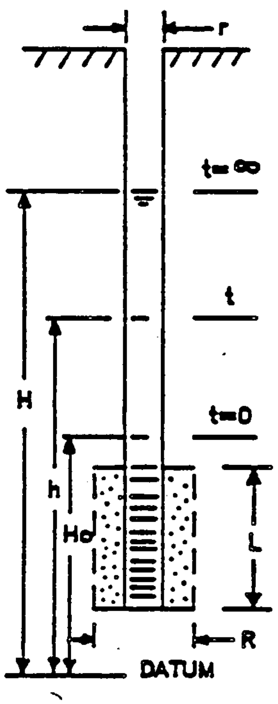
PROJECT BROOME CO. IDA

WELL NUMBER Well 5

DATE 12/13/84

LOCATION See Plan

ELEVATION



STATIC HEAD (H) 855.11

PIPE RADIUS (r) .167

SCREEN RADIUS (R) .583

SCREEN LENGTH (L) 10

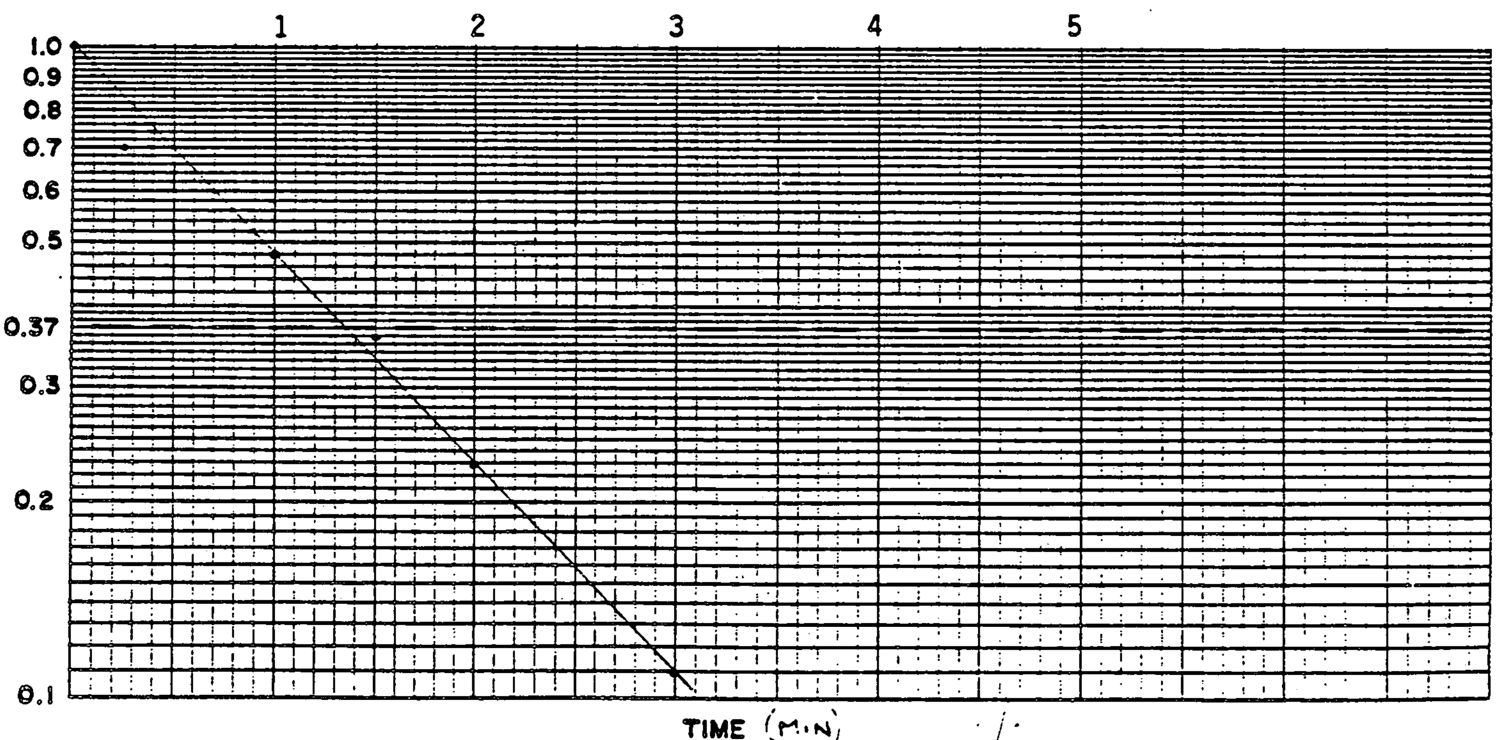
INITIAL HEAD (Ho) 842.31

HYDRAULIC CONDUCTIVITY :

$$K=\frac{r^2\ln(L/R)}{2LT_o}=\frac{(.167)^2\ln(10/.583)}{2(10)(1.45)}$$

K= 0027 ft/min = 1.4 x 10^{-3} cm/sec

TIME	WATER DEPTH	t	h	$\frac{H-h}{H-Ho}$
		0	842.31	1
		.25	846.31	.69
		.5	847.16	.62
		1	849.31	.47
		1.5	850.46	.36
		2	852.06	.23
		3	853.64	.11
		5	854.51	.05



OBRIEN & GERE

IN–SITU PERMEABILITY TEST
FIELD LOG

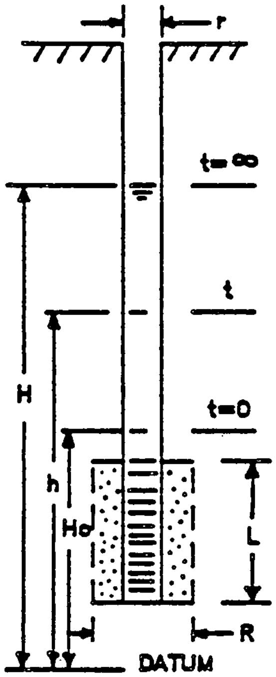
PROJECT BROOME CO. IDA

WELL NUMBER Well 6

DATE 12/13/84

LOCATION See Plan

ELEVATION TOC Elevation 886.82



STATIC HEAD (H) 865.43

PIPE RADIUS (r) .167

SCREEN RADIUS (R) .583

SCREEN LENGTH (L) 10

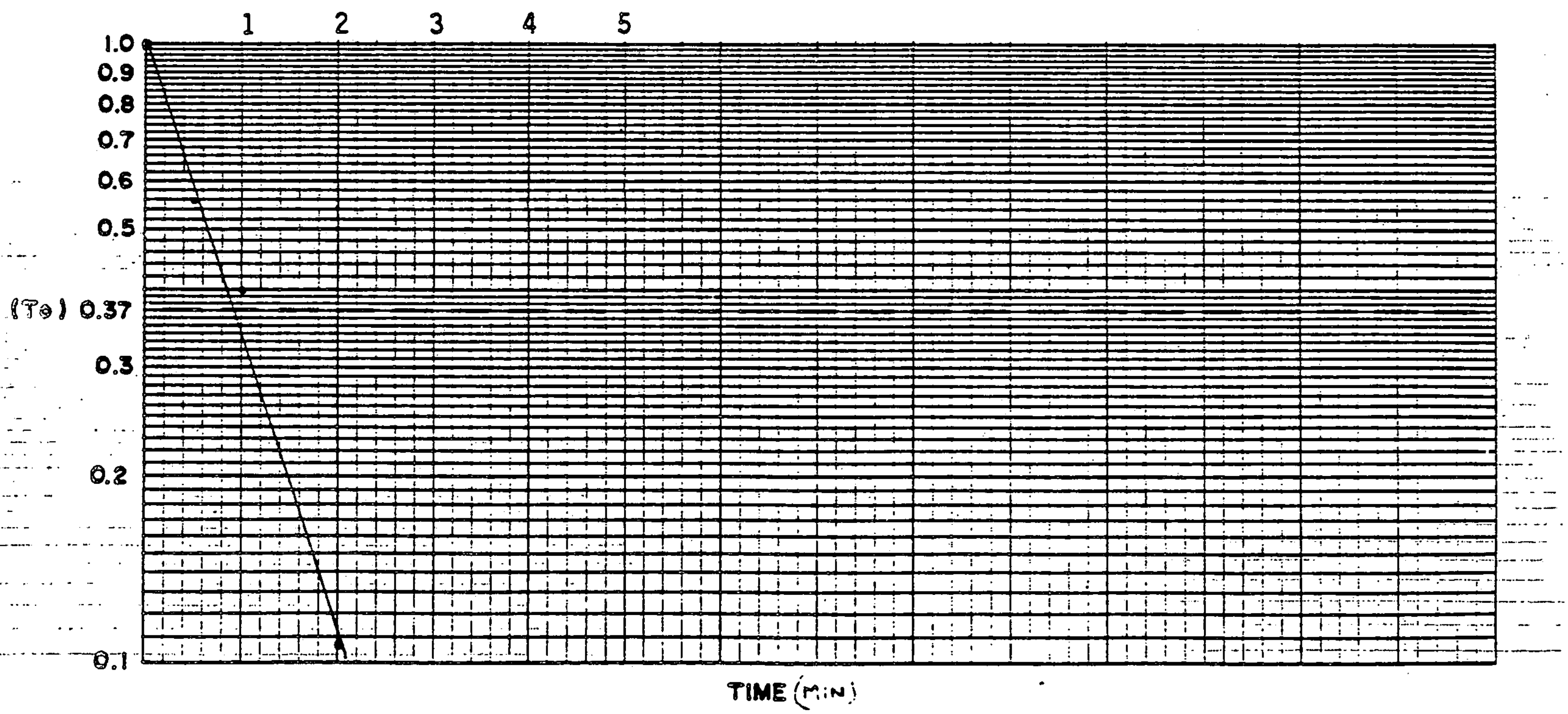
INITIAL HEAD (Ho) 859.8

HYDRAULIC CONDUCTIVITY :

$$K = \frac{r^2 \ln(L/R)}{2LT_o} = \frac{(.03)\ln(10/.583)}{2(10)(1.1)}$$

K= .0039 ft/min = 2.0 x 10^{-3} cm/sec

TIME	WATER DEPTH	t	h	$\frac{H-h}{H-Ho}$
0	9.00	0	859.8	1
.5	6.55	.5	862.25	.56
1	5.64	1	863.16	.40
2	4.00	2	864.8	.11
4	3.75	4	865.05	.07
5	3.37	5	865.43	0



O'BRIEN & GERE

IN-SITU PERMEABILITY TEST
FIELD LOG

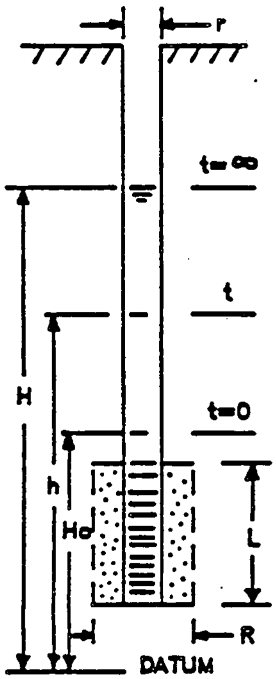
PROJECT BROOME CO. IDA

WELL NUMBER Well 7

DATE 12/20/84

LOCATION See Plan

ELEVATION (TOC) 868.37



STATIC HEAD (H) 856.22

PIPE RADIUS (r) .167

SCREEN RADIUS (R) .583

SCREEN LENGTH (L) 5

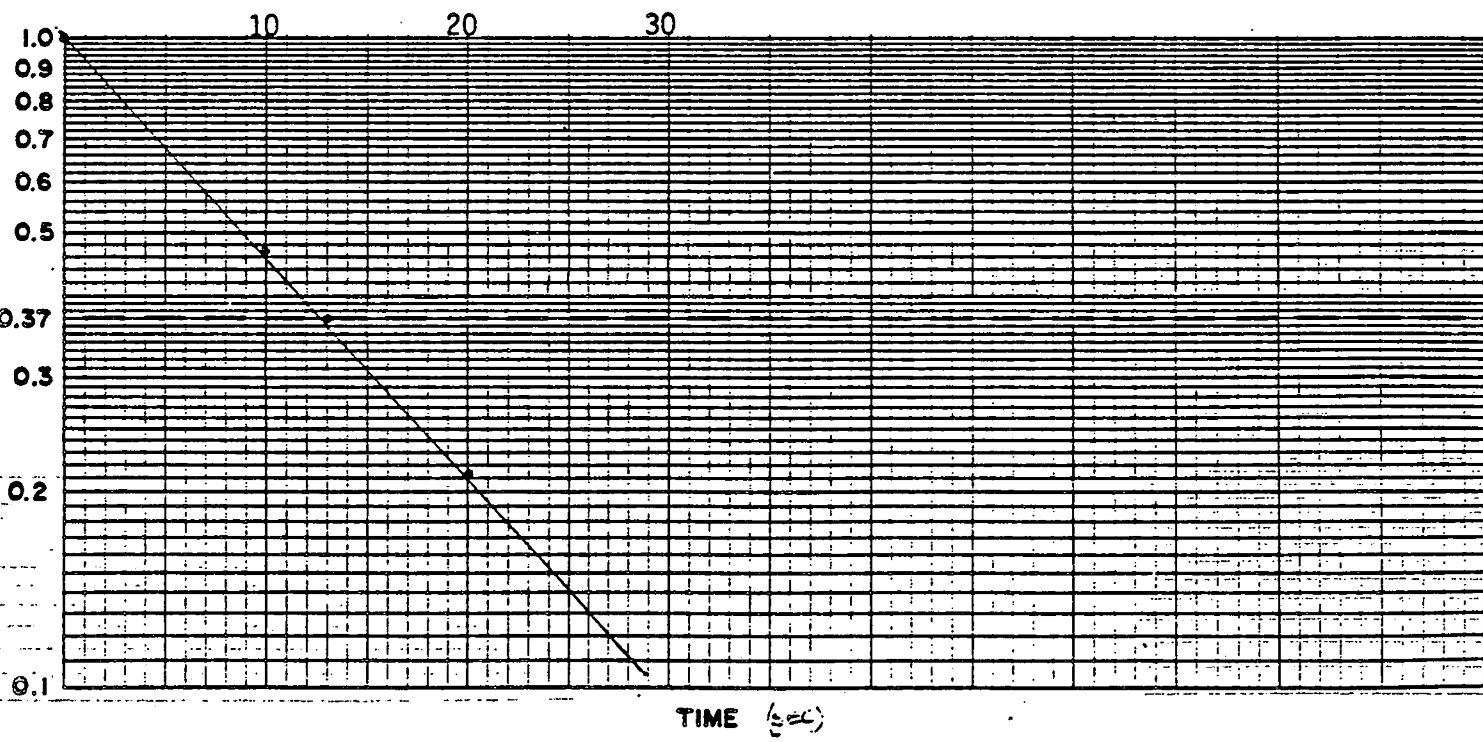
INITIAL HEAD (Ho) 846.37

HYDRAULIC CONDUCTIVITY :

$$K = \frac{r^2 \ln(L/R)}{2LT_o} = \frac{(.34)\ln(5/.583)}{2(5)(.22)}$$

K= 33 ft/min = 1.7 x 10^{-1} cm/sec

TIME	WATER DEPTH	t	h	$\frac{H-h}{H-Ho}$
		0	846.37	1
		10	851.57	.47
		20	854.15	.21
		30	856.22	0



O'BRIEN & GERE

IN–SITU PERMEABILITY TEST
FIELD LOG

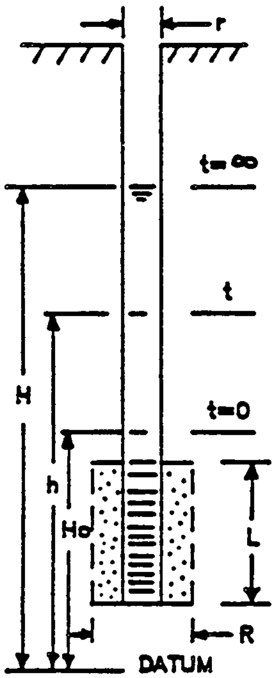
PROJECT BROOME CO. IDA

WELL NUMBER Well 9

DATE 12/20/84

LOCATION Lower Landfill

ELEVATION (TOC) 864.21



STATIC HEAD (H) 854.66

PIPE RADIUS (r) .167

SCREEN RADIUS (R) .583

SCREEN LENGTH (L) 10'

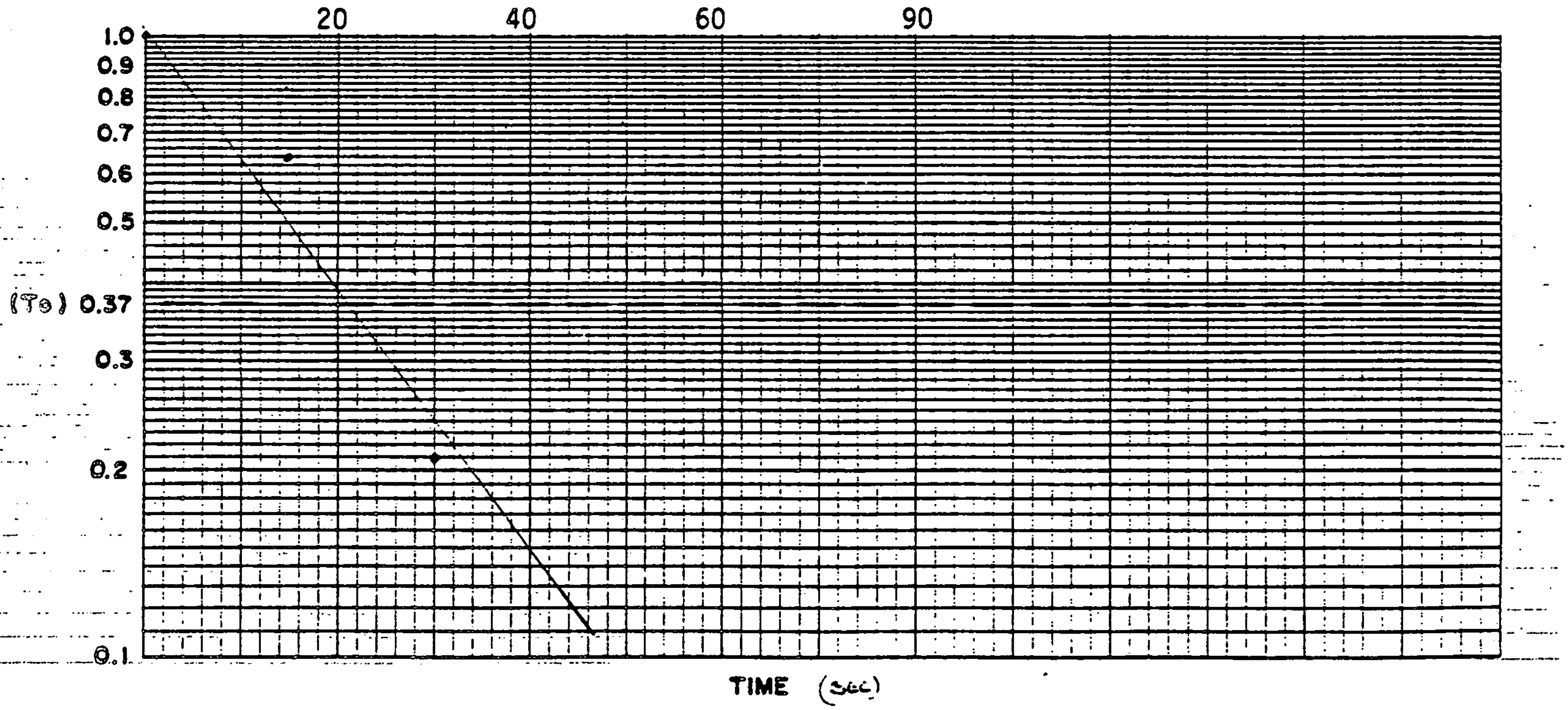
INITIAL HEAD (Ho) 844.21

HYDRAULIC CONDUCTIVITY :

$$K = \frac{r^2 \ln(L/R)}{2LT_o} = \frac{(.34)\ln(10/.583)}{(2)(10)(.35)}$$

$K =$ .14 ft/min = 7×10^{-2} cm/sec

TIME	WATER DEPTH	t	h	$\frac{H-h}{H-Ho}$
		0	844.21	1
		15	848.01	.64
		30	852.71	.21
		60	853.96	.07
		90	854.66	0

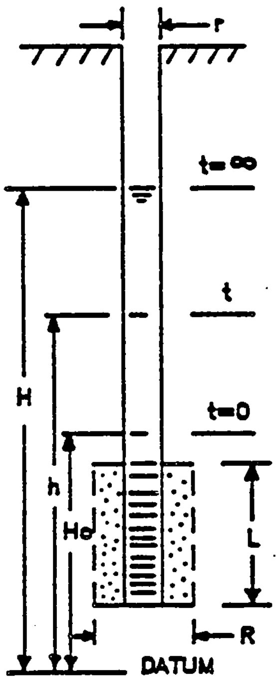


OBRIEN & GERE

IN-SITU PERMEABILITY TEST
FIELD LOG

PROJECT BROOME CO. IDA
WELL NUMBER Well 10
DATE 12/20/84

LOCATION Lower Landfill
ELEVATION (TOC) 863.76



STATIC HEAD (H) 855.29

PIPE RADIUS (r) .167

SCREEN RADIUS (R) .583

SCREEN LENGTH (L) 10

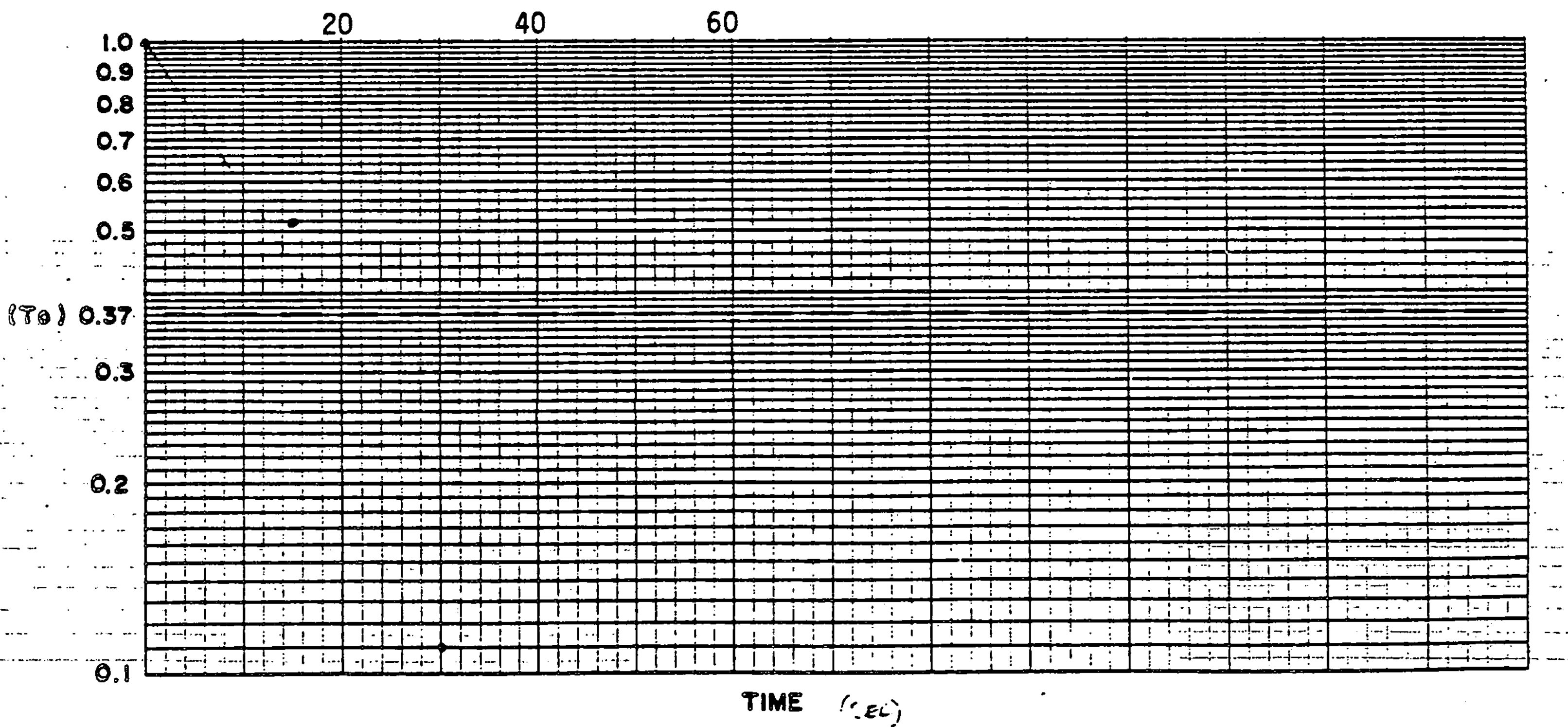
INITIAL HEAD (Ho) 847.76

HYDRAULIC CONDUCTIVITY :

$$K=\frac{r^2\ln(L/R)}{2LT_o}=\frac{(34)\ln(10/.583)}{2(10)(.3)}$$

K= .16 ft/min = 8.2 x 10^{-2} cm/sec

TIME	WATER DEPTH	t	h	$\frac{H-h}{H-Ho}$
		0	847.26	1
		15	851.37	.52
		30	854.39	.12
		45	855.26	.003
		60	855.26	.003



O'BRIEN & GERE

IN-SITU PERMEABILITY TEST
FIELD LOG

Confined Condition

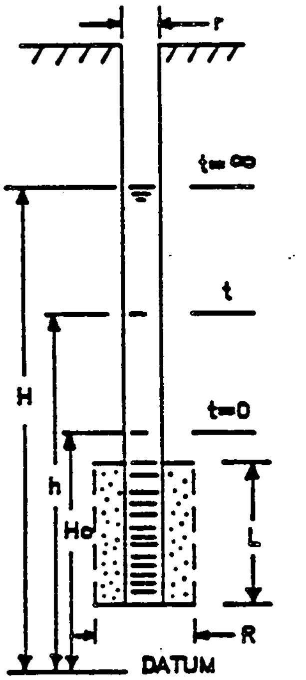
PROJECT BROOME CO. IDA

WELL NUMBER Well 17

DATE ______

LOCATION See Plan

ELEVATION (TOC) 950.89
(GRD) 948.46



TIME	WATER DEPTH	t	h	$\frac{H-h}{H-Ho}$
0	429	0	485	1
15	378	15	536	.87
30	337	30	577	.76
60	305	60	609	.68
120	256	120	658	.55
240	193	240	721	.39
600	132	600	782	.23
1200	77	1200	837	.09
1800	43	1800	871	0

STATIC HEAD (H) 871

PIPE RADIUS (r) 2.54

SCREEN RADIUS (R) 7.62

SCREEN LENGTH (L) 457

INITIAL HEAD (Ho) 485

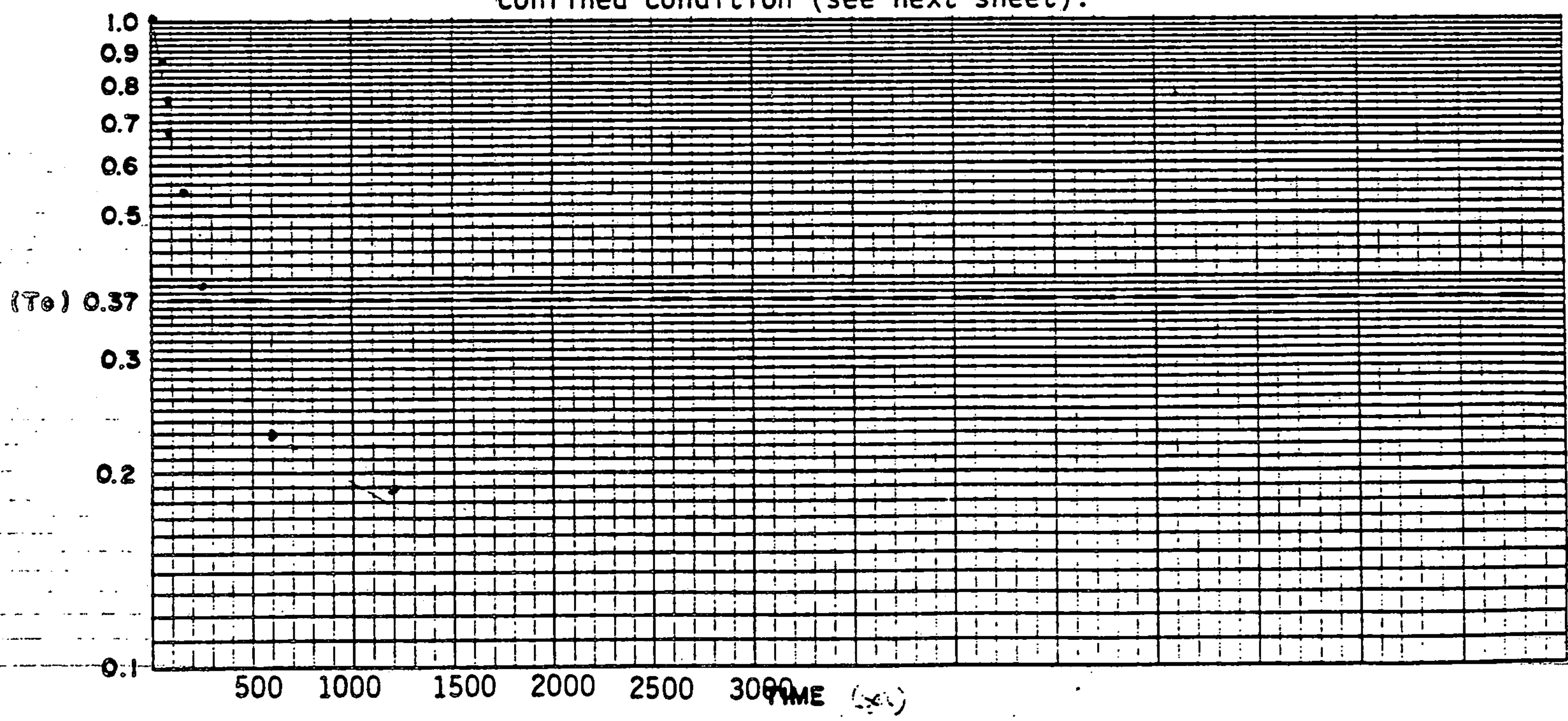
HYDRAULIC CONDUCTIVITY :

$$K = \frac{r^2 \ln(L/R)}{2LT_o} = \frac{6.45 \ln(457/7.62)}{2(457)(300)}$$

K = 9.63 x 10^{-5} cm/sec → 8.08 x 10^{-4} to 9.63 x 10^{-5} Range of K

Mean K = 4.52 x 10^{-4}

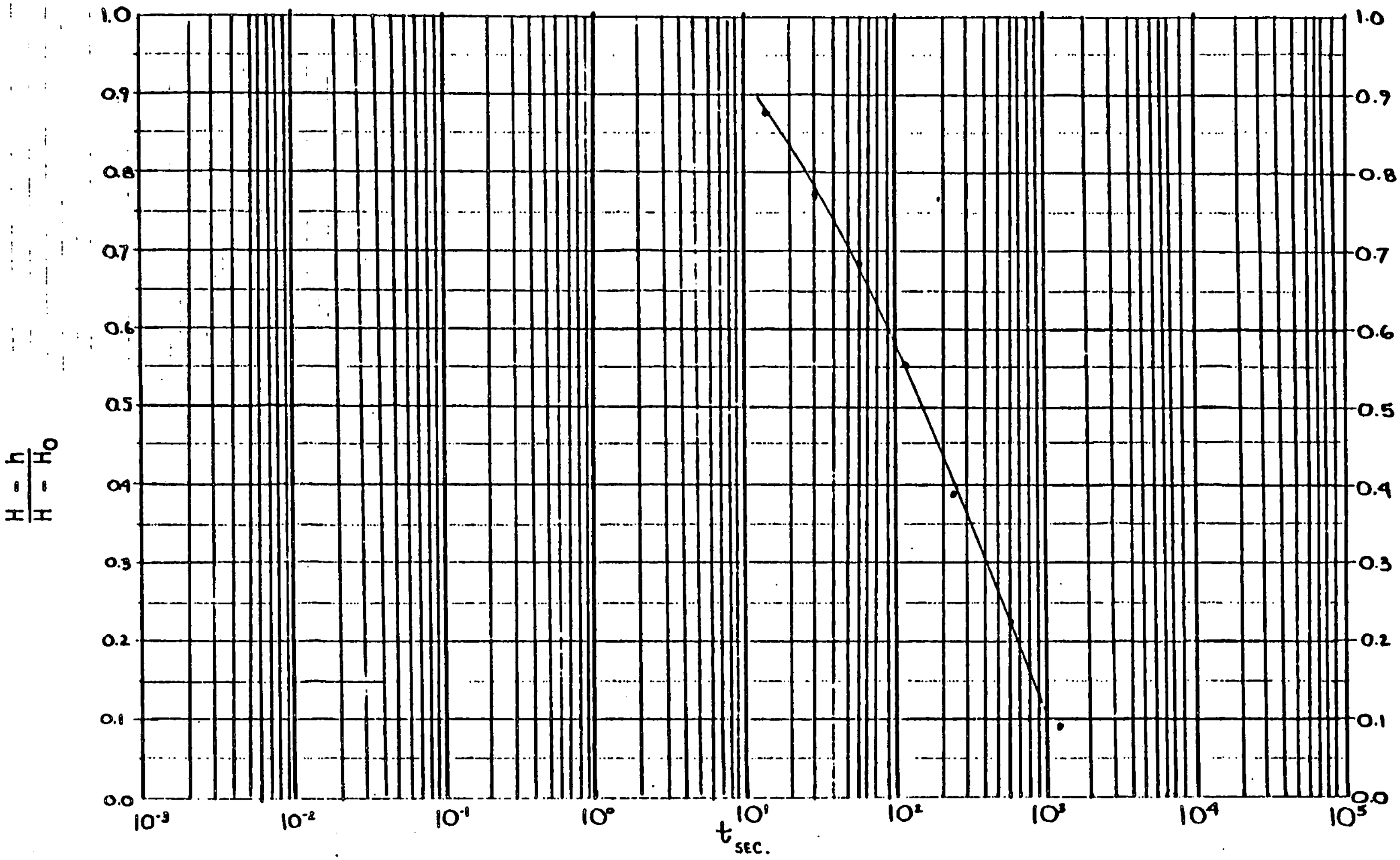
Using Hvorslev's unconfined formula for confined condition (see next sheet).



B-1 BROOME COUNTY INDUSTRIAL PARK

PAPADOPOULOUS CONFINED SLUG TEST

(Assuming entire confined thickness screened which is not the case at B-1, therefore take range of Hvorslev and Papadopoulous)



$$T = \frac{1.0(7.62)^2}{180 \text{ sec}}$$

$$T = .32$$

$$T = Kb$$

$$.32 = K\ 396 \text{ cm}$$

$$K = 8.08 \times 10^{-4} \text{ cm/sec}$$

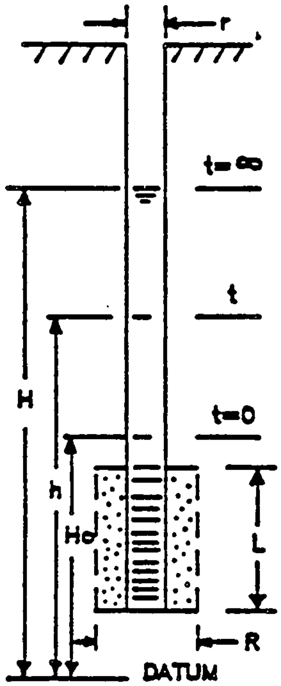
GRAPH FOR PAPADOPOULOS TYPE CURVES IN WELL OF FINITE DIAMETER

OBRIEN & GERE

IN-SITU PERMEABILITY TEST
FIELD LOG

PROJECT BROOME CO. IDA
WELL NUMBER Well 18
DATE

LOCATION See Plan
ELEVATION (TOC) 863.37
(GRD) 861



STATIC HEAD (H) 426

PIPE RADIUS (r) 2.54

SCREEN RADIUS (R) 7.62

SCREEN LENGTH (L) 305

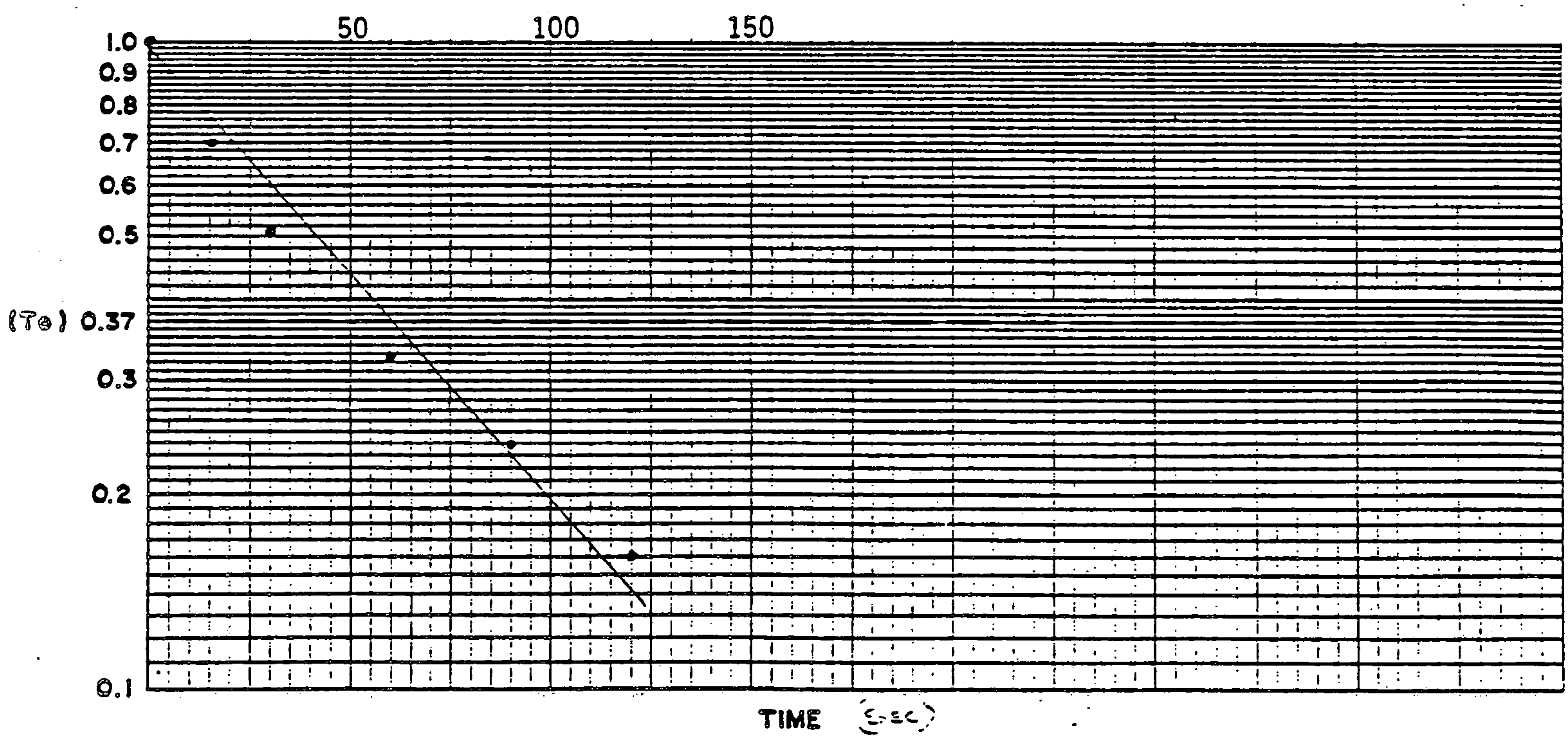
INITIAL HEAD (Ho) 225

HYDRAULIC CONDUCTIVITY :

$$K = \frac{r^2 \ln(L/R)}{2LT_o} = \frac{6.45 \ln 305/7.62}{(2)(305)57}$$

K= 6.84 x 10^{-4} cm/sec.

TIME	WATER DEPTH	t	h	$\frac{H-h}{H-Ho}$
0	232	0	225	1
15	172	15	285	.70
30	133	30	324	.51
60	97	60	360	.33
90	79	90	378	.24
120	44	120	413	.06

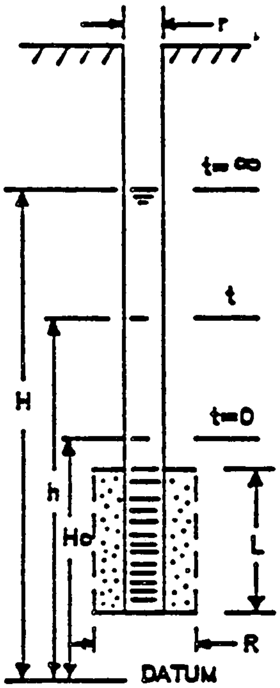


O'BRIEN & GERE

IN-SITU PERMEABILITY TEST
FIELD LOG

PROJECT BROOME CO. IDA
WELL NUMBER Well 19
DATE ______

LOCATION See Plan
ELEVATION (TOC) 914.94
(GRD) 912.39



STATIC HEAD (H) 853

PIPE RADIUS (r) 2.54

SCREEN RADIUS (R) 7.62

SCREEN LENGTH (L) 305

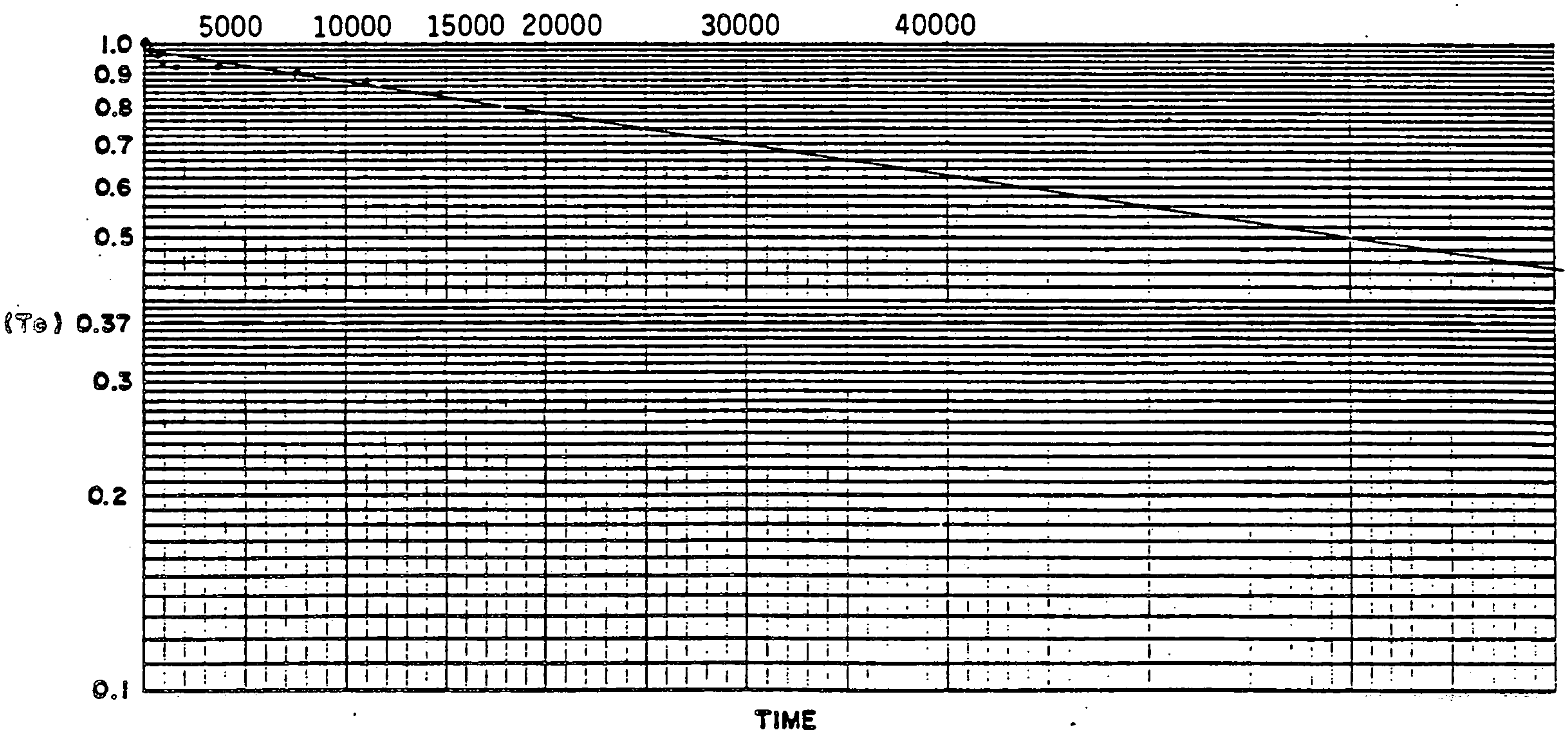
INITIAL HEAD (Ho) 229

HYDRAULIC CONDUCTIVITY :

$$K = \frac{r^2 \ln(L/R)}{2LT_o} = \frac{6.45 \ln(305/7.62)}{2(305)102{,}500}$$

K= 3.80 x 10^{-7} cm/sec.

TIME	WATER DEPTH	t	h	$\frac{H-h}{H-Ho}$
0	731	0	229	1
1	731	60	229	1
2	716	120	244	.98
5	710	300	250	.97
10	708	600	252	.96
20	707	1200	253	.96
60	695	3600	265	.94
120	675	7200	285	.91
180	657	10800	303	.88
240	638	14400	322	.85

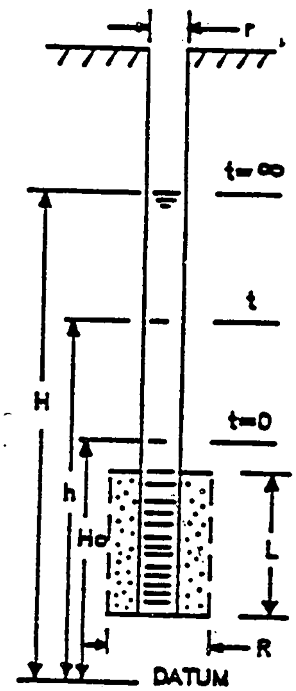


O'BRIEN & GERE

IN–SITU PERMEABILITY TEST
FIELD LOG

PROJECT BROOME CO. IDA
WELL NUMBER Well 20
DATE 12/20/84

LOCATION
ELEVATION (TOC) 890.05
(GRD) 887.89



STATIC HEAD (H) 558

PIPE RADIUS (r) 2.54

SCREEN RADIUS (R) 7.62

SCREEN LENGTH (L) 305

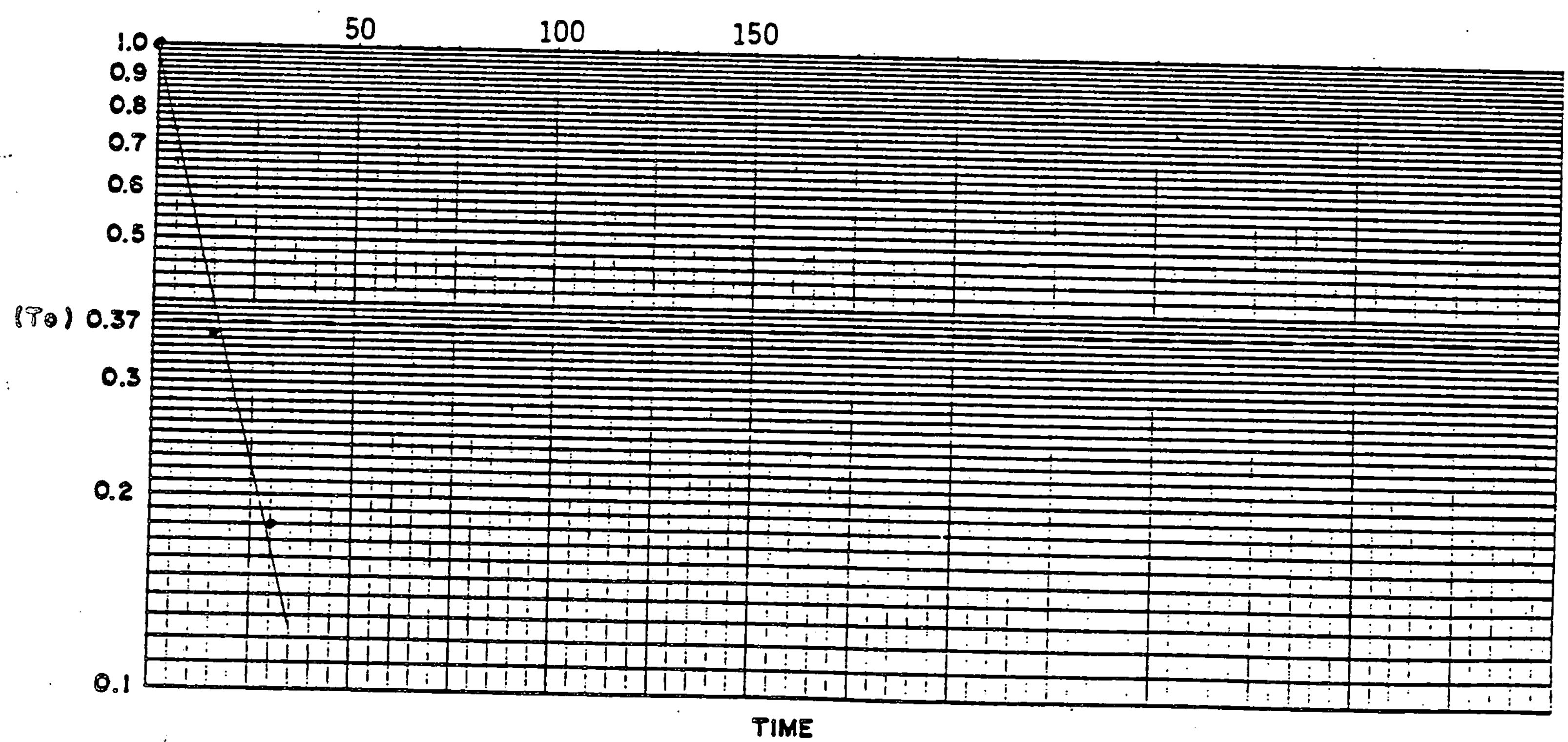
INITIAL HEAD (Ho) 271

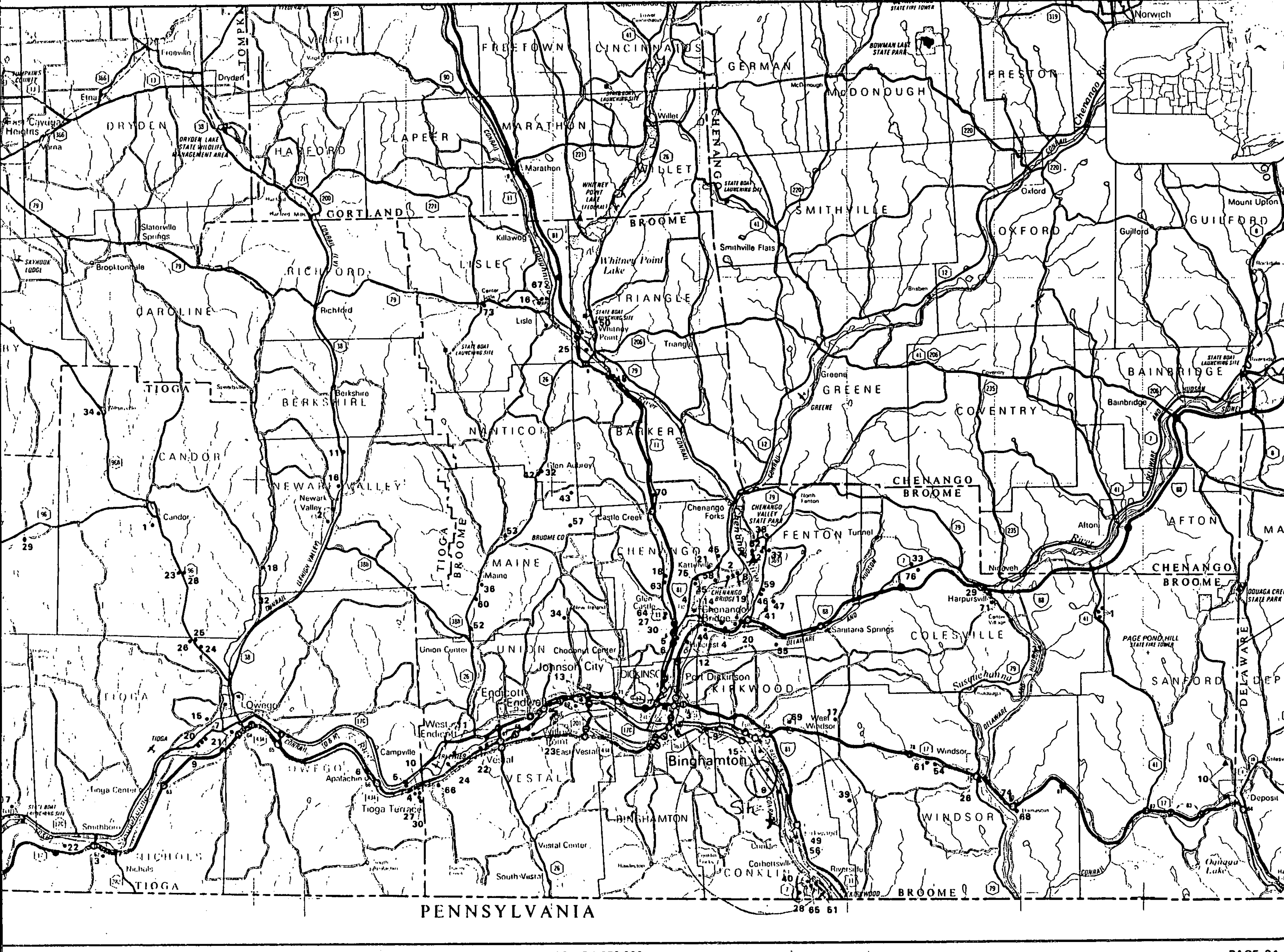
HYDRAULIC CONDUCTIVITY :

$$K = \frac{r^2 \ln(L/R)}{2LT_o} = \frac{6.45 \ln(305/7.62)}{(2)(305)15}$$

K= 2.60×10^{-3} cm/sec

TIME	WATER DEPTH	t	h	$\frac{H-h}{H-H_o}$
0	353	0	271	1
15	170	15	454	.36
30	117	30	507	.18
45	91	45	533	.09
60	85	60	539	.07
120	79	120	545	.04




FREETOWN
CINCINNATUS
GERMAN
McDONOUGH
PRESTON
Norwich
DRYDEN
Dryden
Etna
HARFORD
LAPEER
MARATHON
Marathon
WILLET
Willet
CHENANGO
SMITHVILLE
Smithville Flats
OXFORD
Oxford
GUILFORD
Guilford
Mount Upton
CORTLAND
BROOME
Slaterville Springs
Brooktondale
RICHFORD
Richford
LISLE
Lisle
Killawog
Whitney Point Lake
TRIANGLE
Triangle
Whitney Point
CAROLINE
TIOGA
BERKSHIRE
Berkshire
NANTICOKE
Glen Aubrey
BARKER
GREENE
Greene
COVENTRY
BAINBRIDGE
Bainbridge
CANDOR
Candor
NEWARK VALLEY
Newark Valley
CHENANGO VALLEY STATE PARK
Chenango Forks
Castle Creek
FENTON
AFTON
Afton
Nineveh
MAINE
Maine
CHENANGO
Kattellville
Chenango Bridge
Glen Castle
Harpursville
COLESVILLE
Sanitaria Springs
SANFORD
DELAWARE
UNION
Union Center
Johnson City
Endicott
Endwell
DICKINSON
Port Dickinson
KIRKWOOD
Owego
OWEGO
Apalachin
Campville
West Endicott
Vestal
VESTAL
East Vestal
Binghamton
Tioga Terrace
Tioga Center
Smithboro
NICHOLS
Nichols
TIOGA
Vestal Center
South Vestal
BINGHAMTON
CONKLIN
Conklin
Corbettsville
Riverside
WINDSOR
Windsor
West Windsor
Deposit
Oquaga Lake
PENNSYLVANIA

BROOME COUNTY

ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE	Note
Municipal Community				
1	Afton Village (Chenango Co, Page 22)		Wells (Springs)	
2	Applewood Acres	280	Wells	
3	Binghamton City	60000	Susquehanna River, Wells	
4	Chenango Water District #1	2072	Wells	
5	Chenango Water District #3	680	Wells	
6	Chenango Water District #7	NA	Wells	
7	Chenango Water District #14	272	Wells	
8	Chenango Water District #14 (Woodland Park)	225	Wells	
9	Conklin Water District #2	1868	Wells	in aquifer of concern
10	Deposit Village	1897	Big Hollow Brook Reservoir, Wells	
11	Endicott Municipal Water Works	45000	Wells	
12	Hillcrest Water District #1	3356	Wells	
13	Johnson City Water Works	17126	Wells	
14	Keeler Avenue Water Association	104	Wells	
15	Kirkwood Water District #4	256	Wells	(other side of River)
16	Lisle Village	500	Wells (Springs)	
17	Masler Water Supply	90	Wells	
18	Pennview (Chenango Water District #10)	35	Wells	
19	River Road Water Association	40	Wells	
20	Riverside Co-op Water Association	110	Wells	
21	Runacre Estates (Chenango Water District #11)	180	Wells	
22	Vestal Water District #1	8760	Wells	
23	Vestal Water District #4	3700	Wells	
24	Vestal Water District #5	900	Wells	
25	Whitney Point Village	1100	Wells	
26	Windsor Village	1400	Wells	
Non-Municipal Community				
27	Binghamton Mobile Estates	250	Wells	
28	Blue Ridge Mobile Home Park	75	Wells	Not sure what aquifer
29	Blue Stone Mobile Home Park	30	Spring	
30	Bolebruchs Mobile Home Park	25	Wells	
31	Country Court Mobile Home Park	NA	Wells	
32	Country Estates Mobile Home Court	170	Wells	
33	Country Manor	60	Wells	
34	D & G Trailer Park	25	Wells	
35	Deluxe Mobile Park	60	Wells	
36	Edison Road Mobile Court	150	Wells	
37	Fenton Mobile Estates	210	Wells	
38	Forest Manor Residential Development	200	Wells	
39	Forestview Mobile Homes Park	150	Wells	
40	Fountain Bleau Court	360	Wells	Not sure what aquifer
41	Glendale Court	30	Wells	
42	Green Valley Mobile Lodge	120	Wells	
43	Haist Mobile Home Park	80	Wells	
44	Hayes Service Court	36	Wells	
45	Heaths Trailer Park	150	Wells	
46	Hickory Ridge Trailer Park	46	Wells	
47	Hillside Park	NA	Wells	
48	Hust Trailer Park	NA	Wells	
49	Kirkwood Trailer Park	60	Wells	
50	Lakeside Lodge	NA	Wells	
51	Lillian Diamond Trailer Park	NA	Wells	
52	Maine Mobile Court	NA	Wells	
53	Manns Mobile Community	NA	Wells	
54	Maple Run Mobile Home Park	NA	Wells	
55	MBM Mobile Home Court	NA	Wells	
56	Meadows Mobile Home Park	NA	Wells	
57	Mount Ettrick Terrace	NA	Wells	
58	Mount Mobile Home Community	63	Wells	
59	Mountain View Mobile Home Park	NA	Wells	
60	Nanticoke Valley Mobile Court	270	Wells	
61	Occanum Falls Court	NA	Wells	
62	Orshals	1000	Wells	
63	Pennview Apartments	68	Wells	
64	Perts Mobile Home Park	NA	Wells	
65	Pride Manor Mobile Home Park	NA	Wells	
66	Rush Trailer Park	NA	Wells	
67	Shady Maple Trailer Park	60	Wells	
68	Tuscarora Mobile Village	40	Wells	
69	Twin Acre Terrace	34	Wells	
70	Valley Vista	44	Wells	
71	Village Court	NA	Wells	
72	Virginia City Mobile Home Court	NA	Wells	
73	Wal Mar	24	Wells	
74	Westview Trailer Park	NA	Wells	
75	Whispering Pines Mobile Home Court	NA	Wells	
76	Wooded Estates	NA	Wells	

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-0001

Henry G. Williams
Commissioner

June 6, 1985

Ms. Melonie Sviatyla
Broome County Health Department
One Wall Street
Binghamton, NY 13901

Re: Water Supplies
Conklin T, Broome County

Dear Ms. Sviatyla:

This letter will serve to confirm our discussions of June 3, 1985 regarding public and private water supplies in the vicinity of the Conklin Dumps, Conklin T., Broome County. Based on our discussions it is my understanding that:

1.) The Conklin Water District wells are developed in the glacial outwash (overburden).

2.) The Conklin W.D. is interconnected with the Binghamton Water Supply.

3.) Approximately 50 private wells (in the overburden aquifer) exist in the vicinity of the landfill. A waterline extension would be needed to provide an alternate water source to these individuals.

Please advise me in writing, if any of the above is incorrect. Thank you for your assistance.

Sincerely,

Raymond E. Lupe

Raymond E. Lupe, P.E.
Bureau of Hazardous Site Control
Division of Solid and Hazardous Waste
Western Investigation Section

bcc: C. Goddard
L. Lepak
W. Demick
NPL File
File

RL:jaf

Broome County
HEALTH DEPARTMENT
One Wall Street / Binghamton, New York 13901 / (607) 772-2887

Kathleen A. Gaffney, M.D., Commissioner of Health
Robert W. Denz, P.E., Director, Environmental Health Services

Carl S. Young, County Executive

RECEIVED

June 11, 1985

Mr. R. Lupe, P. E.
Bureau of Hazardous Site Control
Division of Solid and Hazardous Waste
Western Investigation Section
NYSDEC
50 Wolf Road
Albany, New York 12233-0001

Re: Town of Conklin Dumps

Dear Mr. Lupe:

In response to your letter of June 6, 1985 concerning the water supply situation in the Town of Conklin, I would like to make the following comments:

1. Regarding Question #2: The Town of Conklin and Binghamton Water Supplies are not interconnected.

2. Regarding Question #3: Of the 50 or so residential wells in the vicinity of the landfill, about 10-15 are drilled in bedrock. Previously, we have found arsenic in these deep bedrock wells which <u>may be</u> attributed to the type of bedrock geology present in this locality. Nonetheless, a water line extension down Conklin Avenue (Route 7) would be needed to provide an alternate source of water to the residences.

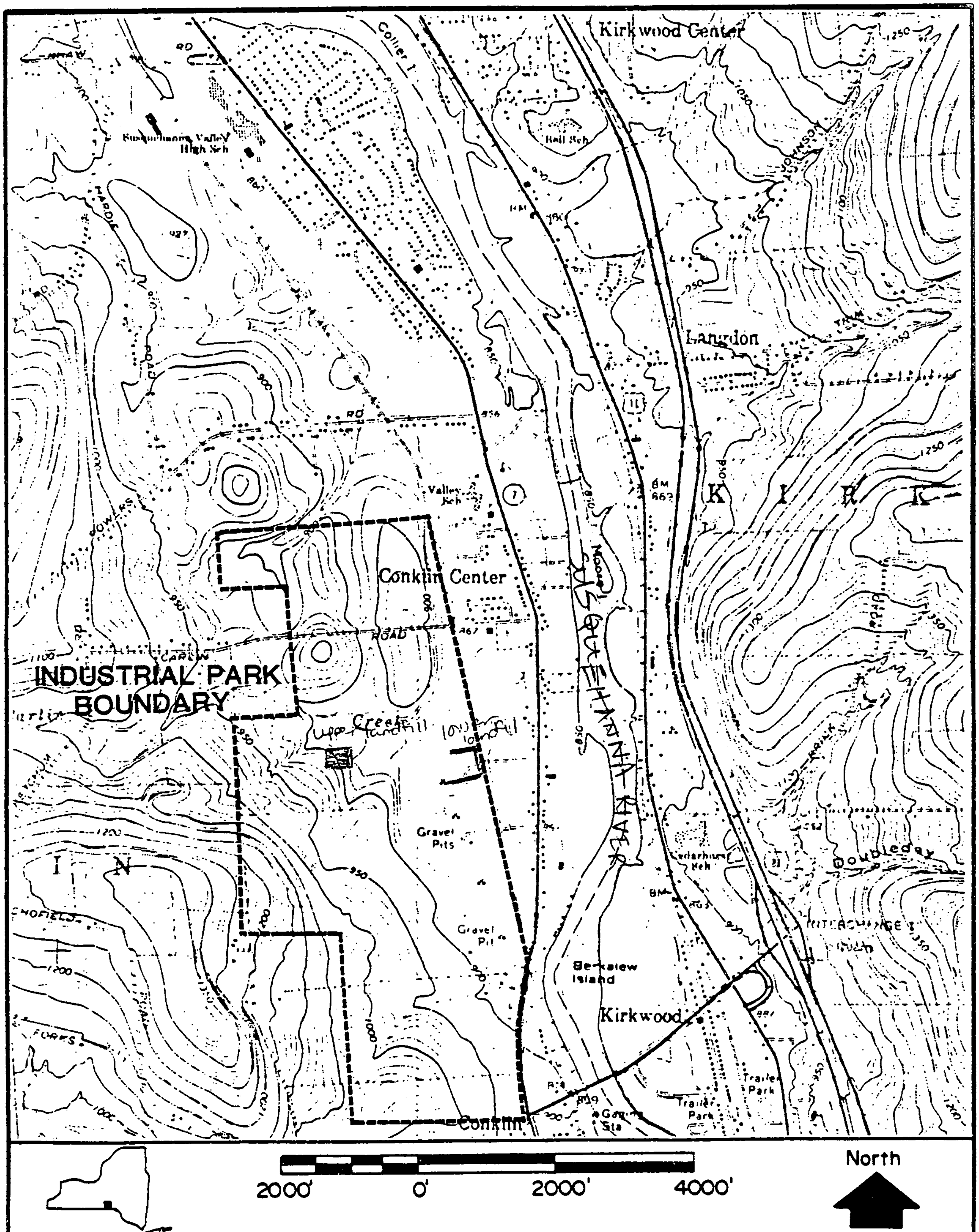
If you have any questions concerning these comments or require additional information, please feel free to call me.

Sincerely yours,

Melonie M. Sviatyla
Assistant Public Health Engineer

MMS:mbf
cc: Robert W. Denz, P. E.

FIGURE 1



BROOME COUNTY INDUSTRIAL DEVELOPMENT AGENCY	BROOME INDUSTRIAL PARK CONKLIN, N.Y. LOCATION MAP

O'BRIEN & GERE ENGINEERS, INC.

EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	704013

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- ☐ C. SLUDGE
- ☒ D. OTHER Drums (Specify)
- ☐ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

- TONS unknown
- CUBIC YARDS unknown
- NO. OF DRUMS unknown

03 WASTE CHARACTERISTICS (Check all that apply)

- ☒ A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☒ D. PERSISTENT
- ☒ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ☐ H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	unknown		Found in groundwaters
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS (As, Cr, Hg)	unknown		Found in groundwaters

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
	Arsenic		Found in on-site groundwaters		
	Chromium		"		
	Mercury		"		
	Toluene		"		
	Ethylbenzene		"		
	Vinyl Chloride		"		
	1,1 Dichloroethane		"		
	1,2 Dichloropropane		"		
	Methylene Chloride		"		

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

1. Hydrogeologic Investigation Report, Proposed Broome County Industrial Park, 1984, O'Brien and Gere Engineers
2. Phase II, Hydrogeologic Inv., Proposed Broome Co. Ind. Park, 1985 O'Brien and Gere Engineers

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: NY
02 SITE NUMBER: 704013

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION
02 [X] OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 2058
04 NARRATIVE DESCRIPTION
August 1983 and Nov. 1983 Sampling. Groundwater Contamination confirmed. See O'Brien and Gere Reports

01 [X] B. SURFACE WATER CONTAMINATION
02 ☐ OBSERVED (DATE: ______) [X] POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 0
04 NARRATIVE DESCRIPTION
Carlin creek and wetlands (designated) within 1300 to 500 FT. of each landfill. Carlin Creek trib. to Susq. River which is recreational. Leachate observed impacting wetland along RTE. 7. Leachate draining toward Carlin Creek

01 ☐ C. CONTAMINATION OF AIR
02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION
No DATA

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS
02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION
No DATA

01 [X] E. DIRECT CONTACT
02 ☐ OBSERVED (DATE: ______) [X] POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION
Leachate OBSERVED. AROUND Landfills.

01 ☐ F. CONTAMINATION OF SOIL
02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: ______ (Acres)
04 NARRATIVE DESCRIPTION
unknown. (Stained by Leachate in several areas).

01 [X] G. DRINKING WATER CONTAMINATION
02 ☐ OBSERVED (DATE: ______) [X] POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 2058
04 NARRATIVE DESCRIPTION
High Arsenic and low trace levels of organic chemicals found in private wells along RTE. 7. Carlin Creek may recharge Aquifer By Conklin Water District Wells.

01 ☐ H. WORKER EXPOSURE/INJURY
02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION
N.A.

01 ☐ I. POPULATION EXPOSURE/INJURY
02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION
N.A.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	704013

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 [X] J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: ________) [X] POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Plants in wetlands may be susceptible

01 [X] K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: ________) [X] POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (include name(s) of species)

Animal populations in wetland habitat may be at risk.

01 [X] L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Unknown

01 [X] M. UNSTABLE CONTAINMENT OF WASTES (Spills/Runoff/Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE: ________) [X] POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ________
04 NARRATIVE DESCRIPTION

Leachate outbreaks around landfills. Access to site is possible.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

[redacted] Potential contamination source for affected private wells. Leachate outbreaks off-site.

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N.A.

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: ________

IV. COMMENTS

Leachate represents threat to Cortlin Creek and protected wetlands. Public and private water supplies at risk from confirmed groundwater contamination.

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

① Hydrogeologic Inv. of Prop. Broome Co. Ind. Park, 1984 O'Brien and Gere
② Phase II, Hyd. Inv. of Prop. Broome Co. Ind. Park, 1985, O'Brien and Gere Eng.
③ Broome County Dept. Health / NYS Dept. Health - Syracuse Reg.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	704013

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A. NPDES				
☐ B. UIC	NA			
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☐ A. SURFACE IMPOUNDMENT		
☐ B. PILES		
☐ C. DRUMS, ABOVE GROUND		
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
☒ F. LANDFILL	unknown	
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ I. OTHER (Specify)		

04 TREATMENT (Check all that apply)

- ☐ A. INCENERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER (Specify)

05 OTHER

- ☐ A. BUILDINGS ON SITE

06 AREA OF SITE

_____ (Acres)

07 COMMENTS

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☐ B. MODERATE ☒ C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

Drums reported to be buried. Landfills closed. Wastes Adequately covered. Leachate generation around both landfills. Wastes landfilled below water table. Permeable cover on lower landfill.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ☐ YES ☐ NO

02 COMMENTS

Leachate on surface of ground. Access to site on foot is easily possible.

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

① Hydrogeologic Inv. Reports, OBrien + Gere, 1984 + 1985

②. Site Inspection Observations.

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POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE: NY 02 SITE NUMBER: 704013

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)

	SURFACE	WELL	02 STATUS: ENDANGERED	AFFECTED	MONITORED
COMMUNITY	A. ☐	B. ☒	A. ☒	B. ☐	C. ☐
NON-COMMUNITY	C. ☐	D. ☒	D. ☒	E. ☐	F. ☐

03 DISTANCE TO SITE
A. ______ (mi)
B. ______ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☒ A. ONLY SOURCE FOR DRINKING

☒ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available)

☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available)

☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER: 2058

03 DISTANCE TO NEAREST DRINKING WATER WELL: < 800 FT. (mi)

04 DEPTH TO GROUNDWATER: 4 - 23 (ft)

05 DIRECTION OF GROUNDWATER FLOW: EAST - Northeast

06 DEPTH TO AQUIFER OF CONCERN: 4 - 23 (ft)

07 POTENTIAL YIELD OF AQUIFER: Unknown (gpd)

08 SOLE SOURCE AQUIFER: ☐ YES ☐ NO

09 DESCRIPTION OF WELLS (including useage, depth, and location relative to population and buildings)

Private wells along Route 7. Most in overburden aquifer. (NO Alt. Source). Conklin W.D. wells developed in glacial overburden. approximately 1-1½ miles northeast of Site.

10 RECHARGE AREA
☒ YES
☐ NO
COMMENTS: Carlin Creek identified as potential recharge area.

11 DISCHARGE AREA
☐ YES
☒ NO
COMMENTS

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☐ A. RESERVOIR, RECREATION DRINKING WATER SOURCE

☒ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES Recreational

☐ C. COMMERCIAL, INDUSTRIAL

☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Carlin Creek (Trib to Susq)	☒	300 FT. ~~(mi)~~
Susquehanna River	☐	1-1½ miles (mi)
On-Site Designated Wetlands	☒	300-800 FT. ~~(mi)~~

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
A. ______ NO. OF PERSONS	B. 2058 NO. OF PERSONS	C. ______ NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION: < 1/4 (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE: —

04 DISTANCE TO NEAREST OFF-SITE BUILDING: < 1/4 (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

Subdivisions along RTE: 7, directly adjacent and across from lower landfills. Conklin (V) located approx. 1/2-1 mile from sites.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE: NY | 02 SITE NUMBER: 704013

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. $10^{-6} - 10^{-8}$ cm/sec ☐ B. $10^{-4} - 10^{-6}$ cm/sec ☐ C. $10^{-4} - 10^{-3}$ cm/sec ☒ D. GREATER THAN 10^{-3} cm/sec

VARIES FROM 10^{-1} TO 10^{-5} cm/sec on most of site.

02 PERMEABILITY OF BEDROCK (Check one)

☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) ☐ B. RELATIVELY IMPERMEABLE ($10^{-4} - 10^{-6}$ cm/sec) ☐ C. RELATIVELY PERMEABLE ($10^{-2} - 10^{-4}$ cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH
60 - 114 (ft)	30 (ft)	

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
12 (in)	2.5 (in)	4 %	EAST	4 %

09 FLOOD POTENTIAL: SITE IS IN — YEAR FLOODPLAIN

10 ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE A. ______ (mi) OTHER B. 300-800 FT. ~~(mi)~~

12 DISTANCE TO CRITICAL HABITAT (of endangered species) ______ (mi)

ENDANGERED SPECIES: ______

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AG LAND
A. ______ (mi)	B. < 1/4 (mi)	C. ______ (mi)	D. ______ (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

Site consists of an upper and lower landfill developed on upgradient area from surrounding residential areas. Lower landfill developed over glacial outwash with very high permeabilities. $10^{-1} - 10^{-2}$ cm/sec in close proximity (800 FT.) to residential areas using private water wells.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

1. 1984 and 1985 Hydro. Inv. of Prop. Broome Co. Industrial Park, OBrien and Gere Engineers.
2. HRS MANUAL
3. SITE OBSERVATIONS

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	704013

II. SAMPLES TAKEN None During INSPECTION. PAST SAMPLING Available

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	720	① O'Brien and Gere Engineers ② BROOME COUNTY Health Dept.	
SURFACE WATER	75	O'Brion and Gere Engineers.	
WASTE			
AIR			
RUNOFF			
SPILL			
SOIL			
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
	None

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☐ GROUND ☐ AERIAL

02 IN CUSTODY OF ______ (Name of organization or individual)

03 MAPS ☒ YES ☐ NO

04 LOCATION OF MAPS NYS DEC Region 7; NYSDEC Albany; Broome Co. IDA

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

①. 1984 and 1985 Hydro. Reports, O'Brion and Gore

[redacted]

②. Follow-up Mtgs. with Broome County Officials.

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	704013

II. CURRENT OWNER(S) / PARENT COMPANY (If applicable)

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER
Town of Conklin			
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	**04 SIC CODE**	**10 STREET ADDRESS** (P.O. Box, RFD #, etc.)	**11 SIC CODE**
Rte. 6			
05 CITY / 06 STATE / 07 ZIP CODE		**12 CITY / 13 STATE / 14 ZIP CODE**	
Conklin / NY /			

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	**04 SIC CODE**	**10 STREET ADDRESS** (P.O. Box, RFD #, etc.)	**11 SIC CODE**
05 CITY / 06 STATE / 07 ZIP CODE		**12 CITY / 13 STATE / 14 ZIP CODE**	

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	**04 SIC CODE**	**10 STREET ADDRESS** (P.O. Box, RFD #, etc.)	**11 SIC CODE**
05 CITY / 06 STATE / 07 ZIP CODE		**12 CITY / 13 STATE / 14 ZIP CODE**	

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	**04 SIC CODE**	**10 STREET ADDRESS** (P.O. Box, RFD #, etc.)	**11 SIC CODE**
05 CITY / 06 STATE / 07 ZIP CODE		**12 CITY / 13 STATE / 14 ZIP CODE**	

III. PREVIOUS OWNER(S) (List most recent first) / IV. REALTY OWNER(S) (If applicable; list most recent first)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
Town of Conklin			
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	**04 SIC CODE**	**03 STREET ADDRESS** (P.O. Box, RFD #, etc.)	**04 SIC CODE**
Rte. 6			
05 CITY / 06 STATE / 07 ZIP CODE		**05 CITY / 06 STATE / 07 ZIP CODE**	
Conklin / NY /			

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	**04 SIC CODE**	**03 STREET ADDRESS** (P.O. Box, RFD #, etc.)	**04 SIC CODE**
05 CITY / 06 STATE / 07 ZIP CODE		**05 CITY / 06 STATE / 07 ZIP CODE**	

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	**04 SIC CODE**	**03 STREET ADDRESS** (P.O. Box, RFD #, etc.)	**04 SIC CODE**
05 CITY / 06 STATE / 07 ZIP CODE		**05 CITY / 06 STATE / 07 ZIP CODE**	

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

① NYS Registry of Inactive Haz. Waste Disposal Sites Vol. 7, 1984

② 1984 and 1985 Hydro. Inv. Reports (O'Brien and Gere Eng.)

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	704013

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER		01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE		03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE
01 NAME	02 D+B NUMBER		01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE		03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER		01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE		03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE
01 NAME	02 D+B NUMBER		01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE		03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	704013

II. PAST RESPONSE ACTIVITIES

01 ☒ A. WATER SUPPLY CLOSED 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION Private water supplies in vicinity of landfill [redacted] have [redacted] high arsenic levels. Owners advised accordingly by Broome Co DOH

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ D. SPILLED MATERIAL REMOVED 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ E. CONTAMINATED SOIL REMOVED 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ F. WASTE REPACKAGED 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ G. WASTE DISPOSED ELSEWHERE 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ H. ON SITE BURIAL 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ I. IN SITU CHEMICAL TREATMENT 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ J. IN SITU BIOLOGICAL TREATMENT 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ K. IN SITU PHYSICAL TREATMENT 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ L. ENCAPSULATION 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ M. EMERGENCY WASTE TREATMENT 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ N. CUTOFF WALLS 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ P. CUTOFF TRENCHES SUMP 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

01 ☐ Q. SUBSURFACE CUTOFF WALL 02 DATE ____ 03 AGENCY ____
04 DESCRIPTION

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	704013

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION

01 ☐ S. CAPPING/COVERING — 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION

01 ☐ V. BOTTOM SEALED — 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION

01 ☐ W. GAS CONTROL — 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION

01 ☐ X. FIRE CONTROL — 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION

01 ☐ Y. LEACHATE TREATMENT — 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION

01 ☐ Z. AREA EVACUATED — 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION

01 ☐ 2. POPULATION RELOCATED — 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	704013

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION ☐ YES ☒ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-13 (7-81)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: 7/17/85

SUBJECT: Conklin Dumps Site

FROM: Karen Sudy KS

TO: Memo to the File

I spoke to Mr. Robert Denz of the Broome County Health Department concerning land area irrigated by supply wells drawing from the aquifer of concern within a 3-mile radius. To the best of Mr. Denz's knowledge, no land in that area is being irrigated. Mr. Denz referred me to the Cooperative Extension Coordinator for confirmation of that statement. I spoke with Mr. David Bradstreet from the Cooperative Extension Coordinator's office and he confirmed the statement that no land in that area is being irrigated.

EPA Form 1320-6 (Rev. 3-76)

REF. 7

NEW YORK STATE FISHING SMALL GAME HUNTING TRAPPING REGULATIONS GUIDE

OCTOBER 1, 1984—SEPTEMBER 30, 1985

DIVISION OF FISH AND WILDLIFE

NEW YORK STATE

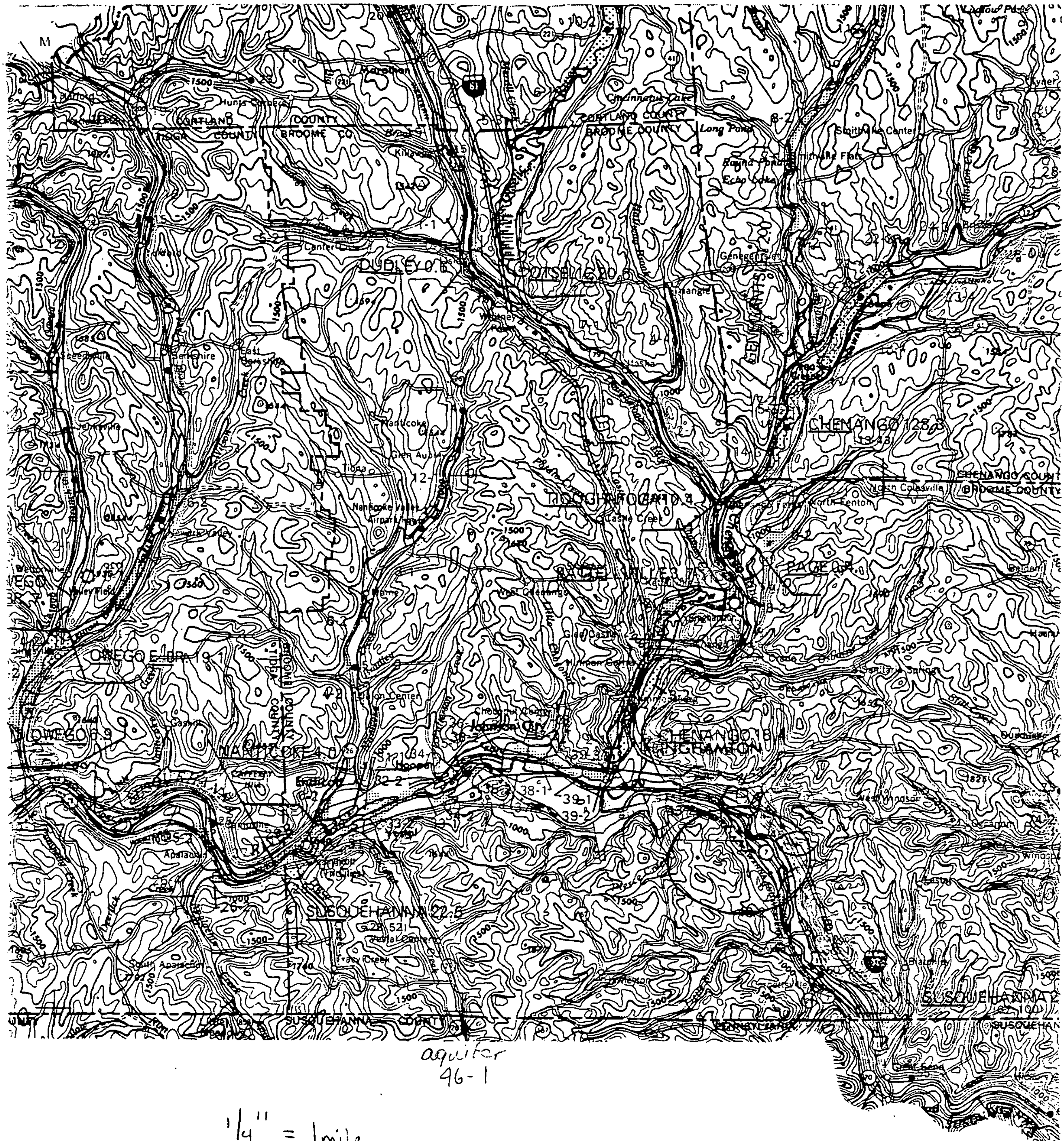
Department of Environmental Conservation

SPECIAL REGULATIONS BY COUNTY

- **This is a list of exceptions to the General Angling Regulations.**
- **Trout waters where ice fishing is permitted are identified here.**
- **In some cases you will be referred to the regulations tables for major resource blocks (Great Lakes, Finger Lakes, Lake Champlain, Border Waters, New York City Reservoirs).**

COUNTY		Species	Open Season	Minimum Length	Daily Limit	Method
ALBANY	Albany State University Pond	Largemouth and Smallmouth bass	April 1-Nov. 30	Any size	5	
	Hudson River from Troy Dam upstream to Fort Edward and tributaries in this section to first barrier impassable by fish, Mohawk River below Rt. 32 bridge		Fishing prohibited			
	Thompsons Lake, Warners Lake	Trout	All year	9"	5	Ice fishing permitted
	Normans Kill, from mouth to Watervliet Res.	Black bass	3rd Sat. in June-Nov. 30	10"	5	
ALLEGANY	Allen Lake, Rushford Lake	Trout	April 1-Nov. 30	Any size	5	
	Genesee River from Belmont Dam upstream to Pennsylvania state line	Largemouth and Smallmouth bass	All year	Any size	Any number	Ice fishing permitted
BROOME	All waters except section of Susquehanna River below:	Largemouth and Smallmouth bass	3rd Sat. in June-Nov. 30	10"	5	
	Susquehanna River from Goudey Station Dam to Tioga County line	All species	General Angling Regulations apply, SEE page 16			
	Nanticoke Lake	Trout	All year	Any size	10	Ice fishing permitted
	Oquaga Creek from old Rt. 17 bridge east of McClure downstream 3 miles to new Rt. 17 bridge west of Deposit	Trout	All year		No kill	Artificial lures only
	Otselic River from mouth to Whitney Point Reservoir Dam, Susquehanna River in Binghamton between Rock Bottom Dam and Exchange Street bridge, Susquehanna River in the towns of Union and Vestal from the Erie-Lackawanna R.R. bridge downstream to Gray Island, Tioughnioga River from N.Y. Rt. 26 bridge to U.S. Rt. 11 bridge, Little Choconut Creek from mouth to Goudey Station Building		Fishing prohibited March 16 through 1st Friday in May to protect spawning walleye			
	Whitney Point Reservoir	Hybrid Striped bass	All year	14"	5	Ice fishing permitted
CATTARAUGUS	ALLEGANY STATE PARK: Fishing Permit Required, State Park regulations apply					
	All waters	Muskellunge	SEE Muskellunge Regulations below			
	Allegheny River, Conewango Creek, Olean Creek, State Drainage Ditch	Northern pike	All year	Any size	Any number	Ice fishing permitted
	Case Lake	Trout	All year	Any size	5	Ice fishing permitted
	Harwood Lake	Trout	April 1-Nov. 30	Any size	5	
	Ischua Creek from Hinsdale upstream	Largemouth and Smallmouth bass	All year	Any size	Any number	Ice fishing permitted
	New Albion Lake	Trout	April 1-Nov. 30	Any size	5	

REF. 13



aquifer
46-1

1/4" = 1 mile

LOCATION POSITION A

EXPLANATION

SCHENEVUS 11.2 — NAME OF RIVER, CREEK, OR VALLEY. Line marks downstream end of valley or valley reach. Letters underlined are abbreviation used in AQUILIST program. Number is total volume of water stored in aquifers upstream within valley, in billions of gallons; value does not include tributaries for which separate totals are shown. For long streams, only subtotals for successive reaches are shown; numbers in parentheses indicate valley mileage for each reach totaled.

15'

●5 — VALLEY MILEAGE. Indicates distance, in miles, from valley mouth (or State line, as explained in text).

—·· — BASIN BOUNDARY

108-4 — BOUNDARY AND NUMBER OF INDIVIDUAL AQUIFER. Boundaries are in part negative hydraulic boundaries, in part arbitrary boundaries to simplify aquifer geometry for AQUILIST program.
Numbers identify aquifer listed in table 4.
Number before hyphen is valley mile near center of aquifer.
Number after hyphen is aquifer-type symbol, defined as follows:

108-2

1 = surficial aquifer, lowest water-level is on downvalley side
2 = buried (artesian) aquifer, underlies fine sand, silt, and(or) clay
3 = right side } surficial aquifer, lowest water level
4 = left side } is on side near center of named valley

Color and pattern designate aquifer thickness or position:

Aquifer types 1, 3, and 4 (surficial aquifers; numbers in blue)	Aquifer type 2 (buried aquifers; numbers in black)
>40 feet thick	depth >200 feet to top of aquifer
10 to 40 feet thick	100 to 200 feet to top of aquifer
<10 feet thick*	depth <100 feet to top of aquifer

42° 00'

* Many of these aquifers are not numbered on this map nor listed in table 4.

M — MORAINE. Mostly till and lake beds (fine sand, silt, clay) capped with unsaturated sand and gravel in some places. Thin, scattered confined aquifers of sand and gravel present in some places.

Hydrology by Allan D. Randall (west of 75°45') and Robert D. MacNish, 1970

AQUIFERS

File on eDOCs X Yes ____ No
Site Name conklin
Site No. 704013
County Broome
Town Conklin
Foilable X Yes ____ No
File Name 1997-02-12 NPL Listing
…d & eDOC ____