Focused Feasibility Study Report

Novelis Corporation
Oswego, New York

February 2006

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BLASLAND, BOUCK & LEE, INC.
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Certification Statement

I, Mark O. Gravelding, as a licensed Professional Engineer in the State of New York, to the best of my knowledge and based on my inquiry of the persons involved in preparing this document under my direction, certify that the Focused Feasibility Study (FFS) for soil and sediment at the Novelis Corporation (Novelis) Oswego Works Facility located in Scriba, New York, was completed in general accordance with the following:

- An Order on Consent (Index No. A7-0395-9908) between Novelis and the New York State Department of Environmental Conservation (NYSDEC); and

- The NYSDEC-approved *Focused Remedial Investigation/Focused Feasibility Study Work Plan* prepared by ENSR Corporation (June 2002).

Pursuant to the above documents, and with NYSDEC concurrence, this FFS Report identifies and evaluates potential remedial alternatives to address the presence of polychlorinated biphenyls in soil and sediment at the site.

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1. Introduction

1.1 General

This Focused Feasibility Study Report (FFS Report) identifies and evaluates potential remedial alternatives to address the presence of polychlorinated biphenyls (PCBs) in soil and sediment at the Novelis Corporation (Novelis) Oswego Works Facility (the "site") located in Scriba, New York. This FFS Report has been prepared by Blasland, Bouck & Lee, Inc. (BBL), on behalf of Novelis, in accordance with the requirements of an existing Order on Consent (Index No. A7-0395-9908) between Novelis (formerly Alcan Sheet & Plate) and the New York State Department of Environmental Conservation (NYSDEC), which became effective on October 7, 2000.

This FFS Report presents relevant background information, identifies remedial action objectives (RAOs), identifies and screens various potential remedial alternatives, presents a detailed and comparative analysis of retained technologies to address the RAOs, and recommends a site-wide remedial action alternative.

This Report has been prepared in general accordance with the following guidance, directives, and other publications:

- NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4025 titled, *Guidelines for Remedial Investigations/Feasibility Studies* (NYSDEC, 1989);
- NYSDEC TAGM #4030 titled, *Selection of Remedial Actions at Inactive Hazardous Waste Sites* (NYSDEC, 1990);
- United States Environmental Protection Agency (USEPA) guidance document titled, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under the Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), Interim Final (USEPA, October 1988);
- USEPA guidance document titled, *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (USEPA, 2005);
- Applicable provisions of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) regulations contained in Title 40 of the Code of Federal Regulations (CFR) Part 300; and
- Applicable provisions of the New York State Environmental Conservation Law (ECL) and associated regulations, including Title 6 of the New York Code of Rules and Regulations (6NYCRR) Part 375.

The RAOs presented in this Report have been developed based on the findings of previous investigation activities and the findings of a human health exposure evaluation (HHEE) and a Fish and Wildlife Impact Assessment (FWIA), which are presented in the Focused Remedial Investigation (FRI) Report for the site prepared by BBL (BBL, January 2004).

Following NYSDEC review and approval of this Report, a Proposed Remedial Action Plan (PRAP) will be developed by NYSDEC that will identify the preferred remedial alternative, summarize the alternatives considered, and provide the rationale for the preferred remedy. The PRAP will be subject to a 30-day public

comment period. Following the public comment period, the NYSDEC will prepare a Record of Decision (ROD), which will identify the selected remedial alternative and include a responsiveness summary to public comments and concerns raised during the public comment period.

1.2 Purpose and Objective

The purpose of this FFS Report is to identify and evaluate remedial alternatives that are:

- Appropriate for site-specific conditions;
- Protective of human health and the environment; and
- Consistent with the aforementioned laws, regulations, and guidance documents.

The overall objective of this FFS Report is to recommend an appropriate remedial alternative for soil and sediment that satisfies the RAOs for the site.

1.3 Report Organization

This FFS Report has been organized into the following sections:

Section	Purpose
Section 1 – Introduction	Provides background information relevant to the development of the FFS Report and the remedial alternatives evaluated.
Section 2 – Standards, Criteria & Guidance	Identifies the standards, criteria, and guidance (SCGs) and 'to-be-considered' (TBC) material that guide the development and selection of remedial alternatives.
Section 3 – Remedial Action Objectives	Develops and presents remedial action objectives (RAOs) for the site.
Section 4 – Technology Screening and Development of Remedial Alternatives	Presents the results of the identification and screening of remedial technologies and the development of remedial alternatives that have the potential to meet the RAOs.
Section 5 – Detailed Analysis of Remedial Alternatives	Presents a detailed description and screening of remedial alternatives using NCP evaluation criteria.
Section 6 – Comparative Analysis of Alternatives	Presents a comparative analysis of the alternatives and identifies the selected remedial alternative and the rationale used for selection.
Section 7 – References	Provides a list of references used to prepare this FFS Report.

1.4 Background Information

This section presents relevant background information used to develop and evaluate the remedial alternatives for the site. A description of the site is presented below, followed by a summary of relevant historical information, topography and drainage in the vicinity of the site, and the geologic and hydrogeologic setting of the site. This section also summarizes results obtained for previous investigation activities, the HHEE, and the FWIA.

1.4.1 Facility Description and History

The Novelis 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 on Figure 1. The Oswego Works Facility is situated on an approximately 506-acre parcel owned by Novelis. A site map that shows the layout of the Novelis property, including manufacturing buildings and support facilities, and the three operable units (OUs) that comprise the site is presented on Figure 2. The Novelis 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 Novelis' property to the northeast.

The Novelis Facility was initially constructed in 1963. Prior to construction of the manufacturing facility, the property consisted of agricultural and undeveloped land. The initial Novelis (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 used 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 cast 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 single pass tanem mill. Proprietary emulsion, consisting of deionized water (approximately 95%) and biodegradable oil, is applied to the ingots via sprayers to assist in the rolling process. Ingots are reduced in thickness, coiled, and staged for cooling. Coils are either shipped offsite to an internal Novelis facility or processed by the onsite Cold Mill. In the Cold Mill, coils from the Hot Mill are reduced in thickness, tempered, 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 closed-loop cooling water recirculation system. Flow through the OU-1 treatment system was ceased in mid-2002 (when Novelis completed construction of a closed-loop cooling water recirculation system). Prior to mid-2002, contact and non-contact cooling water used at the site was discharged to Lake Ontario via SPDES Permitted Outfall 002 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 construction and operation of the Novelis facility, the wetted areas associated with OU-1 were limited to portions of North Pond 2, and Marshes 2 & 3. Following start-up of the Alroll (now Novelis) facility, the wetted perimeter was expanded via the operation of the North Ponds cooling water treatment system to include the areas shaded on Figure 2.

The manufacturing processes at the facility currently use approximately 10 million gallons per day (mgd) of cooling water. The 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 approximate 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. 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 and 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. 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. 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. For

approximately 5 years in the 1980s, water in the OU-1 system was partially recirculated to the plant during the winter through the North Pond #2 intake structure.

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 adjacent to the west of North Pond #1 (Figure 2).

As a result of the use and discharge of contact and non-contact cooling water to the former 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 Novelis 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 Mill Landfill as part of the Dames & Moore investigation.

Two former lake water intake backwash outfalls were formerly located immediately west of North Pond #2. Low levels of PCBs were identified in one of two surface soil samples collected from this area 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 that 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 identified 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, intermittent warm-water stream that enters the Novelis 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 Novelis property, the South Pond, and the South Marsh. Flow within the portion of the tributary upstream of Novelis' property is seasonally intermittent. Current inputs from the facility to OU-3 include 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 the 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 Novelis' onsite sewage treatment plant (STP) were discharged directly to Tributary 63 further downstream, however, the discharge was subsequently re-routed to the cooling water return line west of

the Cold Mill (SPDES internal outfall 03B). The STP is no longer in operation following the connection to the City of Oswego sewer system in January 2005.

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 consist of a series of shallow pools that are linked by a poorly defined flow channel that meanders towards the west and northwest. From the point where OU-3 flows under the truck entrance road to the Novelis 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 Novelis' property. To the west of the Cottage Access Road, Tributary 63 consists of a wetland area with no defined flow channel.

PCBs have been detected in sediment samples collected from the portion of Tributary 63 extending from approximately 75 feet upstream of the South Pond Outfall downstream to the Cottage Access Road.

1.4.3 Site Topography and Drainage

The site is located on relatively level land at an elevation of approximately 250 to 275 feet above mean sea level (AMSL). Within a half-mile of the coastline of Lake Ontario, the terrain becomes undulating with numerous drumlins. Elevations are approximately 250 feet AMSL along the Lake Ontario coastline and rise to greater than 400 feet AMSL on the drumlin tops. All surface water within Oswego County eventually drains to Lake Ontario. Much of the land immediately adjacent to Lake Ontario drains directly into Lake Ontario through local streams and marshes (Dames and Moore, 1997). Surface water from the site drains to Lake Ontario via Tributary 63 or by run-off into the ponds and marshes of OU-1.

1.4.4 Geologic/Hydrogeologic Setting

Regional surface geology in the area is generally characterized as sedimentary bedrock overlain by glacial till. The overburden in the immediate vicinity of the site is comprised of more recent post-glacial materials, such as beach, marsh, and fill deposits. Based on the subsurface soil characteristics observed at the site, the overburden material generally consists of till deposits consisting largely of a poorly sorted, dense, fine to medium sand with variable amounts of fine to medium gravel and silt to depths averaging 6 to 13 feet below ground surface (bgs) in the area of the plant facilities and 19.5 feet bgs in the vicinity of OU-1. 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 4 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.

Bedrock encountered beneath the overburden at the site consists primarily of Oswego Sandstone, which is gray fine-to-medium quartz sandstone. Based on previous investigations, the top of bedrock in the OU-1 area ranges from 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 portion of OU-1 (Dames & Moore, 1997). Based on bedrock monitoring wells installed during the FRI, groundwater beneath the site flows north-northwest towards Lake Ontario.

1.5 Investigation Results

This section presents a brief summary of the results obtained for the FRI and previous investigation activities conducted in connection with the OUs that comprise the site. Additional details of these activities can be found in the FRI Report.

1.5.1 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 total organic carbon (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 Novelis 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, former composting locations, and at various locations around the perimeter of the OU-1 ponds and marshes; and

- Evaluating the congeners present in sediment and biota (fish and turtles) and the impacts of microbial dechlorination of PCBs.

Based on the results of previous investigation activities, PCBs have been identified as the primary constituent of concern in OU-1 soil and sediment. Additional conclusions that are supported by the results for the OU-1 investigation activities are presented below.

1.5.1.1 Soil/Sediment Investigation

As discussed previously, due to the cessation of a cooling water discharge from the facility (which was approved by the NYSDEC), surface water elevations within the OU-1 ponds and marshes have dropped significantly from historic levels, to the point where portions of the marshes and limited areas of the ponds are progressing from wetland to upland conditions. For the purposes of this FFS, as discussed and agreed to with NYSDEC, areas

within the OU-1 ponds and marshes where the water table is within 12 inches of the ground-surface will be considered sediment, and all other areas within the OU-1 ponds and marshes will be considered soil. Areas of soil and sediment within the OU-1 ponds and marshes are shown on Figures 3A through 3E.

The distribution of PCBs in soil and sediment within the OU-1 ponds and marshes has been extensively characterized based on the results of the FRI (BBL, 2004) and the North Ponds Investigation (Dames & Moore, 1997). The soil and 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 soil and sediment within each of the OU-1 ponds and marshes, with the highest PCB concentration [1,275.30 parts per million (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 within the OU-1 ponds and marshes. PCB concentrations also exceeded the NYSDEC sediment screening guidance levels for benthic aquatic life chronic toxicity at a number of sampling locations as well. 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 soil/sediment investigation activities, the horizontal and vertical extent of PCBs in sediment has been sufficiently defined for the purposes of evaluating remedial alternatives in the FFS. A summary of the conclusions that are supported by the soil/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 soil/sediment samples collected from North Pond #1 support the following conclusions:

- 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 North Pond #1 soil and sediment is most likely due to sediment deposition patterns; and

- In general, the highest PCB concentrations were detected in the northern portion of North Pond #1, where the greatest sediment depths were encountered.

Laboratory analytical results are presented on Figure 3A.

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 will ultimately revert to upland conditions due to the cessation of cooling water and stormwater inputs.

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

- Maximum PCB concentrations are encountered within surface soil and sediment (0 to 6 inches) with a maximum concentration of 380 ppm at sample M1-K14 (Dames & Moore, 1997) and decrease with depth; and

- In general, PCBs appear to be widely distributed in surface soil and 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.

Laboratory analytical results are presented on Figure 3B.

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 for soil/sediment samples collected within North Pond #2 support the following conclusions:

- 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 North Pond #2 soil and sediment is most likely due to sediment deposition patterns; 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.

Laboratory analytical results are presented on Figure 3C.

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 will ultimately revert to upland conditions as a result of the decreasing water levels following cessation of the cooling water and stormwater inputs.

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

- Based on sediment data, PCB concentrations were generally highest in surface soil and 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 along the former flow path in the western portion of the marsh (OU1SD14), PCB concentrations increased with sediment depth to a maximum concentration of 72.4 at the 2.0'-2.5' interval; and

- PCB concentrations in surface and subsurface soil 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.

Laboratory analytical results are presented on Figure 3D.

Marsh #3

Marsh #3 has not received cooling water from the Novelis 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. Standing water is typically only present in a few locations in the western portion of the marsh. Out of the 36 FRI sediment probing locations evaluated within Marsh #3 during August and September 2002, standing water was only encountered at one location (probing locations AB14.5) at a depth of 1.2 inches. 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 the eastern portion of the area that was previously mapped as Marsh #3 primarily consists of upland habitat.

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

- PCB concentrations within soil and 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.

Laboratory analytical results are presented on Figure 3E.

1.5.1.2 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 a Phase Distribution Study (Pagano, 1996). The results of the study indicated that total PCB concentrations in the surface water samples ranged from 0.0177 parts per billion (ppb) in a 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.

1.5.1.3 Pre-Existing Upland Soil Investigation

Each surface soil sample collected 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 odors were encountered at any of the surface soil sampling locations.

PCBs were detected in 11 of the 16 surface soil samples collected from the Cold Mill Landfill and the former lake water intake backwash area, at concentrations ranging from 0.32 ppm to 20 ppm. PCBs were detected in five surface soil samples at estimated concentrations of 1.10 ppm, 1.7 ppm, 1.9 ppm, 10.2 ppm, and 20 ppm (locations OU1SS05, SS-CMLF1, SS-IB2, OU1SS01, and SS-CMLF2, respectively), which exceed the 1 ppm NYSDEC-recommended surface soil cleanup objective presented in TAGM 4046.

PCBs were detected in 6 of the 13 surface soil samples collected from the perimeter of the OU-1 ponds and marshes, at concentrations ranging from 0.14 ppm to 3.52 ppm. PCBs were detected in two surface soil samples located along the southern shore of North Pond #1 at concentrations of 2.26 and 3.52 (locations OU1SS14 and OU1SS15, respectively), which exceed the 1 ppm NYSDEC-recommended surface soil cleanup objective presented in TAGM 4046.

Laboratory analytical results are presented on Figures 3F and 3G.

1.5.1.4 OU-1 Groundwater Investigation

Locations of onsite groundwater monitoring wells are shown on Figure 4. The most recent round of groundwater samples collected during October 2002 from monitoring wells located in the vicinity of OU-1 (monitoring wells MW-02 through MW-05) indicated 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. The location of MW-5 and the water level within the well indicate that the sample was most likely water in North Pond #2 rather than groundwater. PCBs were not detected in the other three 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.

- 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.

1.5.2 OU-2 (Main Landfill)

Several investigation efforts have been conducted to evaluate soil and groundwater associated with OU-2 (the Main Landfill). Although low levels of SVOCs were detected in surface soil samples collected from the landfill as part of the Dames & Moore investigation conducted in the early 1990s, 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 conducted for the main landfill are presented below.

1.5.2.1 Landfill Soil Cover Investigation

The OU-2 landfill operated between 1963 and 1978. During operation, approximately 80,000 cubic yards of waste from the Novelis 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. Probing locations and results are presented on Figure 5. Therefore, the landfill cover generally complies with the 1978 closure requirements.

1.5.2.2 OU-2 Groundwater Investigation

Locations of onsite groundwater monitoring wells are shown on Figure 4. The results obtained for groundwater investigation activities implemented for OU-2 indicate the following:

- 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 only one monitoring well (MW-08) at a concentration of

0.0656 ppb, which is less than the 0.09 ppb New York State Class GA groundwater quality standard. PCBs were not detected in the other eight monitoring wells located in the vicinity of OU-2 (monitoring wells MW-06, MW-07, MW-09, MW-10, MW-11, MWB-11, MWB-12, and MWB-13).

- 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 an estimated concentration of 20.8 ppb, which exceeds the 5 ppb New York State Class GA groundwater criteria. 1,1-Dichloroethane was detected in the groundwater sample collected from MW-10 at a concentration of 11.8 ppb, which slightly exceeds the 5 ppb New York State Class GA 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 exceeds the 5 ppb New York State groundwater criteria. Bis(2-ethylhexyl)phthalate is a common field and laboratory artifact that may have been introduced into the samples during collection and processing. 1,4-Dichlorobenzene was detected in the groundwater sample collected from MWB-12 at an estimated concentration of 3.53 ppb, which is close in concentration to the 3 ppb New York State Class GA groundwater criteria. 1,2-Dichlorobenzene was detected in a blind duplicate groundwater sample collected from MWB-12 at an estimated concentration of 3.11, which is close in concentration to 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.

1.5.3 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 (an 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 onsite 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 Novelis 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 tangential to the main flow path of Tributary 63 and, due to the topography, minimal drainage from the tributary is believed to enter this area. Downstream of Segment C, the tributary consists of wetland area with no defined flow channel that ultimately flows towards the west off the Novelis property and into Teal Marsh. Based on the results of previous investigation activities, PCBs have been identified as the primary constituent of concern in OU-3 sediment. The results of the OU-3 investigation efforts are summarized below.

1.5.3.1 Sediment Investigation

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. Flow within the portion of the tributary located upstream from the outlet of the South Marsh is seasonally intermittent. Portions of the tributary located west of the access road for the west entrance to the Novelis 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 at a concentration of 15 ppm in a sample that was collected approximately 75 feet upstream from the south marsh outlet during the 1997 North Ponds Investigation.

- Low-level PCBs were detected within each sediment sample collected within Segment B. The highest PCB concentrations within the onsite portion of Tributary 63 were identified near the outlet of the South Marsh.

- Low-level PCBs were detected in 6 of the 8 samples collected within Segment C at concentrations ranging up to 7.08 ppm. In general, PCB concentrations detected in sediment within Segment C were much lower than 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 tangential to the main flow path of Tributary 63 and probably receives minimal drainage from the tributary. PCBs were not detected in any of the sediment samples collected from Segment D.

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

- PCBs were detected in sediment samples collected from the South Marsh 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.

Laboratory analytical results for the analysis of sediment samples collected from Tributary 63 are presented on Figure 6.

1.5.3.2 Surface Water Investigation

Large volume water samples were collected from four locations in Tributary 63. The approximate locations of water samples are shown on Figure 6. PCBs were not detected in any of the surface water samples collected from Tributary 63. Results and additional details are presented in the FRI Report.

1.6 Qualitative Human Exposure Evaluation

A qualitative human health exposure evaluation (HHEE) was conducted to identify potentially complete exposure pathways for the site. Detailed findings of the HHEE are presented in the FRI Report and summarized below.

The qualitative HHEE identified the following potentially complete exposure pathways:

- *Potential Trespasser* – While the site includes several constraints to limit access (e.g., the site is posted with placards warning trespassers to keep off the property; many areas, including OU-1 and OU-2, are surrounded by a locked barb-wired perimeter fence; other areas are densely vegetated; and Novelis Security personnel routinely patrol the roadways), the potential exists for trespassers. Exposure of trespassers would be infrequent and of relatively short duration. Possible exposure routes may include dermal contact and incidental ingestion.

- *Site Maintenance Worker* – Site workers generally conduct routine maintenance activities (e.g., keeping roadways clear of fallen tree limbs and other debris, mowing grassy areas, inspecting fencing). Exposure to workers during these activities is not likely, however possible exposure routes may include dermal contact and incidental ingestion.

- *Future Site Remedial Worker* – Future site remedial workers may conduct excavation activities associated with future remedial activities. Possible exposure routes for workers conducting these activities may include dermal contact and incidental ingestion. However, the use of properly trained personnel and appropriate personal protective equipment (PPE) would mitigate this potential exposure.

The alternatives evaluated in the FFS will address these potentially complete exposure pathways.

1.7 Fish and Wildlife Impact Analysis (FWIA)

An FWIA was completed as part of the FRI to evaluate the sensitivity of ecological resources in the vicinity of the site. Details of the FWIA are presented in the FRI Report, and summarized below.

The FWIA was conducted in a manner consistent with the recommendations 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.

The next step 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 a more detailed evaluation of potential ecological risks.

A more detailed evaluation of potential ecological risks was subsequently 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 1.) may be associated with the prevalent covertypes, 2.) are documented as having the maximum potential for exposure, and/or 3.) are known to be sensitive to the effects of PCBs, their presence at the site has not been confirmed. It should be noted that no obvious impacts to biota at the site have been observed during numerous site visits and sampling events, and the area currently appears to support a healthy ecosystem. 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 were low.

2. Standards, Criteria & Guidance

2.1 General

This section of the FFS Report discusses potential standards, criteria, and guidance (SCGs) that may apply to the site. The identification of SCGs was conducted as set forth in NYSDEC TAGM #4025 titled, *Guidelines for Remedial Investigations/Feasibility Studies* (NYSDEC, 1989), NYSDEC TAGM #4030 titled, *Selection of Remedial Actions at Inactive Hazardous Waste Sites* (NYSDEC, 1990), and applicable provisions of the New York State ECL and the NCP. The potential SCGs are used in the identification of RAOs and evaluation of potential remedial alternatives but do not dictate a particular alternative and do not set remedial cleanup levels.

2.1.1 Definition of SCGs

Definitions of the SCGs are presented below:

- *Standards and Criteria* – are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances.

- *Guidelines* – are non-promulgated criteria that are not legal requirements. However, remedial programs should be designed with consideration given to guidelines that, based on professional judgment, are determined to address situations sufficiently similar to those encountered at the site [6NYCRR Part 375-1.10(c)(1)(ii)].

The NYSDEC has also identified certain guidance as "to-be-considered" (TBC) criteria. TBC criteria are non-promulgated advisories or guidance issued by federal or state governments that are not legally binding and do not have the status of potential SCGs. For example, the sediment criteria presented in the NYSDEC document titled, *Technical Guidance for Screening Contaminated Sediments*, (NYSDEC, 1999), are TBC criteria. The TBC criteria are considered, as appropriate, with SCGs to develop remedial cleanup levels that are protective of human health and the environment.

2.1.2 Types of SCGs

The NYSDEC has provided guidance on the application of the SCGs concept into the RI/FS process. The potential SCGs considered for the potential remedial alternatives identified in this FFS were categorized into the following NYSDEC-recommended classifications:

- *Chemical-Specific SCGs* – These SCGs are usually health- or risk-based numerical values or methodologies that, when applied to site-specific conditions, result in the establishment of numerical values for each constituent of concern. These values establish the acceptable amount or concentration of constituents that may be found in, or discharged to, the ambient environment.

- *Action-Specific SCGs* – These SCGs are usually technology- or activity-based requirements or limitations on actions taken with respect to hazardous waste management and site cleanup.

- *Location-Specific SCGs* – These SCGs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in specific locations.

The SCGs identified for the site are summarized below.

2.2 SCGs

The identification of federal and state SCGs for the evaluation of remedial alternatives at the site was a multi-step process that included a review of conditions identified by the FRI, including results from the human exposure evaluation and FWIA. The SCGs that have been identified for this FFS Report are presented in Table 1 and summarized below.

2.2.1 Chemical-Specific SCGs

One set of chemical-specific SCGs that apply to soil and sediment at the site are the PCB regulations in 40 CFR Part 761 related to the handling, storage, and disposal of materials containing PCBs. As indicated in 40 CFR Part 761(b)(3), material with PCB concentrations less than 50 ppm that has been dredged or excavated from waters of the United States may be managed or disposed of in accordance with a permit issued:

- Under Section 404 of the Clean Water Act, or the equivalent of such a permit as provided for in regulations of the U.S. Army Corps of Engineers (USACE) at 33 CFR Part 320; or

- By the USACE under Section 103 of the Marine Protection, Research, and Sanctuaries Act, or the equivalent of such a permit as provided for in regulations of the USACE at 33 CFR Part 320.

As indicated in 40 CFR 761.61, remediation wastes (such as excavated soil or sediment) containing PCBs with concentrations at or exceeding 50 ppm must be disposed of in a hazardous waste landfill permitted by the USEPA under Section 3004 of the Resource Conservation and Recovery Act (RCRA), a State authorized under Section 3005 of RCRA, or other approved PCB disposal facility.

Another set of chemical-specific SCGs that may potentially be applicable to the soil and sediment at the site are the federal and New York State regulations regarding identification of hazardous wastes, as outlined in 40 CFR Part 261 and 6NYCRR Part 371, respectively. These regulations provide criteria at which a solid waste is considered a hazardous waste by the characteristics of toxicity, ignitability, corrosivity, and reactivity. The toxicity characteristic is evaluated by comparing concentrations detected in sample extract generated using the Toxicity Characteristic Leaching Procedure (TCLP) to RCRA-regulated levels. New York State includes PCBs on the list of materials considered hazardous waste (designated Waste Code B007).

Ambient water quality criteria set forth in the USEPA document titled, *Quality Criteria for Water – 1986* (USEPA, 1986) may be potentially applicable chemical-specific SCGs for assessing water quality in connection with the remedial activities. In addition, the ambient water quality standards and guidance values for surface waters provided in the NYSDEC Division of Water, Technical and Operational Guidance Series (TOGS 1.1.1) document titled, *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations*, (NYSDEC, 2000) may also be a potentially applicable chemical-specific SCG.

Soil guidance values presented in NYSDEC TAGM 4046 are another set of chemical-specific SCGs that are potentially applicable to soil at the site. The NYSDEC document titled *Technical Guidance for Screening Contaminated Sediments* describes methodology for establishing sediment criteria that provide another set of chemical-specific SCGs that are potentially applicable to sediment at the site. Other potentially applicable chemical-specific SCGs are presented in Table 1.

2.2.2 Action-Specific SCGs

The general health and safety requirements established by the Occupational Safety and Health Administration (OSHA) for general industry under 29 CFR Part 1910, and for construction under 29 CFR Part 1926, are action-specific SCGs that may be potentially applicable to the remedial alternatives evaluated in this FFS Report. Other potentially applicable action-specific SCGs pertain to handling of solid wastes and protecting water quality, as indicated below.

The New York State regulations contained in 6NYCRR Part 364 for the collection, transportation, and delivery of regulated waste within New York State are potentially applicable action-specific SCGs. The National Pollution Discharge Elimination System (NPDES) and the New York State Pollution Discharge Elimination System (SPDES) regulations contained in 40 CFR Part 122 and 6NYCRR Parts 750-758, respectively, which detail specific permit requirements for the discharge of chemical constituents to United States and New York State waters, are also potentially applicable action-specific SCGs.

Another potential action-specific SCG is Section 401 of the Clean Water Act, which requires a federal license or permit for activities including, but not limited to, the construction or operation of facilities that may result in any discharge into waters of the United States (such as dredging or excavation of sediment). However, as authorized in 6NYCRR Part 375, a permit would not be required for remedial alternatives at the site that include the dredging of sediment, provided the activities are conducted in compliance with the substantive permitting requirements.

Potentially applicable action-specific SCGs are presented in Table 1.

2.2.3 Location-Specific SCGs

Examples of potential location-specific SCGs include regulations pertaining to floodplain management, wetlands protection, preservation of historic areas, maintenance of navigable waterways, and protection of endangered/threatened or rare species.

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. 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). The wetlands depicted on the NWI Map are characterized as a combination of palustrine forested, scrub/shrub, and open water habitats.

No threatened or endangered species were observed during site visits that were conducted by BBL in connection with FRI activities during 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 species, 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).

Potentially applicable location-specific SCGs are presented in Table 1.

3. Remedial Action Objectives

3.1 General

This section of the FFS Report presents RAOs which are intended to mitigate potential risks to human health and the environment associated with the presence of chemical constituents in onsite soil and sediment. The RAOs are based on potential SCGs and the results of investigation activities for OU-1, OU-2, and OU-3. The RAOs will be used as a basis for determining the anticipated effectiveness of each remedial action alternative.

3.2 Remedial Action Objectives

RAOs have been developed for the FFS considering the results of the qualitative HHEE and FWIA. Based on the results of previous investigation activities, PCBs have been identified as the primary constituent of concern in onsite sediment and soil. As summarized in the FRI Report, there is no complete exposure pathway for groundwater because groundwater beneath the site is not used for potable water and is encountered at greater than 10 feet below ground surface in the vicinity of OU-2 (where low level VOCs and SVOCs have been observed). It is anticipated that concentrations of VOCs and SVOCs in groundwater will decline due to natural attenuation processes. Therefore, remedial action objectives have not been developed in connection with groundwater at the site. There is also no complete exposure pathway for soils in OU-2, due to the presence of the soil cover. Since there is no complete exposure for OU-2, the RAOs were developed to address sediment and soils in OU-1 and OU-3.

The following RAOs have been established for the site:

- Eliminate or mitigate, to the extent practicable and feasible, the site-specific potential for human exposure to PCBs in environmental media at the site;
- Eliminate or mitigate, to the extent practicable and feasible, the site-specific potential for exposure to ecological receptors resulting from the presence of PCBs in soil and sediment at the site; and
- Eliminate or mitigate, to the extent practicable and feasible, potential adverse long- and short-term effects to human health and the environment resulting from the implementation of remedial activities at the site.

These RAOs were used as the basis for identifying remedial technologies and for developing remedial alternatives to address PCBs in soil and sediment at the site.

4. Technology Screening and Development of Remedial Alternatives

4.1 General

This section presents a detailed description and analysis of remedial alternatives developed to address PCBs in soil and sediment at the site. The evaluation criteria used for analysis of the remedial alternatives are specified in NYSDEC TAGM 4030. These criteria encompass statutory requirements and include other gauges of overall feasibility and acceptability of remedial options.

The detailed evaluation of each remedial alternative presented in this section consists of an assessment of the following seven criteria:

- Compliance with SCGs;
- Overall Protection of Human Health and the Environment;
- Short-Term Effectiveness;
- Long-Term Effectiveness and Permanence;
- Reduction of Toxicity, Mobility, or Volume;
- Implementability; and
- Cost.

In addition to assessing each potential remedial alternative against the seven criteria presented above, the detailed analysis of the remedial alternatives presented in this section also includes a detailed technical description of each remedial alternative. In addition, unique engineering aspects (if any) of the physical components of the remedial alternative are discussed.

Pursuant to TAGM 4030, another criterion to be considered when determining appropriate remedial alternatives is community acceptance. The community acceptance assessment will be completed by the NYSDEC after community comments on the PRAP are received.

4.2 Identification of Remedial Technologies

The identification of remedial technologies involved a focused review of available literature, including the following documents:

- NYSDEC TAGM 4030 (NYSDEC, 1990);

- *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA,* (USEPA, 1988a);
- *Presumptive Remedies: Policy and Procedures,* (USEPA, 1993);
- *Treatment Technologies,* (USEPA, 1991);
- *Technology Screening Guide for Treatment of CERCLA Soils and Sludges,* (USEPA, 1988b);
- *Technology Briefs – Data Requirements for Selecting Remedial Action Technologies,* (USEPA, 1987); and
- *Remediation Technologies Screening Matrix and Reference Guide, Version 3* (Federal Remedial Technologies Roundtable [FRTR], 1997).

These documents, along with remedial technology vendor information and other available information, were reviewed to identify technologies that are potentially applicable for addressing impacted soil and sediment at the site.

4.3 Technology Screening

Potentially applicable technologies and technology processes underwent preliminary and secondary screening to select the technologies that would most-effectively achieve the RAOs identified for the site. For the purposes of the screening evaluations, technology refers to a general category of technologies, such as capping or immobilization, while the technology process is a specific process within each technology type. A "no-further-action" general response has been included and retained through the screening evaluation. The no-further-action response will serve as a baseline for comparing the potential overall effectiveness of the other technologies.

4.3.1 Preliminary Screening

The preliminary screening was performed to reduce the number of potentially applicable technologies and technology processes based on technical implementability. This screening was based on several considerations, including: successful full-scale demonstrations of the technology; compatibility of the technology with the specific media, location, and constituent distribution; time-frame to acquire necessary permits; and area required for setup/operation. The results of the preliminary screening of soil and sediment technologies/technology processes are presented in Table 2.

4.3.2 Secondary Screening

A number of potentially applicable technologies and technology processes were retained through the preliminary screening. To further reduce the technology processes to be assembled into remedial alternatives, the technology processes retained through the preliminary screening were subjected to a secondary screening. The objective of the secondary screening was to choose, when possible, one representative remedial technology process for each remedial technology category to simplify the subsequent development and evaluation of the remedial alternatives. A description of the screening criteria is presented below.

- *Effectiveness* – This criterion evaluates the extent that the technology will mitigate potential threats to public health and the environment through the reduction in toxicity, mobility, and/or volume of constituents in impacted environmental media.

- *Implementability* – This criterion evaluates the ability to construct, reliably operate, and meet technical specifications or criteria associated with each technology. This evaluation also considers the operation and maintenance (O&M) required in the future, following completion of remedial construction.

The remedial technologies for soil and sediment that were retained through secondary screening using the above-listed criteria are summarized in Table 3, and listed below:

- No Action;
- Site Monitoring;
- Institutional/Engineering Controls (e.g., Access Restrictions, Deed Restrictions);
- Capping;
- Excavation;
- Stabilization/Solidification; and
- Offsite Disposal (at a permitted landfill).

The potential remedial technologies identified and screened above have been combined, as appropriate, to form comprehensive remedial alternatives capable of addressing the RAOs for the site. Consideration was given to the NCP (40 CFR Part 300.430), which indicates the following range of alternatives should be developed to the extent practical:

- The no-further-action alternative;

- Alternatives that involve little or no treatment but provide protection of human health and the environment by preventing or minimizing exposure to the constituents of interest through the use of containment options and/or institutional controls;

- Alternatives that treat the constituents of interest but vary in the degree of treatment employed and long-term management needed; and

- Alternatives that remove constituents of interest to the maximum extent possible, thereby eliminating or minimizing the need for long-term management.

The assembly and development of remedial alternatives is presented below.

4.4 Development of Remedial Alternatives

A total of four alternatives have been assembled for further evaluation in the detailed analysis of remedial alternative presented in Section 5. The four remedial alternatives developed to address the RAOs for the site are as follows:

- Alternative 1 – No Further Action;
- Alternative 2 – Targeted Soil/Sediment Removal & Cover;
- Alternative 3 – Targeted Soil/Sediment Removal with Soil Cover; and

- Alternative 4 – Soil/Sediment Removal.

As summarized previously (Subsection 1.4.2.1), due to the cessation of a cooling water discharge, surface water elevations within the OU-1 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. For the purposes of this FFS, and the development and evaluation of remedial alternatives, areas within the OU-1 ponds and marshes where the water table is within 12 inches of the ground-surface will be treated as sediment, and all other areas within the OU-1 ponds and marshes will be treated as soil.

As summarized in the FRI Report, there is not expected to be a potentially complete exposure pathway for groundwater because groundwater beneath the site is not used for potable water and because groundwater in the vicinity of OU-2 (which is where the elevated levels of VOCs and SVOCs have been observed) is greater than 10 feet below ground surface. It is anticipated that concentrations of VOCs and SVOCs in groundwater will decline due to natural attenuation processes. Therefore, the remedial alternatives do not include an action component to address VOCs and SVOCs in groundwater. All remedial alternatives (except 'No Further Action') include periodic groundwater monitoring to further evaluate changes in groundwater conditions. Additional appropriate actions for groundwater would be evaluated and implemented, if needed, based on results of future monitoring.

A brief description of each remedial alternative developed to address the soil and sediment RAOs is presented below.

4.4.1 Alternative 1 – No Further Action

The no-further-action alternative serves as a baseline for comparison of the overall effectiveness of the other remedial alternatives. The no-further-action alternative would not involve the implementation of any remedial activities to remove, treat, or contain the constituents of interest in soil and sediment at the site. The alternative relies on natural attenuation processes to reduce the concentrations of constituents of interest in environmental media. This alternative does not include groundwater monitoring.

4.4.2 Alternative 2 – Targeted Soil/Sediment Removal & Cover

Under this alternative, soil and sediment within pre-determined limits would be excavated and transported for offsite disposal in accordance with applicable rules and regulations. Removal limits (developed in consultation with the NYSDEC) would be based on the results of previous investigation activities. Removal limits would include excavation of the following:

- Soil in pre-existing upland areas that exhibits PCBs at concentrations above TAGM 4046 recommended soil cleanup objectives;

- Soil within the limits of the OU-1 ponds and marshes that exhibits PCBs at concentrations above 10 ppm. A soil cover would be placed over areas where soil exhibits PCBs at concentrations above 1 ppm (without prior excavation), provided placement does not require extensive clearing and grubbing of upland forest;

- Sediment within the limits of the OU-1 marshes that exhibits PCBs at concentrations above 1 ppm;

- Surface sediment (0 to 1-foot) within the limits of OU-1 ponds (from areas that exhibit PCBs in surface sediment at concentrations above 1 ppm), followed by placement of an engineered cover; and

- Sediment within the limits of the OU-3 South Pond, OU-3 South Marsh, and along the main flow path through Segments B and C of Tributary 63, down to the underlying native material.

Following removal, documentation samples would be collected from the limits of the excavation areas and submitted for laboratory analysis. Site restoration would occur following the collection of documentation samples. Restoration would include placement of a minimum of one-foot of clean material in all of the removal areas (additional material may be placed in select areas to approximate pre-existing grades), followed by seeding/planting of disturbed soil areas (where necessary).

The following site controls would also be implemented under this alternative:

- A deed restriction would be developed to: indicate the presence of low concentrations of PCBs in sediment and soil, indicate the presence of VOCs and SVOCs in groundwater, and restrict the use of onsite groundwater; and

- A Site Management Plan would be developed to provide for long-term maintenance of the site fencing and vegetation, and establish guidelines to be followed for the management of soil material, should future activities disturb site soils. The Site Management Plan would be referenced in the deed to the property.

In addition, groundwater monitoring would be performed to evaluate changes in groundwater conditions.

4.4.3 Alternative 3 – Targeted Soil/Sediment Removal with Soil Cover

Under this alternative, soil and sediment within pre-determined limits would be excavated and transported for offsite disposal in accordance with applicable rules and regulations. Removal limits (developed in consultation with the NYSDEC) would be based on the results of previous investigation activities. Removal limits would include excavation of the following:

- Soil in pre-existing upland areas that exhibits PCBs at concentrations above TAGM 4046 recommended soil cleanup objectives;

- Soil within the limits of the OU-1 ponds and marshes that exhibits PCBs at concentrations above 10 ppm. A soil cover would be placed over areas where soil exhibits PCBs at concentrations above 1 ppm (without prior excavation), provided placement does not require extensive clearing and grubbing of upland forest;

- Sediment within the limits of OU-1 ponds and marshes that exhibit PCBs at concentrations above 1 ppm, followed by placement of an engineered cover; and

- Sediment within the limits of the OU-3 South Pond, OU-3 South Marsh, and along the main flow path through Segments B and C of Tributary 63, down to the underlying native material

The key difference between this alternative and Alternative 2 is the removal of subsurface sediment from OU-1 ponds and marshes with PCB concentrations greater than 1 ppm.

Following removal, documentation samples would be collected from the limits of the excavation areas and submitted for laboratory analysis. Site restoration would occur following the collection of documentation samples. Restoration would include placement of a minimum of one-foot of clean material in all of the removal areas (additional material may be placed in select areas to approximate pre-existing grades), followed by seeding/planting of disturbed soil areas (where necessary).

The following site controls would also be implemented under this alternative:

- A deed restriction would be developed to: indicate the presence of low concentrations of PCBs in soil, indicate the presence of VOCs and SVOCs in groundwater, and restrict the use of onsite groundwater; and

- A Site Management Plan would be developed to provide for long-term maintenance of the site fencing and vegetation, and establish guidelines to be followed for the management of soil material, should future activities disturb site soils. The Site Management Plan would be referenced in the deed to the property.

In addition, groundwater monitoring would be performed to evaluate changes in groundwater conditions.

4.4.4 Alternative 4 – Soil/Sediment Removal

Under this alternative, soil and sediment in OU-1 and OU-3 exhibiting constituents at concentrations above relevant guidance values would be excavated and transported for offsite disposal in accordance with applicable rules and regulations. Removal limits would include excavation of the following:

- Soil exhibiting PCBs at concentrations above the TAGM 4046 recommended soil cleanup objectives of 1 ppm for surface material and 10 ppm for subsurface material would be excavated and transported for offsite disposal; and

- Sediment exhibiting PCBs at concentrations above 0.2 ppm would be excavated and transported for offsite disposal.

Samples would be collected from the limits of the excavation areas and submitted for laboratory analysis. Additional excavation would be performed if samples exhibit constituents at concentrations above the remedial action limits of 1 ppm for surface soil, 10 ppm for subsurface soil, and 0.2 ppm for sediment. Site restoration would occur when samples indicate the remedial action limits have been met. Site restoration would include placement of clean material in all of the removal areas to approximate pre-existing grades, followed by seeding/planting of disturbed soil areas (where necessary).

A deed restriction would be developed to document the presence of VOCs and SVOCs in groundwater and restrict the use of onsite groundwater. In addition, this alternative would include post-remediation groundwater monitoring to evaluate changes in groundwater conditions.

5. Evaluation of Remedial Alternatives

5.1 General

This section of the FFS Report presents a detailed description and evaluation of the four remedial alternatives identified in the previous section. The detailed evaluation of each remedial alternative presented in this section consists of an assessment of the following seven criteria, which are specified in NYSDEC TAGM 4030:

- Compliance with SCGs;
- Overall Protection of Human Health and the Environment;
- Short-Term Effectiveness;
- Long-Term Effectiveness and Permanence;
- Reduction of Toxicity, Mobility, or Volume;
- Implementability; and
- Cost.

In addition to assessing each potential remedial alternative against the seven criteria presented above, this section also includes a detailed technical description of each alternative. Unique engineering aspects (if any) of the physical components of each remedial alternative are also discussed.

A description of the seven evaluation criteria used is presented below, followed by a detailed evaluation of each remedial alternative.

5.2 Description of Evaluation Criteria

A description of each evaluation criteria used in this FFS is presented below.

5.2.1 Compliance with SCGs

This criterion evaluates the compliance of the remedial alternative with appropriate SCGs. The evaluation is based on compliance with:

- Chemical-specific SCGs;
- Action-specific SCGs; and
- Location-specific SCGs

5.2.2 Overall Protection of Human Health and the Environment

This criterion evaluates whether the remedial alternative provides adequate protection of human health and the environment. This evaluation relies on the assessment of other evaluation criteria, including long-term and short-term effectiveness and compliance with SCGs. While a site-specific risk assessment has not been performed to determine whether PCBs at the site pose an unacceptable risk to human health and the environment, performance of an FWIA and comparison of constituent concentrations to NYSDEC soil and

sediment guidance values suggest some risk through exposure to PCBs may exist. This criterion will evaluate how implementation of each alternative would reduce the potential exposure risk.

5.2.3 Short-Term Effectiveness

The short-term effectiveness of the remedial alternative is evaluated relative to its effect on human health and the environment during implementation of the alternative. The evaluation of each remedial alternative with respect to its short-term effectiveness considers the following:

- Short-term impacts to which the community may be exposed during implementation of the alternative;
- Potential impacts to remedial workers during implementation of the remedial alternative, and the effectiveness and reliability of protective measures;
- Potential environmental impacts associated with implementation of the remedial alternative and the effectiveness of mitigative measures to be used during implementation; and
- Amount of time until environmental concerns are mitigated.

5.2.4 Long-Term Effectiveness and Permanence

The evaluation of each remedial alternative relative to its long-term effectiveness and permanence is made by considering the risks that may remain following completion of the remedial alternative. The following factors will be assessed in the evaluation of the alternative's long-term effectiveness and permanence:

- Potential environmental impacts from untreated waste or treatment residuals remaining at the completion of the remedial alternative;
- The adequacy and reliability of controls (if any) that will be used to manage treatment residuals or untreated waste remaining after the completion of the remedial alternative; and
- The ability of the remedial alternative to meet RAOs established for the site.

5.2.5 Reduction of Toxicity, Mobility, or Volume

This criterion evaluates the degree to which remedial actions will permanently and significantly reduce the toxicity, mobility, or volume of the constituents present in the site media. The evaluation will be based on the:

- Remedial process and the volume of materials to be addressed;
- Anticipated ability of the remedial process to reduce the toxicity, mobility, or volume of chemical constituents of interest;
- Nature and quantity of residuals that will remain;

- Relative amount of hazardous substances and/or chemical constituents that will be destroyed, treated, or recycled; and

- Degree to which the remedial process is irreversible.

5.2.6 Implementability

This criterion evaluates the technical and administrative feasibility of implementing the remedial alternative, including the availability of the various services and materials required for implementation. The evaluation of implementability will be based on two factors, as described below.

- *Technical Feasibility* – This refers to the relative ease of implementing the remedial alternative based on site-specific constraints. In addition, the ease of construction, operational reliability, and ability to monitor the effectiveness of the remedial alternative are considered.

- *Administrative Feasibility* – This refers to the feasibility/time required to obtain necessary permits and approvals to implement the remedial alternative.

5.2.7 Cost

This criterion evaluates the estimated total cost to implement the remedial alternative. The total cost of each alternative represents the sum of the direct capital costs (materials, equipment, and labor), indirect capital costs (engineering, licenses/permits, and contingency allowances), and operation and maintenance (O&M) costs. O&M costs may include operating labor, energy, chemicals, and sampling and analysis. These costs will be estimated with an anticipated accuracy between -30% to +50% in accordance with the USEPA document titled *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (USEPA, 1988). A 20% contingency factor is included to cover unforeseen costs incurred during implementation of the remedial alternative. Present-worth costs are calculated for alternatives expected to last more than 2 years. In accordance with USEPA guidance presented in OSWER Directive 9355.3-20 as superseded by OSWER 9355.0-75, a 7% discount rate (before taxes and after inflation) is used to determine the present-worth factor.

5.3 Detailed Evaluation of Remedial Alternatives

This section presents the detailed evaluation of each remedial alternative based on the evaluation criteria described in the previous section.

5.3.1 Alternative 1 – No Further Action

Technical Description

The no-further-action alternative serves as a baseline for comparison of the overall effectiveness of the other remedial alternatives. The no-further-action alternative would not involve the implementation of any remedial activities to remove, treat, contain, or monitor constituents of interest in soil, sediment, or groundwater. The alternative relies on natural attenuation processes to reduce the concentrations of PCBs in soil and sediment.

The site would be allowed to remain in its current condition, and no activities would be undertaken to change the current conditions.

Compliance with SCGs

Chemical-Specific SCGs

Chemical-specific guidance to be considered under this alternative are the soil guidance values presented in NYSDEC TAGM 4046. Natural degradation process would not likely be sufficient to reduce PCB concentrations in soil at the site to below the TAGM 4046 soil guidance values.

The sediment screening levels established in the NYSDEC document titled *Technical Guidance for Screening Contaminated Sediments* are additional chemical-specific guidance to be considered under this alternative. While deposition of cleaner material over the existing sediments may occur over time, solids loading to the marshes, ponds, and Tributary 63 is limited, and the viability of natural recovery to reduce PCB concentrations in sediment at the site to levels below the relevant guidance values is questionable. This alternative does not include any monitoring to evaluate potential changes in sediment PCB concentrations. As stated in the NYSDEC document, sediment with concentrations of constituents of interest which exceed the listed criteria is considered impacted, but the listed criteria do not necessarily represent a final concentration that must be achieved through remediation.

The no-further-action alternative does not include the handling of any materials containing PCBs. Therefore, the chemical-specific SCGs that regulate the subsequent handling and disposal of these materials (and related residuals) are not applicable.

The Class GA groundwater quality standards presented in 6NYCRR Parts 700-705 and in NYSDEC TOGS 1.1.1 are applicable chemical-specific SCGs for this alternative. This alternative relies on natural attenuation processes to meet these standards. However, this alternative does not include any monitoring to evaluate potential changes in groundwater quality.

Action-Specific SCGs

Action-specific SCGs are not applicable because this alternative does not include any remedial actions.

Location-Specific SCGs

Location-specific SCGs are not applicable because this alternative does not include any remedial actions.

Overall Protection of Human Health and the Environment

Based on the FRI results, the no-further-action alternative would be ineffective because it would not meet the RAOs of mitigating potential human and ecological exposures to PCBs in environmental media at the site. This alternative does not remove, treat, or contain PCBs in soil or sediment. The FWIA and comparison of constituent concentrations to NYSDEC soil and sediment guidance values suggest some risk through exposure to PCBs may exist. Under this alternative, potential exposure risks may be slightly reduced over time by natural processes. However, it is unlikely this will lead to a significant reduction, and potential exposure risks will generally remain the same. Potential long-term environmental risks associated with the presence of these constituents in soil and sediment would not likely be reduced under this alternative.

Short-Term Effectiveness

No remedial action would be implemented for the site. Therefore, there would be no short-term environmental impacts or risks posed to remedial workers or the community associated with implementation of this alternative.

Long-Term Effectiveness and Permanence

Under the no-further-action alternative, PCBs in soil and sediment would not be addressed. Therefore, this alternative would not likely achieve the RAO of mitigating potential future exposure to PCBs in environmental media at the site.

Reduction of Toxicity, Mobility, and Volume

Under the no-further-action alternative, impacted soil and sediment would not be removed, treated, recycled, contained, or destroyed. Therefore, the toxicity, mobility, and volume of the PCBs in soil and sediment would not be reduced through treatment. Any reductions in toxicity, mobility, or volume which may occur naturally over time would not be observed because monitoring is not proposed as a component of this remedy.

Implementability

The no-further-action alternative does not involve any active remedial measures and poses no technical or administrative implementability concerns.

Cost

There are no capital or O&M costs associated with implementation of the no-further-action alternative.

5.3.2 Alternative 2 – Targeted Soil/Sediment Removal & Cover

Technical Description

Under this alternative, soil and sediment within pre-determined limits would be excavated and transported for offsite disposal in accordance with applicable rules and regulations. Removal limits would be based on the results of previous investigation activities. Proposed removal limits within OU-3 and OU-1 (developed in consultation with the NYSDEC) are shown on Figures 4 and 5, respectively. In general, removal limits would include excavation of the following:

- Soil in pre-existing upland areas that exhibits PCBs at concentrations above TAGM 4046 recommended soil cleanup objectives;

- Soil within the limits of the OU-1 ponds and marshes that exhibits PCBs at concentrations above 10 ppm. A soil cover would be placed over areas where soil exhibits PCBs at concentrations above 1 ppm (without prior excavation), provided placement does not require extensive clearing and grubbing of upland forest;

- Sediment within the limits of the OU-1 marshes that exhibits PCBs at concentrations above 1 ppm;

- Surface sediment (0 to 1-foot) within the limits of OU-1 ponds (from areas that exhibit PCBs in surface sediment at concentrations above 1 ppm), followed by placement of an engineered cover; and

- Sediment within the limits of the OU-3 South Pond, OU-3 South Marsh, and along the main flow path through Segments B and C of Tributary 63, down to the underlying native material.

For purposes of this evaluation, it has been assumed that sediment removal would be conducted "in-the-dry". Ponds and marshes would be de-watered one at a time by pumping the water to an adjacent pond or marsh. Tributary 63 would be de-watered in segments using a pump bypass. It is assumed that sheetpiling will be employed to a limited extent to assist in removal of some of the deeper sediment deposit areas of the OU-1 ponds. It has been assumed that sediment removed from the North Ponds would be processed with a pug mill prior to transportation for offsite disposal, and that sediment removed from the South Pond would be gravity drained and then stabilized prior to transportation for offsite disposal.

Following removal, documentation samples would be collected from the limits of the excavation areas and submitted for laboratory analysis. Results of the documentation sampling would be included in the certification report to be prepared at the conclusion of remedial activities. Site restoration would occur following the collection of documentation samples. Restoration would include placement of a minimum of one-foot of clean material in all of the removal areas (additional material may be placed in select areas to approximate pre-existing grades), followed by seeding/planting of disturbed soil areas (where necessary). In addition, this alternative would include post-remediation groundwater monitoring to evaluate changes in groundwater conditions.

The following site controls would also be implemented under this alternative:

- A deed restriction would be developed to: indicate the presence of low concentrations of PCBs in sediment and soil, indicate the presence of VOCs and SVOCs in groundwater, and restrict the use of onsite groundwater; and

- A Site Management Plan would be developed to provide for long-term maintenance of the site fencing and the sediment/soil cover, and establish guidelines to be followed for the management of sediment/soil material, should future activities disturb site sediments/soils. The Site Management Plan would be referenced in the deed to the property.

Compliance with SCGs

Chemical-Specific SCGs

Chemical-specific guidance to be considered under this alternative are the soil guidance values presented in NYSDEC TAGM 4046. Soil in pre-existing upland areas of the site that exhibits PCBs at concentrations above TAGM 4046 soil guidance values would be removed. Surface soil within the former limits of the OU-1 ponds and marshes that exhibits PCBs at concentrations above TAGM 4046 soil guidance values would be removed or covered, with the exception of a few areas in Marsh No. 2 and Marsh No. 3 where excavation or covering would require the clearing of heavy vegetation.

The sediment screening levels established in the NYSDEC document titled *Technical Guidance for Screening Contaminated Sediments* are additional chemical-specific guidance to be considered under this alternative. Based on the results of previous investigation activities, surface sediment in-place following remedial activities will meet these guidance values through a combination of removal and cover. However, there are inherent

operational attributes associated with sediment removal that will limit the cleanup level which can practically be achieved. Removal limitations are caused in part by resuspended sediments subsequently mixing and resettling within the dredged area, ultimately resulting in an overlying layer of sediments containing PCBs. Removal "in-the-dry" is currently proposed, in part as an attempt to minimize these limitations. As previously mentioned, the NYSDEC document states that sediment with concentrations of constituents of interest which exceed the listed criteria is considered impacted, but the listed criteria do not necessarily represent a final concentration that must be achieved through remediation.

The Class GA groundwater quality standards presented in 6NYCRR Parts 700-705 and in NYSDEC TOGS 1.1.1 are applicable chemical-specific SCGs for this alternative. This alternative relies on natural attenuation processes to meet these standards. This alternative includes monitoring to document changes in groundwater quality over time.

Action-Specific SCGs

Action-specific SCGs that may apply to this alternative are associated with the removal and offsite treatment/ disposal of the soil and sediment, removal and treatment of water (from the dewatering activities), fill and cover placement, monitoring requirements, and OSHA health and safety requirements.

Remedial workers and worker activities that occur during implementation of this alternative must comply with OSHA requirements for training, safety equipment and procedures, monitoring, recordkeeping, and reporting as identified in 29 CFR Parts 1904, 1910, and 1926. Compliance with action-specific SCGs would be accomplished by following a NYSDEC-approved design and site-specific HASP.

U.S. Department of Transportation (USDOT) and disposal facility requirements for packaging, labeling, transporting, and disposing of regulated materials would also be applicable to this alternative. Compliance with these SCGs would be achieved by utilizing licensed and properly permitted waste transporters and treatment/ disposal facilities.

Location-Specific SCGs

Location-specific SCGs that may apply to this alternative are associated with modifications to wetlands and work activities that may affect the New York State Coastal Zone. Compliance with these SCGs would be achieved by complying with permitting requirements and implementing designs that would minimize disturbance and/or alteration of the wetland portions of the site.

Overall Protection of Human Health and the Environment

The FWIA and comparison of constituent concentrations to NYSDEC soil and sediment screening values suggest some risk through exposure to PCBs may exist. Implementation of this alternative would greatly reduce the potential exposure risks by removing and covering much of the soil and sediment at the site that contain PCBs.

Potential exposure to soil at the site containing PCBs above TAGM 4046 soil guidance values would be mitigated because such soils would be removed from pre-existing upland portions of the site. Potential exposure to soil within the OU-1 ponds and marshes containing PCBs above TAGM 4046 soil guidance values would be mitigated by installation of a soil cover, which would physically reduce the likelihood of exposure to soil and soil mobilization.

Potential exposure to sediment at the site containing PCBs at elevated levels would be mitigated because such sediments would be removed from the OU-1 marshes and OU-3, and covered by a minimum of 1-foot of clean fill in the OU-1 ponds that would physically isolate these sediments from direct contact.

Short-Term Effectiveness

The excavation and subsequent handling of soil and sediment containing PCBs at concentrations above relevant guidance values could result in short-term risks to public health and the environment. Implementation of this alternative will impact aquatic habitat and the associated organisms. Excavation activities may generate dust and suspend PCB-containing sediments in surface water, and offsite waste transportation would increase the risk of in-traffic accidents. Truck-traffic associated with transporting waste offsite, and importing fill to the site is estimated to total approximately 7,500 truck trips. Engineering controls would be in place during remedy implementation to minimize the potential short-term risks.

Under this alternative, onsite remedial workers could potentially be exposed to chemical constituents in soil and sediment during implementation of removal activities. Exposure routes would be of relatively short duration. Potential exposure of onsite remedial workers to chemical constituents and operational hazards would be mitigated by the use of PPE as specified in a site-specific HASP and through proper equipment and material handling procedures to be specified in the remedy design documents and site work plans. Air monitoring would be performed during soil handling activities to determine the need for additional engineering controls (e.g., using water sprays to suppress dust) and to confirm that exposure levels remain within acceptable ranges, as specified in the site-specific HASP. Surface water monitoring would be performed during sediment removal activities, as appropriate, to determine the need for additional engineering controls and to confirm that turbidity and PCBs remain within acceptable levels, as specified in site-specific work plans.

This alternative could potentially be conducted in a modest timeframe (i.e., a single construction season).

Long-Term Effectiveness and Permanence

Implementation of this alternative would permanently remove a significant mass of PCBs from the site, and achieve the RAOs of mitigating potential exposure to PCBs in environmental media. In some areas, such soil and sediment would be permanently removed from the site, and in other areas a soil cover would be constructed to achieve the RAOs of mitigating potential exposure to PCBs in environmental media.

The deed restriction and Site Management Plan would be kept in place, unchanged, unless site conditions or relevant guidance values were to change. The Site Management Plan would set forth actions to be taken to protect the health and safety of site remedial workers and the community and properly handle impacted materials under a wide variety of typical scenarios (e.g., utility installation, building construction, maintenance activities). If changes were to occur that would require modifications to the deed restriction/Site Management Plan, such modifications would be presented to the NYSDEC for review and approval, as appropriate. Taken together, these institutional controls could be expected to adequately and reliably provide for the management of impacted material to be left in place.

Groundwater monitoring would continue periodically until relevant guidance values are achieved, or until the results of monitoring support a different approach. The deed restriction on groundwater use would mitigate potential human exposure to VOCs and SVOCs in groundwater at concentrations above the performance goals. Based on groundwater sampling activities to date, the concentrations of VOCs and SVOCs in onsite groundwater are anticipated to continue to decline due to natural attenuation processes.

Reduction of Toxicity, Mobility, and Volume

The soil and sediment excavation activities would reduce the toxicity, mobility, and volume of PCBs in surface and subsurface soil and sediment at the site, as these materials would be removed and replaced with clean backfill material. Soil cover installation activities would also reduce the potential for exposure to PCBs and mobility of PCBs from the subsurface sediment within North Pond No. 1 and North Pond No. 2 at the site, as clean fill materials would provide a protective layer between any residual PCBs and potential receptors.

The toxicity, mobility, and volume of constituents in groundwater would be reduced by natural passive in-situ processes.

Implementability

Excavation and offsite disposal of soil and sediment is commonly employed in remedial activities and is technically feasible. Removal of some of the deeper sediments in the OU-1 Ponds is expected to pose some challenges, which may require use of containment structures (i.e., sheetpiling) to implement. Based on existing information, it is anticipated that a portion of the excavated soil and sediment would be characterized as a TSCA-regulated/New York State hazardous waste for PCBs (Waste Code B007), and a portion of the excavated soil and sediment would be characterized as a non-hazardous waste. These types of materials are routinely transported to RCRA-permitted hazardous waste landfills and RCRA Subtitle D landfills, respectively, during cleanups at other sites and is not expected to be an issue.

Cover construction is also commonly employed in remedial activities and is technically feasible. The equipment and materials necessary to implement this alternative are available, as are several capable contractors.

Cost

The capital costs associated with this alternative include costs associated with mobilization, site preparation, excavation activities, cover construction, water handling and treatment, transportation and offsite disposal of excavated soils and sediments, site restoration, and preparation of documentation necessary for the deed restriction. Annual O&M costs associated with this alternative include costs associated with completing annual groundwater monitoring. Based on the groundwater analytical data, it appears that concentrations of constituents of interest could decrease to concentrations below relevant guidance values in a relatively short timeframe. Therefore, a 10-year O&M period has been included for groundwater monitoring. The actual length of groundwater monitoring will be based on the results of monitoring activities and could differ. The present worth estimated cost of this alternative is $ 14,100,000. A detailed breakdown of the estimated costs associated with this alternative is presented in Table 4.

5.3.3 Alternative 3 – Targeted Soil/Sediment Removal with Soil Cover

Technical Description

Under this alternative, soil and sediment within pre-determined limits would be excavated and transported for offsite disposal in accordance with applicable rules and regulations. Removal limits would be based on the results of previous investigation activities. Proposed removal limits in OU-3 and OU-1 (developed in consultation with the NYSDEC) are shown on Figures 4 and 6, respectively. In general, removal limits would include excavation of the following:

- Soil in pre-existing upland areas that exhibits PCBs at concentrations above TAGM 4046 recommended soil cleanup objectives;

- Soil within the limits of the OU-1 ponds and marshes that exhibits PCBs at concentrations above 10 ppm. A soil cover would be placed over areas where soil exhibits PCBs at concentrations above 1 ppm (without prior excavation), provided placement does not require extensive clearing and grubbing of upland forest;

- Sediment within the limits of OU-1 ponds and marshes that exhibit PCBs at concentrations above 1 ppm, followed by placement of an engineered cover (this includes sediment removal to depths as great as 4 feet in North Pond No. 1, and 5.5 feet in North Pond No. 2); and

- Sediment within the limits of the OU-3 South Pond, OU-3 South Marsh, and along the main flow path through Segments B and C of Tributary 63, down to the underlying native material

The key difference between this alternative and Alternative 2 is the removal of subsurface sediment from OU-1 ponds and marshes with PCB concentrations greater than 1 ppm.

For purposes of this evaluation, it has been assumed that sediment removal would be conducted "in-the-dry". Ponds and marshes would be de-watered one at a time by pumping the water to an adjacent pond or marsh. Tributary 63 would be de-watered in segments using a pump bypass. It is assumed that sheetpiling will be employed to a limited extent to assist in removal of some of the deeper sediment deposit areas of the OU-1 ponds. It has been assumed that sediment removed from the North Ponds would be processed with a pug mill prior to transportation for offsite disposal, and that sediment removed from the South Pond would be gravity drained and then stabilized prior to transportation for offsite disposal.

Following removal, documentation samples would be collected from the limits of the excavation areas and submitted for laboratory analysis. Results of the documentation sampling would be included in the certification report to be prepared at the conclusion of remedial activities. Site restoration would occur following the collection of documentation samples. Restoration would include placement of a minimum of one-foot of clean material in all of the removal areas (additional material may be placed in select areas to approximate pre-existing grades), followed by seeding/planting of disturbed soil areas (where necessary). In addition, this alternative would include post-remediation groundwater monitoring to evaluate changes in groundwater conditions.

The following site controls would also be implemented under this alternative:

- A deed restriction would be developed to: indicate the presence of low concentrations of PCBs in sediment and soil, indicate the presence of VOCs and SVOCs in groundwater, and restrict the use of onsite groundwater; and

- A Site Management Plan would be developed to provide for long-term maintenance of the site fencing and the sediment/soil cover, and establish guidelines to be followed for the management of sediment/soil material, should future activities disturb site sediments/soils. The Site Management Plan would be referenced in the deed to the property.

Compliance with SCGs

Chemical-Specific SCGs

Chemical-specific guidance to be considered under this alternative are the soil guidance values presented in NYSDEC TAGM 4046. Soil in pre-existing upland areas of the site that exhibits PCBs at concentrations above TAGM 4046 soil guidance values would be removed. Surface soil within the former limits of the OU-1 ponds and marshes that exhibits PCBs at concentrations above TAGM 4046 soil guidance values would be removed or covered, with the exception of a few areas in Marsh No. 2 and Marsh No. 3 where excavation or covering would require the clearing of heavy vegetation.

The sediment screening levels established in the NYSDEC document titled *Technical Guidance for Screening Contaminated Sediments* are additional chemical-specific guidance to be considered under this alternative. Based on the results of previous investigation activities, surface sediment in-place following remedial activities will meet these guidance values through a combination of removal and cover. However, there are inherent operational attributes associated with sediment removal that will limit the cleanup level which can practically be achieved. Removal limitations are caused in part by resuspended sediments subsequently mixing and resettling within the dredged area, ultimately resulting in an overlying layer of sediments containing PCBs. Removal "in-the-dry" is currently proposed, in part as an attempt to minimize these limitations. As previously mentioned, the NYSDEC document states that sediment with concentrations of constituents of interest which exceed the listed criteria is considered impacted, but the listed criteria do not necessarily represent a final concentration that must be achieved through remediation.

The Class GA groundwater quality standards presented in 6NYCRR Parts 700-705 and in NYSDEC TOGS 1.1.1 are applicable chemical-specific SCGs for this alternative. This alternative relies on natural attenuation processes to meet these standards. This alternative includes monitoring to document changes in groundwater quality over time.

Action-Specific SCGs

Action-specific SCGs that may apply to this alternative are associated with the removal and offsite treatment/ disposal of the soil and sediment, removal and treatment of water (from the dewatering activities), fill and cover placement, monitoring requirements, and OSHA health and safety requirements.

Remedial workers and worker activities that occur during implementation of this alternative must comply with OSHA requirements for training, safety equipment and procedures, monitoring, recordkeeping, and reporting as identified in 29 CFR Parts 1904, 1910, and 1926. Compliance with action-specific SCGs would be accomplished by following a NYSDEC-approved design and site-specific HASP.

USDOT and disposal facility requirements for packaging, labeling, transporting, and disposing of regulated materials would also be applicable to this alternative. Compliance with these SCGs would be achieved by utilizing licensed and properly permitted waste transporters and treatment/ disposal facilities.

Location-Specific SCGs

Location-specific SCGs that may apply to this alternative are associated with modifications to wetlands and work activities that may affect the New York State Coastal Zone. Compliance with these SCGs would be achieved by complying with permitting requirements and implementing designs that would minimize disturbance and/or alteration of the wetland portions of the site.

Overall Protection of Human Health and the Environment

The FWIA and comparison of constituent concentrations to NYSDEC soil and sediment screening values suggest some risk through exposure to PCBs may exist. Implementation of this alternative would greatly reduce the potential exposure risks by removing and covering much of the soil and sediment at the site that contain PCBs.

Potential exposure to soil at the site containing PCBs above TAGM 4046 soil guidance values would be mitigated because such soils would be removed from pre-existing upland portions of the site. Potential exposure to soil within the OU-1 ponds and marshes containing PCBs above TAGM 4046 soil guidance values would be mitigated by the cover, which would physically isolate these soils from direct contact.

Potential exposure to sediment at the site containing PCBs at elevated levels would be mitigated because such sediments would be removed from the OU-1 ponds and marshes and OU-3, and the residuals covered by a minimum of 1-foot of clean fill that would physically isolate these sediments from direct contact.

Short-Term Effectiveness

The excavation and subsequent handling of soil and sediment containing PCBs at concentrations above relevant guidance values could result in short-term risks to public health and the environment. Implementation of this alternative will impact aquatic habitat and the associated organisms. Excavation activities may generate dust and suspend PCB-containing sediments in surface water, and offsite waste transportation would increase the risk of in-traffic accidents. Truck-traffic associated with transporting waste offsite, and importing fill to the site is estimated to total approximately 8,550 truck trips. Engineering controls would be in place during remedy implementation to minimize the potential short-term risks.

Under this alternative, onsite remedial workers could potentially be exposed to chemical constituents in soil and sediment during media disturbance associated with removal activities. Exposure routes would be of relatively short duration and would be addressed via various health and safety precautions as discussed below.

Potential exposure of onsite remedial workers to chemical constituents and operational hazards would be mitigated by the use of PPE as specified in a site-specific HASP and through proper equipment and material handling procedures to be specified in the remedy design documents and site work plans. Air monitoring would be performed during soil handling activities to determine the need for additional engineering controls (e.g., using water sprays to suppress dust) and to confirm that dust levels remain within acceptable levels, as specified in the site-specific HASP. Surface water monitoring would be performed during sediment removal activities, as appropriate, to determine the need for additional engineering controls and to confirm that turbidity and PCBs remain within acceptable levels, as specified in site-specific work plans.

This alternative could potentially be conducted in a modest timeframe (i.e., one to two construction seasons).

Long-Term Effectiveness and Permanence

Implementation of this alternative would permanently remove a significant mass of PCBs from the site, and achieve the RAOs of mitigating potential exposure to PCBs in environmental media. In some areas, such soil and sediment would be permanently removed from the site, and in other areas a soil cover would be constructed to achieve the RAOs of mitigating potential exposure to PCBs in environmental media.

The deed restriction and Site Management Plan would be kept in place, unchanged, unless site conditions or relevant guidance values were to change. The Site Management Plan would set forth actions to be taken to protect the health and safety of site remedial workers and the community and properly handle impacted materials under a wide variety of typical scenarios (e.g., utility installation, building construction, maintenance activities). If changes were to occur that would require modifications to the deed restriction/Site Management Plan, such modifications would be presented to the NYSDEC for review and approval, as appropriate. Taken together, these institutional controls could be expected to adequately and reliably provide for the management of impacted material to be left in place.

Groundwater monitoring would continue periodically until relevant guidance values are achieved, or until the results of monitoring support a different approach. The deed restriction on groundwater use would mitigate potential human exposure to VOCs and SVOCs in groundwater at concentrations above the performance goals. Based on groundwater sampling activities to date, the concentrations of VOCs and SVOCs in onsite groundwater are anticipated to continue to decline due to natural attenuation processes.

Reduction of Toxicity, Mobility, and Volume

The soil and sediment excavation activities would reduce the toxicity, mobility, and volume of PCBs in surface and subsurface soil and sediment at the site, as these materials would be removed and replaced with a clean backfill material. Cover installation activities would also reduce the mobility of PCBs in surface soil at the site, as clean fill materials would provide a protective layer between any residual PCBs and potential receptors.

The toxicity, mobility, and volume of constituents in groundwater would be reduced by natural passive in-situ processes.

Implementability

Excavation and offsite disposal of soil and sediment is commonly employed in remedial activities and is technically feasible. Removal of some of the deeper sediments in the OU-1 Ponds is expected to pose some challenges, which may require use of containment structures (i.e., sheetpiling) to implement. Based on existing information, it is anticipated that a portion of the excavated soil and sediment would be characterized as a TSCA-regulated/New York State hazardous waste for PCBs (Waste Code B007), and a portion of the excavated soil and sediment would be characterized as a non-hazardous waste. These types of materials are routinely transported to RCRA-permitted hazardous waste landfills and RCRA Subtitle D landfills, respectively, during cleanups at other sites and is not expected to be an issue.

Cover construction is also commonly employed in remedial activities and is technically feasible. The equipment and materials necessary to implement this alternative are available, as are several capable contractors. The Site Management Plan would detail an inspection program to monitor the integrity and effectiveness of the cover.

Cost

The capital costs associated with this alternative include costs associated with mobilization, site preparation, excavation activities, cover construction, water handling and treatment, transportation and offsite disposal of excavated soils and sediments, site restoration, and preparation of documentation necessary for the deed restriction. Annual O&M costs associated with this alternative include costs associated with completing annual groundwater monitoring, and annual monitoring and maintenance of the cover. Based on the groundwater analytical data, it appears that concentrations of constituents of interest could decrease to concentrations below relevant guidance values in a relatively short timeframe. Therefore, a 10-year O&M period has been included

for groundwater monitoring. The actual length of groundwater monitoring will be based on the results of monitoring activities and could differ. For purposes of this FFS, a standard 30-year O&M period has been included for annual inspection of the cover. The present worth estimated cost of this alternative is $ 17,500,000. A detailed breakdown of the estimated costs associated with this alternative is presented in Table 5.

5.3.4 Alternative 4 – Soil/Sediment Removal

Technical Description

Under this alternative, soil and sediment in OU-1 and OU-3 exhibiting constituents at concentrations above relevant guidance values would be excavated and transported for offsite disposal in accordance with applicable rules and regulations. Removal limits would include excavation of the following:

- Soil exhibiting PCBs at concentrations above the TAGM 4046 recommended soil cleanup objectives of 1 ppm for surface material and 10 ppm for subsurface material would be excavated and transported for offsite disposal; and

- Sediment exhibiting PCBs at concentrations above 0.2 ppm would be excavated and transported for offsite disposal.

Samples would be collected from the limits of the excavation areas and submitted for laboratory analysis. Additional excavation would be performed if samples exhibit constituents at concentrations above the remedial action limits of 1 ppm for surface soil, 10 ppm for subsurface soil, and 0.2 ppm for sediment. Site restoration would occur when analytical results indicate the remedial action limits have been met.

For purposes of this evaluation, it has been assumed that sediment removal would be conducted "in-the-dry". Ponds and marshes would be de-watered one at a time by pumping the water to an adjacent pond or marsh. Tributary 63 would be de-watered in segments using a pump bypass. It is assumed that sheetpiling will be employed to a limited extent to assist in removal of some of the deeper sediment deposit areas of the OU-1 ponds. It has been assumed that sediment removed from the North Ponds would be processed with a pug mill prior to transportation for offsite disposal, and that sediment removed from the South Pond would be gravity drained and then stabilized prior to transportation for offsite disposal.

Site restoration would include placement of clean material in all of the removal areas to approximate pre-existing grades, followed by seeding/planting of disturbed soil areas (where necessary). A deed restriction would be developed to indicate the presence of VOCs and SVOCs in groundwater and restrict the use of onsite groundwater. In addition, this alternative would include post-remediation groundwater monitoring to evaluate changes in groundwater conditions.

Compliance with SCGs

Chemical-Specific SCGs

Chemical-specific guidance to be considered under this alternative are the soil guidance values presented in NYSDEC TAGM 4046. On-site soil that exhibits PCBs at concentrations above TAGM 4046 soil guidance values would be removed.

The sediment screening levels established in the NYSDEC document titled *Technical Guidance for Screening Contaminated Sediments* are additional chemical-specific guidance to be considered under this alternative. This alternative would attempt to achieve guidance values through removal. However, there are inherent operational attributes associated with sediment removal that will limit the cleanup level which can practically be achieved. Removal limitations are caused in part by resuspended sediments subsequently mixing and resettling within the dredged area, ultimately resulting in an overlying layer of sediments containing PCBs. Removal "in-the-dry" is currently proposed, in part as an attempt to minimize these limitations. As previously mentioned, the NYSDEC document states that sediment with concentrations of constituents of interest which exceed the listed criteria is considered impacted, but the listed criteria do not necessarily represent a final concentration that must be achieved through remediation.

The Class GA groundwater quality standards presented in 6NYCRR Parts 700-705 and in NYSDEC TOGS 1.1.1 are applicable chemical-specific SCGs for this alternative. This alternative relies on natural attenuation processes to meet these standards. This alternative includes monitoring to document changes in groundwater quality over time.

Action-Specific SCGs

Action-specific SCGs that may apply to this alternative are associated with the removal and offsite treatment/ disposal of the soil and sediment, removal and treatment of water (from the dewatering activities), fill placement, monitoring requirements, and OSHA health and safety requirements.

Remedial workers and worker activities that occur during implementation of this alternative must comply with OSHA requirements for training, safety equipment and procedures, monitoring, recordkeeping, and reporting as identified in 29 CFR Parts 1904, 1910, and 1926. Compliance with action-specific SCGs would be accomplished by following a NYSDEC-approved design and site-specific HASP.

USDOT and disposal facility requirements for packaging, labeling, transporting, and disposing of regulated materials would also be applicable to this alternative. Compliance with these SCGs would be achieved by utilizing licensed and properly permitted waste transporters and treatment/ disposal facilities.

Location-Specific SCGs

Location-specific SCGs that may apply to this alternative are associated with modifications to wetlands and work activities that may affect the New York State Coastal Zone. Compliance with these SCGs would be achieved by complying with permitting requirements and implementing designs that would minimize disturbance and/or alteration of the wetland portions of the site.

Overall Protection of Human Health and the Environment

Under this alternative, more PCBs would be removed from the Site than in other alternatives, however, some PCBs will remain in the soils and sediment. The FWIA and comparison of constituent concentrations to NYSDEC soil and sediment screening values suggest some risk through exposure to PCBs may exist following excavation to the remedial action limits in this alternative. Implementation of this alternative would greatly reduce the potential exposure risks by removing the soil and sediment at the site that contain PCBs.

Short-Term Effectiveness

The extensive excavation and subsequent handling of soil and sediment containing PCBs at concentrations above relevant guidance values could result in potentially significant short-term risks to public health and the environment. Implementation of this alternative will impact aquatic habitat and the associated organisms. Excavation activities may generate dust and suspend PCB-containing sediments in surface water; offsite waste transportation would increase the risk of in-traffic accidents; and prolonged periods of emissions (exhaust) from diesel-powered equipment could disturb the local ecological community. Truck-traffic associated with transporting waste offsite, and importing fill to the site is estimated to total at least 12,600 truck trips, barring the need to perform additional removal to achieve the remedial action levels. Engineering controls would be in place during remedy implementation to minimize the potential short-term risks.

Under this alternative, remedial workers could be exposed to chemical constituents in soil and sediment during the excavation and handling activities. Exposure routes would be of a modest duration and would be addressed via various health and safety precautions as discussed below.

Potential exposure of onsite remedial workers to chemical constituents and operational hazards would be mitigated by the use of PPE as specified in a site-specific HASP and through proper equipment and material handling procedures to be specified in the remedy design documents and site work plans. Air monitoring would be performed during soil handling activities to determine the need for additional engineering controls (e.g., using water sprays to suppress dust) and to confirm that dust levels remain within acceptable levels, as specified in the site-specific HASP. Surface water monitoring would be performed during sediment removal activities, as appropriate, to determine the need for additional engineering controls and to confirm that turbidity and PCBs remain within acceptable levels, as specified in site-specific work plans.

This alternative would require significantly more time to implement than the other alternatives (i.e., two or more construction seasons).

Long-Term Effectiveness and Permanence

Implementation of this alternative would permanently remove surface and subsurface soil and sediment containing PCBs at concentrations above relevant guidance values, and achieve the RAOs of mitigating potential exposure to PCBs in environmental media.

The deed restriction would be kept in place, unchanged, unless site conditions or relevant guidance values were to change. If changes were to occur that would require modifications to the deed restriction, such modifications would be presented to the NYSDEC for review and approval, as appropriate.

Groundwater monitoring would continue periodically until relevant guidance values are achieved, or until the results of monitoring support a different approach. The deed restriction on groundwater use would mitigate potential human exposure to VOCs and SVOCs in groundwater at concentrations above the performance goals. Based on groundwater sampling activities to date, the concentrations of VOCs and SVOCs in onsite groundwater are anticipated to continue to decline due to natural attenuation processes.

Reduction of Toxicity, Mobility, and Volume

The soil and sediment excavation activities would reduce the toxicity, mobility, and volume of PCBs in surface and subsurface soil and sediment at the site, as these materials would be removed and replaced with a clean backfill material.

The toxicity, mobility, and volume of constituents in groundwater would be reduced by natural passive in-situ processes.

Implementability

Excavation and offsite disposal of soil and sediment is commonly employed in remedial activities and is technically feasible. Based on existing information, it is anticipated that a portion of the excavated soil and sediment would be characterized as a TSCA-regulated/New York State hazardous waste for PCBs (Waste Code B007), and a portion of the excavated soil and sediment would be characterized as a non-hazardous waste. These types of materials are routinely transported to RCRA-permitted hazardous waste landfills and RCRA Subtitle D landfills, respectively, during cleanups at other sites and is not expected to be an issue.

When removing sediments, there are inherent operational attributes that will limit the cleanup level which can practically be achieved. Limitations are caused in part by resuspended sediments subsequently mixing and resettling within the removal area, ultimately resulting in an overlying layer of sediments containing PCBs. The degree of sediment disturbance, and hence resuspension and mixing, varies with the equipment used, the operational handling of this equipment, and the physical nature of the sediments. Data collected during dredging activities at some PCB sites have indicated that low PCB cleanup levels (e.g., in the range of 10 ppm or lower) generally are not achievable. Removal "in-the-dry" is currently proposed, in part as an attempt to minimize these limitations. However, based on work performed on similar sites, the ability to achieve a 0.2 ppm concentration of PCBs in sediment is very uncertain.

Cost

The capital costs associated with this alternative include costs associated with mobilization, site preparation, excavation activities, water handling and treatment, transportation and offsite disposal of excavated soils and sediments, site restoration, and preparation of documentation necessary for the deed restriction. Annual O&M costs associated with this alternative include costs associated with completing annual groundwater monitoring. Based on the groundwater analytical data, it appears that concentrations of constituents of interest could decrease to concentrations below relevant guidance values in a relatively short timeframe. Therefore, a 10-year O&M period has been included for groundwater monitoring. The actual length of groundwater monitoring will be based on the results of monitoring activities and could differ. The present worth estimated cost of this alternative is $20,300,000. However, additional removal to achieve the remedial action limits is likely for this alternative, which could result in significantly greater costs. A detailed breakdown of the estimated costs associated with this alternative is presented in Table 6.

6. Comparative Analysis of Alternatives

6.1 General

This section presents a comparative analysis of the alternatives with respect to the seven evaluation criteria identified in Section 5. The comparative analysis identifies the advantages and disadvantages of each alternative relative to each other and in consideration of the seven evaluation criteria. The results of the comparative analysis are used as a basis for recommending a remedial alternative to address site conditions. The comparative analysis of corrective measure alternatives is presented below.

6.1.1 Compliance with SCGs

Chemical-Specific SCGs

Chemical-specific guidance to be considered under each alternative include the soil guidance values presented in NYSDEC TAGM 4046 and the method for evaluating sediment concentrations presented in the NYSDEC document titled *Technical Guidance for Screening Contaminated Sediments*. Alternative 1 (No Further Action) would rely on natural attenuation processes that would not likely reduce PCB concentrations in soil and sediment at the site to levels below the relevant guidance values. Alternative 2 (Targeted Soil/Sediment Removal & Cover) and Alternative 3 (Targeted Soil/Sediment Removal with Soil Cover) would reduce PCB concentrations in targeted areas of soil and sediment, and would minimize potential exposure to PCBs at concentrations above relevant guidance values by achieving the chemical specific SCGs in the bioavailable zone through a combination of removal and cover placement. Under Alternative 4 (Soil/Sediment Removal) soil and sediment exhibiting PCBs at concentrations above relevant guidance values would be removed, achieving Chemical Specific SCGs at all depths through removal and cover placement.

The Class GA groundwater quality standards presented in NYSDEC TOGS 1.1.1 are applicable chemical-specific SCGs for each alternative. Alternative 1 relies on natural attenuation processes to achieve the TOGS 1.1.1 groundwater quality standards/guidance values but it does not provide a means to monitor the location and movement of site groundwater that may exceed these standards. Alternatives 2 through 4 rely on natural attenuation processes to achieve the TOGS 1.1.1 groundwater quality standards/guidance values and provide for groundwater monitoring until relevant guidance values for site-related constituents are achieved, or until the results of monitoring support a different approach.

Action-Specific SCGs

Action-specific SCGs are not applicable under Alternative 1. OSHA regulations (29 CFR Parts 1904, 1910, and 1926) would apply to the construction/installation and excavation activities included under Alternatives 2 through 4. SCGs relating to packaging, labeling, transportation, and disposal of hazardous materials (including RCRA, UTS/LDR and USDOT requirements) would also apply to the remedial activities under Alternatives 2 through 4.

All of the remedial activities could be designed and implemented to meet applicable action-specific SCGs.

Location-Specific SCGs

Location-specific SCGs are not applicable under Alternative 1. Location-specific SCGs related to the discharge of dredge or fill materials; and work in coastal zones, floodplains, and wetlands would be applicable under Alternatives 2 through 4. Compliance with these SCGs would be achieved by following substantive permit requirements and implementing designs that would minimize disturbance and/or alteration of the wetlands and water bodies.

6.1.2 Overall Protection of Human Health and the Environment

The FWIA and comparison of constituent concentrations to NYSDEC soil and sediment guidance values suggest some risk through exposure to PCBs may exist. Aside from any long term attenuation of PCBs which might occur, the potential exposure risks would essentially remain the same if Alternative 1 were selected. The removal, and cover installation activities under Alternatives 2 and 3 would reduce potential exposure and potential migration of soil and sediment at the site that contains chemical constituents. Alternative 4 would remove soil and sediment exhibiting constituents at concentrations above relevant guidance values, further mitigating potential exposure and migration of these constituents.

As summarized in the FRI Report, there is not expected to be a potentially complete exposure pathway for groundwater because groundwater beneath the site is not used for potable water and because groundwater in the vicinity of OU-2 (which is where the elevated levels of VOCs and SVOCs have been observed) is greater than 10 feet below ground surface. It is anticipated that concentrations of VOCs and SVOCs in groundwater will decline due to natural attenuation processes. Alternatives 2 through 4 include periodic groundwater monitoring to further evaluate changes in groundwater conditions. The deed restriction under Alternatives 2 through 4 would further mitigate potential human exposure to VOCs and SVOCs in groundwater.

6.1.3 Short-Term Effectiveness

There are no short-term negative impacts associated with Alternative 1. Potential short-term impacts under Alternatives 2 through 4 are associated with worker and ecological exposures to soil and sediment containing PCBs due to soil/sediment disturbance during excavation activities. Alternative 4 involves the most significant excavation activities with the longest implementation time, and as such, presents the greatest potential for short-term risks to onsite remedial workers and ecological exposure during implementation. Under Alternatives 2 through 4, appropriate measures would be implemented to mitigate these risks, including, but not limited to implementing a site-specific HASP that includes an air monitoring program, using PPE, and instituting engineering controls to suppress dust and/or mitigate possible suspension of PCB-containing sediment.

Alternatives 2 and 3 are expected to achieve the RAOs pertaining to soil and sediment in the less time than Alternative 4. Alternative 2 would require an estimated 7,500 truck trips, Alternative 3 would require an estimated 8,550 truck trips, and Alternative 4 would require at least an estimated 12,600 truck trips. Additional removal required to meet the remedial action levels in Alternative 4 would require even more truck trips and would lengthen the remedial action period. Considering that Alternatives 2 and 3 will achieve the RAOs in a shorter time period than Alternative 4, there would be inherently less onsite labor hours and, thereby, a reduced probability of site accidents or worker exposure.

6.1.4 Long-Term Effectiveness

The no-further-action alternative would provide limited means to achieve and no method to monitor long-term effectiveness. Alternatives 2 and 3 would achieve the RAOs by reducing potential direct contact with soil and sediment containing PCBs, and mitigating potential transport via windblown dust (for soil) or suspension of PCB-containing sediments. Both Alternative 2 and Alternative 3 would require long-term maintenance and monitoring activities. Under Alternative 4, soil and sediment containing PCBs above TAGM 4046 soil cleanup objectives and 0.2 ppm in sediment would be permanently removed and transported for offsite disposal. Alternative 4 would also require long-term monitoring activities.

The third RAO (i.e., eliminate or mitigate, to the extent practicable and feasible, potential adverse long- and short-term effects to human health and the environment resulting from the implementation of remedial activities at the site) is best met by Alternative 2 or 3. Alternative 4 poses greater potential adverse short-term effects to human health and the environment than Alternatives 2 or 3. Alternative 4 would require significantly more labor hours to implement, would require significantly more truck traffic, would be more intrusive, and would take a longer time-frame to implement.

Under Alternatives 2 and 3, the deed restriction and Site Management Plan would be kept in place, unchanged, unless Site conditions or relevant guidance values were to change. The Site Management Plan would set forth actions to be taken to protect the health and safety of site remedial workers and the community and properly handle impacted materials under a wide variety of typical scenarios (e.g., utility installation, building construction, maintenance activities). Under Alternative 4, the deed restriction would be kept in place, unchanged, unless Site conditions or relevant guidance values were to change. If changes were to occur that would require modifications to the deed restriction/Site Management Plan, such modifications would be presented to the NYSDEC for review and approval, as appropriate. Taken together, these institutional controls could be expected to adequately and reliably provide for the management of impacted material to be left in place.

Groundwater monitoring would continue periodically under Alternatives 2 through 4 until relevant guidance values are achieved, or until the results of monitoring support a different approach. The deed restriction would mitigate potential human exposure to VOCs and SVOCs in groundwater at concentrations above the performance goals. Based on groundwater sampling activities to date, the concentrations of VOCs and SVOCs in onsite groundwater are anticipated to continue to decline due to natural attenuation processes.

6.1.5 Reduction of Toxicity, Mobility, or Volume

Alternative 1 does not include implementation of active treatment processes to reduce the toxicity, mobility, or volume of PCBs in soil or sediment. Alternatives 2 and 3 would reduce the toxicity, mobility, and volume of PCBs in onsite soil and sediment through removal and cover construction. Alternative 4 would reduce the volume of PCBs in onsite soil and sediment slightly more than Alternative 3 because additional material would be removed and transported for proper offsite disposal.

Under each of the four alternatives, the toxicity, mobility and volume of VOCs and SVOCs in groundwater would be reduced by natural passive in-situ processes.

6.1.6 Implementability

Each of the alternatives could be implemented at the site. Alternatives 2 would be the most straight-forward to implement, results of the FRI would be adequate to plan and conduct these activities. Alternative 3 would be more difficult to implement than Alternative 2, due to the increased depth of sediment removed in the OU-1 Ponds. Alternative 4 would require additional soil and sediment sampling, and would also require the additional characterization, handling, transportation, and disposal of a substantially larger quantity of soil and sediment than Alternative 2.

When removing sediments, there are inherent operational attributes that will limit the cleanup level which can practically be achieved. Limitations are caused in part by resuspended sediments subsequently mixing and resettling within the removal area, ultimately resulting in an overlying layer of sediments containing PCBs. The degree of sediment disturbance, and hence resuspension and mixing, varies with the equipment used, the operational handling of this equipment, and the physical nature of the sediments. Data collected during dredging activities at other sediment PCB sites have indicated that the viability of consistently achieving low PCB cleanup levels (e.g., in the range of 10 ppm or lower) is questionable, due to suspension and redeposition of sediment containing PCBs which occurs during the removal process. While it has been assumed for purposes of this FFS that removal will be conducted "in-the-dry", in part to mitigate concerns regarding resuspension, the presence of some surface water is expected (i.e., it will be difficult to achieve "dry" conditions at removal depths up to 15 feet below current surface water elevation, which is what is currently anticipated in portions of the North Ponds), complicating attempts to achieve a 0.2 ppm remedial goal. At other sites, the inability to achieve low residual sediment PCB concentrations has been remedied through cap placement, similar to that proposed for Alternatives 2 and 3. In summary, the less intrusive approaches proposed in Alternatives 2 and 3 to achieve the RAOs are considered more implementable than Alternative 4.

6.1.7 Cost

The four remedial alternatives under consideration for the site cover a range of costs. No capital or O&M costs are associated with the implementation of Alternative 1. The total estimated costs to implement Alternatives 1 through 4 are summarized in the table below.

Remedial Alternative	Estimated Capital Costs	Estimated T&D Costs	Estimated O&M Costs	Total Estimated Costs (Rounded)
Alternative 1 – No Further Action	$0	$ 0	$0	$0
Alternative 2 – Area-Based Removal of Targeted Soil/Sediment & Engineered Cover for Sediment	$6,598,044	$7,343,899	$142,497	$14,100,000
Alternative 3 – Area-Based Removal/Engineered Cover for Targeted Soil/Sediment	$8,234,888	$9,099,678	$142,497	$17,500,000
Alternative 4 – Concentration-Based Removal of Targeted Soil/Sediment*	$9,883,757	$10,259,238	$65,634	$20,300,000

* **Note**: Cost assumes a moderate over-excavation (20%) will be sufficient to achieve the remedial action limit of 0.2 ppm. Experience at other sites has shown that substantial costs can be incurred for additional removal associated with multiple passes to achieve low residual cleanup goals, sometimes including costs to cap areas where the cleanup goals have not been achieved (which could significantly increase the costs beyond those currently estimated).

6.2 Recommended Remedial Alternative

Based on the results of the comparative analysis presented above, Alternative 2 provides the best balance of the seven evaluation criteria considered in this feasibility report. Alternative 2 would significantly reduce the potential for human and ecological exposure to soil/sediment exhibiting PCBs, and would achieve the RAOs established for the site in a modest timeframe. In addition, this alternative would be protective of the environment, would have minimal potential short-term negative impacts, is considered effective over the long-term, and would reduce the potential mobility of PCBs in soil and sediment at the site.

However, Alternative 2 varies from the established practices in New York State and may be subject to administrative requirements that could significantly delay, and potentially preclude implementation. With a desire to expeditiously move this project to closure, Alternative 3 – Targeted Soil/Sediment Removal with Soil Cover has been selected by Novelis as the recommended alternative for implementation at the site. Alternative 3 provides for more soil and sediment removal than Alternative 2 (consistent with established practices in New York State), while still achieving a significant reduction in the potential for human and ecological exposure to soil/sediment exhibiting PCBs, and satisfying the RAOs established for the site in a modest time-frame. In addition, Alternative 3 would provide effective long term protection of the environment, and would greatly reduce the potential mobility of PCBs in soil and sediment at the site.

As previously discussed, the ability to achieve a 0.2 ppm concentration of PCBs in sediment in Alternative 4 is very uncertain, based on work performed on similar sites. There are a number of challenges associated with successful implementation and cost-effective achievement of the remedial action limit of 0.2 ppm, which may ultimately require a capping remedy component to achieve the cleanup goal, but at a far greater cost than Alternative 3. Furthermore, Alternative 4 poses greater potential adverse short-term effects to human health and the environment, would require significantly more labor hours to implement, result in significantly more truck traffic, disruption of additional wooded wetland habitat, and would take longer to implement. Finally, it is uncertain whether the additional effort and expense associated with Alternative 4 would yield any measurable additional risk reduction to human health or environmental receptors.

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Tables

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TABLE 1

FOCUSED FEASIBILITY STUDY
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

POTENTIAL CHEMICAL, ACTION, AND LOCATION-SPECIFIC SCGS AND TBCS

Potential Federal/ State Requirements and Guidance	Citation/ Reference	Status	Summary of Requirements/Guidance	Considerations in Remedial Process/Action for Attainment
Chemical-Specific SCGs				
Identification and Listing of Hazardous Wastes	40 CFR Part 261 6NYCRR Part 371	Potentially Applicable	Establishes procedures for identifying solid wastes that are subject to regulation as hazardous wastes under 40 CFR Parts 260-266 and 6 NYCRR Parts 371-376.	These regulations do not set cleanup standards, but are considered when developing remedial alternatives. Material excavated/removed from the site would be handled in accordance with RCRA and New York State hazardous waste regulations, as appropriate.
Universal Treatment Standards/Land Disposal Restrictions (UTS/LDRs)	40 CFR Part 268	Potentially Applicable	Identifies hazardous wastes for which land disposal is restricted and provides a set of numerical constituents concentration criteria at which hazardous waste is restricted from land disposal.	Applicable if waste determined to be hazardous. These regulations will be used for remedial alternatives utilizing offsite land disposal.
Clean Water Act (CWA) – Ambient Water Quality Criteria	40 CFR Parts 131 and 132 EPA 4405/5-86/001 "Quality Criteria for Water – 1986"	Potentially Applicable	Criteria for protection of aquatic life and/or human health depending on designated water use.	Criteria may be applicable for assessing water quality during potential remedial activities.
Surface Water and Groundwater Quality Standards	6NYCRR Part 700-705	Potentially Applicable	Establishes quality standards for surface water and groundwater.	These criteria may be applicable in evaluating surface water and groundwater quality.

TABLE 1 (CONTINUED)

FOCUSED FEASIBILITY STUDY

NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

POTENTIAL CHEMICAL, ACTION, AND LOCATION-SPECIFIC SCGS AND TBCS

Potential Federal/ State Requirements and Guidance	Citation/ Reference	Status	Summary of Requirements/Guidance	Considerations in Remedial Process/Action for Attainment
Chemical-Specific SCGs (continued)				
Toxic Substances Control Act (TSCA)	40 CFR Part 761	Potentially Applicable	Provides regulations for storage, handling, and disposal of materials containing PCBs.	Applicable to remedial alternatives that include removal and management of materials that exhibit PCBs.
NYSDEC Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations	Division of Water Technical and Operational Guidance Series (TOGS 1.1.1, June 1998, revised April 2000)	Potentially Applicable	Provides a compilation of ambient water quality standards and guidance values for toxic and non-conventional pollutants for use in the NYSDEC programs.	These standards may be applicable in evaluating surface water and groundwater quality.
NYSDEC Guidance on Determination of Soil Cleanup Objectives and Cleanup Levels	Technical and Administrative Guidance Memorandum (TAGM) #4046, January 24, 1994	To Be Considered	Provides a basis and a procedure to determine soil cleanup levels, as appropriate, for sites when cleanup to pre-disposal conditions is not possible or feasible. Contains generic soil cleanup objectives.	These guidance values are to be considered in evaluating soil quality.
NYSDEC Technical Guidance for Screening Contaminated Sediments	Division of Fish and Wildlife, Division of Marine Resources (January 1999)	To Be Considered	Describes methodology for establishing sediment criteria for the purpose of identifying sediment that potentially may impact marine and aquatic ecosystems.	These criteria are to be considered in evaluating sediment quality.

TABLE 1 (CONTINUED)

FOCUSED FEASIBILITY STUDY

NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

POTENTIAL CHEMICAL, ACTION, AND LOCATION-SPECIFIC SCGS AND TBCS

Potential Federal/ State Requirements and Guidance	Citation/ Reference	Status	Summary of Requirements/Guidance	Considerations in Remedial Process/Action for Attainment
Chemical-Specific SCGs (continued)				
Guidance on Remedial Actions for Superfund Sites with PCB Contamination	OSWER Directive No. 9355.4-01 dated August 1990	To Be Considered	Provides guidance in the investigation and remedy selection process for PCB-contaminated Superfund sites. Provides preliminary remediation goals for various contaminated media and identifies other considerations important to the protection of human health and the environment.	Although not a Federal Superfund site, may be considered when assessing site remediation.
Action-Specific SCGs				
OSHA – General Industry Standards	29 CFR Part 1910	Potentially Applicable	These regulations specify the 8-hour time-weighted average concentration for worker exposure to various organic compounds. Training requirements for workers at hazardous waste operations are specified in 29 CFR 1910.120.	Proper respiratory equipment may need to be worn if it is not possible to maintain the work atmosphere below these concentrations.
OSHA – Safety and Health Standards	29 CFR Part 1926	Potentially Applicable	These regulations specify the type of safety equipment and procedures to be followed during site remediation.	Appropriate safety equipment will be onsite and appropriate procedures will be followed during any remedial activities.
OSHA – Recordkeeping, Reporting, and Related Regulations	29 CFR Part 1904	Potentially Applicable	These regulations outline recordkeeping and reporting requirements for an employer under OSHA.	These regulations apply to the company(s) contracted to install, operate, and maintain remedial actions at hazardous waste sites.

TABLE 1 (CONTINUED)

FOCUSED FEASIBILITY STUDY

NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

POTENTIAL CHEMICAL, ACTION, AND LOCATION-SPECIFIC SCGS AND TBCS

Potential Federal/ State Requirements and Guidance	Citation/ Reference	Status	Summary of Requirements/Guidance	Considerations in Remedial Process/Action for Attainment
Action-Specific SCGs (continued)				
RCRA – General Standards	40 CFR 264 6NYCRR Part 373-3.2	Potentially Applicable	General performance standards requiring minimization of need for further maintenance and control; minimization or elimination of post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products. Also requires decontamination or disposal of contaminated equipment, structures, and soils.	Proper design considerations will be implemented to minimize the need for future maintenance. Decontamination actions and facilities will be included.
RCRA – Regulated Levels for Toxic Characteristics Leaching Procedure (TCLP) Constituents	40 CFR Part 261 6NYCRR Part 371	Potentially Applicable	These regulations specify the TCLP constituent levels for identification of hazardous waste that exhibit the characteristic of toxicity.	Excavated soil may be sampled and analyzed for TCLP constituents prior to disposal to determine if the materials are hazardous based on the characteristic of toxicity.
RCRA – Preparedness and Prevention	40 CFR Part 264 Subpart C 6NYCRR Part 373-3.3	Potentially Applicable	These regulations outline requirements for safety equipment and spill control.	Safety and communication equipment will be installed at the site as necessary. Local authorities will be familiarized with the site.
RCRA – Land Disposal Restrictions	40 CFR Part 268	Potentially Applicable	Restricts land disposal of hazardous wastes that exceed specific criteria. Includes treatment standards and related testing, as well as tracking and record keeping requirements.	These regulations may apply to remedial alternatives that include removal of materials from the site that are hazardous wastes.

TABLE 1 (CONTINUED)

FOCUSED FEASIBILITY STUDY

NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

POTENTIAL CHEMICAL, ACTION, AND LOCATION-SPECIFIC SCGS AND TBCS

Potential Federal/ State Requirements and Guidance	Citation/ Reference	Status	Summary of Requirements/Guidance	Considerations in Remedial Process/Action for Attainment
Action-Specific SCGs (continued)				
Land Disposal Facility Notice in Deed	40 CFR Parts 264/265 6NYCRR Part 373-3.7(i)	Potentially Applicable	Establishes provisions for a deed notation for closed hazardous waste disposal units to prevent land disturbance by future owners.	The regulations are potentially applicable because closed areas may be similar to closed RCRA units.
RCRA – Contingency Plan and Emergency Procedures	40 CFR Part 264 Subpart D 6NYCRR Part 373-3.4	Potentially Applicable	Provides requirements for outlining emergency procedures to be used following explosions, fires, etc.	Plans will be developed and implemented during remedial design, as appropriate. If necessary to develop, copies of the plan will be kept onsite.
Toxic Substances Control Act (TSCA)	40 CFR Part 761	Potentially Applicable	Provides regulations for storage, handling, and disposal of materials containing PCBs.	Applicable to remedial alternatives that include removal and management of materials that exhibit PCBs.
Standards Applicable to Transporters of Applicable Hazardous Waste – RCRA Section 3003	40 CFR Parts 262 and 263 40 CFR Parts 170-179 6NYCRR Part 372.3	Potentially Applicable	Establishes the responsibility of offsite transporters of hazardous waste in the handling, transportation, and management of the waste. Requires manifesting, recordkeeping, and immediate action in the event of a discharge.	These requirements would be applicable to any company(s) contracted to transport hazardous material from the site.
USEPA – Administered Permit Program: The Hazardous Waste Permit Program	40 CFR Part 270 RCRA Section 3005	Potentially Applicable	Covers the basic permitting, application, monitoring, and reporting requirements for offsite hazardous waste management facilities.	Any offsite facility accepting hazardous waste from the site must be properly permitted. Implementation of the site remedy would include consideration of these requirements.

TABLE 1 (CONTINUED)

FOCUSED FEASIBILITY STUDY

NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

POTENTIAL CHEMICAL, ACTION, AND LOCATION-SPECIFIC SCGS AND TBCS

Potential Federal/ State Requirements and Guidance	Citation/ Reference	Status	Summary of Requirements/Guidance	Considerations in Remedial Process/Action for Attainment
Action-Specific SCGs (continued)				
USDOT Rules for Transportation of Hazardous Materials	49 CFR Parts 107, 171.1 – 172.558	Potentially Applicable	Outlines procedures for the packaging, labeling, manifesting, and transportation of hazardous materials.	Any company contracted to transport hazardous waste from the site will be required to follow these regulations.
Clean Water Act (CWA) - Discharge to Waters of the U.S. National Pollution Discharge Elimination System (NPDES)	40 CFR Part 122, 125, 403, 230, and 402 33 USC 446 Section 404	To be considered	Establishes site-specific pollutant limitations and performance standards that are designed to protect surface water quality. Types of discharges regulated under CWA include discharge to surface water, indirect discharge to POTW, and discharges of dredged or fill material into U.S. waters.	May be Potentially applicable for remedial alternatives that include discharging treated water to surface waters or POTW.
Clean Air Act (CAA) – Ambient Air Quality Standards (NAAQS)	40 CFR Part 1 - 99	To be considered	Establishes ambient air quality standards for protection of public health.	Remedial operations would be performed in a manner that minimizes the production of particulate matter.
Discharge of Dredge or Fill Material into Waters of the United States	40 CFR Part 230	To be considered	Requirements for discharge of fill material or dredge material into waters of the United States.	Activities resulting in the discharge of fill material or dredge material to surface water may require a permit from the United States Army Corps of Engineers.
Rivers and Harbors Act	33 CFR Parts 320-330	To be considered	Prohibits unauthorized obstruction or alteration (e.g., dredging, placing fill) of any navigable water in the U.S. Presents permitting requirements.	Not applicable because remedial activities do not include work in "navigable waters of the U.S." However, these requirements may be considered when planning remedial work that may alter surface water bodies.

TABLE 1 (CONTINUED)

FOCUSED FEASIBILITY STUDY

NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

POTENTIAL CHEMICAL, ACTION, AND LOCATION-SPECIFIC SCGS AND TBCS

Potential Federal/ State Requirements and Guidance	Citation/ Reference	Status	Summary of Requirements/Guidance	Considerations in Remedial Process/Action for Attainment
Action-Specific SCGs (continued)				
Clean Waters Act (CWA) Section 404	40 CFR Parts 230 - 231 33 CFR parts 320 - 329	Potentially Applicable	These regulations detail requirements associated with all existing, proposed, and potential sites for discharges of dredged or fill materials into the waters of the U.S.	Potentially applicable for remedial alternatives that would include removal, capping, and/or discharges of dredged or fill materials.
Fish and Wildlife Coordination Act Modifications to Waterways that Affect Fish or Wildlife	16 USC 661 *et seq.* 40 CFR 6.302	Potentially Applicable	Requires protection of fish or wildlife that may be affected during when diversion, channeling, or other activities associated with modifying a stream or river.	Potentially applicable for remedial activities that include hydraulic modifications to Tributary 63.
National Pollution Discharge Elimination System (NPDES)	40 CFR Part 122	Potentially Applicable	These regulations detail the specific permit requirements for the discharge of pollutants to the waters of the US.	Any water discharged from the site would be treated (either onsite or offsite) and discharged in accordance with NPDES permit requirements.
New York State Pollution Discharge Elimination System (SPDES)	6NYCRR Parts 750-758	Potentially Applicable	These regulations detail the specific permit requirements for the discharge of pollutants to the waters of New York State.	Any water discharged from the site would be treated (either onsite or offsite) and discharged in accordance with NYSDEC SPDES permit requirements.
Use and Protection of Waters	6NYCRR Part 608	Potentially Applicable	These regulations detail the specific permit requirements for changing, modifying, or disturbing any protected stream.	These regulations may apply to remedial work that includes removing and/or capping of sediments.

TABLE 1 (CONTINUED)

FOCUSED FEASIBILITY STUDY

NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

POTENTIAL CHEMICAL, ACTION, AND LOCATION-SPECIFIC SCGS AND TBCS

Potential Federal/ State Requirements and Guidance	Citation/ Reference	Status	Summary of Requirements/Guidance	Considerations in Remedial Process/Action for Attainment
Action-Specific SCGs (continued)				
Surface Water Regulations	6NYCRR Parts 701 and 703	Potentially Applicable	These regulations establish quality standards for releases to surface water and groundwater.	These regulations would apply to remedial work that includes discharge of water to surface water or groundwater.
Air Quality Standards	6NYCRR Part 257	Potentially Applicable	These regulations establish quality standards for ambient air.	These regulations would apply to remedial work that could include discharges (including particulates) to the atmosphere.
Fish and Wildlife Management Practices Cooperative Program	New York ECL § 11-0503	Potentially Applicable	These regulations establish quality standards for releases to surface water to protect wildlife and waterfowl.	These regulations would apply to remedial work that includes discharges to surface water.
New York Hazardous Waste Management System – General	6NYCRR Part 370	Potentially Applicable	Provides definitions of terms and general instructions for the Part 370 series of hazardous waste management.	Hazardous waste is to be managed according to this regulation.
New York State - Identification and Listing of Hazardous Wastes	6NYCRR Part 371	Potentially Applicable	Establishes procedures for identifying solid wastes that are subject to regulation as hazardous waste.	Materials excavated/removed from the site will be handled in accordance with RCRA and New York State hazardous waste regulations, if appropriate.

TABLE 1 (CONTINUED)

FOCUSED FEASIBILITY STUDY

NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

POTENTIAL CHEMICAL, ACTION, AND LOCATION-SPECIFIC SCGS AND TBCS

Potential Federal/ State Requirements and Guidance	Citation/ Reference	Status	Summary of Requirements/Guidance	Considerations in Remedial Process/Action for Attainment
Action-Specific SCGs (continued)				
New York State - Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities	6NYCRR Part 372 6NYCRR Part 373-3.5	Potentially Applicable	Provides requirements relating to the use of the manifest system and its recordkeeping requirements. Also establishes requirements for proper storage of hazardous waste. Applies to hazardous waste generators, transporters, and facilities in New York State.	This regulation will be applicable to the onsite storage of generated hazardous waste (if any) and to any company(s) contracted to do treatment work or to transport hazardous materials from the site.
Inactive Hazardous Waste Disposal Sites – Remedy Selection	6NYCRR Part 375	Potentially Applicable	Establishes general guidance for the selection of a site remedy.	May be considered when evaluating and selecting a site remedial alternative.
Land Disposal Restrictions	6NYCRR Part 376	Potentially Applicable	Identifies hazardous wastes that are restricted from land disposal and defines those circumstances under which an otherwise prohibited waste may be land disposed.	May apply to remedial alternatives that include the removal and land disposal of contaminated materials from the site.
New York State - Waste Transporter Permits	6NYCRR Part 364	Potentially Applicable	Governs the collection, transport, and delivery of regulated waste within New York State.	Properly permitted haulers will be used if any waste materials are transported offsite.
New York Regulations for Hazardous Waste Management Facilities	6NYCRR Parts 373-1.1 - 373-1.8	Potentially Applicable	Provides requirements and procedures for obtaining a permit to operate a hazardous waste treatment, storage, and disposal facility (TSDF). Also lists the contents and conditions of permit.	Any offsite facility accepting waste from the site must be properly permitted.

TABLE 1 (CONTINUED)

FOCUSED FEASIBILITY STUDY

NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

POTENTIAL CHEMICAL, ACTION, AND LOCATION-SPECIFIC SCGS AND TBCS

Potential Federal/ State Requirements and Guidance	Citation/ Reference	Status	Summary of Requirements/Guidance	Considerations in Remedial Process/Action for Attainment
Action-Specific SCGs (continued)				
NYSDEC Technical and Administrative Guidance Memorandums (TAGM)	NYSDEC TAGMs	To be considered	TAGMs are NYSDEC guidance that are to be considered during the remedial process.	Appropriate TAGMs will be considered during the remedial process.
Location-Specific SCGs				
Clean Water Act – Great Lakes Water Quality Guidance	40 CFR Part 132	Potentially Applicable	Provides water quality guidance values for constituents in surface waters of the Great Lakes.	These guidance values are considered when evaluating surface water quality.
Floodplains Management	40 CFR Appendix A to Part 6	Potentially Applicable	Procedures on floodplain management and wetlands protection.	Activities taking place within floodplains must be done to avoid advance impacts and preserve beneficial values in floodplains.
Coastal Zone Management Act (CZMA)	16 USC 1451 – 1465 15 CFR Parts 923 and 930	Potentially Applicable	Requirements for work activities that affect a coastal use or resource.	Activities taking place within the New York State Coastal Zone must be conducted in a manner consistent, to the extent practicable, with State coastal zone management programs.
Federal Endangered Species Act	16 USC §§ 1531 – 1544 50 CFR Part 17, Subpart I 50 CFR Part 402	Potentially Applicable	Prohibitions on work that may jeopardize the continued existence of any endangered or threatened species or habitat critical to such species.	Activities taking place within an area that is habitat for endangered or threatened species must be planned and conducted in a manner that avoids impacts to these species or their habitat.

TABLE 1 (CONTINUED)

FOCUSED FEASIBILITY STUDY

NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

POTENTIAL CHEMICAL, ACTION, AND LOCATION-SPECIFIC SCGS AND TBCS

Potential Federal/ State Requirements and Guidance	Citation/ Reference	Status	Summary of Requirements/Guidance	Considerations in Remedial Process/Action for Attainment
Location-Specific SCGs (continued)				
New York State Endangered Species Act	6NYCRR Part 182	Potentially Applicable	Prohibitions on work that may jeopardize the continued existence of any endangered or threatened species or habitat critical to such species.	Activities taking place within an area that is habitat for endangered or threatened species must be planned and conducted in a manner that avoids impacts to these species or their habitat.
Statement of Procedures on Floodplain Management and Wetlands Protection	40 CFR Part 6, Appendix A	To Be Considered	Provides EPA policy and guidance for implementing Executive Orders 11988 and 11990. These orders require federal agencies to evaluate potential effects of their actions on floodplains and wetlands, and to avoid or minimize adverse impacts.	To be considered for remedial activities that may effect floodplains or wetlands.
Policy on Floodplains and Wetland Assessments for CERCLA Actions	OSWER Directive 9280.0-02	To Be Considered	Discusses situations under Section 104 or 106 of CERCLA that require preparation of floodplains and/or wetlands assessments, and factors to consider when preparing such an assessment.	To be considered in the event a floodplain or wetland assessments is prepared.
National Historic Preservation Act	36 CFR Part 800 16 USC §§ 470 – 470x-6	Potentially Applicable	Requirements for preservation of historic properties.	Activities taking place on a site on or under consideration for placement of the National Register of Historic Places must be planned to preserve the historic property and minimize harm.

TABLE 1 (CONTINUED)

FOCUSED FEASIBILITY STUDY

NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

POTENTIAL CHEMICAL, ACTION, AND LOCATION-SPECIFIC SCGS AND TBCS

Potential Federal/ State Requirements and Guidance	Citation/ Reference	Status	Summary of Requirements/Guidance	Considerations in Remedial Process/Action for Attainment
Location-Specific SCGs (continued)				
Preservation of Area Containing Artifacts	36 CFR Part 65	Potentially Applicable	Requirements for preservation of historical/archeological artifacts.	Activities must be done to identify, preserve, and recover artifacts if the site has been identified as containing significant historical artifacts.
New York Preservation of Historic Structures or Artifacts	NYPRHPL Section 14.09	Potentially Applicable	Requirements for preservation of historical/archeological artifacts.	Activities must be done to identify, preserve, and recover artifacts if the site has been identified as containing significant historical artifacts.
New York State Freshwater Wetlands Law	6NYCRR Parts 662-665	Potentially Applicable	Details procedural requirements for conducting select activities within and adjacent to freshwater wetlands, and provides standards that govern the issuance of permits to alter freshwater wetlands.	Activities within and adjacent to freshwater wetlands would be planned and conducted to meet the substantive requirements of these regulations.

TABLE 2

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

PRELIMINARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Description	Preliminary Assessment
A. No Action			
	----	No remedial activities. On-going natural processes would continue.	Implementable.
B. Monitoring			
	Site-Wide Monitoring	Periodic visual observations and/or field sampling would be used to monitor site conditions.	Implementable.
C. Institutional/Engineering Controls			
	Access Restrictions	Constraints, such as fencing and signs, would be placed throughout the site to limit access.	Implementable.
	Deed Restrictions	Constraints would be placed on future site use.	Implementable.
D. Source Control/Natural Recovery			
I. Source Control	Source Control	Constraints/controls placed on point sources to reduce discharge of PCBs to the site.	Implementable; already in place.
II. Natural Recovery	Burial	Natural recovery from on-going process of clean material deposition over PCB-containing material.	Potentially implementable.
	Biodegradation	Naturally occurring PCB degradation by microorganisms present at the site in an aerobic or anaerobic environment.	Potentially implementable.
E. In-Place Containment			
I. Capping/Cover	Engineered Cap/Cover	Placement of a cap/cover which may consist of a single layer of material or multiple layers (e.g., sand, gravel, cobbles, geotextile) to isolate constituents from biota and mitigate chemical flux.	Potentially implementable.

(See Note on Page 11)

TABLE 2 (CONTINUED)

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

PRELIMINARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Description	Preliminary Assessment
E. In-Place Containment (continued)			
I. Capping/Cover (continued)	Asphalt Cap/Cover	Application of an asphalt or concrete layer over materials.	Not retained. Most suited to high-traffic areas; the impacted portions of the site are not currently high traffic areas, and there are no plans to convert these areas of the site into high-traffic areas.
	Multi-Media Cap/Cover	Clay and synthetic membrane covered by soil over materials.	Not practical for submerged sediment.
II. Hydraulic Modification	Enhanced Sedimentation	Construction/demolition of dams or similar structures to alter the rate of sedimentation.	Not retained. Not applicable to this site; no longer flow through conditions.
F. Material Treatment			
I. Biodegradation, In-Situ	Enhanced	Addition of nutrients (e.g., oxygen, minerals, etc.) or cultured microorganisms to materials to facilitate or improve the rate of natural biodegradation.	Not retained. Process has not been demonstrated at full-scale with PCBs.
II. Immobilization	In-Situ Stabilization/ Solidification	Chemically immobilize materials by injecting and mixing a stabilization/solidification agent into the in-situ materials.	Not retained. In-situ process not yet sufficiently developed for sediment; PCB distribution/concentration in soils precludes practical use.
	Ex-Situ Stabilization/ Solidification	Removed materials are mixed ex-situ with Portland cement, fly ash, or some other stabilization agent. May be used for dewatering only, or to reduce the mobility of the chemical constituents.	Potentially implementable.

(See Note on Page 11)

TABLE 2 (CONTINUED)

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

PRELIMINARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Description	Preliminary Assessment
F. Material Treatment (continued)			
II. Immobilization (continued)	Maectite (Sevenson Environmental Services)	Process converts leachable materials into mineral crystal species within the soil matrix.	Not retained. Process has not been demonstrated at full-scale with sediment.
III. Extraction, In-Situ	Vacuum	Create vacuum in soil through a well; chemical constituents drawn in and extracted. Sediment would need to be dewatered in place.	Not retained. Not feasible for submerged sediment. Not demonstrated at full scale.
	Steam	Inject steam into soil, so that chemical constituents volatilize and are removed via extraction wells. Sediment would need to be dewatered in place.	Not retained. Not feasible for submerged sediment. Not demonstrated at full scale.
	Liquid	Solvents introduced in soil via injection wells, extraction wells recover solvent and extracted chemical constituents. Sediment would need to be dewatered in place.	Not retained. Not feasible for submerged sediment. Not demonstrated at full scale.
	Thermal Wells	PCB-containing soil is heated; vacuum applied to well; removes vapor phase PCBs. Sediment would need to be dewatered in place.	Not retained. Not feasible for submerged sediment. Not demonstrated at full scale.

(See Note on Page 11)

PRELIMINARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Description	Preliminary Assessment
F. Material Treatment (continued)			
IV. Extraction, Ex-Situ	SOLVENT EXTRACTION		
	Basic Extractive Sludge Treatment (BEST™)	Solvent (having inverse miscibility in water) used to remove PCBs from solids. Materials and solvent extractant are mixed in an extractor, dissolving the organic chemicals. The extracted solution is then placed in a separator, where the chemicals and extractant are separated for treatment and further use.	Not retained. Process has not been developed at full-scale. In addition, pilot-scale tests suggest this process may have difficulty with fine-grained sediment and materials that exhibit a high moisture content.
	Low Energy Extraction Process (META LEEP℠)	Acetone, kerosene, and other solvents are used to extract organic and inorganic chemical constituents from solids.	Not retained. Process has not been demonstrated at full-scale.
	CF Systems® Solvent Extraction Process	Critical fluids and liquefied gases such as carbon dioxide, propane, or other liquid hydrocarbons used at high pressure to separate and extract PCBs from wastewater, sludge, sediment, and soil.	Not retained. Process has not been demonstrated at full-scale.
	Methanol Extraction	Methanol used as a solvent to extract PCBs and other organics from solids.	Not retained. Process has not been demonstrated at full-scale with sediment.
	Terra Kleen Solvent Extraction	Solvent used to extract PCBs and other organics from materials. The solvent is separated from the materials and reused.	Not retained. Process has not been demonstrated at full-scale with sediment.
	Biotherm (former Carver-Greenfield) Process	Oil-soluble organic constituents extracted from sludge, soil, and sediment using a food-grade carrier oil.	Not retained. Process has not been demonstrated at full-scale with sediment.

(See Note on Page 11)

TABLE 2 (CONTINUED)

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

PRELIMINARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Description	Preliminary Assessment
F. Material Treatment (continued)			
IV. Extraction, Ex-Situ (continued)	SOIL WASHING		
	Biogenesis	Soil washing process isolates individual particles and removes the adsorbed chemicals and naturally occurring organic material from fine-grained (silt and sand) sediment.	Not retained. Process has not been demonstrated at full-scale.
	THERMAL DESORPTION		
	Surbec-ART Environmental Inc.	Uses physical separation (soil washing) to remove oversize fractions, recovered clean sand, organic and inorganic fractions are treated with stabilization.	Not retained. Process has not been demonstrated at full-scale.
	Low Temperature Extraction (DAVES)	A low-temperature vapor extraction system utilizing a fluidized bed to remove PCBs from materials.	Not retained. Process has not been demonstrated at full-scale with sediment. May require stabilization of treated solids for metals and result in emission of the more volatile inorganic constituents.
	X*TRAX™	Solids heated in the presence of nitrogen, followed by PCB extraction.	Not retained. Emissions data collected during full-scale operations of similar thermal processes have indicated that emissions may be an issue. May require stabilization of treated solids for metals and result in emission of the more volatile inorganic constituents.

(See Note on Page 11)

TABLE 2 (CONTINUED)

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

PRELIMINARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Description	Preliminary Assessment
F. Material Treatment (continued)			
V. Destruction, In-Situ	Electrochemical Geo-Oxidation (Weiss Associates)	Proprietary technology in which an array of single steel piles is installed and low current is applied to stimulate oxidation of organics.	Not retained. Process has not been demonstrated full-scale.
	Vitrification (Geosafe)	Uses an electric current to melt soil or other earthen materials at extremely high temperatures (2,900 to 3,650 degrees F). Inorganic compounds are incorporated into the vitrified glass and crystalline mass and organic pollutants are destroyed by pyrolysis. In-situ applications use graphite electrodes to heat soil.	Not retained. Not feasible for in-situ sediment without significant dewatering. No large scale in-situ sediment projects have been implemented to date. Difficulties have been encountered with off-gas emissions while treating wet sediment (ex-situ).
VI. Destruction, Ex-Situ	ULTRAVIOLET (UV) DESTRUCTION		
	UV/Ozone/ Ultrasonics	Ultrasonics used to extract PCBs from solids. PCBs destroyed by subsequent UV/ozone treatment.	Not retained. Process still being developed.
	Ozonation	Ozone used to decompose PCBs in conjunction with UV radiation.	Not retained. Destruction efficiency is reported to be too low for sediment matrix.
	Radiant Energy	UV light energy, combined with a reducing agent, used to dechlorinate PCBs.	Not retained. Process has not been successfully implemented full scale.

(See Note on Page 11)

PRELIMINARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Description	Preliminary Assessment
F. Material Treatment (continued)			
VI. Destruction, Ex-Situ (continued)	THERMAL DESTRUCTION		
	Incineration	Sediment thermally treated in a fluidized bed, rotary kiln, or infrared incinerator, all of which would require TSCA permitting.	Not retained. Process would require bench- and pilot-scale testing; and there have been prior public concerns associated with emissions.
	Glass Furnace Technology (Minergy Corp.)	Sediment treated in a Holoflite dryer followed by a melting oven. A glass aggregate is produced that can be used in the construction fill market.	Not retained. Process has not been demonstrated full-scale.
	Pyrolysis	Chemical decomposition is induced in organic materials by heat in the absence of oxygen. Organic materials are transformed into gaseous components and a solid residue (coke) containing fixed carbon and ash.	Not retained. Not technically feasible; higher moisture content materials impact the treatment process. Target chemical groups are SVOCs and pesticides. Limited performance data are available for pyrolytic systems treating hazardous wastes containing PCBs.

(See Note on Page 11)

TABLE 2 (CONTINUED)

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

PRELIMINARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Description	Preliminary Assessment
F. Material Treatment (continued)			
VI. Destruction, Ex-Situ (continued)	THERMAL DESTRUCTION		
	Westinghouse Plasma Corp. – Harbor Sediment Treatment (formerly Plasma Arc)	PCBs thermally destroyed at very high temperatures.	Not retained. Process has not been demonstrated at full-scale for PCBs. Requires a significant level of energy and emission controls as the water is transformed into steam and treated as a vapor phase waste stream.
	Cement Lock (IGT)	Process uses a thermochemical manufacturing, which converts removed sediments, mixed with specific modifiers into materials that can be used as a cement base.	Not retained. Process has not been demonstrated at full-scale.
	LOW TEMPERATURE THERMAL DESTRUCTION		
	Wet Air Oxidation	A proprietary process that uses special catalysts and relatively low temperature and high pressure to decompose PCBs.	Not retained. Destruction efficiency is reported to be low for sediments.
	Supercritical Water Oxidation	Temperature and pressure of supercritical water dissolve materials that are oxidized into carbon dioxide, water, and salts.	Not retained. Not technically feasible at the site due to sediment particle size.
	DECHLORINATION		
	Base-Catalyzed Dechlorination (BCD)	Chlorine is stripped off PCB molecules using sodium bicarbonate in a rotary reactor.	Not retained. Process has not been demonstrated at full-scale with sediment.

(See Note on Page 11)

TABLE 2 (CONTINUED)

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

PRELIMINARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Description	Preliminary Assessment
F. Material Treatment (continued)			
VI. Destruction, Ex-Situ (continued)	DECHLORINATION		
	Reduction (Eco Logic)	Various chemical agents (e.g., sodium borohydride, sulfur dioxide) used to destroy PCBs through gas phase reduction. Chemical constituents are transferred to the gas phase through volatilization (thermal desorption unit).	Not retained. Process has not been demonstrated at full-scale with sediment.
	Sodium-Based Reactions (NaPEG)	PCBs broken down into oxygenated organics, sodium chloride (salt), and biodegradable glycols.	Not retained. Not potentially implementable; water destroys the reagent or interferes with its actions; thus, the process would require excessive drying of sediment.
G. Material Removal			
I. Dredging	Mechanical	Removal of materials by directly applying mechanical force to dislodge and excavate.	Potentially implementable.
	Hydraulic	Removal and transportation of bottom sediment in a liquid slurry form using hydraulic pumps (e.g., horizontal auger, Soli-Flo's Eddy Pump®, cutterhead dredge).	Potentially implementable.
II. Excavation	Mechanical	Removal of materials by directly applying mechanical force to dislodge and excavate.	Potentially implementable.
H. Material Dewatering			
I. Filtration	Plate and Frame Filter Press	Materials are pumped into cavities formed by a series of plates covered by a filter cloth. Liquids are forced through filter cloth and dewatered solids collected in the filter cavities.	Potentially implementable.

(See Note on Page 11)

TABLE 2 (CONTINUED)

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

PRELIMINARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Description	Preliminary Assessment
H. Material Dewatering (continued)			
I. Filtration	Belt Filter Press	Materials drop onto a perforated belt where gravity drainage takes place. Thickened solids are pressed between a series of rollers to further dewater solids.	Potentially implementable.
II. Centrifuge	Solid-Bowl	Materials are fed through a central pipe that sprays into a rotating bowl. Centrate discharges out the large end of the bowl and solids are removed from tapered end of the bowl by means of a screw conveyer.	Potentially implementable.
III. Evaporator	Evaporator	Excess water evaporated from materials.	Potentially implementable.
IV. Hydrocyclone	Hydrocyclone	Materials are fed tangentially into a funnel-shaped unit to facilitate centrifugal forces necessary to separate solids from liquids. Dewatered solids collected and overflow liquid discharged.	Potentially implementable.
V. Gravity Settling	Thickener or Settling Basin	Materials enter thickener and settles into circular tank or settling basin. Materials thicken and consolidate at the bottom of the tank. Pretreatment with chemical addition used to enhance settleability.	Potentially implementable.
I. Material Disposal			
I. On-Site Disposal	Confined Disposal Facility	Materials or residuals placed in disposal facility consisting of sheet piling and/or earthen dikes within a water body.	Not retained based on time-frame associated with permitting requirements.
	Local Landfill	Use of on-site landfill for disposal of solids.	Not retained based on time-frame associated with permitting requirements.

(See Note on Page 11)

TABLE 2 (CONTINUED)

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

PRELIMINARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Description	Preliminary Assessment
I. Material Disposal (continued)			
II. Off-Site Disposal	TSCA Landfill	Disposal of solids or residuals in existing TSCA permitted landfill.	Potentially implementable.
	Solid Waste Landfill	Disposal of solids or residuals (containing less than 50 ppm PCBs) in existing off-site permitted solid waste landfill.	Potentially implementable.
J. Residuals Management			
I. Water Treatment	Activated Carbon Adsorption	PCBs in aqueous phase are removed with granular activated carbon.	Potentially implementable.
	Distillation	PCBs separated from aqueous stream by vaporization and condensation.	Not retained. Likely not applicable for PCBs in aqueous stream.
	Filtration	PCBs filtered out through various media (i.e., sand) from the liquid stream.	Potentially implementable.

Note:

1 This screening analysis is based on technical implementability without consideration of cost. Remedial technologies that have not been demonstrated full-scale were not retained for further analysis; although this does not preclude their potential use during remedial design. Shaded process options have been retained for further screening on Table 3.

(See Note on Page 11)

TABLE 3

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

SECONDARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Effectiveness	Technical/Administrative Feasibility
A. No Action			
	---	Remedial action objectives may eventually be met through ongoing naturally occurring processes (including deposition, dechlorination, degradation).	Feasible; with no permits/ equipment required.
B. Monitoring			
	Site-Wide Monitoring	Periodic visual observations and/or field sampling to monitor site conditions. Remedial action objectives may eventually be met through ongoing naturally occurring processes.	Feasible; with required services readily available.
C. Institutional/Engineering Controls			
	Access Restrictions	Deters public (e.g., by signs, fencing) from accessing the site. Expected to reduce the potential for exposure to constituents of interest. This option alone would not meet the remedial action objectives (e.g., mitigate potential exposure to biota). However, access restrictions could be used in conjunction with other remedial technologies to achieve the remedial action objectives.	Feasible.
	Deed Restrictions	Constraints placed on future site use to reduce to the potential for exposure to constituents of interest. This option alone would not meet the remedial action objectives (e.g., mitigate potential exposure to biota). However, deed restrictions could be used in conjunction with other remedial technologies to achieve the remedial action objectives.	Feasible.

(See Note on Page 6)

TABLE 3 (CONTINUED)

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

SECONDARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Effectiveness	Technical/Administrative Feasibility
D. Source Control/Natural Recovery			
I. Source Control	Source Control	Decreases PCB influx to the site, thus enhancing natural recovery and reducing the time to reach the remedial action objectives.	Onsite source controls have already been implemented.
II. Natural Recovery	Burial	Reduces potential PCB flux through natural attenuation processes, including isolating impacted materials through deposition/mixing. Process would be slow since flow through OU-1 has largely been eliminated and flow through OU-3 can be seasonally intermittent.	Feasible; natural process. No permits, specialized equipment or personnel are necessary. Not retained because viability is questionable due to reduced solids loading to the ponds. Additionally, NYSDEC is unlikely to accept this as a remedy component.
	Biodegradation	Biodegradation breaks down PCBs in soil and sediment, resulting in a reduced toxicity. Together with other natural processes, this process could result in eventual reduction in PCB bioavailability and transport.	Feasible; natural process. No permits, specialized equipment or personnel are necessary. Not retained because this is unlikely to occur in a reasonable time-frame. Additionally, NYSDEC is unlikely to accept this as remedy component.
E. In-Place Containment			
I. Capping/Cover	Engineered Cap/Cover	Sediments – Effective for reducing PCB flux to the water column and availability of PCBs to wildlife. Soils – Effective for reducing infiltration of precipitation/surface water and effective for reducing potential exposure to impacted soils. Long-term effectiveness requires ongoing maintenance and monitoring. Not suitable for high-traffic areas.	Feasible. Equipment, materials and personnel are commercially available.

(See Note on Page 6)

TABLE 3 (CONTINUED)

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

SECONDARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Effectiveness	Technical/Administrative Feasibility
E. In-Place Containment (continued)			
I. Capping/Cover (continued)	Multi-Media Cap/Cover	Sediments – Not effective. Soils – Effective for reducing infiltration of precipitation/surface water and effective for reducing potential exposure to impacted soils. Long-term effectiveness requires ongoing maintenance and monitoring. Not suitable for high-traffic areas.	Not retained for evaluation because a soil cover was selected as representative capping/cover technology. Final remedial design will include covering, as appropriate.
F. Material Treatment			
I. Immobilization	Ex-Situ Stabilization/ Solidification	Reduces mobility of PCBs but increases disposal volume. Does not meet remedial action objectives alone, but may be considered in conjunction with other technologies. Process is commonly used to reduce free moisture for disposal purposes.	Feasible.
G. Material Removal			
I. Dredging	Hydraulic	Effective at removing sediments; requires adequate water depths; debris interferes with effectiveness; generates significant volume of water.	Feasible, but likely not most appropriate technology for small portions of the site with shallow draft and excessive debris. Permits not required under CERCLA, but substantive requirements would need to be met. Not retained for evaluation.

(See Note on Page 6)

TABLE 3 (CONTINUED)

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

SECONDARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Effectiveness	Technical/Administrative Feasibility
G. Material Removal (continued)			
II. Excavation	Mechanical	May meet remedial action objective, depending upon post-removal residual PCB concentrations achieved and degree of PCB release during removal, or whether a cover is placed following excavation. May cause the release of PCBs during remedial activities. Vegetation, topsoil, and benthic communities would be disturbed. Risk of release and potential exposures increased due to additional material transport, handling, and processing.	Feasible. Permits not required under CERCLA, but substantive requirements would need to be met.
H. Materials Dewatering			
I. Filtration	Plate and Frame Filter Press	Does not meet remedial action objectives on its own, but may be necessary for removed materials that are high in water content.	Not retained for evaluation because ex-situ stabilization/solidification was selected as representative dewatering technology. Final remedial design will include materials dewatering, as appropriate.
	Belt Filter Press	Does not meet remedial action objectives on its own, but may be necessary for removed materials that are high in water content. A site-specific study would be required to assess treatment effectiveness.	Not retained for evaluation because ex-situ stabilization/solidification was selected as representative dewatering technology. Final remedial design will include materials dewatering, as appropriate.
II. Centrifuge	Solid-Bowl	Does not meet remedial action objectives on its own, but may be necessary for removed materials that are high in water content. Historically, process has required frequent maintenance and often experienced operational difficulties. A site-specific study would be required to assess treatment effectiveness.	Not retained for evaluation because ex-situ stabilization/solidification was selected as representative dewatering technology. Final remedial design will include materials dewatering, as appropriate.

(See Note on Page 6)

TABLE 3 (CONTINUED)

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

SECONDARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Effectiveness	Technical/Administrative Feasibility
H. Materials Dewatering (continued)			
III. Evaporator	Evaporator	Does not meet remedial action objectives on its own, but may be necessary for removed materials that are high in water content. A site-specific study would be required to assess treatment effectiveness.	Not retained for evaluation because ex-situ stabilization/solidification was selected as representative dewatering technology. Final remedial design will include materials dewatering, as appropriate.
IV. Hydrocyclone	Hydrocyclone	Does not meet remedial action objectives on its own, but may be necessary for removed materials that are high in water content. A site-specific study would be required to assess treatment effectiveness.	Not retained for evaluation because ex-situ stabilization/solidification was selected as representative dewatering technology. Final remedial design will include materials dewatering, as appropriate.
V. Gravity Settling	Thickener or Settling Basin	Does not meet remedial action objectives on its own, but may be necessary for removed materials that are high in water content. A site-specific study would be required to assess treatment effectiveness.	Not retained for evaluation because ex-situ stabilization/solidification was selected as representative dewatering technology. Final remedial design will include materials dewatering, as appropriate.
I. Material Disposal			
I. Off-Site Disposal	TSCA Landfill	Does not meet remedial action objective on its own, but may be used in conjunction with other technologies to form remedial actions (including removal, dewatering, disposal, residuals management) that would be expected to meet remedial action objectives.	Feasible. Depends upon landfill location, availability, and capacity. Significant haul distances would increase the risk of exposure and traffic accidents.

(See Note on Page 6)

TABLE 3 (CONTINUED)

FOCUSED FEASIBILITY STUDY REPORT
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

SECONDARY SCREENING OF POTENTIAL PCB-CONTAINING SOIL AND SEDIMENT REMEDIAL TECHNOLOGIES[1]

General Response Action/ Remedial Technology	Process Option	Effectiveness	Technical/Administrative Feasibility
I. Material Disposal			
I. Off-Site Disposal (continued)	Solid Waste Landfill	Does not meet remedial action objective on its own, but may be used in conjunction with other technologies to form remedial actions (e.g., removal, dewatering, disposal, residuals management) that would be expected to meet remedial action objectives.	Feasible for soil/sediment containing PCBs at concentrations below 50 ppm. Depends upon landfill location, availability, and capacity. Significant haul distances would increase the risk of exposure and traffic accidents.
J. Residuals Management			
I. Water Treatment	Activated Carbon Adsorption	Does not meet remedial action objective on its own, but may be used in conjunction with other technologies to form remedial actions (e.g., removal, dewatering, disposal, residuals management) that would be expected to meet remedial action objectives. Could be applied to water generated during materials dewatering.	Feasible. Spent carbon would require proper disposal. Final remedial design will include water treatment, as appropriate.
	Filtration	Does not meet remedial action objective on its own, but may be used in conjunction with other technologies to form remedial actions (e.g., removal, dewatering, disposal, residuals management) that would be expected to meet remedial action objectives. Could be applied to water generated during materials dewatering.	Feasible. Filter media would require proper disposal. Final remedial design will include solids removal, as appropriate.

Note:

1 This screening analysis was conducted to select one representative remedial technology process for each remedial technology category. This does not preclude the potential use of other remedial technology processes during remedial design. Shaded process options have been retained for evaluation in the Focused Feasibility Study.

(See Note on Page 6)

TABLE 4

FOCUSED FEASIBILITY STUDY
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

COST ESTIMATE - REMEDIAL ALTERNATIVE 2

Item	Component Description	Quantity	Unit	Unit Price ($)	Cost ($)
Capital Costs					
1.	Mobilization/Demobilization	5	%	$239,842	$239,842
2.	Clearing, Grubbing, and Site Preparation	21.5	Acre	$10,000	$215,000
3.	Erosion Control - Silt Fence	16,000	LF	$4	$64,000
4.	Construct/Establish Process Area/Access Roads	1	LS	$350,000	$350,000
5.	Dewatering				
	- Pond/Marsh Areas	70	Day	$2,000	$140,000
	- Tributary 63 Segment B/C	4,500	LF	$25	$112,500
6.	Sediment Removal				
	- North Pond No. 1	2,033	CY	$30	$60,990
	- North Pond No. 2	2,382	CY	$30	$71,460
	- North Marsh 1	3,603	CY	$25	$90,075
	- North Marsh 2	1,604	CY	$25	$40,100
	- North Marsh 3	402	CY	$20	$8,040
	- South Pond	219	CY	$50	$10,950
	- South Marsh	2,200	CY	$25	$55,000
	- Tributary 63 Segment B/C	1,475	CY	$50	$73,750
7.	Processing/Stabilization of Excavated Sediments				
	- North Pond and related Marsh Areas	10,024	CY	$40	$400,960
	- South Pond and related Marsh Area	3,894	CY	$20	$77,880
8.	Upland Soil Removal				
	- North Pond No. 1	394	CY	$20	$7,880
	- North Pond No. 2	3,497	CY	$20	$69,940
	- North Marsh 1	6,027	CY	$20	$120,540
	- North Marsh 2	4,823	CY	$20	$96,460
	- North Marsh 3	6,748	CY	$20	$134,960
	-Perimeter Soils	857	CY	$20	$17,140
9.	Load Excavated Soils/Sediments	39,048	CY	$6	$234,286
10.	Water Treatment	556,720	gallon	$0.50	$278,360
11.	Cap/Backfill Placement				
	- Sand Backfill	27,772	CY	$40	$1,110,880
	- Gravel/Topsoil Cap	7,852	CY	$45	$353,340
	- Geotextile	13,494	SY	$25	$337,343
12.	Miscellaneous Activities	1	LS	$50,000	$50,000
13.	Restoration Activities	1	LS	$215,000	$215,000
				Subtotal:	$5,036,675
				Regulatory Oversight (1%):	$50,367
				Administration and Engineering (10%):	$503,667
				Contingency (20%):	$1,007,335
				Total Capital Costs:	$6,598,044
Transportation and Disposal Costs					
14.	Non-TSCA	25,270	Ton	$60	$1,516,224
15.	TSCA	33,301	Ton	$175	$5,827,675
Monitoring Costs					
16.	Groundwater Monitoring	1	LS	$65,634	$65,634
17.	Cap Maintenance and Monitoring	1	LS	$76,863	$76,863
				Total Estimated Cost:	**$14,084,440**

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TABLE 4

FOCUSED FEASIBILITY STUDY
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

COST ESTIMATE - REMEDIAL ALTERNATIVE 2

General Comments:

- All costs include material and labor, unless otherwise noted.
- Unit costs are in 2005 dollars and are estimated from vendors, professional judgment, experience from other similar projects, and standard estimating guides (e.g., Means Site Work and Landscape Cost Data).
- Costs based on current site information and project understanding.
- Monitoring costs are presented as a present worth cost assuming a 5% discount factor.
- A 5% allowance (based on capital costs) is made for mobilization/demobilization activities.
- A 1% allowance (based on capital costs) is included for regulatory oversight.
- A 10% allowance (based on capital costs) is made for engineering fees and administration.
- A 20% contingency allowance (based on capital costs) is included to provide for unforeseen circumstances or variability in estimated areas, volumes, labor and material costs.
- Potential natural resource damage (NRD) costs have not been included in this preliminary cost estimate. The applicability and magnitude of potential NRD issues can not be adequately defined at this time.
- Remedial design and permitting costs have not been included in this preliminary cost estimate.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual project cost. Utilization of this cost estimate information beyond the stated purpose is not recommended. BBL is not licensed to provide financial or legal consulting services; as such, this cost estimate information is not intended to be utilized for complying with financial reporting requirements associated with liability reserves.

Notes and Assumptions:

1. Mobilization/demobilization includes mobilization and demobilization of labor, equipment, and materials necessary to excavate and backfill the targeted areas.
2. Clearing, grubbing and site preparation includes clearing and grubbing of trees/understory to facilitate access for equipment and materials associated with construction-related activities. It has been assumed that approximately 6 acres will be cleared and grubbed to construct a processing/stabilizing area and access roads, approximately 13 acres for the North Ponds area, and that approximately 2.5 acres will be cleared and grubbed to facilitate removal along Segment B/C of Tributary 63 (approximately 4800 linear feet * 20 feet wide * 1 side).
3. Silt fence is anticipated to be placed around the immediate area where construction-related activities are being performed to control surface water runoff during removal activities. It has been assumed that a maximum of 2,000 linear feet will be used at one time and will be replaced up to 4 times during the duration of construction activities (i.e., 2,000 lf plus 4 * 2,000 lf or 10,000 lf total) for the North Pond and up to 2 times during the duration of construction activities for the South Pond, South Marsh, and Tributary 63. Cost associated with removal and disposal are included within Item 13 (Miscellaneous Activities).
4. Construct/establish process area/access roads includes preparation of areas for access roads, staging/handling areas, construction trailers, dewatering and stabilizing areas, pug mill, and water treatment facility. It has been assumed that a 20-foot wide strip will be cleared along the access roads. Access road construction to consist of placement of a geotextile followed by 6-inches of gravel to create a 10-foot wide road to obtain access for removal activities. For OU-1, the South Pond, and South Marsh, water treatment facility and pug mill to be placed on a constructed asphalt pad. For Tributary 63, gravity dewatering is assumed to be appropriate. Access road materials are assumed to be reused, as appropriate. Cost associated with removal and disposal of access roads are included within Item 13 (Miscellaneous Activities).

TABLE 4

FOCUSED FEASIBILITY STUDY
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

COST ESTIMATE - REMEDIAL ALTERNATIVE 2

5. It has been assumed that the pond/marsh areas will be dewatered prior to excavation and the water will be directed to a pond/marsh that has not yet been excavated. For example, prior to excavation of North Pond No. 1, its water may be pumped into North Pond No. 2. For the South Pond, it has been assumed that water from initial dewatering will be directed to the tributary to an appropriate depth approaching the sediments then will be directed to the South Marsh. For the ponds, it has been assumed that the depth of water is 3 feet and that continuous dewatering will be necessary during the duration of removal activities, thus a production rate of 100 cy per day has be utilized to determine total time required for dewatering. For North Marsh Nos. 1 and 2, it has been assumed that the depth of water is 2 feet with initial dewatering required and that continuous dewatering will not be necessary. For North Marsh No. 3 and South Marsh, it has been assumed that no pumping will be required. For Tributary 63, it has been assumed that activities will occur via pump bypass.
6. Sediment removal assumed to be performed by mechanical removal in the dry for the ponds via continuous dewatering, in the dry for the marsh following initial dewatering, and in the dry for Tributary 63 using bypass pumping and typical sediment removal equipment (i.e., backhoe). Unit prices for sediment removal activities have been adjusted, as appropriate, in consideration of site conditions. For example, due to the nature of removal within the pond areas (North Pond 1, North Pond 2, and the South Pond), removal volumes have been increased 25% to account for sloughing of adjacent materials during removal activities.
7. Processing/stabilization of excavated materials assumes that a pug mill will be used to process removed materials from the North Pond area. For the South Pond area, removed materials will be gravity drained and then stabilized. It is assumed that 20% stabilizing agent by weight would be added to stabilize materials to meet transportation/disposal requirements.
8. Soil removal assumed to be performed using conventional equipment. Costs are included to transfer the soil to an appropriate lined material staging area.
9. This cost is associated with loading excavated sediments from the stabilization area and soils from a material staging area to an appropriate truck for transportation and disposal.
10. Water treatment costs are for the operation of the water treatment facility to treat water generated during removal, dewatering, and decontamination activities, with discharge of the treated water to surface water. It is assumed that mechanical removal in the wet would generate approximately 20% water by in-situ sediment volume (or ~ 40 gallons of water generated per 1 cy of in-situ sediment).
11. Sand backfill placement assumes the North Ponds and Marshes will be backfilled with 1-foot of sand (regardless of the excavation depth), and the South Pond, South Marsh and Tributary 63 will be backfilled to generally match the pre-excavation lines and grades. Areas with only subsurface removal will use the associated surface soil as backfill. Placement of a cap is assumed to consist of a geotextile fabric, 6-inches of run-of-bank gravel, and 6-inches of topsoil. Costs assumed to include purchase, haul and placement of material. Geotextile will be placed within excavated sediment areas in North Pond 1, North Pond 2, and prior to placing the soil barrier layer. For geotextile, 10% has been added to the total surface area to account for overlapping during placement.
12. Miscellaneous activities are based on disposal of miscellaneous materials (e.g., used silt fence, personal protective equipment, disposable equipment, access roads) at a facility permitted to accept the waste.
13. Restoration activities include the placement of topsoil and vegetation, as appropriate, to restore areas impaired as a result of construction-related activities. Also, it is assumed that restoration of non-wetted areas will be performed at a cost of approximately $10,000 per acre.
14. The following assumptions have been made with regards to transportation and disposal of processed sediments: 1) disposal volume includes removed in-situ sediment plus stabilizing agent at 20% by volume; 2) soil and sediment exhibiting in-situ PCB concentrations above 50 ppm will be handled and transported for offsite disposal as a TSCA-regulated waste; and 3) TSCA-regulated sediment and soil removed will be disposed at a cost of $175/ton (assumed 1.5 tons/cy).

TABLE 4

FOCUSED FEASIBILITY STUDY
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

COST ESTIMATE - REMEDIAL ALTERNATIVE 2

15. The following assumptions have been made with regards to transportation and disposal of processed sediments: 1) disposal volume includes removed in-situ sediment plus stabilizing agent at 20% by volume; and 2) Non-TSCA-regulated sediment and soil will be disposed at a cost of $60/ton (assumed 1.5 tons/cy).
16. Groundwater monitoring assumes sampling for PCBs at up to 8 locations every year for 10 years. The total annual cost has been estimated to be $8,500.
17. Cap maintenance and monitoring assumes visual inspections of the cap every year for 30 years. The total annual cost has been estimated to be $5,000.

TABLE 5

FOCUSED FEASIBILITY STUDY
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

COST ESTIMATE - REMEDIAL ALTERNATIVE 3

Item	Component Description	Quantity	Unit	Unit Price ($)	Cost ($)
Capital Costs					
1.	Mobilization/Demobilization	5	%	$299,342	$299,342
2.	Clearing, Grubbing, and Site Preparation	21.5	Acre	$10,000	$215,000
3.	Erosion Control - Silt Fence	16,000	LF	$4	$64,000
4.	Construct/Establish Process Area/Access Roads	1	LS	$350,000	$350,000
5.	Dewatering				
	- Pond/Marsh Areas	140	Day	$2,000	$280,000
	- Tributary 63 Segment B/C	4,500	LF	$25	$112,500
6.	Sediment Removal				
	- North Pond No. 1	4,107	CY	$30	$123,210
	- North Pond No. 2	6,317	CY	$30	$189,510
	- North Marsh 1	3,612	CY	$25	$90,300
	- North Marsh 2	1,604	CY	$25	$40,100
	- North Marsh 3	402	CY	$20	$8,040
	- South Pond	219	CY	$50	$10,950
	- South Marsh	2,200	CY	$25	$55,000
	- Tributary 63 Segment B/C	1,475	CY	$50	$73,750
7.	Sheeting to Support Sediment Removal				
	- North Pond No. 1	4,740	SF	$40	$189,600
	- North Pond No. 2	7,455	SF	$40	$298,200
8.	Processing/Stabilization of Excavated Sediments				
	- North Pond and related Marsh Areas	16,042	CY	$40	$641,680
	- South Pond and related Marsh Area	3,894	CY	$20	$77,880
9.	Upland Soil Removal				
	- North Pond No. 1	394	CY	$20	$7,880
	- North Pond No. 2	3,497	CY	$20	$69,940
	- North Marsh 1	6,027	CY	$20	$120,540
	- North Marsh 2	6,616	CY	$20	$132,320
	- North Marsh 3	8,442	CY	$20	$168,840
	-Perimeter Soils	857	CY	$20	$17,140
10.	Load Excavated Soils/Sediments	49,756	CY	$6	$298,537
11.	Water Treatment	797,440	gallon	$0.50	$398,720
12.	Cap/Backfill Placement				
	- Sand Backfill	31,258	CY	$40	$1,250,320
	- Gravel/Topsoil Cap	4,365	CY	$45	$196,425
	- Geotextile	9,658	SY	$25	$241,450
13.	Miscellaneous Activities	1	LS	$50,000	$50,000
14.	Restoration Activities	1	LS	$215,000	$215,000
				Subtotal:	$6,286,174
				Regulatory Oversight (1%):	$62,862
				Administration and Engineering (10%):	$628,617
				Contingency (20%):	$1,257,235
				Total Capital Costs:	$8,234,888
Transportation and Disposal Costs					
15.	Non-TSCA	34,446	Ton	$60	$2,066,778
16.	TSCA	40,188	Ton	$175	$7,032,900
Monitoring Costs					
17.	Groundwater Monitoring	1	LS	$65,634	$65,634
18.	Cap Maintenance and Monitoring	1	LS	$76,863	$76,863
				Total Estimated Cost:	**$17,477,063**

TABLE 5

FOCUSED FEASIBILITY STUDY
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

COST ESTIMATE - REMEDIAL ALTERNATIVE 3

General Comments:

- All costs include material and labor, unless otherwise noted.
- Unit costs are in 2005 dollars and are estimated from vendors, professional judgment, experience from other similar projects, and standard estimating guides (e.g., Means Site Work and Landscape Cost Data).
- Costs based on current site information and project understanding.
- Monitoring costs are presented as a present worth cost assuming a 5% discount factor.
- A 5% allowance (based on capital costs) is made for mobilization/demobilization activities.
- A 1% allowance (based on capital costs) is included for regulatory oversight.
- A 10% allowance (based on capital costs) is made for engineering fees and administration.
- A 20% contingency allowance (based on capital costs) is included to provide for unforeseen circumstances or variability in estimated areas, volumes, labor and material costs.
- Potential natural resource damage (NRD) costs have not been included in this preliminary cost estimate. The applicability and magnitude of potential NRD issues can not be adequately defined at this time.
- Remedial design and permitting costs have not been included in this preliminary cost estimate.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual project cost. Utilization of this cost estimate information beyond the stated purpose is not recommended. BBL is not licensed to provide financial or legal consulting services; as such, this cost estimate information is not intended to be utilized for complying with financial reporting requirements associated with liability reserves.

Notes and Assumptions:

1. Mobilization/demobilization includes mobilization and demobilization of labor, equipment, and materials necessary to excavate and backfill the targeted areas.
2. Clearing, grubbing and site preparation includes clearing and grubbing of trees/understory to facilitate access for equipment and materials associated with construction-related activities. It has been assumed that approximately 6 acres will be cleared and grubbed to construct a processing/stabilizing area and access roads, approximately 13 acres for the North Ponds area, and that approximately 2.5 acres will be cleared and grubbed to facilitate removal along Segment B/C of Tributary 63 (approximately 4800 linear feet * 20 feet wide * 1 side).
3. Silt fence is anticipated to be placed around the immediate area where construction-related activities are being performed to control surface water runoff during removal activities. It has been assumed that a maximum of 2,000 linear feet will be used at one time and will be replaced up to 4 times during the duration of construction activities (i.e., 2,000 lf plus 4 * 2,000 lf or 10,000 lf total) for the North Pond and up to 2 times during the duration of construction activities for the South Pond, South Marsh, and Tributary 63. Cost associated with removal and disposal are included within Item 13 (Miscellaneous Activities).
4. Construct/establish process area/access roads includes preparation of areas for access roads, staging/handling areas, construction trailers, dewatering and stabilizing areas, pug mill, and water treatment facility. It has been assumed that a 20-foot wide strip will be cleared along the access roads. Access road construction to consist of placement of a geotextile followed by 6-inches of gravel to create a 10-foot wide road to obtain access for removal activities. For OU-1, the South Pond, and South Marsh, water treatment facility and pug mill to be placed on a constructed asphalt pad. For Tributary 63, gravity dewatering is assumed to be appropriate. Access road materials are assumed to be reused, as appropriate. Cost associated with removal and disposal of access roads are included within Item 13 (Miscellaneous Activities).

TABLE 5

FOCUSED FEASIBILITY STUDY
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

COST ESTIMATE - REMEDIAL ALTERNATIVE 3

5. It has been assumed that the pond/marsh areas will be dewatered prior to excavation and the water will be directed to a pond/marsh that has not yet been excavated. For example, prior to excavation of North Pond No. 1, its water may be pumped into North Pond No. 2. For the South Pond, it has been assumed that water from initial dewatering will be directed to the tributary to an appropriate depth approaching the sediments then will be directed to the South Marsh. For the ponds, it has been assumed that the depth of water is 3 feet and that continuous dewatering will be necessary during the duration of removal activities, thus a production rate of 100 cy per day has be utilized to determine total time required for dewatering. For North Marsh Nos. 1 and 2, it has been assumed that the depth of water is 2 feet with initial dewatering required and that continuous dewatering will not be necessary. For North Marsh No. 3 and South Marsh, it has been assumed that no pumping will be required. For Tributary 63, it has been assumed that activities will occur via pump bypass.
6. Sediment removal assumed to be performed by mechanical removal in the dry for the ponds via continuous dewatering, in the dry for the marsh following initial dewatering, and in the dry for Tributary 63 using bypass pumping and typical sediment removal equipment (i.e., backhoe). Unit prices for sediment removal activities have been adjusted, as appropriate, in consideration of site conditions. For example, due to the nature of removal within the pond areas (North Pond 1, North Pond 2, and the South Pond), removal volumes have been increased 25% to account for sloughing of adjacent materials during removal activities.
7. Due to the depth of removal of sediment in North Pond No. 1 and North Pond No. 2 (i.e., up to 5 feet), sheeting is anticipated to be used to support a portion of deep sediment removal.
8. Processing/stabilization of excavated materials assumes that a pug mill will be used to process removed materials from the North Pond area. For the South Pond area, removed materials will be gravity drained and then stabilized. It is assumed that 20% stabilizing agent by weight would be added to stabilize materials to meet transportation/disposal requirements.
9. Soil removal assumed to be performed using conventional equipment. Costs are included to transfer the soil to an appropriate lined material staging area.
10. This cost is associated with loading excavated sediments from the stabilization area and soils from a material staging area to an appropriate truck for transportation and disposal.
11. Water treatment costs are for the operation of the water treatment facility to treat water generated during removal, dewatering, and decontamination activities, with discharge of the treated water to surface water. It is assumed that mechanical removal in the wet would generate approximately 20% water by in-situ sediment volume (or ~ 40 gallons of water generated per 1 cy of in-situ sediment).
12. Sand backfill placement assumes the North Ponds and Marshes will be backfilled with 1-foot of sand (regardless of the excavation depth), and the South Pond, South Marsh and Tributary 63 will be backfilled to generally match the pre-excavation lines and grades. Areas with only subsurface removal will use the associated surface soil as backfill. Placement of a cap is assumed to consist of a geotextile fabric, 6-inches of run-of-bank gravel, and 6-inches of topsoil. Costs assumed to include purchase, haul and placement of material. Geotextile will be placed within excavated sediment areas in North Pond 1, North Pond 2, and prior to placing the soil barrier layer. For geotextile, 10% has been added to the total surface area to account for overlapping during placement.
13. Miscellaneous activities are based on disposal of miscellaneous materials (e.g., used silt fence, personal protective equipment, disposable equipment, access roads) at a facility permitted to accept the waste.
14. Restoration activities include the placement of topsoil and vegetation, as appropriate, to restore areas impaired as a result of construction-related activities. Also, it is assumed that restoration of non-wetted areas will be performed at a cost of approximately $10,000 per acre.

TABLE 5

FOCUSED FEASIBILITY STUDY
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

COST ESTIMATE - REMEDIAL ALTERNATIVE 3

15. The following assumptions have been made with regards to transportation and disposal of processed sediments: 1) disposal volume includes removed in-situ sediment plus stabilizing agent at 20% by volume; 2) soil and sediment exhibiting in-situ PCB concentrations above 50 ppm will be handled and transported for offsite disposal as a TSCA-regulated waste; and 3) TSCA-regulated sediment and soil removed will be disposed at a cost of $175/ton (assumed 1.5 tons/cy).
16. The following assumptions have been made with regards to transportation and disposal of processed sediments: 1) disposal volume includes removed in-situ sediment plus stabilizing agent at 20% by volume;; and 2) Non-TSCA-regulated sediment and soil will be disposed at a cost of $60/ton (assumed 1.5 tons/cy).
17. Groundwater monitoring assumes sampling for PCBs at up to 8 locations every year for 10 years. The total annual cost has been estimated to be $8,500.
18. Cap maintenance and monitoring assumes visual inspections of the cap every year for 30 years. The total annual cost has been estimated to be $5,000.

TABLE 6

FOCUSED FEASIBILITY STUDY
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

COST ESTIMATE - REMEDIAL ALTERNATIVE 4

Item	Component Description	Quantity	Unit	Unit Price ($)	Cost ($)
Capital Costs					
1.	Mobilization/Demobilization	5	%	$359,279	$359,279
2.	Clearing, Grubbing, and Site Preparation	21.5	Acre	$10,000	$215,000
3.	Erosion Control - Silt Fence	16,000	LF	$4	$64,000
4.	Construct/Establish Process Area/Access Roads	1	LS	$350,000	$350,000
5.	Dewatering				
	- Pond/Marsh Areas	140	Day	$2,000	$280,000
	- Tributary 63 Segment B/C	4,500	LF	$25	$112,500
6.	Sediment Removal				
	- North Pond No. 1	4,107	CY	$30	$123,210
	- North Pond No. 2	6,745	CY	$30	$202,350
	- North Marsh 1	4,323	CY	$25	$108,075
	- North Marsh 2	1,945	CY	$25	$48,625
	- North Marsh 3	482	CY	$20	$9,640
	- South Pond	219	CY	$50	$10,950
	- South Marsh	2,200	CY	$25	$55,000
	- Tributary 63 Segment B/C	1,475	CY	$50	$73,750
7.	Sheeting to Support Sediment Removal				
	- North Pond No. 1	4,740	SF	$40	$189,600
	- North Pond No. 2	7,455	SF	$40	$298,200
8.	Processing/Stabilization of Excavated Sediments				
	- North Pond and related Marsh Areas	17,602	CY	$40	$704,080
	- South Pond and related Marsh Area	3,894	CY	$20	$77,880
9.	Upland Soil Removal				
	- North Pond No. 1	881	CY	$20	$17,620
	- North Pond No. 2	4,680	CY	$20	$93,600
	- North Marsh 1	7,607	CY	$20	$152,140
	- North Marsh 2	12,228	CY	$20	$244,560
	- North Marsh 3	10,592	CY	$20	$211,840
	-Perimeter Soils	857	CY	$20	$17,140
10.	Load Excavated Soils/Sediments	62,640	CY	$6	$375,841
11.	Water Treatment	859,840	gallon	$0.50	$429,920
12.	Cap/Backfill Placement				
	- Sand Backfill	58,341	CY	$40	$2,333,640
	- Geotextile	4,857	SY	$25	$121,413
13.	Miscellaneous Activities	1	LS	$50,000	$50,000
14.	Restoration Activities	1	LS	$215,000	$215,000
				Subtotal:	$7,544,852
				Regulatory Oversight (1%):	$75,449
				Administration and Engineering (10%):	$754,485
				Contingency (20%):	$1,508,970
				Total Capital Costs:	$9,883,757
Transportation and Disposal Costs					
15.	Non-TSCA	53,772	Ton	$60	$3,226,338
16.	TSCA	40,188	Ton	$175	$7,032,900
Monitoring Costs					
17.	Groundwater Monitoring	1	LS	$65,634	$65,634
				Total Estimated Cost:	**$20,208,629**

TABLE 6

FOCUSED FEASIBILITY STUDY
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

COST ESTIMATE - REMEDIAL ALTERNATIVE 4

General Comments:

- All costs include material and labor, unless otherwise noted.
- Unit costs are in 2005 dollars and are estimated from vendors, professional judgment, experience from other similar projects, and standard estimating guides (e.g., Means Site Work and Landscape Cost Data).
- Costs based on current site information and project understanding.
- Monitoring costs are presented as a present worth cost assuming a 5% discount factor.
- A 5% allowance (based on capital costs) is made for mobilization/demobilization activities.
- A 1% allowance (based on capital costs) is included for regulatory oversight.
- A 10% allowance (based on capital costs) is made for engineering fees and administration.
- A 20% contingency allowance (based on capital costs) is included to provide for unforeseen circumstances or variability in estimated areas, volumes, labor and material costs.
- Potential natural resource damage (NRD) costs have not been included in this preliminary cost estimate. The applicability and magnitude of potential NRD issues can not be adequately defined at this time.
- Remedial design and permitting costs have not been included in this preliminary cost estimate.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual project cost. Utilization of this cost estimate information beyond the stated purpose is not recommended. BBL is not licensed to provide financial or legal consulting services; as such, this cost estimate information is not intended to be utilized for complying with financial reporting requirements associated with liability reserves.

Notes and Assumptions:

1. Mobilization/demobilization includes mobilization and demobilization of labor, equipment, and materials necessary to excavate and backfill the targeted areas.
2. Clearing, grubbing and site preparation includes clearing and grubbing of trees/understory to facilitate access for equipment and materials associated with construction-related activities. It has been assumed that approximately 6 acres will be cleared and grubbed to construct a processing/stabilizing area and access roads, approximately 13 acres for the North Ponds area, and that approximately 2.5 acres will be cleared and grubbed to facilitate removal along Segment B/C of Tributary 63 (approximately 4800 linear feet * 20 feet wide
3. Silt fence is anticipated to be placed around the immediate area where construction-related activities are being performed to control surface water runoff during removal activities. It has been assumed that a maximum of 2,000 linear feet will be used at one time and will be replaced up to 4 times during the duration of construction activities (i.e., 2,000 lf plus 4 * 2,000 lf or 10,000 lf total) for the North Pond and up to 2 times during the duration of construction activities for the South Pond, South Marsh, and Tributary 63. Cost associated with removal and disposal are included within Item 13 (Miscellaneous Activities).

TABLE 6

FOCUSED FEASIBILITY STUDY
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

COST ESTIMATE - REMEDIAL ALTERNATIVE 4

4. Construct/establish process area/access roads includes preparation of areas for access roads, staging/handling areas, construction trailers, dewatering and stabilizing areas, pug mill, and water treatment facility. It has been assumed that a 20-foot wide strip will be cleared along the access roads. Access road construction to consist of placement of a geotextile followed by 6-inches of gravel to create a 10-foot wide road to obtain access for removal activities. For OU-1, the South Pond, and South Marsh, water treatment facility and pug mill to be placed on a constructed asphalt pad. For Tributary 63, gravity dewatering is assumed to be appropriate. Access road materials are assumed to be reused, as appropriate. Cost associated with removal and disposal of access roads are included within Item 13 (Miscellaneous Activities).
5. It has been assumed that the pond/marsh areas will be dewatered prior to excavation and the water will be directed to a pond/marsh that has not yet been excavated. For example, prior to excavation of North Pond No. 1, its water may be pumped into North Pond No. 2. For the South Pond, it has been assumed that water from initial dewatering will be directed to the tributary to an appropriate depth approaching the sediments then will be directed to the South Marsh. For the ponds, it has been assumed that the depth of water is 3 feet and that continuous dewatering will be necessary during the duration of removal activities, thus a production rate of 100 cy per day has be utilized to determine total time required for dewatering. For North Marsh Nos. 1 and 2, it has been assumed that the depth of water is 2 feet with initial dewatering required and that continuous dewatering will not be necessary. For North Marsh No. 3 and South Marsh, it has been assumed that no pumping will be required. For Tributary 63, it has been assumed that activities will occur via pump bypass.
6. Sediment removal assumed to be performed by mechanical removal in the dry for the ponds via continuous dewatering, in the dry for the marsh following initial dewatering, and in the dry for Tributary 63 using bypass pumping and typical sediment removal equipment (i.e., backhoe). Unit prices for sediment removal activities have been adjusted, as appropriate, in consideration of site conditions. Due to the nature of removal within the pond areas (North Pond 1, North Pond 2, and the South Pond), removal volumes have been increased 25% to account for sloughing of adjacent materials during removal activities. Also, due to uncertainty associated with the removal within the marsh areas (North Marsh 1, North Marsh 2, North Marsh 3, and the South Marsh), removal volumes have been increased 20% to approximate a 'conservative' estimate.
7. Due to the depth of removal of sediment in North Pond No. 1 and North Pond No. 2 (i.e., up to 5 feet), sheeting is anticipated to be used to support a portion of deep sediment removal.
8. Processing/stabilization of excavated materials assumes that a pug mill will be used to process removed materials from the North Pond area. For the South Pond area, removed materials will be gravity drained and then stabilized. It is assumed that 20% stabilizing agent by weight would be added to stabilize materials to meet transportation/disposal requirements.
9. Soil removal assumed to be performed using conventional equipment. Costs are included to transfer the soil to an appropriate lined material staging area.
10. This cost is associated with loading excavated sediments from the stabilization area and soils from a material staging area to an appropriate truck for transportation and disposal.
11. Water treatment costs are for the operation of the water treatment facility to treat water generated during removal, dewatering, and decontamination activities, with discharge of the treated water to surface water. It is assumed that mechanical removal in the wet would generate approximately 20% water by in-situ sediment volume (or ~ 40 gallons of water generated per 1 cy of in-situ sediment).
12. Sand backfill placement assumes the excavated areas will be backfilled to generally match pre-excavation lines and grades. Areas with only subsurface removal will use the associated surface soil as backfill. Costs assumed to include purchase, haul and placement of material. Geotextile will be place prior to backfilling sediment areas of North Pond 1, and North Pond 2. For geotextile, 10% has been added to the total surface area to account for overlapping during placement.

TABLE 6

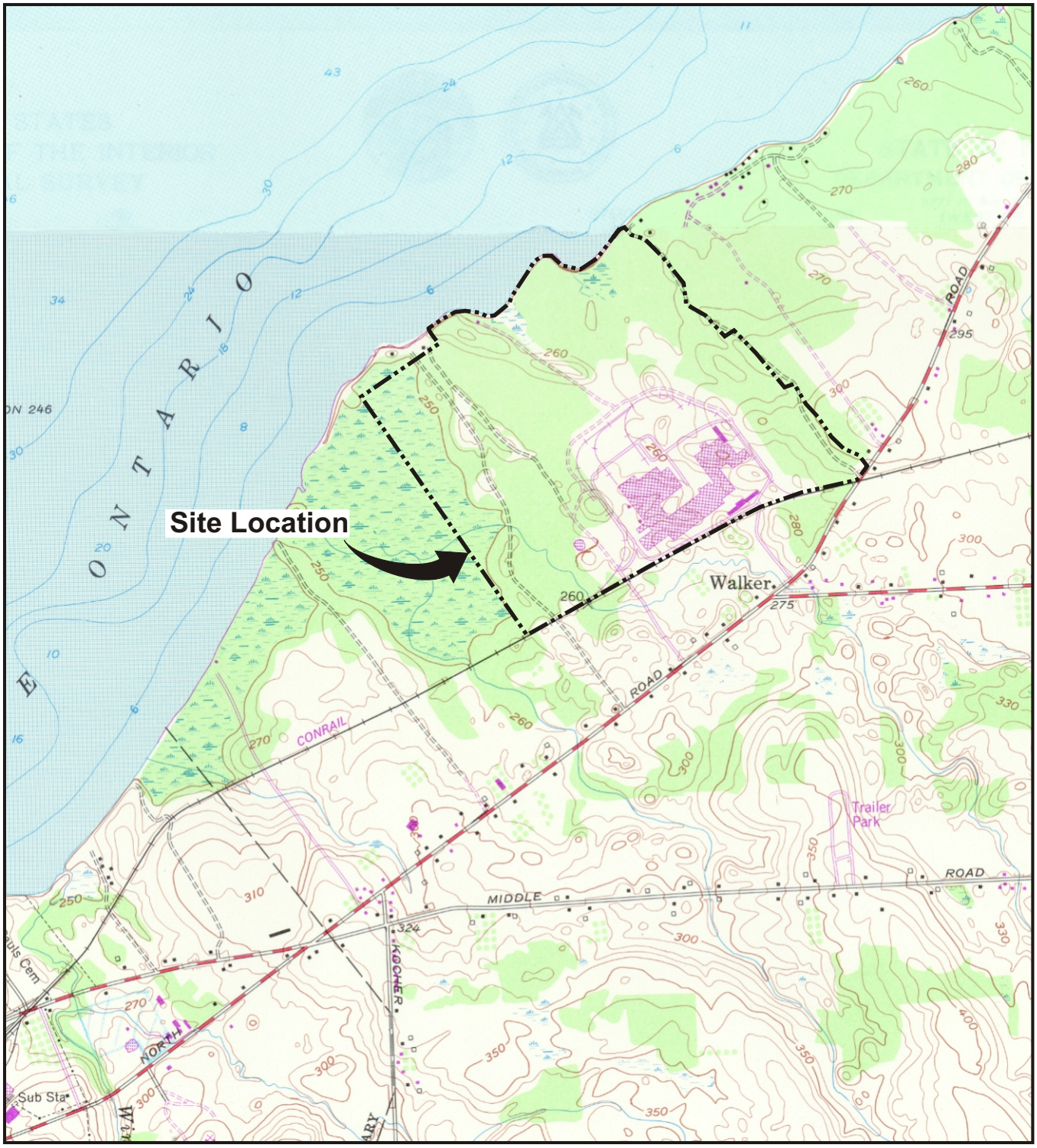
FOCUSED FEASIBILITY STUDY
NOVELIS CORPORATION
OSWEGO WORKS FACILITY, OSWEGO, NEW YORK

COST ESTIMATE - REMEDIAL ALTERNATIVE 4

13. Miscellaneous activities are based on disposal of miscellaneous materials (e.g., used silt fence, personal protective equipment, disposable equipment, access roads) at a facility permitted to accept the waste.
14. Restoration activities include the placement of topsoil and vegetation, as appropriate, to restore areas impaired as a result of construction-related activities. Also, it is assumed that restoration of non-wetted areas will be performed at a cost of approximately $10,000 per acre.
15. The following assumptions have been made with regards to transportation and disposal of processed sediments: 1) disposal volume includes removed in-situ sediment plus stabilizing agent at 20% by volume; 2) soil and sediment exhibiting in-situ PCB concentrations above 50 ppm will be handled and transported for offsite disposal as a TSCA-regulated waste; and 3) TSCA-regulated sediment and soil removed will be disposed at a cost of $175/ton (assumed 1.5 tons/cy).
16. The following assumptions have been made with regards to transportation and disposal of processed sediments: 1) disposal volume includes removed in-situ sediment plus stabilizing agent at 20% by volume;; and 2) Non-TSCA-regulated sediment and soil will be disposed at a cost of $60/ton (assumed 1.5 tons/cy).
17. Groundwater monitoring assumes sampling for PCBs at up to 8 locations every year for 10 years. The total annual cost has been estimated to be $8,500.

Figures

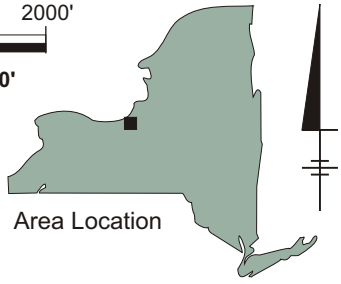
BBL®
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists



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'



01/07/06 SYR-D85-DJH
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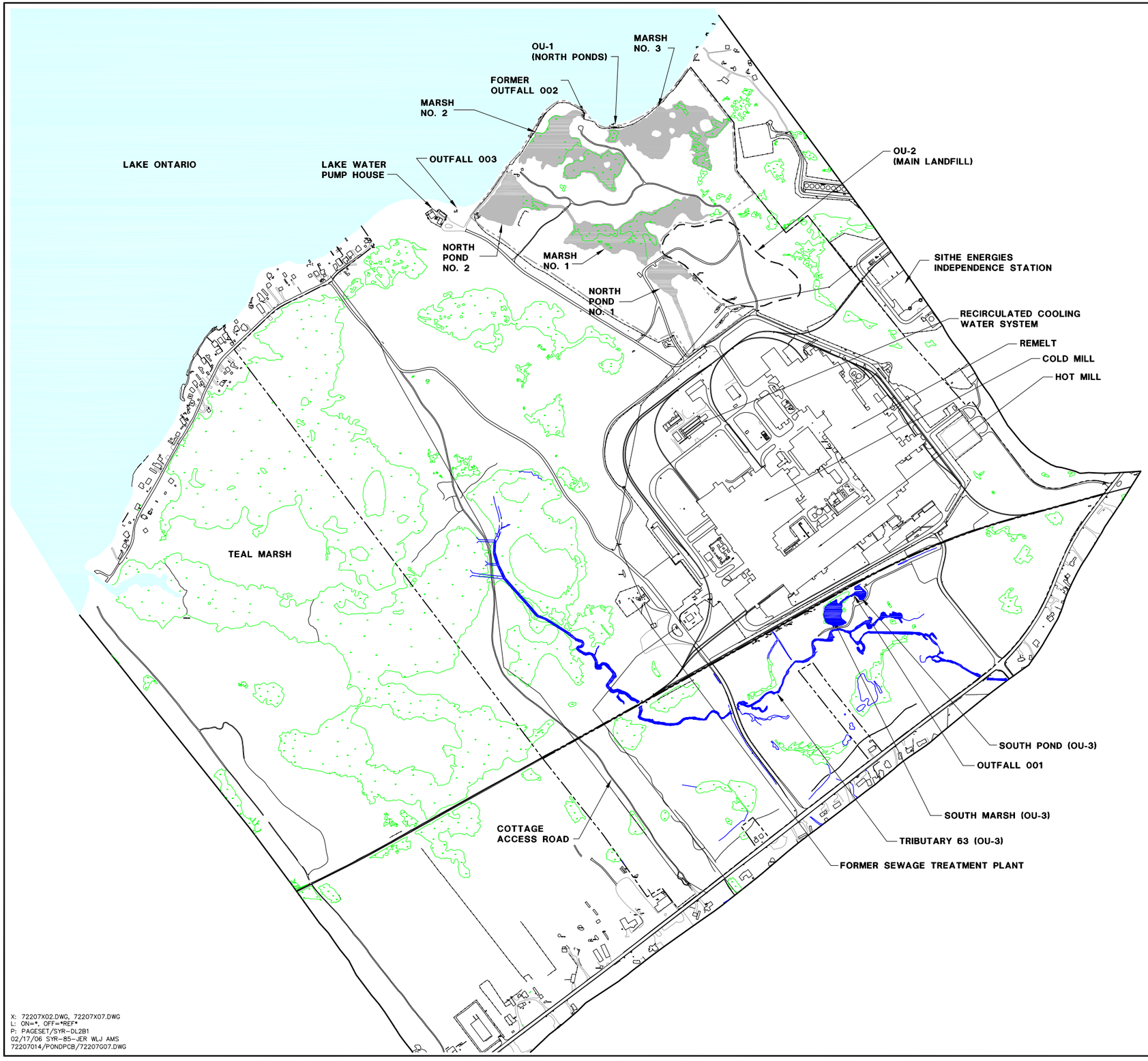
NOVELIS CORPORATION
OSWEGO, NEW YORK
FOCUSED FEASIBILITY STUDY

SITE LOCATION MAP

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

FIGURE 1



LEGEND:

- APPROXIMATE PROPERTY LINE
- APPROXIMATE EXTENT OF PONDS AND MARSHES DURING OPERATION OF COOLING WATER TREATMENT SYSTEM (1968–2002)
- APPROXIMATE AREA OF OU–1
- APPROXIMATE AREA OF OU–2
- APPROXIMATE AREA OF OU–3

NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 2003 AERIAL SURVEY COMPLETED BY SANBORN, INC. AT A SCALE OF 1"=50'.
2. THE HORIZONTAL DATUM IS BASED ON NORTH AMERICAN DATUM OF 1983, NY CENTRAL ZONE.
3. THE VERTICAL DATUM IS BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929.
4. PROPERTY LINE WAS APPROXIMATED FROM A SCANNED DRAWING PROVIDED BY ALCAN ALUMINUM CORPORATION, OSWEGO, NEW YORK DATED 10/18/79, DRAWING NO. 46071.

0 400' 800'
GRAPHIC SCALE

X: 72207X02.DWG, 72207X07.DWG
L: ON=*, OFF=*REF*
P: PAGESET/SYR-DL2B1
02/17/06 SYR-85-JER WLJ AMS
72207014/PONDPCB/72207G07.DWG

NOVELIS CORPORATION
OSWEGO, NEW YORK
FOCUSED FEASIBILITY STUDY

SITE LAYOUT PLAN

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

FIGURE 2

NP1-J	
Interval	PCB
0-0.5	1.756
0.5-1.0	2.188
1.0-1.5	3.182
1.5-2.0	2.88 j
DUP-2 (1.5-2.0)	23.85
2.0-2.5	79.4
2.5-3.0	94.08
3.0-3.5	47.4
3.5-4.0	8.29

NP1-LM16	
Interval	PCB
0-0.08	2.76
0.17-0.25	1.57
0.33-0.42	5.31
0.50-0.58	4.23
0.67-0.75	2.76

NP1-M16	
Interval	PCB
0-0.5	0 U
0.5-1.0	40
1.0-1.5	52

NP1-M15	
Interval	PCB
0-0.5	4.5

NP1-M17	
Interval	PCB
0-0.5	1.6

NP1-M14	
Interval	PCB
0-0.5	0 U
0.5-1.0	7.6
1.0-1.5	12

OU1SD01	
Interval	PCB
0-0.5	2.57 J
0.5-1.0	4.15 J
1.0-1.5	9.60 J
DUP 1.0-1.5 (OU1SDDUP1)	13.11 J
1.5-1.9	<0.16

OU1SD25	
Interval	PCB
0-0.5	1.05 J
0.5-1.0	2.65 J
1.0-1.5	17.67 J
1.5-2.0	81.00 J

NP1-N16	
Interval	PCB
0-0.5	6.6

NP1-ON16	
Interval	PCB
0-0.08	4.67
0.17-0.25	2.65
0.33-0.42	5.63
0.50-0.58	43.62
0.58-0.67	16.13

NP1-O16	
Interval	PCB
0-0.5	0 U

NP1-Q17	
Interval	PCB
0-0.5	16

NP1-R17	
Interval	PCB
0-0.5	2.2

NP1-N15	
Interval	PCB
0-0.5	0 U
0.5-1.0	7.4
1.0-1.5	31

OU1SD02	
Interval	PCB
0-0.5	3.28
0.5-1.0	39.20 J
1.0-1.5	12.10 J
1.5-2.1	3.87 J

MAIN LANDFILL

HEAVY FOLIAGE

HIGH WEEDS

DEBRIS

WOOD PILE

ROCKS

GATE

CONC.

GAUGE B

LEGEND:

- PROBING LOCATION
- SURFACE SAMPLE LOCATION
- CORE SAMPLE LOCATION
- PROBING AND CORE SAMPLE LOCATION
- CORE SAMPLE LOCATION (CONGENER SPECIFIC)
- MONITORING WELL LOCATION
- WATER LEVEL MEASURING POINT
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- APPROXIMATE BOUNDARY OF LANDFILL
- APPROXIMATE AREA WHERE THE WATER TABLE IS WITHIN 12-INCHES OF THE GROUND SURFACE

NOTE:

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.

3. AREAS WHERE THE WATER TABLE IS WITHIN 18-INCHES OF THE GROUND SURFACE WILL BE CONSIDERED SEDIMENT. ALL OTHER AREAS WILL BE CONSIDERED SOIL.

0 100' 200'

GRAPHIC SCALE

X: 72207X06.DWG, 72207X07.DWG
L: ON=*, OFF=*REF*
P: PAGESET/SYR-DL2B1
2/16/06 SYR-BS-RCA WLJ RCB
72207014/PONDPCB/72207C10.DWG

NOVELIS CORPORATION
OSWEGO, NEW YORK

FOCUSED FEASIBILITY STUDY

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

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

FIGURE 3A

OU1SD07	
Interval	PCB
0–0.5	34.67 J
0.5–1.0	2.06
DUP 0.5–1.0 (OU1SDDUP3)	1.35
1.0–1.5	<0.47
1.5–1.7	<0.27

M1–J12	
Interval	PCB
0–0.5	73

OU1SD05	
Interval	PCB
0–0.5	0.68 J
0.5–1.0	134.10 J
1.0–1.5	123.20 J
1.5–2.0	36.38 J
2.0–2.5	<0.410
2.5–3.0	<0.221
3.0–3.5	<0.177
3.5–4.0	<0.645
4.0–4.6	<0.519

M1–H16	
Interval	PCB
0–0.5	150

M1–H17	
Interval	PCB
0–0.5	250
0.5–1.0	9.2
1.0–1.5	0 U

M1–H18	
Interval	PCB
0–0.5	100

OU1SD03	
Interval	PCB
0–0.5	151.00 J
0.5–1.0	23.73
1.0–1.3	33.96 J

M1–I19	
Interval	PCB
0–0.5	3

M1–I14	
Interval	PCB
0–0.5	330

M1–J11	
Interval	PCB
0–0.5	61

M1–I13	
Interval	PCB
0–0.5	110

M1–J9	
Interval	PCB
0–0.5	66
0.5–1.0	0 U
1.0–1.5	0 U

M1–J13	
Interval	PCB
0–0.5	280

M1–J10	
Interval	PCB
0–0.5	37

M1–I16	
Interval	PCB
0–0.5	140

M1–I15	
Interval	PCB
0–0.5	28

M1–I8	
Interval	PCB
0–0.5	22

M1–J14	
Interval	PCB
0–0.5	33

OU1SD04	
Interval	PCB
0–0.5	2.78
0.5–1.0	8.18 J
1.0–1.2	0.21 J

M1–K14	
Interval	PCB
0–0.5	380
0.5–1.0	68
1.0–1.5	0 U

M1–I18	
Interval	PCB
0–0.5	89

M1–K15	
Interval	PCB
0–0.5	4.4

M1–K8	
Interval	PCB
0–0.5	34

M1–K11	
Interval	PCB
0–0.5	40

M1–K9	
Interval	PCB
0–0.5	120

M1–K10	
Interval	PCB
0–0.5	83

M1–KL14	
Interval	PCB
0–0.08	161.01
0.17–0.25	110.28
0.33–0.42	122.81
0.50–0.58	48.31
0.67–0.75	1.76

M1–JK8	
Interval	PCB
0–0.08	13.77
0.17–0.25	8.05
0.33–0.42	5.28
0.50–0.58	0.82
0.58–0.67	0.38

OU1SD06	
Interval	PCB
0–0.5	223
0.5–1.0	42.8
1.0–1.5	14.60 J
1.5–2.0	<0.586

M1–KL11.5	
Interval	PCB
0–0.5	60

M1–K13	
Interval	PCB
0–0.5	140

M1–K12	
Interval	PCB
0–0.5	140

OU1SD08	
Interval	PCB
0–0.5	1.17 J
0.5–1.0	2.83 J
1.0–1.5	<0.37
1.5–2.0	<0.30

M1–L14	
Interval	PCB
0–0.5	24

M1–L13	
Interval	PCB
0–0.5	8

LEGEND:

- PROBING LOCATION
- SURFACE SAMPLE LOCATION
- CORE SAMPLE LOCATION
- CORE SAMPLE LOCATION (CONGENER SPECIFIC)
- MONITORING WELL LOCATION
- WATER LEVEL MEASURING POINT
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- APPROXIMATE BOUNDARY OF LANDFILL
- PIPE
- APPROXIMATE AREA WHERE THE WATER TABLE IS WITHIN 12–INCHES OF THE GROUND SURFACE

NOTE:

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.

3. AREAS WHERE THE WATER TABLE IS WITHIN 18–INCHES OF THE GROUND SURFACE WILL BE CONSIDERED SEDIMENT. ALL OTHER AREAS WILL BE CONSIDERED SOIL.

MAIN LANDFILL

X: 72207X07.DWG, 72207X08.DWG
L: ON=*, OFF=*REF*
P: PAGESET/SYR-DP2B1
2/16/06 SYR-85-RCA WLJ RCB
72207014/PONDPCB/72207C11.DWG

NOVELIS CORPORATION
OSWEGO, NEW YORK
FOCUSED FEASIBILITY STUDY

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

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

FIGURE 3B

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

OU1SD10	
Interval	PCB
0–0.5	5.86 J
0.5–1.0	9.12 J
1.0–1.6	42.30 J

NP2–G4	
Interval	PCB
0–0.5	29
0.5–1.0	23
1.0–1.5	130

NP2–FG4.5	
Interval	PCB
0–0.5	1.6

NP2–G3	
Interval	PCB
0–0.5	27

NP2–H5	
Interval	PCB
0–0.5	18
0.5–1.0	66 J
1.0–1.5	140 J

NP2–G5	
Interval	PCB
0–0.5	0 U

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–I1	
Interval	PCB
0–0.5	12

NP2–H4	
Interval	PCB
0–0.5	22

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 SAMPLE LOCATION
- CORE SAMPLE LOCATION
- PROBING AND CORE SAMPLE LOCATION
- CORE SAMPLE LOCATION (CONGENER SPECIFIC)
- MONITORING WELL LOCATION
- WATER LEVEL MEASURING POINT
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- APPROXIMATE BOUNDARY OF LANDFILL
- APPROXIMATE AREA WHERE THE WATER TABLE IS WITHIN 12–INCHES OF THE GROUND SURFACE

NOTE:

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2. LOCATIONS UPDATED 10/1/02 BASED ON A BBL SURVEY. COORDINATES IN FEET NGVD RELATIVE TO NATIONAL GEODETIC VERTICAL DATUM OF 1929.
3. AREAS WHERE THE WATER TABLE IS WITHIN 18–INCHES OF THE GROUND SURFACE WILL BE CONSIDERED SEDIMENT. ALL OTHER AREAS WILL BE CONSIDERED SOIL.

0 100' 200'
GRAPHIC SCALE

NOVELIS CORPORATION
OSWEGO, NEW YORK
FOCUSED FEASIBILITY STUDY

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

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

FIGURE 3C

X: 72207X01.DWG
L: ON= * OFF= REF*
P: PAGESET/SYR–DL2B1
2/17/06 SYR–54–RCA WLJ RCB
72207014/PONDPCB/72207C12.DWG

M2–C7	
Interval	PCB
0–0.5	20
0.5–1.0	0 U
1.0–1.5	0 U

M2–B7	
Interval	PCB
0–0.5	54

M2–A7	
Interval	PCB
0–0.5	41

M2–A8	
Interval	PCB
0–0.5	16

M2–A9	
Interval	PCB
0–0.5	2.3

M2–B6	
Interval	PCB
0–0.5	29

OU1SD12	
Interval	PCB
0–0.5	6.21 J
0.5–1.0	0.29
1.0–1.4	<0.13

OU1SD14	
Interval	PCB
0–0.5	12.65
0.5–1.0	30.81 J
1.0–1.5	33.99 J
1.5–2.0	55.30 J
2.0–2.5	72.4
2.5–3.0	43.1
3.0–3.4	16.65 J

M2–C6	
Interval	PCB
0–0.5	65

M2–C8	
Interval	PCB
0–0.5	8.1 J

M2–D10	
Interval	PCB
0–0.5	5.7
0.5–1.0	0.97
1.0–1.5	0 U

OU1SD13	
Interval	PCB
0–0.5	10.75 J
0.5–1.0	15.67 J
1.0–1.5	0.97
1.5–2.0	<0.16

M2–D9	
Interval	PCB
0–0.5	16

M2–D11	
Interval	PCB
0–0.5	48

M2–E12	
Interval	PCB
0–0.5	18
0.5–1.0	0 U
1.0–1.5	0 U

M2–D6	
Interval	PCB
0–0.5	7.2

M2–D8	
Interval	PCB
0–0.5	13 J

M2–D5	
Interval	PCB
0–0.5	1.7

M2–E10	
Interval	PCB
0–0.5	10 J

OU1SD15	
Interval	PCB
0–0.5	0.55
0.5–1.0	<0.14

M2–E7	
Interval	PCB
0–0.5	9.9

M2–F11	
Interval	PCB
0–0.5	0.94

M2–E4	
Interval	PCB
0–0.5	0 U

M2–E5	
Interval	PCB
0–0.5	62 J

M2–E9	
Interval	PCB
0–0.5	4.4 J

OU1SD16	
Interval	PCB
0–0.5	7.29 J
0.5–1.0	2.15 J
DUP 0.5–1.0 (OU1SDDUP4)	2.04 J

M2–E8	
Interval	PCB
0–0.5	4.9

M2–F8	
Interval	PCB
0–0.5	5.6

M2–E6	
Interval	PCB
0–0.5	29

M2–D7	
Interval	PCB
0–0.5	60 J

LEGEND:

- PROBING LOCATION
- SURFACE SAMPLE LOCATION
- CORE SAMPLE LOCATION
- PROBING AND CORE SAMPLE LOCATION
- CORE SAMPLE LOCATION (CONGENER SPECIFIC)
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- WATER LEVEL MEASURING POINT
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NOTE:

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3. AREAS WHERE THE WATER TABLE IS WITHIN 18–INCHES OF THE GROUND SURFACE WILL BE CONSIDERED SEDIMENT. ALL OTHER AREAS WILL BE CONSIDERED SOIL.

0 100' 200'
GRAPHIC SCALE

NOVELIS CORPORATION
OSWEGO, NEW YORK
FOCUSED FEASIBILITY STUDY

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

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

FIGURE 3D

X: 72207X06.DWG, 72207X07.DWG
L: ON=*, OFF=*REF*
P: PAGESET/SYR-DL2B1
2/16/06 SYR-85-RCA WLJ RCB
72207014/PONDPCB/72207C13.DWG

OU1SD20	
Interval	PCB
0–0.5	107.83
0.5–0.7	1.21

M3–A15	
Interval	PCB
0–0.5	17 J

OU1SD17	
Interval	PCB
0–0.5	126.61 J
0.5–0.8	16.94 J

M3–AA16	
Interval	PCB
0–0.5	28

OU1SD18	
Interval	PCB
0–0.5	4.83 J
0–0.5 (D&M Sample M3–B20)	0 U
0.5–1.0	0.47
1.0–1.4	<0.12 J

M3–B17	
Interval	PCB
0–0.5	440 J

M3–B10	
Interval	PCB
0–0.5	9.3

M3–B13	
Interval	PCB
0–0.5	200 J

M3–B15	
Interval	PCB
0–0.5	270 J

M3–A17	
Interval	PCB
0–0.5	19

M3–A18	
Interval	PCB
0–0.5	24 J

M3–C13.5	
Interval	PCB
0–0.08	5.78
0.17–0.25	52.68
0.33–0.42	34.59
0.50–0.58	0.33
0.67–0.75	0.34

M3–B14	
Interval	PCB
0–0.5	120

M3–B18	
Interval	PCB
0–0.5	71 J
0.5–1.0	0 U
1.0–1.5	1

M3–C20	
Interval	PCB
0–0.5	0 U

M3–C11	
Interval	PCB
0–0.5	63

M3–B16	
Interval	PCB
0–0.5	520 J

M3–C15	
Interval	PCB
0–0.5	36

M3–C18	
Interval	PCB
0–0.5	67 J

M3–CD18	
Interval	PCB
0–0.08	62.62
0.17–0.25	5.86
0.33–0.42	0.62
0.50–0.58	0.39
0.67–0.75	0.11

M3–C12	
Interval	PCB
0–0.5	14

M3–D14	
Interval	PCB
0–0.5	29 J

M3–D13	
Interval	PCB
0–0.5	76

M3–D19	
Interval	PCB
0–0.5	0 U

M3–C13	
Interval	PCB
0–0.5	320 J
0.5–1.0	1.2
1.0–1.5	0 U

M3–D18	
Interval	PCB
0–0.5	34

OU1SD22	
Interval	PCB
0–0.5	27.05
0.5–1.0	12.62

M3–C14	
Interval	PCB
0–0.5	51

M3–D15	
Interval	PCB
0–0.5	14

M3–E18	
Interval	PCB
0–0.5	570 J
0.5–1.0	16
1.0–1.5	1.2

OU1SD19	
Interval	PCB
0–0.5	29.30 J
0.5–1.0	0.23 J
DUP 0.5–1.0 (OU1SDDUP6)	41.75
1.0–1.5	0.45 J
1.5–2.0	<0.13

M3–F17	
Interval	PCB
0–0.5	630 J

M3–F18	
Interval	PCB
0–0.5	120 J

OU1SD23	
Interval	PCB
0–0.5	1275.3 J
0.5–1.0	48.6
1.0–1.5	1.02
1.5–2.0	0.6

OU1SD21	
Interval	PCB
0–0.5	341 J
DUP 0–0.5 (OU1SDDUP5)	18.82 J
0.5–1.0	23.11 J

OU1SD24	
Interval	PCB
0–0.5	61.1
0.5–1.0	1.32 J
1.0–1.5	7.6

LEGEND:

- PROBING LOCATION
- SURFACE SAMPLE LOCATION
- CORE SAMPLE LOCATION
- PROBING AND CORE SAMPLE LOCATION
- CORE SAMPLE LOCATION (CONGENER SPECIFIC)
- MONITORING WELL LOCATION
- WATER LEVEL MEASURING POINT
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- APPROXIMATE BOUNDARY OF LANDFILL
- APPROXIMATE AREA WHERE THE WATER TABLE IS WITHIN 12–INCHES OF THE GROUND SURFACE

NOTE:

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.
3. AREAS WHERE THE WATER TABLE IS WITHIN 18–INCHES OF THE GROUND SURFACE WILL BE CONSIDERED SEDIMENT. ALL OTHER AREAS WILL BE CONSIDERED SOIL.

0 100' 200'

GRAPHIC SCALE

X: 72207X06.DWG, 72207X07.DWG
L: ON=*, OFF=*REF*
P: PAGESET/SYR–DL2B1
2/16/06 SYR–85–RCA WLJ RCB
72207014/PONDPCB/72207C14.DWG

NOVELIS CORPORATION
OSWEGO, NEW YORK

FOCUSED FEASIBILITY STUDY

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

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

FIGURE 3E

NORTH POND NO. 2

OU1SS09	
Interval	PCB
0–2	<0.12

SS–IB2	
Interval	PCB
0–2	1.9

OU1SS10	
Interval	PCB
0–2	<0.12

SS–IB1	
Interval	PCB
0–2	ND

OU1SS12	
Interval	PCB
0–2	0.38

OU1SS11	
Interval	PCB
0–2	0.80 J

OU1SS01	
Interval	PCB
0–2	10.20 J

SS–CMLF1	
Interval	PCB
0–2	1.7 J

OU1SS02	
Interval	PCB
0–2	0.62 J
DUP 0–2	0.79 J

OU1SS04	
Interval	PCB
0–2	0.74 J

OU1SS05	
Interval	PCB
0–2	1.10 J

SS–CMLF2	
Interval	PCB
0–2	20 J

OU1SS03	
Interval	PCB
0–2	<0.11

OU1SS08	
Interval	PCB
0–2	<0.12

OU1SS06	
Interval	PCB
0–2	0.54 J

OU1SS07	
Interval	PCB
0–2	0.32 J

IB2–SS1, IB2–SS2, IB2–SS3, IB2–SS4, SS–IB2, SS–IB1, CM1–SS1, CM1–SS2, CM1–SS3, CM1–SS4, CM2–SS1, CM2–SS2, CM2–SS3, CM2–SS4, SS–CMLF1, SS–CMLF2, MW–02

MOWED FIELD

WOODED AREA

COLD MILL LANDFILL

ROCKS, WOOD PILE, GATE, SIGN, CONC.

LEGEND:

- SUBSURFACE SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION
- WATER LEVEL MEASURING POINT
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- APPROXIMATE BOUNDARY OF LANDFILL
- PIPE

NOTE:

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

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0 100' 200'

GRAPHIC SCALE

X: 72207X09.DWG
L: ON=*, OFF=*REF*
P: PAGESET/SYR–BL1
01/31/06 SYR–54–RCA KEW WLJ
72207014/PONDPCB/72207C16.DWG

NOVELIS CORPORATION
OSWEGO, NEW YORK
FOCUSED FEASIBILITY STUDY

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

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

FIGURE 3F

OU1SS20	
Interval	Total PCBs
0–2	0.39

OU1SS19	
Interval	Total PCBs
0–2	0.14 J

OU1SS21	
Interval	Total PCBs
0–2	<0.16

OU1SS24	
Interval	Total PCBs
0–2	<0.12

OU1SS25	
Interval	Total PCBs
0–2	0.32

OU1SS22	
Interval	Total PCBs
0–2	0.22

OU1SS23	
Interval	Total PCBs
0–2	<0.11

OU1SS18	
Interval	Total PCBs
0–2	<0.13

OU1SS16	
Interval	Total PCBs
0–2	<0.11

OU1SS15	
Interval	Total PCBs
0–2	3.52

OU1SS14	
Interval	Total PCBs
0–2	2.26

OU1SS13	
Interval	Total PCBs
0–2	<0.11

OU1SS17	
Interval	Total PCBs
0–2	<0.11
DUP 0–2	<0.11

GAUGE 1
GAUGE 3
GAUGE 5
GAUGE 6
GAUGE 7
GAUGE 8
P-SS01
P-SS02
P-SS03
P-SS04
P-SS05
P-SS06
P-SS07
P-SS08
P-SS09
P-SS10
P-SS11
P-SS12
P-SS13
MW-01
MW-02
MW-05
MW-06
MW-07
MW-08
MW-11
MW-12
MW-14
MWB-11
MWB-12
MWB-13
SG-09
MOWED FIELD
COLD MILL LANDFILL

LEGEND:

- SUBSURFACE SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION
- WATER LEVEL MEASURING POINT
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- PROPERTY LINE
- APPROXIMATE BOUNDARY OF LANDFILL
- PIPE

NOTE:

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

X: 72207X09.DWG
L: ON=*, OFF=*REF*
P: PAGESET/SYR-BL1
01/05/06 SYR-54-RCA LAF KEW
72207014/PONDPCB/72207C17.DWG

NOVELIS CORPORATION
OSWEGO, NEW YORK
FOCUSED FEASIBILITY STUDY

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

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

FIGURE 3G

LAKE ONTARIO

TO WATER INTAKE

MW-05

GAUGE 5

GAUGE 4

GAUGE 2

MW-04

GAUGE 3

WOODED AREA

MW-02

GAUGE 6

MOWED FIELD

WOODED AREA

COLD MILL LANDFILL

WOODED AREA

WOODED AREA

MW-03

GAUGE 1

WOODED AREA

MW-12

MWB-13

MW-06

GAUGE 7

MWB-11

MW-07

MWB-12

MW-08

MW-01

MW-10

MAIN LANDFILL

SITHE COOLING POND

SITHE PROPERTY

GAUGE 8

MOWED FIELD

COMPOST PILES

MOWED FIELD

MW-09

GRID

LEGEND:

- MONITORING WELL LOCATION
- WATER LEVEL MEASURING POINT
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- PROPERTY LINE
- APPROXIMATE BOUNDARY OF LANDFILL
- PIPE
- BRIDGE

NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 2003 AERIAL SURVEY COMPLETED BY SANDBORN, 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.

0 120' 240'
GRAPHIC SCALE

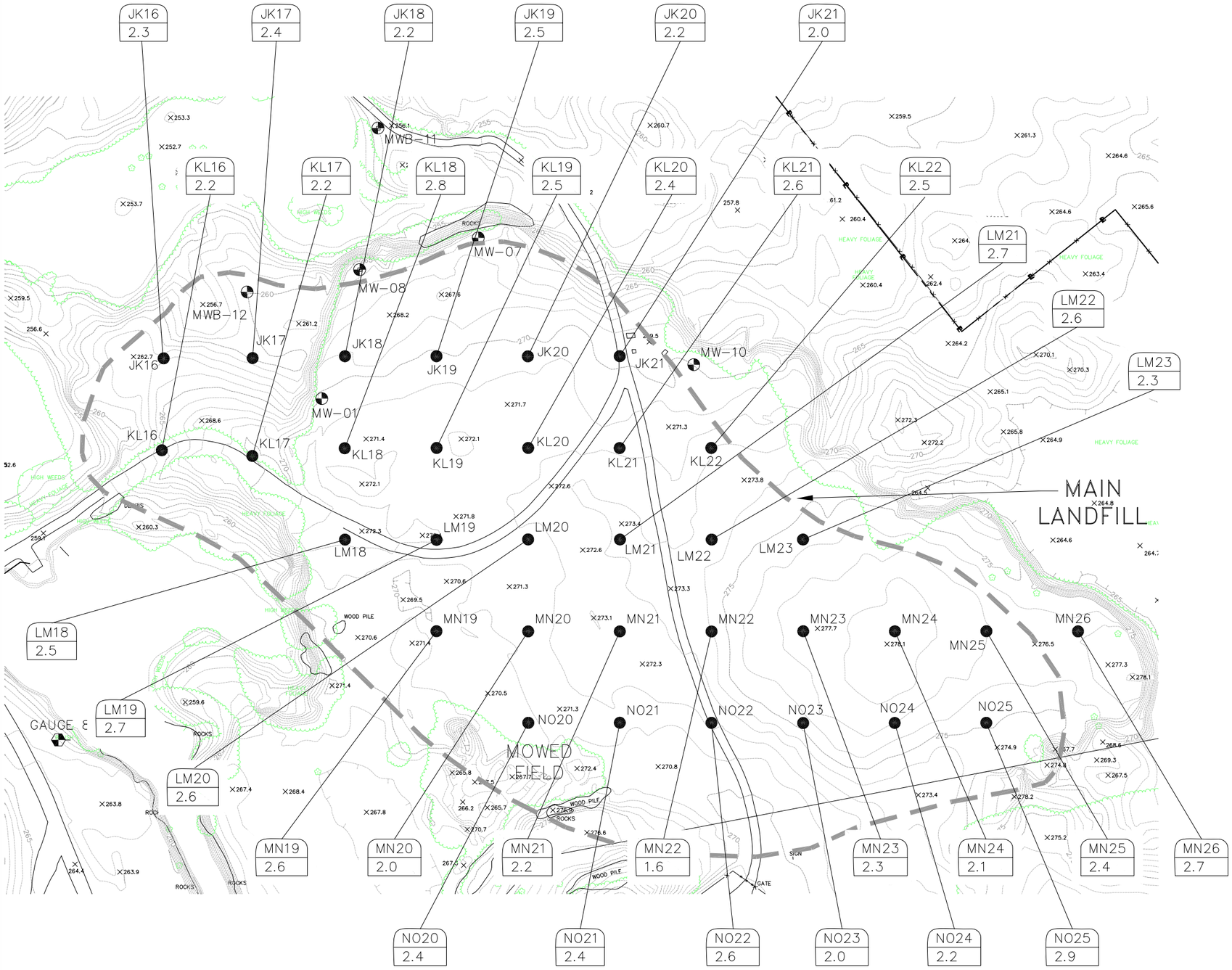
X: 72207X06.DWG, 72207X07.DWG
L: ON=*, OFF=*REF*
P: PAGESET/PLT-DL
1/31/06 SYR-85-RCA LAF WLJ
72207010/72207B01.DWG

NOVELIS CORPORATION
OSWEGO, NEW YORK
FOCUSED FEASIBILITY STUDY

MONITORING WELL LOCATIONS

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

FIGURE
4



LEGEND:

- PROBING LOCATION
- MONITORING WELL LOCATION
- WATER LEVEL MEASURING POINT
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- PROPERTY LINE
- APPROXIMATE BOUNDARY OF LANDFILL
- PIPE
- BRIDGE

NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 2003 AERIAL SURVEY COMPLETED BY SANDBORN, 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.

3. SOIL COVER PROBING ACTIVITIES CONDUCTED BY BLASLAND, BOUCK & LEE INC., ON SEPTEMBER 4, 2002 AS PART OF THE FOCUSED REMEDIAL INVESTIGATION.

4. SOIL COVER DEPTHS ARE LISTED IN FEET.

0 60' 120'

GRAPHIC SCALE

X: 72207X06.DWG, 72207X07.DWG
L: ON=*, OFF=*REF*
P: PAGESET/PLT-DL
1/31/06 SYR-85-RCA LAF WLJ
72207014/72207N01.DWG

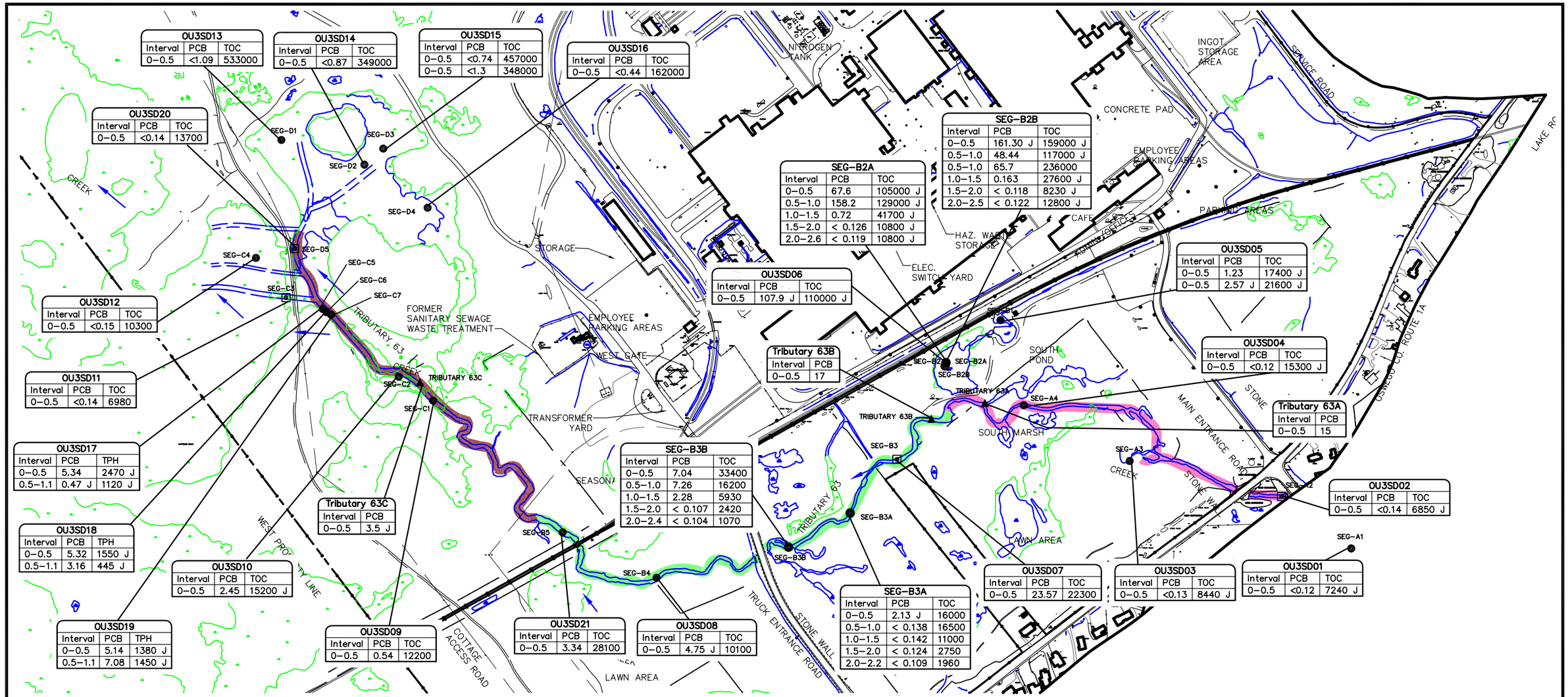
NOVELIS CORPORATION
OSWEGO, NEW YORK

FOCUSED FEASIBILITY STUDY

OU-2 SOIL COVER PROBING RESULTS

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

FIGURE 5



LEGEND:

- RAILROAD
- X — CHAIN LINK FENCE
- LIMITS OF WETLAND AREA AS MAPPED PER AERIAL SURVEY
- 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

NOTE:

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

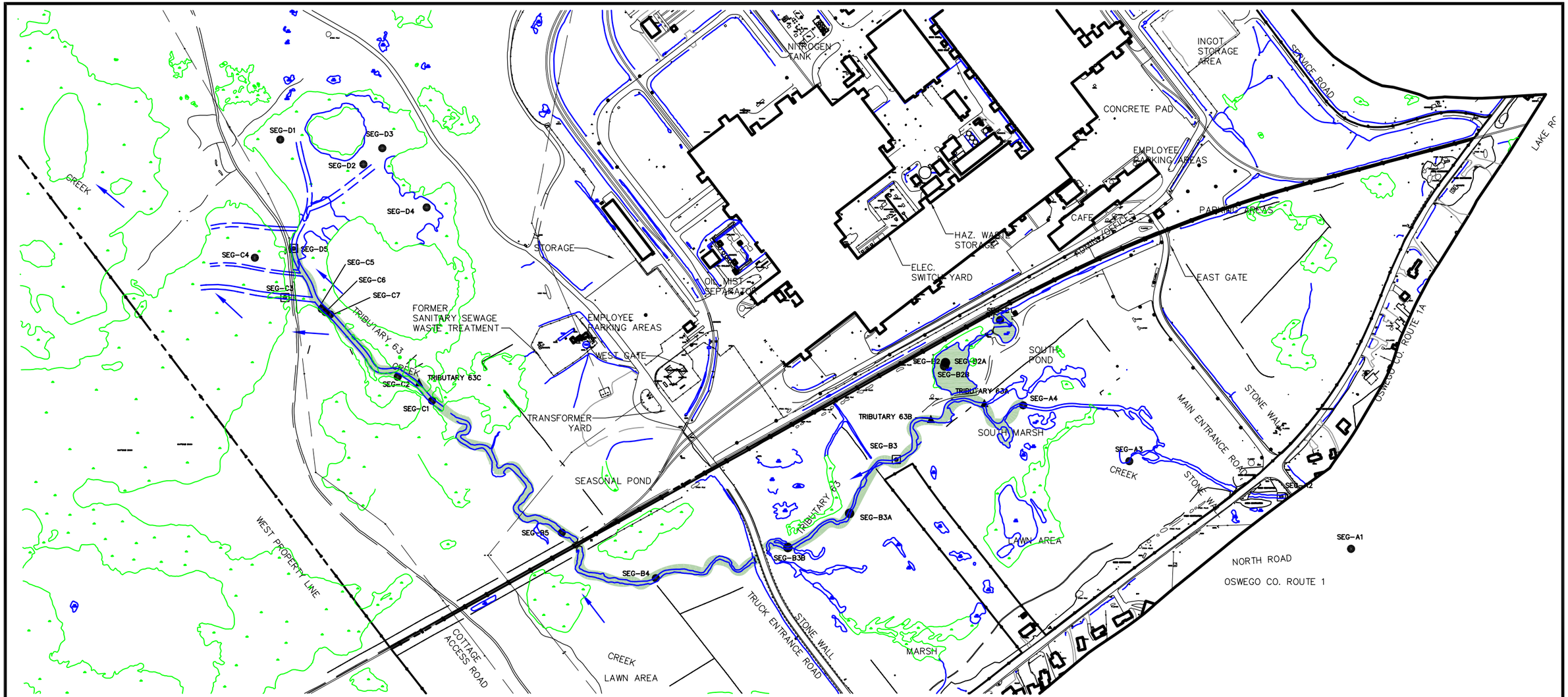
X: 72207X05.DWG
L: ON=*, OFF=*REF*
P: PAGESET/SYR–BL1
01/31/06 SYR–54–JER KEW WLJ
72207014/PONDPCB/72207C15.DWG

NOVELIS CORPORATION
OSWEGO, NEW YORK
FOCUSED FEASIBILITY STUDY

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

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

FIGURE 6



LEGEND:

- RAILROAD
- X — CHAIN LINK FENCE
- LIMITS OF WETLAND AREA AS MAPPED PER AERIAL SURVEY
- PROPOSED SEDIMENT REMOVAL
- SEG-A1 — SURFICIAL SEDIMENT SAMPLE LOCATION
- SEG-A2 — JOINT SURFACE WATER AND SEDIMENT SAMPLE LOCATION
- TRIBUTARY-63A — APPROXIMATE DAMES AND MOORE SEDIMENT SAMPLE LOCATION

NOTE:

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

NOVELIS CORPORATION
OSWEGO, NEW YORK
FOCUSED FEASIBILITY STUDY

OU-3 PROPOSED REMOVAL LIMITS

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

FIGURE 7

X: 72207X05.DWG
L: ON=*, OFF=*REF*
P: PAGESET/SYR-BL1
02/16/06 SYR-85-JER WLJ AMS
72207014/PONDPCB/72207C18.DWG

LEGEND:

- SURFACE SEDIMENT SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION (CONGENER SPECIFIC)
- SUBSURFACE SOIL SAMPLE LOCATION
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- PROPERTY LINE
- APPROXIMATE BOUNDARY OF LANDFILL
- PIPE
- PROPOSED SURFACE SOIL REMOVAL
- PROPOSED SURFACE SEDIMENT REMOVAL
- PROPOSED SUBSURFACE SOIL/SEDIMENT REMOVAL
- PROPOSED COVER AREA

NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 2003 AERIAL SURVEY COMPLETED BY SANDBORN, INC. AT A SCALE OF 1"=50'.
2. LOCATIONS UPDATED 10/1/02 BASED ON A BBL SURVEY. COORDINATES BASED ON NAD 1983.
3. ELEVATIONS BASED ON NGVD 1929.

0 120' 240'
GRAPHIC SCALE

ALCAN SHEET AND PLATE COMPANY
OSWEGO, NEW YORK
FOCUSED FEASIBILITY STUDY

ALTERNATIVE 2 - SOIL/SEDIMENT REMOVAL COVER - PROPOSED LIMITS

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

FIGURE 8

X: 72207X06.DWG
L: ON=*, OFF=*REF*
P: PAGESET/SYR-DL
02/21/06 SYR-85-RCA WLJ AMS
72207014/FFS-3/72207G08.DWG

LEGEND:

- SURFACE SEDIMENT SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION (CONGENER SPECIFIC)
- SUBSURFACE SOIL SAMPLE LOCATION
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- PROPERTY LINE
- APPROXIMATE BOUNDARY OF LANDFILL
- PIPE
- PROPOSED SURFACE SOIL REMOVAL
- PROPOSED SURFACE SEDIMENT REMOVAL
- PROPOSED SUBSURFACE SOIL/SEDIMENT REMOVAL
- PROPOSED COVER AREA

NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 2003 AERIAL SURVEY COMPLETED BY SANDBORN, INC. AT A SCALE OF 1"=50'.
2. LOCATIONS UPDATED 10/1/02 BASED ON A BBL SURVEY. COORDINATES BASED ON NAD 1983.
3. ELEVATIONS BASED ON NGVD 1929.

0 120' 240'
GRAPHIC SCALE

NOVELIS CORPORATION
OSWEGO, NEW YORK
FOCUSED FEASIBILITY STUDY

ALTERNATIVE 3 - SOIL/SEDIMENT REMOVAL WITH SOIL COVER - PROPOSED LIMITS

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

FIGURE 9

X: 72207X06.DWG
L: ON=*, OFF=*REF*
P: PAGESET/SYR-DL
02/21/06 SYR-85-RCA WLJ AMS
72207014/FFS-3/72207G05.DWG

LEGEND:

- SURFACE SEDIMENT SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION
- SEDIMENT CORE SAMPLE LOCATION (CONGENER SPECIFIC)
- SUBSURFACE SOIL SAMPLE LOCATION
- FENCE
- PAVED ROAD
- UNIMPROVED ROAD
- PROPERTY LINE
- APPROXIMATE BOUNDARY OF LANDFILL
- PIPE
- PROPOSED SURFACE SOIL REMOVAL
- PROPOSED SURFACE SEDIMENT REMOVAL
- PROPOSED SUBSURFACE SOIL/SEDIMENT REMOVAL

NOTES:

1. BASEMAP GENERATED FROM A MAY 3, 2003 AERIAL SURVEY COMPLETED BY SANDBORN, INC. AT A SCALE OF 1"=50'.
2. LOCATIONS UPDATED 10/1/02 BASED ON A BBL SURVEY. COORDINATES BASED ON NAD 1983.
3. ELEVATIONS BASED ON NGVD 1929.

0 120' 240'
GRAPHIC SCALE

X: 72207X02.DWG
L: ON=*, OFF=*REF*
P: PAGESET/SYR-DL
02/21/06 SYR-85-RCA WLJ AMS
72207014/FFS-3/72207G07.DWG

NOVELIS CORPORATION
OSWEGO, NEW YORK
FOCUSED FEASIBILITY STUDY

ALTERNATIVE 4 - SOIL/SEDIMENT REMOVAL - PROPOSED LIMITS

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

FIGURE 10