GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS

Project Name	***REYNOLDS METALS (Massena)***	***ProjectID:*** 02-11
Last Updated:	06/14/04	

City:	Massena
County:	St. Lawrence
State:	NY
Country:	USA
Bodies of Water:	St. Lawrence River; Raquette River
US EPA Region:	II
Status (Active, Complete, or Monitoring Only):	Complete
Date On NPL:	N/A
ROD/ESD Date:	1993 (Decision Document); 1998 (Amended Decision Document)
Operable Unit:	OU-1
Areas of Concern (length or acres):	30-acre nearshore area in the St. Lawrence River, opposite the plant site
Other Characteristics of Water Body:	Total avg. flow in the St. Lawrence River is on the order of 240,000 cfs. The main river current which enters the 30-acre area adjacent to the plant site has velocities of 8 feet per second or greater. This flow is deflected to the east by training dikes which protect the Seaway channel, forming a series of clockwise and counterclockwise eddies. These low velocity eddies migrate toward the shore in both upstream and downstream directions. There is an area in the vicinity of Outfalls 001 and 004 which exhibits some flow separation with predominantly upstream flow to the west of the outfalls and predominantly downstream flow to the east of the outfalls. The overall result of these flow patterns is that water generally stagnates along the shoreline in the vicinity of Outfall 001. Because of this stagnation, sediments and particulate materials discharged into the river through the four outfalls generally remained close to shore. This pattern is enhanced in summer months by extensive vegetation growth that acts to further slow currents in the shallow water near the shore (Reference E-51).
Contaminants of Concern:	PCBs (1254); PAHs; total dibenzofurans (TCDFs)
Source of Contamination:	Four historical wastewater outfalls and surface water runoff from the 1,600-acre Reynolds Facility, an active aluminum production plant.
Contaminated Area Physical Characteristics:	In the 30-acre target area, water depth is generally less than 20 feet. Site surveys have shown areas of the river bed with irregular topographies, thick vegetation, and large cobbles and boulders. Maximum contaminant concentrations measured are PCBs, 1,300 ppm; PAHs, 3,734 ppm; and total dibenzofurans (TCDFs), 0.44 ppm, all collected within 500 feet of the Reynolds outfalls.
Type of Regulatory Action:	UAO under CERCLA; for plant site, NYSDEC consent orders.
Overall Status Summary:	A 1993 EPA Decision Document (like a ROD) stipulated a remedy for the 30-acre nearshore target area which called for (1) dredging 51,600 cy of sediments exceeding 1 ppm PCBs; (2) treating dredged sediments exceeding 25 ppm by onsite thermal desorption; and (3) consolidating dredged sediments of 25 ppm PCBs or less into a former disposal pit on the plant site, and capping. In a Post-Decision Proposed Plan issued for comment in July 1998 and confirmed in an Amended Decision Document issued in September 1998, EPA proposed a modified remedy which includes (1) dredging 77,600 cy of sediments exceeding 1 ppm PCBs, 10 ppm total PAHs, or 1 ppb dibenzofurans; (2) treating dredged sediments containing greater than 500 ppm PCBs at an approved offsite facility; (3) disposing dredged sediments containing 50 ppm or greater PCBs and less than 500 ppm PCBs at offsite commercial facilities; and (4)

disposing dredged sediments of less than 50 ppm PCBs into an onsite landfill. The increased volume estimate resulted from an additional sediment characterization program; the decision to increase the maximum allowable PCB concentration for onsite disposal from 25 ppm to 50 ppm was made to be consistent with a recently released amendment to the NYSDEC ROD that addresses land-based contamination at the site; the decision regarding offsite disposal resulted from the substantially lower costs for offsite disposal as compared to 1993 and the excessive cost and time (years) estimated for implementing onsite thermal desorption.

The remedial dredging project was performed in 2001 in the 30-acre nearshore target area in the St. Lawrence River. Bechtel Environmental, Inc. provided construction oversight and project management for Alcoa, Metcalf & Eddy (M&E) provided design and construction oversight for dredging and sheetpile installation, Faust Corporation performed dredging and sheetpile installation, and Parras Environmental and Construction performed the land-based operations (barge offloading, solids handling, and transportation to the landfill). Project oversight was performed by the U.S. Army Corps of Engineers-NY District Office and TAMS Consultants (representing USEPA). Independent oversight of the project was performed by NYSDEC, the St. Regis Mohawk Tribe, and the Canadian Government. Additionally, Alcoa maintained a full-time independent QA Officer onsite. At its peak the project maintained a staff of about 130, approximately 40 being M&E employees and another 78 being union labor.

Sheetpile installation began April 13 and ended June 7. A total length of about 3,800 feet was installed that completely isolated the work area from the river. The use of union labor unskilled at sheetpile installation slowed initial installation efforts. Following sheetpile installation, a combination of the herbicide Aquathol and the aquatic non-crop herbicide Reward was applied within the sheetpiled area for vegetation suppression.

Dredging began on June 15 and ended on October 16, 2001 (98 days of active dredging). The dredge area was divided into four subareas, Areas A, B, C, and D, each defined according to sediment PCB levels found in pre-dredge core samples. Area C was delineated based on sediment containing 50 ppm or greater PCBs and contained all areas (8 – 10 grids) with sediment containing 500 ppm or greater PCBs. Areas A and D were delineated based on sediment containing 1 ppm to less than 50 ppm PCBs. Area B was designated as clean and encompassed areas of sediment containing 1 ppm PCBs or less.

Area C was physically separated from the other dredge areas using a combination of silt and air curtains. The air curtains reportedly allowed equipment movement into and out of Area C while still containing resuspended material within the area.

Dredging was performed using three Cable Arm environmental buckets (two 5 ½ cy and one 2 ½ cy). Equipment for each dredge operation included a derrick barge with a fixed boom-mounted crane for bucket operation and the GPS positioning software WINOPS. The 5 ½ cy buckets were typically used for initial sediment removal and the 2 ½ cy bucket for cleanup passes. Dredging was to a uniform design depth established from the pre-dredge cores collected from the center of each grid cell. Design removal depth was constant over an entire grid cell. Over-dredging of 3 to 6 inches was required by the design specifications. Dredging was performed over two 10-hour shifts per day, six days per week. All three dredges operated during day shift while one operated during second shift. The limited pool of experienced crane operators from the local union resulted in significant time and effort expended to increase the competency of the crane operators with the dredging and positioning equipment, as well as the procedures for environmental dredging. Additionally, a small amount of sediment and riverbank soils was removed from Area C using a land-based excavator (CAT 350).

Dredged material was deposited into scows for transport to an offloading dock. Loading of the larger scows was limited to less than total volume due to draft limitations within the work area. The scows were each fitted at both ends with a gravity filtration system to treat excess water from the dredging operation. Water released from the filtration system was monitored for a visual plume only as a guide for determining when the sand media required cleaning. The filters failed to operate as designed, primarily due to poorer than anticipated dewatering characteristics of the dredged sediments.

Water column monitoring was performed inside and outside the sheetpile and inside the silt curtain (Area C). Turbidity measurements were obtained outside the sheetpile wall every two hours adjacent to, 100 ft. upstream, and 100 ft. and 350 ft. downstream of each dredge. Additionally, water samples for PCB, PAH, and other parameter analyses were collected outside the sheetpile six hours into each shift. Water column samples were also collected inside the sheetpile and silt curtain once each week for analysis.

The land-based operations were located directly adjacent to the dredging area on Alcoa property. The extent of the land-base operations was relatively unrestricted with approximately seven acres used for barge unloading, laydown space, equipment staging, and project trailers. An additional one-acre area containing four small holding cells built in 1993-94 was used for dewatering and storage of sediment containing 500 ppm or greater PCBs.

Offloading of most dredged material was from a dock built specifically for the project and located at the eastern end of the sheetpiled area (Area A). The exception was sediment from Area C characterized to contain 500 ppm or greater PCBs. This material was offloaded at a small existing dock at the western end of the work area due to the close proximity of the dock to the small, pre-existing holding cells designated for this material.

Offloading was able to occur simultaneously from two scows (one 1,200 cy and one 800 cy) and was performed by two excavators, one per barge, that transferred the material to 30-ton dump trucks. The barges and trucks were marked with colored flags to indicate the three different levels of possible PCB contamination (1 ppm to less than 50 ppm; 50 ppm to less than 500 ppm; and 500 ppm or greater). Excess water from the barges was suctioned off using a vacuum truck prior to offloading sediment. The excess water was placed into one of the four existing holding cells to allow solids to settle out prior to treatment.

The dredged sediment was transported to either the onsite landfill (less than 50 ppm) for solidification and disposal or to the solids handling area (50 ppm to less than 500 ppm) for dewatering and solidification prior to offsite disposal. The onsite landfill was within one mile of the offloading dock. Solidification was achieved by mechanically mixing the Portland cement with the sediment using an excavator until compaction requirements were met. At the solids handling area, the material was placed into holding cells and allowed to gravity dewater for one to two days. Portland cement was added to further solidify the material prior to shipment for offsite disposal.

The solids handling area (including the unloading dock) was 2 - 3 acres in size located adjacent to the eastern dock. The cells were sized to hold about 500 cy of piled consolidated sediment. However, due to higher than anticipated water content, the volume of sediment placed in each cell was limited to about 200 cy.

Prior to offsite disposal, PCB content of the material was determined by collecting a composite sample from each holding cell for analysis. Composite samples of the sediment believed to contain 500 ppm or greater PCBs showed that nearly all contained less than 500 ppm PCBs.

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EPA waived the requirement that material containing 500 ppm or greater PCBs be sent offsite for thermal treatment. This material was eventually treated using solidification and shipped offsite for disposal. A total of 85,600 cy of sediment was removed. Of this, an estimated 69,000 cy were disposed in the onsite landfill and the remaining 16,600 cy were sent for disposal at Model City, NY.

Decant water from gravity dewatering of the sediment and rainwater runoff from the material handling area was treated at a 150 gpm onsite water treatment system. Because the sediment did not gravity dewater as efficiently as anticipated, the water treatment system was only required to operate during rain events. Discharge from the system was to the in-water work area under a NYSDEC discharge permit.

Verification samples were collected using a Ponar grab sampler or, if insufficient sediment existed, by split-spoon sampling techniques. Removal verification was accomplished through a series of iterative steps that first required that a design depth be reached across each grid cell, and then verification that the target level of less than 1 ppm PCBs in surface sediment was met. Design depth was determined using pre- and post-dredging surveys. Because of the large amount of rock within the dredge areas, operation of the Cable Arm bucket was altered to allow working around large rocks, boulders or other obstructions unable to be removed by the bucket. Following the completion of all dredging, final verification sample results for the 268 dredge cells were: less than 1 ppm PCBs, 185 cells; between 1 and 2 ppm PCBs, 51 cells; between 2 and 5 ppm PCBs, 16 cells; between 5 and 10 ppm PCBs, four cells; and greater than 10 ppm PCBs, 12 cells (of these, one was greater than 100 ppm). All three bucket types were used to reduce PCB levels in the 12 cells containing greater than 10 ppm PCBs. These efforts were ultimately unsuccessful and the cells, along with three adjacent cells, were temporarily capped with 6- to 12-inches of clean gravel until they could be evaluated for further action.

In May 2002, Alcoa began efforts to have equipment mobilized to the site to complete installation of an engineered cap over the 15 dredge cells that had been temporarily capped. During this same time, NYSDEC was continuing review of the selected cap design and USEPA was reviewing a draft project completion report. Based on its review, NYSDEC concluded that the cap design may not be adequately protective of the local biological community and requested that the cap be redesigned. Because of this, Alcoa canceled equipment mobilization to the site until a final cap design could be agreed upon. As of July 22, 2002, US EPA, NYSDEC, and Alcoa were continuing negotiations on an agreement to finalize the cap design. Additionally, Alcoa and USEPA were continuing to work to resolve issues regarding the method for completing the dredging as documented in the draft completion report.

In Spring 2004, USEPA requested that Alcoa perform additional dredging to remove elevated levels of PAHs found within previously dredged areas. Sixty-eight of the originally targeted 268 dredge cells are being targeted for further dredging. Alcoa previously collected 0 to 8 inch sediment samples from the target areas and as of June 2004 was preparing a sampling plan to collect core samples from the same areas. It is unclear how additional dredging would be implemented since the sheetpile wall used to isolate the original dredge area from the rest of the St. Lawrence River was removed and the facility landfill used to dispose of sediment containing low-level PCBs is now closed.

Remedial Action Planned: ☑

Risk Assessment: ☑

Remedial Action Implemented: ☑

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Status of Dredging	☐
PRPs:	☑
Contacts:	☑
References:	☑
Modeling:	☑
Fishing Advisory:	☑

Key Conditions: capping, commercial landfill, dedicated landfill or CDF, dredging, Great Lakes AOC, hydrodynamic modeling, incineration, post monitoring, solidification/stabilization

REMEDIAL ACTION PLANNED

Project Name	***REYNOLDS METALS (Massena)***	***ProjectID:*** 02-11
Last Updated:	11/04/00	

Target Sediment Cleanup Standards (TSCS):	1 ppm PCBs, 10 ppm total PAHs, and 1 ppb TCDF.
How TSCS Established:	Human Health Risk Assessment
Target Bank and Floodplain Cleanup Levels (if applicable):	N/A
Other Target:	aluminum, fluoride, cyanide
Environmental Sample Data References:	
• ***Sediment:***	
• ***Water:***	
• ***Fish:***	
Estimated Target Volume:	77,600 cy
Planned Disposal Method:	Offsite incineration (>500 ppm, PCBs); Model City, NY landfill (50-500 ppm PCB); on-site landfill (< 50 ppm PCBs).
Estimated Calendar Time to Implement Remedy:	Possibly starting in 2001.
Estimated Time to Implement Remedy:	One to two years following design completion.
Estimated Cost to Implement Remedy:	$63.2 million ($814 per cy) (Source: Reference A-301) "This estimate includes approximately $5.2 million for on-site landfilling of the 43,400 cy of sediment with PCB levels less than 50 ppm, $9.5 million for off-site landfilling of the 29,700 cy of sediment with PCB levels between 50 and 500 ppm, and $7.2 million for transporting and incinerating the 4,500 cy of sediment with PCB levels exceeding 500 ppm." Incineration of 4,500 cy of sediment with PCB concentrations greater than 500 ppm at an offsite facility is estimated to cost $5.8 million more than disposal costs of the same material at the Model City landfill.
Stated Remedial Action Objectives (and Source):	Abate a potential imminent and substantial threat to public health, welfare or the environment. Decision Document, 1993 (Reference A-128).
Measures of Success to be Used:	Not defined
Planned Monitoring and Restoration:	Five-year post monitoring program; details not defined.
Agency Position on Sediment Removal (and Source):	Decision Document, September 1993 (Reference A-128): "The 1 ppm PCB cleanup level in sediment is identical to that selected by EPA for the General Motors Site which is immediately downstream of the RMC site. For the GM site, EPA estimated that a 1 ppm PCB cleanup level in sediments is associated with a 10-4 (1 in 10,000) excess cancer risk to humans. For the RMC Study Area Site, EPA estimates that a 1 ppm PCB cleanup level in sediments is associated with an excess cancer risk to humans on the order of 10-4 (1 in 10,000)."

"There are approximately 51,500 cy of sediment over a 27-acre area with PCB concentrations above 1 ppm, PAHs above 10 ppm, and TDBFs (total dibenzofurans) above 1 ppb. EPA considers such sediments to pose a principal threat to human health and the environment."

"Federal and New York State sediment quality criteria guidance indicate that PCB cleanup levels well below 1 ppm are required to achieve protection of the environment since PCBs pose a significant ecological risk. While EPA would prefer a lower cleanup level associated with a 10-6 cancer risk, EPA has significant concerns as to the technical practicability of achieving a PCB cleanup level below 1 ppm in this area of the St. Lawrence River. In selecting the 1 ppm cleanup goal, EPA has balanced its desire for a very low cleanup level which will minimize residual risk with the constraints posed by the limitations of dredging as a means of removing sediment with the further intent of selecting treatment as a principal element over containment. EPA believes that a 1 ppm cleanup goal in the St. Lawrence River provides an acceptable measure of protection of human health."

Post-Decision Proposed Plan (Reference A-301): "EPA is not proposing to change the cleanup goals established for the Site. The goal of the remedial action is to remove sediments from the St. Lawrence River with PCB concentrations exceeding 1 ppm, total PAH concentrations exceeding 10 ppm, and TDBF concentrations exceeding 1 ppb. It is noted, however, that due to the technological limitations associated with dredging sediments from a riverine environment, those cleanup goals may be difficult to achieve"

"EPA intends to remove contaminated sediments from the St. Lawrence River by dredging to predetermined limits which would be defined during the remedial design. Post-dredging sampling would then be performed to determine if the cleanup goal of 1 ppm of PCBs has been achieved. If such a goal is not achieved, then EPA would make a determination at that time whether further dredging and/or capping of the sediments is necessary."

The agency's position for selecting incineration over offsite landfilling of sediments with PCBs containing greater than 500 ppm PCBs is:

(Source: Reference A-564, Appendix 2: Responsiveness Summary)

"EPA acknowledges that federal TSCA regulations do not distinguish between dredged materials having PCB concentrations greater than 500 ppm and less than 500 ppm in specifying disposal requirements. This distinction is made by EPA, consistent with its Superfund program's expectation for using treatment to address the principal threats posed by a site whenever practicable. Principal threats are generally characterized as waste that cannot be reliably controlled in place, such as liquids, highly mobile materials (e.g., solvents), and high concentrations of toxic compounds (e.g., several orders of magnitude above levels that allow unrestricted use and unlimited exposure). EPA's PCB guidance regarding the remediation of PCB contamination as a principal threat under the Superfund program favors the treatment of materials with PCB concentrations exceeding 500 ppm in an industrial setting."

"Although EPA's program expectation is to use treatment to address principal threats, certain technological, economic and implementation factors may make treatment impracticable for certain types of site conditions. Treatment is less likely to be practicable when sites have large volumes of waste or when the waste is very difficult to handle and treat (e.g., mixed waste of widely varying composition). Other site-specific situations which may limit the use of treatment include: (1) the extraordinary size or complexity of a site makes treatment impracticable; (2) the use of treatment would result in greater overall risk to human health and the environment due to risks

posed to workers or the surrounding community; and (3) treatment technologies are not technically feasible or are not available within a reasonable time frame."

"In considering the Superfund program's expectation and EPA's PCB guidance, EPA has determined that treatment of the sediments with PCB levels exceeding 500 ppm can be practicably utilized with respect to the Site. Although the estimated cost for off-site incineration is high, there is an overall cost savings of $9.2 million associated with this plan."

"EPA recognizes that its proposal is not consistent with the land-based remedy selected by NYSDEC at the Reynolds Facility, where excavated soils sent off-site for landfilling contained PCB levels an order of magnitude higher than the levels found in the river sediments. However, the preference for treatment is a EPA policy, not a federal or state regulation. NYSDEC, in selecting the land-based remedy, was only required to consider whether its preferred remedy met all federal and state ARARs."

"EPA's preference for treatment is a statutory provision that applies to remedial actions selected by the Agency. However, the statutory preference for treatment does not apply to cleanups that occur under the EPA's removal program. Removal actions are conducted in an expedited manner (when compared to remedial actions) to mitigate or abate a release or threat of release; the time and resources associated with treatment may be incompatible with the expedited nature of removal action. Of the specific examples cited by Reynolds, two were performed as removal actions: The Alcoa site in Massena and the Manistique River and Harbor site in Michigan. It also should be noted that the non-time critical removal action conducted at the Alcoa site was an early action conducted to address highly contaminated sediments in the vicinity of one of Alcoa's out falls to the St. Lawrence River. The EPA has not yet selected a final remedial action for the Alcoa site."

"Of the other examples cited by Reynolds, the Willow Run Creek site in Michigan was a state lead site and the Ottawa River Tributary site in Ohio was remediated through a voluntary partnership between the responsible party, the Ohio Environmental Protection Agency, the City of Toledo, and the Great Lakes National Program Office (EPA), and therefore, is out of the realm of the Superfund program. The Cosden Chemical Coatings Corporation-site in New Jersey did not have PCB concentrations exceeding 500 ppm. The remedy selected for the Facet Enterprises, Inc., site in New York, although not specifically calling for the treatment of soils with PCB levels exceeding 500 ppm, included the off-site treatment of those soils by solidification prior to landfilling to address heavy metals in the soils which failed Toxic Characteristic Leaching Procedure (TCLP) testing for characteristics of a hazardous waste."

"Regarding the August 1998 Post-Decision Proposed Plan for GM Superfund site, EPA does not know whether the sediments and soils to be sent off-site for disposal under that plan would exhibit PCB levels greater than 500 ppm. Post-dredging sampling and analyses of the St. Lawrence River sediments, which are temporarily stockpiled at the GM plant, showed PCB levels to be lower than 500 ppm. Since EPA does not anticipate that the sediments or soils will contain PCB levels above 500 ppm, the determination whether or not treatment of those sediments and soils can be practicably utilized in a cost-effective manner will be made during construction, if the alternative preferred by EPA in the GM Post-decision Proposed Plan is selected as the modified remedy."

RISK ASSESSMENT

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Last Updated: 09/21/98

RA Type: Human Health and Ecological

RA Status: Complete

RA Objectives: Evaluate the potential risks to human health and the environment associated with the sediment site in its current state (Reference A-128).

Company Performing RA:

RA Reference Report:

RA Summary and Conclusions: Reference A-128:

EPA's Baseline Human Health Risk Assessment evaluated both present and possible future exposures for recreation users (dermal contact) and subsistence fishermen (ingestion of fish).

Reference A-128 states: "The greatest carcinogenic risk values calculated for the Site are associated with the ingestion of fish caught in the St. Lawrence River. The only contaminants contributing to this value were PCBs." Calculated risk was in the 10-2 range.

Calculated risk from dermal contact or ingestion of sediment was in the10-3 range. The HI for noncarcinogenic effects from ingestion of fish from the St. Lawrence River at the Reynolds facility was 70, and in the vicinity of the Reynolds facility was 100.

Reference A-128 further states: "A four-step process was utilized for assessing site-related ecological risks for a reasonable maximum exposure scenario: Problem Formulation and Hazard Identification - development of information characterizing habitats and potentially exposed species found in the Reynolds Study Area and identification of contaminants of concern and exposure pathways and receptors; Exposure Assessment - the estimation of actual and potential exposure point concentrations for selected indicator species; Ecological Effects Assessment - literature reviews, field studies, and toxicity tests linking contaminant concentrations to effects on indicator species; and Risk Characterization - measurement or estimation of both current and future adverse effects from exposure to contaminants in the Reynolds Study Area."

"EPA identified several contaminants which were of concern from an ecological risk perspective and their respective animal receptors including PCBs, PAHs, aluminum, fluoride, and cyanide in aquatic macroinvertebrates, yellow perch, white sucker, least bittern, belted kingfisher, little brown bat, and mink. PCBs have been shown to have adverse effects on these receptors including reproductive impairment in certain birds and reproductive failure in mink."

"The results of the ecological risk assessment indicate that the contaminated sediment and water in the St. Lawrence River in the Reynolds Study Area pose unacceptable risks to several species. These risks include reproductive effects to animals which bioaccumulate PCBs in their tissues. In addition, the concentrations of several contaminants, including aluminum and PAHs, are several times higher than federal and State ambient water quality criteria and federal sediment quality criteria and National Oceanic and Atmospheric Administration sediment guidelines which are based on protection of wildlife."

Project Name:	***REYNOLDS METALS (Massena)***	***ProjectID:*** 02-11
Last Updated:	08/23/02	

Physical Target: Thirty-acre nearshore area in the St. Lawrence River.

Goals: Remove sediment containing 1 ppm or greater PCBs.

Primary Contractor: Bechtel Environmental, Inc. (construction oversight and project management for Alcoa)

Other Contractors: Metcalf & Eddy (design and construction oversight for dredging and sheetpile installation); Faust Corporation (dredging and sheetpile installation); Parras Environmental and Construction (land-based operations such as barge offloading, solids handling, and transportation to the landfill).

Project oversight was performed by the U.S. Army Corps of Engineers-NY District Office and TAMS Consultants (representing US EPA). Independent oversight of the project was performed by NYSDEC, the St. Regis Mohawk Tribe, and the Canadian Government. Additionally, Alcoa maintained a full-time independent QA Officer onsite. At its peak the project maintained a staff of about 130, approximately 40 being M&E employees and another 78 being union labor.

Generic Remediation Method: Mechanical dredging

Equipment: Sheetpile installation was accomplished using vibratory hammers, derrick and material barges, and welding equipment. A CAT 350 excavator was used for shoreline sediment removal, for debris and rock removal (positioned on a deck barge), and for the placement of cap material. Dredging was performed using three Cable Arm environmental buckets (two 5 ½ cy and one 2 ½ cy). Equipment for each dredge operation included a derrick barge with a fixed boom-mounted crane for bucket operation and the GPS positioning software WINOPS. The 5 ½ cy buckets were typically used for initial sediment removal and the 2 ½ cy bucket for cleanup passes. Each dredge required a three-person crew consisting of a crane operator, deck hand, and an individual to monitor and process incoming data from the WINOPS positioning and dredge tracking system. Five scows (two 1,200 cy, two 800 cy, and one 400 cy) were used to transport sediment to the offloading dock. Two excavators offloaded the sediment from the barges, one per barge, and transferred the material to 30-ton dump trucks. Area C, the most contaminated area, was separated from the other dredge areas using a combination of about 1,200 ft. of silt curtains and air curtains. The air curtains allowed equipment movement into and out of Area C while still containing resuspended material within the area. Air for the air curtains was supplied by two electrically-operated air compressors, or in case of power failure, a backup diesel-operated compressor.

Three tugboats were used to maneuver barges within the dredge area and during sheetpile installation. A land-based excavator (CAT 350) was used for nearshore sediment and bank soil removal.

Material Handling: Sheetpile installation began April 13 and ended June 7. A total length of about 3,800 feet was installed that completely isolated the work area from the river. The rate of sheetpile installation for design purposes was estimated at 100 linear feet per day and the actual ranged from 20 to 80 linear feet per day. The use of union labor unskilled at sheetpile installation necessitated substantial unplanned time and effort for training and slowed initial installation efforts. Following sheetpile installation, a combination of the herbicide Aquathol and the aquatic non-crop herbicide Reward was applied within the sheetpiled area for vegetation suppression. The herbicides required a latency period of seven days to achieve maximum results. Reportedly, the herbicides worked as intended.

Transport channel dredging to provide sufficient water depth for environmental dredging was performed intermittently from June 12 to July 6 (13 days total). Rocks and boulders were removed from the transport channels using Cable Arm and conventional rock buckets, and the CAT 350

equipped with a hydraulic grappler. Environmental dredging began on June 15 following the latency period required by the herbicides and ended on October 16, 2001 (98 days of active dredging). The dredge area was divided into four subareas, Areas A, B, C, and D, each defined according to sediment PCB levels found in pre-dredge core samples. The pre-dredge cores were collected at node points using a triangular grid pattern. Samples from Areas A and D were collected using a grid of 70 ft. to a side. A smaller grid of 50 ft. to a side was used to delineate Area C (the area containing the highest levels of PCBs). Sediment removal was controlled spatially using an offset rectangular grid cell pattern, the center of each rectangular grid cell being defined by a single pre-dredge core sample. Area C was delineated based on sediment containing 50 ppm or greater PCBs and contained all areas with sediment containing 500 ppm or greater PCBs. Areas A and D were delineated based on sediment containing 1 ppm to less than 50 ppm PCBs. Area B was designated as clean and encompassed areas of sediment containing 1 ppm PCBs or less.

Area C was physically separated from the other dredge areas using a combination of silt and air curtains. The air curtains reportedly allowed equipment movement into and out of Area C while still containing resuspended material within the area. The air for the air curtains was supplied by two electrically operated air compressors. A backup diesel compressor was provided in case of power failure.

Dredging was performed using three Cable Arm environmental buckets (two 5 ½ cy and one 2 ½ cy). Equipment for each dredge operation included a derrick barge with a fixed boom-mounted crane for bucket operation and the GPS positioning software WINOPS. The 5 ½ cy buckets were typically used for initial sediment removal and the 2 ½ cy bucket for cleanup passes. Each dredge required a three-person crew consisting of a crane operator, deck hand, and an individual to monitor and process incoming data from the WINOPS positioning and dredge tracking system.

Dredge cycle time varied depending on operator experience, how closely the operator followed the dredging procedure, the type of dredging being performed (initial or cleanup), and whether fractured rock was encountered. A cycle time of four minutes was used for project design but actual cycle times were closer to 1 ½ - 2 minutes. A bucket rinse step (as recommended by Cable Arm) was not used.

Dredging was to a uniform design depth established from the pre-dredge cores collected from the center of each grid cell. Design removal depth was constant for the entire grid cell. Over-dredging of 3 – 6 inches was required by the design specifications.

Bucket closure was monitored closely due to the presence of greater volumes of fractured rock than anticipated. Fractured rock typically has flat, angular sides, making it more easily trapped within the closing jaws of the bucket than natural, weathered rock which tends to be more rounded. Obtaining full bucket closure was accomplished for about 80% of the bucket grabs for the project.

Dredging was performed over two 10-hour shifts per day, six days per week. All three dredges were operated during day shift while only one operated during the second shift. The pool of experienced crane operators from the local union labor pool was found limited, as was the case for sheetpile installation. This resulted in significant time and effort expended working with the crane operators to increase their competency with the dredging and positioning equipment, as well as the procedures for environmental dredging.

Additionally, a small amount of sediment and riverbank soils was removed from Area C using a land-based excavator (CAT 350). An access road was constructed the full length of the target bank area and sediment and soil were loaded directly onto trucks for transport to the material handling area.

Dredged material was deposited into one of five scows (two 1,200 cy, two 800 cy, and one 400 cy) for transport to the offloading dock. Loading of the larger scows was limited to less than total volume due to draft limitations within the work area. Three tugs were used, one large and two small, to maneuver derrick barges and scows within the sheetpile area. The scows were each fitted at both ends with a filtration system to treat sediment decant water.

The land-based operations were located directly adjacent to the dredging area on Alcoa property. The extent of the land-based operations was relatively unrestricted with approximately 7 acres used for barge unloading, laydown space, equipment staging, and project trailers. An additional area (one acre) containing four small holding cells built in 1993-94 was used for dewatering and storage of sediment containing 500 ppm or greater PCBs.

Offloading of most dredged material was from a dock built specifically for the project and located at the eastern end of the sheetpiled area (Area A). The exception was sediment from Area C characterized to contain 500 ppm or greater PCBs. This material was offloaded at a small existing dock at the western end of the work area due to the close proximity of the dock to the small, pre-existing holding cells designated for this material.

Offloading capabilities allowed removal of dredged material to occur simultaneously from two scows (one 1,200 cy and one 800 cy). Offloading was by two excavators, one per barge, that transferred the material to 30-ton dump trucks. The barges and trucks were marked with colored flags to indicate the three different levels of possible PCB contamination (1 ppm to less than 50 ppm; 50 ppm to less than 500 ppm; and 500 ppm or greater). The flags assisted in monitoring the offloading, onsite transport, and disposal of the materials removed from areas containing varying levels of PCB contamination.

Excess water from the barges was suctioned off using a vacuum truck. This water was then offloaded into one of the four existing holding cells to allow solids to settle out prior to treatment.

The dump trucks transported the sediment to either the onsite landfill (less than 50 ppm) for solidification and disposal or to the solids handling area (50 ppm to less than 500 ppm) for dewatering and solidification prior to offsite disposal. The onsite landfill was within one mile of the offloading dock. Solidification was achieved by the addition of Portland cement (as high as 12% by volume; design was 5%). Following unloading at the onsite landfill, the cement was mechanically mixed with the sediment using an excavator to achieve compaction requirements. At the solids handling area, the material was placed into holding cells and allowed to gravity dewater for one to two days. Portland cement was added to further solidify the material prior to shipment for offsite disposal at the landfill at Model City, NY.

The solids handling area (including the unloading dock) was 2 - 3 acres in size with an engineered base consisting of (ascending) geotextile, geomembrane, geonet, stone, and base and top asphalt layers. Concrete traffic barriers were used to separate material holding cells. The cells were sized to hold about 500 cy of piled consolidated sediment. However, due to higher than anticipated water content, the volume of sediment placed in each cell was only about 200 cy. The base was sloped to allow water to gravity drain to a small holding basin for collection, then treatment.

Prior to offsite disposal, the precise PCB content of the material was determined. Material was collected from each holding cell at 10 separate locations, combined in a cement mixer, and a single composite sample was then collected for analysis.

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	Composite samples of the sediment believed to contain 500 ppm or greater PCBs showed that nearly all contained less than 500 ppm PCBs. This material was eventually treated using solidification and shipped offsite for disposal at the landfill at Model City. For the entire project, the removed sediment was disposed of nearly equally between onsite and offsite disposal. EPA waived the requirement that material containing 500 ppm or greater PCBs be sent offsite for thermal treatment. Verification samples were collected using a Ponar grab sampler or, if insufficient sediment existed, by split-spoon sampling techniques.
Volume Removed:	85,600 cy
Calendar Time:	April 13 thru October 16, 2001
Time To Implement:	Two months for sheetpile installation and 4 months for dredging.
Total Cost:	$37.5 million ($468/cy) (as of March 31, 2002)
Dredging Cost:	$5 million ($62.40/cy)
Disposal of Sediment:	Approximately 85,600 cy of sediment containing an estimated 20,200 lbs. of PCBs were removed and disposed either at an onsite industrial landfill or at an offsite TSCA-approved landfill. For sediment containing less than 50 ppm PCBs, treatment was by stabilization and disposal was in an onsite landfill located less than one mile from the unloading dock (an estimated 69,000 cy); for sediment containing 50 ppm or greater PCBs, treatment was by stabilization and disposal was at the landfill at Model City, NY (an estimated 16,600 cy). EPA waived the requirement that material containing 500 ppm or greater PCBs be sent offsite for thermal treatment.
Volume of Water:	Unavailable. Water from the dredge slurry in the scows was treated by a series of filter compartments integral with the scows. For land-based operations, the source of water requiring treatment was from the material handling area and included both decant water from gravity dewatering of sediment and rainwater runoff.
Method of Water Treatment:	A 150 gpm onsite water treatment system was erected that comprised a metallic filter, sand filter, and carbon treatment. Because the sediment did not gravity dewater as efficiently as anticipated, the water treatment system was only required to operate during rain events. Discharge from the system was to the in-water work area under a NYSDEC discharge permit. Additionally, the scows were each fitted at both ends with a filtration system to treat sediment decant water. The filtration system consisted of compartments in series, which included first coarse metal grates and screens; then geomembrane, plastic wedge wire screen, and geomembrane; and finally sand. Excess decant water from the dredging operation flowed by gravity through the series of screens and geomembranes and spread across the sand. The water then percolated through the sand into perforated pipes, returning to the surrounding water through two valved discharge lines penetrating the scow hull. The released water was monitored for a visual plume only. A visual plume was used to indicate when the sand media required cleaning. The filter system failed to operate as designed allegedly due to poorer than anticipated sediment dewatering characteristics and frequent clogging of the filters.
Water Discharge Limit:	300 mg/L per Aroclor (1242, 1248, 1254, 1260). Other parameters monitored were pH (6.0 to 9.0), TSS (20 mg/L), oil and grease (10 mg/L), benzo(a)pyrene (90 mg/L), and individual PAHs (10 µg/L).
Air Monitoring During Remediation:	Not obtained.

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Water Monitoring During Remediation:

Water column monitoring was performed inside and outside the sheetpile and inside the silt curtain (Area C). Turbidity measurements were obtained outside the sheetpile wall every two hours adjacent to, 100 ft. upstream, and 100 ft. and 350 ft. downstream of each dredge. Additionally, water samples for PCB, PAH, and other parameter analyses were collected outside the sheetpile six hours into each shift. Water column samples were also collected inside the sheetpile and silt curtain once each week for analysis.

Outcome:

Approximately 85,600 cy of sediment were removed starting June 15 and ending October 16, 2001 (98 days of active dredging). Of the sediment removed, approximately 69,000 cy (81%) of sediment either identified prior to the start of dredging or verified by sampling following dredging to contain less than 50 ppm PCBs was solidified and disposed of in an onsite landfill. The remaining 16,600 cy (19%) were solidified onsite and sent offsite to the landfill at Model City, NY for disposal. Of this material, approximately 4,564 cy exhibited PCB concentrations of 500 ppm or greater.

The target area was divided into four areas for design purposes, three of which contained sediments with PCB concentrations greater than the target level of 1 ppm. These three dredge areas were further divided into 268 dredge cells to assist control and tracking of the dredging. Removal verification was accomplished through a series of iterative steps that first required that the design depth be reached across each grid cell, and then verification that the target level of less than 1 ppm PCBs in surface sediment was met. Design depth was determined using pre- and post-dredging surveys. If the target depth was reached across an entire grid, a verification sample was collected from the center of the grid (co-located to the extent practical with the pre-dredge characterization core). In cells where target depths were unable to be obtained due to obstructions, dredging around the obstruction was performed to the maximum extent possible using the 2 ½ cy Cable Arm bucket. If the target depth was still not obtained across the entire grid cell, a verification sample was collected at the final elevation.

Verification samples were collected using a Ponar grab sampler or, if insufficient sediment existed, by split-spoon sampling techniques. A decision matrix was then used to determine if dredging within a particular grid cell was complete, based on reaching the target depth and a verification sample result showing 1 ppm PCBs or less. Initially, if greater than 1 ppm PCBs remained following a dredge pass, then up to two additional dredge passes were performed to attempt to reach that level.

Additionally, the work area was divided into three evaluation areas to assist the determination of when the project could be considered complete, and if and where capping may be necessary. The three evaluation areas were assessed by statistically averaging all grid cell verification sample results within the selected area. Remediation was considered complete if the following three criteria were met for each evaluation area:

- Requirements of the dredging procedures and logic flow sheet have been accomplished in each grid cell;
- The average PCB concentration in the evaluation area is less than or equal to 5 ppm; and
- No individual cell within the evaluation area has a PCB concentration greater than 10 ppm.

If these criteria were not met, additional dredging was performed to attempt to meet the criteria, or the grid cells were marked for capping. If capping was selected, then the capped cells could be excluded from further statistical averaging and the balance of grid cells would be used to assess the criteria.

Verification samples collected following initial dredge passes (intended to remove sediment to the design elevation) in each cell indicated that 106 cells and 28 cells contained sediments with PCB levels less than 1 ppm and 2 ppm, respectively. The dredging level of effort (i.e., the number of dredge passes) performed to attempt to reach the target level of 1 ppm PCBs then varied by cell for the remainder of the project as follows: 78 cells, two passes; 22 cells, three passes; 14 cells, four passes; seven cells, five passes; two cells, six passes; five cells, seven passes; three cells, eight passes; two cells, ten passes. A total of 546 dredge passes were performed.

Following the completion of all dredging, final verification sample results for the 268 dredge cells exhibited: less than 1 ppm PCBs, 185 cells; between 1 and 2 ppm PCBs, 51 cells; between 2 and 5 ppm PCBs, 16 cells; between 5 and 10 ppm PCBs, four cells; and greater than 10 ppm PCBs, 12 cells (of these, one was greater than 100 ppm). All three bucket types were used to reduce PCB levels in the 12 cells containing greater than 10 ppm PCBs. These efforts were ultimately unsuccessful and the cells, along with three adjacent cells, were temporarily capped with 6- to 12-inches of clean gravel until they could be evaluated for further action.

Contractors demobilized prior to the onset of winter including removing the sheetpile isolating the remedial area from the river. Alcoa is currently reviewing project data and long-term monitoring requirements, and working with US EPA and NYSDEC prior to deciding on a final remedy for these 12 sub-grids. The options include: 1) remobilization to dredge to attempt to reach surface sediment concentrations of less than 1 ppm PCBs or 2) complete installation of the remaining components of an engineered cap and perform long-term monitoring of the cap. If additional dredging is performed, Alcoa anticipates the need to install sheetpile around the 12 dredge cells.

Restoration and Post-Monitoring:

Unavailable

Site-Specific Difficulties:

- Bucket closure was monitored closely due to the presence of greater volumes of fractured rock than anticipated. Fractured rock typically has flat, angular sides, making it more easily trapped within the closing jaws of the bucket than natural, weathered rock which tends to be more rounded. Obtaining full bucket closure was accomplished for about 80% of the bucket grabs for the project. Because of the large amount of rock within the dredge areas, operation of the Cable Arm bucket was altered to attempt to minimize resuspension of sediment when working around large rocks, boulders, or other obstructions unable to be removed by the bucket.

- The use of union labor unskilled at sheetpile installation necessitated substantial unplanned time and effort for training and slowed initial sheetpile installation efforts. Similarly, the number of experienced crane operators from the local union labor pool was found to be substantially more limited than stated by the union during contract negotiations. This resulted in significant time and effort expended working with the crane operators to increase their competency with the dredging and positioning equipment, as well as the procedures for environmental dredging.

- Loading of the larger scows was limited to less than total volume due to draft limitations within the work area despite a considerably increased navigational dredging program performed in the transport channels prior to the start of environmental dredging. The combination of extensive rock and historically low river levels resulted in less than optimal available draft for barge and scow movement during project implementation. Additionally, the dredge contractor provided a tugboat that required nearly seven feet of draft.

- The complaint of respiratory problems by residents of nearby Cornwall Island resulted in the temporary suspension of dredging on July 13. Air monitoring was increased around Cornwall Island to determine if increased ambient air PCB levels were the source. The sampling showed no

increase in ambient air concentrations of PCBs near the island and dredging was allowed to resume on July 17.

- The target level of 1 ppm PCBs (or less) was not reached in 83 of the 268 dredge cells. Residual PCB levels in surface sediment ranged from 11 to 120 ppm in the 12 dredge cells in which dredging failed to reach 10 ppm PCBs. Significant operational effort was expended attempting to reduce surface sediment concentrations to below 10 ppm in these dredge cells.

- The dredging operational efficiency achieved ("up-time") was 38% compared to the estimated design efficiency of 60%. Movement of dredge barges and scow change-out were the leading factors contributing to non-productive time, each accounting for about 20% of non-dredging time.

- Project design estimated that about 40% of the removed sediment would drain readily and not require the use of amendments for stabilizing agents prior to transport or disposal. During the project, removed sediment was initially wetter than anticipated and failed to appreciably drain. This resulted in difficulty unloading scows, required excessive handling and storing of the sediment, and greatly increased the use of Portland cement as a stabilizing agent.

Monitoring Data References:

- ***Sediment***
- ***Water:***
- ***Fish:***

POTENTIALLY RESPONSIBLE PARTIES

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

PRP Name: **PRP INFORMATION NOT RELEASED** ***PRPID:***

Street Address:

City:

State:

KEY CONTACTS

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Last Name: **KEY CONTACT INFORMATION NOT RELEASED** ***Contact ID:***

First Name:

Title:

Company:

Address:

City:

State:

Postal Code:

Work Phone # : ***Other Phone #:***

Fax # :

Email Address:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

ReferenceID: 128

Reference Type: A

Title: ***EPA Superfund Record of Decision: (Decision Document), EPA / ROD / R02-93 / 201***

Location: AEM

Category: ROD/Proposed Plan/Action Memo/Decision Document

Prepared by/Author: US EPA Region II

Preparer/Author Address: New York, NY

Prepared For: General Public

Date Published: September 1993

Key Words and Phrases:

ReferenceID: 301

Reference Type: A

Title: ***Superfund Post-Decision Proposed Plan: Reynolds Metals Superfund Site***

Location: AEM

Category: ROD/Proposed Plan/Action Memo/Decision Document

Prepared by/Author: US EPA Region II

Preparer/Author Address: New York, NY

Prepared For: General Public

Date Published: July 1998

Key Words and Phrases:

ReferenceID: 564

Reference Type: A

Title: ***Decision Document Amendment - Reynolds Metals Company Study Area, Massena, New York***

Location: AEM

Category: ROD/Proposed Plan/Action Memo/Decision Document

Prepared by/Author: US EPA Region II

Preparer/Author Address: New York, NY

Prepared For: General Public

Date Published: September 1998

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Reference Type: A ***ReferenceID:*** 705

Title: ***Work Plan for: Sediment Resuspension and Contaminant Release Using The Cable Arm Bucket at Reynolds Metals Company Superfund Site, Massena, NY***

Location: AEM

Category: Resuspension

Prepared by/Author: (1) TAMS Consultants, Inc. and (2) Donald F. Hayes, Ph.D, P.E.

Preparer/Author Address: (1) 4248 Ridge Lea Road
Amherst, NY 14226
(2) Civil & Environmental Engineering
University of Utah

Prepared For:

Date Published: August 2001

Key Words and Phrases: This work plan was never implemented.

Reference Type: A ***ReferenceID:*** 706

Title: ***Final Dredging Program Design Report for the River Remediation Project at the Reynolds Metals Company St. Lawrence Reduction Plant, Massena, NY (Revision 4)***

Location: AEM

Category: Remedial Design

Prepared by/Author: Metcalf & Eddy

Preparer/Author Address: Columbus, OH

Prepared For: US EPA Region II and Alcoa

Date Published: June 2000

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Reference Type: A ***ReferenceID:*** 1052

Title: ***Draft Interim Completion Report - Volume 1, Revision 0***

Location: AEM

Category: Close-Out Report

Prepared by/Author: Bechtel Associates Professional Corporation

Preparer/Author Address:

Prepared For: Bechtel Environmental, Inc., Oak Ridge, TN and Alcoa

Date Published: March 2002

Key Words and Phrases:

Reference Type: B ***ReferenceID:*** 271

Title: ***EPA Seeks Public Comment on Cleanup Plan for Contaminated Sediments in the St. Lawrence River near the Reynolds Metal Company Facility in Massena, NY***

Location: AEM

Category: Site Update

Prepared by/Author: US EPA Region II

Preparer/Author Address: New York, NY

Prepared For: News Release

Date Published: July 29, 1998

Key Words and Phrases:

Reference Type: B ***ReferenceID:*** 603

Title: ***Dredging of Contaminated St. Lawrence River Sediments Near Reynolds Metals Company Site in Massena NY is Underway***

Location: AEM

Category: Site Update

Prepared by/Author: US EPA Region II

Preparer/Author Address:

Prepared For: General Public

Date Published: June 19, 2001

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Reference Type: B ***ReferenceID:*** 793

Title: ***Realizing Remediation I - Great Lakes Contaminated Sediments St. Lawrence River - Reynolds Metals Site (see Reference A-905)***

Location: AEM

Category: Dredging: Remedial (Contaminated Sediments)

Prepared by/Author: US EPA Great Lakes National Program Office (GLNPO)

Preparer/Author Address: 77 West Jackson Boulevard (G-17J)
Chicago, IL 60604

Prepared For: General Public

Date Published: August 1, 2002

Key Words and Phrases:

Reference Type: B ***ReferenceID:*** 838

Title: ***Realizing Remediation II - Updated Summary: St. Lawrence River - Reynolds Metals Site (see Reference A-907)***

Location: AEM

Category: Dredging: Remedial (Contaminated Sediments)

Prepared by/Author: US EPA Great Lakes National Program Office (GLNPO)

Preparer/Author Address: 77 West Jackson Boulevard (G-17J)
Chicago, IL 60604

Prepared For: General Public

Date Published: July 2000

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 53

Title: ***Reynolds in agreement on smelter cleanup***

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author Address:

Prepared For: Engineering News-Record (ENR)

Date Published: March 29, 1993

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Reference Type: C ***ReferenceID:*** 164

Title: ***Manufacturers mount mission to mop up Massena***

Location: AEM

Category: Site Update

Prepared by/Author: Debra K. Rubin

Preparer/Author Address:

Prepared For: Engineering News-Record (ENR)

Date Published: August 21, 1995

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 218

Title: ***HWTC seeks desorber regulation***

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author Address:

Prepared For: Superfund Week

Date Published: August 13, 1993

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 299

Title: ***EPA Proposes $63M Dredging Project of PCBs in N.Y. St. Lawrence River***

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author Address:

Prepared For: Superfund Week

Date Published: August 7, 1998

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Reference Type: C ***ReferenceID:*** 326

Title: ***EPA Wants to Dredge St. Lawrence River at Huge Cost: $63 Million***

Location: AEM

Category: Site Update

Prepared by/Author: US EPA Region II

Preparer/Author Address:

Prepared For: Superfund Week

Date Published: October 9, 1998

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 575

Title: ***Sediment Remediation Can Improve Great Lakes Water Quality***

Location: AEM

Category: Miscellaneous

Prepared by/Author: (1) John H. Hartig, (2) Lisa Maynard, (3) Michael A. Zarull, (4) Gail Krantzberg

Preparer/Author Address: (1) Greater Detroit American Heritage River Institute
Detroit, MI
(2) International Joint Commission
Windsor, Ontario, Canada
(3) National Water Research Institute
Burlington, Ontario, Canada
(4) Ontario Ministry of Environment

Prepared For: Water Environment & Technology (WE&T)

Date Published: October 1999

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Reference Type: C ***ReferenceID:*** 664

Title: ***Cable Arm Receives Environmental Order***

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author Address:

Prepared For: International Dredging Review (IDR), 2001, Vol. 20, No. 2

Date Published: February 2001

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 778

Title: ***River Bottom Dredging Removes PCBs near N.Y. Metals Plant***

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author Address:

Prepared For: Hazardous Waste/Superfund Week

Date Published: July 2, 2001

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 785

Title: ***PCB Cleanup***

Location: AEM

Category: Dredging: Equipment

Prepared by/Author:

Preparer/Author Address:

Prepared For: World Dredging Mining & Construction

Date Published: April 2001

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

ReferenceID: 291

Reference Type: D

Title: ***St. Lawrence Cleanup Has Lessons***

Location: AEM

Category: Site Update

Prepared by/Author: Roger Witherspoon

Preparer/Author Address:

Prepared For: The Rockland County (NY) Journal News

Date Published: August 6, 2001

Key Words and Phrases:

ReferenceID: 292

Reference Type: D

Title: ***Alcoa Shuts Down Dredging Following Breathing Trouble***

Location: AEM

Category: Site Update

Prepared by/Author: Karen White

Preparer/Author Address:

Prepared For: The Daily Courier Observer

Date Published: July 14, 2001

Key Words and Phrases:

ReferenceID: 293

Reference Type: D

Title: ***Bad feelings dredged up along with river silt***

Location: AEM

Category: Site Update

Prepared by/Author: Traci Watson

Preparer/Author Address:

Prepared For: USA Today

Date Published: August 17, 2001

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Reference Type: E ***ReferenceID:*** 51

Title: ***Hydrodynamic Studies and Contaminant Transport in a Complex River System.***

Location: AEM

Category: Modeling

Prepared by/Author: (1) George W. Crouse; (2) Peter R. Jacobson; (3) Edward H. Owens

Preparer/Author Address: (1), (2) Woodward-Clyde Consultants
Plymouth Meeting, PA
(3) Woodward-Clyde Consultants
Seattle, WA

Prepared For: HMCRI Great Lakes Conference Proceedings, Pages 272-275

Date Published: September 26-28, 1990

Key Words and Phrases:

Reference Type: E ***ReferenceID:*** 169

Title: ***Reynolds Metals Papers/Presentations (two CD-ROMs)***

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author Address:

Prepared For: ASCE Dredging '02 Conference

Date Published: May 8, 2002

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Reference Type: E ***ReferenceID:*** 174

Title: ***Post-Dredging Economic Analysis for Remediation of PCB-Contaminated Sediment in the St. Lawrence River near Massena, New York (Complete document on CD-ROM - Reference E-169)***

Location: AEM

Category: Cost Summary Reports

Prepared by/Author: (1) P.J. Fargo, Manager of Production Control; (2) R.C. Esterline, Project Manager; (3) J.B. Cange, Project Engineer

Preparer/Author Address: (1) Bechtel Environmental, Inc.
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(2) Alcoa Remediation Group
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(3) Bechtel Environmental, Inc.
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Prepared For: ASCE Dredging '02 Conference

Date Published: May 8, 2002

Key Words and Phrases:

Reference Type: E ***ReferenceID:*** 175

Title: ***Unexpected Conditions, Unforeseen Complications and Unplanned Expenditures: Lessons Learned in the Dredging of PCB-Contaminated Sediment from the St. Lawrence River (Complete document on CD-ROM - Reference E-169)***

Location: AEM

Category: Contaminated Sediments: Overview of Issues

Prepared by/Author: (1) J.B. Cange, Project Field Engineer; (2) R.C. Esterline, Project Manager; (3) M.J. Elsner, Site Manager; (4) R.K. Lambert, Environmental Engineer

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Prepared For: ASCE Dredging '02 Conference

Date Published: May 8, 2002

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Reference Type: E ***ReferenceID:*** 176

Title: ***Dredging PCB-contaminated Sediment from the St. Lawrence River: Project Overview (Complete document on CD-ROM - Reference E-169)***

Location: AEM

Category: Contaminated Sediments: Overview of Issues

Prepared by/Author: (1) R.C. Esterline, Project Manager; (2) J.B. Cange, Project Field Engineer; (3) R.K. Lambert, Environmental Engineer

Preparer/Author Address: (1) Alcoa Remediation Group
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Prepared For: ASCE Dredging '02 Conference

Date Published: May 8, 2002

Key Words and Phrases:

Reference Type: E ***ReferenceID:*** 177

Title: ***Flow Sheet Logic and Decision Criteria for Defining an End Point to Dredging When Cleanup Goals Are Not Obtained (Complete document on CD-ROM - Reference E-169)***

Location: AEM

Category: Contaminated Sediments: Overview of Issues

Prepared by/Author: (1) R.C. Esterline, Project Manager; (2) J.B. Cange, Project Field Engineer; (3) G.D. Nicholas, Construction Quality Assurance Engineer; (4) B.J. Priori, Marine Oversight Manager

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(2) Bechtel Environmental, Inc.
Oak Ridge, TN
(3) Resource Engineering and Testing, Inc.
Oak Ridge, TN
(4) Metcalf & Eddy, Inc.
Columbus, OH

Prepared For: ASCE Dredging '02 Conference

Date Published: May 8, 2002

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Reference Type: G ***ReferenceID:*** 35

Title: ***Post-Dredging Economic Analysis for Remediation of PCB-Contaminated Sediment in the St. Lawrence River near Massena, New York - Presentation (Complete presentation on CD-ROM - Reference E-169)***

Location: AEM

Category: Cost Summary Reports

Prepared by/Author: J.B. Cange, Project Field Engineer

Preparer/Author Address: Bechtel Environmental, Inc.
Oak Ridge, TN

Prepared For: ASCE Dredging '02 Conference

Date Published: May 8, 2002

Key Words and Phrases:

Reference Type: G ***ReferenceID:*** 36

Title: ***Unexpected Conditions, Unforeseen Complications and Unplanned Expenditures: Lessons Learned in the Dredging of PCB-Contaminated Sediment from the St. Lawrence River - Presentation (Complete presentation on CD-ROM - Reference E-169)***

Location: AEM

Category: Cost Summary Reports

Prepared by/Author: J.B. Cange, Project Field Engineer

Preparer/Author Address: Bechtel Environmental, Inc.
Oak Ridge, TN

Prepared For: ASCE Dredging '02 Conference

Date Published: May 8, 2002

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Reference Type: G ***ReferenceID:*** 37

Title: ***Dredging PCB-contaminated Sediment from the St. Lawrence River: Project Overview - Presentation (Complete presentation on CD-ROM - Reference E-169)***

Location: AEM

Category: Cost Summary Reports

Prepared by/Author: J.B. Cange, Project Field Engineer

Preparer/Author Address: Bechtel Environmental, Inc.
Oak Ridge, TN

Prepared For: ASCE Dredging '02 Conference

Date Published: May 8, 2002

Key Words and Phrases:

Reference Type: G ***ReferenceID:*** 38

Title: ***Flow Sheet Logic and Decision Criteria for Defining an End Point to Dredging When Cleanup Goals Are Not Obtained - Presentation (Complete presentation on CD-ROM - Reference E-169)***

Location: AEM

Category: Cost Summary Reports

Prepared by/Author: J.B. Cange, Project Field Engineer

Preparer/Author Address: Bechtel Environmental, Inc.
Oak Ridge, TN

Prepared For: ASCE Dredging '02 Conference

Date Published: May 8, 2002

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Reference Type: K ***ReferenceID:*** 20

Title: ***Grasse River Demonstration Capping and Reynolds Metals Dredging***

Location: AEM

Category: Site Update

Prepared by/Author: AEM, Inc.

Preparer/Author Address:

Prepared For: Distribution

Date Published: August 2001

Key Words and Phrases:

Reference Type: L ***ReferenceID:*** 137

Title: ***Maximum Baseline Cancer Risks for Contaminated Sediment Sites***

Location: AEM

Category: Risk Assessment

Prepared by/Author: AEM, Inc.

Preparer/Author Address:

Prepared For: Distribution

Date Published: October 22, 2001

Key Words and Phrases:

Reference Type: L ***ReferenceID:*** 158

Title: ***Memo re: Reconnaissance of the Reynolds Metals River Remediation Project***

Location: AEM

Category: Site Update

Prepared by/Author: AEM, Inc.

Preparer/Author Address:

Prepared For: Distribution

Date Published: September 6, 2001

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Reference Type: L ***ReferenceID:*** 159

Title: ***Memo re: Status Update on the Reynolds Metals Dredging Project and Response to GE Comments to AEM's Previous Reynolds Metals Memo Dated September 6, 2001***

Location: AEM

Category: Site Update

Prepared by/Author: AEM, Inc.

Preparer/Author Address:

Prepared For: Distribution

Date Published: November 29, 2001

Key Words and Phrases:

Reference Type: L ***ReferenceID:*** 175

Title: ***EPA's Evolving Position on Remedial Dredging***

Location: AEM

Category: ROD/Proposed Plan/Action Memo/Decision Document

Prepared by/Author: AEM, Inc.

Preparer/Author Address: Malvern, PA 19355

Prepared For: Internal Distribution

Date Published: Undated

Key Words and Phrases:

Reference Type: L ***ReferenceID:*** 196

Title: ***Memo re: Summary of Discussions on Reynolds Metals Dredging Project - ASCE Dredging '02 Conference, Orlando, FL***

Location: AEM

Category: Site Update

Prepared by/Author: AEM, Inc.

Preparer/Author Address:

Prepared For: Distribution

Date Published: June 11, 2002

Key Words and Phrases:

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Reference Type: L ***ReferenceID:*** 219

Title: ***Memo re: Reynolds Metals Redredge Evaluation***

Location: AEM

Category: Dredging: Remedial (Contaminated Sediments)

Prepared by/Author: AEM, Inc.

Preparer/Author Address:

Prepared For: AEM, Inc.

Date Published: May 30, 2003

Key Words and Phrases:

Reference Type: M ***ReferenceID:*** 164

Title: ***Multidisciplinary Study of PCBs at Akwesasne***

Location: AEM

Category: Risk Assessment

Prepared by/Author: David O. Carpenter, M.D.

Preparer/Author Address: University of Albany - SUNY
Albany, NY

Prepared For: NIEHS/EPA Superfund Basic Research Program

Date Published: October 22, 1998 (last updated)

Key Words and Phrases:

Project Name: ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Last Updated: 08/11/98

Modeling Performed: Hydrodynamic flow studies

Modeling Objectives: Develop an empirical model of water circulation patterns in the St. Lawrence River near the Reynolds facility.

Modeling Description: Empirical model based on determining water circulation patterns by use of (1) dye injection, (2) drogues, and (3) current meters.

Company Performing Modeling: Woodward-Clyde Consultants

Modeling Status: Complete

Modeling Summary: (Source Reference E-51)

"The main conclusions and predictions from the circulation study were:

1) The river circulation adjacent to the facility can be considered in terms of three zones:

- The River Core: This is the main river current which enters the channel from the north, has flow velocities of 8.0 fps or greater and is deflected to the east by the training dikes to protect shipping in the channel.

- An Eddy Zone: A series of vortices or eddies are shed in a zone of flow separation as the main current exits the dikes; these small diameter (10-50 feet) eddies are characterized by clockwise and counterclockwise low velocity flows (0.2 - 0.4 fps) and migrate onshore (south) and both upstream and downstream.

- A Counter Current Zone: In the vicinity of Outfall A there exists a zone of flow separation in which the circulation to the west of the outfall is consistently towards the west (up-stream) and the circulation to the east of the outfall is predominantly to the east (downstream)."

"2) A consequence of the circulation pattern is that at Outfall A there is a net shoreward transport and piling up of water with alongshore transport along the shore predominantly upstream but occasionally downstream. At Outfall B, located in a small cove, the discharge likely would be trapped in the cove by the onshore piling of water so that deposition of suspended or bedload materials would be localized. The discharge from Outfall C, near the mouth of the cove, may move easily into the cove but otherwise moves slowly alongshore predominantly to the east (downstream). At Outfall D, discharges would be trapped at the shore by the onshore water movement and likely would be dispersed slowly to the east."

"3) Particulate materials introduced into the river adjacent to all four outfalls likely would remain close to the shore due to the onshore water movement and would not be transported far along the shore due to the low velocity of the nearshore currents. This pattern would be enhanced in summer months by extensive vegetation growth that would act as a filter and further slow the nearshore currents in shallow water."

"Locations for the collection of sediment samples were selected on the basis of the expected transport associated with the nearshore circulation pattern."

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Advisory:	St. Lawrence River	***AdvisoryID:***	974
Extent:	Bay at St. Lawrence-Franklin County Line		
Pollutant:	PCBs (total)		
Species:	all fish		
Population:	NCGP		
Population Definition:	No Consumption-General Population: Advise against consumption by the general population.		
Advisory Type:	Great Lake	***Advisory Number:***	2101
Status (Active or Rescinded):	Active	***Date Rescinded:***	
Contact Name:	Tony Forti	***Contact Number:***	518-402-7815

Advisory:	St. Lawrence River	***AdvisoryID:***	973
Extent:	Bay at St. Lawrence-Franklin County Line		
Pollutant:	PCBs (total)		
Species:	all fish		
Population:	NCSP		
Population Definition:	No Consumption-Subpopulation(s): Advises against consumption for populations that are potentially at greater risk, e.g., pregnant or nursing women, and small children.		
Advisory Type:	Great Lake	***Advisory Number:***	2101
Status (Active or Rescinded):	Active	***Date Rescinded:***	
Contact Name:	Tony Forti	***Contact Number:***	518-402-7815

Advisory:	St. Lawrence River	***AdvisoryID:***	962
Extent:	Entire River		
Pollutant:	PCBs (total)		
Species:	all fish		
Population:	NCSP		
Population Definition:	No Consumption-Subpopulation(s): Advises against consumption for populations that are potentially at greater risk, e.g., pregnant or nursing women, and small children.		
Advisory Type:	Great Lake	***Advisory Number:***	748
Status (Active or Rescinded):	Active	***Date Rescinded:***	
Contact Name:	Tony Forti	***Contact Number:***	518-402-7815

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Advisory:	St. Lawrence River	***AdvisoryID:***	963
Extent:	Entire River		
Pollutant:	PCBs (total)		
Species:	carp-common		
Population:	NCGP		
Population Definition:	No Consumption-General Population: Advise against consumption by the general population.		
Advisory Type:	Great Lake	***Advisory Number:***	748
Status (Active or Rescinded):	Active	***Date Rescinded:***	
Contact Name:	Tony Forti	***Contact Number:***	518-402-7815

Advisory:	St. Lawrence River	***AdvisoryID:***	972
Extent:	Entire River		
Pollutant:	PCBs (total)		
Species:	catfish-channel		
Population:	NCGP		
Population Definition:	No Consumption-General Population: Advise against consumption by the general population.		
Advisory Type:	Great Lake	***Advisory Number:***	748
Status (Active or Rescinded):	Active	***Date Rescinded:***	
Contact Name:	Tony Forti	***Contact Number:***	518-402-7815

Advisory:	St. Lawrence River	***AdvisoryID:***	964
Extent:	Entire River		
Pollutant:	PCBs (total)		
Species:	eel-american		
Population:	NCGP		
Population Definition:	No Consumption-General Population: Advise against consumption by the general population.		
Advisory Type:	Great Lake	***Advisory Number:***	748
Status (Active or Rescinded):	Active	***Date Rescinded:***	
Contact Name:	Tony Forti	***Contact Number:***	518-402-7815

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Advisory: St. Lawrence River ***AdvisoryID:*** 967

Extent: Entire River

Pollutant: PCBs (total)

Species: perch-white

Population: RGP

Population Definition: Restricted Consumption-General Population: Advises the general population to restrict the size of the organisms and/or the frequency of meals consumed.

Advisory Type: Great Lake ***Advisory Number:*** 748

Status (Active or Rescinded): Active ***Date Rescinded:***

Contact Name: Tony Forti ***Contact Number:*** 518-402-7815

Advisory: St. Lawrence River ***AdvisoryID:*** 966

Extent: Entire River

Pollutant: PCBs (total)

Species: salmon-chinook

Population: NCGP

Population Definition: No Consumption-General Population: Advise against consumption by the general population.

Advisory Type: Great Lake ***Advisory Number:*** 748

Status (Active or Rescinded): Active ***Date Rescinded:***

Contact Name: Tony Forti ***Contact Number:*** 518-402-7815

Advisory: St. Lawrence River ***AdvisoryID:*** 965

Extent: Entire River

Pollutant: PCBs (total)

Species: salmon-coho

Population: RGP

Population Definition: Restricted Consumption-General Population: Advises the general population to restrict the size of the organisms and/or the frequency of meals consumed.

Advisory Type: Great Lake ***Advisory Number:*** 748

Status (Active or Rescinded): Active ***Date Rescinded:***

Contact Name: Tony Forti ***Contact Number:*** 518-402-7815

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Advisory: St. Lawrence River ***AdvisoryID:*** 971

Extent: Entire River

Pollutant: PCBs (total)

Species: trout-brown

Population: NCGP

Population Definition: No Consumption-General Population: Advise against consumption by the general population.

Advisory Type: Great Lake ***Advisory Number:*** 748

Status (Active or Rescinded): Active ***Date Rescinded:***

Contact Name: Tony Forti ***Contact Number:*** 518-402-7815

Advisory: St. Lawrence River ***AdvisoryID:*** 970

Extent: Entire River

Pollutant: PCBs (total)

Species: trout-brown

Population: RGP

Population Definition: Restricted Consumption-General Population: Advises the general population to restrict the size of the organisms and/or the frequency of meals consumed.

Advisory Type: Great Lake ***Advisory Number:*** 748

Status (Active or Rescinded): Active ***Date Rescinded:***

Contact Name: Tony Forti ***Contact Number:*** 518-402-7815

Advisory: St. Lawrence River ***AdvisoryID:*** 969

Extent: Entire River

Pollutant: PCBs (total)

Species: trout-lake

Population: NCGP

Population Definition: No Consumption-General Population: Advise against consumption by the general population.

Advisory Type: Great Lake ***Advisory Number:*** 748

Status (Active or Rescinded): Active ***Date Rescinded:***

Contact Name: Tony Forti ***Contact Number:*** 518-402-7815

Project Name ***REYNOLDS METALS (Massena)*** ***ProjectID:*** 02-11

Advisory:	St. Lawrence River	***AdvisoryID:***	968
Extent:	Entire River		
Pollutant:	PCBs (total)		
Species:	trout-rainbow		
Population:	RGP		
Population Definition:	Restricted Consumption-General Population: Advises the general population to restrict the size of the organisms and/or the frequency of meals consumed.		
Advisory Type:	Great Lake	***Advisory Number:***	748
Status (Active or Rescinded):	Active	***Date Rescinded:***	
Contact Name:	Tony Forti	***Contact Number:***	518-402-7815