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January 23, 2004



New York State Department of
Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233

Attn: Michael Ryan, P.E.
Environmental Engineer

Re: Site Code #7-38-015
Consent Order Index # A7-0395-9908

Dear Mr. Ryan:

Enclosed is the Focused Remedial Investigation (FRI) Report prepared in accordance with the NYSDEC-approved FRI/FFS Work Plan and the Consent Order. The FRI Report is divided as follows:

VOLUME I: FRI Report

VOLUME II & III: Raw data and analytical supporting documentation

Please call me at (315) 349-0304 if you have any questions.

Sincerely,

David M. Neuner /mcg

David M. Neuner, P.E.
Environmental Leader

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***NOTE: VOLUME II & III AVAILABLE UPON REQUEST***

**REPORT**

# *Focused Remedial Investigation Report*

## *Volume 1 of 3*

**Alcan Aluminum Corporation**
**Oswego, New York**

**January 2004**

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

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**Volumes 2-and-3 –Analytical Data Reports**

# 1. Introduction

## 1.1 General

This report summarizes the work activities performed and the results obtained for the Focused Remedial Investigation (FRI) that was conducted for the following operable units (OUs) located at the Alcan Aluminum Corporation (Alcan) Oswego Works Facility in Scriba, New York:

- OU-1 – onsite constructed treatment ponds and wetlands, also referred to as the "North Ponds;"
- OU-2 – the Main Landfill; and
- OU-3 – onsite portions of unnamed Tributary 63.

These three operable units are collectively referred to as "the site" for the purposes of the FRI Report.

The FRI was conducted in accordance with the requirements of an existing Order on Consent (Index No. A7-0395-9908) between Alcan and the New York State Department of Environmental Conservation (NYSDEC), which became effective on October 7, 2000. The FRI was conducted to further characterize environmental issues identified by previous investigation activities that have been conducted at the site since the 1980s. The Focused RI consisted of the following activities:

| Operable Unit | FRI Activities |
|---|---|
| OU-1 (North Ponds) | • Sediment Investigation<br>• Hydrologic Evaluation<br>• Focused Surface Soil Investigation<br>• Perimeter Surface Soil Investigation<br>• Groundwater Investigation |
| OU-2 (Main Landfill) | • Landfill Soil Cover Evaluation<br>• Groundwater Investigation |
| OU-3 (Tributary 63) | • Sediment Investigation<br>• Surface Water Investigation<br>• Biota Investigation |

The FRI also included the completion of a qualitative Human Exposure Evaluation (HEE) to evaluate potential human exposure pathways and a Fish and Wildlife Impact Analysis (FWIA) that evaluates the potential significance of exposure pathways for ecological receptors in the vicinity of the site.

The FRI was conducted in two phases by Blasland, Bouck & Lee, Inc. (BBL) on behalf of Alcan. The initial FRI activities were implemented during August, September, and October of 2002 in accordance with the following documents:

- The NYSDEC-approved Focused Remedial Investigation/Focused Feasibility Study Work Plan prepared by ENSR Corporation (June 2002) and supporting documents, including a Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP);

- A Community Participation Plan (CPP) prepared by ENSR (June 2002);

- A Health and Safety Plan (HASP) prepared by BBL (August 2002);

- An August 12, 2002 letter from Alcan to the NYSDEC that presented proposed minor modifications to specific field sampling protocols proposed in the FSP; and

- An August 22, 2002 letter from Alcan to the NYSDEC that presented additional proposed modifications to the sampling protocols presented in the FSP.

Based on the results of the initial FRI activities (which included all of the investigation efforts included in the FRI Work Plan), Alcan submitted a May 14, 2003 letter to the NYSDEC that presented proposed supplemental sediment and hydrologic monitoring activities that were intended to address specific datagaps identified by the initial FRI results. The May 14, 2003 letter also presented a proposed approach for collecting biota samples within an off-site wetland area (Teal Marsh) that receives surface drainage from Tributary 63. The NYSDEC requested that Alcan collect off-site biota samples within Teal Marsh during an April 24, 2003 site meeting with Alcan, BBL, the NYSDEC, and the New York State Department of Health (NYSDOH).

Copies of the above-referenced correspondence relating to the FRI activities are presented in Appendix A.

The organization of this report is outlined below, followed by a discussion of applicable regulatory requirements, relevant background information, and the objectives of the FRI.

## 1.2 Report Organization

The Focused RI Report is organized into the following sections:

| Section | | Purpose |
|---|---|---|
| Section 1 - | Introduction | Presents a brief overview of the FRI activities; the organization of the FRI Report; relevant background information, and the objectives of the FRI. |
| Section 2 - | Previous Investigations | Presents a discussion of previous investigation activities and results. |
| Section 3 - | Focused Remedial Investigation Activities | Describes the FRI activities that were implemented for each OU, including sediment, surface water, groundwater, surface soil, and biota investigation efforts. |
| Section 4 - | Focused Remedial Investigation Results | Summarizes the results obtained for the FRI activities that were implemented to evaluate each OU. |
| Section 5 - | Qualitative Human Exposure Evaluation | Presents the results of the qualitative HEE, which includes an evaluation of potential human exposure pathways. |
| Section 6 - | Fish and Wildlife Impact Analysis (Steps I through IIC) | Presents the results of the FWIA that was conducted to evaluate the significance of exposure pathways for ecological receptors in the vicinity of the site. |
| Section 7 - | Conclusions | Presents conclusions supported by the results of the FRI and previous investigations. |
| Section 8 - | Certification Statement | Provides a certification statement that the FRI activities were completed in general accordance with the NYSDEC-approved FRI/FFS Work Plan and supporting documents. |
| Section 9 - | References | Provides references used to prepare the FRI Report. |

A detailed discussion of the results obtained for previous investigation activities conducted at the site is presented in Section 2 of this report. The previous investigation results were utilized as the basis for developing the objectives and scope of the FRI. Data generated by the previous investigation activities is included on figures presented in this FRI Report. However, the discussion presented in Sections 3 and 4 of this document is specific to only those activities and/or results associated with the FRI. The Human Exposure Evaluation (Section 5) and FWIA (Section 6) draw upon the results of the FRI, as well as the results of the previous investigation activities. The conclusions presented in Section 7 have been developed based on the results of relevant environmental investigation activities conducted in connection with the site (including previous investigation results and the FRI results).

### 1.3 Consistency with Regulatory Requirements

The FRI activities described in this report are intended to be consistent with the following Remedial Investigation/Feasibility Study (RI/FS) requirements:

- The Comprehensive Environmental Response, Compensations, and Liability Act of 1980 (CERCLA), 42 USC 9601 *et seq.*, as amended;
- The National Contingency Plan (NCP), 40 CFR Part 300;
- The United State Environmental Protection Agency (USEPA) guidance document entitled "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA", dated October 1988;
- NYSDEC Technical and Administrative Guidance Memorandums (TAGMs) and Technical and Operational Guidance Series (TOGS) documents; and
- NYSDOH guidance.

### 1.4 Background Information

A description of the Alcan Oswego Works facility and historical site operations is presented below, followed by a description of the three OUs that comprise the site and the physical setting of the site.

#### 1.4.1 Facility Description and History

The Alcan Oswego Works Facility is located approximately four miles east of the City of Oswego on Lake Road North (County Route 1A) in the Town of Scriba, Oswego County, New York. A site location map is presented as Figure 1. The Oswego Works Facility is situated on an approximately 506-acre parcel owned by Alcan. A site map that shows the layout of the Alcan property, including manufacturing buildings and support facilities, and the three OUs that comprise the site is presented as Figure 2. A topographic map that shows the Alcan property and the off-site wetland area northwest of the property (Teal Marsh) is presented as Appendix B. The Alcan property is bordered by Lake Road North and North Road to the south/southeast, undeveloped and partially developed lands to the west, and Lake Ontario to the north/northwest. A Sithe Energies, Inc. (Sithe) cogeneration plant, known as the Independence Station, borders Alcan's Property to the northeast.

The Alcan Facility was initially constructed in 1963. Prior to construction of the manufacturing facility, the property consisted of agricultural and undeveloped land. The initial Alcan (formerly Alroll) manufacturing operations at the property consisted of melt and cast centers (Remelt) and hot rolling mills (Hot Mill).

The facility currently produces aluminum ingots and rolled sheet products. Much of the raw aluminum processed by the facility comes from recycled scrap materials such as beverage containers. Aluminum scrap is melted in open-well furnaces, alloying agents are added to achieve the desired product specifications, and the molten aluminum is poured into ingots. Cooling water is circulated through the ingot molds and sprayed onto the surface of the ingots during casting to quickly solidify the metal. The top and bottom faces of the ingots are machined and the ingots are preheated (with air) to prepare for hot rolling. The machined and preheated ingots pass through a reversing mill and a 4-stand single pass hot rolling mill. Proprietary emulsion, mostly consisting of water (approximately 95%) and oil, is applied to the ingots via sprayers to assist in the rolling process. Ingots are reduced in thickness, coiled, and staged prior to being either shipped to either internal (other Alcan facility) or external customers for further processing or transported to the onsite Cold Mill. In the Cold Mill, coils from the Hot Mill are reduced in thickness, cut to the desired width, packaged, and sent to customers.

Cooling water used in manufacturing processes at the Oswego Works Facility is withdrawn from Lake Ontario. Currently, contact and non-contact cooling water is recovered and reused through a cooling water recirculation system that began operation in November 2001. Flow through the OU-1 treatment system was ceased in mid-2002. Prior to mid-2002, contact and non-contact cooling water used at the site was discharged to Lake Ontario after flowing through the OU-1 treatment system as described below.

### 1.4.2 Site Description and History

A description and historical information relating to each of the OUs that comprise the site is presented below.

#### 1.4.2.1 OU-1 (North Ponds)

OU-1 (North Ponds) consists of a system of ponds and marshes located on the northwest portion of the property, immediately south of the Lake Ontario shoreline (shown on Figure 2). The system consists of two ponds and three marshes that occupy a total area of approximately 21 acres. Much of the onsite ponds and marshes within OU-1 are currently classified as New York State regulated wetlands.

Prior to the construction and operation of the Alcan facility, the wetted areas associated with OU-1 were limited to portions of North Pond 2, and Marshes 2 & 3 (See Appendix C: Historical Aerial Photographs). Following start-up of the Alroll (now Alcan) facility, the wetted perimeter was expanded via the operation of the North Ponds cooling water treatment system to include the areas shaded in Figure 2.

The manufacturing processes at the facility currently use approximately 10 million gallons per day (mgd) of cooling water. As indicated above, water is withdrawn from Lake Ontario at the Lake Water Pump House (Figure 2) through a submerged intake structure. Beginning in 1968 and continuing through mid-2002, OU-1 was utilized as a once-through cooling water treatment system. The cooling water was used in various contact and non-contact cooling processes throughout the facility prior to being discharged to OU-1. OU-1 provided natural treatment of the cooling water via settling of entrained solids, oxidation, and natural cooling in the ponds and wetlands, prior to discharge into Lake Ontario through Outfall 002 under a State Pollutant Discharge Elimination System (SPDES) Permit (NY-0002143). The OU-1 treatment system was designed to provide long residence time and slow water flow rates. Settleable solids were separated out from the water throughout the one-half mile long system flow path.

Following cessation of the cooling water discharge (in mid-2002), the only current surface water discharge to OU-1 is surface runoff from areas immediately adjacent to the ponds and marshes. The ponds may also receive storm water runoff from the facility during peak flow runoff events (designed on a 100-year storm event). Due to the cessation of the cooling water discharge (which was approved by the NYSDEC), surface water elevations within the ponds and marshes have dropped significantly from historical levels, to the point where portions of the marshes and limited areas of the ponds are progressing from wetland to upland conditions.

Contact and non-contact cooling water effluent from the facility historically discharged to OU-1 through a pipe north of the manufacturing facility, through a narrow channel into a man-made basin known as North Pond #1, which is approximately 1.5 acres in area and had a historical depth of up to approximately 6 feet. Four submerged, 24-inch diameter, inverted corrugated metal pipes allowed water to flow beneath an access road into Marsh #1, a shallow, 5-acre area. The water then flowed north under a steel footbridge into a man-made basin known as North Pond #2, which is approximately 2.5 acres in area had a historical maximum depth of approximately 10 feet. The water then flowed through a constructed flow measurement weir into Marsh #2, a shallow, 6-acre area, before flowing over a fish weir into Lake Ontario at SPDES-permitted Outfall 002. For approximately 5 years in the 1980s, water in the OU-1 system was partially recirculated to the plant during the winter through an intake structure in the northwest corner of North Pond #2. Prior to 1980, Marsh #3, a shallow 6-acre area, was also utilized as part of the OU-1 treatment system.

Several physical modifications to the ponds and marshes, and changes to the cooling water flow path were implemented during the operational history of the OU-1 treatment system. Figures which show historical flow patterns through the OU-1 treatment system are presented in Appendix D. Modifications to ponds and wetlands that were implemented during the 1970s include the addition of an inverted pipe to discharge to North Pond #1 and the elimination of a side-stream discharge from Marsh #1 to Marsh #3 at the extreme east-northeast end of Marsh #1. Subsequently, in 1980 a fish weir was constructed at the discharge point from Marsh #2 (SPDES Outfall 002), the discharge from the northwest corner of North Pond #2 was eliminated, and the berm between North Pond #2 and Lake Ontario was reinforced. A water recirculation structure was also constructed at the northwest corner of North Pond #2 to permit recirculation of water directly to the Lake Water Pump House.

During the Facility's manufacturing process, biodegradable oils became entrained in the cooling water. Booms were used to skim the oil from the water surface in the OU-1 treatment system. The recovered oil and unwanted vegetative growth from the ponds were composted in an area between the OU-1 and the Facility security fence (Figure2).

As a result of a former operation of the OU-1 treatment system, PCBs were incidentally discharged to the ponds and marshes during the late 1960s and early 1970s. A detailed discussion of the historical use of PCBs at the Alcan facility is presented in the North Ponds Investigation Report prepared by Dames & Moore, inc. (Dames & Moore, November 1997). Previous investigations of OU-1 have indicated the presence of PCBs in sediments of North Pond #1, North Pond #2, Marsh #1, Marsh #2 and Marsh #3. PCBs have also been identified in fish, turtle and vegetation samples collected from OU-1. Surface soils sampled in the vicinity of OU-1 indicate the presence of low levels of PCBs. Following a site investigation and risk assessment in 1997, a fence was constructed to prevent access to OU-1.

A small construction and demolition debris landfill associated with the construction of the Cold Mill is located to the south of North Pond #2 (referred to as the Cold Mill Landfill). Low levels of PCBs were identified in two surface soil samples collected from the Cold Mil Landfill as part of the Dames & Moore investigation.

#### 1.4.2.2 OU-2 (Main Landfill)

OU-2 (Main Landfill) consists of a 10-acre landfill which was operated from 1963 to 1978 (shown on Figure 2). Approximately 80,000 cubic yards of facility wastes, consisting of office trash, wooden pallets, and construction debris, were reportedly disposed of in OU-2. In about 1973, small quantities of rags and absorbent materials containing minor amounts of PCBs from a transformer leak were reportedly disposed of in OU-2. Low levels of certain volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) have been observed in groundwater in the vicinity of OU-2. Low levels of SVOCs were also observed in soil at specific locations on the surface of OU-2.

#### 1.4.2.3 OU-3 (Onsite Portions of Tributary 63)

Tributary 63 is a small, unnamed, low-gradient, warm-water stream that enters the Alcan property from the south and flows across the southern and western portions of the property prior to flowing into Teal Marsh (shown on Figure 2). OU-3 consists of the portion of Tributary 63 that flows across the southern and western portions of the Alcan property, the South Pond, and the South Marsh. Flow within the portion of the tributary upstream of Alcan's property appears to be seasonally intermittent. Current inputs from the facility to OU-3 include process water discharge from a biological wastewater treatment plant, which began operation in June 2002, non-contact cooling water, groundwater, and stormwater from the southern portion of the manufacturing facility (including roof drains and catch basins). Process water and stormwater are conveyed to the South Pond, which overflows into adjacent South Marsh via SPDES Outfall 001. The South Marsh overflows to Tributary 63 at the south end of the marsh via two culverts located underneath an unimproved access road. Historical inputs from Alcan's onsite sewage treatment plant (STP) were discharged directly to Tributary 63 further downstream, however, the discharge was re-routed to the cooling water return line west of the Cold Mill (SPDES internal outfall 03B). The STP currently discharges to Lake Ontario as blowdown from the recirculated cooling water system.

The South Pond is relatively shallow and has a surface area of approximately 75 feet by 100 feet. In the 1990s, the South Pond was partially filled to modify the flow pattern through the pond and increase retention time and an inverted discharge structure was constructed to improve separation and skimming of oil from parking lot runoff. The South Pond discharges to the South Marsh, which is approximately 150 feet by 200 feet.

Portions of Tributary 63 located downstream of the outlet for the South Marsh consists of a series of shallow pools that are linked by a poorly defined flow channel the meanders towards the west and northwest. From the point where OU-3 flows under the truck entrance road to the Alcan Facility, the banks of the tributary are densely vegetated and difficult to access. Tributary 63 continues to flow towards the northwest and eventually flows through several culverts beneath an unpaved road (the Cottage Access Road) that extends along the western portion of Alcan's property. To the west of the Cottage Access Road, Tributary 63 consists of a wetland area with no defined flow channel.

Low levels of PCBs were previously detected in sediment samples collected 75 feet upstream of the South Pond Outfall, 125 feet downstream of the South Pond Outfall and immediately downstream of the confluence of the previous discharge location of the STP and Tributary 63.

### 1.4.3 Physical Setting

This section presents a description of the physical characteristics of the site, including surface features, climate, surface water, and geology.

### 1.4.4 Surface Features

The Alcan property is located within the Erie-Ontario Plain which is characterized by gently rolling, uniform relief, interspersed with moderately large level areas which are commonly swampy. Within the Erie-Ontario Plain, river valleys are typically not much lower than the surrounding countryside and high valley walls are rare. Drumlins are the most pronounced relief within the Erie-Ontario Plain and reflect the area's history of repeated glaciation.

Marshy areas cover much of the land along the coast of Lake Ontario. Within a half-mile of the coastline, the terrain becomes undulating with numerous drumlins. Elevations are approximately 250 feet AMSL along the Lake Ontario coastline and rise greater than 400 feet AMSL on the drumlin tops. The Alcan property is relatively level with elevations across the property ranging from 250 feet AMSL along Lake Ontario to nearly 275 feet AMSL near the manufacturing facility. The areas along the Lake Ontario shoreline are marshy. Maintained lawns surround the manufacturing facility buildings, and the rest of the property is forested land.

### 1.4.5 Climate

Weather conditions in Oswego County consist of a humid-continental climate that is broadly representative of the northeastern United States. Weather within the Oswego area is governed by atmospheric flows from various regions of North America: cold, dry air masses from the northwest; warm, humid air from the southwest; and occasional maritime air masses from the Atlantic Ocean. Lake Ontario greatly influences the weather by moderating temperatures and affecting precipitation.

Summers are generally warm and pleasant with maximum temperatures between 75 and 80 degrees Fahrenheit during the months of June, July, and August. Temperatures in excess of 90 degrees Fahrenheit are typically recorded less than 5 days per year. Precipitation during these months averages approximately 2.5 inches per month (Dames & Moore, 1997).

Winters are typically long and cold with temperatures ranging between an average maximum of approximately 32 degrees Fahrenheit and an average minimum of approximately 19 degrees Fahrenheit. Extremely low temperatures are not common due to the moderating effects of Lake Ontario. Snowfall averages approximately 125 inches annually, as measured in the City of Oswego (Dames & Moore, 1997)

### 1.4.6 Surface Water Drainage

All surface water within Oswego County eventually drains to Lake Ontario. The county is drained predominantly by three river systems, the Oswego, Little Salmon, and Salmon River systems. The Oswego River drains most of the inland areas of the western and south-central parts of the county while the Salmon River originates in the Tug Hill Plateau and drains the northeastern part. The Little Salmon River drains the area between the Oswego and Salmon Rivers. However, much of the land immediately adjacent to Lake Ontario drains directly into Lake Ontario through local streams and marshes (Dames & Moore, 1997). Surface water from the Alcan property drains to Lake Ontario via Tributary 63 or by run-off into the ponds and marshes of OU-1.

The onsite ponds and marshes and Teal Marsh (located to the northwest of the Alcan property) are NYSDEC-regulated wetlands. The wetland characteristics of the ponds and marshes associated with the OU-1 treatment system were enhanced by the former cooling water discharge from the facility and the construction of the ponds. Tributary 63 is a tributary of Lake Ontario with a Class C surface water quality classification. In accordance with NYSDEC surface water quality regulations presented in 6NYCRR Part 701, the best usage for Class C surface water is for fishing. The regulations specify that Class C water shall be suitable for fish propagation and survival, and shall also be suitable for primary and secondary contact recreations, although other factors may limit use for those purposes.

### 1.4.7 Geology

The Erie-Ontario Plain, where the Alcan facility is located, has been influenced by repeated glaciation. As a result of this glacial activity, the regional geology is typified by sedimentary bedrock overlain by glacial till. In some areas of Oswego County, the overburden consists primarily of glaciolacustrine or glaciofluvial deposits. The overburden in the immediate vicinity of the Alcan property is also comprised of more recent post-glacial materials, such as beach, marsh, and fill deposits. A description of regional bedrock, overburden, and groundwater flow conditions is presented below.

#### 1.4.7.1 Bedrock

The bedrock in Oswego County is comprised of sedimentary rocks of the Lorraine Group that dip slightly to the south-southwest. The Lorraine Group is of Upper Ordovician age and consists of the Oswego Sandstone, the Pulaski Formation, and the Whetstone Gulf Formation. The depth to bedrock across the county ranges from approximately 10 feet to greater than 150 feet (United States Department of Agriculture [USDA], 1981).

The Oswego Sandstone, which consists of gray fine to medium quartz sandstone, underlies the central part of the county from Lake Ontario eastward. The Oswego Sandstone has an average thickness of about 60 feet and a maximum thickness of about 100 feet. The Pulaski Formation underlies the Oswego Sandstone Formation. The contact between the Oswego Sandstone and the Pulaski Formation is graduational. The transitional zone between the formations consists of gray to dark gray sandstones with interbedded, dark gray to black siltstone and black shale. The Pulaski Formation has an average thickness of about 100 feet. The Whetstone Gulf Formation underlies the Pulaski Formation, and is recognized by a marked increase in the amount of shale. The Whetstone Gulf Formation has an average thickness of about 150 feet (Dames & Moore, 1997).

At the Alcan property, the Oswego Sandstone has been encountered at depths ranging from four feet to 24 feet below ground surface (bgs). At the adjacent Sithe property, the bedrock was observed to be green-gray, hard sandstone, with little or no weathering and minor interbeds of green shale. Where present, fractures were observed at 90 and 45 degrees to the core barrel walls (O'Brien & Gere, 1989; and HMM Associates, 1991).

Based on previous investigations, the top of bedrock in the OU-1 area ranges from approximately 261 feet AMSL near the Main Landfill to approximately 232 feet AMSL northwest of North Pond #2. Dames and Moore concluded that there might be a northwest to southeast-trending channel in the bedrock surface in the eastern part of the OU-1 (Dames &Moore, 1997).

#### 1.4.7.2 Overburden

Overburden throughout Oswego County is characterized primarily by glacial till, which consists of a dense, unstratified heterogenereous mixture of gravel, sand, silt, and clay. In addition to glacial till, glaciolacustrine and glacioflavial deposits have been mapped in many area of Oswego County. These deposits range from coarse sand and gravel to very fine sand and silt.

Till has been observed to depths averaging 6 to 13 feet bgs in the area of the plant facilities and 19.5 feet bgs in the OU-1. The till deposits have been described as consisting largely of a poorly sorted, dense, fine to medium sand with variable amounts of fine to medium gravel and silt. These deposits are characteristic of a glacially deposited lodgment till. The thickness of the overburden reportedly ranges from 6 to 13 feet in the vicinity of the facility buildings and up to 24 feet near the OU-1 treatment system (Dames & Moore, 1997).

The shallow overburden near the OU-1 treatment system consists primarily of black and brown silt to a depth of up to four feet, underlain by sand or gravel. The soils near OU-2 are comprised of sand to a depth of up to 18 feet. The lodgment till typically underlies the shallow overburden.

#### 1.4.7.3 Hydrogeology

Groundwater recharge in the vicinity of the site is minimal due to the low permeability of the soils and bedrock. Static water levels measured in both bedrock and overburden wells are similar. The average vertical hydraulic conductivity of the till deposits is 1x10-5 cm/sec; while that of the sandstone bedrock is, on average, an order of magnitude lower. Yields from domestic wells in the area are generally low, with an average of 5 to 8 gallons per minute (gpm) in the bedrock (Dames & Moore, 1997). Yields from the bedrock wells are highly dependent upon the fractures within the rock.

At the adjacent Sithe property, bedrock monitoring wells were installed. The piezometric groundwater level in the sandstone ranged from 5 to 14 feet bgs (O'Brien &Gere, 1989). Based on the potentiometric data, the groundwater in the bedrock flows north-northwest towards Lake Ontario (O'Brien &Gere, 1989).

The nearest well that draws from the shallow aquifer is reportedly located approximately 1,500 feet north of the OU-1 area at a camp on the shoreline of Lake Ontario (Engineering Science, 1989).

## 1.5 FRI Objectives

The overall objective of the FRI was to investigate and assess the site to support the development of remedial action objectives and the evaluation of remedial alternatives to be presented in the Focused Feasibility Study (FFS). The FRI activities were primarily focused on addressing data gaps that were identified through an evaluation of the results obtained for previous investigation activities implemented at the site (as discussed in Section 2 of this document). Specific FRI objectives for each OU include:

<u>OU-1 (North Ponds)</u>

- Further characterize the thickness of sediment within each of the ponds and marshes associated with the OU-1 treatment system;
- Further characterize the horizontal and vertical distribution of PCBs in sediments within the ponds and marshes;
- Evaluate hydrologic changes associated with the elimination of the cooling water flow to the OU-1 treatment system;
- Confirm that PCBs within sediment in the ponds and marshes are not migrating to groundwater in the vicinity of the OU-1 treatment system;
- Further characterize PCB concentrations in surface soil in the vicinity of previous sampling locations (at the Cold Mill Landfill and near the Lake Water Pump House) and evaluate the presence of PCBs in surface soil at specific locations adjacent to the ponds and marshes associated with the OU-1 treatment system;
- Perform a Human Exposure Evaluation to evaluate potential human exposure pathways; and
- Complete a FWIA (through Step IIC) to identify and evaluate the potential significance of exposure pathways for ecological receptors.

<u>OU-2 (Main Landfill)</u>

- Evaluate the thickness of the soil cover across the Main Landfill;
- Characterize current groundwater flow conditions in the vicinity, and downgradient of the Main Landfill;
- Evaluate groundwater quality within bedrock in the area downgradient from the Main Landfill and further characterize overburden groundwater quality in the vicinity of OU-2;
- Perform a Human Exposure Evaluation to evaluate potential human exposure pathways; and
- Complete a FWIA (through Step IIC) to identify and evaluate the potential significance of exposure pathways for ecological receptors.

OU-3 (Tributary 63)

- Characterize the presence and distribution of PCBs in sediment within Tributary 63;
- Evaluate the presence of PCBs in surface water flow at specific locations within OU-3;
- Evaluate the potential presence of PCBs within biota collected from OU-3;
- Perform a Human Exposure Evaluation to evaluate potential human exposure pathways; and
- Complete a FWIA (through Step IIC) to identify and evaluate the potential significance of exposure pathways for ecological receptors.

# 2. Previous Investigations

## 2.1 General

This section presents a summary of previous investigations that have been conducted in connection with the OUs that comprise the site. PCBs were detected in Alcan's process water effluent at Outfall 002 as the result of NYSDEC monitoring conducted during June 1980. Subsequently, a number of investigations that have primarily focused on the OU-1 treatment system and OU-2 have been conducted at the site. Analytical data tables from previous investigations are provided in Appendix E.

## 2.2 North Pond Project (1980 to 1982)

In accordance with a Consent Order between Alcan and the NYSDEC (#7-0469), Alcan performed a water sampling program from October 1980 to February 1981 to evaluate the source of PCBs in the cooling water effluent at 002. PCBs were detected in water samples from Marsh #1 (0.2 micrograms per liter [ppb]), the channel from Marsh #1 to North Pond #2 (0.08 ppb), North Pond #2 (0.03 to 0.04 ppb), and Outfall 002 (0.46 ppb). No PCBs were detected in samples from the remelt cooling water (<0.01 ppb), DC#4 Cooling Water, Hot Mill, Cold Mill (<0.01 ppb), North Pond #1 Influent (<0.01 ppb) or Effluent (<0.01 ppb), Outfall 003 (<0.01 ppb), or seeps at the north end of the Main Landfill (<0.01 ppb). Based on the results of this sampling program, Alcan concluded that PCBs were not currently being discharged from the Facility to the North Ponds but that the PCBs detected in Marsh #1, North Pond #2, and at Outfall 002 were the result of historic activities.

Between December 1980 and January 1981, Alcan collected 50 sediment samples from 38 sampling locations in the North Ponds:

| Sample Location | Sample Depth (inches) | Number of Samples | Total PCBs (ppm) |
|---|---|---|---|
| North Pond #1 | 0 to 6<br>6 to 12 | 7<br>1 | 12.3 – 164<br>127 |
| Marsh #1 | 0 to 6<br>6 to 12<br>12 to 18 | 10<br>6<br>3 | 2.4 – 362<br>ND – 397<br>0.07 – 6.3 |
| North Pond #2 | 0 to 6<br>6 to 12 | 6<br>1 | 12.6 – 267<br>0.5 |
| Marsh #2 | 0 to 6<br>6 to 12 | 4<br>2 | ND – 93.6<br>ND |
| Marsh #3 | 0 to 6<br>6 to 12 | 3<br>2 | 2.4 – 7.0<br>ND |
| Cooling Water Intake Tunnel | 0 to 6 | 2 | ND |
| Lake Ontario | 0 to 6 | 5 | ND |

**Notes:**
1. ND = Indicates that PCBs were not detected at a concentration exceeding the laboratory detection limits.

Alcan concluded that the probable source of the PCBs in the pond sediments was the historical incidental discharges of hydraulic fluids that contained PCBs (e.g., Pydraul).

Based on the results of subsequent investigations, Pagano and Roberts (1994) determined that these results were significantly biased, reflecting erroneously high PCB levels. Laboratory studies on oil- and PCB-containing sediment samples from Alcan ponds and wetlands indicated that a lack of appropriate cleanup procedures during sample preparation will result in the reporting of biased PCB concentrations that are too high. According to Pagano and Roberts, the results were biased high because the presence of non-PCB oils in the sample makes the recognition of the actual PCB chromatograph peaks difficult and/or fallable.

## 2.3 Cooling Water Partial Recirculation Study (1983)

In 1983, O'Brien & Gere Engineers, Inc. (O'Brien & Gere) conducted a study to evaluate the feasibility of recirculating cooling water from North Pond #2. As part of this study, ten sediment core samples from the western corner of North Pond #2 were analyzed for PCBs to evaluate whether the construction of a recirculation system would be likely to result in the resuspension and migration of PCB-containing sediments. The samples were collected by standing in the pond in hip waders, which probably stirred up the sediment. It should be noted that the sampling technique and the analytical methods (including the sample cleanup method, as discussed above) used for this work may have biased the results of this study and the reliability of the data is suspect.

The results of the sediment sampling were documented in *Cooling Water Partial Recirculation Study* (O'Brien & Gere, 1983). The following table summarizes the sampling results.

| Sample Location | Sample Depth (inches) | Number of Samples | Total PCBs (ppm) |
|---|---|---|---|
| North Pond #2, western Corner | 0 to 6 | 10 | ND – 64 |
| | 6 to 12 | 8 | ND – 55 |
| | 12 to 18 | 5 | ND – 66 |
| | 18 to 24 | 3 | ND – 81 |
| | 24 to 30 | 1 | 3.7 |

Notes:
1. ND = Indicates that PCBs were not detected at a concentration exceeding the laboratory detection limits.

## 2.4 Annual Sediment Sampling (1984 to 1991)

From 1984 to 1991, Alcan conducted an annual sediment sampling program in the North Ponds treatment system. Each year, Alcan attempted to sample sediment from the same nine sampling locations. The sampling locations included three locations in North Pond #1, and two sampling locations in Marsh #1, North Pond #2, and Marsh #2. The sampling results were likely biased due to the sample cleanup issues discussed above in Subsection 2.2 (Pagano and Roberts, 1994).

The results of Alcan's annual North Ponds sediment sampling program from 1984 to 1991 are summarized below.

| Sample Location | Sample Depth (inches) | Number of Samples | Total PCBs (ppm, dry weight) |
|---|---|---|---|
| North Pond #1 | 0 to 6 | 26 | ND – 175 |
| | 6 to 12 | 4 | ND – 24 |
| | 12 to 18 | 1 | 6.2 |

| Sample Location | Sample Depth (inches) | Number of Samples | Total PCBs (ppm, dry weight) |
|---|---|---|---|
| Marsh #1 | 0 to 6<br>6 to 12<br>12 to 18 | 24<br>16<br>2 | ND – 150<br>ND – 8.4<br>ND |
| North Pond #2 | 0 to 6<br>6 to 12<br>12 to 18 | 25<br>5<br>1 | ND – 546<br>ND – 300<br>ND |
| Marsh #2 | 0 to 6<br>6 to 12 | 16<br>3 | ND – 24<br>ND – 5.1 |
| **Notes:**<br>1. ND = Indicates that PCBs were not detected at a concentration exceeding the laboratory detection limits. | | | |

The results of the annual PCB monitoring indicated that PCB concentrations at individual sampling locations varied by up to two orders of magnitude. Dames & Moore (1997) suggested that the variation of PCBs at individual sampling locations might be attributed to an uneven distribution of PCBs in the sediment or to bioturbation of the sediment.

## 2.5 SPDES Permit Monitoring (1988 to present)

From 1988 to July 2000, Alcan conducted quarterly sampling of the influent to North Pond #1 and the lake water intake in accordance with SPDES Permit No. NY0002143. The quarterly sampling data are summarized in Appendix E.

## 2.6 NYSDEC Phase I Investigation (1989)

In 1989, Engineering Science conducted a Phase I investigation of Alcan's cooling water treatment system on behalf of the NYSDEC. The results of this investigation were documented in the report entitled *Phase I Investigation* (Engineering Science, 1989).

The purpose of the Phase I investigation was to assess the potential hazard to the environment associated with the presence of PCBs in the sediments in Alcan's ponds and marshes. Based on a consideration of geological, toxicological, environmental, chemical, and demographic factors, the site was given a hazard ranking score (HRS) score of 22.63. The threshold score for inclusion on the USEPA National Priority List (NPL) is an HRS of 28.5.

Based on the results of the Phase I Investigation, Engineering Science recommended a Phase II investigation of the North Ponds.

## 2.7 NYSDEC Preliminary Site Assessment (1990)

In 1990, E.C. Jordan conducted a preliminary environmental assessment on behalf of the NYSDEC. The purpose of the assessment was to provide information necessary to reclassify the Main Landfill and the cooling water treatment system from their Class 2a designations on the NYSDEC registry of New York State Inactive Hazardous Waste Sites. The Class 2a designation indicated that additional information was necessary to evaluate whether the cooling water treatment system or the Main Landfill represented a potential risk to human health or the environmental. The results of this investigation were documented in the report entitled *Preliminary Site Assessment* (PSA) (E.C. Jordan, 1990).

No samples were collected as part of this investigation; however, field readings were obtained using a PID, radiation detector, and explosimeter. No readings were reported above background.

The PSA report concluded that since PCB concentrations above 50 ppm had been detected in sediment, hazardous waste, as defined under Title 6 of the New York Code of Rules and Regulations (NYCRR) Section 371.4(e) had been released to the cooling water treatment system. The report further concluded that the PCB-containing sediments posed a significant threat to aquatic and terrestrial wildlife. Additionally, the report stated that surface water collected near Outfall 002 exceed the New York State Class D ambient water quality standard of 0.001 ppb PCBs (*6 NYCRR 371.5*).

Based on the results of the investigation, E.C. Jordan recommended that both the Main Landfill and the North Ponds be reclassified as Class 2 sites in the NYSDEC registry of New York State Inactive Hazardous Waste Sites (indicating that the sites were considered to represent a potential risk to human health or the environment). Currently the cooling water treatment system and the Main Landfill are recognized as OUs under a single site listing on the registry.

## 2.8 North Pond Sediment Sampling Program (1991)

Dames & Moore conducted a study during 1991 that included the collection of groundwater, surface water, sediment, and surface soil samples in and adjacent to the North Ponds treatment system. The results of the Dames & Moore study are summarized below.

### 2.8.1 Groundwater

Two overburden monitoring wells (MW-1 and MW-2) were installed near the western edges of the Main Landfill and the Cold Mill Landfill (Figure 3) to evaluate the potential impact of the landfill on groundwater quality. Groundwater samples from MW-1 and MW-2 were analyzed for volatile organic compounds (VOCs), base neutral semi-volatile organic compounds (SVOCs), pesticides, PCBs, and target analyte list (TAL) metals.

No VOCs or SVOCs were detected in groundwater from MW-2, located north and downgradient of the Cold Mill Landfill. Chloroethane was detected in groundwater from MW-1 (15 ppb) at a concentrations exceeding the NYSDEC groundwater standard (5 ppb). Three SVOCs were also detected in the groundwater sample from MW-1: 1,2-dichlorobenzene (5 ppb), 1,3-dichlorobenzene (4 ppb), and 1,4-dichlorobenzene (4 ppb). The sum of the concentrations of 1,2-dichlorobenzene and 1,4-dichlorobenzene (9 ppb) exceeded the groundwater standard for the sum of those compounds (4.7 ppb).

No pesticides or PCBs were detected in the groundwater samples from MW-1 and MW-2. The detection limit for PCBs in groundwater was 1.2 ppb.

New York State Class GA groundwater standards were exceeded in both MW-1 and MW-2 for iron, lead, and manganese. In addition, standards were exceeded in MW-1 for chromium, copper, magnesium, and sodium. Other metals detected in the monitoring wells were below New York State Class GA standards and guidance values for groundwater.

### 2.8.2 Surface Water

Six surface water samples collected from North Pond #1 and North Pond #2 were analyzed for PCBs. PCBs were not detected in the surface water samples, which were analyzed with an analytical detection limit of 1.1 ppb.

No leachate breakouts or seeps were found coming from the landfill. A composite surface water sample was collected near the northeastern end of Marsh #1, adjacent to the northern edge of the Main Landfill. This sample was analyzed for VOCs, SVOCs, organochlorine pesticides, PCBs, and TAL metals. No PCBs or SVOCs were detected in the composite surface water samples (with an analytical detection limit of 1.2 ppb for PCBs). No VOCs or pesticides were detected in the composite surface water samples at concentrations above the applicable NYSDEC surface water standards or guidance values. However, iron was detected at a concentration of 2,570 ppb, which exceeded the New York State Class D surface water quality standard of 300 ppb.

### 2.8.3 Sediment

Five surface sediment samples were collected at depths of 0 to 6 inches in North Pond #2, the west end of Marsh #1, and near the fish weir at Outfall 002. The sediment samples were analyzed for VOCs, base neutral SVOCs, organochlorine pesticides, PCBs, and TAL metals.

Acetone was detected in four of the five samples at concentrations ranging from 120 ppb to 270 ppb; however, acetone was also detected in the field blank, indicating probable laboratory contamination. Carbon disulfide was detected at 1.4 parts per million (ppm) in one samples and chlorobenzene was detected at 3.0 ppm (estimated) in two sediment samples.

Bis(2-ethylhexyl)phthalate was detected in three sediment samples at concentrations ranging from 0.14 ppm (estimated) to 0.97 ppm (estimated) and chrysene was detected in one sample at a concentration of 0.054 ppm (estimated). No other SVOCs were detected in the sediment samples.

Endrin (0.8 ppm to an estimated concentration of 1.3 ppm), 4,4-DDT (0.55 ppm to 3.4 ppm), and methoxychlor (0.89 ppm to an estimated concentration of 4.4 ppm) were detected in two of the samples. One sample also contained dieldrin (estimated concentration of 0.28 ppm), endosulfan II (estimated concentration of 0.14 ppm), and endrin ketone (estimated concentration of 1.3 ppm). Methoxychlor (estimated concentration of 0.027 ppm) and 4.4'-DDT (estimated concentration of 0.019 ppm) were each detected in one sediment sample.

PCBs (reported as Aroclor 1242) were detected in all five sediment samples at concentrations ranging from 1.1 ppm to 170 ppm. The sampling results may have been biased due to the sample cleanup issues discussed above in Subsection 2.2.

### 2.8.4 Surface Soil

Four surface soil samples were collected within the 100-year floodplain of North Pond #1, North Pond #2, and Marsh #2 and analyzed for PCBs and TAL metals. PCBs were identified in one surface soil sample, collected east of North Pond #1, at a concentration of 2.4 ppm (reported as Aroclor 1260), which exceeds the 1.0 ppm recommended surface soil cleanup objective for PCBs presented in the NYSDEC document entitled "Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels," HWR-94-4046 (TAGM 4046), dated January 1994.

## 2.9 Main Landfill Investigation (1994)

In the early 1990s, Dames & Moore conducted an investigation of the Main Landfill to provide information to appropriately classify the site with respect to the NYS Registry of Inactive Hazardous Waste Disposal Sites. The Main Landfill Investigation results are summarized below.

### 2.9.1 Groundwater

Four monitoring wells (MW-7 through MW-10) were installed in the overburden around the perimeter of the Main Landfill (Shown on Figure 3). Groundwater samples collected from these newly installed monitoring wells, and previously installed monitoring well MW-1 were analyzed for target compound list (TCL) VOCs, SVOCs, PCBs, pesticides, and TAL metals.

Total VOCs ranged from non-detect in upgradient monitoring well MW-9 to 68 ppb in downgradient monitoring well MW-7. VOCs detected above New York State Class GA groundwater quality standards included chloroethane, 1,1-dichloroethane, toluene, and chlorobenzene. Chloroethane was detected in three of the monitoring wells (MW-1, MW-7, and MW-8).

Total SVOCs ranged from non-detect in MW-9 to 58 ppb in MW-7. SVOCs detected above Class GA groundwater quality standards included 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2-methylphenol, and 4-methylphenol.

No pesticides were detected in groundwater. PCBs (Aroclor 1242) were detected at a concentration of 1 ppb in monitoring well MW-7, which is located at the eastern edge of Marsh #1. The New Your State Class GA standard for PCBs in groundwater is 0.1 ppb.

New York State Class GA groundwater quality standards were exceeded for iron, manganese, sodium, and copper, as described below.

**Iron**: The standard was exceeded in upgradient monitoring well MW-9 and the four downgradient monitoring wells (18,000 ppb to 83,400 ppb).

**Manganese**: The standard was exceeded in the four downgradient monitoring wells (3,670 ppb to 47,300 ppb). Manganese was detected in the upgradient well (250 ppb, but did not exceed the standard.

**Sodium**: The standard was exceeded in the four downgradient wells (58,000 ppb to 254,000 ppb). Sodium was detected in the upgradient well above the Class GA standard, but the result was disqualified because the compound had been detected in the blank at a similar value.

**Copper**: The standard was exceeded in downgradient monitoring well MW-1 (264 J ppb), but was not detected in the upgradient monitoring well or the other downgradient monitoring wells.

Other metals detected in the monitoring wells were within Class GA standards.

### 2.9.2 Leachate Sampling

No leachate seeps were observed emanating from the Main Landfill. Two surface water samples were collected in the vicinity of the Main Landfill. One sample (L-1-LF) of standing surface water that exhibited a slight sheen was collected approximately five feet from northern edge of the landfill. A second sample (L-2-LF) of standing surface water that exhibited a sheen was collected along the edge of March #1, adjacent to the eastern edge of the landfill. The surface water samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and TAL metals.

No VOCs were detected in sample L-1-LF. Chloroethene, benzene, and chlorobenzene were detected in sample L-2-LF, at levels that were less than NYSDEC Class D surface water standards. No SVOCs, pesticides, or PCBs were detected in either sample. Several metals were detected in the leachate samples, including aluminum, barium, calcium, iron, magnesium, manganese, potassium, and sodium. Iron was the only metal detected at a concentration that exceeded the New York State Class D surface water standard.

### 2.9.3 Surface Soil Sampling

Three surface soil samples (0 to 6-inches) were collected from the surface of the Main Landfill. The samples were collected using a dedicated stainless steel trowel. In addition, a composite background soil sample was collected from surface soil from a wooded area approximately 100 to 200 feet north of the edge of the Main Landfill. The surface soil samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and TAL metals.

A common laboratory contaminant, 2-butanone, was detected in SS-LF-1 at an estimated concentration of 7 ppm. No VOCs were detected in the other three samples.

SVOCs were detected in all four samples, at concentrations ranging from 1.2 ppm to 14.98 ppm. The background sample collected from the wooded area adjacent to the Main Landfill contained several SVOCs that were also detected in the landfill samples, including phenanthrene, fluoranthene, pyrene, chrysene, benzo(b)fluoranthene, and benzo(a)pyrene. Several other SVOCs were also detected in the landfill samples, including anthracene, carbazole, benzo(a)anthracene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene. The concentration of total SVOCs detected in surface soil samples SS-LF-3 (14.98 ppm) was an order of magnitude higher than the other samples collected from the landfill (1.2 ppm and 1.59 ppm).

No pesticides were detected in the soil samples collected from the landfill surface. Pesticides were detected in the background sample collected from the wooded area adjacent to the Main Landfill at a total concentration of 31.4 ppm.

Total PCBs were detected in the landfill and background surface soil samples at concentrations ranging form 0.017 ppm to an estimated concentration of 0.125 ppm. PCBs were detected in the background and landfill surface soil samples at concentrations exceeding the 1.0 ppm NYSDEC-recommended surface soil cleanup objective presented in TAGM 4046.

### 2.9.4 Air Sampling

Three air samples were collected concurrently over an 8-hour period at the site. One of the samples (DM-2) was collected near the southern edge of the Main Landfill. The other two samples (DM-4 and DM-6) were collected northwest and west-northwest of the Main Landfill, adjacent to Lake Ontario. One set of samples for each sample location was tested for VOCs and PCBs according to reference methods established by the National Institute for Occupational Safety and Health (NIOSH). Additionally, one sample for VOCs was collected using a passive diffusion badge. Samples were analyzed by Galson Laboratories of Syracuse, New York. No airborne concentrations of VOCs or PCBs were detected.

## 2.10 Congener-Specific PCB Analysis of Sediments and Biota from the North Ponds/Wetland Complex (1994)

During 1994, James Pagano of the Environmental Research Center (ERC) of the State University of New York (SUNY) at Oswego performed a study to evaluate if microbial dechlorination of PCBs had occurred in cooling pond sediments. As part of this investigation, the site-specific SUCO-ERC sample cleanup method was developed to provide unbiased PCB analytical results.

A total of six sediment cores were collected at historical sampling locations within the North Ponds (including two samples from North Pond #1, two wetland samples, and two samples from North Pond #2). Locations selected for sampling generally correlated with the highest historical sediment PCBs values previously reported. The cores were segregated by depth, with every other five-centimeter interval being analyzed for PCBs. Half of the cores were also fractionated by particle size and then analyzed for PCBs.

PCB concentrations in North Pond #1 ranged from 1.5 to 59.1 ppm, and generally increased with depth in both samples. In one of the samples, the concentration of PCBs in sediment decreased from 59.1 to 2.8 ppm over a 5 cm interval (45 to 50 cm).

PCB concentrations in the wetland samples (collected from the OU-1 marshes) ranged from 0.8 to 1.2 ppm, and generally decreased with depth.

PCB concentrations in North Pond #2 ranged from 1.6 to 68.9 ppm, and generally increased with depth, with the exception of one location where the concentration of PCBs decreased from 68.9 ppm to 1.6 ppm over a 5 cm interval (at a depth of 35 to 40 cm).

Pagano (1994) concluded that the changes in congener specific and homolog mole % ratios with increasing core depth in North Pond #1 were indicative of reductive microbial degradation. Furthermore, testing at the NYSDOH's Wadsworth Center established that North Ponds sediments contain dechlorinating microorganisms.

## 2.11 Phase Distribution Study of North Ponds/Wetlands Complex (1996)

During 1996, Pagano conducted an additional PCB study in the North Ponds that consisted of evaluating the phase distribution (i.e., dissolved/particulate) of PCBs and polychlorinated terphenyls (PCTs) in water at different locations within the OU-1 cooling water treatment system. The results of this investigation were presented in the reported entitled "Phase Distribution of Polychlorinated Biphenyls and Terphenyls in the North Ponds/Wetland Complex" (Pagano, November 1996).

As part of this study, large volume water samples (8 to 30 liters) were collected using stainless steel buckets and glass carboys. The sampling points included the pumphouse (Lake Ontario water supply intake), the discharge channel to North Pond #1, North Pond #1 inverted discharge, North Pond #2 influent, North Pond #2 discharge, and the fish weir at Outfall 002. The samples were collected during six sampling events over a four-month period. Individual sampling points were sampled during two or three sampling events.

The total PCB results are presented below.

| Sampling Location | Total PCBs (ppb) | | |
|---|---|---|---|
| | Dissolved | Particulate | Total |
| Pumphouse (Lake Ontario intake) | 0.0086 | 0.0013 | 0.0099 |

| Sampling Location | Total PCBs (ppb) | | |
|---|---|---|---|
| | Dissolved | Particulate | Total |
| Channel to North Pond #1 | 0.0146 | 0.0029 | 0.0177 |
| North Pond #1 inverted discharge | 0.0153 | 0.0112 | 0.0265 |
| North Pond #2 influent | 0.1857 | 0.0296 | 0.2153 |
| North Pond #2 discharge | 0.2918 | 0.0515 | 0.3433 |
| Marsh #2 Fish Weir (Outfall 002) | 0.2962 | 0.0977 | 0.3939 |

Additionally, this investigation included a study of the number of chlorine molecules per biphenyl. These results are summarized below.

| Sampling Location | Number of Chlorine Molecules per Biphenyl | | |
|---|---|---|---|
| | Dissolved | Particulate | Total |
| Pumphouse (Lake Ontario intake) | 3.65 | 4.76 | 3.42 |
| Channel to North Pond #1 | 3.33 | 4.23 | 3.18 |
| North Pond #1 inverted discharge | 2.73 | 4.25 | 3.04 |
| North Pond #2 influent | 2.27 | 3.76 | 2.76 |
| North Pond #2 discharge | 2.32 | 3.93 | 2.44 |
| Marsh #2 Fish Weir (Outfall 002) | 2.44 | 3.89 | 2.52 |

Based on these data, the number of chlorine molecules per biphenyl in the particulate phase was greater than the number of chlorine molecules per biphenyl in the dissolved phase. This is most likely attributable to the greater solubility of the lower chlorinated biphenyls. The biphenyl chlorination level was significantly lower in the ponds and marshes than in the incoming lake water. Further, the average number of chlorine molecules per biphenyl for total PCBs decreased significantly from North Pond #1 effluent to North Pond #2 influent and again between North Pond #2 influent and North Pond #2 effluent (3.42 chlorine molecules per biphenyl). Pagano concluded that this data provides additional evidence that the microbial degradation of PCBs, particularly that of dechlorination, is occurring in the ponds and marshes.

## 2.12 Cogener-Specific Determination of PCBs in Monitoring Well Samples (1997)

During 1997, Pagano conducted a third PCB study that consisted of collecting large volume groundwater samples from five monitoring wells in the vicinity of the North Ponds (MW-2, MW-3, MW-4, MW-5, and MW-6) to reduce the detection limit of the SUCO-ERC method. PCBs were not detected at a concentration of greater than or equal to 0.015 ppb in four of the five wells. PCBs were detected in the sample collected from MW-5 at a concentration of 0.1521 ppb. However, Pagano concluded that the results for the sample collected at MW-5 were probably representative of surface water in North Pond #2 (rather than groundwater) because the chlorine level found in MW-5 closely matched results from previous testing conducted in North Pond #2 (Pagano, 1996). The water temperature in MW-5 also reflected the elevated temperature of North Pond #2 at the time of sampling.

## 2.13 North Ponds Investigation (1997)

During the mid-1990s, Dames & Moore conducted an investigation of the North Ponds (referred to as the "North Ponds Investigation") to further characterize the nature and extent of PCBs in the area. The results of the North Ponds Investigation are summarized below.

### 2.13.1 Groundwater

Groundwater samples were collected from six monitoring wells near the North Ponds (MW-2, MW-3, MW-4, MW-5, MW-6, and MW-9). Groundwater samples were analyzed for PCBs using the SUCO-ERC method. PCBs were not detected in any of the groundwater samples, which were analyzed using an analytical detection limit of 8 ppb.

### 2.13.2 Sediment

The North ponds Investigation included the collection of surface and subsurface sediment samples from the North Ponds and the collection of surface sediment samples from Tributary 63 to further evaluate the extent of PCBs in sediment. Samples were collected using clear polycarbonate tubing on foot or by canoe or flat-bottomed boat.

Eighty-nine surface sediment grab samples collected within the North Ponds were analyzed for total PCBs using the SUCO-ERC method. Additionally, 21 sediment core samples were collected from the North Ponds at the locations shown on Figure 3A. The cores were divided into three layers, surface (0 to 6 inches), intermediate (6 to 12 inches), and underlying substratum (12 to 18 inches). Fifteen of the sediment cores (three from each pond and marsh) were analyzed by Northeastern Analytical (NEA) for total PCBs using the SUCO-ERC method. The remaining six sediment cores were submitted to ERC, including two cores from North Pond #1, two cores from Marsh #1, and two cores from Marsh #3. ERC sectioned the cores into one-inch intervals. Every other interval was homogenized and analyzed for PCB congeners. The results obtained for the sediment sampling in the North Ponds are summarized in the table below.

| Sample Location | Sample Depth (inches) | NEA | | ERC | |
|---|---|---|---|---|---|
| | | Number of Samples | Total PCBs (ppm) | Number of Samples* | Total PCBs via PCB Congeners (ppm) |
| North Pond #1 | 0 to 6 | 9 | ND - 16 | 6 | 1.57 - 5.63 |
| | 6 to 12 | 3 | 7.4 - 40 | 4 | 2.76 - 43.62 |
| | 12 to 18 | 3 | 12 - 52 | | |
| Marsh #1 | 0 to 6 | 27 | 3 - 380 | 6 | 5.28 - 161.01 |
| | 6 to 12 | 3 | ND - 68 | 4 | 0.38 - 48.31 |
| | 12 to 18 | 3 | ND | | |
| North Pond #2 | 0 to 6 | 19 | ND - 31 | NA | NA |
| | 6 to 12 | 3 | 21 - 66 | | |
| | 12 to 18 | 3 | 92 - 140 | | |
| Marsh #2 | 0 to 6 | 25 | ND - 65 | NA | NA |
| | 6 to 12 | 3 | ND - 0.97 | | |
| | 12 to 18 | 3 | ND | | |
| Marsh #3 | 0 to 6 | 27 | ND - 630 | 6 | 0.62 - 62.62 |
| | 6 to 12 | 3 | ND - 16 | 4 | 0.11 - 0.39 |
| | 12 to 18 | 3 | ND - 1.2 | | |

**Notes:**
1. The number of samples analyzed by ERC includes the total number of one-inch sediment samples that were analyzed from the specified depth interval. ERC segmented sediment core samples into one-inch segments and analyzed every other one-inch segment.
2. NA = not available.

In North Pond #1 and North Pond #2, PCB concentrations generally increased with depth. The chlorine to biphenyl ratio determined from the PCB congener data indicate that the ratios of PCBs in North Pond #1 are consistent with a mixture of the Aroclors found in Pydraul 280 and Pydraul 312 (Aroclor 1242, Aroclor 1248, and Aroclor 1260). In Marshes 1, 2, and 3, the PCB concentrations generally decreased with depth. The ratio of PCBs in Marsh #3 is also consistent with a mixture of the Aroclors found in Pydraul 280 and Pydraul 312 (Aroclor 1242, Aroclor 1248, and Aroclor 1260).

Forty-four sediment samples from the OU-1 ponds and marshes were also submitted for laboratory analysis for total petroleum hydrocarbons (TPH) as part of the North Ponds Investigation. In North Pond #1 and North Pond #2, TPH concentrations ranged from 4.525 ppm to 12,500 ppm and generally increased with depth. In Marsh #1 and Marsh #3, the TPH concentrations generally decreased with depth, ranging from non-detect to 110,000 ppm. TPH was not detected in sediment samples collected from Marsh #2.

Ten surface sediment samples were analyzed for pesticides. Low levels of total pesticides (0.026 ppm to 0.12 ppm) were detected from specific sediment samples collected from North Pond #1, Marsh #1, and Marsh #2. Surface sediment samples collected from Marsh #3 had total pesticide concentrations ranging from 2.05 ppm to 2.58 ppm.

Five surface sediment samples collected from the OU-1 ponds and marshes were also submitted for laboratory analysis for total organic carbon (TOC). TOC values in the surface sediment samples ranged from 4.6% in North Pond #2 to 18.8% in Marsh #3.

Three surface sediment grab samples collected from Tributary 63 were submitted for laboratory analysis for PCBs as part of the North Ponds Investigation. One sample (Tributary 63A) was collected approximately 75 feet upstream of the South Pond outfall into Tributary 63, and had a PCB concentration of 15 ppm. A second sample (Tributary 63B) was collected approximately 125 feet downstream of the South Pond outfall into Tributary 63, and had a PCB concentration of 17 ppm. The third sample (Tributary 63C) was collected immediately downstream of the confluence of the sanitary sewer discharge stream and Tributary 63, and had a PCB concentration of 3.5 ppm.

### 2.13.3 Surface Water

Five surface water samples were collected from the North Ponds treatment system, including one sample from North Pond #1, North Pond #2, and Marsh #2, and two samples from Marsh #1. Surface water sampling locations corresponded with specific sediment coring locations (Figure 3). Surface water samples were obtained using disposable polyethylene tubing placed near the sediment-water interface and a peristaltic pump. The surface water samples were analyzed for total PCBs using the SUCO-ERC method. PCBs were not detected in the surface water samples that were analyzed for the North Ponds Investigation.

### 2.13.4 Biota Sampling

Biota sampling was conducted to evaluate whether PCBs were present in resident animals and plants within the North Ponds. A total of 44 fish samples, seven vegetation samples, and one turtle sample were collected and submitted to NEA for laboratory analysis. The biota sampling results are summarized below.

#### 2.13.4.1 Fish Samples

Goldfish, carp, largemouth bass, and minnows were collected and analyzed for PCBs. The fish were captured by either electroshock or hook and line. The sampling method was selected in the field on the day of sampling, based on which method was determined to be the most effective and least intrusive to the sediments. To represent the adult fish population in the North Ponds treatment system, a minimum fish size of 12 inches was required for largemouth bass and goldfish. Ten largemouth bass and 10 goldfish were collected from the North Ponds, including three carp and three bass from each of the three ponds and marshes that contained sizable fish populations (Marsh #1, North Pond #2, and Marsh #2). One additional goldfish was acquired from North Pond #1 and one additional bass was collected from Marsh #1. Four composite samples of small fishes that were less than 12 inches (largemouth bass, goldfish, bluegills, and golden shiners) were also collected and analyzed, including two composite samples from North Pond #1, one sample from Marsh #1, and one sample from North Pond #2. No fish were collected from Marsh #3 (which was dry at the time of sampling).

In addition, 10 carp and 10 largemouth bass were collected from Sterling Lake, a pond located on Lake Ontario approximately 15 miles southwest of the Alcan property. These fish were collected to serve as a background population for comparison purposes.

The total PCB concentration in fish samples from the North Ponds ranged from 0.59 to 39 ppm. Overall, the fish samples from North Pond #1 exhibited the lowest PCB concentrations for the samples collected from the North Ponds. Total PCB concentrations in the ten carp collected as background samples ranged from non-detect to 8.5 ppm, and PCBs were not detected in the 10 largemouth bass background biota samples.

#### 2.13.4.2 Turtle Sample

The muscle of the forelimb of one snapping turtle collected from Marsh #2 had a PCB concentration of 3.2 ppm.

#### 2.13.4.3 Vegetation Samples

Milfoil samples were collected to provide an indication of PCB uptake by vegetation within the OU-1 treatment system (via the root system). Milfoil appears to be a food source for the resident goldfish within the Ponds and Marshes. A total of seven milfoil samples were collected from the North Ponds treatment system, including two from North Pond #1, two from Marsh #1, one from Pond #2, and two from Marsh #2. Milfoil was not present in Marsh #3 due to the lack of standing water. The milfoil samples were rinsed with pond water to remove residual sediment, placed in plastic bags, and frozen prior to shipment to the laboratory. The milfoil samples were analyzed for total PCBs using the SUCO-ERC method.

PCBs were not detected in the milfoil samples from North Pond #1. Milfoil samples from Marsh #1 contained PCBs at concentrations up to 2.6 ppm. The milfoil sample from North Pond #2 had a PCB concentration of 0.6 ppm. PCBs were also detected in one of the Milfoil samples collected from Marsh #2 at a concentration of 0.71 ppm.

#### 2.13.4.4 Surface Soil

Six surface soil samples were collected from locations near the North Ponds. Samples were collected from a depth of approximately 0 to 4-inches with a stainless steel trowel. Samples were analyzed for total PCBs using the SUCO-ERC method.

Two surface soil samples were collected immediately west of North Pond #2 (near the location of two former lake water intake backwash outfalls) to evaluate whether this area was impacted by the construction of the recirculation structure in the northwest corner of North Pond #2 during the 1980s. One of the samples was non-detect and PCBs were detected in the other sample at a concentration of 1.9 ppm.

Two surface soil samples were collected from the compost piles located west of North Pond #1 to evaluate whether disposal of recovered oil and vegetable growth from the ponds is of concern. PCBs were not detected in either of the samples.

Two surface soil samples were collected within the former Cold Mill Landfill. PCBs were detected in these samples at estimated concentrations of 1.7 ppm and 20 ppm.

#### 2.13.4.5 Risk Assessment

As part of the North Ponds Investigation, screening-level human health and ecological risk assessments were completed. The results are summarized below.

Human Health

Results of the screening-level human health risk assessment suggest that adverse health effects may potentially result from exposure to PCBs in sediments, surface water, and fish under hypothetically assumed recreational activities (Dames & Moore, 1997). Specifically, the risk assessment concluded that the total incremental cancer risks for hypothetical adult and adolescent populations exceeded the 1E-06 criterion that is typically used as the point of departure for remedial consideration under both the reasonable maximum exposure scenario and the average case scenario (Dames & Moore, 1997).

To mitigate the potential adverse health effects, Alcan erected a fence around OU-1 (North Ponds) which prevents access to the area.

Ecological

After comparing levels of constituents in various site media to screening criteria, several constituents of potential concern (COPCs) were identified as summarized below.

| Chemical Class | Surface Water | Sediment |
|---|---|---|
| PCBs | Total PCBs | Total PCBs |
| Pesticides | Endosulfan Sulfate | Carbon Disulfide Methoxychlor<br>Endrin Endosulfan<br>beta-BHC gamma-BHC<br>4,4'-DDT |
| Metals/Inorganics | Barium | Silver |

Based on the results of the ecological risk assessment, the potential for risk to ecological receptors in the marshes and ponds of OU-1 (the North Ponds) could not be ruled out.

Based on the widespread distribution and identified concentrations of PCBs, the ecological risk assessment concluded that PCBs are clearly the primary COPC that will drive future risk management decisions with respect to OU-1. PCBs exceed screening level water quality criteria and sediment quality criteria in all of the ponds and marshes of OU-1 (the North Ponds). In addition, PCBs were identified in tissue of fish inhabiting the marshes and ponds of OU-1. Based on these results, Dames & Moore (1997) concluded that PCBs are potentially available to receptors that depend on fish, amphibians, and invertebrates that inhabit the ponds and marshes within OU-1.

# 3. Focused Remedial Investigation Activities

## 3.1 General

This section presents a description of FRI activities that were performed for each OU to meet the objectives set forth in Section 1.5 of this report. The FRI activities implemented for each OU included the following efforts:

| Investigation Activity | OU-1 | OU-2 | OU-3 |
|---|---|---|---|
| Sediment Investigation | X | | X |
| Hydrologic Evaluation | X | | X |
| Surface Soil Investigation | X | | |
| Landfill Soil Cover Investigation | | X | |
| Groundwater Investigation | X | X | |
| Biota Investigation | | | X |

The FRI field activities were conducted in accordance with the FRI/FFS Work Plan (ENSR, June 2002) and the following supporting documents:

- The Field Sampling Plan (ENSR, June 2002), which presented field protocols used during completion of the FRI;
- The Quality Assurance Project Plan (QAPP) (ENSR, June 2002), which presented analytical protocols and quality assurance/quality control (QA/QC) procedures used for the laboratory analysis of the FRI samples; and
- The Health and Safety Plan (HASP), which presented project-specific health and safety procedures followed by field personnel during implementation of the FRI activities.

An analytical sample summary that lists the analyses performed for each sample collected for the FRI is presented as Table 1. Samples selected for laboratory analysis as part of the FRI activities were submitted to NEA and analyzed using one or more of the following NYSDEC 2000 Analytical Services Protocol (ASP) equivalent methods:

| Parameter | Analytical Method |
|---|---|
| Polychlorinated Biphenyls (PCBs) | Site Specific SUCO-ERC Method |
| Volatile Organic Compounds (VOCs) | USEPA SW-846 Method 8260 |
| Semi-Volatile Organic Compounds (SVOCs) | USEPA SW-846 Method 8270 |
| Target Analyte List (TAL) Metals | USEPA SW-846 Method 6010 |
| Total Organic Carbon (TOC) | USEPA SW-846 Method 9060 |
| Total Petroleum Hydrocarbons (TPH) | USEPA SW-846 Method 8015 |
| Total Suspended Solids (TSS) | 160.1 |
| Total Hardness | ICP 200.7 (with the addition of calcium & magnesium) |
| Percent Lipids | NE 158_1.SOP |

FRI field activities were conducted in two phases. The initial phase was implemented between August and October 2002 and included the investigation activities outlined in the FRI Work Plan. Supplemental investigation activities were conducted during September 2003 to address minor data gaps identified by the 2002 FRI results. The FRI field activities completed for OU-1, OU-2, and OU-3 are described below.

Based on the results of surveying activities conducted in connection with the initial FRI efforts in 2002, Alcan determined that there were issues with the accuracy of existing base mapping for the OUs. Sanborn, Inc. (Sanborn) was retained to complete an aerial survey of the entire Alcan property and aerial photography for the survey was obtained on May 3, 2003. The aerial photography was used to develop new topographic mapping of the property (including each OU and Teal Marsh) with one foot contour intervals. All of the figures included with this FRI Report utilize the base map from the aerial survey developed by Sanborn. All sediment, soil, and surface water sampling locations depicted on the figures included in the FRI Report were surveyed in the field using high-resolution global positioning system (GPS) surveying methods. The location and top of casing elevations for groundwater monitoring wells and surface water staff gauge reference elevations were surveyed in the field using conventional survey methods.

## 3.2 Operable Unit 1 – North Ponds

The following investigation activities were implemented to achieve the FRI objectives for OU-1:

- Sediment investigation activities, including probing of accumulated sediment in the OU-1 ponds and marshes and collecting surface and subsurface sediment samples within OU-1 for laboratory analysis;

- Hydrologic evaluation activities, including obtaining surface water level measurements at existing staff gauges in the ponds and marshes and groundwater level measurements at groundwater monitoring well locations;

- Surface soil investigation activities, including a focused surface soil sampling effort to delineate the extent of PCBs identified by previous investigations and the collection of perimeter surface soil samples at specific locations adjacent to the OU-1 ponds and marshes for laboratory analysis; and

- Groundwater investigation activities to confirm that PCBs within sediment in the ponds and marshes are not migrating to groundwater in the vicinity of the OU-1 treatment system.

The FRI activities conducted for OU-1 are discussed below.

### 3.2.1 Sediment Investigation

The activities conducted as part of the OU-1 sediment investigation included a sediment probing evaluation and the collection of surface and subsurface sediment samples from each of the OU-1 ponds and marshes to supplement the results of previous investigations. FRI field activities for the OU-1 sediment investigation were initially conducted by BBL during August and September 2002. In addition, supplemental sediment investigation activities were conducted during September 2003. A description of the sediment investigation activities is presented below.

Sediment Probing Evaluation

Sediment probing was conducted during August and September 2002. Sediment probing points were located using the sampling grid system that was established for the North Ponds Investigation conducted by Dames & Moore, as shown on Figure 3A. Sediment probing measurements were obtained at 113 locations within the OU-1 ponds and marshes, including specific sediment probing points and at each sediment sampling location. Based on previous investigation results, 15 of the sediment probing points were established along a sediment probing transect within North Pond #1. At each sediment probing point, water depth and sediment depth measurements were obtained using a ½-inch diameter graduated galvanized steel probing rod and recorded in a field book.

Sediment Sampling

The initial FRI sediment investigation activities for OU-1 consisted of collecting 25 sediment core samples (OU1SD01 through OU1SD25) during August and September 2002. Sediment core sampling locations are shown on Figures 4A through 4E. Sediment core samples were collected using 3-inch diameter Lexan tubing that was driven to refusal with a hand-held core driver. Each core sample was sectioned into 6-inch segments and visually characterized for color, texture, grain size, and moisture content. Each 6-inch sample segment was transferred into a stainless steel bowl for removal of excess water, homogenized using a stainless steel spoon, and transferred into appropriate sample containers. Sediment core samples were submitted to NEA for laboratory analysis for PCBs and TOC. In addition, select sediment samples (including OU1SD02, OU1SD05, OU1SD08, OU1SD09, OU1SD12, OU1SD14, OU1SD16, OU1SD19, and OU1SD23) were submitted for laboratory analysis for grain size, specific gravity, and organic content. Each sediment sample collected during the sediment investigation activities was visually characterized for color, texture, and moisture content.

During September 2003, supplemental sediment investigation activities were conducted at specific locations within OU-1 to further characterize the vertical distribution of PCBs in sediment. During the 2002 FRI sediment sampling activities, 10 sediment samples were collected at depths greater than 2 feet and archived by the laboratory. The archived sediment samples were intended to be released for laboratory analysis if the preliminary results for samples collected at depths of less than two feet did not adequately delineate the vertical extent of PCBs. However, by the time the preliminary results for samples collected at depths of less than 2 feet were reported by the laboratory, the analytical holding times for the archived samples had already been exceeded. Based on the FRI sediment sampling results, additional sediment core samples were collected at previous sampling locations IJ13.5 and DE06.5. Sediment samples were collected from each location at depths greater than 2 feet, sectioned into 6-inch segments, and transferred into appropriate sample containers. Each sediment sample was submitted to NEA for laboratory analysis for PCBs and TOC.

In addition, FRI sediment probing activities completed during 2002 identified approximately 4.3 feet of sediment at probing location NP1T-J within North Pond #1 and approximately 8 feet of sediment at probing location GH03.5 within North Pond #2. Prior to the supplemental sediment sampling effort implemented during September 2003, sediment samples had only been collected at a maximum depth of 2 feet and 4.6 feet from North Pond #1 and North Pond #2, respectively. Based on the probing results, additional sediment samples were collected during September 2003 from previous probing locations NP1T-J and GH03.5 to depths of approximately 4 feet and 6.8 feet, respectively. Each sediment core sample was segmented into 6-inch sampling intervals and submitted to NEA for laboratory analysis for PCBs and TOC.

Quality assurance/quality control (QA/QC) samples, including the following 11 blind duplicate samples were collected in support of OU-1 sediment sampling activities:

| Date Collected | Sample Name | Duplicate of | Analysis |
|---|---|---|---|
| August 22, 2002 | OU1SDDUP1 | OU1SD11 (2.0-2.5) | PCBs, % solids, TOC |
| August 26, 2002 | OU1SDDUP2 | OU1SD01 (1.0-1.5) | PCBs, % solids, TOC |
| August 27, 2002 | OU1SDDUP3 | OU1SD07 (0.5-1.0) | PCBs, % solids, TOC |
| August 27, 2002 | OU1SDGSDUP1 | OU1SD08 (0-0.5) | Grain size, specific gravity, organic content |
| August 29, 2002 | OU1SDGSDUP2 | OU1SD16 (0.5-1.0) | Grain size, specific gravity, organic content |
| August 29, 2002 | OU1SDDUP4 | OU1SD16 (0.5-1.0) | PCBs, % solids, TOC |
| August 30, 2002 | OU1SDDUP5 | OU1SD21 (0-0.5) | PCBs, % solids, TOC |
| August 30, 2002 | OU1SDGSDUP3 | OU1SD23 (0.5-1.0) | Grain size, specific gravity, organic content |
| September 3, 2002 | OU1SDDUP6 | OU1SD19 (0.5-1.0) | PCBs, % solids, TOC |
| September 2, 2003 | DUP-2 | NPIT-J (1.5-2') | PCBs, TOC |
| September 2, 2003 | DUP-3 | GH03.5 (2-2.5') | PCBs, TOC |

### 3.2.2 Hydrologic Evaluation

The hydrologic evaluation was conducted to characterize hydrologic conditions in the North Ponds area following elimination of the cooling water discharge and other flow sources to the OU-1 ponds and marshes. Two rounds of surface water level measurements were obtained during September 2003 from staff gauges located in each pond and marsh following startup of the cooling water recirculation system. Surface water level measurements were obtained at existing Staff Gauges 1 through 8 read from shore or accessed using waders. In addition, surface water levels were measured at Staff Gauges 3, 5, and 8 on a monthly basis between June and October 2003. Groundwater level measurements were also obtained from each onsite monitoring well during October 2002 and at specific monitoring wells on a monthly basis between June and October 2003.

### 3.2.3 Surface Soil Investigation

The FRI surface soil investigation activities for OU-1 included a focused surface soil investigation and a perimeter surface soil investigation. Surface soil investigation activities were conducted by BBL during August and September 2002. A description of the surface soil investigation activities is presented below.

Focused Surface Soil Investigation

The focused surface soil investigation field activities were conducted to delineate the distribution of PCBs in surface soil samples collected for the North Ponds Investigation. A total of 12 surface soil samples (OU1SS01 through OU1SS12, as shown on Figure 3A) were collected from a depth interval of 0 to 2 inches. Samples were collected in the vicinity of the Cold Mill Landfill and the former intake backwash area located northeast of the Lake Water Pump House. Four samples were collected approximately 30 feet north, south, east, and west of North Ponds Investigation sample locations SS-SMLF1 and SS-CMLF2 within the Cold Mill Landfill. In addition, four samples were collected in the vicinity of North Ponds Investigation sample locations SS-IB1 and SS-IB2. Each sample was collected using a dedicated stainless steel trowel and submitted to NEA for laboratory analysis for PCBs and percent solids. Surface soil samples were visually characterized for color, texture, and moisture content. One blind duplicate sample (OU1SSDUP1, duplicate of sample OU1SS02) was submitted to NEA for laboratory analysis as part of the focused surface soil investigation activities.

Perimeter Surface Soil Investigation

As part of the FRI activities, a total of 13 surface soil samples (OU1SS13 through OU1SS25) were collected from the 0 to 2-inch depth interval at various locations around the perimeter at OU-1 ponds and marshes. The perimeter surface soil samples were collected using a dedicated stainless steel trowel. Each surface soil sample was submitted to NEA for laboratory analysis for PCBs and percent solids. Surface soil samples were visually characterized for color, texture, and moisture content. One blind duplicate sample (OU1SSDUP2, duplicate of sample OU1SS17) was submitted to NEA for laboratory analysis.

### 3.2.4 Groundwater Investigation

The OU-1 groundwater investigation was conducted to confirm that PCBs in sediment within the ponds and marshes are not migrating to groundwater in the vicinity of OU-1. Water level measurements were obtained from each monitoring well located in the vicinity of OU-1 (including monitoring wells MW-2 through MW-5) on October 7, 2002. Prior to sampling, a peristaltic pump was used to purge water from the wells using low-flow techniques in accordance with the procedures outlined in the Field Sampling Plan (ENSR, June 2002). Water level measurements and field parameters (consisting of turbidity, temperature, pH, conductivity, ORP, and dissolved oxygen) were measured approximately every 5 to 10 minutes during well purging. Well purging activities continued at each monitoring well until field parameters stabilized and the turbidity was reduced to less than 5 nephelometric turbidity units (NTUs).

The results for groundwater field parameter measurements (including turbidity, temperature, pH, conductivity, ORP, and dissolved oxygen) obtained immediately prior to sampling are presented on the groundwater sampling logs included in Appendix G.

Following stabilization of field parameters, a groundwater sample was collected at each monitoring well using low-flow sampling techniques. Groundwater samples were collected using a peristaltic pump with dedicated tubing (with the exception of samples collected for VOC analysis). Groundwater samples submitted for laboratory analysis for VOCs were collected using dedicated bailers (following collection of the low-flow sample at each well).

Each groundwater sample was submitted to NEA for laboratory analysis for PCBs, VOCs, SVOCs, and TAL metals.

Purge water generated by the groundwater sampling activities was containerized in the onsite polyethylene tank for temporary storage.

## 3.3 Operable Unit 2 – Main Landfill

The following investigation activities were conducted during August and September 2003 to achieve the FRI objectives for OU-2:

- Soil probing to determine the depth of soil cover across the main landfill;
- Installing two new overburden and three new bedrock monitoring wells in the vicinity of OU-2;
- Measuring groundwater levels at each new and existing overburden and bedrock monitoring well; and
- Collecting groundwater samples from each new and existing overburden and bedrock monitoring well for laboratory analysis.

The FRI activities conducted for OU-2 are discussed below.

### 3.3.1 Landfill Soil Cover Investigation

The OU-2 soil cover investigation was conducted to evaluate whether the existing soil cover over the Main Landfill meets the requirements of the NYSDEC 1978 landfill closure regulations (minimum soil cover thickness of 2 feet). The thickness of soil cover across OU-2 was measured at 33 probing locations by direct-push sampling methods using an AMS Power Probe 9600. Soil samples were collected at each probing location using a 4-foot long Macrocore sampler. The soil cover thickness and lithology of the soils encountered at each probing location was recorded in a field book. The Main Landfill soil probing locations are shown on Figure 3A.

### 3.3.2 Groundwater Investigation

During August 2002, BBL's subcontractor, Parratt-Wolff, Inc. (Parratt-Wolff) installed two overburden monitoring wells (MW-11 and MW-12) and three bedrock monitoring wells (MWB-11, MWB-12, and MWB-13) at the monitoring well locations shown on Figure 3A. Monitoring wells MW-11/MWB-11 and MW-12/MWB-12 were constructed to form overburden-bedrock well pairs.

Prior to installing each well, a soil boring was completed at each location using the hollow stem-auger (HSA) drilling method. Drilling was performed using a Mobil B52 truck-mounted drill rig equipped with 4¼-inch inside-diameter HSAs. Continuous soil samples were recovered from each soil boring at 2-foot intervals to refusal using a 2-foot long, 2-inch outer diameter, split-spoon sampling device. Soil samples recovered from each split-spoon sampling interval were visually characterized for color, texture, and moisture content. Once refusal was encountered at the bedrock monitoring well locations, the overburden was cased off and grouted prior to rock coring activities. Following grouting activities, rock coring was conducted using Hx coring from auger refusal to a maximum depth of 20 feet into bedrock. Rock cores were placed in core boxes and labeled with the borehole number, core run, and depth interval.

Following coring activities at the bedrock monitoring well locations, a 2-inch diameter, schedule 40 polyvinyl chloride (PVC) monitoring well was installed in each borehole. Each monitoring well, with the exception of monitoring well MW-11, was constructed with a 10-foot long screen (0.010-inch screen slot size). Based on the depth at which bedrock was encountered, monitoring well MW-11 was constructed with a 5-foot long screen (0.010-inch screen slot size). Following well screen installation, a silica sand pack was placed within the annulus between the monitoring well screen and the borehole wall from the bottom of the borehole to approximately 2 feet above the screened interval. For overburden monitoring wells, a 2-foot thick bentonite seal was placed above the top of the sand pack, and the remainder of the annulus was filled with silica sand. For bedrock monitoring wells, a minimum 8.5-foot thick bentonite seal was placed above the sand pack and the remainder of the annulus was filled with silica sand, with the exception of monitoring well MWB-11. The remainder of the annulus for monitoring well MWB-11 was filled to the ground surface with bentonite chips. Each well was furnished with a stick-up steel protective casing and a locking cap. Following installation of the protective casing, a cement apron was installed to hold the casing in place and to direct surface water runoff away from the well. The location and top of casing elevation for each new groundwater monitoring well was surveyed by BBL following the well installation activities. The depth, construction materials, and screened interval for each existing and new groundwater monitoring well is summarized in Table 3. Monitoring well completion logs for the groundwater monitoring wells that were installed for the FRI are presented in Appendix F.

Following monitoring well installation activities, each new monitoring well was developed to enhance the hydraulic connection between the well screen and the surrounding geologic formation and to remove fine sediment from the well screen and sand pack prior to sampling activities. Development activities included surging each well with a stainless steel bailer prior to purging each monitoring well with a peristaltic pump until the extracted water was clear. Field parameters (consisting of turbidity, temperature, pH, conductivity, oxidation reduction potential [ORP], and dissolved oxygen) were measured periodically during development activities.

Soil cuttings generated by the completion of the soil borings were placed in 55-gallon drums for off-site disposal by Alcan. Wastewater generated during the coring operations, monitoring well development, and equipment decontamination was transferred to an onsite polyethylene tank for temporary storage.

Following development, each new monitoring well was allowed to equilibrate prior to obtaining water level measurements and collecting groundwater samples. Water level measurements were obtained from each new and existing monitoring well on October 7, 2002. Prior to sampling, a peristaltic pump was used to purge water from the wells using low-flow techniques in accordance with the procedures outlined in the Field Sampling Plan (ENSR, June 2002). Water level measurements and field parameters (consisting of turbidity, temperature, pH, conductivity, ORP, and dissolved oxygen) were measured approximately every 5 to 10 minutes during well purging. Well purging activities continued at each monitoring well until field parameters stabilized and the turbidity was reduced to less than 5 nephelometric turbidity units (NTUs).

The results for groundwater field parameter measurements (including turbidity, temperature, pH, conductivity, ORP, and dissolved oxygen) obtained immediately prior to sampling are presented on the groundwater sampling logs included in Appendix G.

Following stabilization of field parameters, a groundwater sample was collected at each monitoring well using low-flow sampling techniques. Groundwater samples were collected using a peristaltic pump with dedicated tubing (with the exception of samples collected for VOC analysis). Groundwater samples submitted for laboratory analysis for VOCs were collected using dedicated bailers (following collection of the low-flow sample at each well).

Each groundwater sample was submitted to NEA for laboratory analysis for PCBs, VOCs, SVOCs, and TAL metals. One blind duplicate sample, designated as DUP-1, was collected from monitoring well MWB-12.

Purge water generated by the groundwater sampling activities was containerized in the onsite polyethylene tank for temporary storage.

## 3.4 Operable Unit 3 – Tributary 63

The following investigation activities were conducted to achieve the FRI objectives for OU-3:

- Collecting surface sediment and sediment core samples from Tributary 63, the South Pond, and the South Marsh for laboratory analysis;
- Collecting surface water samples for laboratory analysis; and
- Collecting biota samples from different segments of Tributary 63 and from two areas within Teal Marsh for laboratory analysis.

The FRI activities conducted for OU-3 are discussed below.

### 3.4.1 Sediment Investigation

The OU-3 sediment investigation activities consisted of collecting sediment samples to evaluate the extent of PCBs in sediment within Tributary 63. Sediment samples (OU3SD01 through OU3SD21, as shown on Figure 3B) were collected from 21 sampling locations during September 2002 using a 3-inch diameter stainless steel auger. Each sediment sample was visually characterized for color, texture, and moisture content. Sediment samples collected from the 0 to 6-inch depth interval at 18 of the 21 locations were submitted to NEA for laboratory analysis for PCBs and TOC. Three OU-3 sediment sampling locations (OU3SD17 through OU3SD19) were added to the original sampling scope at the request of NYSDEC, based on the presence of a sheen that was observed during sampling activities within Segment C of Tributary 63. Sediment samples collected from the 0 to 6-inch and 6-inch to 12-inch depth intervals at these locations were submitted to NEA for laboratory analysis for PCBs and TPH. QA/QC samples, consisting of two blind duplicate samples, OU3SDDUP1 and OU3SDDUP2, were collected in support of the OU-3 sediment investigation at sampling locations OU3SD15 and OU3SD05, respectively.

As part of the 2003 supplemental investigation activities, 20 sediment samples were collected from four locations (SEG-B2A, SEG-B2B, SEG-B3A, and SEG-B3B, as shown on Figure 3B) in the vicinity of previous sampling locations SEG-B2 and SEG-B3. Sediment samples were collected to refusal (approximately 2.4 feet bgs) at each location using 3-inch diameter Lexan tubing. Each sediment sample was visually characterized for color, texture, and moisture content. Each sediment core sample was segmented into 6-inch sampling intervals and submitted to NEA for laboratory analysis for PCBs and TOC. One blind duplicate sample (DUP-1) was collected in support of the OU-3 supplemental sediment investigation activities at sample location SEG-B2B (0.5-1'). Field personnel also completed sediment probing transects at 11 locations along the onsite portions of Tributary 63 to evaluate the distribution of sediment deposits along the tributary. Sediment transect probing results are presented in Appendix H.

### 3.4.2 Surface Water Investigation

Prior to the FRI activities, surface water quality data was not available for Tributary 63. As part of the FRI activities, one surface water sample was collected from each of the four OU-3 segments (segments A through D, as shown on Figure 3B) during October 2002. Samples were collected in sequence proceeding from downstream locations to the upstream locations to minimize the potential for cross-contaminating samples located upstream. Surface water samples were collected by slowly immersing a glass beaker into the water to within 6 inches of the tributary bottom and then slowly lifting the beaker out of the water without disturbing the tributary sediments. The surface water samples were transferred into laboratory-provided sample containers. Each surface water sample was submitted to NEA for laboratory analysis for PCBs, TSS, and hardness. The surface water sampling locations are shown on Figure 3B.

Water quality parameters (including turbidity, temperature, pH, conductivity, ORP, and dissolved oxygen) were obtained prior to collecting each surface water sample using a calibrated water quality meter. Results were recorded in a field book.

### 3.4.3 Biota Investigation

As part of the FRI activities, a total of 30 composite fish samples (OU3AT01 through OU3AT30) were collected from segments A, B, and C/D of the OU-3 watershed during August 2002 to evaluate the presence or absence of PCBs in biota within Tributary 63. Biota samples were collected via electroshocking in accordance with the sampling methods and procedures described in the FRI Work Plan. The samples were mostly composite and individual whole body samples of redfin pickerel, pumpkinseed, green sunfish, and white sucker. In addition, several edible-size fish were collected and analyzed as individual fillet samples (skin-on or skin-off, depending on the species, and in accordance with NYSDEC standards for fillet sample preparation). Very few edible-size fish were collected during the sampling effort (only one largemouth bass and two brown bullheads). Each of the fish tissue samples were submitted to NEA for analysis for total PCBs and percent lipids.

Based on the results of the sediment and biota sampling activities conducted for OU-3 during 2002, the NYSDEC requested that Alcan proceed with the collection of biota samples within Teal Marsh during an April 24, 2003 meeting with the NYSDEC, Alcan, and BBL. An approach for collecting biota samples within Teal Marsh was outlined in a May 14, 2003 letter (included in Attachment A) from Alcan to the NYSDEC that was subsequently approved for implementation. Biota samples were collected from Teal Marsh during July 2003 using a boat-mounted electrofishing unit and a backpack electrofishing unit. The Teal Marsh biota samples were collected from two general locations that were determined by physical access and fish availability, including the mouth of Teal Marsh near Lake Ontario and an area roughly in the center of the marsh (upstream and downstream of a beaver dam that transects the marsh). The species collected from Teal Marsh included redfin pickerel, brown bullhead, largemouth bass, eastern mudminnow, and sunfish (bluegill and pumpkinseed). In general, very few edible-size fish were observed in Teal Marsh. As such, only five of the fish tissue samples (three brown bullheads, one bluegill, and one largemouth bass, all from the mouth of Teal Marsh) were prepared as fillet samples. These edible-size fish were processed individually as fillet samples (in accordance with NYSDEC standards for fillet sample preparation) and forage fish were processed as whole-body composite samples. All of the samples were submitted to NEA for laboratory analysis for PCBs and percent lipids, using the methods previously employed in the FRI. A detailed description of the biota sampling activities and results is presented in the FWIA included in Section 6.0 of this report.

# 4. Focused Remedial Investigation Results

## 4.1 General

This section presents a discussion of the FRI surface soil, sediment, groundwater, surface water, and biota investigation results. The laboratory analytical results for samples collected as part of the FRI were validated by BBL. Validated analytical data reports are presented in Volumes 2 and 3 of this report. Results obtained for the FRI activities that were conducted for each OU are discussed below.

## 4.2 Operable Unit 1 – North Ponds

The results obtained for the OU-1 sediment investigation, hydrogeologic evaluation, and surface soil investigation activities are presented below.

### 4.2.1 Sediment Investigation

Sediment Probing Evaluation

OU-1 sediment probing results are summarized in Table 3. Water depth and sediment depth measurements were obtained at 113 locations. Based on sediment probing data, the water depth in OU-1 ranged from 0 inches (dry) at various locations to 38.4 inches in North Pond #1 and North Pond #2. In addition, the average sediment depth at the OU-1 sediment probing locations was approximately 22.8 inches, ranging from 3.6 inches at location AB15.5 (in Marsh #3) to 96 inches at location GH03.5 (in North Pond #2). Sediment and water depth measurements for each OU-1 pond and marsh are summarized below:

| OU-1 Location | Sediment (inches) | | Water (inches) | |
|---|---|---|---|---|
| | Range | Average | Range | Average |
| Marsh #1 | 6.0 – 57.6 | 25.6 | 0.0 – 4.8 | 0.64 |
| Marsh #2 | 4.8 – 48.0 | 23.2 | 0.0 – 24.0 | 4.64 |
| Marsh #3 | 3.6 – 38.4 | 16.9 | 0.0 – 1.2 | 0.03 |
| North Pond #1 | 6.0 – 51.6 | 29.4 | 0.0 – 38.4 | 24.17 |
| North Pond #2 | 26.4 – 96.0 | 54.3 | 6.0 – 38.4 | 25.73 |

Sediment Sampling

As discussed in Section 3, each sediment core sample collected during sediment sampling activities within OU-1 was visually characterized for color, texture, and moisture content. Based on observations of recovered sediment samples, sediment within the OU-1 ponds and marshes generally consists of dark brown-black silt with a trace of fine sand. In addition, a light to strong odor was observed at each sediment sampling location within OU-1, with the exception of samples OU1SD08 and OU1SD15 (in Marsh #1) through OU1SD24 (in Marsh #2).

Analytical results obtained for the laboratory analysis of the OU-1 sediment samples collected as part of the FRI sediment investigation activities for PCBs and TOC are presented in Table 4 and shown on Figures 4A through 4E. Analytical results obtained for the laboratory analysis of the sediment samples collected from each pond and marsh are summarized below:

| Location | Depth Interval (feet) | PCBs | | | TOC | |
|---|---|---|---|---|---|---|
| | | No. of Samples Detected/No. of Samples Analyzed | Range of Detected PCBs (ppm) | Sample Exhibiting Max. Concentration | Range of TOC (ppm) | Sample Exhibiting Max. Concentration |
| **Marsh 1** | 0 – 0.5 | 6/6 | 0.68 J – 223 | OU1SD06 | 11,100 – 419,000 | OU1SD07 |
| | 0.5 – 1.0 | 6/6 | 2.06 – 134.1 J | OU1SD05 | 75,800 – 628,000 | OU1SD05 |
| | 1.0 – 1.5 | 4/6 | 0.21 J – 123.2 J | OU1SD05 | 11,900 – 577,000 | OU1SD06 |
| | 1.5 – 2.0 | 1/ 4 | 36.38 J | OU1SD05 | 145,000 - 454,000 | OU1SD06 |
| | 2.0 -2.5 | 0/1 | ND | NA | 315,000 | IJ13.5A (2-2.5') |
| | 2.5 – 3.0 | 0/1 | ND | NA | 103,000 | IJ13.5A (2.5-3') |
| | 3.0 – 3.5 | 0/1 | ND | NA | 31,500 | IJ13.5A (3-3.5') |
| | 3.5 – 4.0 | 0/1 | ND | NA | 487,000 | IJ13.5A (3.5-4') |
| | 4.0 – 4.6 | 0/1 | ND | NA | 380,000 | IJ13.5A (4-4.6') |
| **Marsh 2** | 0 – 0.5 | 5/5 | 0.55 – 12.65 | OU1SD14 | 91,000 – 282,000 | OU1SD16 |
| | 0.5 – 1.0 | 4/5 | 0.29 – 30.81 J | OU1SD14 | 13,600 – 149,000 | OU1SD14 |
| | 1.0 – 1.5 | 2/3 | 0.97 – 33.99 J | OU1SD14 | 19,600 – 147,000 | OU1SD13 |
| | 1.5 – 2.0 | 1/2 | 55.30 J | OU1SD14 | 29,800 – 170,000 | OU1SD14 |
| | 2.0 -2.5 | 1/1 | 72.4 | DE06.5A | 230,000 | DE06.5A (2-2.5') |
| | 2.5 – 3.0 | 1/1 | 43.1 | DE06.5A | 240,000 | DE06.5A (2.5-3') |
| | 3.0 – 3.5 | 1/1 | 16.65 J | DE06.5A | 424,000 | DE06.5A3-3.5') |
| **Marsh 3** | 0 – 0.5 | 8/8 | 4.83 J – 1,275.3 J | OU1SD23 | 42,000 – 456,000 | OU1SD21 |
| | 0.5 – 1.0 | 8/8 | 0.23 J – 48.6 | OU1SD23 | 24,400 – 280,000 | OU1SD21 |
| | 1.0 – 1.5 | 3/4 | 0.45 J – 7.6 | OU1SD24 | 1,150 – 21,500 | OU1SD19 |
| | 1.5 – 2.0 | 1/2 | 0.6 | OU1SD23 | 4,070 – 9,270 | OU1SD19 |
| **North Pond 1** | 0 – 0.5 | 4/4 | 1.05 J – 3.28 J | OU1SD02 | 38,300 – 65,600 | OU1SD01 |
| | 0.5 – 1.0 | 4/4 | 2.188 – 39.2 | OU1SD02 | 33,100 – 110,000 | OU1SD01 |
| | 1.0 – 1.5 | 4/4 | 3.182 – 17.67 J | OU1SD02 | 21,600 – 92,300 | OU1SD01 |
| | 1.5 – 2.0 | 3/4 | 2.88 J – 81.0 J | OU1SD25 | 22,800 – 77,000 | OU1SD02 |
| | 2.0 -2.5 | 1/1 | 79.4 | NPIT-J (2-2.5') | 71,100 | NPIT-J (2-2.5') |
| | 2.5 – 3.0 | 1/1 | 94.08 | NPIT-J (2.5-3') | 43,100 | NPIT-J (2.5-3') |
| | 3.0 – 3.5 | 1/1 | 47.4 | NPIT-J (3-3.5') | 10,700 | NPIT-J (3-3.5') |
| | 3.5 – 4.0 | 1/1 | 8.29 | NPIT-J (3.5-4') | 2,300 | NPIT-J (3.5-4') |
| **North Pond 2** | 0 – 0.5 | 4/4 | 2.62 J – 12.59 J | GH03.5 (0-0.5') | 67,900 – 104,000 | OU1SD11 |
| | 0.5 – 1.0 | 4/4 | 4.77 J – 11.3 | GH03.5 (0.5-1') | 73,700 – 99,100 | OU1SD11 |
| | 1.0 – 1.5 | 4/4 | 4.69 J – 42.3 | OU1SD10 | 76,500 – 92,900 | OU1SD10 |
| | 1.5 – 2.0 | 2/3 | 12.74 J – 53.32 | GH03.5 (1.5-2') | 44,000 – 78,600 | OU1SD11 |
| | 2.0 -2.5 | 2/3 | 43.50 J – 66.4 | GH03.5 (2-2.5') | 13,900 – 120,000 | OU1SD11 |
| | 2.5 – 3.0 | 2/3 | 1.57 J – 115.22 | GH03.5 (2.5-3') | 5,700 – 122,000 | GH03.5 (2.5-3') |
| | 3.0 – 3.5 | 2/2 | 0.26 – 113.5 | GH03.5 (3-3.5') | 43,000 – 136,000 | GH03.5 (3-3.5') |
| | 3.5 – 4.0 | 2/2 | 0.74 – 260.0 | GH03.5 (4.5-4') | 9,350 – 95,000 | GH03.5 (4.5-4') |
| | 4.0 – 4.5 | ½ | 51.3 | GH03.5 (4-4.5') | 3,860 – 258,000 | GH03.5 (4-4.5') |
| | 4.5 – 5.0 | 1/1 | 37.9 | GH03.5 (4.5-5') | 259,000 | GH03.5 (4.5-5') |
| | 5.0 – 5.5 | 1/1 | 2.3 | GH03.5 (5-5.5') | 388,000 | GH03.5 (5-5.5') |
| | 5.5 – 6.0 | 0/1 | ND | NA | 54,100 | GH03.5 (5.5-6') |
| | 6.0 – 6.5 | 0/1 | ND | NA | 17,900 | GH03.5 (6.6-5') |
| | 6.5 – 6.8 | 0/1 | ND | NA | 4,790 | GH03.5 (6.5-8') |

**Notes:**

1. Sample quantities do not include duplicate samples.
2. ND = Indicates that PCBs were not detected at a concentration exceeding laboratory detection limits.
3. Concentrations presented in milligrams per kilogram (mg/kg) or parts per million (ppm).
4. J = Estimated value.
5. NA = Not applicable and/or available.

PCBs were detected in 96 of the 119 sediment samples that were submitted for laboratory analysis from OU-1 as part of the FRI. For comparison purposes, the sediment sampling results have been screened against the

NYSDEC sediment criteria for human health bioaccumulation and three ecological risk-based levels (benthic aquatic life acute toxicity, benthic aquatic life chronic toxicity, and wildlife bioaccumulation) as presented in the NYSDEC Division of Fish, Wildlife, and Marine Resources document entitled, "Technical Guidance for Screening Contaminated Sediments," dated January 1999. The NYSDEC sediment screening criteria are adjusted on a location-specific basis using the TOC results obtained for the sediment samples. Comparison of the analytical results obtained for the laboratory analysis of the OU-1 sediment samples with the NYSDEC sediment screening criteria indicates the following:

| Location | No. of Samples Detected/No. of Samples Analyzed* | No. of Samples Exceeding | | | |
|---|---|---|---|---|---|
| | | Human Health Bioaccumulation | Benthic Aquatic Life Acute | Benthic Aquatic Life Chronic | Wildlife Bioaccumulation |
| Marsh 1 | 17 / 27 | 17 | 1 | 15 | 17 |
| Marsh 2 | 15 / 18 | 15 | 0 | 15 | 15 |
| Marsh 3 | 20 / 22 | 20 | 1 | 18 | 20 |
| North Pond 1 | 19 / 20 | 19 | 3 | 19 | 19 |
| North Pond 2 | 25 / 32 | 25 | 0 | 24 | 25 |

Note:
1. * = Sample quantities do not include duplicate samples.

### 4.2.2 Hydrologic Evaluation

Surface water level measurements obtained from eight staff gauges located throughout OU-1 are presented in Table 5. As indicated in Table 5, during September 2002, Staff Gauges 1 and 4 could not be accessed due to dense vegetation and Staff Gauges 3 and 7 were dry. Surface water levels at the remaining staff gauges were measured at depths ranging from 0.50 feet at Gauge 8 to 2.51 feet at Gauge 2, which correspond to elevations of 255.30 and 248.67 feet above mean sea level (ft AMSL), respectively. In addition, surface water level measurements obtained during 2003 ranged from 248.18 feet AMSL at Gauge 3 (which was dry) to 255.6 feet AMSL at Gauge 8.

Groundwater level measurements obtained from 15 onsite monitoring wells are presented in Table 6. As indicated in Table 6, groundwater elevation measurements obtained during October 2002 ranged from 264.41 ft AMSL at monitoring well MW-9 to 244.93 ft AMSL at monitoring well MW-3. In addition, groundwater elevations were measured at depths ranging from 265.34 ft AMSL at monitoring well MW-9 to 238.70 ft AMSL at monitoring well MW-3 during 2003 monitoring activities.

As indicated by the surface water and groundwater level data presented in Tables 5 and 6, the results of the hydrologic evaluation indicate that hydrologic conditions in the vicinity of OU-1 have begun to stabilize.

### 4.2.3 Surface Soil Investigation

Each surface soil sample collected for the focused and perimeter surface soil investigations was visually characterized for color, texture, and moisture content. Based on observations of the recovered surface soil samples, surface soil from the perimeter of the ponds and marshes in OU-1 generally consisted of brown colored silt with a trace of fine sand and gravel. No visible staining or obvious odors were encountered at any of the surface soil sampling locations. For comparison purposes, analytical results for the surface soil samples were compared with the 1 ppm surface soil cleanup objective presented in the NYSDEC document entitled, "Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels," HWR-94-4046 (TAGM 4046), dated January 24, 1994.

Focused Surface Soil Investigation

Analytical results obtained from the laboratory analysis of 12 surface soil samples collected from the Cold Mill Landfill and the former intake backwash area for PCBs are presented in Table 7 and shown on Figure 5A. As indicated in Table 7, PCBs were detected in 8 of the 12 surface soil samples at estimated concentrations ranging from 0.32 ppm in sample OU1SS07 to 10.20 ppm in sample OU1SS01. PCBs were detected in two surface soil samples (OU1SS01 and OU1SS05) at estimated concentrations of 10.20 ppm and 1.10 ppm, respectively, which exceed the 1 ppm NYSDEC-recommended surface soil cleanup objective of 1 ppm presented in TAGM 4046.

Surface soil samples OU1SS01 through OU1SS08 were collected within the Cold Mill Landfill. Samples OU1SS01 through OU1SS04 encircle the previous North Ponds Investigation sample SS-CMLF1 while samples OU1SS05 through OU1SS08 encircle the previous sample SS-CMLF2. Analytical results for surface soil samples OU1SS02 through OU1SS04 indicate that PCB concentrations decrease to the south, east, and west of previous sample SS-CMLF1; however, the concentration of PCBs in sample OU1SS01, located to the north of SS-CMLF1, increase. Analytical results for the four surface soil samples collected in the vicinity of SS-CMLF2 indicate that PCB concentrations decrease in the area encompassing previous sample SS-CMLF2.

Surface soil samples OU1SS09 through OU1SS12 were collected in the former intake backwash area east of the Lake Water Pump House. Analytical results for each surface soil sample indicate that PCB concentrations decrease in the vicinity of North Ponds Investigation sample SS-IB2. PCBs were not detected in the FRI surface soil samples collected in the former intake backwash area, with the exception of OU1SS11 and OU1SS12, which exhibited concentrations of 0.38 ppm and an estimated 0.80 ppm, respectively.

Perimeter Surface Soil Investigation

PCB analytical results obtained for the laboratory analysis of 13 surface soil samples collected from the perimeter of the OU-1 ponds and marshes are presented in Table 8 and shown on Figure 5B. As indicated in Table 8, PCBs were detected in 6 of the 13 perimeter surface soil samples at concentrations ranging from an estimated 0.14 ppm in sample OU1SS19 to 3.52 ppm in sample OU1SS15. PCBs were detected within two surface soil samples, OU1SS14 and OU1SS15, at concentrations of 2.26 ppm and 3.52 ppm, respectively, which exceed the 1 ppm NYSDEC-recommended cleanup objective presented in TAGM 4046. Surface soil samples OU1SS14 and OU1SS15 are located along the southern shore of North Pond #1.

### 4.2.4 Groundwater Investigation

Analytical results obtained from the laboratory analysis of the groundwater samples collected from each of the groundwater monitoring wells in the vicinity of OU-1 (monitoring wells MW-2 through MW-5) for PCBs, VOCs, SVOCs, and TAL metals are presented in Table 10. For discussion purposes, the groundwater analytical results have been compared to the groundwater standards/guidance values presented in the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) document entitled "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations" (June 1998). Analytical results obtained for the laboratory analysis of the groundwater samples indicate the following:

- PCBs were detected in the sample collected from monitoring well MW-05 at a concentration of 0.083 parts per billion (ppb). The detected PCB concentration at monitoring well MW-05 was less than the New York

State Class GA groundwater quality standard of 0.09 ppb. PCBs were not detected in samples collected monitoring wells MW-02, MW-03, or MW-04;

- VOCs were not detected in groundwater samples collected from any of the monitoring wells located in the vicinity of OU-1;
- One SVOC, bis(2-ethylhexyl)phthalate, was detected in each groundwater sample at concentrations exceeding the New York State Class GA groundwater quality standard presented in TOGS 1.1.1. However, bis(2-ethylhexyl)phthalate is a common field and laboratory artifact that was likely introduced into the samples as a result of handling and processing; and
- TAL metals, including iron, magnesium, manganese, and sodium, were detected at concentrations exceeding New York State groundwater quality standards and/or guidance values within each groundwater sample. The inorganic constituent concentrations detected in the groundwater samples collected from the monitoring wells located in the vicinity of OU-1 are consistent with typical background mineral constituent concentrations that would be expected in shallow groundwater.

## 4.3 Operable Unit 2 – Main Landfill

The results obtained for the FRI landfill soil cover and groundwater investigations, including probing and visual characterization of soil and analytical results obtained from the laboratory analysis of groundwater samples, are presented below.

### 4.3.1 Landfill Soil Cover Investigation

Each soil probing sample collected as part of the landfill soil cover investigation was visually characterized for color and texture in order to determine the depth of soil cover at each location. No visible staining or obvious odors were observed at any of the soil probing locations within OU-2. The soil thickness evaluation results obtained for the OU-2 probing activities are presented in Table 9. Of the 33 soil probing locations, only one probing location (MN22) indicated a soil cover depth that was slightly less than the 2 feet described in the 1978 landfill closure requirements (1.6 feet). The remaining probing results indicate that the depth of soil cover across the Main Landfill ranges from 2.0 feet at locations JK21, MN20, and NO23, to 2.9 feet at location NO25. The average soil cover depth for OU-2 is approximately 2.38 feet.

### 4.3.2 Groundwater Investigation

The OU-2 groundwater investigation results are presented below, including a description of subsurface conditions, groundwater flow, and groundwater quality.

<u>Subsurface Stratigraphy</u>

Soil samples recovered from each split-spoon sampling interval for monitoring wells MW-11, MW-12, MWB-11, MWB-12, and MWB-13 were visually characterized for color, texture, and moisture content. A summary of the visual characterization activities is provided on the monitoring well completion logs included in Appendix F. The shallow overburden beneath the site generally consists of brown silt and sand with a trace of gravel to the depth of bedrock. Bedrock was encountered at depths ranging from 10.73 feet bgs at monitoring well MW-11 to 15.0 feet bgs at MW-12. Bedrock cores recovered at monitoring well locations MWB-11 through MWB-13 were visually characterized by BBL's field geologist. The bedrock encountered at the monitoring well locations generally consisted of gray finely-grained sandstone with moderately fractured, intermittent shale/laminations/seams. No visible staining or obvious odors were noted for any of the overburden samples or bedrock cores recovered at the FRI monitoring well locations.

Groundwater Flow

Based on the groundwater elevations obtained during the October 2002 monitoring event, groundwater within the overburden beneath the site appears to flow towards the north/northwest. A potentiometric surface contour map based on groundwater elevations that were obtained during October 2002 from each of the new and existing groundwater monitoring wells at the site is presented on Figure 6.

Groundwater Sampling Results

Analytical results obtained from the laboratory analysis of nine groundwater samples collected from each of the new and existing onsite monitoring wells in the vicinity of OU-2 for PCBs, VOCs, SVOCs, and TAL metals are presented in Table 10. For discussion purposes, the groundwater analytical results have been compared to the groundwater standards/guidance values presented in TOGS 1.1.1. Analytical results obtained for the laboratory analysis of the groundwater samples indicate the following:

- PCBs were detected in the groundwater sample collected from MW-07 at a concentration of 0.066 ppb. The detected PCB concentration at MW-07 was below the New York State Class GA groundwater quality standard of 0.09 ppb. PCBs were not detected in any of the other groundwater samples collected from groundwater monitoring wells located in the vicinity of OU-2;

- VOCs were detected in two groundwater samples as follows: acetone was detected in the groundwater sample collected from monitoring well MW-07 at an estimated concentration of 5.79 ppb; chloroethane was detected in the groundwater sample collected from monitoring well MW-07 at an estimated concentration of 20.8 ppb; 1,1-dichloroethane was detected in the groundwater sample collected from monitoring well MW-10 at a concentration of 11.8 ppb. The New York State Class GA groundwater quality standard for both chloroethane and 1,1-dichloroethane is 5 ppb.

- SVOCs were detected in groundwater samples as follows: 1,4-dichlorobenzene (estimated as 3.53 ppb) was detected in the groundwater sample and 1,2-dichlorobenzene (estimated 3.11 ppb) and 1,4-dichlorobenzene (estimated as 3.43 ppb) were detected in the duplicate sample collected at MWB-12. These concentrations are slightly above the New York State Class GA groundwater quality standards (3 ppb) presented in TOGS 1.1.1. Bis(2-ethylhexyl)phthalate was also detected in each of the groundwater samples at concentrations exceeding the New York State Class GA groundwater quality standard presented in TOGS 1.1.1. However, bis(2-ethylhexyl)phthalate is a common field and laboratory artifact that was likely introduced into the samples as a result of handling and processing; and

- TAL metals iron, magnesium, manganese, and sodium were detected at concentrations exceeding New York State groundwater quality standards and/or guidance values within each groundwater sample, with the exception of samples collected from monitoring wells MW-06, and MW-09. Inorganic constituent concentrations detected within groundwater samples collected during the FRI are generally consistent with typical background mineral constituent concentrations that would be expected in shallow groundwater.

## 4.4 Operable Unit 3 – Onsite Portions of Tributary 63

The results obtained for the FRI sediment, surface water, and biota investigation activities, including sediment probing results, visual characterization of the sediment samples, and analytical results obtained for the laboratory analysis of sediment, surface water, and biota samples, are presented below.

### 4.4.1 Sediment Investigation

Each sediment sample collected for the OU-3 sediment investigation was visually characterized for color, texture, and moisture content. Based on observations of the recovered sediment samples, sediment within Tributary 63 consists of dark brown silt intermixed with fine sand.

Analytical results obtained for the laboratory analysis of 44 sediment samples from OU-3 for PCBs, TOC, and/or TPH are presented in Table 11 and shown on Figure 4F. Analytical results obtained for the laboratory analysis of the sediment samples for PCBs and TOC are summarized below:

| Segment | Depth Interval | PCB | | | TOC | |
|---|---|---|---|---|---|---|
| | | No. of Samples Detected/No. of Samples Analyzed | Range of Detected PCBs (ppm) | Sample Exhibiting Max. Concentration | Range of TOC (ppm) | Sample Exhibiting Max. Concentration |
| A | 0 – 0.5 | 0 / 4 | ND | NA | 6,850 J – 15,300 J | OU3SD04 |
| B (Tributary 63) | 0 – 0.5 | 6/6 | 2.13 J – 23.57 | OU3SD07 | 10,100 – 33,400 | SEG-B3B |
| | 0.5 – 1.0 | 1/2 | ND – 7.26 | SEG-B3B | 16,200 – 16,500 | SEG-B3A |
| | 1.0 – 1.5 | 1/2 | ND – 2.28 | SEG-B3B | 5,930 – 11,000 | SEG-B3A |
| | 1.5 – 2.0 | 0/2 | ND | SEG-B3A | 2,420 – 2,750 | SEG-B3A |
| | 2.0 – 2.5 | 0/2 | ND | SEG-B3A | 1,070 – 1,960 | SEG-B3A |
| B (S. Pond and S. Marsh) | 0 – 0.5 | 4/4 | 1.23 – 161.3 J | SEG-B2B | 17,400 J – 159,000 J | SEG-B2B |
| | 0.5 – 1.0 | 3/3 | 48.44 – 158.2 | SEG-B2A | 117,000 J – 129,000 J | SEG-B2A |
| | 1.0 – 1.5 | 2/2 | 0.163 – 0.72 | SEG-B2A | 27,600 J – 41,700 J | SEG-B2A |
| | 1.5 – 2.0 | 0/2 | ND | SEG-B2A | 8,230 J – 10,800 J | SEG-B2A |
| | 2.0 – 2.5 | 0/2 | ND | SEG-B2B | 10,800 J – 12,800 J | SEG-B2B |
| C | 0 – 0.5 | 5 / 7 | 0.54 – 5.34 | OU3SD17 (0-0.5) | 6,980 – 15,200 J | OU3SD10 |
| | 0.5 – 1.0 | 3 / 3 | 0.47 J – 7.08 | OU3SD19 (0.5-1.0) | NA | NA |
| D | 0 – 0.5 | 0 /4 | ND | NA | 162,000 – 533,000 | OU3SD13 |

**Notes:**
1. Sample quantities do not include duplicate samples.
2. ND = Indicates that PCBs were not detected at a concentration exceeding laboratory detection limits.
3. Concentrations presented in milligrams per kilogram (mg/kg) or parts per million (ppm).
4. J = Estimated value.
5. NA = Not applicable and/or available.

PCBs were detected in 23 of the 44 sediment samples collected from OU-3 during 2002 and 2003. For discussion purposes, the sediment sample results have been compared to NYSDEC sediment screening criteria (as adjusted based on location-specific TOC results at each sampling location) for human health bioaccumulation and the three ecological risk-based levels (benthic aquatic life acute toxicity, benthic aquatic life chronic toxicity, and wildlife bioaccumulation). Comparison of the analytical results obtained for the laboratory analysis of the OU-3 sediment samples with the NYSDEC sediment screening criteria indicates the following:

| Year | Depth Interval | No. of Samples PCBs Detected[1] | No. of Samples Exceeding | | | |
|---|---|---|---|---|---|---|
| | | | Human Health Bioaccumulation | Benthic Aquatic Life Acute | Benthic Aquatic Life Chronic | Wildlife Bioaccumulation |
| 2002 | 0 – 0.5' | 10 / 21 | 6* | 0 | 6* | 6* |
| | 0.5 – 1.0' | 3 / 3 | * | * | * | * |
| 2003 | 0 – 0.5' | 4 / 4 | 4 | 0 | 4 | 4 |
| | 0.5 – 1.0' | 3 / 4 | 3 | 0 | 3 | 3 |
| | 1.0 – 1.5' | 3 / 4 | 3 | 0 | 1 | 3 |
| | 1.5 – 2.0' | 0 / 4 | 0 | 0 | 0 | 0 |
| | 2.0 – 2.5' | 0 / 4 | 0 | 0 | 0 | 0 |

Notes:
1. Sample quantities do not include duplicate samples.
2. * = During 2002, PCBs were detected in three sediment samples from the 0-0.5' and 0.5-1.0' depth intervals. However, sediment criteria values are not available due to the lack of TOC data for the samples.

A detailed discussion of the distribution of PCBs within OU-3 sediments is presented in Section 7 of this report.

TPH analytical results for the sediment samples collected from Tributary Segment C at the request of the NYSDEC (samples OU3SD17 through OU3SD19) are presented in Table 11 and shown on Figure 4F. TPH concentrations in the surface sediment samples (0 to 6 inches) ranged from an estimated concentration of 1,380 ppm in sample OU3SD19 to an estimated concentration of 2,470 ppm in sample OU3SD17. TPH concentrations in the subsurface sediment samples (6 to 12 inches) ranged from an estimated concentration of 445 ppm in sample OU3SD18 to an estimated concentration of 1,450 ppm in sample OU3SD19.

### 4.4.2 Surface Water Investigation

Analytical results obtained for the laboratory analysis of four surface water samples collected from OU-3 (at the locations shown on Figure 3B) for PCBs, total hardness, and TSS are presented in Table 12. For discussion purposes, the surface water analytical results have been compared to the NYSDEC ambient surface water quality standards and/or guidance values presented in TOGS 1.1.1. The analytical results obtained for the laboratory analysis of the surface water samples indicate the following:

- PCBs were not detected in any of the surface water samples at concentrations exceeding laboratory detection limits (See Table 12);
- Total hardness of the surface water samples ranged from 196 ppm in sample SEG-B3 to 229 ppm in sample SEG-A2; and
- TSS of the surface water samples ranged from 1.9 ppm in sample SEG-D5 to 303 ppm in sample SEG-A2.

### 4.4.3 Biota Investigation

The OU-3 biota sampling included the collection and analysis of 30 fish samples from Tributary 63 during 2002. In addition, 30 fish samples were collected from Teal Marsh during 2003. The PCB and lipid results for the

Tributary 63 fish tissue samples are presented in Table 13, and the results for the Teal Marsh fish tissue samples are presented in Table 14.

For Tributary 63, a total of ten composite whole body samples were collected within Segment A (the upstream background location). PCBs were detected in one of these samples (redfin pickerel sample OU3AT05), at a concentration of 0.94 ppm. Segment B is located downstream of the discharge from the South Pond, and a total of eight composite whole body samples and two individual skin-off fillet samples were collected from this area. PCBs were detected in each of these fish tissue samples at concentrations ranging from 0.60 ppm (brown bullhead sample OU3AT12) to 8.05 ppm (pumpkinseed sample OU3AT20). PCB concentrations for this area are lowest for the two brown bullhead fillet samples. Segment C is located downstream of Segment B, and is north of the Alcan water treatment facility. Fish tissue samples collected from Segment C include one largemouth bass skin-on fillet and nine whole body samples. PCBs were not detected in the largemouth bass fillet sample, but were detected in each of the nine whole body samples. Total PCB concentrations in the nine whole body samples ranged from 1.03 ppm (redfin pickerel sample OU3AT28) to 4.09 ppm (redfin pickerel sample OU3AT22).

Biota tissue samples collected from the central portion of Teal Marsh include two whole body samples of mudminnow from upstream of the beaver dam that transects the marsh, and 13 whole body samples, of various species from below the beaver dam. PCBs were detected in the two fish tissue samples collected upstream of the beaver dam at concentrations of 0.63 ppm in sample TM01-02 and 1.08 ppm in sample TM01-01. PCBs were also detected in each of the 13 fish tissue samples collected downstream of the beaver dam at concentrations ranging from 0.11 ppm (redfin pickerel sample TM01-14) to 2.85 ppm (bluegill sample TM01-06). Fish tissue samples collected from the downstream location (at the mouth of the marsh near Lake Ontario) include fillet samples (three brown bullhead samples, one bluegill sample, and one largemouth bass sample), and whole body samples (seven pickerel samples, two bluegill samples, and one pumpkinseed sample). PCBs were detected in ten of the 15 fish tissue samples from this location at concentrations ranging from 0.12 ppm (pickerel sample TM02-11) to 0.77 ppm (bluegill fillet sample TM02-04).

In general, the fish tissue data for Tributary 63 and Teal Marsh show a strong decreasing trend in PCB concentrations with increasing distance downstream of Tributary Segment B. For example, whole body samples of redfin pickerel were collected from each of the sampling locations. As shown in Figure 9, these concentrations show a very strong decreasing trend, and are lowest (frequently non-detect) within Teal Marsh.

# 5. Qualitative Human Exposure Evaluation

## 5.1 Introduction

This section presents a qualitative human exposure evaluation that describes the potential for human exposure to site-related constituents at the Alcan facility. The human exposure evaluation has been prepared in accordance with the guidelines contained in the NYSDOH document entitled "Qualitative Human Health Exposure Assessment" (NYSDOH, 2002), and uses information regarding current and foreseeable land use scenarios and available data for the site to evaluate potential exposure. The evaluation describes the environmental setting of the site and identifies constituents of interest. The results of this qualitative human exposure evaluation will be used, in part, to evaluate remedial options for the site.

## 5.2 Environmental Setting

As described in Subsection 1.4 of this report, the Alcan facility is located on a 506-acre parcel in the Town of Scriba, about 4 miles east of the city of Oswego, New York. Three OUs (shown on Figures 3A and 3B) have been identified: 1) OU-1 (North Ponds); 2) OU-2 (Main Landfill); and 3) OU-3 (Onsite portions of Tributary 63). These OUs are described below.

### 5.2.1 OU-1 (North Ponds)

OU-1 consists of a system of ponds and marshes located in the northwest portion of the property. The ponds and marshes currently cover a surface area of approximately 21 acres and are classified as New York State-regulated and Federal-regulated wetlands. Prior to mid-2002, non-contact cooling water from a variety of facility operations was discharged through OU-1. The OU-1 ponds and marshes provided for natural treatment of cooling water effluent via settling, oxidation, and natural cooling, prior to discharge into Lake Ontario through SPDES-permitted Outfall 002. During mid-2002, Alcan eliminated the direct discharge of cooling water and facility storm water to OU-1.

As discussed in Subsection 1.4 of this report, PCBs were incidentally discharged to OU-1 during the late 1960s and early 1970s. Based on results of the FRI and previous investigations, elevated levels of PCBs have been identified in sediment within the OU-1 ponds and marshes. PCBs were also detected in fish, turtle and vegetation samples collected from OU-1. Surface soils samples collected in the vicinity of OU-1 also indicate the presence of low levels of PCBs. A fence was constructed around the perimeter of the OU-1 ponds and marshes during 1998 to prevent access.

### 5.2.2 OU-2 (Main Landfill)

OU-2 consists of a 10-acre landfill that operated from 1963 to 1978. Approximately 80,000 cubic yards of facility wastes, consisting of office trash, wooden pallets, and construction debris were reportedly disposed of in the landfill. In about 1973, small quantities of rags and absorbent material presumed to contain minor amounts of PCBs from a transformer leak were reportedly deposited in OU-2. VOCs and SVOCs have been identified in groundwater samples collected from monitoring wells located in the vicinity of OU-2. Low levels of SVOCs were also observed in surface soil at select locations across OU-2.

### 5.2.3 OU-3 (Onsite Portions of Tributary 63)

Tributary 63 is a small, unnamed, low-gradient, warm-water stream that enters the Alcan property from the south and flows across the southern and western portions of the property prior to flowing into Teal Marsh (shown on Figure 2). OU-3 consists of the portion of Tributary 63 that flows across the southern and western portions of the Alcan property, the South Pond, and the South Marsh. Flow within the portion of the tributary upstream of Alcan's property appears to be seasonally intermittent. Current inputs from the facility to OU-3 include process water discharge from a biological wastewater treatment plant, which began operation in June 2002, non-contact cooling water, groundwater, and stormwater runoff from the southern portion of the manufacturing facility (including roof drains and catch basins). Process water and stormwater are conveyed to the South Pond. Flow from the South Pond overflows into adjacent South Marsh via SPDES Outfall 001, which overflows to Tributary 63 at the south end of the marsh. Historical inputs from Alcan's onsite sewage treatment plant (STP) were discharged directly to Tributary 63 further downstream, however, the discharge was re-routed to the cooling water return line west of the Cold Mill (SPDES internal outfall 03B).

## 5.3 Constituents of Potential Concern

During 1980, the NYSDEC detected PCBs in process water effluent at Outfall 002. Since then, numerous investigations have been conducted in connection with the site. Most recently, analytical data were collected from OU-1, OU-2, and OU-3 as part of this FRI. Previous investigation results are discussed in Section 2 of this report. The FRI investigation activities and results are discussed in Sections 3 and 4, respectively. Chemical constituents that have been detected in environmental media associated with each OU are summarized below.

### 5.3.1 OU-1 (North Ponds)

As part of the FRI and previous investigations, sediment, surface water, biological tissue, and soil samples collected from OU-1 were analyzed for total PCBs. PCBs have been identified in sediment samples collected from each of the OU-1 ponds and marshes at maximum concentrations of 667 ppm in Marsh #1, 72.4 ppm in Marsh #2, 1,275 ppm in Marsh #3, 175 ppm in North Pond #1, and 529 ppm in North Pond #2. Lower levels of PCBs were also detected in fish, turtle, and vegetation samples, and in surface water from OU-1.

Surface soil investigation activities conducted for OU-1 included a Focused Surface Soil Investigation to characterize surface soil in the vicinity of the Cold Mill Landfill and the former lake water intake backwash area. In addition, a Perimeter Surface Soil Investigation was conducted to evaluate surface soil at various locations around the perimeter of the OU-1 ponds and marshes. PCBs were detected in four surface soil samples in the vicinity of the former Cold Mill Landfill at concentrations of 1.1 ppm, 1.7 ppm, 10.2 ppm, and 20.0 ppm. PCBs were detected in one of six surface soil samples in the vicinity of the former intake backwash area at a concentration of 1.9 ppm. PCBs were detected in two of the 13 perimeter surface soil samples at concentrations of 2.26 ppm and 3.21 ppm. These samples exceed the 1.0 ppm NYSDEC-recommended surface soil cleanup objective for PCBs.

### 5.3.2 OU-2 (Main Landfill)

The FRI included a sampling effort to evaluate the thickness of the soil cover across the Main Landfill. Of the 33 soil probing locations, only one measurement was slightly less than the 2 feet described in the 1978 landfill closure requirements. Previous investigation results indicate that low levels of SVOCs were detected in surface soil at select locations across OU-2.

Groundwater within overburden and shallow bedrock in the vicinity of OU-2 has also been characterized by several investigations. Groundwater samples have been analyzed for PCBs, VOCs, SVOCs, and TAL metals. PCBs were not identified at concentrations exceeding the New York State groundwater standard (0.09 ppb). Two VOCs (1,1-dichloroethane and cholorethane) were each detected in one well at concentrations slightly exceeding the 3 ppb New York State groundwater standards. SVOCs [including 1,2-dichlorobenzene, 1,4-dichlorobenzene, and bis(2-ethylhexyl)phthalate] and metals (including iron, magnesium, manganese, and sodium) were also identified in the groundwater samples at concentrations exceeding New York State groundwater standards and/or guidance values. As previously discussed, bis(2-ethylhexyl)phthalate is a common laboratory contaminant that was likely introduced during sample handling or processing.

### 5.3.3 OU-3 (Onsite Portions of Tributary 63)

Sediment, surface water, and biota samples have been collected from OU-3 during the FRI and previous investigation activities. Sediment and surface water samples were collected from four areas: 1) Segment A (upstream of the discharge from the South Pond and South Marsh); 2) Segment B (from the discharge of the South Pond to the historical STP outfall location); 3) Segment C (downstream of the historical STP outfall location to the two culverts under the Cottage Access Road); and 4) Segment D (ponded marsh area located to the northeast of the culverts) (Figure 3B). Sediment and surface water samples were analyzed for total PCBs. Fish (fillet and whole-body samples) were also collected from Segments A, B and C during 2002, as well as from Teal Marsh during 2003. Teal Marsh is a heavily vegetated wetland area that receives flow from Tributary 63.

PCBs were not detected in sediment samples collected from the area upstream of the discharge from the South Pond (Segment A), with the exception of one sample that was collected by Dames & Moore immediately upstream of the discharge. PCB concentrations were highest in the sediment samples from the South Marsh, and the highest concentrations were found in the top one foot of sediment (with a maximum concentration of 158 ppm). The highest PCB sediment concentration reported in Segment B of Tributary 63 (23.46 ppm) was from sample OU3SD08 collected downstream of the discharge from the South Pond. PCB concentrations in sediment samples decrease with distance downstream of sample OU3SD08 to two non-detect samples at the furthest downstream points of Segment C. PCBs were not detected in any of the surface water samples collected from Segments A, B, C, or D of Tributary 63.

Biota samples were collected from Segments A, B, and C of Tributary 63, and from two locations in Teal Marsh (including the central portion of the marsh and the mouth of the marsh, near Lake Ontario). Fish tissue samples included fillet samples (to assess potential human exposure) and whole-body samples (to assess potential ecological exposure). During the fish sampling activities, very few edible size fish were present, which limited the number of fillet samples that were collected. Fillet samples were collected from Segment B (two samples), Segment C (one sample), and near the mouth of Teal Marsh (five samples). PCB concentrations in fillet samples from Segment B were 0.60 ppm (brown bullhead) and 1.1 ppm (brown bullhead), and were less than the laboratory detection limit of 0.11 ppm for Segment C (largemouth bass). PCB concentrations in fillet samples from the mouth of Teal Marsh ranged from non-detect to 0.77 ppm (bluegill).

## 5.4 Potential Exposure Points, Receptors and Route of Exposure

An initial step in evaluating potential human exposure is the identification of complete exposure pathways. According to NYSDOH guidance (NYSDOH 2002), an exposure pathway is complete if the following five elements exist: 1) a contaminant source; 2) contaminant release and transport mechanism; 3) a point of exposure; 4) a route of exposure; and 5) a receptor population. The NYSDEC (2002) guidance indicates that an exposure pathway may be eliminated from further evaluation if any of the five elements did not previously exist, does not currently exist, and will not exist in the future.

The two most likely current and future receptors evaluated as part of the human health risk assessment are onsite workers and trespassers/recreational users. The activities that may be conducted by onsite workers include routine maintenance activities and hypothetical excavation activities associated with future remedial activities. Routine maintenance activities that occur at the Alcan facility (in the vicinity of the OUs) typically includes keeping the roadways clear of fallen limbs and other debris, mowing grassy areas, and annual inspections of the perimeter fencing. Exposure to PCBs as a result of these activities is not likely. For hypothetical excavation activities, these activities would occur in areas that contain PCBs. However, the use of properly trained personnel and appropriate personal protective equipment (PPE) would mitigate this potential exposure. Trespassers/recreational users are considered as a hypothetical receptor group. Alcan does not permit trespassing (e.g., hunting and fishing is not permitted on the property) and there are several constraints which limit their access to the site. Specifically, the Alcan property is posted with placards warning trespassers to keep off of the site, and access for many areas (e.g., OU-1, OU-2) is restricted by the presence of a locked barb-wired perimeter fence. Many areas of the site are also densely vegetated, making access very difficult. In addition, security routinely patrols the roadways around OU-1.

Details regarding the potential for human exposure to chemical constituents associated with each of the OUs are discussed below.

### 5.4.1 OU-1 (North Ponds)

Access to OU-1 is restricted by the presence of a locked barb-wired fence around the perimeter of the ponds and marshes. Given the access control, the receptors most likely to be exposed to PCBs in media of OU-1 are onsite workers.

Potential Direct Contact with Sediment - Onsite maintenance workers do not perform activities that could result in exposure to PCBs in sediment of the OU-1 ponds and marshes. The greatest potential for exposure would be during hypothetical excavation activities associated with future remedial actions where workers could come into direct contact with PCB-containing sediment. However, training and the use of appropriate PPE would mitigate this potential exposure.

Potential Direct Contact with Surface Water - PCBs have been detected at low concentrations (less than 1.0 ppb) in large volume surface water samples collected from OU-1 in 1996. Since onsite maintenance workers do not perform activities that could result in exposure to surface water, exposure via surface water is not considered a complete exposure pathway for these receptors. The greatest potential for exposure would be during hypothetical excavation activities associated with future remedial actions where workers could come into direct contact with PCB-containing surface water. However, training and the use of appropriate PPE would mitigate this potential exposure.

Potential Direct Contact with Soil - Onsite maintenance workers may be exposed to PCBs in soil around the ponds and marshes during seasonal activities (e.g., mowing). The most likely exposure pathways are incidental ingestion and dermal contact. Because soils in the few locations with detectable levels of PCBs are covered by vegetation, the potential for human exposure to PCBs in soil at OU-1 is expected to be limited. The greatest potential for exposure via soil would occur during hypothetical excavation activities associated with future remedial actions where workers could come into direct contact with PCB-containing soils. However, training and the use of appropriate PPE would mitigate this potential exposure.

Potential Ingestion of Biota - Previous investigations have documented the presence of PCBs in fish collected from the ponds and marshes of OU-1. However, access is restricted by a barb-wired fence surrounding the ponds and marshes associated with OU-1 and fishing is prohibited on Alcan property. Since there is no point of exposure, exposure via consumption of biota is not considered a complete exposure pathway.

### 5.4.2 OU-2 (Main Landfill)

OU-2 is located northeast of North Pond 1 and is included in the same perimeter fence that surrounds OU-1. Given the access control, the receptors most likely to be exposed to PCBs in media of OU-1 are onsite workers.

Potential Direct Contact with Soil - Low levels of SVOCs were reportedly detected in surface soil across the Main Landfill. Based on the concentrations of SVOC in the soil, a contaminant source does not exist. Therefore, exposure via surface soils is not considered to be a complete exposure pathway.

Potential Direct Contact with Groundwater - Low levels of VOCs, SVOCs, PCBs, and metals were detected in groundwater monitoring wells in the vicinity of OU-2. However, because groundwater at the site is not used as a potable source, there is no potential for exposure via groundwater ingestion. The depth to groundwater in the vicinity of OU-2 is greater than ten feet, and direct contact with groundwater is also unlikely.

### 5.4.3 OU-3 (Onsite Portions of Tributary 63)

OU-3 consists of the South Pond, the South Marsh, and onsite portions of Tributary 63 located outside the perimeter fencing (Figure 3B). Human receptors most likely to be exposed to PCBs associated with OU-3 are onsite workers and potential recreational users/trespassers. Non-improved roads and trails are present along Segment C of Tributary 63, and they could potentially be used by recreational users/trespassers. However, most of Tributary 63 is heavily vegetated and generally inaccessible to humans.

Potential Direct Contact with Sediment - PCBs were not detected in sediment from some areas of OU-3 (i.e., most of Segment A and all of Segment D), and therefore these areas are not of concern. An unlikely potential exists for exposure to constituents in media from other areas of OU-3 (e.g., South Marsh and the upstream portions of Segment B, where the highest sediment PCB concentrations are located). Although both of these areas are accessible, onsite maintenance workers do not perform activities in these areas, and exposure to PCBs in sediment is unlikely. The greatest potential for exposure would be during hypothetical excavation activities associated with future remedial actions where workers could come into direct contact with PCB-containing sediment. However, training and the use of appropriate PPE would mitigate this potential exposure. Because access to this area of the site is not restricted by perimeter fencing, an unlikely potential exists for trespasser exposure to PCBs in sediment.

Potential Direct Contact with Surface Water - PCBs were not detected in surface water samples collected from OU-3. Since PCBs were not detected in surface water samples, a contaminant source does not exist, and exposure via surface water is not considered a complete exposure pathway.

Potential Ingestion of Biota - Several fish species are present in OU-3, however, few of the fish are of edible size. As previously indicated, fillets of edible size fish were only collected from Segments B and C of Tributary 63 and from the mouth of Teal Marsh. Most of OU-3 and Teal Marsh are surrounded with dense vegetation, and are generally inaccessible to anglers. While Segment B is more accessible than the other areas of OU-3, fishing is prohibited in this area. Although angler access is possible at the mouth of Teal Marsh (near Lake Ontario), fish fillet PCB concentrations in this area were low (less than 1 ppm).

## 5.5 Summary

Data collected during the FRI and previous investigations indicate that PCBs are present in soil, sediment, surface water, and biological tissue samples from OU-1, and sediment and fish from OU-3. Some VOCs, SVOCs, metals, and PCBs were also detected in groundwater and soil in the vicinity of OU-2. The unlikely potential for human exposure to site-related constituents in these areas is limited to workers who conduct remedial activities in these areas. Potential (and more limited) exposure may also occur for other receptors, including maintenance workers and recreational users/trespassers that may access OU-3.

The greatest potential for exposure would be during hypothetical excavation activities associated with future remedial actions where workers could come into direct contact with PCB-containing sediment. However, training and the use of appropriate PPE would mitigate this potential exposure.

# 6. Fish and Wildlife Impact Analysis

## 6.1 Introduction

This section presents the FWIA for the three OUs associated with the Alcan Site [specifically OU-1 (North Ponds), OU-2 (Main Landfill), and OU-3 (onsite portions of Tributary 63)]. The FWIA was performed in accordance with the NYSDEC guidance document entitled "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites" (NYSDEC, 1994). The FWIA procedures defined in the guidance follow a step-wise process. The steps included in this assessment are as follows:

Step I - Site Description
- Step IA - Site description and maps
- Step IB - Description of fish and wildlife resources
- Step IC - Description of fish and wildlife resource values
- Step ID - Identification of regulatory criteria applicable to fish and wildlife

Step II - Contaminant-Specific Impact Assessment
- Step IIA - Pathway analysis
- Step IIB - Criteria-specific analysis
- Step IIC – Toxic effect analysis

In accordance with the NYSDEC guidance, the initial steps (Steps IA through ID) of the FWIA are used to characterize the site and provide a description of fish and wildlife resources. The next steps (Step IIA through IIB) utilize the information from Step I to generate an exposure pathway evaluation (Step IIA), and evaluate potential impacts to fish and wildlife (Step IIB) through a comparison of concentrations of chemical constituents in environmental media with ecological risk-based criteria and standards. Finally, Step IIC further evaluates the potential for toxic effects through the use of food chain modeling and the calculation of environmental hazard quotients (HQs).

A description of the OUs that are the subject of this FWIA is presented below, followed by a discussion of Steps IA through IIC of the FWIA process.

## 6.2 Step IA - Site Description

The Alcan site is located on an approximately 506-acre parcel in the Town of Scriba, Oswego County, New York. The three operable units that are the focus of this investigation are OU-1 (North Ponds), OU-2 (Main Landfill), and OU-3 (onsite portions of Tributary 63).

OU-1 consists of a system of ponds and marshes located on the northwest portion of the property. As shown on Figure 3A, the system consists of two ponds and three marshes that cover an area of approximately 21 acres. Portions of the ponds and marshes within OU-1 are currently classified as New York State-regulated and Federal-regulated wetlands [NYSDEC, 1986; United States Department of Interior (USDOI), 1981)]. Prior to mid-2002, non-contact cooling water from a variety of facility operations was discharged to OU-1. In mid-2002, Alcan eliminated the direct discharge of cooling water and facility storm water to OU-1. As discussed in Subsection 1.4 of this report, PCBs were incidentally discharged to OU-1 in the late 1960s and early 1970s. PCBs have been detected in sediment, surface water, biological tissue (i.e., fish, turtle, and plants), and soils samples from OU-1.

OU-2 consists of a 10-acre landfill located southwest of OU-1 (as shown on Figure 3A). The landfill was operated from 1963 to 1978, and approximately 80,000 cubic yards of facility wastes, including office trash, wooden pallets, and construction debris were reportedly disposed of in OU-2. In about 1973, small quantities of rags and absorbent materials containing minor amounts of PCBs from a transformer leak were reportedly disposed of in OU-2. Low-level VOCs and SVOCs have been detected in groundwater at certain locations in the vicinity of OU-2. Low-level SVOCs were also present in some surface soil locations in OU-2.

OU-3 consists of the onsite portions of Tributary 63, the South Pond, and the South Marsh. Tributary 63 is a small, low-gradient, warm-water stream that enters the Alcan property from the south and flows across the southern and western portions of the property, prior to flowing into Teal Marsh. PCBs have been detected within portions of OU-3, specifically in sediment and fish tissue samples.

### 6.2.1 Covertype Mapping

Covertype mapping for the site and surrounding area was performed by identifying the dominant vegetative species assemblages and classifying similar areas into ecological communities as defined by Edinger et al. (2002). Topographic and wetland maps were reviewed to identify the general physical and ecological features of the site and surrounding areas. In addition, a site survey was performed by BBL biologists to identify vegetative covertypes and fish and wildlife species associated with the site. The site survey also assisted in the evaluation of wildlife habitat value of the covertypes, and included an evaluation of the presence of stressed vegetation.

Active manufacturing areas associated with the facility are classified as an industrial covertype. Areas of the parcel surrounding the manufacturing areas (including the three operable units) are classified as industrial, paved road/path, unpaved road/path, railroad, maintained roadside/pathway, mowed lawn, successional old field, successional northern hardwoods, wetlands, industrial cooling ponds, midreach stream, and Great Lakes exposed shoal. A covertype map for the site is presented as Figure 8, and a summary of the vegetative species present in each covertype is presented in Table 15. Each of these identified covertypes is described as follows:

- Industrial - The industrial covertype generally consists of industrial buildings, roads, and parking lots with up to 50% vegetative cover. The industrial covertype area for the site includes active manufacturing areas and some of the outlying areas associated with the facility (e.g., the Lake Water Pumphouse and the Sewage Treatment Plant).

- Paved Road/Path – The paved road/path covertype describes roads or pathways that are paved with asphalt, concrete, or brick (Edinger et al., 2002). Paved roads exist at the entrance of the facility, and north of the facility towards Lake Ontario.

- Unpaved Road/Path – The unpaved road/path covertype is used to describe sparsely vegetated roads or pathways of gravel or baresoil that are maintained by regular trampling or scraping of the road surface (Edinger et al., 2002). At the site, this covertype exists in the form of unpaved roads within the northern portion of the facility.

- Railroad – The railroad covertype is described as a permanent road having a line of steel rails fixed to wood ties and laid on a gravel roadbed (Edinger et al., 2002). The railroad covertype exists in the CSX Transportation Services (CSXT) rail lines that transverse the site and enter the facility.

- Maintained Roadside/Pathway - The maintained roadside/pathway covertype is characterized as a narrow strip of mowed vegetation along a road (Edinger et al., 2002). This covertype exists along most of the roadways around the facility.

- Mowed Lawn - The mowed lawn covertype generally consists of residential, recreational, or commercial land in which the groundcover is dominated by clipped grasses and there is less than 30% cover of trees

(Edinger et al., 2002). Ornamental and/or native shrubs may be present, usually with less than 50% cover, and the groundcover is maintained by mowing (Edinger et al., 2002). This covertype includes the areas near the entrance of the facility, and areas along the fenceline.

- Successional Old Field - The successional old field covertype generally consists of a meadow dominated by forbs and grasses that occur on sites that have been cleared or plowed and then abandoned (Edinger et al., 2002). Areas of successional old field include the areas north of the facility in the vicinity of OU-2, and the mowed field west of OU-1.

- Successional Northern Hardwoods - The successional northern hardwoods covertype is used to describe a hardwood or mixed forest that has been cleared or otherwise disturbed (Edinger et al., 2002). The successional northern hardwoods covertype includes most of the wooded areas surrounding the facility, including the wooded portions adjacent to OU-1, OU-2, and OU-3.

- Wetlands – Several wetlands occur in the vicinity of the Alcan facility, and include the palustrine forested areas adjacent to Tributary 63, and the emergent marshes and scrub/shrub swamps associated with the North Ponds and Teal Marsh. Additional information on the wetland areas in the vicinity of the OUs is presented in Subsection 5.2.2 – Fish and Wildlife Resources.

- Industrial Cooling Pond – The industrial cooling pond covertype is defined as the aquatic community of an artificial pond constructed as a holding pond to allow for cooling of high temperature industrial effluents (Edinger et al., 2002). The OU-1 ponds (including North Pond #1 and North Pond #2) and the South Pond in OU-3 are representative of industrial cooling ponds.

- Midreach Stream - The midreach stream covertype is defined as streambeds with a well-defined pattern of alternating pool, riffle, and run sections (Edinger et al., 2002). The midreach stream covertype for the Alcan facility is associated with Tributary 63 (OU-3).

- Great Lakes Exposed Shoal – The Great Lakes exposed shoal covertype describes the aquatic community of the shallow littoral zone of the Great Lakes that occurs along windswept shores that are exposed to wave action (Edinger et al., 2002). This covertype includes the shoreline of Lake Ontario, located to the north and northwest of OU-1.

### 6.2.2 Step IB – Description of Fish and Wildlife Resources

The abundance and diversity of wildlife inhabiting or using an area is influenced by many factors, including the geographic location, presence of physical habitat, and the amount of human disturbance. Given these considerations, there are several factors that contribute to a relatively well established fish and wildlife community in the vicinity of the site. Specifically, the areas surrounding the facility include various natural covertypes of upland forest, wetland, and open water ecological communities. Many of these areas receive only infrequent human disturbance, and likely provide food and cover for a variety of species. In addition, the proximity of the site to Lake Ontario indicates that migratory species that follow the lake shore may frequent the site during certain times of year.

A summary of the wildlife species that may potentially inhabit each of the covertypes associated with the site is listed in Table 16. Wildlife species that are likely to occur include various species of mammals, birds, and reptiles and amphibians. The upland forested and open fields are suitable for mammals, including larger animals such as whitetail deer and coyote, medium-size species such as red fox, raccoon, and skunk, and smaller mammals including mice, shrews, and voles. The wetland areas provide suitable habitat for semi-aquatic mammals such as muskrat and beaver. Bird species include various passerine birds and song birds, and hawks and owls. Species of wading birds are expected to occur within the aquatic habitat of the wetlands and Tributary 63. Reptiles and amphibians, including various species of salamanders, frogs, turtles, and snakes are likely to occur across the site, especially in association with the wetland areas. Fish species that have been identified in OU-3 (Tributary 63) (during the 2003/2004 biota sampling) include redfin pickerel, brown bullhead, and sunfish. Fish species that live in the North Ponds are primarily carp and goldfish, with some sunfish.

No threatened or endangered species were observed during site visits that were conducted by BBL in 2002/2003. Reviews of the New York State Natural Heritage Program files and U.S. Fish and Wildlife Service (USFWS) records were requested to assist in the evaluation of sensitive species or habitats in the vicinity of the site. According to the USFWS (2003), except for occasional transient individuals, no Federally-listed or proposed endangered or threatened species are known to exist in the site. In addition, no habitat in the site is currently designated or proposed "critical habitat" in accordance with provisions of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) (USFWS, 2003). There are records of two threatened bird species, the least bittern and the pied billed grebe, occurring in Teal Marsh (NYSDEC, 2003).

The presence of regulated wetlands in the vicinity of the site was evaluated by review of New York State Freshwater Wetlands Maps and Federal National Wetland Inventory (NWI) Maps. The New York State Freshwater Wetlands Map (NYSDEC, 1986) identifies two wetland series (OE-58 and OE-27) in the vicinity of the site (Figure 9). Portions of the north ponds and marshes are designated NYS Wetland OE-58. Wetland OE-27 includes the area along Tributary 63 (OU-3) and the adjacent Teal Marsh. Much of these areas are also identified on the Federal NWI Map (USDOI, 1981) (Figure 10). The wetlands depicted on the NWI Map are characterized as a combination of palustrine forested, scrub/shrub, and open water habitats.

The NYSDEC (1994) FWIA guidance requires the reporting of any observations of stress potentially associated with the site. During site visits in 2003/2004, there were no observations of stressed vegetation or evidence of negative impacts on wildlife that could be associated with the presence of chemical constituents in environmental media associated with the OUs. Although dead trees occur within the wetland areas, the occurrence of standing dead timber is common in wetland areas, and is predominantly due to the saturated soil conditions. Also, during the early spring, dead fish (mostly carp and goldfish) have been observed in areas of the North Ponds following ice-out. The presence of dead fish is associated with winter kill and is not attributable to any site-related chemical constituent. Winter kill is relatively common in shallow ponds in temperate latitudes, and occurs when heavy snow cover reduces the light penetration into a lake (Wetzel, 1975). The resulting darkness suppresses photosynthesis by algae, and the consumption of dissolved oxygen by catabolic processes leads to severe reductions in dissolved oxygen, killing the fish (Wetzel, 1975; Lagler et al., 1977).

### 6.2.3 Step IC - Description of Fish and Wildlife Resource Values

Step IC of the FWIA consists of an assessment of the general ability of the site to support fish and wildlife resources and an assessment of the value of fish and wildlife resources to humans. The value of the habitat (to both fauna and humans) is based on field observations, research, and professional judgment.

#### 6.2.3.1 Value of Habitat to Associated Fauna

The value of a habitat to fauna is associated with the ability of an area to support fish and wildlife. Specifically, the ability to support different species depends on the degree to which the habitat meets certain species requirements such as food, cover, bedding areas, and breeding and roosting sites (NYSDEC, 1994). As described previously, areas surrounding the Alcan facility have several types of habitat, including upland forested areas, fields, and open water ecological communities. There are also New York State-regulated and Federal-regulated wetlands located both onsite and immediately adjacent to the site. Collectively, these habitats are relatively valuable to local fish and wildlife species for several reasons. First, the site has a diversity of natural habitat, and some of these areas are relatively free of daily human disturbance. This diversity of natural and undisturbed habitat supports a variety of fish and wildlife species. Also, the proximity of the site to Lake Ontario makes the area potentially valuable for migratory species that follow along the lake. The presence of the wetland communities in the vicinity of the site also provides additional value as a habitat resource for fauna.

#### 6.2.3.2 Value of Resources to Humans

The human value of a resource depends on the potential human use of fish and wildlife resources through activities such as hunting, fishing, wildlife observation, scientific research, and other recreational or economic activities (NYSDEC, 1994). The natural areas surrounding the Alcan facility support various species of fish and wildlife. However, restricted access to the site significantly limits the potential human use of the resources (i.e., hunting and fishing is not allowed on Alcan property).

Surface waters in the vicinity of the site include OU-1 (the North Ponds), OU-3 (Tributary 63), and Lake Ontario. The North Ponds were designed for the treatment of cooling water, and provide no resource value to humans. Tributary 63 is classified by New York State as Class C surface water (NYCRR Title 6, Chapter X, Part 847.5). The best usage of Class C water is fishing, and according to New York State (6 NYCRR Part 701) these waters shall be suitable for fish propagation and survival, and the water quality shall be suitable for primary and secondary contact recreation, although other factors may influence their use for these purposes. The relatively small size and inaccessibility of Tributary 63 limits the value of the resource to humans. In addition, during the electrofishing work that was conducted in Tributary 63 in 2002/2003, very few edible-size fish were observed in the stream.

### 6.2.4 Step ID - Applicable Fish and Wildlife Regulatory Criteria

Step ID of the FWIA is the identification of constituent-specific and site-specific criteria that are potentially applicable to fish and wildlife resources (NYSDEC, 1994). The New York State laws, rules, regulations and criteria that have been identified for this FWIA are as follows:

- Environmental Conservation Law - Chapter 43-B of the Consolidated Laws
  - Article 11, Fish and Wildlife: Statute 11-0503, Polluting Streams Prohibited and Statute 11-0535, Endangered and Threatened Species
  - Article 15, Water Resources: Title 5, Protection of Water
  - Article 24, Freshwater Wetlands

- New York Codes, Rules and Regulations (6 NYCRR)
  - Part 608, Use and Protection of Waters
  - Part 663, Freshwater Wetlands Permit Requirements
  - Part 664, Freshwater Wetlands Maps and Classification
  - Part 701, Classifications of Surface Waters and Groundwaters
  - Part 702, Derivation and Use of Standards and Guidance Values
  - Part 703, Surface Water and Groundwater Quality Standards and Groundwater Effluent Standards
  - Part 800 ff., Classes and Standards of Quality and Purity Assigned to Fresh Surface and Tidal Salt Waters

- Criteria and Guidelines
  - NYSDEC, Division of Fish and Wildlife. Technical Guidance for Screening Contaminated Sediment. January 1999.

- NYSDEC. Division of Water Technical and Operational Guidance Series 1.1.1., Ambient Water Quality Standards and Guidance Values. June 1998.

## 6.3 Step II – Contaminant-Specific Impact Assessment

Step II of the FWIA is the contaminant-specific impact assessment. The objective of Step II is to determine the potential impacts of site-related constituents on fish and wildlife resources (NYSDEC, 1994). The contaminant-specific impact assessment is based on information presented in Step I of the FWIA, and information on the presence and distribution of chemical constituents in environmental media as identified by the RFI and previous investigations. Consistent with the NYSDEC (FWIA) guidance, the development of the contaminant-specific impact assessment follows a step-wise process. The three steps are Step IIA (Pathway Analysis), Step IIB (Criteria-Specific Analysis), and Step IIC (Analysis of Toxic Effects). The results of the FRI and previous investigations indicate that PCBs are the primary constituent of concern at the Alcan site, and are, therefore, the only chemical constituents evaluated in this FWIA.

### 6.3.1 Step IIA - Pathway Analysis

The identification of exposure pathways involves consideration of chemical source and release mechanism, fate and transport processes, exposure media, receptors, and receptor activities that would lead to exposure. For an exposure pathway to be complete, a contaminant must be able to travel from the source to ecological receptors and be taken up by the receptors via one or more exposure routes (USEPA, 1997). Possible exposure routes for ecological receptors may include direct ingestion of soil, sediment and surface water, dermal contact, or ingestion through the food chain. However, consistent with USEPA (1997) guidelines, of the basic exposure routes listed above, more information is available to quantify exposure levels for ingestion by terrestrial animals and for direct contact with water or sediments by aquatic organisms. Accordingly, these are the exposure routes that are the primary focus of this FWIA.

At the Alcan facility, PCBs have been detected in soil, sediment, fish tissue, and in other biota samples collected from OU-1 and in sediment and fish tissue samples collected from OU-3. Low concentrations of PCBs were also detected in large-volume surface water samples collected from OU-1 in a previous investigation (at concentrations up to 0.393 ppb). Therefore, these are the primary exposure media for ecological receptors. Although small quantities of rags and absorbent materials containing minor amounts of PCBs from a transformer leak were reportedly disposed of in OU-2 in 1973, there are no complete exposure pathways because most of this area has been covered with 2 feet or more of clean soil, which creates an effective barrier against possible ecological exposure.

In OU-1, terrestrial receptors (e.g., soil invertebrates) may be exposed to PCBs through direct contact and ingestion of soil. For larger terrestrial receptors (e.g., birds and mammals), exposure to PCBs may occur through direct ingestion of PCBs in soil, or the ingestion of PCBs through the food chain. For aquatic receptors (e.g., benthic invertebrates, fish, reptiles/amphibians), exposure could occur through direct contact with PCBs in sediments (in OU-1 and OU-3) and surface water (in OU-1), although exposure could also occur through the aquatic food chain. Exposure through the aquatic food chain could also extend to upper trophic level receptors. For example, fish and benthic macroinvertebrates could be directly exposed to PCBs in sediment and surface water, and the accumulation of PCBs in these organisms could provide a mechanism for exposure to higher trophic level receptors (such as herons or raccoons) that feed on the fish.

### 6.3.2 Step IIB - Criteria-Specific Analysis

The criteria-specific analysis (Step IIB of the FWIA) provides an initial evaluation of potential risks through the use of numerical criteria that have been established for specific media (NYSDEC, 1994). Comparing site-specific chemical constituent levels with numerical criteria provides an assessment of potential impact. If constituent levels in a medium (soil, water, sediment) fall below criteria, it is assumed the constituent poses minimal threat to the resource, and additional analysis is unnecessary (NYSDEC, 1994). If numerical criteria are exceeded, an analysis of toxic effects is required (NYSDEC, 1994).

The criteria-specific analysis for the Alcan site compares PCB concentrations detected in environmental media to ecologically-based screening values. The criteria-specific analysis is considered to be a conservative assessment because it relies on nonsite-specific screening criteria. These screening criteria are generally based on conservative assumptions, and exceedance of the criteria does not necessarily indicate that adverse ecological effects are occurring. Instead, if the criteria are exceeded, then a more detailed analysis (in the form of a Step IIC toxic effects analysis) is required.

For the purposes of the criteria-specific analysis, concentrations of PCBs in sediment are compared with NYSDEC-sediment screening criteria (NYSDEC, 1999). The NYSDEC sediment screening criteria for non-polar organic compounds (including PCBs) were developed based on water quality standards, guidance values, and criteria. For organic compounds, there are three ecological risk-based levels of protection for sediment in New York State: protection of aquatic life from acute toxicity; protection of aquatic life from chronic toxicity; and protection of wildlife from toxic effects of bioaccumulation. Comparison of the sediment PCB concentrations to the criteria was previously presented in Tables 4 and 11. PCB concentrations in sediment exceed the NYSDEC criteria in OU-1, as well as portions of OU-3.

For surface water, the NYSDEC (1998) has developed a PCB standard of 0.00012 ppb for wildlife protection, which is lower than the laboratory practical quantitation limit for PCBs. Large volume surface water samples collected from the North Ponds contained PCBs at concentrations exceeding the water quality standard for wildlife protection. PCBs were not detected in any of the surface water samples collected from OU-3 at a detection limit of 0.025 ppb.

For soil, the NYSDEC does not have ecological risk-based criteria. Although TAGM 4046 includes a PCB surface soil cleanup level of 1.0 ppm, this value is not based on potential ecological risks. Therefore, as a default, soil values developed elsewhere are used. For example, a soil PCB screening benchmark for plants (40 ppm) was developed for Oak Ridge National Laboratory (Efroymson et al., 1997). As part of the FRI, a total of 25 soil samples were collected from OU-1 (including the area around the Cold Mill Landfill). A summary of the soil data for the Alcan site was previously presented in Section 4. PCBs were detected in the surface soil samples at concentrations up to 20 ppm (estimated). Detected PCB concentrations do not exceed the 40 ppm soil screening benchmark for plants from Efroymson, et al. (1997).

To summarize the results of Step IIB, PCBs have been detected in sediment (OU-1 and OU-3), soil (OU-1), and fish tissue samples (OU-1 and OU-3) collected from the site. PCB concentrations in some of these samples exceed generic criteria and similar ecological benchmarks. However, the exceedance of these values does not indicate the occurrence of ongoing ecological effects and simply means that the FWIA process should continue with more detailed evaluation of potential ecological risks.

### 6.3.3 Step IIC – Toxic Effect Analysis

Step IIC of the FWIA process is a toxic effect analysis (NYSDEC, 1994). The toxic effect analysis provides a more detailed and site specific evaluation of potential risks to wildlife, and uses toxicity information from the scientific literature and other types of data to evaluate possible impacts that may affect individual organisms, populations, communities, or ecosystems (NYSDEC, 1994). The toxic effect analysis presented in this FWIA follows the NYSDEC (1994) guidance document, but also utilizes concepts and guidelines developed by the USEPA for ecological risk assessment (e.g., USEPA, 1997; 1998). The USEPA ecological risk assessment process involves identifying complete exposure pathways and estimating exposure and potential effects to ecological receptors (USEPA, 1997). In this manner, the USEPA ecological risk assessment process is consistent with the intent of the NYSDEC (1994) FWIA guidance, and the structured framework of the USEPA approach is useful for completing the Step IIC toxic effect analysis.

Step IIC of the FWIA is presented in the following subsections: 1) Problem Formulation, 2) Exposure Analysis, 3) Ecological Effects Assessment, and 4) Risk Characterization.

#### 6.3.3.1 Problem Formulation

Problem formulation refers to the process of generating hypotheses about exposure pathways and potential effects of exposures, and develops a plan to evaluate the status and significance of exposure pathways (USEPA, 1997). The steps of the problem formulation are: 1) development of a conceptual site model; 2) selection of assessment endpoints; and 3) selection of measurement endpoints. These steps are described below.

Conceptual Site Model

The conceptual site model integrates information regarding the nature and extent of contamination and the habitat and wildlife characteristics of a site (USEPA, 1997). This information is used to identify potential exposure pathways.

As described in previous sections, PCBs have been detected in the recent sediment, soil, and fish tissue samples. PCBs are highly lipophilic, and they tend to bind strongly with organic matter in the sediment/soil (Giesy and Kannan, 1998). This binding of PCBs is expected to be strongest in areas with a high organic content (such as OU-1 and areas of OU-3).

According to USEPA (1997), the primary ecological concern associated with PCBs in ecosystems is not direct exposure and acute toxicity, but rather bioaccumulation in food chains that may diminish reproductive success in some species. The forested and wetland areas surrounding the Alcan facility still retain much of their natural character, and these areas support a variety of aquatic and terrestrial species that may be exposed via bioaccumulation of PCBs in the food chain. For example, in the terrestrial environment, earthworms living in the soil can ingest and bioaccumulate PCBs. The earthworms can in turn be consumed by small mammals, and these small mammals can be consumed by upper trophic level predators (e.g., red-tailed hawk). Similarly, in the aquatic environment, organisms such as fish may bioaccumulate PCBs, and predators that feed on fish may be exposed to PCBs through the food chain.

PCB bioaccumulation in the food chain is a potentially complete exposure pathway for OU-1 and portions of OU-3. Within OU-1 and OU-3, PCBs have been detected in sediment and biota, and have also been detected in soil in OU-1. Food chain exposure is not a complete exposure pathway for OU-2, because the entire surface of the landfill has been covered with a soil cap, which creates an effective barrier against possible ecological exposure and uptake into the food chain.

Assessment Endpoints

Assessment endpoints are used in the problem formulation to help focus the ecological risk assessment design and analysis (USEPA, 1997). Assessment endpoints are defined by USEPA (1997) as explicit expressions of the actual environmental value (e.g., ecological resources) that are to be protected. They are based on the exposure pathways and receptors identified in the conceptual site model, and are used to define the ecological parameters that will be evaluated to assess risk at the site. The assessment endpoints for the FWIA for the Alcan site have been selected based on the potential exposure pathways identified previously in the conceptual site model, and are defined as follows:

- Survival and maintenance of normally reproducing populations of small mammals that feed in terrestrial (upland) areas, specifically in the vicinity of the terrestrial portions of OU-1;
- Survival and maintenance of normally reproducing populations of predatory birds that feed on small mammals in terrestrial areas, specifically in the vicinity of the terrestrial portions of OU-1;
- Survival and maintenance of normally reproducing populations of piscivorous birds that feed in aquatic areas surrounding the site, specifically in the vicinity of OU-1 and OU-3; and
- Survival and maintenance of normally reproducing populations of piscivorous mammals that feed in areas surrounding the site, specifically in the vicinity of OU-1 and OU-3.

These assessment endpoints will be evaluated further in the following sections.

<u>Measurement Endpoints</u>

Measurement endpoints are defined by USEPA (1997) as measurable biological responses to a stressor that can be related to the assessment endpoint. The measurement endpoints for the Alcan FWIA are based on the assessment endpoints described above, and are chosen to represent the ecological categories described above. It is important to note that a detailed survey of species present on-site was not performed as part of this investigation. Instead, the possible receptors represent species that may be associated with the prevalent covertypes, have the maximum potential for exposure, and/or are known to be sensitive to the effects of PCBs. These species may occur in these areas, although their presence has not been confirmed. Considering this information, the measurement endpoints are:

- The calculation of dietary exposure of shorttail shrews to PCBs through the ingestion of earthworms, and the comparison of the estimated average daily dose to PCB toxicity reference values (TRVs) for reproductive effects;
- The calculation of dietary exposure of red-tailed hawks to PCBs through the ingestion of small mammals, and the comparison of the estimated average daily dose to PCB TRVs for reproductive effects;
- The calculation of dietary exposure of great blue heron to PCBs through the ingestion of fish, and the comparison of the estimated average daily dose to PCB TRVs for reproductive effects; and
- The calculation of dietary exposure of mink to PCBs through the ingestion of fish, and comparison of the estimated average daily dose to PCB TRVs for reproductive effects.

These measurement endpoints will provide the basis for the Step IIC toxic effect analysis

### 6.3.3.2 Exposure Analysis

The exposure analysis develops exposure profiles and quantifies the magnitude and the spatial and temporal patterns of exposure (USEPA, 1997). As discussed previously, the most significant exposure pathway for wildlife receptors to bioaccumulative constituents (such as PCBs) is typically through food consumption, although incidental ingestion of soil or sediment may also occur. Exposure of wildlife via dermal contact may also occur; however, the magnitude of exposure via this pathway is expected to be insignificant relative to food consumption, and the methods to quantify ecological exposure via these other pathways are not well developed (USEPA, 1997). Therefore, the only exposure pathways quantified for wildlife receptors are food consumption and incidental ingestion of soil/sediment.

#### 6.3.3.3 Identification of Primary Receptor Species

The wildlife receptor species identified previously are shorttail shrew, red-tailed hawk, great blue heron, and mink. Again, it is important to note that a detailed survey of species present on-site was not performed, and instead the receptors represent species that may be associated with the prevalent covertypes, have the maximum potential for exposure, and/or are known to be sensitive to the effects of PCBs. These species may occur in these areas, although their presence has not been confirmed.

PCB exposure of these receptors is partly a function of the behavior and life history of the individual species. Therefore, a description of the biology of the four receptor species is presented below. Information from these descriptions will be used to support the exposure variables utilized in the receptor-specific food chain models.

Shorttail Shrew - The shorttail shrew (*Blarina brevicauda*) ranges throughout the north-central and northeastern United States (USEPA, 1993a). Shrews are found in a variety of habitats, including forests, grasslands, marshes, and other covertypes with abundant vegetative cover. They utilize underground nests and runs generally within the top 10 cm of soil, and average home range size is approximately 0.16 hectare (ha), with ranges from 0.03 to 0.22 ha depending on prey densities (USEPA, 1993a). Shrews feed on insects, earthworms, snails, and other invertebrates, although their diet may also consist of mice, voles, frogs, and other vertebrates (USEPA, 1993a). Shrews have a high metabolic rate and can eat an amount of food approximately equivalent to their body weight daily (USEPA, 1993a). Shrews may serve as prey for raptors, fox, weasels, and other carnivorous mammals. Winter mortality for this species has been estimated to range from 70 to 90% (USEPA, 1993a). Due to its relatively high ingestion rate and relatively small home range, shorttail shrews have been recommended as a sentinel species for evaluating contaminant exposure (Talmage and Walton, 1991).

Red-Tailed Hawk - The red-tailed hawk (*Buteo jamaicensis*) is common throughout the United States, and is found in a variety of habitats including woodlands, wetlands, fields, and agricultural lands (USEPA, 1993a). They generally require edge habitat along woodlands with mature trees, which are used for perching and nesting. Prey mostly consists of small mammals, although they will also feed on birds, reptiles, and large insects (USEPA, 1993a). Red-tailed hawks are territorial, and territory size depends on habitat and prey availability, but average territory size is approximately 697 ha for both sexes in the northeast region (USEPA, 1993a). Red-tailed hawks are migratory in their northern range from October through March (USEPA, 1993a), but can be year-round residents in New York State. Life span of this species is generally less than 18 years (USEPA, 1993a).

Great Blue Heron - The great blue heron (*Ardea herodias*) is a wading bird that is found in both freshwater and marine environments from southern Canada to Mexico (USEPA, 1993a). Great blue herons nest in large tracts of floodplain forest and forage in shallow aquatic habitats with emergent vegetation. Nesting colonies are usually within a few kilometers (km) of main feeding areas, but foraging distances can range up to 24 km (USEPA, 1993a). Local population densities vary with the availability of suitable nesting habitat as well as foraging habitat (USEPA, 1993a). The diet of the great blue heron mostly consists of small fish (<25 centimeters in length), although reptiles/amphibians, small mammals, and insects may also serve as prey (USEPA, 1993a). The great blue heron typically feeds within 1.8 km of its nest (USEPA, 1993a), which equates to a feeding range of 1,018 ha. In the northern part of its range, which includes New York, heron migrate from October to February and would, therefore, only be in New York for 7 or 8 months of the year (or 58% to 70% of the year) (USEPA, 1993a).

Mink - Mink (*Mustela vison*) are associated with terrestrial and aquatic habitats, and are found throughout most of North America. Aquatic habitats include rivers, streams, lakes, and wetlands, with preferential use of well-developed riparian zones which provide cover and available den sites (USEPA, 1993a). Foraging primarily takes place along shorelines and within emergent vegetation (USEPA, 1993a). Prey may include fish, small mammals, amphibians, crustaceans, birds, reptiles, and insects. Home ranges for mink include their foraging areas and den sites, and range from 7.8 to 20.4 ha in a riverine habitat, with a mean of approximately 14.1 ha (USEPA, 1993a). Population density depends on available cover and prey abundance, but typically ranges from 0.01 to 0.10 mink per ha (USEPA, 1993a). The average mink life span is 7 years (USEPA, 1993a).

#### 6.3.3.4 Exposure Point Concentrations

As part of the exposure analysis, exposure point concentrations are calculated for soil/sediment and potential food sources. Exposure point concentrations for the heron and mink are calculated from site-specific sediment and fish tissue PCB data. Exposure point concentrations for shorttail shrews and red-tailed hawks are based on the site-specific OU-1 soil data, and dietary concentrations are estimated based on literature-derived models. A summary of the exposure point concentrations is presented in Table 17, and described in the following sections.

PCB Concentrations in Sediment – The exposure point concentrations for PCBs in sediment are based on the FRI data collected by BBL in 2002 and the sediment data collected by Dames & Moore during 1995 and 1996. The specific exposure point concentrations are the arithmetic mean concentrations of the sediment data from the upper depth interval (0 to 6 inches or 0 to 12 inches) in OU-1 and areas of OU-3 (specifically Segments B and C). It is important to note that including the relatively higher PCB concentrations from the South Marsh bias the PCB exposure point concentration for OU-3 sediment. Including these data in the exposure point concentration is conservative because the South Marsh has the highest PCB concentrations in OU-3, yet this area does not contribute a substantial amount of habitat area in relation to the rest of OU-3. Sediment sampling was not required in Teal Marsh, and therefore an exposure point concentration is not available for Teal Marsh. However, sediment PCB concentrations decrease considerably downstream of the South Marsh, to the point where PCBs were not detected in samples collected adjacent to the culverts that convey flow from Tributary 63 beneath the Cottage Access Road to Teal Marsh.

PCB Concentrations in Soil – The exposure point concentrations for PCBs in soil are based on the soil data collected by Dames & Moore in 1995/1996 and the FRI data collected by BBL in 2002. The specific exposure point concentrations are the arithmetic mean concentrations of the soil data from the upper depth interval (0 to 2 inches or 0 to 16 inches), and are calculated for the Cold Mill Landfill area of OU-1 and the perimeter surface soil samples collected along the shores of ponds and marshes in OU-1 (including the intake backwash area). The soil PCB exposure point concentration for Cold Mill Landfill (3.5 ppm) is influenced by the inclusion of two samples which had the highest concentrations of PCBs in this area (20 ppm in sample SS-CMLF2 and 10.2 ppm in sample OU1-SS1). The remaining surface soil samples from this area indicated much lower PCB concentrations (ranging from non-detect to 1.7 ppm).

PCB Concentrations in Fish – The exposure point concentrations for fish are based on the PCB results from the whole body fish tissue samples collected from OU-3 and Teal Marsh by BBL during 2002/2003, and from OU-1 by Dames & Moore during 1995/1996. The exposure point concentrations are the arithmetic means for the combined data for fish samples collected from OU-3 (Segments B and C), the combined data from the OU-1 ponds/marshes, and fish samples from both segments of Teal Marsh.

PCB Concentrations in Earthworms - PCB concentrations in earthworms are estimated using a linear regression model described by Sample, et al. (1998). The model was developed by Oak Ridge National Laboratory, which compiled data from numerous studies regarding earthworm bioaccumulation of constituents in soil. The model developed by Sample, et al. (1998) is as follows:

$$Ln(earthworm) = 1.410 + [(1.36) \times (Ln\ soil)]$$

This model is applied to the mean surface soil PCB concentration for the OU-1 perimeter surface soil samples (0.6 ppm, including the intake backwash area) and the Cold Mill Landfill (3.5 ppm) to estimate earthworm PCB concentrations. The mean earthworm PCB concentration calculated for these areas of the site are 22.5 and 2.0 ppm, respectively. It is important to note that use of this model is conservative, given that validation of the model concluded that the model overestimated known measured PCB earthworm values over 80% of the time (Sample et al., 1998), and as such the model represents a conservative evaluation of this endpoint.

PCB Concentrations in Small Mammals

Several studies are available where PCB bioaccumulation factors (BAFs) were identified for small mammals. McKee (1992) studied the PCB uptake by white-footed mice (*Peromyscus leucopus*) as part of a biological impact and residue evaluation at the Crab Orchard National Wildlife Refuge in southern Illinois. The mean PCB (primarily Aroclor 1254) concentration of 10 mice was 11.2 ppm wet weight and the mean soil PCB concentration was 1,244 ppm, resulting in a BAF of 0.01 (McKee, 1992). Dobos, et al. (1991) studied the uptake of constituents by wildlife from confined disposal facilities in Thunder Bay, Ontario, Canada. Two Boreal redback voles (*Clethrionomys gapperi*), and one meadow vole (*Microtus pennsylvanicus*) were collected and analyzed for total PCBs. The report presented an approximate BAF of 3.0 for voles (Dobos, et al., 1991). Batty et al. (1990) studied the uptake of PCBs by white-footed mice at a hazardous waste site near Ann Arbor, Michigan. Soil PCB concentrations averaged 118 ppm (primarily Aroclors 1242 and 1254), and whole-body mice ranged from 1.03 ppm to 2.5 ppm, resulting in BAFs ranging from 0.01 to 0.02 (Batty et al., 1990). Given this information, a soil to mouse BAF of 0.1 was conservatively selected for this FWIA. The PCB BAF of 0.1 was applied to the mean surface soil PCB concentration for the Cold Mill Landfill (3.5 ppm) and the remaining portions of the OU-1 (0.6 ppm) to estimate small mammal PCB concentrations. The small mammal PCB concentration calculated for these two areas of the site are 0.35 ppm and 0.06 ppm, respectively.

#### 6.3.3.5 Exposure Estimates – Food Ingestion

Wildlife dosage for dietary exposure is estimated using USEPA (1993a) exposure models. These exposure models are based on metabolizable energy of the food items and the nutritional requirements of the target species, and use the following approach.

Step 1. Calculate Metabolizable Energy: First, the gross energy (GE) of the food item and the assimilation efficiency (AE) of the receptor species are used to estimate the metabolizable energy (ME) of a species diet.

$$ME = GE \times AE$$

ME = Metabolizable energy (kcal/g)
GE = Gross energy (kcal/g)
AE = Assimilation Efficiency (unitless)

Step 2. Estimate the Normalized Ingestion Rate: In the next step, the ME is used in conjunction with the organism's free-living metabolic rate to estimate the total normalization ingestion rate ($NIR_{total}$) for the diet.

$$NIR_{total} = NFMR/ME$$

$NIR_{total}$ = Total Normalized Ingestion Rate (g/g-day)
NFMR = Free-Living Metabolic Rate (kcal/g-day)

ME = Metabolic energy (kcal/g) (calculated in Step 1 above)

Step 3. Calculate the Potential Average Daily Dose: In the last step, the potential average daily dose is estimated by multiplying the estimated concentration in the food item (C) and the $NIR_{total}$.

$$Dose = C \times NIR_{total}$$

Dose = Potential average daily dose (mg/kg-day)
C = PCB concentration in the food item (mg/kg wet weight)
$NIR_{total}$ = Normalized ingestion rate of the food item (g/g-day)

#### 6.3.3.6 Exposure Estimates - Soil/Sediment Ingestion

Soil can be ingested both intentionally and incidentally by wildlife, and may represent a significant exposure pathway in some instances. Consequently, ecological exposure via soil ingestion is included in the exposure model. The equation for calculating the wildlife dose from soil/sediment ingestion exposure is as follows:

$$Dose = \frac{(C \times FS \times IR \times FR)}{BW}$$

Dose = Potential average daily dose (mg/kg-day)
C = PCB concentration in soil (mg/kg)
FS = Fraction of soil in diet
IR = Food ingestion rate on a dry-weight basis (g/g-day)
FR = Fraction of soil from source area
BW = Body weight (kg)

#### 6.3.3.7 Exposure Estimates for the Receptor Species

The equations presented above are used to estimate the potential average daily dose of PCBs for the shorttail shrew, red-tailed hawk, great blue heron, and mink. The specific assumptions used in the exposure models are described below.

Shorttail Shrew - The potential average daily dose for the shorttail shrew is estimated for dietary exposure and incidental ingestion of soil, and is based on the exposure assumptions presented in Table 18. The shorttail shrew diet is conservatively assumed to consist of 100% earthworms from the site. A food assimilation efficiency of 87% is based on the small mammals eating insects, and the gross energy of 0.81 kcal/g is based on earthworms (USEPA, 1993a). Incidental soil ingestion for the shorttail shrew is estimated using a body weight of 17.3 g, a food consumption rate of 0.001 kg/day-dry weight based on the allometric equation for small mammals eating insects (USEPA, 1993a), and a soil ingestion rate of 2.4% of its daily food consumption rate, as reported for the meadow vole (USEPA, 1993a).

Red-Tailed Hawk - The potential average daily dose for the red-tailed hawk is estimated for dietary exposure based on the exposure assumptions presented in Table 19. The hawk diet is assumed to consist of 100% small mammals. A food assimilation efficiency of 78% is based on the allometric equation for birds of prey eating mammals, and the gross energy of 1.70 kcal/g is based on mice (USEPA, 1993a). The average home range of the red-tailed hawk is 697 ha (USEPA, 1993a), and it is conservatively assumed that PCB-containing areas of the site (i.e., OU-1) represent 50% of the available foraging habitat for the red-tailed hawk. It is assumed that the hawk does not ingest significant quantities of site soils.

Great Blue Heron - The potential average daily dose for the great blue heron is estimated for dietary exposure and incidental ingestion of sediment based on the exposure assumptions presented in Table 20. The heron diet is conservatively assumed to consist entirely of fish. A food assimilation efficiency of 79% is based on birds eating fish, and the gross energy of 2.0 kcal/g is based on fish (USEPA, 1993a). In the northern part of its range (which includes New York State), heron migrate from October to February and would, therefore, only be in the vicinity of the site for 7 to 8 months of the year (USEPA, 1993a). Therefore, it is assumed that 70% of a heron's total annual food supply is from the site. Exposure from sediment ingestion is estimated using a food consumption rate of 0.401 kg/day-dry weight based on the allometric equation for birds eating fish (USEPA, 1993a), and a sediment ingestion rate of 2% of its daily food consumption rate, as reported for mallards (USEPA, 1993a).

Mink - The potential average daily PCB dose for mink is estimated for dietary exposure and incidental ingestion of sediment based on the exposure assumptions presented in Table 21. The mink diet is conservatively assumed to consist entirely of fish. A food assimilation efficiency of 91% is based on mammals eating fish, and the gross energy of 2.0 kcal/g is based on fish (USEPA, 1993a). The average home range of the mink is approximately 14.1 ha (USEPA, 1993a), and the fraction of food intake by a mink from the combined areas of the site is conservatively assumed to be 100%. Sediment ingestion is estimated using the combined food consumption rate of 0.298 kg/day-dry weight based on the allometric equation for small mammals eating fish, a body weight of 1.35 kg, and a sediment ingestion rate of 0.09% of its daily food consumption rate (USEPA, 1993a).

## 6.4 Ecological Effects Assessment

This section presents a brief discussion of the potential effects of PCBs on wildlife receptors, and discusses the TRV selection for each modeled receptor. The TRVs are then used, in combination with the results from the dose equations, to estimate ecological risks.

The most significant exposure pathway to PCBs for wildlife is uptake through the food chain (USEPA, 1997). Following exposure, PCBs initially concentrate in the liver, blood, and muscle, and ultimately accumulate in adipose tissue (Eisler, 1986). Metabolism of PCBs is a function of the degree of chlorination and the chlorine arrangement (Eisler, 1986). In general, the lesser chlorinated PCBs are more readily metabolized, and are excreted in urine and bile (Eisler, 1986; Borlakoglu and Walker, 1989).

TRVs used to assess the potential effects of PCB exposure for the receptors included in the FWIA include the No Observed Adverse Effects Levels (NOAELs) and the Lowest Observed Adverse Effects Levels (LOAELs). NOAELs and LOAELs are derived from laboratory toxicity test data from scientific literature. NOAELs commonly refer to the highest exposure level that can occur without adverse effect (USEPA, 1989). In laboratory dose-response experiments, the NOAEL is an exposure level at which there is no statistically or biologically significant increase in the frequency or severity of adverse effects in an exposed population relative to an appropriate control population (USEPA, 1998). Some effects may be produced at this level, but they are not considered to be adverse or precursors of specific adverse effects. The LOAEL is the lowest exposure level in dose-response experiments at which there are statistically or biologically significant increases in the frequency or severity of adverse effects in the exposed population relative to an appropriate control group (USEPA, 1998).

It is important to note that both the LOAEL and the NOAEL dose estimates are artifacts of the study design, and do not necessarily reflect the specific point of the dose-response relationship that will predict adverse effects. The NOAEL, by definition, is likely to underestimate the dose that will not cause an adverse effect, and the LOAEL is likely to overestimate the minimum dose that may cause an adverse effect.

In this FWIA, the following criteria are used to select TRVs for wildlife receptor species:

1. Chronic studies including critical lifestages for the actual receptor species in question are given highest preference.

2. Toxicity data for suitably analogous species (i.e., ecologically and/or taxonomically similar species) are considered secondarily.

3. When available, studies were selected that provide both a LOAEL and a NOAEL.

The TRVs for each receptor are presented in dosage units of mg/kg-day. For birds, the TRVs do not need adjustment for interspecies extrapolation or physiological scaling factors (Sample et al., 1996). However, for mammals, the TRV is normalized to the receptor's body weight using the method presented in Sample, et al. (1996):

$$d_a = d_b \ x \left[ \frac{bw_b}{bw_a} \right]^{1/4}$$

Where:

$d_a$ = dose producing a given effect in the target species;
$d_b$ = dose producing a given effect in the test species;
$bw_a$ = body weight of target species; and
$bw_b$ = body weight of test species.

The following sections describe the toxicity endpoints selected for the ecological receptors utilized in the food chain exposure models for the site.

Shorttail Shrew - Toxicity data pertaining to the effects of PCBs on shorttail shrews are not available, and the TRVs for this species are based on a study by Linder et al. (1974) for reproductive effects in rats. Rats were exposed by diet to Aroclor 1254 at five levels (0, 1, 5, 20, and 100 ppm) for up to 274 days through a critical reproductive lifestage (Linder et al., 1974). No adverse effects were observed at a dose level of 5 ppm (or 0.32 mg/kg-day), and this dose is considered a chronic NOAEL. At 20 ppm (or 1.5 mg/kg-day), adverse effects including a reduction in litter size were observed, and this dose is considered a chronic LOAEL. To estimate risks to shrews, the NOAEL and LOAEL TRVs are adjusted from a rat body weight of 425 g (from the study) to a shrew body weight of 17.3 g from USEPA (1993a) using the equation presented above, and yield a LOAEL of 3.34 mg/kg-day and a NOAEL of 0.71 mg/kg-day.

Red-Tailed Hawk - Toxicity data pertaining to the effects of PCBs on red-tailed hawk are not available, and the TRVs are based on a study of Aroclor 1254 by Dahlgren, et al. (1972) on reproductive effects in ring-necked pheasant. Penned pheasants were exposed by gelatin capsules to three doses of Aroclor 1254 (0, 12.5, and 50 mg/week). No adverse effects were observed on egg fertility or chick growth at either dose level, although lower egg hatchability was observed at 12.5 mg/week. As such, this value is considered to be the chronic LOAEL. Assuming a pheasant body weight of 1 kg results in a LOAEL of 1.8 mg/kg-day. Using an approach from USEPA (1997), dividing the LOAEL by an uncertainty factor of 10 yields an estimated NOAEL of 0.18 mg/kg-day.

Great Blue Heron - Toxicity data pertaining to the effects of PCBs on great blue herons are not available, and the TRVs are based on the Dahlgren, et al. (1972) study on reproductive effects on pheasant described above. These TRVs include a LOAEL of 1.8 mg/kg-day and NOAEL of 0.18 mg/kg-day.

Mink – Several studies have been conducted on the effects of PCBs on mink, which have been found to be highly sensitive to PCBs (Platonow and Karstad, 1973; Aulerich and Ringer, 1977; Heaton et al., 1995; Restum et al., 1998; Aulerich et al., 1986; Hornshaw et al., 1983; Bleavins et al., 1980). Of these, the series of experiments by Aulerich and Ringer (1977) is often seen as the most usable study for development of PCB TRVs for mink (USEPA, 1993b). In the first part of the study, mink were exposed to dietary Aroclor 1254 at 0, 1, 5, and 15 ppm over a 4.5-month period. Aroclor 1254 at 5 and 15 ppm in the diet reduced the number of live offspring. In the second part of the study, mink were exposed to dietary Aroclor 1254 at 0, 5, and 10 ppm over a 9-month period. In this experiment, all of the mink fed PCB-supplemented diets failed to produce offspring (Aulerich and Ringer, 1977). In the third part of the study, mink were fed diets of 2 ppm Aroclor 1016, 1221, 1242, or 1254, and monitored over 297 days. Aroclor 1254 was the only PCB mixture that had an adverse effect on reproduction (Aulerich and Ringer, 1977). Based on these three experiments, a dietary concentration of 1 ppm is considered a NOAEL, and 2 ppm is a LOAEL. Applying a food ingestion rate of 137 g/day and a mink body weight of 1 kg (from Sample et al., 1996) yields a NOAEL of 0.137 mg/kg-day and LOAEL of 0.274 mg/kg.

## 6.5 Risk Characterization

The risk characterization evaluates the potential for adverse effects on ecological receptors at the site. The risk characterization section also discusses the uncertainty inherent in the ecological risk assessment process and summarizes the results of the FWIA in relation to the ecological significance of the findings (USEPA, 1992). To determine the potential risk to wildlife receptors, estimated exposure concentrations are compared to the selected TRVs by means of hazard quotients (HQs). HQs are calculated as follows:

$$HQ = \frac{\text{Exposure Dose (mg/kg-day)}}{\text{Toxicity Endpoint (mg/kg-day)}}$$

The HQs in this FWIA are calculated for each receptor using both LOAELs and NOAELs. For purposes of this evaluation, if NOAEL-based and LOAEL-based HQ values are both less than 1, it is considered to be indicative of no adverse effects. However, population-level impacts (which are the typical endpoint for USEPA ecological risk assessments) should not necessarily be assumed to occur at a HQ of 1. Depending on the slope of the dose-response relationship, HQ values of 10 to 20 may be required before population-level effects are observed (Giesy and Kannan, 1998; Bowerman, et al., 1995). Given this information, the following system has been developed to categorize the potential ecological significance of the HQ values in this FWIA:

- No Ecological Risk: NOAEL-based HQ < 1; and LOAEL-based HQ < 1.
- Low Ecological Risk: NOAEL-based HQ > 1 but < 10; and LOAEL HQ < 1.
- Moderate Ecological Risk: NOAEL-based HQ > 10; and LOAEL HQ < 10.
- High Ecological Risk: NOAEL-based HQ > 10; and LOAEL HQ > 10.

The calculated HQs for each modeled receptor are presented and discussed below, and a summary of the HQ values and potential ecological significance of the HQ values is presented in Table 22.

Shorttail Shrew - The results of the food chain exposure model and HQ calculation for the shorttail shrew are presented in Table 18. For the OU-1 perimeter sampling the NOAEL-based HQ is greater than 1 but less than 10, and the LOAEL-based HQ value is less than 1. These values indicate low ecological risk for this receptor species across most of OU-1. For the Cold Mill Landfill, the NOAEL-based HQ is greater than 10 and the LOAEL-based HQ value is between 1 and 10. These values indicate moderate ecological risk to shrews in the vicinity of the Cold Mill Landfill.

Red-Tailed Hawk - The results of the food chain exposure model and HQ calculation for the red-tailed hawk are presented in Table 19. For both the OU-1 perimeter sampling and the Cold Mill Landfill, HQs are less than 1 for the LOAEL-based and NOAEL-based TRVs. The HQ values less than 1 indicate no potential for PCB-related adverse effects on this receptor species.

Great Blue Heron - The results of the food chain exposure model and HQ calculation for the heron are presented in Table 20. For OU-1 and OU-3, the NOAEL-based HQs are between 1 and 10 and the LOAEL-based HQs are less than 1, indicating low ecological risk for this receptor species in OU-1 and OU-3. For Teal Marsh, both the NOAEL-based HQ and the LOAEL-based HQ are less than 1, indicating no potential ecological risk to this receptor species.

Mink - The results of the food chain exposure model and HQ calculation for the mink are presented in Table 21. For OU-1, both the NOAEL-based HQ and the LOAEL-based HQ values are greater than 10 indicating a relatively high ecological risk for this receptor species. For OU-3, both the NOAEL-based HQ and the LOAEL-based HQ are greater than 1 but less than 10, indicating a low ecological risk for this receptor species. For Teal Marsh, HQs are less than 1 for both the LOAEL-based and NOAEL-based TRVs, indicating no potential for PCB-related adverse effects for this receptor species.

### 6.5.1 Description of Uncertainty

There are several areas of uncertainty inherent in the ecological risk assessment process. For this FWIA, the most significant areas of uncertainty are associated with the identification of receptor species, quantification of potential exposure, appropriateness of toxicity reference values, and the interpretation of the HQ values.

Receptor Species

The receptor species used in this risk assessment were selected to represent species that could potentially inhabit the covertypes prevalent in the OUs. Since a detailed site-specific receptor survey was not required as part of the FRI, a conservative approach was utilized to identify potential receptor species that could be affected via the routes of exposure identified at the beginning of this section. For example, while mink have not been observed on the Alcan property, this species was selected as a conservative approach because they are known to be extremely sensitive to PCBs.

Quantification of Potential Exposure

In terms of estimating exposure, there are several factors that could contribute uncertainty, including the estimation of exposure point concentrations and the exposure variables that are included in the dose calculations. During the development of the FWIA, some uncertainty is introduced in the exposure estimates through the use of conservative assumptions. For example, the exposure model for the shorttail shrew assumes a diet of 100% earthworms from the site. However, it is known that shrews also consume insects, plants, fungi, and small mammals (USEPA, 1993a), which are not likely to accumulate PCBs to the same extent as earthworms. Similarly, heron and mink are assumed to consume only fish, while their diets are known to include a wide variety of prey items. Mink are reported to also consume vegetation, birds, mammals, snakes, and crustaceans, and great blue herons also consume crustaceans, birds, and mammals (USEPA, 1993a). These types of food items are expected to have much lower PCB concentrations than fish. For comparison, a mink that has a diet of only 50% fish could reduce estimated PCB intake up to 50%, and significantly decrease risks (for example, risks to mink from eating fish from OU-1 could go from "high" to "moderate").

Another source of uncertainty in estimating exposure is the representativeness of the exposure point concentrations. For soils, the PCB exposure point concentration for the Cold Mill Landfill is 3.5 ppm.

However, this exposure point concentration is heavily influenced by two sample results (with PCB concentrations of 10.2 and 20 ppm);whereas the majority of the soil samples from this area have PCB concentrations less than 1 ppm. Another source of uncertainty is the model used to estimate PCB concentrations in food items (i.e., fish, earthworms, and small mammals). Although data specific to the site are used when available (i.e., for fish), and models from the literature are used in instances where site-specific data are lacking (i.e., for estimating earthworm and small mammal PCB concentrations). In these instances, conservative methods for estimating the food item PCB concentrations are used. For example, the earthworm uptake model used in the FWIA is known to consistently overestimate earthworm PCB concentrations (Sample et al., 1998).

Toxicity Reference Values

The toxicity endpoints used in the FWIA are based on the results from controlled feeding studies. These experiments may exaggerate potential effects because they involve closed populations of laboratory animals (not wildlife species) that are exposed to uniform levels of contamination. The toxicity endpoints used in the evaluation are generally selected based on their relevance to the modeled receptors and the adequacy of the studies to identify ecologically relevant effects. The toxicity endpoints selected for the mink are based on toxicological studies on mink, which is the mammalian species known to be most sensitive to PCBs. However, these endpoints are based solely on the effects of Aroclor 1254. The same study (Aulerich and Ringer, 1977) indicated that only Aroclor 1254 exerted detrimental effect, and similar effects were not observed for other Aroclors. The PCBs in the fish tissue samples collected by BBL were quantified by the laboratory primarily as Aroclors 1248 and 1260.

The toxicity endpoints selected for the shorttail shrew, red-tailed hawk, and great blue heron are chosen from toxicity studies on other species. Use of values that are extrapolated from other similar species can result in overestimates of receptor effects, possibly due to potential differences in the receptor's response. For example, for shrews the TRVs are selected based on a study on rats. However, studies have shown that numerous physiological functions relate to body size (Sample et al., 1986). Smaller animals (such as shrews) have greater metabolic rates, and may be more resistant to toxic chemicals because of their higher rates of detoxification or elimination (Sample et al., 1986).

Another important aspect to consider when evaluating PCB toxicity at the site is the possible effects of dechlorination processes on reducing the toxic potential of PCBs. Specifically, biological alteration may reduce PCB toxicity through dechlorination of highly chlorinated (and more toxic) PCBs to lower chlorinated PCBs (Harkness et al., 1993; Abramowicz, 1990). At the Alcan site, the 1994 study by Pagano (described briefly in Section 2.10) concluded that reductive microbial degradation is responsible for changes in congener-specific and homolog mole percent ratios with increasing core depth in North Pond No. 1. This observation is further supported by testing that was conducted at the NYSDOH's Wadsworth Center, which established that sediments from the North Ponds contain dechlorinating microorganisms.

Interpretation of the HQ Values

The interpretation of the HQ values is an additional source of uncertainty in the ecological risk assessment process. In this FWIA, the interpretation of HQ values into estimates of "risk" is based on a ranking system that categorizes the NOAEL-based and LOAEL-based HQs into areas of no risk, low risk, moderate risk, and high risk. This system is based on the following principles: 1) NOAELs are dose estimates that do not cause detrimental effects; 2) LOAELs are more typically associated with a dose that may cause effects to the individual; and 3) HQ values of 10 to 20 are frequently required before population-level effects are observed.

An additional consideration when interpreting the HQ values (and the resulting risk categories) is that they are based on hypothetical exposure modeling and conservative assumptions regarding exposure and toxicity. As such, these risk estimates may not accurately reflect actual risks associated with the site. For example, based on the HQ values, shorttail shrews are considered to be at "moderate" risk from soil PCB concentrations in the vicinity of the Cold Mill Landfill. This conclusion is based on hypothetical exposure modeling and does not incorporate site-specific studies on shrew populations. Alternately, field experiments that have been conducted for other PCB sites have shown no detectable impact on population demography of shrews and other small mammals at similar PCB levels (Linzey and Grant, 1994; Boonstra and Bowman, 2003).

## 6.6 Summary

The FWIA for the Alcan Site is consistent with the requirements outlined in the NYSDEC guidance document entitled "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites" (NYSDEC, 1994). The FWIA procedures defined in the guidance follow a step-wise process. The initial steps of the FWIA involved characterizing the ecology of the site and the value of the resources. These steps concluded that the site includes a diversity of wildlife habitat (including wetlands, forested areas, and fields), and this habitat provides some value to wildlife. Subsequent steps in the FWIA included a conservative screening-level assessment that compared PCB concentrations detected in on-site media to generic ecological-based benchmarks. PCB concentrations in some media exceeded generic criteria and similar ecological benchmarks. However, the exceedance of these values does not indicate the occurrence of ongoing ecological effects, but means that the FWIA process continues with more detailed evaluation of potential ecological risks.

A more detailed evaluation of potential ecological risks was conducted using hypothetical food web modeling for potential receptor species. The food web modeling and subsequent risk calculations were consistent with ecological risk assessment procedures established by USEPA (1993a; 1997; 1998). The exposure scenarios evaluated in the food web modeling were shorttail shrews eating earthworms (with incidental ingestion of soil), red-tailed hawks eating mice, and mink and great blue heron eating fish (with incidental ingestion of sediment). Although these receptors represent species that may be associated with the prevalent covertypes, have the maximum potential for exposure, and/or are known to be sensitive to the effects of PCBs, their presence at the site has not been confirmed. The results of the food web modeling indicate that the highest ecological risks at the site are associated with mink feeding on fish from OU-1. For other receptor species and/or other areas of the site, predicted risks are lower. For OU-2, the soil cover effectively eliminates the potential for ecological exposure, and hence there are no ecological risks associated with this area. For OU-3, great blue heron and mink may be exposed to low levels of PCBs, primarily through the ingestion of fish. However, the calculated risks for these receptors are considered low.

# 7. Summary and Conclusions

## 7.1 General

This section presents a summary of the results obtained for the FRI and previous investigation activities that have been conducted in connection with the flowing OUs at the Alcan Oswego Work facility:

- OU-1 - onsite constructed treatment ponds and wetlands that are referred to as the North Ponds;
- OU-2 - the Main Landfill; and
- OU-3 – onsite portions of Tributary 63.

The FRI activities were conducted in accordance with the requirements of an exiting Order on Consent between Alcan and the NYSDEC that requires Alcan to characterize and address environment issues that have been identified by the FRI and by previous investigation activities that have been conducted at the site since the 1980s.

OU-1 consists of a system of ponds and marshes located on the northwest portion of the property. Prior to mid-2002, non-contact cooling water from a variety of facility operations was discharged to OU-1. In mid-2002, Alcan eliminated the direct discharge of cooling water and facility storm water to OU-1. PCBs were incidentally discharged to OU-1 in the late 1960s and early 1970s. PCBs have been detected in sediment, surface water, biological tissue (i.e., fish, turtle, and plants), and soils samples from OU-1.

OU-2 consists of a closed 10-acre landfill located southwest of OU-1. The landfill operated from 1963 to 1978, and approximately 80,000 cubic yards of facility wastes, including office trash, wooden pallets, and construction debris were reportedly disposed of in OU-2. In about 1973, small quantities of rags and absorbent materials containing minor amounts of PCBs from a transformer leak were reportedly disposed of in OU-2. Low-level VOCs and SVOCs have been detected in groundwater at certain locations in the vicinity of OU-2. Low-level SVOCs were also identified at surface soil samples collected in OU-2.

OU-3 consists of the onsite portions of Tributary 63, the South Pond, and the South Marsh. Tributary 63 is a small, low-gradient, warm-water stream that enters the Alcan property from the south and flows across the southern and western portions of the property, prior to flowing into Teal Marsh. PCBs have been detected in sediment and fish tissue samples collected from specific areas of OU-3.

The FRI was conducted in two phases. Initial FRI activities were conducted during the late summer and fall of 2002 and consisted of implementing the field investigation activities outlined in the FRI Work Plan (ENSR, June 2002). Based on the results of the initial FRI activities, supplemental sediment sampling and hydrologic monitoring activities were conducted during 2003 to address specific datagaps. In addition, at the request of the NYSDEC, off-site biota samples were collected within Teal Marsh during July 2003.

An overview of the investigation results and relevant conclusions pertaining to each OU are presented below.

## 7.2 OU-1 (North Ponds)

Several investigations have been conducted to characterize environmental conditions and the presence of chemical constituents in environmental media associated with OU-1. Investigation activities that have been conducted for OU-1 include:

- Implementing sediment investigation efforts, including sediment probing to characterize the depth of surface water and sediment thickness for each of the OU-1 ponds and marshes and the collection of surface and subsurface sediment samples from each of the OU-1 ponds and marshes to characterize the distribution of PCBs, as well as to evaluate TOC levels in sediment;

- Conducting a hydrologic evaluation to characterize transient hydrologic conditions in the vicinity of OU-1 resulting from the cessation of the cooling water and stormwater inputs from the Alcan facility in mid-2002;

- Collecting surface water samples at various locations throughout the OU-1 ponds and marshes to evaluate the presence of dissolved and particulate-phase PCBs in surface water;

- Collecting surface soil samples to evaluate the presence of PCBs in surface soil in the vicinity of the Cold Mill Landfill, the former intake backwash area, and at various locations around the perimeter of the OU-1 ponds and marshes; and

- Collecting biota samples (including fish, reptiles, and vegetation) from the OU-1 ponds and marshes.

- Evaluating the congeners present in sediment and biota and the impacts of microbial dechlorination of PCBs.

Conclusions that are supported by the results for the OU-1 investigation activities are presented below.

### 7.2.1 Sediment Investigation

The distribution of PCBs in sediment within the OU-1 ponds and marshes has been extensively characterized based on the results of the FRI and the North Ponds Investigation (Dames & Moore 1997). The sediment investigation activities implemented in connection with OU-1 support the following conclusions:

- Hydrologic characteristics of the OU-1 ponds and marshes have been significantly modified by the cessation of the cooling water and stormwater discharges. Portions of the OU-1 ponds and marshes that were historically submerged have begun to revert to upland conditions. Surface water depth measurements collected during the FRI activities (following cessation of the cooling water and stormwater inputs) ranged from dry at numerous sediment sampling/probing locations to a maximum depth of 38.4 inches in both North Pond #1 and North Pond #2. Sediment thickness in the OU-1 ponds and marshes ranged from 3.6 inches (at an upland location in Marsh #3) to a maximum depth of 8 feet in the central portion of North Pond #2.

- PCBs were detected in surface and subsurface sediment within each of the OU-1 ponds and marshes, with the highest PCB concentration (1,275.30 ppm) detected in surface sediment within Marsh #3 (from the 0 to 0.5 foot depth interval at sample OU1SD23).

- Within the OU-1 marshes, PCB concentrations generally decrease with depth (with the exception of a few specific sampling locations). PCBs concentrations in sediment within the OU-1 ponds increase with depth, with maximum concentrations encountered at depths of 2.5 to 3.0 feet for North Pond #1 and 3.5 to 4.0 feet in North Pond #2.

- NYSDEC sediment screening guidance levels for human health bioaccumulation and wildlife bioaccumulation were exceeded at each location at which PCBs were detected. Detected PCB concentrations at the majority of the sampling locations also exceeded the NYSDEC sediment screening guidance levels for benthic aquatic life chronic toxicity. Detected PCB concentrations exceeded NYSDEC sediment screening guidance levels for benthic aquatic life acute toxicity at approximately 5% of the locations.

Based on the results of the sediment investigation activities, the horizontal and vertical extent of PCBs in sediment has been sufficiently defined for the purposes of proceeding with the Focused Feasibility Study (FFS). A summary of the conclusions that are supported by the sediment investigation efforts that were implemented for each of the OU-1 ponds and marshes is presented below.

North Pond #1

Surface water depths within North Pond #1 during the FRI activities (following cessation of the cooling water and stormwater inputs) ranged from 0 to 38.4 inches, with an average depth of 24.17 inches. Sediment probing results indicate that sediment depths within North Pond #1 range from 6 to 51.6 inches, with an average depth of 29.43 inches.

PCB analytical results for sediment samples collected from North Pond #1 as part of the FRI and the North Ponds Investigation are summarized below:

| Depth Interval (ft) | No. of Samples Collected* | PCB Concentration (ppm) | | | Maximum Location |
|---|---|---|---|---|---|
| | | Minimum | Maximum | Average | |
| 0-0.5 | 13 | 1.05 J | 16 | 4.4 | SW portion |
| 0.5-1.0 | 7 | 2.188 | 40 | 15 | NE portion |
| 1.0-1.5 | 7 | 3.182 | 52 | 20 | NE portion |
| 1.5-2.0 | 4 | 2.88 J | 81.00 J | 29 | NW portion |
| 2.0-2.5 | 1 | 79.4 | 79.4 | 79.4 | N portion |
| 2.5-3.0 | 1 | 94.08 | 94.08 | 94.08 | N portion |
| 3.0-3.5 | 1 | 47.4 | 47.4 | 47.4 | N portion |
| 3.5-4.0 | 1 | 8.29 | 8.29 | 8.29 | N portion |

Notes:
1. The number of samples collected does not include duplicate samples.
2. The average concentration is based on the average concentration of detected PCB concentrations.
3. J = estimated value.

PCB analytical results for sediment samples collected from North Pond #1 support the following conclusions:

- Based on the sediment data, PCB concentrations increase with depth to a maximum concentration of 94.08 ppm at a depth of 2.5 to 3.0 feet at sample NP1T-J. The increase in PCB concentrations with depth within the North Pond #1 sediment is most likely due to the sediment deposition pattern

- In general, the highest PCB concentrations were detected in the northern portion of North Pond No. 1, where the greatest sediment depths were encountered.

North Pond #2

Surface water depths within North Pond #2 during the FRI activities (following cessation of the cooling water and stormwater inputs) ranged from 6 to 38.4 inches, with an average depth of 25.73 inches. Sediment probing results indicate that sediment depths within North Pond #2 range from 26.4 to 96 inches, with an average depth of 54.27 inches. The greatest surface water and sediment depths are encountered in the middle of the pond. The southeast portion of the pond has dried as a result of the decreasing water levels following cessation of the cooling water and stormwater inputs.

PCB analytical results obtained for sediment samples collected from North Pond #2 as part of the FRI and the North Ponds Investigation are summarized below:

| Depth Interval (ft) | No. of Samples Collected* | PCB Concentration (ppm) | | | Maximum Location |
|---|---|---|---|---|---|
| | | Minimum | Maximum | Average | |
| 0-0.5 | 20 | 1.4 | 31 | 18 | S portion |
| 0.5-1.0 | 7 | 4.77 J | 66 J | 20 | E portion |
| 1.0-1.5 | 7 | 4.69 J | 140 J | 63 | E portion |
| 1.5-2.0 | 3 | 12.74 J | 53.32 | 33 | Central |
| 2.0-2.5 | 3 | 43.5 J | 66.4 | 55 | Central |
| 2.5-3.0 | 3 | 1.57 J | 115.22 | 58 | Central |
| 3.0-3.5 | 2 | 0.26 | 113.5 | 57 | Central |
| 3.5-4.0 | 2 | 0.74 | 260 | 130 | Central |
| 4.0-4.5 | 2 | 51.3 | 51.3 | 51.3 | Central |
| 4.5-5.0 | 1 | 37.9 | 37.9 | 37.9 | Central |
| 5.0-5.5 | 1 | 2.3 | 2.3 | 2.3 | Central |
| 5.5-6.0 | 1 | ND | ND | NA | NA |
| 6.0-6.5 | 1 | ND | ND | NA | NA |
| 6.5-6.8 | 1 | ND | ND | NA | NA |

Notes:
1. The number of samples collected does not include duplicate samples.
2. The average concentration is based on the average concentration of detected PCB concentrations.
3. J = estimated value.
4. ND = not detected.
5. NA = not applicable.

PCB analytical results for sediment samples collected within North Pond #2 support the following conclusions:

- Based on sediment data, PCB concentrations increase with depth to a maximum concentration of 260 ppm at a depth of 3.5 to 4.0 feet at sample GH03.5. The increase in PCB concentrations with depth within sediment in North Pond #2 is most likely due to the ongoing deposition of sediment after Alcan discontinued the use PCBs at the facility during the 1970s; and

- In general, the highest PCB concentrations were detected in samples collected from the central portion North Pond #2, where the deepest sediments were encountered.

Marsh #1

Surface water depths within Marsh #1 during the FRI activities (following cessation of the cooling water and stormwater inputs) ranged from dry at several locations to 4.8 inches, with an average depth of 0.68 inches. Sediment probing results indicate that sediment depths within Marsh #1 range from 6 to 57.6 inches, with an average depth of 25.6 inches. Comparison of the current wetted perimeter of Marsh #1 with historical data indicates that large portions of the marsh began to revert to upland conditions following cessation of the cooling water and stormwater inputs.

PCB analytical results obtained for the sediment samples collected from Marsh #1 as part of the FRI and the North Ponds Investigation are summarized below.

| Depth Interval (ft) | No. of Samples Collected* | PCB Concentration (ppm) | | | Maximum Location |
|---|---|---|---|---|---|
| | | Minimum | Maximum | Average | |
| 0-0.5 | 33 | 0.68 J | 380 | 98 | SE portion |
| 0.5-1.0 | 9 | 2.06 | 134.10 J | 36 | Central |
| 1.0-1.5 | 9 | 0.21 J | 123.20 J | 52 | Central |
| 1.5-2.0 | 4 | 36.38 | 36.38 | 36.38 | Central |
| 2.0-2.5 | 1 | ND | ND | NA | NA |
| 2.5-3.0 | 1 | ND | ND | NA | NA |
| 3.0-3.5 | 1 | ND | ND | NA | NA |
| 3.5-4.0 | 1 | ND | ND | NA | NA |
| 4.0-4.6 | 1 | ND | ND | NA | NA |

Notes:
1. The number of samples collected does not include duplicate samples.
2. The average concentration is based on the average concentration of detected PCB concentrations.
3. J = estimated value.
4. ND = not detected.
5. NA = not applicable.

PCB analytical results for sediment samples collected from Marsh #1 support the following conclusions:

- Based on sediment data, maximum PCB concentrations are encountered within surface sediment (0 to 6 inches) with a maximum concentration of 380 ppm at sample M1-K14 (Dames & Moore 1997) and decrease with depth. The average sediment deposition within Marsh 1 is approximately 25.6 inches; and

- In general, PCBs appear to be widely distributed in surface sediment throughout Marsh #1 with the exception of a few areas (at the eastern and western edges of the marsh) that were most likely outside of the historical surface water drainage path through this area.

Marsh #2

Surface water depths within Marsh #2 during the FRI activities (following cessation of the cooling water and stormwater inputs) ranged from dry at several locations to 24 inches, with an average depth of 4.64 inches. Sediment probing results indicate that sediment depths within Marsh #2 range from 4.8 to 48 inches, with an average depth of 23.22 inches. Comparison of the current limits of Marsh #2 with historical data indicates that much of the southeast portion of the marsh began to revert to upland conditions as a result of the decreasing water levels following cessation of the cooling water and stormwater inputs. Based on observed groundwater levels in this area of the site (which are very close to the ground surface), this portion of the marsh is expected to remain saturated.

PCB analytical results obtained for sediment samples collected for the FRI and the North Ponds Investigation are summarized below:

| Depth Interval (ft) | No. of Samples Collected* | PCB Concentration (ppm) | | | Maximum Location |
|---|---|---|---|---|---|
| | | Minimum | Maximum | Average | |
| 0-0.5 | 30 | 0.55 | 65 | 20 | NW portion |
| 0.5-1.0 | 8 | 0.29 | 30.81 J | 10 | NW portion |
| 1.0-1.5 | 6 | 0.97 | 33.99 J | 17 | NW portion |
| 1.5-2.0 | 2 | 55.30 J | 55.30 J | 55.30 J | NW portion |
| 2.0-2.5 | 1 | 72.4 | 72.4 | 72.4 | NW portion |

| Depth Interval (ft) | No. of Samples Collected* | PCB Concentration (ppm) | | | Maximum Location |
|---|---|---|---|---|---|
| | | Minimum | Maximum | Average | |
| 2.5-3.0 | 1 | 43.1 | 43.1 | 43.1 | NW portion |
| 3.0-3.4 | 1 | 16.65 J | 16.65 J | 16.65 J | NW portion |

**Notes:**
1. The number of samples collected does not include duplicate samples.
2. The average concentration is based on the average concentration of detected PCB concentrations.
3. J = estimated value.

PCB analytical results for sediment samples collected from Marsh #2 support the following conclusions:

- Based on sediment data, PCB concentrations were generally highest in surface sediment at most locations with a maximum concentration of 65 ppm at sample M2-C6 (Dames & Moore 1997) and decrease with depth. However, at one location (OU1SD14), PCB concentrations increased with sediment depth to a maximum concentration of 72.4 at the 2.0'-2.5' interval. The sediment probing measurements, and surface water depth measurements, suggest that the northern portion of Marsh #2 (along the former cooling water flow path from North Pond #2 to Outfall 002) are not expected to revert to upland conditions; and

- PCB concentrations in surface and subsurface sediment within the lobe of Marsh #2 that extends towards the southeast (away from the main flow path from North Pond #2 to Outfall 002) are generally much lower than the other portions of the OU-1 ponds and marshes.

Marsh #3

As indicated by the drawings included in Appendix D, Marsh #3 has not received cooling water from the Alcan facility since the 1970s and has reverted to upland conditions. Therefore, hydrologic conditions in the marsh were not significantly impacted by the cessation of the cooling water and stormwater inputs in 2002. Surface water is typically only present in a few locations in the western portion of the marsh. Out of the 36 FRI sediment probing locations within Marsh #3, standing water was only encountered at one location (probing locations AB14.5) at a depth of 1.2 inches. Sediment probing results indicate that sediment depths within Marsh #3 range from 3.6 to 38.4 inches, with an average depth of 16.9 inches. Comparison of the current limits of Marsh #3 with historical mapping indicates that eastern portion of the area that was previously mapped as Marsh #3 primarily consists of upland habitat.

PCB analytical results obtained for sediment samples collected from Marsh #3 as part of the FRI and previous investigations are summarized below:

| Depth Interval (ft) | No. of Samples Collected* | PCB Concentration (ppm) | | | Maximum Location |
|---|---|---|---|---|---|
| | | Minimum | Maximum | Average | |
| 0-0.5 | 34 | 4.83 J | 1,275.3 J | 179 | SE portion |
| 0.5-1.0 | 11 | 0.23 J | 48.6 | 12 | SE portion |
| 1.0-1.5 | 7 | 0.45 J | 7.6 | 2.3 | SE portion |
| 1.5-2.0 | 2 | 0.6 | 0.6 | 0.6 | SE portion |

**Notes:**
1. The number of samples collected does not include duplicate samples.
2. The average concentration is based on the average concentration of detected PCB concentrations.
3. J = estimated value.

PCB analytical results for sediment samples collected within Marsh #3 support the following conclusions:

- Based on sediment data, PCB concentrations within sediment decrease with depth with a maximum concentration of 1,275.3 ppm in the surface sediment sample (0 to 0.5 feet)collected at location OU1SD23; and

- Based on topographic mapping, the highest PCB concentrations detected in Marsh 3 appear to coincide with the historical surface water flow path through the marsh.

### 7.2.2 Hydrologic Evaluation

Groundwater level measurements and surface water staff gauge readings obtained as part of the FRI and on-going water level monitoring activities indicate that hydrologic conditions in the vicinity OU-1 have stabilized within the limits of normal seasonal variation. . The wetted perimeter of Marsh 1 and Marsh 2 have been significantly reduced from due to the cessation of the cooling water and stormwater inputs

### 7.2.3 Surface Water Sampling

Large volume surface water samples were collected from several locations in North Pond #1, North Pond #2, and Marsh #2 as part of the Phase Distribution Study (Pagano, 1996). The results of the study indicated that total PCB concentrations in the surface water samples ranged from 0.0177 ppb (in a the sample collected from the channel leading from the facility discharge to North Pond #1) to 0.3939 ppb (at Outfall 002). Based on the average number of chlorine molecules per biphenyl in the dissolved and particulate phase within the large volume water surface water samples, Pagano concluded that the sampling results indicated that microbial degradation, particularly by dechlorination, was occurring within the ponds and marshes. Furthermore, testing at the NYSDOH's Wadsworth Center established that North Ponds sediments contain dechlorinating microorganisms.

### 7.2.4 Surface Soil Investigation

Results obtained for the focused and perimeter surface soil investigation activities are summarized in the table below.

| Location | No. of Samples Detected/No. of Samples Analyzed | Range of Detected PCBs (ppm) | Sample Exhibiting Max Concentration |
|---|---|---|---|
| Lake Water Backwash Area | 3/6 | ND – 1.9 | SS-IB2 |
| Cold Mill Landfill | 8/10 | ND – 20 J | SS-CMLF2 |
| Perimeter Surface Soil Area | 6/13 | ND – 3.52 | OU1SS15 |

**Notes:**
1. Samples numbers do not include duplicates.
2. ppm = parts per million of milligrams per kilogram.
3. J = estimate value.
4. ND = not detected.

PCBs were detected at concentrations exceeding the 1 ppm NYSDEC-recommended surface soil cleanup objective in seven surface soil samples collected throughout OU-1. At most of these locations, PCB concentrations were only slightly greater that the recommended surface soil cleanup objective. Based on the analytical results of the FRI and previous investigations, the delineation of PCBs in surface soil is adequate for the purposes of proceeding with the preparation of a Focused FS.

### 7.2.5 Groundwater Investigation

The most recent round of groundwater samples collected during October 2002 from monitoring wells located in the vicinity of OU-1 (including monitoring wells MW-2 through MW-5) indicate the following:

- PCBs were detected in one groundwater sample (collected from monitoring well MW-5) at a concentration that was less than the New York State Class GA groundwater quality standard. PCBs were not detected in the other monitoring wells located in the vicinity of OU-1.
- VOCs were not detected in any of the groundwater monitoring wells located in the vicinity of OU-1;
- One SVOC, bis(2-ethylhexyl)phthalate, was detected in each groundwater sample at a concentrations exceeding the New York State Class GA water quality standard. Bis(2-ethylhexyl)phthalate is a common field and laboratory artifact that was likely introduced into the samples as a result of handling and processing; and
- TAL metals, including iron, magnesium, manganese, and sodium, were detected at concentrations exceeding New York State groundwater quality standards and/or guidance values within each groundwater sample. The inorganic constituent concentrations detected in the groundwater samples collected from the monitoring wells located in the vicinity of OU-1 are consistent with typical background mineral constituent concentrations that would be expected in shallow groundwater.

### 7.2.6 Biota Sampling

As part of the North Ponds Investigation activities (Dames & Moore, 1997), 44 fish samples, one snapping turtle sample, and seven vegetation samples were collected at various locations throughout OU-1. Total PCB concentrations in fish samples collected from North Pond #1, North Pond #2, Marsh # 1 and Marsh #2 (including goldfish, largemouth bass, and carp) ranged from 0.59 to 39 ppm. PCBs were detected in one sample of muscle from the forelimb of a snapping turtle collected from Marsh #2 at a concentration of 3.2 ppm. PCBs were detected in vegetation samples (milfoil) collected from North Pond #1, North Pond #2, Marsh #1, and Marsh #2 at concentrations ranging up to 3.2 ppm. Based on concentrations of PCBs detected in the OU-1 sediment samples, the presence of PCBs in biological tissues is not unexpected, given that PCBs are lipophilic and known to bioaccumulate in fish and other organisms. The relative significance of the PCB levels that were detected in the tissue samples (in terms of potential exposure and/or risks) was subsequently evaluated in the human exposure assessment and the FWIA.

### 7.2.7 Potential Human Exposure

The qualitative human exposure evaluation that was conducted for the Alcan site described the potential for human exposure to PCBs associated with OU-1. The results of the qualitative human exposure evaluation are summarized as follows:

- Onsite workers are the most likely receptors, however, the possibility of exposure for maintenance workers is significantly limited because they do not conduct any routine activities in OU-1, with the exception of lawn maintenance. The greatest potential for exposure would be during hypothetical excavation activities associated with future remedial actions where workers could come into contact with PCB-containing sediment, surface water, and/or soil. However, training and the use of appropriate PPE would mitigate this potential exposure.

- There are no complete exposure pathways for other receptors (e.g., trespassers/recreational users), because the site is posted and recreational activities such as hunting and fishing are not permitted on Alcan property. In addition, there is a locked barb-wired fence around the perimeter of the ponds and marshes that effectively restricts access to OU-1. These site characteristics effectively limit possible exposure pathways such as the consumption of fish from the North Ponds.

### 7.2.7 Potential Ecological Risks

The potential for ecological risks from exposure to PCBs associated with OU-1 was evaluated as part of the FWIA for the site. The results from the FWIA indicate the following:

- Areas of OU-1 include a diverse habitat of open water, wetlands, forested areas, and fields. These areas likely provide food and cover for a variety of wildlife species.

- According to the USFWS (2003) and NYSDEC (2003), no threatened or endangered species or critical habitats are known to exist at the site, although there are records of two threatened bird species (least bittern and pied billed grebe) occurring in Teal Marsh (located west of OU-1).

- Wildlife exposure to PCBs associated with OU-1 may occur through direct contact with sediment, surface water and soil, and through food chain bioaccumulation.

- PCB concentrations detected in onsite media (e.g., soil, surface water and sediment) frequently exceed generic criteria and other ecological-based benchmarks. However, the exceedance of these values does not indicate the occurrence of ongoing ecological effects, and simply indicates the need for more detailed evaluation of ecological risks.

Detailed evaluations of potential ecological risks associated with OU-1 included food web modeling for several receptor species (including shorttail shrew, red-tailed hawk, mink, and great blue heron). The results of the food web modeling indicated that the highest potential for ecological risks is associated with mink feeding on fish from OU-1.

## 7.3 OU-2 (Main Landfill)

Several investigation efforts have been conducted to evaluate soil and groundwater issues associated with OU-2 (the Main Landfill). Although low levels of SVOCs were detected in surface soil samples collected from the landfill, the presence of chemical constituents in the soil cover across the landfill does not present an environmental concern. Conclusions that are supported by the results of the investigation activities that have been conducted for the main landfill are presented below.

### 7.3.1 Landfill Soil Cover Investigation

The OU-2 landfill operated between 1963 and 1978. During operation, approximately 80,000 cubic yards of waste from the Alcan facility was reportedly disposed of in the landfill. In 1978, the landfill ceased operation and final cover was placed on the landfill. Landfill cover requirements that were in effect at the time of the closure activities are presented in the NYSDEC document entitled, "Part 360, Solid Waste Management Facilities," which became effective on August 23, 1977, revised May 5, 1981. In accordance with the Part 360 regulations that existed at the time the landfill was closed, the final cover required a minimum of 24 inches of cover material with the uppermost 6 inches suitable to sustain plant growth. In addition, an established and maintained grass or a ground cover crop was required for the final cover. Based on the results of the soil probing activities that were conducted across the footprint of the Main Landfill, 2 feet or more of cover was identified at 32 of 33 locations, with one location (MN23) at which the depth of cover was 1.6 feet. The average depth of soil cover across the landfill was 28.5 inches. The entire footprint of the landfill is vegetated with grass cover in accordance with the 1978 closure requirements. Therefore, the landfill cover generally complies with the 1978 closure requirements.

### 7.3.2 Groundwater Investigation

The results obtained for groundwater investigation activities implemented for OU-2 support the following conclusions:

- Groundwater flow in the vicinity of OU-2 is generally towards the north and northwest in the direction of Lake Ontario;

- For the most recent groundwater sampling (conducted during 2002 as part of the FRI activities), PCBs were detected in the groundwater sample collected from monitoring well MW-08 at concentration that was less than the New York State Class GA groundwater quality standard. PCBs were not detected in the other monitoring wells located in the vicinity of OU-2.

- TCL VOCs were detected in groundwater samples collected from shallow groundwater monitoring wells MW-07 and MW-10 at concentrations slightly exceeding New York State groundwater quality standards presented in TOGS 1.1.1. Chloroethane was detected in the groundwater sample collected from MW-07 at a concentration exceeding the 5 ppb groundwater criteria. 1,1-Dichloroethane was detected in the groundwater sample collected from MW-10 at a concentration that was slightly above the 5 ppb groundwater quality criteria;

- One TCL SVOC, bis(2-ethylhexyl)phthalate, was detected in each groundwater sample at concentrations ranging from 77.9 ppb to 455 ppb, which exceeded the 5 ppb New York State groundwater criteria. However, bis(2-ethylhexyl)phthalate is a common field and laboratory artifact which was likely introduced into the samples during collection and processing. 1,4-Dichlorobenzene and 1,2-dichlorobenzene were also detected in the groundwater sample collected from monitoring well MWB-12 at concentrations exceeding the 3 ppb New York State groundwater criteria; and

- Typical mineral constituents (including iron, magnesium, manganese, and sodium) were the only TAL metals detected in the groundwater samples at concentrations exceeding New York State groundwater criteria. Concentrations of the mineral constituents detected in the shallow groundwater samples may be consistent with normal background concentrations and do not represent a concern.

The results of the soil cover and groundwater investigation activities implemented at the site provide a sufficient basis for proceeding with the Focused FS.

### 7.3.3 Potential Human Exposure

The qualitative human exposure evaluation described the potential for human exposure to chemical constituents associated with OU-2. The results of the qualitative human exposure evaluation are summarized as follows:

- OU-2 is within the same perimeter fence as OU-1, and therefore trespassers/recreational users are not considered as possible receptors.
- Potential exposure for onsite workers is not possible. Exposure via soil would not occur because there is a two foot soil cover over the landfill. Similarly, exposure via groundwater could not occur because groundwater at the site is not used as a potable source, and the depth to groundwater (greater than ten feet) makes direct contact with groundwater unlikely.

### 7.3.4 Potential Ecological Risks

The potential for ecological risks from exposure to PCBs associated with OU-2 was evaluated as part of the FWIA for the site. The results from the FWIA indicate the following:

- OU-2 includes primarily field areas. These areas likely provide food and cover for some wildlife species.
- According to the USFWS (2003) and NYSDEC (2003), no threatened or endangered species or critical habitats are known to exist at the site, although there are records of two threatened bird species (least bittern and pied billed grebe) occurring in Teal marsh (located west of OU-2).
- Wildlife exposure to PCBs associated with OU-2 is not likely to occur because the entire surface of the landfill has been covered with a soil cap, which creates an effective barrier against possible ecological exposure.
- Detailed evaluations of potential ecological risks associated with OU-2 included food web modeling. The results of the food web modeling indicate no risk to receptor species in OU-2.

## 7.4 OU-3 (Onsite Portions of Tributary 63)

Investigation efforts have been implemented for OU-3 (onsite portions of Tributary 63) as part of the North Ponds Investigation and the FRI. The North Ponds investigation included the collection of three sediment samples from onsite portions of the tributary. The FRI included a more extensive sediment investigation, the collection of surface water samples, and the collection of biota samples from the onsite portions of the tributary and from two areas within Teal Marsh (the off-site wetland area that receives surface water drainage from the tributary). For the purposes of the sediment and biota sampling activities conducted as part of the FRI, OU-3 was divided into four segments (Segments A through D). Segment A consists of the on-site portion of Tributary 63 located upstream from the outlet of the South Marsh. Segment B includes the South Pond, the South Marsh, and the on-site portion of Tributary 63 extending from the outlet of the South Marsh to immediately west of the railroad right-of-way that extends across the southern portion of the Alcan property. Segment C consists of the on-site portion of Tributary 63 that extends from immediately west of the railroad right-of-way to the Cottage Access Road. Segment D consists of a small wetland area located northeast of the downstream end of Tributary Segment C. Segment D is side-gradient to the main flow path of Tributary 63 and probably receives minimal drainage from the tributary. Downstream of Segment C, the tributary consists of wetland area with no defined flow channel that ultimately flows towards the west off the Alcan property and into Teal Marsh. The results of the OU-3 investigation efforts are summarized below.

### 7.4.1 Sediment Investigation

The OU-3 sediment sampling results are summarized in the table below.

| Segment | Depth Interval | PCB | | | TOC | |
|---|---|---|---|---|---|---|
| | | No. of Samples Detected/No. of Samples Analyzed | Range of Detected PCBs (ppm) | Sample Exhibiting Max. Concentration | Range of TOC (ppm) | Sample Exhibiting Max. Concentration |
| A | 0 – 0.5 | 0 / 4 | ND | NA | 6,850 J – 15,300 J | OU3SD04 |
| B (Tributary 63) | 0 – 0.5 | 6/6 | 2.13 J – 23.57 | OU3SD07 | 10,100 – 33,400 | SEG-B3B |
| | 0.5 – 1.0 | 1/2 | ND – 7.26 | SEG-B3B | 16,200 – 16,500 | SEG-B3A |
| | 1.0 – 1.5 | ½ | ND – 2.28 | SEG-B3B | 5,930 – 11,000 | SEG-B3A |
| | 1.5 – 2.0 | 0/2 | ND | SEG-B3A | 2,420 – 2,750 | SEG-B3A |
| | 2.0 – 2.5 | 0/2 | ND | SEG-B3A | 1,070 – 1,960 | SEG-B3A |
| B (S. Pond and S. Marsh) | 0 – 0.5 | 4/4 | 1.23 – 161.3 J | SEG-B2B | 17,400 J – 159,000 J | SEG-B2B |
| | 0.5 – 1.0 | 3/3 | 48.44 – 158.2 | SEG-B2A | 117,000 J – 129,000 J | SEG-B2A |
| | 1.0 – 1.5 | 2/2 | 0.163 – 0.72 | SEG-B2A | 27,600 J – 41,700 J | SEG-B2A |
| | 1.5 – 2.0 | 0/2 | ND | SEG-B2A | 8,230 J – 10,800 J | SEG-B2A |
| | 2.0 – 2.5 | 0/2 | ND | SEG-B2B | 10,800 J – 12,800 J | SEG-B2B |
| C | 0 – 0.5 | 5 / 7 | 0.54 – 5.34 | OU3SD17 (0-0.5) | 6,980 – 15,200 J | OU3SD10 |
| | 0.5 – 1.0 | 3 / 3 | 0.47 J – 7.08 | OU3SD19 (0.5-1.0) | NA | NA |
| D | 0 – 0.5 | 0 /4 | ND | NA | 162,000 – 533,000 | OU3SD13 |

Notes:
1. Sample quantities do not include duplicate samples.
2. ND = Indicates that PCBs were not detected at a concentration exceeding laboratory detection limits.
3. Concentrations presented in milligrams per liter (ppm) or parts per million (ppm).
4. J = Estimated value.
5. NA = Not applicable and/or available.

The results obtained for the sediment investigation activities implemented for OU-3 support the following conclusions:

- The onsite portions of Tributary 63 are characterized as a low-gradient, warm water stream. Portions of the tributary located west of the access road for the west entrance to the Alcan facility are thickly vegetated with a poorly defined channel. Sediment depths within the tributary are variable, ranging from less than 0.5 feet to depths of up to 6 feet. The average depth of sediment encountered at the sediment probing transect locations was 2.52 feet. However, this average depth is not representative of the entire tributary because the probing transects were specifically selected to characterize sediment depositional areas, Sediment depths within the South Pond and South Marsh ranged up to 2.6 feet.

- PCBs were not detected in samples collected from the portion of the tributary located upstream of the discharge from the south marsh during the FRI activities (Tributary Segment A). However, PCBs were detected in one sample at a concentration of 15 ppm that was collected approximately 75 feet upstream from the south marsh outlet during the North Ponds Investigation.

- PCBs were detected within each sediment sample collected within Segment B during the FRI and North Ponds Investigation activities. The highest PCB concentrations within the onsite portion of Tributary 63 were identified near the outlet of the South Marsh.

- PCBs were detected in 6 of the 8 samples collected within Segment C during the FRI and North Ponds Investigation activities at concentrations ranging up to 7.08 ppm. In general, PCB concentrations detected in sediment within Segment C were much lower that the concentrations detected in Segment B. PCBs were not detected in two samples that were collected at the furthest downstream portion of Segment C (adjacent to culverts that flow beneath the Cottage Access Road.

- Segment D consists of a marsh area located northeast of downstream end of Tributary Segment C. Segment D is sidegradient to the main flow path of Tributary 63 and probably receives minimal drainage from the tributary. PCBs were not detected in five sediment samples that were collected from Segment D as part of the FRI.

- PCBs were detected in sediment samples collected from one sampling location within the South Pond during the FRI activities at concentrations ranging up to 2.57 ppm.

- PCBs were detected in sediment samples collected from the South Marsh as part of the FRI activities at concentrations ranging up to 161.3 ppm. The highest concentrations of PCBs were detected in sediment samples collected from the 0 to 6-inch and 6 to 12-inch sampling intervals.

### 7.4.2 Surface Water Investigation

PCBs were not detected in four surface water samples collected from Tributary 63 as part of the FRI. Total hardness of the water samples ranged from 196 to 229 ppm and TSS in the samples ranged from 1.9 to 303 ppm.

### 7.4.3 Biota investigation

The biota investigation activities conduced as part of the FRI included the collection of 30 fish samples from onsite portions of Tributary 63 during 2002 and the collection of 30 fish samples from 2 areas within Teal Marsh during 2003. The results of the biota investigation activities are summarized in the table below.

| Location Species | No. of Samples Collected | PCB Concentration (ppm) | | |
|---|---|---|---|---|
| | | Minimum | Maximum | Average |
| **OU-3 (Location A)** | | | | |
| Redfin pickerel | 6 | ND | 0.94 | 0.94 |
| Sunfish | 3 | ND | ND | ND |
| White sucker | 1 | NA | NA | ND |
| **OU-3 (Location B)** | | | | |
| Brown bullhead (fillet) | 2 | 0.60 | 1.11 | 0.86 |
| Redfin pickerel | 6 | 2.80 | 4.52 | 3.94 |
| Sunfish | 2 | 5.82 | 8.05 | 6.94 |
| **OU-3 (Location C)** | | | | |
| Largemouth bass (fillet) | 1 | NA | NA | ND |
| Redfin pickerel | 7 | 1.03 J | 3.73 J | 2.18 |
| Sunfish | 2 | 2.33 | 4.09 | 3.21 |

| Location Species | No. of Samples Collected | PCB Concentration (ppm) | | |
|---|---|---|---|---|
| | | Minimum | Maximum | Average |
| **Teal Marsh (Location 1A)** | | | | |
| Mudminnow | 2 | 0.63 | 1.08 | 0.86 |
| **Teal Marsh (Location 1B)** | | | | |
| Sunfish | 5 | 0.13 | 2.85 | 0.79 |
| Redfin pickerel | 5 | 0.11 | 1.34 | 0.60 |
| Mudminnow | 3 | 0.30 | 0.35 | 0.32 |
| **Teal Marsh (Location 2)** | | | | |
| Brown bullhead (fillet) | 3 | ND | 0.24 | 0.24 |
| Sunfish (fillet) | 1 | NA | NA | 0.77 |
| Largemouth bass (fillet) | 1 | NA | NA | 0.16 |
| Redfin pickerel | 7 | ND | 0.59 J | 0.33 |
| Sunfish | 3 | 0.30 | 0.38 | 0.35 |

**Notes:**
1. The number of samples collected does not include duplicate samples.
2. The average concentration is based on the average concentration of detected PCB concentrations.
3. J = estimated value.
4. ND = not detected.
5. NA = not applicable.
6. Sunfish include bluegills, pumpkinseed, and green sunfish.
7. Samples are whole body (individual or composite) samples, unless indicated.

For onsite portions of Tributary 63, ten composite whole body fish samples were collected from Segment A. PCBs were detected in one sample collected from Segment A at a concentration of 0.94 ppm. A total of eight composite whole body samples and two individual skin-off fillet samples were collected from Segment B. PCBs were detected in the samples from Segment B at concentrations ranging from 0.60 to 8.05 ppm. A total of nine whole body composite samples and one skin-off fillet sample were collected from Segment C. PCBs were not detected in the skin-off fillet samples from Segment C and the concentrations of PCBs in the whole body composite samples ranged from 1.03 ppm to 4.09 ppm.

For Teal Marsh, 15 whole body composite samples were collected from the central portion of the marsh (from upstream and downstream of a beaver dam). PCB concentrations in the whole body composite samples from the central portion of the marsh ranged from 0.11 to 2.85 ppm. In addition, five skin-off fillet samples and ten whole body composite samples were collected at the mouth of the marsh, near Lake Ontario. PCB concentrations in the samples collected near the mouth of the marsh ranged from 0.30 ppm to 0.77 ppm.

The fish tissue samples collected for onsite portions of Tributary 63 and Teal Marsh indicate a strong decreasing trend with increasing distance downgradient from the beginning of Tributary 63 Segment B.

### 7.4.4 Potential Human Exposure

The qualitative human exposure evaluation described the potential for human exposure to PCBs associated with OU-3. The results of the qualitative human exposure evaluation are summarized as follows:

- Trespassers/recreational users may access certain areas of Tributary 63 (specifically Segment B) using the non-improved roads and trails that exist. Other areas of Tributary 63 are less accessible because of the dense vegetation that surrounds the stream.

- The most likely exposure pathway for trespassers/recreational users is direct contact with sediment.

- Ingestion of fish is not considered a complete exposure pathway because edible size fish are infrequent in OU-3, and fishing is prohibited on Alcan property. Although angler access is possible at the mouth of Teal Marsh (near Lake Ontario), fish fillet PCB concentrations in this area were low (less than 1 ppm).

- The possibility of exposure for onsite maintenance workers is limited because they do not conduct any routine activities in OU-3. The greatest potential for exposure would be during hypothetical excavation activities where workers could come into contact with PCB-containing sediment. However, training and the use of appropriate PPE would mitigate this potential exposure.

### 7.4.5 Potential Ecological Risks

The potential for ecological risks from exposure to PCBs associated with OU-3 was evaluated as part of the FWIA for the site. The results from the FWIA indicate the following:

- OU-3 includes a variety of habitat, including midreach stream, wetlands, and forested areas. These areas likely provide food and cover for a variety of wildlife species.

- According to the USFWS (2003) and NYSDEC (2003), no threatened or endangered species or critical habitats are known to exist at the site, although there are records of two threatened bird species (least bittern and pied billed grebe) occurring in Teal Marsh.

- Wildlife exposure to PCBs associated with OU-3 may occur through direct contact with sediment and through food chain bioaccumulation.

- PCB concentrations detected in sediment frequently exceed generic criteria and other ecological-based benchmarks. However, the exceedance of these values does not indicate the occurrence of ongoing ecological effects, and simply indicates the need for more detailed evaluation of ecological risks.

- Detailed evaluations of potential ecological risks associated with OU-3 included food web modeling for mink and great blue heron. The results of the food web modeling indicate "low" risk to these receptors in OU-3 and "no" risk in downstream areas of Teal Marsh.

# 8. Certification Statement

I, Stuart D. Messur, as a Vice President at Blasland, Bouck & Lee, Inc. (BBL), hereby certify that the Focused Remedial Investigation (FRI) activities conducted at the Alcan Oswego Works property in Scriba, New York were completed in general accordance with the following:

- The New York State Department of Environmental Conservation- (NYSDEC-) approved Focused Remedial Investigation/Focused Feasibility Study (RI/FS) Work Plan prepared by ENSR Corporation (ENSR, June 2002) and supporting documents, including a Field Sampling Plan (FSP), Quality Assurance Project Plan (QAPP), Health and Safety Plan (HASP), and Citizen Participation Plan (CPP); and

- The correspondence regarding the FRI activities included in Appendix A of the FRI Report.

I also certify that, to the best of my knowledge, this FRI Report accurately summarizes the work activities performed and the results obtained for the FRI.

______________________________

Stuart D. Messur
Vice President

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# *Tables*

BLASLAND, BOUCK & LEE, INC.
*engineers & scientists*

Table 1

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
Analytical Sample Summary

| Sample I.D. | Location I.D. | Date Sampled | Sample Delivery Group | Analyses | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PCBs | Percent Lipids | VOCs | SVOCs & TAL Metals | TSS & Hardness | TOC | Grain Size, Specific Gravity, Organic Content | TPH |
| **Sediment Samples - Collected from Operable Unit 1** | | | | | | | | | | | |
| OU1SD01 (0-0.5) | N17 | 08/26/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD01 (0.5-1.0) | N17 | 08/26/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD01 (1.0-1.5) | N17 | 08/26/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SDDUP2 [OU1SD01 (1-1.5)] | N17 | 08/26/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD01 (1.5-1.9) | N17 | 08/26/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD02 (0-0.5) | P16 | 08/26/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD02 (0.5-1.0) | P16 | 08/26/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD02 (1.0-1.5) | P16 | 08/26/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD02 (1.5-2.1) | P16 | 08/26/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD03 (0-0.5) | HI15.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD03 (0.5-1.0) | HI15.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD03 (1.0-1.3) | HI15.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD04 (0-0.5) | HI18.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD04 (0.5-1.0) | HI18.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD04 (1.0-1.2) | HI18.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD05 (0-0.5) | IJ13.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD05 (0.5-1.0) | IJ13.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD05 (1.0-1.5) | IJ13.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD05 (1.5-2.0) | IJ13.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD05 (2.0-2.5) | IJ13.5 | 08/27/02 | 020828ALCAN | | | | | | ✔ | ✔ | |
| OU1SD05 (2.5-3.0) | IJ13.5 | 08/27/02 | 020828ALCAN | | | | | | ✔ | ✔ | |
| OU1SD05 (3.0-3.5) | IJ13.5 | 08/27/02 | 020828ALCAN | | | | | | ✔ | ✔ | |
| OU1SD05 (3.5-4.2) | IJ13.5 | 08/27/02 | 020828ALCAN | | | | | | ✔ | ✔ | |
| OU1SD06 (0-0.5) | JK9.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD06 (0.5-1.0) | JK9.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD06 (1.0-1.5) | JK9.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD06 (1.5-2.0) | JK9.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD06 (2.0-2.5) | JK9.5 | 08/27/02 | 020828ALCAN | | | | | | ✔ | | |
| OU1SD06 (2.5-3.0) | JK9.5 | 08/27/02 | 020828ALCAN | | | | | | ✔ | | |
| OU1SD06 (3.0-3.5) | JK9.5 | 08/27/02 | 020828ALCAN | | | | | | ✔ | | |
| OU1SD07 (0-0.5) | JK11.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD07 (0.5-1.0) | JK11.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SDDUP3 [OU1SD07 (0.5-1.0)] | JK11.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD07 (1.0-1.5) | JK11.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD07 (1.5-1.7) | JK11.5 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | | |
| OU1SD08 (0-0.5) | KL13 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SDGSDUP1 [OU1SD08 (0-0.5)] | KL13 | 08/27/02 | 020828ALCAN | | | | | | | ✔ | |
| OU1SD08 (0.5-1.0) | KL13 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD08 (1.0-1.5) | KL13 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD08 (1.5-2.0) | KL13 | 08/27/02 | 020828ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD09 (0-0.5) | F4 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD09 (0.5-1.0) | F4 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD09 (1.0-1.5) | F4 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD09 (1.5-2.0) | F4 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD09 (2.0-2.5) | F4 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD09 (2.5-2.7) | F4 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD10 (0-0.5) | FG02.5 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | | |
| OU1SD10 (0.5-1.0) | FG02.5 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | | |
| OU1SD10 (1.0-1.6) | FG02.5 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | | |
| OU1SD11 (0-0.5) | H12.5 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | | |
| OU1SD11 (0.5-1.0) | H12.5 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | | |
| OU1SD11 (1.0-1.5) | H12.5 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | | |
| OU1SD11 (1.5-2.0) | H12.5 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | | |
| OU1SD11 (2.0-2.5) | H12.5 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | | |
| OU1SDDUP1 [OU1SD11 (2.0-2.5)] | HI2.5 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | | |
| OU1SD11 (2.5-3.0) | H12.5 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | | |
| OU1SD11 (3.0-3.5) | H12.5 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | | |
| OU1SD11 (3.5-4.0) | H12.5 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | | |
| OU1SD11 (4.0-4.6) | H12.5 | 08/22/02 | 020823ALCAN | ✔ | | | | | ✔ | | |
| OU1SD12 (0-0.5) | AB7.5 | 08/28/02 | 020830ALCAN | ✔ | | | | | ✔ | ✔ | |

Table 1

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**Analytical Sample Summary**

| Sample I.D. | Location I.D. | Date Sampled | Sample Delivery Group | Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PCBs | Percent Lipids | VOCs | SVOCs & TAL Metals | TSS & Hardness | TOC | Grain Size, Specific Gravity, Organic Content | TPH |
| **Sediment Samples - Collected from Operable Unit 1** | | | | | | | | | | | |
| OU1SD12 (0.5-1.0) | AB7.5 | 08/28/02 | 020830ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD12 (1.0-1.4) | AB7.5 | 08/28/02 | 020830ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD13 (0-0.5) | CD05.5 | 08/28/02 | 020830ALCAN | ✔ | | | | | ✔ | | |
| OU1SD13 (0.5-1.0) | CD05.5 | 08/28/02 | 020830ALCAN | ✔ | | | | | ✔ | | |
| OU1SD13 (1.0-1.5) | CD05.5 | 08/28/02 | 020830ALCAN | ✔ | | | | | ✔ | | |
| OU1SD13 (1.5-2.0) | CD05.5 | 08/28/02 | 020830ALCAN | ✔ | | | | | ✔ | | |
| OU1SD13 (2.0-2.2) | CD05.5 | 08/28/02 | 020830ALCAN | | | | | | ✔ | | |
| OU1SD14 (0-0.5) | DE06.5 | 08/29/02 | 020830ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD14 (0.5-1.0) | DE06.5 | 08/29/02 | 020830ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD14 (1.0-1.5) | DE06.5 | 08/29/02 | 020830ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD14 (1.5-2.0) | DE06.5 | 08/29/02 | 020830ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD14 (2.0-2.5) | DE06.5 | 08/29/02 | 020830ALCAN | | | | | | ✔ | ✔ | |
| OU1SD14 (2.5-3.0) | DE06.5 | 08/29/02 | 020830ALCAN | | | | | | ✔ | ✔ | |
| OU1SD14 (3.0-3.5) | DE06.5 | 08/29/02 | 020830ALCAN | | | | | | ✔ | ✔ | |
| OU1SD15 (0-0.5) | DE4.5 | 09/03/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| OU1SD15 (0.5-1.0) | DE4.5 | 09/03/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| OU1SD16 (0-0.5) | EF10.5 | 08/29/02 | 020830ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD16 (0.5-1.0) | EF10.5 | 08/29/02 | 020830ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SDGSDUP2 [OU1SD16 (0.5-1.0)] | EF10.5 | 08/29/02 | 020830ALCAN | | | | | | | ✔ | |
| OU1SDDUP4 [OU1SD16 (0.5-1.0)] | EF10.5 | 08/29/02 | 020830ALCAN | ✔ | | | | | ✔ | | |
| OU1SD17 (0-0.5) | B16.5 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD17 (0.5-0.8) | B16.5 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD18 (0-0.5) | B20 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | | |
| OU1SD18 (0.5-1.0) | B20 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | | |
| OU1SD18 (1.0-1.4) | B20 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | | |
| OU1SD19 (0-0.5) | BC11.5 | 09/03/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| OU1SD19 (0.5-1.0) | BC11.5 | 09/03/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| OU1SDDUP6 [OU1SD19 (0.5-1.0)] | BC11.5 | 09/03/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| OU1SD19 (1.0-1.5) | BC11.5 | 09/03/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| OU1SD19 (1.5-2.0) | BC11.5 | 09/03/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| OU1SD20 (0-0.5) | BC14.5 | 09/03/02 | 020906ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD20 (0.5-0.7) | BC14.5 | 09/03/02 | 020906ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD21 (0-0.5) | CD15.5 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | | |
| OU1SDDUP5 [OU1SD21 (0-0.5)] | CD15.5 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | | |
| OU1SD21 (0.5-1.0) | CD15.5 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | | |
| OU1SD22 (0-0.5) | DE18.5 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | | |
| OU1SD22 (0.5-1.0) | DE18.5 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | | |
| OU1SD23 (0-0.5) | EF18 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD23 (0.5-1.0) | EF18 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SDGSDUP3 [OU1SD23 (0.5-1.0)] | EF18 | 08/30/02 | 020831ALCAN | | | | | | | ✔ | |
| OU1SD23 (1.0-1.5) | EF18 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD23 (1.5-2.0) | EF18 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU1SD24 (0-0.5) | FG17.5 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | | |
| OU1SD24 (0.5-1.0) | FG17.5 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | | |
| OU1SD24 (1.0-1.5) | FG17.5 | 08/30/02 | 020831ALCAN | ✔ | | | | | ✔ | | |
| OU1SD25 (0-0.5) | MN15 | 08/28/02 | 020830ALCAN | ✔ | | | | | ✔ | | |
| OU1SD25 (0.5-1.0) | MN15 | 08/28/02 | 020830ALCAN | ✔ | | | | | ✔ | | |
| OU1SD25 (1.0-1.5) | MN15 | 08/28/02 | 020830ALCAN | ✔ | | | | | ✔ | | |
| OU1SD25 (1.5-2.0) | MN15 | 08/28/02 | 020830ALCAN | ✔ | | | | | ✔ | | |
| OU1SD25 (2.0-2.5) | MN15 | 08/28/02 | 020830ALCAN | | | | | | ✔ | | |
| OU1SD25 (2.5-3.1) | MN15 | 08/28/02 | 020830ALCAN | | | | | | ✔ | | |
| IJ13.5A (2-2.5') | IJ13.5 | 09/02/03 | AG13256-339 & AG1304-23 | ✔ | | | | | ✔ | | |
| IJ13.5A (2.5-3') | IJ13.5 | 09/02/03 | AG13256-339 & AG1304-23 | ✔ | | | | | ✔ | | |
| IJ13.5A (3-3.5') | IJ13.5 | 09/02/03 | AG13256-339 & AG1304-23 | ✔ | | | | | ✔ | | |
| IJ13.5A (3.5-4') | IJ13.5 | 09/02/03 | AG13256-339 & AG1304-23 | ✔ | | | | | ✔ | | |

Table 1

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
Analytical Sample Summary

| Sample I.D. | Location I.D. | Date Sampled | Sample Delivery Group | Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PCBs | Percent Lipids | VOCs | SVOCs & TAL Metals | TSS & Hardness | TOC | Grain Size, Specific Gravity, Organic Content | TPH |
| **Sediment Samples - Collected from Operable Unit 1** | | | | | | | | | | | |
| IJ13.5A (4-4.6') | IJ13.5 | 09/02/03 | AG13256-339 & AG1304-23 | ✔ | | | | | ✔ | | |
| DE06.5A (2-2.5') | DE06.5 | 09/02/03 | AG13256-339 & AG1304-23 | ✔ | | | | | ✔ | | |
| DE06.5A (2.5-3') | DE06.5 | 09/02/03 | AG13256-339 & AG1304-23 | ✔ | | | | | ✔ | | |
| DE06.5A (3-3.4') | DE06.5 | 09/02/03 | AG13256-339 & AG1304-23 | ✔ | | | | | ✔ | | |
| NP1T-J (0-0.5') | N. Pond No. 1 | 09/02/03 | AG13256-339 & AG13304-23 | ✔ | | | | | ✔ | | |
| NP1T-J (0.5-1') | N. Pond No. 1 | 09/02/03 | AG13256-339 & AG13304-23 | ✔ | | | | | ✔ | | |
| NP1T-J (1-1.5') | N. Pond No. 1 | 09/02/03 | AG13256-339 & AG13304-23 | ✔ | | | | | ✔ | | |
| NP1T-J (1.5-2') | N. Pond No. 1 | 09/02/03 | AG13256-339 & AG13304-23 | ✔ | | | | | ✔ | | |
| NP1T-J (2-2.5') | N. Pond No. 1 | 09/02/03 | AG13256-339 & AG13304-23 | ✔ | | | | | ✔ | | |
| NP1T-J (2.5-3') | N. Pond No. 1 | 09/02/03 | AG13256-339 & AG13304-23 | ✔ | | | | | ✔ | | |
| NP1T-J (3-3.5') | N. Pond No. 1 | 09/02/03 | AG13256-339 & AG13304-23 | ✔ | | | | | ✔ | | |
| NP1T-J (3.5-4') | N. Pond No. 1 | 09/02/03 | AG13256-339 & AG13304-23 | ✔ | | | | | ✔ | | |
| GH03.5 (0-0.5') | GH03.5 | 09/02/03 | AG13256-339 & AG13304-23 | ✔ | | | | | ✔ | | |
| GH03.5 (0.5-1') | GH03.5 | 09/02/03 | AG13256-339 & AG13304-23 | ✔ | | | | | ✔ | | |
| GH03.5 (1-1.5') | GH03.5 | 09/02/03 | AG13256-339 & AG13304-23 | ✔ | | | | | ✔ | | |
| GH03.5 (1.5-2') | GH03.5 | 09/02/03 | AG13324-36 & AG13256-339 | ✔ | | | | | ✔ | | |
| GH03.5 (2-2.5') | GH03.5 | 09/02/03 | AG13324-36 & AG13256-339 | ✔ | | | | | ✔ | | |
| GH03.5 (2.5-3') | GH03.5 | 09/02/03 | AG13324-36 & AG13256-339 | ✔ | | | | | ✔ | | |
| GH03.5 (3-3.5') | GH03.5 | 09/02/03 | AG13324-36 & AG13256-339 | ✔ | | | | | ✔ | | |
| GH03.5 (3.5-4') | GH03.5 | 09/02/03 | AG13324-36 & AG13256-339 | ✔ | | | | | ✔ | | |
| GH03.5 (4-4.5') | GH03.5 | 09/02/03 | AG13324-36 & AG13256-339 | ✔ | | | | | ✔ | | |
| GH03.5 (4.5-5') | GH03.5 | 09/02/03 | AG13324-36 & AG13256-339 | ✔ | | | | | ✔ | | |
| GH03.5 (5-5.5') | GH03.5 | 09/02/03 | AG13324-36 & AG13256-339 | ✔ | | | | | ✔ | | |
| GH03.5 (5.5-6') | GH03.5 | 09/02/03 | AG13324-36 & AG13256-339 | ✔ | | | | | ✔ | | |
| GH03.5 (6-6.5') | GH03.5 | 09/02/03 | AG13324-36 & AG13256-339 | ✔ | | | | | ✔ | | |
| GH03.5 (6.5-6.8') | GH03.5 | 09/02/03 | AG13324-36 & AG13256-339 | ✔ | | | | | ✔ | | |
| **Sediment Samples - Collected from Operable Unit 3** | | | | | | | | | | | |
| OU3SD01 | SEG-A1 | 09/06/02 | 020907ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU3SD02 | SEG-A2 | 09/06/02 | 020907ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU3SD03 | SEG-A3 | 09/06/02 | 020907ALCAN | ✔ | | | | | ✔ | | |
| OU3SD04 | SEG-A4 | 09/05/02 | 020907ALCAN | ✔ | | | | | ✔ | | |
| OU3SD05 | SEG-B1 | 09/06/02 | 020907ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU3SDDUP2 [OU3SD05] | SEG-B1 | 09/06/02 | 020907ALCAN | ✔ | | | | | ✔ | | |
| OU3SD06 | SEG-B2 | 09/06/02 | 020907ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU3SDGSDUP2 [OU3SD06] | SEG-B2 | 09/06/02 | 020907ALCAN | | | | | | | ✔ | |
| OU3SD07 | SEG-B3 | 09/05/02 | 020906ALCAN | ✔ | | | | | ✔ | | |

Table 1

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
Analytical Sample Summary

| Sample I.D. | Location I.D. | Date Sampled | Sample Delivery Group | Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PCBs | Percent Lipids | VOCs | SVOCs & TAL Metals | TSS & Hardness | TOC | Grain Size, Specific Gravity, Organic Content | TPH |
| **Sediment Samples - Collected from Operable Unit 3** | | | | | | | | | | | |
| OU3SD08 | SEG-B4 | 09/05/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| OU3SD09 | SEG-C1 | 09/05/02 | 020906ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU3SD10 | SEG-C2 | 09/06/02 | 020907ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU3SD11 | SEG-C3 | 09/05/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| OU3SD12 | SEG-C4 | 09/04/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| OU3SD13 | SEG-D1 | 09/05/02 | 020906ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU3SDGSDUP1 [OU3SD13] | SEG-D1 | 09/05/02 | 020906ALCAN | | | | | | | ✔ | |
| OU3SD14 | SEG-D2 | 09/05/02 | 020906ALCAN | ✔ | | | | | ✔ | ✔ | |
| OU3SD15 | SEG-D3 | 09/05/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| OU3SDDUP1 [OU3SD15] | SEG-D3 | 09/05/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| OU3SD16 | SEG-D4 | 09/05/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| OU3SD17 (0-0.5) | SEG-C5 | 09/04/02 | 020906ALCAN | ✔ | | | | | | | ✔ |
| OU3SD17 (0.5-1.1) | SEG-C5 | 09/04/02 | 020906ALCAN | ✔ | | | | | | | ✔ |
| OU3SD18 (0-0.5) | SEG-C6 | 09/04/02 | 020906ALCAN | ✔ | | | | | | | ✔ |
| OU3SD18 (0.5-1.0) | SEG-C6 | 09/04/02 | 020906ALCAN | ✔ | | | | | | | ✔ |
| OU3SD19 (0-0.5) | SEG-C7 | 09/04/02 | 020906ALCAN | ✔ | | | | | | | ✔ |
| OU3SD19 (0.5-1.0) | SEG-C7 | 09/04/02 | 020906ALCAN | ✔ | | | | | | | ✔ |
| OU3SD20 | SEG-D5 | 09/05/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| OU3SD21 | SEG-B5 | 09/05/02 | 020906ALCAN | ✔ | | | | | ✔ | | |
| SEG-B2A(0-0.5') | SEG-B2 | 09/02/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B2A(0.5-1') | SEG-B2 | 09/02/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B2A(1-1.5') | SEG-B2 | 09/02/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B2A(1.5-2') | SEG-B2 | 09/02/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B2A(2-2.6') | SEG-B2 | 09/02/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B2B(0-0.5') | SEG-B2 | 09/02/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B2B(0.5-1') | SEG-B2 | 09/02/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B2B(1-1.5') | SEG-B2 | 09/02/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B2B(1.5-2') | SEG-B2 | 09/02/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B2B(2-2.5') | SEG-B2 | 09/02/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B3A(0-0.5') | SEG-B3 | 09/03/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B3A(0.5-1') | SEG-B3 | 09/03/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B3A(1-1.5') | SEG-B3 | 09/03/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B3A(1.5-2') | SEG-B3 | 09/03/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B3A(2-2.2') | SEG-B3 | 09/03/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B3B(0-0.5') | SEG-B3 | 09/03/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B3B(0.5-1') | SEG-B3 | 09/03/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B3B(1-1.5') | SEG-B3 | 09/03/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B3B(1.5-2') | SEG-B3 | 09/03/03 | AG13256-339 | ✔ | | | | | ✔ | | |
| SEG-B3B(2-2.4') | SEG-B3 | 09/03/03 | AG13256-339 & AG13304-23 | ✔ | | | | | ✔ | | |
| **Soil Samples - Collected from Operable Unit 1** | | | | | | | | | | | |
| OU1SS01 | CM1-SS1 | 08/21/02 | 020823ALCAN | ✔ | | | | | | | |
| OU1SS02 | CM1-SS2 | 08/21/02 | 020823ALCAN | ✔ | | | | | | | |
| OU1SSDUP1 (OU1SS02) | CM1-SS2 | 08/21/02 | 020823ALCAN | ✔ | | | | | | | |
| OU1SS03 | CM1-SS3 | 08/21/02 | 020823ALCAN | ✔ | | | | | | | |
| OU1SS04 | CM1-SS4 | 08/21/02 | 020823ALCAN | ✔ | | | | | | | |
| OU1SS05 | CM2-SS1 | 08/21/02 | 020823ALCAN | ✔ | | | | | | | |
| OU1SS06 | CM2-SS2 | 08/21/02 | 020823ALCAN | ✔ | | | | | | | |
| OU1SS07 | CM2-SS3 | 08/21/02 | 020823ALCAN | ✔ | | | | | | | |
| OU1SS08 | CM2-SS4 | 08/21/02 | 020823ALCAN | ✔ | | | | | | | |
| OU1SS09 | 1B2-SS1 | 09/04/02 | 020906ALCAN | ✔ | | | | | | | |
| OU1SS10 | 1B2-SS2 | 09/04/02 | 020906ALCAN | ✔ | | | | | | | |
| OU1SS11 | 1B2-SS3 | 09/04/02 | 020906ALCAN | ✔ | | | | | | | |
| OU1SS12 | 1B2-SS4 | 09/04/02 | 020906ALCAN | ✔ | | | | | | | |
| OU1SS13 | P-SS01 | 08/26/02 | 020828ALCAN | ✔ | | | | | | | |
| OU1SS14 | P-SS02 | 08/26/02 | 020828ALCAN | ✔ | | | | | | | |
| OU1SS15 | P-SS03 | 08/26/02 | 020828ALCAN | ✔ | | | | | | | |
| OU1SS16 | P-SS04 | 09/03/02 | 020906ALCAN | ✔ | | | | | | | |

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Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
Analytical Sample Summary

| Sample I.D. | Location I.D. | Date Sampled | Sample Delivery Group | Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PCBs | Percent Lipids | VOCs | SVOCs & TAL Metals | TSS & Hardness | TOC | Grain Size, Specific Gravity, Organic Content | TPH |
| **Soil Samples - Collected from Operable Unit 1** | | | | | | | | | | | |
| OU1SS17 | P-SS05 | 09/03/02 | 020906ALCAN | ✔ | | | | | | | |
| OU1SSDUP2 (OU1SS17) | P-SS05 | 09/03/02 | 020906ALCAN | ✔ | | | | | | | |
| OU1SS18 | P-SS06 | 09/04/02 | 020906ALCAN | ✔ | | | | | | | |
| OU1SS19 | P-SS07 | 09/04/02 | 020906ALCAN | ✔ | | | | | | | |
| OU1SS20 | P-SS08 | 09/04/02 | 020906ALCAN | ✔ | | | | | | | |
| OU1SS21 | P-SS09 | 09/03/02 | 020906ALCAN | ✔ | | | | | | | |
| OU1SS22 | P-SS10 | 09/03/02 | 020906ALCAN | ✔ | | | | | | | |
| OU1SS23 | P-SS11 | 09/03/02 | 020906ALCAN | ✔ | | | | | | | |
| OU1SS24 | P-SS12 | 09/03/02 | 020906ALCAN | ✔ | | | | | | | |
| OU1SS25 | P-SS13 | 09/03/02 | 020906ALCAN | ✔ | | | | | | | |
| **Groundwater Samples - Collected from Operable Unit 2** | | | | | | | | | | | |
| MW-02 | MW-02 | 10/08/02 | 02100053ALCAN | ✔ | | ✔ | ✔ | | | | |
| MW-03 | MW-03 | 10/10/02 | 021014ALCAN | ✔ | | ✔ | ✔ | | | | |
| MW-04 | MW-04 | 10/10/02 | 021014ALCAN | ✔ | | ✔ | ✔ | | | | |
| MW-05 | MW-05 | 10/10/02 | 021014ALCAN | ✔ | | ✔ | ✔ | | | | |
| MW-06 | MW-06 | 10/08/02 | 02100053ALCAN | ✔ | | ✔ | ✔ | | | | |
| MW-07 | MW-07 | 10/15/02 | 021016ALCAN | ✔ | | ✔ | ✔ | | | | |
| MW-08 | MW-08 | 10/08/02 | 02100053ALCAN | ✔ | | ✔ | ✔ | | | | |
| MW-09 | MW-09 | 10/14/02 | 021016ALCAN | ✔ | | ✔ | ✔ | | | | |
| MW-10 | MW-10 | 10/08/02 | 02100053ALCAN | ✔ | | ✔* | ✔ | | | | |
| MW-10A | MW-10A | 10/14/02 | 021016ALCAN | | | ✔ | | | | | |
| MW-11 | MW-11 | 10/15/02 | 021016ALCAN | ✔ | | ✔ | ✔ | | | | |
| MWB-11 | MWB-11 | 10/08/02 | 02100053ALCAN | ✔ | | ✔ | ✔ | | | | |
| MWB-12 | MWB-12 | 10/10/02 | 021014ALCAN | ✔ | | ✔ | ✔ | | | | |
| DUP-1 (MWB-12) | MWB-12 | 10/10/02 | 021014ALCAN | ✔ | | ✔ | ✔ | | | | |
| MWB-13 | MWB-13 | 10/08/02 | 02100053ALCAN | ✔ | | ✔ | ✔ | | | | |
| SEG-A2 | SEG-A2 | 10/15/02 | 021016ALCAN | ✔ | | | | ✔ | | | |
| SEG-B3 | SEG-B3 | 10/15/02 | 021016ALCAN | ✔ | | | | ✔ | | | |
| SEG-C3 | SEG-C3 | 10/15/02 | 021016ALCAN | ✔ | | | | ✔ | | | |
| SEG-D5 | SEG-D5 | 10/15/02 | 021016ALCAN | ✔ | | | | ✔ | | | |
| **Biota Samples - Collected from Operable Unit 3** | | | | | | | | | | | |
| OU3AT01 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT02 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT03 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT04 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT05 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT06 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT07 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT08 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT09 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT10 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT11 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT12 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT13 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT14 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT15 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT16 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT17 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT18 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT19 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT20 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT21 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT22 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT23 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT24 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT25 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT26 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT27 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT28 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT29 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |
| OU3AT30 | Tributary 63 | 08/28/02 | 020830ALCAN | ✔ | ✔ | | | | | | |

**Table 1**

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**Analytical Sample Summary**

| Sample I.D. | Location I.D. | Date Sampled | Sample Delivery Group | Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PCBs | Percent Lipids | VOCs | SVOCs & TAL Metals | TSS & Hardness | TOC | Grain Size, Specific Gravity, Organic Content | TPH |
| **Biota Samples - Collected from Teal Marsh** | | | | | | | | | | | |
| TM01-01 | Teal Marsh | 07/08/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM01-02 | Teal Marsh | 07/08/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM01-05 | Teal Marsh | 07/10/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM01-06 | Teal Marsh | 07/10/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM01-07 | Teal Marsh | 07/10/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM01-08 | Teal Marsh | 07/10/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM01-09 | Teal Marsh | 07/10/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM01-10 | Teal Marsh | 07/10/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM01-11 | Teal Marsh | 07/10/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM01-12 | Teal Marsh | 07/10/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM01-13 | Teal Marsh | 07/10/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM01-14 | Teal Marsh | 07/10/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM01-15 | Teal Marsh | 07/10/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM01-16 | Teal Marsh | 07/10/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM01-17 | Teal Marsh | 07/10/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-01 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-02 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-03 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-04 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-05 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-06 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-07 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-08 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-09 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-10 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-11 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-12 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-13 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-14 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| TM02-15 | Teal Marsh | 07/02/03 | 03070259 | ✔ | ✔ | | | | | | |
| **Waste Characterization Samples** | | | | | | | | | | | |
| WC-1 | -- | 10/15/02 | 021016ALCAN | ✔ | | | | | | | |
| WC-2 | -- | 10/15/02 | 021016ALCAN | ✔ | | | | | | | |
| WW Tank | -- | 08/25/03 | | | | ✔ | ✔ | | | | |

__Notes:__

1. Samples were collected by Blasland, Bouck & Lee, Inc. (BBL) on the dates indicated.
2. Sample designations indicate the following:
   - OU1SD = Sediment sample collected from Operable Unit 1;
   - OU1SS = Soil sample collected from Operable Unit 1;
   - MW = Groundwater sample;
   - SEG = Surface water sample;
   - OU3SD = Sediment sample collected from Operable Unit 3;
   - OU3AT = Biota sample collected from Operable Unit 3;
   - WC = Waste characterization sample; and
   - DUP = Blind duplicate sample. The sample identification in parenthesis indicates the parent sample.
3. With the exception of sample WW Tank, all samples were analyzed by Northeast Analytical Services, Inc. of Schenectady, New York for the following constituents:
   - Polyclorinated biphenyls (PCBs) using site-specific SUCO-ERC method for all sample analyses with the exception of surface water samples. Surface water samples; were analyzed for PCBs using United States Environmental Protection Agency (USEPA) SW-846 Method 8082;
   - Percent solids using gravimetric sampling methods;
   - Percent lipids using NE 158_1.SOP;
   - Volatile organic compounds (VOCs) using USEPA SW-846 Method 8260:
   - Semi-volatile organic compounds (SVOCs) using USEPA SW-846 Method 8270;
   - Target Analyte List (TAL) inorganic constituents using USEPA SW-846 Method 6010;
   - Total suspended solids (TSS) using 160.1;
   - Hardness using ICP 200.7 (with the addition of calcium magnesium);
   - Total organic carbon (TOC) using Lloyd Kahn Method with the exception of water samples (USEPA SW-846 Method 9030);
   - Grain size using ASTM Standard 422D2216;
   - Specific gravity using ASTM Standard D 854;
   - Organic content using ASTM Standard D 2974; and
   - Total petroleum hydrocarbons (TPH) using USEPA SW-846 Method 8015.
4. Sample WW Tank was analyzed for liquid waste characterization parameters by Columbia Analytical Services, Inc. of Rochester New York.
5. * = Laboratory received sample container broken. Sample MW-10A was resubmitted the following week to cover VOC analysis.

**Table 2**

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**OU-1 Sediment Probing Summary**

| Location | Water Depth (inches) | Sediment Depth (inches) |
|---|---|---|
| AAA15.5 | 0 | 6 |
| AB06.5 | 0 | 12 |
| AB14.5 | 1.2 | 36 |
| AB15.5 | 0 | 3.6 |
| AB16.5 | 0 | 6 |
| AB17.5 | 0 | 12 |
| AB18.5 | 0 | 9.6 |
| B19 | 0 | 9.6 |
| B20 | 0 | 16.8 |
| BC05.5 | 0 | 38.4 |
| BC06.5 | 24 | 48 |
| BC07.5 | 14.4 | 32.4 |
| BC10.5 | 0 | 22.8 |
| BC11.5 | 0 | 24 |
| BC12.5 | 0 | 24 |
| BC13.5 | 0 | 30 |
| BC14.5 | 0 | 8.4 |
| BC15.5 | 0 | 13.2 |
| BC16.5 | 0 | 9.6 |
| BC17.5 | 0 | 38.4 |
| BC18.5 | 0 | 26.4 |
| BC19.5 | 0 | 15.6 |
| CD06.5 | 18 | 34.8 |
| CD07.5 | 0 | 36 |
| CD08.5 | 2.4 | 44.4 |
| CD12.5 | 0 | 12 |
| CD13.5 | 0 | 30 |
| CD14.5 | 0 | 24 |
| CD15.5 | 0 | 15.6 |
| CD18.5 | 0 | 12 |
| DE04.5 | 24 | 33.6 |
| DE05.5 | 24 | 27.6 |
| DE06.5 | 0 | 42 |
| DE07.5 | 0 | 12 |
| DE09.5 | 0 | 14.4 |
| DE10.5 | 0 | 12 |
| DE11.5 | 0 | 8.4 |
| DE17.5 | 0 | 12 |
| DE18 | 0 | 18 |
| DE18.5 | 0 | 12 |
| E05 | 0 | 4.8 |
| E18 | 0 | 10.8 |
| E18.5 | 0 | 9.6 |
| EF04.5 | 0 | 12 |
| EF05.5 | 0 | 14.4 |
| EF06.5 | 0 | 30 |
| EF08.5 | 0 | 15.6 |
| EF10.5 | 0 | 12 |
| EF11.5 | 0 | 13.2 |
| EF17.5 | 0 | 24 |
| EF18 | 0 | 25.2 |
| EF18.5 | 0 | 9.6 |
| F04 | 12 | 38.4 |
| F09 | 0 | 12 |
| F10 | 0 | 24 |
| F18.5 | 0 | 18 |
| FG02.5 | 36 | 36 |
| FG03.5 | 21.6 | 26.4 |
| FG17 | 0 | 14.4 |
| FG17.5 | 0 | 13.2 |
| FG18.5 | 0 | 12 |
| G17.5 | 0 | 24 |
| GH02.5 | 38.4 | 58.8 |
| GH03.5 | 30 | 96 |
| GH04.5 | 6 | 51.6 |
| HI01.5 | 24 | 60 |
| HI02.5 | 33.6 | 60 |
| HI03.5 | 30 | 61.2 |
| HI13.5 | 0 | 24 |
| HI14.5 | 0 | 13.2 |
| HI15.5 | 0 | 21.6 |
| HI16.5 | 0 | 6 |
| HI17.5 | 1 | 14.4 |
| HI18.5 | 0 | 18 |
| HI19.5 | 0 | 24 |
| IJ08.5 | 4.8 | 19.2 |
| IJ09.5 | 0 | 24 |
| IJ10.5 | 0 | 12 |
| IJ11.5 | 0 | 14.4 |
| IJ12.5 | 0 | 30 |
| IJ13.5 | 0 | 57.6 |
| IJ14.5 | 0 | 13.2 |
| IJ15.5 | 0 | 36 |
| JK08.5 | 0 | 48 |
| JK09.5 | 0 | 45.6 |
| JK10.5 | 0 | 16.8 |
| JK11.5 | 2.4 | 30 |
| JK12.5 | 0 | 72 |

Table 2

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
OU-1 Sediment Probing Summary

| Location | Water Depth (inches) | Sediment Depth (inches) |
|---|---|---|
| JK13.5 | 4.8 | 21.6 |
| KL12.5 | 0 | 15.6 |
| KL13 | 2.4 | 24 |
| KL09.5 | 0 | 13.2 |
| MN15 | 27.6 | 44.4 |
| N14 | 9.6 | 6 |
| N17 | 16.8 | 31.2 |
| ON17.5 | 0 | 18 |
| P16 | 24 | 33.6 |
| QR17 | 30 | 9.6 |
| NPIT-A | 0 | 8.4 |
| NPIT-B | -- | -- |
| NPIT-C | 19.2 | 33.6 |
| NPIT-D | 24 | 40.8 |
| NPIT-E | 31.2 | 36 |
| NPIT-F | 32.4 | 27.6 |
| NPIT-G | 34.8 | 27.6 |
| NPIT-H | 37.2 | 33.6 |
| NPIT-I | 38.4 | 37.2 |
| NPIT-J | 38.4 | 51.6 |
| NPIT-K | 38.4 | 36 |
| NPIT-L | 38.4 | 40.8 |
| NPIT-M | 36 | 42 |
| NPIT-N | 24 | 24 |
| NPIT-O | 7.2 | 14.4 |
| NPIT-P | 0 | 21.6 |
| NPIT-Q | -- | -- |

**Notes:**

1. Sediment probing was conducted by Blasland, Bouck & Lee, Inc. (BBL) between August 20 and September 3, 2002.
2. -- = Water and sediment depths at this transect location were not recorded.

..ble 3

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**Monitoring Well Construction Information Summary**

| Monitoring Well I.D. | Investigation by: | Date Installed | Ground Elevation (ft. AMSL) | Top of Casing Elevation (ft. AMSL) | Boring Depth (ft. bgs) | Well Depth (ft. bgs) | Screen Depth (ft. bgs) | Screen Elevation (ft. AMSL) | Midpoint Elev. (ft. AMSL) | Screened Formation/Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | D&M | 9/19/91 | 270.4 | 272.56 | 20.5 | 20.0 | 10-20 | 250.4-260.4 | 255.4 | Brown wet fine to coarse sand, little silt, trace clay & organics. |
| MW-2 | D&M | 9/19/91 | 260.7 | 262.96 | 19.0 | 18.6 | 4.6-18.6 | 242.1-256.1 | 249.1 | Brown-gray wet loose to very dense fine to coarse sand, some fine to medium gravel, trace silt. |
| MW-3 | D&M | 1/22/93 | 253.7 | 255.76 | 15.9 | 15.0 | 5-15 | 238.7-248.7 | 243.7 | Brown moist to wet medium dense to very dense fine to coarse sand, some fine to coarse gravel. |
| MW-4 | D&M | 1/21/93 | 252.9 | 255.09 | 7.4 | 7.3 | 3.3-7.3 | 245.6-249.6 | 247.6 | Brown to green moist to wet dense fine to coarse sand, some fine to coarse gravel, trace weathered sandstone. |
| MW-5 | D&M | 9/16/93 | 255.8 | 258.47 | 21.3 | 19.0 | 4-19 | 236.8-251.8 | 244.3 | Brown wet loose fine to coarse gravel, some fine to coarse sand, little peat. |
| MW-6 | D&M | 1/19/93 | 258.9 | 261.02 | 14.0 | 12.5 | 6.5-12.5 | 246.4-252.4 | 249.4 | Gray-brown dry to wet hard silt and fine to coarse gravel, little fine to coarse sand. |
| MW-7 | D&M | 1/20/93 | 266.7 | 268.94 | 14.8 | 14.5 | 4.5-14.5 | 252.2-262.2 | 257.2 | Brown moist medium dense fine to coarse sand, some silt, little fine to coarse gravel. |
| MW-8 | D&M | 1/21/93 | 265.7 | 267.84 | 24.1 | 23.5 | 7.5-23.5 | 242.2-258.2 | 250.2 | Gray wet medium dense fine to coarse sand and fine to medium gravel, little silt, trace clay. |
| MW-9 | D&M | 1/18/93 | 273.7 | 276.66 | 13.3 | 13.3 | 6.3-13.3 | 260.4-267.4 | 263.9 | Brown wet dense fine to coarse sand, some silt and fine to coarse gravel. |
| MW-10 | D&M | 9/16/93 | 269.4 | 271.95 | 17.8 | 17.8 | 7.8-17.8 | 251.6-261.6 | 256.6 | Brown-gray moist dense fine to coarse sand, little fine to coarse gravel, trace silt, trace cobbles. |
| MW-11 | BBL | 8/23/02 | 256.2 | 257.97 | 11.0 | 10.73 | 5.73-10.73 | 245.47-250.47 | 247.97 | Brown dry medium silt and fine to coarse gravel (sandstone), little fine to coarse sand. |
| MW-12 | BBL | 8/28/02 | 262.6 | 265.07 | 15.0 | 15.0 | 5.1-14.8 | 247.8-257.5 | 252.65 | Orange-brown to gray brown damp fine sand, silt, & weathered sandstone, trace medium gravel. |
| MWB-11 | BBL | 8/29/02 | 255.6 | 257.68 | 27.4 | 27.4 | 15.8-25.4 | 230.2-239.8 | 235.0 | Medium gray finely graded sandstone changing to dark gray finely graded sandstone. |
| MWB-12 | BBL | 8/29/02 | 259.4 | 262.41 | 28.7 | 28.7 | 18.65-28.25 | 231.15-240.75 | 235.95 | Greenish gray fine grained sandstone, slightly fractured, trace intermediate shale/clay fragments. |
| MWB-13 | BBL | 8/28/02 | 258.3 | 260.71 | 32.5 | 32.5 | 20.4-30 | 228.3-237.9 | 233.1 | Medium gray fine graded sandstone, slightly fractured interbedded with moderately fractured friable medium to dark gray shale, silty clay evident in shale fragments. |

**Notes:**
1. ft. AMSL = Feet Above Mean Sea Level (NGVD datum of 1929).
2. bgs - Below ground surface.
3. BBL = Blasland, Bouck & Lee, Inc. installed during 2002.
4. D&M = Dames & Moore installed between 1991 and 1994.
5. Prepared by BBL.

1/21/2004
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Table 4

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
OU-1 Sediment Analytical Results

| Sample ID | Location | Depth Interval (feet) | Water Depth (feet) | PCB Sediment Criteria (ppm) Human Health Bioaccumulation | Benthic Aquatic Life Acute | Benthic Aquatic Life Chronic | Wildlife Bioaccumulation | Total PCBs (ppm) | TOC (ppm) |
|---|---|---|---|---|---|---|---|---|---|
| Marsh 1 | | | | | | | | | |
| OU1SD03 | HI15.5 | 0-0.5 | 0 | 4.07E-05 | 140.52 | 0.9824 | 0.0713 | 151 J | 50,900 |
| OU1SD03 | HI15.5 | 0.5-1 | 0 | 2.67E-04 | 922.11 | 6.4462 | 0.4676 | 23.73 | 334,000 |
| OU1SD03 | HI15.5 | 1-1.3 | 0 | 1.29E-04 | 444.49 | 3.1073 | 0.2254 | 33.96 J | 161,000 |
| OU1SD04 | HI18.5 | 0-0.5 | 0 | 1.13E-04 | 389.27 | 2.7213 | 0.1974 | 2.78 | 141,000 |
| OU1SD04 | HI18.5 | 0.5-1 | 0 | 6.06E-05 | 209.27 | 1.4629 | 0.1061 | 8.18 J | 75,800 |
| OU1SD04 | HI18.5 | 1-1.2 | 0 | 9.52E-06 | 32.85 | 0.2297 | 0.0167 | 0.21 J | 11,900 |
| OU1SD05 | IJ13.5 | 0-0.5 | 0 | 1.50E-04 | 519.03 | 3.6284 | 0.2632 | 0.68 J | 188,000 |
| OU1SD05 | IJ13.5 | 0.5-1 | 0 | 5.02E-04 | 1,733.78 | 12.1204 | 0.8792 | 134.1 J | 628,000 |
| OU1SD05 | IJ13.5 | 1-1.5 | 0 | 3.57E-04 | 1,231.32 | 8.6078 | 0.6244 | 123.2 J | 446,000 |
| OU1SD05 | IJ13.5 | 1.5-2 | 0 | 3.50E-04 | 1,206.47 | 8.4341 | 0.6118 | 36.38 J | 437,000 |
| IJ13.5A (2-2.5') | IJ13.5 | 2-2.5 | 0 | 2.52E-04 | 869.65 | 6.0795 | 0.4410 | < 0.410 | 315,000 |
| IJ13.5A (2.5-3') | IJ13.5 | 2.5-3 | 0 | 8.24E-05 | 284.36 | 1.9879 | 0.1442 | < 0.221 | 103,000 |
| IJ13.5A (3-3.5') | IJ13.5 | 3-3.5 | 0 | 2.52E-05 | 86.97 | 0.6080 | 0.0441 | < 0.177 | 31,500 |
| IJ13.5A (3.5-4') | IJ13.5 | 3.5-4 | 0 | 3.90E-04 | 1,344.51 | 9.3991 | 0.6818 | < 0.645 | 487,000 |
| IJ13.5A (4-4.6') | IJ13.5 | 4-4.6 | 0 | 3.04E-04 | 1,049.10 | 7.3340 | 0.5320 | < 0.519 | 380,000 |
| OU1SD06 | JK09.5 | 0-0.5 | 0 | 9.84E-05 | 339.58 | 2.3739 | 0.1722 | 223.00 | 123,000 |
| OU1SD06 | JK09.5 | 0.5-1 | 0 | 3.77E-04 | 1,300.34 | 9.0903 | 0.6594 | 42.80 | 471,000 |
| OU1SD06 | JK09.5 | 1-1.5 | 0 | 4.62E-04 | 1,592.98 | 11.1361 | 0.8078 | 14.6 J | 577,000 |
| OU1SD06 | JK09.5 | 1.5-2 | 0 | 3.63E-04 | 1,253.40 | 8.7622 | 0.6356 | < 0.586 | 454,000 |
| OU1SD07 | JK11.5 | 0-0.5 | 0.2 | 3.35E-04 | 1,156.78 | 8.0867 | 0.5866 | 34.67 J | 419,000 |
| OU1SD07 | JK11.5 | 0.5-1 | 0.2 | 3.28E-04 | 1,131.93 | 7.9130 | 0.5740 | 2.06 | 410,000 |
| OU1SDDUP3 [OU1SD07 (0.5-1.0)] | JK11.5 | 0.5-1 | 0.2 | 3.14E-04 | 1,082.23 | 7.5656 | 0.5488 | 1.35 | 392,000 |
| OU1SD07 | JK11.5 | 1-1.5 | 0.2 | 2.72E-04 | 938.67 | 6.5620 | 0.4760 | < 0.47 | 340,000 |
| OU1SD07 | JK11.5 | 1.5-1.7 | 0.2 | 1.16E-04 | 400.32 | 2.7985 | 0.2030 | < 0.27 | 145,000 |
| OU1SD08 | KL13 | 0-0.5 | 0.2 | 8.88E-06 | 30.64 | 0.2142 | 0.0155 | 1.17 J | 11,100 |
| OU1SD08 | KL13 | 0.5-1 | 0.2 | 1.84E-04 | 634.98 | 4.4390 | 0.3220 | 2.83 J | 230,000 |
| OU1SD08 | KL13 | 1-1.5 | 0.2 | 1.70E-04 | 585.29 | 4.0916 | 0.2968 | < 0.37 | 212,000 |
| OU1SD08 | KL13 | 1.5-2 | 0.2 | 1.25E-04 | 430.68 | 3.0108 | 0.2184 | < 0.30 | 156,000 |
| Marsh 2 | | | | | | | | | |
| OU1SD12 | AB07.5 | 0-0.5 | 1.9 | 1.04E-04 | 358.90 | 2.5090 | 0.1820 | 6.21 J | 130,000 |
| OU1SD12 | AB07.5 | 0.5-1 | 1.9 | 5.14E-05 | 177.24 | 1.2391 | 0.0899 | 0.29 | 64,200 |
| OU1SD12 | AB07.5 | 1-1.4 | 1.9 | 1.57E-05 | 54.11 | 0.3783 | 0.0274 | < 0.13 | 19,600 |
| OU1SD13 | CD05.5 | 0-0.5 | 1.2 | 9.28E-05 | 320.25 | 2.2388 | 0.1624 | 10.75 J | 116,000 |
| OU1SD13 | CD05.5 | 0.5-1 | 1.2 | 9.52E-05 | 328.54 | 2.2967 | 0.1666 | 15.67 J | 119,000 |
| OU1SD13 | CD05.5 | 1-1.5 | 1.2 | 1.18E-04 | 405.84 | 2.8371 | 0.2058 | 0.97 | 147,000 |
| OU1SD13 | CD05.5 | 1.5-2 | 1.2 | 2.38E-05 | 82.27 | 0.5751 | 0.0417 | < 0.16 | 29,800 |
| OU1SD14 | DE06.5 | 0-0.5 | 0 | 1.15E-04 | 397.56 | 2.7792 | 0.2016 | 12.65 | 144,000 |
| OU1SD14 | DE06.5 | 0.5-1 | 0 | 1.19E-04 | 411.36 | 2.8757 | 0.2086 | 30.81 J | 149,000 |
| OU1SD14 | DE06.5 | 1-1.5 | 0 | 1.16E-04 | 400.32 | 2.7985 | 0.2030 | 33.99 J | 145,000 |
| OU1SD14 | DE06.5 | 1.5-2 | 0 | 1.36E-04 | 469.34 | 3.2810 | 0.2380 | 55.30 J | 170,000 |
| OU1SD15 | DE04.5 | 0-0.5 | 1.7 | 7.29E-05 | 251.51 | 1.7582 | 0.1275 | 0.55 | 91,100 |
| OU1SD15 | DE04.5 | 0.5-1 | 1.7 | 1.09E-05 | 37.55 | 0.2625 | 0.0190 | < 0.14 | 13,600 |
| DE06.5A (2-2.5') | DE06.5 | 2-2.5 | 0 | 1.84E-04 | 634.98 | 4.4390 | 0.3220 | 72.40 | 230,000 |
| DE06.5A (2.5-3') | DE06.5 | 2.5-3 | 0 | 1.92E-04 | 662.59 | 4.6320 | 0.3360 | 43.10 | 240,000 |
| DE06.5A (3-3.4') | DE06.5 | 3-3.4 | 0 | 3.39E-04 | 1,170.58 | 8.1832 | 0.5936 | 16.65 J | 424,000 |
| OU1SD16 | EF10.5 | 0-0.5 | 0 | 2.26E-04 | 778.55 | 5.4426 | 0.3948 | 7.29 J | 282,000 |
| OU1SD16 | EF10.5 | 0.5-1 | 0 | 2.42E-05 | 83.65 | 0.5848 | 0.0424 | 2.15 J | 30,300 |
| OU1SDDUP4 [OU1SD16 (0.5-1.0)] | EF10.5 | 0.5-1 | 0 | 2.41E-05 | 83.10 | 0.5809 | 0.0421 | 2.04 J | 30,100 |

Table 4

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
OU-1 Sediment Analytical Results

| Sample ID | Location | Depth (feet) | Water Depth (feet) | PCB Sediment Criteria (ppm) | | | | Total PCBs (ppm) | TOC (ppm) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Human Health Bioaccumulation | Benthic Aquatic Life Acute | Benthic Aquatic Life Chronic | Wildlife Bioaccumulation | | |
| Marsh 3 | | | | | | | | | |
| OU1SD17 | B16.5 | 0-0.5 | 0 | 6.14E-05 | 211.75 | 1.4803 | 0.1074 | 126.61 J | 76,700 |
| OU1SD17 | B16.5 | 0.5-0.8 | 0 | 3.74E-05 | 129.21 | 0.9032 | 0.0655 | 16.94 J | 46,800 |
| OU1SD18 | B20 | 0-0.5 | 0 | 7.61E-05 | 262.55 | 1.8354 | 0.1331 | 4.83 J | 95,100 |
| OU1SD18 | B20 | 0.5-1 | 0 | 1.95E-05 | 67.36 | 0.4709 | 0.0342 | 0.47 | 24,400 |
| OU1SD18 | B20 | 1-1.4 | 0 | 9.20E-07 | 3.17 | 0.0222 | 0.0016 | < 0.12 J | 1,150 |
| OU1SD19 | BC11.5 | 0-0.5 | 0 | 4.62E-05 | 159.57 | 1.1155 | 0.0809 | 29.30 J | 57,800 |
| OU1SD19 | BC11.5 | 0.5-1 | 0 | 2.18E-05 | 75.37 | 0.5269 | 0.0382 | 0.23 J | 27,300 |
| OU1SDDUP6 [OU1SD19 (0.5-1.0)] | BC11.5 | 0.5-1 | 0 | 6.38E-05 | 220.31 | 1.5401 | 0.1117 | 41.75 | 79,800 |
| OU1SD19 | BC11.5 | 1-1.5 | 0 | 1.72E-05 | 59.36 | 0.4150 | 0.0301 | 0.45 J | 21,500 |
| OU1SD19 | BC11.5 | 1.5-2 | 0 | 7.42E-06 | 25.59 | 0.1789 | 0.0130 | < 0.13 | 9,270 |
| OU1SD20 | BC14.5 | 0-0.5 | 0 | 3.36E-05 | 115.95 | 0.8106 | 0.0588 | 107.83 | 42,000 |
| OU1SD20 | BC14.5 | 0.5-0.7 | 0 | 2.40E-05 | 82.82 | 0.5790 | 0.0420 | 1.21 | 30,000 |
| OU1SD21 | CD15.5 | 0-0.5 | 0 | 3.65E-04 | 1,258.92 | 8.8008 | 0.6384 | 341.00 J | 456,000 |
| OU1SDDUP5 [OU1SD21 (0-0.5)] | CD15.5 | 0-0.5 | 0 | 2.38E-04 | 819.96 | 5.7321 | 0.4158 | 18.82 J | 297,000 |
| OU1SD21 | CD15.5 | 0.5-1 | 0 | 2.24E-04 | 773.02 | 5.4040 | 0.3920 | 23.11 J | 280,000 |
| OU1SD22 | DE18.5 | 0-0.5 | 0 | 3.07E-05 | 106.01 | 0.7411 | 0.0538 | 27.05 | 38,400 |
| OU1SD22 | DE18.5 | 0.5-1 | 0 | 1.19E-05 | 41.14 | 0.2876 | 0.0209 | 12.62 | 14,900 |
| OU1SD23 | EF18 | 0-0.5 | 0 | 1.41E-04 | 485.90 | 3.3968 | 0.2464 | 1,275.30 J | 176,000 |
| OU1SD23 | EF18 | 0.5-1 | 0 | 3.70E-05 | 127.55 | 0.8917 | 0.0647 | 48.60 | 46,200 |
| OU1SD23 | EF18 | 1-1.5 | 0 | 1.24E-05 | 42.79 | 0.2992 | 0.0217 | 1.02 | 15,500 |
| OU1SD23 | EF18 | 1.5-2 | 0 | 3.26E-06 | 11.24 | 0.0786 | 0.0057 | 0.60 | 4,070 |
| OU1SD24 | FG17.5 | 0-0.5 | 0 | 6.25E-05 | 215.62 | 1.5073 | 0.1093 | 61.10 | 78,100 |
| OU1SD24 | FG17.5 | 0.5-1 | 0 | 1.13E-05 | 38.93 | 0.2721 | 0.0197 | 1.32 J | 14,100 |
| OU1SD24 | FG17.5 | 1-1.5 | 0 | 6.95E-06 | 23.99 | 0.1677 | 0.0122 | 7.60 | 8,690 |
| North Pond 1 | | | | | | | | | |
| OU1SD01 | N17 | 0-0.5 | 1.4 | 5.25E-05 | 181.11 | 1.2661 | 0.0918 | 2.57 J | 65,600 |
| OU1SD01 | N17 | 0.5-1 | 1.4 | 8.80E-05 | 303.69 | 2.1230 | 0.1540 | 4.15 J | 110,000 |
| OU1SD01 | N17 | 1-1.5 | 1.4 | 7.38E-05 | 254.82 | 1.7814 | 0.1292 | 9.60 J | 92,300 |
| OU1SDDUP2 [OU1SD01 (1.0-1.5)] | N17 | 1-1.5 | 1.4 | 8.64E-05 | 298.17 | 2.0844 | 0.1512 | 13.11 J | 108,000 |
| OU1SD01 | N17 | 1.5-1.9 | 1.4 | 1.82E-05 | 62.95 | 0.4400 | 0.0319 | < 0.16 | 22,800 |
| OU1SD02 | P16 | 0-0.5 | 2 | 4.10E-05 | 141.63 | 0.9901 | 0.0718 | 3.28 J | 51,300 |
| OU1SD02 | P16 | 0.5-1 | 2 | 2.65E-05 | 91.38 | 0.6388 | 0.0463 | 39.20 J | 33,100 |
| OU1SD02 | P16 | 1-1.5 | 2 | 1.73E-05 | 59.63 | 0.4169 | 0.0302 | 12.10 J | 21,600 |
| OU1SD02 | P16 | 1.5-2.1 | 2 | 6.16E-05 | 212.58 | 1.4861 | 0.1078 | 3.87 J | 77,000 |
| OU1SD25 | MN15 | 0-0.5 | 2.3 | 3.06E-05 | 105.74 | 0.7392 | 0.0536 | 1.05 J | 38,300 |
| OU1SD25 | MN15 | 0.5-1 | 2.3 | 3.06E-05 | 105.46 | 0.7373 | 0.0535 | 2.65 J | 38,200 |
| OU1SD25 | MN15 | 1-1.5 | 2.3 | 5.28E-05 | 182.21 | 1.2738 | 0.0924 | 17.67 J | 66,000 |
| OU1SD25 | MN15 | 1.5-2 | 2.3 | 3.30E-05 | 113.74 | 0.7952 | 0.0577 | 81.00 J | 41,200 |
| NP1T-J (0-0.5') | N. Pond 1 | 0-0.5 | 2.8 | 3.48E-05 | 120.09 | 0.8396 | 0.0609 | 1.756 | 43,500 |
| NP1T-J (0.5-1') | N. Pond 1 | 0.5-1 | 2.8 | 3.38E-05 | 116.78 | 0.8164 | 0.0592 | 2.188 | 42,300 |
| NP1T-J (1-1.5') | N. Pond 1 | 1-1.5 | 2.8 | 2.90E-05 | 99.94 | 0.6987 | 0.0507 | 3.182 | 36,200 |
| NP1T-J (1.5-2') | N. Pond 1 | 1.5-2 | 2.8 | 3.62E-05 | 124.79 | 0.8724 | 0.0633 | 2.88 J | 45,200 |
| DUP-2 [NP1T-J (1.5-2')] | N. Pond 1 | 1.5-2 | 2.8 | 3.38E-05 | 116.78 | 0.8164 | 0.0592 | 23.85 | 42,300 |
| NP1T-J (2-2.5') | N. Pond 1 | 2-2.5 | 2.8 | 5.69E-05 | 196.29 | 1.3722 | 0.0995 | 79.4 | 71,100 |
| NP1T-J (2.5-3') | N. Pond 1 | 2.5-3 | 2.8 | 3.45E-05 | 118.99 | 0.8318 | 0.0603 | 94.08 | 43,100 |

Table 4

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**OU-1 Sediment Analytical Results**

| Sample ID | Location | Depth (feet) | Water Depth (feet) | PCB Sediment Criteria (ppm) | | | | Total PCBs (ppm) | TOC (ppm) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Human Health Bioaccumulation | Benthic Aquatic Life Acute | Benthic Aquatic Life Chronic | Wildlife Bioaccumulation | | |
| North Pond 1 (Continued) | | | | | | | | | |
| NP1T-J (3-3.5') | N. Pond 1 | 3-3.5 | 2.8 | 8.56E-06 | 29.54 | 0.2065 | 0.0150 | 47.40 | 10,700 |
| NP1T-J (3.5-4') | N. Pond 1 | 3.5-4 | 2.8 | 1.84E-06 | 6.35 | 0.0444 | 0.0032 | 8.29 | 2,300 |
| North Pond 2 | | | | | | | | | |
| OU1SD09 | F04 | 0-0.5 | 1 | 7.18E-05 | 247.64 | 1.7312 | 0.1256 | 4.78 J | 89,700 |
| OU1SD09 | F04 | 0.5-1 | 1 | 5.93E-05 | 204.58 | 1.4301 | 0.1037 | 4.77 J | 74,100 |
| OU1SD09 | F04 | 1-1.5 | 1 | 6.50E-05 | 224.18 | 1.5672 | 0.1137 | 6.75 J | 81,200 |
| OU1SD09 | F04 | 1.5-2 | 1 | 3.52E-05 | 121.48 | 0.8492 | 0.0616 | < 0.19 | 44,000 |
| OU1SD09 | F04 | 2-2.5 | 1 | 1.11E-05 | 38.38 | 0.2683 | 0.0195 | < 0.16 | 13,900 |
| OU1SD09 | F04 | 2.5-2.7 | 1 | 4.56E-06 | 15.74 | 0.1100 | 0.0080 | < 0.13 | 5,700 |
| OU1SD10 | FG02.5 | 0-0.5 | 3 | 5.86E-05 | 202.09 | 1.4128 | 0.1025 | 5.86 J | 73,200 |
| OU1SD10 | FG02.5 | 0.5-1 | 3 | 5.90E-05 | 203.47 | 1.4224 | 0.1032 | 9.12 J | 73,700 |
| OU1SD10 | FG02.5 | 1-1.6 | 3 | 7.43E-05 | 256.48 | 1.7930 | 0.1301 | 42.30 J | 92,900 |
| OU1SD11 | H12.5 | 0-0.5 | 2.8 | 8.32E-05 | 287.12 | 2.0072 | 0.1456 | 2.62 J | 104,000 |
| OU1SD11 | H12.5 | 0.5-1 | 2.8 | 7.93E-05 | 273.60 | 1.9126 | 0.1387 | 4.79 J | 99,100 |
| OU1SD11 | H12.5 | 1-1.5 | 2.8 | 6.12E-05 | 211.20 | 1.4765 | 0.1071 | 4.69 J | 76,500 |
| OU1SD11 | H12.5 | 1.5-2 | 2.8 | 6.29E-05 | 217.00 | 1.5170 | 0.1100 | 12.74 J | 78,600 |
| OU1SD11 | H12.5 | 2-2.5 | 2.8 | 9.60E-05 | 331.30 | 2.3160 | 0.1680 | 43.50 J | 120,000 |
| OU1SDDUP1 [OU1SD11 (2.0-2.5)] | H12.5 | 2-2.5 | 2.8 | 8.32E-05 | 287.12 | 2.0072 | 0.1456 | 37.32 J | 104,000 |
| OU1SD11 | H12.5 | 2.5-3 | 2.8 | 5.14E-05 | 177.52 | 1.2410 | 0.0900 | 1.57 J | 64,300 |
| OU1SD11 | H12.5 | 3-3.5 | 2.8 | 3.44E-05 | 118.71 | 0.8299 | 0.0602 | 0.26 | 43,000 |
| OU1SD11 | H12.5 | 3.5-4 | 2.8 | 7.48E-06 | 25.81 | 0.1805 | 0.0131 | 0.74 | 9,350 |
| OU1SD11 | H12.5 | 4-4.6 | 2.8 | 3.09E-06 | 10.66 | 0.0745 | 0.0054 | < 0.12 | 3,860 |
| GH03.5 (0-0.5') | GH03.5 | 0-0.5 | 0.5 | 5.43E-05 | 187.46 | 1.3105 | 0.0951 | 12.59 J | 67,900 |
| GH03.5 (0.5-1') | GH03.5 | 0.5-1 | 0.5 | 6.80E-05 | 234.67 | 1.6405 | 0.1190 | 11.30 | 85,000 |
| GH03.5 (1-1.5') | GH03.5 | 1-1.5 | 0.5 | 7.26E-05 | 250.40 | 1.7505 | 0.1270 | 22.38 J | 90,700 |
| GH03.5 (1.5-2') | GH03.5 | 1.5-2 | 0.5 | 6.00E-05 | 207.06 | 1.4475 | 0.1050 | 53.32 | 75,000 |
| GH03.5 (2-2.5') | GH03.5 | 2-2.5 | 0.5 | 8.64E-05 | 298.17 | 2.0844 | 0.1512 | 66.40 | 108,000 |
| DUP-3 [GH03.5 (2-2.5')] | GH03.5 | 2-2.5 | 0.5 | 7.59E-05 | 262.00 | 1.8316 | 0.1329 | 65.10 | 94,900 |
| GH03.5 (2.5-3') | GH03.5 | 2.5-3 | 0.5 | 9.76E-05 | 336.82 | 2.3546 | 0.1708 | 115.22 | 122,000 |
| GH03.5 (3-3.5') | GH03.5 | 3-3.5 | 0.5 | 1.09E-04 | 375.47 | 2.6248 | 0.1904 | 113.50 | 136,000 |
| GH03.5 (3.5-4') | GH03.5 | 3.5-4 | 0.5 | 7.60E-05 | 262.28 | 1.8335 | 0.1330 | 260.00 | 95,000 |
| GH03.5 (4-4.5') | GH03.5 | 4-4.5 | 0.5 | 2.06E-04 | 712.29 | 4.9794 | 0.3612 | 51.30 | 258,000 |
| GH03.5 (4.5-5') | GH03.5 | 4.5-5 | 0.5 | 2.07E-04 | 715.05 | 4.9987 | 0.3626 | 37.90 | 259,000 |
| GH03.5 (5-5.5') | GH03.5 | 5-5.5 | 0.5 | 3.10E-04 | 1,071.19 | 7.4884 | 0.5432 | 2.30 | 388,000 |
| GH03.5 (5.5-6') | GH03.5 | 5.5-6 | 0.5 | 4.33E-05 | 149.36 | 1.0441 | 0.0757 | < 0.185 | 54,100 |
| GH03.5 (6-6.5') | GH03.5 | 6-6.5 | 0.5 | 1.43E-05 | 49.42 | 0.3455 | 0.0251 | < 0.151 | 17,900 |
| GH03.5 (6.5-6.8') | GH03.5 | 6.5-6.8 | 0.5 | 3.83E-06 | 13.22 | 0.0924 | 0.0067 | < 0.117 | 4,790 |

Table 4

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
OU-1 Sediment Analytical Results

Notes:

1. Samples were collected by Blasland, Bouck & Lee, Inc. (BBL) between August 22 and September 3, 2002.
2. Sample designations indicate the following:
   - OU1SD = Sediment sample collected from Operable Unit 1;
   - DUP = Blind duplicate sample with the parent sample identified in parenthesis.
3. Samples were analyzed by Northeast Analytical Inc. of Schenectady, New York for the following constituents:
   - Polyclorinated biphenyls (PCBs) using site-specific SUCO-ERC method;
   - Total Organic Carbon (TOC) using USEPA Lloyd Kahn Method.
4. All results are presented in parts per million (ppm) which is equivalent to milligrams per kilogram (mg/kg)
5. < = No Aroclors were detected at a concentration exceeding the reported laboratory detection limit.
6. J = Estimated value that is below practical quantitation limit.
7. New York State Department of Environmental Conservation (NYSDEC) sediment criteria were calculated using the human health bioaccumulation and three ecological risk-based levels of protection (benthic aquatic life acute toxicity, benthic aquatic life chronic toxicity, and wildlife bioaccumulation) presented in the NYSDEC Division of Fish, Wildlife, and Marine Resources document entitled, " Technical Guidance for Screening Contaminated Sediments," dated January 1999, and the concentration of TOC detected in the individual sediment samples.
8. NA = Constituent not analyzed.
9. ND = Value not determined.
10. Analytical results have been validated by BBL.

Table 5

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**Surface Water Elevations**

| Staff Gauge ID | Location | Date Measured | Surface Water Elevations | | |
|---|---|---|---|---|---|
| | | | Reference Elevation (ft) | Depth to Water (ft) | Surface Water Elevation (ft) |
| Gauge 1 | Marsh No. 3 | 3-Sep-02 | 246.82 | -- | 246.82 |
| | | 6-Sep-02 | | -- | 246.82 |
| Gauge 2 | Walking Bridge/ Fish Weir | 3-Sep-02 | 246.16 | 2.51 | 248.67 |
| | | 6-Sep-02 | | 2.50 | 248.66 |
| Gauge 3 | Marsh No. 2 | 3-Sep-02 | 248.18 | -- | -- |
| | | 6-Sep-02 | | 0.60* | Dry at 248.78 |
| | | Jun-03 | | 2.70 | 250.88 |
| | | Jul-03 | | 2.30 | 250.48 |
| | | Aug-03 | | 2.00 | 250.18 |
| | | Sep-03 | | 0.00 | 248.18 |
| | | Oct-03 | | 0.80 | 248.98 |
| Gauge 4 | Marsh No. 2 | 3-Sep-02 | -- | -- | -- |
| | | 6-Sep-02 | | -- | -- |
| Gauge 5 | North Pond No. 2 | 3-Sep-02 | 248.92 | 2.00 | 250.92 |
| | | 6-Sep-02 | | 1.95 | 250.87 |
| | | Jun-03 | | 2.40 | 251.32 |
| | | Jul-03 | | 2.20 | 251.12 |
| | | Aug-03 | | 1.90 | 250.82 |
| | | Sep-03 | | 2.00 | 250.92 |
| | | Oct-03 | | 2.10 | 251.02 |
| Gauge 6 | Marsh No. 1 | 3-Sep-02 | 251.78 | -- | -- |
| | | 6-Sep-02 | | 0.80 | 252.58 |
| Gauge 7 | Marsh No. 1 | 3-Sep-02 | 252.64 | -0.20* | Dry at 252.44 |
| | | 6-Sep-02 | | -0.20* | Dry at 252.44 |
| Gauge 8 | North Pond No. 1 | 3-Sep-02 | 254.80 | 0.52 | 255.32 |
| | | 6-Sep-02 | | 0.50 | 255.30 |
| | | Jun-03 | | 0.80 | 255.60 |
| | | Jul-03 | | 0.80 | 255.60 |
| | | Aug-03 | | 0.80 | 255.60 |
| | | Sep-03 | | 0.80 | 255.60 |
| | | Oct-03 | | 0.80 | 255.60 |

**Notes:**
1. Measurements conducted by Blasland, Bouck & Lee, Inc. (BBL) or Alcan Aluminum Corp. on the dates indicated.
2. -- = Gauge location not measured on date indicated.
3. * = Location dry at reading indicated.

**Table 6**

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**Groundwater Elevations**

| Well ID | Location | Well Bottom Elevation (ft) | Reference Elevation (ft) | Groundwater Elevations (ft) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | October-02 | June-03 | July-03 | August-03 | September-03 | October-03 |
| MW-1 | North Ponds Area | 250.40 | 272.46 | 250.40 | 255.96 | 255.36 | 254.51 | 250.40 | 253.66 |
| MW-2 | Cold Mill Landfill | 242.10 | 262.79 | 250.59 | 251.59 | 251.14 | 250.99 | 250.69 | 250.79 |
| MW-3 | Marsh No. 3 | 238.70 | 255.56 | 244.93 | 248.21 | NM | NM | NM | NM |
| MW-4 | Marsh No. 2 | 245.60 | 254.90 | 247.99 | 248.55 | 248.10 | 247.90 | 246.80 | 247.10 |
| MW-5 | North Pond No. 2 | 236.80 | 258.31 | 247.45 | 249.06 | 248.71 | 248.66 | 248.41 | 248.11 |
| MW-6 | North Ponds Area | 246.40 | 260.86 | 247.99 | 246.40 | 246.40 | 246.40 | 247.91 | 247.91 |
| MW-7 | Main Landfill | 252.20 | 268.67 | 253.08 | 255.77 | 255.37 | 254.77 | 253.82 | 253.77 |
| MW-8 | Main Landfill | 242.20 | 267.66 | 252.56 | 254.01 | 253.51 | 253.86 | 252.71 | 252.86 |
| MW-9 | Main Landfill | 260.40 | 276.49 | 264.41 | NM | 265.34 | 265.19 | 264.34 | 264.79 |
| MW-10 | Main Landfill | 251.60 | 272.19 | 256.39 | 259.79 | 258.69 | 257.94 | 257.24 | 256.89 |
| MW-11 | North Ponds Area | 245.50 | 257.72 | 248.17 | 251.07 | 249.77 | 248.82 | 248.37 | 248.02 |
| MW-12 | North Ponds Area | 247.60 | 264.87 | 247.60 | 251.62 | 247.60 | 247.60 | 248.72 | 247.77 |
| MWB-11 | Marsh No. 1 | 228.20 | 257.51 | 250.70 | 251.71 | 251.41 | 251.51 | 250.71 | 250.91 |
| MWB-12 | Main Landfill | 230.70 | 262.07 | 251.33 | 252.67 | 252.17 | 252.07 | 251.32 | 251.42 |
| MWB-13 | North Ponds Area | 225.80 | 260.36 | 248.70 | 250.51 | 249.76 | 249.46 | 248.36 | 248.66 |

**Notes:**
1. Measurements conducted by Blasland, Bouck & Lee, Inc. (BBL) on the dates indicated.
2. When wells were reported dry groundwater elevations equal the well bottom.
3. NM = Well not measured during specified month.

248.17 MW 11 MW12 247.60 MW 13
250.70 MWB 11 MWB12 251.33 MWB13 248.70
-2.53 -3.73

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Table 7

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**OU-1 Cold Mill Landfill and Intake Backwash**
**Focused Surface Soil Analytical Results**

| Sample ID | Location | Total PCBs (ppm) |
|---|---|---|
| OU1SS01 | CM1-SS1 | **10.20 J** |
| OU1SS02 | CM1-SS2 | 0.62 J |
| OU1SSDUP1 (OU1SS02) | CM1-SS2 | 0.79 J |
| OU1SS03 | CM1-SS3 | < 0.11 |
| OU1SS04 | CM1-SS4 | 0.74 J |
| OU1SS05 | CM2-SS1 | **1.10 J** |
| OU1SS06 | CM2-SS2 | 0.54 J |
| OU1SS07 | CM2-SS3 | 0.32 J |
| OU1SS08 | CM2-SS4 | < 0.12 |
| OU1SS09 | IB2-SS1 | < 0.12 |
| OU1SS10 | IB2-SS2 | < 0.12 |
| OU1SS11 | IB2-SS3 | 0.80 J |
| OU1SS12 | IB2-SS4 | 0.38 |

**Notes:**

1. Samples were collected by Blasland, Bouck & Lee, Inc. (BBL) on August 21 and September 4, 2002.
2. Samples were analyzed by Northeast Analytical Inc. of Schenectady, New York for the following constituents:
   - Polyclorinated biphenyls (PCBs) using site-specific SUCO-ERC method; and
   - Percent solids using USEPA SW-846 Method 3545 Section 7.2.1.
3. All results are presented in parts per million (ppm) which is equivalent to milligrams per kilogram (mg/kg).
4. Samples were collected from the 0 to 6-inch depth interval.
5. DUP = Blind duplicate sample. The sample identification in parenthesis indicates the parent sample.
6. < = No Aroclors were detected at a concentration exceeding the reported laboratory detection limit.
7. J = Estimated value that is below practical quantitation limit.
8. Bold and shaded values indicate a PCB concentration exceeding the 1 ppm recommended surface soil cleanup objective presented in the NYSDEC document entitled, "Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels," HWR-94-4046 (TAGM 4046) dated January 24, 1994.
9. Analytical results have been validated by BBL.

Table 8

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**<u>OU-1 Perimeter Surface Soil Analytical Results</u>**

| Sample ID | Location | Total PCBs (ppm) |
|---|---|---|
| OU1SS13 | P-SS01 | < 0.11 |
| OU1SS14 | P-SS02 | **2.26** |
| OU1SS15 | P-SS03 | **3.52** |
| OU1SS16 | P-SS04 | < 0.11 |
| OU1SS17 | P-SS05 | < 0.11 |
| OU1SSDUP2 (OU1SS17) | P-SS05 | < 0.11 |
| OU1SS18 | P-SS06 | < 0.13 |
| OU1SS19 | P-SS07 | 0.14 J |
| OU1SS20 | P-SS08 | 0.39 |
| OU1SS21 | P-SS09 | < 0.16 |
| OU1SS22 | P-SS10 | 0.22 |
| OU1SS23 | P-SS11 | < 0.11 |
| OU1SS24 | P-SS12 | < 0.12 |
| OU1SS25 | P-SS13 | 0.32 |

**<u>Notes:</u>**

1. Samples were collected by Blasland, Bouck & Lee, Inc. (BBL) between August 26 and September 4, 2002.
2. Samples were analyzed by Northeast Analytical Inc. of Schenectady, New York for the following constituents:
   - Polyclorinated biphenyls (PCBs) using site-specific SUCO-ERC method; and
   - Percent solids using USEPA SW-846 Method 3545 Section 7.2.1.
3. All results are presented in parts per million (ppm) which is equivalent to milligrams per kilogram (mg/kg).
4. Samples were collected from the 0 to 6-inch depth interval.
5. DUP = Blind duplicate sample. The sample identification in parenthesis indicates the parent sample.
6. < = No Aroclors were detected at a concentration exceeding the reported laboratory detection limit.
7. Bold and shaded values indicate a PCB concentration exceeding the 1 ppm recommended surface soil cleanup objective presented in the NYSDEC document entitled, "Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels," HWR-94-4046 (TAGM 4046) dated January 24, 1994.
8. Analytical results have been validated by BBL.

**Table 9**

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**OU-2 Soil Cover Investigation Summary**

| Sample Identification | Total Depth Interval (ft) | Description/Comments |
|---|---|---|
| JK16 | 0-2.3 | *0-0.5':* Dark brown damp highly degraded natural organics (roots & leaf litter). |
| | | *0.5-2.3':* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine gravel. |
| JK17 | 0-2.4 | *0-0.4':* Dark brown damp highly degraded natural organics (leaf litter & roots), trace fine sand. |
| | | 0.4-2.4': Orange brown damp fine sand & silt, trace medium to coarse sand. |
| JK18 | 0-2.2 | *0-0.4':* Dark brown damp silt, trace fine sand & organics. |
| | | 0.4-1.4': Brown damp fine sand & silt, trace fine to medium gravel & medium to coarse sand. |
| | | *1.4-2.2':* Pulverized green-gray sandstone. |
| JK19 | 0-2.5 | *0-0.4':* Dark brown damp silt, trace fine sand & organics. |
| | | *0.4-0.8':* Pulverized sandstone. |
| | | *0.8-1.4':* Orange brown damp fine sand & silt, trace medium to coarse sand & fine gravel. |
| | | *1.4-2.0':* Pulverized sandstone. |
| | | *2.0-2.5':* Orange brown fine sand, silt & pulverized sandstone. |
| JK20 | 0-2.2 | *0-0.8'*: Dark brown damp fine sand & silt, trace medium to coarse sand & gravel, trace organics. |
| | | *0.8-1.1':* Pulverized sandstone. |
| | | *1.1-2.2'*: Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| JK21 | 0-2.0 | *0-0.8':* Dark brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| | | *0.8-1.3'*: Light gray brown damp fine sand & silt, trace medium to coarse sand, trace fine gravel. |
| | | *1.3-2.0':* Orange brown to gray brown fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| KL16 | 0-2.2 | *0-0.5':* Orange brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.5-2.2':* Pulverized sandstone and orange brown damp fine sand & silt. |
| | | *Note: location appears to be west of landfill extent.* |
| KL17 | 0-2.2 | *0-0.4':* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.4-2.2'*: Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |
| | | *Note: location appears to be west of landfill extent.* |
| KL18 | 0-2.8 | *0-0.3':* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-2.0':* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |
| | | *2.0-2.8':* Gray damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |

Table 9

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**OU-2 Soil Cover Investigation Summary**

| Sample Identification | Total Depth Interval (ft) | Description/Comments |
|---|---|---|
| KL19 | 0-2.5 | *0-0.3':* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-1.1':* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| | | *1.1-2.3':* Brownish gray pulvierzed sandstone. |
| | | *2.3-2.5':* Dark gray fine sand & silt, odor. |
| KL20 | 0-2.4 | *0-0.3':* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-1.2':* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| | | *1.2-2.4':* Brown to orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone, trace organics. |
| KL21 | 0-2.6 | *0-0.3':* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-1.6':* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |
| | | *1.6-2.6':* Brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |
| KL22 | 0-2.5 | *0-0.3':* Dark brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace organics. |
| | | *0.3-2.5':* Orange brown/gray brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| LM18 | 0-2.5 | *0-0.3':* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-0.6':* Pulverized sandstone. |
| | | *0.6-2.5':* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |
| LM19 | 0-2.7 | *0-0.3:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-2.7:* Orange brown damp fine sand and silt, trace medium to coarse sand, trace fine to medium gravel. |
| LM20 | 0-2.6 | *0-0.5:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.5-0.7:* Pulverized sandstone. |
| | | *0.7-1.05:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine gravel. |
| | | *1.05-1.5:* Pulverized sandstone. |
| | | *1.5-2.6:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |
| LM21 | 0-2.7 | *0-0.35:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.35-2.7:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |

Table 9

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**OU-2 Soil Cover Investigation Summary**

| Sample Identification | Total Depth Interval (ft) | Description/Comments |
|---|---|---|
| LM22 | 0-2.6 | *0-0.3:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-2.6:* Orange brown to gray brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |
| LM23 | 0-2.3 | *0-0.4:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.4-1.4:* Light gray brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| | | *1.4-2.3:* Brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace wood. |
| MN19 | 0-2.6 | *0-1.2:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| | | *1.2-2.6:* Gray brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |
| MN20 | 0-2.0 | *0-0.3:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-2.0:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine gravel. |
| MN21 | 0-2.2 | *0-0.3:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-0.65:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| | | *0.65-1.7:* Pulverized sandstone. |
| | | *1.7-2.2:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| MN22 | 0-1.6 | *0-0.3:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-1.6:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |
| MN23 | 0-2.3 | *0-0.3:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-2.3:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, oxidation, trace pulverized sandstone. |
| MN24 | 0-2.1 | *0-0.3:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-2.1:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |

**Table 9**

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**OU-2 Soil Cover Investigation Summary**

| Sample Identification | Total Depth Interval (ft) | Description/Comments |
|---|---|---|
| MN25 | 0-2.4 | *0-0.3:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-2.4:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |
| MN26 | 0-2.7 | *0-0.3:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-2.7:* Gray brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| NO20 | 0-2.4 | *0-0.3:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.3-1.4:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| | | *1.4-2.4:* Pulverized sandstone. |
| NO21 | 0-2.4 | *0-0.4:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.4-0.8:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| | | *0.8-1.6:* Pulverized sandstone. |
| | | *1.6-2.4:* Graybrown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| NO22 | 0-2.6 | *0-0.7:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel. |
| | | *0.7-2.6:* Gray brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |
| NO23 | 0-2.0 | *0-0.4:* Dark brown damp fine sand & silt, trace medium to coarse sand, trace organics. |
| | | *0.4-2.0:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |
| NO24 | 0-2.2 | *0-0.2:* Dark brown damp fine sand and silt, trace medium to coarse sand, trace organics. |
| | | *0.2-2.2:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |
| NO25 | 0-2.9 | *0-0.2:* Dark brown damp fine sand and silt, trace medium to coarse sand, trace organics. |
| | | *0.2-2.9:* Orange brown damp fine sand & silt, trace medium to coarse sand, trace fine to medium gravel, trace pulverized sandstone. |

**Note:**
1. Samples collected by Blasland, Bouck & Lee, Inc. (BBL) on September 4, 2002.

## Table 10

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**OU-2 Groundwater Analytical Results**

| Constituent | NYSDEC Groundwater Standards/Guidance Values (ppb) | MW-02 | MW-03 | MW-04 | MW-05 | MW-06 | MW-07 | MW-08 | MW-09 |
|---|---|---|---|---|---|---|---|---|---|
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | |
| Total PCBs (ppb) | 0.09* | < 0.025 | < 0.025 | < 0.025 | 0.083 | < 0.026 | 0.0656 | < 0.025 | < 0.025 |
| **Detected VOCs (ppb)** | | | | | | | | | |
| 1,1-Dichloroethane | 5 | < 10 | < 10 J | < 10 J | < 10 J | < 10 | < 10 | < 10 | < 10 |
| Acetone | 50 G | < 10 J | < 10 J | < 10 J | < 10 J | < 10 J | 5.79 J | < 10 J | < 10 J |
| Chloroethane | 5 | < 10 J | < 10 J | < 10 J | < 10 J | < 10 J | 20.8 J | < 10 J | < 10 J |
| **Detected SVOCs (ppb)** | | | | | | | | | |
| 1,2-Dichlorobenzene | 3 | < 9.26 | < 9.26 | < 9.26 | < 9.26 | < 10.2 | < 9.8 | < 9.26 | < 9.62 |
| 1,3-Dichlorobenzene | 3 | < 9.26 | < 9.26 | < 9.26 | < 9.26 | < 10.2 | < 9.8 | < 9.26 | < 9.62 |
| 1,4-Dichlorobenzene | 3 | < 9.26 | < 9.26 | < 9.26 | < 9.26 | < 10.2 | < 9.8 | < 9.26 | < 9.62 |
| Bis(2-Ethylhexyl)phthalate | 5 | 148 | 312 D | 222 D | 77.9 | 346 D | 88.7 | 97 | 426 D |
| Butylbenzylphthalate | 50 G | < 9.26 | < 9.26 | < 9.26 | < 9.26 | < 10.2 | 1.19 J | < 9.26 | 1.49 J |
| Di-n-butylphthalate | 50 | < 9.26 | < 9.26 | < 9.26 | < 9.26 | < 10.2 | < 9.8 | < 9.26 | < 9.62 |
| **Detected TAL Metals (ppb)** | | | | | | | | | |
| Barium | 1,000 | 346 | 25.5 | < 9.11 | 95.7 | 30.5 | 508 | 212 | 56.4 |
| Calcium | -- | 133,000 | 58,300 | 342 U | 101,000 | 57,200 | 139,000 | 179,000 | 46,700 |
| Iron | 300[1] | 18,700 | < 51.6 J | < 51.6 J | 3,470 J | < 289 | 63,300 | 27,300 | < 51.6 |
| Magnesium | 35,000 G | 51,800 J | 17,300 | < 95.9 | 22,900 | 15,500 J | 68,000 | 24,100 J | 14,000 |
| Manganese | 300[1] | 17,300 | < 5.44 | < 5.44 | 841 | < 59.7 | 23,100 | 2,610 | < 5.44 |
| Potassium | -- | 8,300 | 609 | < 390 | 5,050 | < 390 | 42,300 | 7,080 | 920 |
| Sodium | 20,000 | 8,690 | 8,070 | < 370 | 28,200 | 12,600 | 300,000 J | 46,900 | 18,800 J |
| Zinc | 2,000 | < 14.3 | < 14.3 | < 14.3 | < 14.3 | < 14.3 | < 14.3 | < 14.3 | 22 |

## Table 10

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**<u>OU-2 Groundwater Analytical Results</u>**

| Constituent | NYSDEC Groundwater Standards/Guidance Values (ppb) | MW-10 | MW-10A | MW-11 | MWB-11 | MWB-12 | DUP-1 (MWB-12) | MWB-13 |
|---|---|---|---|---|---|---|---|---|
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | |
| Total PCBs (ppb) | 0.09* | < 0.025 | NA | < 0.025 | < 0.025 | < 0.025 | < 0.025 | < 0.025 |
| **Detected VOCs (ppb)** | | | | | | | | |
| 1,1-Dichloroethane | 5 | NA | 11.8 | < 10 | < 10 | < 10 J | < 10 J | < 10 |
| Acetone | 50 G | NA | < 10 J | 2.90 J | < 10 J | < 10 J | < 10 J | < 10 J |
| Chloroethane | 5 | NA | < 10 J | < 10 J | < 10 J | < 10 J | < 10 J | < 10 J |
| **Detected SVOCs (ppb)** | | | | | | | | |
| 1,2-Dichlorobenzene | 3 | < 9.43 | NA | < 9.26 | < 9.43 | < 9.26 | 3.11 J | < 9.26 |
| 1,3-Dichlorobenzene | 3 | < 9.43 | NA | < 9.26 | < 9.43 | < 9.26 | 1.71 J | < 9.26 |
| 1,4-Dichlorobenzene | 3 | < 9.43 | NA | < 9.26 | < 9.43 | 3.53 J | 3.43 J | < 9.26 |
| Bis(2-Ethylhexyl)phthalate | 5 | 455 D | NA | 234 D | 147 | 352 D | 226 D | 122 |
| Butylbenzylphthalate | 50 G | < 9.43 | NA | 1.10 J | < 9.43 | 1.65 J | 1.06 J | < 9.26 |
| Di-n-butylphthalate | 50 | < 9.43 | NA | < 9.26 | < 9.43 | < 9.26 | 1.26 J | < 9.26 |
| **Detected TAL Metals (ppb)** | | | | | | | | |
| Barium | 1,000 | 572 | NA | 150 | 704 | 758 | 776 | 1730 |
| Calcium | -- | 150,000 | NA | 81,900 | 161,000 | 140,000 | 148,000 | 125,000 |
| Iron | 300[1] | 1,100 | NA | < 314 | 31,700 | < 407 J | < 437 J | 831 |
| Magnesium | 35,000 G | 35,700 J | NA | 33,400 | 59,800 J | 55,800 | 57,700 | 21,500 J |
| Manganese | 300[1] | 1,710 | NA | 3,390 | 27,500 | 12,500 | 13,000 | 245 |
| Potassium | -- | 4,510 | NA | 3,430 | 8,000 | 4,990 | 5,100 | 24,400 |
| Sodium | 20,000 | 28,000 | NA | 34,300 J | 113,000 | 72,200 | 79,700 | 56,200 |
| Zinc | 2,000 | < 14.3 | NA | < 14.3 | 15.3 | < 14.3 | < 14.3 | < 14.3 |

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**Table 10**

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**OU-2 Groundwater Analytical Results**

**Notes:**

1. Samples collected by Blasland, Bouck & Lee, Inc. (BBL) during October 2002.
2. Samples were analyzed by Northeast Analytical Inc. of Schenectady, New York for the following constituents:
   - Polyclorinated biphenyls (PCBs) using site-specific SUCO-ERC method; and
   - VOCs using USEPA SW-846 Method 8260;
   - SVOCs using USEPA SW-846 Method 8270; and
   - Target analyte list (TAL) metals using USEPA SW-846 Method 6010.
3. All results are presented in micrograms per kilogram (ug/kg) which is equivalent to parts per billion (ppb).
4. Sample designations indicate the following:
   - MW = Overburden groundwater sample;
   - MWB = Bedrock groundwater sample; and
   - DUP = Blind duplicate sample, with the parent sample identified in parenthesis.
5. < = Constituent was not detected at a concentration exceeding the reported laboratory detection limit.
6. J = Estimated value that is below practical quantitation limit.
7. B = The analyte was detected in the associated blank as well as in the sample.
8. D = Indicates the compound was identified in an analysis at a secondary dilution factor.
9. Groundwater Standards/Guidance Values presented in the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) document entitled "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations" (June 1998).
10. * = Applies to the sum of these substances.
11. 1 = Applies to the individual standard. The standard for the sum of these substances is 500 ppb.
12. -- = Class GA groundwater standard/guidance value was not listed for this compound in TOGS 1.1.1.
13. NA = Not analyzed.
14. Bold and shaded values indicate a concentration exceeding the water quality standards and guidance values presented in TOGS 1.1.1.
15. During shipping of samples collected from MW-10, VOC sample containers broke. BBL resubmitted VOC samples for MW-10 under a new name (MW-10A).
16. Analytical results were validated by BBL.

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Table 11

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
OU-3 Sediment Analytical Results

| Sample ID | Location | Depth Interval (ft) | PCB Sediment Criteria (ppm) | | | | Total PCBs (ppm) | TOC (ppm) | TPH (ppm) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Human Health Bioaccumulation | Benthic Aquatic Life Acute | Benthic Aquatic Life Chronic | Wildlife Bioaccumulation | | | |
| OU3SD01 | SEG-A1 | 0 - 0.5 | 5.79E-06 | 19.99 | 0.1397 | 0.0101 | < 0.12 | 7,240 J | NA |
| OU3SD02 | SEG-A2 | 0 - 0.5 | 5.48E-06 | 18.91 | 0.1322 | 0.0096 | < 0.14 | 6,850 J | NA |
| OU3SD03 | SEG-A3 | 0 - 0.5 | 6.75E-06 | 23.30 | 0.1629 | 0.0118 | < 0.13 | 8,440 J | NA |
| OU3SD04 | SEG-A4 | 0 - 0.5 | 1.22E-05 | 42.24 | 0.2953 | 0.0214 | < 0.12 | 15,300 J | NA |
| OU3SD05 | SEG-B1 | 0 - 0.5 | 1.39E-05 | 48.04 | 0.3358 | 0.0244 | 1.23 | 17,400 J | NA |
| OU3SDDUP2 [OU3SD05] | SEG-B1 | 0 - 0.5 | 1.73E-05 | 59.63 | 0.4169 | 0.0302 | 2.57 J | 21,600 J | NA |
| OU3SD06 | SEG-B2 | 0 - 0.5 | 8.80E-05 | 303.69 | 2.1230 | 0.1540 | 107.9 J | 110,000 J | NA |
| OU3SD07 | SEG-B3 | 0 - 0.5 | 1.78E-05 | 61.57 | 0.4304 | 0.0312 | 23.57 | 22,300 | NA |
| OU3SD08 | SEG-B4 | 0 - 0.5 | 8.08E-06 | 27.88 | 0.1949 | 0.0141 | 4.75 J | 10,100 | NA |
| OU3SD09 | SEG-C1 | 0 - 0.5 | 9.76E-06 | 33.68 | 0.2355 | 0.0171 | 0.54 | 12,200 | NA |
| OU3SD10 | SEG-C2 | 0 - 0.5 | 1.22E-05 | 41.96 | 0.2934 | 0.0213 | 2.45 | 15,200 J | NA |
| OU3SD11 | SEG-C3 | 0 - 0.5 | 5.58E-06 | 19.27 | 0.1347 | 0.0098 | < 0.14 | 6,980 | NA |
| OU3SD12 | SEG-C4 | 0 - 0.5 | 8.24E-06 | 28.44 | 0.1988 | 0.0144 | < 0.15 | 10,300 | NA |
| OU3SD13 | SEG-D1 | 0 - 0.5 | 4.26E-04 | 1,471.51 | 10.2869 | 0.7462 | < 1.09 | 533,000 | NA |
| OU3SD14 | SEG-D2 | 0 - 0.5 | 2.79E-04 | 963.52 | 6.7357 | 0.4886 | < 0.87 | 349,000 | NA |
| OU3SD15 | SEG-D3 | 0 - 0.5 | 3.66E-04 | 1,261.69 | 8.8201 | 0.6398 | < 0.74 | 457,000 | NA |
| OU3SDDUP1 [OU3SD15] | SEG-D3 | 0 - 0.5 | 2.78E-04 | 960.76 | 6.7164 | 0.4872 | < 1.30 | 348,000 | NA |
| OU3SD16 | SEG-D4 | 0 - 0.5 | 1.30E-04 | 447.25 | 3.1266 | 0.2268 | < 0.44 | 162,000 | NA |
| OU3SD17 (0-0.5) | SEG-C5 | 0 - 0.5 | NA | NA | NA | NA | 5.34 | NA | 2,470 J |
| OU3SD17 (0.5-1.1) | SEG-C5 | 0.5 - 1.1 | NA | NA | NA | NA | 0.47 J | NA | 1,120 J |
| OU3SD18 (0-0.5) | SEG-C6 | 0 - 0.5 | NA | NA | NA | NA | 5.32 | NA | 1,550 J |
| OU3SD18 (0.5-1.0) | SEG-C6 | 0.5 - 1.0 | NA | NA | NA | NA | 3.16 | NA | 445 J |
| OU3SD19 (0-0.5) | SEG-C7 | 0 - 0.5 | NA | NA | NA | NA | 5.14 | NA | 1,380 J |
| OU3SD19 (0.5-1.0) | SEG-C7 | 0.5 - 1.0 | NA | NA | NA | NA | 7.08 | NA | 1,450 J |
| OU3SD20 | SEG-D5 | 0 - 0.5 | 1.10E-05 | 37.82 | 0.2644 | 0.0192 | < 0.14 | 13,700 | NA |
| OU3SD21 | SEG-B5 | 0 - 0.5 | 2.25E-05 | 77.58 | 0.5423 | 0.0393 | 3.34 | 28,100 | NA |

Table 11

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
OU-3 Sediment Analytical Results

| Sample ID | Location | Depth Interval (ft) | PCB Sediment Criteria (ppm) Human Health Bioaccumulation | Benthic Aquatic Life Acute | Benthic Aquatic Life Chronic | Wildlife Bioaccumulation | Total PCBs (ppm) | TOC (ppm) | TPH (ppm) |
|---|---|---|---|---|---|---|---|---|---|
| SEG-B2A(0-0.5') | SEG-B2 | 0 - 0.5 | 8.40E-05 | 289.88 | 2.0265 | 0.1470 | 67.60 | 105,000 J | NA |
| SEG-B2A(0.5-1') | SEG-B2 | 0.5 - 1.0 | 1.03E-04 | 356.14 | 2.4897 | 0.1806 | 158.20 | 129,000 J | NA |
| SEG-B2A(1-1.5') | SEG-B2 | 1.0 - 1.5 | 3.34E-05 | 115.13 | 0.8048 | 0.0584 | 0.720 | 41,700 J | NA |
| SEG-B2A(1.5-2') | SEG-B2 | 1.5 - 2.0 | 8.64E-06 | 29.82 | 0.2084 | 0.0151 | < 0.126 | 10,800 J | NA |
| SEG-B2A(2-2.6') | SEG-B2 | 2.0 - 2.6 | 8.64E-06 | 29.82 | 0.2084 | 0.0151 | < 0.119 | 10,800 J | NA |
| SEG-B2B(0-0.5') | SEG-B2 | 0 - 0.5 | 1.27E-04 | 438.97 | 3.0687 | 0.2226 | 161.30 J | 159,000 J | NA |
| SEG-B2B(0.5-1') | SEG-B2 | 0.5 - 1.0 | 9.36E-05 | 323.01 | 2.2581 | 0.1638 | 48.44 | 117,000 J | NA |
| DUP-1 [SEG-B2B (0.5-1')] | SEG-B2 | 0.5 - 1.0 | 1.89E-04 | 651.55 | 4.5548 | 0.3304 | 65.70 | 236,000 | NA |
| SEG-B2B(1-1.5') | SEG-B2 | 1.0 - 1.5 | 2.21E-05 | 76.20 | 0.5327 | 0.0386 | 0.163 | 27,600 J | NA |
| SEG-B2B(1.5-2') | SEG-B2 | 1.5 - 2.0 | 6.58E-06 | 22.72 | 0.1588 | 0.0115 | < 0.118 | 8,230 J | NA |
| SEG-B2B(2-2.5') | SEG-B2 | 2.0 - 2.5 | 1.02E-05 | 35.34 | 0.2470 | 0.0179 | < 0.122 | 12,800 J | NA |
| SEG-B3A(0-0.5') | SEG-B3 | 0 - 0.5 | 1.28E-05 | 44.17 | 0.3088 | 0.0224 | 2.13 J | 16,000 | NA |
| SEG-B3A(0.5-1') | SEG-B3 | 0.5 - 1.0 | 1.32E-05 | 45.55 | 0.3185 | 0.0231 | < 0.138 | 16,500 | NA |
| SEG-B3A(1-1.5') | SEG-B3 | 1.0 - 1.5 | 8.80E-06 | 30.37 | 0.2123 | 0.0154 | < 0.142 | 11,000 | NA |
| SEG-B3A(1.5-2') | SEG-B3 | 1.5 - 2.0 | 2.20E-06 | 7.59 | 0.0531 | 0.0039 | < 0.124 | 2,750 | NA |
| SEG-B3A(2-2.2') | SEG-B3 | 2.0 - 2.2 | 1.57E-06 | 5.41 | 0.0378 | 0.0027 | < 0.109 | 1,960 | NA |
| SEG-B3B(0-0.5') | SEG-B3 | 0 - 0.5 | 2.67E-05 | 92.21 | 0.6446 | 0.0468 | 7.04 | 33,400 | NA |
| SEG-B3B(0.5-1') | SEG-B3 | 0.5 - 1.0 | 1.30E-05 | 44.72 | 0.3127 | 0.0227 | 7.26 | 16,200 | NA |
| SEG-B3B(1-1.5') | SEG-B3 | 1.0 - 1.5 | 4.74E-06 | 16.37 | 0.1144 | 0.0083 | 2.28 | 5,930 | NA |
| SEG-B3B(1.5-2') | SEG-B3 | 1.5 - 2.0 | 1.94E-06 | 6.68 | 0.0467 | 0.0034 | < 0.107 | 2,420 | NA |
| SEG-B3B(2-2.4') | SEG-B3 | 2.0 - 2.4 | 8.56E-07 | 2.95 | 0.0207 | 0.0015 | < 0.104 | 1,070 | NA |

**Table 11**

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**OU-3 Sediment Analytical Results**

**Notes:**

1. Samples collected by Blasland, Bouck & Lee, Inc. (BBL) between September 4 and September 6, 2002.
2. Samples were analyzed by Northeast Analytical Inc. of Schenectady, New York for the following constituents:
   - Polyclorinated biphenyls (PCBs) using site-specific SUCO-ERC method; and
   - Total Organic Carbon (TOC) using USEPA Lloyd Kahn Method; and
   - Total Petroleum Hydrocarbons (TPH) using USEPA Method 8015.
3. All results are presented in parts per million (ppm) which is equivalent to milligrams per kilogram (mg/kg).
4. DUP = Blind duplicate sample. The Sample ID in parenthesis indicates the parent sample.
5. < = No Aroclors were detected at a concentration exceeding the reported laboratory detection limit.
6. NA = Not analyzed.
7. Analytical results have been validated by BBL.

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Table 12

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**OU-3 Surface Water Analytical Results**

| Constituents | NYSDEC Surface Water Standards/Guidance Values | SEG-A2 | SEG-B3 | SEG-C3 | SEG-D5 |
|---|---|---|---|---|---|
| **Polychlorinated Biphenyls (PCBs)** | | | | | |
| Total PCBs (ppb) | 0.09* | < 0.026 | < 0.025 | < 0.025 | < 0.025 |
| **Total Hardness (ppm)** | | | | | |
| Calcium | NA | 69.3 | 58.6 | 62.3 | 60.0 |
| Magnesium | 35,000 | 13.5 | 12.0 | 13.2 | 12.8 |
| Total Hardness | NA | 229 | 196 | 210 | 202 |
| **Total Suspended Solids (TSS)** | | | | | |
| TSS (ppm) | NA | 303 | < 1.0 | 4.8 | 1.9 |

**Notes:**
1. Samples collected by Blasland, Bouck & Lee, Inc. (BBL) on October 15, 2002.
2. Samples were analyzed by Northeast Analytical Inc. of Schenectady, New York for the following constituents:
   - PCBs using United States Environmental Protection Agency (USEPA) SW-846 Method 8082;
   - Total Hardness using USEPA 1979 Method 200.7; and
   - TSS using USEPA Method 160.2.
3. Results for PCBs are presented in micrgrams per kilogram (ug/kg) which is equivalent to parts per billion (ppb). Results for total hardness and TSS are presented in milligrams per kilogram (mg/kg) which is equivalent to parts per million (ppm).
4. * = Applies to the sum of these substances.
5. NA = Class GA groundwater standard/guidance value was not listed for this compound in TOGS 1.1.1.
6. < = Constituent was not detected at a concentration exceeding the reported laboratory detection limit.
7. PCB analytical results were validated by BBL.

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Table 13

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
OU-3 Biota Analytical Results

| Location | Species | Sample ID | Sample Type | Number of Fish | Length Range (centimeters) | Weight Range (grams) | Lipid (percent) | Total PCBs (ppm) |
|---|---|---|---|---|---|---|---|---|
| Location A | Redfin pickerel | OU3AT01 | Composite Whole Body | 6 | 10.9 - 11.8 | 8.2 - 10.9 | 0.80 | < 0.11 |
| | Redfin pickerel | OU3AT02 | Composite Whole Body | 5 | 11.3 - 12.5 | 8.9 - 12.5 | 1.04 | < 0.11 |
| | Redfin pickerel | OU3AT03 | Composite Whole Body | 5 | 11.3 - 13.4 | 9.2 - 15.2 | 0.84 | < 0.11 |
| | Redfin pickerel | OU3AT04 | Composite Whole Body | 5 | 11.4 - 13.6 | 10.3 - 16.5 | 1.25 | < 0.11 |
| | Redfin pickerel | OU3AT05 | Composite Whole Body | 2 | 21.4 - 22.8 | 82.8 - 84.2 | 5.18 | 0.94 |
| | Redfin pickerel | OU3AT06 | Composite Whole Body | 7 | 10.2 - 11.5 | 6.1 - 9.8 | 1.00 | < 0.11 |
| | Pumpkinseed | OU3AT07 | Composite Whole Body | 7 | 7.8 - 10.7 | 11.0 - 25.8 | 4.17 | < 0.11 |
| | Green sunfish | OU3AT08 | Composite Whole Body | 4 | 12.6 - 14.2 | 41.0 - 57.1 | 4.28 | < 0.11 |
| | Green sunfish | OU3AT09 | Composite Whole Body | 6 | 10.6 - 12.2 | 25.2 - 34.4 | 5.10 | < 0.11 |
| | White sucker | OU3AT10 | Composite Whole Body | 2 | 21.0 - 26.8 | 100.1 - 207.7 | 3.43 | < 0.11 |
| Location B | Brown bullhead | OU3AT11 | Individual Fillet Skin Off | 1 | 34.1 | 550 | 0.51 | 1.11 |
| | Brown bullhead | OU3AT12 | Individual Fillet Skin Off | 1 | 33.0 | 530 | 0.27 | 0.60 |
| | Redfin pickerel | OU3AT13 | Composite Whole Body | 4 | 15.0 - 18.3 | 22.6 - 45.2 | 3.20 | 4.52 |
| | Redfin pickerel | OU3AT14 | Composite Whole Body | 4 | 19.2 - 21.3 | 45.8 - 56.6 | 3.57 | 4.30 |
| | Redfin pickerel | OU3AT15 | Composite Whole Body | 4 | 17.5 - 19.5 | 35.1 - 46.9 | 2.85 | 3.95 |
| | Redfin pickerel | OU3AT16 | Composite Whole Body | 4 | 19.3 - 21.1 | 54.9 - 63.6 | 4.26 | 3.95 |
| | Redfin pickerel | OU3AT17 | Composite Whole Body | 4 | 19.5 - 20.4 | 52.0 - 62.9 | 4.52 | 4.09 |
| | Redfin pickerel | OU3AT18 | Composite Whole Body | 4 | 19.1 - 20.5 | 50.1 - 60.4 | 3.73 | 2.80 |
| | Pumpkinseed | OU3AT19 | Composite Whole Body | 6 | 7.7 - 9.6 | 9.7 - 17.1 | 2.65 | 5.82 |
| | Pumpkinseed | OU3AT20 | Composite Whole Body | 4 | 10.6 - 13.7 | 27.0 - 57.9 | 4.52 | 8.05 |
| Location C | Largemouth bass | OU3AT21 | Individual Fillet Skin On | 1 | 30.4 | 430 | 0.25 | < 0.11 |
| | Redfin pickerel | OU3AT22 | Composite Whole Body | 5 | 13.5 - 15.7 | 15.3 - 24.4 | 2.11 | 4.09 J |
| | Redfin pickerel | OU3AT23 | Composite Whole Body | 4 | 14.2 - 16.3 | 17.7 - 27.3 | 0.87 | 1.81 |
| | Redfin pickerel | OU3AT24 | Composite Whole Body | 4 | 15.8 - 18.0 | 26.4 - 39.7 | 2.73 | 3.06 J |
| | Redfin pickerel | OU3AT25 | Composite Whole Body | 3 | 18.6 - 19.2 | 42.5 - 45.9 | 2.73 | 2.00 J |
| | Redfin pickerel | OU3AT26 | Composite Whole Body | 3 | 18.8 - 20.3 | 48.2 - 55.0 | 2.47 | 2.25 |
| | Redfin pickerel | OU3AT27 | Composite Whole Body | 3 | 18.9 - 20.2 | 43.2 - 53.9 | 3.89 | 1.39 |
| | Redfin pickerel | OU3AT28 | Composite Whole Body | 3 | 19.6 - 20.8 | 56.3 - 61.3 | 2.45 | 1.03 J |
| | Pumpkinseed | OU3AT29 | Individual Whole Body | 1 | 13.0 | 42.5 | 3.39 | 4.09 |
| | Pumpkinseed | OU3AT30 | Composite Whole Body | 5 | 6.2 - 7.5 | 3.2 - 6.4 | 1.44 | 2.33 |

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## Table 13

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**OU-3 Biota Analytical Results**

Notes:
1. Samples collected by Blasland, Bouck & Lee, Inc. (BBL) on August 28, 2002.
2. Collections were conducted via electrofishing under BBL's 2002 Fish and Wildlife License #LCP02-508 for Tributary 63 of Lake Ontario.
3. Samples were analyzed by Northeast Analytical, Inc. of Schenectady, New York for the following constituents:
   - Percent lipids using NE 158_1.SOP; and
   - Polyclorinated biphenyls (PCBs) using site-specific SUCO-ERC method.
4. PCB results are presented in parts per million (ppm) which is equivalent to milligrams per kilogram (mg/kg).
5. < = No Aroclors were detected at a concentration exceeding the reported laboratory detection limit.
6. PCB analytical results were validated by BBL.

## Table 14

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**Teal Marsh Biota Analytical Results**

| Sample ID | Species | Sample Type | Number of Fish | Length Range (centimeters) | Weight Range (grams) | Lipid (percent) | Total PCBs (ppm) |
|---|---|---|---|---|---|---|---|
| **Sample Area #1A - Teal Marsh, eastern portion, adjacent to beaver dam** | | | | | | | |
| TM01-01 | Mudminnow | Composite Whole Body | 6 | 66 - 98 | 3.3 - 10.9 | 3.40 | 1.08 |
| TM01-02 | Mudminnow | Composite Whole Body | 9 | 56 - 72 | 1.9 - 4.5 | 3.24 | 0.63 |
| **Sample Area #1B - Teal Marsh, below beaver dam** | | | | | | | |
| TM01-05 | Pumpkinseed | Composite Whole Body | 3 | 90 - 110 | 15.2 - 31.5 | 2.33 | 0.45 |
| TM01-06 | Bluegill | Composite Whole Body | 3 | 83 - 97 | 10.6 - 18.2 | 2.90 | 2.85 |
| TM01-07 | Bluegill | Composite Whole Body | 2 | 98 - 100 | 17.4 - 19.8 | 2.87 | 0.37 |
| TM01-08 | Bluegill | Composite Whole Body | 2 | 100 - 105 | 20.4 - 24.8 | 3.93 | 0.15 |
| TM01-09 | Bluegill | Composite Whole Body | 2 | 109 - 112 | 27.7 - 31.5 | 3.33 | 0.13 |
| TM01-10 | Pickerel | Composite Whole Body | 3 | 112 - 133 | 8.9 - 14.7 | 1.25 | 0.12 |
| TM01-11 | Pickerel | Composite Whole Body | 2 | 161 - 163 | 28.6 - 58.7 | 2.48 | 0.66 J |
| TM01-12 | Pickerel | Composite Whole Body | 2 | 154 - 156 | 26.8 - 27.3 | 2.51 | 0.76 J |
| TM01-13 | Pickerel | Composite Whole Body | 2 | 177 - 178 | 39.6 - 40.9 | 3.05 | 1.34 J |
| TM01-14 | Pickerel | Individual Whole Body | 1 | 200 | 57.1 | 3.33 | 0.11 |
| TM01-15 | Mudminnow | Composite Whole Body | 11 | 66 - 78 | 3.6 - 5.4 | 2.86 | 0.30 |
| TM01-16 | Mudminnow | Composite Whole Body | 13 | 50 - 66 | 1.6 - 3.5 | 2.87 | 0.35 |
| TM01-17 | Mudminnow | Composite Whole Body | 9 | 72 - 96 | 5.2 - 10.6 | 2.69 | 0.30 |
| **Sample Area #2 - Mouth of Teal Marsh, near Lake Ontario** | | | | | | | |
| TM02-01 | Brown Bullhead | Individual Fillet Skin Off | 1 | 374 | NA | 1.36 | 0.24 |
| TM02-02 | Brown Bullhead | Individual Fillet Skin Off | 1 | 356 | NA | 1.80 | < 0.11 |
| TM02-03 | Brown Bullhead | Individual Fillet Skin Off | 1 | 298 | NA | 1.00 | < 0.11 |
| TM02-04 | Bluegill | Composite Fillet Skin On | 2 | 170 - 177 | 138 - 150 | 2.15 | 0.77 |
| TM02-05 | Largemouth Bass | Individual Fillet Skin On | 1 | 294 | NA | 1.85 | 0.16 |
| TM02-06 | Pickerel | Individual Whole Body | 1 | 221 | 87.8 | 2.47 | 0.59 J |
| TM02-07 | Pickerel | Individual Whole Body | 1 | 202 | 64.3 | 1.62 | 0.45 |
| TM02-08 | Pickerel | Individual Whole Body | 1 | 194 | 61.1 | 3.06 | < 0.11 |
| TM02-09 | Pickerel | Individual Whole Body | 1 | 176 | 47.3 | 2.05 | 0.15 |
| TM02-10 | Pickerel | Composite Whole Body | 2 | 117 - 124 | 10.9 - 14.2 | 1.04 | < 0.11 |
| TM02-11 | Pickerel | Composite Whole Body | 3 | 111 - 116 | 9.2 - 11.3 | 0.93 | 0.12 |
| TM02-12 | Pickerel | Composite Whole Body | 3 | 115 - 131 | 11.5 - 16.1 | 1.06 | < 0.11 |
| TM02-13 | Bluegill | Composite Whole Body | 3 | 103 - 111 | 24.6 - 35.1 | 4.96 | 0.30 |
| TM02-14 | Bluegill | Composite Whole Body | 3 | 94 - 98 | 18.2 - 18.7 | 3.75 | 0.38 |
| TM02-15 | Pumpkinseed | Composite Whole Body | 3 | 82 - 102 | 12.0 - 26.8 | 2.04 | 0.37 |

**Table 14**

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**Teal Marsh Biota Analytical Results**

Notes:

1. Samples collected by Blasland, Bouck & Lee, Inc. (BBL).
2. Collections were conducted via electrofishing under BBL's 2002 Fish and Wildlife License #LCP02-508 for Tributary 63 of Lake Ontario.
3. Samples were analyzed by Northeast Analytical, Inc. of Schenectady, New York for the following constituents:
   - Percent lipids using NE 158_1.SOP; and
   - Polyclorinated biphenyls (PCBs) using site-specific SUCO-ERC method.
4. PCB results are presented in parts per million (ppm) which is equivalent to milligrams per kilogram (mg/kg).
5. NA = not applicable.
6. J = Estimated value.
7. < = No Aroclors were detected at a concentration exceeding the reported laboratory detection limit.
8. PCB analytical results were validated by BBL.

## Table 15

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**Potential Vegetative Species Typically Associated with Observed Covertypes**

| Species | Cover Type | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Industrial | Paved Road/ Path | Unpaved Road/ Path | Railroad | Maintained Roadside/ Pathway | Mowed Lawn | Successional Old Field | Successional Northern Hardwoods | Emergent Wetland | Scrub-Shrub Wetland | Industrial Cooling Pond | Midreach Stream | Great Lakes Exposed Shoal |
| **Herbaceous** | | | | | | | | | | | | | |
| Aster spp. | x | | x | x | x | | x | | | | | | |
| Boneset | | | | | | | | | x | x | | | |
| Broad-leaved cattail | | | | | | | | | x | | | | |
| Buttercup | x | | | x | x | | x | x | | | | | |
| Chicory | x | | x | x | x | | x | | | | | | |
| Common milkweed | | | | | | | | | x | x | | | |
| Common mullein | x | | x | x | x | | | x | | | | | |
| Common plantain | x | | x | x | x | x | x | x | | | | | |
| Common ragweed | x | | x | x | x | | x | x | | x | | | |
| Common reed | | | | | | | | | x | | | | |
| Curly dock | | | | x | x | x | x | x | | x | | | |
| Dandelion | x | | x | x | x | x | | | | | | | |
| Evening primrose | | | | | | | x | x | | | | | |
| Goldenrod spp. | x | | x | x | x | | x | x | | | | | |
| Grass spp. | x | | x | x | x | x | | x | | | | | |
| Hawkweed spp. | | | | x | x | | x | x | | | | | |
| Jewelweed | | | | | | | | | x | x | | | |
| New England aster | | | | | | | | x | | | | | |
| Pennsylvania smartweed | | | | | | | | | x | x | | | |
| Poison ivy | | | | | | | | x | | x | | | |
| Pondweed spp. | | | | | | | | | x | | | x | x |
| Raspberry | | | | | | | x | x | | | | | |
| Redtop | x | | | x | x | | x | | | | | | |
| Reed canary grass | | | | | | | | | x | x | | | |
| Rice cutgrass | | | | | | | | | | x | | | |
| Sedge spp. | | | | | | | | | x | x | | | |
| Skunk cabbage | | | | | | | | | | x | | | |
| Sweet vernal grass | | | | | | | x | x | | | | | |
| Timothy | x | | | x | x | | x | x | | | | | |
| Waterweed | | | | | | | | | | | | x | x |
| White clover | x | | x | x | x | x | x | | | | | | |
| Wild carrot | x | | | x | x | | x | x | | | | | |
| Wood sorrel | | | | | | | | x | | | | | |

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Table 15

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
Potential Vegetative Species Typically Associated with Observed Covertypes

| Species | Cover Type | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Industrial | Paved Road/ Path | Unpaved Road/ Path | Railroad | Maintained Roadside/ Pathway | Mowed Lawn | Successional Old Field | Successional Northern Hardwoods | Emergent Wetland | Scrub-Shrub Wetland | Industrial Cooling Pond | Midreach Stream | Great Lakes Exposed Shoal |
| **Shrubs and Trees** | | | | | | | | | | | | | |
| American elm | | | | | | | | x | | | | | |
| Black cherry | | | | | | | | x | | | | | |
| Black oak | | | | | | | | | | | | | |
| Blue spruce | x | | | | | x | | | | | | | |
| Box elder | x | | | | | x | | x | | | | | |
| Buttonbush | | | | | | | | | | x | | | |
| Eastern cottonwood | | | | | | | | | | | | | |
| Gray dogwood | | | | | | | x | | | x | | | |
| Hawthorn | | | | | | | | | | | | | |
| Northern arrowwood | | | | | | | | | | x | | | |
| Norway spruce | | | | | | x | | | | | | | |
| Quaking aspen | | | | | | | | x | | | | | |
| Red maple | x | | | | | x | | x | | | | | |
| Red oak | x | | | | | x | | x | | | | | |
| Red-osier dogwood | | | | | | | | | | x | | | |
| Scotch pine | x | | | | | | | x | | | | | |
| Silky dogwood | | | | | | | x | | | | | | |
| Silver maple | x | | | | | x | | | | | | | |
| Speckled alder | | | | | | | | | | x | | | |
| Staghorn sumac | x | | | | | | x | | | | | | |
| Sugar maple | x | | | | | x | | | | | | | |
| White ash | | | | | | | | x | | | | | |
| White oak | x | | | | | x | | | | | | | |
| White pine | | | | | | | | x | | | | | |
| Willow spp. | | | | | | | | | | x | | | |
| Yellow birch | | | | | | | | x | | | | | |

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Table 16

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
<u>Potential Wildlife Species Typically Associated with Observed Covertypes</u>

| Species | Covertype | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Industrial | Paved Road/ Path | Unpaved Road/ Path | Railroad | Maintained Roadside/ Pathway | Mowed Lawn | Successional Old Field | Successional Northern Hardwoods | Emergent Wetland | Scrub-Shrub Wetland | Industrial Cooling Pond | Midreach Stream | Great Lakes Exposed Shoal |
| **Birds** | | | | | | | | | | | | | |
| American coot | | | | | | | x | | x | | x | | x |
| American crow | x | x | x | x | x | x | x | | | | | | |
| American goldfinch | x | | x | | x | x | x | x | x | x | | | |
| American kestrel | x | | | | x | x | x | x | x | x | | | |
| American robin | x | | | | x | x | | | | | | | |
| American widgeon | | | | | | | | | x | x | x | x | x |
| Bluejay | x | | | | x | x | | x | | x | | | |
| Brown thrasher | | | | | | | x | | | x | | | |
| Bufflehead | | | | | | | | | x | | | | x |
| Canada goose | | | | | | x | | | x | | x | | x |
| Cardinal | x | | | | x | x | | | | | | | |
| Chickadee | x | x | x | | x | x | x | x | | x | | | |
| Chipping sparrow | x | | | | | x | | | | | | | |
| Common goldeneye | | | | | | | | | | | | | x |
| Common merganser | | | | | | | | | x | | | x | x |
| Downy woodpecker | | | | | | | | x | | | | | |
| Double crested cormorant | | | | | | | | | | | | | x |
| Field sparrow | | | | | | | x | | | x | | | |
| Gray catbird | x | | | | | | x | | | x | | | |
| Great black-backed gull | | | | | | | | | | | x | x | x |
| Great blue heron | | | | | | | | | x | x | x | | |
| Great horned owl | | | | | | | x | x | | | | | |
| Green-winged teal | | | | | | | | | x | x | x | x | x |
| Herring gull | x | | | | | | | | | | | | x |
| Hooded merganser | | | | | | | | | x | | | | x |
| House finch | x | x | x | | x | x | | | | | | | |
| House sparrow | x | x | x | | x | x | | | | | | | |
| Mallard | | | | | | | | | x | x | x | | x |
| Mourning dove | x | x | x | x | x | x | | | | | | | |
| Northern flicker | | | | | | x | | x | | | | | |
| Northern pintail | | | | | | | | | x | x | | x | x |
| Pheasant | | | | | | | x | | | x | | | |
| Red-eyed vireo | | | | | | | x | x | | x | | | |
| Red-tailed hawk | | | | | | | x | | | | | | |
| Red-winged blackbird | x | | | | | | x | x | x | x | | | |
| Rock dove | x | x | x | x | x | x | | | | | | | |
| Warbler spp. | | | | | | | x | x | | x | | | |
| White-breasted nuthatch | | | | | | | | x | | | | | |
| Wild turkey | | | | | | | x | x | | x | | | |
| Wood duck | | | | | | | | | x | x | | x | |

Table 16

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
Potential Wildlife Species Typically Associated with Observed Covertypes

| Species | Covertype | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Industrial | Paved Road/ Path | Unpaved Road/ Path | Railroad | Maintained Roadside/ Pathway | Mowed Lawn | Successional Old Field | Successional Northern Hardwoods | Emergent Wetland | Scrub-Shrub Wetland | Industrial Cooling Pond | Midreach Stream | Great Lakes Exposed Shoal |
| **Reptiles/Amphibians** | | | | | | | | | | | | | |
| American toad | x | | x | | x | x | x | x | x | x | | | |
| Blue-spotted salamander | | | | | | | | | x | x | | x | |
| Bullfrog | | | | | | | | | x | | | | |
| Dusky salamander | | | | | | | | | x | x | | x | |
| Eastern garter snake | x | x | x | x | x | x | x | x | x | x | | | |
| Easterb hognose snake | | | | | x | x | x | x | | | | | |
| Eastern newt | | | | | | | | | x | x | | x | |
| Green frog | | | | | | | | | x | x | x | x | |
| Leopard frog | | | | | x | | | | x | | x | | |
| Mudpuppy | | | | | | | | | x | x | | x | |
| Northern brown snake | x | | | | x | | | x | x | x | | | |
| Northern slimy salamander | | | | | | | | x | | x | | | |
| Northern water snake | | | | | | | | | x | x | x | x | |
| Painted turtle | | | | | | | | | x | x | x | x | |
| Pickerel frog | | | | | | | | | x | x | x | x | |
| Redback salamander | | | | | | | | x | | | | | |
| Red-spotted newt | | | | | | | | x | x | x | | x | |
| Ringneck snake | | | | | | | x | x | | | | | |
| Snapping turtle | | | | | | | | | x | x | | x | |
| Spotted salamander | | | | | | | | x | x | x | | | |
| Spring peeper | | | | | | | | | x | x | | | |
| Wood frog | | | | | | | | x | x | x | | | |
| **Mammals** | | | | | | | | | | | | | |
| Beaver | | | | | | | | | x | x | | x | |
| Coyote | | | | | | | x | x | | x | | | |
| Chipmunk | x | x | x | | x | x | x | x | | | | | |
| Deer mouse | x | | | | x | x | x | x | | | | | |
| Eastern cottontail | x | x | x | x | x | x | x | x | | | | | |
| Eastern gray squirrel | x | x | x | | x | x | | x | | | | | |
| Gray fox | x | | | x | x | | | | | | | | |
| House mouse | x | | | | | | | | | | | | |
| Meadow vole | | | | | | | x | x | x | x | | | |
| Mink | | | | | | | | x | x | x | | | |
| Muskrat | | | | | | | | | x | | | | |
| Opossum | x | | | x | x | | x | x | | | | x | |
| Raccoon | | | | | x | | x | x | x | x | x | x | |
| Red fox | | | | | | | x | x | x | x | x | | |
| Shrew spp. | | | | | | x | x | x | x | x | x | | |
| Starnose mole | x | | | | x | x | x | x | | | | | |
| Weasel spp. | | | | | | | x | x | x | x | | | |
| Whitetail deer | x | x | x | | x | | x | x | x | x | x | | |
| Woodchuck | x | | x | x | x | x | x | | | | | | |
| Woodland jumping mouse | | | | | | | | x | x | x | | | |

Table 16

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
<u>Potential Wildlife Species Typically Associated with Observed Covertypes</u>

| Species | Covertype | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Industrial | Paved Road/ Path | Unpaved Road/ Path | Railroad | Maintained Roadside/ Pathway | Mowed Lawn | Successional Old Field | Successional Northern Hardwoods | Emergent Wetland | Scrub-Shrub Wetland | Industrial Cooling Pond | Midreach Stream | Great Lakes Exposed Shoal |
| Fish | | | | | | | | | | | | | |
| Alewife | | | | | | | | | | | | | x |
| Bluegill | | | | | | | | | x | | x | x | x |
| Bluntnose minnow | | | | | | | | | | | | x | |
| Bowfin | | | | | | | | | | | | x | x |
| Brown bullhead | | | | | | | | | x | | | x | x |
| Common carp | | | | | | | | | x | | x | | x |
| Common shiner | | | | | | | | | | | | | x |
| Creek chub | | | | | | | | | | | | | x |
| Eastern mudminnow | | | | | | | | | x | x | | x | |
| Goldfish | | | | | | | | | x | | x | | |
| Greenside darter | | | | | | | | | | | | x | |
| Largemouth bass | | | | | | | | | x | | x | x | x |
| Longnose darter | | | | | | | | | | | | x | |
| Longnose sucker | | | | | | | | | | | | | x |
| Mottled sculpin | | | | | | | | | | | | | x |
| Muskellunge | | | | | | | | | | | | | x |
| Northern hog sucker | | | | | | | | | | | | x | x |
| Northern pike | | | | | | | | | | | | | x |
| Pumpkinseed | | | | | | | | | x | | x | x | x |
| Redfin pickerel | | | | | | | | | x | | x | x | x |
| Rock bass | | | | | | | | | | | | x | x |
| Rosyface shiner | | | | | | | | | | | | x | x |
| Slimy sculpin | | | | | | | | | | | | x | x |
| Smallmouth bass | | | | | | | | | | | | x | x |
| Stonecat | | | | | | | | | | | | x | x |
| Tessellated darter | | | | | | | | | | | | x | |
| Trout perch | | | | | | | | | | | | x | |
| Walleye | | | | | | | | | | | | x | x |
| Yellow perch | | | | | | | | | | | | x | x |

Table 17

Alcan Aluminum Corporation
Oswego, New York

**Focused Remedial Investigation**
**Summary of Exposure Point Concentrations**
**for use in Preliminary Risk Estimate Calculations**

**1. Aquatic Exposure**

| Area | Fish Data[1] | | Sediment Data[2] | |
|---|---|---|---|---|
| | Sample Size | Mean PCB Concentration (mg/kg) | Sample Size | Mean PCB Concentration (mg/kg) |
| **OU-3** | | | | |
| Segment B | 8 | 4.7 | 10 | 39.6 |
| Segment C | 9 | 2.3 | 8 | 2.8 |
| **Total =** | 17 | 3.5 | 18 | 23.2 |
| **Teal Marsh** | | | | |
| **Total =** | 25 | 0.5 | 0 | NA |
| **OU-1** | | | | |
| North Pond 1 | 3 | 1.7 | 13 | 3.2 |
| North Pond 2 | 7 | 16.0 | 23 | 14.1 |
| Marsh 1 | 8 | 19.2 | 33 | 97.5 |
| Marsh 2 | 6 | 12.9 | 30 | 19.0 |
| Marsh 3 | 0 | NA | 35 | 163 |
| **Total =** | 24 | 14.5 | 134 | 73.7 |

**2. Terrestrial Exposure**

| Area | Soil Data[3] | | Estimated Earthworm PCB Concentration[4] (mg/kg) | Estimated Small Mammal PCB Concentration[5] (mg/kg) |
|---|---|---|---|---|
| | Sample Size | Mean PCB Concentration (mg/kg) | | |
| OU-1 | | | | |
| Cold Mill Landfill | [illegible] | [illegible] | [illegible] | [illegible] |
| Remainder of OU-1 | [illegible] | [illegible] | [illegible] | [illegible] |

**Notes:**
1. Fish data include the results from the whole body fish tissue samples collected by Dames & Moore during 1995 and 1996, and BBL during 2002 and 2003.
2. Sediment data include the results from the sediment samples collected by Dames & Moore in 1995 and by BBL 2002, and include the upper depth interval (0-6" or 0-12").
3. Soil data include the results from the soil samples collected by Dames & Moore during 1995 and by BBL during 2002.
4. Earthworm PCB concentrations were estimated using the linear regression equation from Sample et al. (1998): ln (earthworm) = 1.79 + 1.29 (ln[soil]).
5. Small mammal PCB concentrations are estimated using a Bioaccumulation Factor (BAF) of 0.1.
6. In estimating data means, a value of one-half the detection limit was used for non-detects.
7. NA = Not available.

Table 18

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**Preliminary Risk Estimate**
**Shorttail Shrew**

**Step 1: Exposure Estimate**

Dose Equation:

**ADDpot = (Cf x FR x NIR) + ((Cs x FS x IR x FR) / (BW))**

| | | | | |
|---|---|---|---|---|
| Where: | | | | |
| ADDpot = | Potential average daily dose (combined dietary exposure and incidental soil ingestion) | Cold Mill Landfill = | 15.01 mg/kg-day | |
| | | OU-1 = | 1.33 mg/kg-day | |
| Dietary Exposure | | | | |
| Cf = | Average PCB concentration in food | Cold Mill Landfill = | 22.5 mg/kg | Estimated, based on a diet of 100% earthworms (see Table 17) |
| | | OU-1 = | 2.0 mg/kg | |
| FR = | Fraction of total food intake from foraging area | | 1.0 unitless | Each area represents 100% of forage base |
| NIR = | Normalized ingestion rate | | | |
| | NIR = [(NFMR) / (ME)] | | 0.67 g/g-day | |
| | where: | | | |
| | NFMR = Free-living metabolic rate | | 0.47 kcal/g-day | FMR= $0.800(17.3\ g)^{0.813}$= 8.12 kcal/day<br>NFMR= 8.12/0.0173 kg= 469 kcal/kg-day |
| | ME = Metabolizable energy = [(GE) x (AE)] | | 0.70 kcal/g | |
| | GE = Gross energy | | 0.81 kcal/g | earthworms (USEPA, 1993) |
| | AE = Assimilation efficiency | | 0.87 unitless | sm. mammals eating insects (USEPA, 1993) |
| Soil Ingestion | | | | |
| Cs = | Average PCB concentration in soil | Cold Mill Landfill = | 3.50 mg/kg (dry weight) | Calculated average soil concentration |
| | | OU-1 = | 0.60 mg/kg (dry weight) | |
| FS = | Estimated percent soil in diet | | 0.024 unitless | meadow vole (USEPA, 1993) |
| IR = | Food ingestion rate | | 0.0010 kg/day (dry weight) | (0.56 g/g-day) x (17.3 g BW)= 9.69 g/day |
| FR = | Fraction of diet from site | | 1.0 unitless | |
| BW = | Body weight | | 0.0173 kg | estimated (USEPA, 1993) |

**Step 2: Risk Estimate**

Risk Equation:

**HQ = ADDpot / TRV**

| | | | | |
|---|---|---|---|---|
| **Where:** | | | | |
| | | | LOAEL-based HQ | NOAEL-based HQ |
| HQ = | Hazard Quotient | Cold Mill Landfill = | **4.5** | **21.1** |
| | | OU-1 = | **0.4** | **1.9** |
| ADDpot = | Potential average daily dose | Cold Mill Landfill = | 15.01 mg/kg-day | (from Step 1 above) |
| | | OU-1 = | 1.33 mg/kg-day | |
| TRV = | Toxicity reference value | | 3.34 mg/kg-day | LOAEL for Aroclor 1254 |
| | | | 0.71 mg/kg-day | NOAEL for Aroclor 1254 |

Table 19

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**Preliminary Risk Estimate**
**Red-Tailed Hawk**

**Step 1: Exposure Estimate**

| | | | | | |
|---|---|---|---|---|---|
| Dose Equation: | | | | | |
| | **ADDpot = (Cf x FR x NIR)** | | | | |
| Where: | | | | | |
| ADDpot = | Potential average daily dose (dietary exposure) | Cold Mill Landfill = | 0.026 | mg/kg-day | |
| | | OU-1 = | 0.0045 | mg/kg-day | |
| Dietary Exposure | | | | | |
| Cf = | Average PCB concentration in food | Cold Mill Landfill = | 0.35 | mg/kg | Estimated, based on a diet of 100% small mammals |
| | | OU-1 = | 0.06 | mg/kg | (see Table 17) |
| FR = | Fraction of total food intake from foraging area | | 0.5 | unitless | Each area represents 50% of forage base |
| NIR = | Normalized ingestion rate | | | | |
| | NIR = [(NFMR) / (ME)] | | 0.15 | g/g-day | |
| | where: | | | | |
| | NFMR = Free-living metabolic rate | | 0.197 | kcal/g-day | estimated, combined M/F (USEPA, 1993) |
| | ME = Metabolizable energy = [(GE) x (AE)] | | 1.33 | kcal/g | |
| | GE = Gross energy | | 1.70 | kcal/g | small mammals (USEPA, 1993) |
| | AE = Assimilation efficiency | | 0.78 | unitless | birds eating sm. mammals (USEPA, 1993) |

**Step 2: Risk Estimate**

| | | | | | |
|---|---|---|---|---|---|
| Risk Equation: | | | | | |
| | **HQ = ADDpot / TRV** | | | | |
| **Where:** | | | | | |
| | | LOAEL-based HQ | | | NOAEL-based HQ |
| HQ = | Hazard Quotient | Cold Mill Landfill = | **0.014** | | **0.14** |
| | | OU-1 = | **0.002** | | **0.02** |
| ADDpot = | Potential average daily dose | Cold Mill Landfill = | 0.026 | mg/kg-day | (from Step 1 above) |
| | | OU-1 = | 0.0045 | mg/kg-day | |
| TRV = | Toxicity reference value | | 1.8 | mg/kg-day | LOAEL for Aroclor 1254 |
| | | | 0.18 | mg/kg-day | NOAEL for Aroclor 1254 |

Table 20

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**Preliminary Risk Estimate**
**Great Blue Heron**

**Step 1: Exposure Estimate**

Dose Equation:

**ADDpot = (Cf x FR x NIR) + ((Cs x FS x IR x FR) / (BW))**

| | | | | |
|---|---|---|---|---|
| Where: | | | | |
| ADDpot = | Potential average daily dose (combined dietary exposure and incidental sediment ingestion) | OU-1 = | **1.25 mg/kg-day** | |
| | | OU-3 = | **0.31 mg/kg-day** | |
| | | Teal Marsh = | **0.04 mg/kg-day** | |
| Dietary Exposure | | | | |
| Cf = | Average PCB concentration in food | OU-1 = | 14.5 mg/kg | Estimated, based on a diet of 100% fish (see Table 17) |
| | | OU-3 = | 3.5 mg/kg | |
| | | Teal Marsh = | 0.5 mg/kg | |
| FR = | Fraction of total food intake from foraging area | | 0.7 unitless | Each area represents 100% of forage base for 8 months of the year. |
| NIR = | Normalized ingestion rate | | | |
| | NIRtotal = [(NFMR) / (ME)] | | 0.104 g/g-day | Based on a diet of 100% fish |
| | where: | | | |
| | NFMR = Free-living metabolic rate | | 0.165 kcal/g-day | Estimated (USEPA, 1993) |
| | ME = Metabolizable energy = [(GE) x (AE)] | | 1.58 kcal/g | |
| | GE = Gross energy | | 2.0 kcal/g | Fish |
| | AE = assimilation efficiency | | 0.79 unitless | Birds eating fish (USEPA, 1993) |
| Sediment Ingestion | | | | |
| Cs = | Average PCB concentration in sediment | OU-1 = | 73.7 mg/kg (dry weight) | Calculated average sediment PCB concentration (see Table 17) |
| | | OU-3 = | 23.2 mg/kg (dry weight) | |
| | | Teal Marsh = | 0.00 mg/kg (dry weight) | |
| FS = | Estimated percent sediment in diet | | 0.02 unitless | mallard (USEPA, 1993) |
| IR = | Food ingestion rate | | 0.401 kg/day (dry weight) | (0.18 g/g-d) x (2229 g BW) = 401.22 g/day (USEPA, 1993) |
| FR = | Fraction of diet from site | | 0.7 unitless | |
| BW = | Body weight | | 2.229 kg | mean, combined M/F (USEPA, 1993) |

**Step 2: Risk Estimate**

Risk Equation:

**HQ = ADDpot / TRV**

| | | | | |
|---|---|---|---|---|
| **Where:** | | | | |
| | | | LOAEL-Based HQ | NOAEL-based HQ |
| HQ = | Hazard Quotient | OU-1 = | **0.7** | **6.9** |
| | | OU-3 = | **0.2** | **1.7** |
| | | Teal Marsh = | **0.02** | **0.2** |
| ADDpot = | Potential average daily dose | OU-1 = | 1.25 mg/kg-day | (from Step 1 above) |
| | | OU-3 = | 0.31 mg/kg-day | |
| | | Teal Marsh = | 0.04 mg/kg-day | |
| TRV = | Toxicity reference value | | 1.8 mg/kg-day | LOAEL for Aroclor 1254 |
| | | | 0.18 mg/kg-day | NOAEL for Aroclor 1254 |

Table 21

**Alcan Aluminum Corporation**
**Oswego, New York**

**Focused Remedial Investigation**
**Preliminary Risk Estimate**
**Mink**

**Step 1: Exposure Estimate**

Dose Equation:

**ADDpot = (Cf x FR x NIR) + ((Cs x FS x IR x FR) / (BW))**

| | | | | |
|---|---|---|---|---|
| Where: | | | | |
| ADDpot = | Potential average daily dose (combined dietary exposure and incidental sediment ingestion) | OU-1 = | **3.43 mg/kg-day** | |
| | | OU-3 = | **0.94 mg/kg-day** | |
| | | Teal Marsh = | **0.07 mg/kg-day** | |
| Dietary Exposure | | | | |
| Cf = | Average PCB concentration in food | OU-1 = | 14.5 mg/kg | Estimated, based on a diet of 100% fish (see Table 17) |
| | | OU-3 = | 3.5 mg/kg | |
| | | Teal Marsh = | 0.49 mg/kg | |
| FR = | Fraction of total food intake from foraging area | | 1.0 unitless | Each area represents 100% of forage base |
| NIR = | Normalized ingestion rate | | | |
| | NIRtotal = [(NFMR) / (ME)] | | 0.136 g/g-day | Based on a diet of 100% fish |
| | where: | | | |
| | NFMR = Free-living metabolic rate | | 0.247 kcal/g-day | estimated, combined M/F (USEPA, 1993) |
| | ME = Metabolizable energy = [(GE) x (AE)] | | 1.82 kcal/g | |
| | GE = Gross energy | | 2.0 kcal/g | fish |
| | AE = assimilation efficiency | | 0.91 unitless | mammals eating fish (USEPA, 1993) |
| Sediment Ingestion | | | | |
| Cs = | Average PCB concentration in sediment | OU-1 = | 73.7 mg/kg (dry weight) | Calculated average sediment PCB concentration (see Table 17) |
| | | OU-3 = | 23.2 mg/kg (dry weight) | |
| | | Teal Marsh = | 0.00 mg/kg (dry weight) | |
| FS = | Estimated percent sediment in diet | | 0.09 unitless | raccoon (USEPA, 1993) |
| IR = | Food ingestion rate | | 0.298 kg/day (dry weight) | (0.22 g/g-d) x (1354 g BW) = 298 g/day (USEPA, 1993) |
| FR = | Fraction of diet from site | | 1.0 unitless | |
| BW = | Body weight | | 1.35 kg | mean, combined M/F (USEPA, 1993) |

**Step 2: Risk Estimate**

Risk Equation:

**HQ = ADDpot / TRV**

| | | | | |
|---|---|---|---|---|
| **Where:** | | | | |
| | | | LOAEL-Based HQ | NOAEL-based HQ |
| HQ = | Hazard Quotient | OU-1 = | **12.5** | **25** |
| | | OU-3 = | **3.4** | **6.8** |
| | | Teal Marsh = | **0.2** | **0.5** |
| ADDpot = | Potential average daily dose | OU-1 = | 3.43 mg/kg-day | (from Step 1 above) |
| | | OU-3 = | 0.94 mg/kg-day | |
| | | Teal Marsh = | 0.07 mg/kg-day | |
| TRV = | Toxicity reference value | | 0.274 mg/kg-day | LOAEL for Aroclor 1254 |
| | | | 0.137 mg/kg-day | NOAEL for Aroclor 1254 |

Table 22

Alcan Aluminum Corporation
Oswego, New York

Focused Remedial Investigation
Summary of Calculated Hazard Quotients

1. Summary of HQ Values

| Species | OU-1 | | OU-1 (Cold Mill Landfill) | | OU-3 | | Teal Marsh | |
|---|---|---|---|---|---|---|---|---|
| | LOAEL-Based HQ | NOAEL-Based HQ | LOAEL-Based HQ | NOAEL-Based HQ | LOAEL-Based HQ | NOAEL-Based HQ | LOAEL-Based HQ | NOAEL-Based HQ |
| **Shorttail Shrew** | 0.4 | 1.9 | 4.5 | 21.1 | - | - | - | - |
| **Red-tailed Hawk** | 0.002 | 0.02 | 0.014 | 0.14 | - | - | - | - |
| **Great Blue Heron** | 0.7 | 6.9 | - | - | 0.2 | 1.7 | 0.02 | 0.2 |
| **Mink** | 12.5 | 25 | - | - | 3.4 | 6.8 | 0.2 | 0.5 |

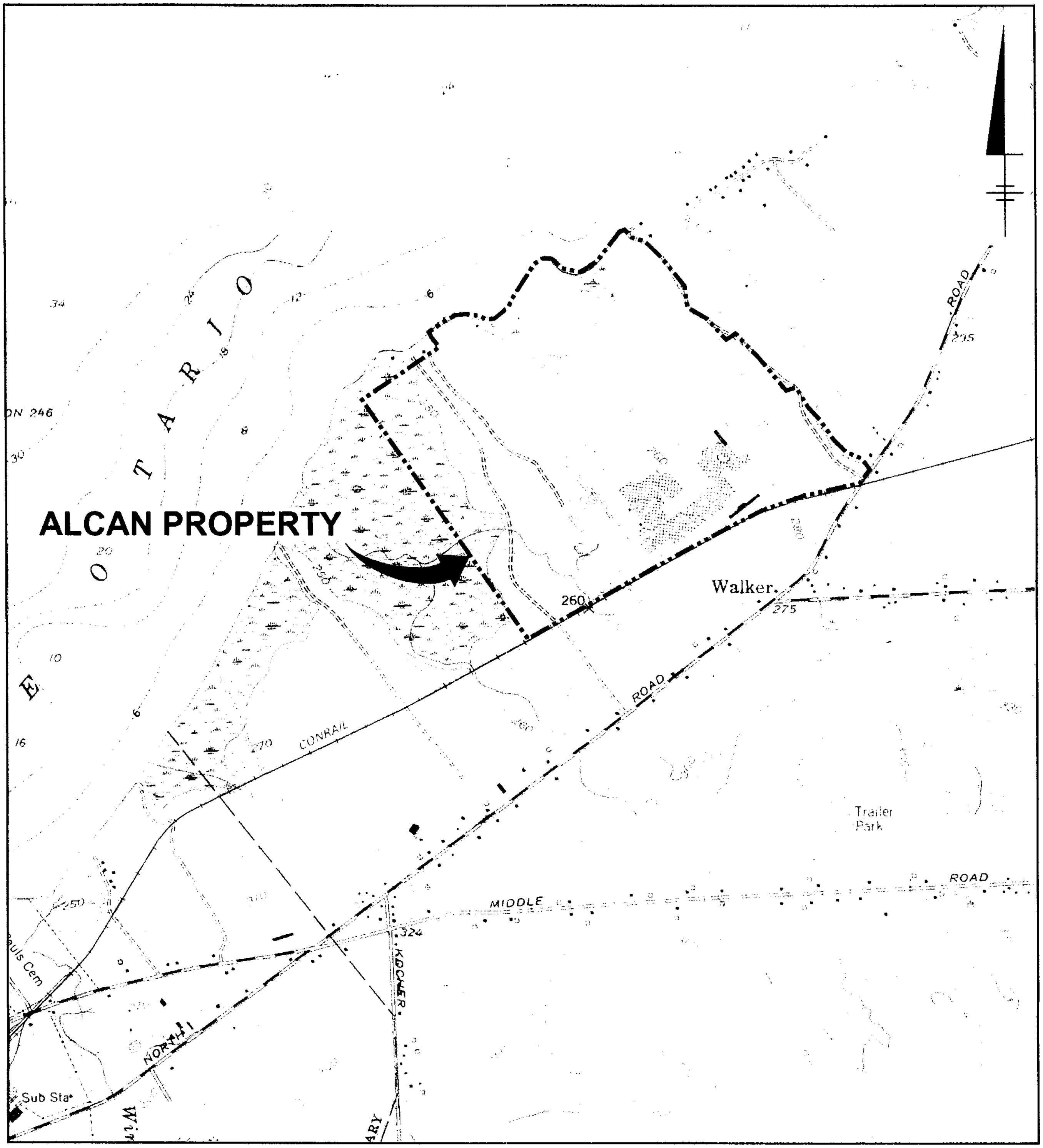
2. Interpretation of HQ Values

| Species | OU-1 | OU-1 (Cold Mill Landfill) | OU-3 | Teal Marsh |
|---|---|---|---|---|
| **Shorttail Shrew** | Low Risk | Moderate Risk | - | - |
| **Red-tailed Hawk** | No Risk | No Risk | - | - |
| **Great Blue Heron** | Low Risk | - | Low Risk | No Risk |
| **Mink** | High Risk | - | Low Risk | No Risk |

Notes:
1. HQ values are interpreted as follows:
   No Ecological Risk: NOAEL- and LOAEL-based HQs are < 1.
   Low Ecological Risk: NOAEL-based HQ >1 but <10, and LOAEL-based HQ <10.
   Moderate Ecological Risk: NOAEL-based HQ >10, and LOAEL-based HQ <10.
   High Ecological Risk: NOAEL- and LOAEL-based HQs are >10.

# *Figures*

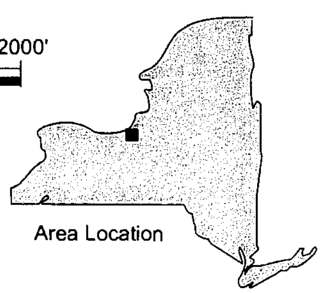
BLASLAND, BOUCK & LEE, INC.
*engineers & scientists*




**REFERENCE:** Base Map USGS 7.5 Min. Quad., Oswego East, & West of Texas, New York, 1954, Photorevised 1978.

2000' 0 2000'

**Approximate Scale: 1" = 2000'**



Area Location

ALCAN ALUMINUM CORPORATION
OSWEGO, NEW YORK

**FOCUSED REMEDIAL INVESTIGATION**

# SITE LOCATION MAP

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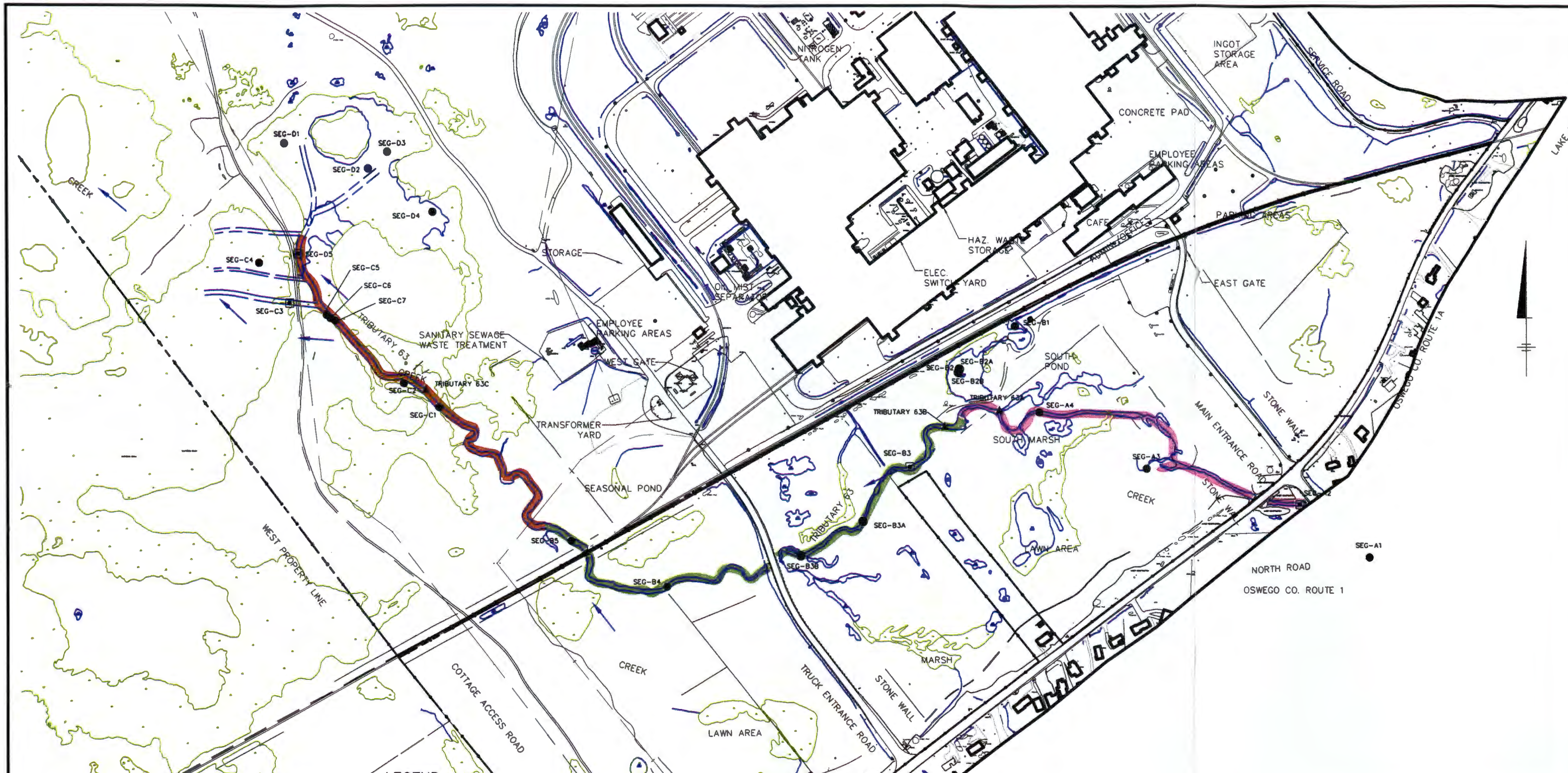
engineers & scientists

**FIGURE**
**1**

12/05/03 SYR-D54-LBR, DJH
72207010/72207n01.cdr




LEGEND:

RAILROAD

CHAIN LINK FENCE

FISH COLLECTION AREA – SEGMENT A

FISH COLLECTION AREA – SEGMENT B

FISH COLLECTION AREA – SEGMENT C/D

SEG-A1 SURFICIAL SEDIMENT SAMPLE LOCATION

SEG-A2 JOINT SURFACE WATER AND SEDIMENT SAMPLE LOCATION

TRIBUTARY-63A APPROXIMATE DAMES AND MOORE SEDIMENT SAMPLE LOCATION

NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 3003 AERIAL SURVEY COMPLETED BY SANBORN, INC. AT A SCALE OF 1"=50'.

2. FISH COLLECTION AREAS WERE DIGITIZED FROM FIGURE OBTAINED FROM ENSR CORPORATION, ENTITLED "FIGURE 5-1c, PROPOSED SAMPLING LOCATIONS OU-3 (TRIBUTARY 63), AT A SCALE OF APPROXIMATELY 1"=500'.

3. SAMPLE LOCATIONS ARE APPROXIMATE.

0 400' 800'

GRAPHIC SCALE

ALCAN ALUMINUM CORPORATION
OSWEGO, NEW YORK
FOCUSED REMEDIAL INVESTIGATION

**TRIBUTARY 63 SAMPLING LOCATIONS**

BBL
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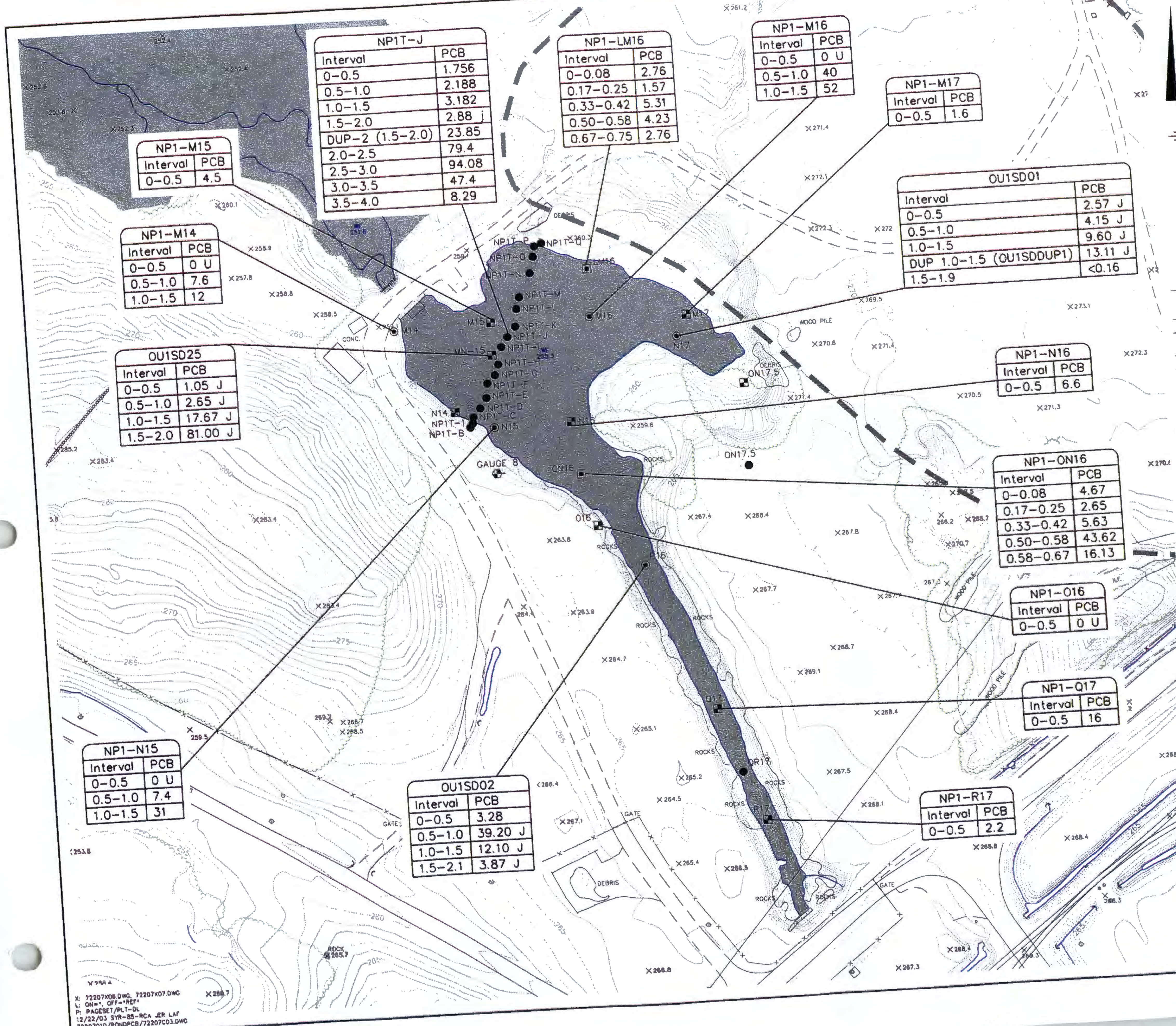
FIGURE
**3B**

X: 72207X01.DWG
L: ON=*, OFF=REF*
P: PAGESET/PLT-BL
12/17/03 SYR-54-JER SDL JER
72207010/72207G03.DWG




PROBING LOCATION
SURFACE SEDIMENT SAMPLE LOCATION
SEDIMENT CORE SAMPLE LOCATION
SEDIMENT CORE SAMPLE LOCATION (CONGENER SPECIFIC)
SUBSURFACE SOIL SAMPLE LOCATION
MONITORING WELL LOCATION
WATER LEVEL MEASURING POINT
FENCE
PAVED ROAD
UNIMPROVED ROAD
PROPERTY LINE
APPROXIMATE BOUNDARY OF LANDFILL
APPROXIMATE LIMIT OF STANDING WATER PER AERIAL SURVEY
APPROXIMATE CURRENT EXTENT OF PONDS AND MARSHES

## NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 2003 AERIAL SURVEY COMPLETED BY SANBORN, INC. AT A SCALE OF 1"=50'.
2. LOCATIONS UPDATED 10/1/02 BASED ON A BBL SURVEY. COORDINATES IN FEET NGVD RELATIVE TO NATIONAL GEODETIC VERTICAL DATUM OF 1929.

0 100' 200'
GRAPHIC SCALE

ALCAN ALUMINUM CORPORATION
OSWEGO, NEW YORK
FOCUSED REMEDIAL INVESTIGATION

**NORTH POND No. 1**
**SEDIMENT ANALYTICAL RESULTS**
**TOTAL PCBs (ppm)**

BBL
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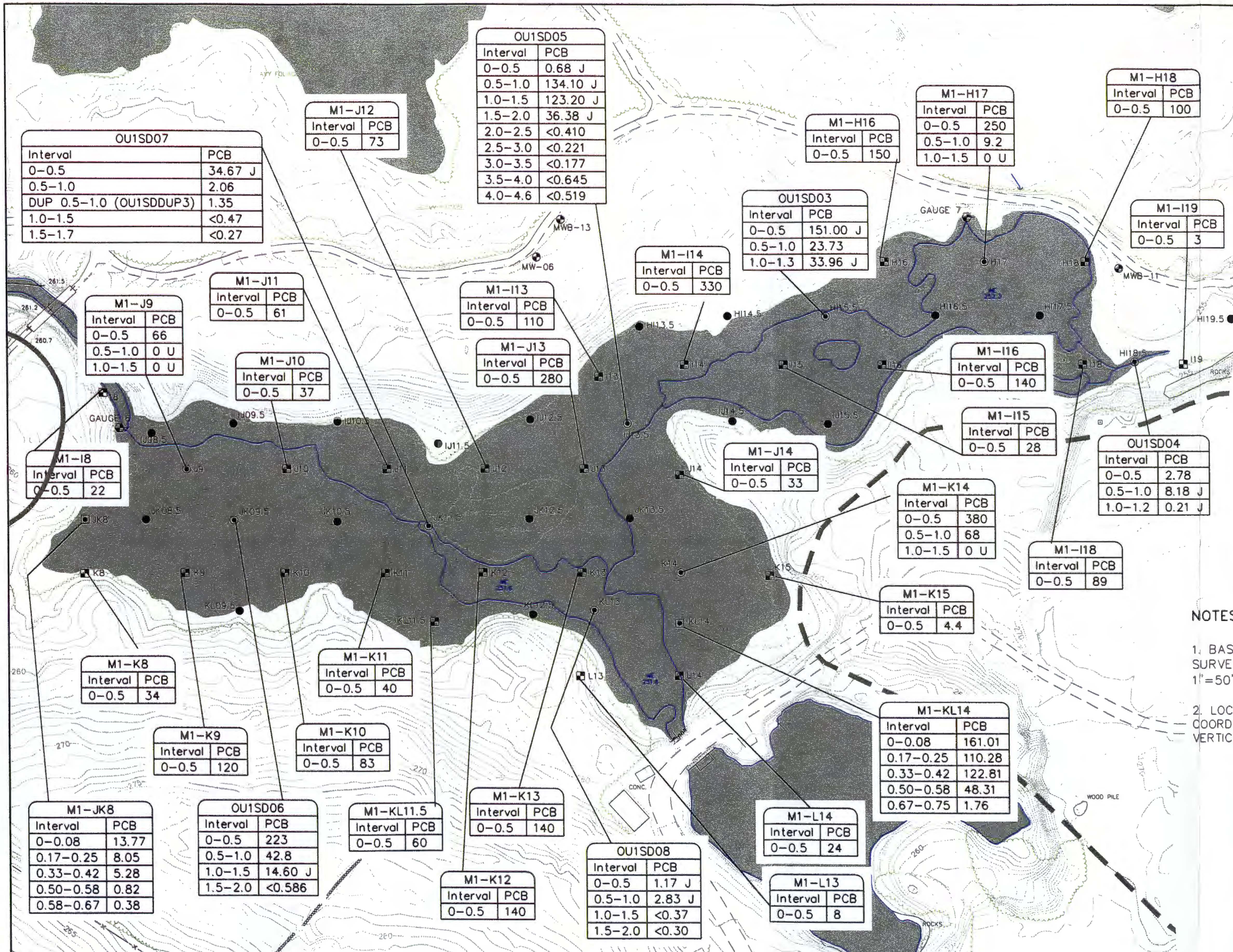
FIGURE
**4A**




LEGEND:

- PROBING LOCATION
- SURFACE SEDIMENT SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION (CONGENER SPECIFIC)
- SUBSURFACE SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION
- WATER LEVEL MEASURING POINT
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- PROPERTY LINE
- APPROXIMATE BOUNDARY OFLANDFILL
- PIPE
- APPROXIMATE LIMIT OF STANDING WATER PER AERIAL SURVEY
- APPROXIMATE CURRENT EXTENT OF PONDS AND MARSHES

NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 2003 AERIAL SURVEY COMPLETED BY SANBORN, INC. AT A SCALE OF 1"=50'.
2. LOCATIONS UPDATED 10/1/02 BASED ON A BBL SURVEY. COORDINATES IN FEET NGVD RELATIVE TO NATIONAL GEODETIC VERTICAL DATUM OF 1929.

0 100' 200'
GRAPHIC SCALE

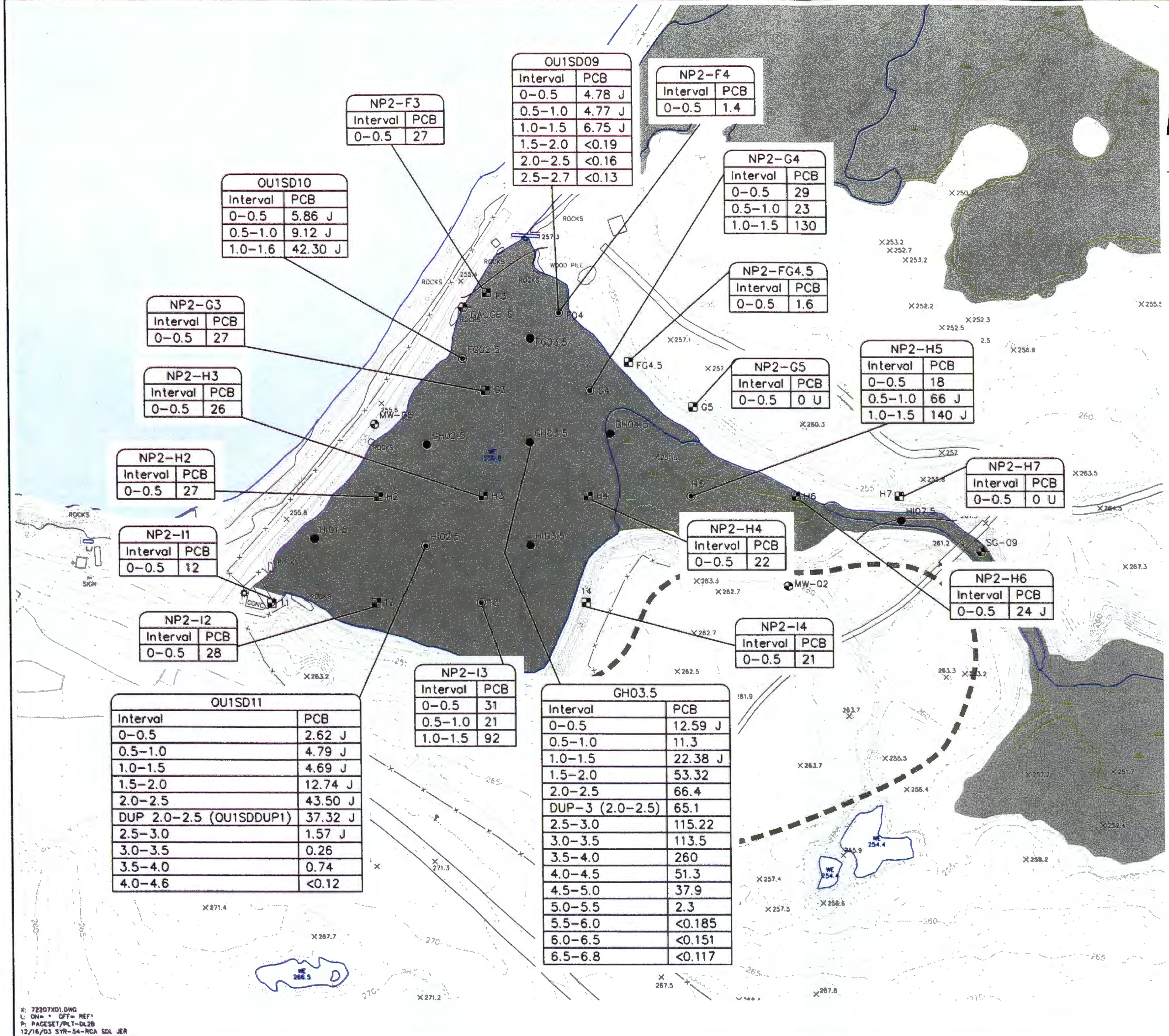
ALCAN ALUMINUM CORPORATION
OSWEGO, NEW YORK
FOCUSED REMEDIAL INVESTIGATION

**MARSH No. 1**
**SEDIMENT ANALYTICAL RESULTS**
**TOTAL PCBs (ppm)**

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
**4B**

X: 72207X07.DWG, 72207X08.DWG
L: ON=*, OFF=*REF*
P: PAGESET/PLT-DL
12/22/03 SYR-85-RCA JER LAF
72207010/PONDPCB/72207C04.DWG




**NP2-F3**

| Interval | PCB |
|---|---|
| 0-0.5 | 27 |

**OU1SD09**

| Interval | PCB |
|---|---|
| 0-0.5 | 4.78 J |
| 0.5-1.0 | 4.77 J |
| 1.0-1.5 | 6.75 J |
| 1.5-2.0 | <0.19 |
| 2.0-2.5 | <0.16 |
| 2.5-2.7 | <0.13 |

**NP2-F4**

| Interval | PCB |
|---|---|
| 0-0.5 | 1.4 |

**NP2-G4**

| Interval | PCB |
|---|---|
| 0-0.5 | 29 |
| 0.5-1.0 | 23 |
| 1.0-1.5 | 130 |

**OU1SD10**

| Interval | PCB |
|---|---|
| 0-0.5 | 5.86 J |
| 0.5-1.0 | 9.12 J |
| 1.0-1.6 | 42.30 J |

**NP2-FG4.5**

| Interval | PCB |
|---|---|
| 0-0.5 | 1.6 |

**NP2-G3**

| Interval | PCB |
|---|---|
| 0-0.5 | 27 |

**NP2-G5**

| Interval | PCB |
|---|---|
| 0-0.5 | 0 U |

**NP2-H5**

| Interval | PCB |
|---|---|
| 0-0.5 | 18 |
| 0.5-1.0 | 66 J |
| 1.0-1.5 | 140 J |

**NP2-H3**

| Interval | PCB |
|---|---|
| 0-0.5 | 26 |

**NP2-H2**

| Interval | PCB |
|---|---|
| 0-0.5 | 27 |

**NP2-H7**

| Interval | PCB |
|---|---|
| 0-0.5 | 0 U |

**NP2-H4**

| Interval | PCB |
|---|---|
| 0-0.5 | 22 |

**NP2-I1**

| Interval | PCB |
|---|---|
| 0-0.5 | 12 |

**NP2-H6**

| Interval | PCB |
|---|---|
| 0-0.5 | 24 J |

**NP2-I2**

| Interval | PCB |
|---|---|
| 0-0.5 | 28 |

**NP2-I4**

| Interval | PCB |
|---|---|
| 0-0.5 | 21 |

**NP2-I3**

| Interval | PCB |
|---|---|
| 0-0.5 | 31 |
| 0.5-1.0 | 21 |
| 1.0-1.5 | 92 |

**OU1SD11**

| Interval | PCB |
|---|---|
| 0-0.5 | 2.62 J |
| 0.5-1.0 | 4.79 J |
| 1.0-1.5 | 4.69 J |
| 1.5-2.0 | 12.74 J |
| 2.0-2.5 | 43.50 J |
| DUP 2.0-2.5 (OU1SDDUP1) | 37.32 J |
| 2.5-3.0 | 1.57 J |
| 3.0-3.5 | 0.26 |
| 3.5-4.0 | 0.74 |
| 4.0-4.6 | <0.12 |

**GH03.5**

| Interval | PCB |
|---|---|
| 0-0.5 | 12.59 J |
| 0.5-1.0 | 11.3 |
| 1.0-1.5 | 22.38 J |
| 1.5-2.0 | 53.32 |
| 2.0-2.5 | 66.4 |
| DUP-3 (2.0-2.5) | 65.1 |
| 2.5-3.0 | 115.22 |
| 3.0-3.5 | 113.5 |
| 3.5-4.0 | 260 |
| 4.0-4.5 | 51.3 |
| 4.5-5.0 | 37.9 |
| 5.0-5.5 | 2.3 |
| 5.5-6.0 | <0.185 |
| 6.0-6.5 | <0.151 |
| 6.5-6.8 | <0.117 |

LEGEND:

- PROBING LOCATION
- SURFACE SEDIMENT SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION (CONGENER SPECIFIC)
- SUBSURFACE SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION
- WATER LEVEL MEASURING POINT
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- PROPERTY LINE
- APPROXIMATE BOUNDARY OF LANDFILL
- PIPE
- APPROXIMATE LIMIT OF SWAMP AREA PER AERIAL SURVEY
- APPROXIMATE EDGE OF STANDING WATER PER AERIAL SURVEY
- APPROXIMATE EDGE OF PONDS AND MARSHES

NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 2003 AERIAL SURVEY COMPLETED BY SANBORN, INC. AT A SCALE OF 1"=50'.
2. LOCATIONS UPDATED 10/1/02 BASED ON A BBL SURVEY. COORDINATES IN FEET NGVD RELATIVE TO NATIONAL GEODETIC VERTICAL DATUM OF 1929.

0 100' 200'

GRAPHIC SCALE

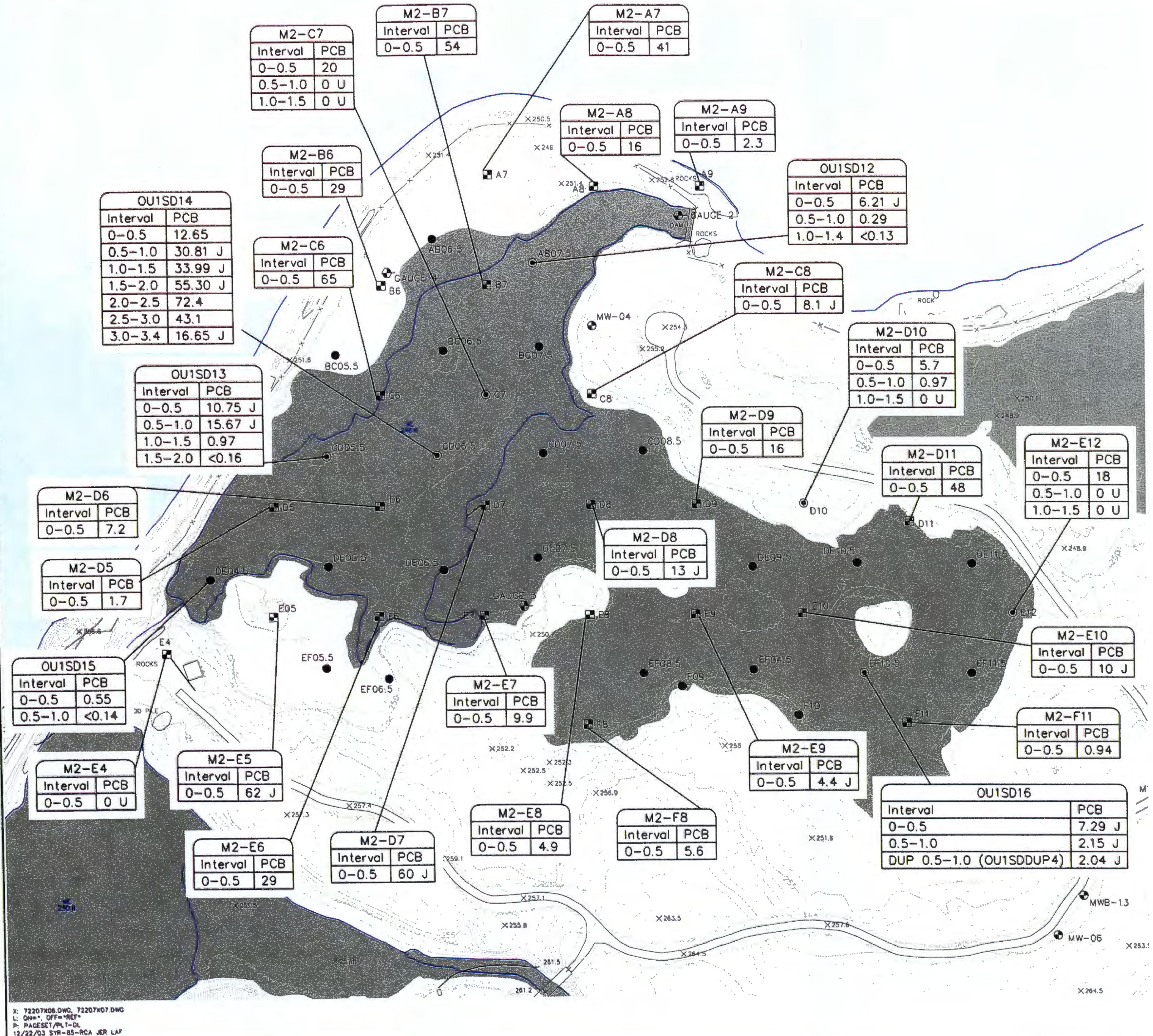
X: 72207X01.DWG
L: ON=* OFF=REF*
P: PAGESET/PLT-DL28
12/16/03 SYR-54-RCA SDL JER
72207010/PONDPCB/72207C05.DWG

ALCAN ALUMINUM CORPORATION
OSWEGO, NEW YORK
FOCUSED REMEDIAL INVESTIGATION

**NORTH POND No. 2**
**SEDIMENT ANALYTICAL RESULTS**
**TOTAL PCBs (ppm)**

BBL® BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE **4C**




X: 72207X06.DWG, 72207X07.DWG
L: ON=*, OFF=*REF*
P: PAGESET/PLT-DL
12/22/03 SYR-85-RCA JER LAF
72207010/PONDPCB/72207C06.DWG

LEGEND:

- PROBING LOCATION
- SURFACE SEDIMENT SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION (CONGENER SPECIFIC)
- SUBSURFACE SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION
- WATER LEVEL MEASURING POINT
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- PROPERTY LINE
- APPROXIMATE BOUNDARY OF LANDFILL
- PIPE
- APPROXIMATE LIMIT OF STANDING WATER PER AERIAL SURVEY
- APPROXIMATE CURRENT EXTENT OF PONDS AND MARSHES

NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 2003 AERIAL SURVEY COMPLETED BY SANBORN, INC. AT A SCALE OF 1"=50'.

2. LOCATIONS UPDATED 10/1/02 BASED ON A BBL SURVEY. COORDINATES IN FEET NGVD RELATIVE TO NATIONAL GEODETIC VERTICAL DATUM OF 1929.

0 100' 200'
GRAPHIC SCALE

ALCAN ALUMINUM CORPORATION
OSWEGO, NEW YORK
FOCUSED REMEDIAL INVESTIGATION

MARSH No. 2
SEDIMENT ANALYTICAL RESULTS
TOTAL PCBs (ppm)

BBL
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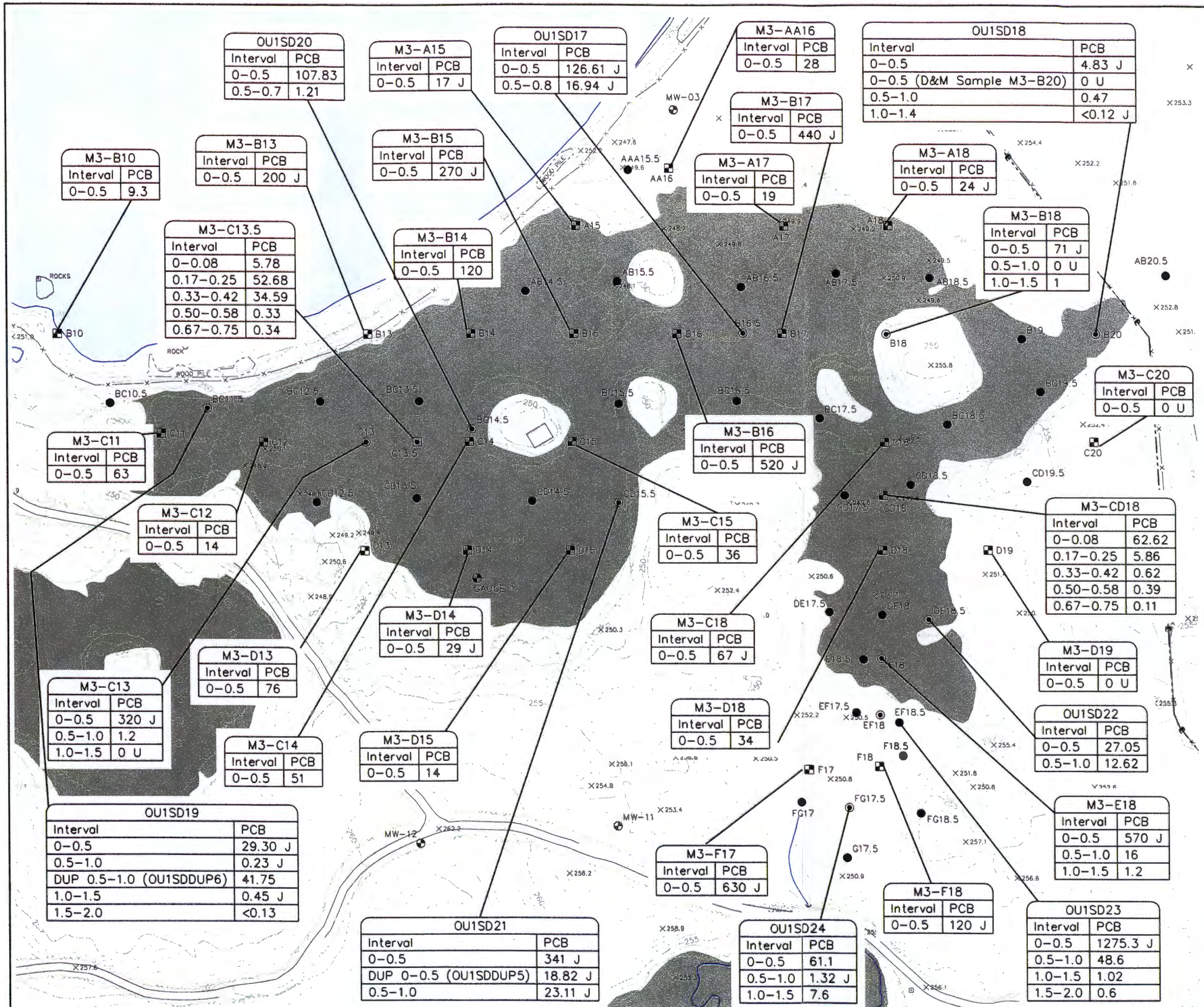
engineers & scientists

FIGURE
4D




LEGEND:

- PROBING LOCATION
- SURFACE SEDIMENT SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION (CONGENER SPECIFIC)
- SUBSURFACE SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION
- WATER LEVEL MEASURING POINT
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- PROPERTY LINE
- APPROXIMATE BOUNDARY OF LANDFILL
- PIPE
- APPROXIMATE LIMIT OF STANDING WATER PER AERIAL SURVEY
- APPROXIMATE CURRENT EXTENT OF PONDS AND MARSHES

NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 2003 AERIAL SURVEY COMPLETED BY SANBORN, INC. AT A SCALE OF 1"=50'.

2. LOCATIONS UPDATED 10/1/02 BASED ON A BBL SURVEY. COORDINATES IN FEET NGVD RELATIVE TO NATIONAL GEODETIC VERTICAL DATUM OF 1929.

0 100' 200'

GRAPHIC SCALE

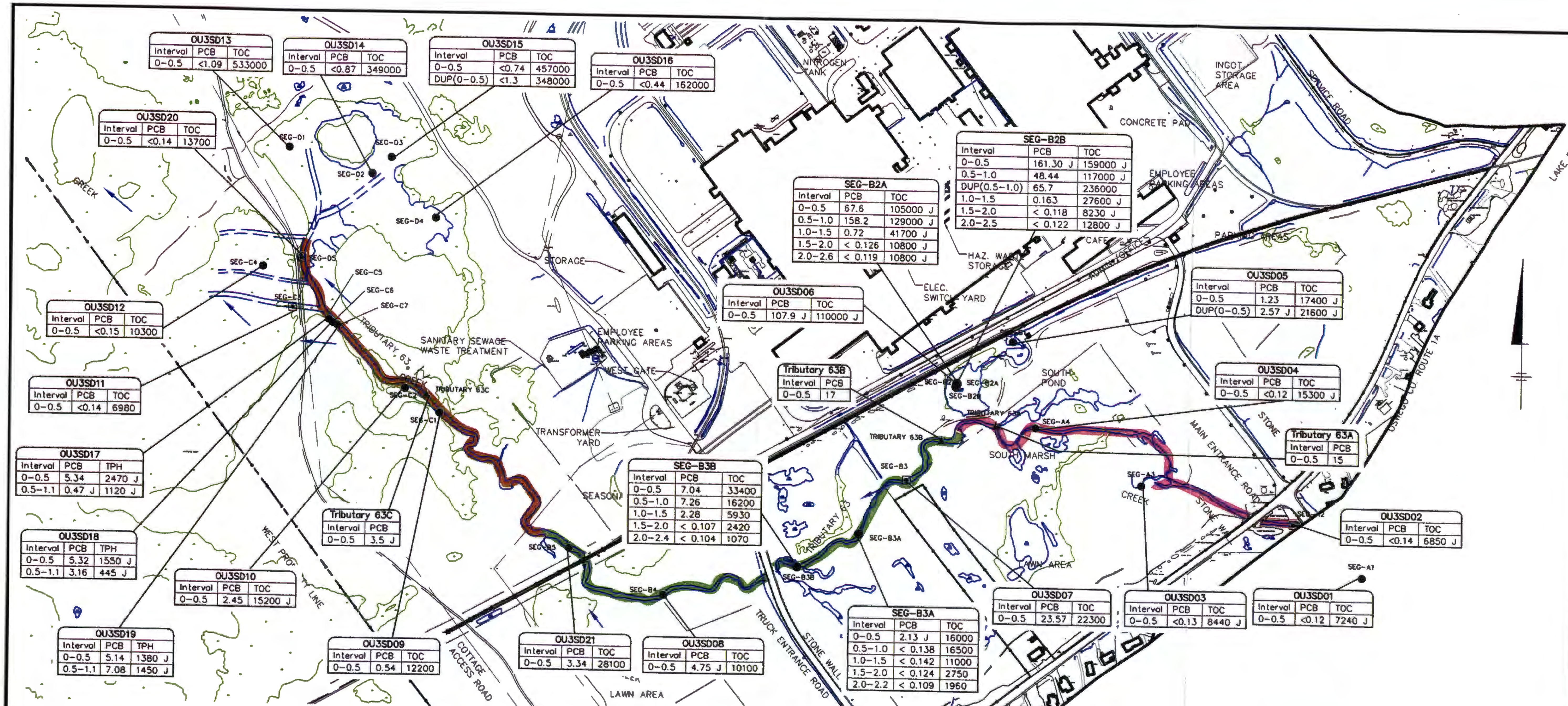
ALCAN ALUMINUM CORPORATION
OSWEGO, NEW YORK
**FOCUSED REMEDIAL INVESTIGATION**

**MARSH No. 3**
**SEDIMENT ANALYTICAL RESULTS**
**TOTAL PCBs (ppm)**

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE **4E**

X: 72207X06.DWG, 72207X07.DWG
L: ON=*, OFF=*REF*
P: PAGESET/PLT-DL
12/22/03 SYR-85-RCA JER LAF
72207010/PONDPCB/72207C07.DWG




## LEGEND:

| | |
|---|---|
| (railroad symbol) | RAILROAD |
| —— X —— | CHAIN LINK FENCE |
| (line) | LIMITS OF WETLAND AREA AS MAPPED PER AERIAL SURVEY |
| (pink band) | SEGMENT A |
| (green band) | SEGMENT B |
| (brown band) | SEGMENT C |
| ● SEG-A1 | SURFICIAL SEDIMENT SAMPLE LOCATION |
| ⊡ SEG-A2 | JOINT SURFACE WATER AND SEDIMENT SAMPLE LOCATION |
| ▲ TRIBUTARY-63A | APPROXIMATE DAMES AND MOORE SEDIMENT SAMPLE LOCATION |

## NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 2003 AERIAL SURVEY COMPLETED BY SANBORN, INC. AT A SCALE OF 1"=50'.

2. FISH COLLECTION AREAS WERE DIGITIZED FROM FIGURE OBTAINED FROM ENSR CORPORATION, ENTITLED "FIGURE 5-1c, PROPOSED SAMPLING LOCATIONS OU-3 (TRIBUTARY 63), AT A SCALE OF APPROXIMATELY 1"=500'.

3. SAMPLE LOCATIONS ARE APPROXIMATE.

0 400' 800'
GRAPHIC SCALE

X: 72207X05.DWG
L: ON=*, OFF=*REF*
P: PAGESET/PLT-BL
1/13/04 SYR-85-JER LAF NJR
72207010/PONDPCB/72207C01.DWG

ALCAN ALUMINUM CORPORATION
OSWEGO, NEW YORK
FOCUSED REMEDIAL INVESTIGATION

**TRIBUTARY 63 - SEDIMENT SAMPLING RESULTS - PCBs, TOCs, AND TPHs (ppm)**

BBL
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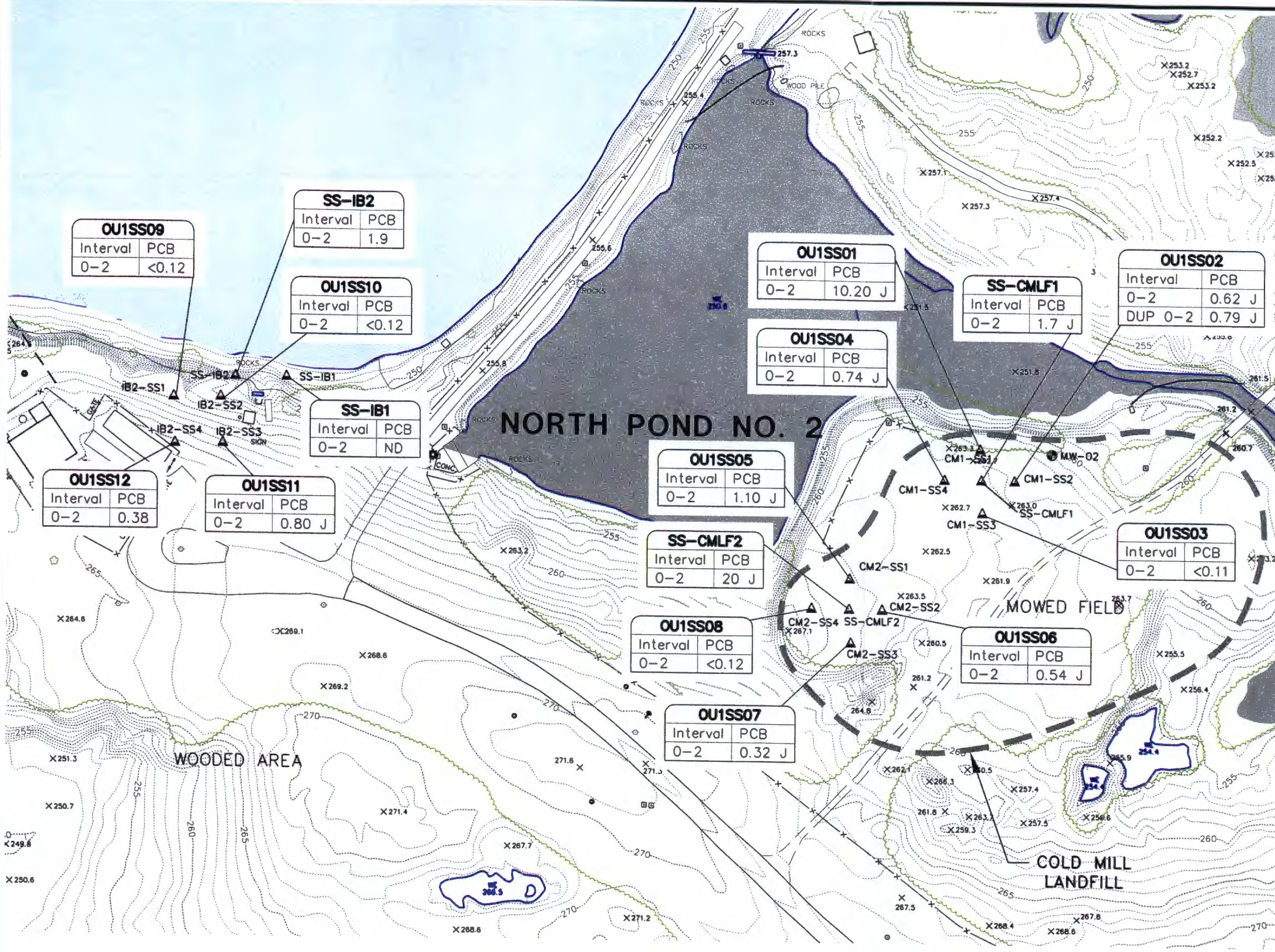
engineers, scientists, economists

FIGURE 4F




LEGEND:

- PROBING LOCATION
- SURFACE SEDIMENT SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION (CONGENER SPECIFIC)
- SUBSURFACE SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION
- WATER LEVEL MEASURING POINT
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- PROPERTY LINE
- APPROXIMATE BOUNDARY OF LANDFILL
- PIPE
- APPROXIMATE EDGE OF STANDING WATER PER AERIAL SURVEY
- APPROXIMATE CURRENT EXTENT OF PONDS AND MARSHES

NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 2003 AERIAL SURVEY COMPLETED BY SANBORN, INC. AT A SCALE OF 1"=50'.

2. LOCATIONS UPDATED 10/1/02 BASED ON A BBL SURVEY. COORDINATES IN FEET NGVD RELATIVE TO NATIONAL GEODETIC VERTICAL DATUM OF 1929.

0 100' 200'
GRAPHIC SCALE

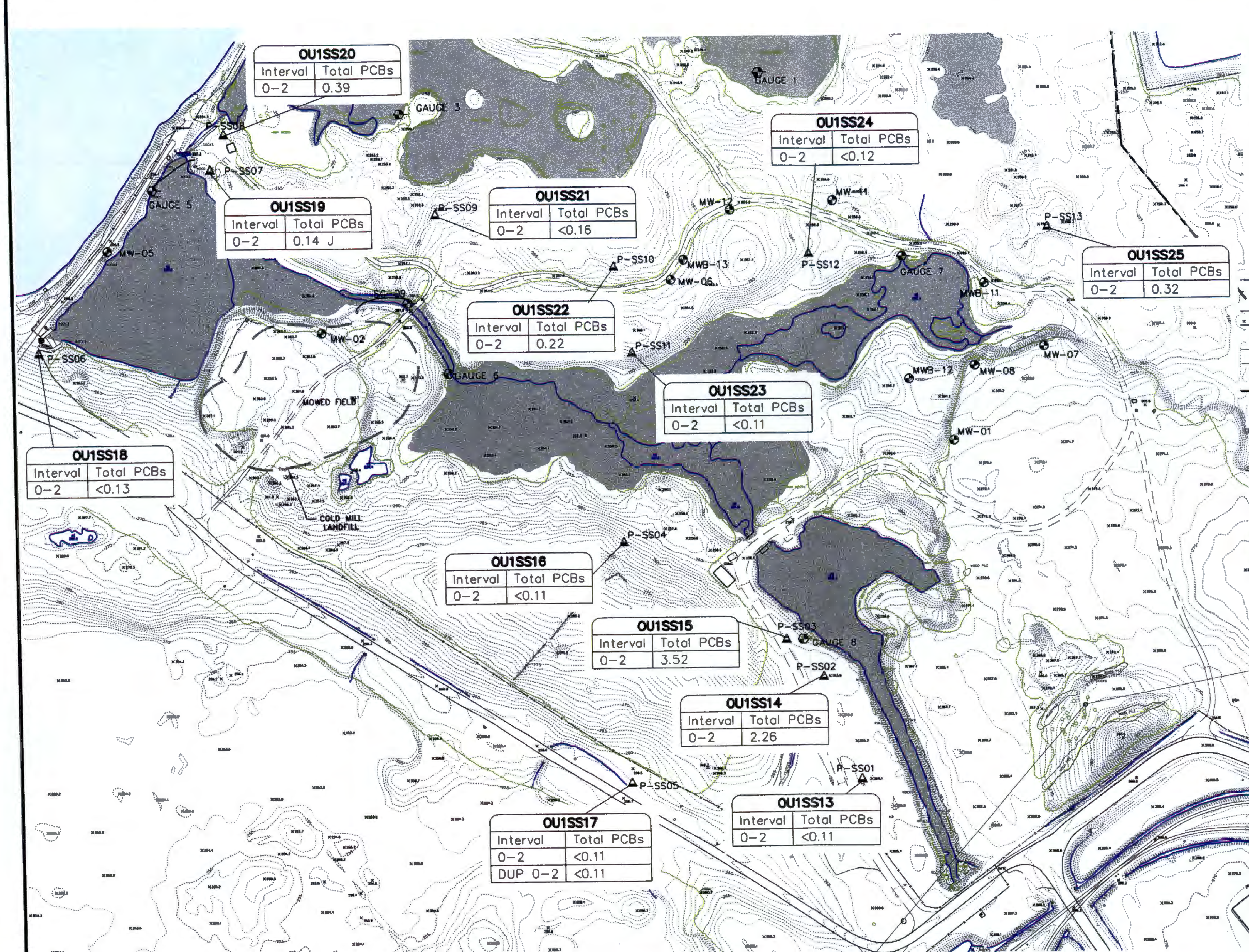
ALCAN ALUMINUM CORPORATION
OSWEGO, NEW YORK
FOCUSED REMEDIAL INVESTIGATION

**OU-1 FOCUSED SURFACE SOIL ANALYTICAL RESULTS TOTAL PCBs (ppm)**

BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 5A

X: 72207X07.DWG, 72207X09.DWG
L: ON=*, OFF=*REF*
P: PAGESET/PLT-BL
12/22/03 SYR-54-RCA JER LAF
72207010/72207C01.DWG




LEGEND:

- SUBSURFACE SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION
- WATER LEVEL MEASURING POINT
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- PROPERTY LINE
- APPROXIMATE BOUNDARY OF LANDFILL
- PIPE
- APPROXIMATE EDGE OF STANDING WATER PER AERIAL SURVEY
- APPROXIMATE EDGE OF PONDS AND MARSHES

NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 2003 AERIAL SURVEY COMPLETED BY SANBORN, INC. AT A SCALE OF 1"=50'.
2. LOCATIONS UPDATED 10/1/02 BASED ON A BBL SURVEY. COORDINATES IN FEET NGVD RELATIVE TO NATIONAL GEODETIC VERTICAL DATUM OF 1929.

0 200' 400'

GRAPHIC SCALE

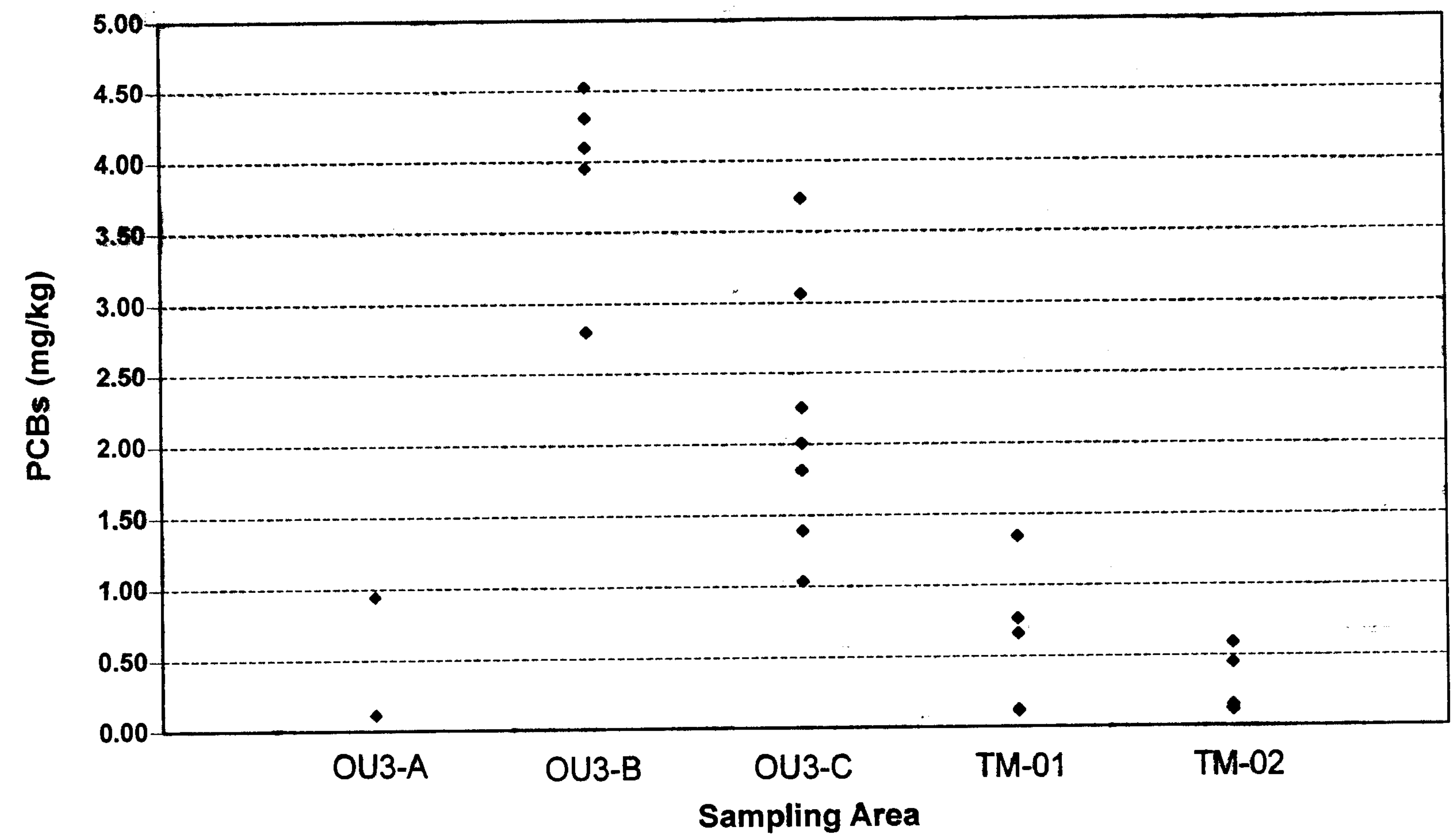
ALCAN ALUMINUM CORPORATION
OSWEGO, NEW YORK
FOCUSED REMEDIAL INVESTIGATION

**OU-1 PERIMETER SURFACE SOIL ANALYTICAL RESULTS TOTAL PCBs (ppm)**

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
**5B**

X: 72207X07.DWG, 72207X09.DWG
L: ON=*, OFF=*REF*
P: PAGESET/PLT-BL
12/22/03 SYR-54-RCA JER LAF
72207010/72207C02.DWG



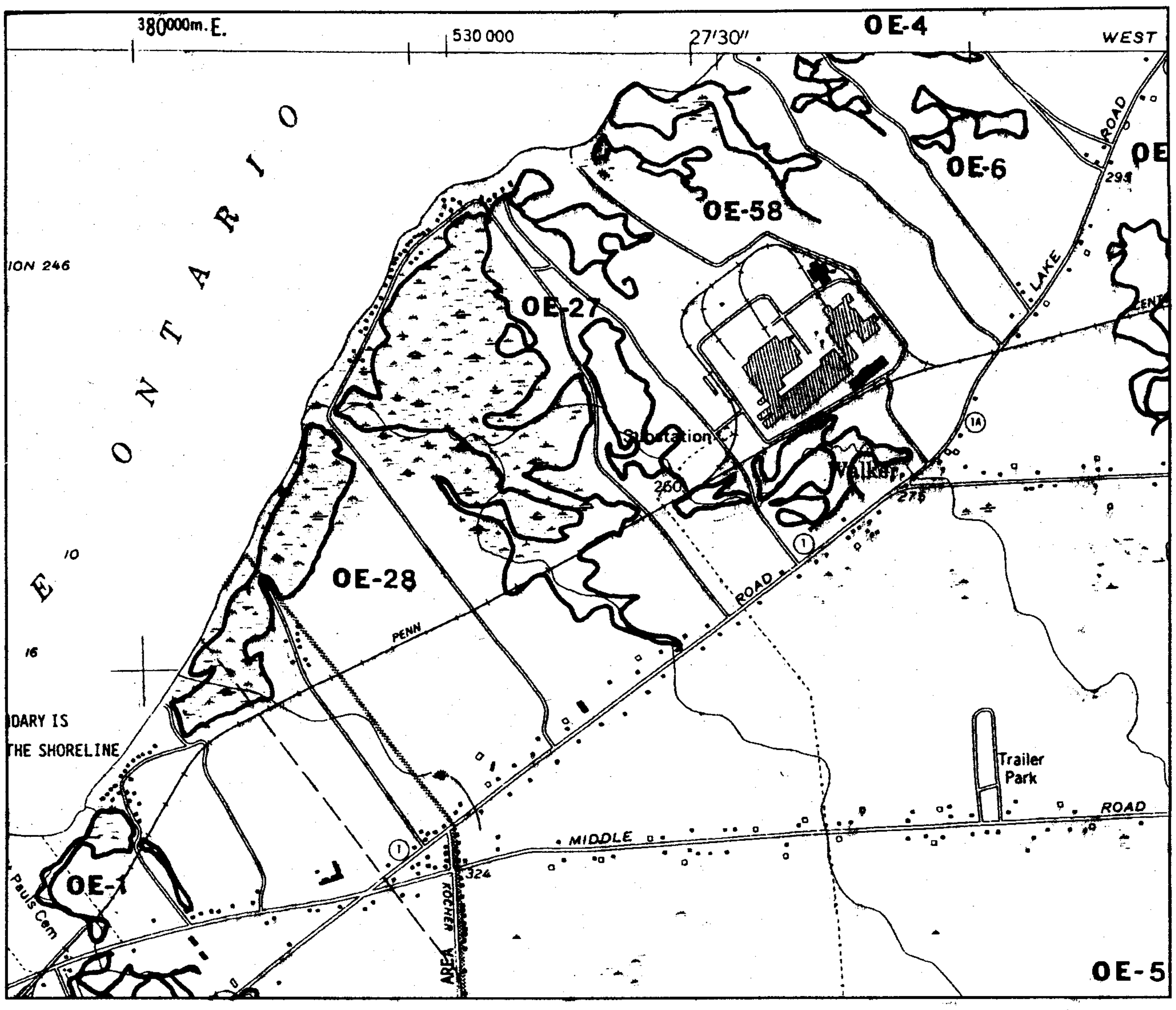

ALCAN ALUMINUM CORPORATION
OSWEGO, NEW YORK
**FOCUSED REMEDIAL INVESTIGATION**

**TOTAL PCB CONCENTRATIONS IN WHOLE-BODY PICKEREL**

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE **7**

12/16/03 SYR-D54-LBR DJH
72207010/72207g01.cdr




**REFERENCE:** Base Map New York State Department of Transportation, 7.5 Min. Series, Oswego East, New York, Oswego County Map 12 of 30, Second Edition, 1975.

2000' 0 2000'

**Approximate Scale: 1" = 2000'**

Area Location

ALCAN ALUMINUM CORPORATION
OSWEGO, NEW YORK

**FOCUSED REMEDIAL INVESTIGATION**

**NEW YORK STATE FRESHWATER WETLANDS MAP FOR THE VICINITY OF THE ALCAN FACILITY**

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

**FIGURE 9**

12/16/03 SYR-D54-DJH LBR
72207010/72207n03.cdr

## *Appendix A*

## Correspondence

BLASLAND, BOUCK & LEE, INC.
*engineers & scientists*

**Alcan Aluminum Corporation**
Oswego Works

448 Co. Rt. 1A
Oswego, NY 13126-0028

Mailing Address:
P.O. Box 28
Oswego, NY 13126-0028

Tel: (315) 349-0304
Fax: (315) 349-8025
David.Neuner@Alcan.com

A

August 12, 2002

New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233

Attn: Mr. Wayne Miserak

Re: FRI Activities
Alcan Aluminum Corporation (#7-38-015)
Consent Order # A7-0395-9908

Dear Wayne:

As we discussed, Blasland, Bouck & Lee, Inc. (BBL) has been retained by Alcan Aluminum Corporation (Alcan) to conduct the Focused Remedial Investigation/Focused Feasibility Study (FRI/FFS). The preliminary schedule of the FRI field activities is attached for your review.

BBL has reviewed the FRI Work Plan and Field Sampling Plan prepared by ENSR Environmental Corporation (ENSR, June 2002). Based on their review of the Field Sampling Plan, BBL proposes to implement the following modifications to the FRI field sampling protocols:

1) The FRI Field Sampling Plan indicates that sediment core samples will be collected using a KB™ corer. BBL proposes to collect sediment samples using a 2-inch diameter lexan tube core sampler that will be driven by hand with a stainless steel block. The lexan core method is widely utilized and results in good recovery of saturated sediments. As specified in the FRI work plan, a maximum of 24 sediment cores will be collected. Sediment samples will be sectioned into 6-inch segments. Each segment will be analyzed in accordance with the FRI/FFS Work Plan;

2) The FRI Work Plan specifies that 6-inch diameter stainless steel casings will be installed through overburden at the bedrock monitoring well locations. BBL proposes to utilize 4-inch diameter steel casings at the bedrock monitoring well locations. Based on our review of the existing groundwater analytical data, steel casings appear to be appropriate for these locations. In addition, the 4-inch casing diameter will be adequate to complete rock coring at the bedrock monitoring well locations; and

3) The FRI Work Plan indicates that surface soil samples will be collected from 0-2 feet below grade. Since the analytical results from the surface soil samples will ultimately be used to support future human health risk evaluation, BBL proposes to collect the surface soil samples from 0-6 inches below grade. The 0-6 inch sampling results will be more

A

representative of actual exposure point concentrations for the purpose of characterizing potential human health risks.

As indicated on the attached project schedule, FRI field sampling activities are scheduled to begin during the week of August 19, 2002. Please notify Alcan prior to the commencement of field activities if any of the above changes are unacceptable to NYSDEC.

Please call me at (315) 349-0304 if you have any questions.

Sincerely,

David M. Neuner, P.E.
Environmental Coordinator

cc:
Michael Ryan – NYSDEC
Henriette Hamel – NYSDOH

**Alcan Aluminum Corporation**
Oswego Works

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Fax: (315) 349-8025
David.Neuner@Alcan.com

A

May 13, 2003

Bureau of Western Remedial Action
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway, 11th Floor
Albany, NY 12233-7017

Attn: Mr. Wayne Miserak

Re: Additional Focused Remedial Investigation Activities
NYSDEC Site ID #738015

Dear Mr. Mizerak:

The purpose of this letter is to notify the New York State Department of Environmental Conservation (NYSDEC) that Alcan Aluminum Corporation (Alcan) intends to implement the following additional investigation activities as part of the Focused Remedial Investigation (FRI) for the Alcan site:

- Completing an aerial photographic survey of the site to develop a base map that accurately portrays existing site conditions;

- Collecting a limited number of additional sediment samples to further characterize the distribution of polychlorinated biphenyls (PCBs) within Tributary 63 (Operable Unit 3) and at specific locations within the North Cooling Ponds area (Operable Unit 1); and

- Implementing a groundwater and surface water level monitoring program to characterize ongoing changes in hydrologic conditions in the vicinity of Operable Unit 1 that have resulted from the elimination of cooling water discharge.

Requirements for the additional investigation activities listed above have been identified based on an evaluation of the results obtained for the FRI activities that were completed by Blasland, Bouck & Lee, Inc. (BBL) between August 2002 and October 2002. The results of the additional investigation activities will facilitate the evaluation of potential remedial alternatives to be included in the Focused Feasibility Study (FFS).

This letter also presents Alcan's proposed approach for collecting biota samples within Teal Marsh as part of the FRI. The biota sampling activities within Teal Marsh were discussed during an April 23, 2003 meeting attended by NYSDEC and NYSDOH representatives. The rationale, scope, and schedule for the completion of additional FRI activities are presented below.

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The sample locations for Teal Marsh will be determined during a preliminary field reconnaissance, and will be based on physical access and habitat availability. Initially, attempts will be made to collect the fish samples from an area located roughly in the center of Teal Marsh, working outwards until sufficient numbers of fish have been collected. A hand-held GPS unit will be used to estimate the approximate boundaries of the fish sampling area.

A maximum of 10 edible-size individual fish samples and 10 composite forage fish samples (20 total samples) will be collected from Teal Marsh. Fish tissue samples will be handled and processed using the methods and procedures described within the FRI Work Plan. The edible-size fish will be processed individually as fillet samples (in accordance with NYSDEC standards for fillet sample preparation) and forage fish will be processed as whole-body composite samples.

Biota samples will be submitted to Northeast Analytical for laboratory analysis for PCBs and percent lipids, using the methods previously employed in the FRI. All biota sampling analytical results will be incorporated into the FRI Report. Based on the analytical results, the need to collect additional biota or sediment samples from the Teal Marsh will be evaluated with NYSDEC.

<u>Schedule</u>

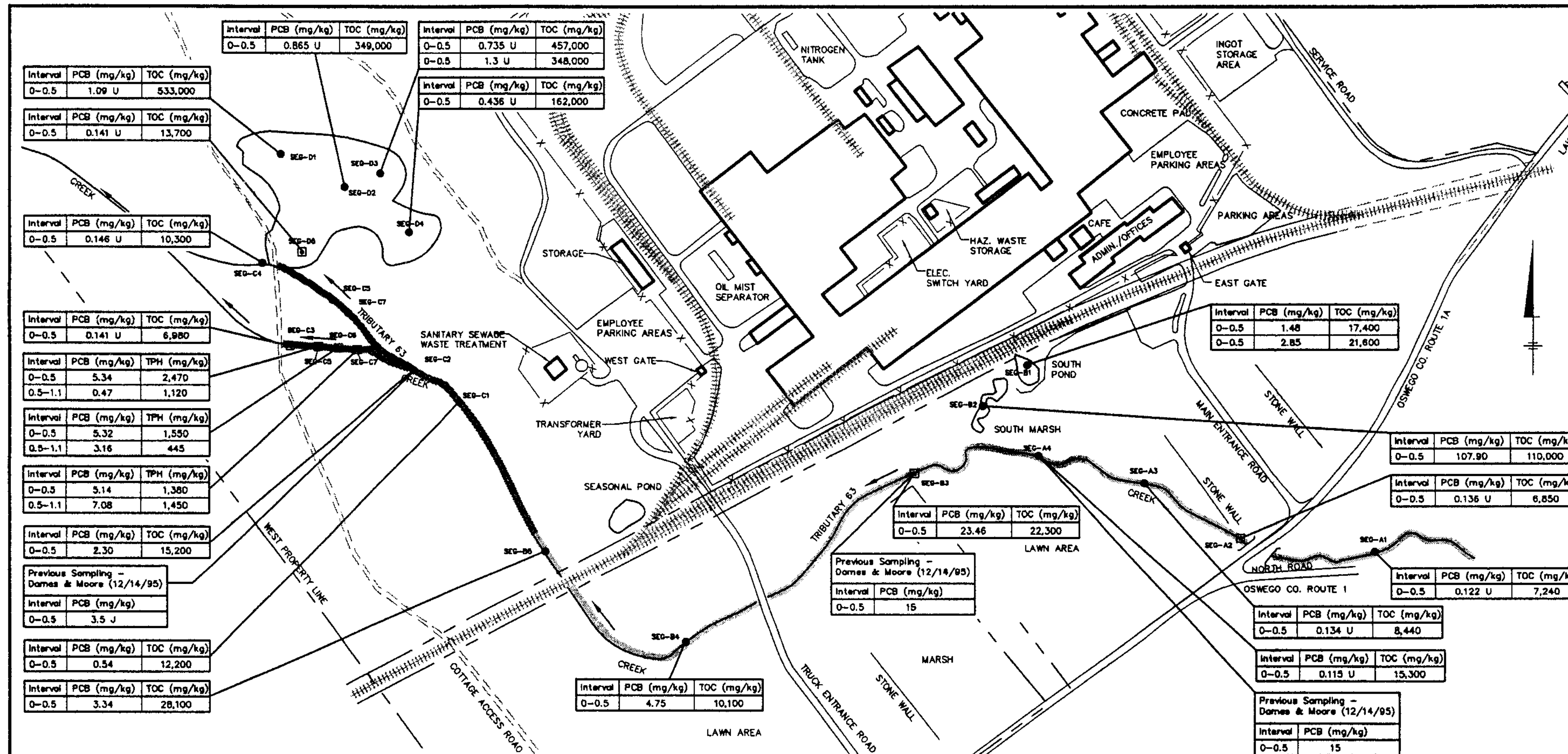
The existing project schedule presented in the Focused RI Work Plan (ENSR Corporation, June 2002) indicates that the Focused RI Report will be submitted to the NYSDEC during July 2003. However, the existing project schedule does not accommodate requirements for additional investigation activities as outlined above (including additional activities requested by the NYSDEC). Alcan is committed to proceeding with the FRI/FFS in an expeditious and responsible manner. However, the additional investigation activities outlined above will necessitate a modification to the overall FRI/FFS schedule. Alcan will prepare a revised project schedule following receipt of NYSDEC approval to proceed with the additional investigation activities discussed above.

Please call me if you have any questions regarding the additional activities outlined in this Work Plan Addendum.

Sincerely,

David M. Neuner, P.E.
Environmental Leader

cc: Mr. Michael Ryan (NYSDEC)
Mr. Richard Koeppicus (NYSDEC)
Ms. Henriette Hamel (NYSDOH)




LEGEND:

- RAILROAD
- CHAIN LINK FENCE
- FISH COLLECTION AREA – SEGMENT A
- FISH COLLECTION AREA – SEGMENT B
- FISH COLLECTION AREA – SEGMENT C/D
- SEG-A1 SURFICIAL SEDIMENT SAMPLE LOCATION
- SEG-A2 JOINT SURFACE WATER AND SEDIMENT SAMPLE LOCATION

NOTES:

1. BASEMAP DIGITIZED FROM A PAPER COPY OF A DRAWING MADE BY DAMES & MOORE, ENTITLED "SITE MAP, ALCAN ROLLED PRODUCTS COMPANY; OSWEGO, NEW YORK", DATED 8/26/97 AT A SCALE OF APPROXIMATELY 1"=300'.

2. FISH COLLECTION AREAS WERE DIGITIZED FROM FIGURE OBTAINED FROM ENSR CORPORATION, ENTITLED "FIGURE 5-1c, PROPOSED SAMPLING LOCATIONS OU-3 (TRIBUTARY 63), AT A SCALE OF APPROXIMATELY 1"=500'.

3. SAMPLE LOCATIONS ARE APPROXIMATE.

4. FIGURE SHOWS PRELIMINARY DATA THAT HAS NOT BEEN VALIDATED BY AN INDEPENDENT DATA VALIDATOR.

0 400' 800'
GRAPHIC SCALE

ALCAN CORPORATION
OSWEGO, NEW YORK
**FOCUSED REMEDIAL INVESTIGATION**

**TRIBUTARY 63 - PRELIMINARY SEDIMENT SAMPLING RESULTS - PCBs AND TOC (ppm)**

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
1

# *Appendix B*

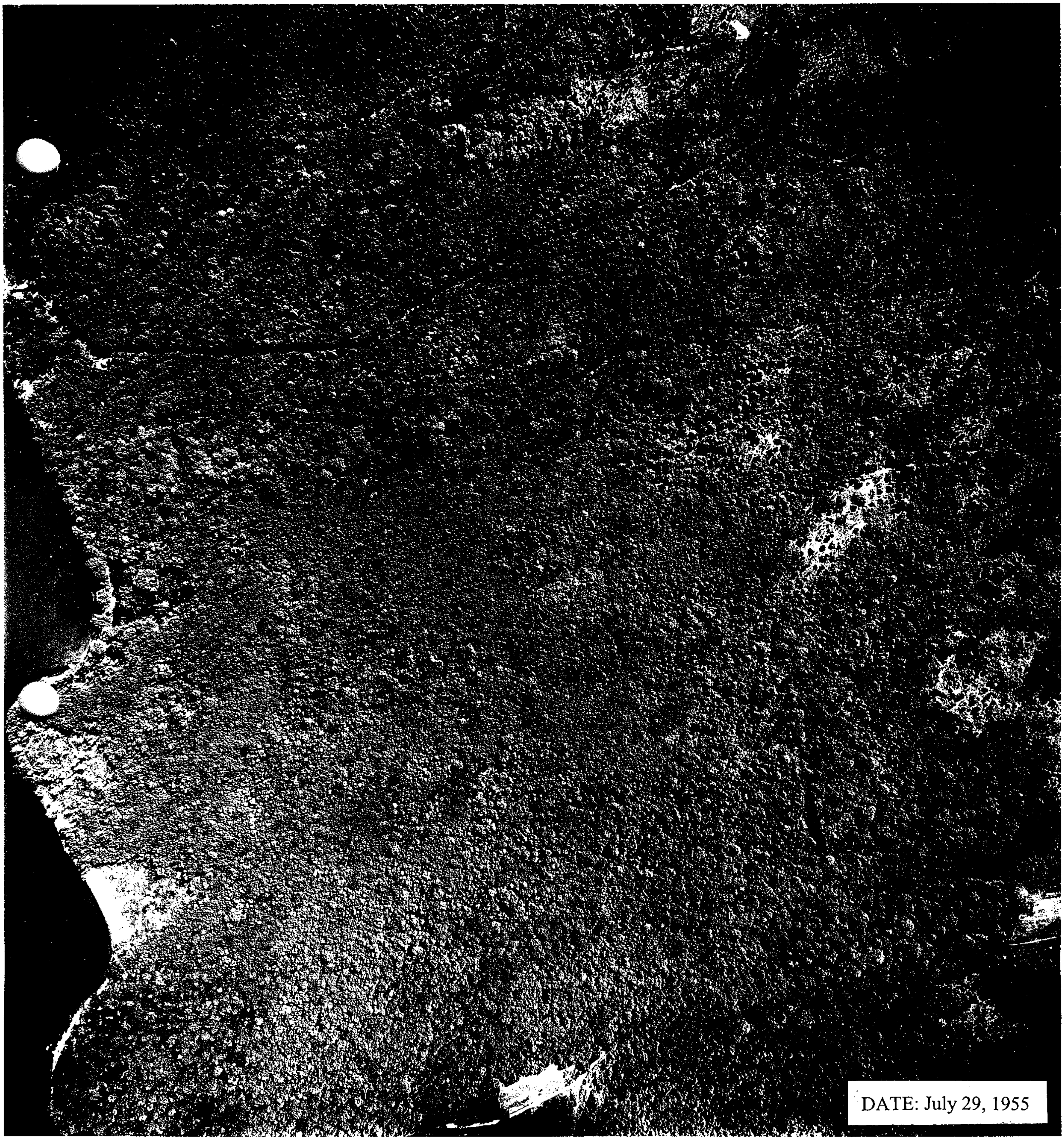
## Topographic Map

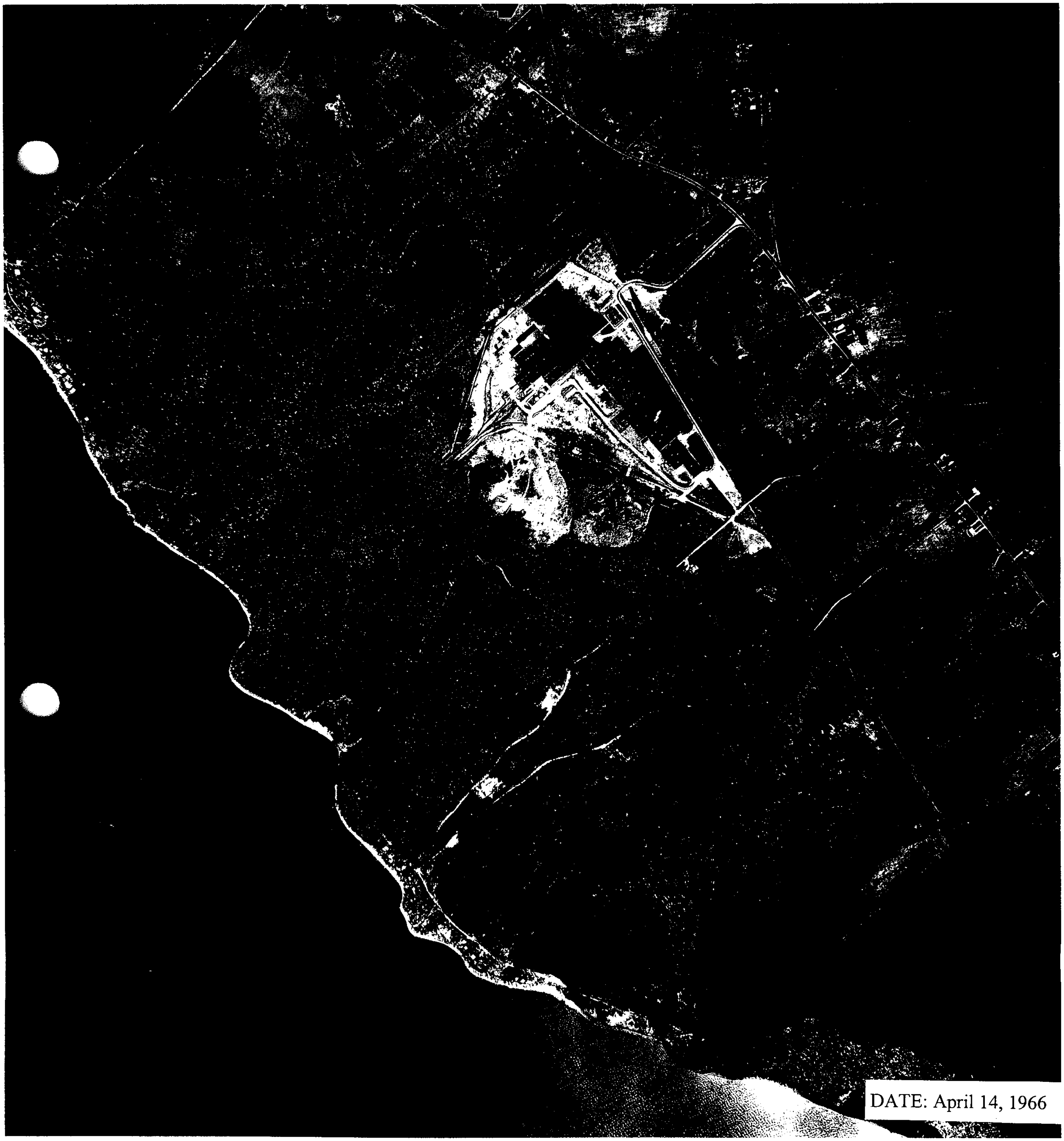
BBL®
BLASLAND, BOUCK & LEE, INC.
*engineers & scientists*

# *Appendix C*

## Historical Aerial Photographs

BLASLAND, BOUCK & LEE, INC.
*engineers & scientists*


DATE: July 29, 1955

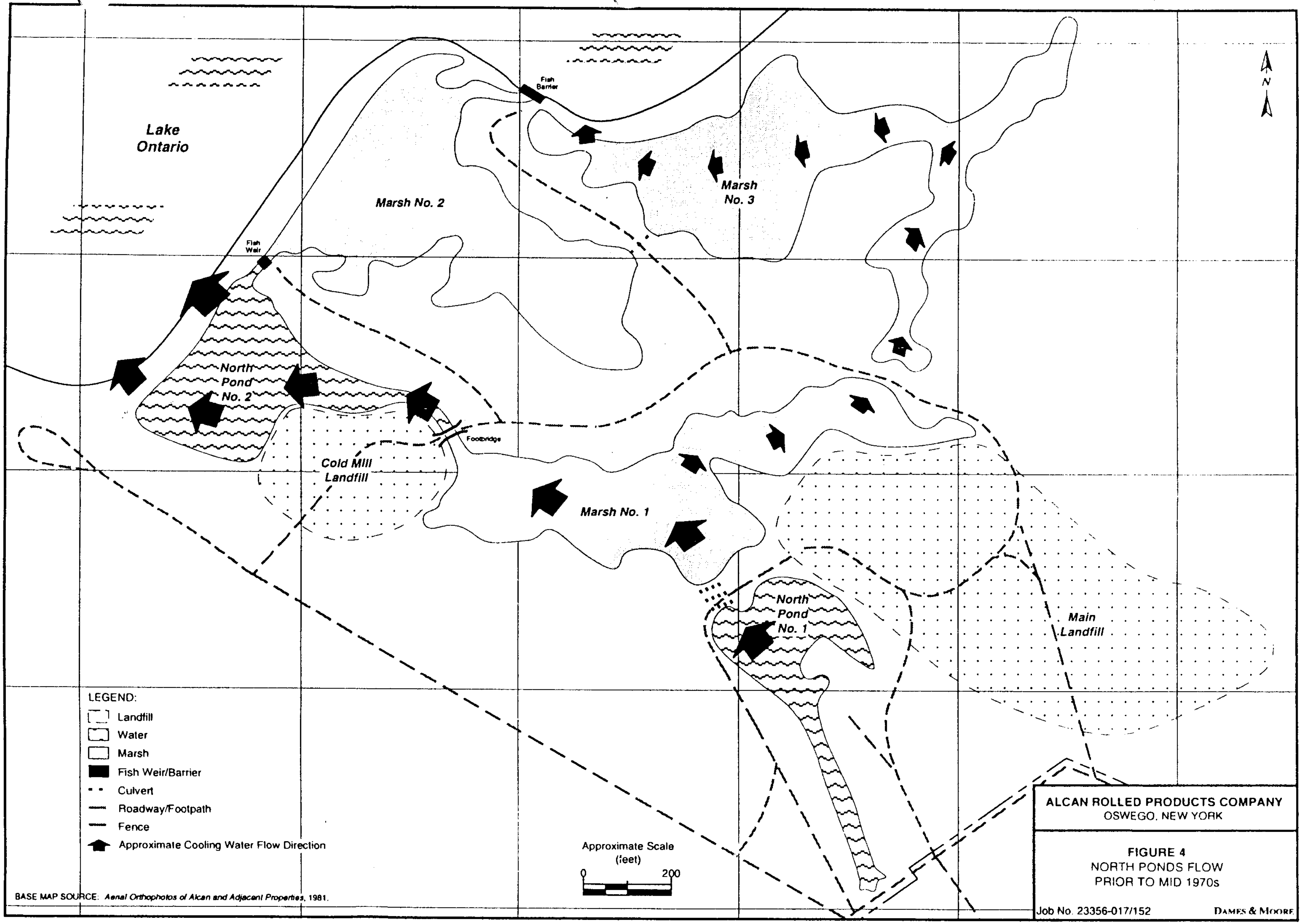

DATE: April 14, 1966


DATE: April 29, 1978

# *Appendix D*

## Historical Flow Patterns Through OU-1 Cooling Water Treatment System

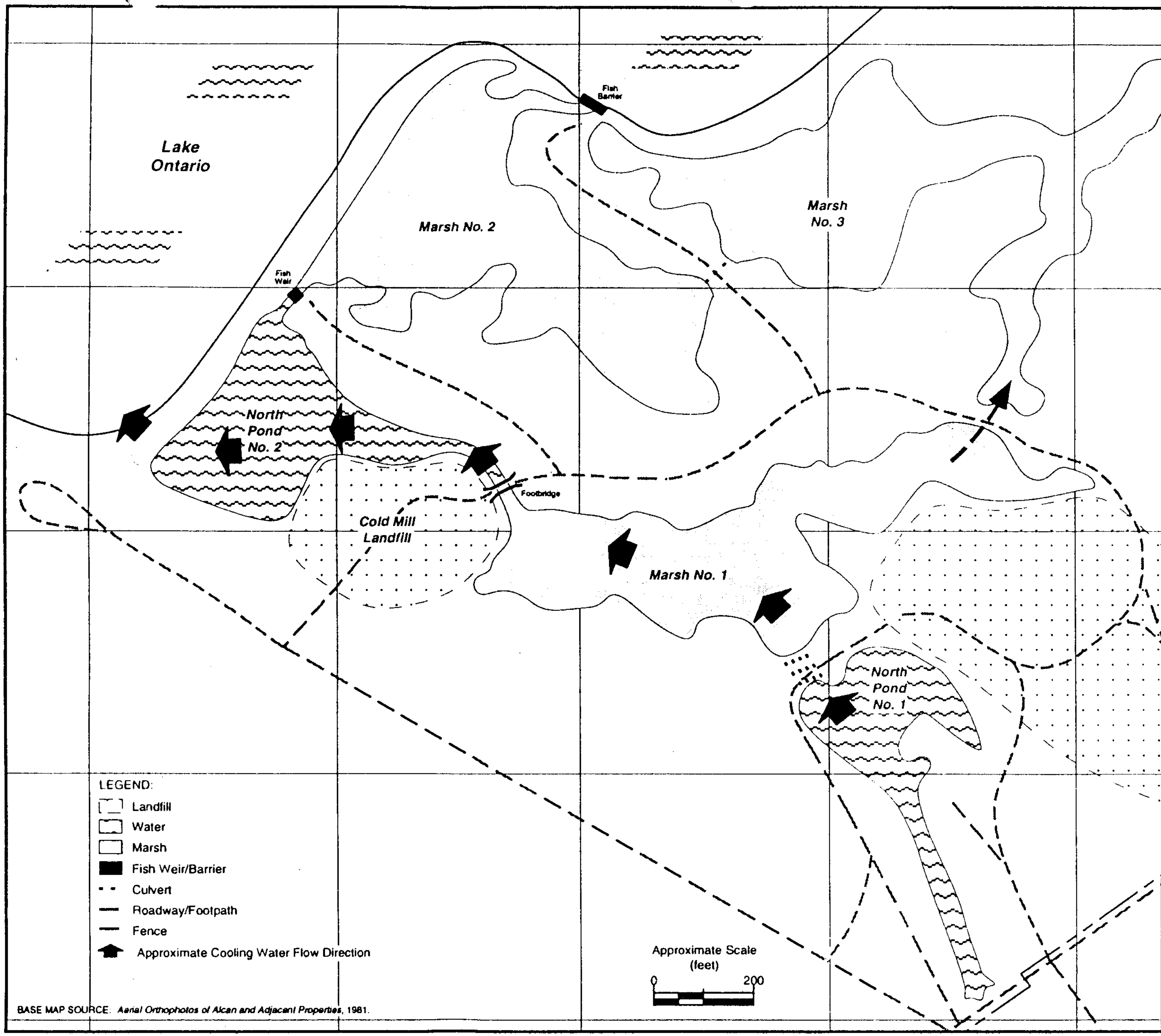
BBL®
BLASLAND, BOUCK & LEE, INC.
*engineers & scientists*




**ALCAN ROLLED PRODUCTS COMPANY**
OSWEGO, NEW YORK

FIGURE 4
NORTH PONDS FLOW
PRIOR TO MID 1970s

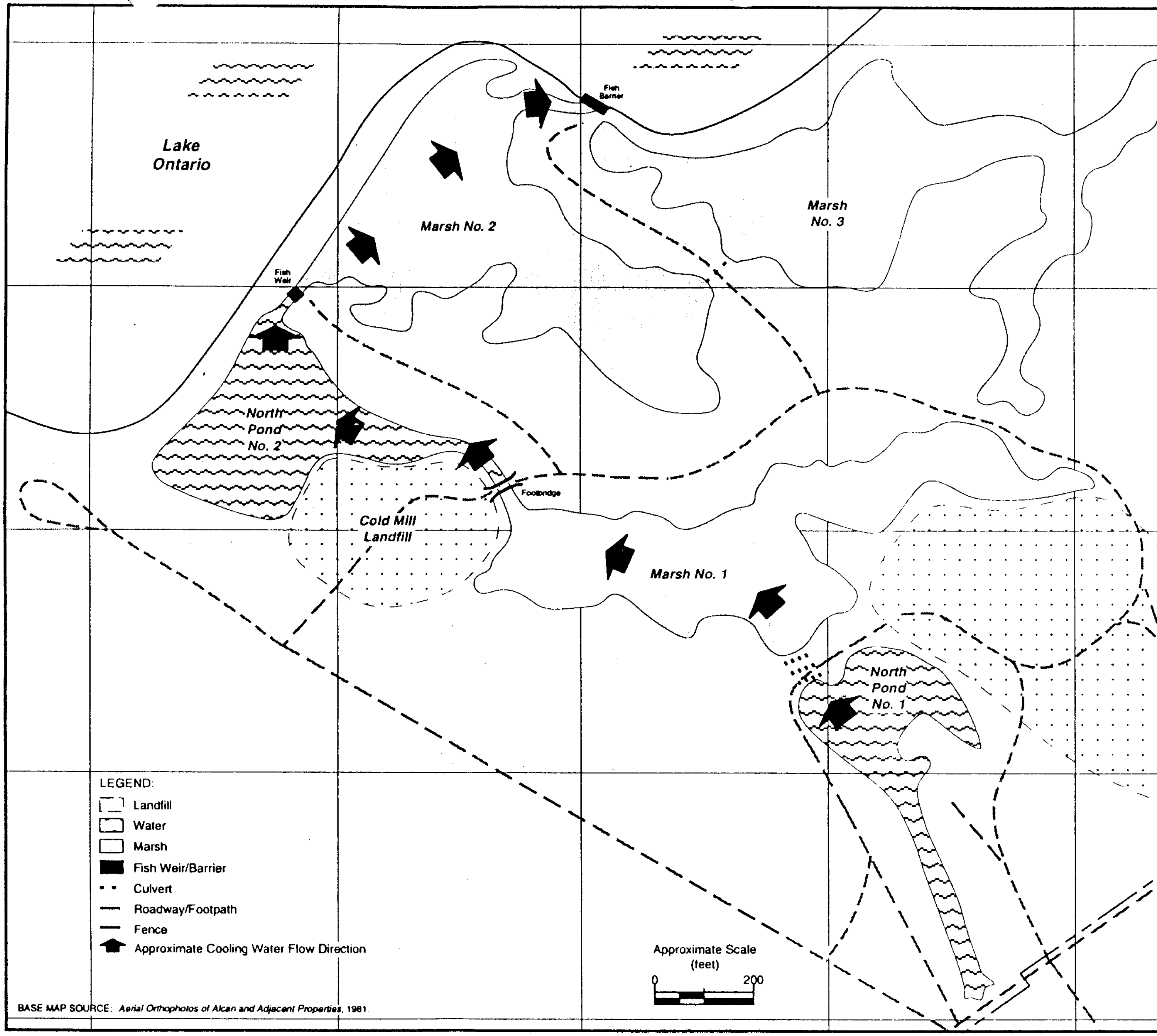
Job No. 23356-017/152 DAMES & MOORE




ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NEW YORK

FIGURE 5
NORTH PONDS FLOW
MID 1970s TO 1980

Job No. 23356-017/152 DAMES & MOORE




ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NEW YORK

FIGURE 6
NORTH PONDS FLOW
SINCE APPROXIMATELY 1980

Job No. 23356-017/152
DAMES & MOORE

# *Appendix E*

## Tabulated Data for Previous Investigations

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

# Appendix E-1

## Sediment Core Sampling 1980-1991

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

| Location | Sample | Depth (inches) | Date | Concentration (ppm) | Source | Predominant Aroclor | Area |
|---|---|---|---|---|---|---|---|
| 10 | A | 0 - 6 | 12/80 | 93.6 | 2 | 1016 | Marsh No. 2 |
| | | | 12/84 | <1.0 | 2 | | |
| | | | 12/85 | <1 | 2 | | |
| | | | 10/86 | 1.7 | 2 | 1016/1242/1248 | |
| | | | 10/87 | 1.0 | 2 | 1016/1242/1248 | |
| | | | 10/88 | <1 | 2 | | |
| | | | 10/89 | <5 | 2 | | |
| | | | 10/90 | <2 | 3 | | |
| | | | 10/91 | <2 | 4 | | |
| | B | 6 - 12 | 10/86 | <1 | 2 | | |
| | | | 10/88 | <1 | 2 | | |
| 11 | A | 0 - 6 | 12/84 | 0 | 2 | 1016/1242 | Pond No. 1 |
| | | | 12/85 | 38 | 2 | 1016/1242 | |
| | | | 10/86 | 16 | 2 | 1016/1242/1248 | |
| | | | 10/87 | 17 | 2 | 1016/1242/1248 | |
| | | | 10/88 | 25 | 2 | 1242 | |
| | | | 10/89 | 37 | 2 | 1016 | |
| | | | 10/90 | <2 | 3 | | |
| | | | 10/91 | <2 | 4 | | |
| | B | 6 - 12 | 01/81 | 20.6 | 2 | 1016/1260/1254 | |
| | | | 12/84 | 7 | 2 | 1260 | |
| | | | 10/87 | 4.8 | 2 | 1016/1242/1248 | |
| | | | 10/89 | <5 | 2 | | |
| | C | 12 - 18 | 10/87 | 6.2 | 2 | 1016/1242/1248 | |
| 12 | A | 0 - 6 | 12/84 | 175 | 2 | 1242/1016 | Pond No. 1 |
| | | | 12/85 | 102 | 2 | 1242/1016 | |
| | | | 10/86 | 55 | 2 | 1016/1242/1248 | |
| | | | 10/87 | 54 | 2 | 1016/1242/1248 | |
| | | | 10/88 | 16 | 2 | 1242 | |
| | | | 10/89 | 11 | 2 | 1016 | |
| | | | 10/90 | 28 | 3 | 1248 | |
| | | | 10/91 | 24 | 4 | 1242 | |
| | B | 6 - 12 | 01/81 | 14 | 2 | 1016 | |
| | | | 10/88 | 24 | 2 | 1242 | |
| 15 | B | 6 - 12 | 01/81 | 2.4 | 2 | 1016 | Marsh No. 2 |
| 19 | A | 0 - 6 | 12/84 | 195 | 2 | 1242/1016 | Pond No. 2 |
| | | | 12/85 | 97 | 2 | 1016/1242 | |
| | | | 10/86 | 36 | 2 | 1016/1242/1248 | |
| | | | 10/87 | <1.0 | 2 | | |
| | | | 10/88 | <1 | 2 | 1242 | |
| | | | 10/89 | <2 | 2 | | |
| | | | 09/90 | <2 | 3 | | |
| | | | 10/91 | 26.0 | 4 | 1248 | |
| | B | 6 - 12 | 01/81 | 40.6 | 2 | 1016/1260 | |
| | | | 12/84 | 142 | 2 | 1242/1016 | |
| | | | 10/86 | <1 | 2 | | |
| | | | 10/88 | <1 | 2 | | |
| | C | 12 - 18 | 10/86 | <1 | 2 | | |
| 23 | A | 0 - 6 | 05/81 | 45.9 | 1 | 1016 | Pond No. 1 |

SUMMARY OF SEDIMENT CORE SAMPLING
1980 - 1991

NORTH PONDS
ALCAN ROLLED PRODUCTS COMPANY

| Location | Sample | Depth (inches) | Date | Concentration (ppm) | Source | Predominant Aroclor | Area |
|---|---|---|---|---|---|---|---|
| 1 | A | 0 - 6 | 12/80 | 12.3 | 2 | 1016/1254 | Pond No. 1 |
| | | | 04/82 | 84.4 | 2 | 1260 | |
| | B | 6 - 12 | 04/82 | 86.2 | 2 | 1260 | |
| | C | 12 - 18 | 04/82 | 83.0 | 2 | 1260 | |
| | D | 18 - 24 | 04/82 | 83.0 | 2 | 1260 | |
| 2 | A | 0 - 6 | 12/80 | 43.3,42.4 | 1,2 | 1016/1254/1260 | Pond No. 1 |
| | | | 04/82 | 31.0 | 2 | 1260 | |
| | B | 6 - 12 | 04/82 | 70.0 | 2 | 1260 | |
| | C | 12 - 18 | 04/82 | 64.2 | 2 | 1260 | |
| | D | 18 - 24 | 04/82 | 67.0 | 2 | 1260 | |
| 3 | A | 0 - 6 | 12/80 | 23.5 | 1 | 1016/1254 | Marsh No. 1 |
| 4 | A | 0 - 6 | 12/80 | 20.1 | 2 | 1016/1254 | Marsh No. 1 |
| 5 | A | 0 - 6 | 12/80 | 77.8 | 2 | 1016/1254 | Pond No. 2 |
| | | | 12/84 | 230 | 2 | 1242/1016 | |
| | | | 12/85 | 546 | 2 | 1016/1242 | |
| | | | 10/86 | 240 | 2 | 1016/1242/1248 | |
| | | | 10/87 | 280 | 2 | 1016/1242/1248 | |
| | | | 10/88 | 55 | 2 | 1242 | |
| | | | 10/89 | 60 | 2 | 1016/1260 | |
| | | | 10/90 | <2 | 3 | | |
| | | • | 10/91 | 38 | 4 | 1248 | |
| | B | 6 - 12 | 12/85 | 49 | 2 | 1016/1242 | |
| | | | 10/89 | 300 | 2 | 1016/1260 | |
| 6 | A | 0 - 6 | 12/80 | 76.1 | 2 | 1016/1254 | Marsh No. 2 |
| | | | 12/84 | 12.0 | 2 | 1242/1016 | |
| | | | 12/85 | 4 | 2 | 1016/1242 | |
| | | | 10/86 | 16.0 | 2 | 1016/1242/1248 | |
| | | | 10/87 | 5.0 | 2 | 1016/1242/1248 | |
| | | | 10/88 | 24 | 2 | 1242 | |
| | | | 10/89 | 21 | 2 | 1016 | |
| | | | 09/90 | <2 | 3 | | |
| | | • | 10/91 | 8 | 4 | 1248 | |
| | B | 6 - 12 | 10/86 | 5.1 | 2 | 1016/1242/1248 | |
| 7 | A | 0 - 6 | 12/80 | 12.6 | 2 | 1016 | Pond No. 2 |
| 8 | A | 0 - 6 | 12/80 | 47.3 | 2 | 1016 | Pond No. 2 |
| 9 | A | 0 - 6 | 12/80 | 267 | 2 | 1016 | Pond No. 2 |
| | | | 12/84 | 39 | 2 | 1016/1242 | |
| | | | 12/85 | 64 | 2 | 1016/1242 | |
| | | | 10/86 | 55 | 2 | 1016/1242/1248 | |
| | | | 10/87 | 210 | 2 | 1016/1242/1248 | |
| | | | 10/88 | 90 | 2 | 1242 | |
| | | | 10/89 | 410 | 2 | 1016/1260 | |
| | | | 10/90 | 30 | 3 | 1248 | |
| | | • | 10/91 | <2 | 4 | | |

| Location | Sample | Depth (inches) | Date | Concentration (ppm) | Source | Predominant Aroclor | Area |
|---|---|---|---|---|---|---|---|
| 24 | A | 0 - 6 | 05/81 | 10.7 | 2 | 1016 | Pond No. 1 |
| | | | 12/84 | 39.1 | 2 | 1242 | |
| | | | 12/85 | 86 | 2 | 1016/1242 | |
| | | | 10/86 | 52 | 2 | 1016/1242/1248 | |
| | | | 10/87 | 71 | 2 | 1016/1242/1248 | |
| | | | 10/88 | 50 | 2 | 1242 | |
| | | | 10/89 | 70 | 2 | 1016 | |
| | | | 10/90 | 36 | 3 | 1248 | |
| | | | 10/91 | <2 | 4 | | |
| 25 | A | 0 - 6 | 05/81 | 21.5 | 2 | 1016 | Marsh No. 1 |
| | B | 6 - 12 | 05/81 | 1.6 | 2 | 1016 | |
| 26 | A | 0 - 6 | 05/81 | 44.4 | 2 | 1016 | Marsh No. 1 |
| | | | 12/84 | <1.0 | 2 | | |
| | | | 12/85 | <1 | 2 | | |
| | | | 10/86 | 45 | 2 | 1016/1242/1248 | |
| | | | 10/87 | 17 | 2 | 1016/1242/1248 | |
| | | | 10/88 | <1 | 2 | | |
| | | | 10/89 | <5 | 2 | | |
| | | | 09/90 | <2 | 3 | | |
| | | | 10/91 | 120 | 4 | 1248 | |
| | B | 6 - 12 | 05/81 | 3.1 | 2 | 1016 | |
| | | | 10/86 | <3 | 2 | | |
| | | | 10/87 | <1.0 | 2 | | |
| | | | 10/88 | <1 | 2 | | |
| 27 | A | 0 - 6 | 05/81 | 23.1 | 2 | 1016 | Marsh No. 1 |
| | | | 12/84 | 13.0 | 2 | 1242/1016 | |
| | | | 12/85 | <4 | 2 | | |
| | | | 10/86 | 18 | 2 | 1016/1242/1248 | |
| | | | 10/87 | 16 | 2 | 1016/1242/1248 | |
| | | | 10/88 | <1 | 2 | | |
| | | | 10/89 | <5 | 2 | | |
| | | | 09/90 | <2 | 3 | | |
| | | | 10/91 | 3 | 4 | 1242 | |
| | B | 6 - 12 | 05/81 | 1.3 | 2 | 1016 | |
| | | | 12/84 | <5 | 2 | | |
| | | | 12/85 | <3 | 2 | | |
| | | | 10/86 | <2 | 2 | | |
| | | | 10/87 | <1.0 | 2 | | |
| | | | 10/88 | <1 | 2 | | |
| | | | 10/89 | <5 | 2 | | |
| | C | 12 - 18 | 05/81 | .07 | 2 | 1016 | |
| | | | 12/85 | <4 | 2 | | |
| | | | 10/86 | <2 | 2 | | |
| 28 | A | 0 - 6 | 05/81 | 23.6 | 2 | 1016 | Pond No. 2 |
| | B | 6 - 12 | 05/81 | 0.5 | 2 | 1016 | |
| 29 | A | 0 - 6 | 05/81 | 68.9 | 1 | 1016 | Marsh No. 1 |
| | B | 6 - 12 | 05/81 | 55.0 | 1 | 1016 | |
| | C | 12 - 18 | 12/80 | 0.2 | 1 | 1016 | |

| Location | Sample | Depth (inches) | Date | Concentration (ppm) | Source | Predominant Aroclor | Area |
|---|---|---|---|---|---|---|---|
| 39 | | 0 - 6 | 05/81 | <0.5 | 1 | | Lake Sediment |
| | | 0 - 6 | 05/81 | <0.5 | 1 | | |
| | | 0 - 6 | 05/81 | <0.5 | 1 | | |
| | | 0 - 6 | 05/81 | <0.5 | 1 | | |
| | | 0 - 6 | 05/81 | <0.5 | 1 | | |
| | A | 0 - 6 | 09/81 | 362 | 1 | 1016 | |
| | B | 6 - 12 | 09/81 | 397 | 1 | 1016 | |
| | C | 12 - 18 | 09/81 | 6.3 | 1 | 1016 | |
| 132 | A | 0 - 6 | 09/81 | 27.0 | 2 | 1016 | Marsh No. 1 |
| | | | 12/84 | 11.0 | 2 | 1242/1016 | |
| | | | 12/85 | <3 | 2 | | |
| | | | 10/86 | 150 | 2 | 1016/1242/1248 | |
| | | | 10/87 | 36 | 2 | 1016/1242/1248 | |
| | | | 10/88 | 88 | 2 | 1242 | |
| | | | 10/89 | 30 | 2 | 1016 | |
| | | | 09/90 | <2 | 3 | | |
| | | | 10/91 | 64 | 4 | 1242/1260 | |
| | B | 6 - 12 | 12/80 | <1.0 | 1 | | |
| | | | 09/81 | <0.02 | 2 | - | |
| | | | 12/84 | 2 | 2 | 1242/1016 | |
| | | | 12/85 | <2 | 2 | | |
| | | | 10/86 | 8.4 | 2 | 1016/1242/1248 | |
| | | | 10/87 | <1.0 | 2 | | |
| | | | 10/88 | <1 | 2 | 1242 | |
| | | | 10/89 | <2 | 2 | | |
| | | | 10/91 | 3 | 4 | 1242 | |
| | C | 12 - 18 | 10/87 | <1 | 2 | | |
| 133 | A | 0 - 6 | 09/81 | <0.015 | 1 | | Marsh No. 2 |
| 135 | A | 0 - 6 | 09/81 | 6.0 | 1 | 1016 | Marsh No. 3 |
| | B | 6 - 12 | 09/81 | 0.27 | 1 | 1016 | |
| 136 | A | 0 - 6 | 09/81 | 9.7 | 1 | 1016 | Marsh No. 2 |
| | B | 6 - 12 | 12/80 | <0.007 | 1 | | |
| 137 | A | 0 - 6 | 09/81 | 2.4 | 1 | 1016 | Marsh No. 3 |
| | B | 6 - 12 | 09/81 | 0.115 | 1 | 1016 | |
| 138 | A | 0 - 6 | 09/81 | <1.0 | 1 | | Marsh No. 3 |
| | B | 6 - 12 | 09/81 | 0.225 | 1 | 1016 | |
| 139 | A | 0 - 6 | 09/81 | 7.0 | 1 | 1016 | Marsh No. 3 |
| 140 | A | 0 - 6 | 09/81 | 164.6 | 2 | 1016 | Pond No. 1 |
| | B | 6 - 12 | 09/81 | 127.0 | 2 | 1016 | |
| 141 | | 0 - 6 | 09/81 | <0.01 | 1 | | Intake Crib |
| 142 | | 0 - 6 | 09/81 | <0.03 | 1 | | Intake Tunnel |

Note: * = Assumed depth (0-6 inches).

Sources:


1. Alcan Sheet and Plate, Oswego, New York, Report entitled "North Pond Project" by P. S. Segretto and W. R. Dowdle, July 1982
2. Alcan Rolled Products Company, "Summary of Sediment Core Sampling", 12/80 - 10/89.
3. Upstate Laboratories, Inc., "Analysis Report #112690039", November 26, 1990.
4. Upstate Laboratories, Inc., "Analysis Report #121391039", December 11, 1991.

# *Appendix E-2*

# SPDES Permit Monitoring (1988 to present)

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

APPENDIX B1
QUARTERLY SPDES PCB MONITORING DATA
ALCAN ROLLED PRODUCTS
(Results in ug/L)

| Date | | Influent to North Pond No. 1 | Effluent from North Pond No. 1 | Influent to North Pond No. 2 | Effluent from North Pond No. 2 | Outfall 002 | Outfall 001 | Lake Intake |
|---|---|---|---|---|---|---|---|---|
| 8/28/80 | | - | - | - | - | 2.64 | 0.05 | 0.06 |
| 10/17/80 | | <0.01 | <0.01 | - | 0.46 | - | - | - |
| 11/24/80 | | - | <0.01 | - | - | - | - | - |
| 1/8/81 | | <0.01 | - | - | - | <2 | <0.01 | <0.01 |
| 5/19/81 | | - | <0.01 | - | - | - | - | - |
| 5/20/81 | | <0.01 | - | - | <0.01 | <0.01 | - | - |
| 11/11/82 | | 0.02 | 0.05 | - | 0.18 | 0.16 | - | 0.02 |
| 1/17/83 | | - | 0.05 | - | 0.06 | 0.09 | - | 0.06 |
| 10/8/91 | | - | ND | ND | ND | - | - | - |
| 11/11/94 | | ND | - | ND | ND | - | - | - |
| **Quarterly Sampling** | | | | | | | | |
| Q4 | 1988 | <0.1 | - | - | - | - | - | <0.1 |
| Q1 | 1989 | <0.5 | - | - | - | - | - | <0.05 |
| Q2 | 1989 | <0.1 | - | - | - | - | - | <0.1 |
| Q3 | 1989 | <0.05 | - | - | - | - | - | 0.06 |
| Q4 | 1989 | 0.06 | - | - | - | - | - | 0.09 |
| Q1 | 1990 | <0.05 | - | - | - | - | - | <0.05 |
| Q2 | 1990 | <0.05 | - | - | - | - | - | <0.05 |
| Q3 | 1990 | <0.05 | - | - | - | - | - | <0.05 |
| Q4 | 1990 | <0.05 | - | - | - | - | - | <0.05 |
| Q1 | 1991 | <0.05 | - | - | - | - | - | <0.05 |
| Q2 | 1991 | <0.05 | - | - | - | - | - | <0.05 |
| Q3 | 1991 | <0.05 | - | - | - | - | - | 0.05 |
| Q4 | 1991 | <0.05 | - | - | - | - | - | <0.05 |
| Q1 | 1992 | <0.05 | - | - | - | - | - | <0.05 |
| Q2 | 1992 | <0.05 | - | - | - | - | - | <0.05 |
| Q3 | 1992 | 0.3 | - | - | - | - | - | <0.05 |
| Q4 | 1992 | <0.05 | | | | | | <0.05 |
| Q1 | 1993 | <0.05 | - | - | - | - | - | <0.05 |
| Q2 | 1993 | <0.05 | - | - | - | - | - | <0.05 |
| Q3 | 1993 | <0.05 | - | - | - | - | - | <0.05 |
| Q4 | 1993 | <0.05 | - | - | - | - | - | <0.05 |
| Q1 | 1994 | <0.05 | - | - | - | - | - | <0.05 |
| Q2 | 1994 | <0.05 | - | - | - | - | - | <0.05 |
| Q3 | 1994 | <0.05 | - | - | - | - | - | <0.05 |
| Q4 | 1994 | <0.05 | - | - | - | - | - | <0.05 |
| Q1 | 1995 | <0.05 | - | - | - | - | - | <0.05 |

**Notes:**

Q1, Q2, Q3, Q4 = First, second, third, and fourth quarters

ND = not detected

8/20/80 results from sampling conducted by NYSDEC

10/08/91 results from North Pond Sediment Sampling Program study conducted by Dames & Moore

**Table 1**
**Alcan Aluminum Corporation**
**Oswego, New York**

**Quarterly SPDES PCB Monitoring Data**

| Date | | Influent to North Pond No. 1 | Lake Intake |
|---|---|---|---|
| Q2 | 1995 | < 0.05 | < 0.05 |
| Q3 | 1995 | < 0.05 | < 0.05 |
| Q4 | 1995 | 0.203 | 0.192 |
| Q1 | 1996 | < 0.05 | < 0.05 |
| Q2 | 1996 | N/A | N/A |
| Q3 | 1996 | N/A | N/A |
| Q4 | 1996 | < 0.05 | < 0.05 |
| Q1 | 1997 | < 0.05 | < 0.05 |
| Q2 | 1997 | < 0.05 | < 0.05 |
| Q3 | 1997 | < 0.05 | < 0.05 |
| Q4 | 1997 | < 0.05 | < 0.05 |
| Q1 | 1998 | < 0.05 | < 0.05 |
| Q2 | 1998 | < 0.05 | < 0.05 |
| Q3 | 1998 | < 0.05 | < 0.05 |
| Q4 | 1998 | < 0.05 | < 0.05 |
| Q1 | 1999 | < 0.05 | < 0.05 |
| Q2 | 1999 | < 0.05 | < 0.05 |
| Q3 | 1999 | < 0.05 | < 0.05 |
| Q4 | 1999 | < 0.05 | < 0.05 |
| Q1 | 2000 | < 0.05 | < 0.05 |
| Q2 | 2000 | < 0.05 | < 0.05 |

**Notes:**
1. All results are presented in parts per billion (ppb) which is equivalent to micrograms per liter (μg/L).
2. N/A = Not Available

ALCAN OSWEGO WORKS
PCB SPDES MONITORING RESULTS OUTFALL 002
January 1995 - June 2001

| Date | PCB average | PCB maximum |
|---|---|---|
| June '01 | <50 ng/L | <50 ng/L |
| May '01 | <50 ng/L | <50 ng/L |
| April '01 | <50 ng/L | <50 ng/L |
| March '01 | <50 ng/L | <50 ng/L |
| Feb. '01 | <80 ng/L | 290 ng/L |
| Jan. '01 | <50 ng/L | <50 ng/L |
| Dec. '00 | <50 ng/L | <50 ng/L |
| Nov. '00 | 74 ng/L | 240 ng/L |
| Oct. '00 | <50 ng/L | <50 ng/L |
| Sept. '00 | <50 ng/L | <50 ng/L |
| Aug. '00 | * | 0.0006 mg/L |
| July '00 | * | 0.00058 mg/L |
| June '00 | * | 0.00051 mg/L |
| May '00 | * | 0.00015 mg/L |
| April '00 | * | <0.00005 mg/L |
| March '00 | * | <0.00005 mg/L |
| Feb. '00 | * | <0.00005 mg/L |
| Jan. '00 | * | <0.00005 mg/L |
| Dec. '99 | * | <0.00005 mg/L |
| Nov. '99 | * | <0.00005 mg/L |
| Oct. '99 | * | <0.00005 mg/L |
| Sept. '99 | * | <0.00005 mg/L |
| Aug. '99 | * | <0.00005 mg/L |

| | | |
|---|---|---|
| July '99 | * | 0.0002 mg/L |
| June '99 | * | 0.0002 mg/L |
| May '99 | * | <0.00005 mg/L |
| April '99 | * | <0.00005 mg/L |
| March '99 | * | <0.00005 mg/L |
| Feb. '99 | * | <0.00005 mg/L |
| Jan. '99 | * | <0.00005 mg/L |
| Dec. '98 | * | <0.00005 mg/L |
| Nov. '98 | * | <0.00005 mg/L |
| Oct. '98 | * | <0.00005 mg/L |
| Sept. '98 | * | <0.0005 mg/L |
| Aug. '98 | * | <0.00005 mg/L |
| July '98 | * | <0.00005 mg/L |
| June '98 | * | <0.00005 mg/L |
| May '98 | * | <0.00005 mg/L |
| April '98 | * | <0.00005 mg/L |
| March '98 | * | <0.00005 mg/L |
| Feb. '98 | * | <0.00005 mg/L |
| Jan. '98 | * | <0.00005 mg/L |
| Dec. '97 | * | <0.00005 mg/L |
| Nov. '97 | * | <0.00005 mg/L |
| Oct. '97 | * | <0.00005 mg/L |
| Sept. '97 | * | <0.00005 mg/L |
| Aug. '97 | * | <0.00005 mg/L |
| July '97 | * | <0.00005 mg/L |
| June '97 | * | <0.00005 mg/L |

| | | |
|---|---|---|
| May '97 | * | 0.00015 mg/L |
| April '97 | * | <0.000065 mg/L |
| March '97 | * | <0.00005 mg/L |
| Feb. '97 | * | 0.00008 mg/L |
| Jan. '97 | * | 0.00015 mg/L |
| Dec. '96 | * | 0.00016 mg/L |
| Nov. '96 | * | <0.00005 mg/L |
| Oct. '96 | * | <0.00005 mg/L |
| Sept. '96 | * | <0.00005 mg/L |
| Aug. '96 | * | <0.00005 mg/L |
| July '96 | * | <0.00005 mg/L |
| June '96 | * | <0.00005 mg/L |
| May '96 | * | <0.00005 mg/L |
| April '96 | * | 0.00031 mg/L |
| March '96 | * | <0.00005 mg/L |
| Feb. '96 | * | 0.000601 mg/L |
| Jan. '96 | * | 0.000611 mg/L |
| Dec. '95 | * | 0.0002 mg/L |
| Nov. '95 | * | 0.00067 mg/L |
| Oct. '95 | * | 0.0007 mg/L |
| Sept. '95 | * | 0.0007 mg/L |
| Aug. '95 | * | 0.0009 mg/L |
| July '95 | * | 0.00018 mg/L |
| June '95 | * | <0.00013 mg/L |
| May '95 | * | 0.00033 mg/L |
| April '95 | * | 0.00014 mg/L |

| | | |
|---|---|---|
| March '95 | * | <0.00005 mg/L |
| Feb. '95 | * | 0.00009 mg/L |
| Jan. '95 | * | 0.00025 mg/L |

# *Appendix E-3*

## North Pond Sediment Sampling Program - 1991

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

T.

## SUMMARY OF VOLATILE ORGANIC ANALYSIS

**NORTH POND SEDIMENT SAMPLING PROGRAM**
**ALCAN ROLLED PRODUCTS COMPANY**
**OSWEGO, NY**

| COMPOUND | MW-1 (µg/l) | MW-2 (µg/l) | L-1,2,3&4 (µg/l) |
|---|---|---|---|
| Chloromethane | - | - | - |
| Bromomethane | - | - | - |
| Vinyl chloride | - | - | - |
| Chloroethane | 16 | - | 2 J |
| Methylene chloride | - | - | - |
| Acetone | - | - | - |
| Carbon Disulfide | - | - | - |
| 1,1-Dichloroethylene | - | - | - |
| 1,1-Dichloroethane | - | - | - |
| 1,2-Dichloroethylene (total) | - | - | - |
| Chloroform | - | - | - |
| 1,2-Dichloroethane | - | - | - |
| 2-Butanone | - | - | - |
| 1,1,1-Trichloroethane | - | - | - |
| Carbon tetrachloride | - | - | - |
| Vinyl acetate | - | - | - |
| Bromodichloromethane | - | - | - |
| 1,2-Dichloropropane | - | - | - |
| cis-1,3-Dichloropropene | - | - | - |
| Trichloroethene | - | - | - |
| Dibromochloromethane | - | - | - |
| 1,1,2-Trichloroethane | - | - | - |
| Benzene | - | - | - |
| trans-1,3-Dichloropropene | - | - | - |
| Bromoform | - | - | - |
| 4-Methyl-2-pentanone | - | - | - |
| 2-Hexanone | - | - | - |
| Tetrachloroethene | - | - | - |
| Toluene | - | - | - |
| 1,1,2,2-Tetrachloroethane | - | - | - |
| Chlorobenzene | 3 J | - | - |
| Ethyl Benzene | - | - | - |
| Styrene | - | - | - |
| Total Xylenes | - | - | - |
| Total TICs and Unknowns | - | - | - |

**Note:**

NYSDEC ASP 1989, (Method 89-1), Plus 10 TICs, Superfund Deliverables
J = Indicates an estimated value.
(-) = Not detected.
TIC = Tentatively Identified Compound

TABLE 2A
SUMMARY OF VOLATILE ORGANIC ANALYSIS

NORTH POND SEDIMENT SAMPLING PROGRAM
ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NY

| COMPOUND | Class GA Ground Water Standard (6 NYCRR 703.5) (µg/l) | Class D Surface Water Standard* (6 NYCRR 703.5) (µg/l) | MW-1 (µg/l) | MW-2 (µg/l) | L-1,2,3&4 (µg/l) |
|---|---|---|---|---|---|
| Chloromethane | | | - | - | - |
| Bromomethane | | | - | - | - |
| Vinyl chloride | | | - | - | - |
| Chloroethane | 5 | V | 15 | - | - |
| Methylene chloride | | | - | - | 2 J |
| Acetone | | | - | - | - |
| Carbon Disulfide | | | - | - | - |
| 1,1-Dichloroethylene | | | - | - | - |
| 1,1-Dichloroethane | | | - | - | - |
| 1,2-Dichloroethylene (total) | | | - | - | - |
| Chloroform | | | - | - | - |
| 1,2-Dichloroethane | | | - | - | - |
| 2-Butanone | | | - | - | - |
| 1,1,1-Trichloroethane | | | - | - | - |
| Carbon tetrachloride | | | - | - | - |
| Vinyl acetate | | | - | - | - |
| Bromodichloromethane | | | - | - | - |
| 1,2-Dichloropropane | | | - | - | - |
| cis-1,3-Dichloropropene | | | - | - | - |
| Trichloroethene | | | - | - | - |
| Dibromochloromethane | | | - | - | - |
| 1,1,2-Trichloroethane | | | - | - | - |
| Benzene | | | - | - | - |
| trans-1,3-Dichloropropene | | | - | - | - |
| Bromoform | | | - | - | - |
| 4-Methyl-2-pentanone | | | - | - | - |
| 2-Hexanone | | | - | - | - |
| Tetrachloroethene | | | - | - | - |
| Toluene | | | - | - | - |
| 1,1,2,2-Tetrachloroethane | | | - | - | - |
| Chlorobenzene | 5 | 50 | 3 J | - | - |
| Ethyl Benzene | | | - | - | - |
| Styrene | | | - | - | - |
| Total Xylenes | | | - | - | - |
| Total TICs and Unknowns | | | - | - | - |

Note:

NYSDEC ASP 1989, (Method 89-1), Plus 10 TICs, Superfund Deliverables
J = Indicates an estimated value.
(-) = Not detected.
TIC = Tentatively Identified Compound
* = Applicable to L-1,2,3&4 only.
V = For discharge purposes, NYSDEC may establish a guidance value of 50 µg/l or less for substances which may pose a threat to human health.
[box] = Value exceeds standard.

## TABLE 3
## SUMMARY OF VOLATILE ORGANIC ANALYSIS

NORTH POND SEDIMENT SAMPLING PROGRAM
ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NY

| COMPOUND | SED-1 (µg/kg) | SED-2 (µg/kg) | SED-3 (µg/kg) | SED-4 (µg/kg) | SED-5 (µg/kg) |
|---|---|---|---|---|---|
| Chloromethane | - | - | - | - | - |
| Bromomethane | - | - | - | - | - |
| Vinyl chloride | - | - | - | - | - |
| Chloroethane | - | - | - | - | - |
| Methylene chloride | - | - | - | - | - |
| Acetone | 270 B | 240 B | 130 B | 120 B | - |
| Carbon Disulfide | 1,400 | - | - | - | - |
| 1,1-Dichloroethylene | - | - | - | - | - |
| 1,1-Dichloroethane | - | - | - | - | - |
| 1,2-Dichloroethylene (total) | - | - | - | - | - |
| Chloroform | - | - | - | - | - |
| 1,2-Dichloroethane | - | - | - | - | - |
| 2-Butanone | - | - | - | - | - |
| 1,1,1-Trichloroethane | - | - | - | - | - |
| Carbon tetrachloride | - | - | - | - | - |
| Vinyl acetate | - | - | - | - | - |
| Bromodichloromethane | - | - | - | - | - |
| 1,2-Dichloropropane | - | - | - | - | - |
| cis-1,3-Dichloropropene | - | - | - | - | - |
| Trichloroethene | - | - | - | - | - |
| Dibromochloromethane | - | - | - | - | - |
| 1,1,2-Trichloroethane | - | - | - | - | - |
| Benzene | - | - | - | - | - |
| trans-1,3-Dichloropropene | - | - | - | - | - |
| Bromoform | - | - | - | - | - |
| 4-Methyl-2-pentanone | - | - | - | - | - |
| 2-Hexanone | - | - | - | - | - |
| Tetrachloroethene | - | - | - | - | - |
| Toluene | - | - | - | - | - |
| 1,1,2,2-Tetrachloroethane | - | - | - | - | - |
| Chlorobenzene | - | - | - | 3 J | 3 J |
| Ethyl Benzene | - | - | - | - | - |
| Styrene | - | - | - | - | - |
| Total Xylenes | - | - | - | - | - |
| Total TICs and Unknowns | 287 J | 274 J | - | - | - |

Note:
NYSDEC ASP 1989, (Method 89-1), Plus 10 TICs, Superfund Deliverables
J - Indicates an estimated value.
(-) - Not detected.
TIC - Tentatively Identified Compound
B - Compound also found in Method Blank.

TABLE 4
SUMMARY OF SEMIVOLATILE ORGANIC ANALYSIS

NORTH POND SEDIMENT SAMPLING PROGRAM
ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NY

| COMPOUND | MW-1 (µg/l) | MW-2 (µg/l) | L-1,2,3&4 (µg/l) |
|---|---|---|---|
| Phenol | - | - | - |
| bis(2-Chloroethyl) ether | - | - | - |
| 2-Chlorophenol | - | - | - |
| 1,3-Dichlorobenzene | 4 J | - | - |
| 1,4-Dichlorobenzene | 4 J | - | - |
| Benzyl alcohol | - | - | - |
| 1,2-Dichlorobenzene | 5 J | - | - |
| 2-Methylphenol | - | - | - |
| bis(2-Chloroisopropyl) ether | - | - | - |
| 4-Methylphenol | - | - | - |
| N-Nitroso-di-n-propylamine | - | - | - |
| Hexachloroethane | - | - | - |
| Nitrobenzene | - | - | - |
| Isophorone | - | - | - |
| 2-Nitrophenol | - | - | - |
| 2,4-Dimethylphenol | - | - | - |
| Benzoic acid | - | - | - |
| bis(2-Chloroethoxy) methane | - | - | - |
| 2,4-Dichlorophenol | - | - | - |
| 1,2,4-Trichlorobenzene | - | - | - |
| Naphthalene | - | - | - |
| 4-Chloroaniline | - | - | - |
| Hexachlorobutadiene | - | - | - |
| 4-Chloro-3-methylphenol | - | - | - |
| 2-Methylnaphthalene | - | - | - |
| Hexachlorocyclopentadiene | - | - | - |
| 2,4,6-Trichlorophenol | - | - | - |
| 2,4,5-Trichlorophenol | - | - | - |
| 2-Chloronaphthalene | - | - | - |
| 2-Nitroaniline | - | - | - |
| Dimethyl phthalate | - | - | - |
| Acenaphthylene | - | - | - |
| 2,6-Dinitrotoluene | - | - | - |
| 3-Nitroaniline | - | - | - |
| Acenaphthene | - | - | - |
| 2,4-Dinitrophenol | - | - | - |
| 4-Nitrophenol | - | - | - |
| Dibenzofuran | - | - | - |

## TABLE 4 (CONTINUED)
## SUMMARY OF SEMIVOLATILE ORGANIC ANALYSIS

NORTH POND SEDIMENT SAMPLING PROGRAM
ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NY

| COMPOUND (cont) | MW-1 µg/l | MW-2 µg/l | L-1,2,3&4 µg/l |
|---|---|---|---|
| 2,4-Dinitrotoluene | - | - | - |
| Diethylphthalate | - | - | - |
| 4-Chlorophenyl-phenylether | - | - | - |
| Fluorene | - | - | - |
| 4-Nitroaniline | - | - | - |
| 4,6-Dinitro-2-methylphenol | - | - | - |
| N-nitrosodiphenylamine | - | - | - |
| 4-Bromophenyl-phenylether | - | - | - |
| Hexachlorobenzene | - | - | - |
| Pentachlorophenol | - | - | - |
| Phenanthrene | - | - | - |
| Anthracene | - | - | - |
| Di-n-butylphthalate | - | - | - |
| Fluoranthene | - | - | - |
| Pyrene | - | - | - |
| Butylbenzylphthalate | - | - | - |
| 3,3'-Dichlorobenzidine | - | - | - |
| Benz(a)anthracene | - | - | - |
| Chrysene | - | - | - |
| bis(2-ethylhexyl) phthalate | - | - | - |
| Di-n-octyl phthalate | - | - | - |
| Benzo(b)fluoranthene | - | - | - |
| Benzo(k)fluoranthene | - | - | - |
| Benzo(a)pyrene | - | - | - |
| Indeno (1,2,3-cd)pyrene | - | - | - |
| Dibenz (a,h)anthracene | - | - | - |
| Benzo(g,h,i)perylene | - | - | - |
| Total TICs and Unknowns | 13 J | 18 J | - |

Note:
NYSDEC ASP 1989 (Method 89-2), Plus 20 TICs, Superfund Deliverables
J = Indicates an estimated value.
(-) = Not detected.
TIC = Tentatively Identified Compound

## TABLE 4A
## SUMMARY OF SEMIVOLATILE ORGANIC ANALYSIS

### NORTH POND SEDIMENT SAMPLING PROGRAM
### ALCAN ROLLED PRODUCTS COMPANY
### OSWEGO, NY

| COMPOUND | Class GA Ground Water Standard (6 NYCRR 703.5) (µg/l) | Class D Surface Water Standard* (6 NYCRR 703.5) (µg/l) | MW-1 (µg/l) | MW-2 (µg/l) | L-1,2,3&4 (µg/l) |
|---|---|---|---|---|---|
| Phenol | | | - | - | - |
| bis(2-Chloroethyl) ether | | | - | - | - |
| 2-Chlorophenol | | | - | - | - |
| 1,3-Dichlorobenzene | 5 | 50 | 4 J | - | - |
| 1,4-Dichlorobenzene | 4.7^ | 50 | 4 J | - | - |
| Benzyl alcohol | | | - | - | - |
| 1,2-Dichlorobenzene | 4.7^ | 50 | 5 J | - | - |
| 2-Methylphenol | | | - | - | - |
| bis(2-Chloroisopropyl) ether | | | - | - | - |
| 4-Methylphenol | | | - | - | - |
| N-Nitroso-di-n-propylamine | | | - | - | - |
| Hexachloroethane | | | - | - | - |
| Nitrobenzene | | | - | - | - |
| Isophorone | | | - | - | - |
| 2-Nitrophenol | | | - | - | - |
| 2,4-Dimethylphenol | | | - | - | - |
| Benzoic acid | | | - | - | - |
| bis(2-Chloroethoxy) methane | | | - | - | - |
| 2,4-Dichlorophenol | | | - | - | - |
| 1,2,4-Trichlorobenzene | | | - | - | - |
| Naphthalene | | | - | - | - |
| 4-Chloroaniline | | | - | - | - |
| Hexachlorobutadiene | | | - | - | - |
| 4-Chloro-3-methylphenol | | | - | - | - |
| 2-Methylnaphthalene | | | - | - | - |
| Hexachlorocyclopentadiene | | | - | - | - |
| 2,4,6-Trichlorophenol | | | - | - | - |
| 2,4,5-Trichlorophenol | | | - | - | - |
| 2-Chloronaphthalene | | | - | - | - |
| 2-Nitroaniline | | | - | - | - |
| Dimethyl phthalate | | | - | - | - |
| Acenaphthylene | | | - | - | - |
| 2,6-Dinitrotoluene | | | - | - | - |
| 3-Nitroaniline | | | - | - | - |
| Acenaphthene | | | - | - | - |
| 2,4-Dinitrophenol | | | - | - | - |
| 4-Nitrophenol | | | - | - | - |
| Dibenzofuran | | | - | - | - |

TABLE 4A (CONTINUED)
SUMMARY OF SEMIVOLATILE ORGANIC ANALYSIS

NORTH POND SEDIMENT SAMPLING PROGRAM
ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NY

| COMPOUND (cont) | Class GA Ground Water Standard (6 NYCRR 703.5) (µg/l) | Class D Surface Water Standard* (6 NYCRR 703.5) (µg/l) | MW-1 µg/l | MW-2 µg/l | L-1,2,3&4 µg/l |
|---|---|---|---|---|---|
| 2,4-Dinitrotoluene | | | - | - | - |
| Diethylphthalate | | | - | - | - |
| 4-Chlorophenyl-phenylether | | | - | - | - |
| Fluorene | | | - | - | - |
| 4-Nitroaniline | | | - | - | - |
| 4,6-Dinitro-2-methylphenol | | | - | - | - |
| N-nitrosodiphenylamine | | | - | - | - |
| 4-Bromophenyl-phenylether | | | - | - | - |
| Hexachlorobenzene | | | - | - | - |
| Pentachlorophenol | | | - | - | - |
| Phenanthrene | | | - | - | - |
| Anthracene | | | - | - | - |
| Di-n-butylphthalate | | | - | - | - |
| Fluoranthene | | | - | - | - |
| Pyrene | | | - | - | - |
| Butylbenzylphthalate | | | - | - | - |
| 3,3'-Dichlorobenzidine | | | - | - | - |
| Benz(a)anthracene | | | - | - | - |
| Chrysene | | | - | - | - |
| bis(2-ethylhexyl) phthalate | | | - | - | - |
| Di-n-octyl phthalate | | | - | - | - |
| Benzo(b)fluoranthene | | | - | - | - |
| Benzo(k)fluoranthene | | | - | - | - |
| Benzo(a)pyrene | | | - | - | - |
| Indeno (1,2,3-cd)pyrene | | | - | - | - |
| Dibenz (a,h)anthracene | | | - | - | - |
| Benzo(g,h,i)perylene | | | - | - | - |
| Total TICs and Unknowns | | | 13 J | 18 J | - |

Note:
NYSDEC ASP 1989 (Method 89-2), Plus 20 TICs, Superfund Deliverables
J = Indicates an estimated value.
(-) = Not detected.
TIC = Tentatively Identified Compound
^ = Standard refers to sum of para (1,4-) and ortho (1,2-) isomers only.
* = Applicable to L-1,2,3&4 only.
[ ] = Value exceeds standard.

## TABLE 5
## SUMMARY OF SEMIVOLATILE ORGANIC ANALYSIS

### NORTH POND SEDIMENT SAMPLING PROGRAM
### ALCAN ROLLED PRODUCTS COMPANY
### OSWEGO, NY

| COMPOUND | SED-1 (μg/kg) | SED-2 (μg/kg) | SED-3 (μg/kg) | SED-4 (μg/kg) | SED-5 (μg/kg) |
|---|---|---|---|---|---|
| Phenol | - | - | - | - | - |
| bis(2-Chloroethyl) ether | - | - | - | - | - |
| 2-Chlorophenol | - | - | - | - | - |
| 1,3-Dichlorobenzene | - | - | - | - | - |
| 1,4-Dichlorobenzene | - | - | - | - | - |
| Benzyl alcohol | - | - | - | - | - |
| 1,2-Dichlorobenzene | - | - | - | - | - |
| 2-Methylphenol | - | - | - | - | - |
| bis (2-Chloroisopropyl) ether | - | - | - | - | - |
| 4-Methylphenol | - | - | - | - | - |
| N-Nitroso-di-n-propylamine | - | - | - | - | - |
| Hexachloroethane | - | - | - | - | - |
| Nitrobenzene | - | - | - | - | - |
| Isophorone | - | - | - | - | - |
| 2-Nitrophenol | - | - | - | - | - |
| 2,4-Dimethylphenol | - | - | - | - | - |
| Benzoic acid | - | - | - | - | - |
| bis(2-Chloroethoxy) methane | - | - | - | - | - |
| 2,4-Dichlorophenol | - | - | - | - | - |
| 1,2,4-Trichlorobenzene | - | - | - | - | - |
| Naphthalene | - | - | - | - | - |
| 4-Chloroaniline | - | - | - | - | - |
| Hexachlorobutadiene | - | - | - | - | - |
| 4-Chloro-3-methylphenol | - | - | - | - | - |
| 2-Methylnaphthalene | - | - | - | - | - |
| Hexachlorocyclopentadiene | - | - | - | - | - |
| 2,4,6-Trichlorophenol | - | - | - | - | - |
| 2,4,5-Trichlorophenol | - | - | - | - | - |
| 2-Chloronaphthalene | - | - | - | - | - |
| 2-Nitroaniline | - | - | - | - | - |
| Dimethyl phthalate | - | - | - | - | - |
| Acenaphthylene | - | - | - | - | - |
| 2,6-Dinitrotoluene | - | - | - | - | - |
| 3-Nitroaniline | - | - | - | - | - |
| Acenaphthene | - | - | - | - | - |
| 2,4-Dinitrophenol | - | - | - | - | - |
| 4-Nitrophenol | - | - | - | - | - |
| Dibenzofuran | - | - | - | - | - |

**TABLE 5 (CONTINUED)**
**SUMMARY OF SEMIVOLATILE ORGANIC ANALYSIS**

**NORTH POND SEDIMENT SAMPLING PROGRAM**
**ALCAN ROLLED PRODUCTS COMPANY**
**OSWEGO, NY**

| COMPOUND (cont) | SED-1 (µg/kg) | SED-2 (µg/kg) | SED-3 (µg/kg) | SED-4 (µg/kg) | SED-5 (µg/kg) |
|---|---|---|---|---|---|
| 2,4-Dinitrotoluene | - | - | - | - | - |
| Diethylphthalate | - | - | - | - | - |
| 4-Chlorophenyl phenyl ether | - | - | - | - | - |
| Fluorene | - | - | - | - | - |
| 4-Nitroaniline | - | - | - | - | - |
| 4,6-Dinitro-2-methylphenol | - | - | - | - | - |
| N-nitrosodiphenylamine | - | - | - | - | - |
| 4-Bromophenyl-phenylether | - | - | - | - | - |
| Hexachlorobenzene | - | - | - | - | - |
| Pentachlorophenol | - | - | - | - | - |
| Phenanthrene | - | - | - | - | - |
| Anthracene | - | - | - | - | - |
| Di-n-butylphthalate | - | - | - | - | - |
| Fluoranthene | - | - | - | - | - |
| Pyrene | - | - | - | - | - |
| Butylbenzylphthalate | - | - | - | - | - |
| 3,3'-Dichlorobenzidine | - | - | - | - | - |
| Benzo(a)anthracene | - | - | - | - | - |
| Chrysene | - | - | - | - | 54J |
| bis(2-Ethylhexyl) phthalate | - | - | 140 J | 970J | 490J |
| Di-n-octyl phthalate | - | - | - | - | - |
| Benzo(b)fluoranthene | - | - | - | - | - |
| Benzo(k)fluoranthene | - | - | - | - | - |
| Benzo(a)pyrene | - | - | - | - | - |
| Indeno (1,2,3-cd)pyrene | - | - | - | - | - |
| Dibenz (a,h)anthracene | - | - | - | - | - |
| Benzo(g,h,i)perylene | - | - | - | - | - |
| Total TICs and Unknowns | 873,400 J | 398,200 J | 108,400 J | 84,300 J | 67,390 J |
| Total TICs and Unknowns Σ | 120,000 B J | - | - | 22,000 B J | 3,300 B J |

**Note:**

NYSDEC ASP 1989 (Method 89-2), Plus 20 TICs, Superfund Deliverables
J = Indicates an estimated value.
(-) = Not detected.
TIC = Tentatively Identified Compound
B = Compound also found in method blank.
Σ = TICs and Unkowns found in the sample at levels greater than 5 times the same TICs found in the method blank.

## TABLE 6
## PESTICIDE/PCB ANALYSIS

### NORTH POND SEDIMENT SAMPLING PROGRAM
### ALCAN ROLLED PRODUCTS COMPANY
### OSWEGO, NY

| COMPOUND | MW-1 (µg/l) | MW-2 (µg/l) | L-1,2,3&4 (µg/l) | SW-1 (µg/l) | SW-2 (µg/l) | SW-3 (µg/l) | SW-4 (µg/l) | SW-5 (µg/l) | SW-6 (µg/l) |
|---|---|---|---|---|---|---|---|---|---|
| alpha-BHC | - | - | - | | | | | | |
| beta-BHC | - | - | - | | | | | | |
| delta-BHC | - | - | - | | | | | | |
| gamma-BHC (Lindane) | - | - | - | | | | | | |
| Heptachlor | - | - | - | | | | | | |
| Aldrin | - | - | - | | | | | | |
| Heptachlor epoxide | - | - | - | | | | | | |
| Endosulfan I | - | - | - | | | | | | |
| Dieldrin | - | - | - | | | | | | |
| 4,4'-DDE | - | - | - | | | | | | |
| Endrin | - | - | - | | | | | | |
| Endosulfan II | - | - | - | | | | | | |
| 4,4'-DDD | - | - | - | | | | | | |
| Endosulfan sulfate | - | - | 0.067 J | | | | | | |
| 4,4'-DDT | - | - | - | | | | | | |
| Methoxychlor | - | - | - | | | | | | |
| Endrin ketone | - | - | - | | | | | | |
| alpha-Chlordane | - | - | - | | | | | | |
| gamma-Chlordane | - | - | - | | | | | | |
| Toxaphene | - | - | - | | | | | | |
| AROCLOR-1016 | - | - | - | - | - | - | - | - | - |
| AROCLOR-1221 | - | - | - | - | - | - | - | - | - |
| AROCLOR-1232 | - | - | - | - | - | - | - | - | - |
| AROCLOR-1242 | - | - | - | - | - | - | - | - | - |
| AROCLOR-1248 | - | - | - | - | - | - | - | - | - |
| AROCLOR-1254 | - | - | - | - | - | - | - | - | - |
| AROCLOR-1260 | - | - | - | - | - | - | - | - | - |

Note:
NYSDEC ASP 1989, (Method 89-3), Superfund Deliverables.
= Not Applicable. Samples were not tested for these compounds.
(-) = Compound analyzed for but not detected.
J = Indicates an estimated value.

12/11/91

## TABLE 6A
## PESTICIDE/PCB ANALYSIS

### NORTH POND SEDIMENT SAMPLING PROGRAM
### ALCAN ROLLED PRODUCTS COMPANY
### OSWEGO, NY

| COMPOUND | Class GA Ground Water Standard (6 NYCRR 703.5) (µg/l) | Class D Surface Water Standard* (6 NYCRR 703.5) (µg/l) | MW-1 (µg/l) | MW-2 (µg/l) | L-1,2,3&4 (µg/l) | SW-1 (µg/l) | SW-2 (µg/l) | SW-3 (µg/l) | SW-4 (µg/l) | SW-5 (µg/l) | SW-6 (µg/l) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| alpha-BHC | | | - | - | - | | | | | | |
| beta-BHC | | | - | - | - | | | | | | |
| delta-BHC | | | - | - | - | | | | | | |
| gamma-BHC (Lindane) | | | - | - | - | | | | | | |
| Heptachlor | | | - | - | - | | | | | | |
| Aldrin | | | - | - | - | | | | | | |
| Heptachlor epoxide | | | - | - | - | | | | | | |
| Endosulfan I | | | - | - | - | | | | | | |
| Dieldrin | | | - | - | - | | | | | | |
| 4,4'-DDE | | | - | - | - | | | | | | |
| Endrin | | | - | - | - | | | | | | |
| Endosulfan II | | | - | - | - | | | | | | |
| 4,4'-DDD | | | - | - | - | | | | | | |
| Endosulfan sulfate | x | x | - | - | 0.067 J | | | | | | |
| 4,4'-DDT | | | - | - | - | | | | | | |
| Methoxychlor | | | - | - | - | | | | | | |
| Endrin ketone | | | - | - | - | | | | | | |
| alpha-Chlordane | | | - | - | - | | | | | | |
| gamma-Chlordane | | | - | - | - | | | | | | |
| Toxaphene | | | - | - | - | | | | | | |
| AROCLOR-1016 | | | - | - | - | - | - | - | - | - | - |
| AROCLOR-1221 | | | - | - | - | - | - | - | - | - | - |
| AROCLOR-1232 | | | - | - | - | - | - | - | - | - | - |
| AROCLOR-1242 | | | - | - | - | - | - | - | - | - | - |
| AROCLOR-1248 | | | - | - | - | - | - | - | - | - | - |
| AROCLOR-1254 | | | - | - | - | - | - | - | - | - | - |
| AROCLOR-1260 | | | - | - | - | - | - | - | - | - | - |

Note:
NYSDEC ASP 1989, (Method 89-3), Superfund Deliverables.
= Not Applicable. Samples were not tested for these compounds.
(-) = Compound analyzed for but not detected.
J = Indicates an estimated value.
x = No standard or guidance value exists for this compound.
* = Applicable to L-1,2,3&4 only.

**TABLE 7**
**SUMMARY OF PESTICIDES/PCB ANALYSIS**

**NORTH POND SEDIMENT SAMPLING PROGRAM**
**ALCAN ROLLED PRODUCTS COMPANY**
**OSWEGO, NY**

| COMPOUND | SED-1 (µg/kg) | SED-2 (µg/kg) | SED-3 (µg/kg) | SED-4 (µg/kg) | SED-5 (µg/kg) | SS-3 (µg/kg) | SS-4 (µg/kg) | SS-5 (µg/kg) | SS-6 (µg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| alpha-BHC | - | - | - | - | - | | | | |
| beta-BHC | - | - | - | - | - | | | | |
| delta-BHC | - | - | - | - | - | | | | |
| gamma-BHC (Lindane) | - | - | - | - | - | | | | |
| Heptachlor | - | - | - | - | - | | | | |
| Aldrin | - | - | - | - | - | | | | |
| Heptachlor epoxide | - | - | - | - | - | | | | |
| Endosulfan I | - | - | - | - | - | | | | |
| Dieldrin | 280 J | - | - | - | - | | | | |
| 4,4'-DDE | - | - | - | - | - | | | | |
| Endrin | 1,300 J | 800 J | - | - | - | | | | |
| Endosulfan II | 140 J | - | - | - | - | | | | |
| 4,4'-DDD | - | - | - | - | - | | | | |
| Endosulfan sulfate | - | - | - | - | - | | | | |
| 4,4'-DDT | 3,400 | 550 | - | - | 19 J | | | | |
| Methoxychlor | 4,400 J | 890 | 27 J | - | - | | | | |
| Endrin ketone | 1,300 J | - | - | - | - | | | | |
| alpha-chlordane | - | - | - | - | - | | | | |
| gamma-chlordane | - | - | - | - | - | | | | |
| Toxaphene | - | - | - | - | - | | | | |
| AROCLOR-1016 | - | - | - | - | - | - | - | - | - |
| AROCLOR-1221 | - | - | - | - | - | - | - | - | - |
| AROCLOR-1232 | - | - | - | - | - | - | - | - | - |
| AROCLOR-1242 | 170,000 | 58,000 | 4,000 | 1,100 | 1,100 | - | - | - | - |
| AROCLOR-1248 | - | - | - | - | - | - | - | - | - |
| AROCLOR-1254 | - | - | - | - | - | - | - | - | - |
| AROCLOR-1260 | - | - | - | - | - | - | - | - | 2,400 |

**Note:**

NYSDEC ASP 1989, (Method 89-3), Superfund Deliverables.

= Not Applicable. Samples were Not tested for these compounds.

(-) = Compound analyzed but not detected.

J = Indicates an estimated value.

## TABLE 8
## SUMMARY OF METALS ANALYSIS

NORTH POND SEDIMENT SAMPLING PROGRAM
ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NY

| ELEMENT | MW-1 (µg/l) | MW-2 (µg/l) | L-1,2,3&4 (µg/l) |
|---|---|---|---|
| Aluminum | 40,700 | 16,000 | 108 B |
| Antimony | - | - | - |
| Arsenic | 9.0 B | 6.0 B | - |
| Barium | 359 | 238 | 117 B |
| Beryllium | - | - | - |
| Cadmium | - | - | - |
| Calcium | 99,100 | 101,000 | 61,900 |
| Chromium | 58.7 | 24.4 | - |
| Cobalt | 25.2 B | - | - |
| Copper | 213 | 132 | - |
| Iron | 58,600 | 28,100 | 2,570 |
| Lead | 30.0 | 27.0 | 21.0 |
| Magnesium | 36,200 | 25,200 | 19,800 |
| Manganese | 19,600 | 6,340 | 3,370 |
| Mercury | - | - | - |
| Nickel | 350 | 114 | 57.7 |
| Potassium | 11,600 | 8,730 | 7,970 |
| Selenium | - | - | - |
| Silver | 29.7 | 7.8 B | - |
| Sodium | 48,200 | 18,900 | 50,500 |
| Thallium | - | - | - |
| Vanadium | 61.0 | - | - |
| Zinc | 164 | 92.0 | 24.1 |

Note:

NYSDEC CLP-M (1989 ASP) Superfund Target Compound List (TCL:23 metals); Superfund-CLP Inorganics

B = Indicates a value greater than or equal to the instrument detection limit but less than the contract required detection limit.

(-) = Not detected.

## TABLE 8A
## SUMMARY OF METALS ANALYSIS

### NORTH POND SEDIMENT SAMPLING PROGRAM
### ALCAN ROLLED PRODUCTS COMPANY
### OSWEGO, NY

| ELEMENT | Class GA Ground Water Standard (6 NYCRR 703.5) (µg/l) | Class D Surface Water Standard* (6 NYCRR 703.5) (µg/l) | MW-1 (µg/l) | MW-2 (µg/l) | L-1,2,3&4 (µg/l) |
|---|---|---|---|---|---|
| Aluminum | | | 40,700 | 15,000 | 108 B |
| Antimony | | | - | - | - |
| Arsenic | 25 | 360 | 9.0 B | 6.0 B | - |
| Barium | 1,000 | | 359 | 238 | 117 B |
| Beryllium | | | - | - | - |
| Cadmium | 10 | † | - | - | - |
| Calcium | | | 99,100 | 101,000 | 61,900 |
| Chromium | 50 | † | 58.7 | 24.4 | - |
| Cobalt | | 110 Ω | 25.2 B | - | - |
| Copper | 200 | † | 213 | 132 | - |
| Iron | 300^ | 300 | 58,600 | 28,100 | 2,570 |
| Lead | 25 | † | 30.0 | 27.0 | 21.0 |
| Magnesium | 35,000 Ω | | 36,200 | 25,200 | 19,800 |
| Manganese | 300^ | | 19,600 | 6,340 | 3,370 |
| Mercury | 2 | 0.2 Ω | - | - | - |
| Nickel | † | † | 350 | 114 | 57.7 |
| Potassium | | | 11,600 | 8,730 | 7,970 |
| Selenium | 10 | | - | - | - |
| Silver | 50 | † | 29.7 | 7.8 B | - |
| Sodium | 20,000 | | 48,200 | 18,900 | 50,500 |
| Thallium | 4 Ω | 20 | - | - | - |
| Vanadium | | 190 | 61.0 | - | - |
| Zinc | 300 | † | 164 | 92.0 | 24.1 |

**Note:**

NYSDEC CLP-M (1989 ASP) Superfund Target Compound List (TCL:23 metals); Superfund-CLP Inorganics

B = Indicates a value greater than or equal to the instrument detection limit but less than the contract required detection limit.

* = Applicable to L-1,2,3&4 only.

(-) = Not detected.

= No standard or guidance value exists.

† = Refer to NYCRR Part 703.5, Sept., 1991 (Appendix B).

^ = Standard is 500 µg/l for iron and manganese combined.

Ω = Guidance value.

[box] = Value exceeds standard or guidance value.

**TABLE 9**
**SUMMARY OF METALS ANALYSIS**

**NORTH POND SEDIMENT SAMPLING PROGRAM**
**ALCAN ROLLED PRODUCTS COMPANY**
**OSWEGO, NY**

| ELEMENT | SED-1 (mg/kg) | SED-2 (mg/kg) | SED-3 (mg/kg) | SED-4 (mg/kg) | SED-5 (mg/kg) | SS-3 (mg/kg) | SS-4 (mg/kg) | SS-5 (mg/kg) | SS-6 (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| Aluminum | 16,200 | 16,200 | 9,400 | 11,300 | 19,800 | 7,540 | 2,420 | 11,700 | 10,400 |
| Antimony | - | - | - | - | - | - | 2.2 B | - | - |
| Arsenic | - | 6.0 B | - | - | 4.5 | 5.2 | 4.0 B | 2.6 B | - |
| Barium | 166 B | 107 B | 51.6 B | 110 | 121 | 51.0 B | 89.4 | 41.2 B | 50.1 B |
| Beryllium | - | - | - | - | - | - | - | - | - |
| Cadmium | - | - | - | - | - | - | - | - | - |
| Calcium | 16,000 | 10,700 | 5,810 | 5,760 | 3,930 | 1,530 | 2,510 | 3,720 | 11,000 |
| Chromium | 54.0 | 43.5 | 7.2 | - | 30.6 | 9.3 | - | 14.2 | 16.0 |
| Cobalt | - | - | - | - | 11.3 B | - | - | 8.3 B | - |
| Copper | 167 | 133 | 7.8 B | 5.0 B | 25.0 | 10.2 | 16.0 | 45.7 | 41.0 |
| Iron | 24,500 | 16,100 | 1,980 | 1,420 | 26,000 | 8,160 | 2,230 | 15,600 | 10,700 |
| Lead | 135 | 118 | 12.8 | 13.9 | 18.5 | 44.2 | 84.4 | 13.8 | 57.0 |
| Magnesium | 8,160 | 6,530 | 1,020 B | 1050 B | 5,030 | 1,300 B | 452 B | 4,900 | 3,900 |
| Manganese | 495 | 434 | 164 | 58.4 | 425 | 454 | 50.5 | 458 | 301 |
| Mercury | - | - | 0.14 | - | - | 0.16 | 2.3 | - | - |
| Nickel | 41.5 B | 32.9 B | 7.7 B | - | 28.5 | 19.8 | - | 22.8 | 16.9 B |
| Potassium | 1,390 B | 2,280 B | 285 B | 355 B | 3,580 | 576 B | 242 B | 1,410 B | 1,650 B |
| Selenium | - | - | - | - | - | - | - | - | - |
| Silver | 7.1 | 5.2 | - | - | - | 2.3 B | 3.7 B | 1.7 | - |
| Sodium | - | - | - | - | - | - | - | - | - |
| Thallium | - | - | - | - | - | - | - | - | - |
| Vanadium | 37.3 B | 36.8 B | - | - | 43.2 | 19.3 | 14.0 B | 17.3 | 22.1 B |
| Zinc | 341 | 259 | 16.0 | 19.2 | 55.6 | 48.0 | 44.6 | 46.8 | 48.2 |

**Notes:**

NYSDEC CLP-M (1989 ASP) Superfund Target Compound List (TCL:23 metals); Superfund-CLP Inorganics

B - Indicates a value greater than or equal to the instrument detection limit but less than the contract required detection limit.

(-) - Indicates element was analyzed for but not detected.

# *Appendix E-4*

## Main Landfill Investigation - 1994

BBL®
BLASLAND, BOUCK & LEE, INC.
*engineers & scientists*

TABLE 1
GROUND WATER ELEVATION AND SURVEY DATA

MAIN LANDFILL INVESTIGATION
ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NY

| Well Location | Well No. | Surveyed Elevation at Ground Surface (feet) | Surveyed Top of PVC Casing Elevation (feet) | Depth to Water 3/22/94 (feet) | Water Elevation 3/22/94 (feet) |
|---|---|---|---|---|---|
| Main Landfill | MW-1 | 270.3 | 272.41 | 14.41 | 258.00 |
| North Ponds | MW-2 | 260.8 | 262.94 | 9.09 | 253.85 |
| North Ponds | MW-3 | 253.83 | 255.74 | 6.61 | 249.13 |
| North Ponds | MW-4 | 253.02 | 255.04 | 5.42 | 249.62 |
| North Ponds | MW-5 | 255.76 | 258.39 | 8.68 | 249.71 |
| North Ponds | MW-6 | 258.95 | 260.89 | 4.62 | 256.27 |
| Main Landfill | MW-7 | 266.63 | 268.6 | 13.04 | 255.56 |
| Main Landfill | MW-8 | 265.68 | 267.62 | 10.15 | 257.47 |
| Main Landfill | MW-9 | 273.96 | 276.35 | 8.50 | 267.85 |
| Main Landfill | MW-10 | 269.9 | 272.18 | 10.05 | 262.13 |
| Alcan Plant | MW-AC1 | 270.45 | 272.58 | 7.74 | 264.84 |
| Alcan Plant | MW-AC2 | 271.06 | 272.28 | 14.20 | 258.08 |
| Alcan Plant | MW-AC3 | 271.14 | 272.04 | 13.78 | 258.26 |
| Alcan Plant | MW-AC4 | 270.79 | 272.35 | 13.78 | 258.57 |
| Sithe Property | MWB-1 | 286.69 | 288.42 | 2.10 | 286.32 |
| Sithe Property | MWB-3 | 262.46 | 264.65 | 3.90 | 260.75 |
| Sithe Property | MWB-4 | 255.34 | 257.45 | 2.83 | 254.62 |
| Sithe Property | MWB-5 | 253.83 | 256.31 | 5.04 | 251.27 |

Note:

Vertical datum is USGS Benchmark N-25 (NGVD 29)

**TABLE 4**
**SUMMARY OF VOLATILE ORGANIC ANALYSES**
**GROUND WATER**

**MAIN LANDFILL INVESTIGATION**
**ALCAN ROLLED PRODUCTS COMPANY**
**OSWEGO, NY**

| | Class GA Ground Water Standard (6 NYCRR 703.5) (µg/l) | UPGRADIENT | DOWNGRADIENT | | | |
|---|---|---|---|---|---|---|
| | | MW-9 (µg/l) | MW-1 (µg/l) | MW-7 (µg/l) | MW-8 (µg/l) | MW-10 (µg/l) |
| COMPOUND | | | | | | |
| Chloromethane | | - | - | - | - | - |
| Bromomethane | | - | - | - | - | - |
| Vinyl chloride | | - | - | - | - | - |
| Chloroethane | 5 | - | 4J | 24 | 5J | - |
| Methylene chloride | 5 | - | - | - | 1J | - |
| Acetone | | - | - | - | - | - |
| Carbon Disulfide | | - | - | - | - | - |
| 1,1-Dichloroethene | | - | - | - | - | - |
| 1,1-Dichloroethane | 5Ω | - | - | - | - | 30 |
| 1,2-Dichloroethene (total) | | - | - | - | - | - |
| Chloroform | | - | - | - | - | - |
| 1,2-Dichloroethane | | - | - | - | - | - |
| 2-Butanone | | - | - | - | - | - |
| 1,1,1-Trichloroethane | | - | - | - | - | - |
| Carbon tetrachloride | | - | - | - | - | - |
| Vinyl acetate | | - | - | - | - | - |
| Bromodichloromethane | | - | - | - | - | - |
| 1,2-Dichloropropane | | - | - | - | - | - |
| cis-1,3-Dichloropropene | | - | - | - | - | - |
| Trichloroethene | | - | - | - | - | - |
| Dibromochloromethane | | - | - | - | - | - |
| 1,1,2-Trichloroethane | | - | - | - | - | - |
| Benzene | 0.7 | - | 0.6J | - | - | - |
| trans-1,3-Dichloropropene | | - | - | - | - | - |
| Bromoform | | - | - | - | - | - |
| 4-Methyl-2-pentanone | | - | - | - | - | - |
| 2-Hexanone | | - | - | - | - | - |
| Tetrachloroethene | | - | - | - | - | - |
| 1,1,2,2-Tetrachloroethane | | - | - | - | - | - |
| Toluene | 5 | - | - | 44 | - | - |
| Chlorobenzene | 5 | - | 35 | - | - | - |
| Ethyl Benzene | | - | - | - | - | - |
| Styrene | | - | - | - | - | - |
| Total Xylenes | | - | - | - | - | - |
| Total VOCs | | - | 39.6 | 68 | 6J | 30 |

Note:
NYSDEC ASP 1991, (Method 91-1), Plus 10 TICs, Superfund Deliverables
- = Not detected
J = Indicates an estimated value
Ω = Guidance Value
[box] = Value exceeds standard or guidance value.

TABLE 5
SUMMARY OF SEMIVOLATILE ORGANIC ANALYSES
GROUND WATER

MAIN LANDFILL INVESTIGATION
ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NY

| | Class GA Ground Water Standard (6 NYCRR 703.5) (µg/l) | UPGRADIENT | DOWNGRADIENT | | | |
|---|---|---|---|---|---|---|
| | | MW-9 (µg/l) | MW-1 (µg/l) | MW-7 (µg/l) | MW-8 (µg/l) | MW-10 (µg/l) |
| COMPOUND | | | | | | |
| Phenol | | - | - | - | - | - |
| bis(2-Chloroethyl) ether | | - | - | - | - | - |
| 2-Chlorophenol | | - | - | - | - | - |
| 1,3-Dichlorobenzene | 5 | - | 9J | - | - | - |
| 1,4-Dichlorobenzene | 4.7 | - | 10 | - | - | - |
| 1,2-Dichlorobenzene | 4.7 | - | 10 | - | - | - |
| 2-Methylphenol | 1^ | - | - | 4J | - | - |
| 2,2'-oxybis (1-Chloropropane) | | - | - | - | - | - |
| 4-Methylphenol | 1^ | - | - | 53 | - | - |
| N-Nitroso-di-n-propylamine | | - | - | - | - | - |
| Hexachloroethane | | - | - | - | - | - |
| Nitrobenzene | | - | - | - | - | - |
| Isophorone | | - | - | - | - | - |
| 2-Nitrophenol | | - | - | - | - | - |
| 2,4-Dimethylphenol | | - | - | - | - | - |
| bis(2-Chloroethoxy) methane | | - | - | - | - | - |
| 2,4-Dichlorophenol | | - | - | - | - | - |
| 1,2,4-Trichlorobenzene | | - | - | - | - | - |
| Naphthalene | 10 | - | - | 1J | - | - |
| 4-Chloroaniline | | - | - | - | - | - |
| Hexachlorobutadiene | | - | - | - | - | - |
| 4-Chloro-3-methylphenol | | - | - | - | - | - |
| 2-Methylnaphthalene | | - | - | - | - | - |
| Hexachlorocyclopentadiene | | - | - | - | - | - |
| 2,4,6-Trichlorophenol | | - | - | - | - | - |
| 2,4,5-Trichlorophenol | | - | - | - | - | - |
| 2-Chloronaphthalene | | - | - | - | - | - |
| 2-Nitroaniline | | - | - | - | - | - |
| Dimethyl phthalate | | - | - | - | - | - |
| Acenaphthylene | | - | - | - | - | - |
| 2,6-Dinitrotoluene | | - | - | - | - | - |
| 3-Nitroaniline | | - | - | - | - | - |
| Acenaphthene | | - | - | - | - | - |
| 2,4-Dinitrophenol | | - | - | - | - | - |
| 4-Nitrophenol | | - | - | - | - | - |
| Dibenzofuran | | - | - | - | - | - |
| 2,4-Dinitrotoluene | | - | - | - | - | - |
| Diethylphthalate | | - | - | - | - | - |
| 4-Chlorophenyl-phenylether | | - | - | - | - | - |
| Fluorene | 50Ω | - | 0.9J | - | - | - |
| 4-Nitroaniline | | - | - | - | - | - |
| 4,6-Dinitro-2-methylphenol | | - | - | - | - | - |
| N-nitrosodiphenylamine | | - | - | - | - | - |
| 4-Bromophenyl-phenylether | | - | - | - | - | - |
| Hexachlorobenzene | | - | - | - | - | - |
| Pentachlorophenol | | - | - | - | - | - |
| Phenanthrene | | - | - | - | - | - |
| Anthracene | | - | - | - | - | - |
| Carbazole | | - | - | - | - | - |
| Di-n-butylphthalate | | - | - | - | - | - |
| Fluoranthene | | - | - | - | - | - |
| Pyrene | | - | - | - | - | - |
| Butylbenzylphthalate | | - | - | - | - | - |
| 3,3'-Dichlorobenzidine | | - | - | - | - | - |
| Benzo(a)anthracene | | - | - | - | - | - |
| Chrysene | | - | - | - | - | - |
| bis(2-Ethylhexyl) phthalate | | - | - | - | - | - |
| Di-n-octyl phthalate | | - | - | - | - | - |
| Benzo(b)fluoranthene | | - | - | - | - | - |
| Benzo(k)fluoranthene | | - | - | - | - | - |
| Benzo(a)pyrene | | - | - | - | - | - |
| Indeno (1,2,3-cd)pyrene | | - | - | - | - | - |
| Dibenzo (a,h) anthracene | | - | - | - | - | - |
| Benzo(g,h,i)perylene | | - | - | - | - | - |
| Total SVOCs | | - | 29.9 | 58 | - | - |

Note:

NYSDEC ASP 1991 (Method 91-2), Plus 20 TICs, Superfund Deliverables
- = Not detected
J = Indicates an estimated value
^ = Total Phenolic Compounds
Ω = Guidance Value
[box] = Value exceeds standard or guidance Value

TABLE 6
SUMMARY OF PESTICIDE/PCB ANALYSES
GROUND WATER

MAIN LANDFILL INVESTIGATION
ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NY

| COMPOUND | Class GA Ground Water Standard (6 NYCRR 703.5) (µg/l) | UPGRADIENT MW-9 (µg/l) | DOWNGRADIENT MW-1 (µg/l) | MW-7 (µg/l) | MW-8 (µg/l) | MW-10 (µg/l) |
|---|---|---|---|---|---|---|
| alpha-BHC | | - | - | - | - | - |
| beta-BHC | | - | - | - | - | - |
| delta-BHC | | - | - | - | - | - |
| gamma-BHC (Lindane) | | - | - | - | - | - |
| Heptachlor | | - | - | - | - | - |
| Aldrin | | - | - | - | - | - |
| Heptachlor epoxide | | - | - | - | - | - |
| Endosulfan I | | - | - | - | - | - |
| Dieldrin | | - | - | - | - | - |
| 4,4'-DDE | | - | - | - | - | - |
| Endrin | | - | - | - | - | - |
| Endosulfan II | | - | - | - | - | - |
| 4,4'-DDE | | - | - | - | - | - |
| Endosulfan sulfate | | - | - | - | - | - |
| 4,4'-DDT | | - | - | - | - | - |
| Methoxychlor | | - | - | - | - | - |
| Endrin-Ketone | | - | - | - | - | - |
| Endrin Aldehyde | | - | - | - | - | - |
| alpha-Chlordane | | - | - | - | - | - |
| gamma-Chlordane | | - | - | - | - | - |
| Toxaphene | | - | - | - | - | - |
| AROCLOR-1016 | | - | - | - | - | - |
| AROCLOR-1221 | | - | - | - | - | - |
| AROCLOR-1232 | | - | - | - | - | - |
| AROCLOR-1242 | 0.1 | - | - | 1 | - | - |
| AROCLOR-1248 | | - | - | - | - | - |
| AROCLOR-1254 | | - | - | - | - | - |
| AROCLOR-1260 | | - | - | - | - | - |

Note:
NYSDEC ASP 1991, (Method 91-3), Superfund Deliverables.
- = Not detected
J = Indicates an estimated value.
P = This flag is used for a pesticide/arochlor target analyte when there is a greater than 25 percent difference for detected contentrations between the two GC columns.

**TABLE 7**
**SUMMARY OF METALS ANALYSES**
**GROUND WATER**

**MAIN LANDFILL INVESTIGATION**
**ALCAN ROLLED PRODUCTS COMPANY**
**OSWEGO, NY**

| ELEMENT | Class GA Ground Water Standard (6 NYCRR 703.5) (µg/l) | UPGRADIENT MW-9 (µg/l) | DOWNGRADIENT MW-1 (µg/l) | MW-7 (µg/l) | MW-8 (µg/l) | MW-10 (µg/l) |
|---|---|---|---|---|---|---|
| Aluminum | | 1,740 | 5,520 | 1,080 | 5,510 | 12,500 |
| Antimony | | - | - | - | - | - |
| Arsenic | 25 | - | 5.3B | 4.5B | 1.9B | - |
| Barium | 1,000 | 47.0B | 404 | 468 | 499 | 692 |
| Beryllium | | - | - | - | - | - |
| Cadmium | | - | - | - | - | - |
| Calcium | | 38,500 | 93,000 | 136,000 | 169,000 | 164,000 |
| Chromium | 50 | - | - | - | - | 29.3 |
| Cobalt | | 3.6B | 13.0B | 6.4B | 6.2B | 9.4B |
| Copper | 200 | - | 264J | - | - | - |
| Iron | 300^ | 2,680 | 33,100 | 83,400 | 27,900 | 18,000 |
| Lead | | - | - | - | - | - |
| Magnesium | | 8,970 | 47,200 | 74,600 | 45,600 | 48,800 |
| Manganese | 300^ | 250 | 47,300 | 26,700 | 7,700 | 3,670 |
| Mercury | | - | - | - | - | - |
| Nickel | † | - | 17.6B | - | 18.0B | 22.9B |
| Potassium | | - | 18,400 | 34,200 | 9,090 | 8,840 |
| Selenium | | - | - | - | - | - |
| Silver | | - | - | - | - | - |
| Sodium | 20,000 | - | 123,000 | 254,000 | 85,900 | 58,500 |
| Thallium | 4Ω | - | - | 1.6B | 3.1B | 1.6B |
| Vanadium | | - | - | - | 25.2B | 30.0B |
| Zinc | | - | - | - | - | - |
| Cyanide | | - | - | - | - | - |

Note:
NYSDEC CLP-M (1989 ASP) Superfund Target Compound List (TCL:23 metals); Superfund-CLP Inorganics
B = Indicates a value greater than or equal to the instrument detection limit but less than the contract required detection limit.
- = Not detected
^ = Standard is 500 µg/l for iron and manganese combined
† = Refer to NYCRR Part 703.5, Sept. 1991.
Ω = Guidance Value
[box] = Value exceeds standard or guidance value.

TABLE 8
SUMMARY OF VOLATILE ORGANIC ANALYSES
LEACHATE

MAIN LANDFILL INVESTIGATION
ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NY

| COMPOUND | Class D Surface Water Standard (6 NYCRR 703.5) (µg/l) | L-1-LF (µg/l) | L-2-LF (µg/l) |
|---|---|---|---|
| Chloromethane | | - | - |
| Bromomethane | | - | - |
| Vinyl chloride | | - | - |
| Chloroethane | | - | 58 |
| Methylene chloride | | - | - |
| Acetone | | - | - |
| Carbon Disulfide | | - | - |
| 1,1-Dichloroethene | | - | - |
| 1,1-Dichloroethane | | - | - |
| 1,2-Dichloroethene (total) | | - | - |
| Chloroform | | - | - |
| 1,2-Dichloroethane | | - | - |
| 2-Butanone | | - | - |
| 1,1,1-Trichloroethane | | - | - |
| Carbon tetrachloride | | - | - |
| Vinyl acetate | | - | - |
| Bromodichloromethane | | - | - |
| 1,2-Dichloropropane | | - | - |
| cis-1,3-Dichloropropene | | - | - |
| Trichloroethene | | - | - |
| Dibromochloromethane | | - | - |
| 1,1,2-Trichloroethane | | - | - |
| Benzene | 6Ω | - | 2J |
| trans-1,3-Dichloropropene | | - | - |
| Bromoform | | - | - |
| 4-Methyl-2-pentanone | | - | - |
| 2-Hexanone | | - | - |
| Tetrachloroethene | | - | - |
| 1,1,2,2-Tetrachloroethane | | - | - |
| Toluene | | - | - |
| Chlorobenzene | 50 | - | 0.6J |
| Ethyl Benzene | | - | - |
| Styrene | | - | - |
| Total Xylenes | | - | - |
| Total VOCs | | - | 60.6 |

Note:
NYSDEC ASP 1991, (Method 91-1), Plus 10 TICs, Superfund Deliverables
- = Not detected
J = Indicates an estimated value
Ω = Guidance value

TABLE 9
SUMMARY OF SEMIVOLATILE ORGANIC ANALYSES
LEACHATE

MAIN LANDFILL INVESTIGATION
ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NY

| COMPOUND | L-1-LF (µg/l) | L-2-LF (µg/l) |
|---|---|---|
| Phenol | - | - |
| bis(2-Chloroethyl) ether | - | - |
| 2-Chlorophenol | - | - |
| 1,3-Dichlorobenzene | - | - |
| 1,4-Dichlorobenzene | - | - |
| 1,2-Dichlorobenzene | - | - |
| 2-Methylphenol | - | - |
| 2,2'-oxybis (1-Chloropropane) | - | - |
| 4-Methylphenol | - | - |
| N-Nitroso-di-n-propylamine | - | - |
| Hexachloroethane | - | - |
| Nitrobenzene | - | - |
| Isophorone | - | - |
| 2-Nitrophenol | - | - |
| 2,4-Dimethylphenol | - | - |
| bis(2-Chloroethoxy) methane | - | - |
| 2,4-Dichlorophenol | - | - |
| 1,2,4-Trichlorobenzene | - | - |
| Naphthalene | - | - |
| 4-Chloroaniline | - | - |
| Hexachlorobutadiene | - | - |
| 4-Chloro-3-methylphenol | - | - |
| 2-Methylnaphthalene | - | - |
| Hexachlorocyclopentadiene | - | - |
| 2,4,6-Trichlorophenol | - | - |
| 2,4,5-Trichlorophenol | - | - |
| 2-Chloronaphthalene | - | - |
| 2-Nitroaniline | - | - |
| Dimethyl phthalate | - | - |
| Acenaphthylene | - | - |
| 2,6-Dinitrotoluene | - | - |
| 3-Nitroaniline | - | - |
| Acenaphthene | - | - |
| 2,4-Dinitrophenol | - | - |
| 4-Nitrophenol | - | - |
| Dibenzofuran | - | - |
| 2,4-Dinitrotoluene | - | - |
| Diethylphthalate | - | - |
| 4-Chlorophenyl-phenylether | - | - |
| Fluorene | - | - |
| 4-Nitroaniline | - | - |
| 4,6-Dinitro-2-methylphenol | - | - |
| N-nitrosodiphenylamine | - | - |
| 4-Bromophenyl-phenylether | - | - |
| Hexachlorobenzene | - | - |
| Pentachlorophenol | - | - |
| Phenanthrene | - | - |
| Anthracene | - | - |
| Carbazole | - | - |
| Di-n-butylphthalate | - | - |
| Fluoranthene | - | - |
| Pyrene | - | - |
| Butylbenzylphthalate | - | - |
| 3,3'-Dichlorobenzidine | - | - |
| Benzo(a)anthracene | - | - |
| Chrysene | - | - |
| bis(2-Ethylhexyl) phthalate | - | - |
| Di-n-octyl phthalate | - | - |
| Benzo(b)fluoranthene | - | - |
| Benzo(k)fluoranthene | - | - |
| Benzo(a)pyrene | - | - |
| Indeno (1,2,3-cd)pyrene | - | - |
| Dibenzo (a,h) anthracene | - | - |
| Benzo(g,h,i)perylene | - | - |

Note:

NYSDEC ASP 1991 (Method 91-2), Plus 20 TICs, Superfund Deliverables
- = Not detected
J = Indicates an estimated value

**TABLE 10**
**SUMMARY OF PESTICIDE/PCB ANALYSES**
**LEACHATE**

**MAIN LANDFILL INVESTIGATION**
**ALCAN ROLLED PRODUCTS COMPANY**
**OSWEGO, NY**

| COMPOUND | L-1-LF (µg/l) | L-2-LF (µg/l) |
|---|---|---|
| alpha-BHC | - | - |
| beta-BHC | - | - |
| delta-BHC | - | - |
| gamma-BHC (Lindane) | - | - |
| Heptachlor | - | - |
| Aldrin | - | - |
| Heptachlor epoxide | - | - |
| Endosulfan I | - | - |
| Dieldrin | - | - |
| 4,4'-DDE | - | - |
| Endrin | - | - |
| Endosulfan II | - | - |
| 4,4'-DDE | - | - |
| Endosulfan sulfate | - | - |
| 4,4'-DDT | - | - |
| Methoxychlor | - | - |
| Endrin-Ketone | - | - |
| Endrin Aldehyde | - | - |
| alpha-Chlordane | - | - |
| gamma-Chlordane | - | - |
| Toxaphene | - | - |
| AROCLOR-1016 | - | - |
| AROCLOR-1221 | - | - |
| AROCLOR-1232 | - | - |
| AROCLOR-1242 | - | - |
| AROCLOR-1248 | - | - |
| AROCLOR-1254 | - | - |
| AROCLOR-1260 | - | - |

Note:
NYSDEC ASP 1991, (Method 91-3), Superfund Deliverables.
- = Not detected

## TABLE 11
## SUMMARY OF METALS ANALYSES
## LEACHATE

**MAIN LANDFILL INVESTIGATION**
**ALCAN ROLLED PRODUCTS COMPANY**
**OSWEGO, NY**

| ELEMENT | Class D Surface Water Standard (6 NYCRR 703.5) (µg/l) | L-1-LF (µg/l) | L-2-LF (µg/l) |
|---|---|---|---|
| Aluminum | | 51.5B | 58.0B |
| Antimony | | - | - |
| Arsenic | | - | - |
| Barium | | 145B | 39.6B |
| Beryllium | | - | - |
| Cadmium | | - | - |
| Calcium | | 120,000 | 43,600 |
| Chromium | | - | - |
| Cobalt | | - | - |
| Copper | | - | - |
| Iron | 300 | [2,020] | [647] |
| Lead | | - | - |
| Magnesium | | 42,000 | 11,400 |
| Manganese | | 2,630 | 713 |
| Mercury | | - | - |
| Nickel | | - | - |
| Potassium | | 23,600 | 4,950 |
| Selenium | | - | - |
| Silver | | - | - |
| Sodium | | 51,000 | 27,400 |
| Thallium | | - | - |
| Vanadium | | - | - |
| Zinc | | - | - |
| Cyanide | | - | - |

Note:
NYSDEC CLP-M (1989 ASP) Superfund Target Compound List (TCL:23 metals); Superfund-CLP Inorganics
B = Indicates a value greater than or equal to the instrument detection limit but less than the contract required detection limit.
- = Not detected
[ ] = Value exceeds standard or guidance value.

**TABLE 12**
**SUMMARY OF VOLATILE ORGANIC ANALYSES**
**SURFACE SOIL**

**MAIN LANDFILL INVESTIGATION**
**ALCAN ROLLED PRODUCTS COMPANY**
**OSWEGO, NY**

| COMPOUND | SS-BKGD (µg/Kg) | SS-LF-1 (µg/Kg) | SS-LF-2 (µg/Kg) | SS-LF-3 (µg/Kg) |
|---|---|---|---|---|
| Chloromethane | - | - | - | - |
| Bromomethane | - | - | - | - |
| Vinyl chloride | - | - | - | - |
| Chloroethane | - | - | - | - |
| Methylene chloride | - | - | - | - |
| Acetone | - | - | - | - |
| Carbon Disulfide | - | - | - | - |
| 1,1-Dichloroethene | - | - | - | - |
| 1,1-Dichloroethane | - | - | - | - |
| 1,2-Dichloroethene (total) | - | - | - | - |
| Chloroform | - | - | - | - |
| 1,2-Dichloroethane | - | - | - | - |
| 2-Butanone | - | 7J | - | - |
| 1,1,1-Trichloroethane | - | - | - | - |
| Carbon tetrachloride | - | - | - | - |
| Vinyl acetate | - | - | - | - |
| Bromodichloromethane | - | - | - | - |
| 1,2-Dichloropropane | - | - | - | - |
| cis-1,3-Dichloropropene | - | - | - | - |
| Trichloroethene | - | - | - | - |
| Dibromochloromethane | - | - | - | - |
| 1,1,2-Trichloroethane | - | - | - | - |
| Benzene | - | - | - | - |
| trans-1,3-Dichloropropene | - | - | - | - |
| Bromoform | - | - | - | - |
| 4-Methyl-2-pentanone | - | - | - | - |
| 2-Hexanone | - | - | - | - |
| Tetrachloroethene | - | - | - | - |
| 1,1,2,2-Tetrachloroethane | - | - | - | - |
| Toluene | - | - | - | - |
| Chlorobenzene | - | - | - | - |
| Ethyl Benzene | - | - | - | - |
| Styrene | - | - | - | - |
| Total Xylenes | - | - | - | - |
| Total VOCs | - | 7J | - | - |

Note:
NYSDEC ASP 1991, (Method 91-1), Plus 10 TICs, Superfund Deliverables
- = Not detected
J = Indicates an estimated value

TABLE 13
SUMMARY OF SEMIVOLATILE ORGANIC ANALYSES
SURFACE SOIL

MAIN LANDFILL INVESTIGATION
ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NY

| COMPOUND | SS-BKGD (µg/Kg) | SS-LF-1 (µg/Kg) | SS-LF-2 (µg/Kg) | SS-LF-3 (µg/Kg) |
|---|---|---|---|---|
| Phenol | - | - | - | - |
| bis(2-Chloroethyl) ether | - | - | - | - |
| 2-Chlorophenol | - | - | - | - |
| 1,3-Dichlorobenzene | - | - | - | - |
| 1,4-Dichlorobenzene | - | - | - | - |
| 1,2-Dichlorobenzene | - | - | - | - |
| 2-Methylphenol | - | - | - | - |
| 2,2'-oxybis (1-Chloropropane) | - | - | - | - |
| 4-Methylphenol | - | - | - | - |
| N-Nitroso-di-n-propylamine | - | - | - | - |
| Hexachloroethane | - | - | - | - |
| Nitrobenzene | - | - | - | - |
| Isophorone | - | - | - | - |
| 2-Nitrophenol | - | - | - | - |
| 2,4-Dimethylphenol | - | - | - | - |
| bis(2-Chloroethoxy) methane | - | - | - | - |
| 2,4-Dichlorophenol | - | - | - | - |
| 1,2,4-Trichlorobenzene | - | - | - | - |
| Naphthalene | - | - | - | 40J |
| 4-Chloroaniline | - | - | - | - |
| Hexachlorobutadiene | - | - | - | - |
| 4-Chloro-3-methylphenol | - | - | - | - |
| 2-Methylnaphthalene | - | - | - | 40J |
| Hexachlorocyclopentadiene | - | - | - | - |
| 2,4,6-Trichlorophenol | - | - | - | - |
| 2,4,5-Trichlorophenol | - | - | - | - |
| 2-Chloronaphthalene | - | - | - | - |
| 2-Nitroaniline | - | - | - | - |
| Dimethyl phthalate | - | - | - | - |
| Acenaphthylene | - | - | - | - |
| 2,6-Dinitrotoluene | - | - | - | 12J |
| 3-Nitroaniline | - | - | - | - |
| Acenaphthene | - | 25J | - | 340J |
| 2,4-Dinitrophenol | - | - | - | - |
| 4-Nitrophenol | - | - | - | - |
| Dibenzofuran | - | - | - | 150J |
| 2,4-Dinitrotoluene | - | - | - | - |
| Diethylphthalate | - | - | - | - |
| 4-Chlorophenyl-phenylether | - | - | - | - |
| Fluorene | - | 20J | - | 370J |
| 4-Nitroaniline | - | - | - | - |
| 4,6-Dinitro-2-methylphenol | - | - | - | - |
| N-nitrosodiphenylamine | - | - | - | - |
| 4-Bromophenyl-phenylether | - | - | - | - |
| Hexachlorobenzene | - | - | - | - |
| Pentachlorophenol | - | - | - | - |
| Phenanthrene | 90J | 120J | 110J | 1,600 |
| Anthracene | - | 28J | 13J | 340J |
| Carbazole | - | 24J | 19J | 480 |
| Di-n-butylphthalate | - | - | - | - |
| Fluoranthene | 170J | 230J | 300J | 2,100 |
| Pyrene | 150J | 170J | 250J | 2,000 |
| Butylbenzylphthalate | - | - | - | - |
| 3,3'-Dichlorobenzidine | - | - | - | - |
| Benzo(a)anthracene | - | 120J | 130J | 1,300 |
| Chrysene | 120J | 140J | 200J | 1,300 |
| bis(2-Ethylhexyl) phthalate | - | - | - | - |
| Di-n-octyl phthalate | - | - | - | - |
| Benzo(b)fluoranthene | 160J | 110J | 230J | 1,600J |
| Benzo(k)fluoranthene | - | 95J | 96J | 1,700J |
| Benzo(a)pyrene | 76J | 81J | 120J | 1,100J |
| Indeno (1,2,3-cd)pyrene | - | 41J | 82J | 290J |
| Dibenzo (a,h) anthracene | - | - | - | 98J |
| Benzo(g,h,i)perylene | - | - | 44J | 120J |
| Total SVOCs | 766 | 1,204 | 1,594 | 14,980 |

Note:
NYSDEC ASP 1991 (Method 91-2), Plus 20 TICs, Superfund Deliverables
- = Not detected
J = Indicates an estimated value

TABLE 14
SUMMARY OF PESTICIDE/PCB ANALYSES
SURFACE SOIL

MAIN LANDFILL INVESTIGATION
ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NY

| COMPOUND | SS-BKGD (µg/Kg) | SS-LF-1 (µg/Kg) | SS-LF-2 (µg/Kg) | SS-LF-3 (µg/Kg) |
|---|---|---|---|---|
| alpha-BHC | - | - | - | - |
| beta-BHC | - | - | - | - |
| delta-BHC | - | - | - | - |
| gamma-BHC (Lindane) | - | - | - | - |
| Heptachlor | - | - | - | - |
| Aldrin | - | - | - | - |
| Heptachlor epoxide | - | - | - | - |
| Endosulfan I | - | - | - | - |
| Dieldrin | - | - | - | - |
| 4,4'-DDE | 14 | - | - | - |
| Endrin | - | - | - | - |
| Endosulfan II | 4.1JP | - | - | - |
| 4,4'-DDE | - | - | - | - |
| Endosulfan sulfate | 2.3J | - | - | - |
| 4,4'-DDT | 11P | - | - | - |
| Methoxychlor | - | - | - | - |
| Endrin-Ketone | - | - | - | - |
| Endrin Aldehyde | - | - | - | - |
| alpha-Chlordene | - | - | - | - |
| gamma-Chlordene | - | - | - | - |
| Toxaphene | - | - | - | - |
| AROCLOR-1016 | - | - | - | - |
| AROCLOR-1221 | - | - | - | - |
| AROCLOR-1232 | - | - | - | - |
| AROCLOR-1242 | - | - | - | - |
| AROCLOR-1248 | - | - | - | - |
| AROCLOR-1254 | - | 50 | - | 110JP |
| AROCLOR-1260 | 74P | 62 | 17JP | 140JP |

Note:
NYSDEC ASP 1991, (Method 91-3), Superfund Deliverables.
U = Compound analyzed for but not detected.
J = Indicates an estimated value.
P = This flag is used for a pesticide/arochlor target analyte when there is a greater than 25 percent difference for detected contentrations between the two GC columns.

**TABLE 15**
**SUMMARY OF METALS ANALYSES**
**SURFACE SOIL**

**MAIN LANDFILL INVESTIGATION**
**ALCAN ROLLED PRODUCTS COMPANY**
**OSWEGO, NY**

| ELEMENT | SS-BKGD (mg/Kg) | SS-LF-1 (mg/Kg) | SS-LF-2 (mg/Kg) | SS-LF-3 (mg/Kg) |
|---|---|---|---|---|
| Aluminum | 11,500JE* | 16,600JE* | 8,510JE* | 9,680JE* |
| Antimony | - | - | - | - |
| Arsenic | 14.2S | 1.4B | 2.1B | 2.4BS |
| Barium | 457 | 22.2B | 55.6 | 37.8B |
| Beryllium | 1.2B | 0.31B | 0.30B | 0.42B |
| Cadmium | 2.5 | - | - | - |
| Calcium | 4,530JE* | 14,700JE* | 2,750JE* | 8,950JE* |
| Chromium | - | - | - | - |
| Cobalt | 12.6B | 4.7B | 3.7B | 5.4B |
| Copper | 37.2* | 39.8* | 12.0* | 39.3* |
| Iron | 27,900 | 12,700 | 12,100 | 14,200 |
| Lead | 53.2 | 4.1 | 10.3 | 10.5 |
| Magnesium | 1,640JBE | 6,390JE | 2,010JE | 4,770JE |
| Manganese | 11,200JN | 315JN | 466JN | 714JN |
| Mercury | 0.19 | - | - | - |
| Nickel | 18.5 | 12.6 | 6.1B | 15.7 |
| Potassium | 717B | 824B | 437B | 891B |
| Selenium | 1.1B | - | - | - |
| Silver | - | - | - | - |
| Sodium | - | - | - | - |
| Thallium | 0.79 B | - | - | - |
| Vanadium | 47.1 | 17.1 | 12.8 | 21.0 |
| Zinc | 191.0 | - | - | - |
| Cyanide | - | - | - | - |

Note:
NYSDEC CLP-M (1989 ASP) Superfund Target Compound List (TCL:23 metals); Superfund-CLP Inorganics
B = Indicates a value greater than or equal to the instrument detection limit but less than the contract required detection limit.
E = Reported value is estimated because of the presence of interference.
* = Duplicate analysis not within control limits.
S = The reported value was determined by the method of standard additions (MSA).
N = Spiked sample recovery not within control limits.
- = Not detected

## TABLE 16
## SUMMARY OF VOLATILE ORGANIC ANALYSES
## AIR

### MAIN LANDFILL INVESTIGATION
### ALCAN ROLLED PRODUCTS COMPANY
### OSWEGO, NY

| | DM-2 | DM-4 | DM-6 |
|---|---|---|---|
| Total VOCs (ppm) | - | - | - |
| Total VOCs (mg/m3) | - | - | - |

Note:
Samples analyzed using NIOSH Method 5503
- = Not detected
ppm = parts of contaminant per million parts of air
mg/m3 = milligrams of contaminant per cubic meter of air

TABLE 17
SUMMARY OF PCB ANALYSES
AIR

MAIN LANDFILL INVESTIGATION
ALCAN ROLLED PRODUCTS COMPANY
OSWEGO, NY

| | DM-1 | DM-3 | DM-5 |
|---|---|---|---|
| Total PCBs (mg/m3) | - | - | - |

Note:
Samples analyzed using NIOSH Method 5503
- = Not detected
mg/m3 = milligrams of contaminant per cubic meter of air

**TABLE 18**
**SUMMARY OF ANALYTICAL RESULTS**

**MAIN LANDFILL INVESTIGATION**
**ALCAN ROLLED PRODUCTS COMPANY**
**OSWEGO, NY**

| Medium | Sample Location | Sample ID | VOA | SVOA | PEST | PCBs | METALS |
|---|---|---|---|---|---|---|---|
| Ground Water | Monitoring Well MW-1 | MW-1 | 2 | 2 | N D | N D | ABG |
| | Monitoring Well MW-7 | MW-7 | 2 | 2 | N D | 1 | ABG |
| | Monitoring Well MW-8 | MW-8 | 1 | N D | N D | N D | ABG |
| | Monitoring Well MW-10 | MW-10 | 2 | N D | N D | N D | ABG |
| | Upgradient Monitoring Well MW-9 | MW-9 | N D | N D | N D | N D | BG |
| Leachate | Surface Water near Main Landfill | L-1-LF | N D | N D | N D | N D | ABG |
| | Surface Water near Main Landfill | L-2-LF | 2 | N D | N D | N D | BG |
| Surface Soil | From northwestern side of Main Landfill | SS-LF-1 | N D | 4 | N D | 3 | BG |
| | From northeastern side of Main Landfill | SS-LF-2 | 1 | 4 | N D | 2 | BG |
| | From center of Main Landfill | SS-LF-3 | N D | 5 | N D | 3 | BG |
| | Composite from forest area north of Main Landfill | SS-BKGD | N D | 3 | 2 | 2 | BG |
| Air | Upwind of Main Landfill | DM-1,2 | N D | | | N D | |
| | Downwind of Main Landfill near Pond No. 2 | DM-3,4 | N D | | | N D | |
| | Downwind of Main Landfill near fish weir | DM-5,6 | N D | | | N D | |

Notes:

VOA = Volatile Organic Analysis
SVOA = Semivolatile Organic Analysis
PEST = Pesticides
PCB = Polychlorinated Biphenyls
= Not tested
N D = Not Detected
1 = <10 ppb
2 = 10 - 100 ppb
3 = 100 - 1,000 ppb
4 = 1,000 - 10,000 ppb
5 = 10,000 - 100,000 ppb

BG = Levels of metals were less than 10 times background.
ABG = Levels of one or more metals were greater than 10 times background.
The metals in leachate samples are compared to the upgradient ground water sample.

# *Appendix E-5*

## Congener-Specific PCB Analysis of Sediments and Biota from the North Ponds/Wetland Complex - 1994

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# Total PCB Method Development and Congener-Specific PCB Analysis of Sediments and Biota from the North Ponds/Wetland Complex

August 16, 1994

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# 3. Acknowledgements

The authors wish to thank Ron Scrudato for his assistance with core sampling and sediment characterization, Amy Tassone and Jeff Bemis for their substantial work with the development of sediment and biota methods, and Harry Hawkins for development of the core sampler. We also would like to acknowledge the staff of Alcan Rolled Products whose continued assistance made this work possible: Dave Lagoe, Steve DuBois, Tom Brown, Steve Gosselin, Gary Gabrielle and Dan Rupert. The authors would also like to thank Stewart Holtzsclaw (Dames & Moore), Rock Vitale (Environmental Standards, Inc) and Robert Wagner (Northeast Analytical, Inc.) for their collaborative efforts on this project.

## Summary

The original goal, as established in the research grant awarded to the SUNY Oswego Environmental Research Center (ERC) in April 1992, was to determine if reductive microbial PCB dechlorination had occurred in cooling pond sediments at the Alcan Rolled Products (ALCAN) - Oswego, NY facility. As the original PCB dechlorination investigation proceeded, it was evident that the oily matrix associated with the cooling pond and wetland sediments required an innovative and extensive clean-up protocol in order to yield non-biased PCB results. It was also apparent that routine sediment congener-specific PCB methods utilized by the ERC, based on EPA Florisil column clean-up, were inadequate and produced biased PCB concentrations with ALCAN sediment.

During the late 1960's and early 1970's, a hydraulic fluid developed by the Monsanto Company containing polychlorinated biphenyls was utilized by ALCAN at the Oswego facility. The hydraulic fluids, with the trade name Pydraul, were accidently released over several years into the pond and wetland complex. Over the past 30 years of operation various rolling oils (hot and cold) and emulsions have been utilized at the ALCAN facility. By permitted and accidental release, the cooling ponds and wetlands have accumulated substantial amounts of these various process oils and emulsions in the sediment and biota. The complexity and abundance of this oily matrix played the major role in requiring the preparation of a site-specific analytical total PCB method for ALCAN sediment and biota.

Based on preliminary congener-specific PCB results, the ERC was contracted

by ALCAN to develop and validate a packed-column clean-up methodology and quantitation specifically for ALCAN cooling pond sediments and biota. The primary rationale(s) for conducting this study was to develop a site-specific, cost-effective and non-biased total PCB method utilizing EPA METHOD 8080 (1986) as a starting point. The developed method was to be within the capabilities of most certified laboratories, readily approved by government regulators and utilize clean-up methods which have prior regulatory approval.

As the study progressed, it was apparent that a combination of sample treatment methods would be necessary to deal with the complex nature of ALCAN sediment. The ALCAN Sediment Method developed by the ERC (Appendix A, Pagano et al., 1993) is based on a the rigorous combination of clean-up elements including: acid, sulfur and alumina treatments.

The most challenging aspect of this study was the final chromatographic procedure necessary to separate the remaining oily matrix (left over from the preliminary clean-up steps) from the PCB. In EPA METHOD 8080 and NYSDEC 91-11, Florisil column clean-up (METHOD 3620) is the preferred choice for PCB separation and is routinely utilized in ERC congener-specific methods. Florisil adsorption column clean-up was determined to be ineffective and to produce significantly biased (high) PCB results in this study.

An EPA Test Method (Bellar and Lichtenburg, 1982), formed the basis and experimental starting point of our utilization of alumina for the ALCAN sediment. A comparison of Florisil vs alumina adsorption column clean-up demonstrated the effectiveness of alumina relative to Florisil. The capillary column comparison of Florisil vs. alumina showed an improved chromatographic baseline and reduced number of integrated peaks utilizing alumina. The packed column comparison of integrated peak areas of the two column clean-up methods conclusively demonstrated the effectiveness of alumina relative to florisil, especially as it related to erroneous total PCB quantitation. A similar comparison, utilizing GC/MS further documented the enhanced ability of alumina to clean-up the ALCAN sediment. The mechanism which accounts for the increased effectiveness of alumina over Florisil with the ALCAN sediment is unknown.

Due to the complex interaction, and as yet undetermined mechanism, between the alumina, oily matrix, and decachlorobiphenyl (DCB), the separation of DCB from the oily matrix is in an extremely narrow, early eluting window. Due to these complex interactions, a surrogate (DCB) recovery problem was occasionally noted during the method development in extremely oily samples associated with ALCAN sediment. Based on extensive testing, this occasional problem was determined to affect only DCB recovery, and does <u>not</u> affect total PCB recovery (matrix spike/matrix spike duplicate). The principal investigators extensively studied this phenomenon and determined that the majority of the DCB (within the required 80-120% recovery window) elutes after the discarded 0-15 mL fraction, utilizing the exact ERC column set-up. We hypothesize that the mixture of ALCAN oily matrix and surrogate, due to its high solubility in oils, is being carried along with the oils which elute in the 0-15 mL fraction.

Based on several whole carp and turtle muscle samples analyzed from the ALCAN pond/wetland complex, it was apparent that routine congener-specific PCB biota methods utilized by the ERC, based on Florisil column clean-up, were inadequate and produced biased results with these samples also. It was further confirmed by GC/MS, that the oily matrix associated with the pond/wetland complex had been transferred (accumulated) from the sediment to the biota. A rigorous clean-up was developed for ALCAN by the ERC, based closely on the sediment protocol, entitled "Alcan Biota Method; Packed Column Total PCB Analysis" (Appendix C, Pagano et al., 1994).

During the development and validation of the site-specific methods for ALCAN, various analytical and equipment parameters were found to affect the validity of the analytical results. These critical elements are identified in the site-specific methods submitted to ALCAN (Appendix A, C and D). Due to the complex nature of the ALCAN sediments and biota, these critical elements must be employed exactly as specified in the ERC methods. Strict adherence to the ERC methods, will facilitate the method validation and regulatory approval of the site-specific methods developed for the North Ponds Investigation. To our knowledge, the specific combination of clean-up treatments developed by the ERC for ALCAN sediment and biota have not been previously reported in the literature. Current research would indicate that the ERC method has applicability and regulatory significance to other industrially contaminated sites.

As stated beforehand, the original goal of this study was to determine if ductive microbial PCB dechlorination had occurred in cooling pond sediments at the ALCAN Oswego facility. The authors of this study have concluded, based on congener-specific PCB results, that the significant changes noted in congener-specific and homologue mole % ratios with increasing core depth in North Pond 1 are indicative of reductive microbial dechlorination. Collaborative testing, utilizing transferred anaerobic microorganisms from the site, conducted at the NYSDOH Wadsworth Center further established that ALCAN sediments contain dechlorinating microorganisms (G-Y Rhee, personal communication).

declor

## . Introduction

The original goal, as established in the research grant awarded to the ERC in April 1992, was to determine if reductive microbial PCB dechlorination had occurred in cooling pond sediments at the Alcan Rolled Products (ALCAN) - Oswego, NY facility. As this investigation proceeded, it became apparent that an oily matrix associated with the cooling pond and wetland sediments required an extensive and innovative clean-up protocol in order to provide non-biased results. Based on preliminary congener-specific PCB results, the SUNY Oswego ERC was contracted by ALCAN to develop and validate a packed-column clean-up methodology specifically for ALCAN cooling pond sediments in December 1992. A draft site-specific sediment clean-up method was transmitted to ALCAN at a March 1993 meeting held at SUNY Oswego, attended by representatives from Alcan Rolled Products, Dames & Moore (D&M) and Environmental Standards, Inc (ESI).

After an unsuccessful attempt by a commercial laboratory to utilize a preliminary draft methodology, ALCAN contracted with the ERC to further develop a comprehensive PCB methodology and associated multi-peak quantitation scheme in July 1993. Research related to the July 1993 modification was substantially completed by October 1993. SUNY Oswego's analytical methods (Appendix A, Pagano et al., 1993) were subsequently integrated into the document "Project-Specific Total PCB Analysis by Packed Column Gas Chromatographic Techniques" by ESI in November 1993. Concurrently in November 1993, the ERC was further contracted by ALCAN to develop and verify a clean-up method for biota samples (turtles and fish) connected with ALCAN pond/wetland complex (Appendix C, Pagano et al., 1994). In April 1994, the required elements of a biota method (Appendix D) were transmitted to ALCAN and ESI for integration into the document "Project-Specific Total PCB Analysis by Packed Column Gas Chromatographic Techniques".

A competitive process (Request for Proposals) was initiated in November 1993 by ALCAN, D&M and ESI to select a commercial laboratory to conduct the environmental testing connected with Alcan's North Ponds Investigation. The ERC provided proficiency samples, standards and evaluated data packages from four commercial laboratories. Northeast Analytical, Inc. (NEA) provided the most comprehensive and accurate data package, and was selected by ALCAN to conduct the environmental testing for the North Pond Investigation. The ERC has worked extensively with NEA to assure that all critical method elements have been obtained.

This report will document and provide scientific rationale for the critical elements associated with the sediment and biota protocols developed by the ERC. It will also document and discuss the congener-specific PCB analysis of core samples taken from the North Pond and Wetlands complex.

## 6. Site History

The study area is series of polishing (cooling) ponds and wetlands utilized by ALCAN in the processing of aluminum and related rolled products. The pond and wetland complex bordering Lake Ontario were constructed in 1968. During the late 1960's and early 1970's, a hydraulic fluid with the trade name Pydraul, developed by the Monsanto Company containing polychlorinated biphenyls (PCB) was utilized by ALCAN at the Oswego facility. An unknown quantity of the hydraulic fluids were accidently released over several years into the pond and wetland complex. Two different Pydraul formulations were used during the period 1968 - 1971 by ALCAN. Pydraul 280, consisting of 50% by weight of Aroclor 1248 and PYDRAUL 312, consisting of 47% by weight of Aroclor 1242 (Lagoe, personal communication). Aroclor is the trade name for PCB produced by the Monsanto Company. The first two digits, usually "12", represent the core biphenyl molecule (12 carbons); whereas the last two digits (e.g. "42") signify the % by weight of chlorine.

Also significant to this study are the various rolling oils (hot and cold) and emulsions utilized at the ALCAN facility over the past 25 years of operation. By permitted and accidental release, the cooling ponds and wetlands have accumulated extensive amounts of various process oils and emulsions in the sediment and biota. The complexity and abundance of this oily matrix played the major role in requiring the preparation of a site-specific analytical total PCB method for ALCAN sediment and biota. Since the inception of this study, the ERC has identified other environmental samples (both sediment and biota) with similar contamination and matrix interferences at other industrial sites (ERC, unpublished data).

Since 1984, PCB testing of pond and wetland sediments have been conducted at 11 historical sampling sites by ALCAN. Over the years, several different commercial laboratories have been utilized to analyze the ALCAN core samples. These results have varied widely and inconsistently, from year to year and site to site.

For example in 1989, sediment values of 410 mg/kg (dry weight) were reported at one site in North Pond #2, whereas a value of 30 mg/kg was reported in 1990 at the same site (Lagoe, personal communication). These inconsistencies in sediment core PCB concentrations originally led the principal investigators to consider the possibility of analytical and/or quantitation problems with historical PCB sediment data.

## 7. Sampling Locations and Methods

After a site visit and consultation with the environmental staff at ALCAN (D. Lagoe, S. DuBois and T. Brown), six sampling locations where chosen from the North Pond/Wetland complex. In order to compare previous results with this study, the following historical sampling locations were chosen: North Pond #1 (NP#1), 12 and 24; Wetland (WET), 131 and 132; North Pond #2 (NP#2), 5 and 9. The sites selected by the ERC generally correlated with the highest historical sediment PCB values previously reported by ALCAN.

In June 1992, staff members from the ERC sampled the North Pond/Wetland complex at the selected sites. Core samples were obtained by driving a pre-cleaned 8-10' polycarbonate tube (2.5" diameter) (AIN Plastics) into the sediment with a driving tool developed by the SUNY Oswego Center for Innovative Technology Transfer (CITT). Wetland samples were obtained by employing waders (sites 131, 132), whereas the pond samples were acquired from a small pond boat. Core samples were capped, stored upright, transferred to the ERC and immediately frozen (-10°C). Samples taken with this coring method ranged between 27-67 cm in depth, with several visually distinct layers and minimal smearing. A core was rejected if a well-defined sediment/water interface was not present. When ready for analysis, the ALCAN sediment cores were allowed to thaw, cut in 5cm sections and stored in pre-cleaned jars until analyzed.

## 8. Analytical Methods - Congener-Specific PCB

The congener-specific chromatographic PCB methods currently utilized by the ERC were developed by Bush et al. (1983 and 1985) at the Wadsworth Center for Laboratories and Research, New York State Department of Health (NYSDOH). A Hewlett-Packard Model 5890 gas chromatograph with an electron capture detector and a Hewlett-Packard Model 5890 gas chromatograph with a Model 5971 electron impact Mass Selective Detector were acquired in 1992. The capillary column utilized in these instruments is a Hewlett-Packard Ultra II 25 meter DB-5 with 0.2 mm id and 0.33 um film thickness. An additional Hewlett-Packard 5890 gas chromatograph with both electron capture and flame ionization detectors was acquired in January 1993 and utilized exclusively for this study. The packed columns used in this system were: Supelco 3% SP-2100 on 100/200 Supelcoport 1.8m by 4mm column and Supelco 1.5% SP-2250/1.95% SP-2401 on 100/200 Supelcoport 1.8m by 4mm column.

Data from the two electron capture gas chromatographs is collected and processed by use of the Hewlett Packard 3365 Series II ChemStation software and Lotus 123 procedures. This software system tabulates the data in a spreadsheet format such that the amount, weight percent, mole percent, and identity of each PCB congener is listed along with the total PCB concentration and sample identity.

Quality Assurance/Quality Control (QA/QC) is based on a program of replicate analyses, surrogate recoveries (decachlorobiphenyl), matrix spikes, matrix spike duplicates, method and reagent blanks and analysis of EPA standards. In addition, periodic exchanges of double-blind samples are conducted with the Wadsworth Center to insure consistency and validity of PCB analysis. The ERC is currently collaborating with several investigators at the Wadsworth Center, as a member of the National Institute Environmental Health Sciences (NIEHS) Superfund project. The precision and accuracy of analytical procedures is monitored by analyzing duplicates of both experimental and spiked samples.

Analytical instruments are maintained in calibration by use of a PCB mixture supplied by the Wadsworth Center. This calibration standard is a 1:1:1:1 mixture of Aroclors 1221, 1016, 1254, and 1260 from the EPA Pesticide Repository each at 200ng/ml, and mirex and DDE at 10 ng/ml. The Wadsworth standard PCB mixture is analyzed before and after every six samples or no less than once per day in order to verify that the chromatographic system has maintained stability and is reproducible. If quality control is lost, the analyzed samples are repeated.

## 9. Site-Specific Analytical Method - Rationale

One of the major difficulties associated with PCB chemistry is the considerable effect of the sample matrix on the gas chromatographic system (injection port, column and electron capture detector). It is imperative for the analyst to demonstrate through a series of quality assurance (QA) and quality control (QC) measures that the sample clean-up protocol chosen is appropriate and valid for each and every sample matrix analyzed. This validation procedure is the reason that the Environmental Protection Agency (EPA) gives only a series of approved PCB extraction, clean-up and quantitation methods and requires the analyst to verify the procedure for a specific matrix (Method 8080B, SW-846, 1990). At the time of this report, no EPA approved congener-specific PCB method exists, although New York State Department of Environmental Conservation (NYSDEC) has recently developed a method (NYSDEC METHOD 91-11, 1992).

From the onset of this study, it was apparent that routine sediment congener-specific PCB methods utilized by the ERC, based on Florisil column clean-up, were inadequate to produce valid results with ALCAN sediment. This conclusion is based on several analytical keys used by experienced analysts to gauge the effectiveness of sample clean-up protocols chosen for a environmental matrix.

Several of these analytical keys are apparent in an ALCAN sediment sample processed with Florisil adsorption column clean-up (Figure 1). As you will note near the middle-to-end (retention time 35-50 min.) of the gas chromatographic run, a conspicuous shift in the chromatographic baseline is evident. To an experienced analyst, baseline shifting is one primary indicator of an unstable gas chromatographic system, which if not corrected will produce biased results.

Another important key utilized by the analyst is the quality of gas chromatographic peak - retention time matches. PCB identification and ultimately quantitation, utilizing either capillary or packed columns, is based on the retention times of congeners or groups of congeners. Briefly, in order to calibrate an instrument, an analyst injects a known group of congeners or Aroclor(s) and records precisely (within a few hundredths of a minute) the time each peak elutes from the GC system. An environmental sample is then injected into the GC, peaks elute and are identified as a specific PCB (congener-specific) or groups of PCB (Aroclor) by the retention times of the peaks. If a sample is not properly prepared, interferences may be present which will be eluted or co-eluted with a PCB and possibly recorded as a false positive PCB. These extra non-PCB peaks generally, but not always, have poor peak - retention time matches. Generally, in complex environmental samples such as sediments and biota, 90-110 PCB peaks are common utilizing capillary columns. Samples with ineffective clean-ups will contain 150-180 or more peaks, with extremely poor peak - time retention matches (Figure 1). One of the problems associated with the use of packed columns is that the lack of peak separation (resolution) can often limit the usefulness of the analytical keys commonly used with capillary columns and necessary for proper data evaluation (Figure 2).

The analytical confirmation of matrix interferences is possible through the use of gas chromatography/mass spectrometry (GC/MS). The GC/MS produces a unique mass/charge (m/z) spectra for each compound separated by the GC column and ionized by the mass selective detector. As you will note in Figure 3, a highly erratic baseline is evident with several, large non-PCB peaks identified. The dramatic shifts in baseline, as recorded on the GC/MS as compared to the electron capture detector

(Figure 1), are due to the nature of the mass selective detector which detects (according to m/z) all constituents of the oily matrix. Because of its selectivity for halogenated compounds (Erikson, 1992), the ECD is relatively blind to the oily components of the ALCAN sediment. The utilization of full scan (all mass weights) peak mass spectral data, definitively confirms the presence of interferences by spectral matching. The non-PCB peaks in Figure 3 have been identified as methyl substituted aliphatic hydrocarbons and napthalenes, common in petroleum and natural-based process oils and emulsions utilized at the ALCAN Oswego facility (Figure 4). The acquisition rate of modern GC/MS instruments allows several full scan spectra to be acquired during the timeframe of a normal chromatographic peak separation. We have found that mixed peak spectra are common with the ALCAN sediment utilizing Florisil clean-up (Figure 5). The occurrence of mixed peak spectra (PCB and matrix interference) indicate the presence of interferences which co-elute with the PCB, and we conclude, negatively influences quantitation and peak/time retention quality. Utilization of selective ion monitoring (SIM) on the GC/MS, which increases instrument sensitivity and omits interferences by looking only for specific characteristic ions, confirmed that the PCB, completely overwhelmed by matrix interference, were present in the ALCAN sediments (Figures 3 and 6).

## 10. Site-Specific Analytical Method - Development

Analysis of ALCAN sediment samples demonstrate that routine ERC and commercial laboratory PCB methods were inadequate and would produce biased PCB concentrations. After a thorough literature search, which included peer-reviewed journals, books and regulatory methods, several alternative clean-up options were seen to be available. A review of the literature indicated that several clean-up methods are commonly used (singularly or in combination) for environmental, waste oil, hydraulic and transformer fluid samples. These methods include: adsorption chromatography (florisil, alumina, silica gel); dilution; digestion (sulfuric acid, permanganate); sulfur cleanup (TBA, elemental Hg, Cu), acetonitrile partition, gel permeation and Florisil slurry (Bellar and Lichtenburg, 1982; Sonchik et al., 1984; de Voogt, 1991; Sandra et al., 1988 and Erickson, 1992). Several of the proposed methods were discarded, being extremely complicated or time consuming (acetonitrile partition), requiring specialized equipment (gel permeation chromatography) or possibly destroying lower chlorinated PCB (permanganate digestion). The primary rationale(s) for conducting this study was to develop a site-specific, cost-effective and non-biased total PCB method utilizing EPA METHOD 8080 (1986) as a starting point. The developed method should be within the capabilities of most certified laboratories and readily approved by government regulators. Therefore, the ERC whenever possible, utilized clean-up methods which have prior regulatory approval. It became readily apparent that a combination of the above methods would be necessary to deal with the complex nature of ALCAN sediment. The final sediment method developed for ALCAN and transmitted to ESI for integration into the "Project-Specific Total PCB Analysis by Packed Column Gas Chromatographic Techniques" is attached as Appendix A (Pagano et al., 1993). Specific elements of the site-specific method will be discussed individually in Section 11. To our knowledge, this specific combination of clean-up methods has not been previously reported. Current research at the ERC would indicate that this method has applicability and regulatory significance to other industrially contaminated sites.

## 11. Site-Specific Analytical Method - Elements

The following section describes the rationale for the specific elements of the site-specific total PCB method developed by the ERC for sediments and biota associated with the ALCAN North Ponds Investigation.

### 11.1 Sample Preparation

Sample Size

In order to obtain a representative sample, a reasonably sized sample must be extracted. EPA ultrasonic extraction protocol METHOD 3550B (1990) recommend 30 and 2 g for low and high concentration samples, respectively. One of the major concerns associated with the ALCAN sediment is limiting the amount of oily matrix that is introduced to the clean-up steps, especially the alumina adsorption column clean-up step. In order to acquire a representative sample and still limit the amount of interferences, 4 grams of sediment are extracted by the ultrasonic method, with the combined ultrasonic extracts (three) concentrated down to approximately 5 mL and rinsed up to 10 mL in a volumetric flask. One (1) mL of this extract is carried through the remaining clean-up protocols (Appendix A - Pagano et al., 1993). This technique effectively limits the amount of oily matrix carried through the clean-up procedures, guarantees a representative sample, and assures adequate sample exists to achieve the method detection limit of 400 ug/kg. It is important to note that the limiting factor in PCB determination (sensitivity) is usually determined by the effectiveness of the clean-up protocols (interferences), not instrumental limitations (EPA, METHOD 8080B, 1990).

Surrogate Spiking Solution

Of the EPA recommended surrogate spiking solutions only decachlorobiphenyl (DCB) did not co-elute with the other PCB congeners usually present. The ERC has extensive experience with the utilization of DCB as a surrogate spiking solution. Of the recommended surrogate spikes, the ERC found DCB to most closely simulate the behavior of PCB in the ALCAN sediment.

### 11.2 Extraction

Ultrasonic Extraction

The site-specific total PCB ultrasonic extraction method, based closely on EPA Method 3550B (1990), was determined to be an accurate and precise procedure for the extraction of ALCAN sediment, utilizing the ERC modifications noted above (Sample Preparation - Sample Size). Blank spike, matrix spike/matrix spike duplicates utilizing the ERC modifications routinely returned the original PCB within the recommended 80-120% limits indicating the site-specific ultrasonic modifications for ALCAN sediment were valid and reproducible. ALCAN sediment proficiency samples analyzed by NEA resulted in acceptable method recoveries utilizing the ERC method.

## 11.3 Acid Treatment

NYSDEC METHOD 91-11 (1992) and EPA Test Method (Bellar and Lichtenberg, 1982) permits the utilization of concentrated sulfuric acid ($H_2SO_4$) for sample clean-up. Sulfuric acid treatment is a mandatory and required element for promoting the satisfactory clean-up of ALCAN sediment. Due to the complex nature of ALCAN sediment, the investigators found the utilization of $H_2SO_4$ to be an highly effective technique. Sulfuric acid destroys lipids and other compounds with polar functional groups. The acid extract usually turns dark brown or even black during the $H_2SO_4$ treatment of ALCAN sediment, indicating that some interfering compounds are being oxidized and destroyed. The acid treatment should be repeated until there is no color change in the extract.

## 11.4 Sulfur Treatment

Tetrabutylammonium (TBA) sulfite reagent is utilized to remove elemental sulfur commonly found in sediments and other similar matrices. Failure to utilize TBA with the ALCAN sediment causes serious degradation of the quality of gas chromatographic tracings, especially during the early stages of the GC analysis. The utilization of TBA is an approved EPA METHOD (3660, 1986) and is a required element in the site-specific total PCB method developed for ALCAN sediment.

## 11.5 Column Clean-Up

Alumina

The most challenging aspect of this study was the final chromatographic procedure necessary to separate the remaining oily matrix (left over from the previous clean-up steps) from the PCB. PCB are exceeding difficult to extract and separate from matrices in which they are soluble, such as the process oils associated with the ALCAN sediment.

The concept behind all forms of adsorption column chromatography (Florisil, silica gel and alumina) is the utilization of differences in polarity, solubility and partition coefficients to separate PCB from other interfering compounds (Erikson, 1992). In this way, the PCB can be isolated from the other compounds in a precisely determined elution fraction. In EPA METHOD 8080 (1986) and NYSDEC 91-11 (1992), Florisil column clean-up (METHOD 3620) is the preferred choice for PCB separation and is routinely utilized in ERC congener-specific methods. As discussed in Section 9 (Site-Specific Analytical Method - Rationales) and illustrated in Figures 1, 2 and 3, Florisil adsorption column clean-up was determined to be ineffective and shown to produce biased results.

Alumina ($Al_2O_3$) clean-up is an approved EPA METHOD (3610 and 3611, 1986) for phthalate esters and petroleum wastes, respectively. According to Erikson (1992), alumina has been successfully utilized in over 30 peer-reviewed PCB studies for the column chromatographic clean-up of a wide variety of matrices.

An EPA Test Method (Bellar and Lichtenburg, 1982), formed the basis and experimental starting point of our utilization of alumina for the ALCAN sediment. During the validation phase of our study various combinations of deactivation (% water), elution volumes and fractionation, amount of alumina and column dimensions were investigated. After several months of experimental trials, the process was optimized for ALCAN sediment.

According to our research, the most critical factor in achieving adequate (80-120%) sample and surrogate recovery is the precise determination of elution windows. Differences in column packing techniques and alumina activity require the analyst to verify where the PCB and interfering oils elute from the column by collecting small incremental fractions. It was determined, utilizing the ERC alumina column set-up, that the majority of interferences (primarily oils) inherent in the ALCAN sediment elute in the 0-15 mL hexane fraction, which is discarded. The remaining fraction (15-300 mL) contains the PCB.

One problem was encountered associated with the recovery of the surrogate spike (DCB) in the ALCAN sample matrix utilizing the ERC method. Due to the complex interaction, and as yet undetermined mechanism, between the alumina, oily matrix, and DCB, the separation of DCB from the oily matrix occurs in an extremely narrow, early eluting window. This surrogate recovery problem only occurs in the oily matrix associated with some ALCAN sediments, only affects DCB recovery, and does not affect total PCB recovery (matrix spike/matrix spike duplicate). The principal investigators have extensively studied this phenomenon and determined that the majority of the DCB (within the required 80-120% recovery window) elutes after the discarded 0-15 mL fraction, utilizing the ERC column set-up. We hypothesize that the mixture of ALCAN oily matrix and surrogate, due to its high solubility in oils, is being carried along with the early eluting oils. Decachlorobiphenyl is the first PCB to elute from the alumina column and was found to elute totally within the 15-50 mL fraction. The majority of the total PCB were determined to elute in the 50-250 mL fraction. These conclusions are based on several surrogate spike, blank spike, matrix spike/matrix spike duplicate experiments, all of which gave results well within the approved 80 - 120% recovery windows.

The justification for employing alumina column adsorption is to separate the ALCAN oily matrix from the PCB, more effectively than Florisil column separation. A comparison of Florisil vs alumina adsorption column clean-up demonstrates the effectiveness of alumina relative to Florisil (Figures 7, 8 and 9). As discussed earlier in Section 9, the capillary column comparison of Florisil vs. alumina shows an improved baseline and reduced number of integrated peaks (175 vs. 110) (Figure 7). The packed column comparison of the two column clean-up methods is even more illustrative (Figure 8). A comparison of integrated calibration peak areas ($4.2 \times 10^6$ vs $10.9 \times 10^6$ units) conclusively demonstrates the effectiveness of alumina relative to Florisil, especially as it relates to erroneous total PCB quantitation (72 vs 203 mg/kg). A similar comparison, utilizing GC/MS further demonstrates the enhanced ability of alumina to clean-up the ALCAN sediment (Figure 9). A GC/MS spectral comparison of alumina vs Florisil treatments illustrates a significant reduction of spectral ion abundance, especially in the ions associated with the oily matrix (Figure

10). The specific mechanism which accounts for the increased effectiveness of alumina over Florisil with the ALCAN sediment is currently unknown.

During the development and validation of the site-specific method for ALCAN, various analytical and equipment parameters were found to affect the validity of the analytical results. These critical elements are identified in the site-specific method submitted to ALCAN (Appendix A, Pagano et al., 1993). Due to the complex nature of the ALCAN sediment, these critical elements must be employed exactly as specified in ERC method. Never the less, it is incumbent on the commercial laboratory to validate the method internally and document those results for the regulatory agencies, since variations in analytical instrumentation, bench techniques and reagents are common and will produce slight variations. Strict adherence to the ERC method, will facilitate the method validation by the commercial laboratory selected for the North Ponds Investigation.

### 11.6 Biota Clean-up

Based on several whole carp and turtle muscle samples analyzed from the ALCAN pond/wetland complex, it was apparent that routine congener-specific PCB biota methods utilized by the ERC, based on Florisil column clean-up, were again found to be inadequate and produce biased results. It was further confirmed by GC/MS, that the same components found in the sediment oily matrix associated with the pond/wetland complex had been transferred (accumulated) from the sediment to the biota. A rigorous clean-up was developed for ALCAN by the ERC, based closely on the sediment protocol, entitled "Alcan Biota Method; Packed Column Total PCB Analysis" (Appendix C, Pagano et al., 1994). This method is based on: several, repetitive acid treatments; limits on sample size (thus lipids and oils) introduced to the clean-up; TBA; and alumina adsorption column clean-up. The method developed by the ERC met all established surrogate, blank and matrix recovery requirements. In April 1994, the required elements of a biota method (Appendix D, Pagano et al., 1994) were transmitted to ALCAN and ESI for integration into the document "Project-Specific Total PCB Analysis by Packed Column Gas Chromatographic Techniques".

### 11.7 Gas Chromatographic Analysis

Quantitation

It is a well documented fact that a highly weathered or biologically (microbially) altered PCB are difficult to identify and quantify based on the original Aroclor(s) (Aroclor matching). Due to the biologically and chemically weathered character of the ALCAN sediment, the utilization of an Aroclor matching technique for total PCB quantitation is not an effective or reliable technique. EPA METHOD 8080B (1990) allows the utilization of several major peaks in the quantitation of total PCB. The ERC has had considerable experience in the quantitation of PCB that have been exposed to the environment, through our participation in the NIEHS Superfund Project. The NYSDOH Wadsworth Center standard, described fully in Section 8, has been routinely utilized to fully cover the extent of environmentally weathered and biologically altered PCB. The types of original Aroclor accidently released to the cooling ponds (1242 and

1248), along with the significant anaerobic dechlorination and weathering found in the ALCAN sediment (Section 12), requires the use of a complex mixture of Aroclors. The Wadsworth Center PCB standard provides the wide range of peak coverage necessary to accurately quantitate the ALCAN sediment. The methodology selected for the site-specific total PCB quantitation is based on the area summation of ten peaks, selected such that they represent approximately 50% of the total area of a 40 mg/L PCB standard mixture of Aroclors 1016, 1221, 1254 and 1260. The quantitation peaks, along with other confirmatory data are illustrated in Appendix B for the primary and confirmatory columns to be used for the North Ponds Investigation.

## 12. Congener-Specific PCB Core Sediment Analysis

The original purpose of this study was to determine if reductive microbial PCB dechlorination had occurred in North Ponds/Wetland complex sediments at the ALCAN Oswego facility. The authors of this study have concluded, based on congener-specific PCB results, that the significant changes noted in congener-specific and homologue mole % ratios with increasing core depth at both sites in North Pond 1 are indicative of reductive microbial dechlorination. Collaborative testing, utilizing transferred anaerobic microorganisms from the site, conducted at the NYSDOH Wadsworth Center further established that ALCAN sediments contain dechlorinating microorganisms (G-Y Rhee, personal communication).

In order to fully characterize the ALCAN sediment, several site-specific parameters were evaluated including: sediment characteristics and fractionation; total PCB concentrations by depth (summation of congeners); congener-specific mole %; homologue mole %; and % DCB recovery. Three of the six whole cores analyzed (WET:132, NP1:24 and NP2:9) were fractionated by particle size to determine the percentage of the total in each standard size fraction. The associated PCB concentration will be reported for each size fraction. Whole core samples were fractionated utilizing standard size separation criteria, with two sieves employed (2mm and 63um) to separate organics/granules (Fraction A) from sands (Fraction B) from silts/clays (Fraction C). Characterization (various combinations of silt, clay, sand and organics) of ALCAN sediment by core depth, was conducted by Dr. Ronald Scrudato. Detailed Lotus 123 spreadsheets which contain congener-specific mass (pg/uL), % DCB recovery, mole % and homologue % are found in Appendix E. Due to a persistent laboratory contaminant (identified as diethyl phthalate ester) which co-elutes with 4-chlorobiphenyl, the mono-chloro PCB were not quantitated for this study. The authors have concluded that eliminating the monochlorobiphenyls for quantitation purposes produces more consistent and reliable results and has a overall minimal effect on sediment and biota total PCB concentrations.

### 12.1 North Pond 1

Site 12

Total PCB concentrations (by summation of congeners) increased significantly with depth in North Pond 1: Site 12, with values ranging from 2.7 - 59.1 mg/kg

(Table 1). The drastic fall off of PCB concentration noted at the 50-55 cm core depth apparently distinguishes the sediment horizon before the utilization of the Pydraul in at the ALCAN Oswego facility. The core data establishes that significant congener-specific and homologue changes occurred with depth (Figures 11 and 12). Most notable are the progressive increase of the lower chlorinated homologues with depth and the concurrent decrease of higher chlorinated PCB homologues (Figure 12). It is a well established fact that anaerobic microbial processes favor dechlorination at the para- and meta- biphenyl positions, with ortho-substituted congeners generally being the microbial end products of reductive dechlorination. As expected, most of the congeners which increased notably with depth contained ortho-substituted chlorination (Figure 11 and Appendix E). The homologue and congener-specific changes observed at Site 12 are highly suggestive of reductive microbial dechlorination.

Table 1. Sediment characterization and total PCB concentrations by core depth for North Pond 1: Site 12.

| Core Depth (cm) | Total PCB (mg/kg, dry wt.) | Sediment Characterization |
|---|---|---|
| 0-5 | 2.7 | silty clay |
| 10-15 | 4.9 | clay |
| 20-25 | 24.5 | clay |
| 30-35 | 34.2 | clay w/organics |
| 40-45 | 59.1 | clay w/organics |
| 50-55 | 2.8 | silty clay w/organics |

Site 24

Total PCB concentrations increased consistently with depth in North Pond 1: Site 24, with values ranging from 1.5 - 26.7 mg/kg (Table 2). Due to problems driving this core, the pre-contamination horizon, found at Site 12, was not reached. Size fractionation found the core to consist of 52% of the silt/clay fraction and 44% of the sand fraction. Total PCB concentrations for the silt/clay and sand fractions were 17.1 and 11.3 mg/kg, respectively.

The core data demonstrates that notable congener-specific and homologue changes occurred with depth (Figures 13 and 14). The progressive shift in the congener-specific pattern with depth toward a lower chlorinated pattern is apparent in Figure 13. A progressive increase was observed, similar to Site 12, in the lower chlorinated homologues (di- and tri-) with depth and a concurrent decrease of higher chlorinated (tetra-, penta- and hexa-) PCB homologues (Figure 14). As in Site 12, most of the congeners which increased notably with depth contained ortho-substituted chlorination (Appendix E). The homologue and congener-specific changes noted at Site 24 are highly indicative of reductive microbial dechlorination.

no microbially induced changes occurred at Wetland Site 132. Sediment core fractionation indicates that nearly 90% of sediment at Site 132 is composed of sand, with an total PCB concentration of approximately 0.33 mg/kg. Clays and silt consisted of only 7.5%, with a total PCB value of 1.2 mg/kg.

Table 4. Sediment characterization, fractionation and total PCB concentrations by core depth for Wetland: Site 132.

| Core Depth (cm) | Total PCB (mg/kg, dry wt.) | % of Total Core | Sediment Characterization |
|---|---|---|---|
| 0-5 | 1.2 | - | sandy silt w/organics |
| 10-15 | 0.7 | - | sandy silt w/organics |
| 20-25 | 0.6 | - | sandy silt |
| 30-35 | 0.8 | - | clean fine sand |
| A | - | 2.7 | organic/rocks |
| B | 0.3 | 89.9 | sand |
| C | 1.2 | 7.5 | clay/silt |

## 12.3 North Pond 2

Site 5

Total PCB concentrations increased consistently with depth in North Pond 2: Site 5, with values ranging from 8.3 - 61.2 mg/kg dry weight (Table 5). No extreme fall off of PCB concentration was noted at the lower core depths, apparently the sediment horizon before the utilization of the Pydraul at the ALCAN Oswego facility was not reached in this core. The core data would suggest that no significant congener-specific and homologue changes occurred with depth (Figures 19, 20 and Appendix E). No significant increase of the lower chlorinated homologues or ortho-substituted congeners was noted with core depth. The homologue and congener-specific changes observed at Site 5 would be suggestive of extremely limited or no reductive microbial dechlorination.

Table 5. Sediment characterization and total PCB concentrations by core depth for North Pond 2: Site 5.

| Core Depth (cm) | Total PCB (mg/kg, dry wt.) | Sediment Characterization |
|---|---|---|
| 0-5 | 8.3 | sandy silt |
| 10-15 | 10.2 | silty clay |
| 20-25 | 12.3 | silty clay |
| 30-35 | 32.1 | silty clay |
| 40-45 | 33.7 | silty clay w/organics |
| 50-55 | 61.2 | silty clay |

Site 9

Total PCB concentrations increased drastically between depths 20-25 cm (12.5 mg/kg) and 30-35 cm (68.9 mg/kg) in North Pond 2: Site 9. Core PCB values ranged from 1.6 - 68.9 mg/kg (Table 6). The drastic fall off of PCB concentration noted at the 40-45 cm core depth distinguishes the sediment horizon before the utilization of the Pydraul in at the ALCAN Oswego facility. The core section at 30-35 cm of depth has the distinction of being the highest PCB value (68.9 mg/kg) found in our congener-specific core study. Particle size fractionation found the core to consist of 30.7% of the silt/clay fraction and 68.4% of the sand fraction. Total PCB concentrations for the silt/clay and sand fractions were 21.9 and 11.3 mg/kg, respectively.

The core data would suggest that no significant congener-specific and homologue changes occurred with depth (Figures 21, 22 and Appendix E). No significant increase of the lower chlorinated homologues or ortho-substituted congeners was noted with core depth. The homologue and congener-specific changes observed at Site 9 would not be suggestive microbial dechlorination.

Table 6. Sediment characterization, fractionation and total PCB concentrations by core depth for North Pond 2: Site 9.

| Core Depth (cm) | Total PCB (mg/kg, dry wt.) | % of Total Core | Sediment Characterization |
|---|---|---|---|
| 0-5 | 9.7 | - | silt |
| 10-15 | 11.2 | - | silt |
| 20-25 | 12.5 | - | silty clay |
| 30-35 | 68.9 | - | silty clay |
| 40-45 | 1.6 | - | sandy organic silt |
| A | - | 0.9 | organics/granules |
| B | 11.2 | 68.4 | sand |
| C | 21.9 | 30.7 | clay/silt |

## 13. Total PCB Biota Analysis

All biota samples for this report were prepared and quantitated utilizing the Alcan Biota Method; Packed Column Total PCB Analysis (Appendix C, Pagano et al., 1994). A comprehensive, congener-specific analysis of turtle and other biota samples collected at the ALCAN pond/wetland complex is currently being prepared by the SUNY Oswego Environmental Research Center and Biology Department.

### 13.1 Snapping Turtle Muscle

A snapping turtle was collected by the environmental staff of ALCAN during the 1993 nesting season near the influent channel of North Pond 1. The collected female turtle was aged at approximately 9-10 years by Dr. Peter Rosenbaum and was immediately sacrificed at SUNY Oswego. Representative tissues and organs were stored in pre-cleaned glass sample jars and frozen until ready for analysis. The muscle tissue was analyzed according to the ALCAN Biota Method developed by the ERC (Appendix C, Pagano et al., 1994). Several samples were analyzed with an average total PCB concentration of 637 ug/kg (wet weight), and a sample range of 626 - 647 ug/kg. Due to the relatively low lipid content of the turtle muscle tissue, the analysis of the muscle sample was generally uncomplicated. Components (interferences) associated with the oily matrix were present at insignificant levels, related to the low lipid levels in the muscle tissue. All surrogate spike, blank spike, matrix spike/matrix spike duplicate recovery trials were well within the established 80-120% windows for the muscle sample.

### 13.2 Carp - Whole Body

Two frozen carp samples (whole fish) were delivered to the ERC by Dames & Moore in October 1993. The whole fish (including skin) was ground to a uniform consistency with a commercial-grade stainless steel Hobart Mill. The samples were stored in pre-cleaned sample jars and frozen until ready for analysis.

The whole carp sample was analyzed according to the ALCAN Biota Method developed by the ERC (Appendix C, Pagano et al., 1994). Due to the relatively high lipid content of the sample, the analysis required a rigorous sample clean-up to produce valid results. As was discussed in Section 11.6, the same components found in the sediment oily matrix had been transferred (accumulated) in the biota. Several samples were analyzed with an average total PCB concentration of 25.9 mg/kg (wet weight), and a sample range of 24.7 - 27.1 mg/kg. All surrogate spike, blank spike, matrix spike/matrix spike duplicate recoveries were well within the established 80-120% windows for the carp sample.

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# Figures

August 16, 1994

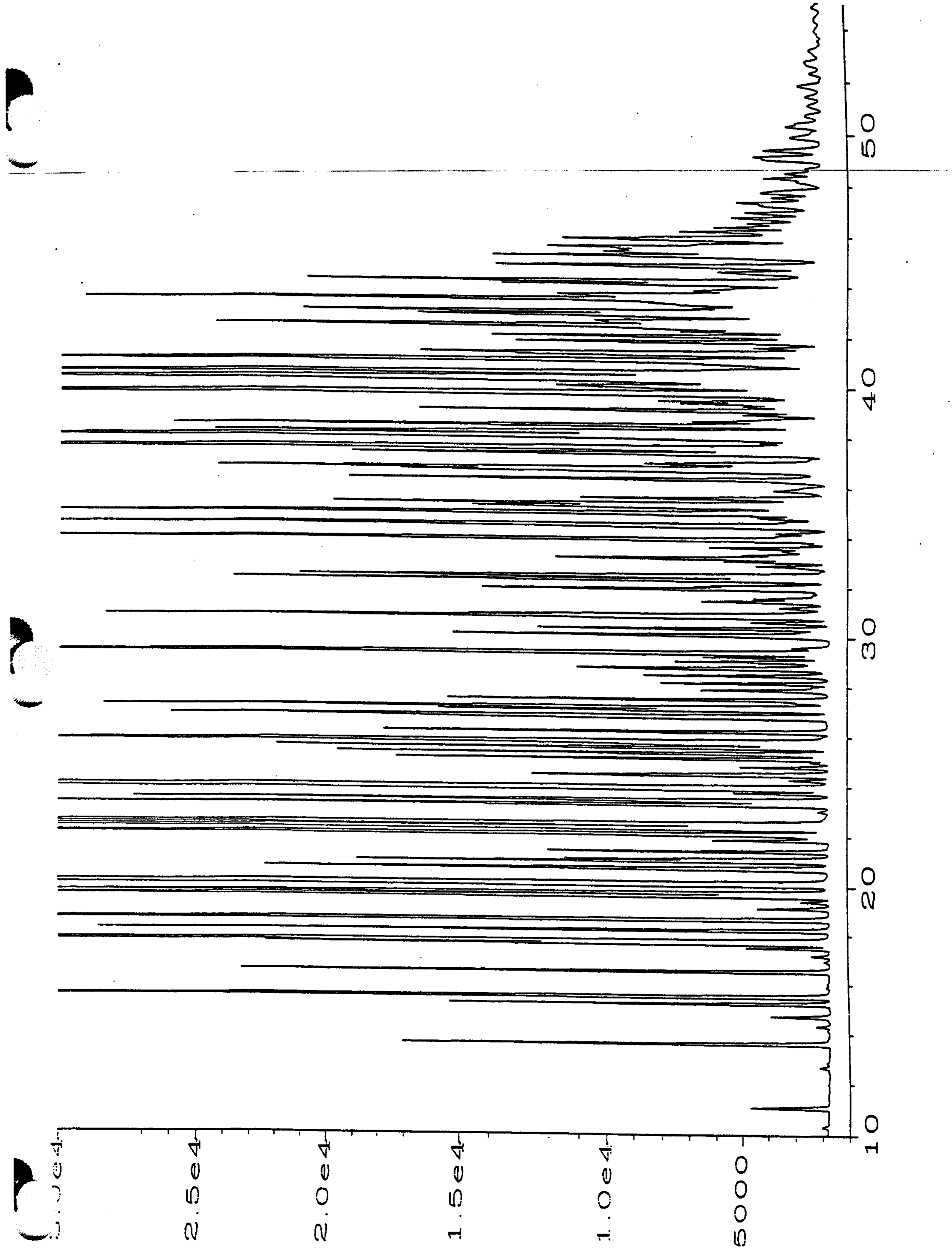



Figure 1.

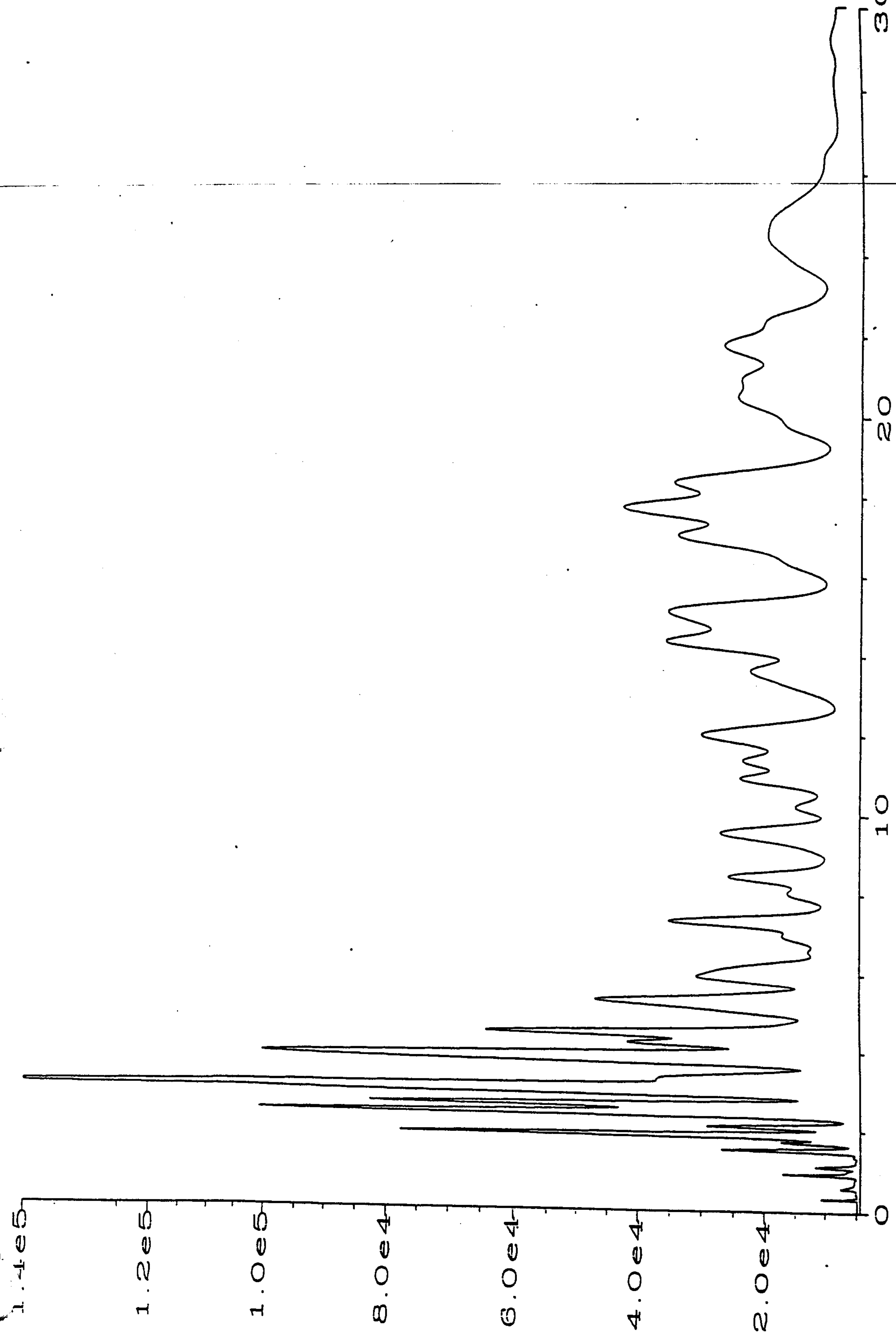



Figure 2.

File : C:\HPCHEM\1\DATA\ALCAN\AL#2419A.D
Operator : Pagano
Acquired : 29 Jul 94 9:43 am using AcqMethod PCB
Instrument : 5971 - In
Sample Name: Alcan sediment, NP2:9-7, florisil clean-up
Misc Info : 1 uL injection, SCAN, 15-300 fraction
Vial Number: 1

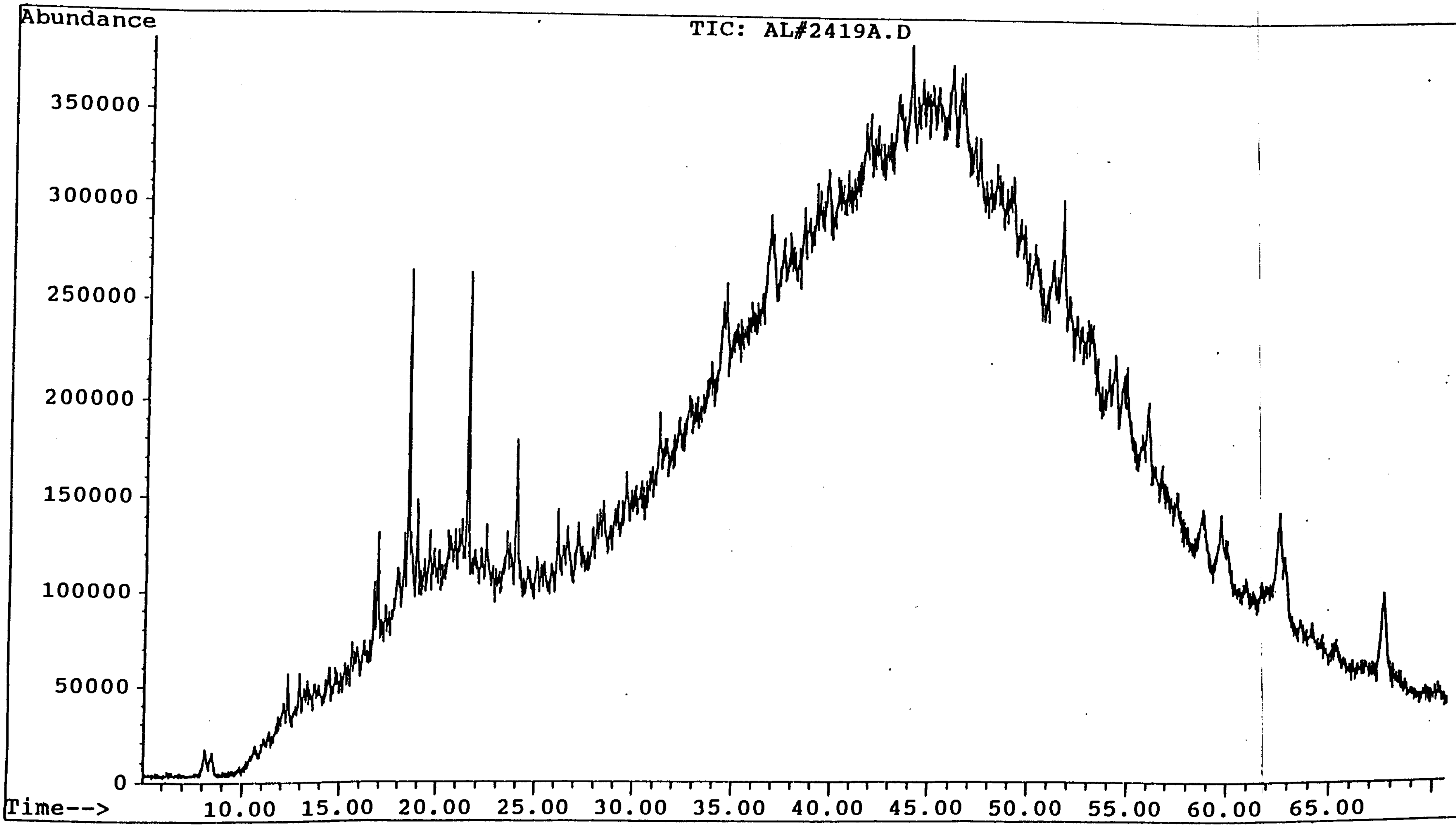



*Figure 3.*

[illegible]y : 86
: Dodecane, 2,6,10-trimet[illegible]

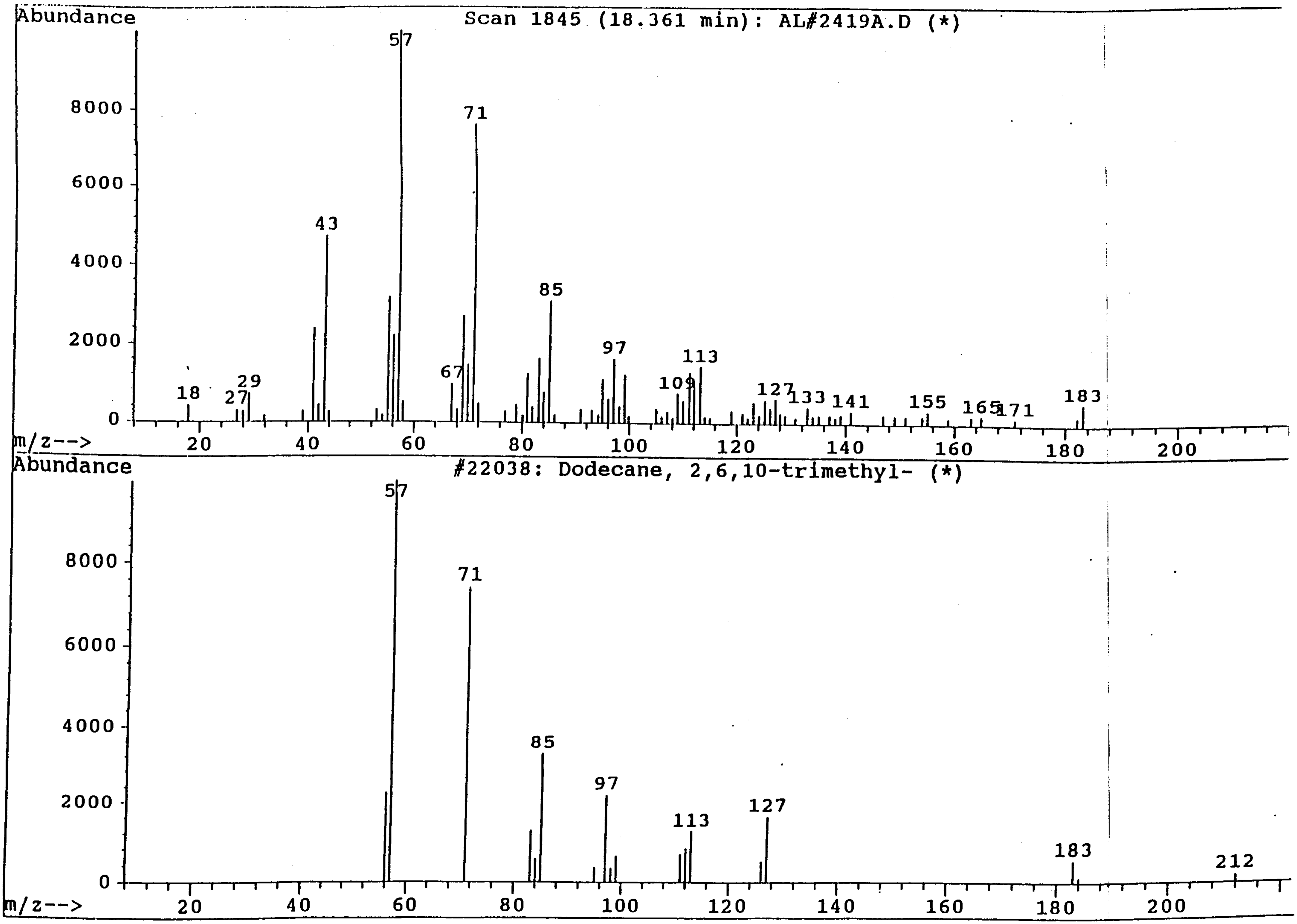



Figure 4.

: C:\HPCHEM\1\DATA\AL#2419A.D
Operator : Pagano
Acquired : 29 Jul 94 9:43 am using AcqMethod PCB
Instrument : 5971 - In
Sample Name: Alcan sedment, NP2:9-7, florisil clean-up
Misc Info : 1 uL injection, SCAN, 15-300 fraction
Vial Number: 1

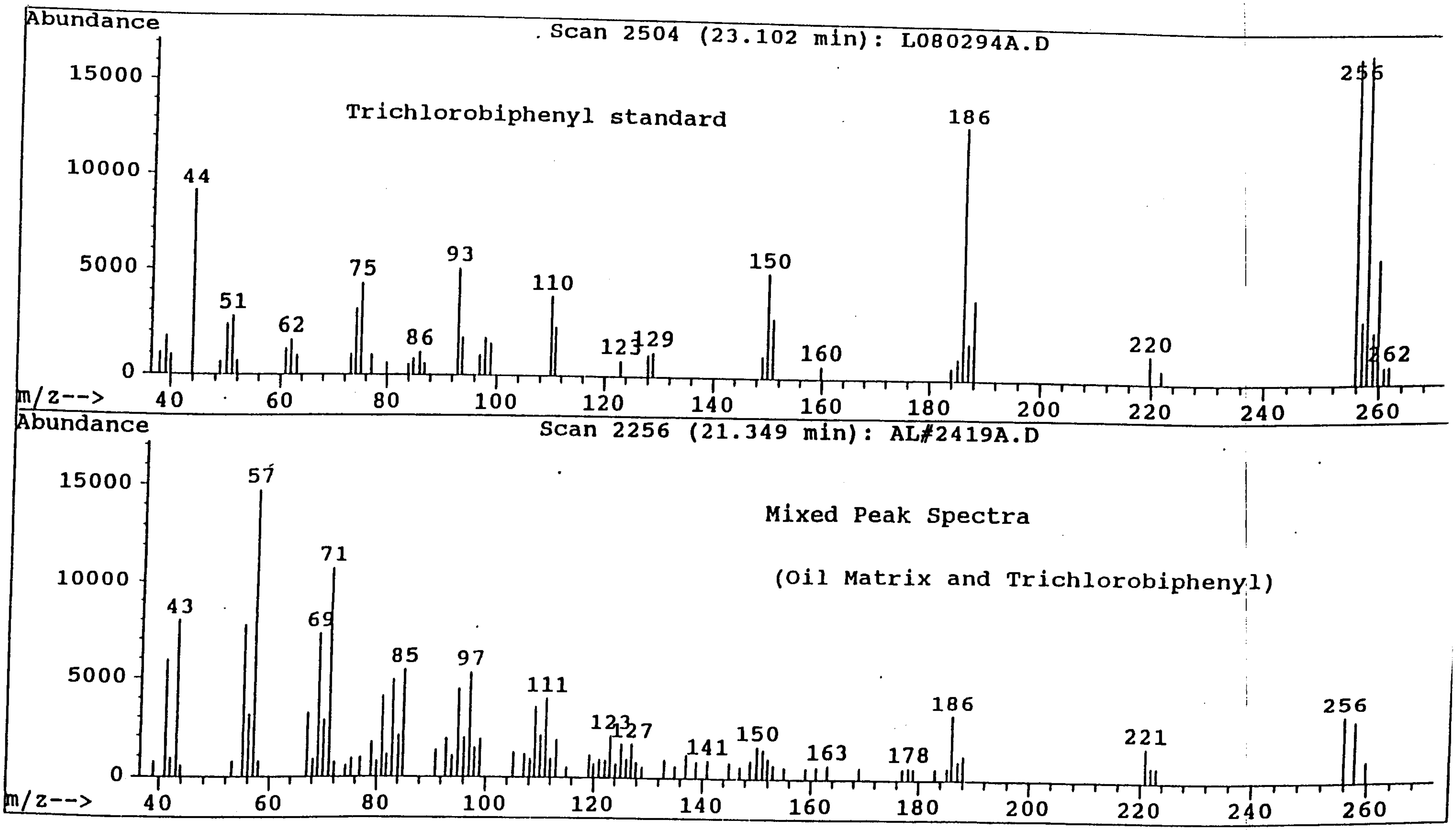



Figure 5.

File        : C:\HPCHEM\1\DATA\AL#2419F.D
Operator    : Pagano
Acquired    :  4 Aug 94   8:47 am using AcqMethod SIMPCB4
Instrument  :   5971 - In
Sample Name: Alcan sediment, NP2:9-7, Florisil clean-up
Misc Info   : 2 uL injection, SIM
Vial Number: 1

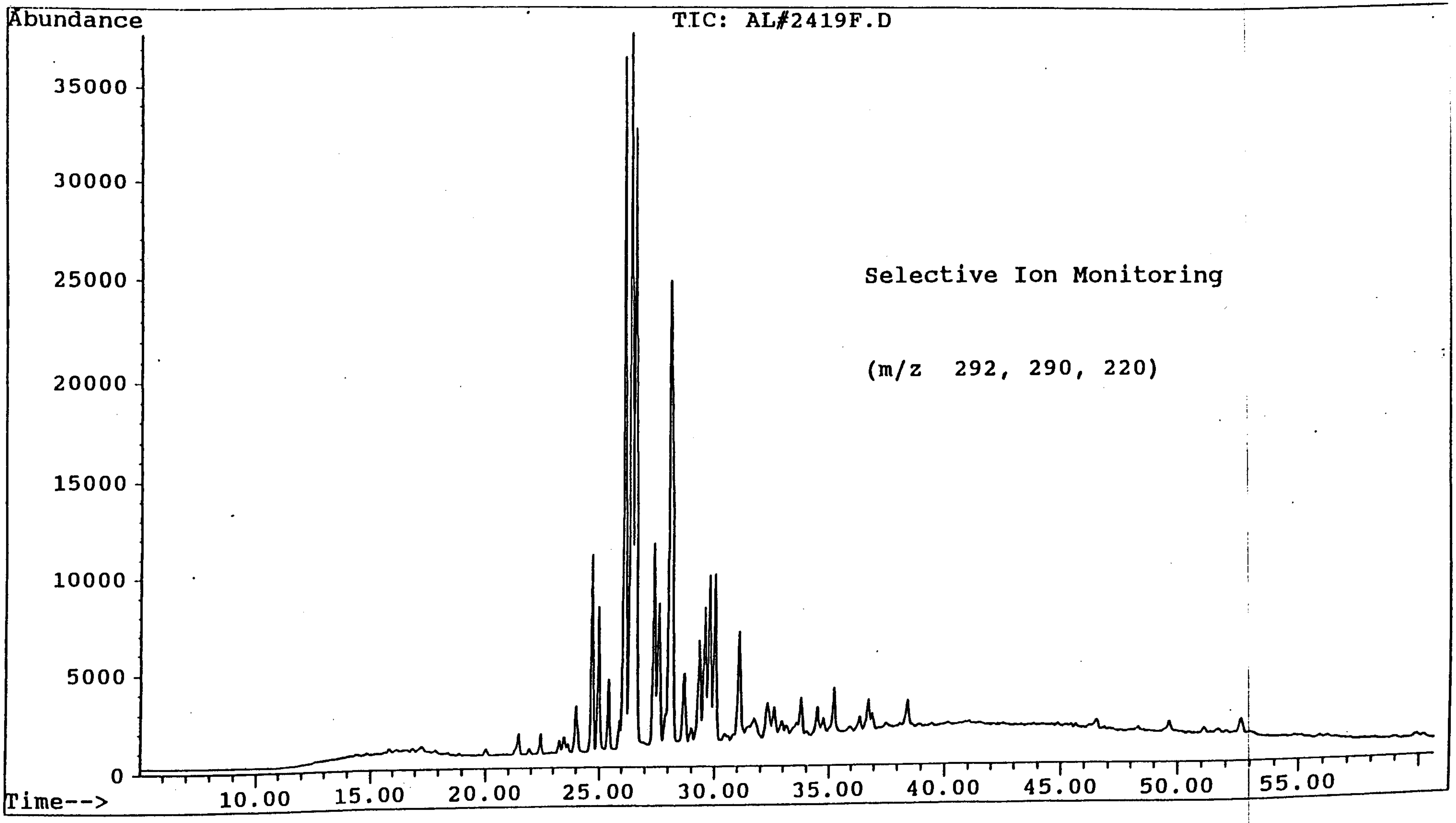



*Figure 6.*

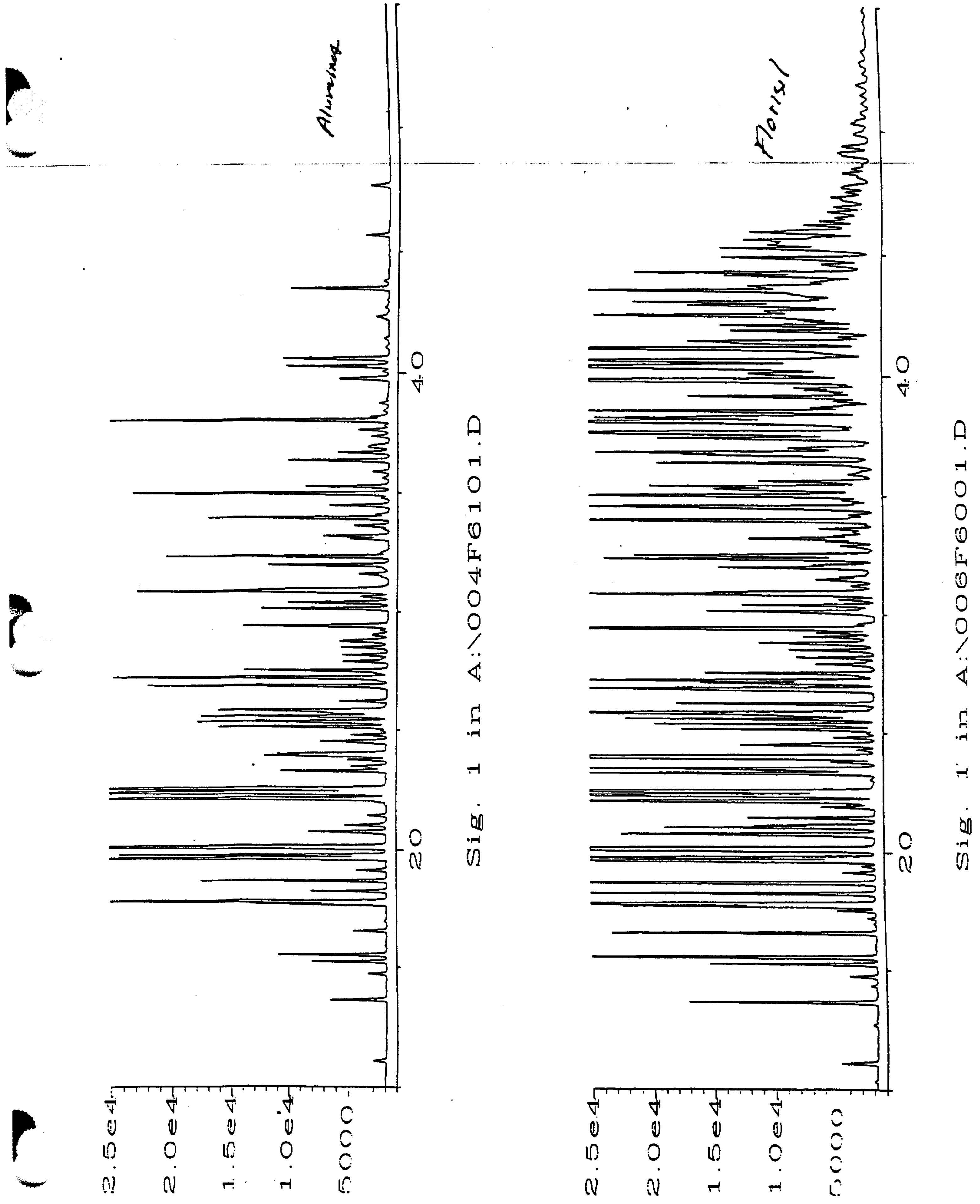

Sig. 1 in A:\004F6101.D
Sig. 1 in A:\006F6001.D
Florisil
2.5e4
2.0e4
1.5e4
1.0e4
5000
20
40

Figure 7.

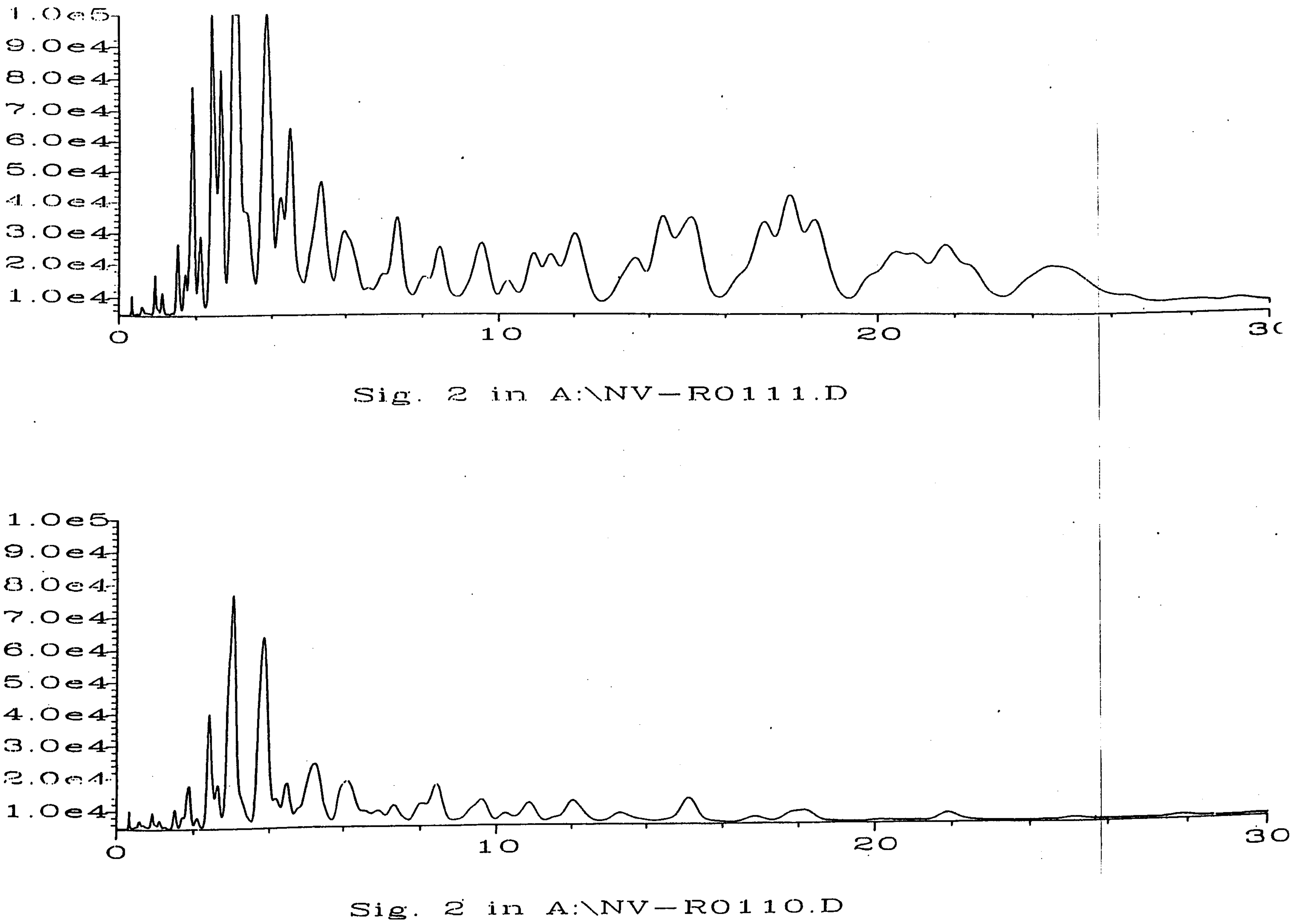

1.0e5
9.0e4
8.0e4
7.0e4
6.0e4
5.0e4
4.0e4
3.0e4
2.0e4
1.0e4
0
10
20
30
Sig. 2 in A:\NV-R0111.D
1.0e5
9.0e4
8.0e4
7.0e4
6.0e4
5.0e4
4.0e4
3.0e4
2.0e4
1.0e4
0
10
20
30
Sig. 2 in A:\NV-R0110.D

Figure 8.

File : C:\HPCHEM\1\DATA\AL#2419A.D
Operator : Pagano
Acquired : 29 Jul 94 9:43 am using AcqMethod PCB
Instrument : 5971 - In
Sample Name: Alcan sediment, NP2:9-7, florisil clean-up
Misc Info : 1 uL injection, SCAN, 15-300 fraction
Vial Number: 1

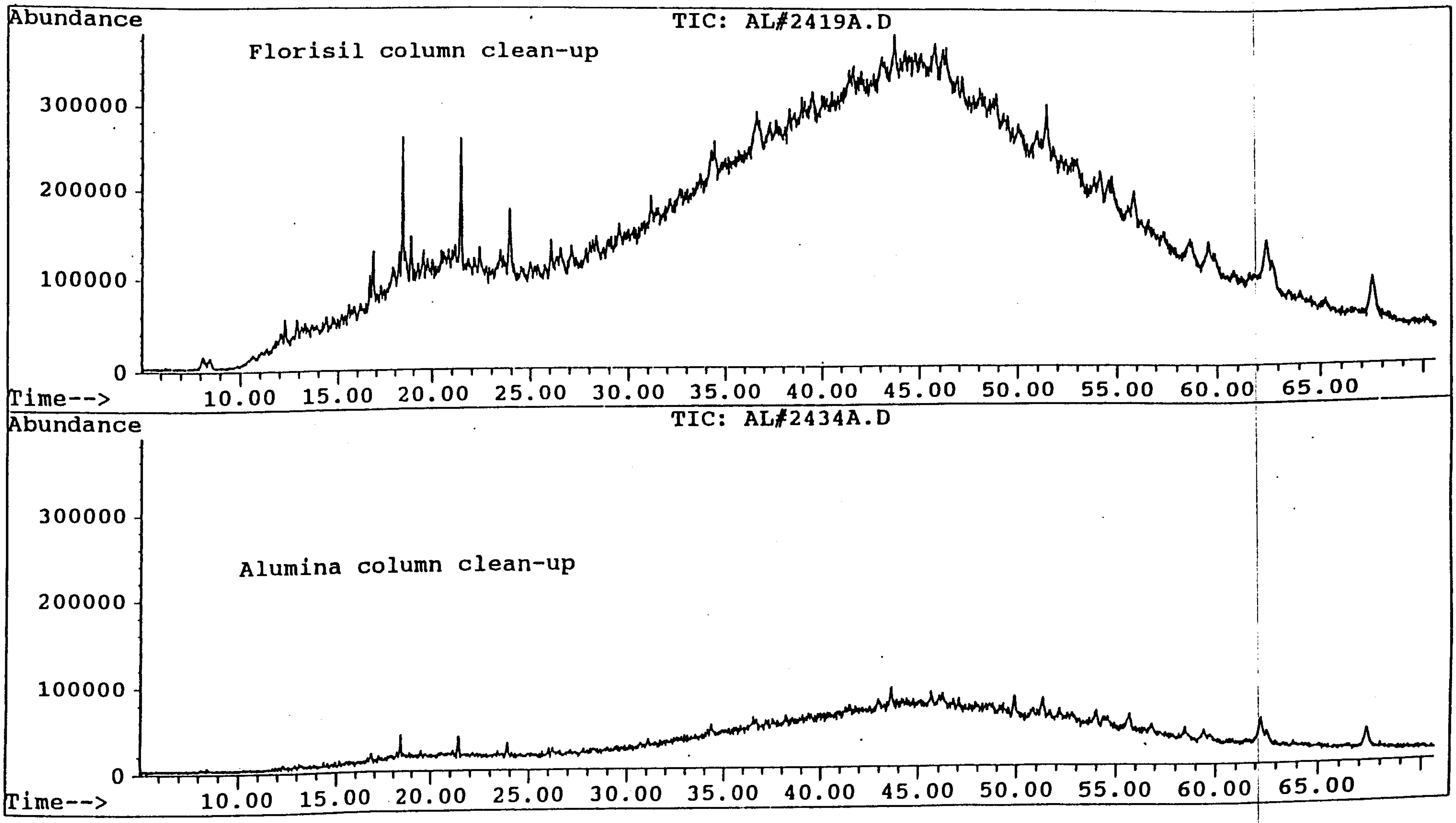



Figure 9.

```
File         : C:\HPCHEM\1\DATA\AL#2419A.D
Operator     : Pagano
Acquired     : 29 Jul 94   9:43 am using AcqMethod PCB
Instrument :    5971 - In
Sample Name: Alcan sedment, NP2:9-7, florisil clean-up
Misc Info    : 1 uL injection, SCAN, 15-300 fraction
Vial Number: 1
```

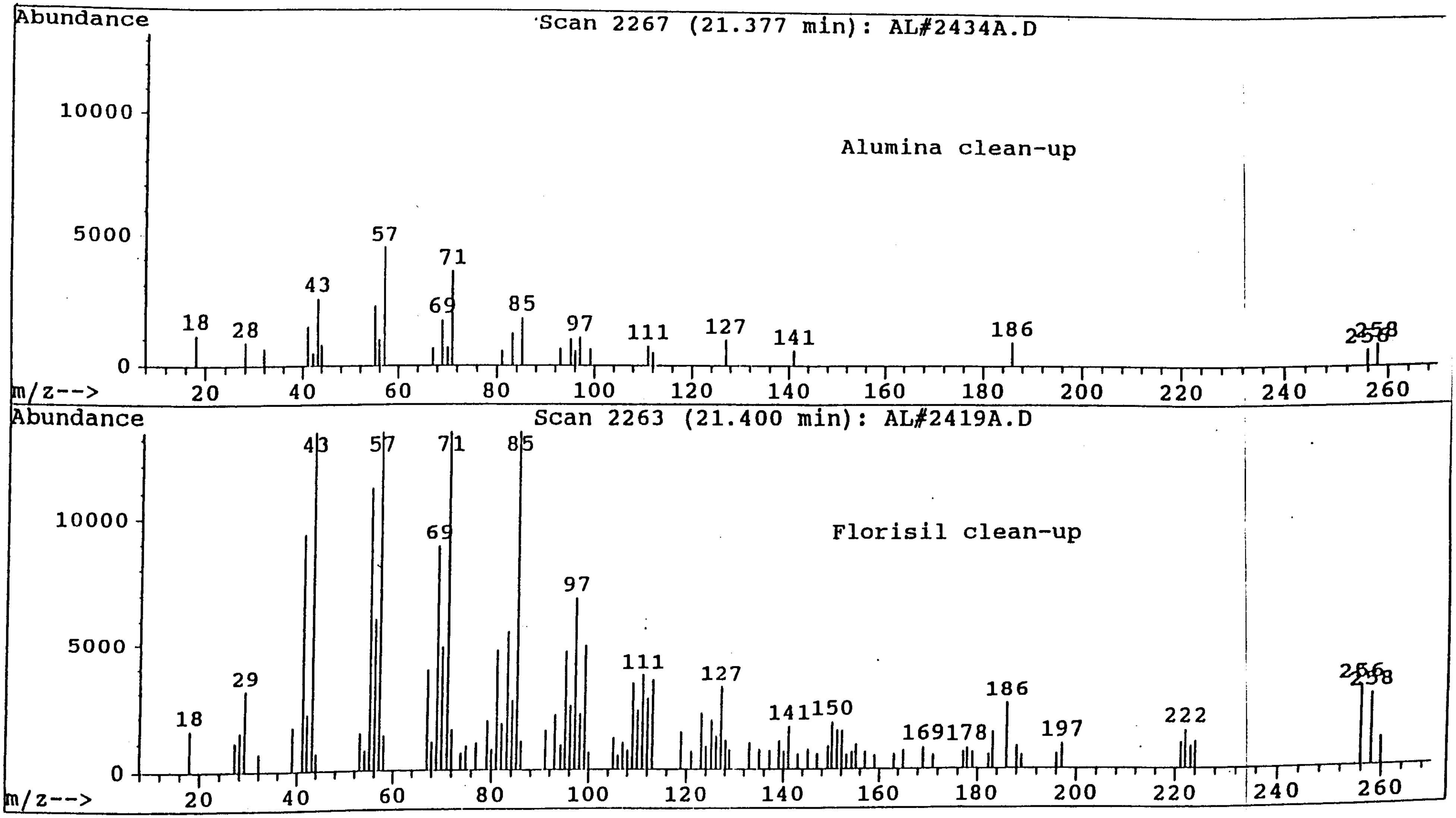



Figure 10.

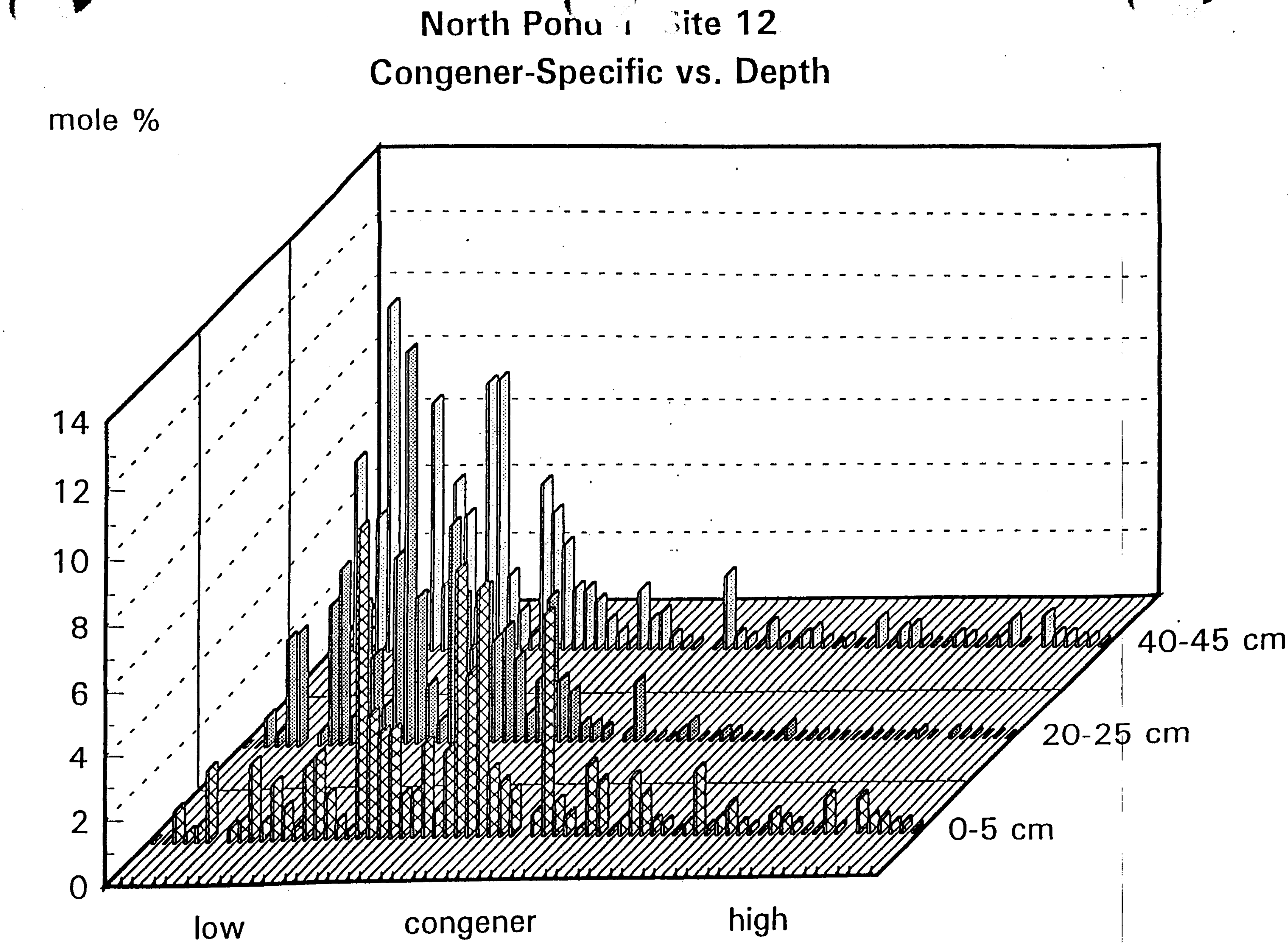

North Pond ... Site 12
Congener-Specific vs. Depth
mole %
14
12
10
8
6
4
2
0
low
congener
high
40-45 cm
20-25 cm
0-5 cm

Figure 11.

## North Pond 1 Site 12
## Homologue Distribution vs. Depth

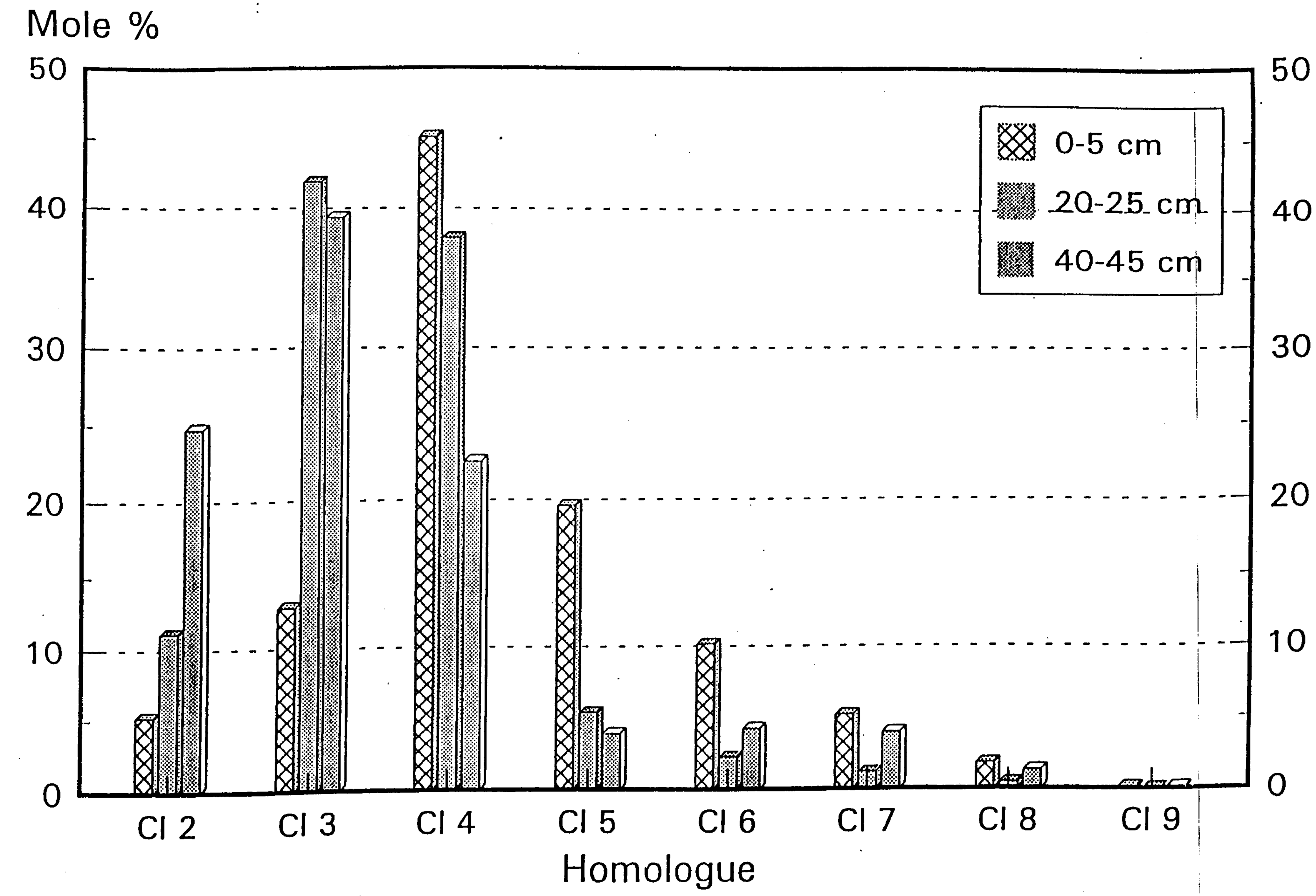



Figure 12.

## North Po... Site 24
## Congener-Specific vs. Depth

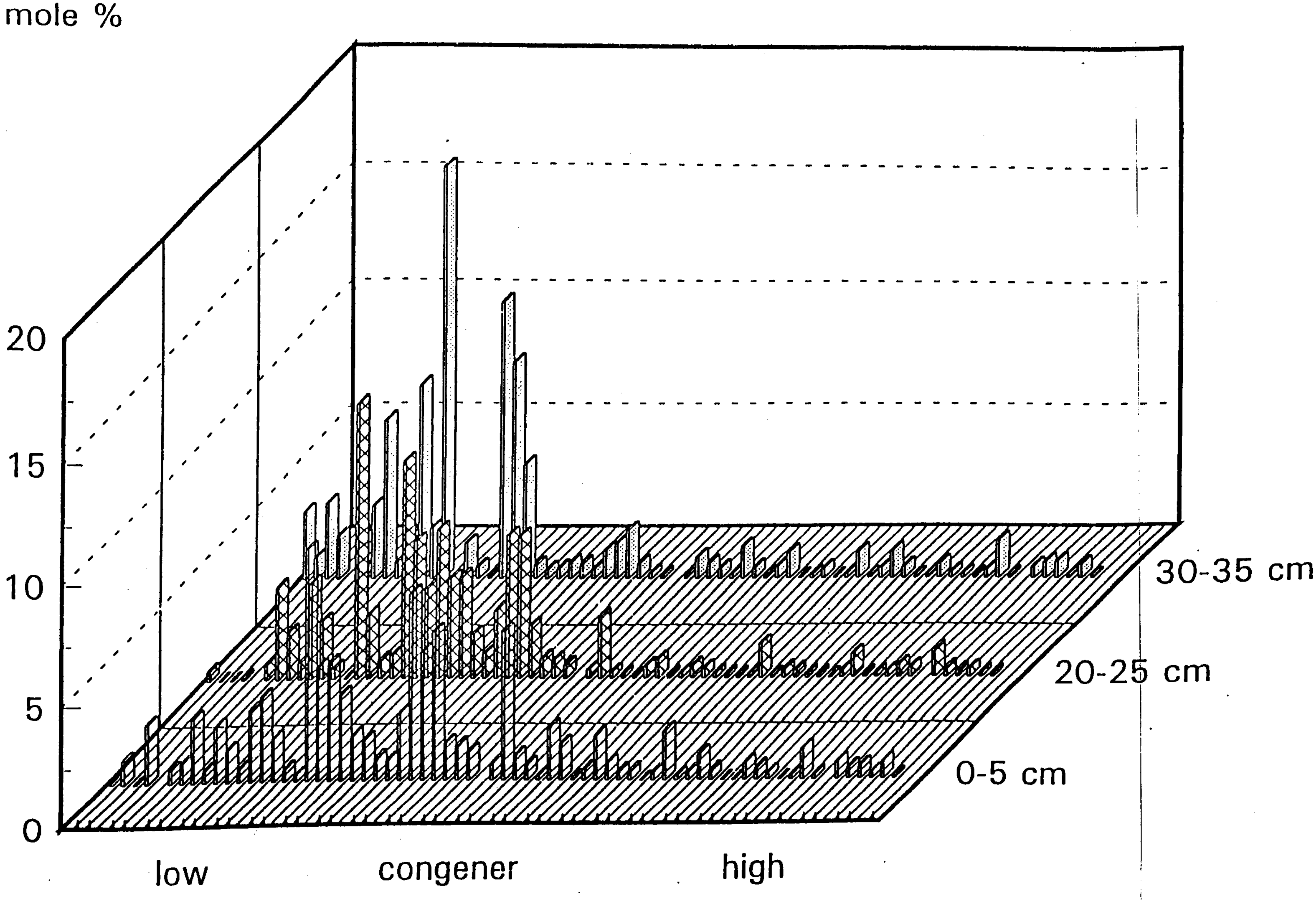



Figure 13.

## North Pond 1 Site 24
## Homologue Distribution vs. Depth

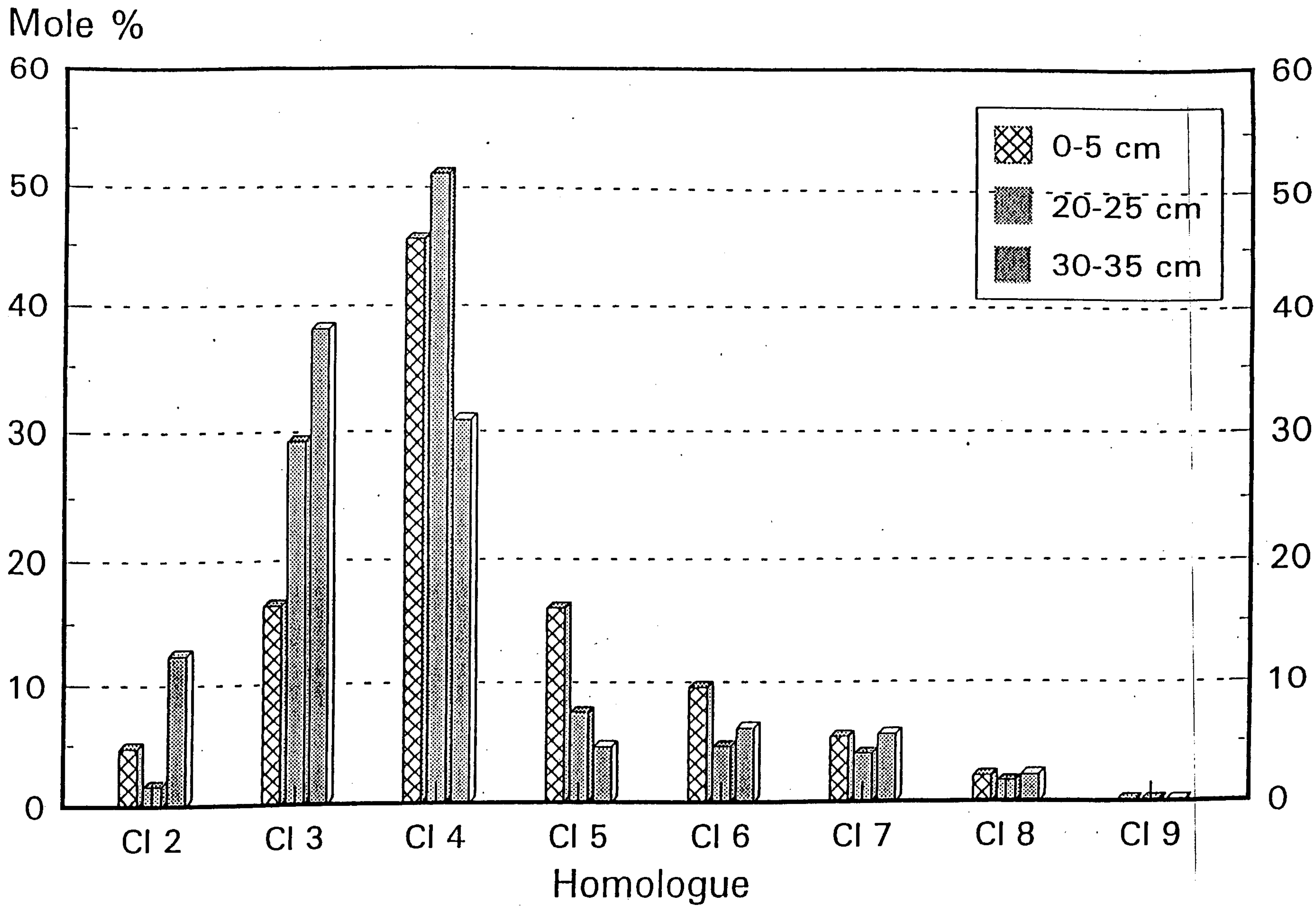



*Figure 14.*

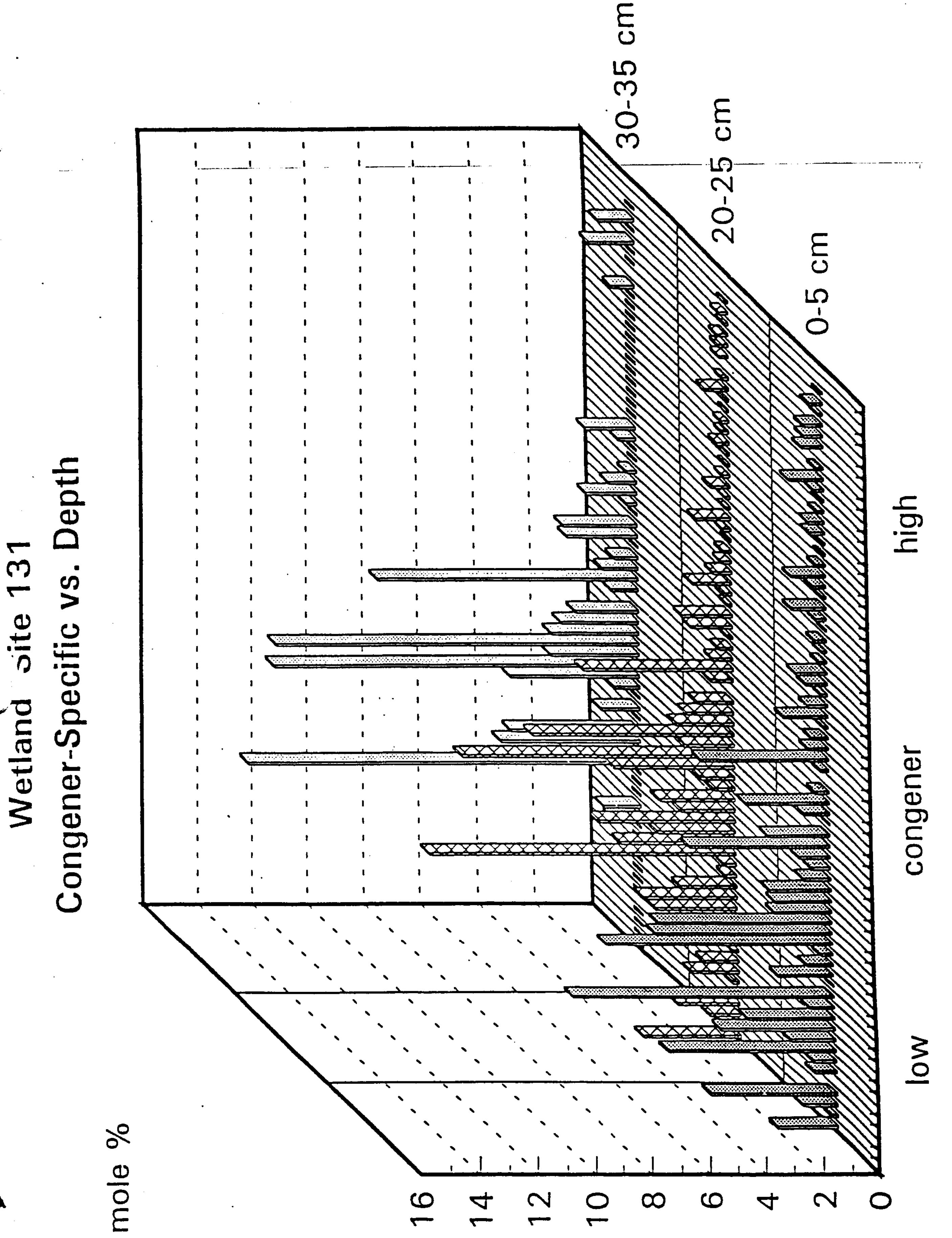

Wetland Site 131
Congener-Specific vs. Depth
mole %
16
14
12
10
8
6
4
2
0
low
congener
high
0-5 cm
20-25 cm
30-35 cm

Figure 15.

# Wetland Site 131
## Homologue Distribution vs. Depth

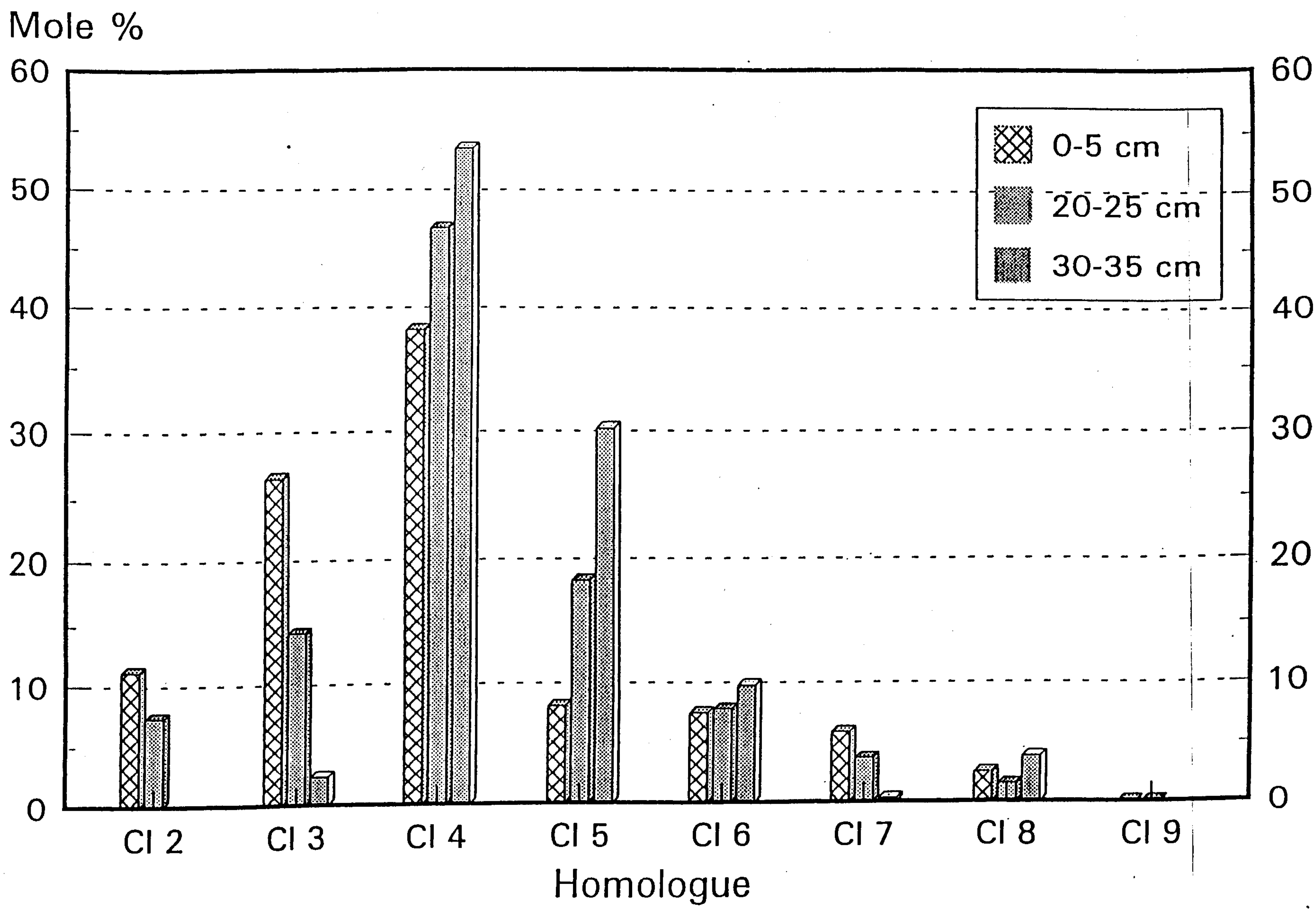



Figure 16.

# Wetland Site 132
## Congener-Specific vs. Depth

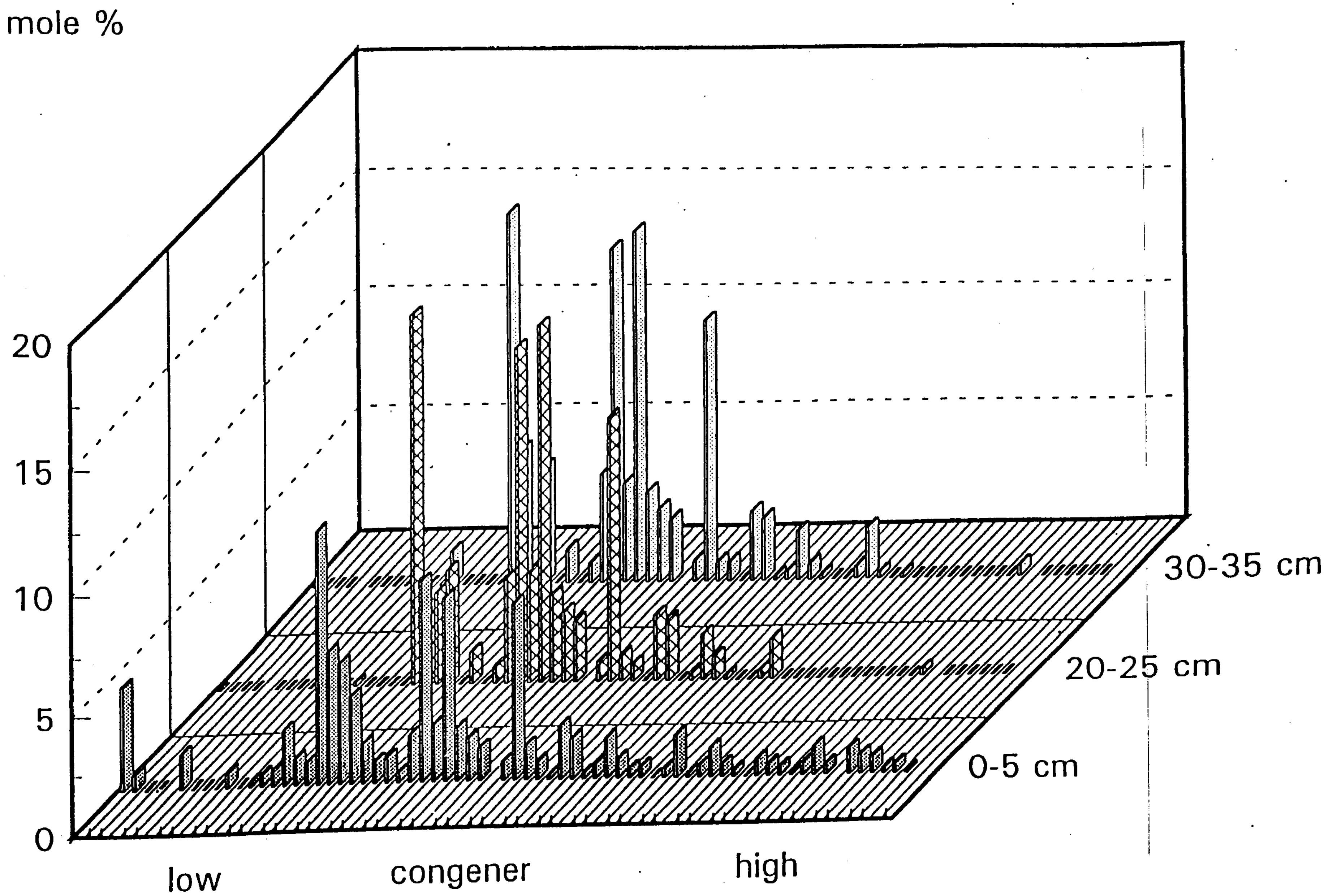



Figure 17.

## Wetland Site 132
## Homologue Distribution vs. Depth

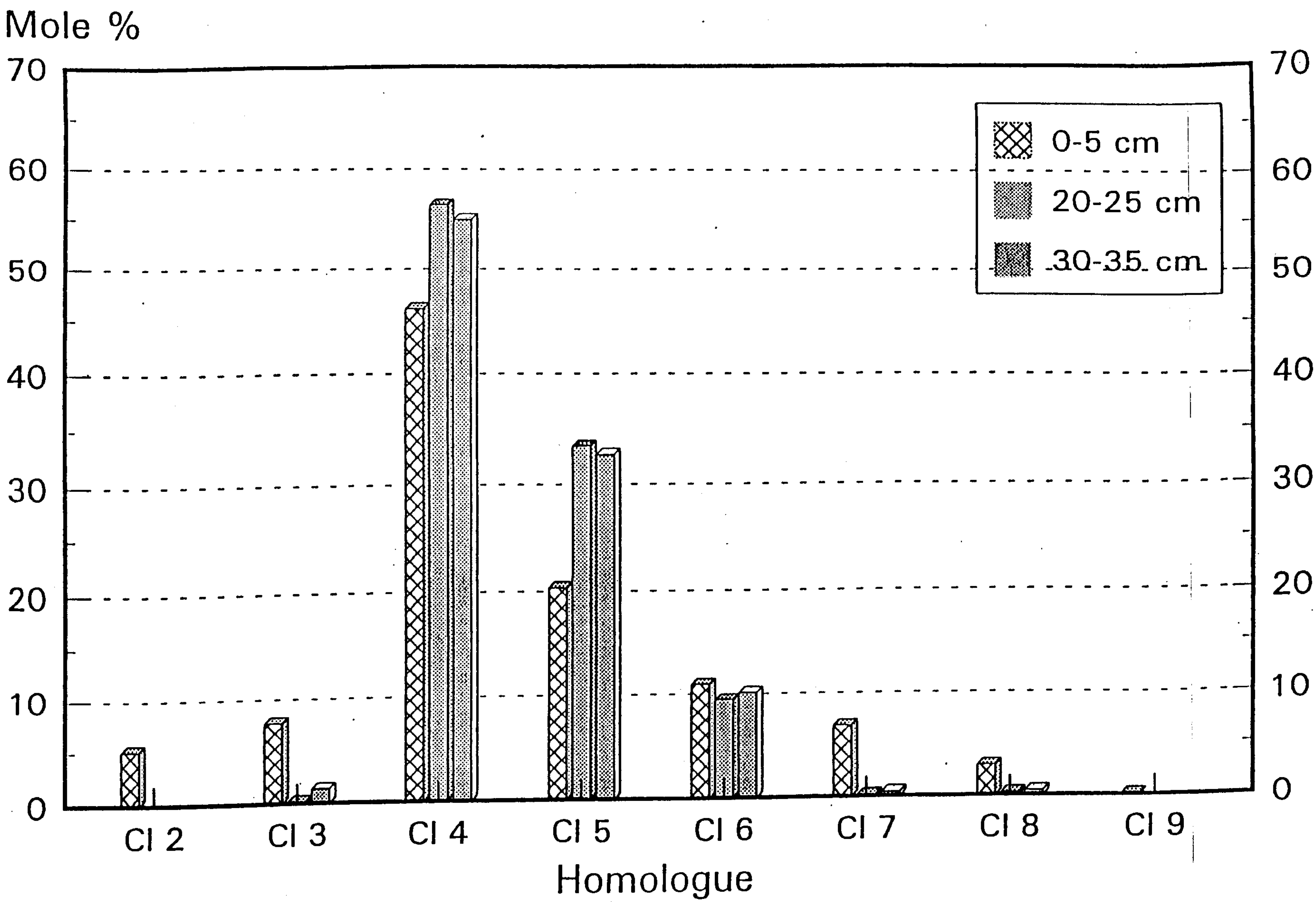



*Figure 18.*

## North Pond 2 Site 5
## Congener-Specific vs. Depth

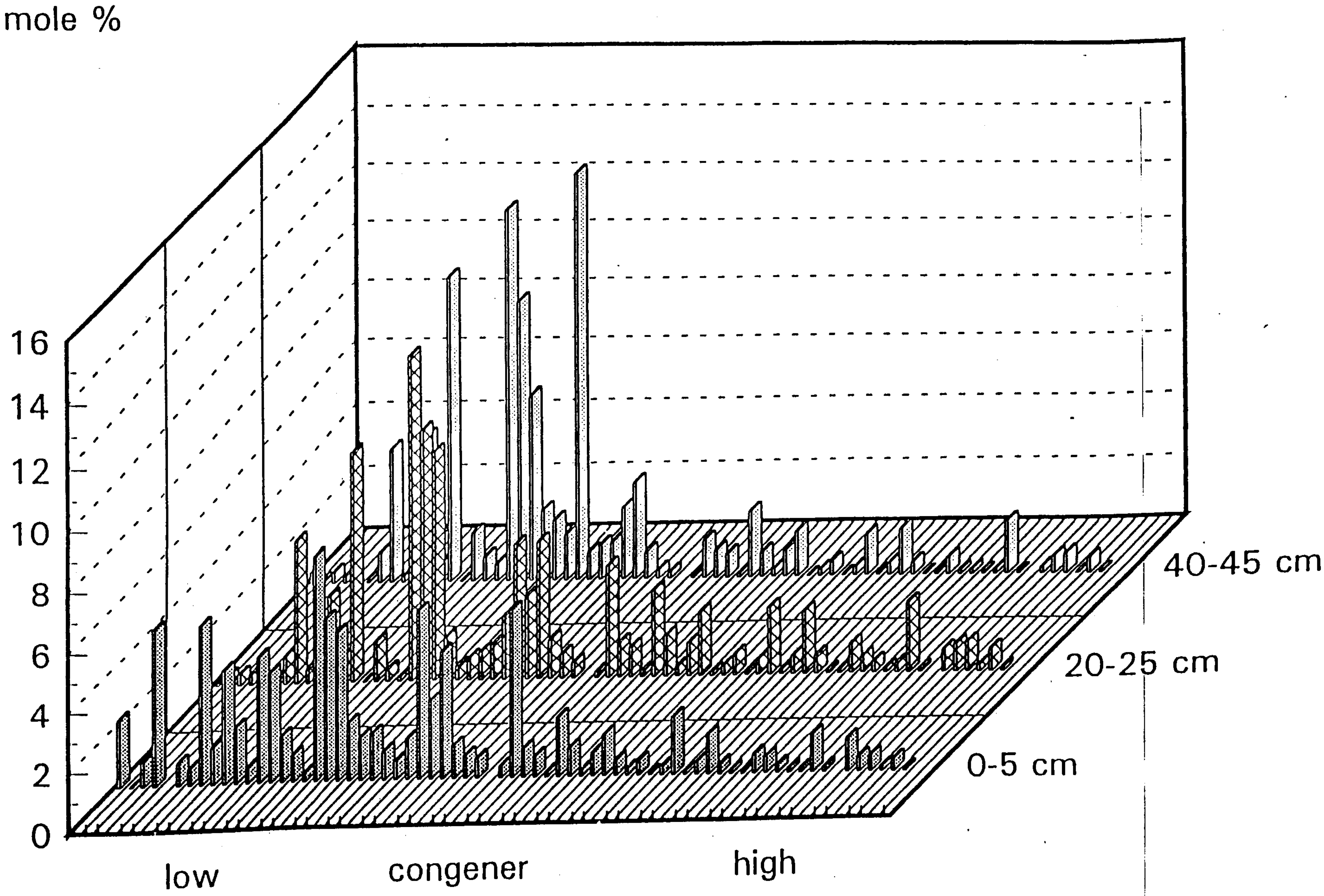



Figure 19.

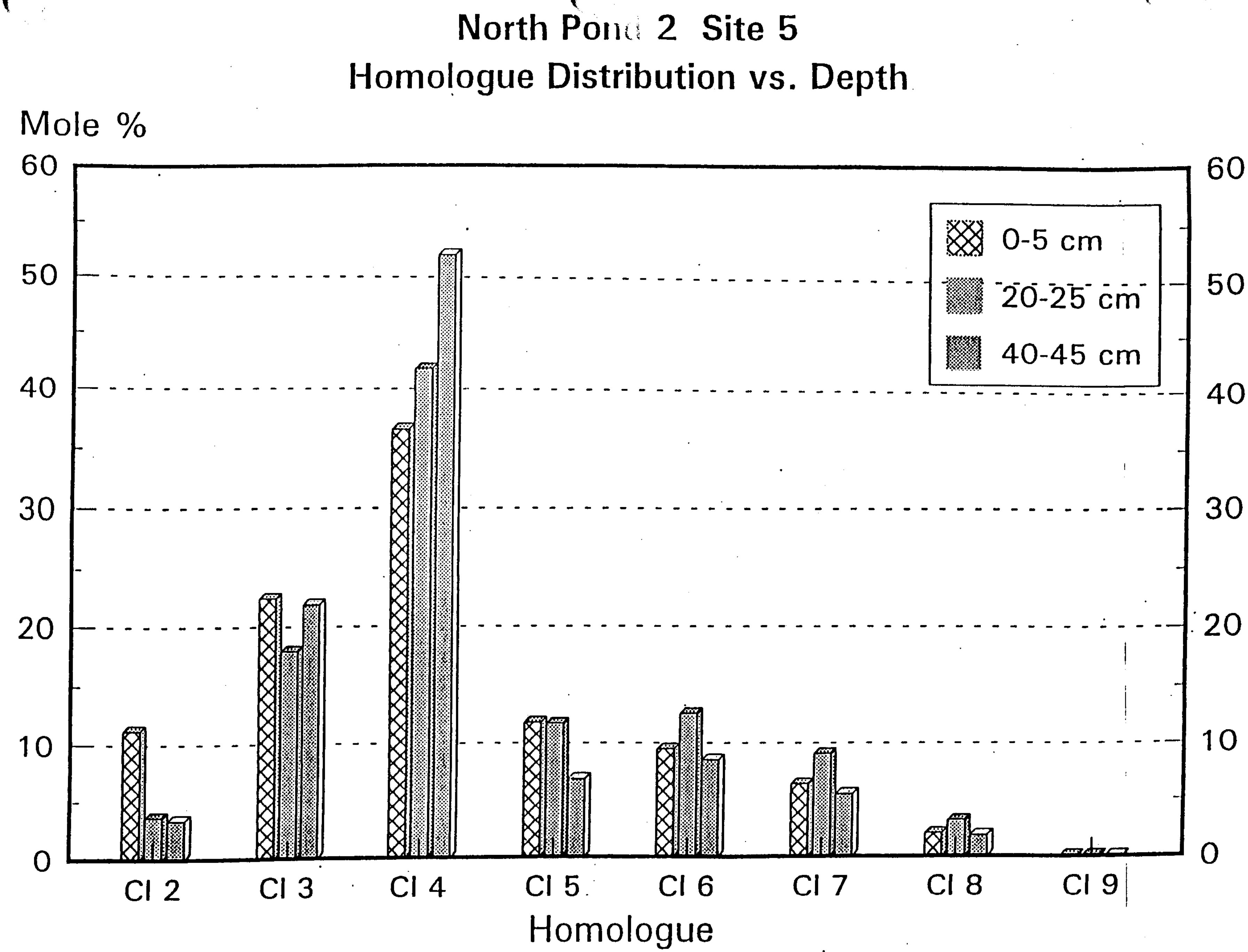

North Pond 2 Site 5
Homologue Distribution vs. Depth
Mole %
60
50
40
30
20
10
0
0-5 cm
20-25 cm
40-45 cm
Cl 2
Cl 3
Cl 4
Cl 5
Cl 6
Cl 7
Cl 8
Cl 9
Homologue

Figure 20.

North Po... 2 Site 9
Congener-Specific vs. Depth

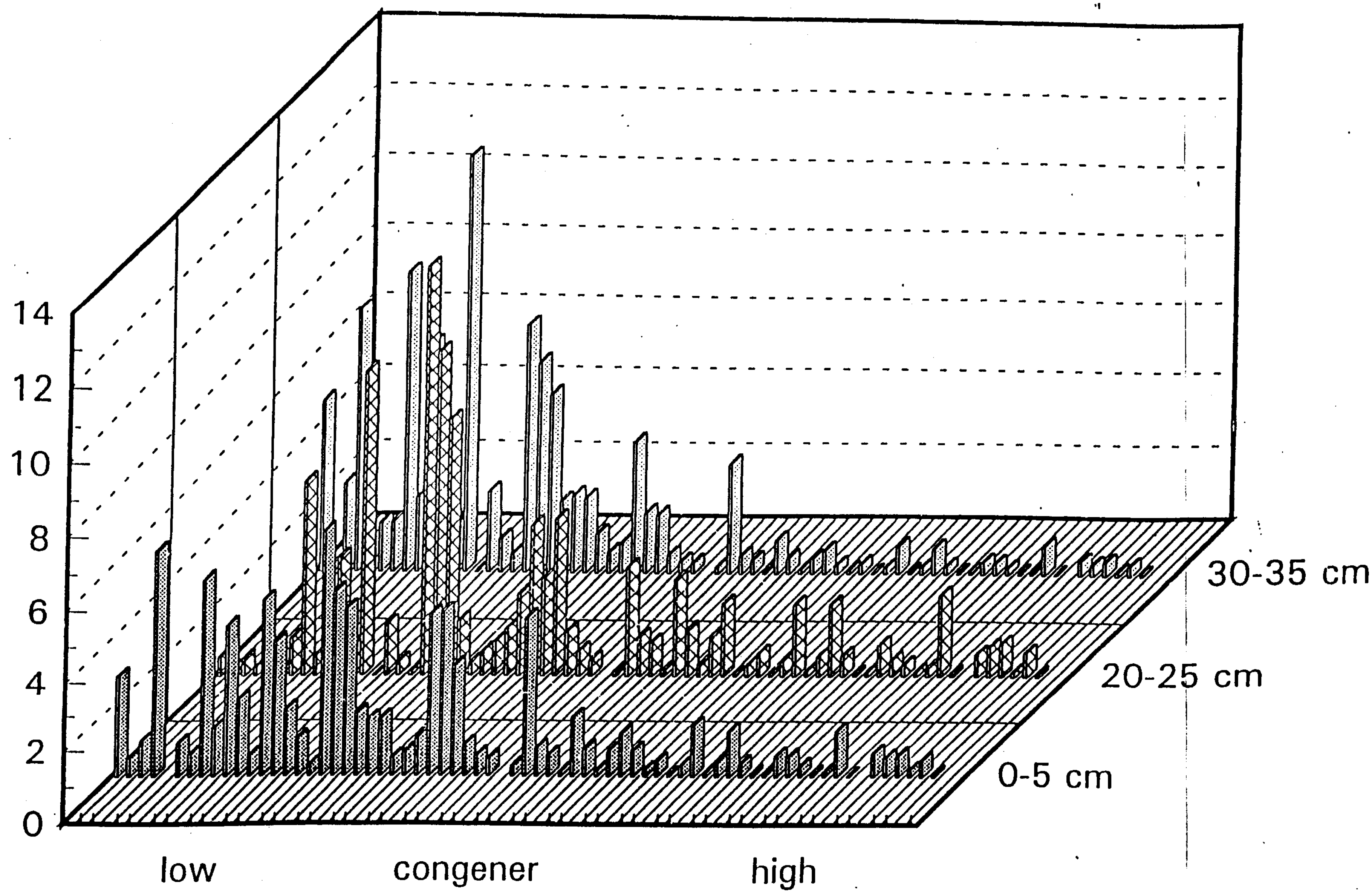
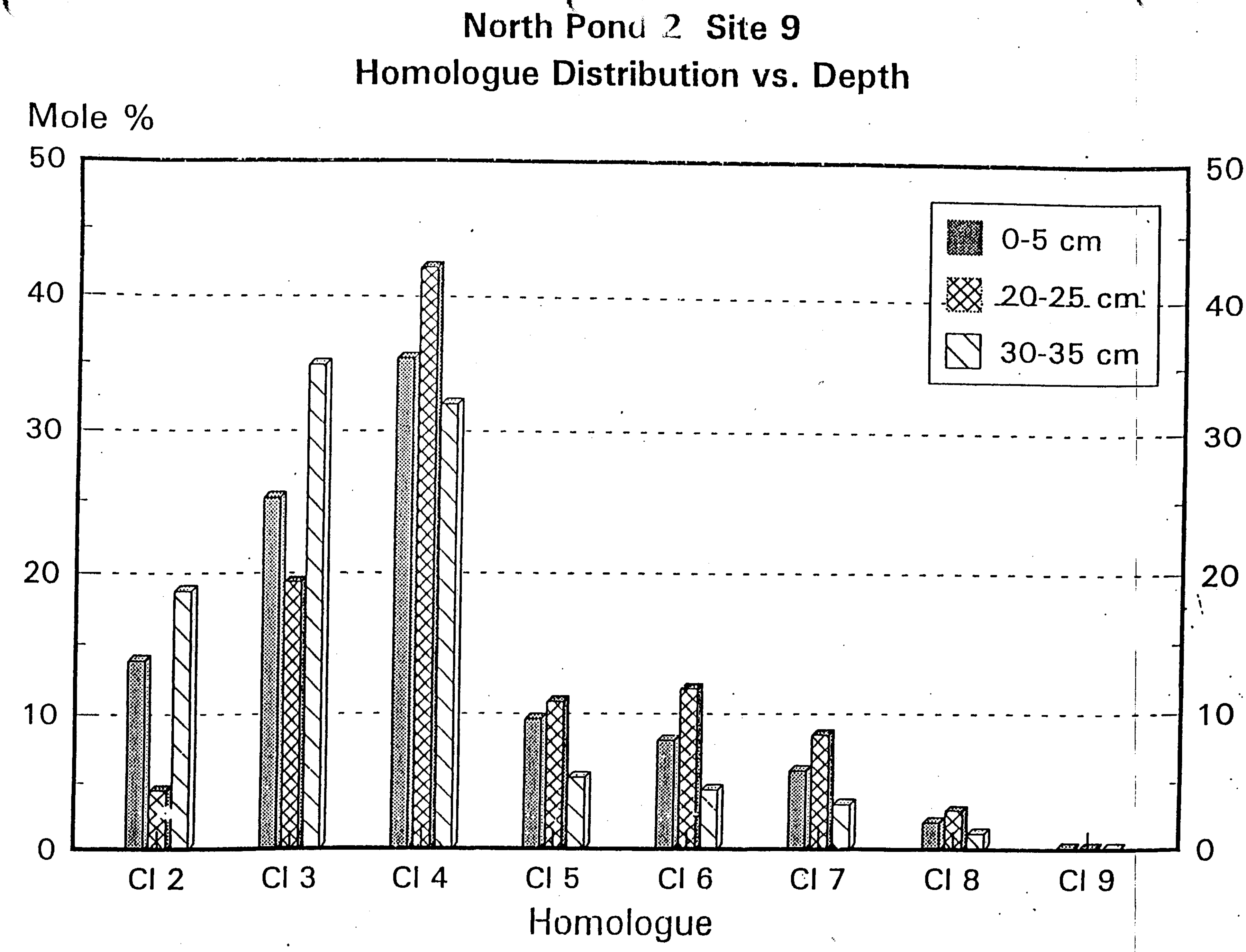



Figure 21.


North Pond 2 Site 9
Homologue Distribution vs. Depth
Mole %
50
40
30
20
10
0
0-5 cm
20-25 cm
30-35 cm
Cl 2
Cl 3
Cl 4
Cl 5
Cl 6
Cl 7
Cl 8
Cl 9
Homologue

# *Appendix E-6*

# Phase Distribution Study of North Ponds/Wetland Complex - 1996

BBL®
BLASLAND, BOUCK & LEE, INC.
*engineers & scientists*

# Phase Distribution of Polychlorinated Biphenyls and Terphenyls in the North Ponds/Wetland Complex

Prepared for:

Alcan Rolled Products
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November 10, 1996

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## Summary

A series of large-volume water samples were collected over a four month period to assess the aqueous phase distribution (dissolved, particulate and total) of polychlorinated biphenyls (PCB) and polychlorinated terphenyls (PCT) in the North Ponds/Wetland Complex. Six sampling points were selected to characterize the water supply (pumphouse), plant discharge (channel), cooling pond system (North Ponds 1 and 2), and discharge point into Lake Ontario (Fish Weir - 002) currently utilized by Alcan Rolled Products at the Oswego facility. All water samples were collected, processed and analyzed by the SUNY Oswego Environmental Research Center (ERC). Results from this study indicate that the concentration of total PCBs found at the Lake Ontario discharge (Fish Weir - 002) averaged 394 ng/L (parts per trillion), and that the majority of that total (~ 75%) was detected in the dissolved phase. Concentrations of total PCTs found at the Fish Weir - 002 averaged 115 ng/L, with the vast majority of the total PCTs (~ 90%) found in the particulate phase. Overall, concentratations of PCB and PCT were closely related to the sampling location within the North Ponds/Wetland Complex. Average concentrations of total PCB revealed a gradual increase from the Pumphouse (10 ng/L), Channel (18 ng/L) and North Pond 1 Inverted Discharge (27 ng/L). A significant increase was noted in total PCB concentrations at the start of North Pond 2 (215 ng/L), North Pond 2 Discharge (343 ng/L) and Fish Weir - 002 (394 ng/L). A significant decrease in the average chlorination level for total PCB was noted between the pumphouse (3.42 Cl/biphenyl) and the Lake Ontario discharge (Fish Weir - 002; 2.52 Cl/biphenyl).

## Sampling and Analytical Methods

Large volume water samples were collected in pre-cleaned glass bottles (1, 8 or 20 L) utilizing stainless steel buckets and funnels according to ERC Standard Operating Procedures (Pagano et al., 1996). Sample collections were made during the summer of 1996 on June 12th, June 27th, July 8th, August 19th, September 6th and October 7th by James Pagano and David Lagoe (Alcan Rolled Products). Samples were collected at six sites chosen to adequately characterize the significant water supply and discharge points of the North Ponds/Wetland Complex. Sampling points included: Pumphouse (Lake Ontario supply water), Channel (plant discharge to North Ponds), North Pond 1 Inverted Discharge, North Pond 2 Beginning, North Pond 2 Discharge and Fish Weir - 002 (Lake Ontario discharge). Samples were transported to the ERC laboratories and stored at 4°C until processed.

Large volume (60 L) water samples were processed utilizing a Sorval SS-3 Centrifuge (SS-34 Rotor) with a KSB-R Continuous Flow System operated at 12,000 rpm to separate the dissolved from particulate PCB/PCT phases (Mudambi, 1987). Dissolved phase PCB were extracted with hexane (8-16 L total) in separate 2 L fractions using a 2 L separatory funnel. The combined extracts were dried with anhydrous sodium sulfate; condensed to 2 mL in a Kuderna-Danish (K-D) apparatus; treated with conc. sulfuric acid to remove oxidizable organics; and further treated with tetrabutylammonium hydrogen sulfate (TBA) to remove elemental sulfur (Pagano et al., 1994).

Two column adsorption clean-ups (Florisil® and alumina) were utilized for this study. Florisil column clean-up was utilized to arrive at total PCB concentrations, and to mimic the clean-up techniques utilized by most commercial laboratories. The alumina adsorption column clean-up method was developed by the ERC specifically for the North Ponds/Wetland Investigation in order to address significant chromatographic problems associated with other co-eluting chlorinated aromatic compounds, and the ubiquitous process oils associated with the North Ponds/Wetland Complex (Pagano et al., 1994; Pagano, 1996). Recent investigations at the ERC has further enhanced the 1994 alumina method, to allow the quantitative adsorption column separation of PCB and PCT (Pagano et al., manuscript in preparation).

Florisil column clean-up utilized 10 grams of 4% deactivated Florisil (60/100 PR grade), placed into a 10x350mm Chromaflex column, with an upper layer (1 cm) of anhydrous sodium sulfate held in place with silanized glass wool. The Florisil column was pre-eluted with 60 mL of hexane which is discarded. The prepared sample extract (acid, TBA) is introduced to the Florisil column and eluted with an additional 60 mL of hexane. The final 60 mL fraction is concentrated by K-D appartus to 1or 2 mL.

Alumina column clean-up utilizes 6-15 grams of fully activated alumina (Fisher A540, 80-200 mesh), placed into a 10x350mm Chromaflex column equipped with a 250 mL reservior (Ace Glass Co., # 5884-981), with an upper layer (1 cm) of anhydrous sodium sulfate held in place with silanized glass wool. The alumina column is pre-eluted with 60 mL of hexane, which is discarded. The prepared sample extract (acid, TBA) is introduced to the alumina column and eluted with an additional 300 mL of hexane. The first 15 mL of hexane is collected separately and discarded. The remaining 285 mL (15-300 mL fraction) contains the PCB sample for concentration and analysis. The alumina column is further eluted with 40 mL of dichloromethane (DCM) in order to recover the PCT. The 40mL of DCM is collected, concentrated and solvent exchanged 3x with hexane in a K-D apparatus to a final volume of 1-2 mL. This DCM fraction contains any PCT for analysis.

Particulate samples were extracted sequentially by ultrasonication at high power (Fisher Scientific, Model 550) with 50 mL each of acetone, acetone:hexane and hexane and placed in a separatory funnel. The sample extract was back extracted, dried with sodium sulfate, sulfur removed and cleaned with Florisil or alumina as described above. The eluate is concentrated in a K-D apparatus to 1 or 2 mL for gas chromatographic analysis.

Congener-specific PCB analyses were conducted using capillary column procedures and standards developed at the Wadsworth Center for Laboratories and Research, New York State Department of Health (Bush et al., 1983; Bush et al., 1985). The calibration standard was a 1:1:1:1 mixture of Aroclors 1221, 1016, 1254, and 1260 from the EPA Pesticide Repository each at 200ng/ml, and HCB (5 ng/mL), DDE and Mirex at 10 ng/mL. Total PCT quantitation is based on United States Environmental Protection Agency (USEPA) total peak area/calibration factor techniques (USEPA, SW-846, 1992) utilizing an Aroclor 5432 calibration standard (ChemService, Inc.). Analytical instruments were calibrated every six samples. The capillary column utilized was a Hewlett-Packard (HP) Ultra II 25 meter DB-5 with 0.22 mm id and 0.33 um film thickness. The gas chromatographic system used helium as the carrier gas and argon/methane (P5) as the ECD makeup gas. The system was temperature programmed after two minutes at 100 °C to 160 °C at 10 °C/min and then increased by 3 °C/min. to 270 °C and held for 16 min. The injection port and detector were maintained at 330 °C and 270 °C, respectively. A HP Model 5890 II gas chromatograph with an electron capture detector ($Ni^{63}$) was used for data acquisition. Quality Assurance/Quality Control was based on a program of replicate analyses, surrogate recoveries (decachlorobiphenyl), matrix spikes/matrix spike duplicates, method and reagent blanks.

Chromatographic data was collected and processed by use of the HP 3365 Series II ChemStation software and Microsoft Excel 5.0 spreadsheet procedures. The HP software system generated the identity and amount of each PCB congener. Data was further processed such that the mole percent (congener specific), mole % (homologue), mole % Cl substitution (homologue) and average Cl/biphenyl (total, homologue and Cl substitution) was generated. Coeluting congeners were assumed to be in equal proportions for all spreadsheet calculations (Pagano et al., 1995).

## Results

During the course of this four-month study, six sampling events were conducted to characterize the aqueous phase distribution of PCB and PCT in the North Ponds/Wetland Complex. The following Tables (1-7) and Figures (1-3) illustrate and fully characterize the sampling conducted for this study:

Table 1. Summary - Averaged Chart Data; North Ponds/Wetland Investigation

Figure 1. Phase Distribution of PCBs; North Ponds/Wetland Investigation (concentration - ng/L)

Figure 2. Phase Distribution of PCBs; North Ponds/Wetland Investigation (average chlorines/biphenyl)

Figure 3. Phase Distribution of PCTs; North Ponds/Wetland Investigation (concentration - ng/L)

Table 2. Summary - Phase Distribution of PCBs in the North Ponds/Wetland Complex (concentration - ng/L)

Table 3. Summary - Phase Distribution of PCBs in the North Ponds/Wetland Complex (average chlorines/biphenyl)

Table 4. Summary - Phase Distribution of PCTs in the North Ponds/Wetland Complex (concentration - ng/L)

Table 5. Alcan Water Testing; 06/12/96 - Preliminary Trial

Table 6. Alcan Water Testing; 06/27/96 and 07/08/96

Table 7. Alcan Water Testing; 08/19/96, 09/06/96 and 10/07/96

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Mudambi, A. R. *Photochemistry of Mirex in Lake Ontario.* Ph.D. Thesis, SUNY Environmental Science and Forestry. June, 1987.

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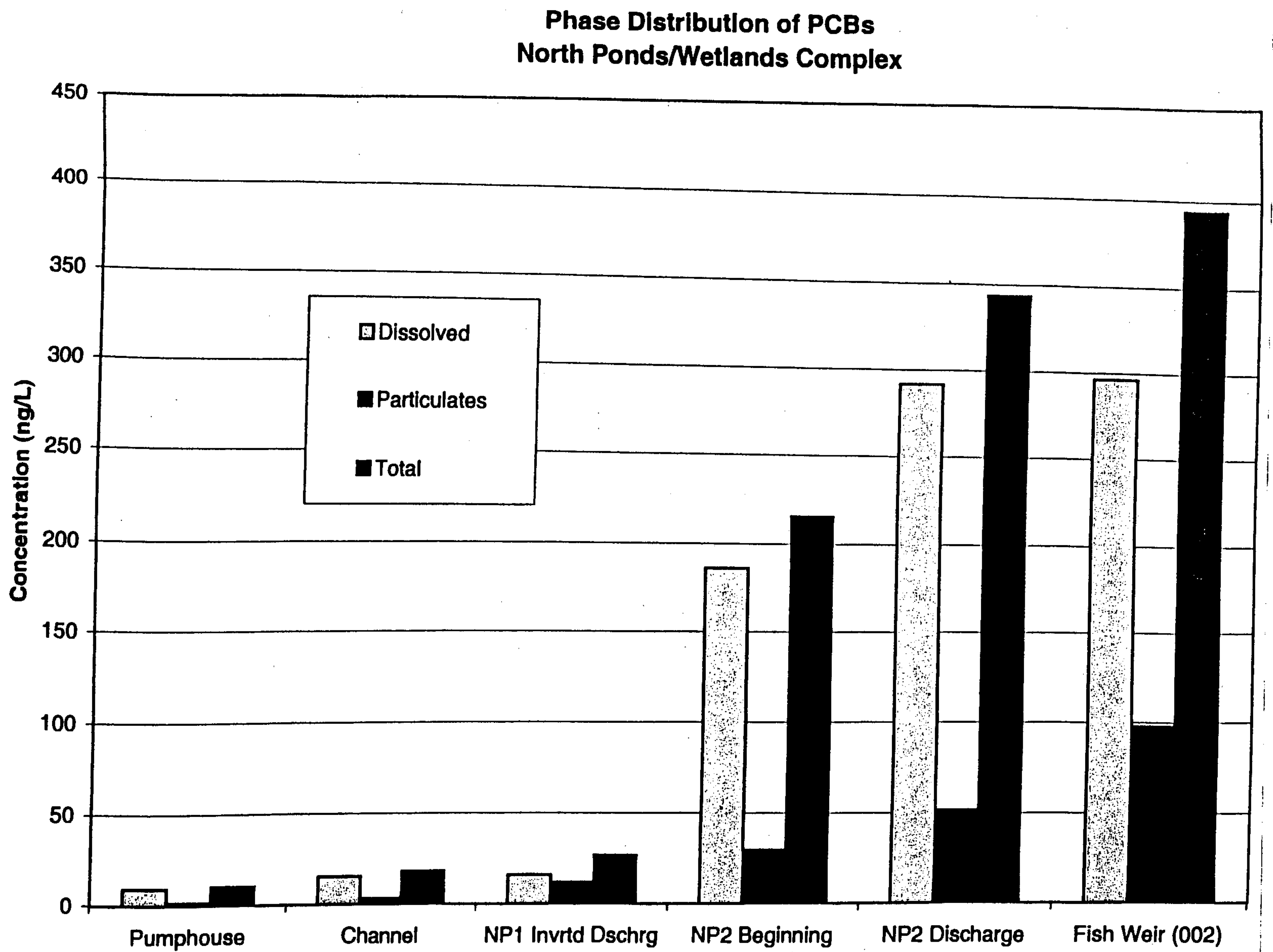
USEPA, *Test Methods for Evaluating Solid Waste; Physical/Chemical Methods.* SW-846, July 1992.

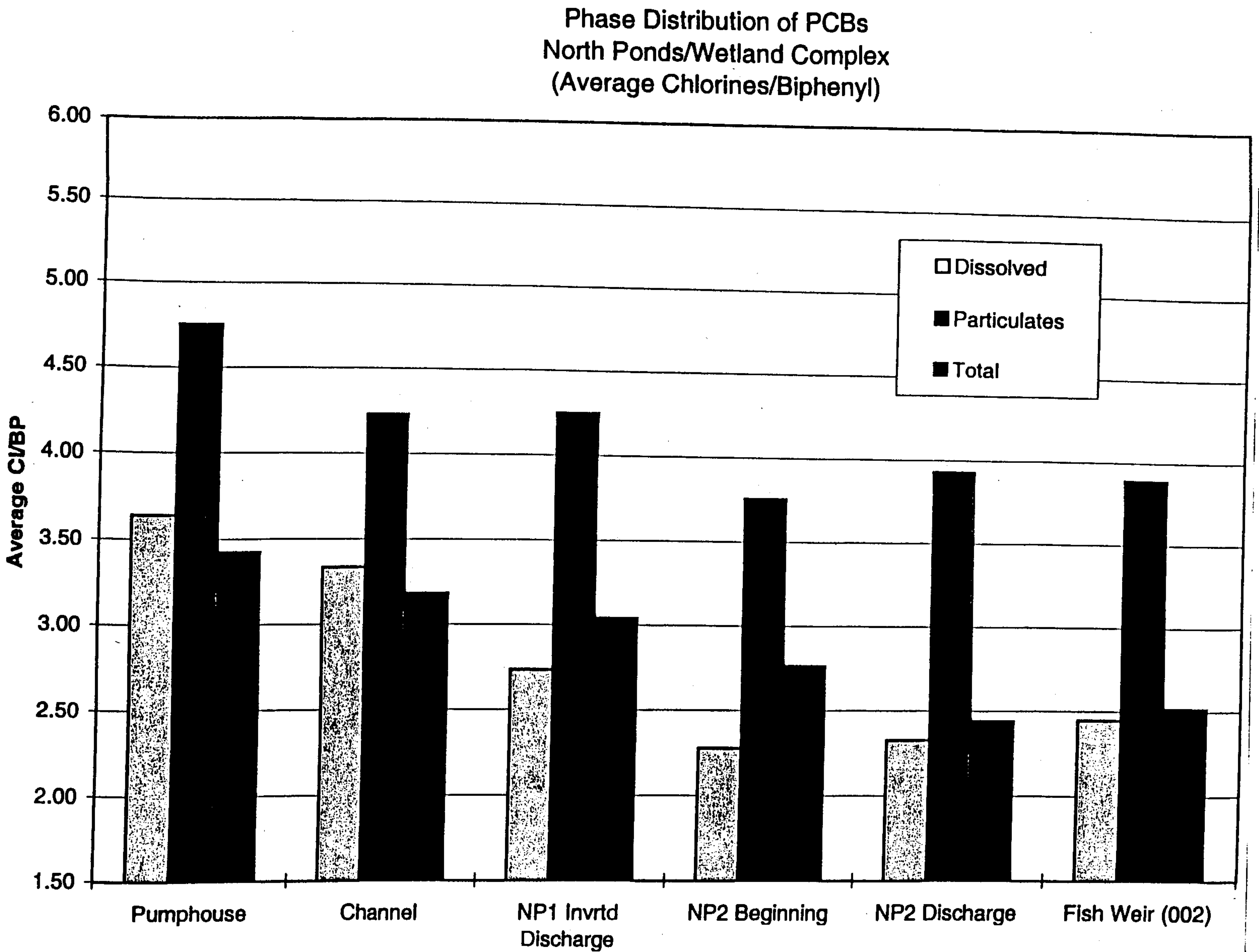
| PCBs (ng/L) | | | |
|---|---|---|---|
| | Dissolved | Particulates | Total |
| Pumphouse | 8.6 | 1.3 | 9.9 |
| Channel | 14.8 | 2.9 | 17.7 |
| NP1 Invrtd Dschrg | 15.3 | 11.2 | 26.5 |
| NP2 Beginning | 185.7 | 29.6 | 215.3 |
| NP2 Discharge | 291.8 | 51.5 | 343.3 |
| Fish Weir (002) | 296.2 | 97.7 | 393.9 |
| | | | |
| PCTs (ng/L) | | | |
| | Dissolved | Particulates | Total |
| Pumphouse | ND* | ND | ND |
| Channel | ND | ND | ND |
| NP1 Invrtd Dschrg | 0.7 | 17.8 | 18.5 |
| NP2 Beginning | 6.1 | 66.3 | 72.4 |
| NP2 Discharge | 7.2 | 67.5 | 74.7 |
| Fish Weir (002) | 10.6 | 104.6 | 115.2 |
| | | | |
| | | | |
| PCBs (Cl/BP) | | | |
| | Dissolved | Particulates | Total |
| Pmphse | 3.65 | 4.76 | 3.42 |
| Channel | 3.33 | 4.23 | 3.18 |
| NP1 Invrtd Dschrg | 2.73 | 4.25 | 3.04 |
| NP2 Beg. | 2.27 | 3.76 | 2.76 |
| NP2 Dschrg | 2.32 | 3.93 | 2.44 |
| Fish Weir (002) | 2.44 | 3.89 | 2.52 |
| | | | |
| | * = ND (not detected) | | |




11/15/99 2:59 PM

Figure 1

Prepared by: JJP




11/15/99 2:59 PM

Figure 2

Prepared by: JJP

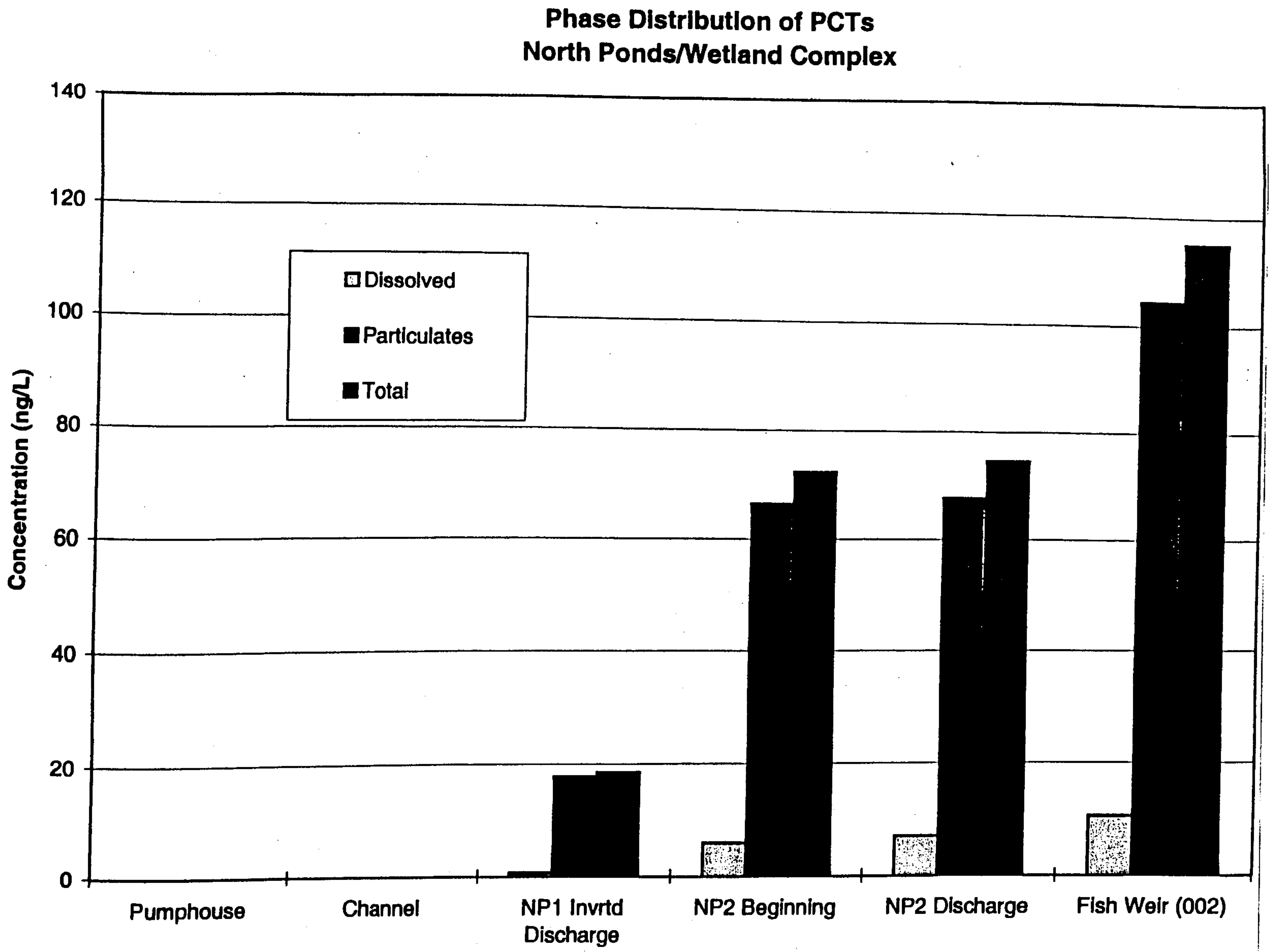



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Figure 3

Prepared by: JJP

## [illegible]UMMARY
### Phase Distribution o[illegible]B in the North Ponds/Wetland Complex
(concentration - ng/L)

| Sampling Date | Pumphouse | | | Channel | | | NP1 Invrtd. Dschrg. | | | NP2 Beginning | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D | P | T | D | P | T | D | P | T | D | P | T |
| 12-Jun-96 PCB (ng/L) | | | | | | | | | | | | |
| 27-Jun-96 PCB (ng/L) | 9.9 | 1.6 | 11.5 | | | 8.8 | | | 18.9 | | | 148.6 |
| 8-Jul-96 PCB (ng/L) | | | | | | | | | | | | |
| 19-Aug-96 PCB (ng/L) | | | 10.0 | 14.8 | 2.9 | 17.7 | 15.3 | 11.2 | 26.5 | | | 277.9 |
| 06-Sep-96 PCB (ng/L) | | | | | | | | | | | | |
| 07-Oct-96 PCB (ng/L) | 7.3 | 1.0 | 8.3 | | | | | | | 185.7 | 29.6 | 215.3 |
| Average | 8.6 | 1.3 | 9.9 | 14.8 | 2.9 | 13.3 | 15.3 | 11.2 | 22.7 | 185.7 | 29.6 | 213.9 |
| Number | 2 | 2 | 3 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 3 |
| Minimum | 7.3 | 1.0 | 8.3 | 14.8 | 2.9 | 8.8 | 15.3 | 11.2 | 18.9 | 185.7 | 29.6 | 148.6 |
| Maximum | 9.9 | 1.6 | 11.5 | 14.8 | 2.9 | 17.7 | 15.3 | 11.2 | 26.5 | 185.7 | 29.6 | 277.9 |

D = dissolved  P= particulates  T= total  ND= not detected

## ,UMMARY
Phase Distribution of PCB in the North Ponds/Wetland Complex
(concentration - ng/L)

| Sampling Date | | NP2 Discharge | | | | Fish Weir (002) | | | | Fish Weir (002) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | D | P | T | | D | P | T | | T |
| 12-Jun-96 | | | | | | | | | | |
| PCB (ng/L) | | | | | | 355.1 | 85.3 | 440.4 | | |
| 27-Jun-96 | | | | | | | | | | |
| PCB (ng/L) | | | | 439.0 | | 339.7 | 154.1 | 493.8 | | |
| 8-Jul-96 | | | | | | | | | | |
| PCB (ng/L) | | | | | | | | | | 508.1 |
| 19-Aug-96 | | | | | | | | | | |
| PCB (ng/L) | | 291.8 | 51.5 | 343.3 | | | | | | |
| 06-Sep-96 | | | | | | | | | | |
| PCB (ng/L) | | | | | | | | | | 337.6 |
| 07-Oct-96 | | | | | | | | | | |
| PCB (ng/L) | | | | | | 193.8 | 53.7 | 247.6 | | |
| Average | | 291.8 | 51.5 | 391.1 | | 296.2 | 97.7 | 393.9 | | 422.8 |
| Number | | 1 | 1 | 2 | | 3 | 3 | 3 | | 2 |
| Minimum | | 291.8 | 51.5 | 343.3 | | 193.8 | 53.7 | 247.6 | | 337.6 |
| Maximum | | 291.8 | 51.5 | 439.0 | | 355.1 | 154.1 | 493.8 | | 508.1 |

UMMARY
Phase Distribution [illegible] in the North Ponds/Wetland Complex
(Average Chlorines/Biphenyl)

| Sampling Date | Pumphouse | | | Channel | | | NP1 Invrtd. Dschrg. | | | NP2 Beginning | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D | P | T | D | P | T | D | P | T | D | P | T |
| **12-Jun-96** | | | | | | | | | | | | |
| **PCB (Avg. Cl/BP)** | | | | | | | | | | | | |
| **27-Jun-96** | | | | | | | | | | | | |
| **PCB (Avg. Cl/BP)** | 3.26 | 4.76 | | | | 3.18 | | | 3.04 | | | 3.04 |
| **8-Jul-96** | | | | | | | | | | | | |
| **PCB (Avg. Cl/BP)** | | | | | | | | | | | | |
| **19-Aug-96** | | | | | | | | | | | | |
| **PCB (Avg. Cl/BP)** | | | 3.42 | 3.33 | 4.23 | | 2.73 | 4.25 | | | | 2.48 |
| **06-Sep-96** | | | | | | | | | | | | |
| **PCB (Avg. Cl/BP)** | | | | | | | | | | | | |
| **07-Oct-96** | | | | | | | | | | | | |
| **PCB (Avg. Cl/BP)** | 4.03 | 4.75 | | | | | | | | 2.27 | 3.76 | |
| **Average** | 3.65 | 4.76 | 3.42 | 3.33 | 4.23 | 3.18 | 2.73 | 4.25 | 3.04 | 2.27 | 3.76 | 2.76 |
| **Number** | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| **Minimum** | 3.26 | 4.75 | 3.42 | 3.33 | 4.23 | 3.18 | 2.73 | 4.25 | 3.04 | 2.27 | 3.76 | 2.48 |
| **Maximum** | 4.03 | 4.76 | 3.42 | 3.33 | 4.23 | 3.18 | 2.73 | 4.25 | 3.04 | 2.27 | 3.76 | 3.04 |

D = dissolved P= particulates T= total ND= not detected

## SUMMARY
### Phase Distribution of PCB in the North Ponds/Wetland Complex
### (Average Chlorines/Biphenyl)

| Sampling Date | NP2 Discharge | | | Fish Weir (002) | | | Fish Weir (002) |
|---|---|---|---|---|---|---|---|
| | D | P | T | D | P | T | T |
| 12-Jun-96 | | | | | | | |
| PCB (Avg. Cl/BP) | | | | 2.38 | 3.94 | | |
| 27-Jun-96 | | | | | | | |
| PCB (Avg. Cl/BP) | | | 2.44 | 2.34 | 3.66 | | |
| 8-Jul-96 | | | | | | | |
| PCB (Avg. Cl/BP) | | | | | | | 2.56 |
| 19-Aug-96 | | | | | | | |
| PCB (Avg. Cl/BP) | 2.32 | 3.93 | | | | | |
| 06-Sep-96 | | | | | | | |
| PCB (Avg. Cl/BP) | | | | | | | 2.47 |
| 07-Oct-96 | | | | | | | |
| PCB (Avg. Cl/BP) | | | | 2.61 | 4.08 | | |
| Average | 2.32 | 3.93 | 2.44 | 2.44 | 3.89 | | 2.51 |
| Number | 1 | 1 | 1 | 3 | 3 | | 2 |
| Minimum | 2.32 | 3.93 | 2.44 | 2.34 | 3.66 | | 2.47 |
| Maximum | 2.32 | 3.93 | 2.44 | 2.61 | 4.08 | | 2.56 |

## [illegible]UMMARY
## Phase Distribution of [illegible] in the North Ponds/Wetland Complex
(concentration ng/L)

| Sampling Date | Pumphouse | | | Channel | | | NP1 Invrtd. Dschrg. | | | NP2 Beginning | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D | P | T | D | P | T | D | P | T | D | P | T |
| 12-Jun-96 | | | | | | | | | | | | |
| PCT (ng/L) | | | | | | | | | | | | |
| 27-Jun-96 | | | | | | | | | | | | |
| PCT (ng/L) | ND | ND | ND | | | | | | | | | |
| 8-Jul-96 | | | | | | | | | | | | |
| PCT (ng/L) | | | | | | | | | | | | |
| 19-Aug-96 | | | | | | | | | | | | |
| PCT (ng/L) | | | | ND | ND | ND | 0.7 | 17.8 | 18.5 | | | |
| 06-Sep-96 | | | | | | | | | | | | |
| PCT (ng/L) | | | | | | | | | | | | |
| 07-Oct-96 | | | | | | | | | | 6.1 | 66.3 | 72.4 |
| PCT (ng/L) | ND | ND | ND | | | | | | | | | |
| Average | ND | ND | ND | ND | ND | ND | 0.7 | 17.8 | 18.5 | 6.1 | 66.3 | 72.4 |
| Number | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Minimum | ND | ND | ND | ND | ND | ND | 0.7 | 17.8 | 18.5 | 6.1 | 66.3 | 72.4 |
| Maximum | ND | ND | ND | ND | ND | ND | 0.7 | 17.8 | 18.5 | 6.1 | 66.3 | 72.4 |
| | | D = dissolved | | | P= particulates | | | T= total | | | ND= not detected | |

Prepared by: JJP

## SUMMARY
## Phase Distribution of PCT in the North Ponds/Wetland Complex
(concentration ng/L)

| Sampling Date | NP2 Discharge D | NP2 Discharge P | NP2 Discharge T | Fish Weir (002) D | Fish Weir (002) P | Fish Weir (002) T |
|---|---|---|---|---|---|---|
| **12-Jun-96** | | | | | | |
| PCT (ng/L) | | | | | 53.7 | 53.7 |
| **27-Jun-96** | | | | | | |
| PCT (ng/L) | | | | 14.3 | 220.5 | 234.8 |
| **8-Jul-96** | | | | | | |
| PCT (ng/L) | | | | | | |
| **19-Aug-96** | | | | | | |
| PCT (ng/L) | 7.2 | 67.5 | 74.7 | | | |
| **06-Sep-96** | | | | | | |
| PCT (ng/L) | | | | | | |
| **07-Oct-96** | | | | | | |
| PCT (ng/L) | | | | 6.9 | 39.6 | 46.5 |
| Average | 7.2 | 67.5 | 74.7 | 10.6 | 104.6 | 111.7 |
| Number | 1 | 1 | 1 | 2 | 3 | 3 |
| Minimum | 7.2 | 67.5 | 74.7 | 6.9 | 39.6 | 46.5 |
| Maximum | 7.2 | 67.5 | 74.7 | 14.3 | 220.5 | 234.8 |

| Sampling Date | | | 12-Jun-96 | 12-Jun-96 | 12-Jun-96 | 12-Jun-96 |
|---|---|---|---|---|---|---|
| | | | Florisil | Alumina | Florisil | Florisil |
| | | | Particulates | Particulates | Dissolved | Dissolved |
| CONGENER | IUPAC # | | #5950 | #5951 | #5949 | #5949 (4x dil) |
| 2 | 1 | | 6.892 | 7.871 | 289.521 | 76.622 |
| 4 | 3 | | 0 | 0 | 41.811 | 8.221 |
| 2/2+2/6 | 4+10 | | 34.393 | 38.505 | 491.486 | 142.066 |
| 24+25 | 7+9 | | 0.914 | 0.621 | 8.114 | 1.812 |
| 2/3 | 6 | | 9.806 | 10.874 | 82.297 | 19.381 |
| 2/4+23 | 8+5 | | 67.325 | 75.07 | 513.937 | 128.591 |
| HCB | | | 0 | 0 | 0.407 | 0 |
| 26/2 | 19 | | 12.402 | 13.751 | 99.73 | 23.211 |
| 25/2 | 18 | | 7.24 | 8.001 | 32.737 | 7.551 |
| 4/4+24/2 | 15+17 | | 74.085 | 80.036 | 279.376 | 66.543 |
| 236+26/3 | 24+27 | | 19.673 | 21.758 | 94.02 | 19.876 |
| 23/2+26/4 | 16+32 | | 53.492 | 59.784 | 211.828 | 45.346 |
| 25/3 | 26 | | 20.78 | 23.001 | 50.365 | 11.221 |
| 24/3 | 25 | | 5.864 | 6.384 | 12.564 | 2.945 |
| 25/4 | 31 | | 44.587 | 49.133 | 158.887 | 22.052 |
| 24/4 | 28 | | 36.674 | 40.892 | 0 | 15.616 |
| 34/2 | 33 | | 20.456 | 22.54 | 43.318 | 9.701 |
| 23/4 | 22 | | 2.9 | 3.13 | 7.718 | 1.447 |
| 236/2 | 45 | | 3.981 | 4.408 | 9.376 | 1.907 |
| 25/25 | 52 | | 72.447 | 79.197 | 92.699 | 21.389 |
| 24/25 | 49 | | 59.007 | 64.874 | 65.288 | 14.602 |
| 24/24+245/2 | 47+48 | | 58.784 | 61.574 | 0 | 14.73 |
| 23/25 | 44 | | 16.085 | 17.503 | 23.657 | 5.118 |
| 236/3+23/24+34/4 | 59+42+37 | | 20.417 | 20.364 | 25.444 | 5.499 |
| 236/4 | 64 | | 15.802 | 17.312 | 0 | 3.641 |
| 23/23 | 40 | | 5.834 | 6.297 | 11.297 | 2.329 |
| 235/26+245/4 | 94+74 | | 6.312 | 6.834 | 4.26 | 0.959 |
| 25/34 | 70 | | 7.241 | 7.721 | 6.242 | 1.413 |
| 24/34 | 66 | | 36.755 | 39.614 | 29.866 | 6.732 |
| 234/4+34/23 | 60+55 | | 17.028 | 18.554 | 9.282 | 2.168 |
| 245/25 | 101 | | 26.649 | 28.454 | 15.265 | 3.564 |
| 245/24 | 99 | | 6.916 | 7.387 | 4.127 | 0.929 |
| 245/23 | 97 | | 4.219 | 4.416 | 2.889 | 0.577 |
| 234/25 | 87 | | 3.859 | 4.033 | 2.743 | 0.79 |
| DDE | | | | | | |
| 236/236 | 136 | | 3.416 | 3.712 | 1.344 | 0.83 |
| 34/34+236/34 | 77+110 | | 32.355 | 34.088 | 15.774 | 4.35 |
| 2356/25+234/23 | 151+82 | | 9.892 | 10.684 | 3.581 | 0.743 |
| 235/236 | 135 | | 5.046 | 5.544 | 1.507 | 0.338 |
| 2356/24 | 147 | | 1.752 | 1.977 | 0.5 | 0 |
| 236/245 | 149 | | 20.354 | 21.992 | 5.89 | 1.36 |
| 245/34 | 118 | | 6.383 | 6.933 | 2.922 | 0.687 |
| 2356/23 | 134 | | 2.94 | 2.074 | 1.65 | 0.271 |
| 235/245 | 146 | | 11.576 | 10.621 | 1.942 | 0.435 |

| Sampling Date | | 12-Jun-96 | 12-Jun-96 | 12-Jun-96 | 12-Jun-96 |
|---|---|---|---|---|---|
| | | Florisil | Alumina | Florisil | Florisil |
| | | Particulates | Particulates | Dissolved | Dissolved |
| CONGENER | IUPAC # | #5950 | #5951 | #5949 | #5949 (4x dil) |
| | | | | | |
| 245/245+234/236 | 153+132 | 14.639 | 15.931 | 3.507 | 0.853 |
| 234/34 | 105 | 6.027 | 5.325 | 2.555 | 0.601 |
| 2345/25 | 141 | 2.21 | 2.427 | 0.558 | 0 |
| 2356/236 | 179 | 7.856 | 8.609 | 2.911 | 0.465 |
| 234/235 | 130 | 0.899 | 0.999 | 0 | 0 |
| 2346/236+2356/34 | 176+163 | 3.818 | 4.033 | 1.083 | 0.639 |
| 234/245 | 138 | 20.654 | 22.369 | 5.587 | 1.3 |
| 2346/34 | 158 | 1.079 | 1.135 | 0.339 | 0 |
| 2345/23 | 129 | 17.526 | 17.664 | 6.28 | 0.971 |
| 2356/245+2345/246 | 187+181 | 21.862 | 20.149 | 3.87 | 0.877 |
| 2346/245 | 183 | 8.286 | 4.991 | 2.174 | 0.486 |
| 234/234+245/345 | 128+167 | 4.978 | 1.675 | 1.572 | 0.329 |
| 23456/25 | 185 | 2.288 | 2.258 | 0 | 0 |
| 2345/236 | 174 | 10.647 | 10.822 | 1.622 | 0.349 |
| 2356/234 | 177 | 9.091 | 9.134 | 1.92 | 0.336 |
| 2346/234+2345/34 | 171+156 | 5.003 | 4.477 | 0.894 | 0 |
| 2346/2356 | 201 | 7.395 | 4.337 | 1.575 | 0.326 |
| 2345/235 | 172 | 24.639 | 17.572 | 5.691 | 1.245 |
| 2345/245 | 180 | 25.322 | 19.942 | 3.807 | 0.846 |
| 23456/236 | 200 | 4.694 | 1.996 | 0.884 | 0 |
| MIREX | | | | | |
| 2345/234+23456/34 | 170+190 | 29.097 | 30.893 | 3.679 | 0.847 |
| 2345/2356 | 199 | 32.709 | 30.507 | 4.148 | 1.06 |
| 23456/245+2345/2346 | 203+196 | 26.394 | 11.191 | 3.558 | 0.877 |
| 23456/234 | 208 | 10.437 | 10.962 | 1.165 | 0 |
| 2345/2345 | 194 | 15.826 | 6.806 | 1.875 | 0.212 |
| 23456/2345 | 206 | 3.658 | 1.653 | 0 | 0 |
| DECACHLOROBIPHENYL | 209 | 12.239 | 12.639 | 17.289 | 5.558 |
| | | | | | |
| | | | | | |
| Total (pg/ul) | | 1189.6 | 1215.4 | 2816.5 | 710.2 |
| | | | | | |
| Total PCB (ng/L) | | 83.5 | 85.3 | 352.1 | 355.1 |
| Total PCT (ng/L) | | | 53.7 | | |
| | | | | | |
| Sample volume (L) | | 57.0 | 57.0 | 8.0 | 8.0 |
| Final Volume (uL) | | 2000 | 2000 | 1000 | 1000 |
| Dilution Factor | | 2 | 2 | 1 | 4 |
| % Surrogate Recovery | | 97.9% | 101.1% | 69.2% | 88.9% |
| | | | | | |

Mole %

| CONGENER | IUPAC # | | #5950 Florisil Particulates | #5951 Alumina Particulates | #5949 Florisil Dissolved | #5949 (4x dil) Florisil Dissolved |
|---|---|---|---|---|---|---|
| 2 | 1 | | 0.91 | 1.00 | 1.47 | 13.50 |
| 4 | 3 | | 0.00 | 0.00 | 0.00 | 1.45 |
| 2/2+2/6 | 4+10 | | 3.83 | 4.12 | 7.87 | 21.17 |
| 24+25 | 7+9 | | 0.10 | 0.07 | 0.00 | 0.27 |
| 2/3 | 6 | | 1.09 | 1.16 | 0.00 | 2.89 |
| 2/4+23 | 8+5 | | 7.50 | 8.03 | 8.83 | 19.16 |
| HCB | | | | | | |
| 26/2 | 19 | | 1.20 | 1.27 | 0.29 | 3.00 |
| 25/2 | 18 | | 0.70 | 0.74 | 0.73 | 0.97 |
| 4/4+24/2 | 15+17 | | 7.70 | 7.99 | 0.82 | 9.25 |
| 236+26/3 | 24+27 | | 1.90 | 2.02 | 0.00 | 2.57 |
| 23/2+26/4 | 16+32 | | 5.16 | 5.54 | 0.96 | 5.86 |
| 25/3 | 26 | | 2.01 | 2.13 | 0.65 | 1.45 |
| 24/3 | 25 | | 0.57 | 0.59 | 0.92 | 0.38 |
| 25/4 | 31 | | 4.30 | 4.55 | 0.00 | 2.85 |
| 24/4 | 28 | | 3.54 | 3.79 | 2.60 | 2.02 |
| 34/2 | 33 | | 1.97 | 2.09 | 1.19 | 1.25 |
| 23/4 | 22 | | 0.28 | 0.29 | 0.63 | 0.19 |
| 236/2 | 45 | | 0.34 | 0.36 | 0.44 | 0.22 |
| 25/25 | 52 | | 6.17 | 6.47 | 10.77 | 2.44 |
| 24/25 | 49 | | 5.02 | 5.30 | 3.87 | 1.66 |
| 24/24+245/2 | 47+48 | | 5.00 | 5.03 | 0.00 | 1.68 |
| 23/25 | 44 | | 1.37 | 1.43 | 4.82 | 0.58 |
| 236/3+23/24+34/4 | 59+42+37 | | 1.80 | 1.72 | 1.74 | 0.65 |
| 236/4 | 64 | | 1.35 | 1.41 | 1.38 | 0.41 |
| 23/23 | 40 | | 0.50 | 0.51 | 1.13 | 0.27 |
| 235/26+245/4 | 94+74 | | 0.51 | 0.53 | 0.64 | 0.10 |
| 25/34 | 70 | | 0.62 | 0.63 | 3.01 | 0.16 |
| 24/34 | 66 | | 3.13 | 3.24 | 9.14 | 0.77 |
| 234/4+34/23 | 60+55 | | 1.45 | 1.52 | 1.13 | 0.25 |
| 245/25 | 101 | | 2.03 | 2.08 | 7.38 | 0.36 |
| 245/24 | 99 | | 0.53 | 0.54 | 2.05 | 0.09 |
| 245/23 | 97 | | 0.32 | 0.32 | 2.06 | 0.06 |
| 234/25 | 87 | | 0.29 | 0.29 | 1.56 | 0.08 |
| DDE | | | | | | |
| 236/236 | 136 | | 0.24 | 0.25 | 0.55 | 0.08 |
| 34/34+236/34 | 77+110 | | 2.61 | 2.64 | 6.23 | 0.47 |
| 2356/25+234/23 | 151+82 | | 0.72 | 0.74 | 1.12 | 0.07 |
| 235/236 | 135 | | 0.35 | 0.37 | 0.47 | 0.03 |
| 2356/24 | 147 | | 0.12 | 0.13 | 0.31 | 0.00 |
| 236/245 | 149 | | 1.40 | 1.45 | 1.92 | 0.13 |
| 245/34 | 118 | | 0.49 | 0.51 | 2.20 | 0.07 |
| 2356/23 | 134 | | 0.20 | 0.14 | 0.42 | 0.02 |
| 235/245 | 146 | | 0.80 | 0.70 | 0.26 | 0.04 |
| 245/245+234/236 | 153+132 | | 1.01 | 1.05 | 1.20 | 0.08 |

| CONGENER | IUPAC # | | #5950 Florisil Particulates | #5951 Alumina Particulates | #5949 Florisil Dissolved | #5949 (4x dil) Florisil Dissolved |
|---|---|---|---|---|---|---|
| 234/34 | 105 | | 0.46 | 0.39 | 0.93 | 0.06 |
| 2345/25 | 141 | | 0.15 | 0.16 | 0.29 | 0.00 |
| 2356/236 | 179 | | 0.49 | 0.52 | 0.07 | 0.04 |
| 234/235 | 130 | | 0.06 | 0.07 | 0.09 | 0.00 |
| 2346/236+2356/34 | 176+163 | | 0.25 | 0.26 | 0.65 | 0.06 |
| 234/245 | 138 | | 1.42 | 1.48 | 1.83 | 0.12 |
| 2346/34 | 158 | | 0.07 | 0.08 | 0.31 | 0.00 |
| 2345/23 | 129 | | 1.21 | 1.17 | 0.26 | 0.09 |
| 2356/245+2345/246 | 187+181 | | 1.37 | 1.22 | 0.19 | 0.07 |
| 2346/245 | 183 | | 0.52 | 0.30 | 0.07 | 0.04 |
| 234/234+245/345 | 128+167 | | 0.34 | 0.11 | 0.36 | 0.03 |
| 23456/25 | 185 | | 0.14 | 0.14 | 0.00 | 0.00 |
| 2345/236 | 174 | | 0.67 | 0.65 | 0.15 | 0.03 |
| 2356/234 | 177 | | 0.57 | 0.55 | 0.09 | 0.03 |
| 2346/234+2345/34 | 171+156 | | 0.33 | 0.28 | 0.19 | 0.00 |
| 2346/2356 | 201 | | 0.43 | 0.24 | 0.02 | 0.03 |
| 2345/235 | 172 | | 1.55 | 1.06 | 0.06 | 0.10 |
| 2345/245 | 180 | | 1.59 | 1.20 | 0.19 | 0.07 |
| 23456/236 | 200 | | 0.27 | 0.11 | 0.00 | 0.00 |
| MIREX | | | | | | |
| 2345/234+23456/34 | 170+190 | | 1.83 | 1.86 | 0.27 | 0.07 |
| 2345/2356 | 199 | | 1.89 | 1.69 | 0.18 | 0.08 |
| 23456/245+2345/2346 | 203+196 | | 1.53 | 0.62 | 0.18 | 0.07 |
| 23456/234 | 208 | | 0.60 | 0.61 | 0.00 | 0.00 |
| 2345/2345 | 194 | | 0.92 | 0.38 | 0.48 | 0.02 |
| 23456/2345 | 206 | | 0.20 | 0.08 | 0.33 | 0.00 |
| DECACHLOROBIPHENYL | 209 | | | | | |

Average Chlorines/Biphenyl

| #5950 | Water (Particulates) | Florisil | | |
|---|---|---|---|---|
| | Mole % | Ortho | Meta | Para |
| Cl 1 = | 0.91 | 0.91 | 0.00 | 0.00 |
| Cl 2 = | 16.65 | 8.20 | 2.45 | 6.05 |
| Cl 3 = | 25.86 | 13.22 | 5.73 | 6.74 |
| Cl 4 = | 27.74 | 12.90 | 9.07 | 5.84 |
| Cl 5 = | 5.97 | 2.25 | 2.29 | 1.44 |
| Cl 6 = | 8.02 | 3.17 | 3.27 | 1.57 |
| Cl 7 = | 9.02 | 3.25 | 3.89 | 1.91 |
| Cl 8 = | 5.64 | 2.09 | 2.47 | 1.09 |
| Cl 9 = | 0.20 | 0.07 | 0.09 | 0.04 |
| | | | | |
| | 100.00 | 46.08 | 29.25 | 24.67 |
| Avg Cl/BP | 4.11 | 1.79 | 1.37 | 0.95 |
| | | | | |
| | | | | |
| #5951 | Water (Particulates) | Alumina | | |
| | Mole % | Ortho | Meta | Para |
| Cl 1 = | 1.00 | 1.00 | 0.00 | 0.00 |
| Cl 2 = | 17.66 | 8.77 | 2.61 | 6.32 |
| Cl 3 = | 27.35 | 13.99 | 6.04 | 7.14 |
| Cl 4 = | 28.69 | 13.41 | 9.41 | 5.94 |
| Cl 5 = | 6.02 | 2.29 | 2.31 | 1.45 |
| Cl 6 = | 7.78 | 3.13 | 3.14 | 1.51 |
| Cl 7 = | 7.76 | 2.84 | 3.32 | 1.63 |
| Cl 8 = | 3.65 | 1.37 | 1.63 | 0.66 |
| Cl 9 = | 0.08 | 0.03 | 0.04 | 0.02 |
| | | | | |
| | 100.00 | 46.82 | 28.51 | 24.66 |
| Avg Cl/BP | 3.94 | 1.75 | 1.28 | 0.91 |
| | | | | |
| | | | | |
| #5949 | Alcan Water (Dissolved) | | | |
| | Mole % | Ortho | Meta | Para |
| Cl 1 = | 14.76 | 12.93 | 0.00 | 1.87 |
| Cl 2 = | 46.57 | 29.99 | 6.49 | 10.21 |
| Cl 3 = | 28.06 | 16.69 | 6.14 | 5.06 |
| Cl 4 = | 7.91 | 3.92 | 3.06 | 0.94 |
| Cl 5 = | 1.09 | 0.42 | 0.42 | 0.26 |
| Cl 6 = | 0.78 | 0.32 | 0.32 | 0.14 |
| Cl 7 = | 0.57 | 0.21 | 0.25 | 0.11 |
| Cl 8 = | 0.26 | 0.10 | 0.11 | 0.05 |
| Cl 9 = | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | 100.00 | 64.58 | 16.78 | 18.64 |
| Avg Cl/BP | 2.40 | 1.45 | 0.50 | 0.45 |

Average Chlorines/Biphenyl

| | | | | | |
|---|---|---|---|---|---|
| #5949 (4x dil) Alcan Water (Dissolved) | | | | | |
| | Mole % | | Ortho | Meta | Para |
| Cl 1 = | 14.95 | | 13.53 | 0.00 | 1.45 |
| Cl 2 = | 48.45 | | 32.41 | 6.32 | 9.84 |
| Cl 3 = | 25.06 | | 14.87 | 4.76 | 5.27 |
| Cl 4 = | 9.15 | | 4.52 | 3.05 | 1.59 |
| Cl 5 = | 1.04 | | 0.40 | 0.40 | 0.24 |
| Cl 6 = | 0.68 | | 0.29 | 0.27 | 0.12 |
| Cl 7 = | 0.49 | | 0.18 | 0.21 | 0.10 |
| Cl 8 = | 0.19 | | 0.07 | 0.08 | 0.03 |
| Cl 9 = | 0.00 | | 0.00 | 0.00 | 0.00 |
| | | | | | |
| | 100.00 | | 66.27 | 15.09 | 18.64 |
| Avg Cl/BP | 2.38 | | 1.47 | 0.45 | 0.46 |

06/27/96 and 07/08/96

Concentration

| Sampling Date | | 27-Jun-96 | 27-Jun-96 | 27-Jun-96 | 27-Jun-96 | 27-Jun-96 |
|---|---|---|---|---|---|---|
| | | Pmphse | Pmphse | Pmphse | Channel | NP1 Dischrg |
| | | Florisil | Florisil | | Florisil | Florisil |
| | | Dissolved | Particulates | Total | Total | Total |
| CONGENER | IUPAC # | #5986 | #5993 | | #5996 | #5999 |
| 2 | 1 | 0 | 0 | | 0 | 5.813 |
| 4 | 3 | 0 | 0 | | 0 | 0 |
| 2/2+2/6 | 4+10 | 13.33 | 0 | | 18.873 | 30.399 |
| 24+25 | 7+9 | 0.92 | 0.87 | | 0 | 0.886 |
| 2/3 | 6 | 0 | 0 | | 0.932 | 3.033 |
| 2/4+23 | 8+5 | 11.107 | 1.113 | | 8.499 | 18.331 |
| HCB | | 0 | 0 | | 0.22 | 0.219 |
| 26/2 | 19 | 1.19 | 0 | | 0.985 | 3.936 |
| 25/2 | 18 | 0.451 | 0 | | 0 | 2.107 |
| 4/4+24/2 | 15+17 | 3.242 | 1.126 | | 1.962 | 8.268 |
| 236+26/3 | 24+27 | 1.68 | 0 | | 1.169 | 2.495 |
| 23/2+26/4 | 16+32 | 2.63 | 0.812 | | 1.55 | 6.317 |
| 25/3 | 26 | 0.665 | 0 | | 0.343 | 1.807 |
| 24/3 | 25 | 0.56 | 0.602 | | 0.473 | 0.996 |
| 25/4 | 31 | 2.688 | 0.984 | | 0.975 | 4.099 |
| 24/4 | 28 | 0 | 1.017 | | 0.852 | 5.257 |
| 34/2 | 33 | 0 | 0 | | 0.953 | 2.975 |
| 23/4 | 22 | 0 | 0 | | 0 | 0.701 |
| 236/2 | 45 | 0 | 0 | | 0 | 0.547 |
| 25/25 | 52 | 5.72 | 6.524 | | 5.487 | 9.602 |
| 24/25 | 49 | 1.99 | 1.868 | | 1.266 | 4.393 |
| 24/24+245/2 | 47+48 | 0 | 0 | | 0 | 0 |
| 23/25 | 44 | 2.186 | 2.691 | | 2.088 | 4.147 |
| 236/3+23/24+34/4 | 59+42+37 | 0.908 | 1.127 | | 0 | 2.446 |
| 236/4 | 64 | 1.262 | 1.475 | | 0.852 | 2.492 |
| 23/23 | 40 | 0 | 1.264 | | 0 | 0.929 |
| 235/26+245/4 | 94+74 | 0.524 | 0.648 | | 0.416 | 0.744 |
| 25/34 | 70 | 1.76 | 2.363 | | 1.672 | 2.306 |
| 24/34 | 66 | 5.328 | 8.214 | | 5.16 | 7.229 |
| 234/4+34/23 | 60+55 | 1.173 | 1.952 | | 0.99 | 1.624 |
| 245/25 | 101 | 5.27 | 8.693 | | 5.058 | 5.797 |
| 245/24 | 99 | 1.293 | 2.148 | | 1.207 | 1.429 |
| 245/23 | 97 | 1.19 | 2.139 | | 1.284 | 1.468 |
| 234/25 | 87 | 0.966 | 1.765 | | 0.955 | 1.148 |
| DDE | | 0 | 0 | | 0 | 0 |
| 236/236 | 136 | 0.32 | 0.691 | | 0.326 | 0.452 |
| 34/34+236/34 | 77+110 | 4.051 | 7.993 | | 3.716 | 4.595 |
| 2356/25+234/23 | 151+82 | 0.649 | 1.443 | | 0.312 | 0.936 |
| 235/236 | 135 | 0.325 | 0.737 | | 0.259 | 0.374 |
| 2356/24 | 147 | 0 | 0.3 | | 0 | 0.14 |
| 236/245 | 149 | 1.403 | 3.234 | | 1.32 | 1.847 |
| 245/34 | 118 | 1.402 | 2.997 | | 1.202 | 1.489 |
| 2356/23 | 134 | 0 | 0.457 | | 0 | 0.122 |

[illegible] Water Testing

06/27/96 and 07/08/96

Concentration

| Sampling Date | | 27-Jun-96 | 27-Jun-96 | 27-Jun-96 | 27-Jun-96 | 27-Jun-96 |
|---|---|---|---|---|---|---|
| | | Pmphse | Pmphse | Pmphse | Channel | NP1 Dischrg |
| | | Florisil | Florisil | | Florisil | Florisil |
| | | Dissolved | Particulates | Total | Total | Total |
| CONGENER | IUPAC # | #5986 | #5993 | | #5996 | #5999 |
| 235/245 | 146 | 0 | 0.767 | | 0 | 0.407 |
| 245/245+234/236 | 153+132 | 0.929 | 2.537 | | 0.886 | 1.413 |
| 234/34 | 105 | 0.642 | 1.437 | | 0.557 | 0.768 |
| 2345/25 | 141 | 0 | 0.517 | | 0 | 0.296 |
| 2356/236 | 179 | 0 | 0.433 | | 0 | 0.29 |
| 234/235 | 130 | 0 | 0 | | 0 | 0 |
| 2346/236+2356/34 | 176+163 | 0.425 | 0.884 | | 0.547 | 0.495 |
| 234/245 | 138 | 1.166 | 3.441 | | 1.065 | 1.603 |
| 2346/34 | 158 | 0 | 0.341 | | 0 | 0 |
| 2345/23 | 129 | 0 | 0.795 | | 0 | 0.502 |
| 2356/245+2345/246 | 187+181 | 0 | 1.125 | | 0 | 0.579 |
| 2346/245 | 183 | 0 | 0.586 | | 0 | 0.432 |
| 234/234+245/345 | 128+167 | 0 | 0.609 | | 0 | 0.321 |
| 23456/25 | 185 | 0 | 0 | | 0 | 0 |
| 2345/236 | 174 | 0 | 0.586 | | 0 | 0.334 |
| 2356/234 | 177 | 0 | 0.46 | | 0 | 0.0793 |
| 2346/234+2345/34 | 171+156 | 0 | 0.424 | | 0 | 0 |
| 2346/2356 | 201 | 0 | 0.314 | | 0 | 0 |
| 2345/235 | 172 | 0 | 1.101 | | 0 | 0.539 |
| 2345/245 | 180 | 0 | 1.431 | | 0 | 0.677 |
| 23456/236 | 200 | 0 | 0 | | 0 | 0 |
| MIREX | | 0 | 0 | | 0 | 0 |
| 2345/234+23456/34 | 170+190 | 0 | 1.29 | | 0 | 0.547 |
| 2345/2356 | 199 | 0 | 1.239 | | 0 | 0.572 |
| 23456/245+2345/2346 | 203+196 | 0 | 1.101 | | 0 | 0.486 |
| 23456/234 | 208 | 0 | 0.389 | | 0 | 0 |
| 2345/2345 | 194 | 0 | 0.751 | | 0 | 0 |
| 23456/2345 | 206 | 0 | 0 | | 0 | 0 |
| DECACHLOROBIPHENYL | 209 | 18.115 | 26.117 | | 13.99 | 15.964 |
| | | | | | | |
| Total (pg/ul) | | 79.3 | 89.8 | | 74.2 | 164.0 |
| | | | | | | |
| Total PCB (ng/L) | | 9.9 | 1.6 | 11.5 | 8.8 | 18.9 |
| Total PCT (ng/L) | | | | | | |
| | | | | | | |
| Sample volume (L) | | 8.0 | 57.0 | | 8.4 | 8.7 |
| Final Volume (uL) | | 1000 | 1000 | | 1000 | 1000 |
| Dilution Factor | | 1 | 1 | | 1 | 1 |
| % Surrogate Recovery | | 72.5% | 104.5% | | 56.0% | 63.9% |

| Sampling Date | | 27-Jun-96 | 27-Jun-96 | 27-Jun-96 | 27-Jun-96 | 27-Jun-96 |
|---|---|---|---|---|---|---|
| | | NP2 Beg. | NP2 Dischrg | NP2 Dischrg | Fish Weir | Fish Weir |
| | | Florisil | Florisil | Florisil | Alumina | Alumina |
| | | Total | Total | Total | Dissolved | Particulates |
| CONGENER | IUPAC # | #6000 | #5997 | #5998 | #5988 | #5991 |
| 2 | 1 | 67.015 | 353.55 | 335.797 | 157.846 | 13.663 |
| 4 | 3 | 6.892 | 56.271 | 54.198 | 0 | 0 |
| 2/2+2/6 | 4+10 | 125.778 | 518.519 | 502.723 | 273.563 | 78.989 |
| 24+25 | 7+9 | 3.785 | 10.118 | 9.583 | 3.815 | 1.87 |
| 2/3 | 6 | 26.799 | 113.669 | 109.229 | 40.248 | 22.814 |
| 2/4+23 | 8+5 | 173.12 | 737.386 | 709.831 | 257.357 | 156.234 |
| HCB | | 0 | 0.448 | 0.423 | 0 | 0 |
| 26/2 | 19 | 24.38 | 111.916 | 109.02 | 47.221 | 30.542 |
| 25/2 | 18 | 0 | 37.186 | 35.012 | 15.474 | 16.714 |
| 4/4+24/2 | 15+17 | 99.122 | 344.692 | 336.468 | 132.663 | 175.182 |
| 236+26/3 | 24+27 | 25.545 | 116.362 | 114.638 | 40.598 | 46.019 |
| 23/2+26/4 | 16+32 | 61.363 | 266.64 | 260.457 | 93.156 | 129.123 |
| 25/3 | 26 | 19.467 | 66.341 | 64.998 | 22.216 | 46.822 |
| 24/3 | 25 | 6.723 | 16.281 | 16.171 | 5.498 | 12.754 |
| 25/4 | 31 | 63.878 | 196.306 | 192.517 | 65.647 | 99.655 |
| 24/4 | 28 | 0 | 0 | 0 | 0 | 84.21 |
| 34/2 | 33 | 17.925 | 55.498 | 55.953 | 19.204 | 45.638 |
| 23/4 | 22 | 3.723 | 8.847 | 0 | 1.885 | 6.337 |
| 236/2 | 45 | 3.872 | 9.77 | 10.662 | 3.562 | 8.764 |
| 25/25 | 52 | 48.654 | 114.251 | 111.679 | 41.176 | 148.729 |
| 24/25 | 49 | 33.163 | 84.093 | 81.59 | 28.042 | 123.24 |
| 24/24+245/2 | 47+48 | 60.146 | 77.098 | 74.021 | 27.579 | 122.932 |
| 23/25 | 44 | 14.174 | 24.617 | 24.436 | 9.789 | 34.916 |
| 236/3+23/24+34/4 | 59+42+37 | 13.978 | 29.548 | 29.673 | 9.539 | 41.61 |
| 236/4 | 64 | 9.909 | 19.219 | 0 | 8.373 | 35.877 |
| 23/23 | 40 | 7.24 | 7.289 | 14.602 | 2.273 | 12.306 |
| 235/26+245/4 | 94+74 | 3.547 | 5.073 | 5.053 | 1.876 | 13.127 |
| 25/34 | 70 | 5.463 | 5.977 | 5.824 | 2.771 | 14.748 |
| 24/34 | 66 | 24.047 | 29.939 | 32.375 | 13.067 | 74.33 |
| 234/4+34/23 | 60+55 | 9.349 | 11.471 | 11.136 | 0 | 34.692 |
| 245/25 | 101 | 16.648 | 17.857 | 16.614 | 6.941 | 51.653 |
| 245/24 | 99 | 4.788 | 4.308 | 4.776 | 1.782 | 13.813 |
| 245/23 | 97 | 3.19 | 2.938 | 3.23 | 1.238 | 8.63 |
| 234/25 | 87 | 2.677 | 2.69 | 3.061 | 1.041 | 7.592 |
| DDE | | 0 | 1.116 | 0 | 0 | 0 |
| 236/236 | 136 | 1.82 | 1.737 | 1.765 | 0.532 | 6.555 |
| 34/34+236/34 | 77+110 | 17.61 | 19.987 | 18.6 | 7.575 | 69.654 |
| 2356/25+234/23 | 151+82 | 5.154 | 4.367 | 4.59 | 1.234 | 17.646 |
| 235/236 | 135 | 2.691 | 2.161 | 2.091 | 0.671 | 9.695 |
| 2356/24 | 147 | 0.891 | 0.851 | 0.876 | 0.221 | 3.563 |
| 236/245 | 149 | 10.862 | 7.875 | 7.193 | 2.669 | 37.602 |
| 245/34 | 118 | 4.014 | 3.189 | 3.005 | 1.427 | 12.48 |
| 2356/23 | 134 | 1.503 | 2.625 | 2.626 | 0 | 3.549 |

| Sampling Date | | 27-Jun-96 | 27-Jun-96 | 27-Jun-96 | 27-Jun-96 | 27-Jun-96 |
|---|---|---|---|---|---|---|
| | | NP2 Beg. | NP2 Dischrg | NP2 Dischrg | Fish Weir | Fish Weir |
| | | Florisil | Florisil | Florisil | Alumina | Alumina |
| | | Total | Total | Total | Dissolved | Particulates |
| CONGENER | IUPAC # | #6000 | #5997 | #5998 | #5988 | #5991 |
| 235/245 | 146 | 5.791 | 3.394 | 3.213 | 0.684 | 15.965 |
| 245/245+234/236 | 153+132 | 7.639 | 4.847 | 4.339 | 1.496 | 25.388 |
| 234/34 | 105 | 3.188 | 3.308 | 3.169 | 0.728 | 9.013 |
| 2345/25 | 141 | 1.162 | 0.655 | 0.665 | 0.327 | 4.17 |
| 2356/236 | 179 | 4.396 | 2.818 | 2.656 | 0.406 | 11.11 |
| 234/235 | 130 | 0.36 | 0.456 | 0.487 | 0 | 1.208 |
| 2346/236+2356/34 | 176+163 | 3.499 | 1.924 | 1.488 | 0.46 | 7.238 |
| 234/245 | 138 | 10.084 | 7.831 | 7.406 | 1.755 | 37.997 |
| 2346/34 | 158 | 0.962 | 0.386 | 0 | 0 | 1.917 |
| 2345/23 | 129 | 7.337 | 9.395 | 8.371 | 0.296 | 10.857 |
| 2356/245+2345/246 | 187+181 | 9.861 | 7.154 | 5.996 | 0.88 | 30.736 |
| 2346/245 | 183 | 3.821 | 3.581 | 3.044 | 0.2 | 8.121 |
| 234/234+245/345 | 128+167 | 2.123 | 2.344 | 2.139 | 0 | 2.995 |
| 23456/25 | 185 | 0.879 | 0.632 | 0.679 | 0 | 2.682 |
| 2345/236 | 174 | 4.533 | 2.754 | 2.399 | 0.434 | 15.675 |
| 2356/234 | 177 | 4.028 | 3.329 | 2.684 | 0.374 | 13.227 |
| 2346/234+2345/34 | 171+156 | 2.289 | 1.499 | 1.322 | 0 | 6.616 |
| 2346/2356 | 201 | 2.759 | 2.627 | 2.186 | 0 | 4.446 |
| 2345/235 | 172 | 8.677 | 8.766 | 7.213 | 0 | 4.44 |
| 2345/245 | 180 | 10.767 | 7.064 | 5.693 | 0.633 | 29.665 |
| 23456/236 | 200 | 1.837 | 1.536 | 1.294 | 0 | 3.331 |
| MIREX | | 1.121 | 0.835 | 0.667 | 0 | 1.64 |
| 2345/234+23456/34 | 170+190 | 10.636 | 7.546 | 5.725 | 0.345 | 27.009 |
| 2345/2356 | 199 | 11.869 | 8.592 | 6.484 | 0 | 14.443 |
| 23456/245+2345/2346 | 203+196 | 9.691 | 6.94 | 5.371 | 0 | 14.644 |
| 23456/234 | 208 | 5.735 | 1.297 | 1.143 | 0 | 5.385 |
| 2345/2345 | 194 | 7.594 | 3.66 | 2.422 | 0 | 11.18 |
| 23456/2345 | 206 | 1.302 | 0.721 | 0.445 | 0 | 2.19 |
| DECACHLOROBIPHENYL | 209 | 21.025 | 14.818 | 14.372 | 9.799 | 11.043 |
| | | | | | | |
| Total (pg/ul) | | 1173.7 | 3603.6 | 3464.1 | 1358.8 | 2195.9 |
| Total PCB (ng/L) | | 148.6 | 444.9 | 433.0 | 339.7 | 154.1 |
| Total PCT (ng/L) | | | | | 14.3 | 220.5 |
| Sample volume (L) | | 7.9 | 8.1 | 8.0 | 8.0 | 57.0 |
| Final Volume (uL) | | 1000 | 1000 | 1000 | 2000 | 2000 |
| Dilution Factor | | 1 | 1 | 1 | 1 | 2 |
| % Surrogate Recovery | | 84.1% | 59.3% | 57.5% | 78.4% | 88.3% |

| Sampling Date | | | 27-Jun-96 | 8-Jul-96 | 8-Jul-96 |
|---|---|---|---|---|---|
| | | | Fish Weir | Fish Weir | Fish Weir |
| | | | | Florisil | Florisil |
| | | | Total | Total | Total |
| CONGENER | IUPAC # | | | #6009 | #6010 |
| 2 | 1 | | | 44.466 | 44.806 |
| 4 | 3 | | | 0 | 0 |
| 2/2+2/6 | 4+10 | | | 110.239 | 107.23 |
| 24+25 | 7+9 | | | 1.168 | 1.517 |
| 2/3 | 6 | | | 11.77 | 11.929 |
| 2/4+23 | 8+5 | | | 78.567 | 80.415 |
| HCB | | | | 0 | 0 |
| 26/2 | 19 | | | 16.154 | 16.218 |
| 25/2 | 18 | | | 5.284 | 5.701 |
| 4/4+24/2 | 15+17 | | | 44.689 | 49.106 |
| 236+26/3 | 24+27 | | | 13.246 | 14.703 |
| 23/2+26/4 | 16+32 | | | 29.932 | 33.097 |
| 25/3 | 26 | | | 7.201 | 8.472 |
| 24/3 | 25 | | | 2.217 | 2.53 |
| 25/4 | 31 | | | 14.189 | 16.946 |
| 24/4 | 28 | | | 10.884 | 12.484 |
| 34/2 | 33 | | | 6.506 | 7.611 |
| 23/4 | 22 | | | 1.085 | 1.216 |
| 236/2 | 45 | | | 1.304 | 1.508 |
| 25/25 | 52 | | | 17.26 | 20.03 |
| 24/25 | 49 | | | 10.337 | 12.802 |
| 24/24+245/2 | 47+48 | | | 0 | 0 |
| 23/25 | 44 | | | 4.785 | 5.211 |
| 236/3+23/24+34/4 | 59+42+37 | | | 3.987 | 4.853 |
| 236/4 | 64 | | | 2.976 | 3.557 |
| 23/23 | 40 | | | 1.836 | 2.214 |
| 235/26+245/4 | 94+74 | | | 0.91 | 1.042 |
| 25/34 | 70 | | | 2.105 | 1.993 |
| 24/34 | 66 | | | 9.057 | 8.982 |
| 234/4+34/23 | 60+55 | | | 0 | 0 |
| 245/25 | 101 | | | 7.002 | 6.308 |
| 245/24 | 99 | | | 1.85 | 1.698 |
| 245/23 | 97 | | | 1.41 | 1.203 |
| 234/25 | 87 | | | 1.198 | 1.021 |
| DDE | | | | 0 | 0 |
| 236/236 | 136 | | | 0.538 | 0.419 |
| 34/34+236/34 | 77+110 | | | 6.113 | 5.544 |
| 2356/25+234/23 | 151+82 | | | 1.214 | 1.214 |
| 235/236 | 135 | | | 0.575 | 0.572 |
| 2356/24 | 147 | | | 0.181 | 0.181 |
| 236/245 | 149 | | | 2.499 | 2.406 |
| 245/34 | 118 | | | 1.456 | 1.277 |
| 2356/23 | 134 | | | 0.223 | 0.251 |

[illegible] Water Testing
06/27/96 and 07/08/96
Concentration

| Sampling Date | | | 27-Jun-96 | 8-Jul-96 | 8-Jul-96 |
|---|---|---|---|---|---|
| | | | Fish Weir | Fish Weir | Fish Weir |
| | | | | Florisil | Florisil |
| | | | Total | Total | Total |
| CONGENER | IUPAC # | | | #6009 | #6010 |
| | | | | | |
| 235/245 | 146 | | | 0.943 | 0.777 |
| 245/245+234/236 | 153+132 | | | 1.681 | 1.595 |
| 234/34 | 105 | | | 0.899 | 0.881 |
| 2345/25 | 141 | | | 0.256 | 0.224 |
| 2356/236 | 179 | | | 0.459 | 0.503 |
| 234/235 | 130 | | | 0 | 0 |
| 2346/236+2356/34 | 176+163 | | | 0.614 | 0.52 |
| 234/245 | 138 | | | 1.96 | 1.952 |
| 2346/34 | 158 | | | 0 | 0 |
| 2345/23 | 129 | | | 1.24 | 1.524 |
| 2356/245+2345/246 | 187+181 | | | 1.346 | 1.515 |
| 2346/245 | 183 | | | 0.522 | 0.647 |
| 234/234+245/345 | 128+167 | | | 0.31 | 0.458 |
| 23456/25 | 185 | | | 0 | 0 |
| 2345/236 | 174 | | | 0.615 | 0.666 |
| 2356/234 | 177 | | | 0.418 | 0.645 |
| 2346/234+2345/34 | 171+156 | | | 0 | 0.475 |
| 2346/2356 | 201 | | | 0.394 | 0.476 |
| 2345/235 | 172 | | | 1.58 | 1.697 |
| 2345/245 | 180 | | | 1.388 | 1.498 |
| 23456/236 | 200 | | | 0 | 0 |
| MIREX | | | | 0 | 0 |
| 2345/234+23456/34 | 170+190 | | | 1.526 | 1.639 |
| 2345/2356 | 199 | | | 1.746 | 1.868 |
| 23456/245+2345/2346 | 203+196 | | | 1.414 | 1.531 |
| 23456/234 | 208 | | | 0 | 0 |
| 2345/2345 | 194 | | | 0.459 | 0.494 |
| 23456/2345 | 206 | | | 0 | 0 |
| DECACHLOROBIPHENYL | - 209 | | | 20.984 | 22.045 |
| | | | | | |
| | | | | | |
| Total (pg/ul) | | | | 496.2 | 519.9 |
| | | | | | |
| Total PCB (ng/L) | | | 493.8 | 496.2 | 519.9 |
| Total PCT (ng/L) | | | 234.8 | | |
| | | | | | |
| Sample volume (L) | | | | 1.0 | 1.0 |
| Final Volume (uL) | | | | 1000 | 1000 |
| Dilution Factor | | | | 1 | 1 |
| % Surrogate Recovery | | | | 83.9% | 88.2% |
| | | | | | |

Mole %

| CONGENER | IUPAC # | | Pumphouse Florisil Dissolved #5986 | Pumphouse Florisil Particulates #5993 | Channel Florisil Total #5996 | NP1 Discharge Florisil Total #5999 |
|---|---|---|---|---|---|---|
| 2 | 1 | | 0.00 | 0.00 | 0.00 | 4.86 |
| 4 | 3 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 2/2+2/6 | 4+10 | | 20.08 | 0.00 | 30.07 | 21.50 |
| 24+25 | 7+9 | | 1.39 | 1.38 | 0.00 | 0.63 |
| 2/3 | 6 | | 0.00 | 0.00 | 1.49 | 2.15 |
| 2/4+23 | 8+5 | | 16.73 | 1.77 | 13.54 | 12.97 |
| HCB | | | | | | |
| 26/2 | 19 | | 1.55 | 0.00 | 1.36 | 2.41 |
| 25/2 | 18 | | 0.59 | 0.00 | 0.00 | 1.29 |
| 4/4+24/2 | 15+17 | | 4.56 | 1.67 | 2.92 | 5.46 |
| 236+26/3 | 24+27 | | 2.19 | 0.00 | 1.61 | 1.53 |
| 23/2+26/4 | 16+32 | | 3.43 | 1.12 | 2.14 | 3.87 |
| 25/3 | 26 | | 0.87 | 0.00 | 0.47 | 1.11 |
| 24/3 | 25 | | 0.73 | 0.83 | 0.65 | 0.61 |
| 25/4 | 31 | | 3.51 | 1.35 | 1.35 | 2.51 |
| 24/4 | 28 | | 0.00 | 1.40 | 1.18 | 3.22 |
| 34/2 | 33 | | 0.00 | 0.00 | 1.32 | 1.82 |
| 23/4 | 22 | | 0.00 | 0.00 | 0.00 | 0.43 |
| 236/2 | 45 | | 0.00 | 0.00 | 0.00 | 0.30 |
| 25/25 | 52 | | 6.58 | 7.92 | 6.68 | 5.19 |
| 24/25 | 49 | | 2.29 | 2.27 | 1.54 | 2.37 |
| 24/24+245/2 | 47+48 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 23/25 | 44 | | 2.52 | 3.27 | 2.54 | 2.24 |
| 236/3+23/24+34/4 | 59+42+37 | | 1.08 | 1.41 | 0.00 | 1.37 |
| 236/4 | 64 | | 1.45 | 1.79 | 1.04 | 1.35 |
| 23/23 | 40 | | 0.00 | 1.53 | 0.00 | 0.50 |
| 235/26+245/4 | 94+74 | | 0.57 | 0.75 | 0.48 | 0.38 |
| 25/34 | 70 | | 2.03 | 2.87 | 2.04 | 1.25 |
| 24/34 | 66 | | 6.13 | 9.97 | 6.28 | 3.91 |
| 234/4+34/23 | 60+55 | | 1.35 | 2.37 | 1.21 | 0.88 |
| 245/25 | 101 | | 5.43 | 9.44 | 5.51 | 2.80 |
| 245/24 | 99 | | 1.33 | 2.33 | 1.31 | 0.69 |
| 245/23 | 97 | | 1.23 | 2.32 | 1.40 | 0.71 |
| 234/25 | 87 | | 0.99 | 1.92 | 1.04 | 0.56 |
| DDE | | | | | | |
| 236/236 | 136 | | 0.30 | 0.68 | 0.32 | 0.20 |
| 34/34+236/34 | 77+110 | | 4.42 | 9.19 | 4.29 | 2.35 |
| 2356/25+234/23 | 151+82 | | 0.64 | 1.49 | 0.32 | 0.43 |
| 235/236 | 135 | | 0.30 | 0.72 | 0.26 | 0.16 |
| 2356/24 | 147 | | 0.00 | 0.29 | 0.00 | 0.06 |
| 236/245 | 149 | | 1.31 | 3.18 | 1.30 | 0.81 |
| 245/34 | 118 | | 1.44 | 3.25 | 1.31 | 0.72 |
| 2356/23 | 134 | | 0.00 | 0.45 | 0.00 | 0.05 |
| 235/245 | 146 | | 0.00 | 0.75 | 0.00 | 0.18 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 245/245+234/236 | 153+132 | | 0.86 | 2.49 | 0.87 | 0.62 |
| 234/34 | 105 | | 0.66 | 1.56 | 0.61 | 0.37 |
| 2345/25 | 141 | | 0.00 | 0.51 | 0.00 | 0.13 |
| 2356/236 | 179 | | 0.00 | 0.39 | 0.00 | 0.12 |
| 234/235 | 130 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 2346/236+2356/34 | 176+163 | | 0.38 | 0.83 | 0.52 | 0.21 |
| 234/245 | 138 | | 1.09 | 3.38 | 1.05 | 0.70 |
| 2346/34 | 158 | | 0.00 | 0.33 | 0.00 | 0.00 |
| 2345/23 | 129 | | 0.00 | 0.78 | 0.00 | 0.22 |
| 2356/245+2345/246 | 187+181 | | 0.00 | 1.01 | 0.00 | 0.23 |
| 2346/245 | 183 | | 0.00 | 0.53 | 0.00 | 0.17 |
| 234/234+245/345 | 128+167 | | 0.00 | 0.60 | 0.00 | 0.14 |
| 23456/25 | 185 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 2345/236 | 174 | | 0.00 | 0.53 | 0.00 | 0.13 |
| 2356/234 | 177 | | 0.00 | 0.41 | 0.00 | 0.03 |
| 2346/234+2345/34 | 171+156 | | 0.00 | 0.40 | 0.00 | 0.00 |
| 2346/2356 | 201 | | 0.00 | 0.26 | 0.00 | 0.00 |
| 2345/235 | 172 | | 0.00 | 0.99 | 0.00 | 0.22 |
| 2345/245 | 180 | | 0.00 | 1.28 | 0.00 | 0.27 |
| 23456/236 | 200 | | 0.00 | 0.00 | 0.00 | 0.00 |
| MIREX | | | | | | |
| 2345/234+23456/34 | 170+190 | | 0.00 | 1.16 | 0.00 | 0.22 |
| 2345/2356 | 199 | | 0.00 | 1.02 | 0.00 | 0.21 |
| 23456/245+2345/2346 | 203+196 | | 0.00 | 0.91 | 0.00 | 0.18 |
| 23456/234 | 208 | | 0.00 | 0.32 | 0.00 | 0.00 |
| 2345/2345 | 194 | | 0.00 | 0.62 | 0.00 | 0.00 |
| 23456/2345 | 206 | | 0.00 | 0.00 | 0.00 | 0.00 |
| DECACHLOROBIPHENYL | 209 | | | | | |
| | | | | | | |

Mole %

| NP2 Beginning | NP2 Discharge | NP2 Discharge | Fish Weir | Fish Weir | Fish Weir | Fish Weir |
|---|---|---|---|---|---|---|
| Florisil | Florisil | Florisil | Alumina | Alumina | Florisil | Florisil |
| Total | Total | Total | Dissolved | Particulates | Total | Total |
| #6000 | #5997 | #5998 | #5988 | #5991 | #6009 | #6010 |
| | | | | | | |
| 7.84 | 12.39 | 12.23 | 14.46 | 0.92 | 11.47 | 11.08 |
| 0.81 | 1.97 | 1.97 | 0.00 | 0.00 | 0.00 | 0.00 |
| 12.44 | 15.37 | 15.49 | 21.19 | 4.52 | 24.06 | 22.43 |
| 0.37 | 0.30 | 0.30 | 0.30 | 0.11 | 0.25 | 0.32 |
| 2.65 | 3.37 | 3.36 | 3.12 | 1.31 | 2.57 | 2.50 |
| 17.12 | 21.86 | 21.87 | 19.94 | 8.94 | 17.15 | 16.82 |
| | | | | | | |
| 2.09 | 2.87 | 2.91 | 3.17 | 1.51 | 3.05 | 2.94 |
| 0.00 | 0.96 | 0.93 | 1.04 | 0.83 | 1.00 | 1.03 |
| 9.15 | 9.54 | 9.67 | 9.59 | 9.36 | 9.10 | 9.58 |
| 2.19 | 2.99 | 3.06 | 2.72 | 2.28 | 2.50 | 2.66 |
| 5.26 | 6.85 | 6.95 | 6.25 | 6.40 | 5.66 | 6.00 |
| 1.67 | 1.70 | 1.73 | 1.49 | 2.32 | 1.36 | 1.54 |
| 0.58 | 0.42 | 0.43 | 0.37 | 0.63 | 0.42 | 0.46 |
| 5.47 | 5.04 | 5.14 | 4.41 | 4.94 | 2.68 | 3.07 |
| 0.00 | 0.00 | 0.00 | 0.00 | 4.18 | 2.06 | 2.26 |
| 1.54 | 1.43 | 1.49 | 1.29 | 2.26 | 1.23 | 1.38 |
| 0.32 | 0.23 | 0.00 | 0.13 | 0.31 | 0.21 | 0.22 |
| 0.29 | 0.22 | 0.25 | 0.21 | 0.38 | 0.22 | 0.24 |
| 3.68 | 2.59 | 2.63 | 2.44 | 6.50 | 2.88 | 3.20 |
| 2.51 | 1.90 | 1.92 | 1.66 | 5.39 | 1.72 | 2.05 |
| 4.55 | 1.75 | 1.74 | 1.63 | 5.38 | 0.00 | 0.00 |
| 1.07 | 0.56 | 0.58 | 0.58 | 1.53 | 0.80 | 0.83 |
| 1.09 | 0.69 | 0.72 | 0.58 | 1.88 | 0.69 | 0.80 |
| 0.75 | 0.44 | 0.00 | 0.50 | 1.57 | 0.50 | 0.57 |
| 0.55 | 0.17 | 0.34 | 0.13 | 0.54 | 0.31 | 0.35 |
| 0.25 | 0.11 | 0.11 | 0.11 | 0.54 | 0.14 | 0.16 |
| 0.41 | 0.14 | 0.14 | 0.16 | 0.64 | 0.35 | 0.32 |
| 1.82 | 0.68 | 0.76 | 0.77 | 3.25 | 1.51 | 1.44 |
| 0.71 | 0.26 | 0.26 | 0.00 | 1.52 | 0.00 | 0.00 |
| 1.13 | 0.36 | 0.35 | 0.37 | 2.02 | 1.04 | 0.90 |
| 0.32 | 0.09 | 0.10 | 0.09 | 0.54 | 0.28 | 0.24 |
| 0.22 | 0.06 | 0.07 | 0.07 | 0.34 | 0.21 | 0.17 |
| 0.18 | 0.05 | 0.06 | 0.06 | 0.30 | 0.18 | 0.15 |
| | | | | | | |
| 0.11 | 0.03 | 0.03 | 0.03 | 0.23 | 0.07 | 0.05 |
| 1.26 | 0.43 | 0.41 | 0.42 | 2.89 | 0.97 | 0.84 |
| 0.33 | 0.08 | 0.09 | 0.06 | 0.66 | 0.17 | 0.17 |
| 0.16 | 0.04 | 0.04 | 0.03 | 0.34 | 0.08 | 0.07 |
| 0.05 | 0.02 | 0.02 | 0.01 | 0.13 | 0.02 | 0.02 |
| 0.66 | 0.14 | 0.14 | 0.13 | 1.33 | 0.34 | 0.31 |
| 0.27 | 0.06 | 0.06 | 0.08 | 0.49 | 0.22 | 0.18 |
| 0.09 | 0.05 | 0.05 | 0.00 | 0.13 | 0.03 | 0.03 |
| 0.35 | 0.06 | 0.06 | 0.03 | 0.56 | 0.13 | 0.10 |

Mole %

| | | | | | | |
|---|---|---|---|---|---|---|
| 0.47 | 0.09 | 0.08 | 0.07 | 0.90 | 0.23 | 0.21 |
| 0.22 | 0.07 | 0.07 | 0.04 | 0.35 | 0.13 | 0.13 |
| 0.07 | 0.01 | 0.01 | 0.02 | 0.15 | 0.03 | 0.03 |
| 0.25 | 0.05 | 0.05 | 0.02 | 0.36 | 0.06 | 0.06 |
| 0.02 | 0.01 | 0.01 | 0.00 | 0.04 | 0.00 | 0.00 |
| 0.20 | 0.03 | 0.03 | 0.02 | 0.24 | 0.08 | 0.06 |
| 0.62 | 0.14 | 0.14 | 0.08 | 1.34 | 0.26 | 0.25 |
| 0.06 | 0.01 | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 |
| 0.45 | 0.17 | 0.16 | 0.01 | 0.38 | 0.17 | 0.20 |
| 0.55 | 0.12 | 0.10 | 0.04 | 0.99 | 0.17 | 0.18 |
| 0.21 | 0.06 | 0.05 | 0.01 | 0.26 | 0.06 | 0.08 |
| 0.13 | 0.04 | 0.04 | 0.00 | 0.11 | 0.04 | 0.06 |
| 0.05 | 0.01 | 0.01 | 0.00 | 0.09 | 0.00 | 0.00 |
| 0.25 | 0.05 | 0.04 | 0.02 | 0.51 | 0.08 | 0.08 |
| 0.22 | 0.06 | 0.05 | 0.02 | 0.43 | 0.05 | 0.08 |
| 0.13 | 0.03 | 0.02 | 0.00 | 0.22 | 0.00 | 0.06 |
| 0.14 | 0.04 | 0.03 | 0.00 | 0.13 | 0.04 | 0.05 |
| 0.48 | 0.15 | 0.13 | 0.00 | 0.14 | 0.19 | 0.20 |
| 0.60 | 0.12 | 0.10 | 0.03 | 0.96 | 0.17 | 0.18 |
| 0.09 | 0.02 | 0.02 | 0.00 | 0.10 | 0.00 | 0.00 |
| | | | | | | |
| 0.59 | 0.13 | 0.10 | 0.02 | 0.87 | 0.19 | 0.19 |
| 0.61 | 0.13 | 0.10 | 0.00 | 0.43 | 0.20 | 0.20 |
| 0.50 | 0.11 | 0.09 | 0.00 | 0.44 | 0.16 | 0.17 |
| 0.29 | 0.02 | 0.02 | 0.00 | 0.16 | 0.00 | 0.00 |
| 0.39 | 0.06 | 0.04 | 0.00 | 0.33 | 0.05 | 0.05 |
| 0.06 | 0.01 | 0.01 | 0.00 | 0.06 | 0.00 | 0.00 |
| | | | | | | |
| | | | | | | |

Average Chlorines/Biphenyl

| #5986 | Pumphouse (dissolved) - Florisil | | | |
|---|---|---|---|---|
| | Mole % | Ortho | Meta | Para |
| Cl 1 = | 0.00 | 0.00 | 0.00 | 0.00 |
| Cl 2 = | 40.63 | 29.18 | 4.54 | 6.98 |
| Cl 3 = | 15.38 | 8.95 | 3.66 | 2.67 |
| Cl 4 = | 25.68 | 9.63 | 9.99 | 6.08 |
| Cl 5 = | 13.77 | 5.15 | 5.25 | 3.39 |
| Cl 6 = | 4.36 | 1.94 | 1.58 | 0.83 |
| Cl 7 = | 0.18 | 0.10 | 0.05 | 0.03 |
| Cl 8 = | 0.00 | 0.00 | 0.00 | 0.00 |
| Cl 9 = | 0.00 | 0.00 | 0.00 | 0.00 |
| | 100.00 | 54.95 | 25.07 | 19.98 |
| Avg Cl/BP | 3.26 | 1.62 | 0.96 | 0.68 |

| #5993 | Pumphouse (particulates) - Florisil | | | |
|---|---|---|---|---|
| | Mole % | Ortho | Meta | Para |
| Cl 1 = | 0.00 | 0.00 | 0.00 | 0.00 |
| Cl 2 = | 4.04 | 1.58 | 0.79 | 1.68 |
| Cl 3 = | 5.99 | 2.69 | 1.16 | 2.09 |
| Cl 4 = | 38.14 | 13.10 | 14.99 | 10.08 |
| Cl 5 = | 26.30 | 9.64 | 10.07 | 6.63 |
| Cl 6 = | 15.52 | 6.39 | 5.97 | 3.12 |
| Cl 7 = | 6.87 | 2.57 | 2.86 | 1.45 |
| Cl 8 = | 3.13 | 1.13 | 1.38 | 0.62 |
| Cl 9 = | 0.00 | 0.00 | 0.00 | 0.00 |
| | 100.00 | 37.10 | 37.22 | 25.68 |
| Avg Cl/BP | 4.76 | 1.77 | 1.82 | 1.17 |

| #5996 | Channel (total) - Florisil | | | |
|---|---|---|---|---|
| | Mole % | Ortho | Meta | Para |
| Cl 1 = | 0.00 | 0.00 | 0.00 | 0.00 |
| Cl 2 = | 46.66 | 37.63 | 4.13 | 4.95 |
| Cl 3 = | 11.43 | 6.38 | 2.29 | 2.67 |
| Cl 4 = | 23.84 | 8.74 | 9.50 | 5.63 |
| Cl 5 = | 13.60 | 5.11 | 5.18 | 3.32 |
| Cl 6 = | 4.22 | 1.87 | 1.51 | 0.83 |
| Cl 7 = | 0.25 | 0.14 | 0.07 | 0.04 |
| Cl 8 = | 0.00 | 0.00 | 0.00 | 0.00 |
| Cl 9 = | 0.00 | 0.00 | 0.00 | 0.00 |
| | 100.00 | 59.86 | 22.70 | 17.44 |
| Avg Cl/BP | 3.18 | 1.67 | 0.89 | 0.62 |

06/27/96 and 07/08/96
Average Chlorines/Biphenyl

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| #5999 | NP1: Inverted Discharge (total) - Florisil | | | | |
| | Mole % | | Ortho | Meta | Para |
| Cl 1 = | 4.86 | | 4.87 | 0.00 | 0.00 |
| Cl 2 = | 40.17 | | 29.44 | 4.48 | 6.34 |
| Cl 3 = | 21.84 | | 11.98 | 4.33 | 5.39 |
| Cl 4 = | 20.30 | | 8.44 | 7.84 | 4.06 |
| Cl 5 = | 7.37 | | 2.77 | 2.81 | 1.80 |
| Cl 6 = | 3.58 | | 1.51 | 1.38 | 0.69 |
| Cl 7 = | 1.49 | | 0.57 | 0.61 | 0.31 |
| Cl 8 = | 0.39 | | 0.15 | 0.17 | 0.07 |
| Cl 9 = | 0.00 | | 0.00 | 0.00 | 0.00 |
| | | | | | |
| | 100.00 | | 59.72 | 21.63 | 18.64 |
| Avg Cl/BP | 3.04 | | 1.62 | 0.81 | 0.61 |
| | | | | | |
| | | | | | |
| #6000 | NP2: Beginning of channel (total) - Florisil | | | | |
| | Mole % | | Ortho | Meta | Para |
| Cl 1 = | 8.64 | | 7.86 | 0.00 | 0.81 |
| Cl 2 = | 37.49 | | 22.57 | 5.71 | 9.30 |
| Cl 3 = | 23.76 | | 13.20 | 5.51 | 4.89 |
| Cl 4 = | 17.83 | | 8.36 | 5.61 | 3.89 |
| Cl 5 = | 3.22 | | 1.22 | 1.23 | 0.78 |
| Cl 6 = | 3.59 | | 1.44 | 1.45 | 0.70 |
| Cl 7 = | 3.38 | | 1.26 | 1.43 | 0.70 |
| Cl 8 = | 2.03 | | 0.74 | 0.89 | 0.40 |
| Cl 9 = | 0.06 | | 0.02 | 0.03 | 0.01 |
| | | | | | |
| | 100.00 | | 56.66 | 21.86 | 21.49 |
| Avg Cl/BP | 3.04 | | 1.56 | 0.83 | 0.66 |
| | | | | | |
| | | | | | |
| #5997 | NP2: discharge (total) - Florisil | | | | |
| | Mole % | | Ortho | Meta | Para |
| Cl 1 = | 14.37 | | 12.42 | 0.00 | 1.98 |
| Cl 2 = | 46.02 | | 28.21 | 7.24 | 10.68 |
| Cl 3 = | 27.17 | | 16.00 | 6.04 | 4.95 |
| Cl 4 = | 9.42 | | 4.75 | 3.11 | 1.58 |
| Cl 5 = | 0.99 | | 0.38 | 0.38 | 0.23 |
| Cl 6 = | 0.89 | | 0.36 | 0.37 | 0.16 |
| Cl 7 = | 0.76 | | 0.28 | 0.33 | 0.16 |
| Cl 8 = | 0.38 | | 0.14 | 0.17 | 0.07 |
| Cl 9 = | 0.01 | | 0.00 | 0.00 | 0.00 |
| | | | | | |
| | 100.00 | | 62.54 | 17.65 | 19.81 |
| Avg Cl/BP | 2.44 | | 1.43 | 0.53 | 0.48 |
| | | | | | |

06/27/96 and 07/08/96

Average Chlorines/Biphenyl

| | | | | | |
|---|---|---|---|---|---|
| #5998 | NP2: discharge (total) - Florisil (duplicate) | | | | |
| | Mole % | | Ortho | Meta | Para |
| Cl 1 = | 14.20 | | 12.26 | 0.00 | 1.98 |
| Cl 2 = | 46.20 | | 28.32 | 7.24 | 10.75 |
| Cl 3 = | 27.41 | | 16.17 | 6.09 | 4.97 |
| Cl 4 = | 9.37 | | 4.71 | 3.16 | 1.52 |
| Cl 5 = | 1.01 | | 0.39 | 0.38 | 0.24 |
| Cl 6 = | 0.85 | | 0.34 | 0.36 | 0.15 |
| Cl 7 = | 0.65 | | 0.24 | 0.28 | 0.13 |
| Cl 8 = | 0.30 | | 0.12 | 0.13 | 0.06 |
| Cl 9 = | 0.01 | | 0.00 | 0.00 | 0.00 |
| | | | | | |
| | 100.00 | | 62.56 | 17.64 | 19.80 |
| Avg Cl/BP | 2.44 | | 1.43 | 0.52 | 0.48 |
| | | | | | |
| | | | | | |
| #5988 | 002: Fish Weir (dissolved) - alumina | | | | |
| | Mole % | | Ortho | Meta | Para |
| Cl 1 = | 14.46 | | 14.49 | 0.00 | 0.00 |
| Cl 2 = | 49.68 | | 32.94 | 6.63 | 10.22 |
| Cl 3 = | 25.53 | | 15.39 | 5.42 | 4.55 |
| Cl 4 = | 8.74 | | 4.39 | 2.89 | 1.48 |
| Cl 5 = | 0.98 | | 0.38 | 0.37 | 0.23 |
| Cl 6 = | 0.45 | | 0.20 | 0.17 | 0.08 |
| Cl 7 = | 0.15 | | 0.06 | 0.06 | 0.03 |
| Cl 8 = | 0.00 | | 0.00 | 0.00 | 0.00 |
| Cl 9 = | 0.00 | | 0.00 | 0.00 | 0.00 |
| | | | | | |
| | 100.00 | | 67.86 | 15.55 | 16.59 |
| Avg Cl/BP | 2.34 | | 1.48 | 0.44 | 0.42 |
| | | | | | |
| | | | | | |
| #5991 | 002: Fish Weir (particulate) - alumina | | | | |
| | Mole % | | Ortho | Meta | Para |
| Cl 1 = | 0.92 | | 0.93 | 0.00 | 0.00 |
| Cl 2 = | 19.89 | | 9.73 | 2.93 | 7.30 |
| Cl 3 = | 30.71 | | 15.89 | 6.67 | 7.96 |
| Cl 4 = | 29.72 | | 13.86 | 9.71 | 6.24 |
| Cl 5 = | 6.00 | | 2.29 | 2.30 | 1.43 |
| Cl 6 = | 6.27 | | 2.58 | 2.46 | 1.23 |
| Cl 7 = | 4.83 | | 1.86 | 1.96 | 1.03 |
| Cl 8 = | 1.59 | | 0.58 | 0.69 | 0.32 |
| Cl 9 = | 0.06 | | 0.02 | 0.03 | 0.01 |
| | | | | | |
| | 100.00 | | 47.75 | 26.74 | 25.51 |
| Avg Cl/BP | 3.66 | | 1.68 | 1.10 | 0.88 |
| | | | | | |
| | | | | | |

| #6009 | 002: Fish Weir (total) - Florisil | | | |
|---|---|---|---|---|
| | Mole % | Ortho | Meta | Para |
| Cl 1 = | 11.47 | 11.50 | 0.00 | 0.00 |
| Cl 2 = | 48.90 | 34.12 | 5.65 | 9.25 |
| Cl 3 = | 24.65 | 14.67 | 4.62 | 5.20 |
| Cl 4 = | 9.31 | 4.30 | 3.56 | 1.46 |
| Cl 5 = | 2.68 | 1.02 | 1.02 | 0.65 |
| Cl 6 = | 1.53 | 0.64 | 0.60 | 0.28 |
| Cl 7 = | 1.01 | 0.37 | 0.43 | 0.21 |
| Cl 8 = | 0.45 | 0.17 | 0.20 | 0.08 |
| Cl 9 = | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | 100.00 | 66.78 | 16.09 | 17.13 |
| Avg Cl/BP | 2.54 | 1.54 | 0.53 | 0.47 |

| #6010 | 002: Fish Weir (total) - Florisil | | | |
|---|---|---|---|---|
| | Mole % | Ortho | Meta | Para |
| Cl 1 = | 11.08 | 11.11 | 0.00 | 0.00 |
| Cl 2 = | 47.19 | 32.32 | 5.55 | 9.44 |
| Cl 3 = | 26.30 | 15.40 | 5.07 | 5.66 |
| Cl 4 = | 10.04 | 4.79 | 3.83 | 1.44 |
| Cl 5 = | 2.33 | 0.89 | 0.89 | 0.56 |
| Cl 6 = | 1.48 | 0.60 | 0.59 | 0.28 |
| Cl 7 = | 1.10 | 0.40 | 0.47 | 0.23 |
| Cl 8 = | 0.47 | 0.18 | 0.21 | 0.09 |
| Cl 9 = | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | 100.00 | 65.70 | 16.60 | 17.70 |
| Avg Cl/BP | 2.57 | 1.53 | 0.55 | 0.48 |

Concentration

| Sampling Date | | 19-Aug-96 | 7-Oct-96 | 7-Oct-96 | 7-Oct-96 | 19-Aug-96 |
|---|---|---|---|---|---|---|
| | | Pmphse | Pmphse | Pmphse | Pmphse | Channel |
| | | Florisil | Florisil | Florisil | | Florisil |
| CONGENER | IUPAC # | Total | Dissolved | Particles | Total | Dissolved |
| | | #6169 | #6270 | #6265 | | #6163 |
| 2 | 1 | 0 | 0 | 0 | | 6.938 |
| 4 | 3 | 0 | 0 | 0 | | 0 |
| 2/2+2/6 | 4+10 | 0 | 0 | 0 | | 0 |
| 24+25 | 7+9 | 0 | 0 | 0 | | 0 |
| 2/3 | 6 | 2.443 | 0 | 0 | | 2.313 |
| 2/4+23 | 8+5 | 22.772 | 4.426 | 0 | | 20.975 |
| HCB | | 0.222 | 0.233 | 0 | | |
| 26/2 | 19 | 5.375 | 0.379 | 0 | | 2.861 |
| 25/2 | 18 | 0 | 0.977 | 0 | | 1.013 |
| 4/4+24/2 | 15+17 | 17.861 | 2.133 | 0 | | 7.155 |
| 236+26/3 | 24+27 | 4.793 | 0.509 | 0 | | 2.146 |
| 23/2+26/4 | 16+32 | 10.311 | 1.699 | 0 | | 4.892 |
| 25/3 | 26 | 2.461 | 0.585 | 0 | | 1.065 |
| 24/3 | 25 | 0.988 | 0 | 0 | | 0.551 |
| 25/4 | 31 | 8.735 | 0 | 0.128 | | 4.007 |
| 24/4 | 28 | 0 | 9.002 | 0 | | 0 |
| 34/2 | 33 | 2.911 | 1.803 | 0 | | 1.258 |
| 23/4 | 22 | 0.464 | 0.823 | 0 | | 0 |
| 236/2 | 45 | 0.533 | 0.381 | 0 | | 0.34 |
| 25/25 | 52 | 13.964 | 11.942 | 5.551 | | 8.578 |
| 24/25 | 49 | 5.563 | 4.358 | 1.56 | | 2.484 |
| 24/24+245/2 | 47+48 | 0 | 5.677 | 0 | | 0 |
| 23/25 | 44 | 4.548 | 5.753 | 2.169 | | 3.226 |
| 236/3+23/24+34/4 | 59+42+37 | 2.13 | 3.069 | 0 | | 0.935 |
| 236/4 | 64 | 2.942 | 3.203 | 1.01 | | 1.48 |
| 23/23 | 40 | 0.958 | 1.178 | 0 | | 0.533 |
| 235/26+245/4 | 94+74 | 0.68 | 1.605 | 0.726 | | 0.519 |
| 25/34 | 70 | 2.571 | 5.34 | 2.3 | | 2.398 |
| 24/34 | 66 | 10.186 | 12.75 | 7.598 | | 8.036 |
| 234/4+34/23 | 60+55 | 0 | 5.919 | 0 | | 0 |
| 245/25 | 101 | 9.142 | 9.002 | 7.248 | | 7.797 |
| 245/24 | 99 | 2.265 | 2.439 | 1.833 | | 1.886 |
| 245/23 | 97 | 2.106 | 2.48 | 1.883 | | 2.001 |
| 234/25 | 87 | 1.732 | 2.01 | 1.537 | | 1.645 |
| DDE | | 0 | 0 | 0 | | 0 |
| 236/236 | 136 | 0.645 | 0.548 | 0.5 | | 0.533 |
| 34/34+236/34 | 77+110 | 6.754 | 7.822 | 6.824 | | 6.407 |
| 2356/25+234/23 | 151+82 | 1.114 | 0 | 1.124 | | 0 |
| 235/236 | 135 | 0.498 | 0.484 | 0.531 | | 0.448 |
| 2356/24 | 147 | 0.156 | 0.238 | 0 | | 0.158 |
| 236/245 | 149 | 2.447 | 1.926 | 2.273 | | 2.235 |
| 245/34 | 118 | 1.844 | 3.145 | 2.743 | | 2.206 |
| 2356/23 | 134 | 0.293 | 0.287 | 0 | | 0.235 |

8/19/96, 9/6/96, and 10/7/96
Concentration

| Sampling Date | | | 19-Aug-96 | 7-Oct-96 | 7-Oct-96 | 7-Oct-96 | 19-Aug-96 |
|---|---|---|---|---|---|---|---|
| | | | Pmphse | Pmphse | Pmphse | Pmphse | Channel |
| | | | Florisil | Florisil | Florisil | | Florisil |
| CONGENER | IUPAC # | | Total | Dissolved | Particles | Total | Dissolved |
| | | | #6169 | #6270 | #6265 | | #6163 |
| | | | | | | | |
| 235/245 | 146 | | 0.485 | 0.347 | 0.482 | | 0.344 |
| 245/245+234/236 | 153+132 | | 1.586 | 1.48 | 1.947 | | 1.638 |
| 234/34 | 105 | | 0 | 1.396 | 1.287 | | 0 |
| 2345/25 | 141 | | 0.171 | 0.516 | 0.287 | | 0.212 |
| 2356/236 | 179 | | 0 | 0 | 0 | | 0 |
| 234/235 | 130 | | 0 | 0 | 0 | | 0 |
| 2346/236+2356/34 | 176+163 | | 0.38 | 0.365 | 0.389 | | 0.489 |
| 234/245 | 138 | | 2.095 | 2.123 | 2.521 | | 2.309 |
| 2346/34 | 158 | | 0.231 | 0.28 | 0 | | 0.234 |
| 2345/23 | 129 | | 0.479 | 0 | 0 | | 0.245 |
| 2356/245+2345/246 | 187+181 | | 0.473 | 0.198 | 0.51 | | 1.868 |
| 2346/245 | 183 | | 0.203 | 0 | 0 | | 0.925 |
| 234/234+245/345 | 128+167 | | 0.37 | 0.389 | 0.498 | | 0.726 |
| 23456/25 | 185 | | 0 | 0 | 0 | | 0 |
| 2345/236 | 174 | | 0.229 | 0 | 0.31 | | 0 |
| 2356/234 | 177 | | 0 | 0 | 0 | | 0 |
| 2346/234+2345/34 | 171+156 | | 0 | 0 | 0 | | 0 |
| 2346/2356 | 201 | | 0 | 0 | 0 | | 0 |
| 2345/235 | 172 | | 0.386 | 0 | 0 | | 0 |
| 2345/245 | 180 | | 0.375 | 0.119 | 0.583 | | 0.214 |
| 23456/236 | 200 | | 0 | 0 | 0 | | 0 |
| MIREX | | | 0 | 0 | 0 | | |
| 2345/234+23456/34 | 170+190 | | 0.379 | 0 | 0.56 | | 0 |
| 2345/2356 | 199 | | 0 | 0 | 0 | | 0.34 |
| 23456/245+2345/2346 | 203+196 | | 0.238 | 0 | 0 | | 0 |
| 23456/234 | 208 | | 0 | 0 | 0 | | 0 |
| 2345/2345 | 194 | | 0 | 0 | 0 | | 0 |
| 23456/2345 | 206 | | 0 | 0 | 0 | | 0 |
| DECACHLOROBIPHENYL | 209 | | 18.645 | 23.355 | 22.061 | | 22.552 |
| | | | | | | | |
| | | | | | | | |
| Total (pg/ul) | | | 160.3 | 121.1 | 56.9 | | 118.8 |
| | | | | | | | |
| Total PCB (ng/L) | | | 10.0 | 7.3 | 1.0 | 8.3 | 14.8 |
| Total PCT (ng/L) | | | | ND | ND | ND | ND |
| | | | | | | | |
| Sample volume (L) | | | 16.0 | 16.7 | 57.0 | | 8.0 |
| Final Volume (uL) | | | 1000 | 1000 | 1000 | | 1000 |
| Dilution Factor | | | 1 | 1 | 1 | | 1 |
| % Surrogate Recovery | | | 74.6% | 93.4% | 88.2% | | 90.2% |
| Total Susp. Solids (mg/L) | | | | | 0.5 | | |
| | | | | | | | |

| Sampling Date | | | 19-Aug-96 | 19-Aug-96 | 19-Aug-96 | 19-Aug-96 | 19-Aug-96 |
|---|---|---|---|---|---|---|---|
| | | | Channel | Channel | NP1 Dischrg | NP1 Dischrg | NP1 Dischrg |
| | | | Florisil | | Alumina | Alumina | |
| CONGENER | IUPAC # | | Particles | Total | Dissolved | Particles | Total |
| | | | #6155 | | #6159 | #6182 | |
| 2 | 1 | | 0 | | 7.544 | 7.585 | |
| 4 | 3 | | 0 | | 0 | 0 | |
| 2/2+2/6 | 4+10 | | 5.837 | | 33.126 | 12.147 | |
| 24+25 | 7+9 | | 0 | | 0 | 0 | |
| 2/3 | 6 | | 2.661 | | 2.617 | 5.985 | |
| 2/4+23 | 8+5 | | 7.291 | | 15.301 | 25.338 | |
| HCB | | | 0.163 | | 0 | 0.339 | |
| 26/2 | 19 | | 1.387 | | 2.766 | 4.765 | |
| 25/2 | 18 | | 0.825 | | 1.503 | 3.697 | |
| 4/4+24/2 | 15+17 | | 6.537 | | 6.736 | 32.2 | |
| 236+26/3 | 24+27 | | 1.396 | | 2.074 | 6.263 | |
| 23/2+26/4 | 16+32 | | 4.181 | | 5.19 | 20.575 | |
| 25/3 | 26 | | 1.427 | | 1.414 | 8.692 | |
| 24/3 | 25 | | 0.644 | | 0.891 | 4.77 | |
| 25/4 | 31 | | 3.712 | | 2.851 | 20.669 | |
| 24/4 | 28 | | 2.819 | | 3.11 | 22.254 | |
| 34/2 | 33 | | 0 | | 0 | 0 | |
| 23/4 | 22 | | 0.346 | | 0.48 | 3.469 | |
| 236/2 | 45 | | 0.341 | | 0.275 | 3.297 | |
| 25/25 | 52 | | 13.679 | | 6.566 | 44.222 | |
| 24/25 | 49 | | 5.912 | | 2.474 | 28.017 | |
| 24/24+245/2 | 47+48 | | 0 | | 0 | 0 | |
| 23/25 | 44 | | 4.437 | | 2.452 | 16.899 | |
| 236/3+23/24+34/4 | 59+42+37 | | 1.881 | | 0.985 | 14.846 | |
| 236/4 | 64 | | 1.874 | | 0.924 | 8.387 | |
| 23/23 | 40 | | 1.237 | | 0.538 | 6.305 | |
| 235/26+245/4 | 94+74 | | 1.109 | | 0.361 | 4.619 | |
| 25/34 | 70 | | 3.425 | | 1.556 | 10.529 | |
| 24/34 | 66 | | 12.625 | | 4.717 | 33.777 | |
| 234/4+34/23 | 60+55 | | 0 | | 0 | 3.457 | |
| 245/25 | 101 | | 11.941 | | 4.242 | 27.483 | |
| 245/24 | 99 | | 3.12 | | 0.982 | 7.281 | |
| 245/23 | 97 | | 2.813 | | 1.063 | 6.591 | |
| 234/25 | 87 | | 2.412 | | 0.849 | 5.571 | |
| DDE | | | 0 | | 0 | 0 | |
| 236/236 | 136 | | 0.917 | | 0.281 | 2.455 | |
| 34/34+236/34 | 77+110 | | 10.929 | | 3.367 | 29.132 | |
| 2356/25+234/23 | 151+82 | | 1.968 | | 0.298 | 6.642 | |
| 235/236 | 135 | | 0.938 | | 0.246 | 2.857 | |
| 2356/24 | 147 | | 0.369 | | 0 | 1.569 | |
| 236/245 | 149 | | 4.395 | | 1.21 | 13.563 | |
| 245/34 | 118 | | 3.442 | | 1.079 | 9.572 | |
| 2356/23 | 134 | | 0.422 | | 0 | 1.802 | |

| Sampling Date | | | 19-Aug-96 | 19-Aug-96 | 19-Aug-96 | 19-Aug-96 | 19-Aug-96 |
|---|---|---|---|---|---|---|---|
| | | | Channel | Channel | NP1 Dischrg | NP1 Dischrg | NP1 Dischrg |
| | | | Florisil | | Alumina | Alumina | |
| CONGENER | IUPAC # | | Particles | Total | Dissolved | Particles | Total |
| | | | #6155 | | #6159 | #6182 | |
| | | | | | | | |
| 235/245 | 146 | | 1.21 | | 0 | 5.11 | |
| 245/245+234/236 | 153+132 | | 3.583 | | 0.917 | 12.298 | |
| 234/34 | 105 | | 0. | | 0.58 | 0 | |
| 2345/25 | 141 | | 0.758 | | 0.119 | 2.59 | |
| 2356/236 | 179 | | 0.681 | | 0 | 3.272 | |
| 234/235 | 130 | | 0.256 | | 0 | 0.875 | |
| 2346/236+2356/34 | 176+163 | | 0.803 | | 0.645 | 4.03 | |
| 234/245 | 138 | | 4.894 | | 1.169 | 16.747 | |
| 2346/34 | 158 | | 0.476 | | 0 | 1.609 | |
| 2345/23 | 129 | | 1.357 | | 0 | 7.725 | |
| 2356/245+2345/246 | 187+181 | | 1.95 | | 0.16 | 9.69 | |
| 2346/245 | 183 | | 0.667 | | 0 | 4.428 | |
| 234/234+245/345 | 128+167 | | 0.918 | | 0.204 | 3.819 | |
| 23456/25 | 185 | | 0 | | 0 | 1.013 | |
| 2345/236 | 174 | | 1.073 | | 0 | 5.7 | |
| 2356/234 | 177 | | 0.866 | | 0 | 4.163 | |
| 2346/234+2345/34 | 171+156 | | 0.714 | | 0 | 3.166 | |
| 2346/2356 | 201 | | 0.573 | | 0 | 3.449 | |
| 2345/235 | 172 | | 1.83 | | 0 | 11.532 | |
| 2345/245 | 180 | | 2.377 | | 0.165 | 13.522 | |
| 23456/236 | 200 | | 0 | | 0 | 0 | |
| MIREX | | | 0 | | 0 | 2.308 | |
| 2345/234+23456/34 | 170+190 | | 2.55 | | 0 | 15.211 | |
| 2345/2356 | 199 | | 2.495 | | 0 | 15.169 | |
| 23456/245+2345/2346 | 203+196 | | 1.981 | | 0 | 12.756 | |
| 23456/234 | 208 | | 0.205 | | 0 | 1.51 | |
| 2345/2345 | 194 | | 1.174 | | 0 | 10.588 | |
| 23456/2345 | 206 | | 0.177 | | 0 | 1.433 | |
| DECACHLOROBIPHENYL | 209 | | 18.593 | | 21.906 | 17.95 | |
| | | | | | | | |
| | | | | | | | |
| Total (pg/ul) | | | 162.8 | | 124.0 | 638.7 | |
| | | | | | | | |
| Total PCB (ng/L) | | | 2.9 | 17.7 | 15.3 | 11.2 | 26.5 |
| Total PCT (ng/L) | | | ND | ND | 0.7 | 17.8 | 18.5 |
| | | | | | | | |
| Sample volume (L) | | | 57.0 | | 8.1 | 57.0 | |
| Final Volume (uL) | | | 1000 | | 1000 | 1000 | |
| Dilution Factor | | | 1 | | 1 | 1 | |
| % Surrogate Recovery | | | 74.4% | | 87.6% | 71.8% | |
| Total Susp. Solids (mg/L) | | | 7.7 | | | 4.0 | |
| | | | | | | | |

Concentration

| Sampling Date | | | 19-Aug-96 | 7-Oct-96 | 7-Oct-96 | 7-Oct-96 | 19-Aug-96 |
|---|---|---|---|---|---|---|---|
| | | | NP2 Beg. | NP2 Beg. | NP2 Beg. | NP2 Beg. | NP2 Dischrg |
| | | | Florisil | Alumina | Alumina | | Alumina |
| CONGENER | IUPAC # | | Total | Dissolved | Particle | Total | Dissolved |
| | | | #6168 | #6255 | #6271 | | #6161 |
| 2 | 1 | | 199.963 | 79.375 | 6.743 | | 273.658 |
| 4 | 3 | | 33.228 | 9.792 | 0 | | 0 |
| 2/2+2/6 | 4+10 | | 322.587 | 140.044 | 26.943 | | 402.573 |
| 24+25 | 7+9 | | 6.555 | 1.798 | 0 | | 6.944 |
| 2/3 | 6 | | 72.87 | 25.151 | 9.645 | | 84.152 |
| 2/4+23 | 8+5 | | 464.148 | 175.148 | 59.328 | | 540.556 |
| HCB | | | 0.398 | 0 | 0 | | 0.328 |
| 26/2 | 19 | | 68.722 | 22.9 | 10.835 | | 82.533 |
| 25/2 | 18 | | 25.28 | 0 | 0 | | 28.441 |
| 4/4+24/2 | 15+17 | | 226.848 | 91.111 | 87.774 | | 237.543 |
| 236+26/3 | 24+27 | | 68.864 | 20.326 | 17.949 | | 82.147 |
| 23/2+26/4 | 16+32 | | 161.474 | 43.359 | 49.136 | | 187.875 |
| 25/3 | 26 | | 42.92 | 11.488 | 19.333 | | 44.798 |
| 24/3 | 25 | | 11.982 | 3.54 | 7.436 | | 11.285 |
| 25/4 | 31 | | 132.906 | 33.727 | 55.127 | | 134.342 |
| 24/4 | 28 | | 0 | 0 | 0 | | 0 |
| 34/2 | 33 | | 0 | 0 | 0 | | 0 |
| 23/4 | 22 | | 6.122 | 0 | 0 | | 0 |
| 236/2 | 45 | | 6.377 | 1.901 | 4.517 | | 7.092 |
| 25/25 | 52 | | 79.298 | 21.004 | 74.027 | | 76.673 |
| 24/25 | 49 | | 54.132 | 13.761 | 60.576 | | 53.934 |
| 24/24+245/2 | 47+48 | | 0 | 0 | 0 | | 0 |
| 23/25 | 44 | | 18.886 | 5.3 | 15.979 | | 16.963 |
| 236/3+23/24+34/4 | 59+42+37 | | 19.553 | 5.243 | 17.46 | | 17.647 |
| 236/4 | 64 | | 12.319 | 0 | 0 | | 0 |
| 23/23 | 40 | | 5.418 | 2.188 | 0 | | 8.965 |
| 235/26+245/4 | 94+74 | | 3.756 | 1.082 | 6.114 | | 3.112 |
| 25/34 | 70 | | 5.575 | 1.898 | 6.668 | | 4.404 |
| 24/34 | 66 | | 24.432 | 8.191 | 38.614 | | 21.563 |
| 234/4+34/23 | 60+55 | | 0 | 0 | 0 | | 0 |
| 245/25 | 101 | | 17.245 | 5.027 | 28.631 | | 12.096 |
| 245/24 | 99 | | 4.092 | 1.367 | 7.087 | | 3.091 |
| 245/23 | 97 | | 3.335 | 1.129 | 4.975 | | 2.34 |
| 234/25 | 87 | | 3.075 | 0.982 | 4.291 | | 1.993 |
| DDE | | | 0 | 0 | 0 | | 0 |
| 236/236 | 136 | | 1.592 | 0.347 | 3.847 | | 0.978 |
| 34/34+236/34 | 77+110 | | 17.584 | 5.595 | 34.878 | | 12.212 |
| 2356/25+234/23 | 151+82 | | 4.215 | 0.794 | 8.525 | | 2.23 |
| 235/236 | 135 | | 2.044 | 0.397 | 5.673 | | 1.071 |
| 2356/24 | 147 | | 0.718 | 0 | 2.092 | | 0.386 |
| 236/245 | 149 | | 8.244 | 1.564 | 27.657 | | 4.242 |
| 245/34 | 118 | | 3.977 | 1.256 | 0 | | 2.475 |
| 2356/23 | 134 | | 1.62 | 0 | 1.678 | | 0.439 |

8/19/96, 9/6/96, and 10/7/96

Concentration

| Sampling Date | | 19-Aug-96 | 19-Aug-96 | 7-Oct-96 | 7-Oct-96 | 7-Oct-96 |
|---|---|---|---|---|---|---|
| | | NP2 Dischrg | NP2 Dischrg | Fish Weir | Fish Weir | Fish Weir |
| | | Alumina | | Alumina | Alumina | |
| CONGENER | IUPAC # | Particle | Total | Dissolved | Particulates | Total |
| | | #6184 | | #6289 | #6291 | |
| 235/245 | 146 | 13.178 | | 0.347 | 8.26 | |
| 245/245+234/236 | 153+132 | 12.321 | | 0.967 | 10.446 | |
| 234/34 | 105 | 0 | | 0.799 | 4.72 | |
| 2345/25 | 141 | 1.832 | | 0.195 | 1.523 | |
| 2356/236 | 179 | 8.732 | | 0 | 5.182 | |
| 234/235 | 130 | 1.192 | | 0 | 0.601 | |
| 2346/236+2356/34 | 176+163 | 4.046 | | 0.246 | 2.928 | |
| 234/245 | 138 | 26.588 | | 1.339 | 13.863 | |
| 2346/34 | 158 | 0 | | 0 | 0.923 | |
| 2345/23 | 129 | 25.819 | | 0 | 0 | |
| 2356/245+2345/246 | 187+181 | 23.14 | | 0.371 | 14.621 | |
| 2346/245 | 183 | 10.302 | | 0.271 | 5.793 | |
| 234/234+245/345 | 128+167 | 7.625 | | 0 | 3.566 | |
| 23456/25 | 185 | 2.454 | | 0 | 1.782 | |
| 2345/236 | 174 | 11.77 | | 0 | 7.054 | |
| 2356/234 | 177 | 10.356 | | 0 | 5.963 | |
| 2346/234+2345/34 | 171+156 | 6.518 | | 0 | 3.406 | |
| 2346/2356 | 201 | 11.159 | | 0 | 5.182 | |
| 2345/235 | 172 | 38.138 | | 0.577 | 16.287 | |
| 2345/245 | 180 | 28.242 | | 0.222 | 17.315 | |
| 23456/236 | 200 | 1.81 | | 0 | 2.791 | |
| MIREX | | 4.418 | | 0 | 2.397 | |
| 2345/234+23456/34 | 170+190 | 42.679 | | 0.415 | 20.639 | |
| 2345/2356 | 199 | 45.304 | | 0 | 0 | |
| 23456/245+2345/2346 | 203+196 | 34.78 | | 0.295 | 18.599 | |
| 23456/234 | 208 | 0 | | 0 | 2.22 | |
| 2345/2345 | 194 | 19.755 | | 0 | 10.933 | |
| 23456/2345 | 206 | 0 | | 0 | 0 | |
| DECACHLOROBIPHENYL | 209 | 9.136 | | 11.236 | 13.325 | |
| | | | | | | |
| | | | | | | |
| Total (pg/ul) | | 1467.2 | | 746.3 | 765.6 | |
| | | | | | | |
| Total PCB (ng/L) | | 51.5 | 343.3 | 193.8 | 53.7 | 247.6 |
| Total PCT (ng/L) | | 67.5 | 74.7 | 6.9 | 39.6 | 46.5 |
| | | | | | | |
| Sample volume (L) | | 57.0 | | 7.7 | 28.5 | |
| Final Volume (uL) | | 2000 | | 2000 | 2000 | |
| Dilution Factor | | 1 | | 1 | 1 | |
| % Surrogate Recovery | | 73.1% | | 89.9% | 106.6% | |
| Total Susp. Solids (mg/L) | | 4.2 | | | 1.58 | |

8/19/96, 9/6/96, and 10/7/96

Concentration

| Sampling Date | | | 19-Aug-96 | 19-Aug-96 | 7-Oct-96 | 7-Oct-96 | 7-Oct-96 |
|---|---|---|---|---|---|---|---|
| | | | NP2 Dischrg | NP2 Dischrg | Fish Weir | Fish Weir | Fish Weir |
| | | | Alumina | | Alumina | Alumina | |
| CONGENER | IUPAC # | | Particle | Total | Dissolved | Particulates | Total |
| | | | #6184 | | #6289 | #6291 | |
| 2 | 1 | | 12.129 | | 14.529 | 3.597 | |
| 4 | 3 | | 0 | | 0 | 0 | |
| 2/2+2/6 | 4+10 | | 44.073 | | 185.77 | 19.888 | |
| 24+25 | 7+9 | | 1.727 | | 0.826 | 0 | |
| 2/3 | 6 | | 16.325 | | 14.358 | 5.182 | |
| 2/4+23 | 8+5 | | 114.917 | | 90.288 | 38.548 | |
| HCB | | | 0 | | 0 | 0 | |
| 26/2 | 19 | | 18.652 | | 31.791 | 7.752 | |
| 25/2 | 18 | | 0 | | 0 | 4.336 | |
| 4/4+24/2 | 15+17 | | 125.84 | | 122.776 | 57.107 | |
| 236+26/3 | 24+27 | | 31.672 | | 28.451 | 12.668 | |
| 23/2+26/4 | 16+32 | | 88.275 | | 57.188 | 33.783 | |
| 25/3 | 26 | | 28.861 | | 15.111 | 13.77 | |
| 24/3 | 25 | | 8.134 | | 4.306 | 4.752 | |
| 25/4 | 31 | | 95.243 | | 45.506 | 50.089 | |
| 24/4 | 28 | | 0 | | 0 | 0 | |
| 34/2 | 33 | | 33.403 | | 0 | 0 | |
| 23/4 | 22 | | 0 | | 0 | 0 | |
| 236/2 | 45 | | 5.534 | | 2.597 | 2.777 | |
| 25/25 | 52 | | 94.804 | | 29.951 | 52.992 | |
| 24/25 | 49 | | 78.005 | | 19.315 | 44.067 | |
| 24/24+245/2 | 47+48 | | 0 | | 22.441 | 45.743 | |
| 23/25 | 44 | | 21.381 | | 8.593 | 11.911 | |
| 236/3+23/24+34/4 | 59+42+37 | | 28.614 | | 7.934 | 15.386 | |
| 236/4 | 64 | | 0 | | 0 | 9.848 | |
| 23/23 | 40 | | 14.987 | | 3.395 | 7.692 | |
| 235/26+245/4 | 94+74 | | 7.265 | | 1.46 | 5.338 | |
| 25/34 | 70 | | 7.766 | | 2.847 | 5.777 | |
| 24/34 | 66 | | 50.439 | | 10.279 | 31.935 | |
| 234/4+34/23 | 60+55 | | 0 | | 0 | 0 | |
| 245/25 | 101 | | 29.487 | | 5.622 | 20.36 | |
| 245/24 | 99 | | 8.016 | | 1.558 | 5.612 | |
| 245/23 | 97 | | 5.053 | | 1.262 | 3.495 | |
| 234/25 | 87 | | 4.901 | | 1.151 | 2.992 | |
| DDE | | | 0 | | 0 | 0 | |
| 236/236 | 136 | | 4.207 | | 0.392 | 2.395 | |
| 34/34+236/34 | 77+110 | | 46.286 | | 5.848 | 27.111 | |
| 2356/25+234/23 | 151+82 | | 11.082 | | 1.036 | 7.265 | |
| 235/236 | 135 | | 5.63 | | 0.387 | 3.871 | |
| 2356/24 | 147 | | 2.192 | | 0 | 1.474 | |
| 236/245 | 149 | | 30.196 | | 1.467 | 19.476 | |
| 245/34 | 118 | | 0 | | 1.362 | 0 | |
| 2356/23 | 134 | | 4.387 | | 0.425 | 2.021 | |

8/19/96, 9/6/96, and 10/7/96

Concentration

| Sampling Date | | 19-Aug-96 | 7-Oct-96 | 7-Oct-96 | 7-Oct-96 | 19-Aug-96 |
|---|---|---|---|---|---|---|
| | | NP2 Beg. | NP2 Beg. | NP2 Beg. | NP2 Beg. | NP2 Dischrg |
| | | Florisil | Alumina | Alumina | | Alumina |
| CONGENER | IUPAC # | Total | Dissolved | Particle | Total | Dissolved |
| | | #6168 | #6255 | #6271 | | #6161 |
| 235/245 | 146 | 3.108 | 0.4 | 8.133 | | 1.362 |
| 245/245+234/236 | 153+132 | 5.57 | 1 | 11.509 | | 2.493 |
| 234/34 | 105 | 3.043 | 0.771 | 2.818 | | 1.405 |
| 2345/25 | 141 | 0.937 | 0 | 1.824 | | 0.452 |
| 2356/236 | 179 | 2.287 | 0 | 6.262 | | 0.675 |
| 234/235 | 130 | 0.395 | 0 | 0.433 | | 0.179 |
| 2346/236+2356/34 | 176+163 | 3.282 | 0 | 6.353 | | 1.135 |
| 234/245 | 138 | 7.865 | 1.559 | 14.727 | | 4.1 |
| 2346/34 | 158 | 0.533 | 0 | 1.235 | | 0.346 |
| 2345/23 | 129 | 0 | 0.938 | 4.095 | | 1.797 |
| 2356/245+2345/246 | 187+181 | 5.906 | 0.566 | 14.249 | | 1.423 |
| 2346/245 | 183 | 2.709 | 0 | 3.643 | | 0.457 |
| 234/234+245/345 | 128+167 | 1.934 | 0 | 0.744 | | 0.394 |
| 23456/25 | 185 | 0.523 | 0 | 0.983 | | 0 |
| 2345/236 | 174 | 2.541 | 0 | 7.245 | | 0.698 |
| 2356/234 | 177 | 2.132 | 0 | 7.173 | | 0.446 |
| 2346/234+2345/34 | 171+156 | 1.442 | 0 | 3.257 | | 0 |
| 2346/2356 | 201 | 1.867 | 0 | 1.086 | | 0.277 |
| 2345/235 | 172 | 6.251 | 0.673 | 1.247 | | 0.647 |
| 2345/245 | 180 | 6.028 | 0 | 12.62 | | 0.988 |
| 23456/236 | 200 | 1.037 | 0 | 1.154 | | 0 |
| MIREX | | 0.649 | 0 | 0 | | 0 |
| 2345/234+23456/34 | 170+190 | 6.052 | 0 | 7 | | 1.285 |
| 2345/2356 | 199 | 6.58 | 0 | 5.969 | | 0.797 |
| 23456/245+2345/2346 | 203+196 | 5.471 | 0 | 6.357 | | 0.379 |
| 23456/234 | 208 | 0.571 | 0 | 2.358 | | 0 |
| 2345/2345 | 194 | 3.022 | 0 | 5.094 | | 0.195 |
| 23456/2345 | 206 | 0.371 | 0 | 1.852 | | 0.131 |
| DECACHLOROBIPHENYL | 209 | 24.049 | 10.625 | 8.816 | | 21.436 |
| | | | | | | |
| | | | | | | |
| Total (pg/ul) | | 2223.4 | 742.7 | 843.0 | | 2392.8 |
| | | | | | | |
| Total PCB (ng/L) | | 277.9 | 185.7 | 29.6 | 215.3 | 291.8 |
| Total PCT (ng/L) | | | 6.1 | 66.3 | 72.4 | 7.2 |
| | | | | | | |
| Sample volume (L) | | 8.0 | 8.0 | 57.0 | | 8.2 |
| Final Volume (uL) | | 1000 | 2000 | 2000 | | 1000 |
| Dilution Factor | | 1 | 1 | 1 | | 1 |
| % Surrogate Recovery | | 96.2% | 85.0% | 70.5% | | 85.7% |
| Total Susp. Solids (mg/L) | | | | 2.8 | | |

Concentration

| Sampling Date | | 6-Sep-96 | 6-Sep-96 |
|---|---|---|---|
| | | Fish Weir | Fish Weir |
| | | Alumina | Alumina |
| CONGENER | IUPAC # | Total | Total |
| | | #6195 | #6197 |
| | | | |
| 2 | 1 | 16.419 | 13.894 |
| 4 | 3 | 0 | 0 |
| 2/2+2/6 | 4+10 | 36.358 | 30.888 |
| 24+25 | 7+9 | 0 | 0 |
| 2/3 | 6 | 4.76 | 4.022 |
| 2/4+23 | 8+5 | 35.265 | 31.345 |
| HCB | | 0 | 0 |
| 26/2 | 19 | 5.543 | 4.773 |
| 25/2 | 18 | 0 | 0 |
| 4/4+24/2 | 15+17 | 21.279 | 18.909 |
| 236+26/3 | 24+27 | 4.623 | 4.07 |
| 23/2+26/4 | 16+32 | 10.262 | 9.028 |
| 25/3 | 26 | 2.742 | 2.48 |
| 24/3 | 25 | 0.664 | 0.634 |
| 25/4 | 31 | 8.201 | 7.48 |
| 24/4 | 28 | 0 | 0 |
| 34/2 | 33 | 0 | 0 |
| 23/4 | 22 | 0 | 0 |
| 236/2 | 45 | 0 | 0 |
| 25/25 | 52 | 6.682 | 6.015 |
| 24/25 | 49 | 3.963 | 3.766 |
| 24/24+245/2 | 47+48 | | |
| 23/25 | 44 | 1.991 | 1.89 |
| 236/3+23/24+34/4 | 59+42+37 | 1.541 | 1.397 |
| 236/4 | 64 | 0 | 0 |
| 23/23 | 40 | 0 | 0 |
| 235/26+245/4 | 94+74 | 0 | 0 |
| 25/34 | 70 | 0.869 | 0.796 |
| 24/34 | 66 | 3.961 | 3.375 |
| 234/4+34/23 | 60+55 | 0 | 0 |
| 245/25 | 101 | 3.067 | 2.653 |
| 245/24 | 99 | 0.727 | 0.667 |
| 245/23 | 97 | 0.88 | 0.713 |
| 234/25 | 87 | 0.711 | 0.561 |
| DDE | | 0 | 0 |
| 236/236 | 136 | 0 | 0 |
| 34/34+236/34 | 77+110 | 3.747 | 2.998 |
| 2356/25+234/23 | 151+82 | 0 | 0 |
| 235/236 | 135 | 0 | 0 |
| 2356/24 | 147 | 0 | 0 |
| 236/245 | 149 | 1.341 | 1.039 |
| 245/34 | 118 | 1.104 | 0.764 |
| 2356/23 | 134 | 0 | 0 |

# *Appendix E-7*

# Congener-Specific Determination of PCBs in Monitoring Well Samples - 1997

BLASLAND, BOUCK & LEE, INC.
*engineers & scientists*

# Congener-Specific Determination of Polychlorinated Biphenyls in Monitoring Well Water Samples

Prepared for:

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## Summary

Five large-volume water samples were collected to determine if polychlorinated biphenyls (PCB) were present in monitoring wells surrounding the North Ponds/Wetland Complex. Five monitoring wells (MW-2, MW-3, MW-4, MW-5, MW-6) were selected for analysis. All water samples were collected, processed and analyzed by the SUNY Oswego Environmental Research Center (ERC). Results from these samples indicate that PCB were conclusively found in only one sample (MW-5) at 152.1 ng/L total PCB (Tables 1 and 2). The average Cl/biphenyl for MW-5 was 2.54 (Table 3). All other monitoring well samples collected and analyzed were determined to be below the 15 ng/L method detection limit.

The results indicate that MW-5 was directly influenced from the adjacent North Pond 2. The PCB chlorination level found in MW-5 closely matches results from previous water testing conducted in North Pond 2 (Pagano, 1996). Although below the 15 ng/L method detection limit, analysis of average Cl/biphenyl results from MW-2 and MW-4 indicates a possible influence from a low-chlorinated PCB source (Table 3). Additional dissolved/particulate phase testing would be required to fully characterize these monitoring wells.

Table 1. Summary of results from monitoring well water testing conducted at the North Ponds/Wetland Complex. ND (non-detect) indicates results below the 15.0 ng/L Method Detection Limit.

| Monitoring Well | Total PCB (ng/L) |
|---|---|
| MW-2 | ND |
| MW-3 | ND |
| MW-4 | ND |
| MW-5 | 152.1 |
| MW-6 | ND |

## Sampling and Analytical Methods

Large volume water samples were collected in pre-cleaned glass bottles (20 L) utilizing a Teflon bailer and stainless steel funnels according to ERC Standard Operating Procedures (Pagano et al., 1996). Samples were collected by James Pagano and David

Lagoe (Alcan Rolled Products) on September 30, 1997 at five monitoring wells (MW-2, MW-3, MW-4, MW-5, MW-6) throughout the North Ponds/Wetland Complex. Samples were transported to the ERC laboratories and stored at 4°C and processed within three days.

Water samples (8-16 L total) were extracted with hexane in separate 2 L fractions using a 2 L separatory funnel. The combined extracts were dried with anhydrous sodium sulfate; condensed to 2 mL in a Kuderna-Danish (K-D) apparatus; treated with conc. sulfuric acid to remove oxidizable organics; and further treated with tetrabutylammonium hydrogen sulfate (TBA) to remove elemental sulfur (Erickson, 1992; Pagano et al., 1994). Florisil column clean-up utilized 10 grams of 4% deactivated Florisil (60/100 PR grade), placed into a 10x350mm Chromaflex column, with an upper layer (1 cm) of anhydrous sodium sulfate held in place with silanized glass wool. The Florisil column was pre-eluted with 60 mL of hexane which is discarded. The prepared sample extract (acid, TBA) is introduced to the Florisil column and eluted with an additional 60 mL of hexane. The final 60 mL fraction is concentrated by K-D apparatus to 1mL for analysis.

Congener-specific PCB analyses were conducted using capillary column procedures and standards developed at the Wadsworth Center for Laboratories and Research, New York State Department of Health (Bush et al., 1983; Bush et al., 1985). The calibration standard was a 1:1:1:1 mixture of Aroclors 1221, 1016, 1254, and 1260 from the EPA Pesticide Repository each at 200ng/mL, and HCB (5 ng/mL), DDE and Mirex at 10 ng/mL. Analytical instruments were calibrated every six samples. The capillary column utilized was a Hewlett-Packard (HP) Ultra II 25 meter DB-5 with 0.22 mm id and 0.33 um film thickness. The gas chromatographic system used helium as the carrier gas and argon/methane (P5) as the ECD makeup gas. The system was temperature programmed after two minutes at 100 °C to 160 °C at 10 °C/min and then increased by 3 °C/min. to 270 °C and held for 16 min. The injection port and detector were maintained at 330 °C and 270 °C, respectively. A HP Model 5890 II gas chromatograph with an electron capture detector ($Ni^{63}$) was used for data acquisition. Total PCB were calculated by the summation of 68 congeners. Quality Assurance/Quality Control was based on an established program of replicate analyses, surrogate recoveries (decachlorobiphenyl), matrix spikes/matrix spike duplicates, method and reagent blanks. The method detection limit was determined to be 15.0 ng/L; 3x the analytical background for an 8 L water method blank sample.

Chromatographic data was collected and processed by use of the HP 3365 Series II ChemStation software and Microsoft Excel 5.0 spreadsheet procedures. The HP software system generated the identity and amount of each PCB congener. Data was further processed such that the mole percent (congener specific), mole % (homologue), mole % Cl substitution (homologue) and average Cl/biphenyl (total, homologue and Cl substitution) was generated. Coeluting congeners were assumed to be in equal proportions for all spreadsheet calculations (Pagano et al., 1995).

**Results**

The following Tables (1-4) fully characterize the sampling conducted:

Table 1. Alcan Water Testing - Summary of Results from Monitoring Wells in the North Ponds/Wetland Complex.

Table 2. Alcan Water Testing - Monitoring Wells in the North Ponds/Wetland Complex (congener-specific and total PCB - ng/L).

Table 3. Alcan Water Testing - Monitoring Wells in the North Ponds/Wetland Complex (average chlorines/biphenyl).

Table 4. Alcan Water Testing - Monitoring Wells in the North Ponds/Wetland Complex (congener-specific mole %).

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Alcan Water Testing
Monitoring Wells (9/30/97)
Concentration (ng/L)

| CONGENER | IUPAC # | MW 2 Total #7337 | MW 3 Total #7334 | MW 4 Total #7335 | MW 5 Total #7333 | MW 6 Total #7330 |
|---|---|---|---|---|---|---|
| 2 | 1 | 0 | 0 | 0 | 104.39 | 0 |
| 4 | 3 | 0 | 0 | 0 | 18.257 | 0 |
| 2/2+2/6 | 4+10 | 82.674 | 0 | 23.293 | 267.568 | 0 |
| 24+25 | 7+9 | 0 | 0 | 0 | 7.131 | 0 |
| 2/3 | 6 | 0 | 0 | 0 | 46.888 | 0 |
| 2/4+23 | 8+5 | 2.43 | 0.907 | 0 | 87.427 | 1.201 |
| HCB | | 0.368 | 0.255 | 0 | 0.564 | 0.0992 |
| 26/2 | 19 | 21.735 | 0 | 2.02 | 58.094 | 0 |
| 25/2 | 18 | 0.663 | 0.104 | 0 | 45.062 | 0 |
| 4/4+24/2 | 15+17 | 2.618 | 0 | 0 | 132.323 | 0 |
| 236+26/3 | 24+27 | 0.842 | 0 | 0.219 | 38.515 | 0 |
| 23/2+26/4 | 16+32 | 3.292 | 0.163 | 0 | 104.253 | 0.32 |
| 25/3 | 26 | 0 | 0 | 0 | 23.48 | 0 |
| 24/3 | 25 | 0 | 0 | 0 | 7.689 | 0 |
| 25/4 | 31 | 0 | 0.264 | 0.408 | 0 | 0.169 |
| 24/4 | 28 | 1.945 | 0.265 | 0.589 | 118.552 | 0.157 |
| 34/2 | 33 | 0 | 0.708 | 0 | 0 | 0.457 |
| 23/4 | 22 | 0 | 0 | 0 | 4.884 | 0 |
| 236/2 | 45 | 1.134 | 0.363 | 0 | 11.096 | 0 |
| 25/25 | 52 | 14.589 | 8.679 | 7.517 | 55.199 | 4.949 |
| 24/25 | 49 | 0 | 0 | 0 | 36.148 | 0 |
| 24/24+245/2 | 47+48 | 9.818 | 0 | 4.974 | 0 | 2.865 |
| 23/25 | 44 | 5.368 | 2.076 | 2.731 | 23.405 | 1.827 |
| 236/3+23/24+34/4 | 59+42+37 | 1.677 | 0.833 | 0.816 | 16.791 | 0.474 |
| 236/4 | 64 | 0.661 | 0 | 0.389 | 10.044 | 0.285 |
| 23/23 | 40 | 0.5 | 0 | 0 | 5.511 | 0 |
| 235/26+245/4 | 94+74 | 0.94 | 0.16 | 0.238 | 1.718 | 0.161 |
| 25/34 | 70 | 1.81 | 0.53 | 0.752 | 3.699 | 0.763 |
| 24/34 | 66 | 6.907 | 1.382 | 2.403 | 15.87 | 2.278 |
| 234/4+34/23 | 60+55 | 0.663 | 0 | 0 | 2.877 | 0 |
| 245/25 | 101 | 5.363 | 1.477 | 2.604 | 6.285 | 2.934 |
| 245/24 | 99 | 1.877 | 0.362 | 0.716 | 2.279 | 0.824 |
| 245/23 | 97 | 1.168 | 0.546 | 0.707 | 1.679 | 0.878 |
| 234/25 | 87 | 0.92 | 0.343 | 0.577 | 1.131 | 0.64 |
| DDE | | 0 | 0 | 0 | 0 | 0 |
| 236/236 | 136 | 0.857 | 0.393 | 0.347 | 0.496 | 0.384 |
| 34/34+236/34 | 77+110 | 4.7 | 1.866 | 2.573 | 7.396 | 2.754 |
| 2356/25+234/23 | 151+82 | 1.634 | 0 | 0 | 0.737 | 0.392 |
| 235/236 | 135 | 1.341 | 0 | 0.441 | 0.6 | 0.636 |
| 2356/24 | 147 | 0 | 0 | 0 | 0.66 | 0 |
| 236/245 | 149 | 27.125 | 18.858 | 9.317 | 4.582 | 5.642 |
| 245/34 | 118 | 0 | 0 | 2.925 | 2.782 | 2.145 |
| 2356/23 | 134 | 0.497 | 0.233 | 0 | 0.502 | 0 |

Alcan Water Testing
Monitoring Wells (9/30/97)
Concentration (ng/L)

| CONGENER | IUPAC # | MW 2 Total #7337 | MW 3 Total #7334 | MW 4 Total #7335 | MW 5 Total #7333 | MW 6 Total #7330 |
|---|---|---|---|---|---|---|
| 235/245 | 146 | 2.378 | 0 | 0.848 | 1.341 | 0.507 |
| 245/245+234/236 | 153+132 | 4.035 | 0.44 | 0.701 | 1.685 | 0.776 |
| 234/34 | 105 | 0 | 0.0925 | 0.325 | 0.819 | 0.349 |
| 2345/25 | 141 | 0.905 | 0.0385 | 0.132 | 0.338 | 0.124 |
| 2356/236 | 179 | 1.319 | 0 | 0 | 0.588 | 0 |
| 234/235 | 130 | 0.101 | 0 | 0 | 0 | 0 |
| 2346/236+2356/34 | 176+163 | 0.934 | 0 | 0.145 | 0.347 | 0 |
| 234/245 | 138 | 4.168 | 0.369 | 0.829 | 1.993 | 0.884 |
| 2346/34 | 158 | 0.559 | 0 | 0.0891 | 0.186 | 0.0825 |
| 2345/23 | 129 | 1.02 | 0 | 0 | 0.318 | 0.0929 |
| 2356/245+2345/246 | 187+181 | 3.604 | 0.2 | 0.29 | 1.294 | 0.245 |
| 2346/245 | 183 | 1.66 | 0 | 0.0833 | 0.465 | 0.0786 |
| 234/234+245/345 | 128+167 | 0.933 | 0.0986 | 0.169 | 0.492 | 0.179 |
| 23456/25 | 185 | 0.723 | 0 | 0 | 0.199 | 0 |
| 2345/236 | 174 | 4.061 | 0.073 | 0.248 | 0.878 | 0.125 |
| 2356/234 | 177 | 2.469 | 0.127 | 0.235 | 0.548 | 0.0924 |
| 2346/234+2345/34 | 171+156 | 1.492 | 0 | 0.0722 | 0.308 | 0.0981 |
| 2346/2356 | 201 | 1.19 | 0 | 0 | 0.276 | 0 |
| 2345/235 | 172 | 2.035 | 0 | 0 | 1.677 | 0 |
| 2345/245 | 180 | 7.639 | 0.679 | 1.02 | 1.691 | 0.726 |
| 23456/236 | 200 | 0 | 0 | 0 | 0 | 0 |
| MIREX | | 0 | 0 | 0 | 0 | 0 |
| 2345/234+23456/34 | 170+190 | 4.961 | 0.086 | 0.245 | 1.73 | 0.407 |
| 2345/2356 | 199 | 3.089 | 0 | 0.173 | 0 | 0.223 |
| 23456/245+2345/2346 | 203+196 | 3.247 | 0 | 0 | 1.317 | 0 |
| 23456/234 | 208 | 0.614 | 0 | 0 | 0 | 0 |
| 2345/2345 | 194 | 1.329 | 0 | 0.0585 | 0.931 | 0 |
| 23456/2345 | 206 | 1.243 | 0.25 | 0.546 | 0.538 | 0.337 |
| DECACHLOROBIPHENYL | 209 | 21.158 | 19.378 | 18.861 | 24.175 | 21.82 |
| | | | | | | |
| Total (pg/ul) | | 261.5 | 43.0 | 72.8 | 1296.0 | 38.5 |
| Total PCB (ng/L) | | < 15.0 | < 15.0 | < 15.0 | 152.1 | < 15.0 |
| Sample volume (L) | | 18.6 | 12.6 | 18.5 | 8.5 | 8.4 |
| Final Volume (uL) | | 1000 | 1000 | 1000 | 1000 | 1000 |
| Dilution Factor | | 1 | 1 | 1 | 1 | 1 |
| % Surrogate Recovery | | 84.6% | 77.5% | 75.4% | 96.7% | 87.3% |

Alcan Water Testing
Monitoring Wells (9/30/97)
Average Chlorine/Biphenyl

| MW 2 | | | | |
|---|---|---|---|---|
| | Mole % | Ortho | Meta | Para |
| Cl 1 = | 0.00 | 0.00 | 0.00 | 0.00 |
| Cl 2 = | 41.76 | 40.58 | 0.29 | 0.93 |
| Cl 3 = | 12.71 | 11.18 | 0.55 | 0.95 |
| Cl 4 = | 16.76 | 7.04 | 6.06 | 3.66 |
| Cl 5 = | 4.28 | 1.75 | 1.59 | 0.95 |
| Cl 6 = | 13.73 | 6.18 | 4.98 | 2.53 |
| Cl 7 = | 8.10 | 2.97 | 3.37 | 1.76 |
| Cl 8 = | 2.38 | 0.89 | 1.03 | 0.46 |
| Cl 9 = | 0.29 | 0.10 | 0.13 | 0.06 |
| | | | | |
| | 100.00 | 70.68 | 18.01 | 11.31 |
| Avg Cl/BP | 3.71 | 2.17 | 0.97 | 0.56 |

| MW 3 | | | | |
|---|---|---|---|---|
| | Mole % | Ortho | Meta | Para |
| Cl 1 = | 0.00 | 0.00 | 0.00 | 0.00 |
| Cl 2 = | 3.06 | 1.53 | 0.77 | 0.77 |
| Cl 3 = | 5.21 | 2.12 | 1.52 | 1.53 |
| Cl 4 = | 37.64 | 16.24 | 17.38 | 4.08 |
| Cl 5 = | 8.84 | 3.54 | 3.38 | 1.95 |
| Cl 6 = | 42.62 | 21.21 | 14.21 | 7.14 |
| Cl 7 = | 2.22 | 0.74 | 0.93 | 0.55 |
| Cl 8 = | 0.00 | 0.00 | 0.00 | 0.00 |
| Cl 9 = | 0.41 | 0.14 | 0.18 | 0.09 |
| | | | | |
| | 100.00 | 45.53 | 38.36 | 16.11 |
| Avg Cl/BP | 4.91 | 2.26 | 1.86 | 0.80 |

| MW 4 | | | | |
|---|---|---|---|---|
| | Mole % | Ortho | Meta | Para |
| Cl 1 = | 0.00 | 0.00 | 0.00 | 0.00 |
| Cl 2 = | 40.05 | 40.09 | 0.00 | 0.00 |
| Cl 3 = | 5.23 | 3.92 | 0.51 | 0.78 |
| Cl 4 = | 27.22 | 11.52 | 10.06 | 5.65 |
| Cl 5 = | 10.88 | 3.62 | 4.19 | 3.08 |
| Cl 6 = | 13.80 | 6.49 | 4.85 | 2.42 |
| Cl 7 = | 2.16 | 0.76 | 0.88 | 0.52 |
| Cl 8 = | 0.21 | 0.07 | 0.10 | 0.03 |
| Cl 9 = | 0.45 | 0.15 | 0.20 | 0.10 |
| | | | | |
| | 100.00 | 66.61 | 20.79 | 12.59 |
| Avg Cl/BP | 3.63 | 2.02 | 1.01 | 0.60 |

Alcan Water Testing
Monitoring Wells (9/30/97)
Average Chlorine/Biphenyl

| | | | | | | |
|---|---|---|---|---|---|---|
| MW 5 | | | | | | |
| | Mole % | | Ortho | Meta | Para | |
| Cl 1 = | 12.13 | | 10.35 | 0.00 | 1.81 | |
| Cl 2 = | 39.74 | | 28.38 | 3.95 | 7.53 | |
| Cl 3 = | 34.22 | | 20.32 | 4.88 | 8.83 | |
| Cl 4 = | 11.48 | | 5.84 | 4.39 | 1.27 | |
| Cl 5 = | 1.14 | | 0.43 | 0.43 | 0.29 | |
| Cl 6 = | 0.72 | | 0.31 | 0.27 | 0.13 | |
| Cl 7 = | 0.44 | | 0.16 | 0.19 | 0.09 | |
| Cl 8 = | 0.11 | | 0.04 | 0.05 | 0.03 | |
| Cl 9 = | 0.02 | | 0.01 | 0.01 | 0.00 | |
| | | | | | | |
| | 100.00 | | 65.84 | 14.18 | 19.98 | |
| Avg Cl/BP | 2.54 | | 1.57 | 0.46 | 0.52 | |
| | | | | | | |
| | | | | | | |
| MW 6 | | | | | | |
| | Mole % | | Ortho | Meta | Para | |
| Cl 1 = | 0.00 | | 0.00 | 0.00 | 0.00 | |
| Cl 2 = | 4.42 | | 2.21 | 1.11 | 1.11 | |
| Cl 3 = | 4.02 | | 1.75 | 1.08 | 1.16 | |
| Cl 4 = | 41.48 | | 16.40 | 15.69 | 9.43 | |
| Cl 5 = | 23.72 | | 8.28 | 9.09 | 6.38 | |
| Cl 6 = | 21.75 | | 10.08 | 7.85 | 3.76 | |
| Cl 7 = | 3.58 | | 1.20 | 1.46 | 0.92 | |
| Cl 8 = | 0.43 | | 0.16 | 0.21 | 0.05 | |
| Cl 9 = | 0.60 | | 0.20 | 0.27 | 0.13 | |
| | | | | | | |
| | 100.00 | | 40.30 | 36.75 | 22.95 | |
| Avg Cl/BP | 4.70 | | 1.89 | 1.75 | 1.06 | |

Alcan Water Testing
Monitoring Wells (9/30/97)
Mole %

| CONGENER | IUPAC # | | MW 2 Total #7337 | MW 3 Total #7334 | MW 4 Total #7335 | MW 5 Total #7333 | MW 6 Total #7330 |
|---|---|---|---|---|---|---|---|
| 2 | 1 | | 0.00 | 0.00 | 0.00 | 10.32 | 0.00 |
| 4 | 3 | | 0.00 | 0.00 | 0.00 | 1.81 | 0.00 |
| 2/2+2/6 | 4+10 | | 39.96 | 0.00 | 40.05 | 22.38 | 0.00 |
| 24+25 | 7+9 | | 0.00 | 0.00 | 0.00 | 0.60 | 0.00 |
| 2/3 | 6 | | 0.00 | 0.00 | 0.00 | 3.92 | 0.00 |
| 2/4+23 | 8+5 | | 1.17 | 3.06 | 0.00 | 7.31 | 4.42 |
| HCB | | | | | | | |
| 26/2 | 19 | | 9.10 | 0.00 | 3.01 | 4.21 | 0.00 |
| 25/2 | 18 | | 0.28 | 0.30 | 0.00 | 3.27 | 0.00 |
| 4/4+24/2 | 15+17 | | 1.18 | 0.00 | 0.00 | 10.33 | 0.00 |
| 236+26/3 | 24+27 | | 0.35 | 0.00 | 0.33 | 2.79 | 0.00 |
| 23/2+26/4 | 16+32 | | 1.38 | 0.48 | 0.00 | 7.55 | 1.02 |
| 25/3 | 26 | | 0.00 | 0.00 | 0.00 | 1.70 | 0.00 |
| 24/3 | 25 | | 0.00 | 0.00 | 0.00 | 0.56 | 0.00 |
| 25/4 | 31 | | 0.00 | 0.77 | 0.61 | 0.00 | 0.54 |
| 24/4 | 28 | | 0.81 | 0.77 | 0.88 | 8.59 | 0.50 |
| 34/2 | 33 | | 0.00 | 2.07 | 0.00 | 0.00 | 1.46 |
| 23/4 | 22 | | 0.00 | 0.00 | 0.00 | 0.35 | 0.00 |
| 236/2 | 45 | | 0.42 | 0.94 | 0.00 | 0.71 | 0.00 |
| 25/25 | 52 | | 5.39 | 22.38 | 9.88 | 3.53 | 13.93 |
| 24/25 | 49 | | 0.00 | 0.00 | 0.00 | 2.31 | 0.00 |
| 24/24+245/2 | 47+48 | | 3.63 | 0.00 | 6.53 | 0.00 | 8.06 |
| 23/25 | 44 | | 1.98 | 5.35 | 3.59 | 1.50 | 5.14 |
| 236/3+23/24+34/4 | 59+42+37 | | 0.64 | 2.22 | 1.11 | 1.11 | 1.38 |
| 236/4 | 64 | | 0.24 | 0.00 | 0.51 | 0.64 | 0.80 |
| 23/23 | 40 | | 0.18 | 0.00 | 0.00 | 0.35 | 0.00 |
| 235/26+245/4 | 94+74 | | 0.33 | 0.39 | 0.30 | 0.10 | 0.43 |
| 25/34 | 70 | | 0.67 | 1.37 | 0.99 | 0.24 | 2.15 |
| 24/34 | 66 | | 2.55 | 3.56 | 3.16 | 1.01 | 6.41 |
| 234/4+34/23 | 60+55 | | 0.24 | 0.00 | 0.00 | 0.18 | 0.00 |
| 245/25 | 101 | | 1.77 | 3.41 | 3.06 | 0.36 | 7.39 |
| 245/24 | 99 | | 0.62 | 0.84 | 0.84 | 0.13 | 2.07 |
| 245/23 | 97 | | 0.39 | 1.26 | 0.83 | 0.10 | 2.21 |
| 234/25 | 87 | | 0.30 | 0.79 | 0.68 | 0.06 | 1.61 |
| DDE | | | | | | | |
| 236/236 | 136 | | 0.26 | 0.82 | 0.37 | 0.03 | 0.87 |
| 34/34+236/34 | 77+110 | | 1.64 | 4.56 | 3.20 | 0.45 | 7.34 |
| 2356/25+234/23 | 151+82 | | 0.51 | 0.00 | 0.00 | 0.04 | 0.94 |
| 235/236 | 135 | | 0.40 | 0.00 | 0.47 | 0.03 | 1.45 |
| 2356/24 | 147 | | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| 236/245 | 149 | | 8.10 | 39.34 | 9.90 | 0.24 | 12.85 |
| 245/34 | 118 | | 0.00 | 0.00 | 3.44 | 0.16 | 5.40 |
| 2356/23 | 134 | | 0.15 | 0.49 | 0.00 | 0.03 | 0.00 |
| 235/245 | 146 | | 0.71 | 0.00 | 0.90 | 0.07 | 1.15 |

Alcan Water Testing
Monitoring Wells (9/30/97)
Mole %

| CONGENER | IUPAC # | | MW 2 Total #7337 | MW 3 Total #7334 | MW 4 Total #7335 | MW 5 Total #7333 | MW 6 Total #7330 |
|---|---|---|---|---|---|---|---|
| 245/245+234/236 | 153+132 | | 1.21 | 0.92 | 0.75 | 0.09 | 1.77 |
| 234/34 | 105 | | 0.00 | 0.21 | 0.38 | 0.05 | 0.88 |
| 2345/25 | 141 | | 0.27 | 0.08 | 0.14 | 0.02 | 0.28 |
| 2356/236 | 179 | | 0.36 | 0.00 | 0.00 | 0.03 | 0.00 |
| 234/235 | 130 | | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2346/236+2356/34 | 176+163 | | 0.27 | 0.00 | 0.15 | 0.02 | 0.00 |
| 234/245 | 138 | | 1.25 | 0.77 | 0.88 | 0.10 | 2.01 |
| 2346/34 | 158 | | 0.17 | 0.00 | 0.09 | 0.01 | 0.19 |
| 2345/23 | 129 | | 0.30 | 0.00 | 0.00 | 0.02 | 0.21 |
| 2356/245+2345/246 | 187+181 | | 0.98 | 0.38 | 0.28 | 0.06 | 0.51 |
| 2346/245 | 183 | | 0.45 | 0.00 | 0.08 | 0.02 | 0.16 |
| 234/234+245/345 | 128+167 | | 0.28 | 0.21 | 0.18 | 0.03 | 0.41 |
| 23456/25 | 185 | | 0.20 | 0.00 | 0.00 | 0.01 | 0.00 |
| 2345/236 | 174 | | 1.11 | 0.14 | 0.24 | 0.04 | 0.26 |
| 2356/234 | 177 | | 0.67 | 0.24 | 0.23 | 0.03 | 0.19 |
| 2346/234+2345/34 | 171+156 | | 0.43 | 0.00 | 0.07 | 0.02 | 0.21 |
| 2346/2356 | 201 | | 0.30 | 0.00 | 0.00 | 0.01 | 0.00 |
| 2345/235 | 172 | | 0.56 | 0.00 | 0.00 | 0.08 | 0.00 |
| 2345/245 | 180 | | 2.08 | 1.29 | 0.99 | 0.08 | 1.51 |
| 23456/236 | 200 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MIREX | | | | | | | |
| 2345/234+23456/34 | 170+190 | | 1.35 | 0.16 | 0.24 | 0.08 | 0.85 |
| 2345/2356 | 199 | | 0.77 | 0.00 | 0.15 | 0.00 | 0.43 |
| 23456/245+2345/2346 | 203+196 | | 0.81 | 0.00 | 0.00 | 0.06 | 0.00 |
| 23456/234 | 208 | | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2345/2345 | 194 | | 0.33 | 0.00 | 0.05 | 0.04 | 0.00 |
| 23456/2345 | 206 | | 0.29 | 0.41 | 0.45 | 0.02 | 0.60 |

# *Appendix E-8*

## North Ponds Investigation - 1997

BBL®
BLASLAND, BOUCK & LEE, INC.
*engineers & scientists*

## TABLE 6-1

## SUMMARY OF ANALYTICAL RESULTS: TOTAL POLYCHLORINATED BIPHENYLS IN GROUNDWATER AND SURFACE WATER

| Sample Name | Sample Date | Location | Sample Type | Total PCBs |
|---|---|---|---|---|
| MW-2 | 11/11/94 | MW-2 | Groundwater | < 8.0 |
| MW-3 | 11/11/94 | MW-3 | Groundwater | < 8.0 |
| MW-4 | 11/11/94 | MW-4 | Groundwater | < 8.0 |
| MW-5 | 11/11/94 | MW-5 | Groundwater | < 8.0 |
| MW-6 | 11/11/94 | MW-6 | Groundwater | < 8.0 |
| MW-9 | 11/11/94 | MW-9 | Groundwater | < 8.0 |
| SWC-1 | 11/14/94 | NP1-N15 | Surface water | < 8.3 |
| SWC-2 | 11/14/94 | M1-H17 | Surface water | < 8.0 |
| SWC-3 | 11/14/94 | M1-J9 | Surface water | < 8.0 |
| SWC-4 | 11/14/94 | NP2-G4 | Surface water | < 8.0 |
| SWC-5 | 11/14/94 | M2-C7 | Surface water | < 8.0 |
| FB-1 | 11/11/94 | Monitoring Wells | Field Blank | < 8.0 |
| FB-1 | 11/14/94 | Ponds/Marshes | Field Blank | < 8.0 |

Notes:

Polychlorinated Biphenyl (PCB) results in micrograms per liter (ug/L).
Total PCBs analyzed by the Alcan Site-Specific Method (SURCO).

## TABLE 6-2

## SUMMARY OF ANALYTICAL RESULTS: TOTAL POLYCHLORINATED BIPHENYLS IN SEDIMENT

### NORTH POND 1

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | Total PCBs |
|---|---|---|---|---|---|
| NP1 - M14U | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | ND |
| NP1 - M14M | 11/27/95 | North Pond 1 | sediment | 6 to 12 inch | 7.6 |
| NP1 - M14L | 11/27/95 | North Pond 1 | sediment | 12 to 18 inch | 12 |
| NP1 - M15* | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | 4.5 |
| NP1 - M16U | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | ND |
| NP1 - M16M | 11/27/95 | North Pond 1 | sediment | 6 to 12 inch | 40 |
| NP1 - M16L | 11/27/95 | North Pond 1 | sediment | 12 to 18 inch | 52 |
| NP1 - M17 | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | 1.6 |
| NP1 - N15U | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | ND |
| NP1 - N15M | 11/27/95 | North Pond 1 | sediment | 6 to 12 inch | 7.4 |
| NP1 - N15L | 11/27/95 | North Pond 1 | sediment | 12 to 18 inch | 31 |
| NP1 - N16 | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | 6.6 |
| NP1 - O16* | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | ND |
| NP1 - Q17 | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | 16 |
| NP1 - R17 | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | 2.2 |
| | | | **Average** | **0 to 6 inch** | ***3.4*** |
| | | | **Average** | **6 to 12 inch** | ***18.3*** |
| | | | **Average** | **12 to 18 inch** | ***31.7*** |

Notes:
Polychlorinated Biphenyl (PCB) results in milligrams per kilogram (mg/kg).
Total PCBs analyzed by the Alcan Site-Specific Method (SURCO).
"*" - sample was split with Environmental Research Center prior to extraction.
"ND" - PCBs were not detected in the sample.

TABLE 6-2

# SUMMARY OF ANALYTICAL RESULTS: TOTAL POLYCHLORINATED BIPHENYLS IN SEDIMENT

## MARSH 1

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | Total PCBs |
|---|---|---|---|---|---|
| M1 - H16 | 10/13/95 | Marsh 1 | sediment | 0 to 6 inch | 150 J[1] |
| M1 - H17U | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 250 |
| M1 - H17M | 11/16/95 | Marsh 1 | sediment | 6 to 12 inch | 9.2 |
| M1 - H17L | 11/16/95 | Marsh 1 | sediment | 12 to 18 inch | ND |
| M1 - H18 | 10/13/95 | Marsh 1 | sediment | 0 to 6 inch | 100 J[1] |
| M1 - I8 | 11/9/95 | Marsh 1 | sediment | 0 to 6 inch | 22 |
| M1 - I13 | 10/13/95 | Marsh 1 | sediment | 0 to 6 inch | 110 J[1] |
| M1 - I14 | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 330 |
| M1 - I15 | 10/13/95 | Marsh 1 | sediment | 0 to 6 inch | 28 J[1] |
| M1 - I16 | 10/13/95 | Marsh 1 | sediment | 0 to 6 inch | 140 J[1] |
| M1 - I18* | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 89 |
| M1 - I19 | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 3 |
| M1 - J9U* | 11/9/95 | Marsh 1 | sediment | 0 to 6 inch | 66 J[1] |
| M1 - J9M | 11/9/95 | Marsh 1 | sediment | 6 to 12 inch | ND |
| M1 - J9L | 11/9/95 | Marsh 1 | sediment | 12 to 18 inch | ND |
| M1 - J10 | 11/9/95 | Marsh 1 | sediment | 0 to 6 inch | 37 |
| M1 - J11 | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 61 |
| M1 - J12 | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 73 |
| M1 - J13 | 10/13/95 | Marsh 1 | sediment | 0 to 6 inch | 280 J[1] |
| M1 - J14 | 10/13/95 | Marsh 1 | sediment | 0 to 6 inch | 33 J[1] |
| M1 - K8 | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 34 |
| M1 - K9 | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 120 |
| M1 - K10 | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 83 |
| M1 - K11 | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 40 |
| M1 - K12 | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 140 |
| M1 - K13 | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 140 |
| M1 - K14U | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 380 |
| M1 - K14M | 11/16/95 | Marsh 1 | sediment | 6 to 12 inch | 68 |
| M1 - K14L | 11/16/95 | Marsh 1 | sediment | 12 to 18 inch | ND |
| M1 - K15 | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 4.4 |
| M1 - KL11.5 | 12/14/95 | Marsh 1 | sediment | 0 to 6 inch | 60 |
| M1 - L13* | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 8 |
| M1 - L14 | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 24 J[2] |
| | | | Average | 0 to 6 inch | 103.9 |
| | | | Average | 6 to 12 inch | 25.7 |
| | | | Average | 12 to 18 inch | ND |

Notes:

Polychlorinated Biphenyl (PCB) results in milligrams per kilogram (mg/kg).

Total PCBs analyzed by the Alcan Site-Specific Method (SURCO).

"J[1]" - concentration is estimated because hold time was exceeded

"J[2]" - concentration is estimated due to a greater than fifty percent difference between column 1 and column 2 on chromatogram.

"*" - sample was split with Environmental Research Center prior to extraction

"ND" - PCBs were not detected in the sample.

## TABLE 6-2

## SUMMARY OF ANALYTICAL RESULTS: TOTAL POLYCHLORINATED BIPHENYLS IN SEDIMENT

### NORTH POND 2

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | Total PCBs |
|---|---|---|---|---|---|
| NP2 - F3 | 11/7/95 | North Pond 2 | sediment | 0 to 6 inch | 27 |
| NP2 - F4 | 11/7/95 | North Pond 2 | sediment | 0 to 6 inch | 1.4 |
| NP2 - FG4.5 | 12/14/95 | North Pond 2 | sediment | 0 to 6 inch | 1.6 |
| NP2 - G3 | 11/7/95 | North Pond 2 | sediment | 0 to 6 inch | 27 |
| NP2 - G4U | 11/7/95 | North Pond 2 | sediment | 0 to 6 inch | 29 |
| NP2 - G4M | 11/7/95 | North Pond 2 | sediment | 6 to 12 inch | 23 |
| NP2 - G4L | 11/7/95 | North Pond 2 | sediment | 12 to 18 inch | 130 |
| NP2 - G5 | 11/28/95 | North Pond 2 | sediment | 0 to 6 inch | ND |
| NP2 - G5 | 11/28/95 | North Pond 2 | sediment | 0 to 6 inch | ND |
| NP2 - G5 | 11/28/95 | North Pond 2 | sediment | 0 to 6 inch | ND |
| NP2 - G5 | 11/28/95 | North Pond 2 | sediment | 0 to 6 inch | ND |
| NP2 - H2 | 11/7/95 | North Pond 2 | sediment | 0 to 6 inch | 27 |
| NP2 - H3 | 11/7/95 | North Pond 2 | sediment | 0 to 6 inch | 26 |
| NP2 - H4* | 11/9/95 | North Pond 2 | sediment | 0 to 6 inch | 22 |
| NP2 - H5U | 11/9/95 | North Pond 2 | sediment | 0 to 6 inch | 18 |
| NP2 - H5M | 11/9/95 | North Pond 2 | sediment | 6 to 12 inch | 66 $J^2$ |
| NP2 - H5L | 11/9/95 | North Pond 2 | sediment | 12 to 18 inch | 140 $J^2$ |
| NP2 - H6 | 11/9/95 | North Pond 2 | sediment | 0 to 6 inch | 24 $J^2$ |
| NP2 - H7* | 11/9/95 | North Pond 2 | sediment | 0 to 6 inch | ND |
| NP2 - I1 | 11/28/95 | North Pond 2 | sediment | 0 to 6 inch | 12 |
| NP2 - I2 | 11/7/95 | North Pond 2 | sediment | 0 to 6 inch | 28 |
| NP2 - I3U | 11/7/95 | North Pond 2 | sediment | 0 to 6 inch | 31 |
| NP2 - I3M | 11/7/95 | North Pond 2 | sediment | 6 to 12 inch | 21 |
| NP2 - I3L | 11/7/95 | North Pond 2 | sediment | 12 to 18 inch | 92 |
| NP2 - I4 | 11/7/95 | North Pond 2 | sediment | 0 to 6 inch | 21 |
| | | | **Average** | **0 to 6 inch** | **18.4** |
| | | | **Average** | **6 to 12 inch** | **36.7** |
| | | | **Average** | **12 to 18 inch** | **120.7** |

Notes:

Polychlorinated Biphenyl (PCB) results in milligrams per kilogram (mg/kg).

Total PCBs analyzed by the Alcan Site-Specific Method (SURCO).

"$J^2$" - concentration is estimated due to a greater than fifty percent difference between column 1 and column 2 on chromatogram.

"*" - sample was split with Environmental Research Center prior to extraction.

"ND" - PCBs were not detected in the sample.

## TABLE 6-2

## SUMMARY OF ANALYTICAL RESULTS: TOTAL POLYCHLORINATED BIPHENYLS IN SEDIMENT

### MARSH 2

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | Total PCBs |
|---|---|---|---|---|---|
| M2 - A7 | 11/28/95 | Marsh 2 | sediment | 0 to 6 inch | 41 |
| M2 - A8 | 10/25/95 | Marsh 2 | sediment | 0 to 6 inch | 16 |
| M2 - A9 | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | 2.3 |
| M2 - B6 | 11/28/95 | Marsh 2 | sediment | 0 to 6 inch | 29 |
| M2 - B7 | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | 54 |
| M2 - C6 | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | 65 |
| M2 - C7U | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | 20 |
| M2 - C7M | 10/31/95 | Marsh 2 | sediment | 6 to 12 inch | ND |
| M2 - C7L | 10/31/95 | Marsh 2 | sediment | 12 to 18 inch | ND |
| M2 - C8 | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | 8.1 $J^2$ |
| M2 - D5 | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | 1.7 |
| M2 - D6 | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | 7.2 |
| M2 - D7 | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | 60 $J^3$ |
| M2 - D8 | 10/25/95 | Marsh 2 | sediment | 0 to 6 inch | 13 $J^2$ |
| M2 - D9 | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | 16 |
| M2 - D10U | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | 5.7 |
| M2 - D10M | 10/31/95 | Marsh 2 | sediment | 6 to 12 inch | 0.97 |
| M2 - D10L | 10/31/95 | Marsh 2 | sediment | 12 to 18 inch | ND |
| M2 - D11 | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | 48 |
| M2 - E4 | 11/28/95 | Marsh 2 | sediment | 0 to 6 inch | ND |
| M2 - E5 | 10/25/95 | Marsh 2 | sediment | 0 to 6 inch | 62 $J^2$ |
| M2 - E6 | 10/25/95 | Marsh 2 | sediment | 0 to 6 inch | 29 |
| M2 - E7 | 10/25/95 | Marsh 2 | sediment | 0 to 6 inch | 9.9 |
| M2 - E8 | 10/25/95 | Marsh 2 | sediment | 0 to 6 inch | 4.9 |
| M2 - E9 | 10/25/95 | Marsh 2 | sediment | 0 to 6 inch | 4.4 $J^2$ |
| M2 - E10 | 10/25/95 | Marsh 2 | sediment | 0 to 6 inch | 10 $J^2$ |
| M2 - E12U | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | 18 |
| M2 - E12M | 10/31/95 | Marsh 2 | sediment | 6 to 12 inch | ND |
| M2 - E12L | 10/31/95 | Marsh 2 | sediment | 12 to 18 inch | ND |
| M2 - F8 | 10/25/95 | Marsh 2 | sediment | 0 to 6 inch | 5.6 |
| M2 - F11 | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | 0.94 |
| | | | Average | 0 to 6 inch | 21.3 |
| | | | Average | 6 to 12 inch | 0.3 |
| | | | Average | 12 to 18 inch | ND |

Notes:

Polychlorinated Biphenyl (PCB) results in milligrams per kilogram (mg/kg).

Total PCBs analyzed by the Alcan Site-Specific Method (SURCO).

"$J^2$" - concentration is estimated due to a greater than fifty percent difference between column 1 and column 2 on chromatogram.

"$J^3$" - concentration is estimated due to low surrogate recovery

"ND" - PCBs were not detected in the sample.

TABLE 6-2

SUMMARY OF ANALYTICAL RESULTS:
TOTAL POLYCHLORINATED BIPHENYLS IN
SEDIMENT

MARSH 3

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | Total PCBs |
|---|---|---|---|---|---|
| M3 - AA16 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 28 |
| M3 - A15 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 17 J |
| M3 - A17 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 19 |
| M3 - A18 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 24 J |
| M3 - B10 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 9.3 |
| M3 - B13 | 10/25/95 | Marsh 3 | sediment | 0 to 6 inch | 200 $J^2$ |
| M3 - B14 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 120 |
| M3 - B15 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 270 J |
| M3 - B16 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 520 J |
| M3 - B17 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 440 J |
| M3 - B18U | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 71 J |
| M3 - B18M | 10/23/95 | Marsh 3 | sediment | 6 to 12 inch | ND |
| M3 - B18L | 10/23/95 | Marsh 3 | sediment | 12 to 18 inch | 1 |
| M3 - B20 | 11/16/95 | Marsh 3 | sediment | 0 to 6 inch | ND |
| M3 - C11 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 63 |
| M3 - C12 | 10/25/95 | Marsh 3 | sediment | 0 to 6 inch | 14 |
| M3 - C13U | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 320 J |
| M3 - C13M | 10/23/95 | Marsh 3 | sediment | 6 to 12 inch | 1.2 |
| M3 - C13L | 10/23/95 | Marsh 3 | sediment | 12 to 18 inch | ND |
| M3 - C14 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 51 |
| M3 - C15 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 36 |
| M3 - C18 | 10/25/95 | Marsh 3 | sediment | 0 to 6 inch | 67 $J^2$ |
| M3 - C20 | 11/16/95 | Marsh 3 | sediment | 0 to 6 inch | ND |
| M3 - D13 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 76 |
| M3 - D14 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 29 J |
| M3 - D15 | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 14 |
| M3 - D18 | 10/25/95 | Marsh 3 | sediment | 0 to 6 inch | 34 |
| M3 - D19 | 11/16/95 | Marsh 3 | sediment | 0 to 6 inch | ND |
| M3 - E18U | 10/25/95 | Marsh 3 | sediment | 0 to 6 inch | 570 $J^2$ |
| M3 - E18M | 10/25/95 | Marsh 3 | sediment | 6 to 12 inch | 16 |
| M3 - E18L | 10/25/95 | Marsh 3 | sediment | 12 to 18 inch | 1.2 |
| M3 - F17 | 10/25/95 | Marsh 3 | sediment | 0 to 6 inch | 630 $J^2$ |
| M3 - F18 | 10/25/95 | Marsh 3 | sediment | 0 to 6 inch | 120 $J^2$ |
| | | | Average | 0 to 6 inch | 138.6 |
| | | | Average | 6 to 12 inch | 5.7 |
| | | | Average | 12 to 18 inch | 0.7 |

Notes:

Polychlorinated Biphenyl (PCB) results in milligrams per kilogram (mg/kg).

Total PCBs analyzed by the Alcan Site-Specific Method (SURCO).

"J" - concentration is estimated

"$J^2$" - concentration is estimated due to a greater than fifty percent difference between column 1 and column 2 on chromatogram.

"ND" - PCBs were not detected in the sample.

## TABLE 6-2

## SUMMARY OF ANALYTICAL RESULTS: TOTAL POLYCHLORINATED BIPHENYLS IN SEDIMENT

### TRIBUTARY 63

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | Total PCBs |
|---|---|---|---|---|---|
| Trib. 63A | 12/14/95 | Tributary 63 | sediment | 0 to 6 inch | 15 |
| Trib. 63B | 12/14/95 | Tributary 63 | sediment | 0 to 6 inch | 17 |
| Trib. 63C | 12/14/95 | Tributary 63 | sediment | 0 to 6 inch | 3.5 $J^2$ |
| | | | **Average** | **0 to 6 inch** | **11.8** |

Notes:

Polychlorinated Biphenyl (PCB) results in milligrams per kilogram (mg/kg).

Total PCBs analyzed by the Alcan Site-Specific Method (SURCO).

"$J^2$" - concentration is estimated due to a greater than fifty percent difference between column 1 and column 2 on chromatogram.

## TABLE 6-2

## SUMMARY OF ANALYTICAL RESULTS: TOTAL POLYCHLORINATED BIPHENYLS IN SEDIMENT

### FIELD BLANKS

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | Total PCBs |
|---|---|---|---|---|---|
| FB-S D-1 | 10/13/95 | - | field blank | - | ND |
| FB-S D-2 | 10/25/95 | - | field blank | - | ND |
| FB-S D-3 | 10/31/95 | - | field blank | - | ND |
| FB-S D-4 | 11/9/95 | - | field blank | - | ND |
| SED - 5 | 11/27/95 | - | field blank | - | ND |
| SED - 6 | 11/28/95 | - | field blank | - | ND |
| FB-S D-6a | 12/4/95 | - | field blank | - | ND |

Notes:
Polychlorinated Biphenyl (PCB) results in milligrams per kilogram (mg/kg).
Total PCBs analyzed by the Alcan Site-Specific Method (SURCO).
"ND" - PCBs were not detected in the sample.

## TABLE 6-3

## SUMMARY OF ANALYTICAL RESULTS:
## TOTAL POLYCHLORINATED BIPHENYLS BY CONGENERS IN SEDIMENT

| Sample Location | North Pond No. 1 | | Marsh No. 1 | | Marsh No. 3 | |
|---|---|---|---|---|---|---|
| Sample Name<br>Sample Date | NP1-LM16<br>12/14/95 | NP1-ON16<br>12/14/95 | M1-KL14<br>12/14/95 | M1-JK8<br>12/14/95 | M3-C13.5<br>12/14/95 | M3-CD18<br>12/14/95 |
| Sample Interval | | | | | | |
| 0 to 1-inch | 2.76 | 4.67 | 161.01 | 13.77 | 5.78 | 62.62 |
| 1 to 2-inch | S | S | S | S | S | S |
| 2 to 3-inch | 1.57 | 2.65 | 110.28 | 8.05 | 52.68 | 5.86 |
| 3 to 4-inch | S | S | S | S | S | S |
| 4 to 5-inch | 5.31 | 5.63 | 122.81 | 5.28 | 34.59 | 0.62 |
| 5 to 6-inch | S | S | S | S | S | S |
| 6 to 7-inch | 4.23 | 43.62 | 48.31 | 0.82 | 0.33 | 0.39 |
| 7 to 8-inch | S | 16.13 | S | 0.38 | S | S |
| 8 to 9-inch | 2.76 | S | 1.76 | S | 0.34 | 0.11 |

Notes:
Total polychlorinated biphenyls (PCBs) by summation of congeners in milligrams per kilogram (mg/kg).
PCB congeners analyzed using New York Department of Health Wadsworth Center for Laboratories and Research Method by SUNY at Oswego Environmental Research Center.
"S" - sample was stored for future analysis, if required

## TABLE 6-4

## SUMMARY OF ANALYTICAL RESULTS: TOTAL PETROLEUM HYDROCARBONS IN SEDIMENT

### NORTH POND 1

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | TPH |
|---|---|---|---|---|---|
| NP1 - M14U | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | 7,000 |
| NP1 - M14M | 11/27/95 | North Pond 1 | sediment | 6 to 12 inch | 2,600 |
| NP1 - M14L | 11/27/95 | North Pond 1 | sediment | 12 to 18 inch | 7,700 |
| NP1 - M16U | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | 8,500 |
| NP1 - M16M | 11/27/95 | North Pond 1 | sediment | 6 to 12 inch | 12,000 |
| NP1 - M16L | 11/27/95 | North Pond 1 | sediment | 12 to 18 inch | 18,000 |
| NP1 - N15U | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | 6,500 |
| NP1 - N15M | 11/27/95 | North Pond 1 | sediment | 6 to 12 inch | 7,200 |
| NP1 - N15L | 11/27/95 | North Pond 1 | sediment | 12 to 18 inch | 1,300 |
| | | | **Average** | **0 to 6 inch** | **7,333** |
| | | | **Average** | **6 to 12 inch** | **7,267** |
| | | | **Average** | **12 to 18 inch** | **9,000** |

Notes:

Total Petroleum Hydrocarbon (TPH) results in milligrams per kilogram (mg/kg).
TPH analyzed by United States Environmental Protection Agency (USEPA) Method 418.1.
"J" - concentration is estimated.
"ND" - TPH was not detected in the sample.

TABLE 6-4

# SUMMARY OF ANALYTICAL RESULTS: TOTAL PETROLEUM HYDROCARBONS IN SEDIMENT

## MARSH 1

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | TPH |
|---|---|---|---|---|---|
| M1 - H17U | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 39,000 |
| M1 - H17M | 11/16/95 | Marsh 1 | sediment | 6 to 12 inch | 1,400 |
| M1 - H17L | 11/16/95 | Marsh 1 | sediment | 12 to 18 inch | ND |
| M1 - J9U | 11/9/95 | Marsh 1 | sediment | 0 to 6 inch | ND |
| M1 - J9M | 11/9/95 | Marsh 1 | sediment | 6 to 12 inch | ND |
| M1 - J9L | 11/9/95 | Marsh 1 | sediment | 12 to 18 inch | ND |
| M1 - K14U | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | 110,000 |
| M1 - K14M | 11/16/95 | Marsh 1 | sediment | 6 to 12 inch | 69,000 |
| M1 - K14L | 11/16/95 | Marsh 1 | sediment | 12 to 18 inch | ND |
| M1 - KL11.5 | 12/14/95 | Marsh 1 | sediment | 0 to 6 inch | 4,000 |
| | | | **Average** | **0 to 6 inch** | **38,250** |
| | | | **Average** | **6 to 12 inch** | **23,467** |
| | | | **Average** | **12 to 18 inch** | **ND** |

<u>Notes:</u>
Total Petroleum Hydrocarbon (TPH) results in milligrams per kilogram (mg/kg).
TPH analyzed by United States Environmental Protection Agency (USEPA) Method 418.1.
"ND" - TPH was not detected in the sample.

## TABLE 6-4

## SUMMARY OF ANALYTICAL RESULTS: TOTAL PETROLEUM HYDROCARBONS IN SEDIMENT

### NORTH POND 2

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | TPH |
|---|---|---|---|---|---|
| NP2 - G4U | 11/7/95 | North Pond 2 | sediment | 0 to 6 inch | 5,400 J |
| NP2 - G4M | 11/7/95 | North Pond 2 | sediment | 6 to 12 inch | 6,000 J |
| NP2 - G4L | 11/7/95 | North Pond 2 | sediment | 12 to 18 inch | 32,000 J |
| NP2 - H5U | 11/9/95 | North Pond 2 | sediment | 0 to 6 inch | 1,700 |
| NP2 - H5M | 11/9/95 | North Pond 2 | sediment | 6 to 12 inch | 4,200 |
| NP2 - H5L | 11/9/95 | North Pond 2 | sediment | 12 to 18 inch | 5,500 |
| NP2 - I3U | 11/7/95 | North Pond 2 | sediment | 0 to 6 inch | 11,000 J |
| NP2 - I3M | 11/7/95 | North Pond 2 | sediment | 6 to 12 inch | 9,700 J |
| NP2 - I3L | 11/7/95 | North Pond 2 | sediment | 12 to 18 inch | 32,000 J |
| NP2 - FG4.5 | 12/14/95 | North Pond 2 | sediment | 0 to 6 inch | ND |
| | | | **Average** | **0 to 6 inch** | **4,525** |
| | | | **Average** | **6 to 12 inch** | **6,633** |
| | | | **Average** | **12 to 18 inch** | **12,500** |

Notes:
Total Petroleum Hydrocarbon (TPH) results in milligrams per kilogram (mg/kg).
TPH analyzed by United States Environmental Protection Agency (USEPA) Method 418.1.
"J" - concentration is estimated.
"ND" - TPH was not detected in the sample.

TABLE 6-4

# SUMMARY OF ANALYTICAL RESULTS: TOTAL PETROLEUM HYDROCARBONS IN SEDIMENT

## MARSH 2

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | TPH |
|---|---|---|---|---|---|
| M2 - C7U | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | ND |
| M2 - C7M | 10/31/95 | Marsh 2 | sediment | 6 to 12 inch | ND |
| M2 - C7L | 10/31/95 | Marsh 2 | sediment | 12 to 18 inch | ND |
| M2 - D10U | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | ND |
| M2 - D10M | 10/31/95 | Marsh 2 | sediment | 6 to 12 inch | ND |
| M2 - D10L | 10/31/95 | Marsh 2 | sediment | 12 to 18 inch | ND |
| M2 - E12U | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | ND |
| M2 - E12M | 10/31/95 | Marsh 2 | sediment | 6 to 12 inch | ND |
| M2 - E12L | 10/31/95 | Marsh 2 | sediment | 12 to 18 inch | ND |
| | | | **Average** | **0 to 6 inch** | **ND** |
| | | | **Average** | **6 to 12 inch** | **ND** |
| | | | **Average** | **12 to 18 inch** | **ND** |

Notes:

Total Petroleum Hydrocarbon (TPH) results in milligrams per kilogram (mg/kg).

TPH analyzed by United States Environmental Protection Agency (USEPA) Method 418.1.

"J" - concentration is estimated.

"ND" - TPH was not detected in the sample.

# SUMMARY OF ANALYTICAL RESULTS: TOTAL PETROLEUM HYDROCARBONS IN SEDIMENT

## MARSH 3

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | TPH |
|---|---|---|---|---|---|
| M3 - B18U | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 1,100 |
| M3 - B18M | 10/23/95 | Marsh 3 | sediment | 6 to 12 inch | ND |
| M3 - B18L | 10/23/95 | Marsh 3 | sediment | 12 to 18 inch | ND |
| M3 - C13U | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 26,000 |
| M3 - C13M | 10/23/95 | Marsh 3 | sediment | 6 to 12 inch | 1,000 |
| M3 - C13L | 10/23/95 | Marsh 3 | sediment | 12 to 18 inch | ND |
| | | | **Average** | **0 to 6 inch** | **13,550** |
| | | | **Average** | **6 to 12 inch** | **500** |
| | | | **Average** | **12 to 18 inch** | **ND** |

Notes:

Total Petroleum Hydrocarbon (TPH) results in milligrams per kilogram (mg/kg).

TPH analyzed by United States Environmental Protection Agency (USEPA) Method 418.1.

"ND" - TPH was not detected in the sample.

## TABLE 6-4

## SUMMARY OF ANALYTICAL RESULTS: TOTAL PETROLEUM HYDROCARBONS IN SEDIMENT

### FIELD BLANKS

| Sample Name | Sample Date | TPH |
|---|---|---|
| FB-S E D-7 | 12/14/95 | 0.41 J |
| FB-S E D-10 | 12/14/95 | 0.24 J |

Notes:
Total Petroleum Hydrocarbon (TPH) results in milligrams per kilogram (mg/kg).
TPH analyzed by United States Environmental Protection Agency (USEPA) Method 418.1.
"J" - concentration is estimated.
"ND" - TPH was not detected in the sample.

## TABLE 6-5

## SUMMARY OF ANALYTICAL RESULTS: PESTICIDES IN SEDIMENT

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | Pesticides | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | gamma-BHC | beta-BHC | 4,4'-DDE | Total |
| NP1 - M17 | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | 0.026 J | ND | ND | 0.026 J |
| NP1 - N16 | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | 0.044 J | ND | ND | 0.044 J |
| | | | | | | | | |
| M1 - L14 | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | ND | ND | 0.051 | 0.051 |
| M1 - J11 | 11/16/95 | Marsh 1 | sediment | 0 to 6 inch | ND | ND | ND | ND |
| | | | | | | | | |
| NP2 - H3 | 11/7/95 | North Pond 2 | sediment | 0 to 6 inch | ND | ND | ND | ND |
| NP2 - H7 | 11/9/95 | North Pond 2 | sediment | 0 to 6 inch | ND | ND | ND | ND |
| | | | | | | | | |
| M2 - E7 | 10/25/95 | Marsh 2 | sediment | 0 to 6 inch | 0.120 J | ND | ND | 0.120 J |
| M2 - D5 | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | ND | ND | ND | ND |
| | | | | | | | | |
| M3 - B13 | 10/25/95 | Marsh 3 | sediment | 0 to 6 inch | 2.580 | ND | ND | 2.580 |
| M3 - F18 | 10/25/95 | Marsh 3 | sediment | 0 to 6 inch | 1.300 J | 0.750 J | ND | 2.050 J |
| | | | | | | | | |
| FB-S D-9 | 12/14/95 | - | field blank | - | ND | ND | ND | ND |

Notes:
Results in milligrams per kilogram (mg/kg).
Pesticides analyzed by United States Environmental Protection Agency (USEPA) Method 8080.
"ND" - compound was not detected in the sample.
"J" - concentration is estimated

## TABLE 6-6

## SUMMARY OF ANALYTICAL RESULTS: TOTAL ORGANIC CARBON IN SEDIMENT

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | TOC | |
|---|---|---|---|---|---|---|
| NP1 - N15U | 11/27/95 | North Pond 1 | sediment | 0 to 6 inch | 9.7 % | J |
| M1 - KL11.5 | 12/14/95 | Marsh 1 | sediment | 0 to 6 inch | 15.4 % | |
| NP2 - FG4.5 | 12/14/95 | North Pond 2 | sediment | 0 to 6 inch | 4.6 % | |
| M2 - D10U | 10/31/95 | Marsh 2 | sediment | 0 to 6 inch | 9.6 % | |
| M3 - B18U | 10/23/95 | Marsh 3 | sediment | 0 to 6 inch | 18.8 % | J |
| FB-S E D-8 | 12/14/95 | - | field blank | - | 0.0 % | |
| | | | **Average** | **0 to 6 inch** | **11.6 %** | |

Notes:
Total Organic Carbon (TOC) analyzed by the Lloyd-Kahn Method, results in percent.
"J" - Result is estimated

TABLE 6-7

SUMMARY OF ANALYTICAL RESULTS:
TOTAL POLYCHLORINATED BIPHENYLS AND LIPIDS IN
BIOTA
OFF-SITE FISH

| Sample Name | Location | Sample Type | Sample Date | Percent Lipids | | Total PCBs | |
|---|---|---|---|---|---|---|---|
| | | | | NEA | ERC | NEA | ERC |
| B1 | Sterling Lake | Largemouth bass | 11/13/95 | 4.0 | - | ND | - |
| B2 | Sterling Lake | Largemouth bass | 11/13/95 | 3.3 | - | ND | - |
| B3 | Sterling Lake | Largemouth bass | 11/13/95 | 3.5 | - | ND | - |
| B4 | Sterling Lake | Largemouth bass | 11/13/95 | 1.9 | - | ND | - |
| B5 | Sterling Lake | Largemouth bass | 11/13/95 | 3.7 | - | ND | - |
| B6 | Sterling Lake | Largemouth bass | 11/13/95 | 3.5 | - | ND | - |
| B7 | Sterling Lake | Largemouth bass | 11/13/95 | 3.8 | - | ND | - |
| B8 | Sterling Lake | Largemouth bass | 11/13/95 | 1.6 | - | ND | - |
| B9 | Sterling Lake | Largemouth bass | 11/13/95 | 2.4 | - | ND | - |
| B10 | Sterling Lake | Largemouth bass | 11/13/95 | 3.7 | - | ND | - |
| C1 | Sterling Lake | Carp | 11/13/95 | 17 | - | 2.6 | - |
| C2 | Sterling Lake | Carp | 11/13/95 | 17 | - | 0.66 | - |
| C3 | Sterling Lake | Carp | 11/13/95 | 15 | - | 1.8 | - |
| C4 | Sterling Lake | Carp | 11/13/95 | 8.8 | - | ND | - |
| C5 | Sterling Lake | Carp | 11/13/95 | 6.8 | - | 1.5 | - |
| C6 | Sterling Lake | Carp | 11/13/95 | 27 | - | 7.3 | - |
| C7** | Sterling Lake | Carp | 11/13/95 | 1.6 | 1.6 | ND | 0.09 |
| C8 | Sterling Lake | Carp | 11/13/95 | 14 | - | 1.6 | - |
| C9 | Sterling Lake | Carp | 11/13/95 | 19 | - | 8.5 | - |
| C10 | Sterling Lake | Carp | 11/13/95 | 11 | - | 5.2 | - |
| | | **Average** | **Largemouth bass** | **3.1** | - | **ND** | - |
| | | **Average** | **Carp** | **13.7** | - | **2.9** | - |

Notes:
Polychlorinated Biphenyl (PCB) results in milligrams per kilogram (mg/kg).
Total PCBs analyzed by Northeast Analytical Laboratories (NEA) using the Alcan Site-Specific Method (SURCO).
"**" - sample extract was split with Environmental Research Center (ERC).
"ND" - PCBs were not detected in the sample.

# TABLE 6-7

## SUMMARY OF ANALYTICAL RESULTS: TOTAL POLYCHLORINATED BIPHENYLS AND LIPIDS IN BIOTA ON-SITE FISH/TURTLE

| Sample Name | Location | Sample Type | Sample Date | Percent Lipids | | Total PCBs | |
|---|---|---|---|---|---|---|---|
| | | | | NEA | ERC | NEA | ERC |
| - | - | - | - | - | - | - | - |
| NP1-G1 | North Pond 1 | Goldfish | 8/13/96 | 0.9 | - | 0.59 | - |
| NP1-SF3 | North Pond 1 | Small Fish (goldfish) | 11/28/95 | 2.8 | - | 1.7 | - |
| NP1-SF4** | North Pond 1 | Small Fish (shiners) | 11/28/95 | 4.5 | 4.5 | 2.8 | 2.02 |
| - | - | - | - | - | - | - | - |
| M1-B14 | Marsh 1 | Largemouth bass | 10/24/95 | 1.7 | - | 11.0 | - |
| M1-B15 | Marsh 1 | Largemouth bass | 10/24/95 | 1.0 | - | 12.0 | - |
| M1-B16 | Marsh 1 | Largemouth bass | 8/13/96 | 1.8 | - | 3.2 | - |
| M1-B20 | Marsh 1 | Largemouth bass | 8/13/96 | 1.0 | - | 13.0 | - |
| M1-G3*/** | Marsh 1 | Goldfish | 10/24/95 | 6.2 | 6.4/6.2 | 39.0 | 35.65/29.74 |
| M1-G4 | Marsh 1 | Goldfish | 10/24/95 | 9.2 | - | 36.0 | - |
| M1-G5 | Marsh 1 | Goldfish | 11/28/95 | 8.1 | - | 28.0 | - |
| M1-SF2 | Marsh 1 | Small Fish (bluegills) | 11/28/95 | 2.3 | - | 11.0 | - |
| - | - | - | - | - | - | - | - |
| NP2-B13 | North Pond 2 | Largemouth bass | 11/28/95 | 1.4 | - | 21.0 J | - |
| NP2-B18 | North Pond 2 | Largemouth bass | 8/13/96 | 1.6 | - | 28.0 | - |
| NP2-B19 | North Pond 2 | Largemouth bass | 8/13/96 | 1.0 | - | 11.0 | - |
| NP2-G6 | North Pond 2 | Goldfish | 8/13/96 | 3.0 | - | 13.0 | - |
| NP2-G7 | North Pond 2 | Goldfish | 8/13/96 | 3.3 | - | 22.0 | - |
| NP2-G8 | North Pond 2 | Goldfish | 8/13/96 | 2.2 | - | 9.4 | - |
| NP2-SF1 | North Pond 2 | Small Fish (bass) | 11/28/95 | 2.4 | - | 7.5 | - |
| - | - | - | - | - | - | - | - |
| M2-B11 | Marsh 2 | Largemouth bass | 10/24/95 | 1.0 | - | 7.0 | - |
| M2-B12*/** | Marsh 2 | Largemouth bass | 10/24/95 | 1.4 | 2.0/1.4 | 8.1 | 6.27/4.25 |
| M2-B17 | Marsh 2 | Largemouth bass | 8/13/96 | 2.0 | - | 12.0 | - |
| M2-G2 | Marsh 2 | Goldfish | 8/13/96 | 4.3 | - | 27.0 | - |
| M2-G9 | Marsh 2 | Goldfish | 8/13/96 | 1.1 | - | 13.0 | - |
| M2-G10 | Marsh 2 | Goldfish | 8/13/96 | 2.2 | - | 10.0 | - |
| Turtle | Marsh 2 | Snapping Turtle (male forelimb) | 10/12/95 | 0.4 | - | 3.2 | - |

Notes:

Polychlorinated Biphenyl (PCB) results in milligrams per kilogram (mg/kg).

Total PCBs analyzed by Northeast Analytical Laboratories (NEA) using the Alcan Site-Specific Method (SURCO).

"*" - sample was split with Environmental Research Center (ERC) prior to extraction.

"**" - sample extract was split with ERC.

"J" - concentration is estimated

"ND" - PCBs were not detected in the sample.

TABLE 6-7

SUMMARY OF ANALYTICAL RESULTS:
TOTAL POLYCHLORINATED BIPHENYLS AND LIPIDS IN
BIOTA
VEGETATION

| Sample Name | Location | Sample Type | Sample Date | Percent Lipids | | Total PCBs | |
|---|---|---|---|---|---|---|---|
| | | | | NEA | ERC | NEA | ERC |
| Veg-2 | North Pond 1 | Milfoil | 11/28/95 | 0.4 | - | ND | - |
| Veg-3* | North Pond 1 | Milfoil | 11/28/95 | 0.3 | | ND | |
| - | - | - | - | - | - | - | - |
| Veg-1** | Marsh 1 | Milfoil | 11/28/95 | 0.4 | 0.4 | 2.6 | 2.26 |
| Veg-7 | Marsh 1 | Milfoil | 11/28/95 | 0.4 | - | 0.75 | - |
| - | - | - | - | - | - | - | - |
| Veg-4 | North Pond 2 | Milfoil | 11/28/95 | 0.4 | - | 0.6 | - |
| - | - | - | - | - | - | - | - |
| Veg-5 | Marsh 2 | Milfoil | 11/28/95 | 0.2 | - | ND | - |
| Veg-6 | Marsh 2 | Milfoil | 11/28/95 | 0.5 | - | 0.71 | - |

Notes:
Polychlorinated Biphenyl (PCB) results in milligrams per kilogram (mg/kg).
Total PCBs analyzed by Northeast Analytical Laboratories (NEA) using the Alcan Site-Specific Method (SURCO).
"*" - sample was split with Environmental Research Center (ERC) prior to extraction.
"**" - sample extract was split with ERC.
"ND" - PCBs were not detected in the sample.

TABLE 6-8

## SUMMARY OF ANALYTICAL RESULTS: TOTAL POLYCHLORINATED BIPHENYLS IN SOIL

| Sample Name | Sample Date | Location | Sample Type | Sample Interval | Total PCBs |
|---|---|---|---|---|---|
| SS-Comp1 | 12/4/95 | Compost Piles | soil | 0 to 6 inch | ND |
| SS-Comp2 | 12/4/95 | Compost Piles | soil | 0 to 6 inch | ND |
| SS-CMLF1 | 12/4/95 | Cold Mill Landfill | soil | 0 to 6 inch | 1.7 $J^2$ |
| SS-CMLF2 | 12/4/95 | Cold Mill Landfill | soil | 0 to 6 inch | 20 $J^2$ |
| SS-IB1 | 12/4/95 | Former Backwash Outfall | soil | 0 to 6 inch | ND |
| SS-IB2 | 12/4/95 | Former Backwash Outfall | soil | 0 to 6 inch | 1.9 |
| FB-SS-1 | 12/4/95 | - | field blank | - | ND |

Notes:
Polychlorinated Biphenyl (PCB) results in milligrams per kilogram (mg/kg).
Total PCBs analyzed by the Alcan Site-Specific Method (SURCO).
"$J^2$" - concentration is estimated due to a greater than fifty percent difference between column 1 and column 2 on chromatogram.
"ND" - PCBs were not detected in the sample.

TABLE 6-9

PHYSICOCHEMICAL DATA:
OVERBURDEN GROUNDWATER

| Well Designation | Sampling Date | Purge Method | pH | Temperature (°F) | Conductivity (uS) | Turbidity (NTU) |
|---|---|---|---|---|---|---|
| MW-2 | 11/10/94 | Pump | 6.87 | 57.1 | 1,295 | 48.1 |
| MW-3 | 11/10/94 | Bailer | 7.50 | 50.9 | 569 | 16.2 |
| MW-4 | 11/10/94 | Pump | 7.02 | 55.5 | 382 | 167.8 |
| MW-5 | 11/10/94 | Pump | 7.03 | 65.2 | 658 | 5.7 |
| MW-6 | 11/10/94 | Pump | 7.51 | 51.0 | 235 | 67.0 |
| MW-9 | 11/10/94 | Bailer | 7.98 | 54.3 | 366 | 81.5 |

Notes:
°F - Fahrenheit
uS - microSiemens
NTU - Nephelometric turbidity units

## TABLE 6-10

## SURFACE WATER ELEVATION DATA

| Gauge Number | Location | Elevation of Zero on Gauge (feet NGVD) | Elevation of Top of Stake (feet NGVD) | Gauge Reading 12/13/95 (feet NGVD) | Water Elevation 12/13/95 (feet NGVD) |
|---|---|---|---|---|---|
| 1 | Marsh 3 | 246.71 | 250.75 | 0.98 | 247.69 |
| 2 | Lake Ontario | 245.28 | 248.82 | Gauge Damaged | 244.86 * |
| 3 | Marsh 2 | 248.49 | 252.54 | 0.98 | 249.47 |
| 4 | Marsh 2 | 248.74 | 252.65 | 0.74 | 249.48 |
| 5 | North Pond 2 | 252.11 | 255.65 | 1.42 | 253.53 |
| 6 | Marsh 1 | 251.86 | 255.77 | 1.74 | 253.6 |
| 7 | Marsh 1 | 252.67 | 256.22 | 0.84 | 253.51 |
| 8 | North Pond 1 | 254.49 | 257.53 | 1.64 | 256.13 |

Notes:
Feet NGVD - Elevation in feet relative to National Geodetic Vertical Datum of 1929
Vertical datum is USGS Benchmark N-25 (NGVD 29)
* Water elevation obtained from the National Oceanic and Atmospheric Administration (NOAA) using Gauge Numbers 2000 in Cape Vincent, New York and 2030 in Oswego, New York on 12/13/95.

## TABLE 7-1
## PCB CONCENTRATIONS IN SURFACE WATER

| Sampling Location | Number of Samples | Total PCB Concentration (ng/L) | |
|---|---|---|---|
| | | | |
| Pumphouse (Lake Ontario Intake) | 3 | 8.3 to 11.5 | 9.9 |
| Channel to North Ponds No. 1 | 2 | 8.8 to 17.7 | 13.3 |
| North Pond No. 1 Inverted Discharge | 2 | 18.9 to 26.5 | 22.7 |
| North Pond No. 2 Beginning | 3 | 149 to 278 | 214 |
| North Pond No. 2 Discharge | 2 | 343 to 439 | 291 |
| Fish Weir - Outfall 002 | 5 | 248 to 508 | 405 |
| *Mean* | - | - | *209* |

Source: Pagano, 1996

## TABLE 7-2
## ANALYTICAL RESULTS SUMMARY TABLE
## SURFACE WATER

| Parameter | Sample Location | Frequency of Detections | Total Number of Samples | Maximum Concnetration (mg/L) | Study | Reliability |
|---|---|---|---|---|---|---|
| Total PCBs | North Pond No.1 | 0 | 4 | ND | D&M 1991 Report | 1 |
| Total PCBs | North Pond No. 2 | 0 | 8 | ND | D&M 1991 Report | 1 |
| Chloroethane | surface water | 1 | 1 | 2 | D&M 1991 Report | 1 |
| Endosulfan Sulfate | surface water | 1 | 1 | 0.067 | D&M 1991 Report | 1 |
| Aluminum | surface water | 1 | 1 | 108 | D&M 1991 Report | 1 |
| Barium | surface water | 1 | 1 | 117 | D&M 1991 Report | 1 |
| Calcium | surface water | 1 | 1 | 61,900 | D&M 1991 Report | 1 |
| Iron | surface water | 1 | 1 | 2,570 | D&M 1991 Report | 1 |
| Lead | surface water | 1 | 1 | 21 | D&M 1991 Report | 1 |
| Magnesium | surface water | 1 | 1 | 19,800 | D&M 1991 Report | 1 |
| Manganese | surface water | 1 | 1 | 3,370 | D&M 1991 Report | 1 |
| Nickel | surface water | 1 | 1 | 57.7 | D&M 1991 Report | 1 |
| Potassium | surface water | 1 | 1 | 7,970 | D&M 1991 Report | 1 |
| Sodium | surface water | 1 | 1 | 50,500 | D&M 1991 Report | 1 |
| Zinc | surface water | 1 | 1 | 24.1 | D&M 1991 Report | 1 |

## TABLE 7-3
## SUMMARY OF SEDIMENT ANALYTICAL RESULTS

| Parameters | Sample Location | Sample Interval (inches) | Frequency of Detections | Total Number of Samples | Maximum Concentration (mg/kg) | Study | Reliability |
|---|---|---|---|---|---|---|---|
| *Volatile Organic Compounds* | | | | | | | |
| Acetone | Marsh No. 1 | 0-6 | 2 | 2 | 0.13 | D&M 1991 | 1 |
| Acetone | North Pond No. 2 | 0-6 | 2 | 2 | 0.27 | D&M 1991 | 1 |
| Acetone | Marsh No. 2 | 0-6 | 1 | 1 | 0.026 | D&M 1991 | 1 |
| Chlorobenzene | Marsh No. 1 | 0-6 | 1 | 2 | 0.003 | D&M 1991 | 1 |
| Chlorobenzene | Marsh No. 2 | 0-6 | 1 | 1 | 0.003 | D&M 1991 | 1 |
| Carbon Disulfide | North Pond No. 2 | 0-6 | 1 | 2 | 1.4 | D&M 1991 | 1 |
| *Semi-Volatile Organic Compounds* | | | | | | | |
| Chrysene | Marsh No. 2 | 0-6 | 1 | 1 | 0.054 | D&M 1991 | 1 |
| bis(2-ethylbexy)phahalte | Marsh No. 1 | 0-6 | 2 | 2 | 0.97 | D&M 1991 | 1 |
| bis(2-ethylbexy)phahalte | Marsh No. 2 | 0-6 | 1 | 1 | 0.49 | D&M 1991 | 1 |
| *Pesticides* | | | | | | | |
| Dieldrin | North Pond No. 2 | | 1 | 2 | 0.28 | D&M 1991 | 1 |
| Endrin | North Pond No. 2 | 0-6 | 2 | 2 | 1.3 | D&M 1991 | 1 |
| Endosulfan 13 | North Pond No. 2 | 0-6 | 1 | 2 | 0.14 | D&M 1991 | 1 |
| 4-4'-DDT | North Pond No. 2 | 0-6 | 2 | 2 | 3.4 | D&M 1991 | 1 |
| 4,4'-DDT | Marsh No. 2 | 0-6 | 1 | 1 | 0.19 | D&M 1991 | 1 |
| Methoxychlor | Marsh No. 1 | 0-6 | 1 | 2 | 0.027 | D&M 1991 | 1 |
| Methoxychlor | North Pond No. 2 | 0-6 | 2 | 2 | 4.4 | D&M 1991 | 1 |
| Endrin Ketone | North Pond No. 2 | 0-6 | 1 | 2 | 1.3 | D&M 1991 | 1 |
| gamma-BHC | North Pond No. 1 | 0-6 | 2 | 2 | 0.044 | D&M 1997 | 1 |
| 4-4'DDE | Marsh No. 1 | 0-6 | 1 | 2 | 0.051 | D&M 1997 | 1 |
| gamma-BHC | Marsh No. 2 | 0-6 | 1 | 2 | 0.12 | D&M 1997 | 1 |
| gamma-BHC | Marsh No. 3 | 0-6 | 2 | 2 | 2.58 | D&M 1997 | 1 |
| beta-BHC | Marsh No. 3 | 0-6 | 1 | 2 | 0.75 | D&M 1997 | 1 |
| *Total Petroleum Hydrocarbons* | | | | | | | |
| TPH | North Pond No. 1 | 0-6 | 3 | 3 | 8,500 | D&M 1997 | 1 |
| TPH | North Pond No. 1 | 6-12 | 3 | 3 | 12,000 | D&M 1997 | 1 |
| TPH | North Pond No. 1 | 12-18 | 3 | 3 | 18,000 | D&M 1997 | 1 |
| TPH | Marsh No. 1 | 0-6 | 3 | 4 | 110,000 | D&M 1997 | 1 |
| TPH | Marsh No. 1 | 6-12 | 2 | 3 | 69,000 | D&M 1997 | 1 |
| TPH | North Pond No. 2 | 0-6 | 3 | 4 | 11,000 | D&M 1997 | 1 |
| TPH | North Pond No. 2 | 6-12 | 3 | 3 | 9,700 | D&M 1997 | 1 |
| TPH | North Pond No. 2 | 12-18 | 3 | 3 | 32,000 | D&M 1997 | 1 |
| TPH | Marsh No. 3 | 0-6 | 2 | 2 | 26,000 | D&M 1997 | 1 |
| TPH | Marsh No. 3 | 6-12 | 1 | 2 | 1,000 | D&M 1997 | 1 |

## TABLE 7-3
## SUMMARY OF SEDIMENT ANALYTICAL RESULTS

| Parameters | Sample Location | Sample Interval (inches) | Frequency of Detections | Total Number of Samples | Maximum Concentration (mg/kg) | Study | Reliability |
|---|---|---|---|---|---|---|---|
| *Metals* | | | | | | | |
| Aluminum | Marsh No. 1 | 0-6 | 2 | 2 | 11,300 | D&M 1991 | 1 |
| Aluminum | North Pond No. 2 | 0-6 | 2 | 2 | 16,200 | D&M 1991 | 1 |
| Aluminum | Marsh No. 2 | 0-6 | 1 | 1 | 19,800 | D&M 1991 | 1 |
| Arsenic | North Pond No. 2 | 0-6 | 1 | 2 | 6 | D&M 1991 | 1 |
| Arsenic | Marsh No. 2 | 0-6 | 1 | 1 | 4.5 | D&M 1991 | 1 |
| Barium | Marsh No. 1 | 0-6 | 2 | 2 | 110 | D&M 1991 | 1 |
| Barium | North Pond No. 2 | 0-6 | 2 | 2 | 166 | D&M 1991 | 1 |
| Barium | Marsh No. 2 | 0-6 | 1 | 1 | 120 | D&M 1991 | 1 |
| Calcium | Marsh No. | 0-6 | 2 | 2 | 5,810 | D&M 1991 | 1 |
| Calcium | North Pond No. 2 | 0-6 | 2 | 2 | 18,000 | D&M 1991 | 1 |
| Calcium | Marsh No. 2 | 0-6 | 1 | 1 | 3,930 | D&M 1991 | 1 |
| Chromium | Marsh No. 1 | 0-6 | 1 | 2 | 7.2 | D&M 1991 | 1 |
| Chromium | North Pond No. | 0-6 | 2 | 2 | 54 | D&M 1991 | 1 |
| Chromium | Marsh No. 2 | 0-6 | 1 | 1 | 30.6 | D&M 1991 | 1 |
| Cobalt | Marsh No. 2 | 0-6 | 1 | 1 | 11.3 | D&M 1991 | 1 |
| Copper | Marsh No. 1 | 0-6 | 2 | 2 | 7.8 | D&M 1991 | 1 |
| Copper | North Pond No. 2 | 0-6 | 2 | 2 | 167 | D&M 1991 | 1 |
| Copper | Marsh No. 2 | 0-6 | 1 | 1 | 25 | D&M 1991 | 1 |
| Iron | Marsh No. 1 | 0-6 | 2 | 2 | 1,980 | D&M 1991 | 1 |
| Iron | North Pond No. 2 | 0-6 | 2 | 2 | 24,500 | D&M 1991 | 1 |
| Iron | Marsh No. 2 | 0-6 | 1 | 1 | 26,000 | D&M 1991 | 1 |
| Lead | Marsh No. 1 | 0-6 | 2 | 2 | 13.9 | D&M 1991 | 1 |
| Lead | North Pond No. 2 | 0-6 | 2 | 2 | 13.5 | D&M 1991 | 1 |
| Lead | Marsh No. 2 | 0-6 | 1 | 1 | 18.5 | D&M 1991 | 1 |
| Magnesium | Marsh No. 1 | 0-6 | 2 | 2 | 1,050 | D&M 1991 | 1 |
| Manganese | Marsh No. 1 | 0-6 | 2 | 2 | 164 | D&M 1991 | 1 |
| Magnesium | North Pond No. 2 | 0-6 | 2 | 2 | 8,160 | D&M 1991 | 1 |
| Manganese | North Pond No. 2 | 0-6 | 2 | 2 | 495 | D&M 1991 | 1 |
| Magnesium | Marsh No. 2 | 0-6 | 1 | 1 | 5,030 | D&M 1991 | 1 |
| Manganese | Marsh No. 2 | 0-6 | 1 | 1 | 425 | D&M 1991 | 1 |
| Mercury | Marsh No. 1 | 0-6 | 1 | 2 | 0.14 | D&M 1991 | 1 |
| Nickel | Marsh No. 1 | 0-6 | 1 | 2 | 7.7 | D&M 1991 | 1 |
| Nickel | North Pond No. 2 | 0-6 | 2 | 2 | 41.5 | D&M 1991 | 1 |
| Nickel | Marsh No. 2 | 0-6 | 1 | 1 | 28.5 | D&M 1991 | 1 |
| Potassium | Marsh No. 1 | 0-6 | 2 | 2 | 355 | D&M 1991 | 1 |
| Potassium | North Pond No. 2 | 0-6 | 2 | 2 | 2,280 | D&M 1991 | 1 |
| Potassium | Marsh No. 2 | 0-6 | 1 | 1 | 3,580 | D&M 1991 | 1 |
| Silver | North Pond No. 2 | 0-6 | 2 | 2 | 7.1 | D&M 1991 | 1 |
| Vanadium | North Pond No. 2 | 0-6 | 2 | 2 | 37.3 | D&M 1991 | 1 |
| Vanadium | Marsh No. 2 | 0-6 | 1 | 1 | 43.2 | D&M 1991 | 1 |
| Zinc | Marsh No. 1 | 0-6 | 2 | 2 | 19.2 | D&M 1991 | 1 |
| Zinc | North Pond No. 2 | 0-6 | 2 | 2 | 341 | D&M 1991 | 1 |
| Zinc | Marsh No. 2 | 0-6 | 1 | 1 | 55.6 | D&M 1991 | 1 |

# *Appendix F*

## Monitoring Well Completion Logs

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**Finish Date:** 8/23/02
**Drilling Company:** Parratt-Wolff
**Driller's Name:** Ron Bush
**Drilling Method:** Hollow Stem Auger
**Bit Size:** NA
**Auger Size:** 4-1/4" ID HSA
**Rig Type:** Mobil B52 Truck Rig
**Sampling Method:** 2" Split Spoon

**Northing:** NA
**Easting:** NA
**Casing Elevation:** NA

**Borehole Depth:** 11' below grade
**Surface Elevation:** NA

**Geologist:** Ron Kuhn

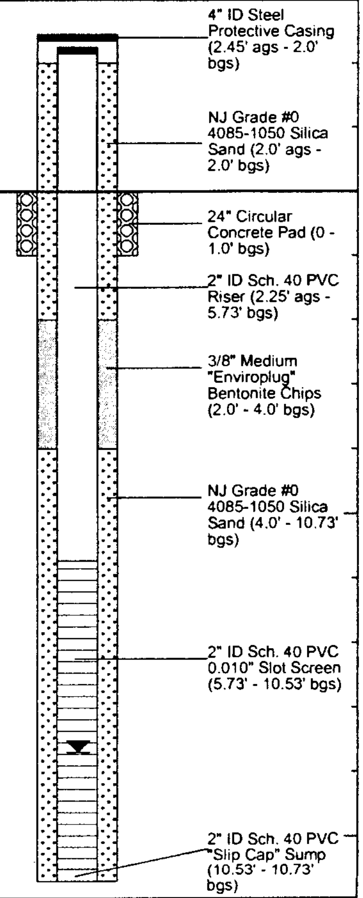
**Boring/Well ID:** MW-11
**Client:** Alcan Rolled Products Company

**Location:** Oswego, NY

DRAFT

| DEPTH | ELEVATION | Sample\Run Number | Sample/Int/Type | Recovery (feet) | PID Headspace (ppm) | Blows / 6 Inches | N - Value | Geologic Column | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 1 | 0-2 | 0.8 | 0.3 | 2<br>2<br>8<br>41 | 10 | | Dark brown SILT and highly degraded Organics (leaf littler), trace fine Sand, damp.<br>Medium brown SILT and fine to coarse GRAVEL (Sandstone), trace fine to coarse Sand, damp, very dense. |
| | | 2 | 2-4 | 0.5 | 0.2 | 48<br>50/0.4<br>-<br>- | - | | Medium brown SILT and fine to coarse GRAVEL (Sandstone), little fine Sand, damp to dry. |
| 5 | | 3 | 4-6 | 0.6 | 0.2 | 13<br>50/0.2<br>-<br>- | - | | |
| | | 4 | 6-8 | 0.5 | 0.8 | 16<br>20<br>48<br>30 | 38 | | |
| | | 5 | 8-10 | 0.4 | 1.3 | 7<br>50/0.4<br>-<br>- | - | | Saturated at 8.7' bgs.<br>Bedrock at 8.9' bgs. Auger to 11' bgs to facilitate well installation. |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |

**Boring/Well Construction**

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**Remarks:** ags = above ground surface; bgs = below ground surface;
NA = Not Available; ID = Inner Diameter; - = Not applicable.

Project: 722.07.013 Template: j:\rockware\logplot2001\logfiles\72207\Alcan.ldf
Date: 11/20/02

**DRAFT**

**Finish Date:** 8/28/02
**Drilling Company:** Parratt-Wolff
**Driller's Name:** Ron Bush
**Drilling Method:** Hollow Stem Auger
**Bit Size:** NA
**Auger Size:** 4-1/4" ID HSA
**Rig Type:** Mobil B52 Truck Rig
**Sampling Method:** 2" Split Spoon

**Northing:** NA
**Easting:** NA
**Casing Elevation:** NA

**Borehole Depth:** 15' below grade
**Surface Elevation:** NA

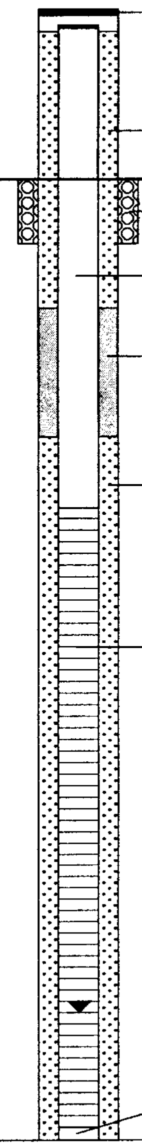
**Geologist:** Ron Kuhn

**Boring/Well ID:** MW-12
**Client:** Alcan Rolled Products Company

**Location:** Oswego, NY

| DEPTH | ELEVATION | Sample\Run Number | Sample/Int/Type | Recovery (feet) | PID Headspace (ppm) | Blows / 6 Inches | N - Value | Geologic Column | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 1 | 0-2 | 1.2 | NA | 4<br>5<br>12<br>26 | 17 | | Dark brown SILT and highly degraded Organics (leaf littler), trace fine Sand, moist.<br>Orange-brown to gray-brown fine SAND and SILT, little medium to coarse Sand, little fine to medium Gravel, damp. |
| | | 2 | 2-4 | 0.3 | NA | 50/0.4<br>-<br>-<br>- | - | | Weathered/Pulverized SANDSTONE. |
| 5 | | 3 | 4-6 | 0.5 | NA | 16<br>50/0.3<br>-<br>- | - | | Orange-brown weathered SANDSTONE and SILT, damp. |
| | | 4 | 6-8 | 0.5 | NA | 39<br>50/0.4<br>-<br>- | - | | Orange-brown to gray-brown SILT and SANDSTONE fragments. |
| | | 5 | 8-10 | 0.8 | NA | 29<br>60<br>-<br>- | - | | Orange-brown to gray-brown fine SAND, SILT and weathered SANDSTONE, trace medium gravel-sized pulverized Sandstone fragments, damp. |
| 10 | | 6 | 10-12 | 0.1 | NA | 50/0.1<br>-<br>-<br>- | - | | |
| | | 7 | 12-14 | 0.8 | NA | 12<br>24<br>50/0.2<br>- | - | | Orange-brown fine SAND, SILT, and pulverized SANDSTONE, wet.<br>Saturated at 13' bgs.<br>Bedrock at 13.5' bgs. Auger to 15' bgs to facilitate well installation. |
| 15 | | | | | | | | | |

**Boring/Well Construction**

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**Remarks:** ags = above ground surface; bgs = below ground surface;
NA = Not Available; ID = Inner Diameter; - = Not applicable.
Auger refusal at 6.5' bgs, moved approximately 5' west.

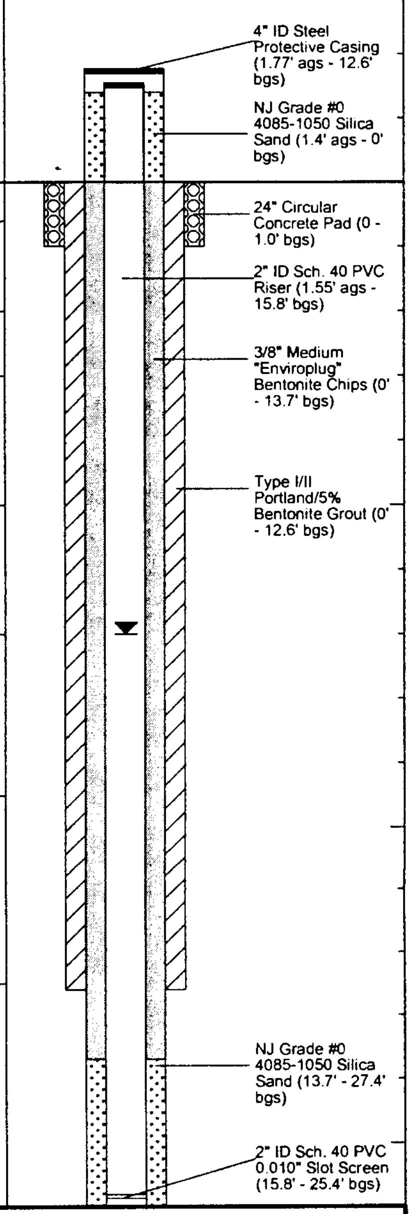
Project: 722.07.013 Template: j:\rockware\logplot2001\logfiles\72207\Alcan.ldf
Date: 11/20/02

| | | |
|---|---|---|
| **Finish Date:** 8/23/02<br>**Drilling Company:** Parratt-Wolff<br>**Driller's Name:** Ron Bush<br>**Drilling Method:** Hollow Stem Auger<br>**Bit Size:** NA<br>**Auger Size:** 4-1/4" ID HSA & 5-7/8" Rollerbit<br>**Rig Type:** Mobil B52 Truck Rig<br>**Sampling Method:** 2" Split Spoon &<br>5' HQ Core Barrel | **Northing:** NA<br>**Easting:** NA<br>**Casing Elevation:** NA<br><br>**Borehole Depth:** 27.7' below grade<br>**Surface Elevation:** NA<br><br>**Geologist:** Ron Kuhn | **Boring/Well ID:** MWB-11<br>**Client:** Alcan Rolled Products Company<br><br>**Location:** Oswego, NY |

**DRAFT**

| DEPTH | ELEVATION | Sample/Run Number | Sample/Int/Type | Recovery (feet) | PID Headspace (ppm) | Blows per 6 Inches/ Minutes per foot | N - Value / RQD (%) | Geologic Column | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 1 | 0-2 | 0.9 | 0.4 | 4<br>20<br>30<br>50/0.2 | 50 | | Dark brown SILT, trace fine to coarse Sand, trace fine to medium Gravel, trace Organics (Roots), damp.<br>Green abrasive SANDSTONE, very hard. |
| | | NA | 2-3 | NA | NA | NA | NA | | Continuous HSA through Cobble/Boulder. |
| | | 2 | 3-5 | 1.0 | 0.2 | 41<br>47<br>48<br>48 | 95 | | Medium brown SILT, trace fine to coarse Sand, trace fine to medium Gravel including weathered Sandstone, hard/dense, dry to damp. |
| 5 | | 3 | 5-7 | 0.1 | 0.3 | 50/0.2<br>-<br>-<br>- | - | | Greenish-gray abrasive SANDSTONE, very hard. |
| | | 4 | 7-9 | 0.9 | 0.6 | 24<br>18<br>14<br>12 | 32 | | Brown to gray-brown fine SAND and SILT, little medium to coarse Sand, trace to little fine to medium Gravel (Sandstone), sample moist, outside of spoon saturated (moisture in sample lost due to heat while drilling). |
| | | 5 | 9-9.5 | 0.1 | 0.8 | 50/0.5' | - | | |
| 10 | | | | | | Min/Ft | RQD | | |
| | | 1 | 9.5-12.5 | 3.0 | NA | 2:00<br>1:30<br>2:00 | 88 | | Grayish-green fine grained abrasive SANDSTONE, hard, occasional secondary filling of fractures with dark gray to purple fine grained Sandstone. FRACTURES: 10° from horizontal, mechanical at 10' bgs; 50° from horizontal, secondary min, Silt/Clay at 11' bgs; 35° from horizontal, secondary min, hairline at 11.6' and 11.7' bgs; Mechanical break at 12.5' bgs. |
| 15 | | 2 | 12.5-17.7 | 3.9 | NA | 1:00<br>1:00<br>3:00 | 40 | | Grayish-green fine grained SANDSTONE with medium gray Shale interbedding, moderately weathered, Shale is friable with Clay and Silt filling fractures. Driller indicates large voids within first 2' of run. FRACTURES: Horizontal with large degree of weathering, surface of Rock "vuggy/porous"from water flow at 12.8' and 12.9' bgs; Irregular mechanical break, approximately horizontal at 13.35' bgs; High angle 55° from horizontal at 13.4' bgs; Irregular horizontal fracture, Shale contact at 13.9' bgs; Irregular horizontal fracture, Sandstone contact at 14' bgs; Broken zone, Shale/Sandstone, Clay adhering to broken rock from 14.6' - 16.35' bgs. |

**Boring/Well Construction**

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**Remarks:** ags = above ground surface; bgs = below ground surface;
NA = Not Available; ID = Inner Diameter;
OD = Outer Diameter; - = Not applicable.

**Client:**
Alcan Rolled Products Company

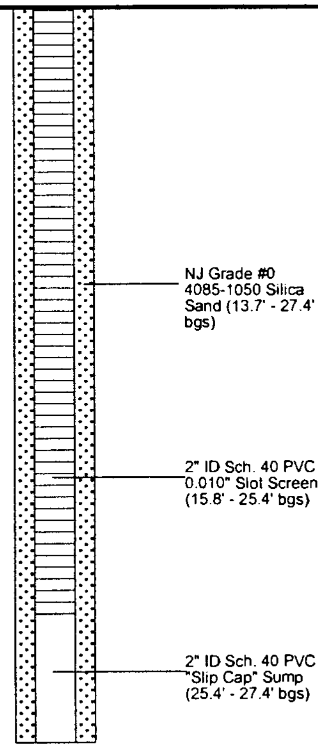
**Site Location:**
Oswego, NY

**Boring/Well ID:** MWB-11

**DRAFT**

**Borehole Depth:** 27.7' below grade

| DEPTH | ELEVATION | Sample/Run Number | Sample/Int/Type | Recovery (feet) | PID Headspace (ppm) | Blows per 6 Inches/ Minutes per foot | N - Value / RQD (%) | Geologic Column | Stratigraphic Description | Boring/Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 2 | 12.5-17.7 | 3.9 | NA | 3:00<br>3:00 | 40 | | Grayish-green fine grained SANDSTONE with medium gray Shale interbedding, moderately weathered, Shale is friable with Clay and Silt filling fractures. Driller indicates large voids within first 2' of run. FRACTURES: Broken zone, Shale/Sandstone, Clay adhering to broken rock from 14.6' - 16.35' bgs; Irregular horizontal break along Shale seam/laminantion at 16.35' bgs; Mechanical break at 16.9' bgs. | |
| 20 | | 3 | 17.7-22.7 | 5.0 | NA | 2:00<br>3:00<br>3:00<br>3:00<br>3:00 | 95 | | Medium gray fine grained SANDSTONE, changing to dark gray fine grained Sandstone at 21.3' bgs, slightly fractured competent Bedrock. FRACTURES: Irregular mechanical horizontal break at 17.7' and 19.5' bgs; Irregular horizontal fracture, trace Clay on surface at 21.4' bgs; Irregular mechanical horizontal break at 22.35', 22.5', and 22.9' bgs. | |
| 25 | | 4 | 22.7-27.7 | 5.0 | NA | 3:00<br>3:00<br>3:00<br>3:00<br>3:00 | 100 | | Medium gray fine grained SANDSTONE, slightly to moderately fractured with slight Clay filling of fractures, intermittant Shale laminations and seams. FRACTURES: Mechanical horizontal break at at 22.7' and 22.8' bgs; Irregular mechanical horizontal break, smooth from water at 24.3' bgs; Horizontal hairline fracture with Shale laminantions at 24.6' and 24.7' bgs; Irregular horizontal break with Shale seam at 25.85' bgs; Irregular mechanical break, 20° from horizontal at 26.2' bgs; Horizontal break with Shale seam at 26.5' bgs; Horizontal break with Shale seam, clay filling fracture at 26.6' and 26.7' bgs; Horizontal mechanical break at 27.7' bgs. | |
| 30 | | | | | | | | | | |
| 35 | | | | | | | | | | |

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**Remarks:** ags = above ground surface; bgs = below ground surface; NA = Not Available; ID = Inner Diameter; OD = Outer Diameter; - = Not applicable.

**Finish Date:** 8/27/02
**Drilling Company:** Parratt-Wolff
**Driller's Name:** Ron Bush
**Drilling Method:** Hollow Stem Auger
**Bit Size:** NA
**Auger Size:** 4-1/4" ID HSA & 5-7/8" Rollerbit
**Rig Type:** Mobil B52 Truck Rig/CME 850
**Sampling Method:** 2" Split Spoon & 5' HQ Core Barrel

**Northing:** NA
**Easting:** NA
**Casing Elevation:** NA

**Borehole Depth:** 29.2' below grade
**Surface Elevation:** NA

**Geologist:** Ron Kuhn

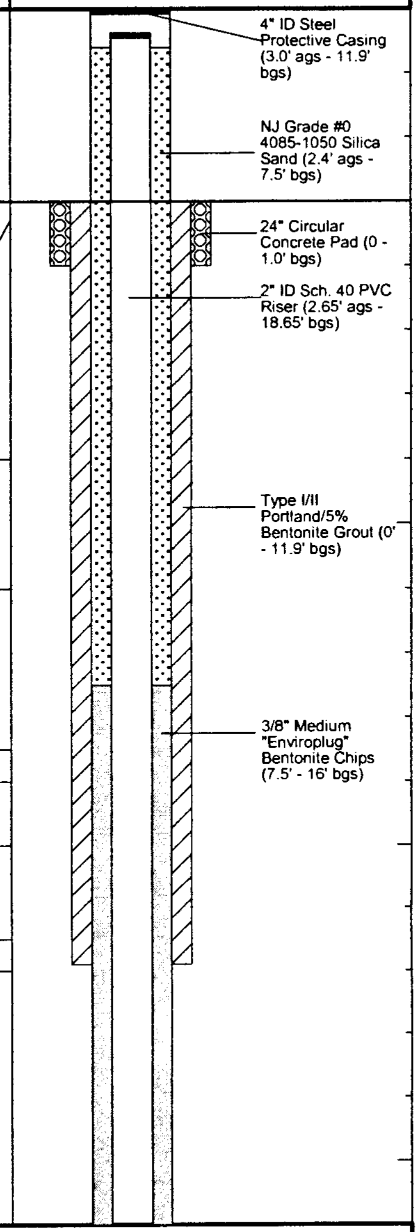
**Boring/Well ID:** MWB-12
**Client:** Alcan Rolled Products Company

**Location:** Oswego, NY

DRAFT

| DEPTH | ELEVATION | Sample/Run Number | Sample/Int/Type | Recovery (feet) | PID Headspace (ppm) | Blows per 6 Inches/ Minutes per foot | N - Value / RQD (%) | Geologic Column | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 1 | 0-2 | 1.1 | 0.2 | 2, 4, 7, 6 | 11 | | Dark brown SILT and highly degraded Organics (leaf litter), trace fine Sand, damp. Medium brown fine SAND and SILT, little medium to coarse Sand, little fine to medium Gravel (Till). |
| | | 2 | 2-4 | 0.5 | 0.1 | 11, 50/0.4, -, - | - | | |
| 5 | | 3 | 4-6 | 0.2 | 0.3 | 50/0.3, -, -, - | - | | Pulverized SANDSTONE (Cobble/Boulder). |
| | | 4 | 6-8 | NA | NA | NA | NA | | Continuous HSA through Boulder, saturated Soil cuttings from 7.5' - 8' bgs. |
| | | NA | 8-8.5 | NA | NA | NA | NA | | |
| 10 | | 1 | 8.5-11.5 | 2.5 | NA | Min/Ft. 1:40, 1:50, 2:00 | RQD 100 | | Apparent SANDSTONE boulder from 8.5' - 9.0' bgs. Olive brown CLAY with Sandstone fragments. Medium gray SANDSTONE bedrock. FRACTURES: Horizontal mechanical break at 10.6' bgs; Irregular horizontal break, Iron staining at 11' bgs. |
| | | NA | 11.5-12 | NA | NA | NA | NA | | Rollerbit to 12' bgs. |
| 15 | | 2 | 12-16.5 | 3.4 | NA | 3:00, 3:00, 3:00 | 34 | | Greenish-gray fine grained SANDSTONE, highly fractured, Iron staining among fractures, Clay present in fractures. FRACTURES: Horizontal break, smooth/porous from water at 12.1' bgs; Irregular horizontal break with iron staining at 12.45' bgs; Broken zone with iron staining from 12.45' - 13' bgs; Irregular horizontal break with iron staining and Clay at 13' bgs; Horizontal mechanical break at 13.7' bgs; Broken zone with Clay from 13.9' - 16.5' bgs. |

Boring/Well Construction

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**Remarks:** ags = above ground surface; bgs = below ground surface;
NA = Not Available; ID = Inner Diameter;
OD = Outer Diameter; - = Not applicable.

Project: 722.07.013 Template: j:\rockware\logplot2001\logfiles\72207\AlcanROCK.ldf
Date: 11/21/02

**Client:**
Alcan Rolled Products Company

**Site Location:**
Oswego, NY

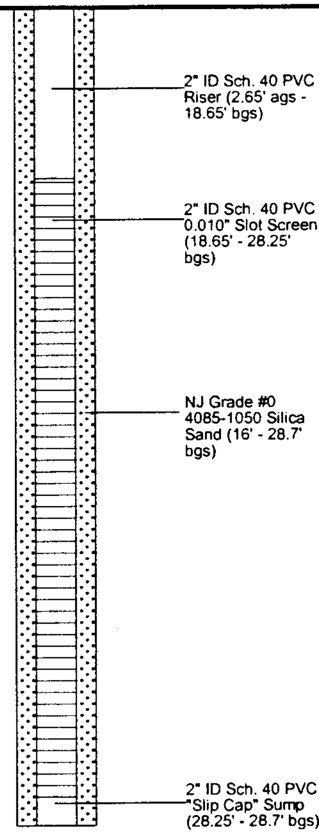
**Boring/Well ID:** MWB-12

**Borehole Depth:** 29.2' below grade

**DRAFT**

| DEPTH | ELEVATION | Sample/Run Number | Sample/Int/Type | Recovery (feet) | PID Headspace (ppm) | Blows per 6 Inches/ Minutes per foot | N - Value / RQD (%) | Geologic Column | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| | | 2 | 12-16.5 | 3.4 | NA | 4:00 | 34 | | Greenish-gray fine grained SANDSTONE, highly fractured, Iron staining among fractures, Clay present in fractures. FRACTURES: Broken zone with Clay from 13.9' - 16.5' bgs. |
| 20 | | 3 | 16.5-21.2 | 5.1 | NA | 4:00<br>4:00<br>4:00<br>4:00<br>4:00 | 84 | | Greenish-gray fine grained SANDSTONE, slightly fractured, slight iron staining, trace Clay in fractures. FRACTURES: Broken zone with iron staining from 16.5' - 17' bgs; Irregular horizontal break at 17' bgs; Irregular horizontal mechanical break at 17.7' bgs; Horizontal break, smoothed surface from water flow at 18.9' and 20.4' bgs; Irregular horizontal break, Clay on fracture surface at 20.6' bgs; Irregular horizontal mechanical break at 21.5' bgs. |
| 25 | | 4 | 21.2-25.2 | 4.2 | NA | 4:00<br>4:00<br>4:00<br>4:00 | 91 | | Greenish-gray fine grained SANDSTONE, slightly fractured, trace intermittant Shale/clay in fractures. FRACTURES: Horizontal mechanical break at 21.2' bgs; Horizontal hairline fracture with Clay at 21.92', 21.97', 22.03', and 22.12' bgs; Irregular horizontal fracture, trace Clay on Rock face at 22.35' bgs; Horizontal mechanical break at 25.2' bgs. |
| | | 5 | 25.2-29.2 | 3.9 | NA | 4:00<br>4:00<br>6:00<br>6:00 | 92 | | Greenish-gray fine grained SANDSTONE, slightly fractured, trace intermittant Shale laminations. FRACTURES: Horizontal hairline fracture with Shale laminations at 25.92', 26.02', and 26.09' bgs; Horizontal mechanical break at 27.2' and 29.2' bgs. |
| 30 | | | | | | | | | |
| 35 | | | | | | | | | |

**Boring/Well Construction**

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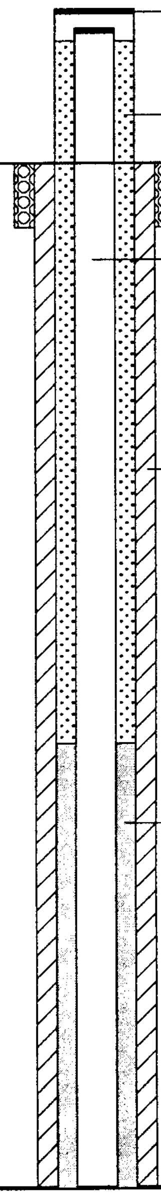
**Remarks:** ags = above ground surface; bgs = below ground surface;
NA = Not Available; ID = Inner Diameter;
OD = Outer Diameter; - = Not applicable.

**DRAFT**

| | | |
|---|---|---|
| **Finish Date:** 8/26/02<br>**Drilling Company:** Parratt-Wolff<br>**Driller's Name:** Ron Bush<br>**Drilling Method:** Hollow Stem Auger<br>**Bit Size:** NA<br>**Auger Size:** 4-1/4" ID HSA & 5-7/8" Rollerbit<br>**Rig Type:** Mobil B52 Truck Rig/CME 850<br>**Sampling Method:** 2" Split Spoon & 5' HQ Core Barrel | **Northing:** NA<br>**Easting:** NA<br>**Casing Elevation:** NA<br><br>**Borehole Depth:** 32.5' below grade<br>**Surface Elevation:** NA<br><br>**Geologist:** Ron Kuhn | **Boring/Well ID:** MWB-13<br>**Client:** Alcan Rolled Products Company<br><br>**Location:** Oswego, NY |

| DEPTH | ELEVATION | Sample/Run Number | Sample/Int/Type | Recovery (feet) | PID Headspace (ppm) | Blows per 6 Inches/ Minutes per foot | N - Value / RQD (%) | Geologic Column | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 1 | 0-2 | 0.7 | 0.2 | 4<br>14<br>19<br>20 | 33 | | Dark brown SILT and highly degraded Organics (leaf litter), trace fine Sand, damp.<br>Orange-brown fine SAND and SILT, trace medium to coarse Sand, trace fine to medium Gravel, damp (Till). |
| | | 2 | 2-4 | 0.5 | 0.3 | 50/0.4<br>-<br>-<br>- | - | | |
| 5 | | 3 | 4-6 | 0.8 | 0.2 | 38<br>50/0.4<br>-<br>- | - | | |
| | | 4 | 6-8 | 0.6 | 0.4 | 30<br>50/0.4<br>-<br>- | - | | |
| | | 5 | 8-10 | 1.2 | 0.6 | 10<br>14<br>20<br>40 | 41 | | BRown fine SAND and SILT, little medium to coarse Sand, little fine to medium Gravel, moist to wet (Till). |
| 10 | | 6 | 10-12 | 1.2 | 0.4 | 16<br>19<br>33<br>50/0.1 | 52 | | |
| | | 7 | 12-14 | 0.4 | 0.4 | 38<br>50/0.1<br>-<br>- | - | | Weathered SANDSTONE. |
| | | NA | 14-14.5 | NA | NA | NA | NA | | Rollerbit to 14.5' bgs. |
| | | | | | | Min/Ft. | RQD | | |
| 15 | | 1 | 14.5-17.5 | 2.5 | NA | 2:50 | 64 | | Grayish-green fine grained abrasive SANDSTONE, moderately fractured with Iron staining. FRACTURES: Broken zone from 14.5' - 14.75' bgs; 12° break from horizontal at 14.75'; 14° mechanical break from horizontal at 15.55. |

Boring/Well Construction

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**Remarks:** ags = above ground surface; bgs = below ground surface;
NA = Not Available; ID = Inner Diameter;
OD = Outer Diameter; - = Not applicable.

**Client:**
Alcan Rolled Products Company

**Site Location:**
Oswego, NY

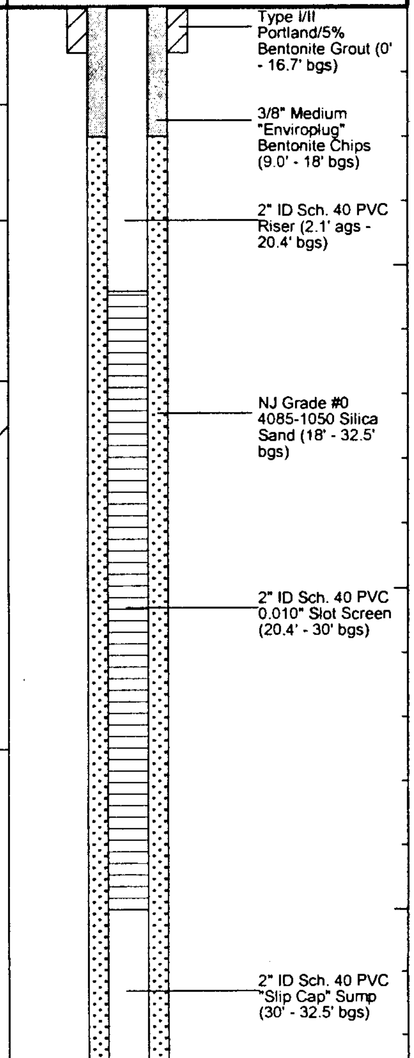
**Boring/Well ID:** MWB-13

**DRAFT**

**Borehole Depth:** 32.5' below grade

| DEPTH | ELEVATION | Sample/Run Number | Sample/Int/Type | Recovery (feet) | PID Headspace (ppm) | Blows per 6 Inches/ Minutes per foot | N - Value / RQD (%) | Geologic Column | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 14.5-17.5 | 2.5 | NA | 2:20<br>2:15 | 64 | | Grayish-green fine grained abrasive SANDSTONE, moderately fractured with Iron staining. FRACTURES: Broken zone with oxidation at 16' bgs; Horizontal mechanical break at 16.4' bgs; 60° high angle from horizontal, Iron staining at 17' bgs; 45° Irregular from horizontal, Iron staining at 17.1' bgs; Mechanical break at 17.5' bgs. |
| | | 2 | 17.5-19.3 | 1.4 | NA | 3:00<br>5:00 | 0 | | Medium gray highly fractured fine grained SANDSTONE, Iron staining abundant, Silt and Clay in fractures, quality of sample core poor due to coare blockage and presence of Silt and Clay. |
| 20 | | 3 | 19.3-22.5 | 3.2 | NA | 3:00<br>5:00<br>9:00 | 68 | | Medium gray fine grained SANDSTONE, slightly to moderately fractured, Clay in fractures. FRACTURES: Horizontal mechanical break at 19.4' bgs; Broken zone with Clay from 19.15' - 19.85' bgs; Irregular horizontal breaks at 19.15' and 19.85' bgs; Irregular horizontal break at 21.8' (Sandstone/Shale interface).<br>Gray SHALE, slightly to moderately fractured, moderately soft, friable. FRACTURES: Broken zone, numerous fractures and breaks horizontally with bedding from 21.8' - 22.5' bgs. |
| 25 | | 4 | 22.5-27.5 | 5.0 | NA | 4:00<br>4:00<br>4:00<br>4:00<br>4:00 | 77 | | Medium gray fine SANDSTONE, slightly fractured interbedded with moderately fractured friable medium to dark gray Shale, Silt and Clay evident in Shale fractures. FRACTURES: Broken zone from 22.5' - 22.8' bgs; Horizontal break with bedding at 22.8' bgs; Numerous horizontal breaks with bedding in Shale, Clay in fractures from 24.45' - 24.9' bgs; Horizontal break with bedding, Clay at 26.4' bgs; Irregular mechanical break at 26.6' bgs; 20° break from horizontal at 27.05' bgs; Horizontal break with bedding at 27.4' and 27.45' bgs. |
| 30 | | 5 | 27.5-32.5 | 5.0 | NA | 4:00<br>4:00<br>4:00<br>4:00<br>4:00 | 100 | | Medium gray very competant fine grained SANDSTONE. FRACTURES: Broken zone with iron staining from 27.5' - 27.7' bgs; No fractures from 27.7' - 32.5' bgs. |
| 35 | | | | | | | | | |

**Boring/Well Construction**

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**Remarks:** ags = above ground surface; bgs = below ground surface;
NA = Not Available; ID = Inner Diameter;
OD = Outer Diameter; - = Not applicable.

Project: 722.07.013 Template: j:\rockware\logplot2001\logfiles\72207\Alcan.ldf
Date: 11/21/02

# *Appendix G*

# Groundwater Sampling Logs

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*engineers & scientists*

# GROUND-WATER SAMPLING LOG

**Sampling Personnel:** Jason Sents [BBL-Syracuse] & Meghan Myles [BBL-Syracuse]
**Job Number:** 72207
**Weather:** Cloudy, breezy, 55° F

**Well ID.** MWB-13
**Date:** 10/08/02
**Time In:** 1320 **Time Out:** 1615

## WELL INFORMATION

| | | TIC | TOC | BGS |
|---|---|---|---|---|
| Well Depth | (feet) | 34.34 | | |
| Water Table Depth | (feet) | 11.66 | | |

*check where appropriate*

- Well Type: Flushmount ☐ Stick-Up ☒
- Well Locked: Yes ☒ No ☐
- Measuring Point Marked: Yes ☒ No ☐
- Well Diameter: 1" ☐ 2" ☒ Other: ____

## WELL WATER INFORMATION

| | | |
|---|---|---|
| Length of Water Column: | (feet) | 22.68 |
| Volume of Water in Well: | (gal) | 3.70 |
| Pumping Rate of Pump: | (mL/min) | ~150 mL/min |
| Pumping Rate of Pump: | (GPM) | 0.04 GPM |
| Minutes of Pumping: | | 120 |
| Total Volume Removed: | (gal) | 5.0 |

Conversion Factors

| gallons per feet of water column: | 1" ID | 2" ID | 4" ID | 6" ID |
|---|---|---|---|---|
| | 0.041 | 0.163 | 0.653 | 1.469 |

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

Unit Stability

| pH | DO | Cond | ORP |
|---|---|---|---|
| ± 0.1 | ± 10% | ± 3.0% | ± 10 mV |

## SAMPLING INFORMATION

Analyses:
- VOC ☒
- SVOC ☒
- PCB ☒
- TAL Metals ☒
- ____ ☐
- ____ ☐

Sample ID: MWB-13
Sample Time: 1535
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID: —
Total Bottles: 5

## EVACUATION INFORMATION

- Evacuation Method: Bailer ☐ Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
- Tubing Used: Teflon ☐ Polyethylene ☐
- Sampling Method: Bailer ☒ VOC Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
- Did well go dry? Yes ☐ No ☒
- Water Quality Meter Type: ____

| Time / Parameter | 1 1335 Initial | 2 1350 | 3 1405 | 4 1420 | 5 1450 | 6 1520 | 7 1535 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Volume Purged (gal) | Initial | 0.5 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 | | |
| Depth to Water (ft. TIC) | 11.66 | 11.80 | 11.80 | 11.83 | 11.83 | 11.82 | 11.82 | | |
| Temperature (°C) | 12.13 | 11.36 | 11.56 | 11.47 | 11.40 | 11.42 | 11.32 | | |
| pH | 7.53 | 7.43 | 7.47 | 7.49 | 7.51 | 7.51 | 7.51 | | |
| Conductance (mS/cm) | 3.96 | 3.87 | 3.79 | 3.73 | 3.68 | 3.75 | 3.71 | | |
| Dissolved Oxygen mg/L) | 1.75 | 6.76 | 1.01 | 0.56 | 0.58 | 0.45 | 0.44 | | |
| Turbidity (NTU) | 56.5 | 113.0 | 182.0 | 423.0 | 942.0 | 999.0* | 214.0** | | |
| ORP (mV) | -94 | -100 | -103 | -108 | -115 | -119 | -121 | | |

| Time / Parameter | 10 | 11 | 12 |
|---|---|---|---|
| Volume Purged (gal) | | | |
| Depth to Water (ft. TIC) | | | |
| Temperature (°C) | | | |
| pH | | | |
| Conductance (mS/cm) | | | |
| Dissolved Oxygen mg/L) | | | |
| Turbidity (NTU) | | | |
| ORP (mV) | | | |

## MISCELLANEOUS OBSERVATIONS/PROBLEMS

* Hach ~~T~~ Turbidity meter reading = 3.7 NTU
** Hach Turbidity Meter reading = 1.13 NTU

## SAMPLE DESTINATION

Laboratory: Northeast Analytical
Shipped Via: ☒ Federal Express ☐ Other: ____
Sample was ☐ shipped day of sampling ☒ sent on 10/9/02
Chain of Custody Signed By: JCS

## GROUND-WATER SAMPLING LOG

**Sampling Personnel:** Jason Sents [BBL-Syracuse] & Meghan Myles [BBL-Syracuse]
**Job Number:** 72207
**Weather:** Cloudy, breezy, 55°F

**Well ID.** MW-06
**Date:** 10/08/02
**Time In:** 1620 **Time Out:** 1820

**WELL INFORMATION**

| | | TIC | TOC | BGS |
|---|---|---|---|---|
| Well Depth | (feet) | 14.32 | | |
| Water Table Depth | (feet) | 12.87 | | |

*check where appropriate*
Well Type: Flushmount ☐ Stick-Up ☒
Well Locked: Yes ☒ No ☐
Measuring Point Marked: Yes ☐ No ☐
Well Diameter: 1" ☐ 2" ☒ Other: ____

**WELL WATER INFORMATION**

| | | |
|---|---|---|
| Length of Water Column: | (feet) | 1.45 |
| Volume of Water in Well: | (gal) | 0.24 |
| Pumping Rate of Pump: | (mL/min) | ~20 mL/min |
| Pumping Rate of Pump: | (GPM) | |
| Minutes of Pumping: | | 60 |
| Total Volume Removed: | (gal) | 0.3 |

Conversion Factors

| | 1" ID | 2" ID (circled) | 4" ID | 6" ID |
|---|---|---|---|---|
| gallons per feet of water column: | 0.041 | 0.163 | 0.653 | 1.469 |

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

Unit Stability

| pH | DO | Cond | ORP |
|---|---|---|---|
| ± 0.1 | ± 10% | ± 3.0% | ± 10 mV |

**SAMPLING INFORMATION**

Analyses:
VOC ☒
SVOC ☒
PCB ☒
TAL Metals ☒
____ ☐
____ ☐

Sample ID: MW-06
Sample Time: 1740
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID: —
Total Bottles: 5

**EVACUATION INFORMATION**

Evacuation Method: Bailer ☐ Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
Tubing Used: Teflon ☐ Polyethylene ☐
Sampling Method: Bailer ☒ VOC Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
Did well go dry? Yes ☐ No ☒
Water Quality Meter Type: Horiba U-22

| Time / Parameter | 1 1640 Initial | 2 1700 | 3 1720 | 4 1740 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Volume Purged (gal) | Initial | 0.1 | 0.2 | 0.3 | | | | | |
| Depth to Water (ft. TIC) | 12.87 | 13.45 | 13.45 | 13.45 | | | | | |
| Temperature (°C) | 12.73 | 11.83 | 11.43 | 11.30 | | | | | |
| pH | 7.53 | 7.14 | 7.07 | 7.05 | | | | | |
| Conductance (mS/cm) | 0.383 | 0.382 | 0.388 | 0.388 | | | | | |
| Dissolved Oxygen mg/L) | 7.95 | 10.62 | 10.83 | 10.90 | | | | | |
| Turbidity (NTU) | 94.7 | 78.6 | 20.2* | 5.2 ** | | | | | |
| ORP (mV) | 6 | 42 | 59 | 63 | | | | | |

| Time / Parameter | 10 | 11 | 12 |
|---|---|---|---|
| Volume Purged (gal) | | | |
| Depth to Water (ft. TIC) | | | |
| Temperature (°C) | | | |
| pH | | | |
| Conductance (mS/cm) | | | |
| Dissolved Oxygen mg/L) | | | |
| Turbidity (NTU) | | | |
| ORP (mV) | | | |

**MISCELLANEOUS OBSERVATIONS/PROBLEMS**

1700 - bubbles being pumped 10 mL/min

* 12.8 NTU - HACH TURBIDITY meter

~~** NTU - HACH TURBIDITY METER~~

**SAMPLE DESTINATION**

Laboratory: Northeast Analytical
Shipped Via: ☒ Federal Express ☐ Other: ____
Sample was ☐ shipped day of sampling ☒ sent on 10/9/02
Chain of Custody Signed By: JCS

# GROUND-WATER SAMPLING LOG

| | |
|---|---|
| Sampling Personnel: Jason Sents [BBL-Syracuse] & Meghan Myles [BBL-Syracuse] | Well ID. MW-10 |
| Job Number: 72207 | Date: 10/09/02 |
| Weather: Cloudy, windy, 40°F | Time In: 0825 Time Out: 1100 |

**WELL INFORMATION**

| | | TIC | TOC | BGS |
|---|---|---|---|---|
| Well Depth | (feet) | 19.91 | | |
| Water Table Depth | (feet) | 15.80 | | |

*check where appropriate*

- Well Type: Flushmount ☐ Stick-Up ☒
- Well Locked: Yes ☒ No ☐
- Measuring Point Marked: Yes ☒ No ☐
- Well Diameter: 1" ☐ 2" ☒ Other: ____

**WELL WATER INFORMATION**

| | | |
|---|---|---|
| Length of Water Column: | (feet) | 4.11 |
| Volume of Water in Well: | (gal) | 0.70 |
| Pumping Rate of Pump: | (mL/min) | 190 mL/min |
| Pumping Rate of Pump: | (GPM) | 0.05 |
| Minutes of Pumping: | | 75 |
| Total Volume Removed: | (gal) | 3.75 |

Conversion Factors

| gallons per feet of water column: | 1" ID | 2" ID | 4" ID | 6" ID |
|---|---|---|---|---|
| | 0.041 | 0.163 | 0.653 | 1.469 |

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

Unit Stability

| pH | DO | Cond | ORP |
|---|---|---|---|
| ± 0.1 | ± 10% | ± 3.0% | ± 10 mV |

**SAMPLING INFORMATION**

Analyses:
- VOC ☒
- SVOC ☒
- PCB ☒
- TAL Metals ☒
- ____ ☐
- ____ ☐

Sample ID: MW-10
Sample Time: 1010
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID: —
Total Bottles: 5

**EVACUATION INFORMATION**

- Evacuation Method: Bailer ☐ Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
- Tubing Used: Teflon ☐ Polyethylene ☐
- Sampling Method: Bailer ☒ VOCs Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
- Did well go dry? Yes ☐ No ☒
- Water Quality Meter Type: Horiba U-22

| Time / Parameter | 1 0855 Initial | 2 0910 | 3 0925 | 4 0940 | 5 0955 | 6 1010 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Volume Purged (gal) | initial | 0.75 | 1.5 | 2.25 | 3.0 | 3.75 | | | |
| Depth to Water (ft. TIC) | 15.80 | 16.00 | 16.02 | 16.02 | 16.02 | 16.02 | | | |
| Temperature (°C) | 12.25 | 13.22 | 13.28 | 13.34 | 13.85 | 14.03 | | | |
| pH | 6.94 | 6.75 | 6.61 | 6.61 | 6.60 | 6.59 | | | |
| Conductance (mS/cm) | 1.62 | 1.49 | 1.18 | 1.16 | 1.14 | 1.13 | | | |
| Dissolved Oxygen mg/L) | 3.29 | 1.90 | 1.79 | 1.85 | 2.02 | 1.69 | | | |
| Turbidity (NTU) | 9.6 | 2.3 | 1.9 | 3.7 | 10.0* | 0.60^A | | | |
| ORP (mV) | -42 | -15 | 16 | 25 | 38 | 42 | | | |

| Time / Parameter | 10 | 11 | 12 |
|---|---|---|---|
| Volume Purged (gal) | | | |
| Depth to Water (ft. TIC) | | | |
| Temperature (°C) | | | |
| pH | | | |
| Conductance (mS/cm) | | | |
| Dissolved Oxygen mg/L) | | | |
| Turbidity (NTU) | | | |
| ORP (mV) | | | |

**MISCELLANEOUS OBSERVATIONS/PROBLEMS**

Particles (black/brown) in initial purge water
* 0.76 NTU using Hach turbidity meter
A - using Hach Turbidity Meter

**SAMPLE DESTINATION**

Laboratory: Northeast Analytical
Shipped Via: ☒ Federal Express ☐ Other: ____
Sample was ☒ shipped day of sampling ☐ sent on ____
Chain of Custody Signed By: JCS

# GROUND-WATER SAMPLING LOG

**Sampling Personnel:** Jason Sents [BBL-Syracuse] & Meghan Myles [BBL-Syracuse]
**Job Number:** 72207
**Weather:** Partly cloudy, ~~very~~ breezy, 57°F
**Well ID.** MWB-11
**Date:** 10/09/02
**Time In:** 1220 **Time Out:** 1505

## WELL INFORMATION

| | | TIC | TOC | BGS |
|---|---|---|---|---|
| Well Depth | (feet) | 28.63 | | |
| Water Table Depth | (feet) | 6.81 | | |

*check where appropriate*
Well Type: Flushmount ☐ Stick-Up ☒
Well Locked: Yes ☒ No ☐
Measuring Point Marked: Yes ☐ No ☐
Well Diameter: 1" ☐ 2" ☒ Other: ____

## WELL WATER INFORMATION

| | | |
|---|---|---|
| Length of Water Column: | (feet) | 21.82 |
| Volume of Water in Well: | (gal) | 3.56 |
| Pumping Rate of Pump: | (mL/min) | ~125 mL/min |
| Pumping Rate of Pump: | (GPM) | 0.03 |
| Minutes of Pumping: | | 120 |
| Total Volume Removed: | (gal) | 4.0 |

Conversion Factors

| gallons per feet | 1" ID | 2" ID | 4" ID | 6" ID |
|---|---|---|---|---|
| of water column: | 0.041 | 0.163 (circled) | 0.653 | 1.469 |

1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.

Unit Stability

| pH | DO | Cond | ORP |
|---|---|---|---|
| ± 0.1 | ± 10% | ± 3.0% | ± 10 mV |

## SAMPLING INFORMATION

Analyses:
- VOC ☒
- SVOC ☒
- PCB ☒
- TAL Metals ☒
- ____ ☐
- ____ ☐

Sample ID: MWB-11
Sample Time: 1435
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID: ____
Total Bottles: 5

## EVACUATION INFORMATION

Evacuation Method: Bailer ☐ Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
Tubing Used: Teflon ☐ Polyethylene ☐
Sampling Method: Bailer ☒ VOC Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
Did well go dry? Yes ☐ No ☐
Water Quality Meter Type: Horiba U-22

| Time / Parameter | 1 1235 Initial | 2 1250 | 3 1305 | 4 1320 | 5 1335 | 6 1350 | 7 1405 | 8 1420 | 9 1435 |
|---|---|---|---|---|---|---|---|---|---|
| Volume Purged (gal) | Initial | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
| Depth to Water (ft. TIC) | 6.81 | 6.81 | 6.81 | 6.81 | 6.81 | 6.81 | 6.81 | 6.81 | 6.81 |
| Temperature (°C) | 16.13 | 15.86 | 16.97 | 16.52 | 15.99 | 15.89 | 15.74 | 15.82 | 15.93 |
| pH | 6.63 | 6.56 | 6.58 | 6.57 | 6.57 | 6.57 | 6.57 | 6.58 | 6.58 |
| Conductance (mS/cm) | 1.69 | 1.84 | 1.85 | 1.84 | 1.84 | 1.84 | 1.84 | 1.84 | 1.84 |
| Dissolved Oxygen mg/L) | 2.19 | 0.68 | 1.09 | 1.08 | 0.68 | 0.59 | 0.53 | 0.50 | 0.47 |
| Turbidity (NTU) | 28.7 | 7.1 | 5.5 | 1.8 | 1.4 | 1.5 | 1.7 | 1.4 | 1.4 |
| ORP (mV) | -69 | -83 | -80 | -76 | -82 | -85 | -88 | -89 | -89 |

| Time / Parameter | 10 | 11 | 12 |
|---|---|---|---|
| Volume Purged (gal) | | | |
| Depth to Water (ft. TIC) | | | |
| Temperature (°C) | | | |
| pH | | | |
| Conductance (mS/cm) | | | |
| Dissolved Oxygen mg/L) | | | |
| Turbidity (NTU) | | | |
| ORP (mV) | | | |

**MISCELLANEOUS OBSERVATIONS/PROBLEMS**

## SAMPLE DESTINATION

Laboratory: Northeast Analytical
Shipped Via: ☒ Federal Express ☐ Other: ____
Sample was ☒ shipped day of sampling ☐ sent on ____
Chain of Custody Signed By: JCS

ALCAN Aluminum Corporation — October 2002 Groundwater Sampling

## GROUND-WATER SAMPLING LOG

**Sampling Personnel:** Jason Sents [BBL-Syracuse] & Meghan Myles [BBL-Syracuse]
**Well ID.** MW-08
**Job Number:** 72207
**Date:** 10/09/02
**Weather:** Partly cloudy, breezy, 62°F
**Time In:** 1515 **Time Out:** 1755

**WELL INFORMATION**

| | | TIC | TOC | BGS |
|---|---|---|---|---|
| Well Depth | (feet) | 22.05 | | |
| Water Table Depth | (feet) | 15.10 | | |

*check where appropriate*

- Well Type: Flushmount ☐ Stick-Up ☒
- Well Locked: Yes ☐ No ☒
- Measuring Point Marked: Yes ☒ No ☐
- Well Diameter: 1" ☐ 2" ☒ Other: ____

**WELL WATER INFORMATION**

| | | |
|---|---|---|
| Length of Water Column: | (feet) | 6.95 |
| Volume of Water in Well: | (gal) | 1.13 |
| Pumping Rate of Pump: | (mL/min) | ~63 mL/min |
| Pumping Rate of Pump: | (GPM) | 0.017 |
| Minutes of Pumping: | | 90 |
| Total Volume Removed: | (gal) | 1.50 |

Conversion Factors

| gallons per feet of water column: | 1" ID | 2" ID | 4" ID | 6" ID |
|---|---|---|---|---|
| | 0.041 | 0.163 (circled) | 0.653 | 1.469 |

1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.

Unit Stability

| pH | DO | Cond | ORP |
|---|---|---|---|
| ± 0.1 | ± 10% | ± 3.0% | ± 10 mV |

**SAMPLING INFORMATION**

Analyses:
- VOC ☒
- SVOC ☒
- PCB ☒
- TAL Metals ☒
- ____ ☐
- ____ ☐

Sample ID: MW-08
Sample Time: 1655
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID: —
Total Bottles: 5

**EVACUATION INFORMATION**

- Evacuation Method: Bailer ☐ Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
- Tubing Used: Teflon ☐ Polyethylene ☐
- Sampling Method: Bailer ☒ VOC Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
- Did well go dry? Yes ☐ No ☒
- Water Quality Meter Type: Horiba U-22

| Time / Parameter | 1 1525 Initial | 2 1540 | 3 1555 | 4 1610 | 5 1625 | 6 1640 | 7 1655 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Volume Purged (gal) | Initial | 0.25 | 0.50 | 0.75 | 1.0 | 1.25 | 1.50 | | |
| Depth to Water (ft. TIC) | 15.10 | ~~15.~~ 16.71 | 16.72 | 16.71 | 16.71 | 16.71 | 16.71 | | |
| Temperature (°C) | 16.11 | 16.35 | 17.33 | 17.55 | 17.66 | 17.60 | 17.24 | | |
| pH | 6.80 | 6.78 | 6.71 | 6.70 | 6.70 | 6.71 | 6.72 | | |
| Conductance (mS/cm) | 0.762 | 0.760 | 6.788 | 0.805 | 0.818 | 0.827 | 0.823 | | |
| Dissolved Oxygen mg/L) | 2.35 | 1.00 | 0.91 | 1.18 | 1.51 | 1.77 | 2.26 | | |
| Turbidity (NTU) | 50.4 | 65.2 | 38.4 | 16.1 | 12.7 | 6.3 | 9.6 | | |
| ORP (mV) | -107 | -92 | -77 | -72 | -70 | -69 | -69 | | |

| Time / Parameter | 10 | 11 | 12 |
|---|---|---|---|
| Volume Purged (gal) | | | |
| Depth to Water (ft. TIC) | | | |
| Temperature (°C) | | | |
| pH | | | |
| Conductance (mS/cm) | | | |
| Dissolved Oxygen mg/L) | | | |
| Turbidity (NTU) | | | |
| ORP (mV) | | | |

**MISCELLANEOUS OBSERVATIONS/PROBLEMS**

| Time | Hach Turbidity |
|---|---|
| 1555 | 6.62 NTU |
| 1610 | 4.61 NTU |
| 1625 | 2.94 NTU |
| 1640 | 3.37 NTU |
| 1655 | 3.79 NTU |

Sulfur odor, black particles at initial pumping

**SAMPLE DESTINATION**

Laboratory: Northeast Analytical
Shipped Via: ☒ Federal Express ☐ Other: ____
Sample was ☒ shipped day of sampling ☐ sent on ____
Chain of Custody Signed By: JCS

## GROUND-WATER SAMPLING LOG

**Sampling Personnel:** Jason Sents [BBL-Syracuse] & Meghan Myles [BBL-Syracuse]
**Well ID.** MWB-12
**Job Number:** 72207.005
**Date:** 10/10/02
**Weather:** P. Cloudy 55°F breezy
**Time In:** 0845 **Time Out:**

**WELL INFORMATION**

| | | TIC | TOC | BGS |
|---|---|---|---|---|
| Well Depth | (feet) | 31.02 | | |
| Water Table Depth | (feet) | 10.74 | | |

*check where appropriate*

- **Well Type:** Flushmount ☐ Stick-Up ☒
- **Well Locked:** Yes ☒ No ☐
- **Measuring Point Marked:** Yes ☒ No ☐
- **Well Diameter:** 1" ☐ 2" ☒ Other: ____

**WELL WATER INFORMATION**

| | | |
|---|---|---|
| Length of Water Column: | (feet) | 20.28 |
| Volume of Water in Well: | (gal) | 3.31 |
| Pumping Rate of Pump: | (mL/min) | ~125 mL/min |
| Pumping Rate of Pump: | (GPM) | 0.03 |
| Minutes of Pumping: | | 105 |
| Total Volume Removed: | (gal) | 3.5 |

Conversion Factors

| gallons per feet | 1" ID | 2" ID | 4" ID | 6" ID |
|---|---|---|---|---|
| of water column: | 0.041 | 0.163 | 0.653 | 1.469 |

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

Unit Stability

| pH | DO | Cond | ORP |
|---|---|---|---|
| ± 0.1 | ± 10% | ± 3.0% | ± 10 mV |

**SAMPLING INFORMATION**

Analyses:

- VOC ☒
- SVOC ☒
- PCB ☒
- TAL Metals ☒
- ☐
- ☐

- **Sample ID:** MWB-12
- **Sample Time:** 1110
- **MS/MSD:** Yes ☒ No ☐
- **Duplicate:** Yes ☒ No ☐
- **Duplicate ID:** DUP-1
- **Total Bottles:** ~~15~~ 20

**EVACUATION INFORMATION**

- Evacuation Method: Bailer ☐ Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
- Tubing Used: Teflon ☐ Polyethylene ☐
- Sampling Method: Bailer ☒ VOC Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
- Did well go dry? Yes ☐ No ☐
- Water Quality Meter Type: Horiba U-22

| Time / Parameter | 1 0925 Initial | 2 0940 | 3 0955 | 4 1010 | 5 1025 | 6 1040 | 7 1055 | 8 1110 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Volume Purged (gal) | — | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | |
| Depth to Water (ft. TIC) | 10.74 | 10.94 | 10.95 | 10.96 | 10.96 | 10.97 | 10.97 | 10.97 | |
| Temperature (°C) | 13.80 | 13.02 | 12.98 | 12.94 | 12.92 | 13.01 | 13.08 | 13.04 | |
| pH | 6.83 | 6.62 | 6.60 | 6.60 | 6.60 | 6.60 | 6.60 | 6.60 | |
| Conductance (mS/cm) | 0.598 | 0.831 | 0.863 | 0.886 | 0.900 | 0.908 | 0.917 | 0.921 | |
| Dissolved Oxygen mg/L) | 2.00 | 1.05 | 1.00 | 0.84 | 0.75 | 0.69 | 0.67 | 0.61 | |
| Turbidity (NTU) | 7.89* | 4.73* | 3.71* | 1.45* | 0.99* | 0.64* | 0.64* | 0.55 | |
| ORP (mV) | 126 | 46 | 37 | 35 | 32 | 30 | 25 | 23 | |

| Time / Parameter | 10 | 11 | 12 |
|---|---|---|---|
| Volume Purged (gal) | | | |
| Depth to Water (ft. TIC) | | | |
| Temperature (°C) | | | |
| pH | | | |
| Conductance (mS/cm) | | | |
| Dissolved Oxygen mg/L) | | | |
| Turbidity (NTU) | | | |
| ORP (mV) | | | |

**MISCELLANEOUS OBSERVATIONS/PROBLEMS**

* Hach Turbidity Meter Reading

**SAMPLE DESTINATION**

- Laboratory: Northeast Analytical
- Shipped Via: ☒ Federal Express ☐ Other: ____
- Sample was ☐ shipped day of sampling ☒ sent on 10/11/02
- Chain of Custody Signed By: JGS

# GROUND-WATER SAMPLING LOG

**Sampling Personnel:** Jason Sents [BBL-Syracuse] & Meghan Myles [BBL-Syracuse]
**Job Number:** 72207
**Weather:** Partly cloudy, breezy, 55°F

**Well ID.** MW-03
**Date:** 10/10/02
**Time In:** 1415 **Time Out:** 1720

## WELL INFORMATION

| | | TIC | TOC | BGS |
|---|---|---|---|---|
| Well Depth | (feet) | 16.57 | | |
| Water Table Depth | (feet) | 10.63 | | |

*check where appropriate*

- Well Type: Flushmount ☐ Stick-Up ☒
- Well Locked: Yes ☒ No ☐
- Measuring Point Marked: Yes ☒ No ☐
- Well Diameter: 1" ☐ 2" ☒ Other: ____

## WELL WATER INFORMATION

| | | |
|---|---|---|
| Length of Water Column: | (feet) | 5.94 |
| Volume of Water in Well: | (gal) | 0.97 |
| Pumping Rate of Pump: | (mL/min) | 84 mL/min |
| Pumping Rate of Pump: | (GPM) | 0.02 |
| Minutes of Pumping: | | 90 |
| Total Volume Removed: | (gal) | 2.0 |

Conversion Factors

| gallons per feet of water column: | 1" ID | 2" ID | 4" ID | 6" ID |
|---|---|---|---|---|
| | 0.041 | 0.163 | 0.653 | 1.469 |

1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.

Unit Stability

| pH | DO | Cond | ORP |
|---|---|---|---|
| ± 0.1 | ± 10% | ± 3.0% | ± 10 mV |

## SAMPLING INFORMATION

Analyses:
- VOC ☒
- SVOC ☒
- PCB ☒
- TAL Metals ☒
- ____ ☐
- ____ ☐

Sample ID: MW-03
Sample Time: 1615
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID: ____
Total Bottles: 5

## EVACUATION INFORMATION

- Evacuation Method: Bailer ☐ Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
- Tubing Used: Teflon ☐ Polyethylene ☐
- Sampling Method: Bailer ☒ VOC Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
- Did well go dry? Yes ☐ No ☒
- Water Quality Meter Type: Horiba U-22

| Time / Parameter | 1 1445 Initial | 2 1500 | 3 1515 | 4 1530 | 5 1545 | 6 1600 | 7 1615 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Volume Purged (gal) | — | 0.25 | 0.50 | 0.75 | 1.0 | 1.5 | 2.0 | | |
| Depth to Water (ft. TIC) | 10.63 | 11.10 | 11.15 | 11.11 | 11.11 | 11.11 | 11.11 | | |
| Temperature (°C) | 15.46 | 14.73 | 14.49 | 14.60 | 14.55 | 14.56 | 14.46 | | |
| pH | 7.42 | 7.29 | 7.34 | 7.44 | 7.45 | 7.45 | 7.45 | | |
| Conductance (mS/cm) | 0.283 | 0.275 | 0.272 | 0.270 | 0.269 | 0.269 | 0.269 | | |
| Dissolved Oxygen mg/L) | 2.44 | 1.86 | 1.61 | 1.58 | 1.55 | 1.61 | 1.63 | | |
| Turbidity (NTU) | 4.42* | 8.54* | 6.40* | 4.19* | 2.70* | 1.60* | 1.26* | | |
| ORP (mV) | 110 | 122 | 122 | 118 | 117 | 116 | 115 | | |

| Time / Parameter | 10 | 11 | 12 |
|---|---|---|---|
| Volume Purged (gal) | | | |
| Depth to Water (ft. TIC) | | | |
| Temperature (°C) | | | |
| pH | | | |
| Conductance (mS/cm) | | | |
| Dissolved Oxygen mg/L) | | | |
| Turbidity (NTU) | | | |
| ORP (mV) | | | |

**MISCELLANEOUS OBSERVATIONS/PROBLEMS**

* Hach Turbidity Meter

## SAMPLE DESTINATION

Laboratory: Northeast Analytical
Shipped Via: ☒ Federal Express ☐ Other: ____
Sample was ☐ shipped day of sampling ☒ sent on 10/11/02
Chain of Custody Signed By: JCS

# GROUND-WATER SAMPLING LOG

**Sampling Personnel:** Jason Sents [BBL-Syracuse] & Meghan Myles [BBL-Syracuse]
**Job Number:** 72207
**Weather:** cloudy, drizzle, breezy, 40°F

**Well ID.** MW-05
**Date:** 10/11/02
**Time In:** 0845 **Time Out:** 1130

**WELL INFORMATION**

| | | TIC | TOC | BGS |
|---|---|---|---|---|
| Well Depth | (feet) | 26.58 | | |
| Water Table Depth | (feet) | 10.86 | | |

*check where appropriate*
Well Type: Flushmount ☐ Stick-Up ☒
Well Locked: Yes ☒ No ☐
Measuring Point Marked: Yes ☒ No ☐
Well Diameter: 1" ☐ 2" ☒ Other: ____

**WELL WATER INFORMATION**

| | | |
|---|---|---|
| Length of Water Column: | (feet) | 15.72 |
| Volume of Water in Well: | (gal) | 2.56 |
| Pumping Rate of Pump: | (mL/min) | 180 mL/min |
| Pumping Rate of Pump: | (GPM) | 0.05 |
| Minutes of Pumping: | | 105 |
| Total Volume Removed: | (gal) | 5.0 |

Conversion Factors

| gallons per feet of water column: | 1" ID | 2" ID | 4" ID | 6" ID |
|---|---|---|---|---|
| | 0.041 | 0.163 | 0.653 | 1.469 |

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

Unit Stability

| pH | DO | Cond | ORP |
|---|---|---|---|
| ± 0.1 | ± 10% | ± 3.0% | ± 10 mV |

**SAMPLING INFORMATION**

Analyses:
- VOC ☒
- SVOC ☒
- PCB ☒
- TAL Metals ☒
- ☐
- ☐

Sample ID: MW-05
Sample Time: 1050
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID: ——
Total Bottles: 5

**EVACUATION INFORMATION**

Evacuation Method: Bailer ☐ Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
Tubing Used: Teflon ☐ Polyethylene ☐
Sampling Method: Bailer ☒ VOC Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____

Did well go dry? Yes ☐ No ☒
Water Quality Meter Type: Horiba U-22

| Time / Parameter | 1 0905 Initial | 2 0920 | 3 0935 | 4 0950 | 5 1005 | 6 1020 | 7 1035 | 8 1050 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Volume Purged (gal) | — | 0.75 | 1.50 | 2.25 | 3.0 | 3.75 | 4.50 | 5.0 | |
| Depth to Water (ft. TIC) | 10.86 | 11.99 | 11.50 | 11.39 | 11.39 | 11.10 | 11.29 | 11.40 | |
| Temperature (°C) | 17.73 | 17.48 | 17.49 | 17.34 | 17.53 | 16.69 | 17.48 | 17.49 | |
| pH | 6.82 | 6.84 | 6.92 | 6.95 | 6.96 | 6.96 | 6.96 | 6.96 | |
| Conductance (mS/cm) | 0.474 | 0.478 | 0.496 | 0.502 | 0.508 | 0.510 | 0.509 | 0.516 | |
| Dissolved Oxygen mg/L) | 2.16 | 0.68 | 1.04 | 1.39 | 0.99 | 0.98 | 1.14 | 0.98 | |
| Turbidity (NTU) | 24.4 | 19.6 | 13.6 | 9.2 | 5.3 | 5.4 | 4.7 | 4.1 | |
| ORP (mV) | -103 | -126 | -148 | -157 | -167 | -167 | -175 | -180 | |

| Time / Parameter | 10 | 11 | 12 |
|---|---|---|---|
| Volume Purged (gal) | | | |
| Depth to Water (ft. TIC) | | | |
| Temperature (°C) | | | |
| pH | | | |
| Conductance (mS/cm) | | | |
| Dissolved Oxygen mg/L) | | | |
| Turbidity (NTU) | | | |
| ORP (mV) | | | |

**MISCELLANEOUS OBSERVATIONS/PROBLEMS**

- Having difficulties keeping flowrate below 100 mL/min.
- Purge water has strong sulfur/rotten egg odor

MUST HAVE EXTRACT SPLIT AND SENT TO SUNY OSWEGO

**SAMPLE DESTINATION**

Laboratory: NEA
Shipped Via: ☒ Federal Express ☐ Other: ____
Sample was ☒ shipped day of sampling ☐ sent on ____
Chain of Custody Signed By: JCS

*ALCAN Aluminum Corporation* *October 2002 Groundwater Sampling*

## GROUND-WATER SAMPLING LOG

**Sampling Personnel:** Jason Sents [BBL-Syracuse] & Meghan Myles [BBL-Syracuse]
**Job Number:** 72207
**Weather:** Cloudy, drizzle, breezy, 45°F

**Well ID.** MW-04
**Date:** 10/11/02
**Time In:** 1255 **Time Out:** 1520

**WELL INFORMATION**

| | | TIC | TOC | BGS |
|---|---|---|---|---|
| Well Depth | (feet) | 8.16 | | |
| Water Table Depth | (feet) | 6.91 | | |

*check where appropriate*
Well Type: Flushmount ☐ Stick-Up ☒
Well Locked: Yes ☒ No ☐
Measuring Point Marked: Yes ☒ No ☐
Well Diameter: 1" ☐ 2" ☒ Other: ____

**WELL WATER INFORMATION**

| | | |
|---|---|---|
| Length of Water Column: | (feet) | 1.25 |
| Volume of Water in Well: | (gal) | 0.20 |
| Pumping Rate of Pump: | (mL/min) | ~125 mL/min |
| Pumping Rate of Pump: | (GPM) | 0.03 |
| Minutes of Pumping: | | 90 |
| Total Volume Removed: | (gal) | 3.0 |

Conversion Factors

| | 1" ID | 2" ID | 4" ID | 6" ID |
|---|---|---|---|---|
| gallons per feet of water column: | 0.041 | 0.163 (circled) | 0.653 | 1.469 |

1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.

Unit Stability

| pH | DO | Cond | ORP |
|---|---|---|---|
| ± 0.1 | ± 10% | ± 3.0% | ± 10 mV |

**SAMPLING INFORMATION**

Analyses:
VOC ☒
SVOC ☒
PCB ☒
TAL Metals ☒
____ ☐
____ ☐

Sample ID: MW-04
Sample Time: 1445
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID: —
Total Bottles: 5

**EVACUATION INFORMATION**

Evacuation Method: Bailer ☐ Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
Tubing Used: Teflon ☐ Polyethylene ☐
Sampling Method: Bailer ☒ (NA) Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
Did well go dry? Yes ☐ No ☐
Water Quality Meter Type: Horiba U-22

| Time / Parameter | 1 1315 Initial | 2 1330 | 3 1345 | 4 1400 | 5 1415 | 6 1430 | 7 1445 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Volume Purged (gal) | ~~7.08~~ | 0.25 | 0.50 | 1.50 | 2.0 | 2.5 | 3.0 | | |
| Depth to Water (ft. TIC) | 7.08 | 7.04 | 7.04 | 7.04 | 7.04 | 7.04 | 7.04 | | |
| Temperature (°C) | 16.17 | 15.96 | 15.96 | 15.92 | 15.93 | 15.95 | 15.97 | | |
| pH | 6.95 | 6.66 | 6.69 | 6.71 | 6.72 | 6.72 | 6.72 | | |
| Conductance (mS/cm) | 0.265 | 0.293 | 0.291 | 0.295 | 0.296 | 0.297 | 0.298 | | |
| Dissolved Oxygen mg/L) | 2.9 | 1.06 | 0.66 | 0.68 | 0.74 | 0.71 | 0.60 | | |
| Turbidity (NTU) | 800 | 28.4 | 10.2 | 9.4 | 8.3 | 4.4 | 4.2 | | |
| ORP (mV) | 185 | -76 | -83 | -85 | -82 | -81 | -80 | | |

| Time / Parameter | 10 | 11 | 12 |
|---|---|---|---|
| Volume Purged (gal) | | | |
| Depth to Water (ft. TIC) | | | |
| Temperature (°C) | | | |
| pH | | | |
| Conductance (mS/cm) | | | |
| Dissolved Oxygen mg/L) | | | |
| Turbidity (NTU) | | | |
| ORP (mV) | | | |

**MISCELLANEOUS OBSERVATIONS/PROBLEMS**

Initial purge very turbid, rust color

| Time | Hach Turbidity meter |
|---|---|
| 1415 | 2.55 NTU |
| 1445 | 1.98 NTU |

**SAMPLE DESTINATION**

Laboratory: Northeast Analytical
Shipped Via: ☒ Federal Express ☐ Other: ____
Sample was ☒ shipped day of sampling ☐ sent on ____
Chain of Custody Signed By: JCS

## GROUND-WATER SAMPLING LOG

**Sampling Personnel:** Jason Sents [BBL-Syracuse] & Meghan Myles [BBL-Syracuse]
**Job Number:** 72207
**Weather:** Cloudy, breezy, 50°F

**Well ID.** MW-09
**Date:** 10/14/02
**Time In:** 0955 **Time Out:** 1230

**WELL INFORMATION**

| | TIC | TOC | BGS |
|---|---|---|---|
| Well Depth (feet) | 12.31 | | |
| Water Table Depth (feet) | 12.08 | | |

check where appropriate
Well Type: Flushmount ☐ Stick-Up ☒
Well Locked: Yes ☐ No ☒
Measuring Point Marked: Yes ☒ No ☐
Well Diameter: 1" ☐ 2" ☒ Other: ____

**WELL WATER INFORMATION**

| | | |
|---|---|---|
| Length of Water Column: | (feet) | 0.23 |
| Volume of Water in Well: | (gal) | 0.04 |
| Pumping Rate of Pump: | (mL/min) | 54 mL/min |
| Pumping Rate of Pump: | (GPM) | 0.01 |
| Minutes of Pumping: | | 105 |
| Total Volume Removed: | (gal) | 1.50 |

Conversion Factors

| gallons per feet of water column: | 1" ID | 2" ID | 4" ID | 6" ID |
|---|---|---|---|---|
| | 0.041 | 0.163 | 0.653 | 1.469 |

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

Unit Stability

| pH | DO | Cond | ORP |
|---|---|---|---|
| ± 0.1 | ± 10% | ± 3.0% | ± 10 mV |

**SAMPLING INFORMATION**

Analyses:
VOC ☒
SVOC ☒
PCB ☒
TAL Metals ☒
____ ☐
____ ☐

Sample ID: MW-09
Sample Time: 1155
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID: ____
Total Bottles: 5

**EVACUATION INFORMATION**

Evacuation Method: Bailer ☐ Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
Tubing Used: Teflon ☐ Polyethylene ☐
Sampling Method: Bailer ☒ VOC Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____

Did well go dry? Yes ☐ No ☒
Water Quality Meter Type: Horiba U-22

| Time / Parameter | 1 1010 Initial | 2 1025 | 3 1040 | 4 1055 | 5 1110 | 6 1125 | 7 1140 | 8 1155 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Volume Purged (gal) | — | 0.20 | 0.40 | 0.60 | 0.80 | 1.0 | 1.25 | 1.50 | |
| Depth to Water (ft. TIC) | * | * | * | * | * | * | * | * | |
| Temperature (°C) | 14.68 | 14.96 | 15.55 | 15.29 | 15.64 | 16.10 | 16.49 | 17.24 | |
| pH | 6.81 | 6.90 | 6.91 | 6.92 | 6.93 | 6.92 | 6.91 | 6.92 | |
| Conductance (mS/cm) | 0.273 | 0.272 | 0.273 | 0.277 | 0.282 | 0.286 | 0.287 | 0.284 | |
| Dissolved Oxygen mg/L) | 4.55 | 4.32 | 3.99 | 3.81 | 3.68 | 3.56 | 3.50 | 3.63 | |
| Turbidity (NTU) | 43.5 | 18.1 | 16.5 | 16.1 | 14.7 | 15.6 | 15.8 | 16.0 | |
| ORP (mV) | 128 | 136 | 139 | 140 | 140 | 141 | 141 | 141 | |

| Time / Parameter | 10 | 11 | 12 |
|---|---|---|---|
| Volume Purged (gal) | | | |
| Depth to Water (ft. TIC) | | | |
| Temperature (°C) | | | |
| pH | | | |
| Conductance (mS/cm) | | | |
| Dissolved Oxygen mg/L) | | | |
| Turbidity (NTU) | | | |
| ORP (mV) | | | |

**MISCELLANEOUS OBSERVATIONS/PROBLEMS**

* Can not measure w/ probe - well has not gone dry.
Rust color particles in initial purge.
@1110 - Hach Turbidimeter = 0.46 NTU
@1125 - Hach Turbidimeter = 0.64 NTU
@1140 - Hach Turbidimeter = 0.76 NTU
@1155 - Hach Turbidimeter = 0.89 NTU

**SAMPLE DESTINATION**

Laboratory: NEA
Shipped Via: ☒ Federal Express ☐ Other: ____
Sample was ☐ shipped day of sampling ☒ sent on 10/15/02
Chain of Custody Signed By: JCS

ALCAN Aluminum Corporation — October 2002 Groundwater Sampling

## GROUND-WATER SAMPLING LOG

Sampling Personnel: Jason Sents [BBL-Syracuse] & Meghan Myles [BBL-Syracuse]
Well ID. MW-11
Job Number: 72207
Date: 10/11/02
Weather: cloudy, breezy, 50°F
Time in: 1525 Time Out: 1010 (10/15/02)

**WELL INFORMATION**

| | | TIC | TIC | BGS |
|---|---|---|---|---|
| Well Depth | (feet) | 12.45 | 12.45 | |
| Water Table Depth | (feet) | 9.55 | 9.59 | |

check where appropriate
Well Type: Flushmount ☐ Stick-Up ☒
Well Locked: Yes ☒ No ☐
Measuring Point Marked: Yes ☒ No ☐
Well Diameter: 1" ☐ 2" ☒ Other: ____

**WELL WATER INFORMATION**

| | | |
|---|---|---|
| Length of Water Column: | (feet) | 2.9 |
| Volume of Water in Well: | (gal) | 0.47 |
| Pumping Rate of Pump: | (mL/min) | 77 mL/min |
| Pumping Rate of Pump: | (GPM) | 0.02 |
| Minutes of Pumping: | | 245 |
| Total Volume Removed: | (gal) | 5.0 |

Conversion Factors

| gallons per feet of water column: | 1" ID | 2" ID | 4" ID | 6" ID |
|---|---|---|---|---|
| | 0.041 | 0.163 | 0.653 | 1.469 |

1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.

Unit Stability

| pH | DO | Cond | ORP |
|---|---|---|---|
| ± 0.1 | ± 10% | ± 3.0% | ± 10 mV |

**SAMPLING INFORMATION**

Analyses:
VOC ☒
SVOC ☒
PCB ☒
TAL Metals ☒
____ ☐
____ ☐

Sample ID: MW-11
Sample Time:
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID:
Total Bottles: 5

**EVACUATION INFORMATION**

Evacuation Method: Bailer ☐ Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
Tubing Used: Teflon ☐ Polyethylene ☐
Sampling Method: Bailer ☒ VOC Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
Did well go dry? Yes ☒ No ☐ Water Quality Meter Type: Horiba U-22

| Time / Parameter | 1 1540 Initial | 2 1555 | 3 1610 | 4 ~~1625~~ 0905 | 5 ~~1640~~ 0920 | 6 0935 | 7 0950 | 8 1355 | 9 1410 |
|---|---|---|---|---|---|---|---|---|---|
| Volume Purged (gal) | — | 0.5 | 1.0 | — | 0.25 | 0.50 | ~~0.75~~ ~~0.50~~ | ~~[illegible]~~ — | 1.0 |
| Depth to Water (ft. TIC) | 9.89 | 11.35 | DRY | 9.99 | 10.33 | 12.22 | DRY | 9.95 | 9.94 |
| Temperature (°C) | 14.07 | 14.41 | 14.12 | 12.20 | 12.42 | 12.26 | 11.28 | 13.66 | 13.09 |
| pH | 7.27 | 7.10 | 7.37 | 7.26 | 6.89 | 6.91 | 7.05 | 7.15 | 6.85 |
| Conductance (mS/cm) | 0.629 | 0.529 | 0.641 | 5.75 | 0.547 | 0.526 | 0.551 | 0.558 | 0.532 |
| Dissolved Oxygen mg/L) | 5.57 | 9.00 | 4.32 | 5.0 | 6.17 | 5.83 | 9.12 | 7.24 | 6.68 |
| Turbidity (NTU) | 999.0 | 999.0 | 999.0 | 999.0 | 237.0 | 755.0 | 7 | 165.0 | 293.0 |
| ORP (mV) | -26 | -5 | -58 | 90 | 111 | 61 | 37 | 56 | 91 |

| Time / Parameter | 10 1425 | 11 1440 | 12 1455 |
|---|---|---|---|
| Volume Purged (gal) | 1.25 | 1.50 | 2.0 |
| Depth to Water (ft. TIC) | 10.04 | 10.30 | 11.14 |
| Temperature (°C) | 12.80 | 12.63 | 12.57 |
| pH | 6.76 | 6.66 | 6.68 |
| Conductance (mS/cm) | 0.526 | 0.524 | 0.514 |
| Dissolved Oxygen mg/L) | 7.00 | 7.29 | 7.17 |
| Turbidity (NTU) | 176.0 | 35.3 | 76.0 |
| ORP (mV) | 108 | 126 | 119 |

**MISCELLANEOUS OBSERVATIONS/PROBLEMS**

@1440 Hach Turbidimeter = 19.1 NTU
@ 1455 " " = 463 NTU

**SAMPLE DESTINATION**

Laboratory: Northeast Analytical
Sample was ☒ shipped day of sampling ☐ sent on ____
Chain of Custody Signed By: JCS
Shipped Via: ☒ Federal Express ☐ Other: ____

ALCAN Aluminum Corporation — October 2002 Groundwater Sampling

## GROUND-WATER SAMPLING LOG

Sampling Personnel: Jason Sents [BBL-Syracuse] & Meghan Myles [BBL-Syracuse]
Well ID: MW-11
Job Number: 72207
Date: 10/11/02 10/15/02
Weather:
Time In: 1525 Time Out: 1010

**WELL INFORMATION**

| | | TIC | TOC | BGS |
|---|---|---|---|---|
| Well Depth | (feet) | | | |
| Water Table Depth | (feet) | | | |

check where appropriate
- Well Type: Flushmount ☐ Stick-Up ☒
- Well Locked: Yes ☒ No ☐
- Measuring Point Marked: Yes ☒ No ☐
- Well Diameter: 1" ☐ 2" ☒ Other: ____

**WELL WATER INFORMATION**

| | | |
|---|---|---|
| Length of Water Column: | (feet) | |
| Volume of Water in Well: | (gal) | |
| Pumping Rate of Pump: | (mL/min) | |
| Pumping Rate of Pump: | (GPM) | |
| Minutes of Pumping: | | |
| Total Volume Removed: | (gal) | |

Conversion Factors

| | 1" ID | 2" ID | 4" ID | 6" ID |
|---|---|---|---|---|
| gallons per feet of water column: | 0.041 | 0.163 | 0.653 | 1.469 |

1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.

Unit Stability

| pH | DO | Cond | ORP |
|---|---|---|---|
| ± 0.1 | ± 10% | ± 3.0% | ± 10 mV |

**SAMPLING INFORMATION**

Analyses:
- VOC ☒
- SVOC ☒
- PCB ☒
- TAL Metals ☒
- ________ ☐
- ________ ☐

Sample ID: MW-11
Sample Time:
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID: —
Total Bottles: 5

**EVACUATION INFORMATION**

- Evacuation Method: Bailer ☐ Peristaltic ☒ Grundfos ☐ Other Pump ☐ ________
- Tubing Used: Teflon ☐ Polyethylene ☐
- Sampling Method: Bailer ☒ VOC Peristaltic ☒ Grundfos ☐ Other Pump ☐ ________
- Did well go dry? Yes ☒ No ☐
- Water Quality Meter Type: Horiba U-22

| Time / Parameter | 1 1510 Initial | 2 1525 | 3 1540 | 4 1745 | 5 1800 | 6 1815 | 7 10/15/02 0825 | 8 0835 | 9 0845 |
|---|---|---|---|---|---|---|---|---|---|
| Volume Purged (gal) | 2.25 | 2.50 | ~~3~~ 2.75 | — | 4.0 | 4.5 | — | 4.6 | 4.7 |
| Depth to Water (ft. TIC) | 11.71 | 12.26 | DRY | 10.05 | 11.06 | 12.45 | 9.56 | 9.89 | 9.95 |
| Temperature (°C) | 12.26 | 12.11 | 11.86 | 12.34 | 12.67 | 12.41 | 9.50 | 9.86 | 10.07 |
| pH | 6.81 | 6.97 | 7.01 | 6.96 | 6.70 | 6.84 | 6.95 | 6.77 | 6.70 |
| Conductance (mS/cm) | 0.505 | 0.537 | 0.540 | 0.527 | 0.515 | 0.525 | 0.525 | 0.524 | 0.527 |
| Dissolved Oxygen mg/L) | 6.45 | 7.11 | 8.59 | 6.49 | 7.55 | 8.00 | 7.65 | 7.99 | 7.97 |
| Turbidity (NTU) | 152.0 | 299.0 | 298.0 | 254.0 | 330.0 | 178.6 | 806.0 | 135.0 | 55.1 |
| ORP (mV) | 85 | 29 | 20 | 27 | 86 | 31 | 101 | 122 | 133 |

| Time / Parameter | 10 0855 | 11 0905 | 12 0915 |
|---|---|---|---|
| Volume Purged (gal) | 4.8 | 4.9 | 5.0 |
| Depth to Water (ft. TIC) | 9.99 | 10.01 | 10.10 |
| Temperature (°C) | 10.22 | 10.39 | 10.66 |
| pH | 6.68 | 6.66 | 6.65 |
| Conductance (mS/cm) | 0.528 | 0.528 | 0.525 |
| Dissolved Oxygen mg/L) | 7.96 | 7.84 | 7.67 |
| Turbidity (NTU) | 36.3 | 30.2 | 29.5 |
| ORP (mV) | 136 | 137 | 135 |

**MISCELLANEOUS OBSERVATIONS/PROBLEMS**

@ 1510 Hach Turbidimeter = 108 NTU
@ 1525 " " = 282 NTU
@ 1540 Well dry – allow to recover, pump dry again to sample on 10/15/02
~~Final reading on back~~

**SAMPLE DESTINATION**

Laboratory: Northeast Analytical
Shipped Via: ☒ Federal Express ☐ Other: ________
Sample was ☒ shipped day of sampling ☐ sent on ________
Chain of Custody Signed By: JCS

# GROUND-WATER SAMPLING LOG

**Sampling Personnel:** Jason Sents [BBL-Syracuse] & Meghan Myles [BBL-Syracuse]
**Job Number:** 72207
**Weather:** Cool, breezy, 43° F

**Well ID.** MW-07
**Date:** 10/15/02
**Time In:** 1015 **Time Out:** 1320

**WELL INFORMATION**

| | | TIC | TOC | BGS |
|---|---|---|---|---|
| Well Depth | (feet) | 16.37 | | |
| Water Table Depth | (feet) | 15.59 | | |

*check where appropriate*
Well Type: Flushmount ☐ Stick-Up ☒
Well Locked: Yes ☒ No ☐
Measuring Point Marked: Yes ☒ No ☐
Well Diameter: 1" ☐ 2" ☒ Other: ____

**WELL WATER INFORMATION**

| | | |
|---|---|---|
| Length of Water Column: | (feet) | 0.78 |
| Volume of Water in Well: | (gal) | 0.13 |
| Pumping Rate of Pump: | (mL/min) | ~ 50mL/min |
| Pumping Rate of Pump: | (GPM) | 0.01 |
| Minutes of Pumping: | | 95 |
| Total Volume Removed: | (gal) | 1.0 |

Conversion Factors

| gallons per feet of water column: | 1" ID | 2" ID (circled) | 4" ID | 6" ID |
|---|---|---|---|---|
| | 0.041 | 0.163 | 0.653 | 1.469 |

1 gal = 3.785 L = 3765 mL = 0.1337 cubic ft.

Unit Stability

| pH | DO | Cond | ORP |
|---|---|---|---|
| ± 0.1 | ± 10% | ± 3.0% | ± 10 mV |

**SAMPLING INFORMATION**

Analyses:
VOC ☒
SVOC ☒
PCB ☒
TAL Metals ☒
____ ☐
____ ☐

Sample ID: MW-07
Sample Time: 1220
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID: ____
Total Bottles: 5

**EVACUATION INFORMATION**

Evacuation Method: Bailer ☐ Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____
Tubing Used: Teflon ☐ Polyethylene ☐
Sampling Method: Bailer ☒ VOC Peristaltic ☒ Grundfos ☐ Other Pump ☐ ____

Did well go dry? Yes ☐ No ☒
Water Quality Meter Type: Horiba U-22

| Time / Parameter | 1 1035 Initial | 2 1045 | 3 1055 | 4 1105 | 5 1115 | 6 1125 | 7 1135 | 8 1145 | 9 1155 |
|---|---|---|---|---|---|---|---|---|---|
| Volume Purged (gal) | — | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 |
| Depth to Water (ft. TIC) | 15.64 | 15.67 | 15.68 | 15.70 | 15.71 | 15.72 | 15.74 | 15.76 | 15.78 |
| Temperature (°C) | 13.85 | 14.63 | 14.96 | 15.37 | 15.37 | 15.85 | 15.69 | 15.23 | 15.09 |
| pH | 6.59 | 6.51 | 6.45 | 6.43 | 6.41 | 6.42 | 6.41 | 6.41 | 6.41 |
| Conductance (mS/cm) | 2.52 | 2.52 | 2.50 | 2.48 | 2.48 | 2.48 | 2.49 | 2.50 | 2.52 |
| Dissolved Oxygen mg/L) | 4.24 | 3.57 | 3.07 | 2.85 | 2.39 | 2.03 | 1.84 | 1.51 | 1.31 |
| Turbidity (NTU) | 36.2 | 21.2 | 17.7 | 16.5 | 15.7 | 12.2 | 12.3 | 10.9 | 11.8 |
| ORP (mV) | -71 | -56 | -49 | -47 | -46 | -47 | -48 | -48 | -49 |

| Time / Parameter | 10 1200 | 11 1210 | 12 |
|---|---|---|---|
| Volume Purged (gal) | 0.9 | 1.0 | |
| Depth to Water (ft. TIC) | 15.64 | 15.65 | |
| Temperature (°C) | 14.92 | 15.52 | |
| pH | 6.41 | 6.41 | |
| Conductance (mS/cm) | 2.53 | 2.53 | |
| Dissolved Oxygen mg/L) | 1.30 | 1.31 | |
| Turbidity (NTU) | 4.8 | 2.0 | |
| ORP (mV) | -46 | -42 | |

**MISCELLANEOUS OBSERVATIONS/PROBLEMS**

@ 1155 Hach Turbidimeter = 2.3 NTU
Initial purge: slight odor, trace sheen, orange-brown color
1155 slightly lowered purge rate to < 50mL/min

**SAMPLE DESTINATION**

Laboratory: Northeast Analytical
Shipped Via: ☒ Federal Express ☐ Other: ____
Sample was ☒ shipped day of sampling ☐ sent on ____
Chain of Custody Signed By: JCS

## GROUND-WATER SAMPLING LOG

Sampling Personnel: Jason Sents [BBL-Syracuse] & Meghan Myles [BBL-Syracuse]
Job Number: 72207
Weather: M. Cloudy, 55°F, very breezy
Well ID. MW-02
Date: 10/08/02
Time In: 0825 Time Out: 1120

**WELL INFORMATION**

| | | TIC | TOC | BGS |
|---|---|---|---|---|
| Well Depth | (feet) | 20.77 | | |
| Water Table Depth | (feet) | 12.20 | | |

check where appropriate
Well Type: Flushmount ☐ Stick-Up ☒
Well Locked: Yes ☒ No ☐
Measuring Point Marked: Yes ☒ No ☐
Well Diameter: 1" ☐ 2" ☒ Other:

**WELL WATER INFORMATION**

| | | |
|---|---|---|
| Length of Water Column: | (feet) | 8.57 |
| Volume of Water in Well: | (gal) | 1.46 |
| Pumping Rate of Pump: | (mL/min) | ≈100 mL/min |
| Pumping Rate of Pump: | (GPM) | ≈0.03 GPM |
| Minutes of Pumping: | | 85 |
| Total Volume Removed: | (gal) | 2.50 |

3 well vols = 4.2 gal

Conversion Factors

| gallons per feet of water column: | 1" ID | 2" ID | 4" ID | 6" ID |
|---|---|---|---|---|
| | 0.041 | 0.163 | 0.653 | 1.469 |

1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.

Unit Stability

| pH | DO | Cond | ORP |
|---|---|---|---|
| ± 0.1 | ± 10% | ± 3.0% | ± 10 mV |

**SAMPLING INFORMATION**

Analyses:
- VOC ☒
- SVOC ☒
- PCB ☒
- TAL Metals ☒
- ☐
- ☐

Sample ID: MW-02
Sample Time: 1030
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID: —
Total Bottles: 5

**EVACUATION INFORMATION**

Evacuation Method: Bailer ☐ Peristaltic ☒ Grundfos ☐ Other Pump ☐
Tubing Used: Teflon ☐ Polyethylene ☐
Sampling Method: Bailer ☒ VOC Peristaltic ☒ Grundfos ☐ Other Pump ☐
Did well go dry? Yes ☐ No ☒
Water Quality Meter Type:

| Time / Parameter | 1 0905 Initial | 2 0930 | 3 0945 | 4 1000 | 5 1015 | 6 1030 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Volume Purged (gal) | initial | 0.75 | 1.00 | 1.75 | 2.00 | 2.50 | | | |
| Depth to Water (ft. TIC) | 12.20 | 12.22 | 12.25 | 12.25 | 12.22 | 12.22 | | | |
| Temperature (°C) | 13.64 | 14.09 | 14.18 | 14.26 | 13.82 | 13.99 | | | |
| pH | 6.68 | 6.66 | 6.66 | 6.66 | 6.67 | 6.67 | | | |
| Conductance (mS/cm) | 1.07 | 1.05 | 1.04 | 1.05 | 1.05 | 1.05 | | | |
| Dissolved Oxygen mg/L) | 2.88 | 2.07 | 1.75 | 1.59 | 1.91 | 1.73 | | | |
| Turbidity (NTU) | 85.8 | 10.3 | 6.6 | 8.8 | 5.3 | 2.4 | | | |
| ORP (mV) | -60 | -53 | -57 | -58 | -50 | -52 | | | |

| Time / Parameter | 10 | 11 | 12 |
|---|---|---|---|
| Volume Purged (gal) | | | |
| Depth to Water (ft. TIC) | | | |
| Temperature (°C) | | | |
| pH | | | |
| Conductance (mS/cm) | | | |
| Dissolved Oxygen mg/L) | | | |
| Turbidity (NTU) | | | |
| ORP (mV) | | | |

**MISCELLANEOUS OBSERVATIONS/PROBLEMS**

initial – black particles/flakes in water; sewage odor
1000 - reducing flow rate back to 100 mL/min
HACH DO KIT @ 1030 = 2.52 NTU

**SAMPLE DESTINATION**

Laboratory: NorthEast Analytical
Shipped Via: ☒ Federal Express ☐ Other:
Sample was ☐ shipped day of sampling ☒ sent on 10/9/02
Chain of Custody Signed By: JCS

# *Appendix H*

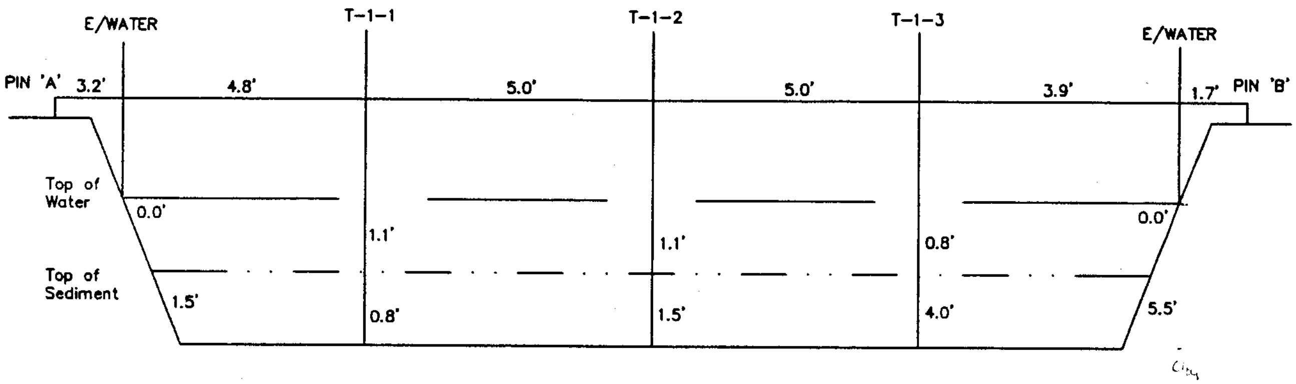
## Tributary 63 Sediment Probing Transect Results

BLASLAND, BOUCK & LEE, INC.
*engineers & scientists*

TRANSECT ID: T – 1

Note: Coordinates based on NAD 1983, New York Central State Plane Zone.

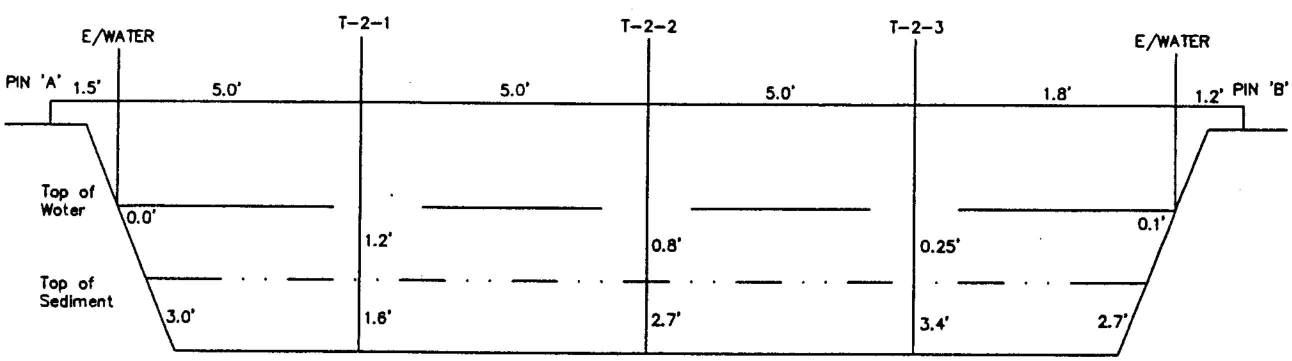
APPROX. NORTHING: 1271210 '
APPROX. EASTING: 852127 '




TRANSECT ID: T – 2

Note: Coordinates based on NAD 1983, New York Central State Plane Zone.

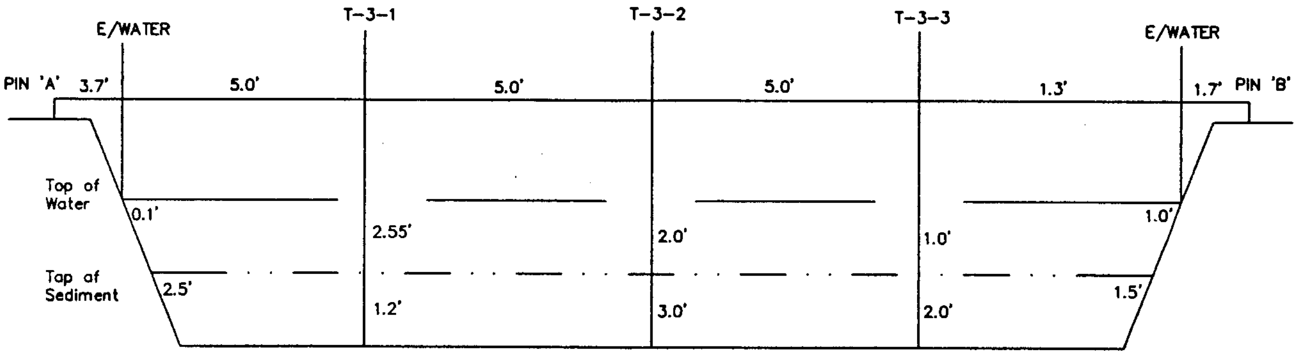
APPROX. NORTHING: 1270950 '
APPROX. EASTING: 852340 '



TRANSECT ID: T – 3

APPROX. NORTHING: 1270947 '
APPROX. EASTING: 852420 '

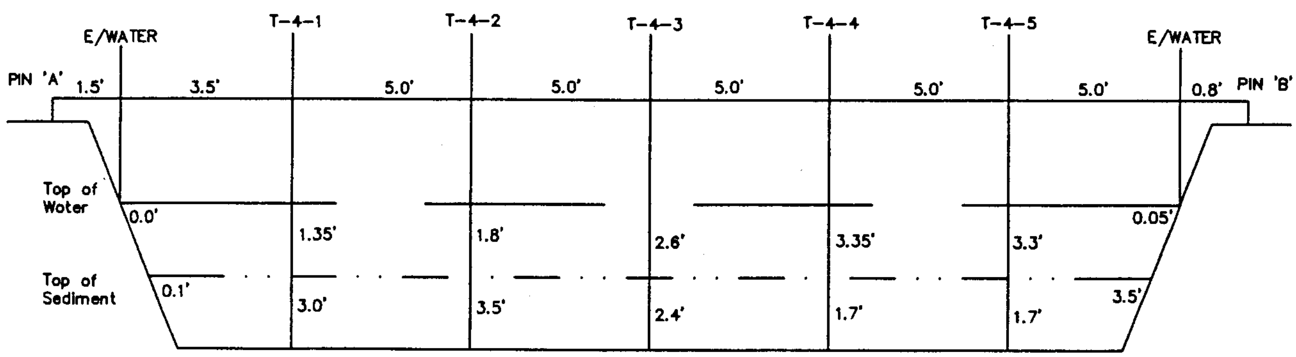
Note: Coordinates based on NAD 1983, New York Central State Plane Zone.




TRANSECT ID: T – 4

APPROX. NORTHING: 1270365 '
APPROX. EASTING: 852989 '

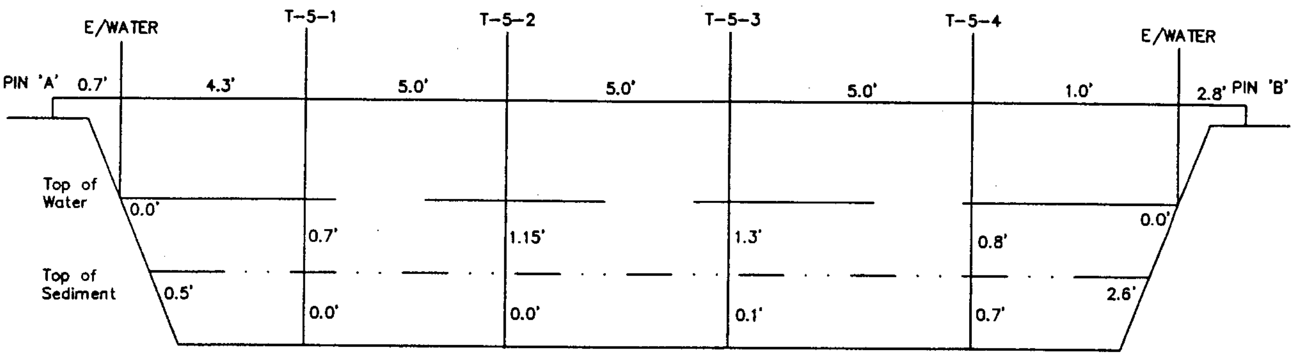
Note: Coordinates based on NAD 1983, New York Central State Plane Zone.



TRANSECT ID: T – 5

Note: Coordinates based on NAD 1983, New York Central State Plane Zone.

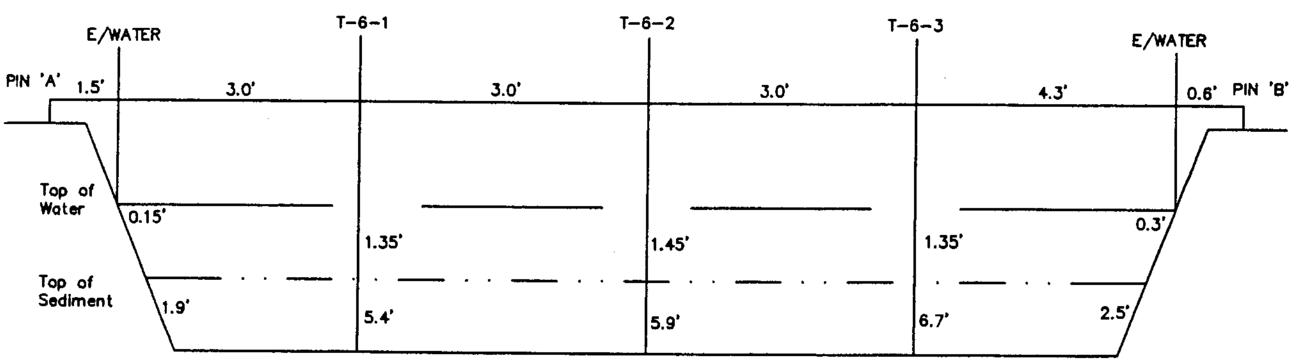
APPROX. NORTHING: 1270152 '
APPROX. EASTING: 853218 '




TRANSECT ID: T – 6

Note: Coordinates based on NAD 1983, New York Central State Plane Zone.

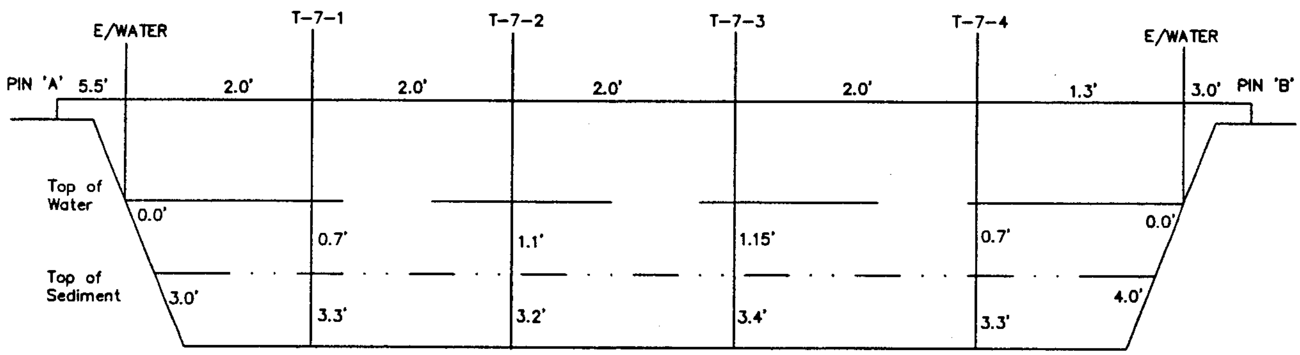
APPROX. NORTHING: 1270193 '
APPROX. EASTING: 853673 '



TRANSECT ID: T – 7

APPROX. NORTHING: 1270292 '
APPROX. EASTING: 854037 '

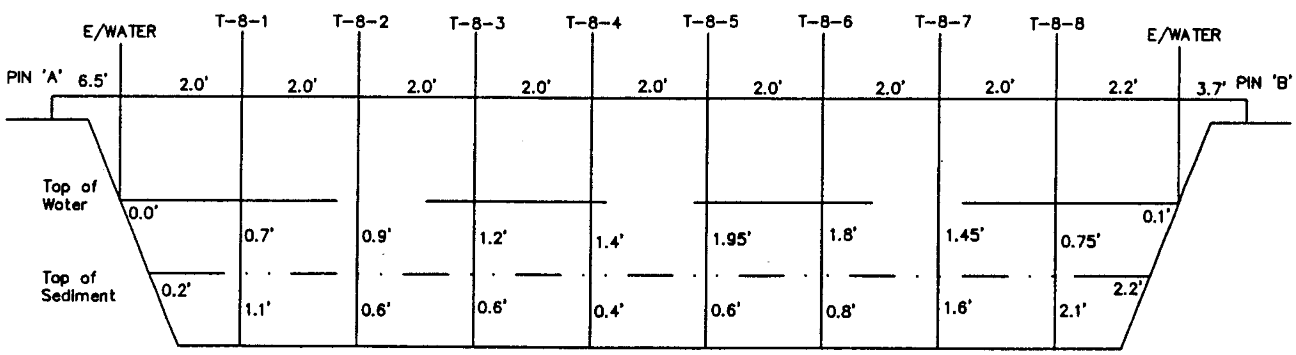
Note: Coordinates based on NAD 1983, New York Central State Plane Zone.




TRANSECT ID: T – 8

APPROX. NORTHING: 1270665 '
APPROX. EASTING: 854487 '

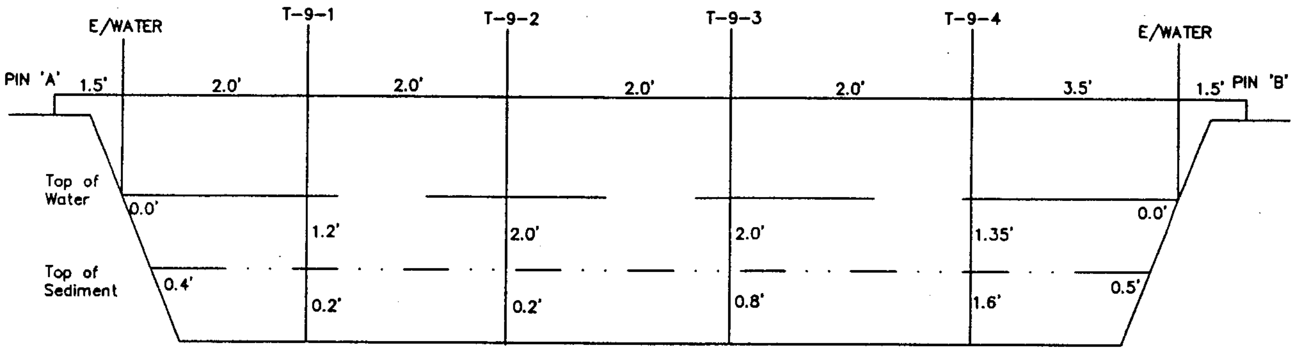
Note: Coordinates based on NAD 1983, New York Central State Plane Zone.



TRANSECT ID: T – 9

APPROX. NORTHING: 1270848 '
APPROX. EASTING: 854729 '

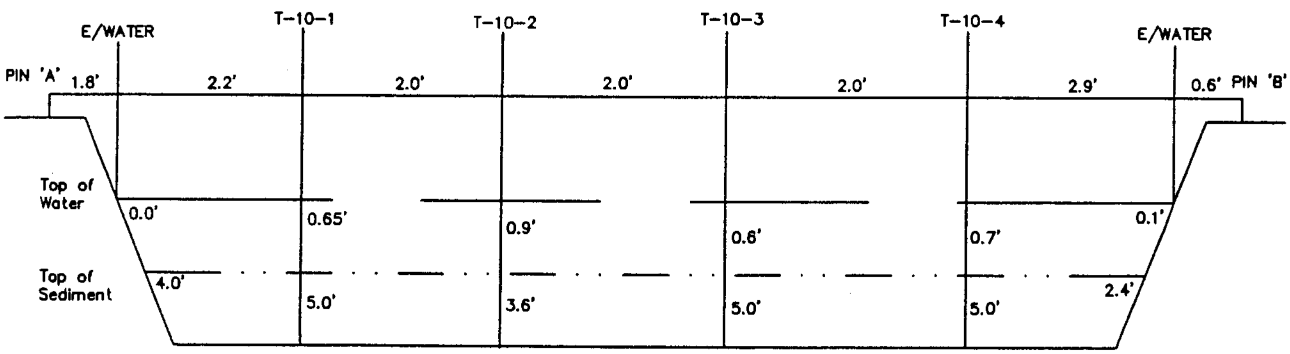
Note: Coordinates based on NAD 1983, New York Central State Plane Zone.




TRANSECT ID: T – 10

APPROX. NORTHING: 1270758 '
APPROX. EASTING: 854975 '

Note: Coordinates based on NAD 1983, New York Central State Plane Zone.



TRANSECT ID: T – 11

APPROX. NORTHING: 1270622 '
APPROX. EASTING: 855482 '

Note: Coordinates based on NAD 1983, New York Central State Plane Zone.