REPORT

Focused Remedial Investigation Alcan Aluminum Corporation Site #828005 Pittsford, New York

Alcan Aluminum Corporation
Cleveland, Ohio

October 1996

O'BRIEN & GERE
ENGINEERS, INC.

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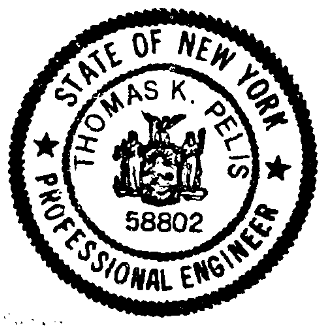

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Contents

Tables

Figures

Appendices

A Historical Analytical Data
B Surface Impoundment Boring Logs
C Air Monitoring Data
D Well Logs
E *In Situ* Permeability Test Logs
F Ground Water Budget Calculations
G Laboratory Chain of Custody Forms
H Ground Water Sampling Field Logs
I Fugitive Dust Exposure Evaluation
J Wildlife Species Potentially Present at the Site

Exhibits

Attachments

A Waste Disposal Documentation

Executive summary

A Focused Remedial Investigation (RI) is being completed at the Alcan Aluminum Corporation site in Pittsford, New York. The Remedial Investigation will be completed with the submittal of a Supplemental RI letter report after completion of an investigation of the main building. The site is #828005 on the New York State list of Inactive Hazardous Waste Sites and is currently a Class 2 site. The RI was undertaken pursuant to an Administrative Order on Consent dated September 17, 1990. The objective of the RI was to document the nature and extent of contamination in the soil, water, and air at the site. The site is adjacent to Sigismondi Landfill, site #828011, which is a Class 2 inactive hazardous waste site.

The Alcan site was formerly an active aluminum extrusions and anodizing facility. During a period of its operation, process wastewater was discharged into an adjacent ravine, and later to two impoundments on the property before the introduction of a sewer line along Linden Avenue. Solids from the wastewaters accumulated in the impoundments and were subsequently graded during the closure of the impoundments.

Previous site investigations by LaBella Associates, P.C. (1982), NUS Corporation for the United States Environmental Protection Agency (USEPA) (1984), and O'Brien & Gere Engineers (1986) have provided some site information. Additional site information was required by the NYSDEC. The RI work effort was completed in accordance with the Focused Remedial Investigation Work Plan, Quality Assurance Project Plan, and Health and Safety Plan which were developed for the site and accepted by the NYSDEC. The initial RI work effort involved the sampling and analysis of site air, soil, two pumphouses, a cistern, and ground water. Test borings and shallow and deep ground water monitoring well installations and sampling were completed. Samples were analyzed for New York State Target Compound List (TCL) metals, volatile organics, and semivolatiles as well as selected non-TCL parameters. Subsequent requests by the DEC resulted in an additional scope of work identified in a letter to NYSDEC dated May 20, 1991. The scope of work included additional sampling of several monitoring wells and the collection of sediment and ground water from the cistern and pumphouses. Based on Alcan's refusal to investigate off-site impacts due to the presence of the Sigismondi landfill between the Jarl site and potential downgradient receptors, the NYSDEC has proposed to include that component of the investigation into the anticipated RI/FS at the Sigismondi Landfill (see 4/13/93 letter from NYSDEC).

The site is located on unconsolidated glacio-fluvial and glacio-lacustrine deposits. The unconsolidated deposits consist of silty sand, clayey silt, and sand and silt. The unconsolidated deposits are believed to be about 125 feet thick at the site. The silty sand is the uppermost unit and is unsaturated except during periods of high precipitation. Beneath the silty sand is the shallow ground water zone, which is a clayey silt. The shallow ground water zone is about 11 feet thick and overlies an unsaturated sand and silt. The clayey silt is a perched ground water unit. At a depth of between approximately 50 feet and 80 feet below the ground surface, the sand and silt unit becomes saturated. This forms the deeper ground water unit beneath the site. Ground water flow, in both the shallow and deep ground water zones, is generally toward the north. The ground water in the shallow zone discharges to the ravine located immediately north of the site. The deep ground water is part of the Irondequoit Aquifer which generally flows north to Lake Ontario.

The results of the air quality sampling did not detect impacts to the site air with the possible exception of aluminum.

Site soil sampling and analysis documented seven soil samples to the north of the site which showed no impact and one sample on the east side of the site had elevated levels of total chromium.

Samples of the impoundment settled solids identified elevated levels of a variety of metals, yet are not characteristic hazardous wastes based upon TCLP metal analyses of the solids. The sampling and analyses of the settled solids demonstrate that they are not a characteristic hazardous waste based on metals TCLP analyses. Settled solids in a portion of the eastern impoundment identified elevated concentrations of some volatile organic compounds.

As discussed in the FRI Work Plan (O'Brien & Gere, 1990), sampling of surface water was not proposed due to the proximity to and possible contributions by the adjacent Sigismondi Landfill. Potential past overflows or discharges from the surface impoundments were addressed through the collection of soil samples.

Ground water samples from the shallow ground water zone identified impacts by chromium, hexavalent chromium, iron, sodium, fluoride, and chloride. Unfiltered shallow ground water samples exhibited elevated concentrations of lead, manganese and magnesium. After filtration, levels were within ground water standards, indicating that sediment within the samples was responsible for the elevated values. Samples from wells upgradient or beyond the zone believed to be impacted by the settled solids of the impoundments (wells B-1S and B-2S) also showed elevated levels of hexavalent chromium (B-2S only), chromium, magnesium, manganese and iron. Shallow ground water may be hydraulically connected to the deep ground water zone, but the volume of water potentially involved in vertical migration is small compared to the volume of flow in the deep zone . Volatile organics were identified in deep monitoring wells. Chromium and hexavalent chromium concentrations were elevated in some downgradient deep wells. However, the distribution of compounds in the deep ground water suggests that the potential source of the elevated chromium, hexavalent chromium, and some volatile organics in the deep wells may be the shallow ground water zone on the Jarl site and/or off-site.

A risk assessment was completed for the site in accordance with the work plan. The risk assessment concluded that the presence of chromium in the settled solids presents a risk to future on-site workers if the settled solids are exposed at the site surface or chromium residues are released to the air. Shallow ground water did not present a complete pathway. Deep ground water presented a risk to future off-site residents due to the presence of chromium in the ground water.

1. Introduction

1.1. General

This document presents the methods and results of a Focused Remedial Investigation (FRI) conducted at the Alcan Aluminum Corporation Site #828005 pursuant to Article 27, Title 13 of the Environmental Conservation Law of the State of New York entitled "Inactive Hazardous Waste Disposal Sites" and Order on Consent #B8-0049-84-10.

The investigation meets the requirements of the Order on Consent through the development and implementation of work tasks designed to evaluate the nature and extent of impacts former site activities may have had on the site. The original RI work tasks were submitted to the New York State Department of Environmental Conservation (NYSDEC) in a Work Plan entitled Focused Remedial Investigation - Alcan Aluminum Site #828005, Pittsford, New York dated July 1990. The Work Plan included a Quality Assurance Project Plan and a Health and Safety Plan. In a letter dated September 10, 1990, the NYSDEC informed Alcan Aluminum Corporation that the Work Plan was approved. On September 17, 1990, Alcan Aluminum Corporation executed the Order on Consent #B8-0049-84-10. Subsequent requests by the NYSDEC resulted in an additional scope of work identified in a letter to NYSDEC dated May 20, 1991. In a letter dated July 8, 1991 the NYSDEC approved the additional scope of work with certain reservations. These reservations related to potential impacts associated with the main building, cistern, and pumphouses. It was agreed by the involved parties that work associated with these areas would be deferred until sampling results from the proposed investigative work were discussed in the FRI report. The results of the additional scope of work identified in the May 20, 1991 letter are presented in this report. Work related to sampling of the cistern and pumphouses has been completed and is presented in this report. A scope of work related to the main building was approved by the NYSDEC in a letter dated April 12, 1996. This scope of work was completed in May 1996 and will be presented in a Supplemental FRI letter report.

1.2. Site description

The Alcan Aluminum Corporation Site, #828005 on the New York State Inactive Hazardous Waste Site list, is located on Linden Avenue in Pittsford, New York. Figure 1 illustrates the location of the site with respect to proximal physical and cultural features. The site is bordered on the south by Linden Avenue and a railroad yard. Light industrial facilities are located to the west. J.C. Plastics Co. is located on the southwestern corner of the property. Steeply graded wooded lots with a tributary of Irondequoit Creek (Tributary #9) are located to the north, and the Sigismondi Landfill borders the site to the east. The Sigismondi Landfill consists of fill materials which extend to, and may encroach upon, the Alcan property. The exact site boundaries will be determined during the RI/FS at the Sigismondi site..

The Alcan site is approximately 1540 ft long and 600 ft wide as illustrated in Figure 2. The surface of the site is for the most part generally flat, varying in elevation by less than 4 ft. The area in the northern portion of the site, at the location of former impoundments, is slightly elevated relative to the rest of the site due to filling and grading activities associated with impoundment closure. Toward the northern edge of the property, headward eroding gullies create an area with ravines and increased topographic relief. No standing water is visible at the site. Water that falls as precipitation drains from the site via a drainage swale along Linden Avenue and a second drainage ditch running west to east along the south end of the former impoundments. This swale continues along the east side of the site carrying water off-site to the north. This drainage swale reportedly also receives runoff from a portion of Linden Avenue. Reeds and other marshy vegetation are found along the southern boundary of the former impoundments and within the drainage swale. Based on visual observation, the saturation at this location is believed to be related to surface runoff from the parking lot immediately south of the swale and the main building's roof drainage system which is connected to the cistern and pumped to the area immediately south of wells B-2S and B-2D. Elevated water levels at well B-2S may be associated with increased recharge relative to these processes. Representatives on-site indicated that water from the facility roof drains to a cistern where it is pumped to the area just south of the former impoundments where the natural surface gradient carries it off-site (oral communication, Peter McAnn). Formerly this same swale served as a discharge channel for the J.C. Plastics Co. parking lot.

The five structures currently on site include three larger buildings and two smaller structures that had previously served as pumphouses (Figure 2). The westernmost most building is currently leased from Alcan and occupied by J.C. Plastics Co. The remaining two buildings are currently vacant. Both of the pumphouses have been decommissioned, though standing water is present in each.

1.3. Site history

The Alcan Aluminum Site #828005, formerly known as Jarl Extrusions, Inc., is presently owned by Alcan Aluminum Corporation. Historical data indicate the facility began operations in 1953. Information from the NYSDEC and Monroe County Department of Health (MCDOH) indicates that until 1956, wastewater generated from aluminum extrusion operations was discharged into the ravine at the north end of the site, or to a ravine formerly present to the east of the site and now occupied by Sigismondi Landfill. Materials provided by the MCDOH indicate that wastewaters generated from aluminum extrusion operations were pumped into retention impoundments after 1956 (Figure 2). An estimated 200,000 gallons per year of untreated wastewater generated from the processing plants was likely pumped to the eastern and western impoundments from one or both of the two pumphouses, found along the eastern and western property boundaries, via underground pipes. Historic aerial photographs received from the U.S. Department of Agriculture Soil Conservation Service (1971) and U.S. Geologic Survey (1958, 1963, 1966, 1976 and 1980) suggest that the impoundments were located in areas of natural depressions and were active between 1963 and 1976. Periodic overflows of the lagoon were reported by various state and county agencies between 1956 and 1968. Since the wastewater was directly discharged, the discharge of listed settled solids from this process into the lagoons did not occur. Currently, there are settled solids in the former impoundments. Based on documentation available, no listed or characteristic hazardous wastes were discharged to the lagoons. It is Alcan's position that the past discharges were free of F019 wastes. Based on available documentation, Alcan believes that wastewater treatment sludges derived from the chemical conversion coating of aluminum were disposed off-site. However, the NYSDEC position is that past discharges from the Jarl facility contained F019 wastes. Wastewater was disposed to the public sewer system in 1975. A pretreatment system was initiated in 1976 in order to discharge to the public sewer. Settled solids generated from this pretreatment system were disposed of off-site through local subcontractors. Documentation of this activity is included in Attachment A. This documentation includes representative contracts and other reporting information. In 1980, the impoundments were backfilled, graded and seeded. A cistern, located approximately 75 ft northwest of the eastern pumphouse (Figure 2), currently serves as a roof drain receptacle, holding storm water until it is pumped to the drainage swale along the eastern boundary. It is not known whether the cistern was utilized as part of the facility process wastewater system; however, the NYSDEC noted the presence of metal fragments and a green sheen during the sediment sampling events at the cistern.

Residual settled solids are present in the area of the former impoundments. A review of existing wastewater documentation exhibits a large variability in the volume of wastewater pumped from the facility, volumes discharged directly to the ravine, and volume that may have overflowed from the lagoons. Determination of the volume of settled solids currently existing in the area of the impoundments will be calculated as part of the site Feasibility Study (FS).

1.4. Previous studies

Three previous investigations were completed prior to the completion of this document. A previous investigation for metal contaminants within the surface impoundments was conducted by LaBella Associates, P. C., in July 1982 entitled "Abandoned Waste Lagoon Study". An investigation was completed by NUS Corporation in 1984 at the request of USEPA, and an investigation was completed by O'Brien & Gere Engineers, Inc. between 1985 and 1986. The results of the LaBella report are provided in the Jarl Extrusions, Inc. Site Investigation Report dated March 1986 by O'Brien & Gere Engineers, Inc.

In 1984, NUS Corporation, a USEPA contractor, inspected the site and collected and analyzed four soil samples, two sediment samples, and two surface water samples to evaluate concentrations of metal contaminants within and in the vicinity of the site.

Between February 1985 and March 1986, O'Brien & Gere Engineers, Inc. conducted a site investigation at the facility to locate the two former wastewater impoundments and evaluate their impact on the site soils and local ground water. Results of ground water analyses are included in Appendix A. The scope of the site investigation included:

a. Background Information and Aerial Photograph Review;
b. Geophysical Surveys (Electromagnetic and Electrical Resistivity);
c. Soil Boring and Ground Water Monitoring Well Installations;
d. Hydraulic Conductivity Tests;
e. Ground Water Sampling and Analysis; and
f. Surface Impoundment Test Pits

In March 1986, the site investigation was completed and a report entitled "Jarl Extrusions, Inc. Site Investigation" was submitted to the NYSDEC. The report summarized the site investigation and recommended several additional rounds of ground water sampling and analysis. The following text provides a brief discussion of the work tasks:

a. Background Information and Aerial Photograph Review

Available literature and information, aerial photographs and on-site use were reviewed. Aerial photographs from 1938 through 1951 indicated that the Jarl site was an open pasture until after 1951. The 1966 aerial photos illustrated the building complex and two shallow wastewater impoundments. Based on review of aerial photos and a comparison of the impoundments with various natural objectives and site structures in the photos, the impoundments appeared to be 5 to 10 feet deep. The surface impoundments were originally constructed within the native soils. When abandoned, the impoundments were apparently covered with the originally excavated soils (LaBella, 1982). There was no indication that the settled solids were removed prior to backfilling. The 1980 aerial photos illustrated that the former impoundments had been backfilled and graded. Figure 2 illustrates the site including the approximate horizontal extent of the impoundments based on review of the aerial photographs.

b. Geophysical Surveys

An electromagnetic survey conducted over the site identified the variable nature of the shallow unconsolidated deposits (Figure 3). The electromagnetic variations provided no indication of the locations of the former surface impoundments. Therefore, it was concluded that the accumulated impoundment deposits do not provide a conductivity anomaly sufficient to be distinguished from variations in native soil conductivity. The elevated readings observed in isolated areas along the eastern and northern boundaries of the site were attributed to pipes or other features associated with the former impoundments buried within the subsurface.

The electrical resistivity survey confirmed that the natural subsurface stratigraphy was consistent with the soil borings performed during the investigation. Generally, the sandy soil between 5 and 10 feet thick was recognized as a higher resistivity layer. A 10 to 20 feet thick clayey silt layer beneath the sandy soil was recognized as a low resistivity layer. Beneath the clayey silt, a significant thickness of a higher resistivity layer corresponds to the unsaturated sand identified in boring B-1. Additionally, the survey did not detect the former surface impoundments. The fact that neither geophysical survey delineated the horizontal or vertical extent of the impoundments suggested that variations in the natural subsurface conductivities exceeded any variation due to the presence of waste settled solids within the former lagoon impoundment.

c. Ground Water Monitoring Well Installations

Five soil borings, completed as 2-inch I.D. PVC ground water monitoring wells (B-1S, B-2S, B-3S, B-4S, and B-5S), were drilled on the site (Figure 2). Monitoring well locations were selected to provide upgradient and downgradient monitoring locations outside the perimeter of the former wastewater impoundments. The review of background information, maps, aerial photographs and geophysical surveys provided the information upon which monitoring well locations were selected.

The test soil borings reveal that the surficial materials are comprised of brown fine grained silty sand. This unit varies from approximately 5 feet thick on the southwestern side of the site to approximately 8 feet thick in the northeastern portion of the site. The bottom foot of this layer was saturated. Clayey silt to silty clay layers approximately 10 to 20 feet thick underlie the silty sand surficial deposit. The monitoring wells were installed predominantly within the clayey silt unit.

Results of ground water elevation data in the shallow monitoring wells indicated that ground water flows radially away from the former impoundments. This apparent flow pattern may not be representative due to the presence of a discharge boundary, the ravine, immediately north and east of the former impoundments. The true horizontal ground water flow direction is probably toward the north and northeast, given the regional topography.

Deep soil boring B-1 revealed that coarse grained sand and gravel deposits beneath the clayey silt are unsaturated to a depth of about 65 feet below the ground surface. The low permeable clayey silts are causing a perched ground water condition at the site. Although wells B-4S and B-5S were set within the clayey silt saturated zone, the lack of water in the wells during some or all of the sampling events suggests that the discharge boundary, the ravine immediately north of the site, is affecting the ground water elevation in these wells. In addition, this discharge boundary may bias the horizontal flow determination, since the ground water elevation in the wells will equilibrate with the lowest hydraulic head intercepted by the well. Lastly, water levels in these wells will be a product of the vertical and horizontal extent of the clay/silt horizon that is supporting the water above it.

Wells were not installed to define the vertical hydraulic potential or to evaluate potential vertical transport of site ground water parameters.

d. Hydraulic Conductivity Tests

In situ hydraulic conductivity tests were conducted in three of the five monitoring wells. Re-evaluation of these data as part of the current efforts indicated the horizontal hydraulic conductivity of the clayey silt ranged from 4.9×10^{-7} cm/sec to 1.6×10^{-5} cm/sec (1.0×10^{-2} gpd/ft^2 to 3.4×10^{-1} gpd/ft^2). Table 1 provides the results of the *in situ* hydraulic conductivity tests.

e. Ground Water Sampling and Analysis

As part of the site investigation (OBG, March 1986), ground water samples were obtained from four of the five monitoring wells on two occasions in July 1985. Well B-5S did not have sufficient water in it to be sampled on either of these occasions.

During a return trip in October 1985, insufficient water existed in wells B-3S, B-4S and B-5S to collect samples. Therefore, no samples were analyzed.

Ground water samples were filtered in the laboratory and analyzed for total chromium, hexavalent chromium, nickel, copper, cadmium, zinc, mercury, and lead. The analyses for chromium, nickel, copper, and zinc were selected based on the known processes and materials used at the facility. Analyses for mercury, lead and cadmium were included due to their occurrence in samples split with NUS Corporation in September 1984, although Jarl Extrusions has no record of using these metals at the facility. Additionally, total organic halogen (TOX) analyses were performed on unfiltered samples. The analytical results are included in Appendix A.

f. Surface Impoundment Test Pits

Fifteen test pits were excavated in October 1985 to collect soil samples for analyses and to assess whether residual material from the former surface impoundments existed in the soil. The test pit locations were selected based on review of aerial photographs to provide sampling locations both within and outside the former surface impoundments. The test pits were excavated and backfilled by a backhoe. Several selected soil samples of the site soil and black and white impoundment deposits were submitted to the laboratory for analyses of total chromium, copper, cadmium, zinc, lead and aluminum.

Analyses of selected samples of these variable deposits revealed the total chromium concentration was two orders of magnitude higher than background. Lead showed a two- to three-fold increase as compared to background levels. Copper increased approximately two-fold over background in the white deposits, and an order of magnitude over background in the black deposits. Although aluminum was found in each sample, it was attributed to the fact that sand and clay soils typically contain high levels of aluminum or that non-visible deposits of aluminum from the wastewaters may exist in the site soils. There is approximately a two-fold increase in aluminum concentrations between the background samples and the black deposits, whereas the white deposits contain about a five-fold increase in aluminum. The results of the EP Toxicity test on the black impoundment deposits from test pit #5 indicated no detectable concentrations of leachable heavy metals.

Since the March 1986 Report, ground water samples have been collected on March 21, 1986, October 16, 1986, April 15, 1987, June 2, 1987 and December 29, 1987. These ground water samples were analyzed by up to four different laboratories, which included NYSDEC analyzed samples. Sample results may be found in Appendix A (Historical Results). These samples were typically turbid and as such were analyzed as both unfiltered and filtered samples. Chromium, copper and aluminum have been documented in some of the monitoring wells. Hexavalent chromium, nickel, zinc, lead, mercury and cadmium have been detected; however detection has either been sporadic or not detected by all of the laboratories.

The previous studies and reports are noted here, however the results of these works are not discussed and were not relied upon to develop the findings of the RI report.

The NYSDEC considered the site a threat to the environment based on the possible presence of settled solids from the chemical conversion of aluminum and the exceedences of ground water and drinking water standards. Given this determination, in 1988 the NYSDEC reclassified the site as Class 2 on the Registry of Inactive Hazardous Waste Sites and required a Remedial Investigation.

In April 1989, representatives of Alcan Aluminum Corporation and O'Brien & Gere Engineers, Inc. met with representatives from the NYSDEC to discuss the status of the Jarl Extrusions Inc. site. During the meeting, it was decided to conduct a Focused Remedial Investigation (FRI) pursuant to an Administrative Order on Consent to address the concerns of the state regarding inconsistent performance of the shallow wells; evaluating impact, if any, on the deep ground water zone; characterizing the vertical extent of the surface impoundments; and the use of Contract Laboratory Protocols (CLP).

2. Remedial investigation field methods

Field methods utilized for the RI were previously presented for review and accepted by the NYSDEC as part of the Focused Remedial Investigation Work Plan dated July 1990. The protocols employed during the sampling of the east and west pumphouses and the cistern were accepted by NYSDEC prior to sample collection. The tasks employed during the FRI included installation of seven shallow and six deep ground water monitoring wells to assess ground water flow and the potential impact from past site activities. Sampling of the former impoundment settled solids, air monitoring, and sampling of surficial soils was completed to identify if discharges from the former impoundments have affected the natural environment. A total of four ground water sampling events were conducted during wet and dry periods to assess the impact of past plant activities on ground water. Ground water elevations during the sampling events are presented on Table 1. At the request of the NYSDEC, two rounds of sampling were also performed on standing water bodies within two of the buildings that were believed to have served as pumphouses during plant operation. A cistern, located south of the former impoundments, that currently collects rainwater from the main plants roof was also sampled.

2.1. Impoundment boring sampling

On October 16 and 17, 1990, seven soil borings were completed to collect samples of waste materials from the former wastewater impoundments. Boring locations were mutually selected by OBG and NYSDEC personnel based on aerial photographs, a previously completed electromagnetic survey (EM-31), and past invasive activities. Four soil borings were drilled in the former western impoundment and three borings were drilled through the former eastern impoundment. Materials encountered during boring activities were logged by an OBG hydrogeologist (Appendix B). Figure 2 illustrates locations of the impoundment borings. Impoundment borings IB-5A, IB-5B, and IB-3 were conducted under the oversight of a NYSDEC representative. NYSDEC representatives were not present during completion of the other impoundment borings, although they were present during the location selection process. Laboratory results of impoundment boring samples are presented in Tables 2 through 5.

Borings IB-4, IB-5A, IB-5B, and IB-6 were located in the western impoundment. Borings IB-4 and IB-5A did not appear to intercept waste material. Boring IB-5B contained a 1-inch thick layer of green and white waste material. Subsequent drilling, approximately 10 ft southeast of IB-5B, did not intercept this material; therefore a test pit was manually excavated to expose a greater volume of soil adjacent to IB-5B and a sample for analyses was retrieved. During the boring of IB-6, a 0.5-ft thick layer of brown and orange sand with green and brown clay was intercepted at a depth of 8 feet and subsequently sampled.

The thickness of waste materials encountered in eastern impoundment soil borings IB-1, IB-2, and IB-3 was greater than the western impoundment. The thickness of the waste materials ranged from 10.1 ft towards the south to 8.6 ft in the north. Materials sampled included: (1) a grey and black fine grained sand, (2) black and white settled solids, (3) a grey-white clay, (4) a grey, white and black sand, (5) a second black and white settled solids, (6) a second grey and black fine grained sand, and (7) a black and green clay.

Samples of the encountered materials were collected by driving a 2-inch diameter split-barrel sampler (ASTM Method D-1586-84), manually excavating shallow test pits, or retrieving a sample as it ascended the auger. Manual excavation and sampling at the auger were employed when settled solids samples were not retained in the 2-inch split-barrel fitted with a plastic sample retainer or the layers of settled solids were too sporadic or thin to collect enough sample for laboratory analyses. Samples IB-5B (0 to 2 ft) and IB-3 (3.5 to 4 ft) were collected manually, and IB-3 (6 to 8 ft) was retrieved from the auger. Three samples (a green and white silty layer; a sporadic black, white, and green layer; and a black and white settled solids) were collected by these means.

Samples collected during boring operations were visually identified by color, major and minor grain size components, and saturation content in the split spoon. Sheens, odors, or other significant properties of the materials encountered were noted in the field boring log. A minimum of one waste/settled solids sample was collected from each soil boring, such that each type of encountered settled solids was represented by at least two samples. The sample locations and collection methods were approved by the on-site NYSDEC personnel.

Samples of the settled solid materials were submitted to the laboratory for analyses based on physical appearance and odor. A sample of each settled solid type from a single boring was submitted to the laboratory for analyses as per the Work Plan. Settled solids were usually identified by their unnatural color and physical composition. A duplicate sample of the black and white settled solids and a rinsate blank were also submitted to the laboratory for analyses in accordance with the Work Plan.

Impoundment samples were transported to O'Brien & Gere Laboratories for analyses of NYS TCL metals, NYS TCL volatiles, hexavalent chromium, boron, cyanide, fluoride, chloride, phenols, and sulfate in accordance with the QAPP. Analyses were carried out under CLP protocol with the exception of non-CLP parameters including hexavalent chromium, boron, fluoride, chloride, phenols, and sulfate in accordance with the QAPP. Additionally, a composite sample from the nine submitted samples was analyzed for full NYS TCL parameters. In accordance with the Work Plan, the composite sample to be analyzed for volatile organics was obtained from the black and white settled solids sample of IB-3 (6 to 8 ft) retrieved under the observation and concurrence of the on-site NYSDEC representative.

Split-barrel samplers were decontaminated after each use with a non-phosphate detergent wash followed by a distilled water rinse in accordance with the QAPP. Shovels were decontaminated by pressure steam cleaning after each test pit excavation. Decontamination water generated was contained at each site where impoundment waste materials were identified. Decontamination wastewater was contained in a labeled 55-gallon metal drum at the decontamination pad. The drilling rig was decontaminated after each boring with a high pressure steam wash as per the Work Plan QAPP.

2.2. Surface soil sampling

On October 3, 1990, ten surface soil samples were collected by an OBG hydrogeologist under the observation of a NYSDEC representative. The purpose of surface soil collection and subsequent analyses was to evaluate areas that may have been impacted by former impoundment discharges due to overflowing. Two surface soil samples, S-9 and S-10, were collected from the southwest portion of the site in areas believed to have been unaffected by overflow, to evaluate normal or background levels for the parameters in question. The first background sample, S-9, was retrieved from within the naturally occurring berm along the western edge of the site approximately 230 feet north of monitoring well B-ID. This sample was retrieved from a point 5 to 7 feet higher than the top of the former impoundment surface and is therefore believed to have been unaffected by substances contained within the impoundment. The second background sample, S-10, was collected approximately 30 feet south of monitoring well B-1S, or approximately 225 feet southwest of the former impoundment. Figure 2 illustrates the locations of the soil samples. Surface soil sample results are presented in Tables 6 and 7.

Two samples were collected at locations identified as electromagnetic highs. OBG personnel, under observation by a NYSDEC representative, conducted a second electromagnetic survey within the previously identified anomalous areas to further delineate areas of suspected impoundment overflows. The electromagnetic high encountered along the eastern boundary of the site and adjacent to the drainage ditch separating the site from the Sigismondi Landfill consisted of an approximately 40 feet long area (Figure 3). Along the most northern portion of the north-south rending high, a metal drum and other metallic debris were observed within the bank of the ditch beneath the surface vegetation and soil. Sample S-1 was retrieved from within the side of the drainage ditch located along the eastern side of the site near the center of this electromagnetic high (Figure 2). Sample S-6, based on the northern electromagnetic anomaly, was retrieved from a location approximately 25 ft north of B-7 (Figure 2). No metallic debris was observed within this electromagnetic high.

The remaining six surface soil samples were retrieved from areas located along the northern portion of the site. These samples were generally taken from within headward eroding gullies that may have been evacuated by overflow from the former impoundments (Figure 2). Based on a USGS benchmark, these samples were retrieved from elevations ranging from 389.4 ft to 363.7 ft.

The soil samples were collected at locations accepted by both OBG and NYSDEC personnel and field surveyed to document their location and elevation (Figure 2). Samples were retrieved from depths between 6 and 12 inches and were excavated with a decontaminated stainless steel trowel. The trowel was decontaminated between samples using an alconox detergent wash followed by a distilled water rinse, 1% nitric acid rinse, a second distilled water rinse, a pesticide grade hexane rinse and a methanol rinse before air drying. A distilled water rinsate blank was also collected and returned to the laboratory for analysis in accordance with the Work Plan.

Soil samples were transported to OBG Laboratories on October 3, 1990 for analyses of NYS TCL metals, NYS TCL volatiles, hexavalent chromium, cyanide, fluoride, boron, chloride, sulfate, and phenols under CLP.

2.3. Air monitoring

The air quality monitoring program was conducted at the site by OBG personnel on October 17, 1990 to evaluate the potential for air transport of site contaminants in volatile and fugitive dust emissions. This program was conducted in accordance with the Focused Remedial Investigation Work Plan (July 1990). This program included:

- Upwind, on-site, and downwind monitoring for aromatic hydrocarbons following NIOSH Method 1501
- Upwind, on-site, and downwind monitoring for halogenated hydrocarbons following NIOSH Method 1003
- Upwind, on-site, and downwind monitoring for metals following NIOSH Method 7300

The objective of the sampling efforts was to quantify site indicator compound emissions from the site. Aromatic hydrocarbons, halogenated hydrocarbons, and metals have been identified as possible contaminants which may be released from the site to general atmospheric circulation. These compounds were identified in Table B-5 of the Work Plan as the compounds that were targeted for the air sampling survey. To quantify the target compound concentrations, air quality sampling was performed at three areas. These locations can be found on Figure 4. On-site sampling locations were selected to provide sensitivity to direct releases from known source areas. One upwind sample location for the site was selected to identify background concentrations. Emissions moving off-site were evaluated at the downwind sampling location for the site. Laboratory results for all samples are presented in Appendix C.

Samples were collected approximately 4 feet above ground to approximate the human breathing zone. Samples were collected for the targeted compounds using modified National Institute for Occupational Safety and Health (NIOSH) methods listed below:

- NIOSH method 1501 for Aromatic Hydrocarbons
- NIOSH method 1003 for Halogenated Hydrocarbons

- NIOSH method 7300 for Metals

The hydrocarbon sampling trains were modified to include commercially available charcoal tubes (Dupont 200/100). The hydrocarbon air samples were collected using SKC air sampling pumps pre-calibrated to 0.5 liter per minute. A duplicate air quality sample was collected for each analytical method. The charcoal tubes were sealed with plastic caps provided by the manufacturer, labeled and hand-delivered to Galson Laboratory, American Industrial Hygiene Association (AIHA) accredited, for analysis. Analyses were performed on November 6, 1990.

The particulate samples were captured on closed-faced mixed cellulose ester filters (manufactured by Millipore). These filters were mounted in resealable three-piece cassettes. The samples were collected using SKC air sampling pumps pre-calibrated to 2.5 liters per minute. A duplicate air quality sample was collected at the eastern location. The cassettes were capped, labeled and hand-delivered to Galson Laboratory for analysis. Analyses were performed on November 6, 1990. Laboratory results for all samples, including the duplicate samples, are presented in Appendix C.

For Quality Assurance/Quality Control (QA/QC) purposes, a replicate air sample for each analytical method was collected at the east location and submitted for analysis as a separate sample. A field blank for each analytical method was submitted to evaluate contamination related to shipping and handling. It was opened briefly to the atmosphere, but no air was drawn through it.

2.4. Ground water monitoring well installation

Thirteen additional ground water monitoring wells were installed at the site to provide information on ground water quality, elevation, flow direction, and velocity. Six of the wells, B-1D, B-2D, B-3D, B-4D, B-5D and B-12D, were installed within the deep ground water zone adjacent to existing shallow wells, where present. These deep wells were installed at depths of 70 ft, 70 ft, 85 ft, 90 ft, 90 ft, and 53 ft, respectively. The remaining seven wells, B-6, B-7, B-8, B-9, B-10, B-11 and B-13 were installed within the shallow saturated zone at depths of 20 ft, 18 ft, 20 ft, 20 ft, 17 ft, 13 ft, and 20 ft, respectively. Shallow monitoring wells B-9, B-10, and B-11 were installed to assess potential impacts from the existing building on-site. Figure 2 illustrates the location of the new and existing wells. The new wells were installed between October 1, 1990 and May 7, 1992. The five previously installed wells (1985) were also utilized, whenever possible, for ground water collection and subsurface hydraulic conductivity evaluation.

Ground water monitoring wells were installed using hollow stem augers. Boreholes for monitoring well installation were sampled using split-barrel samplers (ASTM D-1587-84). Sampling was continuous for all wells except for the first 20 ft of wells B-4D and B-5D, where standard sampling was accepted by NYSDEC personnel because of the proximity to previously installed and logged wells (B-4S and B-5S). An OBG hydrogeologist logged the encountered material and a representative sample was preserved in a labeled jar. Ground water monitoring well logs are presented in Appendix D.

Shallow wells installed in 1990 were positioned so that well screens extended a minimum of 10 ft below the first saturated zone. Shallow wells installed later (1991 and 1992) were set so that no part of the screen extended into material determined to be unsaturated. Well depths were agreed upon by OBG and NYSDEC personnel. Deep well screens were installed a minimum of 10 ft into the second saturated zone. Wells were screened at the base with 10 ft of 0.01-inch slot size, threaded flush joint, 2-inch I.D. Schedule 40 PVC well screen. Schedule 40 PVC, 2-inch I.D. well casing extended from the top of the screen to 2 to 3 ft above grade. Morie #0 grade washed silica sandpack was installed around the annulus of each well screen using the tremie method within the augers. The sandpack was installed a minimum of 2 ft above the well screen. Due to the wet weather experienced during field operations, wells B-3D, B-4D, and B-5D were sand tremied for the first 2 to 5 ft. Because sand often became plugged in the tremie rod due to damp conditions, the drillers manually added sand within the augers with consent of the NYSDEC representative. Continuous measurement with a weighted tape documented that no bridging of the sand had occurred. Sand heaving up into the lead auger at well B-4D did not allow the addition of Morie "0" grade sand until 7 ft of auger had been pulled. The sand continuously heaved up into the augers due to its saturated nature, lack of cohesiveness, and the difference in hydraulic head. The formation sand is of sufficient coarse grained nature that it will act as a natural filter pack, preventing finer sand particles from entering the well. A layer of fine sand, a minimum of 0.5 ft in thickness, was added on top of the coarse sand to act as a filter and to support the overlying bentonite. This sand was tremied when dry conditions allowed, but often was also manually emplaced down the augers with the permission of the NYSDEC representative; continuous tape measurements were made to document that bridging of the sand had not occurred.

A minimum of 3 ft of bentonite was emplaced over the fine sand to seal off the screened interval from surface waters. Continuous measurements with a weighted tape were taken to document that the pellets were settling to the base of the open auger. The bentonite pellets were hydrated and allowed to swell for more than 0.5 hours to seal off the annulus of the borehole above the well screen. The remaining annular space between the borehole wall and riser was backfilled with a bentonite/cement grout as the augers were being pulled. A locking steel protective casing was installed approximately 3 ft into the cement grout and extended 2 to 3 ft above grade. An elevated cement pad which drains water away from the casing was installed to prevent surface water from entering the borehole.

Each of the new and existing wells were surveyed with respect to an USGS datum/benchmark.

2.5. Ground water monitoring well development

The existing and newly installed ground water monitoring wells were developed to remove fine grained sediment from the well and the surrounding sand pack. Fine grained sediments within ground water samples have been known to alter the values of certain metals when analyzed (Strausberg, 1983).

Wells were bailed dry with a decontaminated polystyrene or stainless steel bailer connected to new dedicated rope. The bailer was agitated in the well to induce turbulence and increase the probability for the removal of fine material. The three newly installed shallow wells were bailed dry after the removal of 1 to 5 gallons of turbid water. This volume represents between one and seven well volumes since wells contained between 2 to 5 ft of water when bailing had begun. Water evacuated from the shallow wells was discarded on the ground surface in accordance with the Work Plan.

The deeper wells were bailed and yielded between 25 and 45 gallons. This equates to between 15 and 25 well volumes. Water evacuated from the deeper wells was contained in labeled 55-gallon drums placed proximal to the wells. Water removed from deeper wells was relatively turbid as it contained sand, silt and clay particles during early development, but generally improved in clarity with continued development. Following receipt of analytical results and concurrence with NYSDEC representatives, development water was discharged to the ground surface and the empty drums were removed from the site.

2.6. Ground water sampling and analyses

Ground water samples were collected from the wells as follows:

Round	Date	Wells Sampled
Round 1 (1)	Nov. 11-19, 1990	B-1S, B-1D, B-2S, B-2D, B-3S, B-3D, B-4D, B-5D, B-6, B-7, B-8, B-10
Round 2 (2)	Feb. 28 - March 1, 1991	B-1S, B-1D, B-2S, B-2D, B-3S, B-3D, B-4S, B-4D, B-5D, B-6, B-7, B-8, B-10
Round 3	June 3, 1992	B-1D, B-9, B-10, B-12D, B-13
Round 4	August 1992	B-1D, B-9, B-12D, B-13

(1) Wells B-4S and B-5S were dry.
(2) Well B-5S was dry.

Prior to sampling, ground water level measurements were collected in each of the monitoring wells and converted to the ground water elevations presented in Table 1. Ground water samples were collected using a decontaminated stainless steel bailer attached to new polypropylene rope or a decontaminated bladder pump with dedicated Teflon tubing. The method used was based on well recharge rates. Wells with low recharge rates were sampled with a bailer as retrieval of the greatest proportion of available water to sample was critical and time requirements for bailing wells that quickly ran dry were much less than bladder pump setup. Bailers and bladder pumps were decontaminated between wells by scrubbing with a low phosphate detergent, a tap water rinse, 1% HNO_3 rinse, methanol rinse, followed by a hexane rinse, and a final distilled water rinse. A plastic drop cloth was placed around the well to shield sampling equipment from the ground surface.

Wells were purged of a minimum of three well volumes before sampling commenced or wells were bailed dry and sampled after recharge. Water removed from deep wells was contained in secured drums proximal to the well locations. Shallow water was not containerized as per the Work Plan.

Because of the slow recharge rates, some wells were bailed dry a number of times during the sampling process. Field measurements of water level, conductivity, temperature, pH, and turbidity were collected and are included on the ground water field sampling logs.

Samples for inorganic analysis with turbidity less than or equal to 50 NTU were not filtered and inorganic results are reported as soluble. Samples with turbidity greater than 50 NTU were filtered with disposable in-line filters when retrieved with the bladder pump or hand drawn through the filter apparatus as described below when retrieved with a bailer. Laboratory results from samples below 50 NTU and filtered samples are reported as soluble, while unfiltered samples with turbidities above 50 NTU are reported as total. During the initial sampling round, the samples from all shallow wells required filtration except well B-2S. The only deep well sample which required filtration was collected from well B-1D. Wells B-1S, B-1D, and B-6 were filtered with in-line cellulose filters with 0.45 micron openings. Samples from wells B-3S, B-7, and B-8 were retrieved with a bailer and filtered with hand apparatus if submitted for metals analyses.

The procedure for hand apparatus filtration consisted of removal of the required volume of water with a stainless steel bailer. The water was then decanted into the filtering mechanism which consisted of a filter funnel fitted with a 5.5 μm filter. A negative pressure was induced by hand pumping into an Erhlemeyer flask, pulling the sample through the filter and into the flask. Filters generally required changing 2 to 3 times for the full sample volume. The sample was then filtered again through a 0.45 μm filter before preservation with HNO_3. Samples requiring filtration during the second sampling event included wells B-3S, B-3D, B-6, B-7, and B-8. Samples from wells B-3S, B-7 and B-8 were poured into a decontaminated teflon tube and forced through an in-line filter. Filters were disposed of after a single use. After filtration and during both rounds of sampling, the samples retrieved from well B-8 retained a light brown color, indicating that some very fine clays may have passed through the filters and remained in the sample.

On June 3 and August 10, 1992, ground water samples were collected from newly installed wells B-9 and B-13 which are located south of the former impoundments and south of the office building, respectively. Ground water samples from B-13 on both sampling dates and B-9 in June 1992 had turbidities above 100 NTU, and therefore unfiltered (total) and filtered (soluble) samples were collected. The ground water sample from B-9 collected in August 1992 was clear, so filtering was not required and results are reported as soluble.

Samples and required trip and field blanks, including matrix spike (MS) and matrix spike duplicates (MSD), were placed in appropriate containers and placed in a cooler for transport to the laboratory. The first round of samples was analyzed by OBG Laboratories, Inc. and the second round samples were analyzed by General Testing Laboratories. The third and fourth round samples were analyzed by NYTEST Enviornmental, Inc. Samples were delivered to the appropriate laboratory on the day of collection. A chain of custody was initiated in the field during collection of the sample.

2.7. Cistern and pumphouse sampling

A first round of water samples was collected from the cistern and the east and west pumphouses on June 3, 1992 (Figure 2). The second round of sampling of the cistern and two pumphouses was performed on August 10, 1992. Sediment samples were proposed for all three of these locations, but only the cistern contained enough sediment for sampling. Samples were analyzed for the parameters requested by the NYSDEC for the second round of ground water samples, including: volatile organic compounds (VOCs), hexavalent chromium, chromium, cadmium, iron, lead, mercury, nickel, sodium, zinc, fluoride, chloride and sulfate. Samples were submitted to NYTEST Environmental, Inc. for analyses using NYS CLP methodologies with Category B deliverables. Results of the analyses are included in Tables 8A, 8B, 9A, and 9B.

Methodologies utilized for water sampling of the pumphouses and cistern, and sediment sampling from the cistern were approved by the NYSDEC prior to sample collection. Water samples were collected from the east and west pumphouses using a decontaminated stainless steel bailer attached to new polypropylene rope. Because of the paucity of waste within the cistern during the first sampling round,, a newly emptied plastic distilled water container was then maneuvered so that water flowed freely into the container. This method of sample collection was field improvised, as the water volume in the cistern was much lower than anticipated. The method was approved by the on-site NYSDEC representative and will not likely affect sample results. Water from the cistern was collected during the second round with a decontaminated stainless steel bailer and new polypropylene rope. Sediment samples were retrieved from the cistern with a decontaminated Ekman box dredge that was lowered into the cistern with new polypropylene rope.

2.8. Hydraulic conductivity tests

Upon completion of the ground water monitoring wells, *in situ* hydraulic conductivity tests were conducted to assess the horizontal hydraulic conductivity of the subsurface materials encountered within the screened interval. The tests were performed on November 6 and 8, 1990 and August 10, 1992. Results of the hydraulic conductivity tests are presented on Table 1.

Hydraulic conductivity tests were performed using two different techniques. Data for hydraulic conductivity tests of wells with water levels that could not be lowered by bailing were collected through use of a pressure transducer. This method required the measurement of the static water level, addition of a decontaminated teflon rod which acted as a slug, and nearly continuous measurement of the water column height (hydraulic head) using a pressure transducer until equilibrium conditions were reached. Wells with lower conductivities were purged of water with a decontaminated stainless steel bailer and the water level was measured with a water level probe until the water level had recovered to at least two-thirds of the static water level.

Data from both methods were analyzed using Hvorslev's method to estimate the horizontal hydraulic conductivity of the screened portion of the formation. Results of the *in situ* hydraulic conductivity tests are presented in Appendix E. The values calculated using these methods are in agreement with similar materials of this nature, silty clay with minor fine sand for the shallow saturated zone, or medium sand with minor silt for the deeper saturated zone (Freeze and Cherry, 1979). Shallow ground water hydraulic conductivity values were calculated under the assumption that no vertical potential exists across the screened interval. Well logs and water level data indicate that near the northern end of the site, a vertical potential exists within the shallow ground water zone; therefore results of the shallow hydraulic conductivity tests in that area may be in error.

Hydraulic conductivity data from 1986 was re-evaluated and found to be in error. The re-evaluated values determined using the data retrieved and evaluated by Hvorslev's method are 1.6×10^{-5} cm/sec and 2.6×10^{-5} cm/sec for wells B-1S and B-2S. Well B-3S had less than 4 ft of water and yielded a value of 4.9×10^{-7} cm/sec, which is believed to be more representative of the true hydraulic conductivity.

3. Regional and site geology

3.1. Regional geology

The site is located within the Erie-Ontario Lowland region of the Central Plains physiographic province (Muller, 1965). This region's geomorphology is characterized by features of glacial activity such as moraines, drumlins, kettles, and filled valleys (Fairchild, 1926). The Irondequoit Valley is one such feature.

Bedrock within this region consists of Paleozoic age sedimentary rocks of a fine grained nature deposited in shallow seas or deltas during erosion of the eastern lying highlands. These rocks dip gently to the south with more resistant layers responsible for the two major escarpments and many cuestas that trend east-west within this region.

The overburden sediments within the Irondequoit Valley occupy a deep bedrock channel developed prior to and during glaciation (Yager, R.M. et al, 1985). During the recession of the last glacial episode, meltwater from the glacier which covered the region produced deposits of medium- to fine-grained sediments ranging from a few feet to about 400 feet in thickness (Fairchild, 1935). The unconsolidated sediments overlying the bedrock within the Irondequoit valley were deposited by glacial, glacio-fluvial, and glacio-lacustrine processes.

3.2. Site geology

Bedrock was not encountered during drilling operations at the site but available information indicates that the site is located over the Penfield Dolostone near the contact with the resistant Decew Dolostones of the

Lockport Formation (Fisher et. al., 1971). The depth to bedrock beneath the site is estimated at 125 feet. Bedrock is exposed on the bed of Irondequoit Creek approximately one-half mile northeast of the site at an elevation about 125 ft below the site elevation.

The overburden at the site consists of horizontally laminated fine grained sands, silts, and clays with gravel. These parallel laminated deposits appear to have originated within a preglacial lake. Apparent post-glacial beach, fan, and stream deposits are also present at lower elevations at the site.

Surficial deposits at the site include massive appearing silty sands. The silty sands may have been reworked by grading operations during impoundment closure in that area. Below the silty sands is laminated clayey silt with occasional fine- grained sand horizons. The clayey silt zones appear as individual clay laminae alternating with silt laminae. These couplets of silt and clay laminae with occasional sand horizons result from seasonal or diurnal fluctuations in the glacial meltwater discharge volume (Walker, 1984). The accompanying geologic cross sections (Figures 5, 6, 7, and 8) show that the clayey silts of the shallow saturated zone appear to thicken slightly towards the northern end of the site. Figure 5 illustrates the location of the geologic cross section which is depicted in Figure 6. Figure 7 illustrates the location of the cross section depicted in Figure 8. Below the clayey silt zone is an unsaturated fine grained sand and silt unit that occasionally contains larger outsized clasts (pebbles) which may be ice rafted debris released from floating icebergs. The thickness of the fine grained sand and silt is likely the result of suspension settling of particles in a preglacial lake. The similarity in thickness and homogeneity in grain size of the unconsolidated materials found at the site infers that the deposits at the site are most likely continuous across the site. Associated with the lower sampled portion of these deposits are coarse grained sands with heavy mineral crossbedding.

Within the area surrounding the site, topography gently slopes to the north towards the highly incised Irondequoit Creek Valley and its tributaries. Surface water drainage within and proximal to the site is to the north into a tributary of Irondequoit Creek (Tributary #9) and ultimately Lake Ontario. Headward eroding gullies create an area with high relief immediately north of the site. The unconsolidated sands are easily eroded due to the lack of cementation by finer particles.

4. Hydrogeology

4.1. Regional hydrogeology

Regionally, the site lies within the Irondequoit Creek drainage basin which includes a buried preglacial valley. The thick sequence of sediments within the valley comprises the Irondequoit Aquifer, which is utilized primarily by private and municipal water systems (Waller and Finch, 1982). A significant amount of ground water is transmitted through the Irondequoit aquifer (Yager, R.M. et al, 1985). Although data regarding the hydraulic conductivity of the aquifer are apparently unavailable, reported yields from well fields installed within the aquifer range from less than 1 million gallons per day (mgd) to greater than 13 mgd. Permeable overburden sediments and fractured/jointed bedrock recharge the aquifer, which in 1980 supplied an average of 4 million gallons per day to municipal water supply systems (Waller, R.M. et al, 1982).

The subsurface Lockport Formation may serve to recharge surficial systems with ground water originating from higher elevations. Significant deposits of recent alluvium in the larger streams also contribute to aquifer recharge areas. Both surface drainage and ground water flow within the region and locally are generally to the north into Lake Ontario. This is consistent with the topography at the surface and the topography of the preglacial bedrock valley within which the aquifer is situated.

Ground water in the area is not utilized for public or private drinking water supplies (Albert, 1996 and Froham, 1996). The Village of East Rochester and the Monroe County Water Authority once operated well fields for public water supplies in the vicinity of the site. Each of these well fields have been dismantled and are no longer used. Municipal water in the area is purchased from the Monroe County water Authority which blends surface water from Lake Ontario with water from Canadice and Hemlock Lakes prior to distribution. Monroe County Water Authority does not utilize ground water.

4.2. Site hydrogeology

Two separate water bearing zones are present at the site: a shallow ground water zone and a deep ground water zone that is believed to extend to bedrock. The shallow zone is a perched ground water table that is not hydraulically connected to the deep zone on the site. The deep ground water zone is the Irondequoit Aquifer and is separated from the shallow ground water zone by 30 to 52 feet of unsaturated sediment.

4.3. Shallow ground water zone

The shallow ground water zone consists of horizontally laminated clayey silt with occasional fine-grained sand horizons. The shallow ground water zone extends from approximately 6 feet below grade to 30 feet below grade (Figures 6 and 8). The presence of an unsaturated, fine-grained sand and silt unit immediately below the saturated clayey silt indicates that the shallow zone is a perched ground water zone. Saturation of the sandy silt zone located immediately above the clayey silt zone during periods of high precipitation indicates that water mounds on top of the lesser permeable materials that comprise the shallow zone.

Based on field observation and ground water elevation data, ground water within the shallow saturated zone undergoes vertical and horizontal transport. Horizontal flow rates are controlled by the horizontal hydraulic conductivity of the fine sand horizons, while vertical flow potentials are controlled by the hydraulic conductivity of the clayey silts.

Horizontal hydraulic gradients, as interpreted from the contoured shallow ground water elevation data (Figures 9 and 10), range from approximately 0.018 ft/ft during the dry season to approximately 0.039 ft/ft during the wet season. Horizontal gradients are normally controlled by formation hydraulic conductivity with increasing hydraulic conductivity causing a decreased gradient.

Vertical hydraulic gradients within the shallow ground water zone are apparent only in the eastern and northern portion of the site and are believed to be created by the discharge of ground water through more permeable sandy horizons into topographic depressions. Evidence of this vertical gradient within the shallow saturated zone was observed during installation of the shallow wells. The ground water table within the shallow zone was typically observed in the soil samples collected during the installation of the boring. The well screened interval was selected to be below the ground water table. However, the ground water elevation within the shallow ground water monitoring wells did not always correspond to that observed during boring completion. Vertical gradients within the clayey silt unit are difficult to quantify but are approximately 1 ft/ft at the location of most wells along the northern and eastern portions of the site. Vertical gradients were not observed towards the south or center of the site.

The vertical gradients within the clayey silt zone do not appear to be related to vertical flow of ground waters from the shallow zone to the deep ground water zone. Rather vertical hydraulic gradients within the shallow zone appear to be caused by the discharge boundary created by the outcropping of the shallow saturated zone in the gullies immediately north and formerly east of the site (Figure 6). As the discharge boundary (ravine) is approached, the hydraulic head in the individual sandy horizons responds to the presence of a discharge boundary in the ravine. Water moves through the sandy horizons because the clayey silt horizons restrict downward migration of water. The clayey silt layers act to restrict vertical flow because their hydraulic conductivities are lower than the hydraulic conductivities of the sandy horizon (Freeze and Cherry, 1979; Todd, 1979). At wells B-1S and B-2S, which are located 600 to 800 feet upgradient from the ravine, ground water elevations within the wells generally correspond to the ground water table observed during drilling. At wells proximal to the ravine (B-3S, B-4S, B-5S, B-6, and B-7), the ground water elevations were significantly lower than the ground water table observed during drilling.

The vertical gradients within a well will allow communication between sand horizons in the upper portion of a screened interval with sand horizons in the lower portion (Figure 11). If the sandy layer, which has a higher hydraulic conductivity, is near the bottom of the well, the ground water elevation in the well will be near the bottom of the well even through the entire well screen is within the saturated zone. Therefore, the ground water elevations measured in shallow wells may not represent the ground water table or accurately document the horizontal ground water flow direction and hydraulic conductivity. With the communication of the various sandy horizons, the ground water elevations within the wells will reflect some average between the ground water elevations in the various sandy horizons. The ground water elevation in a well is controlled by the hydraulic conductivity of the most permeable formation which is intercepted by the screen.

The absence of vertical hydraulic gradients in the southern and central portion of the site, based on the equivalent ground water table elevations from the drilling and well measurements, indicates that significant volumes of water are not migrating vertically through the shallow saturated zone to the deep saturated zone. If significant vertical flow was occurring, a vertical hydraulic gradient would occur within the shallow zone across the entire site and not just towards the present and filled ravines. Water budget calculations (Section 4.05) further support the hypothesis that little water flows from the shallow saturated zone to the deep saturated zone.

In situ hydraulic conductivity tests indicate that the horizontal hydraulic conductivities for the shallow ground water zone average approximately 2.7 x 10^{-6} cm/sec. This value is consistent with values for materials of similar composition (Freeze and Cherry, 1979). The reason for the depressed hydraulic conductivities are believed to be related to the vertical flow component present within some of the shallow wells. Vertical potentials within a well are not considered during hydraulic conductivity measurements, as horizontal conductivities are generally two orders of magnitude greater than vertical conductivities (Freeze and Cherry, 1979; Todd, 1979). The effects of vertical potentials on hydraulic conductivities can best be viewed when comparing the conductivity of wells located proximal to the discharge boundary with those located further from the discharge boundary. Wells more distal from the discharge boundary, B-1S and B-2S, appear to have higher and more representative hydraulic conductivities than conductivities found proximal to the northern and eastern discharge boundaries, B-3S and B-6. The determined hydraulic conductivities for B-1S and B-2S are approximately 1.6 x 10^{-5} cm/sec and 2.6 x 10^{-6} cm/sec, respectively, while the hydraulic conductivities for wells B-3S and B-6 are approximately 4.9 x 10^{-7} cm/sec and 1.1 x 10^{-6} cm/sec, respectively.

Recalculated hydraulic conductivity values for two wells (B-1S and B-2S) and from test data collected immediately after installation more closely match similar geologic materials, ranging from 1.4 x 10^{-7} cm/sec to 2.6 x 10^{-6} cm/sec (O'Brien & Gere, 1986). The low hydraulic conductivities of the shallow ground water zone suggest that the rate of discharge from the shallow zone to the ravine is low and unlikely to be observed as a seep. This discharge rate is further discussed in the site ground water budget (Section 4.5).

Ground water elevation data have been collected during periods of increased and decreased precipitation to assist in understanding the complex hydrogeologic setting. Ground water levels in shallow wells may not accurately reflect the ground water table or the ground water flow directions due to: the presence of vertical hydraulic gradients; variability in thickness, lateral extent and composition of the materials present at the well site; and anthropogenic effects.

The site geology, including the vertical and lateral extent of the restricting clayey silt zone, or the lateral extent of the more permeable sandy zones, will alter ground water elevations found within a well. The lateral extent of the clayey silt zone will increase the size of the mound which it is able to support with increasing lateral and vertical extent. The vertical and lateral extent of the more permeable fine sand horizons will control the amount of water discharging at a boundary, and will thus also affect the ability of water to mound at a well location. Wells more proximal to the suspected location of the former eastern impoundment have a greater increase in saturated thickness during periods of high precipitation than wells distant from the impoundment. This is most likely the result of a thicker and more laterally extensive lower permeability zone at the location of the former impoundment. Newly installed wells B-9, B-10, and B-13 encountered considerable thicknesses of the clayey silt zone, whereas wells B-11 and B-12D intercepted lesser thicknesses of the same unit.

Ground water elevation data for the periods of high and low precipitation are presented on Table 1 and Figures 9, 10, 12, and 13, respectively. Ground water level data for the third round of sampling, considered to represent a period of intermediate precipitation, are also presented on Table 1 and Figures 14 and 15. Shallow and deep ground water elevations for the fourth round of sampling are presented on Figures 16 and 17, respectively.

During the second sampling event, which followed a period of high precipitation, a layer of ground water between 0.5 and 4 ft in thickness was present in the silty sand unit that overlies the clayey silt unit (Figure 6). This is suggested by ground water level elevations which were above the top of the clayey silt unit. Excess water entering the shallow saturated zone during periods of higher precipitation is apparently discharged through the more permeable silty sand unit overlying the less permeable clayey silt unit. The discharge through the silty sands occurs because the majority of the precipitation cannot flow through the clayey silt zone due to the low hydraulic conductivity of this zone. During the first round of sampling, conducted during a period of decreased precipitation, lower water levels were observed throughout the site and no water elevations were found to be above the clayey silt/silty sand contact.

Structures on the site, including buildings and parking lots, will restrict ground water recharge in certain areas (near B-10 and B-11), creating a depressed ground water table. Drainage systems such as the drainage swale will tend to increase recharge in certain areas (near B-2S), therefore raising ground water elevations.

Shallow ground water elevation data from the periods of high precipitation indicate that ground water is mounding over the area of the former impoundments, creating a radial flow pattern. Ground water elevations recorded during a period of high precipitation increased as much as 13 ft above the previous data and allowed for sampling of an additional shallow well (B-4S). The increase in thickness of the upper saturated zone appears to be related to the well's distance from the former impoundment, or possibly the center of the mound. Water elevation data from a period of low precipitation, Table 1 and Figure 9, indicate that ground water flow is following the local topography, moving to the north. It appears that during summer, an increase in evapotranspirative demands and a decrease in recharge allows water mounded over the lower permeability clayey silt sufficient time to discharge mounded water.

An increase in saturated thickness during periods of increased rainfall, the large extent of unsaturated materials between the upper and lower ground water zones (up to 55 feet), along with the presence of discharge boundaries (gullies) immediately north and east of the site, indicates that little water is transmitted from the shallow ground water zone to the deep ground water zone.

4.4. Deep ground water zone

The deep ground water zone is contained within a horizontally laminated silty sand unit that forms part of the Irondequoit Aquifer. The deep ground water zone is believed to be approximately 60 ft thick, extending from approximately 65 ft below grade to bedrock, which is reported to occur at approximately 265 ft MSL (Yager et al, 1985).

The horizontal hydraulic conductivity of the deeper saturated silty sand unit ranged from 1.4×10^{-2} cm/sec to 2.3×10^{-3} cm/sec. This range is consistent with the values presented in the literature for materials of similar composition (Freeze and Cherry, 1979) and is about three orders of magnitude higher than hydraulic conductivity values estimated for the shallow ground water zone.

Ground water elevation measurements from the deep wells indicated that ground water is generally flowing towards the north under a hydraulic gradient of approximately 0.035 ft/ft (Figures 12 and 13). The water level measurements and gradients under high and low infiltration periods do not vary significantly, as the ground water elevations in the deep wells remained within 0.5 ft of initial measurement.

4.5. Site ground water budget

A site ground water budget examines and quantifies the potential sources of inflow to a site as well as the potential sources of outflow. Under conditions of steady state, a ground water budget will demonstrate a balance between inflow and outflow. The preparation of a ground water budget can provide a quantitative method of evaluating the site hydrogeology. A site ground water budget was calculated to facilitate interpretation of the site hydrogeology. Site ground water budget calculations are presented in Appendix F.

Results of the water budget data indicate inflow to the shallow ground water zone in the vicinity of the impoundments apparently occurs primarily through recharge from precipitation. Precipitation data, evapotransporative demands, surface runoff, and soil moisture storage were analyzed to assess inflow to the shallow zone via percolation. Inflow to the shallow ground water zone via percolation is estimated to be approximately 8,200 gallons per day (gpd). Outflow calculations, based upon the *in situ* hydraulic conductivity data, thickness of clayey silt unit, and hydraulic gradient, were utilized to assess the total volume of water discharging from the shallow ground water zone. The total outflow would be comprised of ground water discharging from the clayey silt unit and silty sand unit during periods of high precipitation and potential vertical percolation to the deeper ground water zone. Water discharging from the shallow ground water zone was estimated to be approximately 24 gpd. The amount of water discharging from the silty sand unit to the north and east is unquantifiable because the hydraulic conductivity, ground water gradient and how often water is present in this unit are unknown. The volume of water percolating into the deep ground water zone was evaluated based on assumed vertical hydraulic conductivities which were two orders of magnitude lower than the horizontal hydraulic conductivities of the shallow ground water zone. Vertical outflow from the shallow zone is estimated to be about 205 gpd. Thus, the total quantifiable volume of outflow is approximately 229 gpd.

The volume of outflow from the shallow zone as estimated by the water budget information is approximately 3 percent of the volume of inflow of water to the shallow zone. The excess inflow water probably occurs during periods of increased precipitation. The shallow ground water apparently saturates some of the silty sand unit above the clayey silt and then discharges from the site through the silty sand unit. It is likely that the hydraulic conductivity of the silty sand unit is high enough to allow this volume of water to be transported through this zone.

Calculations for the deep ground water budget (Appendix F) indicate that inflow to the deep ground water zone is predominantly from upgradient (153,775 gpd) with a potential addition from vertical percolation from the shallow ground water zone (205 gpd). Thus total inflow is approximately 153,980 gpd. The estimated total outflow from the deep ground water zone is approximately 153,775 gpd. Water budget results indicate that the ratio of inflow to outflow for the deep ground water zone balances. The ground water budget suggests that the typical percolation from the shallow ground water zone to the deep ground water zone comprises only 0.13% of the ground water flow in the deep zone. During periods of increased precipitation, if all of the inflow from the shallow zone were to percolate into the deep zone, the 8,196 gpd represents about 5 percent of the ground water volume flowing under the site in the deep ground water zone.

5. Laboratory results

Laboratory results for samples collected during the Remedial Investigation are presented in the following sections. Samples include: impoundment settled solids, surface soils, ground water, and first round cistern and pumphouse samples. As a guideline for interpretation of inorganics parameters in soils, a comparison with background concentrations, and reference materials provided by the NYSDEC (Exhibit A) were used. In addition, the data was validated based on QA/QC criteria in accordance with the QAPP provided in the Work Plan dated July 1990. The Data Validation Technical Memorandum is provided as a separate document dated October 1991. Ground water results were compared with the available New York State Class GA water quality standards and guidance values, where applicable. Tables 2 through 10 provide the analytical data. Appendix G provides the Chain of Custody Records and Appendix H provide the Ground Water Sampling Field Logs.

5.1. Impoundment boring results

Nine impoundment boring samples collected from five borings and a composite sample were submitted to O'Brien & Gere Laboratories for analyses of TCL metals, volatile organic compounds (VOCs) included under USEPA Method 624, semivolatile organics included under USEPA Method 625, PCBs and pesticides. Tables 2, 3, 4, and 5 provide the laboratory results for VOCs, semivolatile organic, pesticide, and inorganic analyses, respectively.

5.1.1. Impoundment boring inorganic analyses

Concentrations of inorganic parameters detected in the impoundment boring samples are summarized on Table 5. Aluminum concentrations for samples withdrawn from the former impoundment ranged from 59,000 parts per million (ppm) in the composite sample (IB-C) to 5,780 ppm at IB-1 (6 to 8 ft). Four samples - IB-3 (3.5 to 4 ft), IB-3 (6 to 8 ft), IB-5, and IB-C - exceeded the maximum aluminum concentration with respect to naturally occurring New York soils.

Antimony was not detected in any of the samples submitted for analyses.

Arsenic was detected in all samples at concentrations ranging from 4.46 ppm to 1.2 ppm. Each of the submitted samples was below the maximum concentration typically found in naturally occurring New York soils.

Concentrations of barium for the impoundment boring samples ranged from 91.7 ppm to 16.2 ppm. Concentrations were below the upper limit of naturally occurring New York soils.

Beryllium concentrations ranged from 0.985 ppm to 0.138 ppm. Values were below the upper limit of 1.75 ppm for beryllium in naturally occurring New York soils.

Cadmium was detected in 1B-3 (3.5 to 4 ft) at a concentration of 0.637 ppm, which was below the upper limit of 1 ppb for cadmium in naturally occurring New York soils.

Calcium concentrations ranged from 48,600 to 1,400 ppm. Only three of the samples from IB-1 revealed calcium concentrations higher than the upper limit of 35,000 ppm for calcium in naturally occurring New York soils.

Chromium was detected in each of the impoundment boring samples at concentrations ranging from 2810 ppm at IB-3 (6 to 8 ft) to 13 ppm at I-6 (8.7 to 9.2 ft). Chromium was detected above the upper limit of 40 ppm for naturally occurring New York soils in eight of the samples, including the composite sample.

Hexavalent chromium was not detected in any of the impoundment boring samples.

Concentrations of cobalt from each of the submitted samples ranged from 11.3 ppm to 2.32 ppm. Samples were within the range of concentrations typically found in naturally occurring New York soils.

Copper concentrations in the impoundment boring samples ranged from 425 ppm in B-C to 8.96 ppm at IB-6 (8.7 to 9.2 ft). Five of the samples contained concentrations of copper above the upper limit typically found in natural New York soils. These elevated concentrations were observed in both the eastern and western impoundments.

Iron concentrations ranged from 25,500 ppm in IB-1 (12 to 14 ft) to 7,540 ppm in IB-5. Only one sample from IB-1 (12 to 14 ft) revealed an iron concentration greater than the upper limit of 25,000 ppm for iron in naturally occurring New York soils.

Lead concentrations ranged from 51.5 ppm to 2.61 ppm. A single sample from impoundment boring IB-3 (3.5 to 4 ft) contained elevated levels of lead with respect to naturally occurring New York soils.

Magnesium was detected in each of the samples at concentrations ranging from 14,400 ppm to 1,300 ppm. Six of the submitted samples, each within the eastern impoundment (IB-1, IB-3 and IB-C), revealed elevated magnesium concentrations with respect to native soils of New York with a range from 14,400 ppm at IB-1 (12 to 14 ft) to 5630 ppm at IB-3 (6 to 8 ft).

Manganese concentrations ranged from 443 ppm to 137 ppm. Concentrations were within the range typically found in naturally occurring New York soils.

Mercury was not detected in any of the impoundment boring samples.

Nickel concentrations ranged from 25.8 ppm at IB-1 (12 to 14 ft) to 4.7 ppm at IB-1 (6 to 8 ft). One sample, IB-1 (12 to 14 ft), exceeded the upper limit of 25 ppm for nickel typically found in naturally occurring New York soils.

Potassium concentrations ranged from 4,780 ppm to 480 ppm. Samples were below the upper concentration limit of 43,000 ppm for naturally occurring soils.

Selenium was not detected in any of the impoundment boring samples.

Silver concentrations ranged from 0.827 ppm to 0.318 ppm. Concentrations were below the upper limit typically observed in naturally occurring New York soils.

Sodium concentrations ranged from 3,680 ppm to 176 ppm. Concentrations were below the upper concentration limit for natural New York State soils.

Thallium was detected in two of the impoundment boring samples at concentrations of 0.249 ppm and 0.217 ppm. These concentrations are within the range typically found in naturally occurring North American soils.

Vanadium concentrations ranged from 60.2 ppm to 13.9 ppm. Concentrations were within the range typically observed in natural New York soils.

Zinc was detected in all samples at concentrations ranging from 130 ppm to 18.1 ppm. Eastern impoundment concentrations of zinc were above those occurring naturally within New York soils and varied from 130 ppm at IB-3 (3.5-4 ft) to 18.1 ppm at IB-1 (6-8 ft). Each of the western impoundment samples were within the range of naturally occurring soils.

Cyanide was detected within impoundment boring samples IB-3 (6 to 8 ft), IB-5 (0.7 to 1.2 ft) and IB-C at 5.3 ppm, 0.92 ppm and 0.83 ppm, respectively. No other samples returned to the laboratory for analyses contained detectable cyanide concentrations.

Boron was detected in each sample, except IB-1 (6 to 8 ft), at concentrations ranging from 30 ppm to 6 ppm. Samples were within the range typically found in native North American soils.

Phenol was detected in each of the impoundment boring samples at concentrations ranging from 0.90 ppm to 0.46 ppm.

Fluoride concentrations ranged from 150 ppm to 36 ppm. Samples showed concentrations within the range typically found in native North American soils.

Sulfate concentrations were similar to those found in the surface soils proximal to the impoundment with concentrations ranging from 330 ppm to 65 ppm.

Chloride concentrations within the eastern and western impoundments were elevated with respect to naturally occurring North American soils with concentrations ranging from 2400 ppm at IB-3 (10 to 12 ft) to less than 100 ppm at IB-3 (3.5 to 4 ft). Two of the impoundment boring samples had chloride concentrations below the detection limit of 100 ppm.

TCLP extraction was performed on each of the submitted samples for chromium, lead, and mercury. A single sample from IB-3 (3.5 to 4 ft) had a detectable concentration of lead (1.1 ppm). This value of leachable lead is below that for a characteristic hazardous substance as defined by the USEPA (50 ppm). Concentrations of chromium, lead and mercury were not detected in the other samples. Therefore the settled solids sampled are not a characteristic hazardous waste as determined by the TCLP analyses.

5.1.2. Impoundment boring volatile analyses

Concentrations of volatile compounds detected in the impoundment borings are shown on Table 2. Analyses for the detection of VOCs by USEPA Method 624 indicated the presence of methylene chloride, acetone, carbon disulfide, 1,2-dichloroethene, trichloroethene, tetrachloroethene, toluene, ethylbenzene, and xylenes in varying concentrations within the impoundment. Other compounds were reported to be found in levels below the method detection limits. A computer library search for tentatively identified compounds (TICs) was completed and no match was identified. Given the large number of compounds in existence, we do not consider it reasonable to attempt further identification.

Methylene chloride was detected in five samples from the former impoundment at concentrations ranging from 710 parts per billion (ppb) at IB-1 (12 to 14 ft) to 0.8 ppb (estimated) at IB-3 (10 to 12 ft). Methylene chloride was not detected in samples retrieved from the western impoundment. Methylene chloride was not reported in laboratory blanks, but is a common laboratory contaminant. Acetone was detected in each of the ten boring samples at concentrations ranging from 150 ppb (estimated) at IB-3 (6 to 8 ft) to 4 ppb at IB-3 (3.5 to 4 ft). Carbon disulfide was detected in one sample of a duplicate from IB-1 at an estimated concentration of 2 ppb. The duplicate sample did not contain detectable concentrations of carbon disulfide. Total 1,2- dichloroethene was detected in a single sample from IB-2 (9 to 9.5 ft) at a concentration of 160 ppb. Trichloroethene was detected only at IB-2 (9 to 9.5 ft) at 180 ppb. Tetrachloroethene was detected only at IB-2 (9 to 9.5 ft) at an estimated concentration of 2 ppb. Toluene was detected in both the eastern and western impoundments at concentrations ranging from 850 ppb in IB-1 (12 to 14 ft) to 1 ppb in IB-3 (3.5 to 4 ft). Toluene was detected in both samples from the western impoundment at lower concentrations (2 and 6 ppb) and was also found in the laboratory blank samples. Ethylbenzene was detected only in the eastern impoundment samples from IB-1 at concentrations ranging from 130 ppb (8 to 8.5 ft) to 14 ppb (6 to 8 ft). Total xylene was also detected only in eastern impoundment samples from IB-1 and ranged from 410 ppb (8 to 8.5 ft) to 110 ppb (6 to 8 ft).

5.1.3. Impoundment boring semivolatile and PCB analyses

One composite impoundment boring sample (IB-C) was analyzed for semivolatiles. Results of this analysis are summarized on Table 3. Semi-volatile analyses revealed only the presence of phenanthrene at an estimated concentration of 420 ppb.

Results of the pesticide/PCB analyses for the composite sample are included on Table 4. No pesticides or PCBs were detected in this sample.

5.2. Surface soil results

Ten surface soil samples (S-1 to S-10) were collected from the area surrounding the former impoundments, including two background samples (S-9 and S-10). Surface soil samples were submitted to O'Brien & Gere Laboratories for analyses of TCL metals and volatile organics included under USEPA Method 624. Inorganic concentrations were compared to background concentrations as well as typical concentrations for native New York State soils. Contract Required Detection Limits (CRDLs) were below the range of typical concentrations for natural soils for all inorganics except mercury, although mercury was not detected in any of the surface soil samples. Tables 6 and 7 provide the laboratory results of volatile organic and inorganic analyses, respectively.

5.2.1. Surface soil inorganic analyses

Aluminum concentrations for surface soil samples ranged from 14,600 ppm in S-7 to 5,020 ppm in background sample S-9. Background concentrations of aluminum were 5,020 ppm in S-9 and 8,930 ppm in S-10. Each of the samples collected had aluminum concentrations within the range of concentrations typically found in naturally occurring New York soils.

Antimony was not detected in any of the surface soil samples.

Arsenic concentrations ranged from 2.94 ppm to 0.663 ppm, with background concentrations of 1.24 ppm and 2.4 ppm. Concentrations for each of the submitted samples was below the concentration typically found in naturally occurring New York soils.

Concentrations of barium in the surface soil samples ranged from 44.9 ppm to 13.5 ppm. Concentrations of background samples S-9 and S-10 were 15.5 ppm and 34.6 ppm, respectively. Concentrations were within the range typically observed in natural New York soils.

Beryllium concentrations ranged from 0.825 ppm to 0.319 ppm, with background concentrations of 0.335 ppm and 0.334 ppm. Concentrations were within the range typically observed in natural New York soils.

Cadmium was not detected in any of the surface soil samples at the site.

Calcium concentrations ranged from 12,000 ppm to 809 ppm. Background samples had concentrations of 1,390 and 1,250 ppm for S-9 and S-10, respectively. Sample concentrations were within the range typically observed in natural soils.

Chromium in S-1 was detected above the concentration typically found in natural New York soils with a concentration of 268 ppm. Concentrations of chromium from the other samples ranged from 35.1 ppm to 7.32 ppm. Background samples showed concentrations of 8.07 ppm and 8.72 ppm for samples S-9 and S-10, respectively. Hexavalent chromium was not detected in any of the surface soil samples.

Concentrations of cobalt in the submitted samples ranged from 7.52 ppm to 1.98 ppm. Both background samples had similar concentrations, with levels of 2.02 ppm and 2.07 ppm, respectively, for samples S-9 and S-10. Sample concentrations were lower than the upper limit of 60 ppm for cobalt in naturally occurring New York soils.

Copper concentrations ranged from 27.3 ppm to 4.2 ppm. Background samples S-9 and S-10 had concentrations of 5.68 and 6.14 ppm, respectively. Sample concentrations were within the range typically observed for natural New York soils.

Iron concentrations ranged from 18,300 ppm to 7,080 ppm. Background sample concentrations were 7,080 ppm to 8,870 ppm. Sample concentrations were lower than the upper limit of 25,000 ppm for iron in naturally occurring New York soils.

Lead concentrations ranged from 21.9 ppm to 4.09 ppm. Background sample concentrations ranged from 4.26 ppm to 5.94 ppm. Each of the surface soil samples contained concentrations of lead within the range expected for natural New York soils.

Magnesium concentrations ranged from 4,800 ppm to 972 ppm. The range for background samples was 1,030 ppm to 1,040 ppm. The samples submitted for magnesium analyses showed concentrations within the range of naturally occurring New York soils.

Concentrations of manganese ranged from 704 ppm to 96.5 ppm, with background concentrations of 140 ppm and 263 ppm. Manganese concentrations for surface soil samples were within the range of natural New York soils in each of the submitted samples.

Mercury was not detected in any of the surface soil samples. Because the contract required detection limit (CRDL) was higher than the upper limit occurring in native soil, it is not known whether the samples submitted fall within the range of naturally occurring New York soils.

Nickel concentrations in the surface soil samples ranged from 17.2 ppm to 3.81 ppm, with background concentrations of 4.78 ppm and 4.85 ppm. The concentrations were within the range typically observed for natural New York soils.

Potassium concentrations of submitted samples ranged from 1,830 ppm to 353 ppm, with background concentrations of 427 ppm and 353 ppm for S-9 and S-10, respectively. Levels of potassium for surface soil samples were within the range observed for naturally occurring soils.

Selenium was not detected in any of the surface soil samples submitted for analyses.

Silver was only detected in S-3 at a concentration of 0.347 ppm. This concentration falls within the range typically observed for native North American soils.

Sodium concentrations ranged from 296 ppm to 145 ppm. Low concentrations were observed in the background samples, with concentrations of 145 ppm and 160 ppm. The sample concentrations were below the upper limit of 8000 ppm for sodium in natural New York soils.

Thallium was not detected in any of the surface soil samples submitted for analyses.

Vanadium concentrations as determined by laboratory analyses ranged from 30.2 ppm to 12.7 ppm. Background levels ranged from 12.7 ppm to 14.5 ppm for S-9 and S-10, respectively. Concentrations were within the range of levels that occur in natural New York soils in each of the surface soil samples submitted.

Zinc concentrations ranged from 49.5 ppm at S-1 to 15.4 ppm at S-8. Background concentrations were 16.1 and 25.2 ppm for samples S-9 and S-10, respectively. The concentrations were below the upper limit of 60 ppm for zinc in naturally occurring New York soils.

Cyanide was not detected in any of the surface soil samples submitted for analyses. Because holding times were not met, the data does not need to be rejected, but the detected values should be considered approximate (per USEPA Guidelines).

Boron was detected in six of the surface soil samples at concentrations ranging from 6 ppm in S-2 to 15 ppm in S-7. The boron concentrations were below the upper limit of 130 ppm for boron in native North American soils.

Phenols were detected in each of the surface soil samples at concentrations ranging from 0.55 ppm to 0.22 ppm. Concentrations in the surface soil samples were higher than those observed in the impoundment boring samples. Levels for background samples were higher than most others with concentrations of 0.37 ppm and 0.23 ppm.

Fluoride was detected in S-1, S-5, and S-10 at concentrations of 14 ppm, 20 ppm and 14 ppm, respectively. The concentrations were lower than the range typically observed in native North American soils.

Sulfate concentrations in the surface soils were similar to those observed in the impoundment borings, with concentrations ranging from 290 ppm to 59 ppm. Background sample S-10 had the highest concentration (290 ppm), while sample S-9 contained 66 ppm.

Chloride concentrations for surface soil samples were elevated with respect to concentrations observed in native North American soils, with concentrations ranging from 870 ppm at S-4 to below the detection limit (100 ppm) at S-8 and S-10. Background sample S-9 had a chloride concentration of 160 ppm, higher than the range for native soils.

5.2.2. Surface soil volatile analyses

Volatile analyses of surface soil samples and QA/QC blanks indicated the presence of methylene chloride, chloroform, 2-butanone, 1,1,1-trichloroethane, bromodichloromethane, and toluene.

Methylene chloride was detected in background sample S-10 at a concentration of 1 ppb (estimated). Chloroform and bromodichloromethane were only detected in the rinsate blank. 2-butanone was detected in S-4, S-9 and the rinsate blank at 1 ppb (estimated). Three samples (S-1, S-3, and S-9) showed detectable concentrations of 1,1,1-trichloroethane, with a concentration of 1 ppb (estimated) in each of these samples. Toluene was detected in each sample including the rinsate blank, at concentrations ranging from 7 ppb in background sample S-10 to 1 ppb at S-2, S-3, and S-6.

5.3. Ground water analyses

Ground water samples were collected from six shallow (B-1S, B-2S, B-3S, B-6, B-7 and B-8) and five deep wells (B-10, B-2D, B-3D, B-4D, and B-5), during the first round of sampling; seven shallow and five deep wells (as per first round plus B-4S) were sampled during the second round of sampling. Samples were collected from two shallow (B-9 and B-13) and two deep (B-1D and B-12D) wells during the third and fourth rounds of sampling. The first sampling round was undertaken during a period of low precipitation, while the second round of sampling occurred during a period of higher precipitation. The third sampling event was taken during a period of intermediate precipitation and the fourth sampling event occurred during a period of higher precipitation. Ground water samples collected during the four sampling events were analyzed for volatile organics using USEPA method 625. Ground water samples collected during the first sampling event were analyzed for TCL metals, while an amended TCL metals list was approved by the NYSDEC for analysis during the second, third and fourth rounds based on the first sampling event results. Turbidity measurements of ground water samples collected were taken. When turbidity values were less than 50 NTU, one sample was collected for metals analysis. When turbidity values exceeded 50 NTU, a filtered sample was also collected for soluble metals analyses. Tables 8A, 8B, and 10 provide the laboratory results for volatile organic, inorganic, and nitrogen analyses, respectively. Appendix H provides the Ground Water Sampling Field Logs.

5.3.1. Ground water inorganic analyses

Concentrations of total aluminum in ground water samples collected during the first sampling event ranged from 89,500 ppb in well B-6 to 715 ppb at well B-1D. Soluble concentrations of aluminum ranged from 12,500 ppb at well B-6 to below the concentration detection limit (CDL) at upgradient well B-1D.

There is no Class GA water quality standard for aluminum. Ground water samples were not analyzed for aluminum during the second, third, or fourth rounds of sampling due to the low levels encountered during the first round of sampling.

Since antimony was not detected, it was analyzed only during the first sampling event. Antimony concentrations were not detected in either total or soluble samples.

Samples were analyzed for arsenic during first round sampling only because of the low levels encountered during the first round. Total arsenic concentrations ranged from 20 ppb at well B-3S to non-detectable in several monitoring wells. Soluble arsenic concentrations ranged from 20 ppb at well B-3S to non-detectable. Samples showed arsenic concentrations below the NYS Class GA ground water quality standard of 25 ppb.

Concentrations of total barium ranged from 435 ppb at well B-6 to 58 ppb at well B-3S. Concentrations of soluble barium ranged from 123 ppb at well B-1D to 17 ppb at well B-2S. The samples showed barium concentrations below the NYS Class GA ground water standard of 1000 ppb. Barium analyses were not completed during the second, third, or fourth rounds of sampling.

Total beryllium was detected in five samples at concentrations ranging from 7 ppb at well B-6 to 3 ppb in B-1S, B-3S, and B-8. Soluble beryllium was not detected for each of the samples analyzed. The NYS Class GA water quality guidance value for beryllium is 3 ppb. Beryllium analyses were not included in the second, third, or fourth rounds of sampling.

Cadmium was analyzed during all four rounds of sampling since it was an analyte in the historic sampling events. Cadmium was not detected in any of these samples submitted for analyses.

Total calcium concentrations ranged from 149,000 ppb at well B-8 to 27,500 at well B-7. Soluble calcium concentrations ranged from 146,000 ppm at upgradient well B-1D to 3,810 ppb at well B-8. There is no NYS Class GA water quality standard for calcium. Calcium analyses were not completed during the second, third, or fourth round sampling events.

For the first sampling event, total chromium was detected at concentrations ranging from 431 ppb in B-6 to 5 ppb in B-1D. Three of these samples exceeded the NYS Class GA water quality standard of 50 ppb for chromium, including wells B-6 (431 ppb), B-7 (129 ppb), and B-8 (78 ppb). Total chromium concentrations for the second sampling event ranged from 57.6 ppb in B-7 to 283 in B-3S. Five samples collected during the second round exceeded the NYS Class GA water quality standard. These wells included B-3S (283 ppb), B-3D (179 ppb), B-6 (124 ppb), B-7 (57.6 ppb), and B-8 (131 ppb). During the third round sampling event, well B-13 exceeded the standard for total chromium (114 ppb). For the fourth sampling event in August 1992, only well B-13 detected total chromium at a concentration of 6.4 ppb. This sample did not exceed the Class GA ground water quality standard of 50 ppb for chromium.

During the first round of sampling, two samples analyzed for soluble chromium exceeded the NYS Class GA water quality standard: well B-2S (64 ppb) and well B-3D (214 ppb). Four second round samples analyzed for soluble chromium exceeded this standard, including wells B-2S (82 ppb), B-3S (230 ppb), B-3D (150 ppb), and B-8 (94 ppb). Soluble chromium was not detected in the samples collected during the third and fourth rounds of sampling.

Hexavalent chromium was detected in four samples during the first sampling event at concentrations ranging from 10 ppb to 230 ppb. Hexavalent chromium exceeded the NYS Class GA water quality standard of 50 ppb in well B-2S with a concentration of 90 ppb for soluble hexavalent chromium, and well B-3D with a level of 230 ppb for soluble hexavalent chromium. Second round samples analyzed for total hexavalent chromium revealed detectable levels in four wells. Concentrations were 191 ppb at well B-3D, 177 ppb at well B-3S, 113 ppb at well B-8, and 10.8 ppb at well B-7. Second round samples analyzed for soluble hexavalent chromium showed six samples containing detectable concentrations ranging from 201 ppb in B-3S to 7.38 ppb in B-7. Three of these samples exceeded the NYS Class GA water quality standard. These samples included B-3S (201 ppb), B-3D (181 ppb), and B-8 (99.5 ppb). No detectable concentration of hexavalent chromium were detected during the third and fourth round sampling events.

Total cobalt was detected in four samples at concentrations ranging from 52 ppb in B-6 to 8 ppb in B-3S. There is no NYS Class GA water quality standard for cobalt. Analyses for cobalt were not included during the second, third or fourth sampling events.

Total copper concentrations ranged from 183 ppb in well B-6 to 8 ppb in well B-1D. Soluble copper was detected in nine wells at concentrations ranging from 22 ppb in well B-6 to 8 ppb in B-4D. Copper concentrations were below the NYS Class GA water quality standard of 200 ppb. Laboratory blanks were contaminated with copper in twelve of the analyses. Analyses for copper were not included during the second, third or fourth sampling events.

Total iron values for each of the unfiltered samples analyzed during the first round exceeded the NYS Class GA water quality standard of 300 ppb. Total iron concentrations ranged from 132,000 ppb in well B-6 to 1,310 ppb in well B-1D. Soluble iron was detected in ten samples at concentrations ranging from 8,610 ppb in well B-6 to 38 ppb in B-1S. Total iron concentrations for samples retrieved during the second round ranged from 38,000 ppb in well B-6 to 806 ppb in well B-3S. Samples retrieved during the second round and analyzed for soluble iron revealed detectable concentrations in five samples ranging from 2,110 ppb to 52.8 ppb. Samples retrieved during the third round sampling event for total iron showed samples from B-9 and B-13 exceeded the ground water standard with concentrations of 897 ppm and 143,000 ppm respectively, although these data were rejected as part of the data validation process. Soluble iron was not detected in the samples analyzed during the third sampling event. The fourth round sample from B-13 also exceeded the ground water standard with a total iron concentration of 3,820 ppb. The fourth round soluble iron concentration from well B-9 was 1410 ppb, which also exceeded the NYS Class GA Standard. The fourth round soluble sample from B-13 contained a reported estimated concentration of 19.6 ppb, which is below the standard.

Total lead concentrations from the first round ranged from 51 ppb in well B-6 to 2 ppb in B-2S, B-3S, and B-3D. Samples from wells B-6, B-7 and B-8 exceeded the NYS Class GA standard of 25 ppb for lead with concentrations of 51 ppb, 28 ppb, and 27 ppb, respectively. Soluble lead was detected in four of the first round samples at concentrations ranging from 4 ppb to 1 ppb. Samples retrieved for total lead analyses during the second round showed a detectable level only in well B-6 (14.5 ppb). Soluble lead was not detected in any samples analyzed during the second sampling event. Total lead was detected at a concentration exceeding the standard in well B-13 (29.6 ppb) during the third round of sampling. Total and soluble lead were not detected during the fourth round sampling event.

Total magnesium concentrations from the first sampling event ranged from 39,100 ppb in well B-6 to 7070 ppb in well B-25. Only the sample from B-6 exceeded the NYS Class GA guidance values of 35,000 ppb with a concentration of 39,100 ppb. Soluble magnesium concentrations ranged from 35,600 in B-1D to 469 ppb in B-8. Only the sample from B-1D exceeded the NYS Class GA guidance value with a concentration of 35,600 ppb. Analyses for magnesium were not included in the second, third or fourth sampling events.

Total manganese concentrations ranged from 2770 ppb in B-6 to 95 ppb in B-1D. Six first round samples analyzed for total manganese exceeded the NYS Class GA water quality standard of 300 ppb. Soluble manganese was detected in the filtered samples at concentrations ranging from 139 ppb to 11 ppb. Each of the filtered samples collected during the first round were below the NYS Class GA Standard. Second, third, and fourth round samples were not analyzed for manganese because first round results indicated that concentrations of manganese were not elevated at the site.

Total mercury was detected in two samples during the first round at concentrations of 0.8 ppb and 0.2 ppb in B-3S and B-8, respectively. Analyses for mercury showed a detectable soluble concentration only in well B-3S (0.9 ppb) during the first round. Second round samples containing detectable amounts of total mercury were B-3D (0.79 ppb) and B-3S (0.43 ppb). Soluble mercury was detected in the samples from B-2S, B-3S, and B-5D at concentrations of 0.22 ppb, 0.72 ppb, and 0.22 ppb, respectively. These mercury concentrations were below the NYS Class GA standard of 2 ppb for mercury. Mercury was not detected in any of the total or soluble ground water samples collected during the third and fourth round sampling events.

Total nickel concentrations in the first sampling round ranged from 137 ppb at well B-6 to non-detectable at well B-1D. Concentrations of soluble nickel were not detected in the first round samples. Total nickel was detected in a single second round sample from well B-6 at 48.1 ppm. Concentrations of soluble nickel were below the detection limit in each of the second round samples. Total nickel was detected in a single third round sample from B-13 at 101 ppb (estimated). Total and soluble nickel were not detected in any of the fourth round ground water samples. There is no Class GA ground water standard for nickel.

Total potassium ranged from 13,400 ppb at well B-6 to a non-detectable at well B-3S. Soluble potassium was detected only in wells B-6 and B-7 at 3,850 and 2,550 ppb, respectively. Potassium was also encountered in the laboratory blank. Potassium analyses were not completed during the second, third, or fourth round sampling events. There is no Class GA ground water standard for potassium.

Total selenium was detected in wells B-3S and B-7 at concentrations of 8 ppb and 10.8 ppb, respectively. Soluble selenium was only detected in well B-3S at 3.34 ppb. Selenium was also found in the laboratory blank. The NYS Class GA ground water standard for selenium is 10 ppb. Analyses for selenium were not included during the second, third, or fourth round sampling events.

Total silver was found in one first round sample at a concentration of 3 ppb (B-10). Soluble silver was detected in first round samples from B-3D and B-4D at concentrations of 2 ppb and 3 ppb, respectively. Silver concentrations were below the NYS Class GA ground water standard of 50 ppb. Second, third, and fourth round samples were not analyzed for silver because first round results indicated that concentrations of silver were not elevated at the site.

Total sodium concentrations for the first sampling round ranged from 492,000 ppb in well B-6 to 19,200 ppb in well B-1S. Five samples exceeded the NYS Class GA ground water standard of 20,000 ppb. Soluble concentrations of sodium during the first round of sampling ranged from 540,000 ppb at well B-6 to 13,900 ppb at well B-3D. Nine well samples exceeded the Class GA standard. Total sodium concentrations for the second sampling round ranged from 404,000 ppb at well B-6 to 65,600 ppb at well B-8. Second round soluble sodium samples ranged from 353,000 ppb in well B-3S to 68,400 ppb at well B-4D. The same nine samples that exceeded the Class GA standard in the first sampling round exceeded the standard during the second sampling event. In addition, B-3D exceeded the standard during the second sampling event with a concentration of 146,000 ppb. During the third round of sampling, the total sodium concentration in B-13 (220,000 ppb) exceeded the ground water standard. Concentrations of soluble sodium exceed the ground water standard during the third round in wells B-9 and B-13 with concentrations of 241,000 ppb and 238,000 ppb, respectively. During the fourth round of sampling, the total sodium concentration in B-13 (169,000 ppb) exceeded the ground water standard. Similarly, the soluble sodium concentration in this well (172,000 ppb) also exceeded the standard. In well B-9, the soluble sodium concentration observed during the fourth sampling round (15,000 ppb) was below the standard.

Thallium was not detected in any of the samples submitted for analyses during the first sampling round, and therefore was not analyzed during the subsequent sampling events.

Concentrations of total vanadium ranged from 168 ppb in well B-6 to not detected in B-1D. Soluble vanadium was detected in nine wells at concentrations ranging from 63 ppb in well B-3S to 5 ppb in B-1S. There is no Class GA ground water standard for vanadium. Analyses for vanadium were not included in the second, third, and fourth round of analyses.

Total zinc concentrations during the first round of sampling ranged from 336 ppb in B-6 to 25 ppb in B-1D. Shallow wells contained higher levels in most analyses with wells B-6, B-7, and B-8 containing concentrations of total zinc an order of magnitude higher than other shallow samples (336 ppb, 229 ppb, and 219 ppb, respectively). Only one sample obtained from B-6 during the first sampling round exceeded the NYS Class GA water quality standard of 300 ppb. Soluble zinc during first round analyses was detected in nine samples at concentrations ranging from 24 ppb at well B-7 and B-2D to 12 ppb at B-8. Second round total zinc concentrations ranged from 97 ppb at well B-6 to non-detectable limits at well B-3S. Soluble zinc was detected in four samples at concentrations ranging from 12.8 ppb to 10 ppb. During the third round of sampling, the total zinc concentration in B-13 (395 ppb) exceeded the ground water standard of 300 ppb. Total zinc was detected in B-9 at 30.1 ppb, which is below the NYS Class GA water quality standard. Soluble zinc was not detected in the third round samples. During the fourth round of sampling, total zinc was detected in B-13 at an estimated concentration of 15.8 ppb, which is below the standard of 300 ppb. Soluble zinc was detected in the samples from B-9 and B-13 at concentrations of 16.4 ppb and 15.8 ppb (estimated), respectively.

Cyanide was only detected in the total sample from B-8 at a concentration of 10 ppb. The NYS Class GA water quality standard for cyanide is 100 ppb. Cyanide analyses were not performed during the second, third, and fourth sampling events.

First round sulfate concentrations ranged from 230,000 ppb in well B-7 to 20,000 ppb in well B-2S. Second round concentrations ranged from 112,00 ppb at well B-3D to 14,100 ppb at well B-6. Third round concentrations ranged from 116,000 ppb in well B-13 to 31,000 ppb in well B-9. During the fourth sampling event, sulfate concentrations ranged from 30,000 ppb in B-9 to 52,000 ppb in B-13. Sulfate concentrations were below the NYS Class GA ground water standard of 250,000 ppb.

Boron concentrations during the first round of ground water sampling ranged from 900 ppb at upgradient well B-1D to non-detectable at wells B-1S and B-3S. Each of the analyzed samples was below the NYS Class GA water quality standard of 1,000 ppb for boron. Analyses for boron were not included in the second, third, or fourth round of sample analyses.

Fluoride concentrations during the first round of sampling ranged from 1,700 ppb in well B-7 to 200 ppb at well B-4D. Only the sample from B-7 exceeded the NYS Class GA water quality standard of 1,500 ppb for fluoride. Fluoride was detected in seven samples during the second sampling round. Concentrations ranged from 4,920 ppb in B-3S to 118 ppb in B-4S. The only second round sample to exceed the NYS standard was from B-3S with a concentration of 4920 ppb. Third round samples were below the water quality standard for all submitted samples with concentrations ranging from 140 ppb in well B-9 to 130 ppb in well B-13. Similarly, fourth round fluoride concentrations ranged from 100 ppb to 110 ppb, which are below the standard.

Phenols were not detected during the initial sampling round in any ground water samples and were therefore not analyzed in the second, third, or fourth rounds.

Concentrations of chloride were elevated during the first round of ground water sampling advocating chloride analyses of the second round samples. Chloride concentrations during the first sampling round ranged from 350,000 ppb in well B-7 to 12,000 ppb at well B-3S. Only the sample from B-7 exceeded the NYS Class GA water quality standard of 250,000 ppb. Each of the samples analyzed during the second round had chloride concentrations below the NYS standard with concentrations ranging from 171,000 ppb at well B-5D to 2,670 ppb at well B-8. Concentrations of chloride exceeded the NYS Class GA standard during the third round sampling event only in well B-13 (314,000 ppb). Fourth round chloride concentrations ranged form 7,000 ppb to 241,000 ppb, which are below the standard.

5.3.2. Ground water volatile analyses

First round samples analyzed for VOCs detected methylene chloride, acetone, 1,2-dichloroethene (total), chloroform, 1,1,1-trichloroethane, trichloroethene, benzene, and toluene. Second round analyses, including the sampling of previously dry well B-4S, revealed concentrations of methylene chloride, 1,1,1-trichloroethane, hexane, and toluene. Third round samples revealed concentrations of trichloroethene and freon 113, whereas fourth round samples detected methylene chloride and TCE.

Methylene chloride was only detected in well B-6 at 46 ppb during the first sampling round. Six samples analyzed during the second round had detectable concentrations ranging from 12 ppb at wells B-2S and well B-6 to 3 ppb (estimated) at B-8. Methylene chloride was not detected in third round samples. Methylene chloride was detected in fourth round samples from B-1D, B-9 and B-13 at estimated concentrations of 2 ppb, 2 ppb and 3 ppb, respectively. The NYS Class GA Ground Water standard for methylene chloride is 5 ppb.

Acetone was detected during first round sampling in samples from wells B-1S, B-2S, B-2D, B-4D, and B-7 at concentrations ranged from 20 ppb in B-7 to 4 ppb (estimated) in B-2S. Acetone was not detected in any of the samples collected during the second, third, or fourth sampling events.

Well B-3S contained 80 ppb of 1,2-dichloroethene (total) during the first round of sampling. No concentrations of 1,2-dichloroethene were observed in the second, third, or fourth sampling events. The NYS Class GA water quality standard for t-1,2-dichloroethene is 5 ppb.

Chloroform was detected at wells B-5D and B-7 during the first sampling round at concentrations of 1 ppb (estimated) and 3 ppb (estimated), respectively. Second, third, and fourth round samples submitted for analyses did not detect chloroform. The NYS Class GA water quality standard for chloroform is 100 ppb.

The compound 1,1,1-trichloroethane was detected in wells B-1D (1 ppb), B-2D (2 ppb), B-3D (5 ppb), B-4D (1 ppb), and B-5D (2 ppb) during the first sampling round. The second round sample from well B-3D (4 ppb) was the only sample containing 1,1,1-trichloroethane. The NYS Class GA water quality standard for 1,1,1-trichloroethane is 5 ppb. The compound 1,1,1-trichloroethane was not detected in any of the third or fourth round samples. The 1,1,1-trichloroethane concentrations were equal to or below the NYS Class GA water quality standard. No source of 1,1,1-trichloroethane was identified on the Jarl site.

Trichloroethene was detected in wells B-1D (23 ppb) and B-3S (46 ppb) during the first round of sampling. The second round sample from well B-1D (6 ppb) was the only sample that contained trichloroethene. The only sample from the third round sample event to contain trichloroethene was B- 1D at a concentration of 13 ppb. TCE was also detected in B-1D during the fourth round at a concentration of 9 ppb. The NYS Class GA water quality standard for trichloroethene is 5 ppb.

Benzene was detected during the first round of sampling only at well B-2S at 0.7 ppb. Benzene was not detected in any of the second, third, or fourth round samples submitted for analyses. The NYS Class GA water quality standard for benzene is 0.7 ppb.

Hexane, which was used for equipment decontamination, was detected only in the second round of sampling. The presence of hexane is probably due to the incomplete rinsing of the decontaminated equipment. Concentrations of hexane ranged from 1,600 ppb (estimated) in well B-3D to 5 ppb (estimated) in well B-3S.

Toluene was detected in six samples at concentrations ranging from 5 ppb (estimated) in B-6 to 0.7 ppb (estimated) in B-1D. Only two samples from B-

2S and B-6 showed detectable concentrations of 1 ppb and 2 ppb, respectively, during the second sampling round. Toluene was not detected during analyses of third or fourth round samples. The NYS Class GA water quality standard for toluene is 5 ppb.

Freon 113 was detected during the third sampling event at estimated concentrations ranging from 6 ppb in B-13 to 11 ppb in B-9. There is no Class GA water quality standard for freon 113. The presence of freon 113 in these samples is due to laboratory contamination or the introduction of freon 113 to samples during collection.

5.4. Air monitoring results

This section presents the results of the air quality monitoring conducted at the site on October 17, 1990. These efforts were undertaken in order to evaluate the potential for air transport of site contaminants in volatile and fugitive dust emissions outlined in the Focused Remedial Investigation Work Plan (July 1990).

The parameters targeted for the air monitoring work effort are provided on Table 11. Metals detected in the sample blanks and the meteorological data are provided in Tables 12 and 13, respectively. Laboratory results for all samples, including the duplicate samples, are presented in Appendix C. The method detection limits can also be found in Appendix C.

5.4.1. Aromatic hydrocarbons

Analytical accuracy was measured by the percent analyte recovery from spiked charcoal sampling media. The desorption efficiencies were all within 100%, with the exception of methyl styrene and styrene, which were 60% and 73%, respectively.

Based on these results, local and site-wide atmospheric concentrations of the above listed aromatic hydrocarbons were not present above the detection limits. These results are consistent with observed physical features (e.g. vegetative cover) at each site which likely inhibit significant communication with local and site-wide atmospheric circulation.

5.4.2. Halogenated hydrocarbons

Analytical accuracy was measured by the percent analyte recovery from spiked charcoal sampling media. The desorption efficiencies were within 90 to 100%.

Based on these results, local and site-wide atmospheric concentrations of the targeted halogenated hydrocarbons listed on Table 11 were not detected. These results are consistent with observed physical features (e.g. vegetative cover) at each site which likely inhibit significant communication with local and site-wide atmospheric circulation.

5.4.3. Metals

Aluminum, calcium, chromium, iron, magnesium, and sodium were detected in at least one of the samples and/or the blank submitted to the laboratory for analysis. Each of these metals, except for aluminum, were present in the blank. A summary of the metals detected in the blank, the average amount detected in the sample, and the range detected in the sample are provided on Table 12.

Based on the results, the concentrations of metals present in the blank were greater than or equal to the average concentrations found in the samples and it is thought that these metals are present due to media contamination introduced in the manufacturing environment. It is unlikely that the on-site waste locations are contributing detectable airborne concentrations of the targeted metals, with the exception of aluminum. However, it is not possible to distinguish whether the aluminum detected is a function of the waste material or the native soils.

Aluminum was detected in the sample collected at the central, on-site location and was not detected at any of the other samples nor in the blank. Based upon the analytical results, the site was contributing 2.6 $\mu g/m^3$ of airborne aluminum to the central, on-site sampling location on the day of sampling.

5.5. Cistern and pumphouse sampling results

Water and sediment samples were collected from the cistern in conjunction with water sampling of the east and west pumphouses during the third and fourth sampling events completed in June 1992 and August 1992, respectively. It should be noted that the water elevation in the cistern was closer to the ground surface in the second round of sampling than it was during the first round. During sampling of the cistern sediment, the DEC noted the presence of metal chips and a green sheen. Results of the VOC and inorganic analyses for the cistern sediment are show on Tables 9A and 9B, respectively. Results of analyses for water samples collected from the cistern and east and west pumphouses are included in Tables 8A and 8B. Samples were submitted to NYTEST Environmental, Inc. for analyses of second round ground water parameters including: VOCs included under USEPA Method 624, hexavalent chromium, chromium, cadmium, iron lead, mercury, nickel, sodium, zinc, chloride, fluoride, and sulfate.

5.5.1. Cistern sediment inorganic analyses

Results of inorganic analyses from the cistern sediment are summarized on Table 9B.

Cadmium was not detected in the cistern sediments analyzed during the two rounds of sampling of the cistern except for a concentration of 5.8 mg/kg in the second round blind duplicate.

Chromium concentrations of the sediment in the cistern ranged from 2,410 ppm to 1,170 ppm. These values exceed the upper level for naturally occurring soils in New York State.

Hexavalent chromium was detected in the sample collected in August 1992 at a estimated concentration of 0.86 ppm. No guidelines were found on levels of hexavalent chromium. Hexavalent chromium was not detected in the soil samples analyzed during the first round sampling of the cistern.

The iron concentrations detected during both sampling rounds (29,700 ppm) were slightly above the upper limit for naturally occurring soils.

Lead concentrations ranged from 722 ppm in June 1992 to 412 ppm in August 1992. Concentrations of lead were elevated with respect to naturally occurring New York soils.

Samples analyzed for mercury revealed estimated concentrations of 0.52 ppm for June 1992 and 0.27 ppm in August 1992. Concentrations in the cistern samples exceeded the upper limit of 0.6 ppm for native New York soils.

Nickel concentrations for the two sampling rounds were 70 ppm and 62.9 ppm. These concentrations exceed the 25 ppm upper limit for naturally occurring New York soils.

Estimated sodium concentrations for the two sampling rounds were 778 ppm and 540 ppm, respectively. These concentrations are within the range expected for New York soils.

Zinc was detected at estimated concentrations of 3,110 ppm and 2,510 ppm for the June and August 1992 sampling events, respectively. Zinc concentrations exceeded the upper limit of 60 ppm for naturally occurring New York soils.

Concentrations of fluoride were below the range typically found in naturally occurring New York soils. Estimated concentrations in June and August 1992 were 0.56 ppm and 0.44 ppm, respectively.

The chloride concentration observed during the June 1992 sampling event was 2,940 ppm, while a concentration of 61 ppm was observed in August 1992. The chloride concentration observed during the June 1992 sampling event was elevated with respect to typical New York soils.

5.5.2. Cistern sediment volatile analyses

Volatile analyses of cistern sediment samples during the June and August 1992 sampling events detected five parameters; however, only chlorobenzene was detected in both rounds. Results of sediment analyses for VOCs are presented on Table 9A.

Chlorobenzene was detected in the sediment samples at concentrations of 5J ppb and 1300 ppb for the first and second rounds, respectively. Xylene (total) was only detected in the second round sample at a concentration of 340 ppb. Toluene was detected during the second round of sampling at an estimated concentrations of 13 ppb. Ethylbenzene was also detected only in the second round with an estimated concentration of 39 ppb. Freon 113 was detected in the sample collected during the first round of sampling. Freon 113 was also detected in several ground water samples collected on this date, and its presence is attributed to laboratory contamination or the introduction of freon 113 to samples during collection.

In addition, several unknown tentatively identified compounds (TICs) were identified in the cistern sample and associated blind duplicate. During the June 1992 sampling event, estimated concentrations of the TICs in the cistern sample, and the blind duplicate totaled 0.075 ppm and 0.369 ppm, respectively. During the August 1992 sampling event, estimated concentrations in the cistern and blind duplicate samples were 70.7 ppm and 31.0 ppm, respectively.

5.5.3. Cistern and pumphouses water inorganic analyses

Water samples from the cistern and the east and west pumphouses collected on June 3, 1992 and August 10, 1992 were analyzed for an amended TCL metals list. Results for these analyses are summarized on Table 8B. Because the sample from the cistern had a turbidity above 50 NTUon June 3, 1992, a filtered sample was also submitted to NYTEST Environmental Laboratories for soluble analyses.

Samples from the pumphouses had turbidities below 50 NTU on both sampling dates. Only the sodium concentration in June 1992 exceeded the ground water standard in the east pumphouse with a concentration of 21,400 ppb.

Cadmium was not detected in any of these samples submitted for analyses.

Only the unfiltered sample collected from the cistern in June 1992 exceeded the NYS Class GA ground water quality standard of 50 ppb for chromium with a concentration of 214 ppb. Chromium was not detected in either the east or west pumphouse samples.

No detectable concentrations of hexavalent chromium were found in the cistern or either of the pumphouse samples. However, hexavalent chromium was detected in the NYSDEC split sample collected during the first sampling round (June 1992) at a concentration of 131 ppb.

Iron concentrations ranged from 4,930 ppb in the unfiltered cistern sample to 63.7 ppb in the west pumphouse sample. Both the total and soluble samples collected from the cistern in June 1992 exceeded the NYS Class GA ground water quality standard of 300 ppb with concentrations ranging from 74.4 ppb to 4,930 ppb. The iron concentration detected in the west pumphouse sample in August 1992 (935 ppb) also exceeded the ground water standard.

Lead was detected only in the unfiltered cistern sample collected in June 1992 at a concentration of 77.8 ppb. This single sample exceeded the NYS Class GA ground water quality standard of 25 ppb for lead.

Mercury and nickel were not detected in any of the samples submitted for analyses.

Sodium concentrations ranged from 21,400 ppb in the east pumphouse sample in June 1992 to 2,350 ppb in the unfiltered cistern sample in June 1992. Only the sample from the east pumphouse collected in June 1992 exceeded the NYS Class GA ground water standard of 20,000 ppb.

Zinc concentrations during the two rounds of sampling ranged from 673 ppb in the unfiltered cistern sample in June 1992 to 48.6 ppb in the filtered sample in June 1992. t The unfiltered sample obtained from the cistern in June 1992 and the soluble sample from the cistern in August 1992 exceeded the NYS Class GA ground water standard of 300 ppb for zinc.

Sulfate was detected in the east and west pumphouses samples at concentrations ranging from 34,000 ppb in the west pumphouse sample in June 1992 to 16,000 ppb in the east pumphouse sample in August 1992. Samples contained sulfate at concentrations that were below the NYS Class GA standard of 250,000 ppb.

Fluoride was detected at concentrations ranging from 70 ppb in the filtered cistern sample in June 1992 to 270 ppb in the west pumphouse sample in June 1992.

Chloride was detected in the unfiltered cistern sample and the east and west pumphouse samples at concentrations ranging from 2,000 ppb in the unfiltered cistern sample in June 1992 to 16,000 ppb in the east pumphouse sample. None of the samples exceeded the NYS Class GA ground water quality standard of 250,000 ppb.

5.5.4. Cistern and pumphouses water volatile analyses

Freon 113 was the only detected VOC in the cistern and pumphouse water samples. (Table 8A). Freon 113 was detected in the cistern and west pumphouse samples collected in June 1992 at estimated concentrations of 5 ppb. Freon 113 was also detected in several ground water samples collected on this date, and its presence is attributed to laboratory contamination or introduction to samples during collection.

6. Results discussion

6.1. Impoundment boring samples

The predominant chemical constituents found within the samples collected from the impoundment borings were inorganic parameters. A comparison of the settled solids collected from the two former impoundments revealed that the eastern impoundment settled solids contained a greater number of inorganic parameters with greater concentrations than the western impoundment settled solids. The eastern impoundment settled solids contained calcium, chromium, copper, cyanide, iron, lead, magnesium, nickel, zinc, sulfate, and chloride at concentrations which were elevated with respect to typical values for NYS soils. Settled solids obtained from the western impoundment also contained chromium, copper, magnesium, and chloride; however the concentrations were not as elevated as the eastern impoundment. Concentrations of aluminum were elevated in the western impoundment.

There is no apparent correlation between the color and depth of the impoundment settled solids sample and the number of inorganic parameters detected. However, in each impoundment, the fine-grained (settled solids and clay) samples contained a greater number of inorganic parameters with elevated concentrations than the coarse-grained (sand) samples. This correlation may reflect the contrasts between fine-grained and coarse-grained soils or the heterogeneous deposition of the settled solids rather than the nature of the impoundment settled solids. Based on the TCLP data, the settled solids are not a characteristic hazardous waste as defined by 40 CFR Part 261.

VOCs were only detected in the settled solids in a portion of the eastern impoundment. No semivolatile organic compounds were detected in the impoundment settled solids samples. The correlations with respect to grain size were not observed within the samples analyzed for volatile organics.

Historical site information suggests that, although the two impoundments were connected, they were fed by separate pipes from different portions of the facility. The separate sources of the waste streams may explain why the two impoundments contain settled solids of different characteristics. The vertical extent of the settled solids was identified in both impoundments. The vertical thickness of the settled solids based on physical observation of split spoon samples ranged from 2 ft to 8 ft within an interval of 2 ft to 13 ft beneath the surface.

6.2. Surface soil samples

The surface soil samples, with the exception of sample S-1, indicated that organic or inorganic parameter concentrations are not elevated with respect to typical soil concentrations for New York State. Some inorganic constituents such as aluminum, iron and potassium are elevated with respect to the two site background surface soil samples. These elevated concentrations, with respect to site background, are believed to reflect the fact that the background soils were sandy, while the other surface soil samples were collected from finer grained soils with more decayed vegetative material. Surface soil sample S-1 contained an elevated concentration of total chromium. This sample was collected on the wall of the drainage ditch which forms the boundary between the Alcan site and the Sigismondi Landfill site to the east. This sample may contain an elevated level of chromium due to past impoundment overflows. The reported concentration of total chromium in S-1 (268 ppm) exceeds the upper limit for chromium in New York soils.

6.3. Shallow ground water

The shallow ground water elevation data suggests that a mound of ground water is present in the area of the former impoundment (Figure 16). The ground water elevation data (Table 1) indicates that the shallow zone of saturation adjacent to and under the buildings is thin to non-existent. The general lack of water in the wells adjacent to the building supports this hypothesis. The principle source of water in the shallow saturated zone is recharge from precipitation. The impoundment area is covered with sand while buildings and pavement cover the remainder of the southern portion of the site. Therefore a mound would be expected to develop where the sand cover allows infiltration. Little to no recharge in the covered areas of the site would result in a thin to non-existent shallow ground water zone. This mound and corresponding low water adjacent to the buildings indicates that wells B-9, B-10, and B-13 are located hydraulic downgradient of the surface impoundments.

The ground water elevation data suggest that shallow wells B-1S and B-2S are upgradient of the former surface impoundments. Although B-2S is located close to the eastern impoundment, ground water quality does not appear to be significantly altered by the impoundment settled solids. The VOC data from the four rounds of sampling did not demonstrate consistent patterns of ground water contamination. A variety of organic compounds were detected in the sampling rounds. Most of the concentrations were below the method detection limits. Five parameters were detected at concentrations which exceeded the method detection limits (methylene chloride, acetone, toluene, total 1,2-dichloroethene, and trichloroethene). Both acetone and methylene chloride are common laboratory solvents and often laboratory contaminants. Toluene was detected in wells B-1S, B-6, and B-2S, which would suggest that the impoundment may be contributing traces of toluene to the shallow system. Total 1,2-dichloroethene and trichloroethene were only detected in monitoring well B-3S during the first round of ground water sampling. Although these contaminants were not detected during the second round of ground water sampling, except toluene at 1 ppb (estimated) in well B-2S and 2 ppb (estimated) in well B-6, the presence of the same VOCs in the nearby impoundment settled solids suggests that the eastern impoundment is the likely source of these volatile organics in the shallow ground water.

Inorganic parameters detected in the shallow ground water suggest that the impoundment settled solids are influencing the shallow ground water chemistry. Evaluation of sample results suggests that aluminum, arsenic, chromium, hexavalent chromium, copper, iron, lead, mercury, sodium, vanadium, zinc, and sulfate are elevated downgradient of the former impoundments. These parameters occur in the impoundment settled solids, although the concentrations in the settled solids for some parameters such as arsenic, hexavalent chromium, sodium, vanadium, and sulfate are within the range for uncontaminated New York soils. Inorganic parameters which were detected at soluble concentrations which exceeded NYS Class GA standards or guidance values included chromium, hexavalent chromium, iron, manganese, sodium, fluoride and chloride.

The ground water in monitoring wells B-3S and B-6 has been affected the greatest by inorganic constituents. Iron and sodium were the only dissolved inorganic parameters which were consistently identified in the four sampling rounds. It appears that inorganic results may be a product of differing zones of saturation during periods of high and low precipitation. As noted in the site hydrogeology section (4.02), ground water during periods of precipitation appears to migrate off-site through the silty sand layer, and does not come in direct contact with the impoundment materials.

Concentrations of inorganic parameters were generally higher and more variable in ground water samples which were turbid (greater than 50 NTU). These higher and more variable concentrations are likely due to the presence of finer grained sediment in the samples.

6.4. Deep ground water

The ground water elevation data indicate that monitoring wells B-1D, B-2D, and B-12D are located upgradient of the former impoundments. Monitoring wells B-3D, B-4D and B-5D are downgradient of the former impoundments.

VOCs were detected in each of the deep monitoring wells. Most of the detections occurred during the first ground water sampling event and were below the method detection limits. Acetone and methylene chloride were detected sporadically in the deep ground water. There does not appear to be any replication of the results or a pattern of occurrence. Therefore, as discussed above, the presence of acetone and methylene chloride in the samples probably reflects laboratory contamination. Hexane, which was used for equipment decontamination, was detected in the second round of sampling. The presence of hexane is probably due to the incomplete rinsing of the decontaminated equipment. The other volatile organic parameters detected were 1,1,1-trichloroethane and trichloroethene. Trichloroethene was not detected in the newly installed upgradient monitoring well B-12D, which suggests that the source of the B-1D volatile organics is on-site or to the west of the site. However, since trichloroethene was not detected in wells B-4D or B-5D, which are downgradient of B-1D, it is likely that the presence of trichloroethene at B-1D is a localized occurrence.

The following inorganic parameters were detected in soluble concentrations which exceeded the New York State Class GA ground water standards: chromium, hexavalent chromium, iron, and sodium. Both iron and sodium concentrations exceeded the Class GA standards in the upgradient monitoring wells. Soluble iron concentrations do not show an increase from the upgradient ground water to the downgradient ground water. Therefore, with respect to iron, the deep ground water has not been impacted by the site. Soluble sodium concentrations are higher in some of the downgradient wells; however the higher concentrations may reflect natural variations since the upgradient concentrations exceed the Class GA standards by about six times. Chromium and hexavalent chromium were detected in upgradient monitoring well B-2D and in downgradient wells B-3D and B-5D. Chromium concentrations in B-3D exceeded the Class GA standard, while the B-5D concentrations were equal to or lower than the upgradient concentration. The inorganic ground water quality results indicated that monitoring well B-3D has been impacted. The ground water at B-3D not only contains elevated chromium and hexavalent chromium, but it also has the highest sulfate and lowest iron concentrations of the deep monitoring wells on the site. None of the shallow monitoring wells at the Alcan site detected concentrations of sulfate as high as well B-3D. Furthermore, a deep ground water seep, located near the bottom of the ravine to the north of the site, which issues from the bottom of landfill material, appears to have a sulfur odor and shows evidence of reducing conditions. This information suggests that off-site sources could also be contributing to deep ground water contamination on the Jarl site.

The presence of chromium and hexavalent chromium in wells B-3D and B-5D suggests that the shallow ground water zone on the Jarl site could be a potential contributor to the deep ground water contamination.

6.5. Cistern and pumphouse samples

Results of the two rounds of sampling of the cistern and the east and west pumphouses show exceedances of NYS Class GA ground water quality standards within the cistern and within the east pumphouse. Cistern sediment contains levels of metals above the range typically occurring within the native soils of New York State.

The unfiltered water samples collected from the cistern in June 1992 exceeded NYS Class GA ground water quality standards for chromium, iron, lead and zinc. Filtered samples exceeded the standard only for iron (both sampling rounds) and zinc (second round in August 1992).

Cistern sediments contained a low concentration of freon 113, most likely attributed to laboratory contamination. Concentrations of chlorobenzene and hexane were detected. The data indicate that the cistern is not hydraulically connected to the ground water system, since water levels within the cistern remained elevated above the ground water table after the pump was shut off. The cistern water levels do not coincide with shallow ground water levels at nearby monitoring well B-2S. Rather the water level within the cistern appears to be related to the rates of precipitation and runoff from the building roof. Furthermore, probing with a steel rod at the time of the first round sampling event (June 1992) determined that the bottom of the cistern is of steel plate construction.

Water samples collected from the east and west pumphouses exceeded the NYS Class GA ground water quality standard for sodium (east pumphouse in June 1992) and iron (west pumphouse in August 1992). Elevated sodium is most likely the result of road salt use. The pumphouses do not appear to be hydraulically connect to the shallow ground water system due to the cement block construction.

7. Risk assessment

7.1. Overview

This section presents a qualitative and quantitative baseline[1] assessment of the potential human health hazards which may be associated with the Alcan Jarl Site #828005 in Pittsford, New York. This assessment was conducted in accordance with United States Environmental Protection Agency (USEPA) guidelines and procedures, as presented in the Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A) (USEPA 1989).

In the opinion of O'Brien & Gere Engineers, Inc., the risks calculated and presented in this assessment are not a numerical presentation of actual risks to humans represented by the site. The values presented are a reflection of the methodology developed by the USEPA. Inherent in this standard methodology for conducting risk assessments is the generation of risk values which are designed to overestimate actual site risks by utilizing standard assumptions and conventions. However, because they are generated by a "standardized" procedure, the risk values are useful as a basis for comparison between investigated sites, as well as a basis for identifying remedial objectives.

The assessment addresses potential risks associated with chemicals detected in site ground water, soil, and air. Key conclusions of the risk assessment are summarized as follows:

- The total non-carcinogenic hazard index (HI) (0.004) calculated for potential current exposures by on-site workers at the plastics facility (J.C. Plastics) is within the USEPA's range of acceptability (a HI of less than

[1] In a baseline exposure assessment, current and future exposures are evaluated assuming no site remediation.

one). The cancer risk for potential current exposures by on-site workers at the plastics facility could not be quantified since a toxicity value was not available for the potential carcinogen (lead) detected in the medium of concern (soil) for this receptor.

- The total cancer risk calculated for potential future exposures by on-site workers ($2x10^{-7}$) is within the USEPA's range of acceptability. The total non-cancer hazard index calculated for potential future exposures by on-site workers (11.5) exceeds the USEPA's range of acceptability. The exposure pathway posing the greatest potential risk to future on-site workers is air. The major factors reducing the certainty in the risk calculations (i.e., resulting in systematic overestimation of risk) are:

  a) use of the 95% upper confidence limit on the current average surface soil and subsurface impoundment settled solids concentrations in the risk calculations; over a 25-year exposure period, it is more likely that workers would contact concentrations at the 50% upper confidence limit (i.e., mean concentration), resulting in lower risks than those calculated.

  b) assumption that subsurface impoundment settled solids will be distributed at the site surface, and subsequently will be contacted (currently, impoundment settled solids are situated below grade).

  c) use of a conservative air model in estimating inhalation exposures to fugitive dust; conservative assumptions were used in the model (e.g., 0% slope and 0% ground cover on-site).

- The total cancer risks calculated for potential future ground water exposures by off-site residents using ground water for potable uses (adult: $1x10^{-6}$, child: $8x10^{-7}$) are within the USEPA's range of acceptability. The total non-cancer hazard index calculated for an adult (1.3) exceeds the USEPA's range of acceptability, while the total non-cancer hazard index calculated for a child (0.8) is within the USEPA's range of acceptability. The major factors reducing the certainty in the risk calculations (i.e., resulting in systematic overestimation of risk) are:

  a) the assumption that ground water concentrations detected in on-site wells are site-related and are not influenced by the adjacent Sigismondi Landfill. However, it should be noted that it is believed that the Landfill has impacted the ground water quality in the deep aquifer at the site and therefore this hazard index would not be applicable to the Alcan site (see Section 6.04).

b) use of unfiltered ground water data (in compliance with NYSDEC guidelines); unfiltered ground water quality data does not represent the ground water quality which potential ground water users may contact.

c) use of the 95% upper confidence limit on the current average ground water concentrations in the risk calculations; over the exposure period, it is more likely that residents would contact concentrations at the 50% upper confidence limit (i.e., mean concentration), resulting in lower risks than those calculated.

d) assumption that current ground water concentrations will be present in future off-site wells (and will not undergo dilution, degradation, or adsorption).

7.2. Scope of the assessment

Risk assessment is a method used to evaluate the potential health risks which may be associated with chemical residues present at a site. There are a number of possible approaches to risk assessment: risks may be analyzed qualitatively (to identify potential exposure scenarios), quantitatively (to evaluate their magnitude and significance), or both. The risk assessment presented herein is a qualitative and quantitative assessment, conducted in accordance with guidelines and procedures of the USEPA for evaluating human health risks related to hazardous waste sites, as described in the <u>Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)</u> (USEPA 1989).

Specifically, this assessment estimates potential risks associated with exposures to chemicals detected in site soil, ground water, and air. The assessment is based on analytical results presented in this document.

7.3. Organization of the risk assessment

This risk assessment is divided into four main sections:

1) Identification of Chemicals of Potential Concern
2) Exposure Assessment
3) Toxicity Assessment
4) Risk Characterization

7.4. Data collection considerations

Representative samples were collected from environmental media potentially affected by releases from the site. Sampling procedures and associated quality assurance/quality control (QA/QC) criteria are presented in Section 2.

The following discussion identifies the sampled media and preliminarily identifies potential human exposures:

- Since, historically, the impoundments have been reported to overflow, surface soil samples were collected at on-site locations downgradient of the impoundments. Site surface soil is accessible to on-site workers and site trespassers.

- Since, historically, wastewaters were released to the impoundments, subsurface settled solids samples were collected from the impoundments. The settled solids is situated below grade, and is currently not accessible.

- Since site-related chemicals in the soil and settled solids may leach into ground water, ground water samples were collected from on-site shallow and deep monitoring wells. Site ground water in the deep aquifer may migrate off-site to potable wells and be contacted by off-site residents. As presented in Section 7.04, ground water chemistry of the deep aquifer is believed to be affected by the adjacent Sigismondi Landfill.

- Since site-related chemicals in the surface soil may be released to site air, air samples were collected at upwind, on-site, and downwind locations. Site air is accessible to on-site workers and site trespassers.

- Site related chemicals present in the soils in the on-site cistern may be occasionally contacted by on-site workers during maintenance activities. Therefore, soil samples were collected from the on-site cistern.

<u>**Background Samples**</u>

- Background ground water samples were collected on-site from two monitoring wells (B-1S and B-1D) installed hydraulically upgradient of the impoundments.

- Background surface soil samples were collected on-site from two locations (S-9 and S-10) upgradient of the impoundments.

- A background air sample was collected on-site from an upwind location.

7.5. Summary of chemicals of potential concern

The list of potentially site-related chemicals is lengthy (see Tables 14 to 16). Carrying all chemicals through the quantitative risk assessment would distract from the dominant risks potentially presented by the site. Consistent with USEPA risk assessment methodology, to reduce the number of chemicals used in the risk assessment, chemical concentrations detected in environmental media were compared to background concentrations. If chemicals were detected hydraulically downgradient (or downwind) at concentrations less than background, the chemical was excluded from the quantitative risk assessment. It should be noted that background ground water quality was not completely characterized. The Sigismondi Landfill borders the site on the east and north. During the remedial investigation, ground water elevations and ground water samples were not available from this area. However, preliminary NYSDEC data suggest that the landfill is situated hydraulically upgradient from the impoundment area, and therefore the Landfill has probably impacted the ground water quality in the deep aquifer on-site (see Section 6.04). Therefore, it is likely that concentrations detected in one-site wells installed in the deep aquifer are influenced by the adjacent landfill.

As a second step in reducing the number of chemicals potentially used in the risk assessment, detected ground water concentrations were compared to NYSDEC Class GA Standards for drinking water, or, in their absence, USEPA MCLs. As shown in Table 17, seven inorganics and one organic were excluded as chemicals of potential concern in ground water, based on compliance with associated MCLs.

The chemicals of potential concern at the site are summarized in Table 18.

The following chemicals of potential concern were identified:

- 11 inorganics and eight VOCs in soil and settled solids
- 15 inorganics and five VOCs in ground water
- one inorganic in air

7.6. Exposure assessment

7.6.1. Characterization of exposure setting

The following summarizes the key aspects of the site and its surroundings:

- The site is an inactive metal finishing facility situated in Pittsford, New York.
- Between the years 1962 and 1976, the facility utilized two surface impoundments for wastewater retention. In 1980, the impoundments were backfilled, graded, and seeded.
- The labor force at J.C. Plastics consists of approximately 10 to 20 workers.
- Access to the site is not limited; therefore, trespassers may gain access to the site.
- The site is surrounded by industrial land use; the Sigismondi Landfill (New York State Hazardous Site #8-28-011) is present immediately to the north and east of the site.
- Local ground water in the deep aquifer may be used as a potable supply; however, ground water users have not been identified within 2.5 miles downgradient of the site.
- Two to four wells are reportedly present on-site; historically, they were used for industrial processes.
- The nearest surface water body is a tributary to the Irondequoit Creek, located approximately 1000 feet to the north of the site.

<u>Location of Current Populations Relative to the Site</u>

<u>On-site</u> - Current on-site populations consist of workers at J.C. Plastics and occasional on-site trespassers. The maximum exposure period for an on-site worker is expected to be eight hours.

<u>Off-site</u> - Current off-site populations consist of workers (the nearest are immediately to the west of the site) and residents (nearest are approximately 2000 feet to the east of the site).

<u>Current Land Use</u>

On-site and immediately adjacent to the site, the land use is classified "industrial".

<u>Future Land Use</u>

The current site land use is classified "light industrial". Since the surrounding land use is industrial, it is likely that the future site use will remain industrial. Therefore, it was assumed that, in the future, the site use will remain industrial. At that time, on-site industrial workers would be the on-site receptors of concern. The maximum daily exposure period for a future on-site worker is expected to be eight hours. It should be noted that this risk assessment is a baseline risk assessment, in which risks are assessed based on no site remediation. In the future, off-site land uses are expected to remain the same as present.

7.6.2. Exposure pathways

An exposure pathway describes the course a chemical takes from the source to the exposed individual. An exposure pathway analysis links the sources, locations, and types of environmental releases with population locations and activity patterns to identify the significant pathways of human exposure.

An exposure pathway generally consists of four elements:

1) source and mechanism of chemical release;
2) retention or transport medium;
3) point of potential human contact with the contaminated medium (referred to as the exposure point); and
4) exposure route (e.g., ingestion) at the contact point.

Possible release sources, release mechanisms, and receiving media were identified for past, current, and future releases (Table 19). As previously discussed soil, surface water, sediment, ground water, air, and biota are/were potential receiving media for release sources (soil, ground water, and sediment).

The fate and transport of the chemicals of potential concern were evaluated to help link sources with currently contaminated media. To assess the fate of the chemicals, information was obtained on their physical/chemical and environmental fate properties (Table 20).

Potential exposure points were identified by identifying if and where potentially exposed populations (Section 8.08.1) could contact the receiving media presented in Table 19. Reasonable points of potential contact with contaminated medium were considered to be a potential exposure point (Table 21). In general, potential exposure points were identified where the concentration that could be encountered is the greatest.

After identifying potential exposure points, potential exposure routes were identified based on the media contaminated and the anticipated activities at the exposure points. Potential exposure routes are presented in Table 22. Subsequently, complete exposure pathways were identified. A pathway was considered to be complete if the following were present:

- a source or chemical release from a source
- an exposure point where contact can occur
- an exposure route by which contact can occur.

If these conditions were not met, the pathway was concluded to be incomplete. As a result, the following conclusions were drawn:

Surface Soil

On-Site - Under current and future land uses, the surface soil exposure pathway via incidental ingestion and dermal absorption was concluded to be complete at on-site locations. Current on-site workers and trespassers, and future on-site workers may contact chemical residues in surface soil during outdoor activities.

Off-Site - Under current and future land uses, the surface soil exposure pathway via incidental ingestion and dermal absorption was concluded to be complete at off-site locations. Chemical residues in surface soil may be transported off-site via tracking, and may be contacted by off-site workers during outdoor activities.

Subsurface Impoundment Settled solids

Under current land use, the subsurface settled solids exposure pathway via incidental ingestion and dermal absorption was concluded to be incomplete. Settled solids is situated approximately 3 feet below grade and is not accessible to on-site workers or trespassers.

Under future industrial land use, the subsurface settled solids exposure pathway via incidental ingestion and dermal absorption was concluded to be complete. Under future industrial use of the site, buildings or other structures may be constructed on the impoundments, and subsurface settled solids may be distributed at the site surface. Subsequently, on-site workers may contact chemical residues in settled solids during outdoor job-related activities.

Surface Water - Under current and future land uses, the surface water exposure pathway via incidental ingestion and dermal absorption in the tributary to Irondequoit Creek was concluded to be complete. Chemical residues in the on-site shallow and deep aquifer may be released to the tributary, and subsequently be contacted by off-site residents during outdoor play.

Sediments - Under current and future land uses, the sediment exposure pathway via incidental ingestion and dermal absorption in the tributary to the Irondequoit Creek was concluded to be complete. Chemical residues in the on-site shallow and deep aquifer may be released to the tributary, and subsequently be contacted by off-site residents during outdoor play.

Ground Water

On-Site - Under current land use, the ground water exposure pathway via ingestion, dermal absorption, and inhalation was concluded to be incomplete at on-site locations. Although ground water wells are reportedly present on-site, the wells are not utilized by current on-site workers.

Under future land use, the ground water exposure pathway via ingestion, dermal absorption, and inhalation was concluded to be complete at on-site locations. Under future industrial use of the site, on-site workers may utilize on-site ground water from the deep aquifer for potable water use. At that time, workers may contact chemical residues in site ground water.

Off-Site - For current exposures at off-site locations, the ground water exposure pathway via ingestion, dermal absorption, and inhalation was concluded to be incomplete. Since actively used off-site ground water wells were not identified within 2.5 miles downgradient of the site, an off-site ground water receptor population was not identified.

For future exposures under current and future land uses, the ground water exposure pathway via ingestion, dermal absorption, and inhalation was concluded to be complete at off-site wells. In the future, off-site residents within two miles downgradient of the site may install ground water wells for potable uses, and may contact chemicals which have migrated from the on-site deep aquifer.

Air

On-Site - Under current and future land uses, the air exposure pathway via inhalation was concluded to be complete at on-site locations. Compounds in site air may be inhaled by current on-site workers and trespassers. In the future, chemical residues in site air may be inhaled by on-site workers.

Off-Site - Under current and future land uses, the air exposure pathway via inhalation of off-site outdoor air was concluded to be complete. Chemicals in site air may be transported off-site in general atmospheric circulation, and be contacted by off-site workers.

Foodchain

Under current and future land uses, the foodchain pathway via ingestion of on-site game animals was concluded to be complete. On-site trespassers or off-site residents may occasionally ingest game animals (deer) which have grazed on-site. However, it should be noted that the site does not represent a significant habitat for wildlife.

Under current and future land uses, the foodchain pathway via ingestion of fish from the tributary to Irondequoit Creek was concluded to be complete. Chemical residues in the deep aquifer may be released to the tributary, and off-site residents may ingest fish caught in the tributary.

Various complete exposure pathways were further evaluated in the exposure assessment (Table 23). The following complete exposure pathways were not selected for quantification:

- **Ingestion and dermal contact exposures to on-site surface soil** by on-site trespassers were not selected for quantification. It is acknowledged that occasional site trespassers may contact chemical residues in site surface soil. However, soil exposures by trespassers are expected to be minimal in comparison to exposures by on-site workers, and exposures to on-site workers are quantified in this risk assessment.

- **Ingestion and dermal contact exposures to off-site soil** by off-site workers were not selected for quantification. Off-site workers may contact site-related chemical residues in off-site soil. However, exposures are expected to be minimal in comparison with soil exposures by on-site workers, and exposures to on-site workers are quantified in this risk assessment.

- **Ingestion and dermal contact exposures to surface water and sediments in the tributary to Irondequoit Creek** were not quantified due to confounding issues (as approved by the NYSDEC). Site ground water (in the deep aquifer) flows towards the tributary. However, the Sigismondi Landfill lies between the site and the tributary, and may be contributing to contamination (if any) in the tributary. Therefore, site-related concentrations in the tributary could not be determined.

- **Inhalation exposures to site air** were not quantified for on-site trespassers. Occasional site trespassers may contact chemical residues in site air. However, exposures are expected to be minimal in comparison with air exposures by on-site workers, and exposures to on-site workers are quantified in this risk assessment.

- **Inhalation exposures to off-site outdoor air** were not quantified for off-site workers. Although site-related chemicals in site air may be transported off-site, the magnitude of off-site exposures is expected to be small due to dilution and dispersion mechanisms.

- **Ingestion exposures to game animals** were not selected for quantification. On-site trespassers and local residents may occasionally ingest deer which have grazed on-site. However, due to the short duration of hunting season, the limited amount of game animals available, and the fact that the site does not represent a significant habitat for wildlife, the magnitude of risk is expected to be low and was not quantified.

- **Ingestion exposures to fish in the tributary to the Irondequoit Creek** were not selected for quantification due to confounding issues. Local residents may occasionally ingest fish from the tributary. However, the Sigismondi Landfill lies between the site and the tributary, and may be contributing to contamination (if any) in the tributary. Therefore, site-related fish tissue concentrations could not be determined.

- **Ingestion exposures to settled solids in the on-site cistern** were not quantified as a separate exposure route. While site-related chemicals are present in the settled solids at the on-site cistern, the potential exposures to the cistern settled solids by on-site workers is expected to be minimal. As a conservative measure, however, the concentrations of site-related residues detected in the cistern settled solids were averaged into the soil exposure point concentration for an on-site workers (see Table 25).

7.6.3. Quantification of exposure

The next step in the exposure assessment was to quantify the magnitude, frequency, and duration of exposure for the populations and exposure pathways selected for quantitative evaluation. First, exposure concentrations were estimated; then pathway-specific intakes were quantified. For this exposure assessment, intake variable values for a given pathway were selected so that the combination of all intake variables resulted in an estimate of the "reasonable maximum exposure" for that pathway.

The concentration terms in the intake equations are the average concentrations contacted at the exposure point over the exposure period. When estimating exposure concentrations, the objective was to provide a conservative estimate of the average concentration. Consistent with the approach specified in the USEPA guidance document, for each chemical of potential concern, the 95% upper confidence limit on the arithmetic mean chemical concentration was used. Exposures will be overestimated using this approach; it is assumed that the calculated exposure concentrations are present site-wide, and that exposures occur consistently at those concentrations. This assumption is unrealistic and inconsistent with actual site data (see distribution of detected concentrations in Tables 24 to 27).

The calculated exposure concentrations for each matrix are presented in Tables 24 to 27. Briefly, exposure concentrations were calculated as follows:

Surface Soil - For current land use exposures to on-site workers, surface soil exposure concentrations were derived from the 95% upper confidence limit on the average chemical concentrations detected in the surface soil samples (0 to 12-inch interval) collected from the site. Calculated exposure concentrations are presented in Table 24.

For future land use exposures to on-site workers, surface soil and settled solids exposure concentrations were derived from the 95% upper confidence limit on the average chemical concentrations detected in site surface soil and settled solids (in the future, settled solids may be dispersed at the site surface). Calculated exposure concentrations are presented in Table 25.

Ground Water - For future exposures to hypothetical off-site residents and future on-site workers using potable wells, ground water exposure concentrations were based on the 95% upper confidence limit on the current average concentrations detected in unfiltered ground water samples collected from on-site monitoring wells installed in the deep aquifer. Acetone, methylene chloride, and trichloroethene were detected in on-site deep ground water wells. Acetone and methylene chloride were detected in more than one well on-site, which indicates that these chemicals may be relatively widely distributed at the site. Therefore, acetone and methylene chloride were used as indicator parameters for off-site residents. Trichloroethylene, however, was detected in only one on-site monitoring well (B-1D), and was not detected in other on-site deep monitoring wells hydraulically downgradient of B-1D. This implies that TCE residues detected in B-1 are confined to on-site ground water and have not migrated off-site. Therefore, TCE was not used as an indicator parameter for off-site residents, but was used as an indicator parameter for future on-site workers. It should be noted that the ground water concentrations are likely affected by the adjacent landfill, and therefore may not be site-related.

Ground water quality in monitoring wells installed in the shallow aquifer were not used in the exposure concentration calculations since the shallow aquifer is not suitable for development on-site due to its low yield. In addition, the shallow aquifer is not present off-site (it releases to the ravine along the northern site boundary). Calculated exposure concentrations are presented in Table 26.

Air - For current exposures to on-site workers, air exposure concentrations were based on the 95% upper confidence limit on the current average concentrations detected in site air. Calculated exposure concentrations are presented in Table 27.

For future exposures to on-site workers, air exposure concentrations were modeled based on the 95% upper confidence limit on the average chemical concentrations detected in site surface soil and settled solids (in the future, settled solids may be distributed at the site surface). Supporting documentation for the modeled air concentrations is presented in Appendix I.

The exposure point concentration of each chemical of potential concern was used to calculate chemical intakes. Intakes were calculated for each receptor for each complete exposure route selected for quantification.

<u>Assumptions</u> - The following is a summary of the assumptions used in the health risk calculations. Most of the assumption values are default values specified in USEPA guidance documents, designed to overestimate actual exposures. The term "reasonable maximum exposure" is used in the guidance document in reference to the type of exposure evaluated through the use of these assumptions. However, it should be noted that the exposures evaluated are not considered by O'Brien & Gere Engineers, Inc. to be "reasonable" due to numerous upper-bound assumptions used in each exposure calculation (eg., upper-bound exposure concentration, upper-bound ingestion rate, and upper-bound exposure duration are used in the same calculation). As such, they are likely to overestimate the magnitude of potential exposures.

Soil - Under the current and future land use scenarios considered, current and future on-site workers may contact chemicals of potential concern in site soil during occasional outdoor job-related activities. Soil may be contacted via incidental ingestion or dermal contact.

Intakes from incidental ingestion of chemicals in soil were calculated (Table 28). Intakes were calculated for current and future on-site industrial workers. Ingestion exposures were assumed to occur as a result of inadvertently ingesting soil/dust from hands during eating or smoking following outdoor job-related activities. The following assumptions were used in the intake calculations:

- Soil exposure concentrations were based on the 95% upper confidence limit on the current average soil concentrations detected in site surface soil (for current worker; see Table 24) or in site surface soil and subsurface settled solids (for future worker; see Table 25)
- An ingestion rate of 50 milligrams (mg) soil/day (USEPA 1991a)
- 100% of the soil ingested is contaminated
- An exposure frequency of 250 days/year (USEPA 1991a)
- An exposure duration of 25 years (based on a 25-year term of employment at the site)(USEPA 1991a)

- An average body weight of 70 kg (USEPA 1989, p. 6-40)
- To evaluate non-carcinogenic health effects associated with long-term exposure, intakes were averaged over a 25-year period. To estimate carcinogenic effects, intakes were averaged over a 70-year lifetime (USEPA 1989, p. 6-40).

Intakes from dermal contact with chemicals in soil were calculated for current and future on-site workers (Tables 28 and 29). Dermal absorption exposures were assumed to occur as a result of hand and arm contact with soil/dust during occasional outdoor job-related activities. The following assumptions were used in the intake calculations:

- Soil exposure concentrations were based on the 95% upper confidence limit on the current average soil concentrations detected in site surface soil (for current worker; Table 24) or in site surface soil and subsurface settled solids (for future worker; Table 25)
- An average skin surface area of 3120 cm^2 (arms and hands; USEPA 1989, p. 6-41)
- A soil to skin adherence factor of 0.51 mg soil/cm^2 skin (Hawley 1985)
- Skin absorption factors of 1 percent (for all inorganics except lead; Ryan 1987), 0.06% (lead; Moore et al. 1980), and 25 percent (volatile organics; Ryan 1987)
- An exposure frequency of 250 days/year (USEPA 1991a)
- An exposure duration of 25 years (based on a 25-year term of employment at the site)(USEPA 1991a)
- An average body weight of 70 kg (USEPA 1989, p. 6-40)
- To evaluate non-carcinogenic health effects associated with long-term exposure, intakes were averaged over a period of 25 years. To estimate carcinogenic effects, intakes were averaged over a 70-year lifetime (USEPA 1989, p. 6-40).

Ground Water - Under the future land use scenario considered, chemicals of potential concern in the deep aquifer may be contacted by hypothetical off-site residents or on-site workers utilizing ground water wells for potable uses. Off-site residents may be exposed to chemicals of potential concern by ingestion of ground water used as drinking water, dermal contact with ground water, and inhalation of ground water vapors during showering, cooking, or washing. On-site workers may be exposed to chemicals of potential concern by ingestion of ground water, although it is unlikely that on-site ground water would be used for potable water since public water currently serves the facility.

Intakes from ingestion of ground water used as drinking water (and beverages made using drinking water) were calculated for off-site residents (children ages 1-6 and adults) and on-site workers (Table 30). The following assumptions were used in the intake calculations:

- Ground water concentrations were based on the 95% upper confidence limit on the current average unfiltered ground water concentrations detected in on-site monitoring wells installed in the deep aquifer[2] (Table 26); it should be noted that these concentrations may be due to the presence of the adjacent landfill.
- Ingestion rates of 1 liter/day (child resident ages 1-6 and on-site worker) and 2 liters/day (adult resident; USEPA 1991a)
- Exposure frequencies of 350 days/year (child and adult residents); and 250 days/year (on-site worker)(USEPA 1991a)
- Exposure durations of six years (child ages 1-6), 30 years (adult, based on a reasonable worst-case length of residence at a single dwelling), (USEPA 1991a)
- Average body weights of 15 kg (child ages 1-6; USEPA 1991a) and 70 kg (adult and worker; USEPA 1989, p. 6-40)
- To evaluate non-carcinogenic health effects associated with long-term exposure, intakes were averaged over periods of six years (child ages 1-6), 30 years (adult), and 25 years (worker). To estimate carcinogenic effects, intakes were averaged over a 70-year lifetime (USEPA 1989, p. 6-40).

Intakes from dermal contact with ground water during household use (showering and bathing) were calculated for off-site residents (children and adults) (Table 31). The following assumptions were used in the intake calculations:

- Ground water concentrations were based on the 95% upper confidence limit on the current average unfiltered ground water concentrations detected in on-site monitoring wells installed in the deep aquifer (Table 26); it should be noted that these concentrations may be due to the presence of the adjacent landfill.
- Skin surface areas of 7200 cm^2 (child ages 1-6: whole body) and 18150 cm^2 (adult: whole body) (USEPA 1989, p. 6-37).
- Chemical-specific dermal permeability constants, when available; due to the lack of chemical-specific dermal permeability constants for many

[2] Trichloroethene was detected in one on-site monitoring well (B-1D). However, as discussed in Section 7.06.03 it is highly unlikely that the detected TCE residues have migrated to off-site locations. Therefore, trichloroethene was not included as an off-site ground water chemical of concern.

chemicals of potential concern in ground water, the permeability constant for water was used for most chemicals (USEPA 1988, p. 126).
- An average exposure time of 0.117 hours (7 minutes) per day (USEPA 1989, p. 6-44).
- An exposure frequency of 350 days/year (USEPA 1991a).
- Exposure durations of six years (child ages 1-6) and 30 years (adult, based on a reasonable worst-case length of residence at a single dwelling; USEPA 1989, p. 6-40).
- Average body weights of 15 kg (child ages 1-6; USEPA 1991a) and 70 kg (adult; USEPA 1989, p. 6-40).
- To evaluate non-carcinogenic health effects associated with long-term exposure, intakes were averaged over periods of six years (child ages 1-6) and 30 years (adult). To estimate carcinogenic effects, intakes were averaged over a 70-year lifetime (USEPA 1989, p. 6-40).

Inhalation exposures were quantified for off-site residents (children and adults) utilizing ground water wells (Table 32). Exposures were assumed to occur as a result of inhaling contaminants transferred to the air during showering.

The following assumptions were used in the intake calculation:

- Air concentrations were calculated using the following equation:

$$CA = \frac{(CW \ x \ FR \ x \ ET)}{RV}$$

Where:

CW = chemical concentration in water (mg/L)
FR = flow rate of water during the shower (L/minute)
ET = exposure time (minutes)
RV = room volume (m^3)

The average flow of water during a typical shower is approximately 8 gallons per minute (or 3.028 L/minute), and the average shower duration is 7 minutes (USEPA 1989). It was assumed that the room volume is 20 m^3.

- It was assumed that all of the VOCs in the water are volatiled during the shower event.
- An inhalation rate of 0.6 m^3 (USEPA 1989)
- An exposure time of 0.117 hours/day (USEPA 1989)

- An exposure frequency of 350 days/year (USEPA 1991a)
- Exposure durations of 6 years (child ages 1-6) and 30 years (adult; USEPA 1991a)
- Body weights of 15 kg (child) and 70 kg (adult) (USEPA 1991a)
- To evaluate non-carcinogenic health effects associated with long-term exposure, intakes were averaged over periods of six years (child) and 30 years (adult). To estimate carcinogenic effects, intakes were averaged over a 70-year lifetime (USEPA 1989, p. 6-40).

Air - Under the current land use scenario considered, current on-site workers may inhale chemicals of potential concern in site air. In addition, under the future land use scenario considered, future on-site workers may inhale inorganic chemicals emitted to the air via fugitive dust generation. Intakes from inhalation of site air were calculated (Table 32). The following assumptions were used in the intake calculations:

- Air concentrations were based on the 95% upper confidence limit on the average concentrations detected in site air (current worker - Table 27), or were modeled based on the 95% upper confidence limit on the current average surface soil and subsurface settled solids concentrations detected on-site (Appendix I).
- An inhalation rate of 2.5 m^3/hour (USEPA 1991a)
- An exposure time of 8 hours/day (USEPA 1991a)
- An exposure frequency of 250 days/year (USEPA 1991a)
- An exposure duration of 25 years (USEPA 1991a)
- An average body weight of 70 kg (USEPA 1989, p. 6-40)
- To evaluate non-carcinogenic health effects associated with long-term exposure, intakes were averaged over a period of 25 years; to estimate carcinogenic effects, intakes were averaged over a 70-year lifetime (USEPA 1989, p. 6-40).

7.6.4. Summary of exposure assessment

The reasonable maximum exposure (RME) at the site reflects the RME for a pathway as well as the RME across pathways. Populations of concern (on-site workers and off-site child and adult residents) may be exposed to chemicals from several exposure routes. Intakes associated with the following exposure pathways were summed for the indicated populations:

- **On-site worker (current)** - ingestion and dermal contact with site soil; inhalation of site air

- **On-site worker (future)** - ingestion and dermal contact with site soil; inhalation of site air; ingestion of site ground water
- **Child resident (off-site)** - Ingestion, dermal contact, and inhalation of ground water
- **Adult resident (off-site)** - Ingestion, dermal contact, and inhalation of ground water

<u>Identification of Uncertainties</u>
Based on the sources and degree of uncertainty associated with estimates of exposure, it is possible to evaluate whether the exposure estimates are the maximum exposures that can be reasonably expected to occur. Tabular summaries of the values used to estimate soil, ground water, and air exposures are presented in Tables 33 to 35. The tables include the range of possible values for the parameters affecting intake, the midpoint of each range, and the values used to estimate exposures. In addition, a brief description of the selection rationale is included.

The major assumptions of the exposure assessment are summarized in Table 36. In addition, the degree to which each assumption is expected to affect the exposure calculations is presented. As shown, sources of uncertainty include the monitoring data, the exposure concentrations, and values of the intake variables used to calculate intake.

7.7. Toxicity assessment

Toxicity assessment is accomplished in two steps: hazard identification and dose-response assessment. Hazard identification is the process of determining whether exposure to an agent can cause an increase in the incidence of a particular adverse health effect, and whether the adverse health effect is likely to occur in humans. Hazard identification involves characterizing the nature and strength of the evidence of causation.

The dose-response evaluation is the process of quantitatively evaluating the toxicity information and characterizing the relationship between the dose received and the incidence of adverse health effects in the exposed population. From this quantitative dose-response relationship, toxicity values (e.g., reference doses [RfDs]) are derived that can be used to estimate the potential for adverse effects as a function of human exposure to the agent.

7.7.1. Non-carcinogenic effects

Consistent with USEPA methodology for conducting risk assessments, the following sources were consulted for toxicity information for non-carcinogenic effects: Integrated Risk Information System (IRIS) (USEPA 1991b), Health Effects Assessment Summary Tables (HEAST) (USEPA 1991c), and the USEPA Environmental Criteria and Assessment Office (ECAO) (1990). Chronic RfDs were identified for evaluating potential non-carcinogenic effects associated with exposure periods between seven years and a lifetime (i.e., those to workers and adult residents). Subchronic RfDs were identified to evaluate exposure periods between two weeks and seven years (i.e., those to child residents).

Summaries of toxicity values (RfDs) for potential non-carcinogenic effects are presented in Tables 37 to 39. It should be noted that there are varying degrees of uncertainty associated with RfDs; RfDs for human health effects are often extrapolated from animal studies, extrapolated from acute to chronic exposures, and extrapolated outside the range of exposure studied. Consequently, RfDs are very conservative values designed to be protective of the most sensitive individuals within human populations.

7.7.2. Carcinogenic effects

Consistent with USEPA methodology, IRIS and HEAST were consulted for toxicity information for carcinogenic effects (slope factors) of chemicals of potential concern. Slope factors for probable/known carcinogens are presented in Table 40. Slope factors are used in evaluating potential carcinogenic effects associated with exposure to potential carcinogens having an USEPA weight-of-evidence classification of A, B, or C. The slope factor is described by the USEPA as an upper-bound estimate of the probability of a response per unit intake of a chemical over a lifetime. The slope factor is used to estimate an upper-bound lifetime probability of an individual developing cancer as a result of exposure to a particular level of a potential carcinogen.

It should be noted that there are also varying degrees of uncertainty associated with slope factors; slope factors for human health effects are extrapolated from animal studies, and/or extrapolated from acute to chronic exposures. The slope factors are often extrapolated outside the range of exposures studied, and, therefore, there is no demonstrated basis supporting the probabilities of cancer incidence at those levels. Therefore, for these reasons and others, calculated risks are not representative of actual site risks, but are theoretical approximations of the upper-bound lifetime probability of developing cancer as a result of exposure, and are designed to overestimate the actual probabilities of cancer.

7.7.3. Unavailable toxicity values

USEPA-promulgated toxicity values were unavailable for some of the chemicals detected in site media (see Tables 37 to 40).

7.7.4. Uncertainties

There are varying degrees of uncertainty associated with toxicity values used in the risk assessment. For USEPA-verified RfDs obtained from IRIS, a statement of the confidence that the evaluators have in the RfD is presented.[3] In addition, the Uncertainty and Modifying Factors for each RfD are identified (Tables 37 to 39). For slope factors, the USEPA weight-of-evidence classification is presented in Tables 40.

7.8. Risk Characterization

In this section of the risk assessment, the toxicity and exposure assessments are summarized and integrated into quantitative and qualitative expressions of risk. To characterize potential non-carcinogenic effects, comparisons are made between projected intakes of chemicals and toxicity values; to characterize potential carcinogenic effects, probabilities that an individual will develop cancer over a lifetime of exposure are estimated from projected intakes and chemical-specific dose-response information.

7.8.1. Absorption adjustments

To compare exposure estimates (calculated in Tables 28 to 32) to toxicity values (presented in Tables 37 to 40), both must be either expressed as absorbed doses or both expressed as intakes (administered doses). Except for the dermal route of exposure, the exposure estimates developed in Tables 28 to 32 are in the form of intakes, with no adjustments made for absorption. The exposure estimates for dermal exposure are expressed as the amount of

[3] This is not reflective of the degree of confidence held by O'Brien & Gere Engineers, Inc. in these values.

substance absorbed per kg body weight per day. Therefore, it was necessary to adjust toxicity values expressed as administered doses to absorbed doses for comparison with the dermal exposure estimates. In the absence of chemical-specific absorption information, a relatively conservative assumption of five percent oral absorption was used (USEPA 1989). Toxicity value adjustments are presented in Tables 41 and 42.

The toxicity values for trichloroethene and methylene chloride are expressed as absorbed rather than administered doses. For these chemicals, the calculated exposure estimates initially expressed as administered doses were adjusted to absorbed doses. The exposure estimate adjustments are presented in Table 43.

7.8.2. Quantifying risks

Under current land use, on-site workers may be exposed to a combination of chemicals through several pathways. Total current exposures to on-site workers were based on the following pathways: ingestion and dermal contact with site soil, and inhalation of site air.

Under future industrial site use, on-site workers and off-site residents may be exposed to a combination of chemicals through several pathways. Total future exposures to off-site residents (child ages 1-6 and adult) were based on ingestion, dermal contact, and inhalation of chemicals in ground water, assuming that site ground water in the deep aquifer has migrated to a potable water supply. Total future exposures to on-site workers were based on the following pathways: ingestion and dermal contact with site soil, inhalation of site air, and ingestion of site ground water.

Carcinogenic effects - In quantifying carcinogenic effects, risks were estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to potential carcinogens.[4] The slope factors were used to convert estimated daily intakes averaged over a lifetime of exposure to incremental risks of an individual developing cancer.

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[4] The numerical risk is not truly representative of probability, but is a product of the EPA risk assessment process. The risk value is **not** a means of predicting human health impacts, but is useful for comparing to remediation goals.

The total calculated theoretical probability of the same individual developing cancer as a consequence of exposure to two or more carcinogens was calculated by summing the risk estimates for each potential carcinogen. The following total risks were calculated (Tables 44 to 47):

- $8x10^{-7}$ (off-site child resident ages 1-6)
- $1x10^{-6}$ (off-site adult resident)
- $2x10^{-7}$ (future on-site worker)

These risks are within the Superfund site remediation goal specified in the National Contingency Plan (10^{-4} to 10^{-6}) (40 CFR Part 300).

Non-Carcinogenic Effects - The potential for non-carcinogenic effects was evaluated by comparing exposure intakes over a specified time period with RfDs derived for a similar exposure period. According to USEPA methodology, this ratio of exposure to toxicity is called a hazard quotient. The hazard quotient assumes that there is a level of exposure below which it is unlikely for even sensitive populations to experience adverse health effects. If the exposure level exceeds this threshold, there may be concern for potential non-cancer health effects.

To assess the overall potential for non-carcinogenic effects posed by more than one chemical, a hazard index (HI) approach was used. The HI is equal to the sum of the hazard quotients. When the total HI for a population exceeds one, the approach utilized indicates that there may be concern for potential non-cancer health effects.

For workers and adults, HIs were calculated for chronic exposures, while for children ages 1-6, HIs were calculated for subchronic exposures (Tables 48 to 51). The following HIs were calculated:

- 0.8 (off-site child resident ages 1-6)
- 1.3 (off-site adult resident)
- 0.004 (current on-site worker)
- 11.5 (future on-site worker)

The HIs calculated for an off-site child resident and current on-site worker are within the Superfund site remediation goal (expressed as a numerical value less than one). However, the HIs calculated for an off-site adult resident and future on-site worker are not within the Superfund site remediation goal. The calculated HI for the off-site resident may reflect the impact due to the Sigismondi Landfill.

7.8.3. Uncertainties

The risk measures used in this risk assessment are not precise, deterministic estimates of risk, but conditional estimates controlled by a considerable number of consecutive upper-bound assumptions regarding exposure and toxicity. They are designed to overestimate the true risk value, as opposed to present a precise, realistic estimate of it. This is done by convention, consistent with USEPA protocols. There are several categories of uncertainties associated with risk assessments: selection of chemicals of potential concern, toxicity values for each chemical, and exposure assessment.

In the exposure assessment, several sources of uncertainty are the definition of the physical setting, parameter values, and tracking. Uncertainties related to these sources are discussed below.

Physical Setting - The initial characterization of the physical setting involves many professional judgments and assumptions. These include definition of the current and future land uses, identification of potential exposure pathways, and selection of chemicals of potential concern. The following statements may be made regarding uncertainties associated with the physical setting:

- It was assumed that the detected ground water concentrations in the deep aquifer are solely site-related.
- It was assumed that future off-site land uses will remain the same as present; there is a high probability that this assumption is true.
- It was assumed that the future on-site land use is industrial; there is a high probability that this assumption is true.
- There is a moderate probability that the complete exposure scenarios selected for quantification will occur or are actually occurring.

Parameter Values - The selection of parameter values used in the risk calculations involves many professional judgments, assumptions, and default values dictated by the USEPA methodology. These include calculation of exposure point concentrations, as well as selection of exposure frequencies, exposure durations, and intake rates. The following statements may be made regarding uncertainties associated with the parameter values:

- Numerous parameters are included in the calculations of human intake. The key parameters which influence intake are presented in Tables 33 to 35. The tables present the range of parameter values, the values used, and the rationale for the value selection.

- There is a very low probability that exposures to site contaminants (for the pathways identified as complete) will occur at the frequency, duration, and magnitude assumed in this assessment.
- Those chemicals which were not included in the quantitative risk estimate due to missing information on health effects may represent a source of uncertainty in the final risk estimates.
- There is a low probability that not quantifying several, but minor, complete exposure scenarios (e.g., ingestion of sediments) may cause the final risk estimates to be slightly underestimated.

Tracking - Uncertainties may be magnified or biased through the risk assessment process. Risk calculations utilize consecutive worst-case assumptions (e.g., upper-bound exposure concentration, upper-bound ingestion rate, and upper-bound exposure duration are used in the same calculation), while the probability of occurrence (of the series of worst-case parameters) is not considered. Therefore, the risks are overestimated.

Table 36 presents key assumptions used in the exposure assessment, and identifies the potential magnitude of these assumptions on the exposures. Uncertainty information for chemicals of potential concern is presented in Tables 37 to 40. These tables identify the weight-of-evidence for potential human carcinogens, and the Uncertainty and Modifying Factors for non-cancer toxicity values.

7.9. Summary

A baseline risk assessment was performed using available analytical data generated by O'Brien & Gere Engineers, Inc. The risk and hazard index estimates were calculated to highlight potential sources of risk so that they may be considered for inclusion in the remedial process as remedial objectives. In summary, the following conclusions may be made:

- Historically, inorganic and organic materials were released on-site to two unlined impoundments. Inorganics and volatile organics have been detected in site soil, settled solids, and ground water; aluminum which may be naturally occurring has been detected in site air.

- The following total cancer risks[5] were calculated:
  $8x10^{-7}$ (off-site child resident ages 1-6)
  $1x10^{-6}$ (off-site adult resident)
  $1x10^{-6}$ (future on-site worker)
  These risks are within the Superfund remediation goal (10^{-4} to 10^{-6}).

- The following HIs is were calculated:
  0.8 (off-site child resident ages 1-6)
  1.3 (off-site adult resident due to deep ground water which is probably from the adjacent landfill)
  0.027 (current on-site worker)
  11.5 (future on-site worker)

The HIs calculated for an off-site child resident and current on-site worker are within the Superfund site remediation goal (expressed as a numerical value less than one). However, the HIs calculated for an off-site adult resident and future on-site worker are not within the Superfund site remediation goal.

- The major factors reducing the certainty in the calculated site risks are:

  a) the assumption that concentrations in on-site wells installed in the deep aquifer are site-related. However, preliminary ground water data obtained from the adjacent Sigismondi Landfill suggests that the concentrations in the deep aquifer are due to the adjacent landfill.

  b) the use of unfiltered ground water data (in compliance with NYSDEC guidelines); unfiltered, turbid ground water quality is not representative of the ground water quality which potential ground water users may contact.

  c) the assumption that current on-site ground water concentrations will be present in future off-site wells (and will not undergo dilution, degradation, or adsorption).

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[5] The numerical risk is not truly representative of probability, but is a product of the EPA risk assessment process. The risk value is **not** a means of predicting human health impacts, but is useful for comparing sites within State and Federal Hazardous Waste Remediation programs, and for assistance in establishing remedial objectives.

d) the use of the 95% upper confidence limit on the current average concentrations in the risk calculations; over the exposure periods, it is more likely that receptors would contact concentrations at the 50% upper confidence limit (i.e., mean concentration).

e) the assumption that subsurface impoundment settled solids will be distributed at the site surface, and subsequently will be contacted by future industrial workers.

f) the use of a conservative air model in estimating inhalation exposures to fugitive dust.

- Due to high dose to low dose extrapolation, extrapolation from animal to human data, and due to incomplete toxicity information for some chemicals of potential concern, there is a low to medium level of confidence in the quantitative toxicity information used to estimate risks. Tables 37 to 40 present the USEPA confidence levels for toxicity values.

- Under current conditions, potential health effects are not associated with the ground water pathway due to the lack of ground water users. In the future, under industrial use of the site and use of site ground water in the deep aquifer as a drinking water source, adverse health effects are not expected to be associated with the ground water pathway for on-site workers. In the future, adverse health effects may be associated with the ground water pathway if chromium in the deep aquifer migrates to nearby residential ground water wells installed nearby. However, it is believed that future adverse health effects associated with chromium in the deep ground water are the result of impacts from the Sigismondi Landfill.

- Under current and future site uses, significant health effects are not expected to be associated with the soil/settled solids pathway.

- Site-related health effects associated with the surface water, sediment, and fish pathways (in the tributary to the Irondequoit Creek) could not be evaluated due to confounding issues (as approved by the NYSDEC). Site ground water (in the deep aquifer) flows towards the tributary. However, the Sigismondi Landfill lies between the site and the tributary, and may be contributing to contamination (if any) in the tributary. Therefore, site-related concentrations in the tributary could not be determined.

- Under current conditions, significant health effects are not expected to be associated with the air pathway.

- Under future conditions, significant health effects may be associated with the air pathway if impoundment settled solids is distributed at the site surface and chromium is released to site air in fugitive dust.

8. Habitat assessment

8.1. Introduction

This document presents the methods and results of a covertype analysis and ecological resource inventory conducted at the Alcan Aluminum Corporation site (#828005), in Pittsford, New York. The scope of this analysis consists of wildlife habitat descriptions consistent with portions of Step I of a Fish and Wildlife Impact Analysis (NYSDEC, 1991). The scope of the analysis for the impact of the site on fish and wildlife in the area was based on results of negotiations between Alcan and the NYSDEC. Based on these negotiations, examination of analytical data and evaluation of potential exposure pathways typically included in a Step I analysis are not included in this report. The purpose of this analysis is to identify potential ecological receptors inhabiting the site and vicinity.

This report is organized into two sections: Section 1 - Site Description, and Section 2 - Summary and Discussion. Section 1 describes the physical characteristics of identified covertypes and evaluates the use and value of each covertype as fish and wildlife resources. Section 2 summarizes the ecological assessment and habitat evaluation. The tasks which were performed and the results of each task are discussed in the following sections.

8.2. Site description

The site description section is divided into components designated as tasks: 1) General Site Description - presents a general discussion of the environmental setting and the history of site activities, 2) Covertype Delineation - discusses the classification of the site and vicinity according to ecological covertypes, 3) Fish and Wildlife Resources - identifies observed and typical wildlife inhabitants of the site and vicinity and evaluates the quality of the covertypes as wildlife habitat, and 4) Other Resources - discusses other resources on or in the vicinity of the site such as state regulated wetlands, significant habitats, wild, scenic, and recreational rivers, and rare, threatened, or endangered species.

8.3. General site description

The Alcan Aluminum Corporation site is located on Linden Avenue in Pittsford, New York. Formerly known as Jarl Extrusions Inc., the site is presently owned by Alcan Aluminum Corporation. The site is on the New York State Inactive Hazardous Waste site List #828005. Figure 1 illustrates the location of the site with respect to proximal physical and cultural features. It is bordered to the south by Linden Avenue. Industrial facilities are located to the west. Steeply graded wooded land containing an unnamed tributary of Irondequoit Creek is located to the north. The Sigismondi Landfill, also a listed New York State Hazardous Waste Disposal site (#828011), borders the site to the east. The Sigismondi Landfill contains fill material which may encroach upon the Alcan property.

The site is approximately 1000 ft long and 500 ft wide as illustrated in Figure 2. Three buildings are located on the southern portion of the site. The western-most building is currently leased from Alcan and occupied by J.C. Plastics. The remaining two buildings are currently vacant. Two former impoundments, located in the northern portion of the site (Figure 2), were utilized for wastewater retention from metal finishing operations conducted at the Jarl Extrusions plant. Following filling and grading activities associated with impoundment closure, human activity declined, allowing the area to revegetate with species characteristic of early succession old field communities.

8.4. Covertype delineation

In the context of this report, a "covertype" is defined as an area characterized by a distinct pattern of natural (e.g. forest) or cultural (e.g. residential) land use. Covertype designations were applied to the site and surrounding areas within 0.5 miles of the site (the study area) based on the observed physical and vegetative features. Covertype designations and delineations for the study area were developed based on a field reconnaissance conducted on December 16, 1992. Each covertype designation was selected based on a comparison between the observed characteristics and the ecological community descriptions presented in the NYSDEC Natural Heritage Program document *Ecological Communities of New York State* (NYSDEC, 1990).

The dominant vegetative species observed during the field reconnaissance are included in the description of each covertype and/or aquatic habitat identified in the covertype delineation. Herbaceous vegetation was not identified, because the site reconnaissance was conducted in the winter when these plants have lost their identifying characteristics. In addition, heavy snow cover hindered observation of the ground cover vegetation.

A covertype map was developed for the study area which identifies eight covertypes (Figure 18). Of these covertypes, four are considered natural covertypes and four are considered cultural covertypes (NYSDEC, 1990), reflecting the extent of human disturbance to the study area for land uses such as residential housing, roadways, and industrial activities. Tributary #9 of Irondequoit Creek, approximately 8 ft wide, was observed north of the site. Small drainageways, apparently resulting from recent construction activities, drain into the tributary. Because of their small size, the tributary and sub-tributaries are not represented on the covertype map. Each of the identified covertypes has a secure global and state ranking (NYSDEC, 1990) indicating that they are not rare ecological communities requiring preservation. Descriptions of each of the covertypes identified within the study area follow.

8.4.1. Natural covertype designations

<u>**Successional Southern Hardwoods**</u>

Two separate portions of the site, located in the northeast and southwest corners of the study area, contain a low-density mixture of southern hardwood tree species in a rolling community. Dominant tree species observed in this area consist of: honeylocust *(Gleditsia triacanthos)*, black cherry (*Prunus serotina*), quaking aspen (*Populus tremuloides*), hawthorne (*Crataegus* sp.), and box elder (*Acer negundo*). The approximate age of trees in these stands is 15 to 30 years. The understory consists of staghorn sumac (*Rhus typhina*), dogwoods (*Cornus* sp.), golden rod (*Solidago* sp.), and raspberry (*Rubus* sp.). Successional southern hardwood areas are represented by dark green on the covertype map (Figure 18). Both areas are adjacent to either residential and/or commercial zones.

Successional Northern Hardwoods

The north/northwest portion of the study area consists of another low-density rolling community bordered by Penfield Road to the south. Dominant hardwoods and conifers in this area include: red maple (*Acer rubrum*), white pine (*Pinus strobus*), black cherry, and quaking aspen. The average age of dominant trees in this stand is 15 to 30 years. The understory consists of staghorn sumac and dogwoods. The successional northern hardwood area is represented by brown on the covertype map (Figure 18).

Pine - Northern Hardwood Forest

This area, located in the southwest portion of the study area, is dominated by white pine, norway spruce (*Picia abies*), and Scotch pine (*Pinus sylvestris*). The approximate age of trees in this moderately dense stand is 25 to 40 years. This area is bordered by a residential zone to the south and a successional southern hardwood covertype to the north. The pine-northern hardwood forest area is represented by teal on the covertype map (Figure 18).

Successional Old Field

In the area of the former impoundments and across Linden Avenue southwest of the site are open meadows of grasses and shrubs such as goldenrod, staghorn sumac, wild carrot (*Daucus carota*), aster (*Aster* sp.) and dogwood. These areas are bordered by either urban structure exterior and/or successional southern hardwood covertypes. Successional old field areas are represented by blue on the covertype map (Figure 18).

8.4.2. Aquatic habitats

The small drainageways located north of the site were apparently created by runoff from recent construction activities north of the site. They are approximately 10 to 12 inches wide and 2 to 3 inches deep. The observed flow was extremely slow.

Tributary #9 of Irondequoit Creek is located north of the site. The approximate width and depth of the stream are 8 feet and 6 to 12 inches, respectively. Small pools were observed, but riffles were absent. Its perennial flow rate varies seasonally and is dependent upon ground water discharge and runoff from the south. The stream bottom is sandy and void of vegetation. The stream is hydrologically connected to deep ground water. Runoff from adjacent areas and ground water discharge into the stream may adversely impact the water quality.

Irondequoit Creek borders the northeast portion of the study area. According to the NYCRR (6 NYCRR Part 846), this stretch of Irondequoit Creek is a Class "B" surface water. Class "B" waters are suitable for primary contact recreation and any other uses except as a source of water supply for drinking, culinary, or food processing purposes. Irondequoit Creek is represented by light blue on the covertype map (Figure 18).

8.4.3. Cultural covertype designations

The remaining covertypes in the study area are heavily influenced by urbanization. Industrial and residential areas have eliminated much of the natural habitat in the area and replaced it with urban wildlife habitats consisting primarily of mowed lawns, mowed lawns with trees, paved roads, parking lots, landfills, and urban structure exteriors. These areas are considered covertypes by NYSDEC since they do provide suitable habitat for urban wildlife. These cultural covertypes are discussed below.

Urban Structure Exterior

The dominate covertype in the study area consists of urban or densely populated suburban zones. This area is sparsely vegetated with natural vegetation consisting of: boxelder (*Acer negundo*), goldenrod, staghorn sumac, wild carrot, milkweed (*Asclepias*), aster and grasses. Commercial buildings, apartment buildings, houses and paved roadways are prevalent in this area. Urban structure exterior areas are represented by red on the covertype map (Figure 18).

Mowed Lawn

Surrounding many of the commercial and residential structures in the study areas was groundcover dominated by grasses maintained by mowing. These areas are maintained for cosmetic purposes around buildings located to the east, west and south of the site. Mowed lawn areas are represented by light green on the covertype map (Figure 18).

Urban Vacant Lot

An area to the north of the site consists of an open zone cleared for construction or development. Vegetation was lacking as bulldozing activity appeared recent. This area is bordered to the north/northwest by Penfield Road. The urban vacant lot area is represented by yellow on the covertype map (Figure 18).

Paved Road/Path

Roadways traversed the study area with moderate to heavy vehicle traffic. Penfield Road to the north, and Linden Avenue and Conrail Railroad to the south are the significant asphalt or concrete pathways. Paved roads and paths are represented by black on the covertype map (Figure 18).

8.5. Description of fish and wildlife resources

The objectives of the description of fish and wildlife resources were to: 1) list wildlife observed within the study area, 2) identify typical fauna of each covertype or aquatic habitat, 3) describe the quality of the terrestrial covertypes and aquatic habitats present within the study area, 4) discuss the value of fish and wildlife resources to humans and 5) document instances in the study area where the site may have produced visible signs of stress to vegetation or wildlife. The tasks performed to meet each of these objectives and the results of the tasks are discussed in the following sections.

8.5.1. Observed fish and wildlife

Fish and wildlife observed during the site reconnaissance were identified and are listed in this section. Included in the list of observed species are species for which evidence (e.g. tracks or scat) was observed within the study area.

Terrestrial Wildlife

The majority of the wildlife observed during the site reconnaissance were birds. The greatest diversity of species was found in the Successional Southern Hardwoods. Observed here were: mourning dove (*Zenaidura macroura*), downy woodpecker (*Picoides pubescens*), house sparrow (*Passer domesticus*), house finch (*Carpodacus cassinii*), American crow (*Corvus brachyrhynchos*), rock dove (*Columba livia*), black-capped chickadee (*Parus atricapillus*), red-bellied woodpecker (Melanerpes carolinus) and northern oriole (*Icterus galbula*) (nest only). Bird species observed throughout the remainder of the study area in each listed covertype include: American crow, house sparrow, house finch, rock dove, and northern cardinal (*Cardinalis*).

Although no terrestrial mammals were observed, indicators of site use by white-tailed deer (*Odocoileus virginianus*), Eastern cottontail rabbit (*Sylvilagus floridanus*), gray squirrel (*Sciurus carolinensis*), striped skunk (*Mephitis*), and raccoon (*Procyon lotor*) were observed.

Aquatic Wildlife

No aquatic wildlife or submergent vegetation was observed in Irondequoit Creek, the tributary or drainageways.

8.5.2. Fauna typical of each covertype and aquatic habitat

Terrestrial Habitats

Wildlife potentially inhabiting the terrestrial covertypes in the vicinity of the site were evaluated using available published information regarding habitat preference and geographic range data for New York State wildlife compiled by Chambers (1983). Lists of avian, mammalian, amphibian, and reptilian wildlife species potentially inhabiting the identified covertypes are presented in Appendix J.

Aquatic Habitat

Because of their small size, shallow depth, and seasonal flow, no fishes or aquatic furbearers are expected to inhabit the drainageways.

Both Irondequoit Creek and its tributary, located north of the site, are capable of supporting small fishes and aquatic furbearers. Although no aquatic wildlife was observed, Appendix J lists avian, reptilian, mammalian and plant species potentially inhabiting freshwater stream habitats.

8.5.3. Habitat quality evaluation

The value of each habitat was qualitatively evaluated based on field observations of physical characteristics. For terrestrial covertype wildlife habitat evaluations, resident wildlife species requirements for food sources, home range, breeding requirements, and cover were examined. Additional information used in the evaluation of habitat quality included: 1) the nature, extent and diversity of observed wildlife, 2) the availability of similar habitats in the immediate vicinity, 3) the size of the habitat, and 4) adjacent land use patterns. Aquatic habitat evaluations were primarily based on the size of the stream and adjacent land use.

Successional Northern and Southern Hardwoods, Pine - Northern Hardwood Forest

Although these covertypes contain sufficient food and cover to support a diversity of wildlife species, their location and size limit their use by wildlife. The covertypes are bordered by industrial facilities and residential neighborhoods. The areas are capable of supporting a variety of bird and small mammals because of the high productivity of these early succession mast producing forests. Use of these covertypes by larger mammals such as deer was evident during the site reconnaissance. Canopy and understory vegetative species provide food and cover for a variety of birds including the songbird and woodpecker species native to northern New York State (see Appendix J).

Successional Old Field

Wildlife habitat quality of this area is relatively low. The dense grasses may provide a good source of cover for wildlife such as small mammals which may inhabit this area. This community may also support populations of ground feeding and nesting birds such as the field sparrow (*Spizella pusilla*), American robin (*Turdus migratorius*), mourning dove and northern cardinal (see Appendix J).

Aquatic Habitats

Because of their small size, shallow depth, and seasonal flow, the drainageways do not provide adequate habitat for fishes or aquatic furbearers. However, they may serve as a drinking water source for terrestrial mammals and birds.

The unnamed tributary to Irondequoit Creek offers good quality habitat and is potentially capable of supporting small fishes and aquatic furbearers. The stream bottom is sandy and capable of supporting submergent vegetation.

Irondequoit Creek offers high quality habitat for aquatic wildlife. Trout and salmon are among many common resident and migratory fish species. Portions of the creek are used for spawning by rainbow and brown trout, and Pacific and Atlantic Salmon (Sanderson, 1992).

Cultural Covertypes

Urban and industrial areas, with their mowed lawns, ornamental trees, and building exteriors provide habitat for urbanized bird and mammal species. As natural habitat communities diminish in size and quality, wildlife are forced to adapt to the more urban environment. However, urbanization is not practical for the majority of wildlife species. This analysis acknowledges the need and use of urban areas by many wildlife species, but does not consider these habitats to be impacted by the site.

8.5.4. Value of resources to humans

Fish and wildlife resources are valuable to humans for recreational and aesthetic reasons. Many sportsmen hunt, fish and consume their catches.

Wildlife resources are also enjoyed by naturalists which enjoy observations of wildlife during hiking and camping. However, the value of wildlife inhabiting the study area to humans is very limited. Access to the site and contiguous areas is restricted by fences, posted signs, etc. It is possible to access what appears to be a tree stand, located on-site, without breaking a fence or crossing posted property. However,there is no hunting of any kind, including bow and arrow, allowed within the Town of Pittsford (Froham, 1996 and Koster, 1996). For these reasons, the value of wildlife in the study area for humans is considered to be low.

8.5.5. Observations of site-related stress

During the site reconnaissance, the study area was examined for evidence of stress to biota potentially attributable to chemical residues of the site. No signs of stress were observed on or in the vicinity of the site. Field observations of Irondequoit Creek and Tributary #9 noted that no aquatic wildlife or submergent vegetation was observed. The lack of wildlife and submergent vegetation extended upgradient of the possible influence of the Jarl and Sigismondi sites. This condition is most likely the result of the time of year the investigation was completed.

8.6. Other resources

Freshwater Wetlands

Based on a review of the NYSDEC Freshwater Wetlands Maps for the Fairport, Webster, Rochester East, and Pittsford Quadrangles, two state wetlands are located within 2 miles of the site (Figure 19). One wetland (PR-29) is located approximately one mile southeast of the site, on Irondequoit Creek. This portion of the creek is upgradient of the confluence with tributaries near the site. The second wetland (PR-6) is also located on Irondequoit Creek, almost two miles upstream of site tributaries. Both wetlands are designated Class I (Sanderson, 1992).

NYS wetlands are classified according to the functions and values of the wetlands. According to the Codes, Rules and Regulations for the State of New York (NYCRR), Class I wetlands provide the most critical of the State's wetland benefits; Class II wetlands provide important wetland benefits; Class III wetlands supply wetland benefits; Class IV wetlands provide some wildlife and open space benefits (6 NYCRR Part 663). Permits are issued for regulated activities in wetlands based on their functions and values. Permits are issued for activities in Class I wetlands if the activity satisfies a compelling economic or social need that clearly and substantially outweighs the loss of or detriment to the benefits of the wetland (6 NYCRR Part 663).

<u>Significant Habitats</u>

According to the NYSDEC, Division of Fish and Wildlife, the area around the site is one of rich biodiversity (Butkas, 1992). An 11-acre area providing significant wildlife habitat exists approximately 1.5 miles northeast of the site. This area is a relatively undisturbed natural environment isolated in an expanding urban development (Hauber, 1977). A 3-acre "oak opening" community within 2 miles of the site was identified by the New York State Natural Heritage Program (NHP). Although the "oak opening" community is considered rare, it is not protected in New York State. No information on the location of the community was provided by NHP.

<u>Wild, Scenic and Recreational Rivers</u>

No surface waters of the site and vicinity are designated as Wild, Scenic or Recreational in accordance with the Wild, Scenic and Recreational Rivers Act.

<u>Rare, Threatened, or Endangered Plant and Animal Species</u>

Information regarding the presence of state listed rare, threatened or endangered (RTE) plant or animal species on or within 2 miles of the site was obtained from NHP. No state listed RTE animal species or habitats were identified. However, NHP identified five plant species receiving NYS legal status (Buffington, 1992). Information on the locations of protected plants and communities is not released to the public by NHP. Table 52 summarizes the legal status of each species. Information regarding Federally listed RTE plant and animal species was obtained from the United States Fish and Wildlife Service (USFWS). According to the USFWS, no Federally listed or proposed threatened or endangered species are known to exist in the vicinity of the site.

8.7. Summary

This section summarizes the ecological resources and habitat evaluation based on the site reconnaissance and information provided by state agencies.

- Four natural covertypes and four cultural covertypes exist within the study area.

- The natural covertypes: Successional southern hardwoods, Successional northern hardwoods, Pine-hardwood forest, and Successional old-field provide good quality habitat for a variety of wildlife species.

- Irondequoit Creek and Tributary #9 are significant aquatic habitats within the study area. Although they are capable of supporting life, none was observed at the time of field investigations.

- Cultural covertypes do not provide significant habitats which are capable of supporting a diversity of wildlife species.

- Two NYS regulated wetlands are present along Irondequoit Creek within 2 miles of the site, but upstream of site tributaries.

- Five rare plants and one rare community exist within 2 miles of the site.

The Environmental Evaluation was designed to identify potential ecological receptors at or in the vicinity of a site, which could be exposed to site-related compounds during normal life activities. Covertypes and aquatic habitats in the vicinity of the site provide quality wildlife habitat for a variety of mammalian, avian, reptilian, and amphibious species. Five rare plants, one rare community, two regulated wetlands, Irondequoit Creek, and an Irondequoit Creek tributary are located within 2 miles of the site. Based on the wetland locations upstream of the site on Irondequoit Creek, the site could not influence wetland quality.

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TABLE 1

Ground Water Monitoring Well Data

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

WELL NUMBER	GROUND SURFACE ELEV. (FT)	PVC CASING ELEV. (FT)	WELL DEPTH (FT) (Below Surface)	SCREENED INTERVAL ELEV. (FT)	HYDRAULIC CONDUC-TIVITY (cm/sec)	GROUND WATER ELEVATION (FT) 11/30/90	2/28/91	6/3/92	8/10/92
B-1S	417.4	419.27	23.0	395 - 405	1.6E-05	406.31	407.31	406.70	408.48
B-1D	417.8	420.30	70.1	348 - 358	1.2E-02	362.98	363.02	362.32	362.55
B-2S	414.8	417.18	18.0	397 - 407	2.6E-06	406.42	408.92	409.77	410.20
B-2D	414.9	417.42	70.3	345 - 355	2.6E-03	353.03	353.54	353.07	353.35
B-3S	416.0	417.98	21.3	395 - 405	4.9E-07	401.77	405.86	404.36	402.79
B-3D	415.9	417.90	83.7	333 - 343	2.3E-03	339.73	340.03	339.81	339.92
B-4S	418.3	420.97	20.7	398 - 408	N/A	DRY	410.70	404.56	404.31
B-4D	417.9	420.18	89.9	328 - 338	9.8E-03	336.71	337.03	336.86	336.95
B-5S	416.4	418.69	20.9	396 - 406	N/A	DRY	DRY	397.62	DRY
B-5D	415.7	417.72	89.5	326 - 336	1.4E-02	335.17	335.61	335.43	335.51
B-6	415.4	417.59	20.7	394 - 404	1.1E-06	403.33	405.78	403.92	406.24
B-7	418.0	420.00	19.5	399 - 409	2.5E-07	401.73	408.82	405.39	407.03
B-8	418.9	421.22	21.9	397 - 407	1.4E-07	405.74	409.29	421.22	405.15
B-9	417.2	418.88	19.9	397 - 407	1.2E-04	(*)	(*)	405.48	410.83
B-10	417.5	419.36	16.9	401 - 411	N/A	(*)	(*)	DRY	401.69
B-11	413.5	414.66	13.4	400 - 410	N/A	(*)	(*)	DRY	DRY
B-12D	416.5	418.76	53.4	363 - 373	3.9E-03	(*)	(*)	371.81	372.17
B-13	413.4	413.50	19.9	393 - 403	2.7E-05	(*)	(*)	399.08	403.73
Cistern	415.2	——	11.6	——	——	(*)	(*)	~405.30	~413.13

Notes: Based on a range from 1.4 x 10-7 to 1.2 x 10-4 cm/sec, the log average hydraulic conductivity for the shallow ground water zone is 2.7 x 10-6 cm/sec.
Based on a range from 2.3 x 10-3 to 1.4 x 10-2 cm/sec, the log average hydraulic conductivity for the deep ground water zone is 5.8 x 10-3 cm/sec.
NA - Insufficient water in wells to perform test.
—— - Not applicable.
(*) - Well not yet installed.

TABLE 2

SURFACE IMPOUNDMENT BORING VOLATILE ANALYSES RESULTS
ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	IB-1 6-8' 10/18/90	IB-1 8-8.5' 10/18/90	IB-1 8-8.5' DUP 10/18/90	IB-1 12-14' 10/18/90	IB-2 9-9.5' 10/18/90	IB-3 3.5-4' 10/18/90	IB-3 6-8' 10/18/90
CHLOROMETHANE	12 U	13 U	13 U	64 U	13 U	12 U	15 U
BROMOMETHANE	12 U	13 U	13 U	64 U	13 U	12 U	15 U
VINYL CHLORIDE	12 U	13 U	13 U	64 U	13 U	12 U	15 U
CHLOROETHANE	12 U	13 U	13 U	64 U	13 U	12 U	15 U
METHYLENE CHLORIDE	6 U	4 J	3 J	710	9	6 U	8 U
ACETONE	35	29 B	82 B	63 J	34	4 J	150 B
CARBON DISULFIDE	6 U	6 U	2 J	32 U	6 U	6 U	8 U
1,1-DICHLOROETHENE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
1,1-DICHLOROETHANE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
1,2-DICHLOROETHENE (TOTAL)	6 U	6 U	6 U	32 U	160	6 U	8 U
CHLOROFORM	6 U	6 U	6 U	32 U	6 U	6 U	8 U
1,2-DICHLOROETHANE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
2-BUTANONE	12 U	13 U	13 U	64 U	13 U	12 U	15 U
1,1,1-TRICHLOROETHANE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
CARBON TETRACHLORIDE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
VINYL ACETATE	12 U	13 U	13 U	64 U	13 U	12 U	15 U
BROMODICHLOROMETHANE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
1,2-DICHLOROPROPANE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
CIS-1,3-DICHLOROPROPENE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
TRICHLOROETHENE	6 U	6 U	6 U	32 U	180	6 U	8 U
DIBROMOCHLOROMETHANE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
1,1,2-TRICHLOROETHANE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
BENZENE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
TRANS-1,3-DICHLOROPROPENE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
BROMOFORM	6 U	6 U	6 U	32 U	6 U	6 U	8 U
4-METHYL-2-PENTANONE	13 U	13 U	13 U	64 U	13 U	12 U	15 U
2-HEXANONE	13 U	13 U	13 U	64 U	13 U	12 U	15 U
TETRACHLOROETHENE	6 U	6 U	6 U	32 U	2 J	6 U	8 U
1,1,2,2-TETRACHLOROETHANE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
TOLUENE	2 J	16 B	29 B	850 B	13	1 J	4 JB
CHLOROBENZENE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
ETHYLBENZENE	14	130	110	29 J	6 U	6 U	8 U
STYRENE	6 U	6 U	6 U	32 U	6 U	6 U	8 U
XYLENE (TOTAL)	110	410	280	110	6 U	6 U	8 U

NOTES: All values measured in ug/kg (ppb).
U – Not detected
J – Indicates an estimated value
B – Analyte found in blank

TABLE 2 (CONT.)

SURFACE IMPOUNDMENT BORING VOLATILE ANALYSES RESULTS
ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	IB-3 10-12' 10/18/90		IB-6 8.7-9.2' 10/18/90		IB-5 CENTER 10/18/90	
CHLOROMETHANE	13	U	12	U	12	U
BROMOMETHANE	13	U	12	U	12	U
VINYL CHLORIDE	13	U	12	U	12	U
CHLOROETHANE	13	U	12	U	12	U
METHYLENE CHLORIDE	0.8	J	6	U	6	U
ACETONE	31	B	21	B	6	JB
CARBON DISULFIDE	6	U	6	U	6	U
1,1-DICHLOROETHENE	6	U	6	U	6	U
1,1-DICHLOROETHANE	6	U	6	U	6	U
1,2-DICHLOROETHENE (TOTAL)	6	U	6	U	6	U
CHLOROFORM	6	U	6	U	6	U
1,2-DICHLOROETHANE	6	U	6	U	6	U
2-BUTANONE	13	U	12	U	12	U
1,1,1-TRICHLOROETHANE	6	U	6	U	6	U
CARBON TETRACHLORIDE	6	U	6	U	6	U
VINYL ACETATE	13	U	12	U	12	U
BROMODICHLOROMETHANE	6	U	6	U	6	U
1,2-DICHLOROPROPANE	6	U	6	U	6	U
CIS-1,3-DICHLOROPROPENE	6	U	6	U	6	U
TRICHLOROETHENE	6	U	6	U	6	U
DIBROMOCHLOROMETHANE	6	U	6	U	6	U
1,1,2-TRICHLOROETHANE	6	U	6	U	6	U
BENZENE	6	U	6	U	6	U
TRANS-1,3-DICHLOROPROPENE	6	U	6	U	6	U
BROMOFORM	6	U	6	U	6	U
4-METHYL-2-PENTANONE	13	U	12	U	12	U
2-HEXANONE	13	U	12	U	12	U
TETRACHLOROETHENE	6	U	6	U	6	U
1,1,2,2-TETRACHLOROETHANE	6	U	6	U	6	U
TOLUENE	2	J	2	JB	6	B
CHLOROBENZENE	6	U	6	U	6	U
ETHYLBENZENE	6	U	6	U	6	U
STYRENE	6	U	6	U	6	U
XYLENE (TOTAL)	6	U	6	U	6	U

NOTES: All values measured in ug/kg (ppb).
U - Not detected
J - Indicates an estimated value
B - Analyte found in blank

TABLE 3

SURFACE IMPOUNDMENT BORING SEMIVOLATILE ANALYSES RESULTS
ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	IB-C COMP. 10/18/90	
PHENOL	530	U
BIS(2-CHLOROETHYL)ETHER	530	U
2-CHLOROPHENOL	530	U
1,3-DICHLOROBENZENE	530	U
1,4-DICHLOROBENZENE	530	U
BENZYL ALCOHOL	530	U
1,2-DICHLOROBENZENE	530	U
2-METHYLPHENOL	530	U
BIS(2-CHLOROISOPROPYL)ETHER	530	U
4-METHYLPHENOL	530	U
N-NITROSO-DI-N-PROPYLAMINE	530	U
HEXACHLOROETHANE	530	U
NITROBENZENE	530	U
ISOPHORONE	530	U
2-NITROPHENOL	530	U
2,4-DIMETHYLPHENOL	530	U
BENZOIC ACID	2600	U
BIS(2-CHLOROETHOXY)METHANE	530	U
2,4-DICHLOROPHENOL	530	U
1,2,4-TRICHLOROBENZENE	530	U
NAPHTHALENE	530	U
4-CHLOROANILINE	530	U
HEXACHLOROBUTADIENE	530	U
4-CHLORO-3-METHYLPHENOL	530	U
2-METHYLNAPHTHALENE	530	U
HEXACHLOROCYCLOPENTADIENE	530	U
2,4,6-TRICHLOROPHENOL	530	U
2,4,5-TRICHLOROPHENOL	2600	U
2-CHLORONAPHTHALENE	530	U
2-NITROANILINE	530	U
DIMETHYLPHTHALATE	530	U
ACENAPHTHYLENE	530	U
2,6-DINITROTOLUENE	530	U
3-NITROANILINE	2600	U
ACENAPHTHENE	530	U
2,4-DINITROPHENOL	530	U

NOTES: All values measured in ug/kg (ppb).
U - Not detected
J - Indicates an estimated value

TABLE 3 (CONT.)

SURFACE IMPOUNDMENT BORING SEMIVOLATILE ANALYSES RESULTS
ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	IB-C COMP. 10/18/90	
4-NITROPHENOL	2600	U
DIBENZOFURAN	530	U
2,4-DINITROTOLUENE	530	U
DIETHYLPHTHALATE	530	U
4-CHLOROPHENYL-PHENYLETHER	530	U
FLUORENE	535	U
4-NITROANILINE	2600	U
4,6-DINITRO-2-METHYLPHENOL	530	U
N-NITROSODIPHENYLAMINE	530	U
4-BROMOPHENYL-PHENYLETHER	530	U
HEXACHLOROBENZENE	530	U
PENTACHLOROPHENOL	2600	U
PHENANTHRENE	420	J
ANTHRACENE	530	U
DI-N-BUTYLPHTHALATE	530	U
FLUORANTHENE	530	U
PYRENE	530	U
BUTYLBENZYLPHTHALATE	530	U
3,3'-DICHLOROBENZIDINE	1100	U
BENZO(A)ANTHRACENE	530	U
CHRYSENE	530	U
BIS(2-ETHYLHEXYL)PHTHALATE	530	U
DI-N-OCTYLPHTHALATE	530	U
BENZO(B)FLUORANTHENE	530	U
BENZO(K)FLUORANTHENE	530	U
BENZO(A)PYRENE	530	U
INDENO(1,2,3-CD)PYRENE	530	U
DIBENZO(A,H)ANTHRACENE	530	U
BENZO(G,H,I)PERYLENE	530	U

NOTES: All values measured in ug/kg (ppb).
U - Not detected
J - Indicates an estimated value

TABLE 4

SURFACE IMPOUNDMENT BORING PESTICIDE AND PCB RESULTS
ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	IB-C COMP. 10/18/90	
ALPHA-BHC	19	U
BETA-BHC	19	U
DELTA-BHC	19	U
GAMMA-BHC (LINDANE)	19	U
HEPTACHLOR	19	U
ALDRIN	19	U
HEPTACHLOR EPOXIDE	19	U
ENDOSULFAN I	19	U
DIELDRIN	38	U
4,4'-DDE	38	U
ENDRIN	38	U
ENDOSULFAN II	38	U
4,4'-DDD	38	U
ENDOSULFAN SULFATE	38	U
4,4'-DDT	38	U
METHOXYCHLOR	190	U
ENDRIN KETONE	38	U
ALPHA-CHLORDANE	190	U
GAMMA-CHLORDANE	190	U
TOXAPHENE	380	U
AROCHLOR-1016	190	U
AROCHLOR-1221	190	U
AROCHLOR-1232	190	U
AROCHLOR-1242	190	U
AROCHLOR-1248	190	U
AROCHLOR-1254	380	U
AROCHLOR-1260	380	U

NOTES: All values measured in ug/kg.
U - Not detected

TABLE 5

SURFACE IMPOUNDMENT BORING INORGANIC ANALYSES RESULTS
ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	SOIL CONCENTRATIONS TYPICAL RANGE	IB-1 6-8' 10/18/90	IB-1 8-8.5' 10/18/90	IB-1 8-8.5' DUP. 10/18/90	IB-1 12-14' 10/18/90	IB-2 9-9.5' 10/18/90
ALUMINUM	1,000-25,000	5,780	17,700	17,100	20,600	11,200
ANTIMONY	0.6-10	6.25 U	6.6 U	6.6 U	6.4 U	6.35 U
ARSENIC	3-12	1.20 B	2.27	1.78	3.44	1.98
BARIUM	15-600	16.2 B	39.6	43.1	83.7	29.2
BERYLLIUM	0-1.75	0.138 B	0.484 B	0.462 B	0.985	0.333 B
CADMIUM	0.0001-1	0.375 U	0.396 U	0.396 U	0.384 U	0.381 U
CALCIUM	130-35,000	1,680	36,700	37,000	48,600	16,000
CHROMIUM	1.5-40	50.4	532	310	39.4	113
HEXAVALENT CHROMIUM	——	1 U	1 U	1 U	1 U	1 U
COBALT	2.5-60	2.66 B	5.47 B	5.56 B	11.3	4.76 B
COPPER	1-50	10.1	69.5	46.9	24.6	18.5
IRON	17,500-25,000	7,970	14,600	15,100	25,500	12,300
LEAD	1-30	2.61	7.22	9.07	10.5	6.33
MAGNESIUM	100-5,000	1,300	10,100	9,230	14,400	3,810
MANGANESE	50-5,000	189	298	330	443	269
MERCURY	0.042-0.06	0.125 U	0.132 U	0.132 U	0.128 U	0.127 U
NICKEL	0.5-25	4.7 B	12.7	11.9	25.8	9.49
POTASSIUM	8,500-43,000	549 B	2,080	2,610	4,780	1,080
SELENIUM	<0.1-3.9	0.375 U	1.98 U	1.98 U	1.92 U	1.9 U
SILVER	0.1-5	0.371 B	0.448 B	0.488 B	0.511 B	0.564 B
SODIUM	<500-8,000	176 B	631 B	748	2,810	625 B
THALLIUM	0.1-12*	0.125 U	0.132 U	0.132 U	0.217 B	0.127 U
VANADIUM	11-119	14.1	27.1	27.4	38.3	19.8
ZINC	37-60	18.1	43.4	38.3	65.3	25.9
CYANIDE	——	0.625 U	0.66 U	0.66 U	0.64 U	0.635 U
BORON	2-130*	6 U	13	23	30	11
PHENOL	——	0.6	0.58	0.67	0.65	0.9
FLUORIDE	30-300*	36	78	66	140	50
SULFATE	——	110	97	100	110	180
CHLORIDE	10-100*	640	670	740	1,900	1,200
PERCENT TOTAL SOLIDS	——	80	76	76	78	79
TCLP CHROMIUM **		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TCLP LEAD **		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TCLP MERCURY **		0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U

NOTES: NYS concentration range in uncontaminated soils from background concentrations of 20 elements in soils with special regard for New York State by E. Carol McGovern

* - Dragun, Soil Chemistry of Hazardous Wastes

Values reported in mg/kg (ppm).

—— - Not available

U - Not detected

B - Value less than contract required detection limit, but greater than instrument detection limit.

NA - Not analyzed

** - Values reported in mg/l

TABLE 5 (CONT.)

SURFACE IMPOUNDMENT BORING INORGANIC ANALYSES RESULTS
ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	SOIL CONCENTRATIONS TYPICAL RANGE	IB-3 3.5-4' 10/18/90		IB-3 6-8' 10/18/90		IB-3 10-12' 10/18/90		IB-6 8.7-9.2' 10/18/90		IB-6 Center 10/18/90		IB-C COMPOSITE 10/18/90	
ALUMINUM	1,000-25,000	32,400		28,900		21,300		7,770		29,900		59,000	
ANTIMONY	0.6-10	5.8	U	7.6	U	6.5	U	6.1	U	6.1	U	7.95	U
ARSENIC	3-12	2.91		1.79		4.46		2.51		2.04		2.46	
BARIUM	15-600	40.8		26.8	B	91.7		19.9	B	19.7	B	32.9	
BERYLLIUM	0-1.75	0.33	B	0.437	B	0.873		0.308	B	0.343	B	0.440	B
CADMIUM	0.0001-1	0.637		0.456	U	0.39	U	0.366	U	0.366	U	0.477	U
CALCIUM	130-35,000	13100		12,300		5,210		1,410		5,870		21,700	
CHROMIUM	1.5-40	47.8		2810		35.2		13		1,700		2,660	
HEXAVALENT CHROMIUM	——	1	U	2	U	1	U	1	U	1	U	NA	
COBALT	2.5-60	2.53	B	2.61	B	10.3		4.83	B	2.32	B	3.60	B
COPPER	1-50	125		214		26.3		8.96		121		425	
IRON	17,500-25,000	11,100		7,590		24,100		12,100		7,540		10,600	
LEAD	1-30	51.5		20.2		13.1		2.95		14.3		24.9	
MAGNESIUM	100-5,000	2,200		5,630		5,700		1,770		2,730		8,980	
MANGANESE	50-5,000	165		168		363		328		137		251	
MERCURY	0.042-0.06	0.116	U	0.152	U	0.13	U	0.122	U	0.122	U	0.159	U
NICKEL	0.5-25	14		10.8		24.7		8.26		8.49		23.7	
POTASSIUM	8,500-43,000	493	B	798		3,370		1,150		480	B	1,020	
SELENIUM	<0.1-3.9	1.74	U	2.28	U	1.95	U	0.366	U	1.83	U	2.38	U
SILVER	0.1-5	0.445	B	0.827	B	0.41	B	0.334	B	0.459	B	0.318	U
SODIUM	<500-8,000	358	B	403	B	3,680		218	B	293	B	1,120	
THALLIUM	0.1-12*	0.116	U	0.152	U	0.249	B	0.122	U	0.122	U	0.159	U
VANADIUM	11-119	13.9		17.3		60.2		21.1		15.2		21	
ZINC	37-60	130		63.2		62.3		24.2		47.2		90.6	
CYANIDE	——	0.58	U	5.3		0.65	U	0.61	U	0.915		0.83	
BORON	2-130*	6		14		17		7		11		NA	
PHENOL	——	0.51		0.73		0.49		0.5		0.46		NA	
FLUORIDE	30-300*	41		110		150		58		63		NA	
SULFATE	——	330		280		190		170		65		NA	
CHLORIDE	10-100*	100	U	240		2,400		1,500		100	U	NA	
PERCENT TOTAL SOLIDS	——	86		66		77		82		82		NA	
TCLP CHROMIUM **		0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	NA	
TCLP LEAD **		1.1		0.5	U	0.5	U	0.5	U	0.5	U	NA	
TCLP MERCURY **		0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	NA	

NOTES: NYS concentration range in uncontaminated soils from background concentrations of 20 elements in soils with special regard for New York State by E. Carol McGovern

* - Dragun, Soil Chemistry of Hazardous Wastes

Values reported in mg/kg (ppm).

—— - Not available

U - Not detected

B - Value less than contract required detection limit, but greater than instrument detection limit.

NA - Not analyzed

** - Values reported in mg/l

TABLE 6
SURFACE SOIL VOLATILE ANALYSES RESULTS
ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	S-1 10/04/90		S-2 10/04/90		S-3 10/04/90		S-4 10/04/90		S-5 10/04/90		S-6 10/04/90	
CHLOROMETHANE	11	U	10	U	11	U	11	U	11	U	11	U
BROMOMETHANE	11	U	10	U	11	U	11	U	11	U	11	U
VINYL CHLORIDE	11	U	10	U	11	U	11	U	11	U	11	U
CHLOROETHANE	11	U	10	U	11	U	11	U	11	U	11	U
METHYLENE CHLORIDE	6	U	5	U	5	U	6	U	6	U	5	U
ACETONE	11	U	10	U	11	U	11	U	11	U	11	U
CARBON DISULFIDE	6	U	5	U	5	U	6	U	6	U	5	U
1,1-DICHLOROETHENE	6	U	5	U	5	U	6	U	6	U	5	U
1,1-DICHLOROETHANE	6	U	5	U	5	U	6	U	6	U	5	U
1,2-DICHLOROETHENE (TOTAL)	6	U	5	U	5	U	6	U	6	U	5	U
CHLOROFORM	6	U	5	U	5	U	6	U	6	U	5	U
1,2-DICHLOROETHANE	6	U	5	U	5	U	6	U	6	U	5	U
2-BUTANONE	11	U	10	U	11	U	1	J	11	U	11	U
1,1,1-TRICHLOROETHANE	1	J	5	U	1	J	6	U	6	U	5	U
CARBON TETRACHLORIDE	6	U	5	U	5	U	6	U	6	U	5	U
VINYL ACETATE	11	U	10	U	11	U	11	U	11	U	11	U
BROMODICHLOROMETHANE	6	U	5	U	5	U	6	U	6	U	5	U
1,2-DICHLOROPROPANE	6	U	5	U	5	U	6	U	6	U	5	U
CIS-1,3-DICHLOROPROPENE	6	U	5	U	5	U	6	U	6	U	5	U
TRICHLOROETHENE	6	U	5	U	5	U	6	U	6	U	5	U
DIBROMOCHLOROMETHANE	6	U	5	U	5	U	6	U	6	U	5	U
1,1,2-TRICHLOROETHANE	6	U	5	U	5	U	6	U	6	U	5	U
BENZENE	6	U	5	U	5	U	6	U	6	U	5	U
TRANS-1,3-DICHLOROPROPENE	6	U	5	U	5	U	6	U	6	U	5	U
BROMOFORM	6	U	5	U	5	U	6	U	6	U	5	U
4-METHYL-2-PENTANONE	11	U	10	U	11	U	11	U	11	U	11	U
2-HEXANONE	11	U	10	U	11	U	11	U	11	U	11	U
TETRACHLOROETHENE	6	U	5	U	5	U	6	U	6	U	5	U
1,1,2,2-TETRACHLOROETHANE	6	U	5	U	5	U	6	U	6	U	5	U
TOLUENE	5	J	1	J	1	J	2	J	2	J	1	JB
CHLOROBENZENE	6	U	5	U	5	U	6	U	6	U	5	U
ETHYLBENZENE	6	U	5	U	5	U	6	U	6	U	5	U
STYRENE	6	U	5	U	5	U	6	U	6	U	5	U
XYLENE (TOTAL)	6	U	5	U	5	U	6	U	6	U	5	U

NOTES: All values measured in ug/kg (ppb).
U – Not detected
J – Indicates an estimated value
B – Analyte found in blank
* – Background samples

TABLE 6 (CONT.)
SURFACE SOIL VOLATILE ANALYSES RESULTS
ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	S-7 10/04/90		S-8 10/04/90		S-9* 10/04/90		S-10* 10/04/90		RINSATE 10/04/90	
CHLOROMETHANE	11	U	10	U	11	U	11	U	10	U
BROMOMETHANE	11	U	10	U	11	U	11	U	10	U
VINYL CHLORIDE	11	U	10	U	11	U	11	U	10	U
CHLOROETHANE	11	U	10	U	11	U	11	U	10	U
METHYLENE CHLORIDE	6	U	5	U	5	U	1	J	5	U
ACETONE	11	U	10	U	11	U	11	U	10	U
CARBON DISULFIDE	6	U	5	U	5	U	6	U	5	U
1,1-DICHLOROETHENE	6	U	5	U	5	U	6	U	5	U
1,1-DICHLOROETHANE	6	U	5	U	5	U	6	U	5	U
1,2-DICHLOROETHENE (TOTAL)	6	U	5	U	5	U	6	U	5	U
CHLOROFORM	6	U	5	U	5	U	6	U	12	
1,2-DICHLOROETHANE	6	U	5	U	5	U	6	U	5	U
2-BUTANONE	10	U	10	U	1	J	10	U	1	J
1,1,1-TRICHLOROETHANE	6	U	5	U	1	J	6	U	5	U
CARBON TETRACHLORIDE	6	U	5	U	5	U	6	U	5	U
VINYL ACETATE	11	U	10	U	11	U	11	U	10	U
BROMODICHLOROMETHANE	6	U	5	U	5	U	6	U	4	J
1,2-DICHLOROPROPANE	6	U	5	U	5	U	6	U	5	U
CIS-1,3-DICHLOROPROPENE	6	U	5	U	5	U	6	U	5	U
TRICHLOROETHENE	6	U	5	U	5	U	6	U	5	U
DIBROMOCHLOROMETHANE	6	U	5	U	5	U	6	U	5	U
1,1,2-TRICHLOROETHANE	6	U	5	U	5	U	6	U	5	U
BENZENE	6	U	5	U	5	U	6	U	5	U
TRANS-1,3-DICHLOROPROPENE	6	U	5	U	5	U	6	U	5	U
BROMOFORM	6	U	5	U	5	U	6	U	5	U
4-METHYL-2-PENTANONE	11	U	10	U	11	U	11	U	10	U
2-HEXANONE	11	U	10	U	11	U	11	U	10	U
TETRACHLOROETHENE	6	U	5	U	5	U	6	U	5	U
1,1,2,2-TETRACHLOROETHANE	6	U	5	U	5	U	6	U	5	U
TOLUENE	2	J	2	JB	2	J	7	B	1	JB
CHLOROBENZENE	6	U	5	U	5	U	6	U	5	U
ETHYLBENZENE	6	U	5	U	5	U	6	U	5	U
STYRENE	6	U	5	U	5	U	6	U	5	U
XYLENE (TOTAL)	6	U	5	U	5	U	6	U	5	U

NOTES: All values measured in ug/kg (ppb).
U – Not detected
J – Indicates an estimated value
B – Analyte found in blank
* – Background samples

TABLE 7
SURFACE SOIL INORGANIC ANALYSES RESULTS
ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	SOIL CONCENTRATIONS TYPICAL RANGE	S-1 10/18/90	S-2 10/18/90	S-3 10/18/90	S-4 10/18/90	S-5 10/18/90	S-6 10/18/90
ALUMINUM	1,000–25,000	12,000	5,670	9,160	14,200	10,200	7,080
ANTIMONY	0.6–10*	5.55 U	5.25 U	5.3 U	5.75 U	5.75 U	5.45 U
ARSENIC	3–12	1.46	1.27	2.11	1.8	2.18	0.728 B
BARIUM	15–600	21 B	17.5 B	34.1	44.9	28.9	15.5 B
BERYLLIUM	0–1.75	0.332 B	0.319 B	0.403 B	0.424 B	0.458 B	0.337 B
CADMIUM	0.0001–1	0.333 U	0.315 U	0.318 U	0.345 U	0.345 U	0.327 U
CALCIUM	130–35,000	4,180	4,910	12,000	1,260	2,300	976
CHROMIUM	1.5–40	268	7.32	13.5	17.3	35.1	28.2
HEXAVALENT CHROMIUM	——	1 U	1 U	1 U	1 U	1 U	1 U
COBALT	2.5–60	2.77 B	2.76 B	6.3	7.52	4.22 B	2.12 B
COPPER	1–50	27.3	6.7	13	7.73	9.19	4.26
IRON	17,500–25,000	9,420	9,100	16,000	17,200	13,100	7,780
LEAD	1–30	13.1	7.13	6.41	8.01	10.1	6.75
MAGNESIUM	100–5,000	1,870	2,210	4,840	2,600	1,960	1,070
MANGANESE	50–5,000	181	177	358	704	264	115
MERCURY	0.042–0.06	0.111 U	0.105 U	0.106 U	0.115 U	0.115 U	0.109 U
NICKEL	0.5–25	6.82	6.99	13.6	13.5	10.5	3.81 B
POTASSIUM	8,500–43,000	538 B	484 B	1,460	1,210	1,020	420 B
SELENIUM	<0.1–3.9	0.333 U	1.58 U	1.6 U	1.72 U	0.345 U	0.326 U
SILVER	0.1–5*	0.222 U	0.21 U	0.347 B	0.23 U	0.23 U	0.218 U
SODIUM	<500–8,000	170 B	220 B	296 B	188 B	228 B	176 B
THALLIUM	0.1–12*	0.111 U	0.105 U	0.106 U	0.115 U	0.115 U	0.109 U
VANADIUM	11–119	16.5	14.8	24.2	28.6	23	14.4
ZINC	37–60	49.5	22.9	33.5	39.9	28	19.2
CYANIDE	——	0.555 U	0.525 U	0.53 U	0.575 U	0.575 U	0.545 U
BORON	2–130*	8	6	8	6 U	10	9
PHENOLS	——	0.31	0.29	0.22	0.28	0.55	0.52
FLUORIDE*	30–300*	14	10 U	10 U	10 U	20	10 U
SULFATE	——	59	69	120	85	80	62
CHLORIDE	10–100*	220	140	850	870	320	230
PERCENT TOTAL SOLIDS	——	90	95	94	87	87	92

NOTES: NYS concentration range in uncontaminated soils from background concentrations of 20 elements in soils with special regard for New York State by E. Carol McGovern
* – Dragun, Soil Chemistry of Hazardous Wastes
All values reported in mg/kg (ppm).
—— – Not available
U – Not detected
B – Value less than contract required detection limit, but greater than instrument detection limit.
** – Background sample

TABLE 7
SURFACE SOIL INORGANIC ANALYSES RESULTS
ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	SOIL CONCENTRATIONS TYPICAL RANGE	S-7 10/18/90		S-8 10/18/90		S-9** 10/18/90		S-10** 10/18/90	
ALUMINUM	1,000-25,000	14,600		6,750		5,020		8,930	
ANTIMONY	0.6-10*	5.56	U	5.25	U	5.3	U	5.56	U
ARSENIC	3-12	2.94		0.663	B	1.24		2.4	
BARIUM	15-600	43.6		13.5	B	15.5	B	34.6	
BERYLLIUM	0-1.75	0.825		0.325	B	0.335	B	0.344	B
CADMIUM	0.0001-1	0.333	U	0.315	U	0.318	U	0.333	U
CALCIUM	130-35,000	1,290		809		1,390		1,250	
CHROMIUM	1.5-40	18		9.23		8.07		8.72	
HEXAVALENT CHROMIUM	——	1	U	1	U	1	U	1	U
COBALT	2.5-60	7.28		1.98	B	2.02	B	2.07	B
COPPER	1-50	14.1		4.2		5.68		6.14	
IRON	17,500-25,000	18,300		7,340		7,080		8,870	
LEAD	1-30	21.9		4.09		4.26		5.94	
MAGNESIUM	100-5,000	2,770		972		1,030		1,040	
MANGANESE	50-5,000	410		96.5		140		263	
MERCURY	0.042-0.06	0.111	U	0.105	U	0.106	U	0.111	U
NICKEL	0.5-25	17.2		5.33		4.78		4.85	
POTASSIUM	8,500-43,000	1,830		496	B	427	B	353	B
SELENIUM	<0.1-3.9	0.333	U	1.58	U	0.319	U	0.333	U
SILVER	0.1-5*	0.222	U	0.21	U	0.212	U	0.222	U
SODIUM	<500-8,000	222	B	145	B	145	B	160	B
THALLIUM	0.1-12*	0.11	B	0.105	U	0.106	U	0.111	U
VANADIUM	11-119	30.2		13.8		12.7		14.5	
ZINC	37-60	47.8		15.4		16.1		25.2	
CYANIDE	——	0.556	U	0.525	U	0.53	U	0.556	U
BORON	2-130*	15		5	U	5	U	6	U
PHENOLS	——	0.34		0.33		0.37		0.23	
FLUORIDE	30-300*	10	U	10	U	10	U	14	
SULFATE	——	73		65		66		290	
CHLORIDE	10-100*	440		100	U	160		100	U
PERCENT TOTAL SOLIDS	——	90		95		94		90	

NOTES: NYS concentration range in uncontaminated soils from background concentrations of 20 elements in soils with special regard for New York State by E. Carol McGovern
* - Dragun, Soil Chemistry of Hazardous Wastes
All values reported in mg/kg (ppm).
—— - Not available
U - Not detected
B - Value less than contract required detection limit, but greater than instrument detection limit.
** - Background sample

Table 8A

Water Volatile Organic Analyses Results

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	NYS CLASS GA STANDARDS	B-1S 11/16/90	B-1S 2/28/91	B-1D 11/13/90	B-1D 2/28/91	B-1D 6/4/92	B-1D 8/10/92	B-1D BLDUP. 6/4/92
CHLOROMETHANE	—	10 U	10 U	10 U	10 U	10 UJ	10 U	10 UJ
BROMOMETHANE	—	10 U	10 U	10 U	10 U	10 UJ	10 U	10 UJ
VINYL CHLORIDE	2	10 U	10 U	10 U	10 U	10 UJ	10 U	10 UJ
CHLOROETHANE	—	10 U	10 U	10 U	10 U	10 UJ	10 U	10 UJ
METHYLENE CHLORIDE	5	5 U	5 U	5 U	5 U	17 UJ	2 J	17 UJ
ACETONE	—	7 JB	10 U	10 U	10 U	10 UJ	15 UJ	10 UJ
CARBON DISULFIDE	—	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
1,1-DICHLOROETHENE	5	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
1,1-DICHLOROETHANE	5	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
1,2-DICHLOROETHENE (TOTAL)	5	5 U	5 U	5 U	5 U	12 UJ	10 U	12 UJ
CHLOROFORM	7	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
1,2-DICHLOROETHANE	5	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
2-BUTANONE	—	10 U	10 U	10 U	10 U	10 UJ	12 UJ	10 UJ
1,1,1-TRICHLOROETHANE	5	5 U	5 U	1 J	5 U	10 UJ	10 U	10 UJ
CARBON TETRACHLORIDE	5	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
VINYL ACETATE	2	10 U	10 U	10 U	10 U	10 UJ	—	10 UJ
BROMODICHLOROMETHANE	50 *	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
1,2-DICHLOROPROPANE	5	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
CIS-1,3-DICHLOROPROPENE	—	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
TRICHLOROETHENE	5	5 U	5 U	23	6	13 J	9 J	12 J
DIBROMOCHLOROMETHANE	50 *	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
1,1,2-TRICHLOROETHANE	5	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
BENZENE	0.7	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
TRANS-1,3-DICHLOROPROPENE	—	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
BROMOFORM	50 *	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
4-METHYL-2-PENTANONE	—	10 U	10 U	10 U	10 U	10 UJ	14 U	10 UJ
2-HEXANONE	50 *	10 U	10 U	10 U	10 U	10 UJ	23 U	23 U
TETRACHLOROETHENE	5	5 U	5 U	5 U	5 U	12 UJ	10 U	12 UJ
1,1,2,2-TETRACHLOROETHANE	5	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
TOLUENE	5	1 J	5 U	0.7 JB	5 U	10 UJ	10 U	10 UJ
CHLOROBENZENE	5	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
ETHYLBENZENE	5	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
STYRENE	5	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
XYLENE (TOTAL)	5	5 U	5 U	5 U	5 U	10 UJ	10 U	10 UJ
HEXANE	—	10 U	10 U	10 U	10 U	10 UJ	10 U	10 UJ
FREON 113	—	—	—	—	—	9	ND	ND

NOTES: All values reported in µg/l (ppb).
— - Not available
U - Not detected
J - Indicates an estimated value
B - Analyte found in blank
* - Indicates NYS CLASS GA GUIDANCE VALUE
ND - non-detect

Table 8A

Water Volatile Organic Analyses Results

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	NYS CLASS GA STANDARDS	B-1D BLDUP. 8/10/92	B-2S 11/16/90	B-2S 3/1/91	B-2D 11/14/90	B-2D 3/1/91	B-3S 11/19/90	B-3S 3/1/91
CHLOROMETHANE	—	10 U	10 U	10 U	10 U	10 U	10 U	10 U
BROMOMETHANE	—	10 U	10 U	10 U	10 U	10 U	10 U	10 U
VINYL CHLORIDE	2	10 U	10 U	10 U	10 U	10 U	10 U	10 U
CHLOROETHANE	—	10 U	10 U	10 U	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	5	10 U	5 U	12	5 U	10	5 U	5 U
ACETONE	—	15 UJ	4 J	10 U	10	10 U	10 U	10 U
CARBON DISULFIDE	—	10 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHENE	5	10 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHANE	5	10 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROETHENE (TOTAL)	5	10 U	5 U	5 U	5 U	5 U	80	5 U
CHLOROFORM	7	10 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROETHANE	5	10 U	5 U	5 U	5 U	5 U	5 U	5 U
2-BUTANONE	—	12 UJ	10 U	10 U	10 U	10 U	10 U	10 U
1,1,1-TRICHLOROETHANE	5	10 U	5 U	5 U	2 J	5 U	5 U	5 U
CARBON TETRACHLORIDE	5	10 U	5 U	5 U	5 U	5 U	5 U	5 U
VINYL ACETATE	2	—	10 U	10 U	10 U	10 U	10 U	10 U
BROMODICHLOROMETHANE	50 *	10 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROPROPANE	5	10 U	5 U	5 U	5 U	5 U	5 U	5 U
CIS-1,3-DICHLOROPROPENE	—	10 U	5 U	5 U	5 U	5 U	5 U	5 U
TRICHLOROETHENE	5	7 J	5 U	5 U	5 U	5 U	46	5 U
DIBROMOCHLOROMETHANE	50 *	10 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2-TRICHLOROETHANE	5	10 U	5 U	5 U	5 U	5 U	5 U	5 U
BENZENE	0.7	10 U	0.7 J	5 U	5 U	5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE	—	10 U	5 U	5 U	5 U	5 U	5 U	5 U
BROMOFORM	50 *	10 U	5 U	5 U	5 U	5 U	5 U	5 U
4-METHYL-2-PENTANONE	—	14 U	10 U	10 U	10 U	10 U	10 U	10 U
2-HEXANONE	50 *	23 U	10 U	10 U	10 U	10 U	10 U	10 U
TETRACHLOROETHENE	5	10 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE	5	10 U	5 U	5 U	5 U	5 U	5 U	5 U
TOLUENE	5	10 U	1 JB	1 J	1 J	5 U	5 U	5 U
CHLOROBENZENE	5	10 U	5 U	5 U	5 U	5 U	5 U	5 U
ETHYLBENZENE	5	10 U	5 U	5 U	5 U	5 U	5 U	5 U
STYRENE	5	10 U	5 U	5 U	5 U	5 U	5 U	5 U
XYLENE (TOTAL)	5	10 U	5 U	5 U	5 U	5 U	5 U	5 U
HEXANE	—	10 U	10 U	10 U	10 U	10 U	10 U	5 J
FREON 113	—	ND	—	—	—	—	—	—

NOTES: All values reported in µg/l (ppb).
— - Not available
U - Not detected
J - Indicates an estimated value
B - Analyte found in blank
* - Indicates NYS CLASS GA GUIDANCE VALUE
ND - non-detect

Table 8A

Water Volatile Organic Analyses Results

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	NYS CLASS GA STANDARDS	B-3D 11/14/90	B-3D 3/1/91	B-4S 3/1/91	B-4D 11/14/90	B-4D 3/1/91	B-5D 11/14/90	B-5D 3/1/91
CHLOROMETHANE	—	10 U	10 U	10 U	10 U	10 U	10 U	10 U
BROMOMETHANE	—	10 U	10 U	10 U	10 U	10 U	10 U	10 U
VINYL CHLORIDE	2	10 U	10 U	10 U	10 U	10 U	10 U	10 U
CHLOROETHANE	—	10 U	10 U	10 U	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	5	5 U	5 U	5 U	5 U	10	5 U	5 U
ACETONE	—	10 U	10 U	10 U	11	10 U	10 U	10 U
CARBON DISULFIDE	—	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHENE	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHANE	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROETHENE (TOTAL)	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CHLOROFORM	7	5 U	5 U	5 U	5 U	5 U	1 J	5 U
1,2-DICHLOROETHANE	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-BUTANONE	—	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,1-TRICHLOROETHANE	5	5	4 J	5 U	1 J	5 U	2 J	5 U
CARBON TETRACHLORIDE	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U
VINYL ACETATE	2	10 U	10 U	10 U	10 U	10 U	10 U	10 U
BROMODICHLOROMETHANE	50 *	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROPROPANE	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CIS-1,3-DICHLOROPROPENE	—	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TRICHLOROETHENE	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U
DIBROMOCHLOROMETHANE	50 *	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2-TRICHLOROETHANE	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BENZENE	0.7	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE	—	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BROMOFORM	50 *	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-METHYL-2-PENTANONE	—	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-HEXANONE	50 *	10 U	10 U	10 U	10 U	10 U	10 U	10 U
TETRACHLOROETHENE	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TOLUENE	5	5 U	5 U	5 U	0.9 J	5 U	5 U	5 U
CHLOROBENZENE	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U
ETHYLBENZENE	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U
STYRENE	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U
XYLENE (TOTAL)	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U
HEXANE	—	10 U	1600 J	6 J	10 U	640 J	10 U	480 J
FREON 113	—	—	—	—	—	—	—	—

NOTES: All values reported in µg/l (ppb).
— - Not available
U - Not detected
J - Indicates an estimated value
B - Analyte found in blank
* - Indicates NYS CLASS GA GUIDANCE VALUE
ND - non-detect

Table 8A

Water Volatile Organic Analyses Results

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	NYS CLASS GA STANDARDS	B-6 11/16/90	B-6 2/28/91	B-7 11/16/90	B-7 3/1/91	B-8 11/14/90	B-8 3/1/91	B-9 6/4/92
CHLOROMETHANE	—	20 U	10 U	10 U	10 U	20 U	10 U	10 UJ
BROMOMETHANE	—	20 U	10 U	10 U	10 U	20 U	10 U	10 UJ
VINYL CHLORIDE	2	20 U	10 U	10 U	10 U	20 U	10 U	10 UJ
CHLOROETHANE	—	20 U	10 U	10 U	10 U	20 U	10 U	10 UJ
METHYLENE CHLORIDE	5	46	12	5 U	8	10 U	3 J	17 UJ
ACETONE	—	20 U	10 U	20	10 U	20 U	10 U	10 UJ
CARBON DISULFIDE	—	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
1,1-DICHLOROETHENE	5	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
1,1-DICHLOROETHANE	5	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
1,2-DICHLOROETHENE (TOTAL)	5	10 U	5 U	5 U	5 U	10 U	5 U	12 UJ
CHLOROFORM	7	10 U	5 U	3 J	5 U	10 U	5 U	10 UJ
1,2-DICHLOROETHANE	5	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
2-BUTANONE	—	20 U	10 U	10 U	10 U	20 U	10 U	10 UJ
1,1,1-TRICHLOROETHANE	5	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
CARBON TETRACHLORIDE	5	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
VINYL ACETATE	2	20 U	10 U	10 U	10 U	20 U	10 U	10 UJ
BROMODICHLOROMETHANE	50 *	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
1,2-DICHLOROPROPANE	5	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
CIS-1,3-DICHLOROPROPENE	—	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
TRICHLOROETHENE	5	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
DIBROMOCHLOROMETHANE	50 *	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
1,1,2-TRICHLOROETHANE	5	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
BENZENE	0.7	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
TRANS-1,3-DICHLOROPROPENE	—	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
BROMOFORM	50 *	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
4-METHYL-2-PENTANONE	—	20 U	10 U	10 U	10 U	20 U	10 U	10 UJ
2-HEXANONE	50 *	20 U	10 U	10 U	10 U	20 U	10 U	10 UJ
TETRACHLOROETHENE	5	10 U	5 U	5 U	5 U	10 U	5 U	12 UJ
1,1,2,2-TETRACHLOROETHANE	5	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
TOLUENE	5	5 J	2 J	5 U	5 U	10 U	5 U	10 UJ
CHLOROBENZENE	5	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
ETHYLBENZENE	5	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
STYRENE	5	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
XYLENE (TOTAL)	5	10 U	5 U	5 U	5 U	10 U	5 U	10 UJ
HEXANE	—	10 U	10 U	10 U	10 U	20 U	10 U	10 UJ
FREON 113	—	—	—	—	—	—	—	11

NOTES: All values reported in µg/l (ppb).
— - Not available
U - Not detected
J - Indicates an estimated value
B - Analyte found in blank
* - Indicates NYS CLASS GA GUIDANCE VALUE
ND - non-detect

Table 8A

Water Volatile Organic Analyses Results

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	NYS CLASS GA STANDARDS	B-9 8/10/92	B-10 8/10/92	B-12D 6/4/92	B-12D 8/10/92	B-13 6/4/92	B-13 8/10/92	CISTERN-W 6/4/92
CHLOROMETHANE	—	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
BROMOMETHANE	—	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
VINYL CHLORIDE	2	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
CHLOROETHANE	—	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
METHYLENE CHLORIDE	5	2 J	10 U	17 UJ	15 UJ	17 UJ	3 J	17 UJ
ACETONE	—	15 UJ	15 UJ	10 UJ	10 U	10 UJ	15 UJ	10 UJ
CARBON DISULFIDE	—	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
1,1-DICHLOROETHENE	5	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
1,1-DICHLOROETHANE	5	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
1,2-DICHLOROETHENE (TOTAL)	5	10 U	10 U	12 UJ	10 U	12 UJ	10 U	12 UJ
CHLOROFORM	7	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
1,2-DICHLOROETHANE	5	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
2-BUTANONE	—	12 UJ	12 UJ	10 UJ	12 UJ	10 UJ	12 UJ	10 UJ
1,1,1-TRICHLOROETHANE	5	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
CARBON TETRACHLORIDE	5	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
VINYL ACETATE	2	—	—	10 UJ	—	10 UJ	—	10 UJ
BROMODICHLOROMETHANE	50 *	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
1,2-DICHLOROPROPANE	5	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
CIS-1,3-DICHLOROPROPENE	—	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
TRICHLOROETHENE	5	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
DIBROMOCHLOROMETHANE	50 *	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
1,1,2-TRICHLOROETHANE	5	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
BENZENE	0.7	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
TRANS-1,3-DICHLOROPROPENE	—	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
BROMOFORM	50 *	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
4-METHYL-2-PENTANONE	—	14 U	14 U	10 UJ	14 U	10 UJ	14 U	10 UJ
2-HEXANONE	50 *	23 U	23 U	10 UJ	23 U	10 UJ	23 U	10 UJ
TETRACHLOROETHENE	5	10 U	10 U	12 UJ	10 U	12 UJ	10 U	12 UJ
1,1,2,2-TETRACHLOROETHANE	5	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
TOLUENE	5	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
CHLOROBENZENE	5	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
ETHYLBENZENE	5	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
STYRENE	5	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
XYLENE (TOTAL)	5	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
HEXANE	—	10 U	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
FREON 113	—	ND	ND	10 J	ND	6 J	ND	5 J

NOTES: All values reported in µg/l (ppb).
— - Not available
U - Not detected
J - Indicates an estimated value
B - Analyte found in blank
* - Indicates NYS CLASS GA GUIDANCE VALUE
ND - non-detect

Table 8A

Water Volatile Organic Analyses Results

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	NYS CLASS GA STANDARDS	CISTERN-W 8/10/92	EAST PUMPHOUSE 6/4/92	EAST PUMPHOUSE 8/10/92	WEST PUMPHOUSE 6/4/92	WEST PUMPHOUSE 8/10/92	EQUIP. BLANK 6/4/92
CHLOROMETHANE	—	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
BROMOMETHANE	—	10 U	10 UJ	10 UJ	10 UJ	10 U	10 UJ
VINYL CHLORIDE	2	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
CHLOROETHANE	—	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
METHYLENE CHLORIDE	5	10 U	17 UJ	10 U	17 UJ	10 U	3 J
ACETONE	—	15 UJ	10 UJ	15 UJ	10 UJ	15 UJ	10 UJ
CARBON DISULFIDE	—	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
1,1-DICHLOROETHENE	5	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
1,1-DICHLOROETHANE	5	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
1,2-DICHLOROETHENE (TOTAL)	5	10 U	12 UJ	10 U	12 UJ	10 U	12 UJ
CHLOROFORM	7	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
1,2-DICHLOROETHANE	5	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
2-BUTANONE	—	12 UJ	10 UJ	12 UJ	10 UJ	12 UJ	10 UJ
1,1,1-TRICHLOROETHANE	5	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
CARBON TETRACHLORIDE	5	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
VINYL ACETATE	2	—	10 UJ	—	10 UJ	—	10 UJ
BROMODICHLOROMETHANE	50 *	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
1,2-DICHLOROPROPANE	5	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
CIS-1,3-DICHLOROPROPENE	—	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
TRICHLOROETHENE	5	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
DIBROMOCHLOROMETHANE	50 *	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
1,1,2-TRICHLOROETHANE	5	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
BENZENE	0.7	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
TRANS-1,3-DICHLOROPROPENE	—	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
BROMOFORM	50 *	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
4-METHYL-2-PENTANONE	—	14 U	10 UJ	14 U	10 UJ	14 U	10 UJ
2-HEXANONE	50 *	23 U	10 UJ	23 U	10 UJ	23 U	10 UJ
TETRACHLOROETHENE	5	10 U	12 UJ	10 U	12 UJ	10 U	12 UJ
1,1,2,2-TETRACHLOROETHANE	5	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
TOLUENE	5	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
CHLOROBENZENE	5	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
ETHYLBENZENE	5	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
STYRENE	5	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
XYLENE (TOTAL)	5	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
HEXANE	—	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
FREON 113	—	ND	ND J	ND	5 J	ND	

NOTES: All values reported in µg/l (ppb).
— - Not available
U - Not detected
J - Indicates an estimated value
B - Analyte found in blank
* - Indicates NYS CLASS GA GUIDANCE VALUE
ND - non-detect

Table 8A

Water Volatile Organic Analyses Results

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	NYS CLASS GA STANDARDS	EQUIP. BLANK 8/10/92	TRIP BLANK 11/13/90	TRIP BLANK 6/4/92	TRIP BLANK 8/10/92
CHLOROMETHANE	—	10 U	10 U	10 UJ	10 U
BROMOMETHANE	—	10 U	10 U	10 UJ	10 U
VINYL CHLORIDE	2	10 U	10 U	10 UJ	10 U
CHLOROETHANE	—	10 U	10 U	10 UJ	10 U
METHYLENE CHLORIDE	5	10 U	5 U	2 J	10 U
ACETONE	—	15 UJ	10 U	10 UJ	15 UJ
CARBON DISULFIDE	—	10 U	5 U	10 UJ	10 U
1,1-DICHLOROETHENE	5	10 U	5 U	10 UJ	10 U
1,1-DICHLOROETHANE	5	10 U	5 U	10 UJ	10 U
1,2-DICHLOROETHENE (TOTAL)	5	10 U	5 U	12 UJ	10 U
CHLOROFORM	7	20	5 U	10 UJ	10 U
1,2-DICHLOROETHANE	5	10 U	5 U	10 UJ	10 U
2-BUTANONE	—	12 UJ	10 U	10 UJ	12 UJ
1,1,1-TRICHLOROETHANE	5	10 U	5 U	10 UJ	10 U
CARBON TETRACHLORIDE	5	10 U	5 U	10 UJ	10 U
VINYL ACETATE	2	—	10 U	10 UJ	—
BROMODICHLOROMETHANE	50 *	10 U	5 U	10 UJ	10 U
1,2-DICHLOROPROPANE	5	10 U	5 U	10 UJ	10 U
CIS-1,3-DICHLOROPROPENE	—	10 U	5 U	10 UJ	10 U
TRICHLOROETHENE	5	10 U	5 U	10 UJ	10 U
DIBROMOCHLOROMETHANE	50 *	10 U	5 U	10 UJ	10 U
1,1,2-TRICHLOROETHANE	5	10 U	5 U	10 UJ	10 U
BENZENE	0.7	10 U	5 U	10 UJ	10 U
TRANS-1,3-DICHLOROPROPENE	—	10 U	5 U	10 UJ	10 U
BROMOFORM	50 *	10 U	5 U	10 UJ	10 U
4-METHYL-2-PENTANONE	—	14 U	10 U	10 UJ	14 U
2-HEXANONE	50 *	23 U	10 U	10 UJ	23 U
TETRACHLOROETHENE	5	10 U	5 U	12 UJ	10 U
1,1,2,2-TETRACHLOROETHANE	5	10 U	5 U	10 UJ	10 U
TOLUENE	5	10 U	5 U	10 UJ	10 U
CHLOROBENZENE	5	10 U	5 U	10 UJ	10 U
ETHYLBENZENE	5	10 U	5 U	10 UJ	10 U
STYRENE	5	10 U	5 U	10 UJ	10 U
XYLENE (TOTAL)	5	10 U	5 U	10 UJ	10 U
HEXANE	—	10 U	10 U	10 UJ	10 U
FREON 113	—	ND	ND	ND	ND

NOTES: All values reported in µg/l (ppb).
— - Not available
U - Not detected
J - Indicates an estimated value
B - Analyte found in blank
* - Indicates NYS CLASS GA GUIDANCE VALUE
ND - non-detect

Table 8B

Water Inorganic Analyses Results

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	NYS CLASS GA STANDARDS	B-1S TOTAL 11/16/90	B-1S SOLUBLE 11/16/90	B-1S SOLUBLE 2/28/91	B-1D TOTAL 11/13/90	B-1D SOLUBLE 11/13/90	B-1D SOLUBLE 2/28/91	B-2S SOLUBLE 11/16/90
ALUMINUM	—	6,320	68 B	—	715	20 U	—	456
ANTIMONY	3 *	50 U	50 U	—	50 U	50 U	—	50 U
ARSENIC	25	3 B	2 B	—	2 U	2 B	—	13
BARIUM	1,000	82 B	49 B	—	119 B	123 B	—	17 B
BERYLLIUM	3 *	3 B	1 U	—	1 U	1 U	—	1 U
CADMIUM	10	3 U	3 U	5 U	3 U	3 U	5 U	3 U
CALCIUM	—	119,000	96,400	—	134,000	146,000	—	32,400
CHROMIUM	50	22	5 U	10 U	5 B	5 U	10 U	64
CHROMIUM-HEXAVALENT	50	10 U	10 U	10 U	10 U	10 U	10 U	90
COBALT	—	5 U	5 U	—	5 U	5 U	—	5 U
COPPER	200	18 B	5 U	—	8 B	5 U	—	11 B
IRON	300	9,820	38 B	150	1,310	20 U	72 B	836
LEAD	25	7	1 U	5 U	3 B	1 U	5 U	2 B
MAGNESIUM	35000 *	31,800	28,000	—	32,600	35,600	—	7,070
MANGANESE	300	1,100	11 B	—	95	64	—	554
MERCURY	2	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	—	23 B	15 U	20 U	15 U	15 U	20 U	15 U
POTASSIUM	—	1,360 B	1,000 U	—	1,630 B	1,000 U	—	1,000 U
SELENIUM	10	3 U	3 U	—	3 U	3 U	—	3 U
SILVER	50	2 U	2 U	—	3 B	2 U	—	2 U
SODIUM	20,000	19,200	19,200	18,400 U	93,500	102,000	116,000	200,000
THALLIUM	4	1 U	1 U	—	1 U	1 U	—	1 U
VANADIUM	—	17 B	5 B	—	5 U	5 U	—	11 B
ZINC	300	42	5 U	10 U	25	5 U	10 U	23
CYANIDE	100	10 U	—	—	10 U	—	—	10 U
SULFATE	250,000	46,000	—	36,200	88,000	—	69,500	20,000
BORON	1,000	100 U	—	—	900	—	—	100
FLUORIDE	1,500	400	—	100 U	500	—	100 U	400
PHENOL	5	5 U	—	—	5 U	—	—	5 U
CHLORIDE	250,000	15,000	—	7,590	160,000	—	149,000	17,000
pH ***		7.5	—	7.6	7.2	—	7.6	7.9
CONDUCTIVITY (µS)		600	—	760	1150	—	1,500	840
TEMPERATURE (°C)		14	—	7	11	—	10	14
TURBIDITY (NTU)		>100	—	49	67	—	7	21

Notes: All values reported in µg/l (ppb).
— - Not available
* - NYS CLASS GA GUIDANCE VALUE
*** - Field determined values
U - Not detected
B - Value less than contract required detection limit, but greater than instrument detection limit.
R - Data Rejected
TOTAL = Samples having turbidity >50 NTUs
SOLUBLE = Samples having turbidity <50 NTUs, or filtered samples

Table 8B

Water Inorganic Analyses Results

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	NYS CLASS GA STANDARDS	B-2S SOLUBLE 3/1/91	B-2D SOLUBLE 11/14/90	B-2D SOLUBLE 3/1/91	B-3S TOTAL 11/16/90	B-3S SOLUBLE 11/16/90	B-3S TOTAL 3/1/91	B-3S SOLUBLE 3/1/91
ALUMINUM	—	—	794	—	9,900	1,540	—	—
ANTIMONY	3 *	—	50 U	—	50 U	50 U	—	—
ARSENIC	25	—	2 U	—	20	20	—	—
BARIUM	1,000	—	42 B	—	58 B	61 B	—	—
BERYLLIUM	3 *	—	1 U	—	3 B	1 U	—	—
CADMIUM	10	5 U	3 U	5 U	3 U	3 U	5 U	5 U
CALCIUM	—	—	73,200	—	80,300	5,110	—	—
CHROMIUM	50	82	12	13.6	37	9 B	283	230
CHROMIUM-HEXAVALENT	50	35	10	10 U	10 U	10 U	177	201
COBALT	—	—	5 U	—	8 B	5 U	—	—
COPPER	200	—	9 B	—	48	21 B	—	—
IRON	300	384	1,660	2,020	15,700	1,460	806	355
LEAD	25	5 U	4 B	5 U	6	2 B	5 U	5 U
MAGNESIUM	35000 *	—	21,600	—	19,700	1,100 B	—	—
MANGANESE	300	—	53	—	546	21	—	—
MERCURY	2	0.22	0.2 U	0.2 U	0.8	0.9	0.43	0.72
NICKEL	—	20 U	15 U	20 U	29 B	15 U	20 U	20 U
POTASSIUM	—	—	1,000 U	—	1,000 U	1,000 U	—	—
SELENIUM	10	—	3 U	—	8	3.34 B	—	—
SILVER	50	—	2 U	—	2 U	2 U	—	—
SODIUM	20,000	119,000	90,200	117,000	*********	372,000	**********	353,000
THALLIUM	4	—	1 U	—	1 U	1 U	—	—
VANADIUM	—	—	6 B	—	79	63	—	—
ZINC	300	10 U	24	12.7 B	72	17 B	10 U	10 U
CYANIDE	100	—	10 U	—	10 U	—	—	—
SULFATE	250,000	13,600	72,000	83,400	75,000	—	5,000 U	5,480
BORON	1,000	—	100	—	100 U	—	—	—
FLUORIDE	1,500	1,020	400	100 U	600	—	4,920	4,530
PHENOL	5	—	5 U	—	5 U	—	—	—
CHLORIDE	250,000	17,800	61,000	67,900	12,000	—	15,600	19,400
pH ***		7.9	7.6	7.5	7.7	—	8.7	—
CONDUCTIVITY (µS)		790	770	1,100	940	—	1,710	—
TEMPERATURE (°C)		5	9	9	14	—	9	—
TURBIDITY (NTU)		13	28	40	>100	—	90	—

Notes: All values reported in µg/l (ppb).
— - Not available
* - NYS CLASS GA GUIDANCE VALUE
*** - Field determined values
U - Not detected
B - Value less than contract required detection limit, but greater than instrument detection limit.
R - Data Rejected
TOTAL = Samples having turbidity >50 NTUs
SOLUBLE = Samples having turbidity <50 NTUs, or filtered samples

Table 8B

Water Inorganic Analyses Results

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	NYS CLASS GA STANDARDS	B-3D SOLUBLE 11/14/90	B-3D TOTAL 3/1/91	B-3D SOLUBLE 3/1/91	B-4S SOLUBLE 3/1/91	B-4D SOLUBLE 11/14/90	B-4D SOLUBLE 3/1/91	B-5D SOLUBLE 11/14/90
ALUMINUM	—	96 B	—	—	—	359	—	492
ANTIMONY	3 *	50 U	—	—	—	50 U	—	50 U
ARSENIC	25	2 U	—	—	—	2 U	—	3 B
BARIUM	1,000	73 B	—	—	—	76 B	—	120 B
BERYLLIUM	3 *	1 U	—	—	—	1 U	—	1 U
CADMIUM	10	3 U	5 U	5 U	5 U	3 U	5 U	3 U
CALCIUM	—	83,500	—	—	—	97,200	—	86,600
CHROMIUM	50	214	179	150	10 U	6 B	10 U	10
CHROMIUM-HEXAVALENT	50	230	191	181	10 U	10 U	10 U	10
COBALT	—	5 U	—	—	—	5 U	—	5 U
COPPER	200	10 B	—	—	—	8 B	—	10 B
IRON	300	157	11,800	52.8 B	920	807	204	1,170
LEAD	25	2 B	5 U	5 U	5 U	3 B	5 U	3 B
MAGNESIUM	35000 *	26,300	—	—	—	23,700	—	23,600
MANGANESE	300	12 B	—	—	—	40	—	46
MERCURY	2	0.2 U	0.79	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	—	15 U	20 U	20 U	20 U	15 U	20 U	15 U
POTASSIUM	—	1,000 U	—	—	—	1,000 U	—	1,000 U
SELENIUM	10	3 U	—	—	—	3 U	—	3 U
SILVER	50	2 B	—	—	—	3 B	—	2 U
SODIUM	20,000	13,900	152,000	146,000	284,000	80,500	68,400	143,000
THALLIUM	4	1 U	—	—	—	1 U	—	1 U
VANADIUM	—	5 B	—	—	—	6 B	—	5 U
ZINC	300	18 B	29.8	10 U	12.8 B	20	10 U	22
CYANIDE	100	10 U	—	—	—	10 U	—	10 U
SULFATE	250,000	**********	112,000	109,000	56,400	65,000	71,600	62,000
BORON	1,000	300	—	—	—	500	—	200
FLUORIDE	1,500	300	171	201	118	200	100 U	300
PHENOL	5	5 U	—	—	—	5 U	—	5 U
CHLORIDE	250,000	**********	116,000	122,000	4,750	81,000	114,000	190,000
pH ***		7.7	7.6	—	7.8	7.5	7.5	7.0
CONDUCTIVITY (µS)		1030	1,470	—	1,980	880	1,380	1530
TEMPERATURE (°C)		11	9	—	8	11	10	11
TURBIDITY (NTU)		7	>100	—	30	23	4	23

Notes: All values reported in µg/l (ppb).
— - Not available
* - NYS CLASS GA GUIDANCE VALUE
*** - Field determined values
U - Not detected
B - Value less than contract required detection limit, but greater than instrument detection limit.
R - Data Rejected
TOTAL = Samples having turbidity >50 NTUs
SOLUBLE = Samples having turbidity <50 NTUs, or filtered samples

Table 8B

Water Inorganic Analyses Results

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	NYS CLASS GA STANDARDS	B-5D SOLUBLE 3/1/91		B-6 TOTAL 11/16/90		B-6 SOLUBLE 11/16/90		B-6 TOTAL 2/28/91		B-6 SOLUBLE 2/28/91		B-7 TOTAL 11/27/90	
ALUMINUM	---	---		89,500		12,500		---		---		51,900	
ANTIMONY	3 *	---		50	U	50	U	---		---		50	U
ARSENIC	25	---		6	B	10		---		---		4	B
BARIUM	1,000	---		435		46	B	---		---		249	
BERYLLIUM	3 *	---		7		1	U	---		---		4	B
CADMIUM	10	5	U	3	U	3	U	5	U	5	U	3	U
CALCIUM	---	---		128,000		2,990	B	---		---		27,500	
CHROMIUM	50	10.6		431		36		124		11.5		129	
CHROMIUM-HEXAVALENT	50	10	U	10	U	10	U	10	U	10	U	10	U
COBALT	---	---		52		5	U	---		---		38	B
COPPER	200	---		183		22	B	---		---		92	
IRON	300	2,110		132,000		8,610		38,000		1,590		87,500	
LEAD	25	5	U	51		1	B	14.5		5	U	28	
MAGNESIUM	35000 *	---		39,100		1,690	B	---		---		16,200	
MANGANESE	300	---		2,770		139		---		---		2,600	
MERCURY	2	0.22		0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
NICKEL	---	20	U	137		15	U	48.1		20	U	96	
POTASSIUM	---	---		13,400		3,850	B	---		---		7,080	
SELENIUM	10	---		15	U	3	U	---		---		10.8	
SILVER	50	---		2	U	2	U	---		---		2	U
SODIUM	20,000	144,000		492,000		540,000		404,000		387,000	U	274,000	
THALLIUM	4	---		1	U	1	U	---		---		1	U
VANADIUM	---	---		168		35	B	---		---		117	
ZINC	300	12.1	B	336		16	B	97		10	U	229	
CYANIDE	100	---		10	U	---		---		---		10	U
SULFATE	250,000	72,800		110,000		---		14,100		30,200		230,000	
BORON	1,000	---		100		---		---		---		100	
FLUORIDE	1,500	267		600		---		178		178		1,700	
PHENOL	5	---		5	U	---		---		---		5	U
CHLORIDE	250,000	171,000		39,000	U	---		9,280		8,680		350,000	
pH ***		7.6		9.7		---		9		---		9.5	
CONDUCTIVITY (µS)		1,620		>1400		---		1,980		---		1010	
TEMPERATURE (°C)		10		16		---		7		---		15	
TURBIDITY (NTU)		40		>100		---		>100		---		>100	

Notes: All values reported in µg/l (ppb).
--- - Not available
* - NYS CLASS GA GUIDANCE VALUE
*** - Field determined values
U - Not detected
B - Value less than contract required detection limit,
but greater than instrument detection limit.
R - Data Rejected
TOTAL = Samples having turbidity >50 NTUs
SOLUBLE = Samples having turbidity <50 NTUs,
or filtered samples

Table 8B

Water Inorganic Analyses Results

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	NYS CLASS GA STANDARDS	B-13 SOLUBLE 6/4/92		B-13 SOLUBLE BLDUP 6/4/92		B-13 TOTAL 8/10/92		B-13 SOLUBLE 8/10/92		Cistern-W TOTAL 6/4/92	
ALUMINUM	---	---		---		---		---		---	
ANTIMONY	3 *	---		---		---		---		---	
ARSENIC	25	---		---		---		---		---	
BARIUM	1,000	---		---		---		---		---	
BERYLLIUM	3 *	---		---		---		---		---	
CADMIUM	10	3.8	UJ	3.8	U	5	U	5	U	3.8	U
CALCIUM	---	---		---		---		---		---	
CHROMIUM	50	3.9	UJ	3.9	U	6.4	J	6	U	214	
CHROMIUM-HEXAVALENT	50	10	UJ	10	UJ	20	U	10	U	10	UJ
COBALT	---	---		---		---		---		---	
COPPER	200	---		---		---		---		---	
IRON	300	11.2	UJ	11.2		3,820		19.6	J	4930	R
LEAD	25	3	UJ	3	U	15	U	15	U	77.8	
MAGNESIUM	35000 *	---		---		---		---		---	
MANGANESE	300	---		---		---		---		---	
MERCURY	2	0.2	UJ	0.2	U	0.2	U	0.2	U	0.2	U
NICKEL	---	30.6	UJ	30.6	U	17	U	17	U	30.6	U
POTASSIUM	---	---		---		---		---		---	
SELENIUM	10	---		---		---		---		---	
SILVER	50	---		---		---		---		---	
SODIUM	20,000	238,000	J	241,000		169,000		172,000		2,350	J
THALLIUM	4	---		---		---		---		---	
VANADIUM	---	---		---		---		---		---	
ZINC	300	4.5	UJ	4.5	U	15.8	J	15.8	J	673	J
CYANIDE	100	---		---		---		---		---	
SULFATE	250,000	101,000		104,000		52,000		51,000		6,000	U
BORON	1,000	---		---		---		---		---	
FLUORIDE	1,500	110		120		110		100		100	
PHENOL	5	---		---		---		---		---	
CHLORIDE	250,000	311,000		314,000		238,000		241,000		2,000	
pH ***		---		---		---		---		---	
CONDUCTIVITY (µS)		---		---		---		---		---	
TEMPERATURE (°C)		---		---		---		---		---	
TURBIDITY (NTU)		---		---		---		---		---	

Notes: All values reported in µg/l (ppb).
--- - Not available
* - NYS CLASS GA GUIDANCE VALUE
*** - Field determined values
U - Not detected
B - Value less than contract required detection limit, but greater than instrument detection limit.
R - Data Rejected
TOTAL = Samples having turbidity >50 NTUs
SOLUBLE = Samples having turbidity <50 NTUs, or filtered samples

Table 8B

Water Inorganic Analyses Results

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	NYS CLASS GA STANDARDS	Cistern-W SOLUBLE 6/4/92	Cistern-W SOLUBLE 8/10/92	Cistern-W BLDUP. 8/10/92	East Pumphouse 6/4/92	East Pumphouse 8/10/92	West Pumphouse 6/4/92
ALUMINUM	---	---	---	---	---	---	---
ANTIMONY	3 *	---	---	---	---	---	---
ARSENIC	25	---	---	---	---	---	---
BARIUM	1,000	---	---	---	---	---	---
BERYLLIUM	3 *	---	---	---	---	---	---
CADMIUM	10	3.8 U	5 U	5 U	3.8 UJ	5 U	3.8 UJ
CALCIUM	---	---	---	---	---	---	---
CHROMIUM	50	3.9 U	6 U	6 U	3.9 UJ	6 U	3.9 UJ
CHROMIUM-HEXAVALENT	50	10 UJ	10 U	10 U	10 UJ	10 U	10 UJ
COBALT	---	---	---	---	---	---	---
COPPER	200	---	---	---	---	---	---
IRON	300	998 R	74.4 J	51.7 J	136 R	204	63.7 J
LEAD	25	3 U	3 U	3.7	3 UJ	3 U	3 UJ
MAGNESIUM	35000 *	---	---	---	---	---	---
MANGANESE	300	---	---	---	---	---	---
MERCURY	2	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 UJ
NICKEL	---	30.6 U	17 U	17 U	30.6 UJ	17 U	30.6 UJ
POTASSIUM	---	---	---	---	---	---	---
SELENIUM	10	---	---	---	---	---	---
SILVER	50	---	---	---	---	---	---
SODIUM	20,000	2,450 J	990 U	990 U	21,400 J	19,000	10,900 J
THALLIUM	4	---	---	---	---	---	---
VANADIUM	---	---	---	---	---	---	---
ZINC	300	48.6 J	310	327	52.3 J	56.7	106 J
CYANIDE	100	---	---	---	---	---	---
SULFATE	250,000	7,000 U	3,000 U	3,000 U	24,000	16,000	34,000
BORON	1,000	---	---	---	---	---	---
FLUORIDE	1,500	70	50	40	250	210	270
PHENOL	5	---	---	---	---	---	---
CHLORIDE	250,000	1,000 U	1,000 U	1,000 U	16,000	10,000	7,000
pH ***		---	---	---	---	---	---
CONDUCTIVITY (µS)		---	---	---	---	---	---
TEMPERATURE (°C)		---	---	---	---	---	---
TURBIDITY (NTU)		---	---	---	---	---	---

Notes: All values reported in µg/l (ppb).
--- - Not available
* - NYS CLASS GA GUIDANCE VALUE
*** - Field determined values
U - Not detected
B - Value less than contract required detection limit, but greater than instrument detection limit.
R - Data Rejected
TOTAL = Samples having turbidity >50 NTUs
SOLUBLE = Samples having turbidity <50 NTUs, or filtered samples

Table 9A

Sediment Volatile Organic Analyses Results

Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	Cistern 6/4/92		Cistern 8/10/92		Blind Dup. 6/4/92		Blind Dup. 8/10/92	
CHLOROMETHANE	24	U	100	UJ	28	U	140	UJ
BROMOMETHANE	24	U	100	U	28	U	140	U
VINYL CHLORIDE	24	U	100	UJ	28	U	140	UJ
CHLOROETHANE	24	U	130	U	28	U	180	U
METHYLENE CHLORIDE	24	U	100	U	28	U	140	U
ACETONE	24	U	140	UJ	28	U	210	UJ
CARBON DISULFIDE	24	U	100	UJ	28	U	140	UJ
1,1-DICHLOROETHENE	24	U	100	U	28	U	140	U
1,1-DICHLOROETHANE	24	U	100	U	28	U	140	U
1,2-DICHLOROETHENE (TOTAL)	24	U	100	U	28	U	140	U
CHLOROFORM	24	U	100	U	28	U	140	U
1,2-DICHLOROETHANE	24	U	100	U	28	U	140	U
2-BUTANONE	24	U	100	U	28	U	140	U
1,1,1-TRICHLOROETHANE	24	U	100	U	28	U	140	U
CARBON TETRACHLORIDE	24	U	100	U	28	U	140	U
VINYL ACETATE	24	U	NA		28	U	NA	
BROMODICHLOROMETHANE	24	U	100	U	28	U	140	U
1,2-DICHLOROPROPANE	24	U	100	U	28	U	140	U
CIS-1,3-DICHLOROPROPENE	24	U	100	U	28	U	140	U
TRICHLOROETHENE	24	U	100	U	28	U	140	U
DIBROMOCHLOROMETHANE	24	U	100	U	28	U	140	U
1,1,2-TRICHLOROETHANE	24	U	100	U	28	U	140	U
BENZENE	24	U	100	U	28	U	140	U
TRANS-1,3-DICHLOROPROPENE	24	U	100	U	28	U	140	U
BROMOFORM	24	U	100	U	28	U	140	U
4-METHYL-2-PENTANONE	24	U	100	U	28	U	140	U
2-HEXANONE	24	U	100	U	28	U	140	U
TETRACHLOROETHENE	24	U	100	U	28	U	140	U
1,1,2,2-TETRACHLOROETHANE	24	U	100	U	28	U	140	U
TOLUENE	24	U	13	J	28	U	9	J
CHLOROBENZENE	5	J	1300		28	U	750	
ETHYLBENZENE	24	U	39	J	28	U	22	J
STYRENE	24	U	100	U	28	U	140	U
XYLENE (TOTAL)	24	U	340		28	U	150	
HEXANE	24	U	NA		7	J	NA	
FREON-113	21	J	NA		26	J	NA	

Notes: All values reported in µg/kg (ppb).
U - Not detected
J - Indicates an estimated value
NA - Not analyzed

Table 9B

Sediment Inorganic Analyses Results
Alcan Aluminum Corporation
Alcan Aluminum Site #828005
Pittsford, New York

	Soil Concentrations Typical Range (ppm)	Cistern 6/4/92		Cistern 8/10/92		Blind Dup. 6/4/92		Blind Dup. 8/10/92	
ALUMINUM	1,000-25,000	—		—		—		—	
ANTIMONY	0.6-10 *	—		—		—		—	
ARSENIC	3-12	—		—		—		—	
BARIUM	15-600	—		—		—		—	
BERYLLIUM	0-1.75	—		—		—		—	
CADMIUM	0.0001-1	1.9	UJ	2	UJ	2.1	UJ	5.8	J
CALCIUM	130-35,000	—		—		—		—	
CHROMIUM	1.5-40	2,410	J	1,170	J	1,390	J	1,640	J
CHROMIUM-HEXAVALENT	—	0.10	UJ	0.86	J	0.10	UJ	1.19	J
COBALT	2.5-60	—		—		—		—	
COPPER	1-50	—		—		—		—	
IRON	17,500-25,000	29,700	J	29,700	J	33,400	J	32,100	J
LEAD	1-30	722	J	412	J	516	J	658	J
MAGNESIUM	100-5,000	—		—		—		—	
MANGANESE	50-5,000	—		—		—		—	
MERCURY	0.042-0.06	0.52	J	0.27	J	0.27	UJ	0.35	J
NICKEL	0.5-25	70	J	62.9	J	66.3	J	95.7	J
POTASSIUM	8,500-43,000	—		—		—		—	
SELENIUM	<0.1-3.9	—		—		—		—	
SILVER	0.1-5 *	—		—		—		—	
SODIUM	<500-8,000	778	J	540	J	480	J	648	J
THALLIUM	0.1-12 *	—		—		—		—	
VANADIUM	11-119	—		—		—		—	
ZINC	37-60	3,110	J	2,510	J	2,530	J	5,520	J
CYANIDE	—	—		—		—		—	
SULFATE	2-130 *	—		6	UJ	—		6	UJ
BORON	—	—		—		—		—	
FLUORIDE	30-300 *	0.56	J	0.44	J	0.47	J	1	J
PHENOL	—	—		—		—		—	
CHLORIDE	10-100 *	2,940	J	61	J	1,380	J	208	J

Notes: Lab values reported in mg/kg (ppm).
— - Not available
* - Guidance value
U - Not detected
B - Value less than contract required detection limit,
'but greater than instrument detection limit.
NYS concentration range in uncontaminated soils from backround concentrations of 20 elements in soils with special regard for New York State by E. Carol McGovern
* - Dragun, Soil Chemistry of Hazardous Wastes

TABLE 10

GROUND WATER NITROGEN ANALYSES
ALCAN ALUMIUM CORPORATION
ALCAN ALUMIUM SITE #828005
PITTSFORD, NEW YORK

Well #	B-1S		B-1D		B-2S		B-2D		B-3S		B-3D		B-4S		B-4D		B-5D		B-6		B-7		B-8	
Date Received	2/28/91		2/28/91		3/1/91		3/1/91		3/1/91		3/1/91		3/1/91		3/1/91		3/1/91		2/28/91		3/1/91		3/1/91	
Nitrogen, Kjeldahl	200	U	200	U	200	U	200	U	1170		200	U	414		200	U	200	U	379		346		200	U
Nitrogen, Nitrate	50	U	4490		80		3660		18600		4290		1750		3570		3330		23		1440		3310	
Nitrogen, Nitrite	10	U	10	U	11		11		47		10	U	67		10	U	10	U	233		241		63	
Nitrogen, Nitrate/Nitrite	50	U	4490		91		3670		18600		4290		1820		3570		3330		256		1680		3370	

NOTE: All values reported in ug/l (ppb).

TABLE 11

AIR MONITORING TARGET COMPOUNDS
ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

I. Aromatic Hydrocarbons:

- Benzene
- Cumene
- Methylstyrene
- Vinyltoluene
- p-tert-Butyltoluene
- Ethylbenzene
- Styrene
- Xylene

II. Halogenated Hydrocarbons:

- 1,1,1-Trichloroethane
- Bromoform
- Chlorobromomethane
- o-Dichlorobenzene
- 1,1-Dichloroethane
- Hexachloroethane
- Chlorobenzene
- Benzyl Chloride
- Carbon Tetrachloride
- Chloroform
- p-Dichlorobenzene
- 1,2-Dichloroethylene
- 1,1,2,2-Tetrachloroethane
- trans-1,3-Dichloropropylene

III. Metals:

- Aluminum
- Cadmium
- Cobalt
- Lead
- Nickel
- Sodium
- Arsenic
- Calcium
- Copper
- Magnesium
- Selenium
- Thallium
- Beryllium
- Chromium
- Iron
- Manganese
- Silver
- Zinc

TABLE 12

METALS DETECTED IN SAMPLE BLANK
ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

METAL	BLANK (ug)	AVG. SAMPLE (ug)	RANGE (ug)
Calcium	7	4	4 - 5
Chromium	0.24	0.25	0.22 - 0.27
Iron	11	9	5 - 16
Magnesium	2	2 *	N/A
Sodium	14	14	12 - 16

NOTE: * - Indicates magnesium was present in only one sample.

TABLE 13

METEOROLOGICAL DATA
ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

8:00 AM	*No noticeable wind movement (assumed wind to be from NW)*
9:00 AM	*Wind <5 mph from NW*
10:00 AM	*No noticeable wind movement*
10:30 AM	*Wind <5 mph from East*
10:45 AM	*Wind 5 mph from East*
11:15 AM	*No noticeable wind movement*
11:45 AM	*Wind gusts up to 10 mph from SW*
12:15 PM	*Winds variable from SE and SW*
12:45 PM	*Wind gusts up to 10 mph from South*
13:15 PM	*Winds variable from SE*
14:15 PM	*Winds variable from SE*
15:00 PM	*Wind gusts up to 10 mph from SE*
15:30 PM	*No noticeable wind movement*
16:00 PM	*Wind <5 mph from SE*

TABLE 15

CHEMICALS DETECTED IN MONITORING WELLS

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	Reported Range	Reported Hits	Background Range	Background Hits
Inorganics				
Aluminum	<96 - 89500	10/11	715 - 6320	2/2
Barium	17 - 435	11/11	82 - 119	2/2
Beryllium	<1 - 7	5/11	<1 - 3	1/2
Calcium	27500 - 149000	11/11	119000 - 134000	2/2
Chromium	5 - 431	19/23	5 - 22	2/4
Chromium 6+	0.0108 - 230	9/21	<10	0/3
Cobalt	<5 - 52	4/11	<5	0/2
Copper	<8 - 183	3/11	<18	0/2
Iron	72 - 132000	23/23	72 - 9820	4/4
Lead	2 - 51	12/23	3 - 7	2/4
Magnesium	7070 - 39100	11/11	31800 - 32600	2/2
Manganese	12 - 2770	11/11	95 - 1100	2/2
Mercury	<0.2 - 0.8	5/22	<0.2	0/4
Nickel	<15 - 137	6/23	<15 - 23	1/4
Potassium	<1000 - 13400	5/11	1360 - 1630	2/2
Selenium	8	1/1	-	-
Silver	<2 - 3	3/11	<2 - 3	1/2
Sodium	<18400 - 492000	22/23	<18400 - 116000	3/4
Vanadium	<5 - 168	9/11	<5 - 17	1/2
Zinc	<10 - 336	10/23	<42	0/4
Boron	<100 - 900	9/11	<100 - 900	1/2
Cyanide	<10 - 10	1/11	<10	0/2
Fluoride	0.118 - 1700	8/23	<500	0/4
Volatile Organics				
Acetone	<10 - 20	3/12	<10	0/2
1,2-Dichloroethene (total)	<5 - 80	1/12	<5	0/2
Methylene chloride	<5 - 46	5/12	<5	0/2
1,1,1-Trichloroethane	<5 - 5	1/12	<5	0/2
Trichloroethene	<5 - 46	2/12	<5 - 23	1/2

Notes: All values reported in ug/l.
Based on unfiltered ground water samples collected in 1990/1991 from shallow and deep aquifers
Values incorporate 1990 data validation
Background water quality based on B-1S and B-1D

Table 16

CHEMICALS DETECTED IN AMBIENT AIR

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	Reported		Background	
	Range	Hits	Range	Hits
Aluminum	<0.8 - 2.6	1/3	<0.8	0/1

Notes: Values reported in ug/m^3

TABLE 17

COMPARISON OF GROUND WATER CONCENTRATIONS
TO DRINKING WATER STANDARDS

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	Maximum Concentration	New York State MCL	U.S. EPA MCL	Comment
Inorganics				
Aluminum	89,500	NA	50 PS	over
Barium	435	1000	-	within
Beryllium	7	NA	NA	
Calcium	149,000	NA	NA	
Chromium	431	50	-	over
Chromium 6+	230	50	-	over
Cobalt	52	NA	NA	
Copper	183	1,000	-	within
Iron	132,000	300	-	over
Lead	51	50	-	over
Magnesium	39,100	NA	NA	
Manganese	2,770	300	-	over
Mercury	0.8	2	-	within
Nickel	137	NA	NA	
Potassium	13,400	NA	NA	
Selenium	8	10	-	within
Silver	3	50	-	within
Sodium	492,000	20,000 R	-	over
Vanadium	168	NA	NA	
Zinc	336	5000	-	within
Cyanide	10	NA	NA	
Fluoride	1,700	2,200	-	within
Volatile Organics				
Acetone	20	NA	NA	
1,2-Dichloroethene (total)	80	5	-	over
Methylene chloride	46	NA	NA	
1,1,1-Trichloroethane	5	NA	200	within
Trichloroethene	46	NA	5	over

Notes: All values reported in ug/l.
Based on unfiltered ground water samples collected in 1990/1991 from shallow and deep aquifers
Values incorporate 1990 data validation
R = for people on severly restricted sodium diets
PS = proposed secondary standard

TABLE 18

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	Soil/Settled Solids	Ground Water	Air
Inorganics			
Aluminum	X	X	X
Beryllium		X	
Calcium	X	X	
Chromium	X	X	
Chromium 6+	X	X	
Cobalt		X	
Copper	X		
Iron	X	X	
Lead	X	X	
Magnesium	X	X	
Manganese		X	
Nickel	X	X	
Potassium		X	
Sodium		X	
Vanadium		X	
Zinc	X		
Cyanide	X	X	
Volatile Organics			
Acetone	X	X	
1,2-Dichloroethene (total)	X	X	
Ethylbenzene	X		
Methylene chloride	X	X	
Toluene	X		
1,1,1-Trichloroethane	X	X	
Trichloroethene	X	X	
Xylenes (total)	X		

TABLE 19

CHEMICAL RELEASE SOURCES

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Receiving Medium	Release Mechanism	Release Source
Soil	Surface runoff	Contaminated soil/sludge
Soil	Tracking	Contaminated soil/sludge
Surface water	Ground water seepage	Contaminated ground water
Sediment	Ground water seepage	Contaminated ground water
Ground water	Leaching	Contaminated soil/sludge
Air	Fugitive Dust	Contaminated soil/sludge
Air	Volatilization	Contaminated sludge
Air	Volatilization	Contaminated ground water
Biota	Uptake	Contaminated soil, surface water, sediment

TABLE 20

SUMMARY OF PHYSICAL AND ENVIRONMENTAL FATE DATA
FOR CHEMICALS OF POTENTIAL CONCERN

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	Koc (ml/g)	log Kow	Water Solubil-ity (mg/l)	Henry's Law Constant (atm*m3/mol)	Vapor Pressure (mm Hg)	Fish BCF (l/kg)	S*	Ground Water Half-life (hours)	S*	Soil Half-life (hours)	S
Organics											
Acetone	2.2	-0.24	1.00E+06	2.06E-05	2.70E+02	0.69	HE	48 - 336	HE	24 -168	H
cis-1,2-Dichloroethene	49	0.70	3.50E+03	7.58E-03	2.08E+02	1.6					
trans-1,2-Dichloroethene	59	0.48	6.30E+03	6.56E-03	3.24E+02	1.6					
Ethylbenzene	1100	3.15	1.52E+02	6.43E-03	7.00E+00	37.5		144 - 5472	HE	72 - 240	H
Methylene Chloride	8.8	1.30	2.00E+04	2.03E-03	3.62E+02	5		336 - 1344	HE	168 - 672	H
1,1,1-Trichloroethane	152	2.50	1.50E+03	1.44E-02	1.23E+02	5.6		3360 - 13104	HE	3360 - 6552	H
Trichloroethene	126	2.38	1.10E+03	9.10E-03	5.79E+01	10.6		7704 - 39672	HE	4320 - 8640	H
Toluene	300	2.73	5.35E+02	6.37E-03	2.81E+01	10.7		168 - 672	HE	96 - 528	H
Xylenes (total)	240	3.26	1.98E+02	7.04E-03	1.00E+01	2.2	HE	336 - 8640	HE	168 - 672	H
Inorganics											
Aluminum											
Arsenic				NA	0.00E+00	44					
Barium											
Beryllium					0.00E+00	19					
Boron											
Cadmium				NA	0.00E+00	81					
Calcium											
Chromium 6+					0.00E+00	16					
Cobalt											
Copper				NA	0.00E+00	200					
Cyanide											
Fluoride											
Iron											
Lead				NA	0.00E+00	49					
Magnesium											
Manganese											
Nickel				NA	0.00E+00	47					
Potassium											
Silver					0.00E+00	3080					
Sodium											
Thallium					0.00E+00						
Vanadium											
Zinc				NA	0.00E+00	47					

Source: Superfund Public Health Evaluation Manual, unless otherwise noted
HE = Handbook of Environmental Degradation Rates (Howard et al. 1991)

TABLE 21

POTENTIAL MIGRATION PATHWAYS
AND EXPOSURE POINTS

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Release Source	Release Mechanism	Transport Medium	Exposure Point
contaminated soil/settled solids	surface runoff	soil	on-site
contaminated soil/settled solids	surface runoff	soil	game animals
contaminated soil/settled solids	tracking	soil	off-site
contaminated GW	GW seepage	SW	tributary to Irondequoit Creek
contaminated GW	leaching	sediments	tributary to Irondequoit Creek
contaminated soil/settled solids	leaching	GW	on-site wells
contaminated GW	GW seepage	GW	off-site wells
contaminated soil/settled solids	fugitive dust	air	on-site air
contaminated soil/settled solids	fugitive dust	air	off-site air
contaminated settled solids	volatilization	air	on-site air
contaminated settled solids	volatilization	air	off-site air

GW = ground water, SW = surface water

TABLE 22

POTENTIAL EXPOSURE ROUTES

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Exposure Medium Exposure Route	Exposure Point	Current Exposures Current Land Use	Future Exposures Current Land Use	Future Exposures Future Land Use
SURFACE SOIL				
Ing, derm	on-site	complete	complete	complete
Ing, derm	off-site	complete	complete	complete
SLUDGE				
Ing, derm	on-site	incomplete	incomplete	complete
SURFACE WATER				
Ing, derm	tributary to Irondequoit Creek	complete	complete	complete
SEDIMENTS				
Ing, derm	tributary to Irondequoit Creek	complete	complete	complete
GROUND WATER				
Ing, inh, derm	on-site wells	incomplete	incomplete	complete
Ing, inh, derm	off-site wells	incomplete	complete	complete
AIR				
Inh	on-site	complete	complete	complete
Inh	off-site	complete	complete	complete
FOODCHAIN				
Ing of fish	tributary to Irondequoit Creek	complete	complete	complete
Ing	game animals in the site vicinity	complete	complete	complete

Ing = ingestion, Inh = inhalation, Derm = dermal contact, fish = fish ingestion

TABLE 23

COMPLETE EXPOSURE PATHWAYS

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
On-site workers	ING & DC of site surface soil	Yes	Current on-site workers may contact site surface soil
On-site trespassers	ING & DC of site surface soil	No	Magnitude of risk is small in comparison to on-site workers; on-site worker exposures are quantified
On-site workers	ING & DC of sludge/surface soil	Yes	Future on-site workers may contact site sludge and surface soil
Off-site workers	ING & DC of off-site surface soil	No	Concentrations in site soil are expected to be greater than in off-site soil; on-site exposures are quantified
Off-site residents	ING & DC of water and sediments in the tributary to Irondequoit Creek	No	Due to the presence of the Siquismondi Landfill in the site vicinity, site-related concentrations in the tributary, if any, cannot be determined
On-site workers	ING of water from on-site potable wells	Yes	Future site workers may utilize site ground water for drinking purposes
Off-site residents	ING, DC, and INH of ground water from off-site potable wells	Yes	The on-site deep ground water plume may migrate to off-site potable wells
On-site workers	INH of site air	Yes	Current and future workers may inhale site air
On-site trespassers	INH of site air	No	Magnitude of risk is small in comparison to on-site workers; on-site worker exposures are quantified
Off-site workers	INH of off-site outdoor air	No	Magnitude of risk is small due to chemical dispersion in air
Off-site fishermen	ING of fish from the tributary to the Irondequoit Creek	No	Due to the presence of the Siquismondi Landfill in the site vicinity, site-related concentrations in fish, if any, cannot be determined
On-site trespassers, off-site residents	ING of deer which have grazed on-site	No	Magnitude of risk is small

DC = dermal contact, ING = ingestion, INH = inhalation

TABLE 24

CALCULATION OF SURFACE SOIL EXPOSURE CONCENTRATIONS

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9	S-10	Average	Standard Deviation (SD)	Average + 2SD	Maximum	Value to be Used
Aluminum	12000	5670	9160	14200	10200	7080	14600	6750	5020	8930	9361	3213	15787	14600	14600
Calcium	4180	4910	12000	1260	2300	976	1290	809	1390	1250	3037	3271	9579	12000	9579
Chromium 3+	268	7.32	13.5	17.3	35.1	28.2	18.0	9.23	8.07	8.72	41.34	76.05	193.45	268.00	193.45
Copper	27.3	6.70	13.0	7.73	9.19	4.26	14.1	4.20	5.68	6.14	9.83	6.65	23.12	27.30	23.12
Iron	9420	9100	16000	17200	13100	7780	18300	7340	7080	8870	11419	4113	19645	18300	18300
Lead	13.1	7.13	6.41	8.01	10.1	6.75	21.9	4.09	4.26	5.94	8.77	5.06	18.89	21.90	18.89
Magnesium	1870	2210	4840	2600	1960	1070	2770	972	1030	1040	2036	1134	4304	4840	4304
Nickel	6.82	6.99	13.6	13.5	10.5	3.81	17.2	5.33	4.78	4.85	8.74	4.41	17.56	17.20	17.20
Zinc	49.5	22.9	33.5	39.9	28.0	19.2	47.8	15.4	16.1	25.2	29.8	11.9	53.5	49.5	49.5

Notes: * Concentrations expressed in mg/kg
* Incorporates data validation
* If the chemical was not detected in the sample, one-half the detection limit was used

TABLE 25

CALCULATION OF SURFACE SOIL/SUBSURFACE SLUDGE EXPOSURE CONCENTRATIONS

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9	S-10	IB-1 6-8'	IB-1 8-8.5'	IB-1 12-14'	IB-2 9-9.5'
INORGANICS (mg/kg)														

Aluminum	12000	5670	9160	14200	10200	7080	14600	6750	5020	8930	5780	17700	20600	11200
Calcium	4180	4910	12000	1260	2300	976	1290	809	1390	1250	1680	37000	48600	16000
Chromium 3+	268	7.32	13.5	17.3	35.1	28.2	18.0	9.23	8.07	8.72	50.4	532	39.4	113
Copper	27.3	6.70	13.0	7.73	9.19	4.26	14.1	4.20	5.68	6.14	10.1	69.5	24.6	18.5
Iron	9420	9100	16000	17200	13100	7780	18300	7340	7080	8870	7970	15100	25500	12300
Lead	13.1	7.13	6.41	8.01	10.1	6.75	21.9	4.09	4.26	5.94	2.61	9.07	10.5	6.33
Magnesium	1870	2210	4840	2600	1960	1070	2770	972	1030	1040	1300	10100	14400	3810
Nickel	6.82	6.99	13.6	13.5	10.5	3.81	17.2	5.33	4.78	4.85	4.7	12.7	25.8	9.49
Zinc	49.5	22.9	33.5	39.9	28.0	19.2	47.8	15.4	16.1	25.2	18.1	43.4	65.3	25.9
Cyanide	0.278	0.263	0.265	0.288	0.288	0.273	0.278	0.263	0.265	0.278	0.313	0.330	0.320	0.318
VOLATILES (ug/kg)														

Methylene chloride	3	2.5	2.5	3	3	2.5	3	2.5	2.5	1	3	4	710	9
Acetone	5.5	5	5.5	5.5	5.5	5.5	5.5	5	5.5	5.5	35	82	31.5	34
1,2-DCE (total)	3	2.5	2.5	3	3	2.5	3	2.5	2.5	3	3	3	16	160
Trichloroethene	3	2.5	2.5	3	3	2.5	3	2.5	2.5	3	3	3	16	180
Toluene	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.5	2.5	29	850	13
Ethylbenzene	3	2.5	2.5	3	3	2.5	3	2.5	2.5	3	14	130	29	3
Xylenes (total)	3	2.5	2.5	3	3	2.5	3	2.5	2.5	3	110	410	110	3

DCE = Dichloroethene

Notes: * Incorporates data validation

* If the chemical was not detected in the sample, one-half the detection limit was used

TABLE 25 (CONT.)

CALCULATION OF SURFACE SOIL/SUBSURFACE SLUDGE EXPOSURE CONCENTRATIONS

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	IB-3 3.5-4'	IB-3 6-8'	IB-3 10-12'	IB-6 8.7-9.2'	IB-5 Center	IB-C Comp.	Average	Deviation (SD)	Average + 2SD	Maximum	Value to be Used
INORGANICS (mg/kg)											
Aluminum	32400	28900	21300	7770	29900	59000	16408	12778	41964	59000	41964
Calcium	13100	12300	5210	1410	5870	21700	9662	12608	34878	48600	34878
Chromium 3+	47.8	2810	35.2	13.0	1,700	2,660	421	857	2135	2810	2135
Copper	125	214	26.3	8.96	121	425	57	100	257	425	257
Iron	11100	7590	24100	12100	7540	10600	12405	5320	23044	25500	23044
Lead	51.5	20.2	13.1	2.95	14.3	24.9	12.2	10.9	33.9	51.5	33.9
Magnesium	2200	5630	5700	1770	2730	8980	3849	3492	10832	14400	10832
Nickel	14.0	10.8	24.7	8.26	8.49	23.7	11.5	6.6	24.7	25.8	24.7
Zinc	130	63.2	62.3	24.2	47.2	90.6	43.4	27.9	99.2	130.0	99.2
Cyanide	0.290	5.30	0.325	0.305	0.915	0.830	0.599	1.093	2.784	5.300	2.784
VOLATILES (ug/kg)											
Methylene chloride	3	4	0.8	3	3	4	38	154	347	710	347
Acetone	5	150	31	21	6	19	23	34	92	150	92
1,2-DCE (total)	3	4	3	3	3	4	11	34	80	160	80
Trichloroethene	3	4	3	3	3	4	12	39	90	180	90
Toluene	2.5	2.5	2.5	2.5	6	3	47	184	416	850	416
Ethylbenzene	3	4	3	3	3	5	11	28	67	130	67
Xylenes (total)	3	4	3	3	3	3	34	92	218	410	218

TABLE 26

CALCULATION OF GROUND WATER EXPOSURE CONCENTRATIONS

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	B-1D	B-1D*	B-2D	B-3D	B-4D	B-5D	B-12D*	Average	Standard Deviation (SD)	Average + 2SD	Maximum	Value to be Used
Inorganics												
Aluminum	715		794	48	359	492		482	267	1015	715	715
Chromium	5		13.6	214	6	10.6		50	82	214	5	5
Chromium 6+	5		10	230	5	10		52	89	230	5	5
Iron	1310		2020	11800	807	2110		3609	4123	11856	1310	1310
Lead	3		4	2.5	3	3		3	0	4	3	3
Sodium	116000		117000	152000	80500	144000		121900	25168	172236	116000	116000
Vanadium	2.5		6	5	6	2.5		4	2	8	3	3
Volatile Organics												
Acetone	5	5	10	5	11	5	5	5	0	5	5	5
Methylene Chloride	2.5	2	10	2.5	10	2.5	2.5	2	0	3	3	3
Trichloroethene	23	13	2.5	2.5	2.5	2.5	5	18	5	28	23	23

Notes: All values reported in ug/l
Based on ground water samples collected from the deep aquifer in 1990/1991
Values incorporate 1990 data validation
If the chemical was not detected in the sample, one-half the detection limit was used
Only those chemicals detected in the deep aquifer at concentrations above background (well B-1D) are presented

TABLE 27

CALCULATION OF AIR EXPOSURE CONCENTRATIONS
FOR CURRENT ON-SITE WORKERS

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

	Upwind	On-Site	Downwind	Average	Standard Deviation (SD)	Average + 2SD	Maximum	Value to be Used
Aluminum	0.40	2.6	0.45	1.2	1.0	3.2	2.6	2.6

Notes: All values reported in ug/m^3
Based on air samples collected in October 1990
If the chemical was not detected, one-half the detection limit was used

TABLE 28

INTAKES FROM INGESTION OF SOIL

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Chemical	CS (mg/kg)	IR (mg/day)	CF (kg/mg)	FI	EF (dy/yr)	ED (yrs)	BW (kg)	AT (yrs)	Intake for Non-carc. Effects	AT (yrs)	Intake for Carc. Effects
Current Worker											
Aluminum	14600	50	1.00E-06	1	250	25	70	25	7.14E-03	-	-
Calcium	9579	50	1.00E-06	1	250	25	70	25	4.69E-03	-	-
Chromium 3+	1626.00	50	1.00E-06	1	250	25	70	25	7.95E-04	-	-
Copper	23.12	50	1.00E-06	1	250	25	70	25	1.13E-05	-	-
Iron	26195	50	1.00E-06	1	250	25	70	25	1.28E-02	-	-
Lead	484.00	50	1.00E-06	1	250	25	70	25	2.37E-04	70	8.46E-05
Magnesium	4304	50	1.00E-06	1	250	25	70	25	2.11E-03	-	-
Nickel	51.00	50	1.00E-06	1	250	25	70	25	2.50E-05	-	-
Zinc	2081.0	50	1.00E-06	1	250	25	70	25	1.02E-03	-	-
Future Worker											
Aluminum	41528	50	1.00E-06	1	250	25	70	25	2.03E-02	-	-
Calcium	34878	50	1.00E-06	1	250	25	70	25	1.71E-02	-	-
Chromium 3+	2135	50	1.00E-06	1	250	25	70	25	1.04E-03	-	-
Copper	257	50	1.00E-06	1	250	25	70	25	1.26E-04	-	-
Iron	23044	50	1.00E-06	1	250	25	70	25	1.13E-02	-	-
Lead	33.9	50	1.00E-06	1	250	25	70	25	1.66E-05	70	5.93E-06
Magnesium	10832	50	1.00E-06	1	250	25	70	25	5.30E-03	-	-
Nickel	24.7	50	1.00E-06	1	250	25	70	25	1.21E-05	-	-
Zinc	99.2	50	1.00E-06	1	250	25	70	25	4.85E-05	-	-
Cyanide	2.784	50	1.00E-06	1	250	25	70	25	1.36E-06	-	-
Methylene Chloride	0.347	50	1.00E-06	1	250	25	70	25	1.70E-07	70	6.06E-08
Acetone	0.092	50	1.00E-06	1	250	25	70	25	4.50E-08	-	-
1,2-Dichloroethene	0.080	50	1.00E-06	1	250	25	70	25	3.91E-08	-	-
Trichloroethene	0.090	50	1.00E-06	1	250	25	70	25	4.40E-08	70	1.57E-08
Toluene	0.416	50	1.00E-06	1	250	25	70	25	2.04E-07	-	-
Ethylbenzene	0.067	50	1.00E-06	1	250	25	70	25	3.28E-08	-	-
Xylenes (total)	0.218	50	1.00E-06	1	250	25	70	25	1.07E-07	-	-

CS = chemical concentration in soil; IR = ingestion rate
CF = conversion factor (10e-6 kg/mg); FI = fraction ingested from contaminated source;
EF = exposure frequency; ED = exposure duration;
BW = body weight; AT = averaging time
- = not a carcinogen by this exposure pathway

$$\frac{CS \times IR \times CF \times FI \times EF \times ED}{BW \times AT \times 365 \text{ days/yr}} = \text{Intake (mg/kg-day)}$$

TABLE 29

INTAKES FROM DERMAL CONTACT WITH SOIL

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Chemical	CS (mg/kg)	CF (kg/mg)	SA (cm2)	AF (mg/cm2)	ABS	EF (event/yr)	ED (yrs)	BW (kg)	AT (yrs)	Intake for Non-carc. Effects	AT (yrs)	Intake for Carc. Effects
Current Worker												
Aluminum	14600	1.00E-06	3120	0.51	0.01	250	25	70	25	2.27E-03	-	-
Calcium	9579	1.00E-06	3120	0.51	0.01	250	25	70	25	1.49E-03	-	-
Chromium 3+	1626.00	1.00E-06	3120	0.51	0.01	250	25	70	25	2.53E-04	-	-
Copper	23.12	1.00E-06	3120	0.51	0.01	250	25	70	25	3.60E-06	-	-
Iron	26195	1.00E-06	3120	0.51	0.01	250	25	70	25	4.08E-03	-	-
Lead	484.00	1.00E-06	3120	0.51	0.0006	250	25	70	25	4.52E-06	70	1.61E-06
Magnesium	4304	1.00E-06	3120	0.51	0.01	250	25	70	25	6.70E-04	-	-
Nickel	51.00	1.00E-06	3120	0.51	0.01	250	25	70	25	7.94E-06	-	-
Zinc	2081.0	1.00E-06	3120	0.51	0.01	250	25	70	25	3.24E-04	-	-
Future Worker												
Aluminum	41528	1.00E-06	3120	0.51	0.01	250	25	70	25	6.47E-03	-	-
Calcium	34878	1.00E-06	3120	0.51	0.01	250	25	70	25	5.43E-03	-	-
Chromium 3+	2391	1.00E-06	3120	0.51	0.01	250	25	70	25	3.72E-04	-	-
Copper	257	1.00E-06	3120	0.51	0.01	250	25	70	25	4.00E-05	-	-
Iron	25959	1.00E-06	3120	0.51	0.01	250	25	70	25	4.04E-03	-	-
Lead	349.0	1.00E-06	3120	0.51	0.0006	250	25	70	25	3.26E-06	70	1.16E-06
Magnesium	10832	1.00E-06	3120	0.51	0.01	250	25	70	25	1.69E-03	-	-
Nickel	42.4	1.00E-06	3120	0.51	0.01	250	25	70	25	6.60E-06	-	-
Zinc	1496.7	1.00E-06	3120	0.51	0.01	250	25	70	25	2.33E-04	-	-
Cyanide	2.784	1.00E-06	3120	0.51	0.01	250	25	70	25	4.34E-07	-	-
Methylene Chloride	0.347	1.00E-06	3120	0.51	0.25	250	25	70	25	1.35E-06	70	4.82E-07
Acetone	0.092	1.00E-06	3120	0.51	0.25	250	25	70	25	3.58E-07	-	-
1,2-DCE (total)	0.080	1.00E-06	3120	0.51	0.25	250	25	70	25	3.11E-07	-	-
Trichloroethene	0.090	1.00E-06	3120	0.51	0.25	250	25	70	25	3.50E-07	70	1.25E-07
Toluene	0.416	1.00E-06	3120	0.51	0.25	250	25	70	25	1.62E-06	-	-
Ethylbenzene	0.067	1.00E-06	3120	0.51	0.25	250	25	70	25	2.61E-07	-	-
Xylenes (total)	0.218	1.00E-06	3120	0.51	0.25	250	25	70	25	8.49E-07	-	-

DCE = dichloroethene
CS = chemical concentration in soil; CF = conversion factor (10^-6 kg/mg);
SA = skin surface area contacted; AF = soil to skin adherence factor;
ABS= absorption factor; EF = exposure frequency
ED = exposure duration; BW = body weight
AT = averaging time;

$$\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT \times 365 \text{ days/yr}} = \text{Intake (mg/kg-day)}$$

TABLE 30

INTAKES FROM INGESTION OF DRINKING WATER

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Chemical	CW (mg/l)	IR (l/dy)	EF (dy/yr)	ED (years)	BW (kg)	AT (yrs)	Intake for Non-carc. Effects	AT (yrs)	Intake for Carcin. Effects
Child Resident									
Aluminum	0.794	1	350	6	15	6	5.08E-02	-	-
Chromium	0.214	1	350	6	15	6	1.37E-02	-	-
Chromium 6+	0.230	1	350	6	15	6	1.47E-02	-	-
Iron	11.800	1	350	6	15	6	7.54E-01	-	-
Lead	0.004	1	350	6	15	6	2.56E-04	70	2.19E-05
Sodium	152.000	1	350	6	15	6	9.72E+00	-	-
Vanadium	0.006	1	350	6	15	6	3.84E-04	-	-
Acetone	0.011	1	350	6	15	6	7.03E-04	-	-
Methylene chloride	0.010	1	350	6	15	6	6.39E-04	70	5.48E-05
Adult Resident									
Aluminum	0.794	2	350	30	70	30	2.18E-02	-	-
Chromium	0.214	2	350	30	70	30	5.86E-03	-	-
Chromium 6+	0.230	2	350	30	70	30	6.30E-03	-	-
Iron	11.800	2	350	30	70	30	3.23E-01	-	-
Lead	0.004	2	350	30	70	30	1.10E-04	70	4.70E-05
Sodium	152.000	2	350	30	70	30	4.16E+00	-	-
Vanadium	0.006	2	350	30	70	30	1.64E-04	-	-
Acetone	0.011	2	350	30	70	30	3.01E-04	-	-
Methylene chloride	0.010	2	350	30	70	30	2.74E-04	70	1.17E-04
On-Site Worker									
Aluminum	0.794	1	250	25	70	25	7.77E-03	-	-
Chromium	0.214	1	250	25	70	25	2.09E-03	-	-
Chromium 6+	0.230	1	250	25	70	25	2.25E-03	-	-
Iron	11.800	1	250	25	70	25	1.15E-01	-	-
Lead	0.004	1	250	25	70	25	3.91E-05	70	1.40E-05
Sodium	152.000	1	250	25	70	25	1.49E+00	-	-
Vanadium	0.006	1	250	25	70	25	5.87E-05	-	-
Acetone	0.011	1	250	25	70	25	1.08E-04	-	-
Methylene chloride	0.010	1	250	25	70	25	9.78E-05	70	3.49E-05
Trichloroethene	0.023	1	250	25	70	25	2.25E-04	70	8.04E-05

CW = chemical concentration in water; IR = ingestion rate; EF = exposure frequency
ED = exposure duration; BW = body weight; AT = averaging time

$$\frac{CW \times IR \times EF \times ED}{BW \times AT \times 365 \text{ days/yr}} = \text{Intake (mg/kg-day)}$$

TABLE 31

INTAKES FROM DERMAL CONTACT WITH GROUND WATER

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Chemical	CW (mg/l)	SA (cm^2)	PC (cm/hr)	ET (hr/dy)	EF (dy/yr)	ED (years)	CF (l/cm3)	BW (kg)	AT (yrs)	Intake for Non-carc. Effects	AT (yrs)	Intake for Carc. Effects
Child Resident												

Aluminum	0.794	7200	0.000007	0.117	350	6	0.001	15	6	3.08E-07	-	-
Chromium 3+	0.214	7200	0.0008	0.117	350	6	0.001	15	6	9.22E-06	-	-
Chromium 6+	0.230	7200	0.0008	0.117	350	6	0.001	15	6	9.91E-06	-	-
Iron	11.800	7200	0.0008	0.117	350	6	0.001	15	6	5.08E-04	-	-
Lead	0.004	7200	0.0008	0.117	350	6	0.001	15	6	1.72E-07	70	1.48E-08
Sodium	152.000	7200	0.0008	0.117	350	6	0.001	15	6	6.55E-03	-	-
Vanadium	0.006	7200	0.0008	0.117	350	6	0.001	15	6	2.58E-07	-	-
Acetone	0.011	7200	0.0008	0.117	350	6	0.001	15	6	4.74E-07	-	-
Methylene chloride	0.010	7200	0.0008	0.117	350	6	0.001	15	6	4.31E-07	70	3.69E-08
Adult Resident												

Aluminum	0.794	18150	0.000007	0.117	350	30	0.001	70	30	1.66E-07	-	-
Chromium 3+	0.214	18150	0.0008	0.117	350	30	0.001	70	30	4.98E-06	-	-
Chromium 6+	0.230	18150	0.0008	0.117	350	30	0.001	70	30	5.35E-06	-	-
Iron	11.800	18150	0.0008	0.117	350	30	0.001	70	30	2.75E-04	-	-
Lead	0.004	18150	0.0008	0.117	350	30	0.001	70	30	9.31E-08	70	3.99E-08
Sodium	152.000	18150	0.0008	0.117	350	30	0.001	70	30	3.54E-03	-	-
Vanadium	0.006	18150	0.0008	0.117	350	30	0.001	70	30	1.40E-07	-	-
Acetone	0.011	18150	0.0008	0.117	350	30	0.001	70	30	2.56E-07	-	-
Methylene chloride	0.010	18150	0.0008	0.117	350	30	0.001	70	30	2.33E-07	70	9.97E-08

CW = chemical concentration in water; SA = skin surface area; PC = permeability constant; ET = exposure time
EF = exposure frequency; ED = exposure duration; CF = volumetric conversion factor; BW = body weight; AT = averaging time

$$\frac{CW \times SA \times PC \times ET \times EF \times ED \times CF}{BW \times AT \times 365 \text{ days/yr}} = \text{Intake (mg/kg-day)}$$

TABLE 32

INTAKES FROM INHALATION OF AIR

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

CHEMICAL	CA (mg/m3)	IR (m3/hr)	ET (hrs/day)	EF (days/yr)	ED (yrs)	BW (kg)	AT (yrs)	Intake for Non-Carc. Effects	AT (yrs)	Intake for Carc. Effects
Current Worker										
Aluminum	2.60E-03	2.5	8	250	25	70	25	5.09E-04	-	-
Future Worker										
Aluminum	6.29E-04	2.5	8	250	25	70	25	1.23E-04	-	-
Calcium	5.23E-04	2.5	8	250	25	70	25	1.02E-04	-	-
Chromium 3+	3.20E-05	2.5	8	250	25	70	25	6.27E-06	-	-
Copper	3.85E-06	2.5	8	250	25	70	25	7.54E-07	-	-
Iron	3.46E-04	2.5	8	250	25	70	25	6.76E-05	-	-
Lead	5.09E-07	2.5	8	250	25	70	25	9.96E-08	70	3.56E-08
Magnesium	1.62E-04	2.5	8	250	25	70	25	3.18E-05	-	-
Nickel	3.71E-07	2.5	8	250	25	70	25	7.26E-08	70	2.59E-08
Zinc	1.49E-06	2.5	8	250	25	70	25	2.91E-07	-	-
Cyanide	3.64E-07	2.5	8	250	25	70	25	7.12E-08	-	-
Off-site Child										
Acetone	2.50E-01	0.6	0.117	350	6	15	6	1.12E-03	-	-
Methylene chloride	2.27E-01	0.6	0.117	350	6	15	6	1.02E-03	70	8.74E-05
Off-site Adult										
Acetone	2.50E-01	0.6	0.117	350	30	70	30	2.40E-04	-	-
Methylene chloride	2.27E-01	0.6	0.117	350	30	70	30	2.18E-04	70	9.36E-05

CA = chemical concentration in air; IR = inhalation rate
ET = exposure time; EF = exposure frequency
ED = exposure duration; BW = body weight
AT = averaging time

$$\frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365 \text{ days/yr}} = \text{Intake (mg/kg-day)}$$

TABLE 33

SUMMARY OF VALUES USED TO ESTIMATE SOIL EXPOSURES

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Variable	Range	Midpoint	Value Used	Rationale
Chemical concentration				
Current Worker	(see Table 14)	(see Table 24)	(see Table 24)	95% UCL (USEPA 1989)
Future Worker	(see Table 14)	(see Table 25)	(see Table 25)	95% UCL (USEPA 1989)
Soil ingestion rate (mg/day)	0 - 170	17	50	USEPA 1991a
Skin surface area (cm^2) contacted	0 - 2.28		0.3120	Mean (arms & hands) (USEPA 1989)
Skin absorption factor				
Lead			0.06%	Moore et al. 1980
Other metals			1%	Ryan 1987
Volatiles			25%	Ryan 1987
Exposure Frequency (days/year)	0 - 260	130	250	USEPA 1991a
Exposure Duration (yrs)	1 - 50	25	25	USEPA 1991a

UCL = upper confidence limit

TABLE 34

SUMMARY OF VALUES USED TO ESTIMATE GROUND WATER EXPOSURES

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Variable	Range	Midpoint	Value Used	Rationale
Chemical concentration	(see Table 15)	(see Table 26)	(see Table 26)	95% upper confidence limit (USEPA 1989)
Water ingestion rates (l/day)				
Child (ages 1-6)			1	Best professional judgement
Adult	1.24 - 1.73	1.4	2	USEPA 1991a
Worker			1	USEPA 1991a
Skin surface area (cm^2) contacted				
Child (ages 1-6)			7200	Mean for males & females (USEPA 1989)
Adult			18150	Mean for males & females (USEPA 1989)
Dermal permeability constant				
Aluminum			7.20E-6	(USEPA 1988)
Other chemicals			8E-4	Constant for water
Dermal exposure time (minutes)		7	7	Average (USEPA 1989)
Exposure Frequency (days/year)				
Child (ages 1-6)	0 - 365	183	350	Best professional judgement
Adult	0 - 365	183	350	USEPA 1991a
Worker	0 - 260	130	250	USEPA 1991a
Exposure Duration (yrs)				
Child (ages 1-6)	1 - 6	3	6	Best professional judgement
Adult	1 - 70	35	30	USEPA 1991a
Worker	1 - 50	25	25	USEPA 1991a

TABLE 36

UNCERTAINTIES IN THE EXPOSURE ASSESSMENT

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

ASSUMPTION	EFFECT ON EXPOSURE: Potential Magnitude for Over-Estimation of Exposure	Potential Magnitude for Under-Estimation of Exposure	Potential Magnitude for Over- or Under-Estimation of Exposure
ENVIRONMENTAL SAMPLING & ANALYSIS			
* Adequate characterizion of environmental media			Low
* Systematic or random errors in the chemical analyses			Low
EXPOSURE PARAMETER ESTIMATION			
* Use of standard assumptions in the risk calculations	Moderate		
* Use of the dermal permeability constant for water in calculating dermal exposures		Moderate	
* Use of GW ingestion exposures to represent GW inhalation exposures			Moderate
* The amount of media intake is assumed to be constant and representative of the exposed population	Moderate		
* Daily lifetime exposure for residents	Moderate		
* Use of the upper range of absorption estimates in calculating dermal exposures	Moderate		
* Chemicals of potential concern in GW are site-related	Moderate		
* Future industrial facilities will distribute impoundment sludge at the site surface	High		
* GW users are exposed to unfiltered ground water quality	High		

GW = ground water

TABLE 37

TOXICITY VALUES FOR POTENTIAL NONCARCINOGENIC
EFFECTS (CHRONIC ORAL EXPOSURES)

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Chemical	Chronic RfD (mg/kg-day)	* Confidence Level	Critical Effect	RfD Basis/ RfD Source	Uncertainty & Modifying Factors	Study Species	ABS/ADM Dose
ORGANICS							

Acetone	1E-01	low	incr. liver/kidney wt.	gavage/IRIS	1000	rat	ADM
1,2-Dichloroethene (cis)	1E-02		blood effects	gavage/HEAST	3000	rat	ADM
1,2-Dichloroethene (trans)	2E-02	low	blood effects	water/IRIS	1000	mouse	ADM
Ethylbenzene	1E-01	low	liver/kidney toxicity	gavage/IRIS	1000	rat	ADM
Methylene Chloride	6E-02	medium	liver toxicity	water/IRIS	100	rat	ADM
Toluene	2E-01	medium	liver/kidney effects	gavage/IRIS	1000	rat	ADM
Trichloroethene	7E-03			air/ECAO		rat	ABS
Xylenes	2E+00	medium	hyperactivity	gavage/IRIS	100	rat	ADM
INORGANICS							

Aluminum	NA						
Calcium	NA						
Chromium 3+	1E+00	low	no effects observed	diet/IRIS	1000	rat	ADM
Chromium 6+	5E-03	low	no effects reported	water/IRIS	500	rat	ADM
Copper	NA						
Iron	NA						
Lead	NA						
Magnesium	NA						
Nickel	2E-02	medium	red. body/organ wt.	diet/IRIS	300	rat	ADM
Sodium	NA						
Vanadium	7E-03		none observed	water/HEAST	100	rat	ADM
Zinc	2E-01		anemia	drug/HEAST	10	human	ADM
Cyanide	2E-02	medium	wt. loss/thyr. effects	diet/IRIS	500	rat	ADM

* - confidence level from IRIS, either high, medium, or low
ABS = absorbed; ADM = administered

TABLE 38

TOXICITY VALUES FOR POTENTIAL NONCARCINOGENIC
EFFECTS (SUBCHRONIC ORAL EXPOSURES)

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Chemical	Subchronic RfD (mg/kg-day)	Confidence Level *	Critical Effect	RfD Basis/ RfD Source	Uncertainty & Modifying Factors	Study Species	ABS/ADM Dose
Inorganics							
Aluminum	NA						
Chromium 3+	1E+01		liver toxicity	diet/HEAST	100	rat	ADM
Chromium 6+	2E-02		not defined	water/HEAST	100	rat	ADM
Iron	NA						
Lead	NA						
Sodium	NA						
Vanadium	7E-03		none observed	water/HEAST	100	rat	ADM
Organics							
Acetone	1E+00		liver/kidney effects	gavage/HEAST	100	rat	ADM
Methylene chloride	6E-02		liver toxicity	water/HEAST	100	rat	ADM

* - confidence level from IRIS, either high, medium, or low
ABS = absorbed; ADM = administered

TABLE 39

TOXICITY VALUES FOR POTENTIAL NONCARCINOGENIC EFFECTS
(CHRONIC & SUBCHRONIC INHALATION EXPOSURES)

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Chemical	Chronic RfC (mg/kg-day)	Critical Effect	RfC Basis/ RfC Source	Uncertainty & Modifying Factors	Study Species	ABS/ADM Dose
Organics (in ground water)						
Acetone	NA					
Methylene Chloride	8.6E-01	NA	air/HEAST	100	rat	ADM
Inorganics (in soil)						
Aluminum	NA					
Calcium	NA					
Chromium III and IV (chronic)	5.7E-07	nasal effects	air/HEAST	300	human	ADM
Copper	NA		NA/HEAST	NA	human	ADM
Iron	NA					
Lead	NA					
Magnesium	NA					
Nickel	NA					
Zinc	NA					
Cyanide	NA					

ABS = absorbed; ADM = administered

TABLE 40

TOXICITY VALUES FOR POTENTIAL CARCINOGENIC EFFECTS

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Chemical	Slope Factor (SF) (mg/kg-day)-1	Weight-of Evidence Classification	Tumor Site *	SF Basis/ SF Source	Based on Absorbed (ABS)/ Admin. (ADM) dose	Study Species
ORAL CARCINOGENS						
Lead	NA	B2				
Methylene chloride	7.5E-03	B2		air & water/IRIS	ABS	mouse
Trichloroethene	1.1E-02	B2		gavage/HEAST	ABS	mouse
INHALATION CARCINOGENS						
Lead	NA	B2				
Methylene chloride	UR	B2		air/IRIS	not applicable	mouse
Nickel (refinery dust)	8.4E-01	A	resp. tract	air/IRIS	not applicable	human

* - tumor site for Class A carcinogens only

NA = not available

UR = unit risk available in IRIS: 4.7 E-7 per ug/m^3

TABLE 41

RfD VALUE ADJUSTMENTS FOR DERMAL EXPOSURES

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Chemical	Oral Toxicity value (RfD) (mg/kg-day)	Based on Absorb. (ABS/ Admin. (Adm)	Study Species	Oral Absorption Efficiency in Study Species	Adjusted Toxicity Value (mg/kg-day)
CHRONIC EXPOSURES					
Acetone	1E-01	ADM	rat	0.05	5E-03
1,2-Dichloroethene (cis)	1E-02	ADM	rat	0.05	5E-04
1,2-Dichloroethene (trans)	2E-02	ADM	mouse	0.05	1E-03
Ethylbenzene	1E-01	ADM	rat	0.84	8E-02
Methylene Chloride	6E-02	ADM	rat	0.50	3E-02
Toluene	2E-01	ADM	rat	0.05	1E-02
Trichloroethene	7E-03	ABS			-
Xylenes	2E+00	ADM	rat	0.90	2E+00
Chromium 3+	1E+00	ADM	rat	0.05	5E-02
Chromium 6+	5E-03	ADM	rat	0.05	3E-04
Nickel	2E-02	ADM	rat	0.05	1E-03
Vanadium	7E-03	ADM	rat	0.05	4E-04
Zinc	2E-01	ADM	human	0.25	5E-02
Cyanide	2E-02	ADM	rat	0.50	1E-02
SUBCHRONIC EXPOSURES					
Acetone	1E+00	ADM	rat	0.05	5E-02
Methylene chloride	6E-02	ADM	rat	0.50	3E-02
Chromium 3+	1E+01	ADM	rat	0.05	5E-01
Chromium 6+	2E-02	ADM	rat	0.05	1E-03
Vanadium	7E-03	ADM	rat	0.05	4E-04

TABLE 42

SLOPE FACTOR VALUE ADJUSTMENTS FOR DERMAL EXPOSURES

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Chemical	Oral Toxicity Value (Slope Factor)	Based on Absorb. (ABS)/ Admin. (ADM) Dose	Study Species	Oral Absorption Efficiency in Study Species	Adjusted Toxicity Value
Methylene chloride	7.5E-03	ABS	-	-	-
Trichloroethene	1.1E-02	ABS	-	-	-

Notes: Only oral slope factors based on administered doses need be adjusted
Absorption efficiencies were obtained from ATSDR Toxicological Profiles
Slope factors expressed in (mg/kg-day)^-1

$$\text{Adjusted Slope Factor} = \frac{\text{Oral Slope Factor}}{\text{Absorption Efficiency}}$$

TABLE 44

CANCER RISK ESTIMATE FOR AN OFF-SITE CHILD AGES 1-6 (FUTURE)

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Exposure Pathway	CDI (mg/kg-dy)	SF (mg/kg-dy)-1	Wt. of Evidence	Chemical-Specific Risk	Total Pathway Risk	Total Exposure Risk
GROUND WATER INGESTION						
Methylene chloride	4.11E-05 *	7.5E-03	B2	3E-07		
					3E-07	
GROUND WATER DERMAL						
Methylene chloride	3.69E-08	7.5E-03	B2	3E-10		
					3E-10	
GROUND WATER INHALATION						
Methylene chloride	8.74E-05	UR	B2	5E-07		
					5E-07	
						8E-07

CDI = chronic daily intake; SF = slope factor

* = adjusted for absorption

UR = unit risk available in IRIS: 4.7E-7 per ug/m^3; risk level is E-4 at a concentration of 200 ug/m^3 for a chronic (24-hour) exposure. The risk level was adjusted to reflect a 7-minute exposure rather than a 24-hour exposure.

TABLE 45

CANCER RISK ESTIMATE FOR AN OFF-SITE ADULT (FUTURE)

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Exposure Pathway	CDI (mg/kg-dy)	SF (mg/kg-dy)-1	Wt. of Evidence	Chemical-Specific Risk	Total Pathway Risk	Total Exposure Risk
GROUND WATER INGESTION						
Methylene chloride	8.78E-05 *	7.5E-03	B2	7E-07		
					7E-07	
GROUND WATER DERMAL						
Methylene chloride	9.97E-08	7.5E-03	B2	7E-10		
					7E-10	
GROUND WATER INHALATION						
Methylene chloride	9.36E-05	UR	B2	5E-07		
					5E-07	
						1E-06

CDI = chronic daily intake; SF = slope factor

* = adjusted for absorption

UR = unit risk available in IRIS: 4.7E-7 per ug/m^3; risk level is E-4 at a concentration of 200 ug/m^3 for a chronic (24-hour) exposure. The risk was adjusted to reflect a 7-minute exposure rather than a 24-hour exposure.

TABLE 47

CANCER RISK ESTIMATE FOR AN ON-SITE WORKER (FUTURE)

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM CORPORATION
PITTSFORD, NEW YORK

Exposure Pathway	CDI (mg/kg-dy)	SF (mg/kg-dy)-1	Wt. of Evidence	Chemical-Specific Risk	Total Pathway Risk	Total Exposure Risk
GROUND WATER INGESTION						
Methylene chloride	2.62E-05 *	7.5E-03	B2	2E-07		
Trichloroethene	8.04E-05 *	1.1E-02	B2	9E-07		
					1E-06	
SOIL INGESTION						
Methylene chloride	4.55E-08 *	7.5E-03	B2	3E-10		
Trichloroethene	1.18E-08 *	1.1E-02	B2	1E-10		
					5E-10	
SOIL DERMAL						
Methylene chloride	4.82E-07	7.5E-03	B2	4E-09		
Trichloroethene	1.25E-07	1.1E-02	B2	1E-09		
					5E-09	
AIR INHALATION						
Nickel	2.59E-08	8.4E-01	A	2E-08		
					2E-08	
						1E-06

CDI = chronic daily intake; SF = slope factor

* = adjusted for absorption

TABLE 48

SUBCHRONIC HAZARD INDEX ESTIMATE FOR AN OFF-SITE CHILD (AGES 1-6)

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Exposure Pathway	SDI	RfD	Hazard Quotient	Pathway Hazard Index	Total Exposure Hazard Index
GROUND WATER - INGESTION					
Chromium 3+	1.37E-02	1E+01	1.37E-03		
Chromium 6+	1.47E-02	2E-02	7.35E-01		
Vanadium	3.84E-04	7E-03	5.49E-02		
Methylene Chloride	6.39E-04	6E-02	1.07E-02		
Acetone	7.03E-04	1E+00	7.03E-04		
				0.8	
GROUND WATER - DERMAL					
Chromium 3+	9.22E-06	5E-01 *	1.84E-05		
Chromium 6+	9.91E-06	1E-03 *	9.91E-03		
Vanadium	2.58E-07	4E-04 *	6.45E-04		
Methylene Chloride	4.31E-07	3E-02 *	1.44E-05		
Acetone	4.74E-07	5E-02 *	9.48E-06		
				0.01	
GROUND WATER - INHALATION					
Methylene Chloride	6.25E-04	9E-01	7.27E-04		
				7E-04	
					0.8

* = adjusted for absorption
SDI = subchronic daily intake; RfD = reference dose

TABLE 49

CHRONIC HAZARD INDEX ESTIMATE FOR AN OFF-SITE ADULT

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Exposure Pathway	CDI	RfD	Hazard Quotient	Pathway Hazard Index	Total Exposure Hazard Index
GROUND WATER - INGESTION					
Chromium 3+	5.86E-03	1E+00	5.86E-03		
Chromium 6+	6.30E-03	5E-03	1.26E+00		
Vanadium	1.64E-04	7E-03	2.34E-02		
Acetone	3.01E-04	1E-01	3.01E-03		
Methylene chloride	2.74E-04	6E-02	4.57E-03		
				1.3	
GROUND WATER - DERMAL					
Chromium 3+	4.98E-06	5E-02 *	9.96E-05		
Chromium 6+	5.35E-06	3E-04 *	1.78E-02		
Vanadium	1.40E-07	4E-04 *	3.50E-04		
Acetone	2.56E-07	5E-03 *	5.12E-05		
Methylene chloride	2.33E-07	3E-02 *	7.77E-06		
				2E-02	
GROUND WATER - INHALATION					
Methylene chloride	2.18E-04	9E-01	2.53E-04		
				3E-04	
					1.3

* = adjusted for absorption
CDI = chronic daily intake; RfD = reference dose

TABLE 50

CHRONIC HAZARD INDEX ESTIMATE FOR AN ON-SITE WORKER (CURRENT)

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Exposure Pathway	CDI	RfD	Hazard Quotient	Pathway Hazard Index	Total Exposure Hazard Index
SOIL - INGESTION					
Chromium 3+	7.95E-04	1E+00	7.95E-04		
Nickel	2.50E-05	2E-02	1.25E-03		
Zinc	1.02E-03	2E-01	5.10E-03		
				7.1E-03	
SOIL - DERMAL					
Chromium 3+	2.53E-04	5E-02 *	5.06E-03		
Nickel	7.94E-06	1E-03 *	7.94E-03		
Zinc	3.24E-04	5E-02 *	6.48E-03		
				1.9E-02	
					0.027

* = adjusted for absorption
CDI = chronic daily intake
RfD = reference dose

TABLE 51

CHRONIC HAZARD INDEX ESTIMATE FOR AN ON-SITE WORKER (FUTURE)

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

Exposure Pathway	CDI	RfD	Hazard Quotient	Pathway Hazard Index	Total Exposure Hazard Index
SOIL - INGESTION					
Chromium 3+	7.95E-04	1E+00	8.0E-04		
Nickel	2.50E-05	2E-02	1.3E-03		
Zinc	1.02E-03	2E-01	5.1E-03		
Cyanide	1.36E-06	2E-02	6.8E-05		
Acetone	4.50E-08	1E-01	4.5E-07		
1,2-Dichloroethene (total)	3.91E-08	1E-02 a	3.9E-06		
Ethylbenzene	3.28E-08	1E-01	3.3E-07		
Methylene Chloride	1.70E-07	6E-02	2.8E-06		
Toluene	2.04E-07	2E-01	1.0E-06		
Trichloroethene	3.30E-08 *	7E-03	4.7E-06		
Xylenes (total)	1.07E-07	2E+00	5.4E-08		
				0.007	
SOIL - DERMAL					
Chromium 3+	1.17E-03	5E-02 *	2.3E-02		
Nickel	2.07E-05	1E-03 *	2.1E-02		
Zinc	7.32E-04	5E-02 *	1.5E-02		
Cyanide	4.34E-07	1E-02 *	4.3E-05		
Acetone	3.58E-07	5E-03 *	7.2E-05		
1,2-Dichloroethene (total)	3.11E-07	5E-04 *a	6.2E-04		
Ethylbenzene	2.61E-07	8E-02 *	3.3E-06		
Methylene Chloride	1.35E-06	3E-02 *	4.5E-05		
Toluene	1.62E-06	1E-02 *	1.6E-04		
Trichloroethene	3.50E-07	7E-03	5.0E-05		
Xylenes (total)	8.49E-07	2E+00 *	4.2E-07		
				0.06	
GROUND WATER - INGESTION					
Chromium 3+	2.09E-03	1E+00	2.1E-03		
Chromium 6+	2.25E-03	5E-03	4.5E-01		
Vanadium	5.87E-05	7E-03	8.4E-03		
Acetone	1.08E-04	1E-01	1.1E-03		
Methylene chloride	9.78E-05	6E-02	1.6E-03		
Trichloroethene	2.25E-04	7E-03	3.2E-02	0.46	
AIR - INHALATION					
Chromium 3+	6.27E-06	6E-07	1.1E+01		
				11.0	
					11.5

CDI = chronic daily intake; RfD = reference dose; * = adjusted for absorption
a = based on RfD for cis-1,2-DCE, the more toxic of the cis- and trans- isomers

Table 52

Rare, Threatened, or Endangered Plant Species and Communities in the Vicinity of the Site

Alcan Aluminum Corporation
Alcan Aluminum Site # 828005
Pittsford, New York

Common Name	Scientific Name	NYS Legal Status
Tick-trefoil	*Desmodium ciliare*	Threatened
Tall tick-clover	*Desmodium glabellum*	Threatened
Green gentian	*Frasera caroliniensis*	Rare
Sweet-scented indian-plantain	*Cacalia suaveolens*	Rare
Clearweed	*Pilea fontana*	Unprotected
Oak openings - Community		Unprotected

FIGURE 1

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE # 828005
PITTSFORD, NEW YORK

SITE LOCATION MAP

0 2000 4000

SCALE IN FEET

CONTOUR INTERVAL = 5 FEET

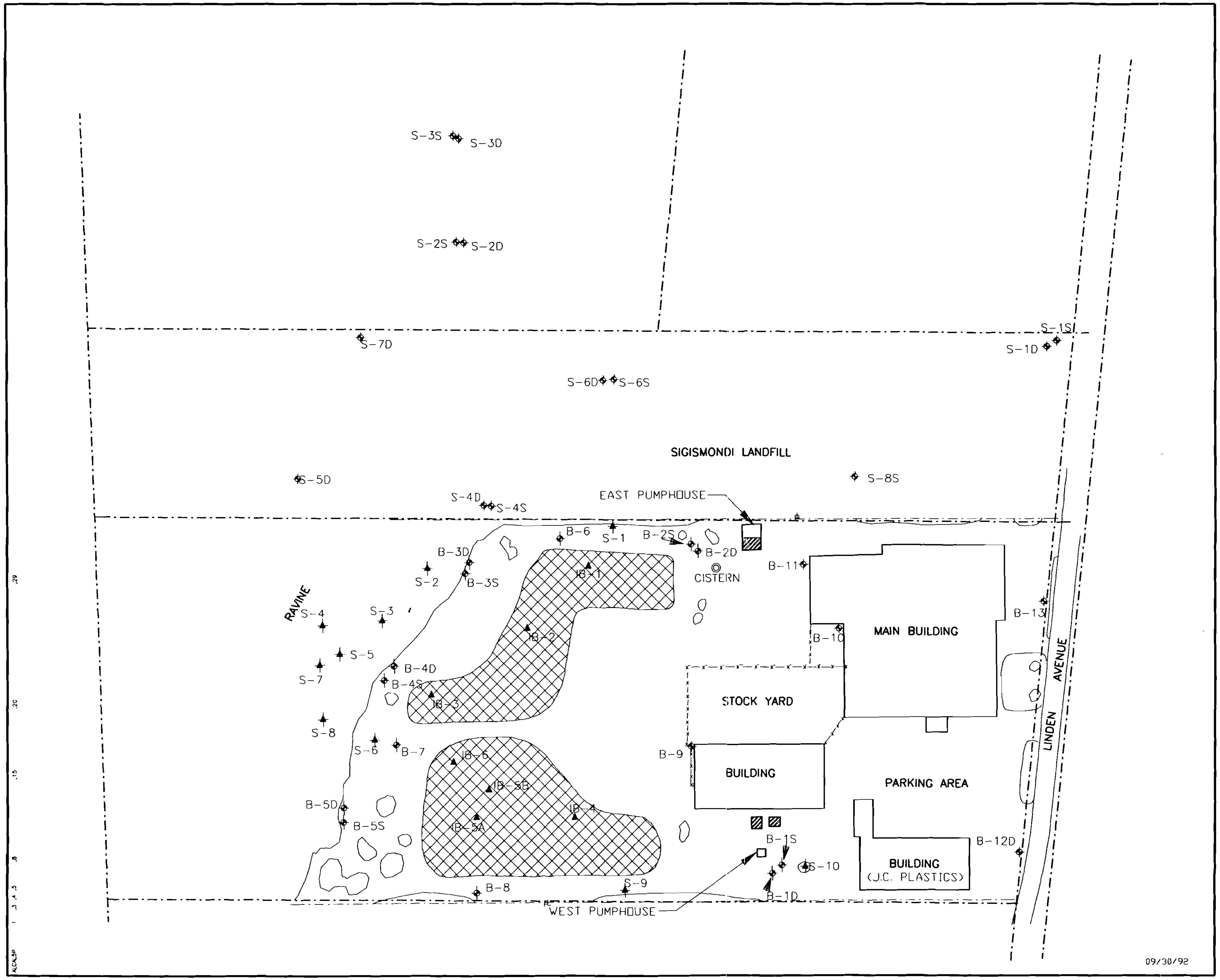
ADAPTED FROM ROCHESTER EAST N.Y., WEBSTER N.Y., FAIRPORT N.Y.
AND PITTSFORD N.Y. 7.5 MIN. QUAD. MAPS

8/1/92 3057.032.130 8.5X11

O'BRIEN & GERE ENGINEERS, INC.

FIGURE 2

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK



LEGEND

- PROPERTY BOUDARY
- MONITORING WELL LOCATION
- IMPOUNDMENT BORING LOCATION
- SURFACE SOIL SAMPLE LOCATION
- FORMER WATER IMPOUNDMENTS AS LOCATED BY AERIAL PHOTOS AND SOIL BORINGS
- CEMENT FOUNDATION
- CISTERN

LOCATION OF SHALLOW AND DEEP GROUND WATER MONITOR WELLS, SURFACE SOIL SAMPLES AND IMPOUNDMENT BORINGS

150 0 150

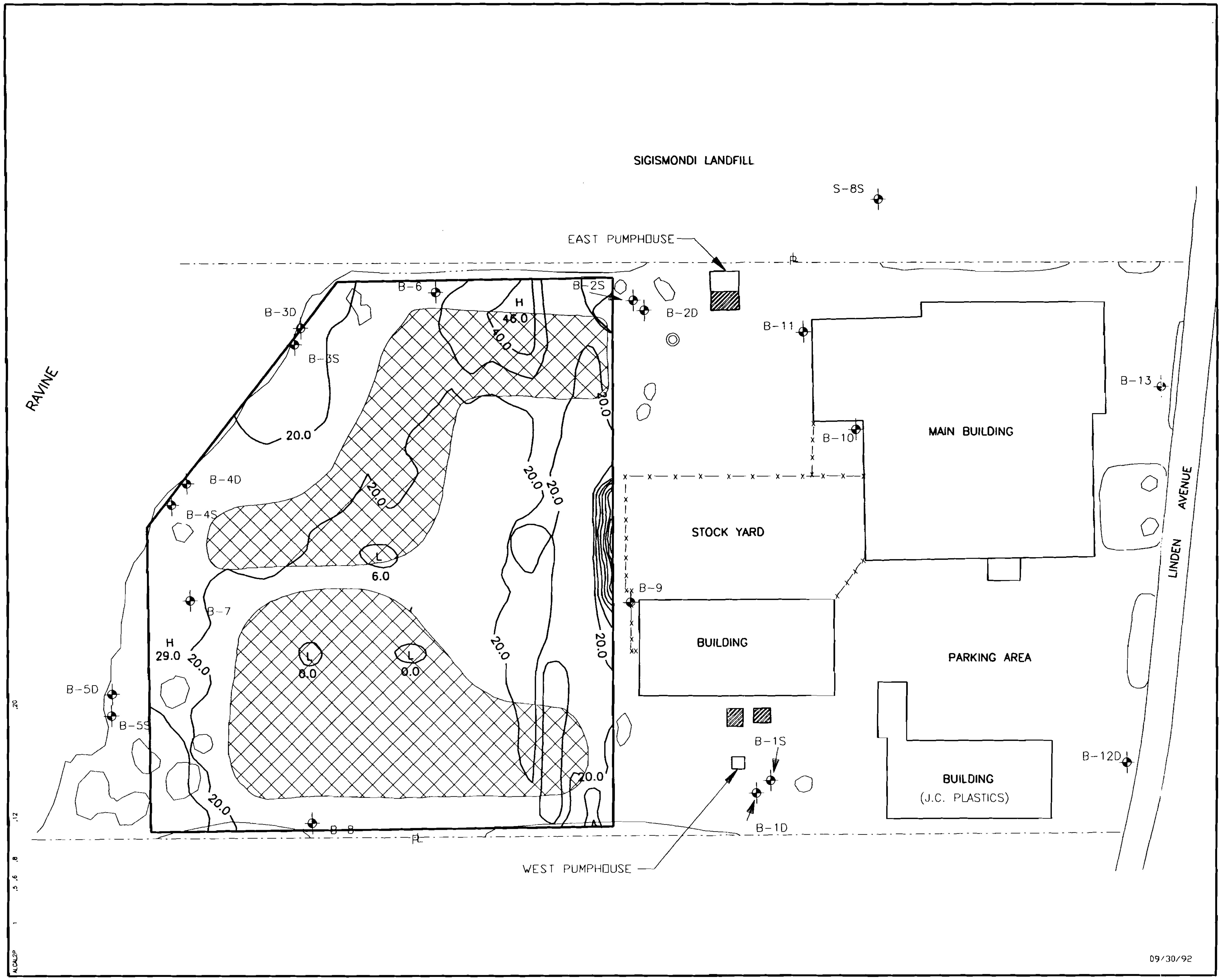
SCALE IN FEET

3057.032.131

O'BRIEN & GERE ENGINEERS, INC.

FIGURE 3

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK



LEGEND

- PROPERTY BOUNDARY
- MONITORING WELL LOCATION
- LIMITS OF GEOPHYSICAL SURVEY
- FORMER WATER IMPOUNDMENTS AS LOCATED BY AERIAL PHOTOS AND SOIL BORINGS
- 20.0 CONDUCTIVITY CONTOURS IN MILLIMHOS PER METER
- CEMENT FOUNDATIONS
- CISTERN
- CISTERN

EM-31
ELECTROMAGNETIC SURVEY
(COMPLETED DURING 1986 STUDY)

100 0 100
SCALE IN FEET

3057.032.131

O'BRIEN & GERE ENGINEERS, INC.

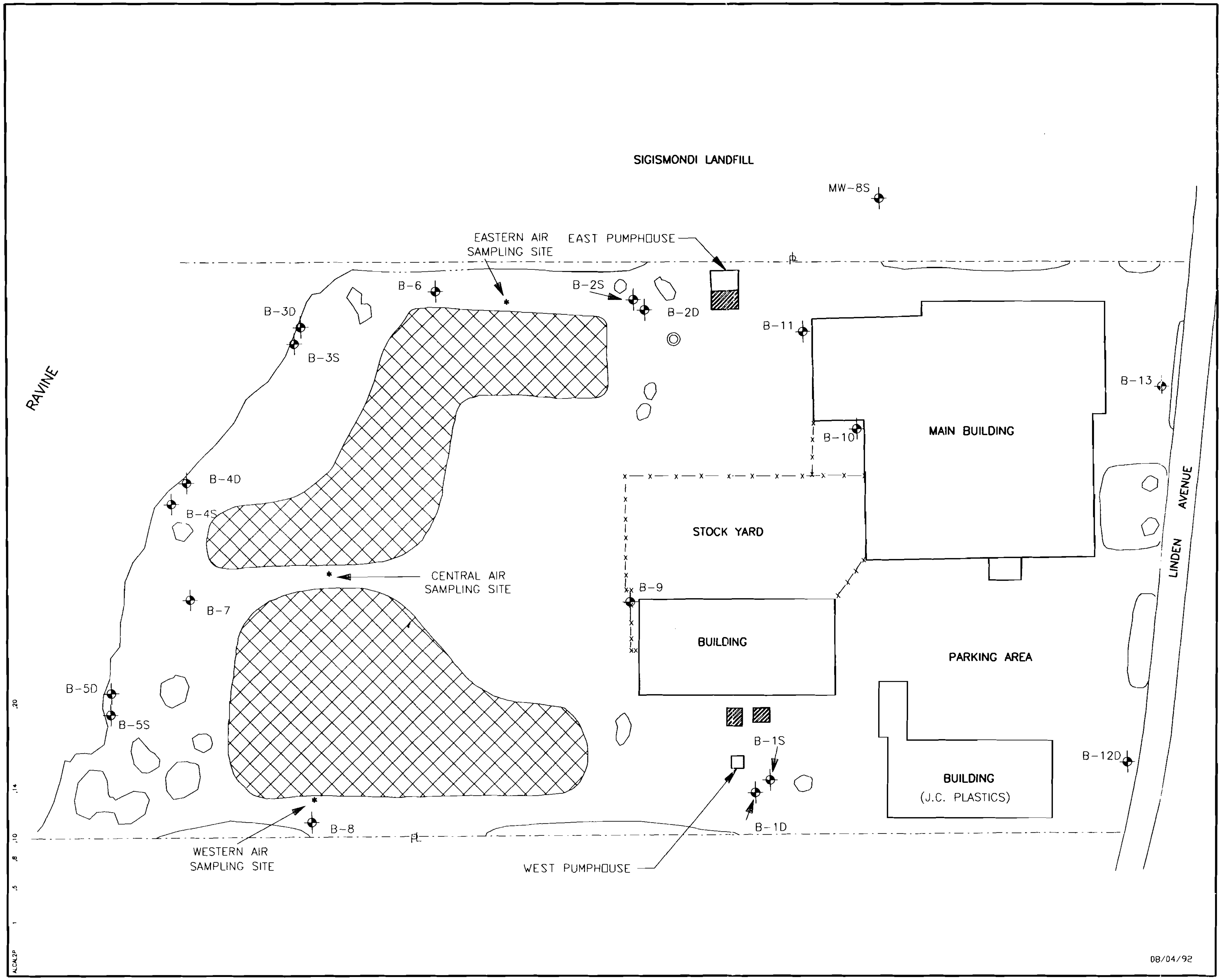


FIGURE 4

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

LEGEND

PROPERTY BOUNDARY
MONITORING WELL LOCATION
AIR MONITORING LOCATION
FORMER WATER IMPOUNDMENTS AS LOCATED BY AERIAL PHOTOS AND SOIL BORINGS
CEMENT FOUNDATION
CISTERN

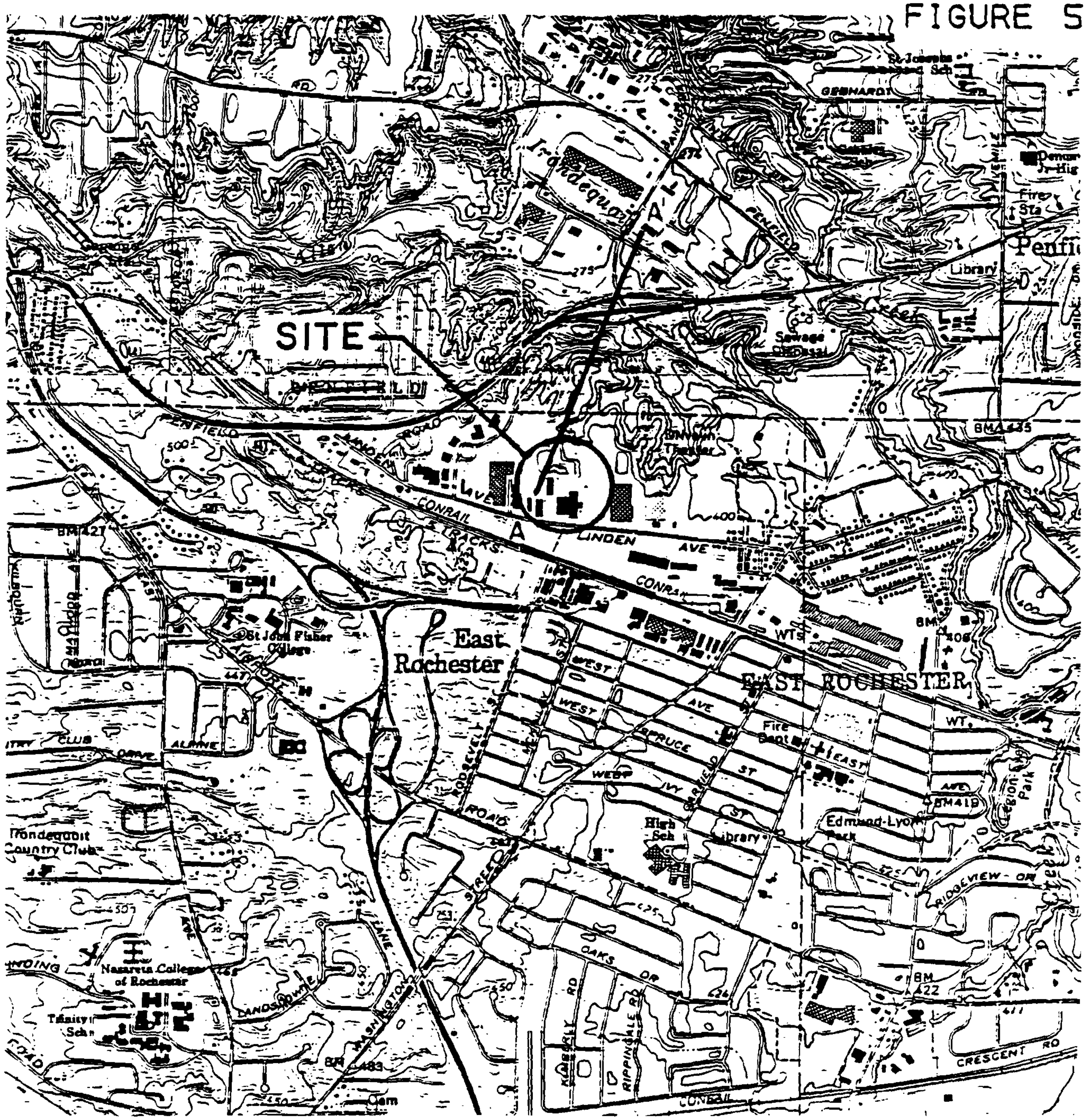
AIR MONITORING LOCATIONS

100 0 100
SCALE IN FEET

3057.032.131

O'BRIEN & GERE ENGINEERS, INC.

FIGURE 5



ALCAN ALUMINUM CORPORATION

ALCAN ALUMINUM SITE # 828005

PITTSFORD, NEW YORK

GEOLOGIC CROSS SECTION LOCATION MAP

0 2000 4000

SCALE IN FEET

CONTOUR INTERVAL = 5 FEET

ADAPTED FROM ROCHESTER EAST N.Y., WEBSTER N.Y., FAIRPORT N.Y. AND PITTSFORD N.Y. 7.5 MIN. QUAD. MAPS

8.5X11 3057.032.130 8/1/92

O'BRIEN ENGINE

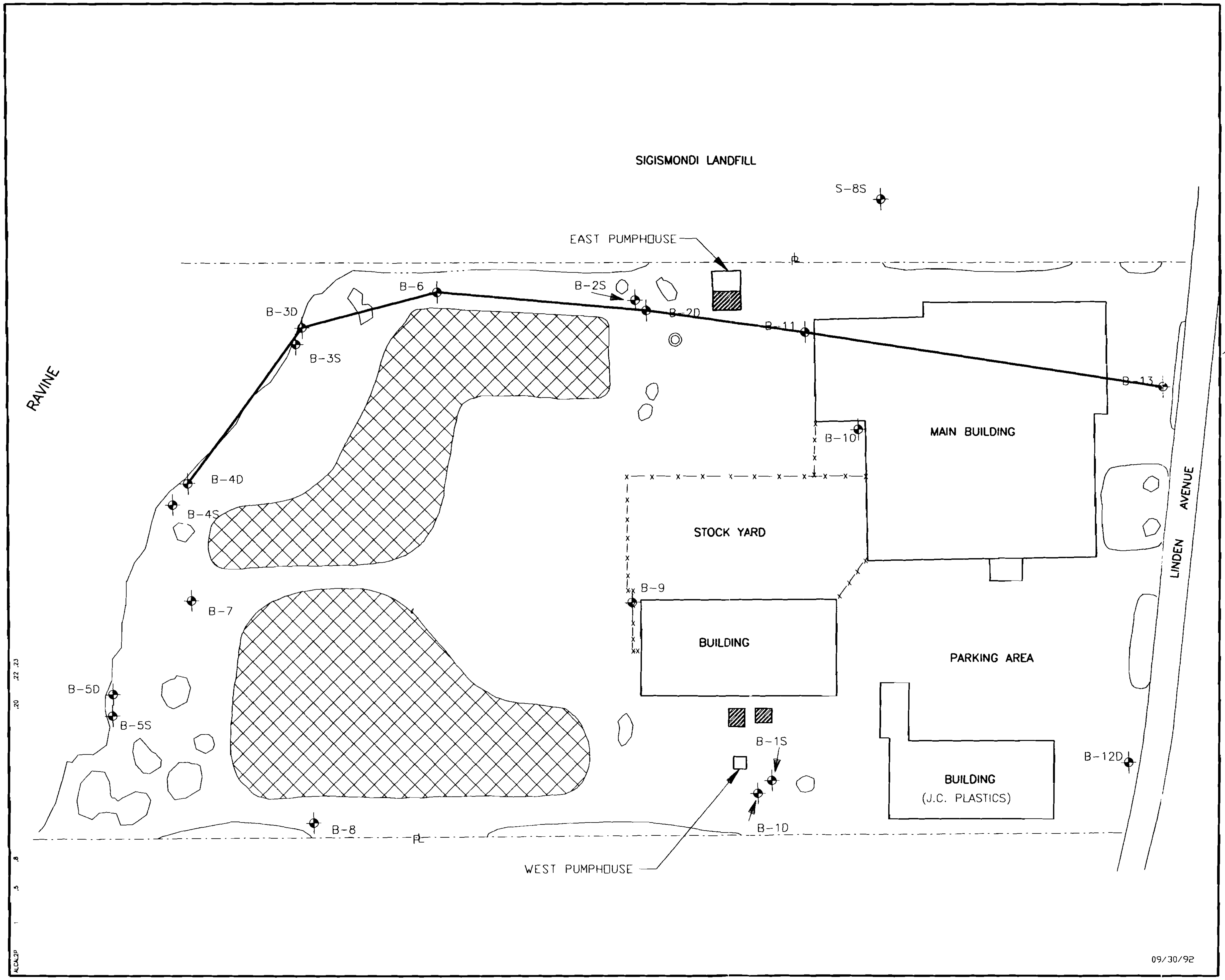


FIGURE 7

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

LEGEND

PROPERTY BOUNDARY

FORMER WATER IMPOUNDMENTS AS LOCATED BY AERIAL PHOTOS AND SOIL BORINGS

MONITORING WELL LOCATION

CROSS SECTION LOCATION

CEMENT FOUNDATION

CISTERN

CROSS SECTION LOCATION MAP

100 0 100

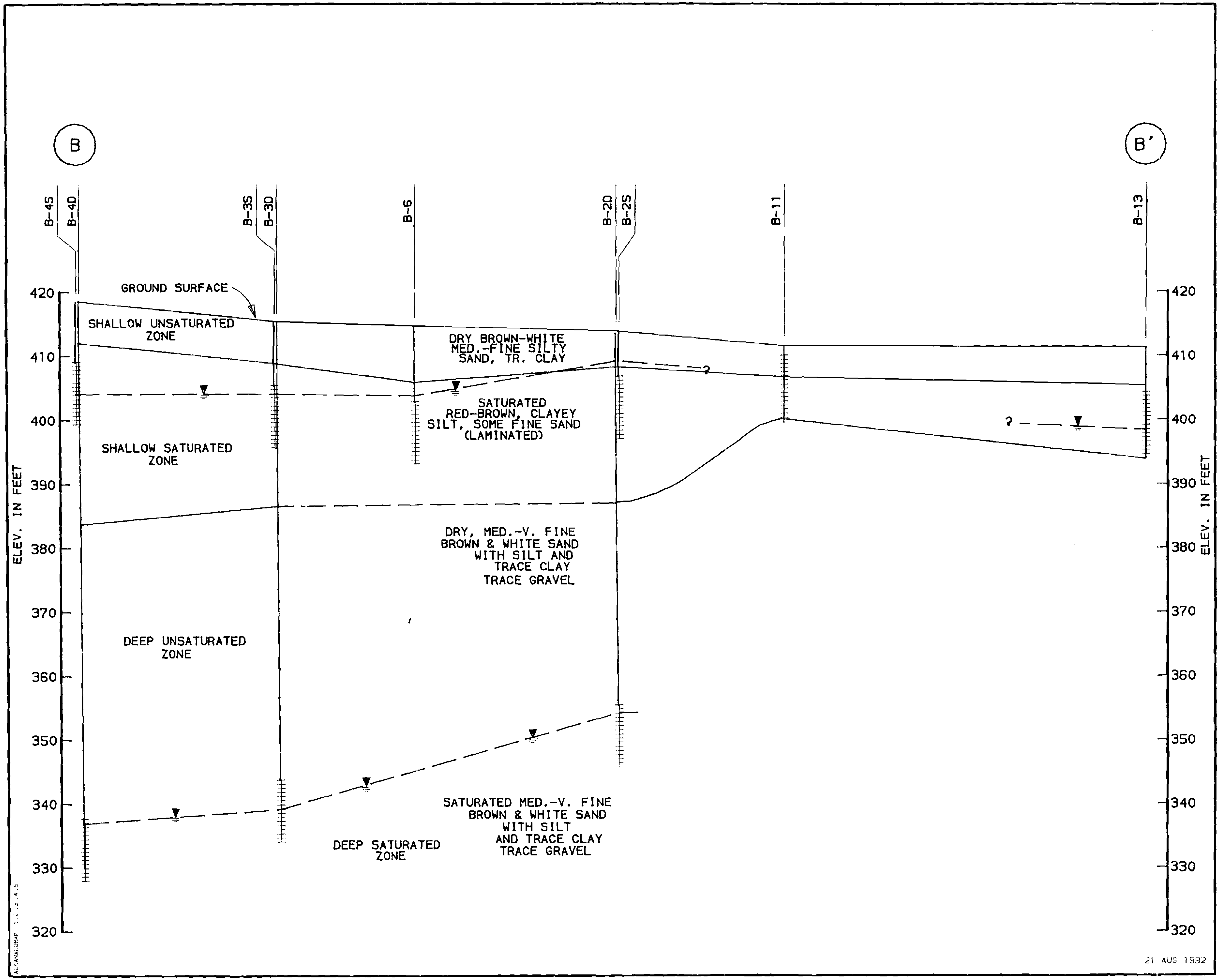
SCALE IN FEET

3057.032.131

O'BRIEN & GERE ENGINEERS, INC.

FIGURE 8

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK



LEGEND

WELL SCREEN INTERVAL

GROUND WATER ELEVATION (6/3/92)

B-4S SHALLOW MONITORING WELL

B-4D DEEP MONITORING WELL

MEASUREMENT IN FEET (USGS DATUM)

CROSS SECTION B - B'

15 0 15

VERT. SCALE IN FEET

100 0 100

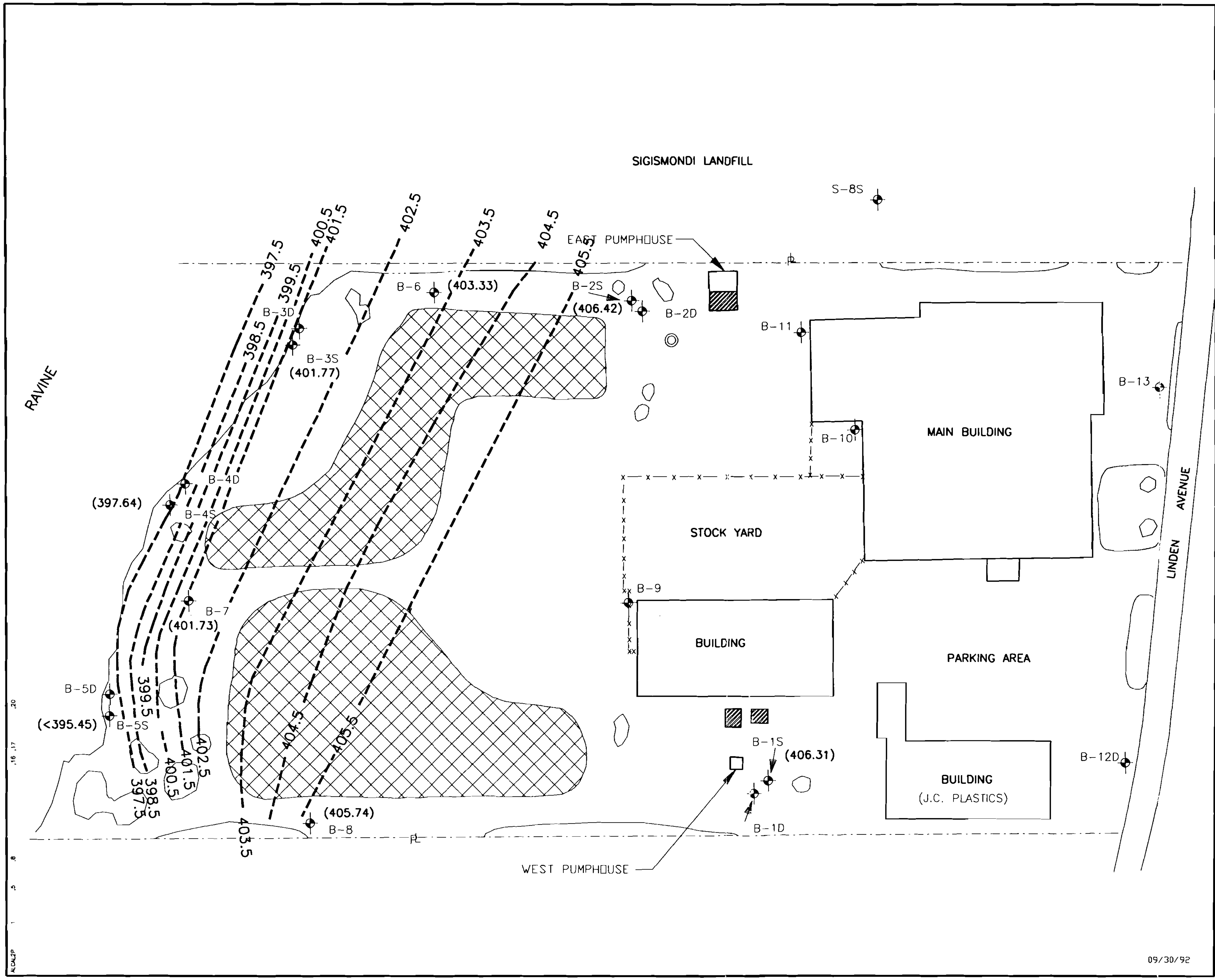
HORIZ. SCALE IN FEET

3357.032.131

O'BRIEN & GERE ENGINEERS, INC.

FIGURE 9

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK



LEGEND

- PROPERTY BOUNDARY
- MONITORING WELL LOCATION
- (406.31) GROUND WATER ELEVATION
- 397.5 GROUND WATER ELEVATION CONTOUR
- FORMER WATER IMPOUNDMENTS AS LOCATED BY AERIAL PHOTOS AND SOIL BORINGS
- CEMENT FOUNDATION
- CISTERN

NOTE: CONTOUR LINES BASED ON EQUAL DISTRIBUTION OF GROUND WATER ELEVATIONS BETWEEN WATER LEVELS DETERMINED IN WELLS. WATER LEVELS IN SHALLOW WELLS REPRESENT AVERAGE HEIGHT OF HEAD WITHIN THE AREA OF WELL SCREEN. WATER LEVELS IN SHALLOW WELLS DO NOT NECESSARILY REPRESENT ELEVATION OF GROUND WATER TABLE.

SHALLOW GROUND WATER ELEVATIONS ON 11/30/90

100 0 100
SCALE IN FEET

3057.032.131

O'BRIEN & GERE ENGINEERS, INC.

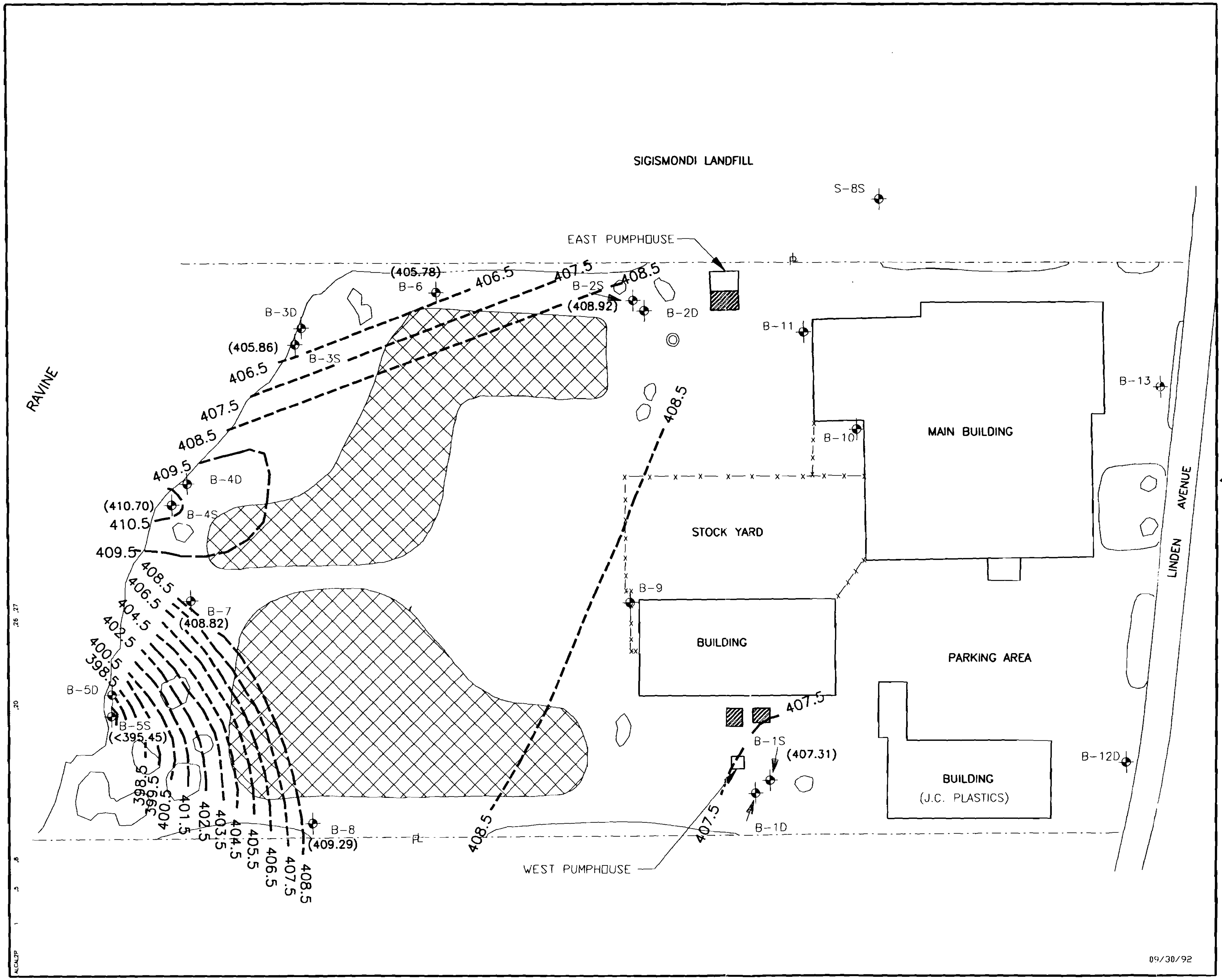


FIGURE 10

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

LEGEND

PROPERTY BOUNDARY

MONITORING WELL LOCATION

(409.29) GROUND WATER ELEVATION

409.5 GROUND WATER ELEVATION CONTOUR

FORMER WATER IMPOUNDMENTS AS LOCATED BY AERIAL PHOTOS & SOIL BORINGS

CEMENT FOUNDATION

CISTERN

NOTE: CONTOUR LINES BASED ON EQUAL DISTRIBUTION OF GROUND WATER ELEVATIONS BETWEEN WATER LEVELS DETERMINED IN WELLS. WATER LEVELS IN SHALLOW WELLS REPRESENT AVERAGE HEIGHT OF HEAD WITHIN THE AREA OF WELL SCREEN. WATER LEVELS IN SHALLOW WELLS DO NOT NECESSARILY REPRESENT ELEVATION OF GROUND WATER TABLE.

SHALLOW GROUND WATER ELEVATIONS ON 2/28/91

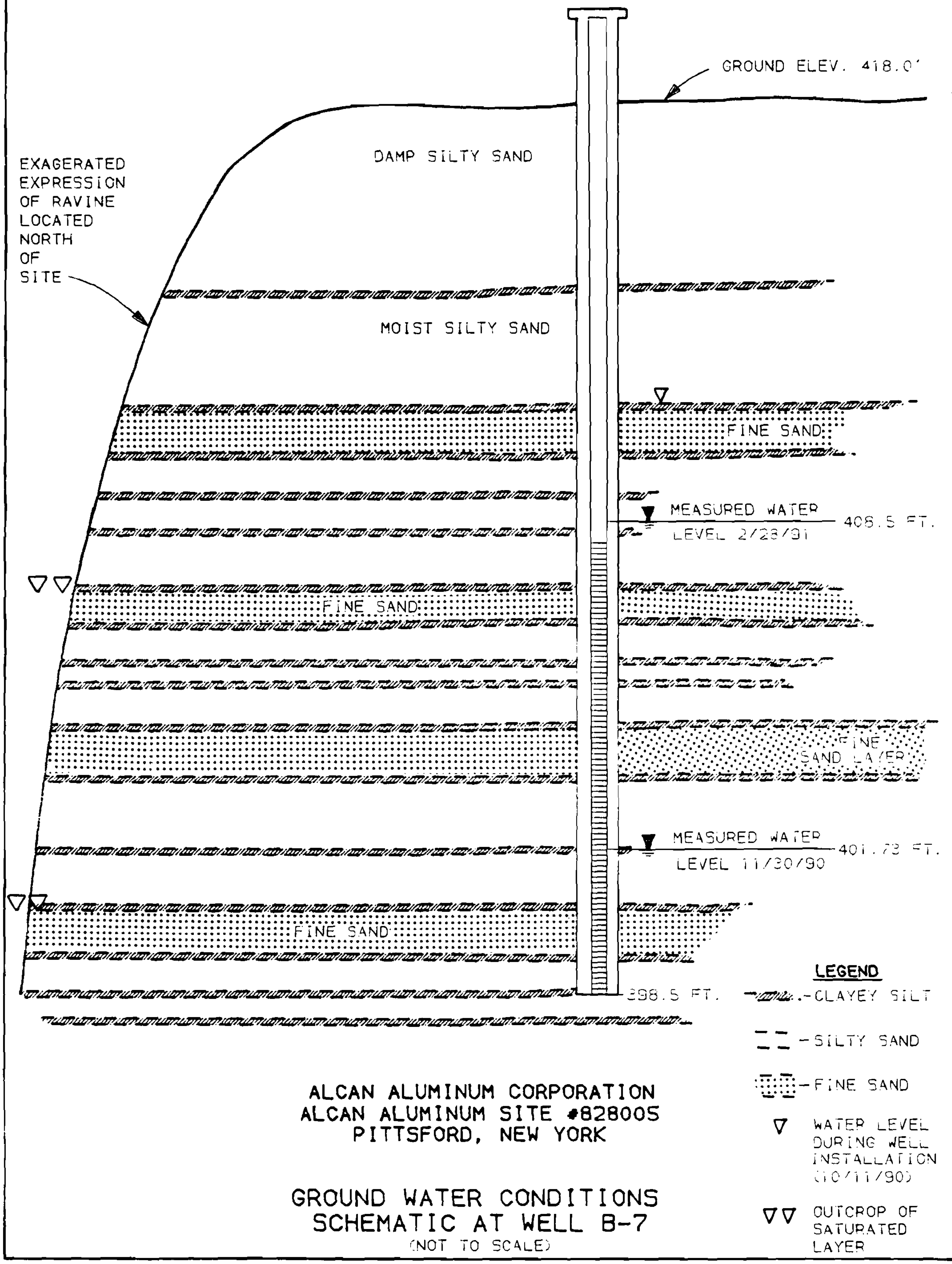
100 0 100

SCALE IN FEET

3057.032.131

O'BRIEN & GERE ENGINEERS, INC.

FIGURE 11



ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

GROUND WATER CONDITIONS
SCHEMATIC AT WELL B-7
(NOT TO SCALE)

5/2/91

O'BRIEN & GERE ENGINEERS, INC.

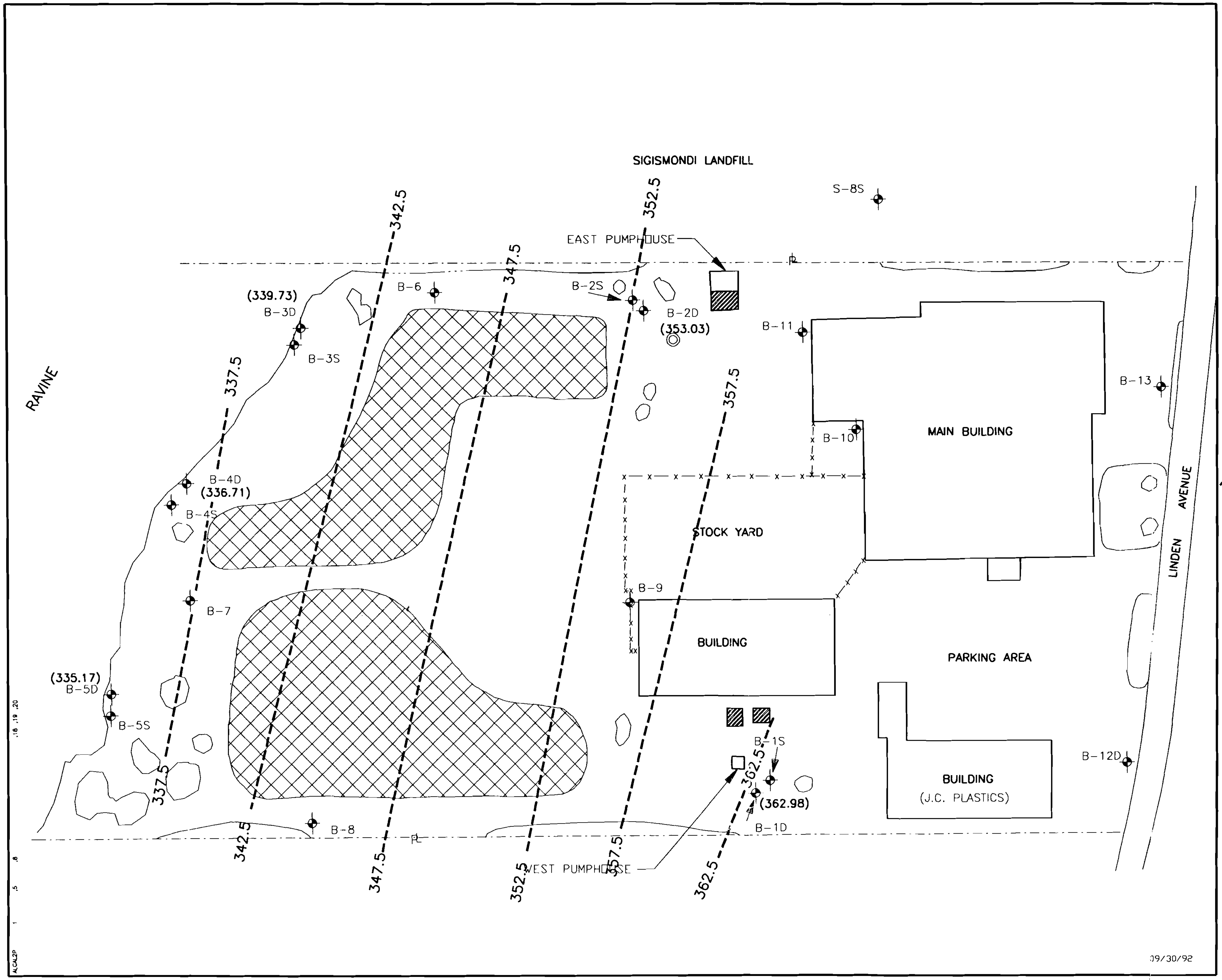


FIGURE 12

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

LEGEND

- PROPERTY BOUNDARY
- MONITORING WELL LOCATION
- (362.98) GROUND WATER ELEVATION
- 347.5 GROUND WATER ELEVATION CONTOUR
- FORMER WATER IMPOUNDMENTS AS LOCATED BY AERIAL PHOTOS & SOIL BORINGS
- CEMENT FOUNDATIONS
- CISTERN

DEEP GROUND WATER ELEVATIONS ON 11/30/90

100 0 100

SCALE IN FEET

3057.032.131

O'BRIEN & GERE ENGINEERS, INC.

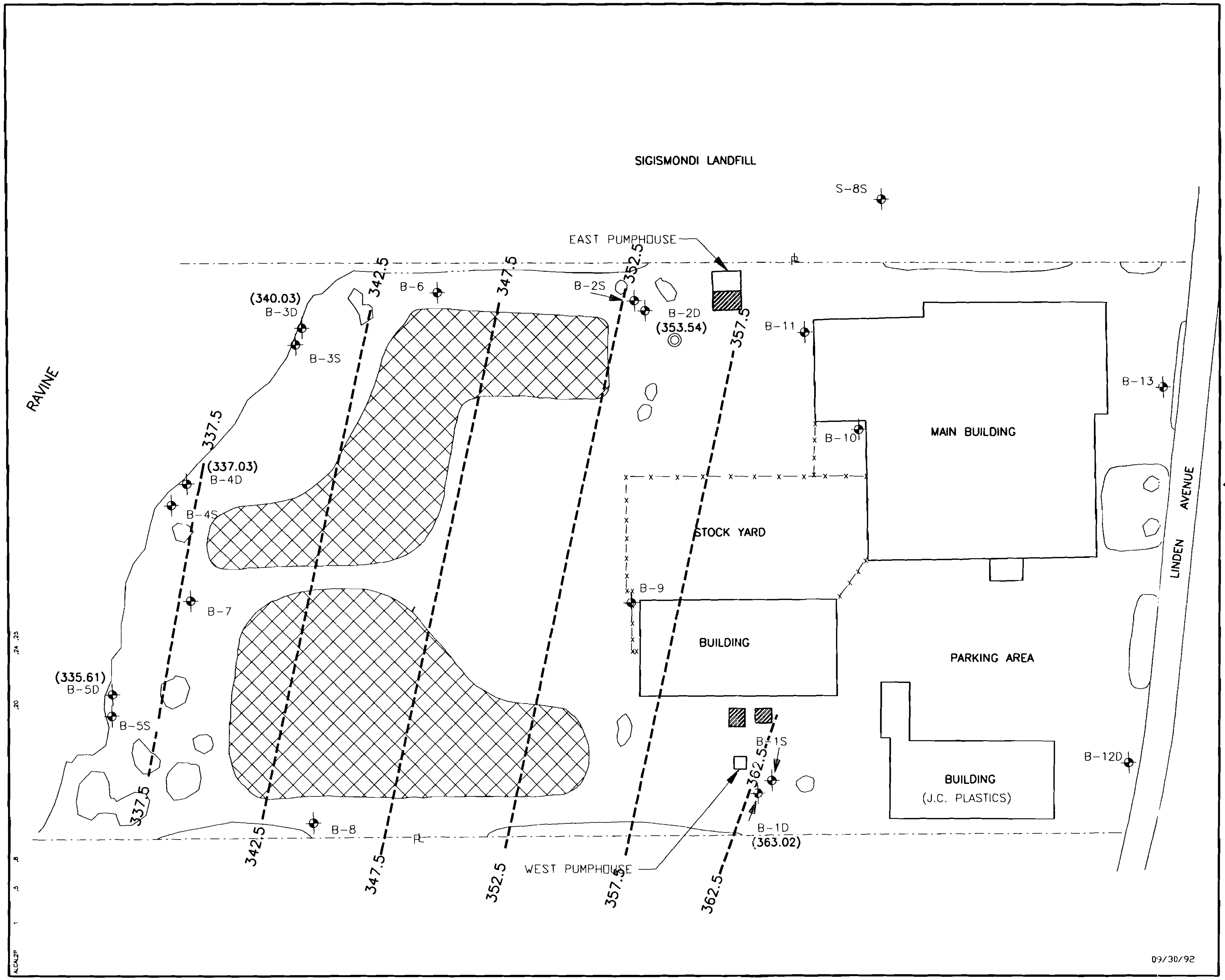


FIGURE 13

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

LEGEND

- PROPERTY BOUNDARY
- MONITORING WELL LOCATION
- (363.02) GROUND WATER ELEVATION
- 337.5 GROUND WATER ELEVATION CONTOUR
- FORMER WATER IMPOUNDMENTS AS LOCATED BY AERIAL PHOTOS & SOIL BORINGS
- CEMENT FOUNDATION
- CISTERN

DEEP GROUND WATER ELEVATIONS ON 2/28/91

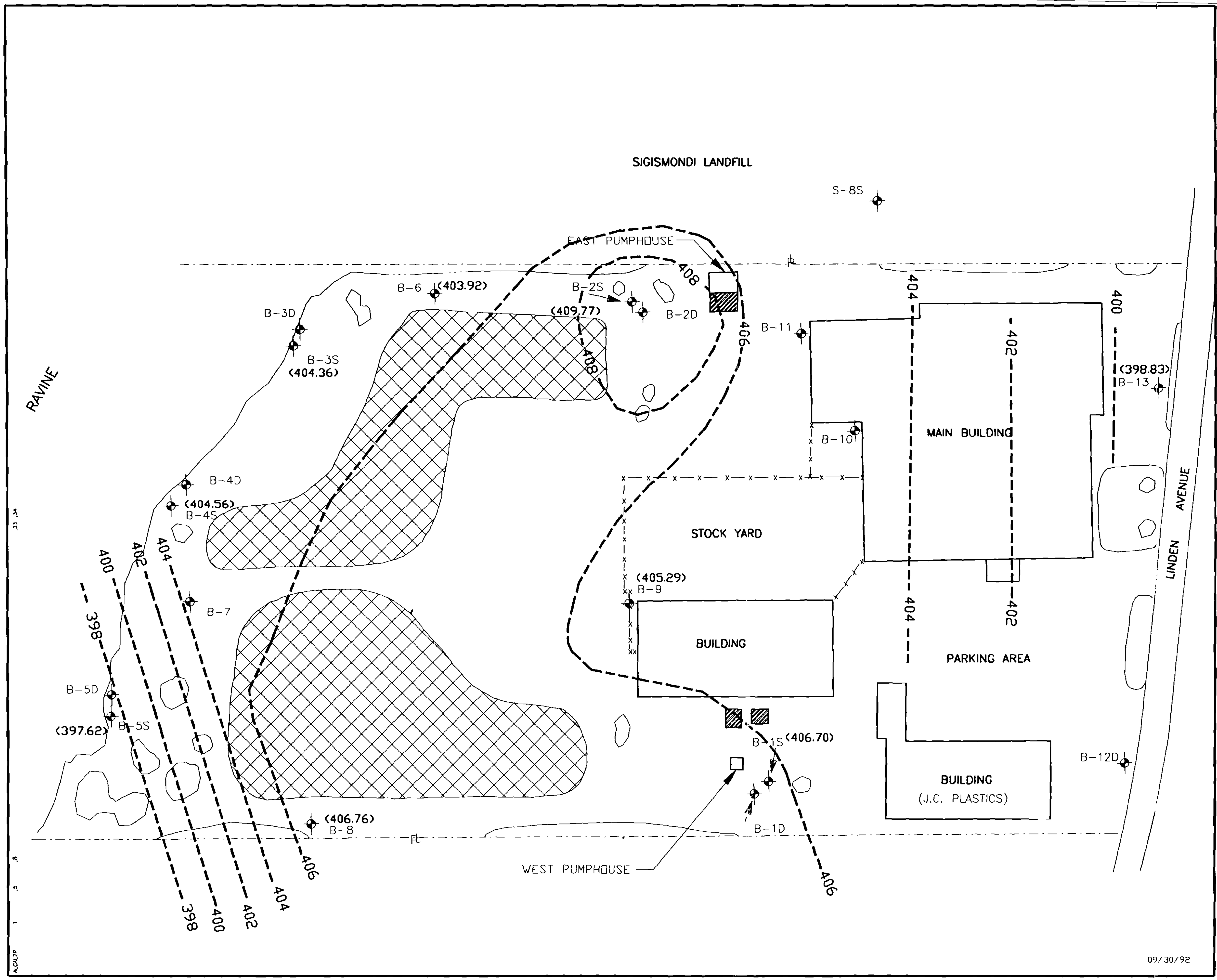
100 0 100
SCALE IN FEET

3057.032.131

O'BRIEN & GERE ENGINEERS, INC.

FIGURE 14

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK



LEGEND

PROPERTY BOUNDARY

MONITORING WELL LOCATION

(409.77) GROUND WATER ELEVATION

400 GROUND WATER ELEVATION CONTOUR

FORMER WATER IMPOUNDMENTS AS LOCATED BY AERIAL PHOTOS & SOIL BORINGS

CEMENT FOUNDATION

CISTERN

SHALLOW GROUND WATER ELEVATIONS 6/3/92

100 0 100

SCALE IN FEET

3057.032.131

O'BRIEN & GERE ENGINEERS, INC.

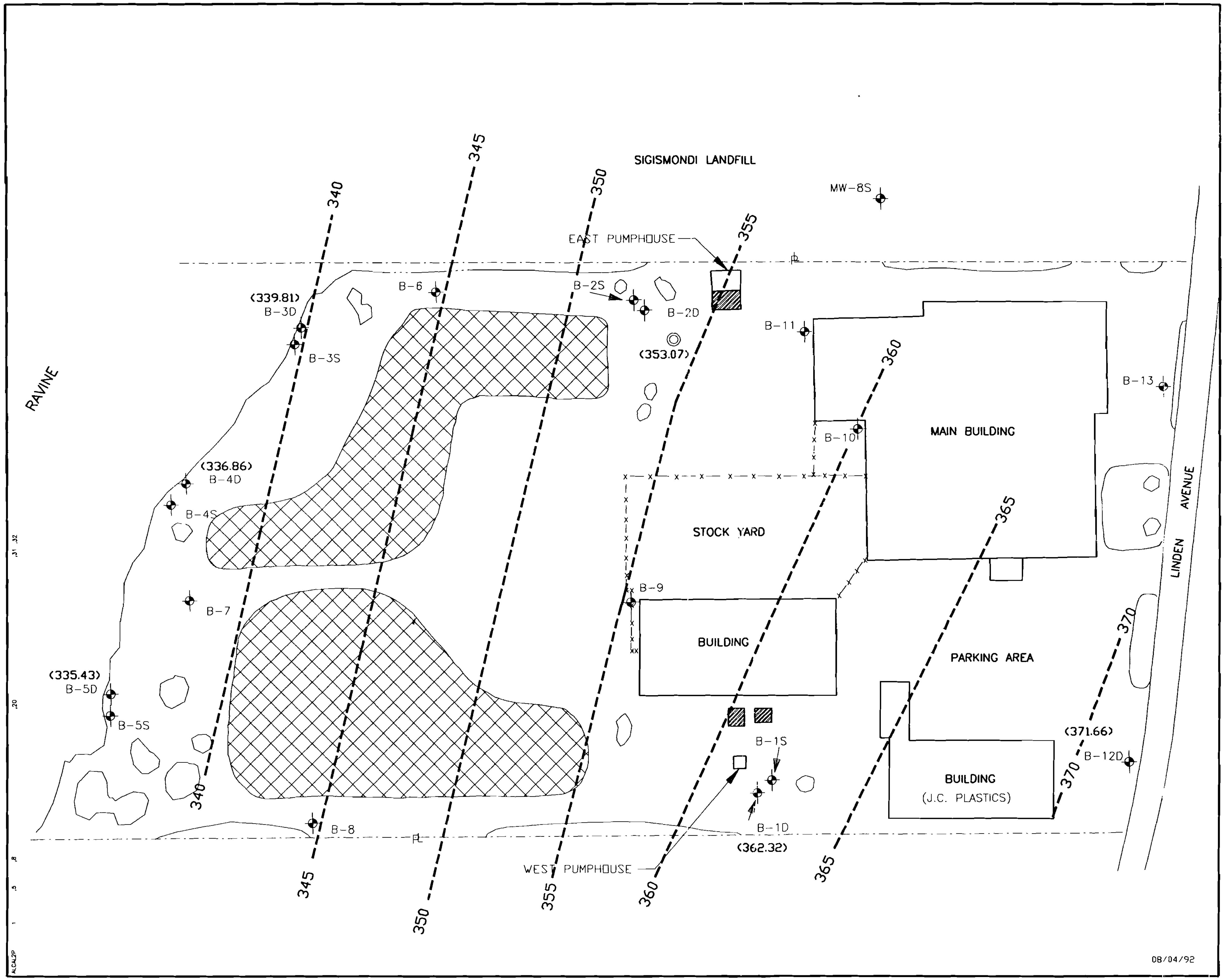


FIGURE 15

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

LEGEND

- PROPERTY BOUNDARY
- MONITORING WELL LOCATION
- (363.32) GROUND WATER ELEVATION
- 340 GROUND WATER ELEVATION CONTOUR
- FORMER WATER IMPOUNDMENTS AS LOCATED BY AERIAL PHOTOS & SOIL BORINGS
- CEMENT FOUNDATION
- CISTERN

DEEP GROUND WATER ELEVATIONS 6/3/92

100 0 100
SCALE IN FEET

3057.032.131

O'BRIEN & GERE ENGINEERS, INC.

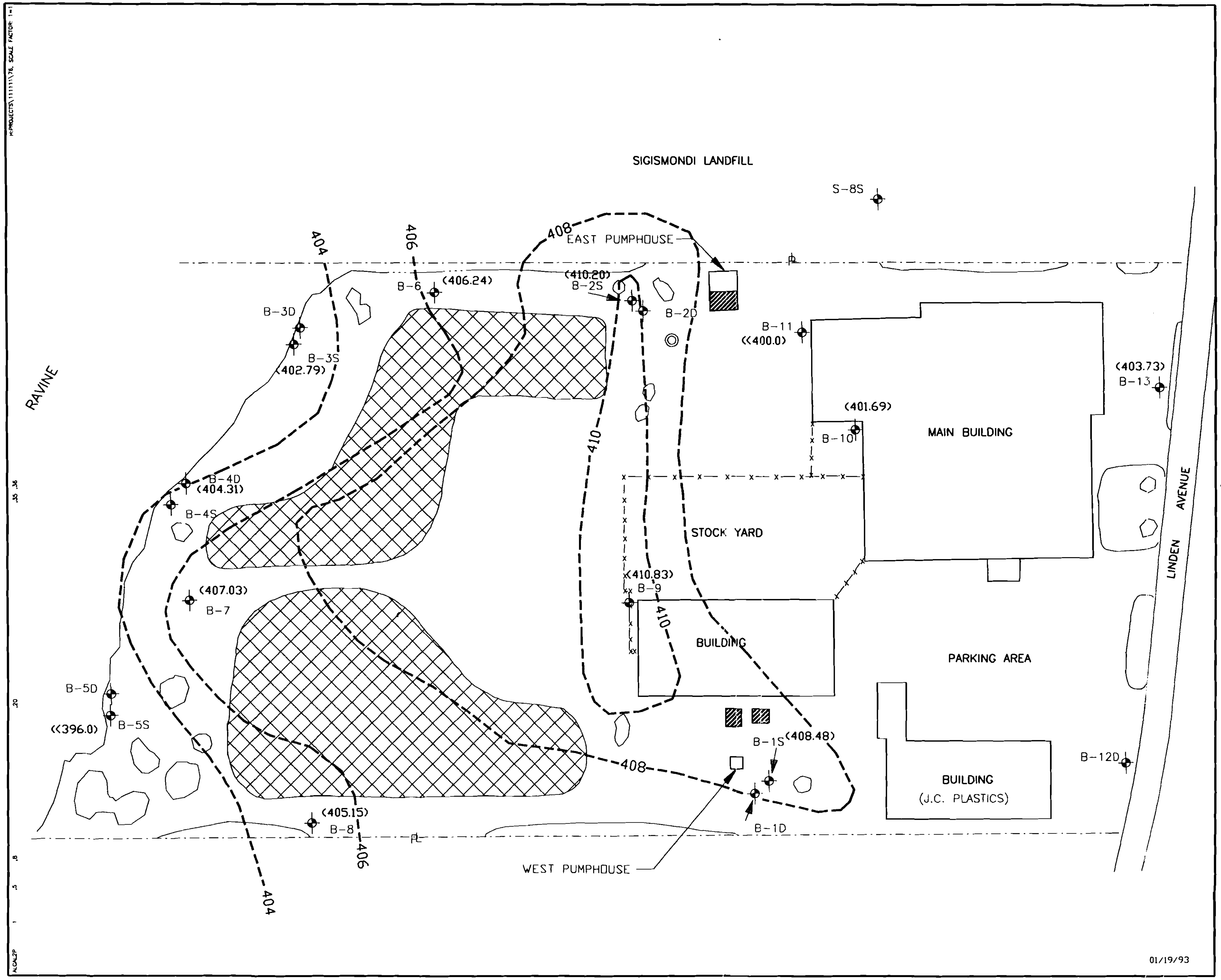


FIGURE 16

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

LEGEND

PROPERTY BOUNDARY

MONITORING WELL LOCATION

(401.69) GROUND WATER ELEVATION

400 GROUND WATER ELEVATION CONTOUR

FORMER WATER IMPOUNDMENTS AS LOCATED BY AERIAL PHOTOS & SOIL BORINGS

CEMENT FOUNDATION

CISTERN

SHALLOW GROUND WATER ELEVATIONS
8/10/92

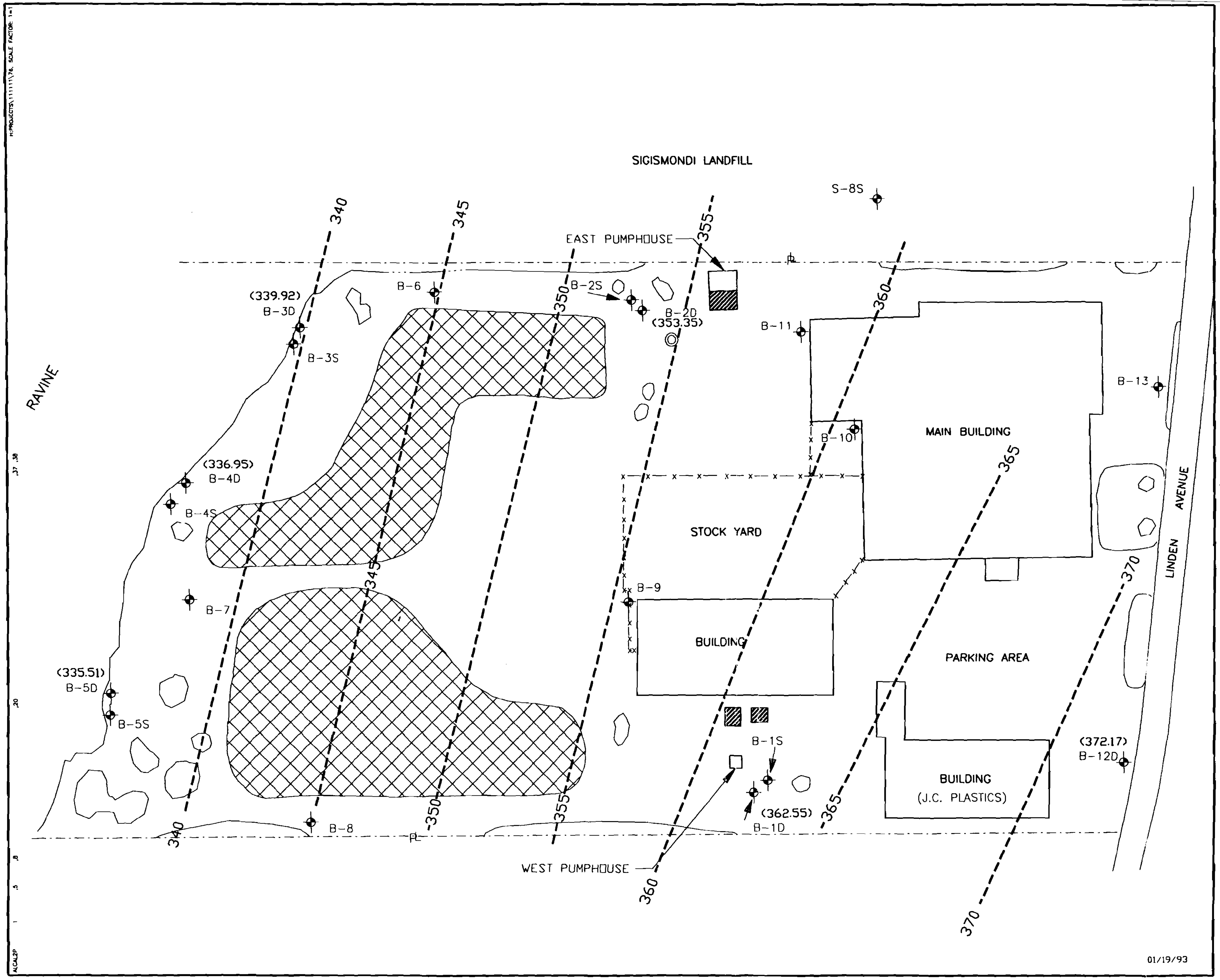
100 0 100
SCALE IN FEET

3057.032.131

O'BRIEN & GERE ENGINEERS, INC.

FIGURE 17

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK



LEGEND

PROPERTY BOUNDARY

MONITORING WELL LOCATION

(353.35) GROUND WATER ELEVATION

350 GROUND WATER ELEVATION CONTOUR

FORMER WATER IMPOUNDMENTS LOCATED BY AERIAL PHOTOS & SOIL BORINGS

CEMENT FOUNDATION

CISTERN

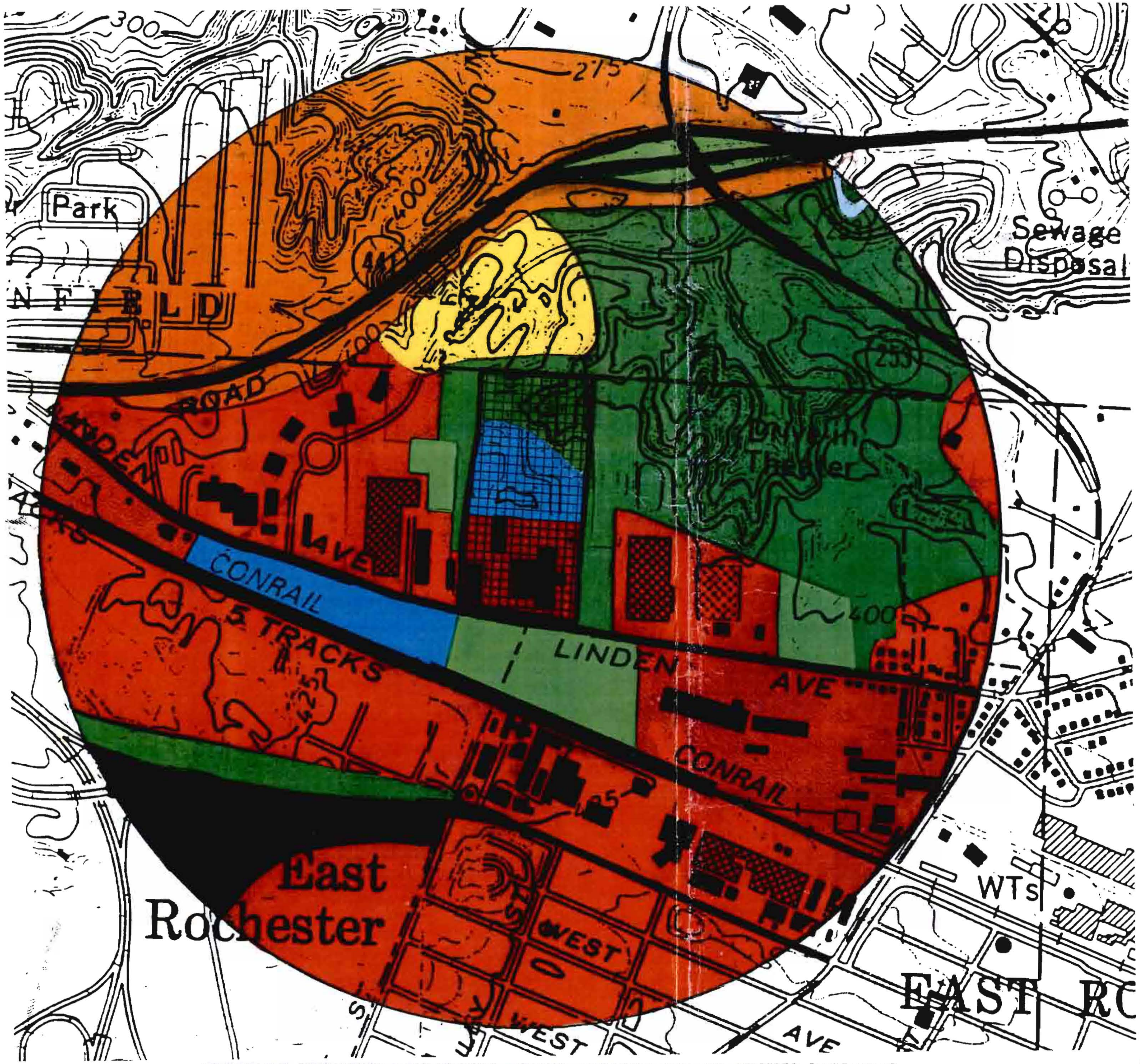
DEEP GROUND WATER ELEVATIONS 8/10/92

100 0 100

SCALE IN FEET

3057.032.131

O'BRIEN & GERE ENGINEERS, INC.



SOURCE:USGS TOPOGRAPHIC MAPS–FAIRPORT, WEBSTER, ROCHESTER EAST AND PITTSFORD QUADRANGLES

12/29/92

FIGURE 18

ALCAN ALUMINUM CORPORATION
PITTSFORD, NEW YORK

LEGEND

- URBAN STRUCTURE EXTERIOR
- MOWED LAWN
- SUCCESSIONAL SOUTHERN HARDWOODS
- SUCCESSIONAL NORTHERN HARDWOODS
- SUCCESSIONAL OLD FIELD
- URBAN VACANT LOT
- PINE–NORTHERN HARDWOOD FOREST
- PAVED ROAD/PATH
- SURFACE WATER
- SITE

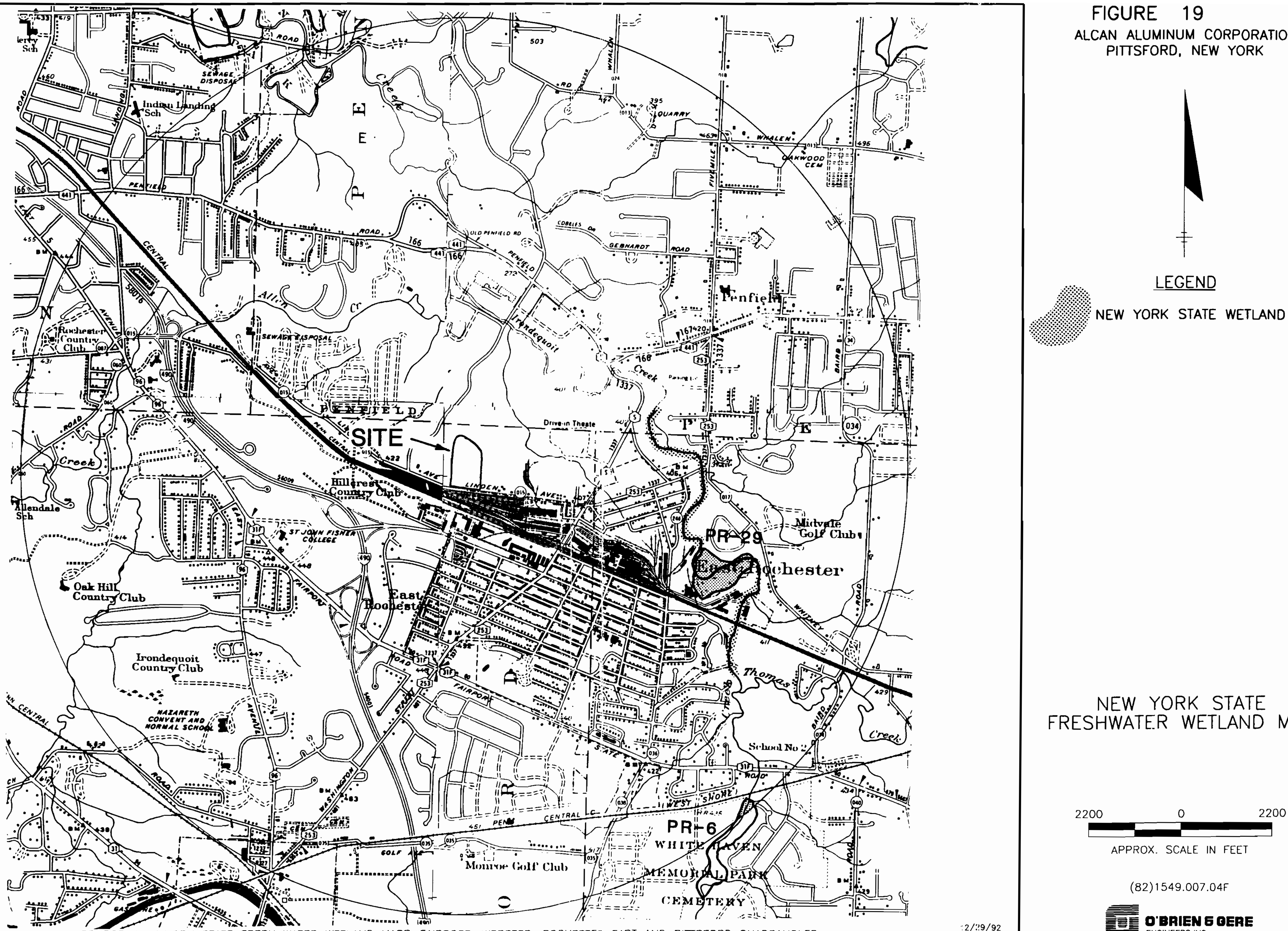
COVERTYPE MAP

650 0 650

APPROX. SCALE IN FEET

(76)3057.032.131

O'BRIEN & GERE ENGINEERS, INC.



SOURCE: NEW YORK STATE FRESH WATER WETLAND MAPS–FAIRPORT, WEBSTER, ROCHESTER EAST AND PITTSFORD QUADRANGLES

2/29/92

FIGURE 19

ALCAN ALUMINUM CORPORATION
PITTSFORD, NEW YORK

NEW YORK STATE
FRESHWATER WETLAND MA

2200 0 2200

APPROX. SCALE IN FEET

(82)1549.007.04F

O'BRIEN & GERE ENGINEERS, INC.

Appendix A

Historical Analytical Data

O'BRIEN & GERE
ENGINEERS, INC.

TABLE 1

GROUNDWATER QUALITY ANALYSIS DATA

ALCAN ALUMINUM SITE # 828005

PITTSFORD, NEW YORK

Parameters (mg/l)

Well No.	Cr	CrHex	Ni	Cu	Cd	Zn	Hg	Pb	Al	pH lab
B-1										
7/5/85	LT 0.01	LT 0.01	0.07	0.02	LT 0.01	0.10	LT 0.0005	LT 0.01	--	--
7/23/85	0.02	LT 0.01	LT 0.01	0.03	LT 0.01	0.02	LT 0.0005	LT 0.01	--	--
3/21/86	LT 0.01	LT 0.01	0.03	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	0.03	0.5	7.8
3/21/86 Dup.	0.06	LT 0.01	LT 0.01	LT 0.01	LT 0.01	0.03	LT 0.0005	LT 0.01	1.9	7.5
10/16/86	LT 0.01	--	--	LT 0.01	LT 0.01	LT 0.01	--	--	LT 0.1	6.5 F
10/16/86**	LT 0.005	--	--	LT 0.005	LT 0.01	LT 0.01	--	--	LT 0.1	--
4/15/87	LT 0.01	--	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	LT 0.01	0.04	6.8 F
4/15/87**	LT 0.0050	--	LT 0.050	0.0026	LT 0.01	LT 0.010	LT 0.0050	LT 0.0050	LT 0.01	--
4/15/87 (DEC)UF	LT 0.010	0.011	LT 0.040	LT 0.025	LT 0.005	0.020	LT 0.00020	LT 0.005	0.784	--
6/2/87	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.01	0.02	LT 0.0005	LT 0.01	LT 0.01	--
6/2/87 UF	0.01	LT 0.01	0.02	LT 0.01	LT 0.01	0.02	LT 0.0005	LT 0.01	0.04	7.3
6/2/87**	LT 0.0050	LT 0.010	LT 0.040	0.0054	LT 0.010	LT 0.010	LT 0.00020	LT 0.0050	0.29	--
6/2/87**UF	0.012	LT 0.010	LT 0.040	0.010	LT 0.010	LT 0.010	LT 0.00020	0.010	1.14	--
6/2/87(DEC)UF	--	0.015	--	--	--	--	--	--	--	--
12/29/87	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	LT 0.01	0.013	--
12/29/87 UF	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	LT 0.01	0.075	7.3
12/29/87(DEC)UF	0.0475	0.0205	--	0.0269	--	0.0783	--	0.016	--	--
12/29/87**	0.0057	LT 0.010	LT 0.040	0.0092	LT 0.010	LT 0.010	LT 0.00020	LT 0.0050	0.14	--
12/29/87**UF	0.0064	0.015	LT 0.040	0.019	0.012	LT 0.010	LT 0.00020	0.0060	1.31	--
4/7/88	LT 0.01	LT 0.01	0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	LT 0.01	LT 0.01	8.0
4/7/88 UF	LT 0.01	LT 0.01	0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	LT 0.01	LT 0.01	7.1 F
4/7/88**	0.[illegible]6	0.046	LT 0.04	0.0055	LT 0.010	LT 0.010	LT 0.00020	LT 0.0050	0.95	
4/17/88 UF**	0.055	0.034	LT 0.04	0.0050	LT 0.010	LT 0.010	LT 0.00020	LT 0.0050	LT 0.01	
NYS Groundwater Standard Class GA	--	0.05	--	1.0	0.01	5.0	0.002	0.025	--	6.5 - 8.5

LT - Less Than

* - Well B-4 did not contain a sufficient water volume to allow proper purging prior to sampling. Therefore, these results may not be indicative of actual groundwater quality.

DUP - Duplicate sample collected

** - General Testing Corporation

F - Measured in Field

DEC - NYSDEC Split

UF - Unfiltered Sample

TABLE 1 (Continued)
GROUNDWATER QUALITY ANALYSIS DATA
ALCAN ALUMINUM SITE # 828005
PITTSFORD, NEW YORK

Parameters (mg/1)

Well No.	Cr	CrHex	Ni	Cu	Cd	Zn	Hg	Pb	Al	pH lab
B-2										
7/5/85	LT 0.C	LT 0.01	0.05	0.02	LT 0.01	LT 0.01	0.0056	LT 0.01	--	--
7/23/85	0.35	LT 0.01	0.26	0.27	0.02	0.60	0.0007	0.05	--	--
3/21/86	0.21	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	LT 0.01	LT 0.01	9.1
10/16/86	0.07	--	--	LT 0.01	LT 0.01	LT 0.01	--	--	LT 0.1	7.3 F
10/16/86**	0.075	--	--	LT 0.005	LT 0.01	LT 0.01	--	--	LT 0.1	--
4/15/87	0.11	--	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	LT 0.01	0.05	7.9 F
4/15/87**	0.155	--	LT 0.050	0.0025	LT 0.010	LT 0.010	LT 0.0005	LT 0.0050	0.15	--
4/15/87 (DEC)UF	0.150	0.129	LT 0.040	LT 0.025	LT 0.005	0.012	LT 0.00020	LT 0.005	0.577	--
6/2/87	0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	LT 0.01	LT 0.01	--
6/2/87UF	0.38	LT 0.01	0.01	0.11	0.01	0.04	0.0010	0.03	LT 0.01	9.0
6/2/87**	0.0096	LT 0.010	LT 0.040	0.0080	LT 0.010	LT 0.010	LT 0.00020	LT 0.0050	0.39	--
6/2/87**UF	0.067	LT 0.010	LT 0.040	0.032	LT 0.010	LT 0.010	0.00062	0.014	3.32	--
6/2/87**UF DUP	0.018	LT 0.010	LT 0.040	0.0078	LT 0.010	LT 0.010	LT 0.00020	LT 0.0050	1.83	--
6/2/87(DEC)UF	--	LT 0.010	--	--	--	--	--	--	--	--
12/29/87	0.013	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	LT 0.01	LT 0.01	--
12/29/87 UF	0.017	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	LT 0.01	LT 0.01	8.8
12/29/87(DEC)UF	0.0359	0.0178	--	LT 0.01	--	0.0144	--	LT 0.005	--	--
12/29/87**	0.0285	0.027	LT 0.040	0.0095	LT 0.010	LT 0.010	0.00020	LT 0.0050	0.25	--
12/29/87**UF	0.0366	0.027	LT 0.040	0.0081	LT 0.010	LT 0.010	LT 0.00020	LT 0.0050	0.75	--
4/7/88	0.07	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	LT 0.01	LT 0.01	8.0
4/7/88 UF	0.07	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	LT 0.01	LT 0.01	8.7 F
4/7/88**	0.066	LT 0.046	LT 0.04	0.0055	LT 0.010	LT 0.010	LT 0.00020	LT 0.0050	0.95	
4/7/88 UF**	0.055	0.034	LT 0.04	0.0050	LT 0.050	LT 0.010	LT 0.00020	LT 0.0050	LT 0.01	
NYS Groundwater Standard Class GA	--	0.05	--	1.0	0.01	5.0	0.002	0.025	--	6.5 - 8.5

LT - Less Than
* - Well B-4 did not contain a sufficient water volume to allow proper purging prior to sampling. Therefore, these results may not be indicative of actual groundwater quality.
DUP - Duplicate sample collected
** - General Testing Corporation
F - Measured in Field
DEC - NYSDEC Split
UF - Unfiltered Sample

TABLE 1 (Continued)
GROUNDWATER QUALITY ANALYSIS DATA
ALCAN ALUMINUM SITE # 828005
PITTSFORD, NEW YORK

Parameters (mg/l)

Well No.	Cr	CrHex	Ni	Cu	Cd	Zn	Hg	Pb	Al	pH lab
B-3										
7/5/85	LT 0.01	LT 0.01	0.05	0.02	LT 0.01	0.07	LT 0.0005	LT 0.01	--	--
7/23/85	0.56	LT 0.01	1.10	0.90	0.04	1.5	0.0012	0.46	--	--
3/21/86	LT 0.01	LT 0.01	0.02	0.12	LT 0.01	0.02	0.0005	LT 0.01	8.2	9.4
10/16/86	0.01	--	--	0.02	LT 0.01	LT 0.01	--	--	LT 0.1	8.3 F
10/16/86**	0.17	--	--	0.033	LT 0.01	LT 0.01	--	--	0.43	--
4/15/87	0.06	--	LT 0.01	0.05	LT 0.01	LT 0.01	0.0009	0.03	0.10	9.0 F
4/15/87**	0.072	--	LT 0.050	0.050	LT 0.010	LT 0.010	LT 0.00050	LT 0.0050	1.59	
4/15/87 (DEC)UF	0.068	0.077	LT 0.040	0.061	LT 0.005	0.037	0.00060	LT 0.005	8.120	--
4/15/87 (DEC)	0.053	0.039	LT 0.040	0.053	LT 0.005	0.028	0.00051	LT 0.005	5.530	--
6/2/87	0.05	LT 0.01	0.03	0.10	LT 0.01	0.03	0.0010	LT 0.01	LT 0.01	--
6/2/87UF	0.08	LT 0.01	0.05	0.11	LT 0.01	0.04	0.0010	0.04	LT 0.01	8.9
6/2/87**	0.055	0.025	LT 0.040	0.082	LT 0.010	0.014	LT 0.00020	0.0093	3.06	--
6/2/87**UF	0.057	0.024	LT 0.040	0.101	LT 0.010	0.017	LT 0.00020	0.012	3.37	--
6/2/87(DEC)UF	--	0.023	--	--	--	--	--	--	--	--
12/29/87	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
4/7/88	LT 0.01	LT 0.01	LT 0.01	0.01	LT 0.01	LT 0.01	--	LT 0.01	LT 0.01	9.0
4/7/88 UF	LT 0.01	LT 0.01	LT 0.01	0.01	LT 0.01	LT 0.01	0.0007	LT 0.01	LT 0.01	8.9 F
4/7/88*	0.014	LT 0.010	LT 0.040	0.032	LT 0.010	LT 0.010	LT 0.0020	LT 0.0050	0.78	
4/7/88**	LT 0.010	LT .0.10	LT 0.040	0.015	LT 0.010	LT 0.010	LT 0.00020	LT 0.0050	0.18	
NYS Ground Water Standard Class GA	--	0.05	--	1.0	0.01	5.0	0.002	0.025	--	6.5 - 8.5

LT - Less Than
* - Well B-4 did not contain a sufficient water volume to allow proper purging prior to sampling. Therefore, these results may not be indicative of actual ground water quality.
DUP - Duplicate sample collected
** - General Testing Corporation
F - Measured in Field
DEC - NYSDEC Split
UF - Unfiltered Sample

TABLE 1 (Continued)
GROUNDWATER QUALITY ANALYSIS DATA
ALCAN ALUMINUM SITE # 828005
PITTSFORD, NEW YORK

Parameters (mg/l)

Well No.	Cr	CrHex	Ni	Cu	Cd	Zn	Hg	Pb	Al	pH lab
B-4										
7/5/85*	LT 0.01	LT 0.01	0.06	0.07	LT 0.01	0.23	0.0013	LT 0.01	--	--
7/23/85*	1.0	LT 0.01	1.1	1.54	0.05	54.0	0.0020	0.99	--	--
3/21/86	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.01	0.02	LT 0.0005	LT 0.01	LT 0.01	8.1
3/21/86 Dup.	LT 0.01	LT 0.01	0.03	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	LT 0.01	LT 0.01	8.1
10/16/86	LT 0.01	--	--	LT 0.01	LT 0.01	LT 0.01	--	--	LT 0.1	7.5 F
10/16/86**	LT 0.005	--	--	LT 0.005	LT 0.01	LT 0.01	--	--	LT 0.1	--
4/15/87	--	--	--	--	--	--	--	--	--	8.2 F
4/15/87**	0.0050	--	LT 0.050	0.0096	LT 0.010	LT 0.010	LT 0.00050	LT 0.0050	0.16	--
4/15/87 (DEC)UF	LT 0.010	0.010	LT 0.040	LT 0.025	LT 0.005	0.039	LT 0.00020	0.014	6.230	--
6/2/87	0.01	--	0.01	0.01	0.01	0.02	LT 0.0005	LT 0.01	--	--
6/2/87UF	0.01	--	0.01	0.02	0.01	0.03	LT 0.0005	LT 0.01	--	--
6/2/87**	0.0093	--	LT 0.040	0.021	LT 0.010	LT 0.010	LT 0.00020	0.0064	1.21	--
6/2/87**UF	0.0089	--	LT 0.040	0.024	LT 0.010	LT 0.010	LT 0.00020	0.014	1.23	--
6/2/87(DEC)UF	--	--	--	--	--	--	--	--	--	--
12/29/87	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
4/7/88 UF	LT 0.01	***	0.02	LT 0.01	LT 0.01	0.02	LT 0.0005	0.02	4.2	***
NYS Groundwater Standard Class GA	--	0.05	--	1.0	0.01	5.0	0.002	0.025	--	6.5 - 8.5

LT - Less Than
* - Well B-4 did not contain a sufficient water volume to allow proper purging prior to sampling. Therefore, these results may not be indicative of actual groundwater quality.
DUP - Duplicate sample collected
** - General Testing Corporation
F - Measured in Field
DEC - NYSDEC Split
UF - Unfiltered Sample
*** - Insufficient Water in Well

TABLE 1 (Continued)
GROUNDWATER QUALITY ANALYSIS DATA
ALCAN ALUMINUM SITE # 828005
PITTSFORD, NEW YORK

Parameters (mg/l)

Well No.	Cr	CrHex	Ni	Cu	Cd	Zn	Hg	Pb	Al	pH lab
B-5 (Well Dry during all previous sampling events)										
4/15/87	0.02	--	LT 0.01	LT 0.01	LT 0.01	LT 0.01	LT 0.0005	LT 0.01	0.04	6.8 F
4/15/87**	0.019	--	LT 0.050	0.0040	LT 0.010	0.027	LT 0.00050	LT 0.0050	0.22	--
4/15/87 (DEC)UF	0.014	0.016	LT 0.040	LT 0.025	LT 0.005	0.039	LT 0.00020	LT 0.005	0.852	--
4/15/87 (DEC)	0.015	0.011	LT 0.040	LT 0.025	LT 0.005	0.014	LT 0.00020	LT 0.005	0.608	--
6/2/87	0.01	LT 0.01	LT 0.01	LT 0.01	0.01	0.01	LT 0.0005	LT 0.01	LT 0.01	--
6/2/87 UF	0.18	LT 0.01	0.17	0.21	0.01	0.08	LT 0.0005	0.06	0.02	7.5
6/2/87**	0.020	0.013	LT 0.040	0.012	LT 0.010	LT 0.010	LT 0.00020	0.016	1.24	--
6/2/87**UF	0.046	0.014	LT 0.040	0.044	LT 0.010	0.064	LT 0.00020	0.120	6.27	--
6/2/87(DEC)UF	--	0.011	--	--	--	--	--	--	--	--
12/29/87	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
4/7/88	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
NYS Groundwater Standard Class GA	--	0.05	--	1.0	0.01	5.0	0.002	0.025	--	6.5 - 8.5

LT - Less Than
* - Well B-4 did not contain a sufficient water volume to allow proper purging prior to sampling. Therefore, these results may not be indicative of actual groundwater quality.
DUP - Duplicate sample collected
** - General Testing Corporation
F - Measured in Field
DEC - NYSDEC Split
UF - Unfiltered Sample

TABLE 2

SURFACE IMPOUNDMENT SOIL ANALYSIS DATA

ALCAN ALUMINUM SITE # 828005
PITTSFORD, NEW YORK

			Parameters (mg/kg)						
Sample Location	Depth (ft)	Description	Cr	Cu	Cd	Zn	Pb	Al	Pcts Solids
1	5-6	soil	24	18	LT 1	62	8	10,300	81.4
15	5-6	soil	21	22	2	60	9	10,100	77.5
4	6-7	black deposits (distinct odor)	4,500	297	2	73	30	21,200	31.6
5	7-8	black deposits (distinct odor)	5,600	312	LT 1	79	29	22,300	25.3
7	1.5	white deposits	3,600	38	2	110	17	49,000	55.7
9	2.5	white deposits	4,100	39	2	86	18	57,000	56.8
10	7	black deposits	2,280	148	LT 1	63	19	16,000	63.1

TABLE #2

GROUND WATER QUALITY ANALYSIS DATA

Samples taken 7/5/85	Well No. B-1	Well No. B-2	Well No. B-3	Well No. B-4**	NYS Ground Water Standard
Parameters					
Cr	BDL mg/l	BDL mg/l	BDL mg/l	BDL mg/l	--
Cr Hex	BDL	BDL	BDL	BDL	0.05 mg/l
Ni	0.07	0.05	0.05	0.06	--
Cu	0.02	0.02	0.02	0.07	1.0
Cd	BDL	BDL	BDL	BDL	0.01
Zn	0.10	BDL	0.07	0.23	5.0
Hg	BDL	0.0056	BDL	0.0013	0.002
Pb	BDL	BDL	BDL	BDL	0.025
Tox(duplicates)	13/14	93/79	100/100	*N/A	--

*This sample was too muddy to be analyzed by Method 450.1, TOX. The fine grained sediments could not be removed by centrifugation.

Samples taken 7/23/85	Well No. B-1	Well No. B-2	Well No. B-3	Well No. B-4**	NYS Ground Water Standard
Parameters					
Cr	0.02 mg/l	0.35 mg/l	0.56 mg/l	1.0 mg/l	--
Cr Hex	BDL	BDL	BDL	BDL	0.05 mg/l
Ni	BDL	0.26	1.10	1.1	--
Cu	0.03	0.27	0.90	1.54	1.0
Cd	BDL	0.02	0.04	0.05	0.01
Zn	0.02	0.60	1.5	54.0	5.0
Hg	BDL	0.0007	0.0012	0.0020	0.002
Pb	BDL	0.05	0.46	0.99	0.025

Parameters	EPA Method	Detection Limit
Chromiumn (Cr)	218.1	0.01 mg/l
Hexavalent Chromium (Cr-Hex)	218.5	0.01
Nickel (Ni)	249.1	0.01
Copper (Cu)	220.1	0.01
Cadmium (Cd)	213.1	0.01
Zinc (Zn)	289.1	0.01
Mercury (Hg)	245.1	0.01
Lead (Pb)	239.1	0.0005
Total Organic Halogens (Tox)	450.1	0.01

**Well B-4 did not contain a sufficient water volume to allow proper purging prior to sampling. Therefore these results may not be indicative of actual ground water quality.

BDL - Below Detection Limit

Appendix B

Surface Impoundment Boring Logs

O'BRIEN & GERE ENGINEERS, INC.

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. IB-1 Sheet 1 of 1
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc. Foreman: Brian Waters OBG Geologist: Paul Gottler	Boring Location: Most South boring in East Inpoundment Ground Elevation: Dates: Started: 10/17/90 Ended: 10/17/90

Depth	Sample					Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing			Rmks*
	No	Depth	Blows /6"	Penetr/ Recovry	"N" Value				pH	Sp Cond	HNU	
0	1	0-2'	1-1-1-1	2'/0.5'	2	SOD						
						Dry, medium to fine, brown SAND						
	2	2-4'	1-1-1-1	2'/0.5'	2	Same as above, damp						
	3	4-6'	1-1-1-1	2'/0.3'	2	Wet, medium, black gray SAND, some fine sand						
5												
	4	6-8'	2-1-1-1	2'/0.5'	2	Same as above						
	5	8-10'	2-1-1-2	2'/0.4'	2	Same as above, gray with a layer of black sludge with white chips						
10	6	10-12'	1-2-WOH	2'/1.4'		Gray CLAY trace silt						
	7	12-14'	8-5-5-4	2'/1.8'	10	Same as above, increasing silt						
	8	14-16'	7-3-5-5	2'/1.9'	8	Wet, laminated, red brown CLAY to 14.8' Gray CLAY wih SILT						
15												
	9	16-18'	4-3-3-3	2'/1.'	6	Same as above to 17.1' Less clay to 17.5' Wet gray CLAY as above, with dropstone						
						Bottom of boring 18 ft						

IB1.KJF

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

Report of Boring No. IB-2
Sheet 1 of 1

Project Location: Alcan Site # 828005
E. Rochester, N.Y.
Client: Alcan

SAMPLER
Type: Split Spoon
Hammer: 140 lbs. Fall: 30"

Ground Water Depth Date
Depth Date
File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler

Boring Location: 138' Northwest of IB-1 East Impoundment
Ground Elevation:
Dates: Started: 10/17/90 Ended: 10/17/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Field Testing Sp Cond	Field Testing HNU	Rmks*
0	1	0-2'	2-3-3-3	2'/1.8'	6	SOD	0.5'					
						Dry, medium to fine brown SAND with white chips (plastic?) throughout						
	2	2-4'	3-1-1-1	2'/1.2'	2	Same as above						
	3	4-6'	1-1-1-1	2'/0'	2	No recovery						
5												
	4	6-8'	1-2-2-1	2'/0.3'	4	Wet, gray and brown SAND						
	5	8-10'	2-3-1-6	2'/1.3'	4	Wet, gray black, medium SAND with white mottling, grading to green clay with silt at 9.5' then wet, red brown laminated clay with silt						
10	6	10-12'	8-17-	2'/2'	29	Same as above						
			12-19									
	7	12-14'	17-18-	2'/2'	37	Same as above	12.5'					
			19-24			Bottom of boring 12.5 ft.						

Drilled to 10', spooned to 14'

IB2.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. IB-3 Sheet 1 of 1
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler

Boring Location: 185' Northwest of IB-2 East Impoundment
Ground Elevation:
Dates: Started: 10/17/90 Ended: 10/17/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
0	1	0-2'	3-3-3-3	2'/1.5'	6	SOD						
						Dry, medium, light brown, massive SAND	0.2'					
	2	2-4'	2-1-1-1	2'/1.7'	2	Same as above, pinkish white clay layer (1"						
	3	4-6'	1-1-WOH	2'/0.2'	---	Same as above						
5												
	4	6-8'		2'/0.4'	---	Same as above, black gray sand with white chips						
	5	8-10'	WOH-2-2-1	2'/1.9'	---	Wet, gray CLAY, black laminations						
10	6	10-12'	WOH-2-2-1	2'/1.8'	---	Wet, green and black CLAY, trace silt						
	7	12-14'	4-6-6-6	2'/1.8'	12	Wet, laminated, brown and red CLAY, some silt to 12.9'						
						Wet SILT and olive brown CLAY						
	8	14-16'	8-7-8-18			Same as above						
15						Bottom of boring 14.0 ft.						

IB3.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. IB-4 Sheet 1 of 1
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc. Foreman: Brian Waters OBG Geologist: Paul Gottler	Boring Location: 63' West-Southwest of B-6 Ground Elevation: Dates: Started: 10/12/90 Ended: 10/12/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
0	1	0-2'	3-4-4-4	2'/1.7'	8	SOD	0.4'					
						Dry, brown to light brown SAND, trace silt						
	2	2-4'	3-4-4-3	2'/2'	8	Same as above with clay laminations at at 2.4' and 3.4'						
	3	4-6'	3-3-2-3	2'/2'	5	Same as above						
5												
	4	6-8'	4-3-3-4	2'/2'	6	Same as above, moist sand to 6.4' Increasing moisture to 7.7'						
						Wet red and brown CLAY with silt, organics						
	5	8-10'	2-3-8-9	2'/2'	11	Same as above, horizontal laminations						
10	6	10-12'	4-9-14-15	2'/2'	23	Same as above						
						Bottom of Boring at 10 ft. (sampled to 12 ft.)						

IB4.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. IB-5A Sheet 1 of 1
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131
Boring Co.: Parratt-Wolff, Inc. Foreman: Brian Waters OBG Geologist: Paul Gottler	Boring Location: Ground Elevation: Dates: Started: 10/16/90	Ended: 10/16/90

Depth	Sample No	Sample Depth	Sample Blows /6"	Sample Penetr/ Recovry	Sample "N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Field Testing Sp Cond	Field Testing HNU	Rmks#
0	1	0-2'	2-3-4-7	2'/1.8'	7	SOD Damp brown to light brown SAND and SILT laminated, white chips throughout spoon	0.4'					
	2	2-4'	7-7-6-4	2'/1.7'	13	Damp, medium to fine, light brown SAND to 2.2', green and white silt and clay laminated with black, medium sand, grades to light brown sand and silt						
	3	4-6'	2-2-4-3	2'/1.5'	6	Same as above						
5												
	4	6-8'	6-5-3-5	2'/0.5'	8	Same as above, wet at 7.8'						
	5	8-10'	5-4-4-4		8	Wet, as above						
10	6	10-12'				Gray and black streaked CLAY and SILT with light brown clay						
	7	12-14'				Wet, gray and brown with black streaked CLAY with some silt red and brown clay at 13.1' with horizontal laminations						
	8	14-16'				Wet, red and brown CLAY, then SILT with trace brown-olive clay at 14.9'						
15						Bottom of Boring at 14 ft. (sampled to 16 ft.)						

IB5A.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. IB-5B Sheet 1 of 1
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler

Boring Location: 50' East Southeast IB-5A
Ground Elevation:
Dates: Started: 10/16/90 Ended: 10/16/90

Depth	Sample No	Sample Depth	Sample Blows /6"	Sample Penetr/ Recovry	Sample "N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Field Testing Sp Cond	Field Testing HNU	Rmks*
0	1	0-2'	3-3-6-5	2'/1.7'	9	SOD Medium SAND with trace silt, white chips throughout spoon, laminated at 1.1'	0.4'					
	2	2-4'	4-3-4-4	2'/1.3'	7	Same as above to 2.9', then moist green and white clay, silt zone 3" thick, black sand to 3.3', moist, brown sand						
	3	4-6'	4-2-3-3	2'/1.5'	5	Damp, brown, medium-fine SAND						
5												
	4	6-8'	4-3-3-3	2'/1.3'	6	Same as above, wet at 7.2', dark spots						
	5	8-10'	3-3-5-5	2'/1'	8	Same as above, iron staining throughout						
10	6	10-12'	6-3-5-4	2'/1.6'	8	Same as above, laminated, medium to fine sand trace brown to gray brown silt						
	7	12-14'	6-1-2-2	2'/1.8'	3	Same as above to 13.3', red brown CLAY with organics, laminations Bottom of boring 10 ft. (Sampled to 14 ft.)						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. IB-6 Sheet 1 of 1
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc. Foreman: Brian Waters OBG Geologist: Paul Gottler	Boring Location: 128' West Southwest of IB-4 Ground Elevation: Dates: Started: 10/17/90 Ended: 10/17/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
0	1	0-2'	2-2-1-2	2'/1.3'	3	SOD Dry, medium to fine, brown and iron-stained brown SAND, trace silt, massive	0.3'					
	2	2-4'	2-5-5-6	2'/1.9'	10	Same as above, with black streak						
	3	4-6'	4-4-4-5	2'/1.1'	8	Dry, medium to fine iron colored and light gray brown SAND						
5												
	4	6-8'	5-5-5-6	2'/1.3'	10	Moist, medium to fine brown SAND, wet at 6.9', faint laminations at 7.2'						
	5	8-10'	7-5-3-3	2'/1.6'	8	Wet, iron brown colored, medium to fine SAND, mottled green and brown clay						
10	6	10-12'	1-1-1-1	2'/1.4'	2	Wet, olive SILT and CLAY						
	7	12-14'	1-1-5-10		6	Same as above to 13.1' Wet, red brown CLAY laminated to 13.6' Wet SILT and CLAY						
						Bottom of boring 10 ft. (sampled to 14 ft.)						

IB6.KJF

Appendix C

Air Monitoring Data

O'BRIEN & GERE
ENGINEERS, INC.

TABLE 1

AIR SAMPLE RESULTS

Company: Alcan Alum - Jarl

Client # 3057.032

Parameter	Sample Number	Location	Time (Min)	Rate (lpm)	Volume (m^3)	Result (ug)	ug/M^3	PPB
Aluminum								
	J-M-BLK	Field Blank			0	< 1	< 0	< 0
	J-M-E-1	East Side	425	2.5	1.06	< 1	< 0.94	< 0
	J-M-E-2	East Side	480	2.6	1.24	< 1	< 0.8	< 0
	J-M-OS	Central	480	2.4	1.15	3	2.6	0
	J-M-W-1	West Side	480	2.5	1.2	< 1	< 0.83	< 0
Arsenic								
	J-M-BLK	Field Blank			0	< 0.08	< 0	< 0
	J-M-E-1	East Side	425	2.5	1.06	< 0.08	< 0.07	< 0
	J-M-E-2	East Side	480	2.6	1.24	< 0.08	< 0.06	< 0
	J-M-OS	Central	480	2.4	1.15	< 0.08	< 0.06	< 0
	J-M-W-1	West Side	480	2.5	1.2	< 0.08	< 0.06	< 0
Beryllium								
	J-M-BLK	Field Blank			0	< 0.03	< 0	< 0
	J-M-E-1	East Side	425	2.5	1.06	< 0.03	< 0.02	< 0
	J-M-E-2	East Side	480	2.6	1.24	< 0.03	< 0.02	< 0
	J-M-OS	Central	480	2.4	1.15	< 0.03	< 0.02	< 0
	J-M-W-1	West Side	480	2.5	1.2	< 0.03	< 0.02	< 0
Cadmium								
	J-M-BLK	Field Blank			0	< 0.08	< 0	< 0
	J-M-E-1	East Side	425	2.5	1.06	< 0.08	< 0.07	< 0
	J-M-E-2	East Side	480	2.6	1.24	< 0.08	< 0.06	< 0
	J-M-OS	Central	480	2.4	1.15	< 0.08	< 0.06	< 0
	J-M-W-1	West Side	480	2.5	1.2	< 0.08	< 0.06	< 0
Calcium								
	J-M-BLK	Field Blank			0	7	0	0
	J-M-E-1	East Side	425	2.5	1.06	4	3.76	0
	J-M-E-2	East Side	480	2.6	1.24	5	4	0

Date 11/19/90

TABLE 1
AIR SAMPLE RESULTS

Company: Alcan Alum - Jarl

Client # 3057.032

Parameter	Sample Number	Location	Time (Min)	Rate (lpm)	Volume (m^3)	Result (ug)	ug/M^3	PPB
	J-M-OS	Central	480	2.4	1.15	4	3.47	0
	J-M-W-1	West Side	480	2.5	1.2	4	3.33	0
Chromium								
	J-M-BLK	Field Blank			0	0.24	0	0
	J-M-E-1	East Side	425	2.5	1.06	0.27	0.25	0
	J-M-E-2	East Side	480	2.6	1.24	0.22	0.17	0
	J-M-OS	Central	480	2.4	1.15	0.27	0.23	0
	J-M-W-1	West Side	480	2.5	1.2	0.24	0.2	0
Cobalt								
	J-M-BLK	Field Blank			0	< 0.4	< 0	< 0
	J-M-E-1	East Side	425	2.5	1.06	< 0.4	< 0.37	< 0
	J-M-E-2	East Side	480	2.6	1.24	< 0.4	< 0.32	< 0
	J-M-OS	Central	480	2.4	1.15	< 0.4	< 0.34	< 0
	J-M-W-1	West Side	480	2.5	1.2	< 0.4	< 0.33	< 0
Copper								
	J-M-BLK	Field Blank			0	< 0.3	< 0	< 0
	J-M-E-1	East Side	425	2.5	1.06	< 0.3	< 0.28	< 0
	J-M-E-2	East Side	480	2.6	1.24	< 0.3	< 0.24	< 0
	J-M-OS	Central	480	2.4	1.15	< 0.3	< 0.26	< 0
	J-M-W-1	West Side	480	2.5	1.2	< 0.3	< 0.25	< 0
Iron								
	J-M-BLK	Field Blank			0	11	0	0
	J-M-E-1	East Side	425	2.5	1.06	16	15	0
	J-M-E-2	East Side	480	2.6	1.24	9	7.21	0
	J-M-OS	Central	480	2.4	1.15	6	5.2	0
	J-M-W-1	West Side	480	2.5	1.2	5	4.16	0
Lead								
	J-M-BLK	Field Blank			0	< 1	< 0	< 0

Date 11/19/90

TABLE 1

AIR SAMPLE RESULTS

Company: Alcan Alum - Jarl

Client # 3057.032

Parameter	Sample Number	Location	Time (Min)	Rate (lpm)	Volume (m^3)	Result (ug)	ug/M^3	PPB
	J-M-E-1	East Side	425	2.5	1.06	< 1	< 0.94	< 0
	J-M-E-2	East Side	480	2.6	1.24	< 1	< 0.8	< 0
	J-M-OS	Central	480	2.4	1.15	< 1	< 0.86	< 0
	J-M-W-1	West Side	480	2.5	1.2	< 1	< 0.83	< 0
Magnesium								
	J-M-BLK	Field Blank			0	2	0	0
	J-M-E-1	East Side	425	2.5	1.06	< 1	< 0.94	< 0
	J-M-E-2	East Side	480	2.6	1.24	< 1	< 0.8	< 0
	J-M-OS	Central	480	2.4	1.15	2	1.73	0
	J-M-W-1	West Side	480	2.5	1.2	< 1	< 0.83	< 0
Manganese								
	J-M-BLK	Field Blank			0	< 0.1	< 0	< 0
	J-M-E-1	East Side	425	2.5	1.06	< 0.1	< 0.09	< 0
	J-M-E-2	East Side	480	2.6	1.24	< 0.1	< 0.08	< 0
	J-M-OS	Central	480	2.4	1.15	< 0.1	< 0.08	< 0
	J-M-W-1	West Side	480	2.5	1.2	< 0.1	< 0.08	< 0
Nickel								
	J-M-BLK	Field Blank			0	< 0.4	< 0	< 0
	J-M-E-1	East Side	425	2.5	1.06	< 0.4	< 0.37	< 0
	J-M-E-2	East Side	480	2.6	1.24	< 0.4	< 0.32	< 0
	J-M-OS	Central	480	2.4	1.15	< 0.4	< 0.34	< 0
	J-M-W-1	West Side	480	2.5	1.2	< 0.4	< 0.33	< 0
Selenium								
	J-M-BLK	Field Blank			0	< 2	< 0	< 0
	J-M-E-1	East Side	425	2.5	1.06	< 2	< 1.88	< 0
	J-M-E-2	East Side	480	2.6	1.24	< 2	< 1.6	< 0
	J-M-OS	Central	480	2.4	1.15	< 2	< 1.73	< 0
	J-M-W-1	West Side	480	2.5	1.2	< 2	< 1.66	< 0
Silver								

Date 11/19/90

TABLE 1

AIR SAMPLE RESULTS

Company: Alcan Alum - Jarl

Client # 3057.032

Parameter	Sample Number	Location	Time (Min)	Rate (lpm)	Volume (m^3)	Result (ug)	ug/M^3	PPB
	J-M-BLK	Field Blank			0	< 0.4	< 0	< 0
	J-M-E-1	East Side	425	2.5	1.06	< 0.4	< 0.37	< 0
	J-M-E-2	East Side	480	2.6	1.24	< 0.4	< 0.32	< 0
	J-M-OS	Central	480	2.4	1.15	< 0.4	< 0.34	< 0
	J-M-W-1	West Side	480	2.5	1.2	< 0.4	< 0.33	< 0
Sodium								
	J-M-BLK	Field Blank			0	14	0	0
	J-M-E-1	East Side	425	2.5	1.06	12	11.2	0
	J-M-E-2	East Side	480	2.6	1.24	16	12.8	0
	J-M-OS	Central	480	2.4	1.15	15	13	0
	J-M-W-1	West Side	480	2.5	1.2	14	11.6	0
Thallium								
	J-M-BLK	Field Blank			0	< 0.8	< 0	< 0
	J-M-E-1	East Side	425	2.5	1.06	< 0.8	< 0.75	< 0
	J-M-E-2	East Side	480	2.6	1.24	< 0.8	< 0.64	< 0
	J-M-OS	Central	480	2.4	1.15	< 0.8	< 0.69	< 0
	J-M-W-1	West Side	480	2.5	1.2	< 0.8	< 0.66	< 0
Zinc								
	J-M-BLK	Field Blank			0	< 0.3	< 0	< 0
	J-M-E-1	East Side	425	2.5	1.06	< 0.3	< 0.28	< 0
	J-M-E-2	East Side	480	2.6	1.24	< 0.3	< 0.24	< 0
	J-M-OS	Central	480	2.4	1.15	< 0.3	< 0.26	< 0
	J-M-W-1	West Side	480	2.5	1.2	< 0.3	< 0.25	< 0

TABLE 1
AIR SAMPLE RESULTS

Company: Alcan Alum - Jarl

Client # 3057.032

Parameter	Sample Number	Location	Time (Min)	Rate (lpm)	Volume (m^3)	Result (ug)	ug/M^3	PPB
Benzene								
	J-V2-BLK	Field Blank			0	< 6	< 0	< 0
	J-V2-E1	East Side	480	0.496	0.23	< 6	< 25.2	< 7.9
	J-V2-E2	East Side	480	0.423	0.2	< 6	< 29.5	< 9.26
	J-V2-OS	Central	480	0.483	0.23	< 6	< 25.8	< 8.11
	J-V2-W	West Side	480	0.35	0.16	< 6	< 35.7	< 11.2
Cumene								
	J-V2-BLK	Field Blank			0	< 8	< 0	< 0
	J-V2-E1	East Side	480	0.496	0.23	< 8	< 33.6	< 6.84
	J-V2-E2	East Side	480	0.423	0.2	< 8	< 39.4	< 8.02
	J-V2-OS	Central	480	0.483	0.23	< 8	< 34.5	< 7.03
	J-V2-W	West Side	480	0.35	0.16	< 8	< 47.6	< 9.7
Ethyl Benzene								
	J-V2-BLK	Field Blank			0	< 4	< 0	< 0
	J-V2-E1	East Side	480	0.496	0.23	< 4	< 16.8	< 3.87
	J-V2-E2	East Side	480	0.423	0.2	< 4	< 19.7	< 4.54
	J-V2-OS	Central	480	0.483	0.23	< 4	< 17.2	< 3.98
	J-V2-W	West Side	480	0.35	0.16	< 4	< 23.8	< 5.49
Methyl Styrene								
	J-V2-BLK	Field Blank			0	< 13	< 0	< 0
	J-V2-E1	East Side	480	0.496	0.23	< 13	< 54.6	< 11.3
	J-V2-E2	East Side	480	0.423	0.2	< 13	< 64	< 13.2
	J-V2-OS	Central	480	0.483	0.23	< 13	< 56	< 11.6
	J-V2-W	West Side	480	0.35	0.16	< 13	< 77.3	< 16
p-tert-Butyltoluene								
	J-V2-BLK	Field Blank			0	< 8	< 0	< 0
	J-V2-E1	East Side	480	0.496	0.23	< 8	< 33.6	< 5.55
	J-V2-E2	East Side	480	0.423	0.2	< 8	< 39.4	< 6.5

Date 11/19/90

TABLE 1

AIR SAMPLE RESULTS

Company: Alcan Alum - Jarl

Client # 3057.032

Parameter	Sample Number	Location	Time (Min)	Rate (lpm)	Volume (m^3)	Result (ug)	ug/M^3	PPB
	J-V2-OS	Central	480	0.483	0.23	< 8	< 34.5	< 5.7
	J-V2-W	West Side	480	0.35	0.16	< 8	< 47.6	< 7.86
Styrene								
	J-V2-BLK	Field Blank			0	< 8	< 0	< 0
	J-V2-E1	East Side	480	0.496	0.23	< 8	< 33.6	< 7.9
	J-V2-E2	East Side	480	0.423	0.2	< 8	< 39.4	< 9.26
	J-V2-OS	Central	480	0.483	0.23	< 8	< 34.5	< 8.11
	J-V2-W	West Side	480	0.35	0.16	< 8	< 47.6	< 11.2
Xylenes								
	J-V2-BLK	Field Blank			0	< 8	< 0	< 0
	J-V2-E1	East Side	480	0.496	0.23	< 8	< 33.6	< 7.75
	J-V2-E2	East Side	480	0.423	0.2	< 8	< 39.4	< 9.08
	J-V2-OS	Central	480	0.483	0.23	< 8	< 34.5	< 7.95
	J-V2-W	West Side	480	0.35	0.16	< 8	< 47.6	< 10.9

Date 11/19/90

TABLE 1
AIR SAMPLE RESULTS

Company: Alcan Alum - Jarl

Client # 3057.032

Parameter	Sample Number	Location	Time (Min)	Rate (lpm)	Volume (m^3)	Result (ug)	ug/M^3	PPB
1,1 Dichloroethane								
	J-V1-BLK	Field Blank			0	< 20	< 0	< 0
	J-V1-E1	East Side	480	0.471	0.22	< 20	< 88.4	< 21.8
	J-V1-E2	East Side	480	0.492	0.23	< 20	< 84.6	< 20.9
	J-V1-OS	Central	480	0.522	0.25	< 20	< 79.8	< 19.7
	J-V1-W	West Side	433	0.494	0.21	< 20	< 93.5	< 23
1,2 Dichlorobenzene								
	J-V1-BLK	Field Blank			0	< 11	< 0	< 0
	J-V1-E1	East Side	480	0.471	0.22	< 11	< 48.6	< 8.09
	J-V1-E2	East Side	480	0.492	0.23	< 11	< 46.5	< 7.74
	J-V1-OS	Central	480	0.522	0.25	< 11	< 43.9	< 7.3
	J-V1-W	West Side	433	0.494	0.21	< 11	< 51.4	< 8.55
1,3 Dichloropropene								
	J-V1-BLK	Field Blank			0	< 20	< 0	< 0
	J-V1-E1	East Side	480	0.471	0.22	< 20	< 88.4	< 19.1
	J-V1-E2	East Side	480	0.492	0.23	< 20	< 84.6	< 18.3
	J-V1-OS	Central	480	0.522	0.25	< 20	< 79.8	< 17.2
	J-V1-W	West Side	433	0.494	0.21	< 20	< 93.5	< 20.2
1,4 Dichlorobenzene								
	J-V1-BLK	Field Blank			0	< 11	< 0	< 0
	J-V1-E1	East Side	480	0.471	0.22	< 11	< 48.6	< 8.09
	J-V1-E2	East Side	480	0.492	0.23	< 11	< 46.5	< 7.74
	J-V1-OS	Central	480	0.522	0.25	< 11	< 43.9	< 7.3
	J-V1-W	West Side	433	0.494	0.21	< 11	< 51.4	< 8.55
Benzyl Chloride								
	J-V1-BLK	Field Blank			0	< 20	< 0	< 0
	J-V1-E1	East Side	480	0.471	0.22	< 20	< 88.4	< 17
	J-V1-E2	East Side	480	0.492	0.23	< 20	< 84.6	< 16.3

Date 11/19/90

TABLE 1

AIR SAMPLE RESULTS

Company: Alcan Alum - Jarl

Client # 3057.032

Parameter	Sample Number	Location	Time (Min)	Rate (lpm)	Volume (m^3)	Result (ug)	ug/M^3	PPB
	J-V1-OS	Central	480	0.522	0.25	< 20	< 79.8	< 15.3
	J-V1-W	West Side	433	0.494	0.21	< 20	< 93.5	< 18
Bromoform								
	J-V1-BLK	Field Blank			0	< 20	< 0	< 0
	J-V1-E1	East Side	480	0.471	0.22	< 20	< 88.4	< 8.54
	J-V1-E2	East Side	480	0.492	0.23	< 20	< 84.6	< 8.18
	J-V1-OS	Central	480	0.522	0.25	< 20	< 79.8	< 7.71
	J-V1-W	West Side	433	0.494	0.21	< 20	< 93.5	< 9.03
Carbon Tetrachloride								
	J-V1-BLK	Field Blank			0	< 40	< 0	< 0
	J-V1-E1	East Side	480	0.471	0.22	< 40	< 176	< 28
	J-V1-E2	East Side	480	0.492	0.23	< 40	< 169	< 26.8
	J-V1-OS	Central	480	0.522	0.25	< 40	< 159	< 25.3
	J-V1-W	West Side	433	0.494	0.21	< 40	< 187	< 29.6
Chlorobenzene								
	J-V1-BLK	Field Blank			0	< 11	< 0	< 0
	J-V1-E1	East Side	480	0.471	0.22	< 11	< 48.6	< 10.5
	J-V1-E2	East Side	480	0.492	0.23	< 11	< 46.5	< 10
	J-V1-OS	Central	480	0.522	0.25	< 11	< 43.9	< 9.49
	J-V1-W	West Side	433	0.494	0.21	< 11	< 31.4	< 6.8
Chlorobromomethane								
	J-V1-BLK	Field Blank			0	< 20	< 0	< 0
	J-V1-E1	East Side	480	0.471	0.22	< 20	< 88.4	< 16.7
	J-V1-E2	East Side	480	0.492	0.23	< 20	< 84.6	< 16
	J-V1-OS	Central	480	0.522	0.25	< 20	< 79.8	< 15.1
	J-V1-W	West Side	433	0.494	0.21	< 20	< 93.5	< 17.7
Chloroform								
	J-V1-BLK	Field Blank			0	< 20	< 0	< 0

Date 11/19/90

TABLE 1

AIR SAMPLE RESULTS

Company: Alcan Alum - Jarl

Client # 3057.032

Parameter	Sample Number	Location	Time (Min)	Rate (lpm)	Volume (m^3)	Result (ug)	ug/M^3	PPB
	J-V1-E1	East Side	480	0.471,	0.22	< 20	< 88.4	< 18.1
	J-V1-E2	East Side	480	0.492	0.23	< 20	< 84.6	< 17.4
	J-V1-OS	Central	480	0.522	0.25	< 20	< 79.8	< 16.4
	J-V1-W	West Side	433	0.494	0.21	< 20	< 93.5	< 19.2
Hexachloroethane								
	J-V1-BLK	Field Blank			0	< 20	< 0	< 0
	J-V1-E1	East Side	480	0.471	0.22	< 20	< 88.4	< 9.12
	J-V1-E2	East Side	480	0.492	0.23	< 20	< 84.6	< 8.73
	J-V1-OS	Central	480	0.522	0.25	< 20	< 79.8	< 8.23
	J-V1-W	West Side	433	0.494	0.21	< 20	< 93.5	< 9.64
Methyl Chloroform								
	J-V1-BLK	Field Blank			0	< 20	< 0	< 0
	J-V1-E1	East Side	480	0.471	0.22	< 20	< 88.4	< 16.2
	J-V1-E2	East Side	480	0.492	0.23	< 20	< 84.6	< 15.5
	J-V1-OS	Central	480	0.522	0.25	< 20	< 79.8	< 14.6
	J-V1-W	West Side	433	0.494	0.21	< 20	< 93.5	< 17.1
t-1,2Dichloroethene								
	J-V1-BLK	Field Blank			0	< 20	< 0	< 0
	J-V1-E1	East Side	480	0.471	0.22	< 20	< 88.4	< 14.7
	J-V1-E2	East Side	480	0.492	0.23	< 20	< 84.6	< 14
	J-V1-OS	Central	480	0.522	0.25	< 20	< 79.8	< 13.2
	J-V1-W	West Side	433	0.494	0.21	< 20	< 93.5	< 15.5
Trichloroethylene								
	J-V1-BLK	Field Blank			0	< 20	< 0	< 0
	J-V1-E1	East Side	480	0.471	0.22	< 20	< 88.4	< 16.5
	J-V1-E2	East Side	480	0.492	0.23	< 20	< 84.6	< 15.8
	J-V1-OS	Central	480	0.522	0.25	< 20	< 79.8	< 14.9
	J-V1-W	West Side	433	0.494	0.21	< 20	< 93.5	< 17.4

Date 11/19/90

OB. NGGERE ENGINEERS, INC.

INDUSTRIAL HYGIENE SURVEY DATA SHEET

CLIENT: Alcan Aluminum LOCATION: Steel Extrusion CLIENT NO. 3057. . SURVEY DATE: 10/17/90

SAMPLING PUMP DATA		
Pump Type: GTT personal	Manufacturer: Gilian	Model:

Serial number	OBG Number	REASON FOR SAMPLING - INCLUDE PROCESS OR OPERATION DESCRIPTION & CONTROLS
		As part of [illegible] upload, [illegible] onsite

Collection (sampling) Media: Charcoal tubes / Filters (MCE)	Analysis Required: NIOSH 1003, 1501, 7300

SAMPLE DATA

OBG Instr. No.	Sample No.	Sampling Location (include employee's name)	Collection Time Start	Collection Time End	Collection Duration (in mins.)	Flow Rate	Sampler Position	No. of Persons In Area	Exposure Time (mins.)	Shift Duration (mins.)	COMMENTS
21921 #1	J-V1-UW	Upwind West side	0814	1614	433	50.0 cc/min 49.2	E	N/A			NIOSH 1003 186 min 21939 1205 247 min
21921 #2	J-V2-UW	Upwind West side	0814	1614	480	35.0 cc/min					NIOSH 1501
21924	J-M-UW	Upwind West side	0814	1614	480	2.5 lpm					NIOSH 7300
21931 #1	J-V1-OS	On site Central	0824	1424	480	52.2 cc/min			N/A		NIOSH 1003
#2	J-V2-OS	On site Central	0824	1424	480	49.4 cc/min					NIOSH 1501
21727	J-M-OS	On site Central	0824	1424	480	2.4 lpm					NIOSH 7300

Manager:	Hygienist: Caroline Miller	Sampler: Caroline Miller

OB. .NEGERE ENGINEERS, INC.

INDUSTRIAL HYGIENE SURVEY DATA SHEET

CLIENT: Alcan Aluminum LOCATION: Jud Colmsen CLIENT NO. 3057 . . SURVEY DATE: 10/17/90

SAMPLING PUMP DATA		
Pump Type: personal	Manufacturer: Gilian	Model: HFS 113

Serial Number	OBG Number	REASON FOR SAMPLING - INCLUDE PROCESS OR OPERATION DESCRIPTION & CONTROLS
		as specified in work plan. Upwind, onsite + downwind

Collection (sampling) Media:	Analysis Required:
Charcoal / MCE	NIOSH 1003, 1501, 7300

SAMPLE DATA

OBG Instr. No.	Sample No.	Sampling Location (include employee's name)	Collection Time Start	Collection Time End	Collection Duration (in mins.)	Flow Rate	Sampler Position	No. of Persons In Area	Exposure Time (mins.)	Shift Duration (mins.)	COMMENTS
21151 #1	JVI-E 1	downwind dept east side	[illegible]	[illegible]	450	4.71 cc/m	E				NIOSH 1003
21752 #2	JVI-E 1	downwind east side	0837	[illegible]	480	4.9 cc/m		N/A			NIOSH 1501
21940 #1	JVI-E 2	downwind east side	0837	[illegible]	480	4.2 cc/m					NIOSH 7300
21941 #2	JVI-E 2	downwind duplicate east side	0837	[illegible]	480	4.23 cc/m					NIOSH 1003 #1
21435	J-14 E 1	downwind duplicate east side	[illegible]	[illegible]	425	2.41 2.45			N/A		NIOSH 1501 242 min 21941 474 134 min
21925	J-14 E 2	downwind duplicate east side	[illegible]	[illegible]	450	2.0					NIOSH 7300

Manager:	Hygienist: Carolina Miller	Sampler: Carolina Miller

OBG ENGINEERS, INC.

INDUSTRIAL HYGIENE SURVEY DATA SHEET

CLIENT: Alcan Aluminum LOCATION: [illegible] CLIENT NO. 3057 . . SURVEY DATE: 10/7/9[illegible]

SAMPLING PUMP DATA		
Pump Type: personal	Manufacturer: [illegible]	Model:

Serial Number	OBG Number	REASON FOR SAMPLING - INCLUDE PROCESS OR OPERATION DESCRIPTION & CONTROLS
		As part of work plan

Collection (sampling) Media:	Analysis Required:

SAMPLE DATA

OBG Instr. No.	Sample No.	Sampling Location (include employee's name)	Collection Time Start	Collection Time End	Collection Duration (in mins.)	Flow Rate	Sampler Position	No. of Persons In Area	Exposure Time (mins.)	Shift Duration (mins.)	COMMENTS
N/A	5-V1 BLK	Blank		N/A							NIOSH 1025
	5-V2-BLK	Blank			N/A			N/A			NIOSH 1501
	5-M-BLK	Blank							N/A		NIOSH 7300

Manager:	Hygienist:	Sampler:

Galson Laboratories

LABORATORY ANALYSIS REPORT

6601 Kirkville Road
E Syracuse NY 13057
Tel (315) 432-0506
1-800-950-0506

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 18-OCT-1990

BENZYL CHLORIDE NIOSH 1003

Sample ID	Lab ID	SAMP VOL L	PART A UG	PART B UG	TOTAL UG	MG/M3	PPM
J-V1-W	J22005	NS	<20	<20	<20	NA	NA
J-V1-OS	J22006	NS	<20	<20	<20	NA	NA
J-V1-E1	J22007	NS	<20	<20	<20	NA	NA
J-V1-E2	J22008	NS	<20	<20	<20	NA	NA
J-V1-BLK	J22009BL	NA	<20	<20	<20	NA	NA

Desorption Efficiency = 100%

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: EDA
Approved by:
Date: 6-NOV-1990

Galson
Laboratories

LABORATORY ANALYSIS REPORT

6601 Kirkville Road
E Syracuse NY 13057
Tel (315) 432-0506
1-800-950-0506

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

CHLOROBROMOMETHANE NIOSH 1003

Sample ID	Lab ID	AIR VOL L	PART A UG	PART B UG	TOTAL UG	MG/M3	PPM
J-V1-W	J22005	NS	<20	<20	<20	NA	NA
J-V1-OS	J22006	NS	<20	<20	<20	NA	NA
J-V1-E1	J22007	NS	<20	<20	<20	NA	NA
J-V1-E2	J22008	NS	<20	<20	<20	NA	NA
J-V1-BLK	J22009BL	NA	<20	<20	<20	NA	NA

Desorption Efficiency =100%

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: EDA
Approved by:
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 18-OCT-1990

1,3 DICHLOROPROPENE NIOSH 1003

Sample ID	Lab ID	AIR VOL L	PART A UG	PART B UG	TOTAL UG	MG/M3	PPM
J-V1-W	J22005	NS	<20	<20	<20	NA	NA
J-V1-OS	J22006	NS	<20	<20	<20	NA	NA
J-V1-E1	J22007	NS	<20	<20	<20	NA	NA
J-V1-E2	J22008	NS	<20	<20	<20	NA	NA
J-V1-BLK	J22009BL	NA	<20	<20	<20	NA	NA

Desorption Efficiency = 100%

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: EDA
Approved by:
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 18-OCT-1990

1,2-DICHLOROBENZENE NIOSH 1003

Sample ID	Lab ID	AIR VOL L	PART A UG	PART B UG	TOTAL UG	MG/M3	PPM
J-V1-W	J22005	NS	<10	<10	<11	NA	NA
J-V1-OS	J22006	NS	<10	<10	<11	NA	NA
J-V1-E1	J22007	NS	<10	<10	<11	NA	NA
J-V1-E2	J22008	NS	<10	<10	<11	NA	NA
J-V1-BLK	J22009BL	NA	<10	<10	<11	NA	NA

Desorption Efficiency: TOTAL UG CORRECTED FOR A DESORPTION EFFICIENCY OF 90%

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: EDA
Approved by:
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 18-OCT-1990

HEXACHLOROETHANE NIOSH 1003

Sample ID	Lab ID	AIR VOL L	PART A UG	PART B UG	TOTAL UG	MG/M3	PPM
J-V1-W	J22005	NS	<20	<20	<20	NA	NA
J-V1-OS	J22006	NS	<20	<20	<20	NA	NA
J-V1-E1	J22007	NS	<20	<20	<20	NA	NA
J-V1-E2	J22008	NS	<20	<20	<20	NA	NA
J-V1-BLK	J22009BL	NA	<20	<20	<20	NA	NA

Desorption Efficiency = 100%

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: EDA
Approved by:
Date: 6-NOV-1990

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Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 18-OCT-1990

TRICHLOROETHYLENE NIOSH 1003

Sample ID	Lab ID	AIR VOL L	PART A UG	PART B UG	TOTAL UG	MG/M3	PPM
J-V1-W	J22005	NS	<20	<20	<20	NA	NA
J-V1-OS	J22006	NS	<20	<20	<20	NA	NA
J-V1-E1	J22007	NS	<20	<20	<20	NA	NA
J-V1-E2	J22008	NS	<20	<20	<20	NA	NA
J-V1-BLK	J22009BL	NA	<20	<20	<20	NA	NA

Desorption Efficiency = 100%

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: EDA
Approved by:
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 18-OCT-1990

CHLOROBENZENE NIOSH 1003

Sample ID	Lab ID	SAMP VOL L	PART A UG	PART B UG	TOTAL UG	MG/M3	PPM
J-V1-W	J22005	NS	<10	<10	<11	NA	NA
J-V1-OS	J22006	NS	<10	<10	<11	NA	NA
J-V1-E1	J22007	NS	<10	<10	<11	NA	NA
J-V1-E2	J22008	NS	<10	<10	<11	NA	NA
J-V1-BLK	J22009BL	NA	<10	<10	<11	NA	NA

Desorption Efficiency: TOTAL UG CORRECTED FOR A DESORPTION EFFICIENCY OF 94%

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms

Submitted by: EDA
Approved by:
Date: 6-NOV-1990

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Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 18-OCT-1990

METHYL STYRENE NIOSH 1501

Sample ID	Lab ID	AIR VOL L	PART A UG	PART B UG	TOTAL UG	MG/M3	PPM
J-V2-W	J22010	NS	<8	<8	<13	NA	NA
J-V2-OS	J22011	NS	<8	<8	<13	NA	NA
J-V2-E1	J22012	NS	<8	<8	<13	NA	NA
J-V2-E2	J22013	NS	<8	<8	<13	NA	NA
J-V2-BLK	J22014BL	NA	<8	<8	<13	NA	NA

Desorption Efficiency: TOTAL UG CORRECTED FOR A DESORPTION EFFICIENCY OF 60%

Footnotes: METHYL STYRENE AND VINYL TOLUENE ARE SYNONYMS

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms

Submitted by: EDA
Approved by:
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

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Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 18-OCT-1990

ETHYLBENZENE NIOSH 1501

Sample ID	Lab ID	AIR VOL L	PART A UG	PART B UG	TOTAL UG	MG/M3	PPM
J-V2-W	J22010	NS	<4	<4	<4	NA	NA
J-V2-OS	J22011	NS	<4	<4	<4	NA	NA
J-V2-E1	J22012	NS	<4	<4	<4	NA	NA
J-V2-E2	J22013	NS	<4	<4	<4	NA	NA
J-V2-BLK	J22014BL	NA	<4	<4	<4	NA	NA

Desorption Efficiency = 100%

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: EDA
Approved by:
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 18-OCT-1990

CUMENE NIOSH 1501

Sample ID	Lab ID	AIR VOL L	PART A UG	PART B UG	TOTAL UG	MG/M3	PPM
J-V2-W	J22010	NS	<8	<8	<8	NA	NA
J-V2-OS	J22011	NS	<8	<8	<8	NA	NA
J-V2-E1	J22012	NS	<8	<8	<8	NA	NA
J-V2-E2	J22013	NS	<8	<8	<8	NA	NA
J-V2-BLK	J22014BL	NA	<8	<8	<8	NA	NA

Desorption Efficiency =100%

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: EDA
Approved by:
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 18-OCT-1990

STYRENE NIOSH 1501

Sample ID	Lab ID	AIR VOL L	PART A UG	PART B UG	TOTAL UG	MG/M3	PPM
J-V2-W	J22010	NS	<6	<6	<8	NA	NA
J-V2-OS	J22011	NS	<6	<6	<8	NA	NA
J-V2-E1	J22012	NS	<6	<6	<8	NA	NA
J-V2-E2	J22013	NS	<6	<6	<8	NA	NA
J-V2-BLK	J22014BL	NA	<6	<6	<8	NA	NA

Desorption Efficiency: TOTAL UG CORRECTED FOR A DESORPTION EFFICIENCY OF 73%

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M³ - Cubic Meter
MG/M³ - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: EDA
Approved by:
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

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Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 18-OCT-1990

BENZENE NIOSH 1501

Sample ID	Lab ID	AIR VOL L	PART A UG	PART B UG	TOTAL UG	MG/M3	PPM
J-V2-W	J22010	NS	<6	<6	<6	NA	NA
J-V2-OS	J22011	NS	<6	<6	<6	NA	NA
J-V2-E1	J22012	NS	<6	<6	<6	NA	NA
J-V2-E2	J22013	NS	<6	<6	<6	NA	NA
J-V2-BLK	J22014BL	NA	<6	<6	<6	NA	NA

DESORPTION EFFICIENCY = 100%

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: EDA
Approved by:
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 18-OCT-1990

P-TERT-BUTYLTOLUENE NIOSH 1501

Sample ID	Lab ID	AIR VOL L	PART A UG	PART B UG	TOTAL UG	MG/M3	PPM
J-V2-W	J22010	NS	<8	<8	<8	NA	NA
J-V2-OS	J22011	NS	<8	<8	<8	NA	NA
J-V2-E1	J22012	NS	<8	<8	<8	NA	NA
J-V2-E2	J22013	NS	<8	<8	<8	NA	NA
J-V2-BLK	J22014BL	NA	<8	<8	<8	NA	NA

DESORPTION EFFICIENCY = 100%

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: EDA
Approved by:
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 18-OCT-1990

XYLENES NIOSH 1501

Sample ID	Lab ID	AIR VOL L	PART A UG	PART B UG	TOTAL UG	MG/M3	PPM
J-V2-W	J22010	NS	<8	<8	<8	NA	NA
J-V2-OS	J22011	NS	<8	<8	<8	NA	NA
J-V2-E1	J22012	NS	<8	<8	<8	NA	NA
J-V2-E2	J22013	NS	<8	<8	<8	NA	NA
J-V2-BLK	J22014BL	NA	<8	<8	<8	NA	NA

DESORPTION EFFICIENCY =100%

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: EDA
Approved by:
Date: 6-NOV-1990

Galson Laboratories

LABORATORY ANALYSIS REPORT

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Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

THALLIUM

Sample ID	Lab ID	AIR VOL M3	TOTAL UG	UG/M3
J-M-W-1	J22000	NS	<0.8	NA
J-M-OS	J22001	NS	<0.8	NA
J-M-E1	J22002	NS	<0.8	NA
J-M-E2	J22003	NS	<0.8	NA
J-V1-BLK	J22004BL	NA	<0.8	NA

Method(s): NITIRC ACID DIGESTION, ANALYSIS GFAA
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: KMB,KSB
Approved by: M. urthrow
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 18-OCT-1990

CHROMIUM FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL UG	MG/M3
J-M-W-1	J22000	NS	0.24	NA
J-M-OS	J22001	NS	0.27	NA
J-M-E1	J22002	NS	0.27	NA
J-M-E2	J22003	NS	0.22	NA
J-V1-BLK	J22004BL	NA	0.24	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by: M. Withrow
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

COBALT FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL UG	MG/M3
J-M-W-1	J22000	NS	<0.4	NA
J-M-OS	J22001	NS	<0.4	NA
J-M-E1	J22002	NS	<0.4	NA
J-M-E2	J22003	NS	<0.4	NA
J-V1-BLK	J22004BL	NA	<0.4	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by: M. withrow
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

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Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

COPPER FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL UG	MG/M3
J-M-W-1	J22000	NS	<0.3	NA
J-M-OS	J22001	NS	<0.3	NA
J-M-E1	J22002	NS	<0.3	NA
J-M-E2	J22003	NS	<0.3	NA
J-V1-BLK	J22004BL	NA	<0.3	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by: M. Withrow
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

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Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

NICKEL FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL UG	MG/M3
J-M-W-1	J22000	NS	<0.4	NA
J-M-OS	J22001	NS	<0.4	NA
J-M-E1	J22002	NS	<0.4	NA
J-M-E2	J22003	NS	<0.4	NA
J-V1-BLK	J22004BL	NA	<0.4	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by: M. Withrow
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

BERYLLIUM FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL UG	UG/M3
J-M-W-1	J22000	NS	<0.03	NA
J-M-OS	J22001	NS	<0.03	NA
J-M-E1	J22002	NS	<0.03	NA
J-M-E2	J22003	NS	<0.03	NA
J-V1-BLK	J22004BL	NA	<0.03	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by: M. Warthron
Date: 6-NOV-1990

Galson
Laboratories

6601 Kirkville Road
E Syracuse NY 13057
Tel (315) 432-0506
1-800-950-0506

LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

CADMIUM FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL UG	UG/M3
J-M-W-1	J22000	NS	<0.08	NA
J-M-OS	J22001	NS	<0.08	NA
J-M-E1	J22002	NS	<0.08	NA
J-M-E2	J22003	NS	<0.08	NA
J-V1-BLK	J22004BL	NA	<0.08	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by: M. Withrow
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

LEAD FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL UG	UG/M3
J-M-W-1	J22000	NS	<1	NA
J-M-OS	J22001	NS	<1	NA
J-M-E1	J22002	NS	<1	NA
J-M-E2	J22003	NS	<1	NA
J-V1-BLK	J22004BL	NA	<1	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by: M. Wthrow
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

MANGANESE FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL UG	MG/M3
J-M-W-1	J22000	NS	<0.1	NA
J-M-OS	J22001	NS	<0.1	NA
J-M-E1	J22002	NS	<0.1	NA
J-M-E2	J22003	NS	<0.1	NA
J-V1-BLK	J22004BL	NA	<0.1	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by: M. Cuthron
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

ZINC FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL UG	MG/M3
J-M-W-1	J22000	NS	<0.3	NA
J-M-OS	J22001	NS	<0.3	NA
J-M-E1	J22002	NS	<0.3	NA
J-M-E2	J22003	NS	<0.3	NA
J-V1-BLK	J22004BL	NA	<0.3	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by: M. Withrow
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

ALUMINUM FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL MG	MG/M3
J-M-W-1	J22000	NS	<0.001	NA
J-M-OS	J22001	NS	0.003	NA
J-M-E1	J22002	NS	<0.001	NA
J-M-E2	J22003	NS	<0.001	NA
J-V1-BLK	J22004BL	NA	<0.001	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by: M. Withrow
Date: 6-NOV-1990

Galson Laboratories

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

CALCIUM FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL MG	MG/M3
J-M-W-1	J22000	NS	0.004	NA
J-M-OS	J22001	NS	0.004	NA
J-M-E1	J22002	NS	0.004	NA
J-M-E2	J22003	NS	0.005	NA
J-V1-BLK	J22004BL	NA	0.007	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by: M. Withrow
Date: 6-NOV-1990

Galson Laboratories

LABORATORY ANALYSIS REPORT

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Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

IRON FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL MG	MG/M3
J-M-W-1	J22000	NS	0.005	NA
J-M-OS	J22001	NS	0.006	NA
J-M-E1	J22002	NS	0.016	NA
J-M-E2	J22003	NS	0.009	NA
J-V1-BLK	J22004BL	NA	0.011	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by: M Winthrow
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

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Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

SILVER FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL UG	MG/M3
J-M-W-1	J22000	NS	<0.4	NA
J-M-OS	J22001	NS	<0.4	NA
J-M-E1	J22002	NS	<0.4	NA
J-M-E2	J22003	NS	<0.4	NA
J-V1-BLK	J22004BL	NA	<0.4	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by:
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

MAGNESIUM FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL MG	MG/M3
J-M-W-1	J22000	NS	<0.001	NA
J-M-OS	J22001	NS	0.002	NA
J-M-E1	J22002	NS	<0.001	NA
J-M-E2	J22003	NS	<0.001	NA
J-V1-BLK	J22004BL	NA	0.002	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by: M. Withrow
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

SODIUM FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL MG	MG/M3
J-M-W-1	J22000	NS	0.014	NA
J-M-OS	J22001	NS	0.015	NA
J-M-E1	J22002	NS	0.012	NA
J-M-E2	J22003	NS	0.016	NA
J-V1-BLK	J22004BL	NA	0.014	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7300 (ICP)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: AJN
Approved by: M. Withrow
Date: 6-NOV-1990

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LABORATORY ANALYSIS REPORT

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

SELENIUM FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL UG	UG/M3
J-M-W-1	J22000	NS	<2	NA
J-M-OS	J22001	NS	<2	NA
J-M-E1	J22002	NS	<2	NA
J-M-E2	J22003	NS	<2	NA
J-V1-BLK	J22004BL	NA	<2	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS GFAA
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: KSB,KMB
Approved by: M. Withrow
Date: 6-NOV-1990

Galson
Laboratories

LABORATORY ANALYSIS REPORT

6601 Kirkville Road
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Tel (315) 432-0506
1-800-950-0506

Client: O'BRIEN & GERE ENGINEERS, INC.
Task Number: 90101804 Job Number: L9114
Location: PROJECT #3057 Date Sampled: 17-OCT-1990

ARSENIC FILTER

Sample ID	Lab ID	AIR VOL M3	TOTAL UG	UG/M3
J-M-W-1	J22000	NS	<0.08	NA
J-M-OS	J22001	NS	<0.08	NA
J-M-E1	J22002	NS	<0.08	NA
J-M-E2	J22003	NS	<0.08	NA
J-V1-BLK	J22004BL	NA	<0.08	NA

Method(s): NITRIC ACID DIGESTION, ANALYSIS NIOSH 7901 (GFAA)
Footnotes:

(<) - Less Than
(>) - Greater Than
NA - Not Applicable
ND - Not detectable
NS - Not specified
MG - Milligrams
L - Liters
M^3 - Cubic Meter
MG/M^3 - Milligrams Per Cubic Meter
PPM - Parts Per Million
UG - Micrograms
NG - Nanograms
BL - Blank

Submitted by: KSB,KMB
Approved by: M. Withrow
Date: 6-NOV-1990

Appendix D

Well Logs

O'BRIEN & GERE
ENGINEERS, INC.

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-1D Sheet 1 of 5
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc. Foreman: Brian Waters OBG Geologist: Paul Gottler 8" dia. augers	Boring Location: 30' North of B-15 Ground Elevation: Dates: Started: 10/8/90 Ended: 10/8/90

Depth	Sample No	Sample Depth	Sample Blows /6"	Sample Penetr/ Recovry	Sample "N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Field Testing Sp Cond	Field Testing HNU	Rmks*
0	1	0-2'	1-2-3-5	2'/1.2'	5	Sod						
						Moist SAND with silt and clay, medium to fine sand, brownish-red clay horizontal laminations	0.3'					
1												
2	2	2-4'	4-3-6-5	2'/1'	9	Moist, medium to very fine, some brown to light brown SAND, trace silt, laminated, massive near bottom, may be minor grading to bottom						
3												
4	3	4-6'	5-4-4-5	2'/1.1'	8	Sand as above, wet SILT with brownish black clay						
5												
6	4	6-8'	4-3-3-3	2'/1.3'	6	Sand as above, grades to brown, iron-colored, orange and gray CLAY and SILT with faint laminations						
7												
8	5	8-10'	4-5-7-13	2'/1.6'	13	Sand as above to 8.3' Wet, CLAY and SILT with silt horizons, laminated						
9												
10	6	10-12'	7-9-9-13	2'/1.9'	18	Same as above, wet SILT horizons						
11												
12	7	12-14'	11-11-12-8	2'/2'	23	Same as above to 12.6 ft. Wet CLAY and SILT, laminated with wet red clay, moderately sharp contacts						
13												
14	8	14-16'	11-11-15-15	2'/2'	26	Same as above to 14.7 ft. Wet CLAY and SILT, laminated with orange and brown, sharp contact with wet SILT with trace clay at 15.2 ft.						
15												

1B1D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-1D Sheet 5 of 5
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler 8" d.a. augers

Boring Location: 30' North of B-1S
Ground Elevation:
Dates: Started: 10/5/90 Ended: 10/8/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
62	32	62-64'	5-5-10-12	2'/1.5'	15	Same as above with silt and clay laminations						
63												
64	33	64-66'	7-10-15-19	2'/1.3'	25	Same as above, orange tint						
65												
66	34	66-68'	18-16-19-17	2'/2'	35	Same as above						
67												
68	35	68-70'	10-7-13-10	2'/2'	20	Same as above, gray clay and silt	68'					
						Bottom of boring 68.0 ft.						

69-59' Screen
59' - grade Riser
69-57' Sand
57-56.5 Fine sand
56.5-53' Bentonite
53' - grade Cement

5B1D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-2D Sheet 1 of 5
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler 8" dia. augers

Boring Location: South west corner
Ground Elevation:
Dates: Started: 10/2/90 Ended: 10/3/90

Depth	Sample No	Sample Depth	Sample Blows /6"	Sample Penetr/ Recovry	Sample "N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Field Testing Sp Cond	Field Testing HNU	Rmks*
0	1	0-2'	2-3-4-4	2'/1.4'	7	Sod	0.5'					
						Moist, brown to light brown SAND and SILT, trace fine, well sorted silt						
1												
2	2	2-4'	4-3-4-5	2'/1.1'	7	Same as above, lighter in color						
3												
4	3	4-6'	4-4-4-3	2'/1.2'	8	Same as above, some silt						
5												
6	4	6-8'	4-8-8-8	2'/1.4'	16	Same as above, wet to 6.4', wet, red and gray CLAY and SILT						
7												
8	5	8-10'	5-5-10-15	2'/2'	15	Wet, gray, red and olive CLAY, some silt, iron staining						
9												
10	6	10-12'	13-16-	2'/1.7'	30	Wet, brownish gray CLAY, trace fine sand, clay horizons						
			14-21									
11												
12	7	12-14'	15-11-	2'/1.8'	25	Same as above, horizons with approx. 50% silt						
			14-16									
13												
14	8	14-16'	6-3-7-7	2'/1.7'	10	Wet, brown, fine SAND with sorted clay and silt						
15												

1B2D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-2D Sheet 2 of 5
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc. Foreman: Brian Waters OBG Geologist: Paul Gottler 8" dia. augers	Boring Location: South west corner Ground Elevation: Dates: Started: 10/2/90 Ended: 10/3/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Field Testing Sp Cond	Field Testing HNU	Rmks*
16	9	16-18'	8-7-6-7	2'/1.8'	13	Grading to wet silt at 16.8', to wet brown and gray clay at 17.2', to wet silt at 17.7						
17												
18	10	18-20'	4-4-4-6	2'/1'	8	Wet, fine, well sorted SAND, grading to wet silt, to wet sand						
19												
20	11	20-22'	4-4-4-5	2'/1.8'	8	Wet, SAND, SILT and CLAY, some fine sorted clay with brownish gray horizons at 21.8'						
21												
22	12	22-24'	5-6-7-12	2'/1.8'	13	Wet CLAY with silt laminations to 22.3' Wet, brown, medium to fine SAND to 22.6' Wet CLAY and SILT with iron staining to 23.3'						
23												
24	13	24-26'	7-7-12-13	2'/1.3'	19	Wet, SAND, CLAY and SILT, some brown, fine sand, trace brownish red clay to 25.8' Dry, SAND laminated by clay at 25.8'						
25												
26	14	26-28'	21-20- 23-23	2'/1'	43	Moist SAND, SILT and CLAY, some brown to tan, fine to very fine clay, laminated gray and brown clay and silt						
27												
28	15	28-30'	16-19- 23-19	2'/0.6'	42	Moist SAND and SILT, some brown and tan fine to very fine clay with silt lamination						
29												
30	16	30-32'	10-14- 16-23	2'/0.7'	30	Same as above, damp SILT and CLAY						

2B2D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-2D Sheet 3 of 5
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler
8" dia. augers

Boring Location: South west corner
Ground Elevation:
Dates: Started: 10/2/90 Ended: 10/3/90

Depth	Sample No	Sample Depth	Sample Blows /6"	Sample Penetr/ Recovry	Sample "N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Field Testing Sp Cond	Field Testing HNU	Rmks*
31												
32	17	32-34'	23-38-	2'/0.6'	75	Same as above, no clay						
			37-39									
33												
34	18	34-36'	19-26-	2'/0.5'	60	Same as above with graded horizons						
			34-41									
35												
36	19	36-38'	39-35-	2'/0.6'	68	Same as above with graded beds approximately 4 cm apart						
			33-30									
37												
38	20	38-40'	20-20-	2'/1.5'	39	Same as above with iron stained horizon above a clay horizon						
			19-26									
39												
40	21	40-42'	16-17-	2'/1.2'	37	Moist, fine SAND with brownish tan silt laminations						
			20-25									
41												
42	22	42-44'	13-13-	2'/1.3'	31	Same as above						
			18-19									
43												
44	23	44-46'	14-20-	2'/1.7'	40	Same as above						
			20-23									
45												
46	24	46-48'	16-22-	2'/1.4'	47	Same, grading to wet SAND and SILT to medium sand with silt laminations						
			25-30									

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-2D Sheet 4 of 5
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc. Foreman: Brian Waters OBG Geologist: Paul Gottler 8" dia. augers	Boring Location: South west corner Ground Elevation: Dates: Started: 10/2/90 Ended: 10/3/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Field Testing So Cond	Field Testing HNU	Rmks*
47	25	46-48'	16-22-	2'/1.4'	47	Same as above, grading to very fine sand to very moist silt at 47.5' with medium sand with silt lamination						
			25-30									
48												
49	26	48-50'	20-20-	2'/1.2'	52	Damp, medium to very fine SAND with black silt, heavy metal horizons lamination show cross bedding, very fine sand horizon has water						
			32-36									
50												
51	27	50-52'	23-22-	2'/1.5'	52	Moist CLAY with 5 laminations deformed (water escape), grading to damp sand with silt laminations						
			30-32									
52												
53	28	52-54'	23-27-	2'/1.7'	56	Damp SAND and SILT, very small cross beds						
			29-32									
54												
55	29	54-56'	19-28-	2'/1.9'	67	Damp, medium to very fine SAND, SILT and CLAY, water escape structures with clay laminations						
			39-35									
56												
57	30	56-58'	24-29-	2'/1.3'	64	Same as above						
			35-35									
58												
59	31	50-60'	14-25-	2'/1.7'	50	Moist, white and brown, medium to very fine SAND, brown CLAY and SILT to 59.6', moist sand with pebbles, fine sand in single horizon						
			25-27									
60												
61	32	60-62'	21-20-	2'/1.7'	46	Wet, medium to very fine SAND, with silt and brown clay laminations Wet at bottom of spoon 61.5 ft.						
			26-27									
62												

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-2D Sheet 5 of 5
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler 8" dia. augers

Boring Location: South west corner
Ground Elevation:
Dates: Started: 10/2/90 Ended: 10/3/90

Depth	Sample No	Sample Depth	Sample Blows /6"	Sample Penetr/ Recovry	Sample "N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Field Testing Sp Cond	Field Testing HNU	Rmks*
63	33	62-64'	8-7-9-11	2'/0.2'	16	Same as above with pebble horizon						
64												
65	34	64-66'	12-20-	2'/1.7'	46	Wet, coarse to very fine brown SAND with silt						
			26-29									
66												
67	35	66-68'	10-17-	2'/1.8'	46	Same as above						
			29-33									
68												
69	36	68-70'	18-17-	2'/1.9'	49	Same as above, medium to very fine SAND						
			32-39			Bottom of boring 70.2 ft.						

70-60' Screen
60-+2' Riser
70-58' Sand
58-57.5' Fine sand
57.5-54.5' Bentonite

5B2D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-3D Sheet 1 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc. Foreman: Brian Waters OBG Geologist: Paul Gottler 8" dia. augers	Boring Location: Ground Elevation: Dates: Started: 10/9/90 Ended: 10/10/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks
0	1	0-2'	2-4-7-6	2'/1.2'	11	Sod						
						Moist fine brown SAND, with SILT and brown/ orange brown CLAY laminated	0.4'					
1												
2	2	2-4'	3-3-4-3	2'/1.7'	7	Same as above, medium to fine, brown tan sand little silt						
3												
4	3	4-6'	2-2-3-3	2'/1.2'	5	Dry golden, medium to very fine SAND, trace brown silt, faint laminations						
5												
						Same as above to 6.4'						
6	4	6-8'	3-5-4-5	2'/1.3'	9	Moist CLAY and SILT layer to 6.5' Dry, medium to fine SAND, trace slight brown silt laminations to 7.8'	6.4'					
7						Moist CLAY and SILT layer						
						Moist, medium to very fine SAND, trace light brown-gold silt to 9'						
8	5	8-10'	4-4-5-8	2'/1.3'	9	Wet, brown, red and olive gray CLAY with silt and fine pebbles laminated to 9.3' Olive gray CLAY at 9.7'						
9												
10	6	10-12'	2-1-6-9	2'/1.5'	7	Wet CLAY laminated with gray-green clay and silt to 11.5' Wet SILT, trace olive green-gray clay						
11												
12	7	12-14'	11-10-7-6	2'/1.7'	17	Same as above to 13' Moist, reddish brown CLAY with silt to 13.4 Wet SILT, trace olive green, gray clay						
13												
14	8	14-16'	3-4-8-10	2'/1.8'	12	Same as above with fine sand and clay laminations						
15												

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-3D Sheet 2 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler
8" dia. augers

Boring Location:
Ground Elevation:
Dates: Started: 10/9/90 Ended: 10/10/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
16	9	16-18'	15-12-	2'/1.5'	21	Wet SILT and very fine SAND with olive green clay to 17.4'						
			9-10			Wet, red-reddish brown CLAY with pebbles - Ice rafted debris to 17.7'						
17						Wet SILT and very fine SAND with clay						
18	10	18-20'	8-5-6-7	2'/1.5'	11	Wet, olive green SILT and very fine SAND with clay to 19.2'						
						Moist, red/brown CLAY with little organic matter laminated to 19.4'						
19												
20	11	20-22'	6-7-8-12	2'/1.7'	15	Wet SILT and very fine SAND and olive green CLAY to 20.3'						
						Same as above, moist clay layer to 20.5'						
21						Wet, very fine SAND and SILT with clay to 21.5'						
						Wet fine SAND, trace silt to 21.6' Wet, very fine SAND and SILT with clay						
22	12	22-24'	7-12-	2'/0.2'	27	Same as above						
			15-13									
23												
24	13	24-26'	18-17-	2'/1.8'	34	Same as above to 24.5'						
			17-15			Wet CLAY with red silt to 24.7' Moist, SAND and SILT with medium to very fine, brown, laminated with iron colored streaks (30 laminations/1 inch)						
25												
26	14	26-28'	24-19-	2'/0.6'	38	Same as above, medium to fine, brown and white sand to 27.7'						
			19-17			Damp, medium to fine, brown to gold SAND						
27												
28	15	28-30'	25-47-	2'/1'	80	Same as above, cross bedded						
			33-36									
29												
30	16	30-32'	24-25-	2'/1'	42	Same as above with organics						
			17-19									

2B3D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-3D Sheet 3 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131
Boring Co.: Parratt-Wolff, Inc. Foreman: Brian Waters OBG Geologist: Paul Gottler 8" d.a. augers		Boring Location: Ground Elevation: Dates: Started: 10/9/90 Ended: 10/10/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
31												
32	17	32-24'	17-19-	2'/1.3'	44	Moist CLAY with olive green silt to 32.8' Same as above, damp sand with organics						
			25-31									
33												
34	18	34-36'	44-39-	2'/1'	74	Same as above						
			35-37									
35												
						Same as above to 37.1'						
36	19	36-38'	35-37-	2'/1.1'	62	Damp, medium to fine brown SAND, SILT and CLAY to 37.4'						
			25-29									
37												
38	20	38-40'	18-31-	2'/1.3'	52	Dry, medium to fine SAND, trace light brown silt, cross beds, organics						
			21-36									
39												
40	21	40-42'	23-21-	2'/1.3'	41	Same as above						
			20-20									
41												
42	22	42-44'	25-27-	2'/1.1'	56	Same as above						
			29-31									
43												
44	23	44-46'	17-19-	2'/1.1'	45	Same as above						
			26-24									
45												
46	24	46-48'	31-33-	2'/1.1'	60	Same as above, brown to dark brown						
			27-29									

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-3D Sheet 4 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler 8" d.a. augers

Boring Location:
Ground Elevation:
Dates: Started: 10/9/90 Ended: 10/10/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
47												
48	25	48-50'	23-22-		43	Dry to moist, medium to fine, brown to light brown SAND, laminations						
			21-19									
49												
50	26	50-52'	21-21-		45	Same as above						
			24-40									
51												
52	27	52-54'	37-39-		---	Same as above						
			50/.4									
53												
54	28	54-56'	29-31-		96	Same as above						
			65-87									
55												
						Moist, laminated CLAY and SILT to 56.5'						
56	29	56-58'	56-65-	2'/1.8'	127	Dry, cinnamon-colored, fine SAND with cross beds						
			62-67									
57												
58	30	58-60'	33-36-	2'/1.8'	105	Same as above						
			69-73									
59												
60	31	60-62'	28-35-	2'/1.4'	72	Damp brown to light brown SAND with SILT and trace brown clay laminations						
			37-39									
61												

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-3D Sheet 5 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler
8" dia. augers

Boring Location:
Ground Elevation:
Dates: Started: 10/9/90 Ended: 10/10/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
62	32	62-64'	36-39-	2'/1.4'	81	Moist, medium to fine SAND, some brown to dark brown silt, trace clay to 62.7'						
			42-50/.4			Damp, brown to light brown SAND laminated with brown clay, some silt						
63												
64	33	64-66'	33-26-	2'/2'	83	Same as above to 64.3' Dry, medium, cinnamon colored SAND, well sorted to 64.5'						
			57-51			Very moist, fine to very fine, brown to dark brown SAND and SILT to 65.5'						
65						Damp, medium to fine SAND with trace silt lamination						
66	34	66-68'	37-36-	2'/1.8'	81	Same as above to 66.8'						
			45-52			Moist, brown to light brown CLAY with silt	67.4'					
67			~			Moist, fine, brown SAND with SILT and CLAY laminations						
68	35	68-70'	27-27-	2'/1.8'	73	Same as above to 67.1' Moist clay laminations to 67.13'						
			46-62			Damp, laminated, medium fine cinnamon SAND with trace silt						
69												
70	36	70-72'	42-41-	2'/2'	88	Same as above to 70.4'						
			47-61			Wet, SILT with fine SAND and CLAY, brown-orange brown clay lamination to 71.3'						
71						Damp, SAND, with trace cinnamon colored medium to fine silt laminations to 71.6' Wet, SILT with fine sand and clay						
72	37	72-74'	70-81-	2'/1.8'	170	Same as above to 72.3' Moist, medium to fine SAND to 73'						
			89-73			Moist SAND with silt, trace clay lamination fine to very fine iron staining and cinnamon laminations, cross beds						
73												
74	38	74-76'	27-35-	2'/1'	81	Same as above to 74.8'						
			46-61			Wet CLAY with brown to tan silt to 75' Wet, medium to fine, dark brown to brown SAND to 75.5'						
75						Same as above, wet CLAY and SILT						
76	39	76-78'	20-30-	2'/1.9'	77	Wet, medium to very fine, brown cinnamon SAND with little silt, trace brown and gray, faintly laminated clay						
			47-41									
77												

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-3D Sheet 6 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131
Boring Co.: Parratt-Wolff, Inc. Foreman: Brian Waters OBG Geologist: Paul Gottler 8" dia. augers	Boring Location: Ground Elevation: Dates: Started: 10/9/90	Ended: 10/10/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Field Testing Sp Cond	Field Testing HNU	Rmks*
78	40	78-80'	24-29-	2'/2'	60	Same as above						
			31-35									
79												
80	41	80-82'	12-13-	2'/2'	34	Same as above to 81' Same as above laminated with silt to 81.1'						
			21-42									
81												
82	42	82-84'	22-37-	2'/2'	83	Same as above, little silt, trace clay						
			46-57									
83												
84		84-86'	-------	------	---	Same as above						
						Bottom of boring 85 ft.						
85												

85- 75' Screen
75- +2' 2" PVC
85- 73' Sand
73- 72.5' Fine Sand
72.5- 69.4' Bentonite
Cement to grade

6B3D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-4D Sheet 1 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc. Foreman: Brian Waters OBG Geologist: Paul Gottler 8" dia. augers	Boring Location: 30' East south east of B-4S Ground Elevation: Dates: Started: 10/18/90 Ended: 10/19/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
0												
1												
2												
3												
4												
5	1	5-7'	-	2'/1.1'	---	Dry, medium to fine, light brown SAND laminated with brown brown/red clay, little silt laminations to 5.9'						
6						Dry, red-brown/brown CLAY with silt, with fine sand laminations						
7												
8												
9												
10	2	10-12'	6-6-10-12	2'/1.8'	16	Wet CLAY and red/brown brown CLAY laminated with little white streaks to 11'						
						SILT with clay laminations to 11.8'						
11						Wet SILT with olive brown clay						
12												
13												
14												
15	3	15-17'	5-11-8-11	2'/2'	19	Same as above to 15.5'						

1B4D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-4D Sheet 2 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler 8" dia. augers

Boring Location: 30' East south east of B-4S
Ground Elevation:
Dates: Started: 10/18/90 Ended: 10/19/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
						Wet SILT with CLAY and DROPSTONE to 16.3' Wet olive brown clay to 16.6' Wet red and brown clay laminations to 16.8' Wet silt with clay as above						
16												
17												
						Wet, brown red/brown CLAY to 18.5'						
18	4	18-20'	17-11- 12-8	2'/2'	23	Wet, very fine SAND and SILT with trace olive brown clay to 19.35' Wet, fine, round to sub-rounded PEBBLES with silt and clay, ice rafted debris to 19.6'						
19												
						Wet, fine, brown to light brown SAND & SILT						
20	5	20-22'	7-5-7-8	2'/2'	12	Wet CLAY and brown-red/brown SILT to 20.7' Wet, very fine SAND and brown-red/brown SILT with organics, red-brown clay laminated, ice rafted debris to 21.9' Wet SILT and very fine SAND, trace clay						
21												
22	6	22-24'	11-7-6-5	2'/2'	13	Same as above, SILT, little fine sand, trace clay and pebbles to 23.2' Wet, maroon brown CLAY and SILT						
23												
24	7	24-26'	2-3-12-11	2'/2'	15	Wet, maroon brown CLAY and SILT						
25												
26	8	26-28'	12-11- 15-15	2'/2'	26	Same as above to 26.7' Moist, brown orange/brown SILT and CLAY to 26.8', brown and red clay laminations to 27.5', grading to wet SILT and very fine SAND with olive clay to 27.8' Wet SILT and very fine SAND						
27												
28	9	28-30'	11-13- 14-17	2'/2'	27	Same as above to 29' Wet cyclopels SILT and CLAY 6/1"						
29												
30	10	30-32'	10-17- 16-17	2'/2'	33	Same as above to 31' Wet SILT, little fine sand and olive brown clay						

2B4D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-4D Sheet 3 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc. Foreman: Brian Waters OBG Geologist: Paul Gottler 8" dia. augers	Boring Location: 30' East south east of B-4S Ground Elevation: Dates: Started: 10/18/90 Ended: 10/19/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Field Testing Sp Cond	Field Testing HNU	Rmks*
31												
32	11	32-34'	12-18-	2'/2'	41	Same as above grading to medium to very fine sand, laminations to 33.7' Dry, brown and white SAND						
			23-16									
33												
34	12	34-36'	26-24-	2'/1.8'	48	Dry, light brown to light tan, laminated, fine to very fine SAND with trace silt						
			24-41									
35												
36	13	36-38'	40-33-	2'/1.9'	69	Same as above to 36.6' Wet brown CLAY to 36.8' Dry, fine to very fine, cinnamon-colored SAND with trace silt as above, looks massive but breaks along planes						
			36-37									
37												
38	14	38-40'	36-26-	2'/1.9'	50	Same as above to 39.5' Moist, brown to dark brown SILT and CLAY to 39.6' Same as above with dry sand to 39.8'						
			24-38									
39												
40	15	40-42'	23-31-	2'/1.9'	76	Moist SILT and CLAY as above, with dry, fine to very fine sand laminated, massive organics layers of dark brown wet silt and clay						
			45-51									
41												
42	16	42-44'	27-19-	2'/1.9'	46	Dry, fine to very fine SAND, trace light brown silt laminations, trace organics						
			27-28									
43												
44	17	44-46'	20-22-	2'/2'	44	Same as above to 45.6' Moist, brown-red CLAY and cinnamon-colored, well-sorted SAND with fine-medium pebbles (ice rafted sands supported in clay matrix)						
			22-23									
45												
						Medium to fine SAND with pebbles and clay to 47.3'						
46	18	46-48'	27-33-	2'/2'	66	Wet, brown orange brown fine SAND and SILT						
			33-30									

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-4D Sheet 4 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler
8" dia. augers

Boring Location: 30' East south east of B-4S
Ground Elevation:
Dates: Started: 10/18/90 Ended: 10/19/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
47												
48	19	48-50'	31-27-	2'/2'	53	Same as above to 48.2' Dry, very light to light gray, fine to very fine SAND, faintly laminated						
			26-31									
49												
50	20	50-52'	22-26-	2'/2'	63	Moist, light brown SAND						
			37-49									
51												
52	21	52-54'	43-36-	2'/2'	86	Same as above						
			50-47									
53												
54	22	54-56'	30-22-	2'/2'	52	Same as above, with fine well rounded pebbles at approximately 55.1'						
			30-33									
55												
56	23	56-58'	29-36-	2'/2'	78	Same as above, no pebbles						
			42-53									
57												
58	24	58-60'	71-70-	2'/1.2'	146	Same as above, large pebbles at 59'						
			76-70									
59												
60	25	60-62'	29-30-	2'/1.9'	59	Damp, medium to fine, brown SAND lamination to 61.1' Dry, cinnamon colored SAND laminations						
			29-32									
61												

4B4D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-4D Sheet 5 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler

8" d.a. augers

Boring Location: 30' East south east of B-4S
Ground Elevation:
Dates: Started: 10/18/90 Ended: 10/19/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Field Testing Sp Cond	Field Testing HNU	Rmks*
62	26	62-64'	31-33-		65							
			32-34									
63												
64	27	64-66'	21-25-	2'/1.7'	51	Same as above, clay laminations with some coarse to fine sand						
			26-28									
65												
66	28	66-68'	23-36-	2'/1.7'	75	Dry, very light gray to white fine SAND to 66.7'						
			39-43			Moist, brown to dark brown with red CLAY to 67.2'						
67			-			Moist, massive, coarse to fine SAND with laminations of medium to fine light brown sand						
68	29	68-70'	33-37-	2'/1.5'	76	Same as above, very fine sand						
			39-41									
69												
70	30	70-72'	36-39-	2'/1.3'	80	Same as above, dry SAND with clay laminations						
			41-43									
71												
72	31	72-74'	30-24-	2'/1.5'	48	Same as above, cinnamon colored						
			24-26									
73												
74	32	74-76'	17-16-	2'/2'	35	Same as above. dark brown, high angle cross bedding						
			19-20									
75												
76	33	76-78'	17-17-	2'/2'	33	Moist, orange, fine SAND to 77.7'						
			16-18			Same as above, wet with parallel laminations to 78.3'						
77												

584D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-4D Sheet 6 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler

8" d.a. augers

Boring Location: 30' East south east of B-4S
Ground Elevation:
Dates: Started: 10/18/90 Ended: 10/19/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
78	34	78-80'	30-24-	2'/2'	52	Wet, fine brown and gray SAND with silt and clay to 79'						
			28-40			Wet, medium SAND, trace clay, iron streaks						
79												
80	35	80-82'	36-37-	2'/2'	77	Same as above to 80.3' Wet, medium to coarse, brown to dark brown						
			40-41			SAND to 81.5'						
81												
82	36	82-84'	33-32-	2'/2'	73	Same as above with clay laminations to 82.6', fine sand to 83.2'						
			41-39									
83												
84	37	84-86'	18-18-	2'/2'	37	Wet, medium to fine SAND with clay and silt laminations to 85.1'						
			19-20			Wet, coarse to medium SAND, trace clay						
85												
86	38	86-88'	15-31-	2'/2'	63	Same as above to 87.7' Wet, medium to fine SAND, trace clay						
			32-33									
87												
88	39	88-90'	21-43-	2'/1.8'	89	Same as above to 85.5' Wet, coarse to medium SAND with trace clay						
			46-46			and fine pebbles at 89.7'						
89						Bottom of boring 90.0 ft.						
90												

6B4D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-5D Sheet 1 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler
8" d.a. augers

Boring Location: 20' East of B-55
Ground Elevation:
Dates: Started: 10/11/90 Ended: 10/15/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
0												
1												
2												
3												
4												
5	1	5-7'	12-12-	2'/1.6'	24	Dry CLAY laminated with brown and red silt						
			12-12			Dry, medium to very fine light brown-brown SAND and SILT, cross bedded	6.1'					
6												
7												
8												
9												
10	2	10-12'	2-2-1-2	2'/1.6'	3	Same as above to 10.8' Moist brown to light brown SAND and red CLAY laminations to 11.4' Dry, brown to light brown SAND and SILT, little clay laminations						
11												
12												
13												
14												
15												

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-5D Sheet 2 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131
Boring Co.: Parratt-Wolff, Inc. Foreman: Brian Waters OBG Geologist: Paul Gottler 8" d.a. augers	Boring Location: 20' East of B-55 Ground Elevation: Dates: Started: 10/11/90 Ended: 10/15/90	

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
16												
17												
18	3	18-20'	11-11-	2'/1.7'	27	Wet, brown and red CLAY and SILT grading to wet brown to light gray SILT and fine SAND with little clay						
			16-13									
19												
20	4	20-22'	13-9-	2'/2'	22	Same as above, laminated						
			13-17									
21												
22	5	22-24'	13-4-4-5	2'/2'	8	Same as above to 23.0 ' Damp CLAY and SILT to 23.7'						
23												
24	6	24-26'				Wet SAND and SILT to 24.6' Wet CLAY and SILT to 25' Wet SILT and CLAY, some fine sand with iron orange staining						
25												
26	7	26-28'	18-20-	2'/2'	36	Wet, fine SAND and SILT with trace clay to 27' Wet, CLAY with red and brown silt and fine sand laminations to 27.3'						
			16-13									
27						Damp, medium to very fine SAND, trace silt, cross beds, iron stained	-					
28	8	28-30'	12-13-	2'/2'	30	Same as above, dry						
			17-14									
29												
30	9	30-32'	18-17-	2'/2'	35	Same as above, trace clay, little organics						
			18-19									

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-5D Sheet 3 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler
8" dia. augers

Boring Location: 20' East of B-55
Ground Elevation:
Dates: Started: 10/11/90 Ended: 10/15/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
31												
32	10	32-34'	25-19-	2'/2'	38	Same as above, cinnamon colored to 32.8'						
			19-18			Dry, light brown CLAY and SILT to 33' Dry SAND and SILT with trace clay						
33												
34	11	34-36'	18-16-	2'/2'	39	Dry, fine SAND and SILT, trace clay, organics, rafted pebbles						
			23-22									
35												
36	12	36-38'	21-18-	2'/2'	35	Same as above with increasing clay laminations, trace organics, rafted fine pebbles						
			17-25									
37												
38	13	38-40'		2'/2'		Same as above, rafted clast						
39												
40	14	40-42'	24-17-	2'/2'	41	Same as above, no clay to 41.3', rafted clast						
			24-27			Same with clay laminations						
41												
42	15	42-44'	31-22-	2'/1.9'	59	Dry, cinnamon red-red/brown colored SAND and SILT, unusually red to 42.5'						
			37-36			Same as above with clay						
43												
44	16	44-46'	25-24-	2'/1.9'	53	Dry, fine SAND and SILT, trace clay, organic spots, thin gray clay parallel laminations						
			29-31									
45												
46	17	46-48'	35-22-	2'/1.8'	43	Same as above, cross bedded with fine sand						
			21-23									

3B5D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-5D Sheet 4 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler
8" dia. auger

Boring Location: 20' East of B-55
Ground Elevation:
Dates: Started: 10/11/90 Ended: 10/15/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
47												
48	18	48-50'	14-18-	2'/1.8'	44	Same as above, no clay						
			26-25									
49												
50	19	50-52'				Same as above, clay at 50.9'						
51												
52	20	52-54'	22-16-	2'/1.9'	33	Damp, fine to very fine, cinnamon-colored SAND with silt, trace brown clay						
			17-23									
53												
54	21	54-56'	14-10-	2'/2'	29	Same as above with floating sand clasts in brown clay and silt, sand well sorted, iceberg rafted						
			19-18									
55												
56	22	56-58'	31-32-	2'/1.8'	63	Damp, medium to fine SAND and SILT, trace cinnamon, white and brown clay parallel laminations						
			31-36									
57												
58	23	58-60'	27-21-	2'/2'	49	Same as above, breaks along horizontal planes						
			28-32									
59												
60	24	60-62'	30-30-	2'/1.7'	45	Dry, fine SAND and brown SILT to 60.4'						
			15-17			Dry, medium, cinnamon-colored SAND and SILT to 60.8' Same as above, trace clay to 61'						
61												
						Dry, medium to very fine SAND and SILT with trace clay parallel laminations						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-5D Sheet 3 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler
8" dia. auger

Boring Location: 20' East of B-55
Ground Elevation:
Dates: Started: 10/11/90 Ended: 10/15/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
62	25	62-64'	23-19-	2'/1.8'	52	Same as above to 62.1'						
			33-42			Moist SILT with trace light brown clay to 62.3'						
63						Same as above with dry sand and silt to to 63.6'						
						Same as above with moist silt and clay to 63.8'						
						Same as above with sand and silt						
64	26	64-66'	21-28-	2'/1.6'	61	Same as above with brown clay laminations to 65.1', silt to 65.9'						
			33-41			Fine, light brown SAND and SILT, trace clay						
65												
66	27	66-68'	29-33-	2'/1.8'	85	Moist, medium to very fine, brown tan SAND with parallel silt laminations						
			52-65			3" long vertical burrow at top						
67												
68	28	68-70'	76-25-	2'/1.7'	73	Same as above with brown clay dropclasts in clay and sand to 69.3'						
			48-46			Moist SAND and SILT parallel laminations						
69												
70	29	70-72'		2'/1.6'		Same as above						
71												
72	30	72-74'	36-28-	2'/1.3'	63	Damp, medium, well sorted, brown to light brown SAND, (cinnamon) sand quartz and gar-						
			35-36			net rich						
73												
74	31	74-76'	24-38-	2'/1.4'	91	Same as above						
			53-92									
75												
76	32	76-78'	78-65-	2'/1.8'	157	Same as above, cross bedded at 77.1'						
			92-97									
77												

5B5D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-5D Sheet 6 of 6
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler 8" dia. auger

Boring Location: 20' East of B-5S
Ground Elevation:
Dates: Started: 10/11/90 Ended: 10/15/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Field Testing Sp Cond	Field Testing HNU	Rmks*
78	33	78-80'	45-41-	2'/2'	119	Wet brown CLAY and SILT to 78.2' Wet medium to very fine, brown SAND and SILT with parallel laminations						
			78-82									
79												
80	34	80-82'	41-45-	2'/1.7'	77	Wet, coarse to very fine SAND laminated						
			32-27									
81												
82	35	82-84'		2'/1.8'		Same as above, with subrounded, faceted, fine to medium pebbles						
			~									
83												
84	36	84-86'	39-39-	2'/1.9'	77	Same as above						
			38-37									
85												
86	37	86-88'	100/0.4			Same as above						
87												
88		88-90'				No sample taken, sand running up auger Bottom of boring 90 ft.						

90- 80' Screen
80- +3' Riser
90- 78' Sand
78-77.5' Fine sand

77.5-74.5' Bentonite
Cement to grade

6B5D.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-6 Sheet 1 of 1
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler
8" dia. auger

Boring Location:
Ground Elevation:
Dates: Started: 10/14/90 Ended: 10/14/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Field Testing Sp Cond	Field Testing HNU	Rmks*
0	1	0-2'	2-3-4-10	2'/1.1'	7	SOD Moist, SILT and medium to fine, dark brown SAND, trace brown clay	0.4'					
	2	2-4'	5-5-6-8	2'/1'	11	Moist, fine, brown-light brown SAND with SILT						
	3	4-6'	3-3-4-7	2'/1.2'	7	Moist, medium to very fine, light brown SAND with silt laminations						
5												
	4	6-8'	6-8-6-8	2'/1.2'	14	Moist, medium SAND with trace silt, graded beds create laminations Same as above to 8.2'						
	5	8-10'	5-6-4-5	2'/1.9'	10	Moist orange brown CLAY with gray silt horizons						
10	6	10-12'	2-2-2-1	2'/2'	4	Wet CLAY with silt, as above, laminations approximately 4mm thick						
	7	12-14'	2-2-1-2	2'/2'	3	Same as above, wet, very fine, brown to gray SAND and SILT						
	8	14-16'	4-6-5-7	2'/2'	11	Same as above						
15												
	9	16-18'	6-6-10-7	2'/1.9'	16	Wet brown red with gray CLAY, laminations present, dry layer at 16'						
	10	18-20'	2-2-5-5	2'/0'	7							
						Bottom of boring 20 ft.						
20												

20- 10' Screen 7.5-4.5' Bentonite
10- +2' Riser Cement to grade
20- 8' Sand
8- 7.5' Fine sand

B6.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-7 Sheet 1 of 1
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler
8" dia. auger

Boring Location:
Ground Elevation:
Dates: Started: 10/11/90 Ended: 10/15/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
0	1	0-2'	2-3-6-6	2'/1.3'	9	SOD Dry, medium-fine, brown-dark brown SAND to 1.1' Dry, medium, brown and white SAND to 1.3'	0.4'					
	2	2-4'	6-6-8-7	2'/1.7'	14	Damp, brown-dark brown SAND with silt Same as above to 2.6' Damp, brown-tan fine SAND, massive to 3.8'						
	3	4-6'	6-5-2-3	2'/1'	7	Moist, brown, fine SAND with silt and clay Same as above to 5.2' Moist, medium-very fine, brown-tan SAND with silt to 5.8'						
5												
	4	6-8'	2-2-2-1	2'/1.9'	4	Same as above, but wet with brown clay	6.7'					
	5	8-10'	4-3-4-4	2'/2'	7	Wet, red-red/brown CLAY and SILT to 7.0' Wet, medium, brown SAND to 7.1' Wet, red-red/brown CLAY and SILT to 7.4' Wet, medium, brown SAND to 7.5' Wet, medium-fine brown SAND with trace olive-brown clay and silt						
10	6	10-12'	2-1-2-1	2'/2'	3	Wet, red and olive CLAY with silt to 9.1' grades to wet, olive-gray silt						
	7	12-14'	3-1-2-1	2'/2'	3	Wet, light brown, fine SAND with silt and clay to 10.4' Wet, olive-gray silt to 10.5'						
	8	14-16'	7-7-4-5	2'/2'	11	Wet, red-red/brown CLAY, couplets of sand and silt to 12.4'						
15						Couplets of SILT and CLAY to 14.4'						
	9	16-18'	2-2-1-2	2'/0'	3	Couplets of fine SAND and SILT to 16.8'						
	10	18-20'	6-6-7-8	2'/2'	13	Couplets of SILT and CLAY to 18.2' Couplets of fine SAND and SILT to 20.0'						
20						Bottom of boring 18 ft.						

18-8'	Screen	5.5-2.5'	Bentonite
8-+2'	Riser	2.5-grade	Cement
18-6'	Sand		
6-5.5'	Fine sand		

B7.KJF

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-8 Sheet 1 of 1
Project Location: Alcan Site # 828005 E. Rochester, N.Y. Client: Alcan	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30"	Ground Water Depth Date Depth Date File No.: 3057.032.131

Boring Co.: Parratt-Wolff, Inc.
Foreman: Brian Waters
OBG Geologist: Paul Gottler 8" dia. auger

Boring Location:
Ground Elevation:
Dates: Started: 10/4/90 Ended: 10/5/90

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
0	1	0-2'	2-2-2-3	2'/1.1'	4	SOD Moist, medium to fine dark brown SAND with silt grading to silt with fine white and green laminations	0.4'					
	2	2-4'	3-3-4-5	2'/1'	7	Moist, medium to fine, well sorted SAND, massive with organics throughout						
	3	4-6'	4-3-2-4	2'/1.7'	5	Same as above, drier, brown						
5												
	4	6-8'	4-3-4-5	2'/1.7'	7	Same as above, fine sand						
	5	8-10'	4-3-3-3	2'/1.6'	6	Same as above, wet silt with light brown clay laminates, dark mineral horizons						
10	6	10-12'	2-2-2-2	2'/0'	4	Sand in auger to 13'						
	7	12-14'	6-6-9-16	2'/2'	15	Wet, medium, brown SAND and brown red CLAY, some silt to 13.8' Wet SILT trace fine sand						
	8	14-16'	9-6-7-9	2'/1.9'	13	Same as above with red brown clay layers 3 couplets observed						
15												
	9	16-18'	7-7-9-9	2'/2'	16	Wet SILT with clay couplets as above, large dropstone at 17'						
	10	18-20'	8-4-7-8		11	Same as above with fine pebble, couplets, approx. 1 cm apart						
20	11	20-22'				Same as above, increasing clay Bottom of boring 20 ft.						

20- 10' Screen
10- +2' Riser
20- 8' Sand
8-7.5' Fine sand
7.5- 4.5' Bentonite
4.5- grade Cement

B8.KJF

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING B-9
PAGE 1 OF 1

CLIENT: Alcan

PROJECT LOCATION: Pittsford, NY

FILE NO.: 3047.032.131

SAMPLER: Split Spoon
HAMMER: 140 lbs.
FALL: 30"

ANALYTICAL SAMPLES
DEPTH ID # ANALYSIS

8" dia. augers

LOCATION: 3' NW of NE corner of warehouse building
START DATE: 8/8/91 1130
END DATE: 8/8/91

LEGEND: Grout; Sand Pack; Pellets; Screen; Riser

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Barney Waters
OBG GEOLOGIST: Paul Gottler

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING HNU
0	1	0-2'	3-7-	2'/2'	17	SOD to 0.3'			0
			10-14			Dry, orange-brown, fine SAND to 0.7'			
1						Dry, green and white CLAY and SILT, white			
						spotted to 0.9'			
2	2	2-4'	10-8-6-7	2'/1.7'	14	Same as above, dry, light brown-tan, fine			0
						SAND to 2'			
3						Same as above, dry to 2.2'	SHARP		
						Damp, light brown SILT and CLAY to 2.8'	CONTACT		
4	3	4-6'	2-3-3-3	2'/1.8'	6	Damp, red-brown SILT and CLAY, seems to be			0
						grading to finer, to 4'			
5						Moist, brown-red brown SILT with clay, silt			
						horizons, saturated, gold in color (~4/1.8'),			
6	4	6-8'	5-12-	2'/2'	19	very cyclic in appearance, to 6'			1
			7-17			Same as above, saturated (?) to 6.2'			
7						Saturated (?), subrounded, faceted GRAVEL,			
						with fine to coarse sand, some silt, trace			
8	5	8-10'	12-12-	2'/2'	27	clay to 6.4'	IBRD		0
			15-12			Same as above, saturated to moist, brown-gold			
9						SILT and CLAY to 8'			
						Same as above, saturated, 4 silt laminations			
10	6	10-12'	3-4-4-5	2'/1.9'	8	per spoon, each ~0.1' thick, to 10'			0
						Saturated, golden SILT with clay laminations			
11						(trace sand, fine gravel at 11.8') to 12'			
12	7	12-14'	4-3-2-3	2'/2'	5	Same as above, saturated with some very			0
						fine sand horizons to 14'			
13									
14	8	14-16'	5-4-3-3	2'/2'	7	Same as above, saturated to 14.1'			0
						Saturated, red-red brown CLAY, trace silt			
15						to 14.4'			
						Saturated, gray, fine SAND, well sorted to 16'			
16	9	16-18'	6-7-5-4	2'/2'	12	Same as above, saturated with silt and clay,			0
						all laminated (~4 cycles/2'), to 18'			
17									
18	10	18-20'	3-3-9-11	2'/1.6'	12	Saturated, gray, fine SAND and SILT, laminated			0
						(Fe orange lamination at bottom of spoon)			
19									
20						Bottom of boring 20'			

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING B-10
PAGE 1 OF 1

CLIENT: Alcan
PROJECT LOCATION: Pittsford, NY
FILE NO.: 3047.032.131

SAMPLER: Split Spoon
HAMMER: 140 lbs.
FALL: 30"

LOCATION: 6' NW of SE corner sebarb pad
START DATE: 8/9/91 1410
END DATE: 8/9/91

ANALYTICAL SAMPLES
DEPTH ID # ANALYSIS

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Barney Waters
OBG GEOLOGIST: Paul Gottler

8" dia. augers

LEGEND: Grout, Sand Pack, Pellets, Screen, Riser

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0						CEMENT to 0.5'				0
	1	0.5-2'	4-6-5	1.5'/1.3'	10	Dry, black, orange and brown, medium SAND,				
1						messive (fill material), to 2'				
2	2	2-4'	4-3-3-3	2'/1.7'	6	Same as above, dry to 3.9'				0
						Dry, light brown-tan, fine SAND, trace				
3						silt to 4'				
4	3	4-6'	5-7-7-6	2'/1'	14	Same as above, dry to 4.2'				0
						Dry, gray-black and tan, fine SAND and				
5						SILT to 5.1'				
						Same as above, light brown and tan, to 6'				
6	4	6-8'	5-7-18-21	2'/1.2'	25	Dry, brown-light brown, fine SAND, trace silt and fine gravel, ~4 cycles/2', to 8'				0
7										
8	5	8-10'	12-14-13-10	2'/1.7'	27	Same as above, dry, trace fine gravel to 8.3'				0
						Dry, brown, round to subround GRAVEL, fine to				
9						coarse SAND, and SILT to 8.5'				
						Dry, light brown-gray brown SILT and very				
10	6	10-12'	5-8-6-5	2'/1.8'	14	fine SAND, trace clay, to 10'				
						Same as above, dry, to 10.4', grades to				
11						coarse SAND				
						Wet, brown SILT and CLAY to 11.4'				
12	7	12-14'	4-4-6-7	2'/1.6'	10	Wet, brown, medium SAND to 12.4'				
						Wet, gold SILT to 14'				
13										
14	8	14-16'	10-10-16-26	2'/2'	26	Moist, brown-light brown, medium SAND to 14.6', 4 cycles per spoon				
15						Wet, gold and red-brown SILT and clay, to 16'				
16	9	16-18'	17-13-26-28	2'/	39	Same as above, wet to 17.3'				
						Damp, red-brown SILT and CLAY (hardpan)				
17						to 17.35'				
						Moist, red-brown SILT and CLAY to 17.5'				
18						Damp, brown SILT and CLAY (hardpan) to				
						17.55'				
19						Dry, light brown-tan, fine to very fine SAND				
						to 18'				
20						Bottom of boring 18'				

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING B-11 PAGE 1 OF 1
CLIENT: Alcan PROJECT LOCATION: Pittsford, NY FILE NO.: 3047.032.131	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30" ANALYTICAL SAMPLES DEPTH ID # ANALYSIS	LOCATION: 16' WNW from NE corner of main building START DATE: 8/8/91 1515 END DATE: 8/8/91 1730
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Barney Waters OBG GEOLOGIST: Paul Gottler	8" dia. augers	LEGEND: Grout, Sand Pack, Pellets, Screen, Riser

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0-2'	27-16-	2'/1'	33	Dry, gray GRAVEL and SAND, to 0.5'				0
			17-11			Dry, brown and orange-brown, fine SAND,				
1						parallel laminations, trace silt, to 2'				
2	2	2-4'	7-8-8-10	2'/1.5'	16	Same as above, dry, grading common individ-				0
						ual horizons ~1" thick, grade from medium				
3						to very fine SAND				
4	3	4-6'	9-6-4-4	2'/0.3'	10	Same as above, dry with red, medium, faceted,				0
						subround gravel (quartzite)				
5										
6	4	6-8'	4-4-3-2	2'/1.3'	7	Damp, brown-light brown, fine SAND with				1
						some silt, trace clay and gravel to 7.5'				
7						Saturated, gold SILT, grades to moist, red				
						CLAY, trace silt, grades to moist, gold SILT,				
8	5	8-10'	5-5-5-4	2'/2'	10	grades to saturated, brown-light brown CLAY				0
						and SILT to 9.4'				
9						Saturated, gold-light brown SILT and CLAY,				
						to 10'				
10	6	10-12'	3-5-8-11	2'/1.8'	13	Same as above, saturated				0
11										
12	7	12-14'	13-18-	2'/1.9'	37	Same as above, saturated to 13.4'				0
			19-22			Damp, red CLAY horizon to 13.5'				
13						Dry, light brown, fine SAND, trace silt to 14'				
14	8	14-16'	7-10-	2'/1.5'	24	Moist, brown SILT with clay to 15.6'				0
			14-17			Moist, light brown, fine SAND, trace				
15						silt and gray clay to 16'				
16	9	16-18'	13-13-	2'/2'	28	Same as above, damp, fine SAND and SILT,	BACK			0
			15-17			trace gray clay	FILLED			
17							WITH			
							CUTTINGS			
18	10	18-20'	7-8-	2'/1.5'	18	Same as above, damp with wet CLAY horizon				0
			10-13			at 18.7'				
19										
			13-14-							
20	11	20-22'	14-17	2'/1.4'	28	Same as above, damp (no wet horizons)				0

Bottom of boring 22'

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING B-12D PAGE 1 OF 3
CLIENT: Alcan Site #828005 PROJECT LOCATION: Linden Ave, Pittsford, NY FILE NO.: 3057.032	SAMPLER: Split Spoon HAMMER: 140 lbs. FALL: 30" 4.25" I.D. Augers 8" O.D. Augers	LOCATION: 64.5' S of SE corner of J.C. Plastics START DATE: 5/27/92 END DATE: 5/27/92
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Barney Waters OBG GEOLOGIST: Paul Gottler		LEGEND: Grout; Sand Pack; PVC 2" I.D. Pellets; Screen (0.010"); Riser

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING PID	FIELD TESTING HNU
0	1	0-2'	2-2-4-7	2'/1.7'	6	Sod	0.2'			
						Damp, gold tan, medium SAND, massive, some silt	1'			
						Dry, gold tan, SAND with silt, laminated	1.3'			
						Damp, brown CLAY and GRAVEL, trace silt to	1.5'			
	2	2-4'	12-7-6-6	2'/1.5'	13	Dry, as above, (~5 lams./0.1'), fine to				
						medium sand				
	3	4-6'	4-5-4-5	2'/1.6'	9	Dry, as above to	4.5'			
						Damp to saturated, red brown CLAY, SILT				
5						and fine SAND				
	4	6-8'	8-7-3-4	2'/1.3'	10	Same as above	7.1'			
						Dry, light gray, brown and tan, medium				
						SAND				
	5	8-10'	4-2-3-3	2'/1.4'	5	Dry, as above (~20 lams./0.1')				
10	6	10-12'	2-4-4-4	2'/1.6'	8	Same as above				
	7	12-14'	3-4-4-6	2'/1.8'	8	Same as above				
	8	14-16'	7-6-8-11	2'/2'	14	Same as above				
15										
	9	16-18'	6-8-11-12	2'/1.6'	19	Dry, light gray-brown, tan, medium SAND,				
						with little silt and little clay in lamination				
						~0.01' thick				
	10	18-20'	14-11	2'/1.8'	25	Dry to damp, tan gray, light brown, medium				
			14-12			SAND, faintly laminated with clay at 18.9'				
20	11	20-22'	13-11-	2'/1.7'	27	Dry, light brown, medium sand, faintly laminated				
			16-16			(breaks along vertical planes)				

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING B-12D PAGE 2 OF 3
CLIENT: Alcan Site #828005 PROJECT LOCATION: Linden Ave, Pittsford, NY FILE NO.: 3057.032	SAMPLER: Split Spoon HAMMER: 140 lbs. FALL: 30" 4.25" I.D. Augers 8" O.D. Augers	LOCATION: 64.5' S of SE corner of J.C. Plastics START DATE: 5/27/92 END DATE: 5/27/92
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Barney Waters OBG GEOLOGIST: Paul Gottler		LEGEND: Grout, Sand Pack, Pellets, Screen (0.010"), Riser PVC 2" I.D.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING PID	FIELD TESTING HNU
	12	22-24'	18-12- 14-16	2'/1.5'	26	Same as above				
	13	24-26'	12-14- 15-16	2'/1.9'	29	Same as above				
25										
	14	26-28'	22-12- 16-13	2'/1.8'	28	Same as above				
	15	28-30'	13-17- 15-17	2'/1.7'	32	Same as above				
30	16	30-32'	18-23- 25-27	2'/1.4'	48	Same as above				
	17	32-34'	16-14-20	2'/1.6'	34	Same as above				
	18	34-36'	13-14- 16-19	2'/1.4'	30	Same as above				
35										
	19	36-38'	18-16- 21-24	2'/1.5'	37	Same as above				
	20	38-40'	14-17- 19-20	2'/1.7'	36	Same as above				
40	21	40-42'	16-19- 20-22	2'/1.6'	39	Same as above, damp at bottom of spoon				

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING B-12D PAGE 3 OF 3
CLIENT: Alcan Site #828005 PROJECT LOCATION: Linden Ave, Pittsford, NY FILE NO.: 3057.032	SAMPLER: Split Spoon HAMMER: 140 lbs. FALL: 30" 4.25" I.D. Augers 8" O.D. Augers	LOCATION: 64.5' S of SE corner of J.C. Plastics START DATE: 5/27/92 END DATE: 5/27/92
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Barney Waters OBG GEOLOGIST: Paul Gottler		LEGEND: Grout, Sand Pack, Pellets, Screen (0.01"), Riser PVC 2" I.D.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING PID	FIELD TESTING HNU
	22	42–44'	9-13-15-21	2'/1.4'	28	Same as above				
	23	44–46'	14-17-23-24	2'/1.6'	40	Moist, brown to dark brown, medium SAND, laminated, increasing moisture at bottom of spoon				
45										
	24	46–48'	14-23-24-26	2'/1.8'	47	Same, grading to Fe orange, medium sand Saturated, round-sub round GRAVEL, SAND and CLAY, Fe rich to	47.7' 48'			
	25	48–50'	13-15-19-17	13-15-19-17	34	Saturated, orange brown medium SAND to Saturated, gray, GRAVEL and CLAY to Saturated, gray, medium SAND, laminated	48.5' 48.7'			
50	26	50–52'	17-24-26-21	2'/1.7'	50	As above (gray clay 0.1' thick at lamination ~0.1')	51.2'			
	27	52–54'	3-3-4-6	2'/1.8'	7	Saturated, gray SAND and SILT, little clay Clay lamination at 53 ft.	53'			
	28	54–56'	4-3-4-1	2'/1.1'	7	Saturated as above (Sand running up auger)				
55										

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING B-13 PAGE 1 OF 1
CLIENT: Alcan Site #828005 PROJECT LOCATION: Linden Ave, Pittsford, NY FILE NO.: 3057.032	SAMPLER: Split Spoon HAMMER: 140 lbs. FALL: 30" 4.25" I.D. Augers 8" O.D. Augers	LOCATION: 86' N 120° W from SE corner of Jarl office Bldg START DATE: 5/28/92 END DATE: 5/28/92

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Barney Waters
OBG GEOLOGIST: Paul Gottler

LEGEND: PVC 2" I.D. — Grout; Sand Pack; Pellets; Screen (0.010"); Riser

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING PID	FIELD TESTING HNU
0						Asphalt with gravel fill to	1'			
						Dry, dark brown, medium SAND to	1.3'			
	1	1-3'	6-4-4-3	2'/1'	8	Dry, orange brown, medium SAND lighter				
						at bottom of spoon				
	3	3-5'	2-2-4-4	2'/1.3'	6	Damp, orange brown, fine SAND and SILT				
						coarsening towards bottom of spoon to	4.8'			
						Laminated medium SAND with trace silt				
5	5	5-7'	7-6-6-3	2'/0	12	begins at 4.8'				
	7	7-9'	4-2-3-8	2'/1.9'	5	Moist, brown, medium fine SAND, trace silt to	7.3'			
						Moist, brown-orange brown CLAY, little silt	7.4'			
						Saturated, medium fine SAND, as above to	7.7'			
						Moist, brown-red brown CLAY and SILT (laminated)				
	9	9-11'	6-7-14-15	2'/2'	21	As above with olive and red CLAY and medium				
						SAND laminations ~0.2' apart				
10										
	11	11-13'	16-16-	2'/1.6'	37	Saturated to moist, as above with Fe orange				
			21-16			sand horizons at 12.8' and 13', trace finr				
						sub-rounded gravel				
	13	13-15'	8-9-9-10	2'/1.6'	18	Saturated, gold SILT interlaminated with red,				
						brown clay				
						Water producing silt layers ~0.4' apart				
15	15	15-17'	10-8-	2'/1.7'	19	As above with fine gravel to	15.8'			
			11-16			and medium Fe rich gneiss at	16.7'			
						orange red, Fe staining at 16.2-16.7'				
	17	17-19'	20-19-	2'/2'	37	Saturated, as above to	17.2'			
			18-19			Saturated, brown SILT with black brown				
						organic spots				
	19	19-21'	14-13-9	1.5'/1.1'	22	Saturated SILT, as above with some medium				
						gravel				
20										

Appendix E

In Situ Permeability Test Logs

O'BRIEN & GERE
ENGINEERS, INC.

IN-SITU PERMEABILITY FIELD LOG (REVISED 5/96)

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-1S
DATE: 7/23/86
METHOD USED : BAIL/RECOVERY

EVACUATION METHOD: BAILER
PERSONNEL: BOB FORESTI
DATUM USED FOR CALCULATIONS:
TOP OF CASING

STATIC HEAD (H) = 6.83 ft

PIPE RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R)= 0.34 ft
EFFECTIVE BOREHOLE RADIUS (R_0)= 0.21 ft
SCREEN LENGTH (L)= 6.83 ft

INITIAL HEAD (Ho)= 2.25 ft

To (from graph) = 162 min
9720 sec

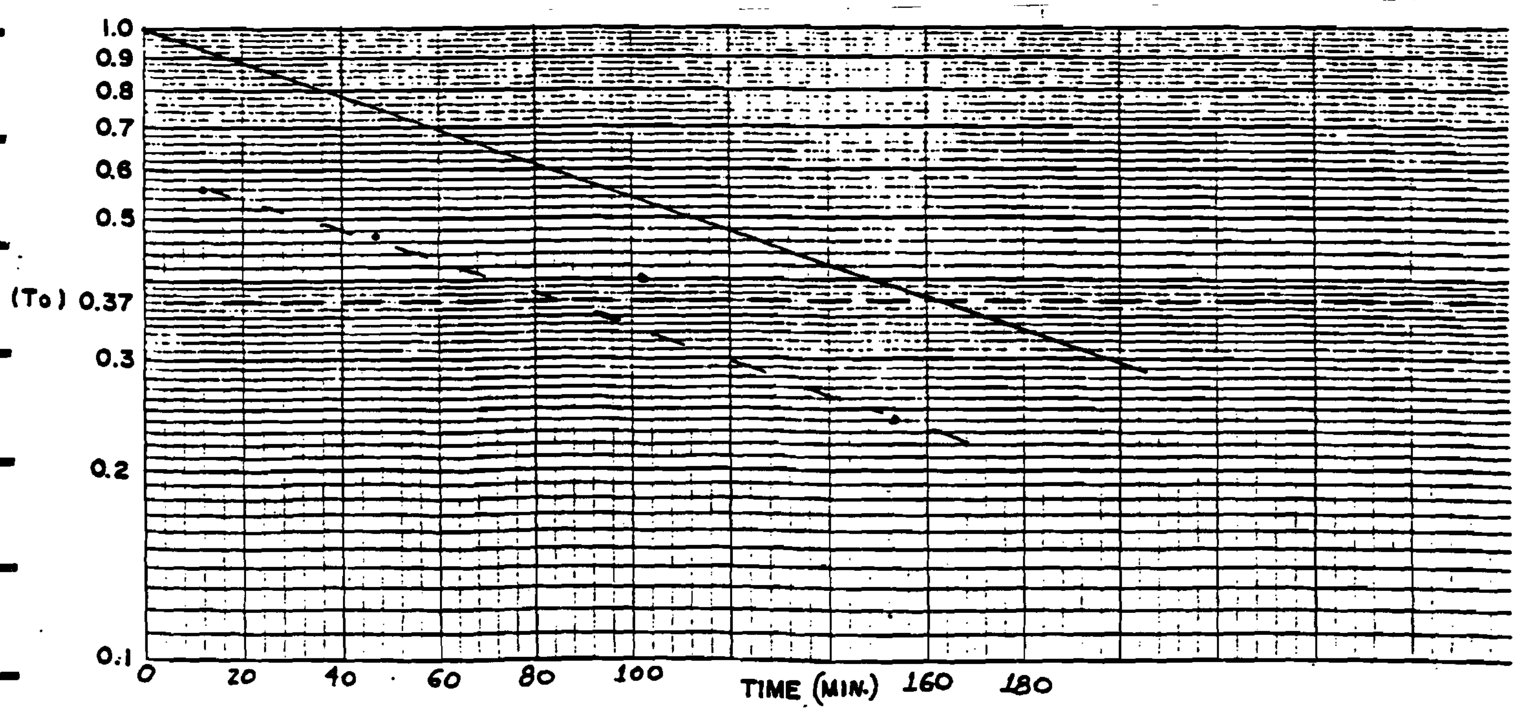
WELL TOT. DEPTH = 22.99 ft

TIME (MIN.)	Depth To Water	h	H-h / H-Ho
0.00	21.58	2.25	1
12.00	19.58	4.25	0.56
47.00	19.16	4.67	0.47
103.00	18.83	5.00	0.40
153.00	18.08	5.75	0.24
416.00	17.41	6.42	0.09
443.00	17.25	6.58	0.05

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R_0)}{2LT_o} = 1.8E-07 \text{ ft/sec}$$

5.5E-06 cm/sec



IN-SITU PERMEABILITY FIELD LOG (REVISED 5/96)

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-1S
DATE: 11/6/90
METHOD USED : BAIL/RECOVERY

EVACUATION METHOD: BAILER
PERSONNEL: PAUL GOTTLER
DATUM USED FOR CALCULATIONS: TOP OF CASING

STATIC HEAD (H) = 10.00 ft

PIPE RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R) = 0.34 ft
EFFECTIVE BOREHOLE RADIUS (R_o) 0.21 ft
SCREEN LENGTH (L) = 6.89 ft

INITIAL HEAD (Ho) = 6.48 ft

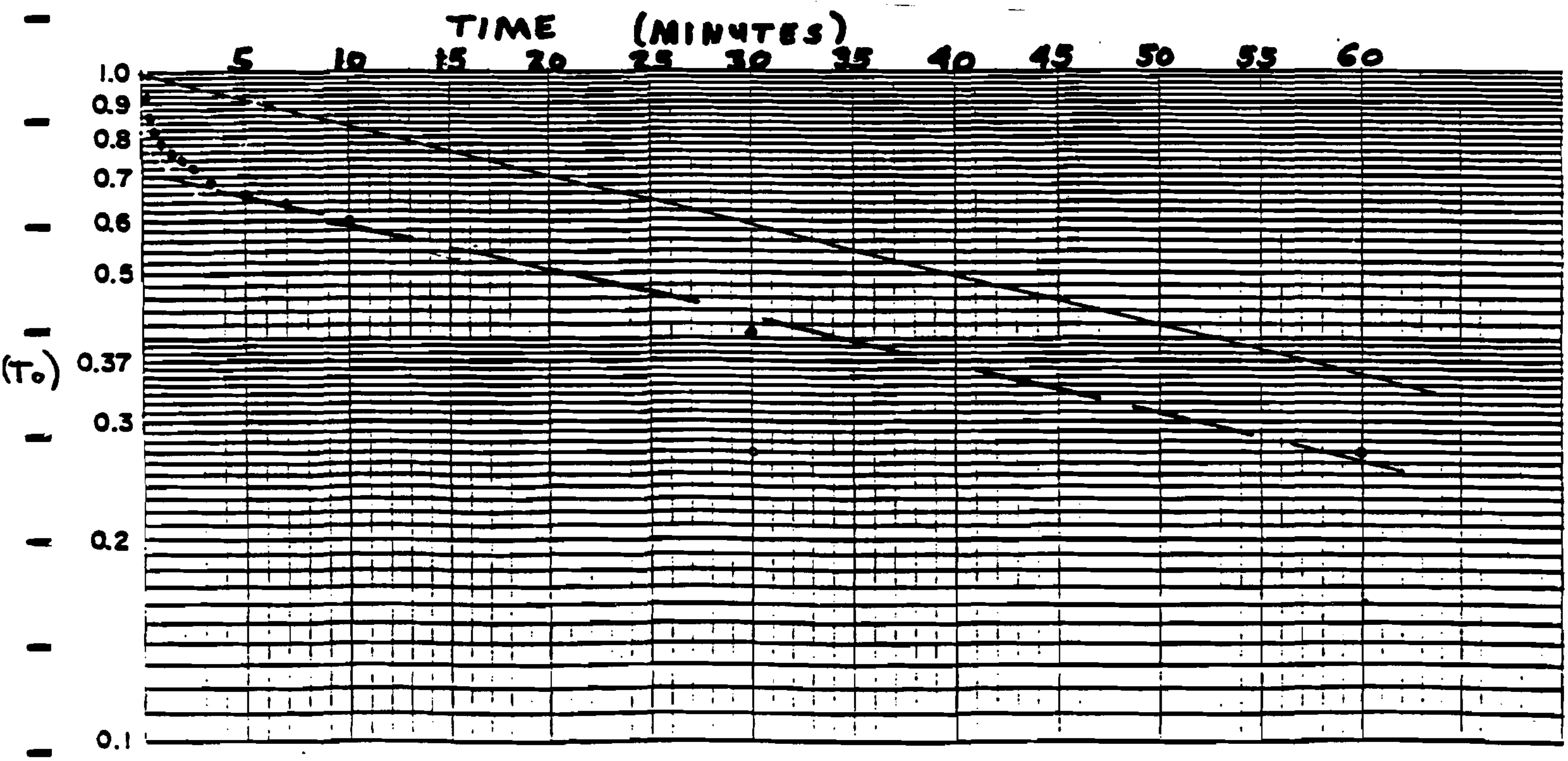
To (from graph) = 57 min
3420 sec

WELL TOT. DEPTH = 22.99 ft

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R_0)}{2LTo} = \begin{matrix} 5.1E-07 \text{ ft/sec} \\ 1.6E-05 \text{ cm/sec} \end{matrix}$$

TIME (MIN.)	Depth To Water	h	H-h / H-Ho
0.00	16.51	6.48	1
0.16	16.25	6.74	0.93
0.33	16.03	6.96	0.86
0.66	15.89	7.10	0.82
1.00	15.76	7.23	0.79
1.50	15.68	7.31	0.76
2.00	15.59	7.40	0.74
2.50	15.51	7.48	0.72
3.33	15.41	7.58	0.69
5.00	15.31	7.68	0.66
7.00	15.23	7.76	0.64
10.00	15.11	7.88	0.60
30.00	14.44	8.55	0.41
60.00	13.95	9.04	0.27
80.00	13.56	9.43	0.16



IN-SITU PERMEABILITY FIELD LOG

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-1D
DATE: 11/15/90
METHOD USED: : ENVIROLABS

EVACUATION METHOD: NONE
PERSONNEL: PAUL GOTTLER
DATUM USED FOR CALCULATIONS: TOP OF CASING

STATIC HEAD (H) = 8.94 ft

SCREEN RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R) = 0.083 ft

SCREEN LENGTH (L) = 10.0 ft

INITIAL HEAD (Ho) = 10.68 ft

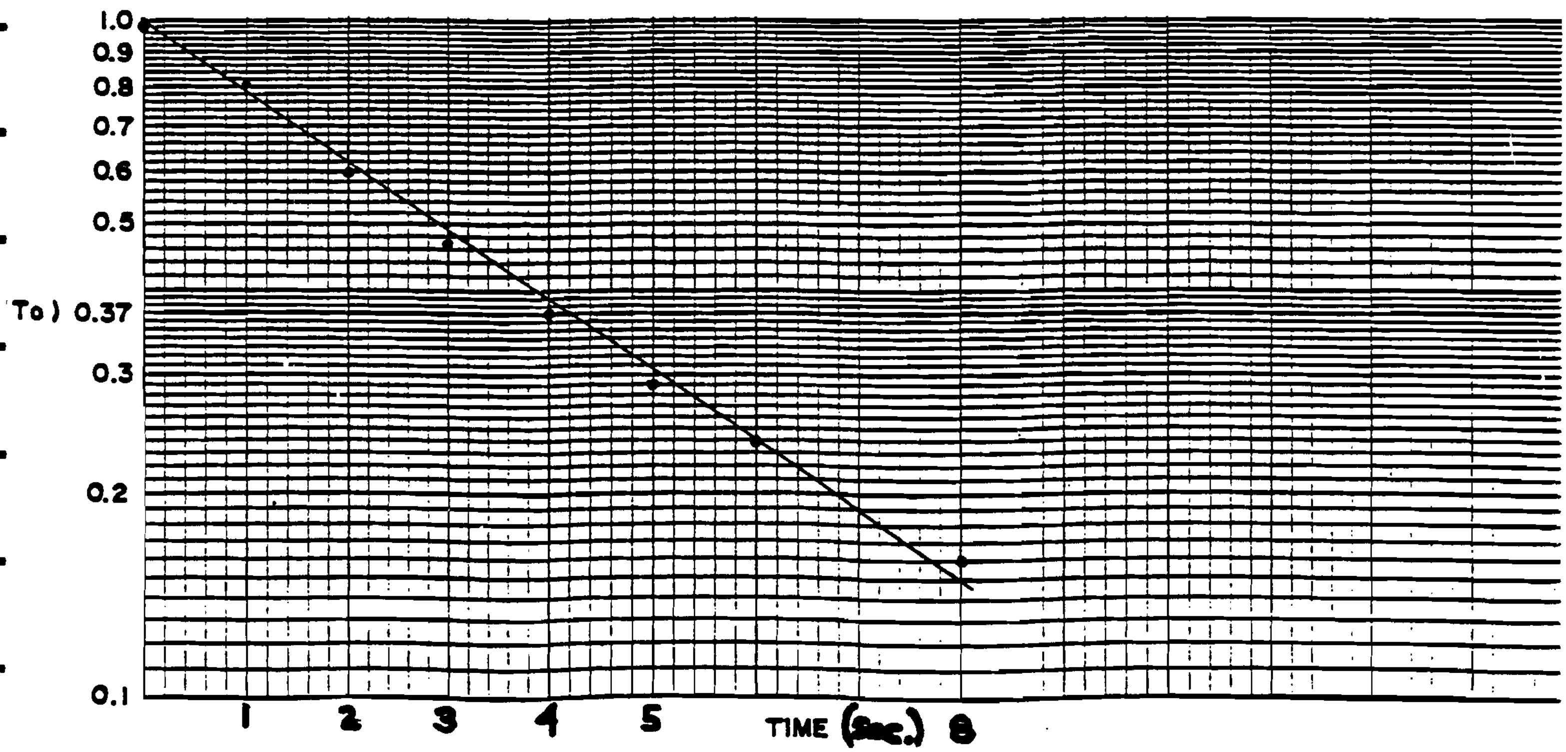
To (from graph) = 0.07 min
4.2 sec

WELL TOT. DEPTH = 70.07 ft

HYDRAULIC CONDUCTIVITY

TIME (SEC.)	h	H-h / H-Ho
0	10.68	1.00
1	10.35	0.81
2	9.98	0.60
3	9.75	0.47
4	9.58	0.37
5	9.45	0.29
6	9.35	0.24
8	9.21	0.16
10	9.12	0.10
15	9.02	0.05
20	8.98	0.02
30	8.96	0.01
40	8.95	0.01
100	8.94	0.00

$$K = \frac{r^2 \ln(L/R)}{2LTo} = 3.9E-04 \text{ ft/sec}$$
$$1.2E-02 \text{ cm/sec}$$



IN-SITU FIELD PERMEABILITY LOG (REVISED 5/96)

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-2S
DATE: 7/23/86
METHOD USED : BAILER/RECOVERY

EVACUATION METHOD: BAILER
PERSONNEL: BOB FORESTI
DATUM USED FOR CALCULATIONS: TOP OF CASING

STATIC HEAD (H) = 9.14 ft

SCREEN RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R) = 0.34 ft

EFFECTIVE BOREHOLE RADIUS (R_0) = 0.21 ft

SCREEN LENGTH (L) = 9.14 ft

INITIAL HEAD (Ho) = 1.22 ft

To (from graph) = 264 min
15840 sec

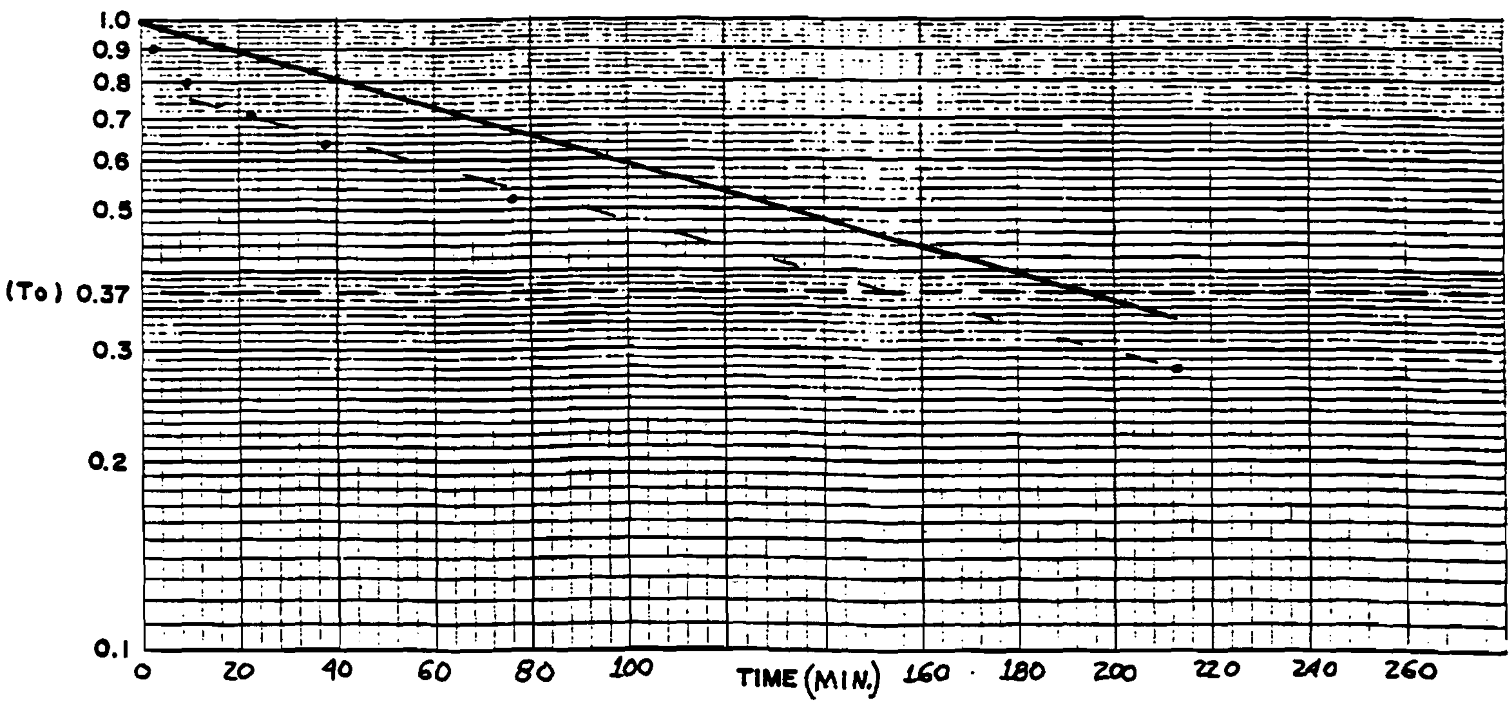
WELL TOT. DEPTH = 17.98 ft

TIME (MIN.)	Depth To Water	h	H-h / H-Ho
0.00	17.08	0.90	1.00
3.00	16.41	1.57	0.92
10.00	15.83	2.15	0.84
23.00	15.25	2.73	0.77
38.00	14.75	3.23	0.71
76.00	14.00	3.98	0.61
213.0	12.50	5.48	0.42
236.0	12.41	5.57	0.41

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R_0)}{2LTo} = 9.0E{-}08 \text{ ft/sec}$$

2.7 E-06 cm/sec



IN SITU PERMEABILITY FIELD LOG (REVISED 5/96)

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-2S
DATE: 11/7/90
METHOD USED : BAILER/RECOVERY

EVACUATION METHOD: BAILER
PERSONNEL: PAUL GOTTLER
DATUM USED FOR CALCULATIONS: TOP OF CASING

STATIC HEAD (H) = 9.06 ft

SCREEN RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R) = 0.34 ft

EFFECTIVE BOREHOLE RADIUS (R_0) = 0.21 ft

SCREEN LENGTH (L) = 9.61 ft

INITIAL HEAD (Ho) = 14.9 ft

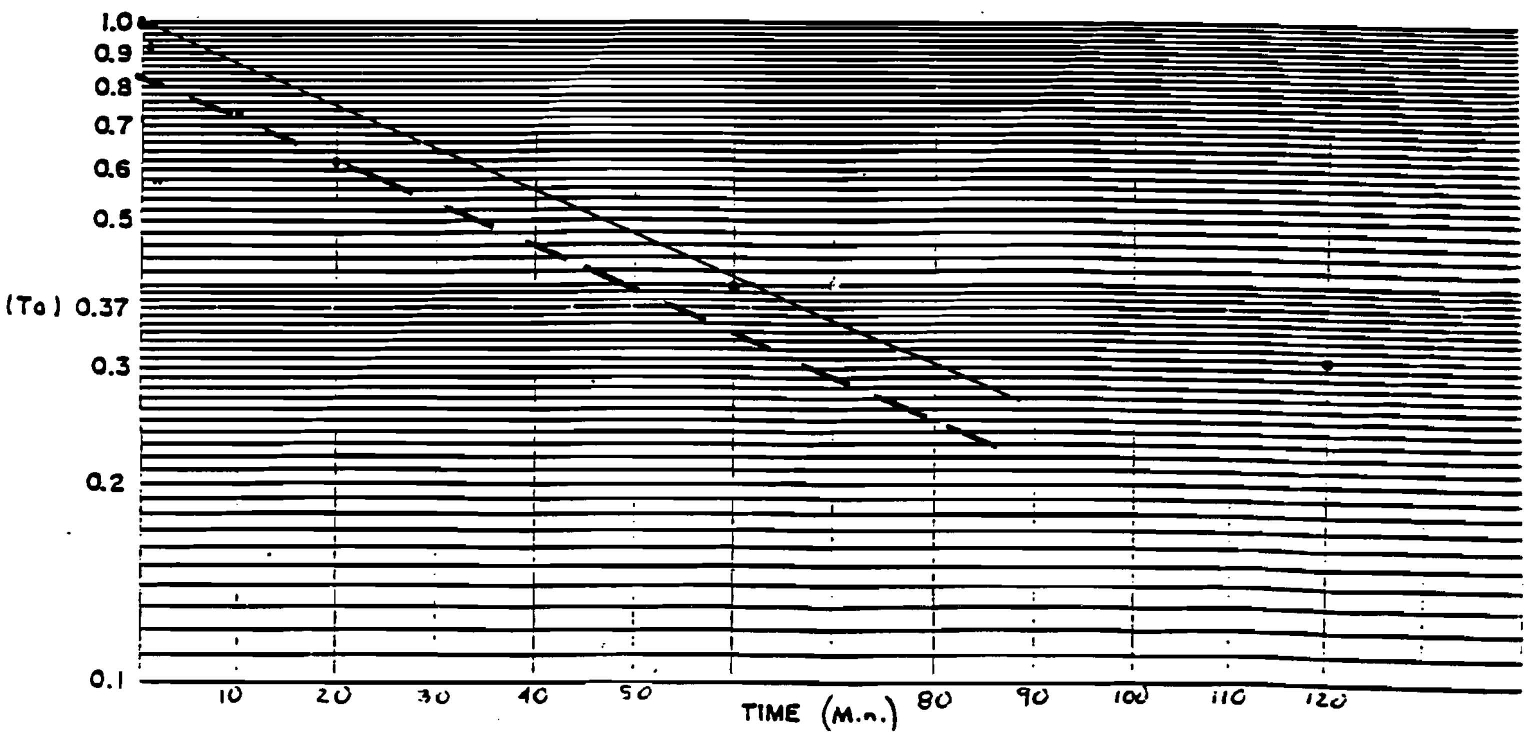
To (from graph) = 264 min
15840 sec

WELL TOT. DEPTH = 17.98 ft

HYDRAULIC CONDUCTIVITY

TIME (MIN.)	Depth To Water	h	H-h / H-Ho
0.00	14.90	3.08	1.00
0.16	14.76	3.22	0.98
0.33	14.67	3.31	0.96
0.50	14.61	3.37	0.95
0.66	14.52	3.46	0.93
1.00	14.48	3.50	0.93
2.00	14.29	3.69	0.90
3.00	14.15	3.83	0.87
6.00	13.77	4.21	0.81
10.00	13.31	4.67	0.73
20.00	12.67	5.31	0.62
60.00	11.40	6.58	0.40
120	10.95	7.03	0.32
180	10.76	7.22	0.29

$$K = \frac{r^2 \ln(L/R_0)}{2LT_o} = \begin{array}{l} 8.7\text{E-08 ft/sec} \\ 2.6\text{E-06 cm/sec} \end{array}$$



IN-SITU PERMEABILITY TEST FIELD LOGS

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-2D
DATE: 11/13/90
METHOD USED : ENVIROLABS

EVACUATION METHOD: NONE
PERSONNEL: PAUL GOTTLER
DATUM USED FOR CALCULATIO
TOP OF CASING

STATIC HEAD (H) = 6.33 ft

SCREEN RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R) = 0.083 ft

SCREEN LENGTH (L) = 8.39 ft

INITIAL HEAD (Ho) = 8.67 ft

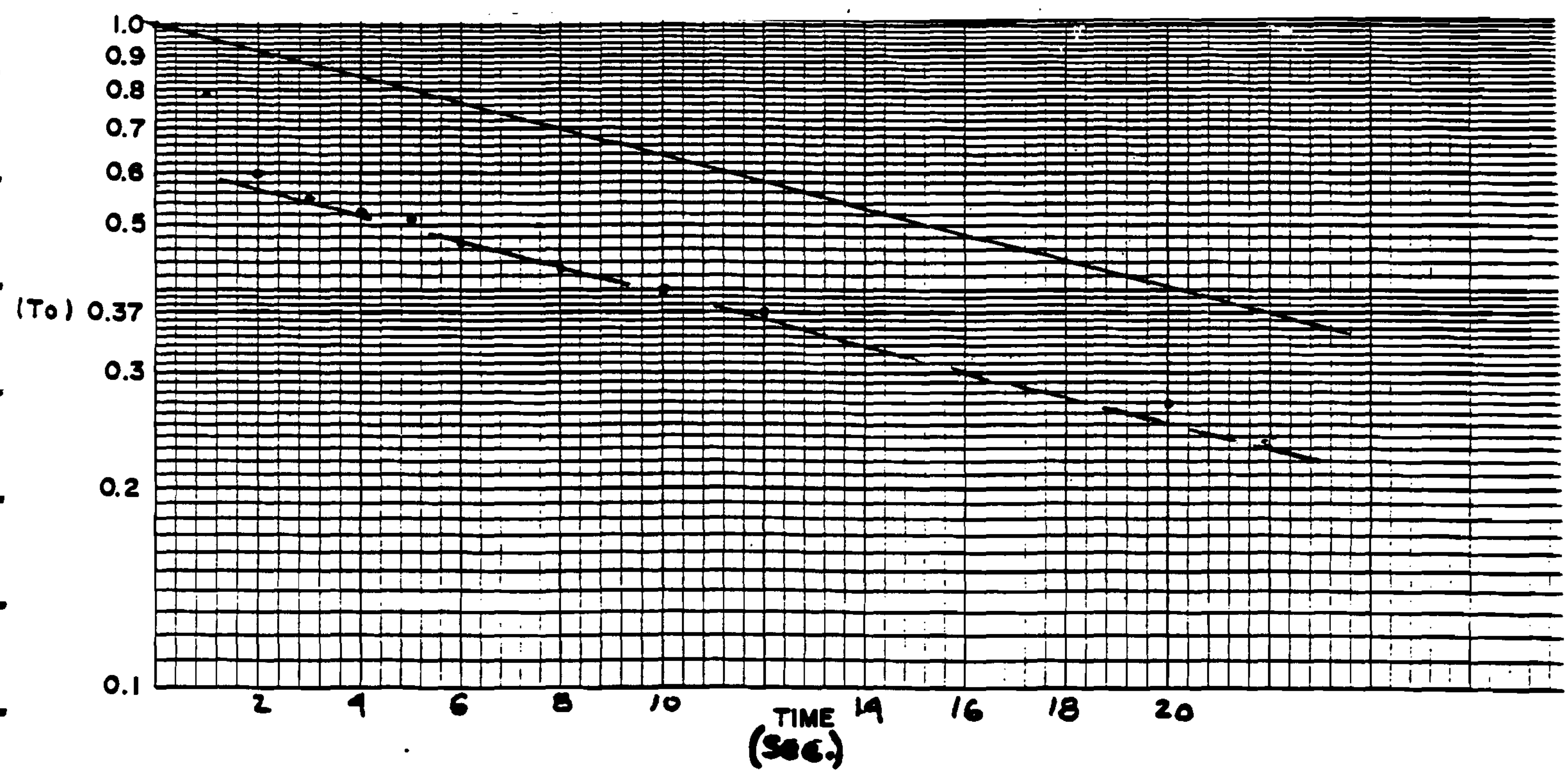
To (from graph) = 0.37 min
22.2 sec

WELL TOT. DEPTH = 70.27 ft

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R)}{2LTo} = \begin{array}{l} 8.5E-05 \text{ ft/sec} \\ 2.6E-03 \text{ cm/sec} \end{array}$$

TIME (SEC.)	h	H-h / H-Ho
0	8.67	1.00
1	8.17	0.79
2	7.74	0.60
3	7.61	0.55
4	7.55	0.52
5	7.53	0.51
6	7.44	0.47
8	7.34	0.43
10	7.26	0.40
12	7.19	0.37
20	6.97	0.27
30	6.73	0.17
40	6.59	0.11
60	6.53	0.09
120	6.48	0.06
240	6.45	0.05



IN-SITU FIELD PERMEABILITY FIELD LOG (REVISED 5/96)

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-3S
DATE: 7/23/86
METHOD USED : BAILER/RECOVERY

EVACUATION METHOD: BAILER
PERSONNEL: BOB FORESTI
DATUM USED FOR CALCULATIONS: TOP OF CASING

STATIC HEAD (H) = 3.83 ft

SCREEN RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R) = 0.34 ft

EFFECTIVE BOREHOLE RADIUS (R_o) = 0.21ft

SCREEN LENGTH (L) = 3.83 ft

INITIAL HEAD (Ho) = 17.08 ft

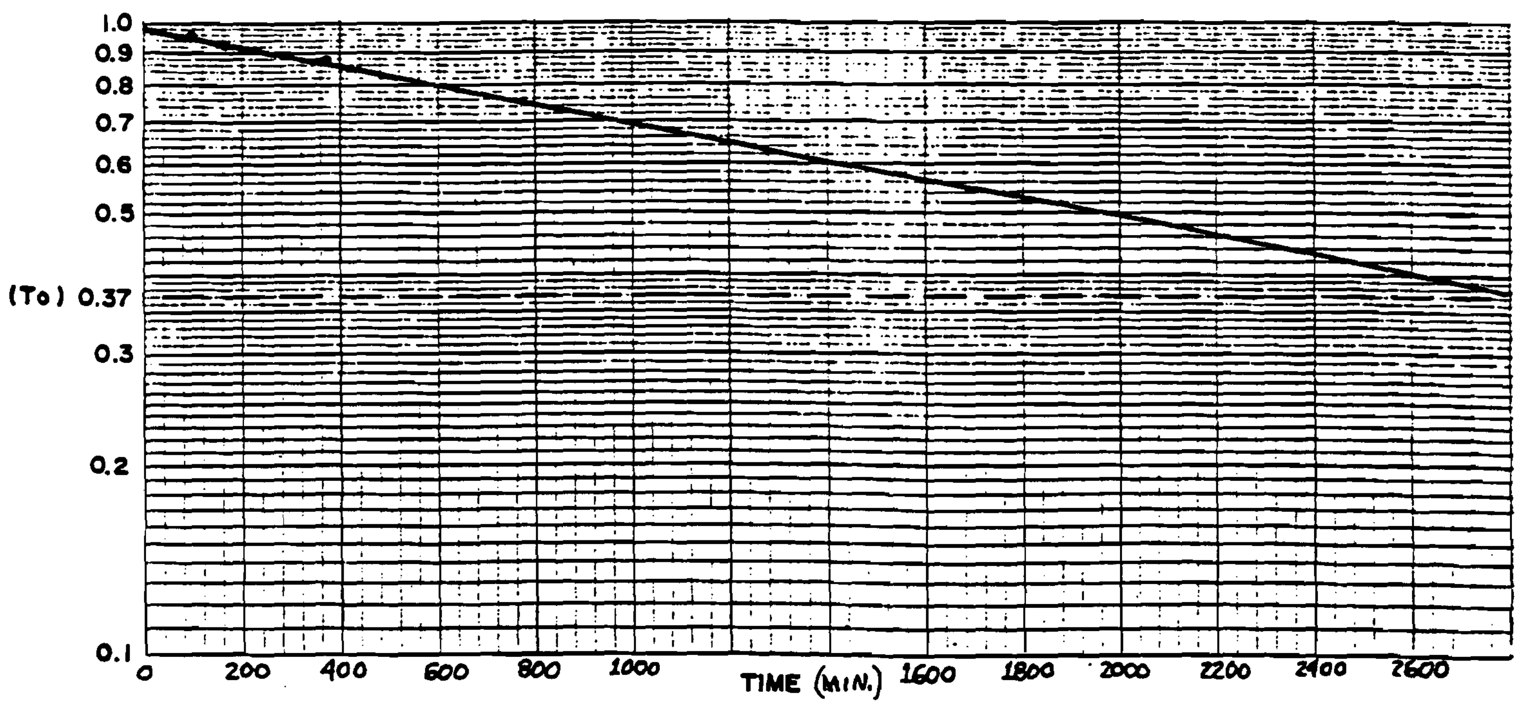
To (from graph) = 2820 min
169200 sec

WELL TOT. DEPTH = 22.99 ft

TIME (MIN.)	Depth To Water	h	H-h / H-Ho
0.0	17.08	0.04	1.00
94.0	16.41	0.2	0.95
162.0	15.83	0.29	0.91
370.0	15.25	0.49	0.86

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R_o)}{2LTo} = 1.5E-08 \text{ ft/sec}$$
$$4.7E-07 \text{ cm/sec}$$



IN-SITU FIELD PERMEABILITY LOG (REVISED 5/96)

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-3S
DATE: 11/7/90
METHOD USED : BAILER/RECOVERY

EVACUATION METHOD: BAILER
PERSONNEL: PAUL GOTTLER
DATUM USED FOR CALCULATIONS: TOP OF CASING

STATIC HEAD (H) = 2.95 ft

SCREEN RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R) = 0.34 ft

EFFECTIVE BOREHOLE RADIUS (R_O) = 0.21 ft

SCREEN LENGTH (L) = 7.05 ft

INITIAL HEAD (Ho) = 0.01 ft

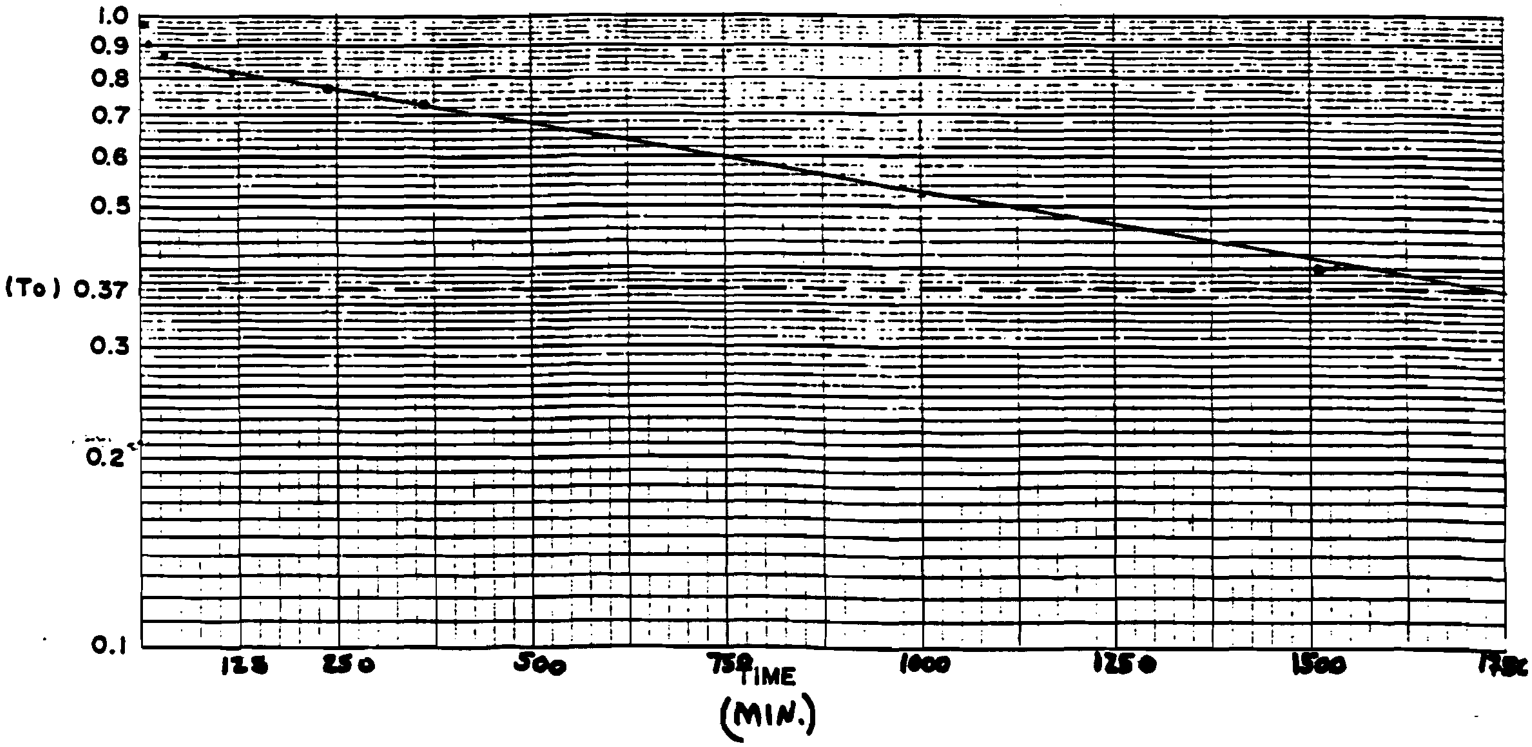
To (from graph) = 1770 min
106200 sec

WELL TOTAL DEPTH = 21.29 ft

HYDRAULIC CONDUCTIVITY

TIME (MIN.)	Depth To Water	h	H-h / H-Ho
0.00	21.28	0.01	1.00
0.16	21.26	0.03	0.99
0.33	21.24	0.05	0.99
0.50	21.22	0.07	0.98
0.66	21.20	0.09	0.97
1.00	21.18	0.11	0.97
2.00	21.14	0.15	0.95
4.00	21.09	0.20	0.94
10.00	20.99	0.30	0.90
30.00	20.90	0.39	0.87
60.00	20.82	0.47	0.84
120.00	20.75	0.54	0.82
240.00	20.61	0.68	0.77
360.00	20.5	0.79	0.73
1530	19.52	1.77	0.40

$$K = \frac{r^2 \ln(L/R_0)}{2LTo} = \begin{array}{l} 1.6E-08 \text{ ft/sec} \\ 4.9E-07 \text{ cm/sec} \end{array}$$



IN-SITU PERMEABILITY FIELD LOG

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-3D
DATE: 11/16/90
MEHTOD USED : ENVIROLABS

EVACUATION METHOD: NONE
PERSONNEL: PAUL GOTTLER
DATUM USED FOR CALCULATI
TOP OF CASING

STATIC HEAD (H) = 6.03 ft

SCREEN RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R) = 0.083 ft

SCREEN LENGTH (L) = 7.54 ft

INITIAL HEAD (Ho) = 7.87 ft

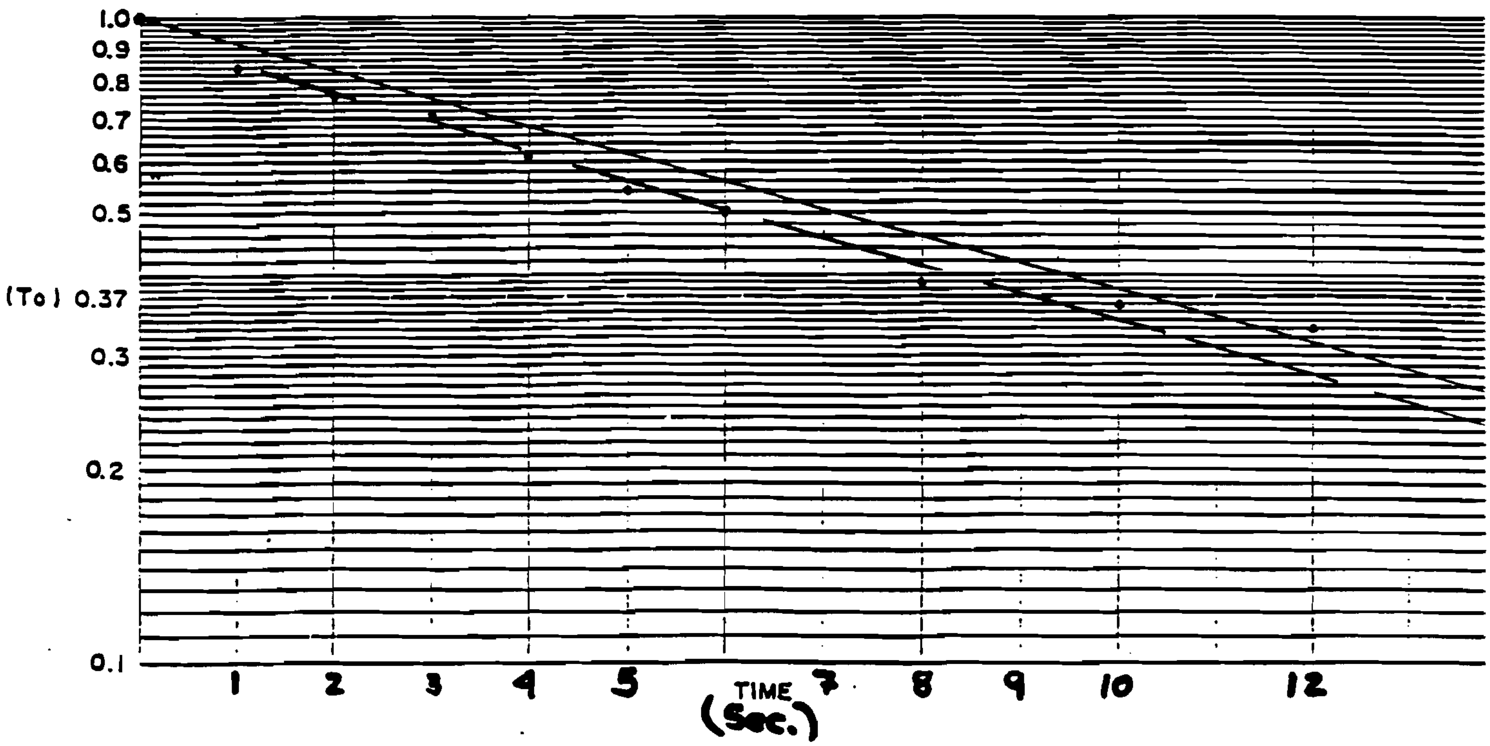
To (from graph) = 0.45 min
27 sec

WELL TOT. DEPTH = 83.71 ft

HYDRAULIC CONDUCTIVITY

TIME (SEC.)	h	H-h / H-Ho
0	7.87	1.00
1	6.79	0.41
2	6.68	0.35
3	6.62	0.32
4	6.59	0.30
5	6.52	0.27
6	6.47	0.24
8	6.42	0.21
10	6.38	0.19
15	6.32	0.16
20	6.29	0.14
30	6.26	0.12
40	6.23	0.11
70	6.12	0.05
100	6.1	0.04

$$K = \frac{r^2 \ln(L/R)}{2LTo} = 7.6E-05 \text{ ft/sec}$$
2.3E-03 cm/sec



IN-SITU PERMEABILITY FIELD LOG

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-4D
DATE: 11/16/90
METHOD USED : ENVIROLABS

EVACUATION METHOD: NONE
PERSONNEL: PAUL GOTTLER
DATUM USED FOR CALCULATIONS
TOP OF CASING

STATIC HEAD (H) = 7.02 ft

SCREEN RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R) = 0.083 ft

SCREEN LENGTH (L) = 8.73 ft

INITIAL HEAD (Ho) = 10.46 ft

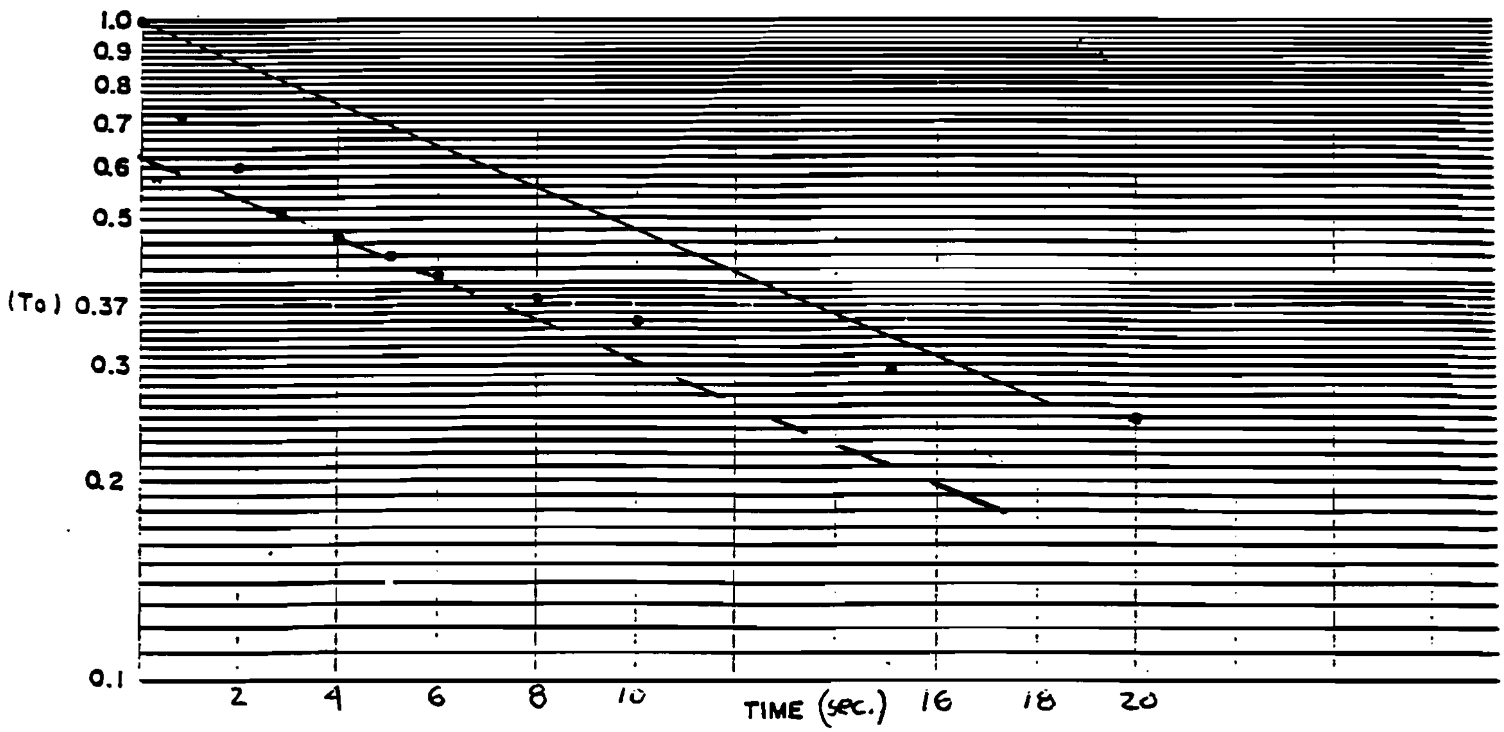
To (from graph) = 0.095 min
5.7 sec

WELL TOTAL DEPTH = 89.93 ft

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R)}{2LTo} = 3.2E-04 \text{ ft/sec}$$
$$= 9.8E-03 \text{ cm/sec}$$

TIME (SEC.)	h	H-h / H-Ho
0	10.46	1.00
1	8.47	0.42
2	7.67	0.19
3	7.6	0.17
4	7.5	0.14
5	7.43	0.12
6	7.37	0.10
8	7.32	0.09
10	7.29	0.08
15	7.25	0.07
20	7.21	0.06
30	7.15	0.04
40	7.11	0.03
80	7.05	0.01



IN-SITU PERMEABILITY FIELD LOG

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-5D
DATE: 11/16/90

EVACUATION METHOD: NONE
PERSONNEL: PAUL GOTTLER
DATUM USED FOR CALCULATIONS: TOP OF CASING

METHOD USED : ENVIROLABS

STATIC HEAD (H) = 7.61 ft

SCREEN RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R)= 0.083 ft

SCREEN LENGTH (L)= 8.73 ft

INITIAL HEAD (Ho)= 9.39 ft

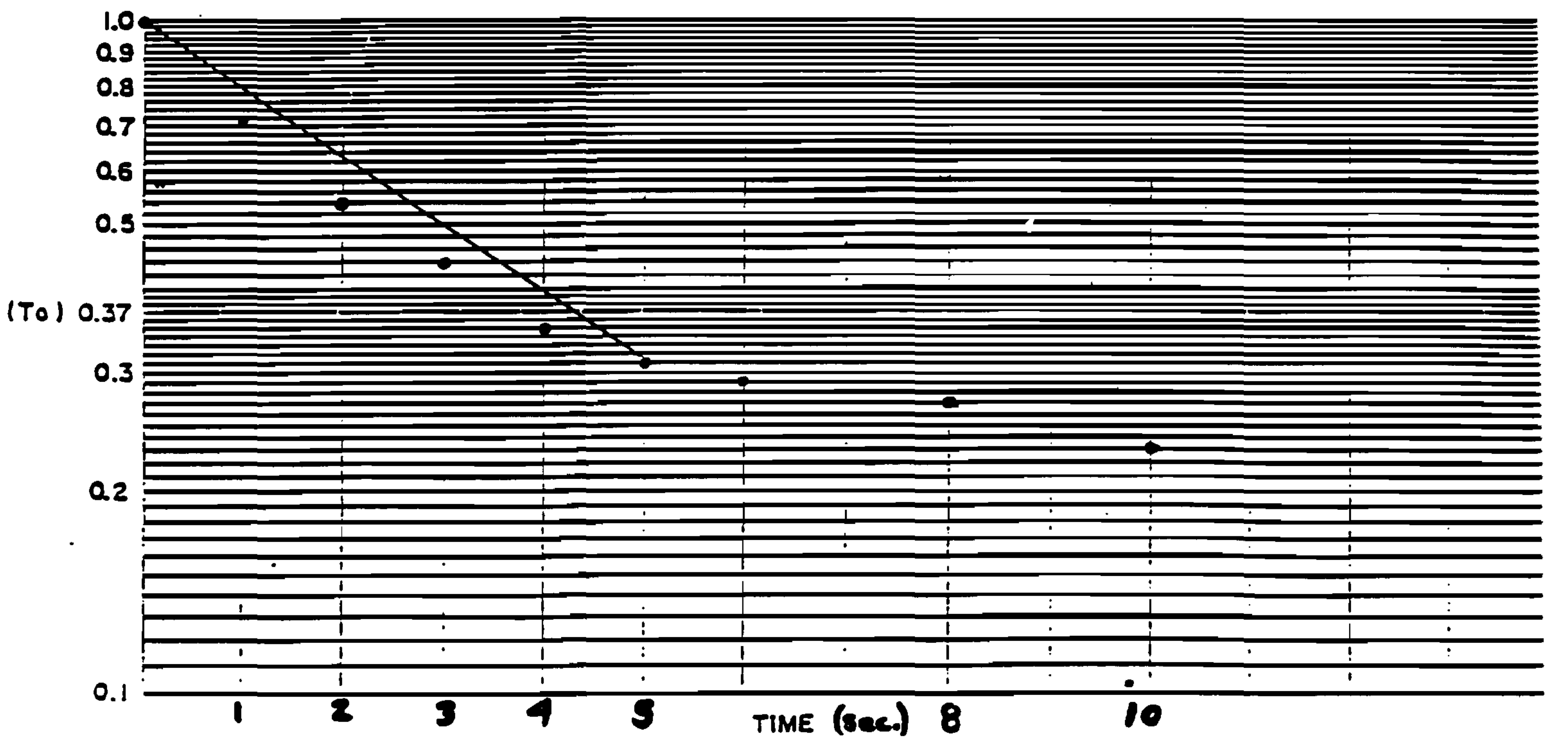
To (from graph) = 0.065 min
3.9 sec

WELL TOT. DEPTH = 91.87 ft

TIME (SEC.)	h	H-h / H-Ho
0	9.39	1.00
1	9.04	0.80
2	8.37	0.43
3	8.06	0.25
4	7.92	0.17
5	7.84	0.13
6	7.79	0.10
8	7.75	0.08
10	7.72	0.06
15	7.7	0.05
20	7.68	0.04
30	7.66	0.03
60	7.64	0.02

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R)}{2LTo} = 4.7E-04 \text{ ft/sec}$$
$$1.4E-02 \text{ cm/sec}$$



IN-SITU PERMEABILTY FIELD LOG (REVISED 5/96)

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-6
DATE: 11/7/90
METHOD USED : BAIL/RECOVERY

EVACUATION METHOD: BAILER
PERSONNEL: PAUL GOTTLER
DATUM USED FOR CALCULATIONS: TOP OF CASING

STATIC HEAD (H) = 8.67 ft

SCREEN RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R) = 0.34 ft

EFFECTIVE BOREHOLE RADIUS (R_o) 0.21 ft

SCREEN LENGTH (L) = 8.67 ft

INITIAL HEAD (Ho) = 1.75 ft

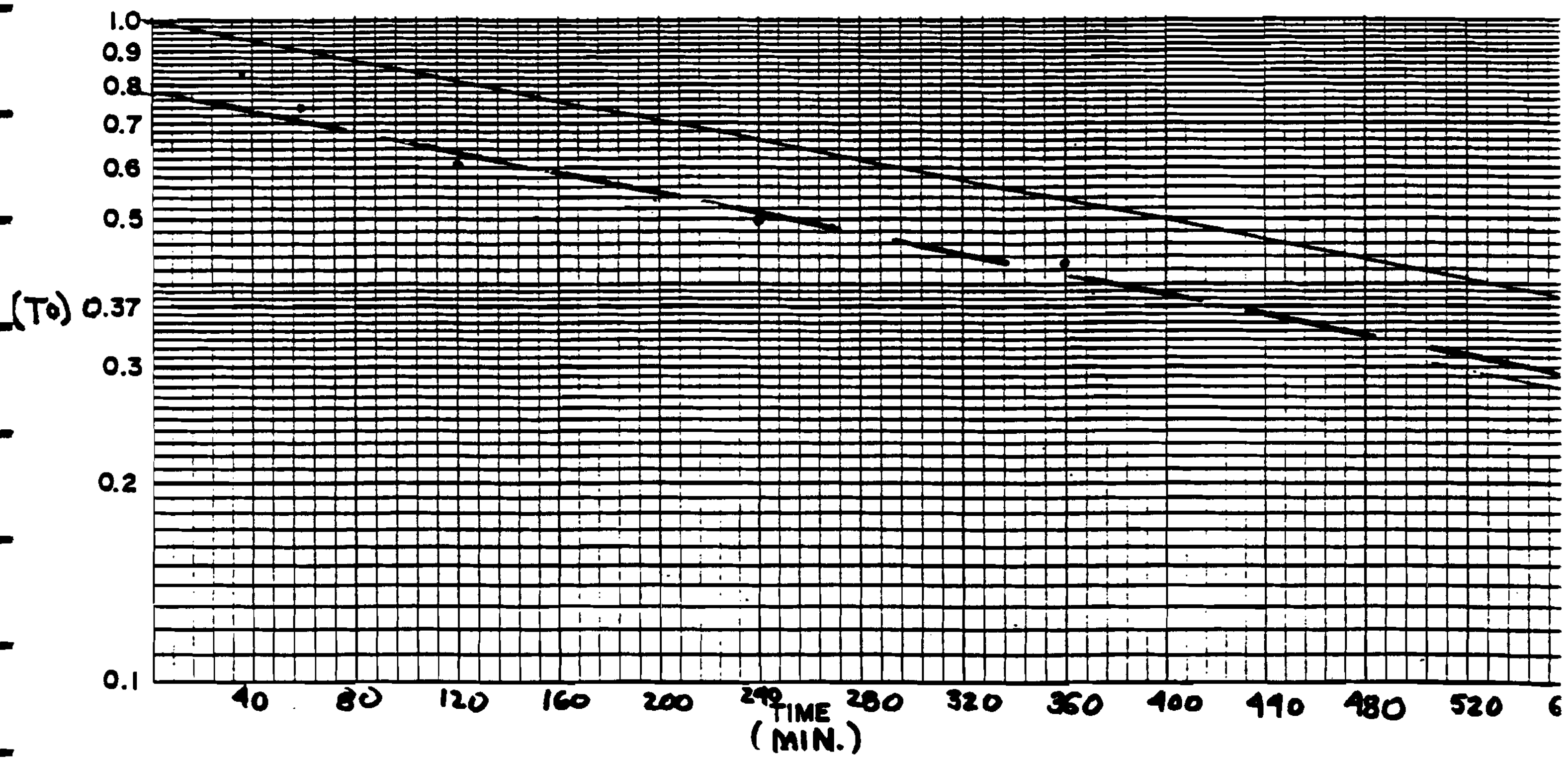
To (from graph) = 660 min
39600 sec

WELL TOTAL DEPTH = 21.54 ft

HYDRAULIC CONDUCTIVITY

TIME (MIN.)	Depth To Water	h	H-h / H-Ho
0.00	19.79	1.75	1.00
0.16	19.76	1.78	1.00
0.33	19.73	1.81	0.99
0.50	19.70	1.84	0.99
0.66	19.67	1.87	0.98
1.00	19.64	1.90	0.98
2.00	19.56	1.98	0.97
4.00	19.43	2.11	0.95
10.00	19.15	2.39	0.91
30.00	18.60	2.94	0.83
60.00	18.02	3.52	0.74
120.00	17.10	4.44	0.61
240.00	16.31	5.23	0.50
360.00	15.85	5.69	0.43

$$K = \frac{r^2 \ln(L/R_o)}{2LTo} = 3.7E-08 \text{ ft/sec}$$
1.1E-06 cm/sec



IN-SITU PERMEABILTY FIELD LOG (REVISED 5/96)

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-7
DATE: 11/6/90
METHOD USED : BAIL/RECOVERY

EVACUATION METHOD: BAILER
PERSONNEL: PAUL GOTTLER
DATUM USED FOR CALCULATIONS: TOP OF CASING

STATIC HEAD (H) = 3.24 ft

SCREEN RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R) = 0.34 ft

EFFECTIVE BOREHOLE RADIUS (R_o) = 0.21 ft

SCREEN LENGTH (L) = 3.24 ft

INITIAL HEAD (Ho) = 0.25 ft

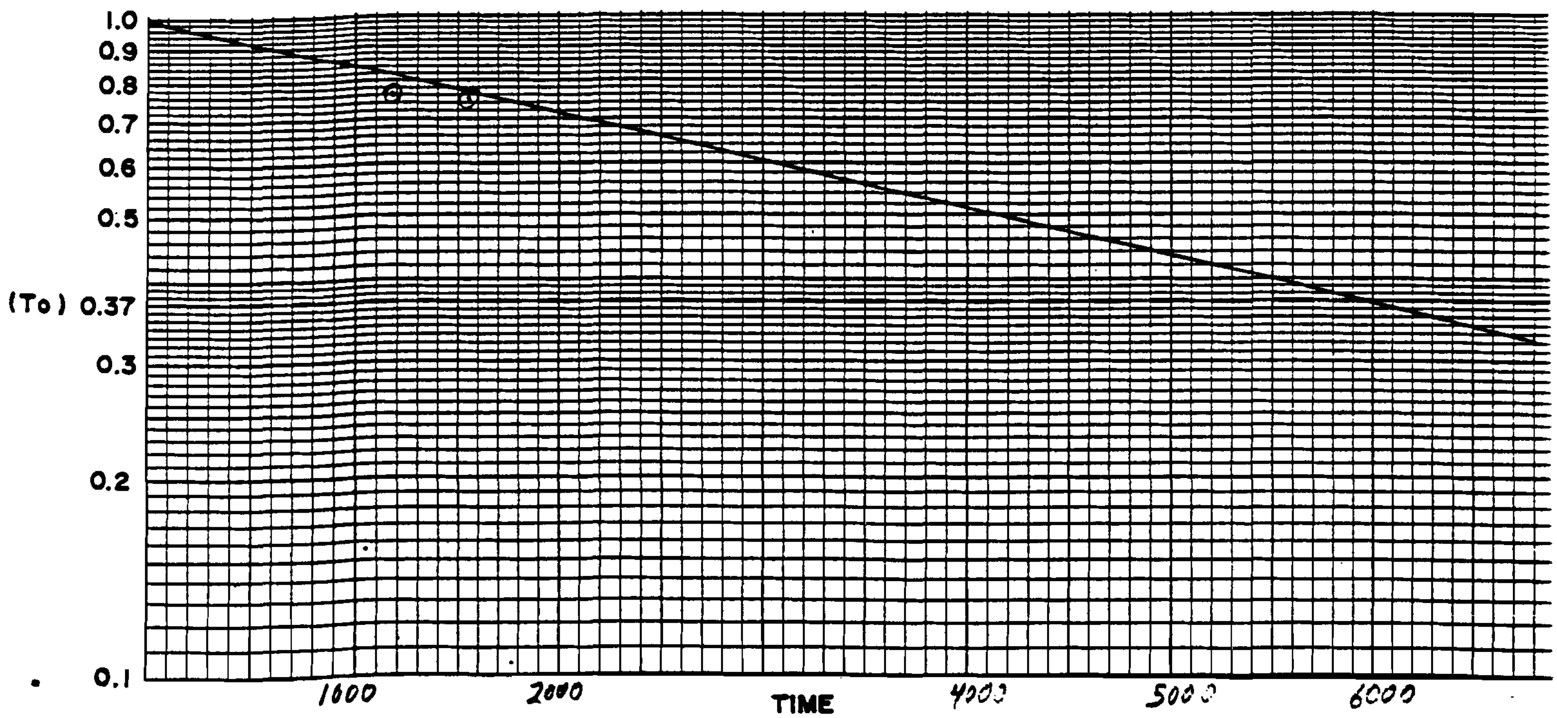
To (from graph) = 6000 min
360000 sec

WELL TOTAL DEPTH = 19.52 ft

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R_o)}{2LTo} = 8.0E-09 \text{ ft/sec}$$
$$2.5E-07 \text{ cm/sec}$$

TIME (Min.)	Depth to Water	h	H-h / H-Ho
0.00	19.27	0.25	1.00
0.16	19.26	0.26	1.00
0.33	19.24	0.28	0.99
0.50	19.22	0.30	0.98
0.66	19.20	0.32	0.98
1.00	19.17	0.35	0.97
1.50	19.12	0.40	0.95
2.00	19.07	0.45	0.93
3.50	18.96	0.56	0.90
5.00	18.87	0.65	0.87
8.00	18.75	0.77	0.83
13.00	18.66	0.86	0.80
20.00	18.62	0.90	0.78
40.00	18.60	0.92	0.78
100.00	18.58	0.94	0.77
1170	18.54	0.98	0.76
1570	18.52	1.00	0.75



IN-SITU PERMEABILITY FIELD LOG (REVISED 5/96)

IN-SITU PERMEABILITY TEST FIELD LOG

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-8
DATE: 11/6/90

EVACUATION METHOD: BAILER
PERSONNEL: PAUL GOTTLER
DATUM USED FOR CALCULATION: TOP OF CASING

METHOD USED : BAIL/RECOVERY

STATIC HEAD (H) = 8.75 ft

SCREEN RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R) = 0.34 ft
EFFECTIVE BOREHOLE RADIUS (R_o) = 0.21 ft
SCREEN LENGTH (L) = 8.75 ft

INITIAL HEAD (Ho) = 0.95 ft

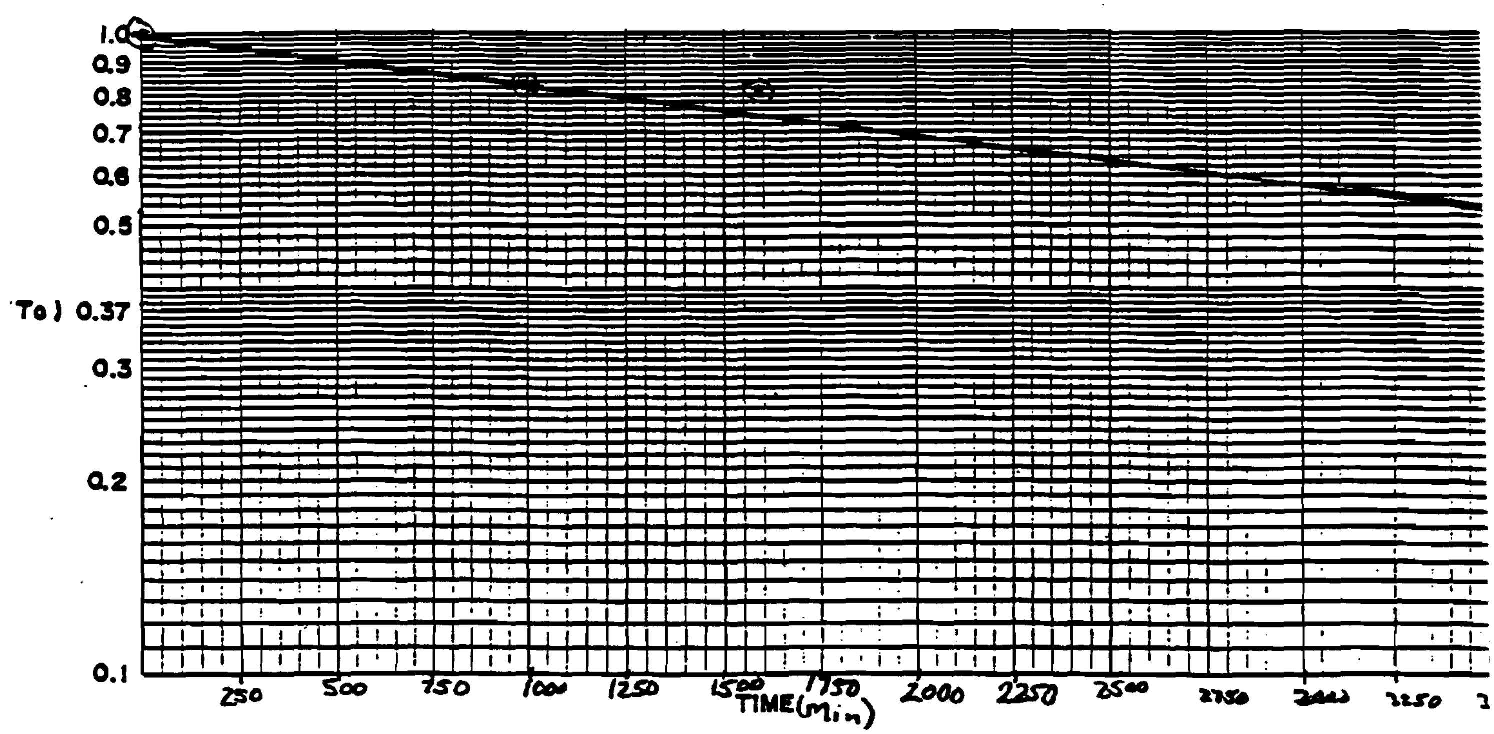
To (from graph) = 5300 min
318000 sec

WELL TOTAL DEPTH = 21.94 ft

TIME (MIN.)	Depth To Water	h	H-h / H-Ho
0.00	20.99	0.95	1.00
0.16	20.98	0.96	1.00
0.33	20.97	0.97	1.00
0.50	20.96	0.98	1.00
0.66	20.94	1.00	0.99
1.00	20.93	1.01	0.99
1.50	20.91	1.03	0.99
2.00	20.90	1.04	0.99
3.33	20.87	1.07	0.98
5.00	20.85	1.09	0.98
10.00	20.81	1.13	0.98
30.00	20.75	1.19	0.97
60.00	20.71	1.23	0.96
90.00	20.67	1.27	0.96
150.00	20.6	1.34	0.95
210.00	20.56	1.38	0.94
1000.00	19.69	2.25	0.83
1590.00	19.49	2.45	0.81

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R_o)}{2LT_o} = 5.0E{-}09 \text{ ft/sec}$$
1.4 E-07 cm/sec



PROJECT: ALCAN SITE 828005
WELL NUMBER: B-9
DATE: 8/10/92
METHOD USED: BAILER/RECOVERY

EVACUATION METHOD: BAILER
PERSONNEL: MOORE/O'DELL
DATUM USED FOR CALCULATIONS: TOP OF CASING

STATIC HEAD (H) = 9.06 ft

SCREEN RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R) = 0.34 ft

SCREEN LENGTH (L) = 10.00 ft

INITIAL HEAD (Ho) = 19.13 ft

To (from graph) = 4.85 min
291 sec

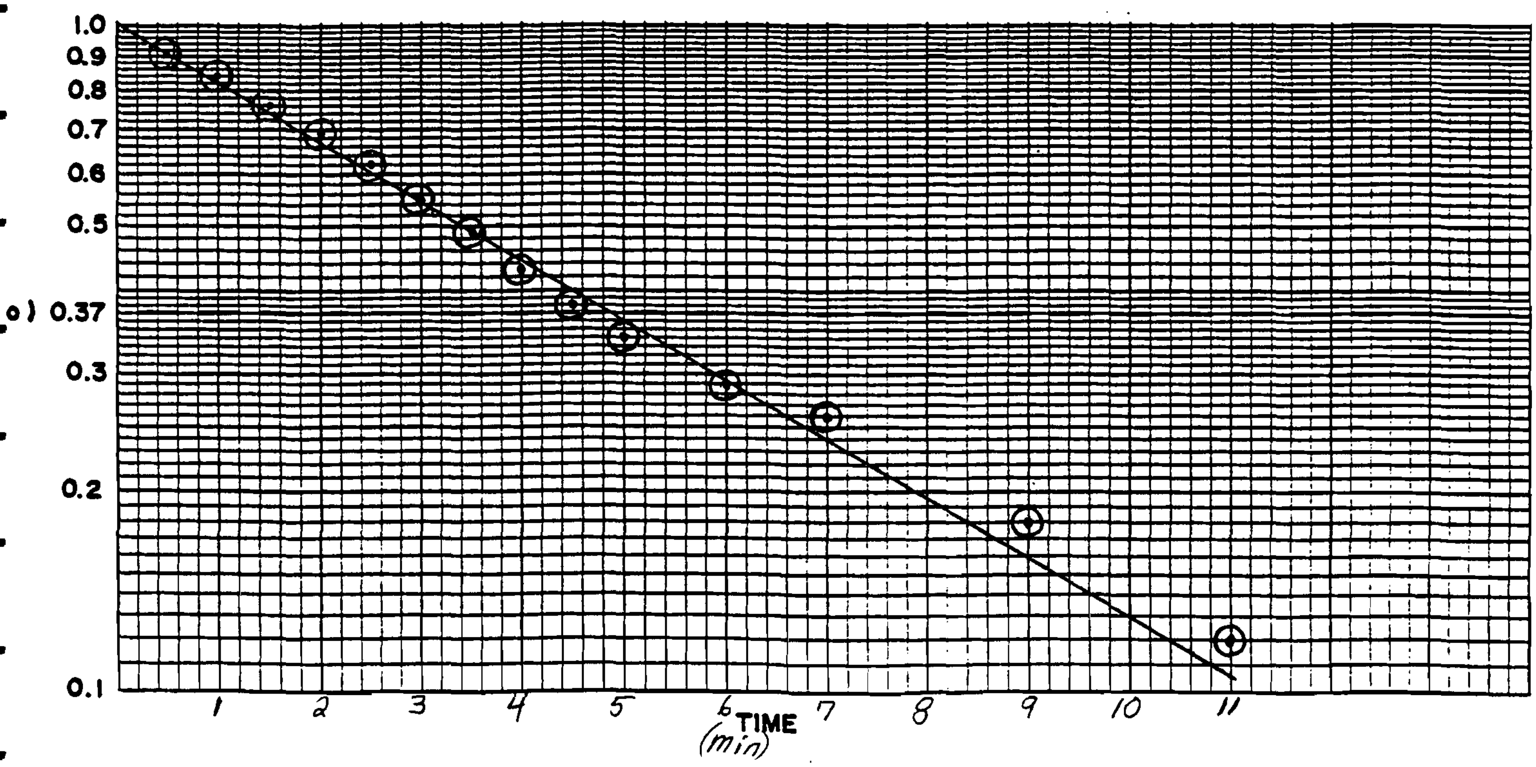
WELL TOT. DEPTH = 21.54 ft

HYDRAULIC CONDUCTIVITY

TIME (MIN.)	Depth To Water	h	H-h / H-Ho
0.00	19.13	2.41	1.00
0.50	18.27	3.27	0.91
1.00	17.54	4	0.84
1.50	16.75	4.79	0.76
2.00	15.98	5.56	0.69
2.50	15.28	6.26	0.62
3.00	14.57	6.97	0.55
3.50	13.97	7.57	0.49
4.00	13.37	8.17	0.43
4.50	12.86	8.68	0.38
5.00	12.44	9.1	0.34
6.00	11.98	9.56	0.29
7.00	11.72	9.82	0.26
9.00	10.91	10.6	0.18
11.00	10.31	11.2	0.12

$$K = \frac{r^2 \ln(L/R)}{2LTo} = 4.0E{-}06 \text{ ft/sec}$$

1.2E-04 cm/sec



IN-SITU PERMEABILITY FIELD LOG

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-12D
DATE: 11/15/90
METHOD USED: AQUASTAR

EVACUATION METHOD: NONE
PERSONNEL: PAUL GOTTLER
DATUM USED FOR CALCULATIONS: TOP OF CASING

STATIC HEAD (H) = 17.83 ft

SCREEN RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R) = 0.083 ft

SCREEN LENGTH (L) = 10.0 ft

INITIAL HEAD (Ho) = 13.19 ft

To (from graph) = 0.22 min
13 sec

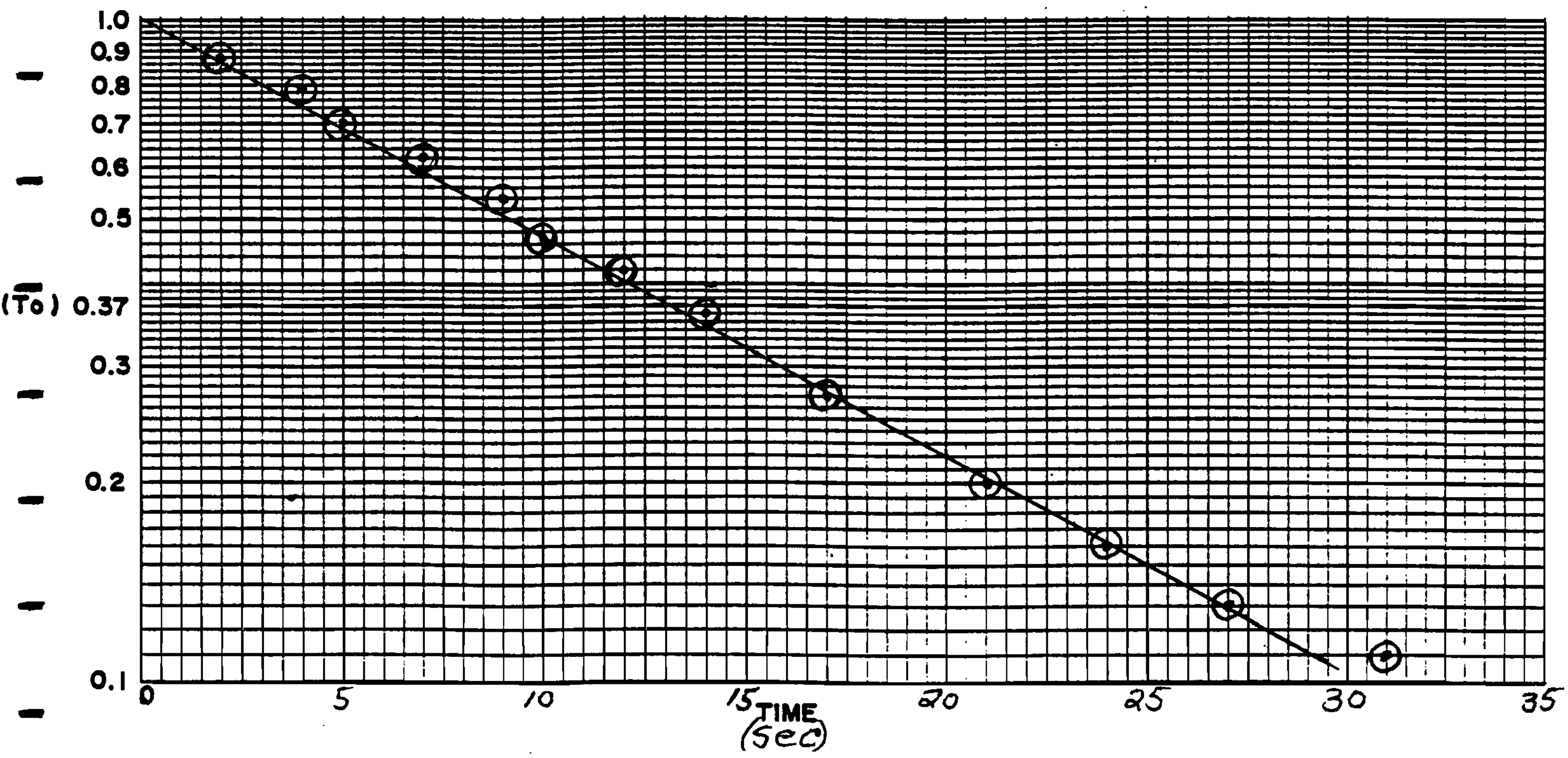
WELL TOT. DEPTH = 70.07 ft

HYDRAULIC CONDUCTIVITY

TIME (SEC.)	h	H-h / H-Ho
0	13.19	1.00
2	13.75	0.88
4	14.16	0.79
5	14.6	0.70
7	14.97	0.62
9	15.32	0.54
10	15.63	0.47
12	15.9	0.42
14	16.16	0.36
17	16.6	0.27
21	16.91	0.20
24	17.1	0.16
27	17.22	0.13
31	17.3	0.11

$$K = \frac{r^2 \ln(L/R)}{2LTo} = 1.3E-04 \text{ ft/sec}$$

3.9E-03 cm/sec



IN-SITU PERMEABILITY FIELD LOG

PROJECT: ALCAN SITE 828005
WELL NUMBER: B-13
DATE: 8/10/92
METHOD USED : BAIL/RECOVERY

EVACUATION METHOD: BAILER
PERSONNEL: MOORE/O'DELL
DATUM USED FOR CALCULATIONS: TOP OF CASING

STATIC HEAD (H) = 9.64 ft

PIPE RADIUS (r) = 0.083 ft

BOREHOLE RADIUS (R)= 0.34 ft

SCREEN LENGTH (L)= 10.00 ft

INITIAL HEAD (Ho)= 14.56 ft

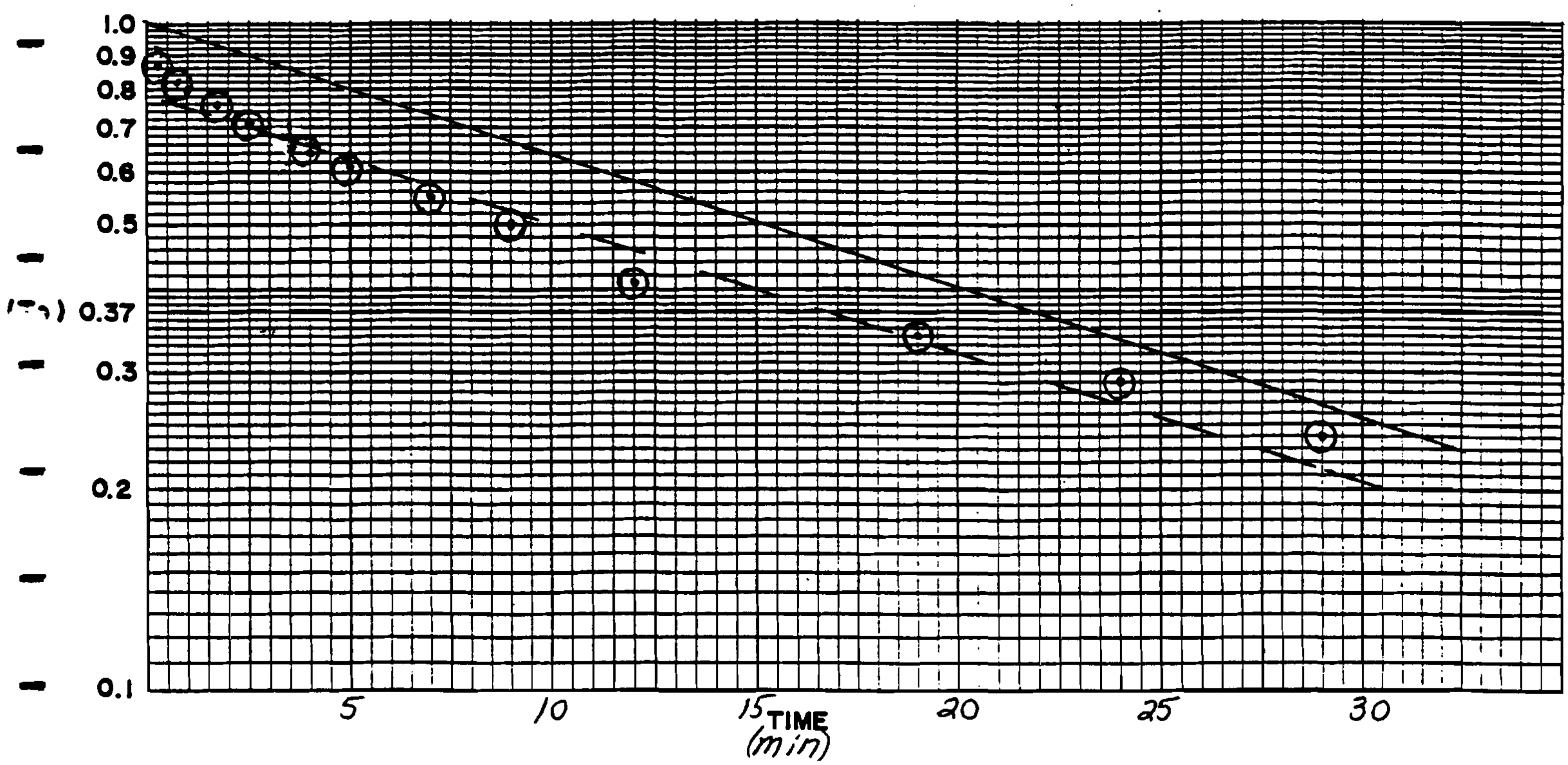
To (from graph) = 22 min
1320 sec

WELL TOT. DEPTH = 19.71 ft

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R)}{2LTo} = 8.8E-07 \text{ ft/sec} \quad 2.7E-05 \text{ cm/sec}$$

TIME (MIN.)	Depth To Water	h	H-h / H-Ho
0.00	14.56	5.15	0.91
0.25	14.34	5.37	0.87
0.50	14.23	5.48	0.85
0.75	14.12	5.59	0.82
1.00	14.01	5.70	0.80
1.50	13.83	5.88	0.76
2.00	13.7	6.01	0.74
2.50	13.57	6.14	0.71
3.00	13.45	6.26	0.69
4.00	13.24	6.47	0.64
5.00	13.05	6.66	0.61
7.00	12.79	6.92	0.55
9.00	12.55	7.16	0.50
12.00	12.08	7.63	0.41
19.00	11.75	7.96	0.34
24.00	11.48	8.23	0.29
29.00	11.26	8.45	0.24



Appendix F

Ground Water Budget Calculations

O'BRIEN & GERE ENGINEERS, INC.

ALCAN ALUMINUM CORPORATION SITE #828005 - GROUND WATER BUDGET CALCULATIONS

I. Inflow Calculations for Shallow Zone

A. Hydraulic conductivity range: 1.2×10^{-4} to 1.4×10^{-7} cm/sec
B. Geometric mean hydraulic conductivity: $K = 2.7 \times 10^{-6}$ cm/sec or 5.7×10^{-2} gpd/ft^2 or 7.7×10^{-3} ft/day
C. Year percolation rate: P = 13.335 in/yr or 1.111 ft/yr (based on the Thornwaite - EPA Method presented in USEPA 530/SW-168, October 1975)
D. Area of site: A = 360000 ft^2 (based on data collected on 11/30/90, Fig. A, attached)
E. Hydraulic gradient: i = 0.002 ft/ft (based on data collected on 11/30/90, Fig. A, attached)
F. Length of area of inflow: L = 625 ft (based on measurements from Fig. A, attached)
G. Thickness of shallow zone: b = 11 ft (based on test boring log data, Appendix C)
H. Porosity: n = 0.45 (based upon Davis and De Wiest, 1966)

1. Volume of Horizontal Ground Water Inflow: Qsi = (K)(i)(b)(L)

K (gpd/ft^2)	i (ft/ft)	b (ft)	L (ft)	Qsi (gpd)
0.057	0.002	11	625	0.78

2. Inflow via Percolation: Ip = (P)(A)(7.48)/(365)

P (ft/yr)	A (ft^2)	7.48 (g/ft^3)	365 (days)	Ip (gpd)
1.111	360000	7.48	365	8196.44

3. Total Volume of Ground Water Inflow to Shallow Zone: Qtsi = (Qsi) + (Ip)

Qsi (gpd)	Ip (gpd)	Qtsi (gpd)
0.78	8196.44	8197.22

II. Outflow Calculations for Shallow Zone

A. Hydraulic conductivity range: 1.2×10^{-4} to 1.4×10^{-7} cm/sec
B. Geometric mean hydraulic conductivity: $K = 2.7 \times 10^{-6}$ cm/sec or 5.7×10^{-2} gpd/ft^2 or 7.7×10^{-3} ft/day
C. Hydraulic gradient: i = 0.04 ft/ft (based on data collected on 11/30/90, Fig. A, attached)
D. Average vertical hydraulic gradient: iv = 1 ft/ft (based on elevation of water table in and water table encountered during drilling)
E. Thickness of shallow zone: b = 11 ft (based on test boring log data, Appendix C)
F. Length of area of outflow: ln = 950 ft (based on measurements from Fig. A, attached)
G. Porosity: n = 0.45 (based upon Davis and De Wiest, 1966)
H. Average vertical hydraulic conductivity: $Kv = 2.7 \times 10^{-8}$ cm/sec or 0.00057 gpd/ft^2

1. Average Horizontal Ground Water Velocity: (Vs) = (Kh)(i)/(n)

Kh (ft/day)	i (ft/ft)	n (no units)	=	Vs (ft/day)
6.8×10^{-3}	0.04	0.45		6.84×10^{-4}

2. Volume of Horizontal Ground Water Outflow: Qso = (K)(i)(b)(l)

Kh (gpd/ft^2)	in (ft/ft)	b (ft)	l(ft)	=	Qso (gpd)
0.057	0.04	11	950		23.83

3. Volume of Vertical Outflow: Qv = (Kv)(i)(A)

Kv (gpd/ft^2)	iv (ft/ft)	A(ft^2)	Qv (gpd)
0.00057	1	360000	205.2

4. Total volume of Outflow from the Shallow Zone: Qtso = (Qso) + (Qv)

Qso (gpd)	Qv (gpd)	Qtso (gpd)
23.83	205.2	229.03

III. Ratio of Total Shallow Ground Water Inflow to Outflow: (Qtso/Qtsi)(100) = %

Qtso (gpd)	Qtsi (gpd)	Percent
229.03	8197.22	2.8

IV. Inflow Calculations for Deep Zone

A. Hydraulic conductivity range: 1.4×10^{-2} to 2.3×10^{-3} cm/sec
B. Geometric mean hydraulic conductivity: 5.8×10^{-3} cm/sec or 123.02 gpd/ft^2 or 16.44 ft/day
C. Horizontal hydraulic gradient: i = 0.04 ft/ft (based on data collected on 11/30/90, Fig. B, attached)
D. Vertical hydraulic gradient for shallow zone: i = 1.35 ft/ft
E. Aquifer thickness: b - 50 ft (based on test boring log data, Appendix C)
F. Length of area of inflow: l = 625 ft (based on measurements from Fig. 6, attached)
G. Porosity: n = 0.40 (based upon Davis and De Wiest, 1966)

1. Average Ground Water Velocity: V = (K)(i)/(n)

K (ft/day)	I (ft/ft)	n (no units)	=	V (ft/day)
16.44	0.04	0.40		1.64

2. Volume of Horizontal Ground Water Inflow: Qdi = (K)(i)(b)(l)

K (gpd/ft^2)	i (ft/ft)	b (ft)	l (ft)	Qdi (gpd)
123.02	0.04	50.00	625	153775

3. Given Volume of Vertical Ground Water Inflow from Shallow Zone (see item II, 3 above)

Qv (gpd)
205.2

4. Total Ground Water Inflow to Deep Zone: Qtdi = (Qdi) + (Qv)

Qdi (gpd)	Qv (gpd)	=	Qtdi (gpd)
153775	205.2		153980

V. Outflow Calculations for Deep Zone

A. Hydraulic conductivity range: 1.4×10^{-2} to 2.3×10^{-3} cm/sec
B. Geometric mean hydraulic conductivity: $K = 5.8 \times 10^{-3}$ cm/sec or 123.02 gpd/ft^2 or 16.44 ft/day
C. Horizontal hydraulic gradient: i = 0.04 ft/ft (based on data collected on 11/30/90, Fig. B, attached)
D. Aquifer thickness: b = 50 ft (based on test boring log data, Appendix C)
E. Length of area of inflow: l = 625 ft (based on measurements form Fig. B, attached)
F. Porosity: n = 0.40 (based upon Davis and De Wiest, 1966)

1. Volume of Ground Water Outflow: Qdo = (K)(i)(b)(l)

K (gpd/ft^2)	i (ft/ft)	b ft)	l (ft)	Qtdo (gpd)
123.02	0.04	50	625	153775

VI. Ratio of Total Deep Ground Water Inflow to Outflow: (Qtdi)/(Qtdo) = %

Qtdi (gpd)	Qtdo (gpd)	Percent
153980	153775	100

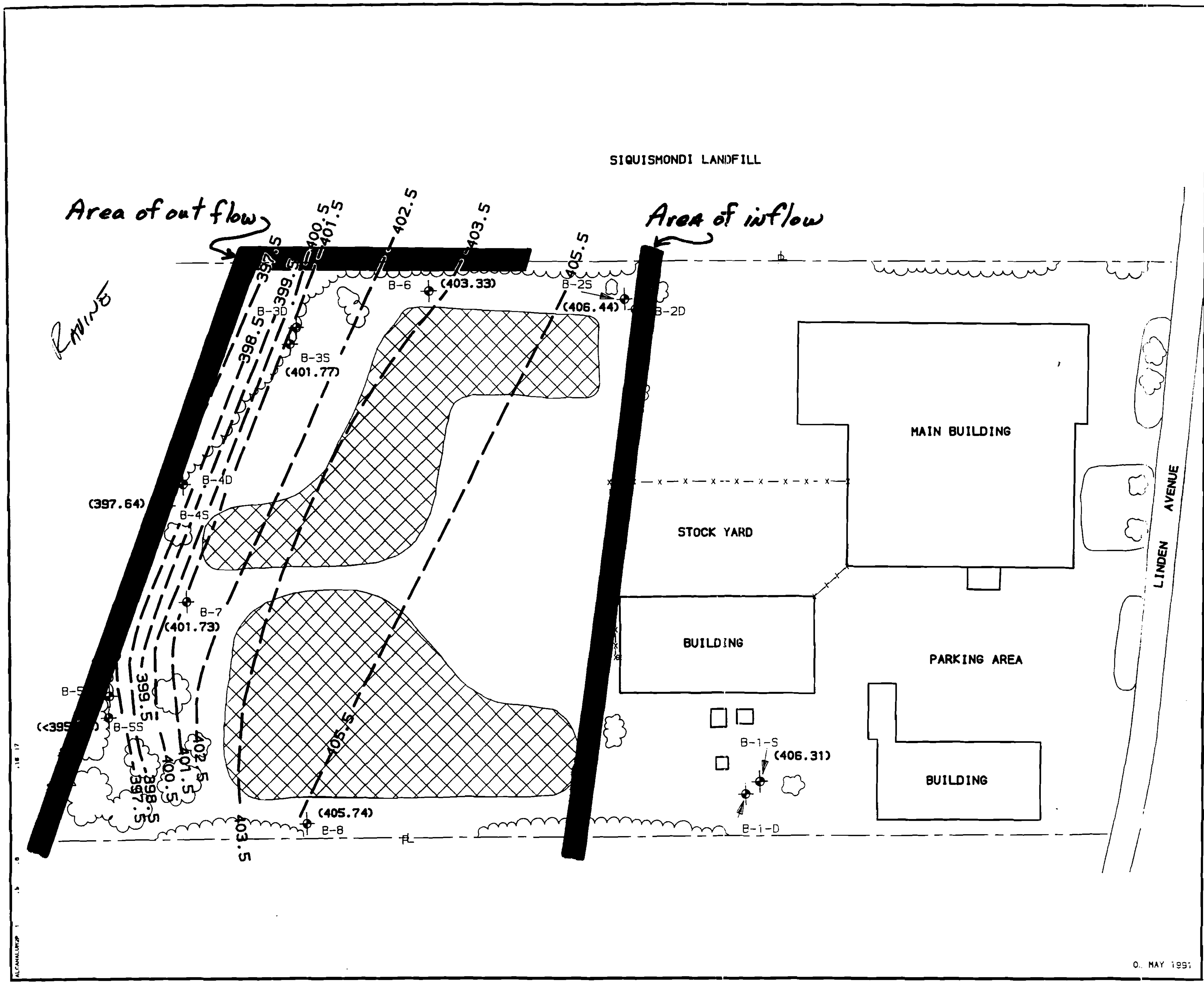


FIGURE A

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK

LEGEND

- MONITORING WELL LOCATION
- (406.31) GROUND WATER ELEVATION
- 397.5 GROUND WATER ELEVATION CONTOUR
- FORMER WATER IMPOUNDMENTS LOCATED BY AERIAL PHOTOS AND SOIL BORINGS

NOTE: CONTOUR LINES BASED ON EQUAL DISTRIBUTION OF GROUND WATER ELEVATIO BETWEEN WATER LEVELS DETERMINED IN WELLS. WATER LEVELS IN SHALLOW WELLS REPRESENT AVERAGE HEIGHT OF HEAD WITH THE AREA OF WELL SCREEN. WATER LEVELS SHALLOW WELLS DO NOT NECESSARILY REPR ELEVATION OF GROUND WATER TABLE.

SHALLOW GROUND WATER ELEVATIONS ON 11/30/9

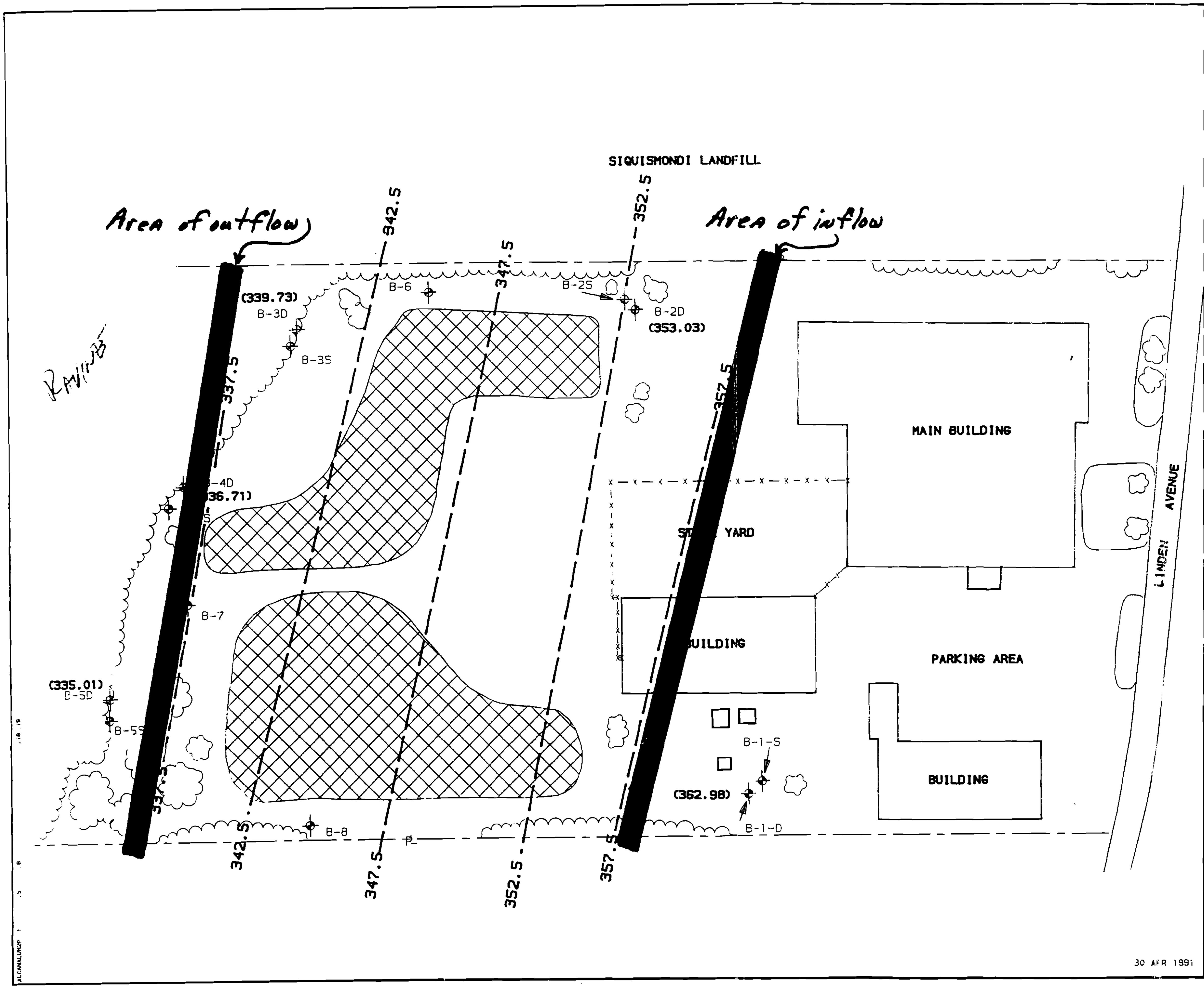
100 0 100
SCALE IN FEET

3057.032.131

O'BRIEN & GERE ENGINEERS, INC.

FIGURE B

ALCAN ALUMINUM CORPORATION
ALCAN ALUMINUM SITE #828005
PITTSFORD, NEW YORK



LEGEND

MONITORING WELL LOCATION

(362.98) GROUND WATER ELEVATION

347.5 GROUND WATER ELEVATION CONTOUR

FORMER WATER IMPOUNDMENTS A
LOCATED BY AERIAL PHOTOS
& SOIL BORINGS

DEEP GROUND WATER
ELEVATIONS
ON 11/30/90

100 0 100

SCALE IN FEET

3057.032.131

O'BRIEN & GERE
ENGINEERS, INC.

SOIL WATER BUDGET / GROUND WATER RECHARGE

MONTH	TEMPERATURE (F)	PRECIPITATION (IN)
YEAR = 1		
JANUARY	30.30	1.18
FEBRUARY	22.50	1.55
MARCH	32.30	3.69
APRIL	42.10	1.62
MAY	56.30	5.99
JUNE	67.40	5.65
JULY	72.80	0.98
AUGUST	68.50	2.46
SEPTEMBER	61.70	2.82
OCTOBER	52.60	3.13
NOVEMBER	38.10	2.01
DECEMBER	17.10	1.58

NUMBER OF YEAR OF CALCULATIONS	= 1
SOIL MOISTURE STORAGE	= 1.2 IN
ROOT DEPTH	= 10 IN
HOLDING CAPACITY	= 1.44 IN/FT
SITE LATITUDE	= 43 DEG.
WET SEASON RUNOFF COEFFICIENT	= .05
DRY SEASON RUNOFF COEFFICIENT	= .01
INITIAL STORAGE	= 1.2 IN

WATER BUDGET FOR 1 YEAR

VARIABLE SYMBOLS

PRECIPITATION, (IN)	- PREC
POTENTIAL EVAPOTRANSPIRATON, (IN)	- PE
RUNOFF COEFFICIENT	- CRO
RUNOFF, (IN)	- RO
INFILTRATION, (IN)	- I
ACCUMULATED POT. WATER LOSS, (IN)	- NGE
STORAGE, (IN)	- ST
CHANGE IN STORAGE, (IN)	- DELST
ACTUAL EVAPOTRANSPIRATION, (IN)	- AE
PERCOLATION, (IN)	- PERC

ALL VALUES ARE IN INCHES

WATER BUDGET FOR YEAR= 1

	PREC	PE	CR	RO	INF	I-PE	NGE	ST	DELST	AE	PERC
JANUARY	1.2	0.00	.05	0.06	1.12	1.12	0.00	1.20	0.00	0.00	1.12
FEBRUARY	1.6	0.00	.05	0.08	1.47	1.47	0.00	1.20	0.00	0.00	1.47
MARCH	3.7	0.02	.05	0.18	3.51	3.49	0.00	1.20	0.00	0.02	3.49
APRIL	1.6	0.97	.05	0.08	1.54	0.57	0.00	1.20	0.00	0.97	0.57
MAY	6.0	3.02	.05	0.30	5.69	2.67	0.00	1.20	0.00	3.02	2.67
JUNE	5.7	4.71	.05	0.28	5.37	0.65	0.00	1.20	0.00	4.71	0.65
JULY	1.0	5.65	.01	0.01	0.97	-4.68	-4.68	0.39	-0.81	1.78	0.00
AUGUST	2.5	4.64	.01	0.02	2.44	-2.21	-6.89	0.39	0.00	2.44	0.00
SEPTEMBER	2.8	3.20	.01	0.03	2.79	-0.41	-7.29	0.39	0.00	2.79	0.00
OCTOBER	3.1	1.93	.01	0.03	3.10	1.16	0.00	1.20	0.81	1.93	0.36
NOVEMBER	2.0	0.41	.05	0.10	1.91	1.50	0.00	1.20	0.00	0.41	1.50
DECEMBER	1.6	0.00	.05	0.08	1.50	1.50	0.00	1.20	0.00	0.00	1.50

INITIAL STORAGE	1.200	IN
SITE LATITUDE	43.000	DEG
ROOT DEPTH	10.000	IN
HOLDING CAPACITY	1.440	IN/FT
DRY SEASON RUNOFF COEFFICIENT	0.01	
WET SEASON RUNOFF COEFFICIENT	0.05	
AVERAGE SEASONAL RUNOFF COEFFICIENT	0.03	
AVERAGE PRECIPITATION	2.722	IN
TOTAL PRECIPITATION	32.660	IN
TOTAL POT. EVAPOTRANSPIRATION =	24.556	IN
TOTAL INFILTRATION =	31.403	IN
TOTAL RUNOFF =	1.257	IN
TOTAL CHANGE IN STORAGE =	0.000	IN
TOTAL ACTUAL EVAPOTRANSPIRATION =	18.068	IN
TOTAL PERCOLATION =	13.335	IN

Note: The water budget calculation follows the Thornwaite - EPA Method presented in "Use of the Water Balance Method for Predicting Leachate Generation from Solid Waste Disposal Sites", USEPA 530/SW-168, October 1975.