Third Five-Year Review Report
Reynolds Metals Superfund Site
St. Lawrence County
Town of Massena, New York

Prepared by

U.S. Environmental Protection Agency
Region 2
New York, New York

August 2016

Approved by:

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Contents

Executive Summary

This is the third five-year review for the Reynolds Metals Company site, located in the Town of Massena, St. Lawrence County, New York. The selected remedies have been fully implemented. Monitoring and maintenance associated with the remedies is ongoing. The Environmental Protection Agency believes that the selected remedies protect public health and the environment.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Reynolds Metals site		
EPA ID: NYD002245967		
Region: 2	**State:** NY	**City/County:** Town of Massena/St. Lawrence County

SITE STATUS	
NPL Status: Non-NPL	
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: EPA ***[If "Other Federal Agency", enter Agency name]*:** Click here to enter text.
Author name (Federal or State Project Manager): Pamela Tames
Author affiliation: EPA
Review period: 2/1/2011 - 2/1/2016
Date of site inspection: 10/1/2015
Type of review: Statutory
Review number: 3
Triggering action date: 2/1/2011
Due date *(five years after triggering action date)*: 2/1/2016

OU PROTECTIVENESS STATEMENT		
Operable Unit:	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* N/A
Protectiveness Statement: The OU1 remedy protects human health and the environment. The dredging and capping of contaminated sediments have been completed, removing ecological exposure and direct contact (i.e., ingestion of contaminated sediments) exposures to the public. Fish advisories have been posted for the entire St. Lawrence River to prevent or limit exposure to contaminated fish.		

SITEWIDE PROTECTIVENESS STATEMENT		
	Protectiveness Determination: Protective	*Addendum Due Date (if applicable):* N/A
Protectiveness Statement: The sitewide remedy protects human health and the environment. The dredging and capping of contaminated sediments have been completed, removing ecological exposure and direct contact (i.e., ingestion of contaminated sediments) exposures to the public. Fish advisories have been posted for the entire St. Lawrence River to prevent or limit exposure to contaminated fish.		

Introduction

The purpose of a five-year review is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment and is functioning as intended by the decision documents. The methods, findings, and conclusions of reviews are documented in the five-year review. In addition, five-year review reports identify issues found during the review, if any, and document recommendations to address them.

This is the third five-year review for the Reynolds Metals Company (RMC) site, located in the Town of Massena, St. Lawrence County, New York, and was conducted by Environmental Protection Agency (EPA) Remedial Project Manager (RPM) Pamela Tames. The review was conducted pursuant to Section 121 (c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, 42 U.S.C. '9601 et seq. and 40 CFR 300.430(f)(4)(ii) and in accordance with the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (June 2001). The purpose of five-year reviews is to ensure that implemented remedies protect public health and the environment and that they function as intended by the site decision documents. This report will become part of the site file.

A five-year review is required at this site because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

The trigger for this five-year review is the previous five-year review dated February 1, 2011. The site consists of one operable unit, which is addressed in this five-year review.

Site Chronology

See Table 1 for the site chronology.

Background

Site Location

The RMC facility, a recently shuttered aluminum production plant, is located on the St. Lawrence River, approximately eight miles east of the Village of Massena, New York. The RMC facility is bordered on the north by the St. Lawrence River, which is the international border with Canada. The properties immediately east of the RMC facility are owned by the St. Lawrence Seaway Corporation, New York State Department of Transportation, and the Revitalizing Auto Communities Environmental Response (RACER) Trust. St. Regis Mohawk Tribal lands, known as Akwesasne, are located to the east, and Route 37 and the Grasse River are situated to the south and west, respectively.

The RMC site encompasses a portion of the St. Lawrence River bordering the RMC facility (the facility, which is not part of the site, was addressed under New York State authorities). Figure 1 identifies the RMC site's location.

Physical Characteristics

The RMC site, a shallow shelf within the St. Lawrence River adjacent to the RMC facility, contains slow currents, fine-grained sediments, and dense beds of submerged aquatic vegetation (SAV). The shallow shelf was created in the late 1950's by dredge spoils from the south Cornwall Navigation Channel, within the St. Lawrence Seaway, that is located 300 to 800 feet offshore from the RMC facility. Dredge spoils have not been deposited in this section of the river since the initial dredging.

Site Geology/Hydrogeology

The St. Lawrence Seaway shipping channel runs adjacent to the remediation area. Currents in the main river channel are 8 feet per second or greater. This flow is deflected to the east by training dikes that protect the Seaway channel. There are a series of clockwise and counterclockwise eddies as the main current exits the training dikes. Currents within the shallow portions of the remediation area are generally stagnant.

In general, the regional topography of the area is characterized by low, elongated ridges of glacial till that generally trend northeast-southwest. Broad, flat valleys between the ridges contain marshy areas and meandering streams that drain to the St. Lawrence, Raquette, and Grasse Rivers. Beneath the study area are approximately 100 feet of overburden materials, consisting primarily of glacial till and clay, overlying fractured carbonate bedrock. The sediments within the study area are also dominated by glacial tills, clays, and sandy depositional units.

Land and Resource Use

Land use in the area surrounding the RMC site consists of mixed residential and industrial uses. As noted in the 2010 census, approximately 3,288 individuals live on the St. Regis Indian Reservation, located within 0.5 miles of the site. The downtown area of Massena is located approximately eight miles west and upriver of the site. In the 2010 census, the population within the Town of Massena was approximately 10,883.

The RMC facility is a recently shuttered manufacturing facility and is zoned industrial. It encompasses 1,600 acres, 112 of which were utilized by the facility. The property also contains a 170-acre tract of Class 2 regulated water wetlands.

Local water bodies are used recreationally for swimming, wading, fishing, boating, camping, and picnicking. The Mohawk native population and recreational fisherman fish in the vicinity of the RMC site. However, direct land access to the site is limited by the steep nature of the shoreline. The River is also used as a public water supply and the intakes are located about one and a half miles downstream.

History of Contamination

The RMC facility was constructed in 1958 for the production of aluminum from alumina (aluminum oxide). Through its operation, various types of industrial wastes were generated, disposed of, and spread throughout the grounds. The facility also discharged contaminants to the St. Lawrence River through four outfalls known as Outfalls 001, 002, 003, and 004. Discharges from Outfall 001 included water from the facility's wastewater treatment system. Outfall 002 discharged contact cooling water and stormwater

runoff from the facility. The discharge traveled down an open ditch on the RMC property prior to entering the St. Lawrence River. Outfall 003 carried treated discharge from the facility sanitary treatment plant through a submerged pipe that discharged approximately 100 feet from the shore. Outfall 004 carried intermittent runoff from northern areas of the plant directly to the St. Lawrence.

Initial Response

The RMC facility was placed on the New York State Department of Environmental Conservation (NYSDEC) Registry of Inactive Hazardous Waste Sites in September 1987. RMC, under a Consent Order with NYSDEC, agreed to investigate the contamination at the facility. It should be noted that this investigation excluded the St. Lawrence River. In January 1992, NYSDEC issued a Record of Decision (ROD) that called for a combination of excavation and treatment of areas highly contaminated with polychlorinated biphenyls (PCBs) and other contaminants and consolidation and containment of other contaminated areas on the grounds of the facility. In March 1993, RMC and NYSDEC signed a Consent Order that required RMC to implement the remedy in the ROD. In June 1995, NYSDEC issued a ROD amendment allowing on-site disposal of soils and sediments containing less than 50 milligrams per kilogram (mg/kg) PCBs and requiring more highly contaminated soils and sediments to be disposed of off-site.

Basis for Taking Action

In January 1989, RMC completed an initial study of sediment contamination in the St. Lawrence River adjacent to its plant. In September 1989, pursuant to a Unilateral Administrative Order (Index No. II CERCLA-90230) issued by EPA, RMC agreed to investigate and clean up contamination in the river system surrounding the RMC facility, referred to as the "Reynolds Study Area". In August 1991, RMC submitted a report that characterized the nature and extent of contamination in the Reynolds Study Area. Based upon the results of this investigation, it was determined that approximately 30 acres of sediments, covering a 3,500-foot portion of the St. Lawrence River and extending 450 feet out from the shoreline were contaminated with PCBs, polycyclic aromatic hydrocarbons (PAHs), and total dibenzofurans (TDBFs) from discharges from the facility and that the contaminated sediments presented both a potential ecological and human health risk from ingestion of contaminated sediments and fish.

Remedial Actions

Remedy Selection

EPA issued a ROD for the site in September 1993. The major components of the remedy include:

- Dredge St. Lawrence River sediments that contain greater than 1 mg/kg PCBs, greater than 10 mg/kg total PAHs, and greater than 1 microgram per kilogram (µg/kg) TDBFs
- On-site treatment of the dredged sediments with PCB concentrations greater than 25 mg/kg by thermal desorption; and
- Consolidation of the untreated dredged sediments containing between 1 mg/kg and 25 mg/kg PCBs and the treated dredged sediments in Black Mud Pond, a disposal pit located on the

grounds of the facility, prior to its capping in conformance with NYSDEC's January 1992 ROD.

The remedial action objectives (RAOs) were:

1) prevent human and biota contact with contaminated sediments;
2) reduce and/or prevent human ingestion of fish caught from the St. Lawrence River; and
3) reduce short-term impacts to surface water and air expected as a result of remedial activities

A ROD amendment was signed by EPA in September 1998. The major components of the amendment include:

- Treatment and disposal of all dredged sediments with concentrations exceeding 500 mg/kg PCBs at an approved off-site facility;
- Disposal of all dredged sediments with concentrations of PCBs between 50 mg/kg and 500 mg/kg at an approved off-site facility;
- Consolidation of all dredged sediments with concentrations of PCBs less than 50 mg/kg in the on-site Industrial Landfill, which will be capped in conformance with NYSDEC's ROD (Black Mud Pond was capped in 1996 and was no longer available); and
- After implementation of the dredging project, if it is determined that technological imitations preclude the attainment of the cleanup goals, then other remedial actions, such as capping, can be performed to assure attainment of the cleanup goals.

Remedy Implementation

In 2000, RMC, now Alcoa, completed the remedial design for the dredging project and a design for a subaqueous cap, should it be needed. The design divided the river study area into four subareas, labeled Areas A, B, C, and D. The contaminated portions of each subarea were further subdivided into individual dredge cells based on triangular sampling grids with a grid spacing of 70 feet for Areas A, B, and D, and 50 feet for Area C. The remediation area was defined by 268 dredge cells, with an average cell size of approximately 0.08 acres. A three-foot wide, 625-foot long strip of shoreline in Area C was also included in the remediation area.

In April 2001, Alcoa's contractor constructed a containment system consisting of 3,829 feet of interlocking steel sheet pile panels that completely enclosed the area to be dredged, greatly reducing the potential for sediment migration during the dredging. Dredging began soon after using Cable Arm environmental buckets and WINOPS[1] positioning systems and continued through mid- October 2001. Of the 30 acres in the remediation area, 21.8 required dredging. After the first pass dredging which removed an estimated 63,265 cubic yards (CY) of sediment, post-dredging sampling indicated that 134 cells required re-dredging. Several cells required numerous rounds of re-dredging. The re-dredging activities

[1] WINOPS is the registered trademark name of dredge positioning software. WIN refers to Windows and OPS stands for offshore positioning software.

removed an additional 22,390 CY of sediment. A total mass of approximately 20,200 pounds of PCBs were removed from the St. Lawrence River[2].

Sixty-nine thousand CY of sediment with PCB concentrations less than 50 mg/kg were stabilized with Portland cement and disposed of in the landfill on the facility. The remaining 16,655 CY (14,920 tons of sediment with PCB concentrations greater than 50 mg/kg and 5,360 tons of sediment with PCB concentrations greater than 500 mg/kg) were shipped to Chemical Waste Management in Model City, New York, an approved hazardous waste facility, for disposal; sediments with PCB concentrations greater than 500 mg/kg were treated prior to disposal.

The removal of the sheet pile wall and demobilization in advance of the onset of winter began in mid-October 2001 concurrently with the completion of post-remedial action sampling activities. Sample results indicated that 12 cells did not meet the cleanup goal of 1 mg/kg PCBs even though these cells underwent several dredge passes. A decision was made to cap 15 cells, which included these recalcitrant cells, as well as three cells that were located in the midst of the 12 cells, with a three-layer cap consisting of 6 inches of gravel, 12 inches of sand, and a 9-inch armor layer. Since there was not enough time remaining in the construction season to install all three layers of the cap, Alcoa was directed to increase the depth of the gravel layer to 12 inches and place the remaining two layers the following spring. Measurements taken following the placement of the gravel showed that the average thickness of the gravel layer was 2.3 feet, with a range of 1.0 to 6.9 feet.

Post-dredging sampling in 2001 for TDBFs in 32 cells showed that 30 cells met the cleanup goal and 2 did not (indicating that the TDBF-contaminated sediments were collocated with the PCB-contaminated sediments). Post-dredging sample results from 96 cells showed that numerous cells had levels of PAHs above the cleanup goal, indicating that the PAHs were not always collocated with the PCBs and the TDBFs. As a result of these findings, the completion of the PCB cap was put on hold until the full extent of remaining PAH contaminated sediments could be determined. Based upon the results of additional sediment sampling conducted in 2002, 2003, 2004, and 2006, it was concluded that seventy-six of the 268 cells contained PAH levels above the cleanup goal of 10 mg/kg. Fifty-three of these cells had total PAHs above 20 mg/kg and the remaining 23 cells had total PAH concentrations between 10 mg/kg and 20 mg/kg (the majority of which had a concentration of 13 mg/kg or less).

An Explanation of Significant Differences (ESD) was issued in December 2008, which documented changes to the 1993 ROD and the 1998 ROD amendment. The ESD concluded that capping the remaining contaminated cells was the proper way to complete the remedial action at the site. There was a concern that additional dredging might recontaminate remediated cells and that residual PAHs in a smaller subset of cells might still need to be addressed through the placement of a cap. It was also determined that the 23 cells with total PAH concentrations between 10 mg/kg and 20 mg/kg would not require supplemental remediation since much of their low molecular weight PAHs would readily break down over a relatively short period of time bringing their total PAH levels to below the action level of 10 mg/kg.

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[2] Soil sample results from the facility indicated that the PCBs, PAHs, and TDBFs were collocated. Since it was presumed that the PCBs, PAHs, and TDBFs in the sediments were also collocated, the dredging effort utilized PCBs as an indicator compound.

During the 2009 construction season, the PCB cap was completed. The PCB cap for the 0.75 acre area included placement of a 12-inch sand layer over the existing gravel layer (placed in 2001) followed by a 6-inch armor layer over 15 cells, 12 of which contained PCBs over 1 mg/kg. One shoreline cell, part of the cluster of 15 cells, which had elevated PCBs, was excavated prior to capping in order to maintain the original bathymetry. In addition, 50 cells that contain total PAH levels above 20 mg/kg were capped with a 6-inch sand layer followed by a 6-inch armor layer. Pre-construction sampling of an additional three shoreline cells which had elevated levels of PAHs were also shown to have elevated levels of PCBs and were capped with a PCB-style cap rather than a PAH-style cap following excavation. The excavation prior to capping was performed in order to maintain the original bathymetry at the shoreline. At the completion of capping, a six-inch habitat (substrate) layer was placed over the armor layer at every capped cell located outside the nearshore boundary. This layer is expected to facilitate the reestablishment of the submerged aquatic vegetation and benthic communities. In addition, a small volume of substrate was placed within the nearshore area to fill in spaces between the armor stone.

Remedial Action Reports for the dredging and capping remedial actions were approved on October 18, 2010.

System Operations/Operation and Maintenance

To maintain the integrity and effectiveness of the subaqueous caps, monitoring the caps for erosion and making repairs as necessary was required annually for the first five years. Although a cap maintenance plan for the site was not finalized until 2012, the subaqueous sediment caps were inspected in the spring of 2011 using probes along with an underwater video camera. Inspections performed in 2011, 2012, 2013, and 2014 indicated that the caps needed no repairs. The cap maintenance plan was revised in 2015 to require inspection of the caps using probes and underwater video camera once every five years and following significant hydrodynamic events. Young-of-year pumpkinseed fish were monitored for PCBs during the spring of 2011, 2012 and 2014. Adult fish were monitored for PCBs in 2012. Future monitoring will include monitoring of young-of-year and adult fish for PCBs twice during each five year review period.

The maintenance and monitoring costs are approximately $125,000 on an annual basis. Potential site impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the site.

Progress Since Last Five-Year Review

The previous five-year review, which was completed in February 2011, concluded that:

The dredging and capping of contaminated sediments have been completed, removing ecological exposure and direct contact (i.e., ingestion of contaminated sediments) exposures to the public. Fish advisories have been posted for the entire St. Lawrence River to prevent or limit exposure to contaminated fish. The implemented remedy for the site is fully protective.

The last five-year review included several comments and suggestions. The comments and suggestions and how they were addressed are summarized below.

Comment 1: Now that the Reynolds Metals Company site remediation has been completed, St. Lawrence River ecological data are needed.
Suggestion 1: A St. Lawrence River biota sampling plan should be developed in conjunction with the Trustees and appropriate government agencies and coordinated with monitoring at the adjacent Superfund sites (Alcoa Grasse River site and General Motors site).
Update 1: Adult fish monitoring at the three St. Lawrence River area Superfund sites has been coordinated and will take place twice every five years.

Comment 2: Although specific monitoring activities have been approved, a cap monitoring and maintenance plan for the site has not been finalized.
Suggestion 2: The cap monitoring and maintenance plan should be finalized.
Update 2: The cap monitoring and maintenance plan was finalized in 2015.

Comment 3: New York State requires annual certification that remedy-related maintenance is being performed.
Suggestion 3: Annually, Alcoa, the potentially responsible party, will need to certify that the subaqueous cap maintenance is being performed.
Update 3: While monitoring of the cap is necessary based upon agreed protocols, cap maintenance is performed as needed, not necessarily annually. Alcoa will notify New York State after cap maintenance activities have been performed.

The remediated area was monitored several times during the review period to ensure the stability of the cap and recovery of the fish, benthic community, submerged aquatic vegetation, and sediment. The data results are described in the data review section below.

Five-Year Review Process

Administrative Components

The five-year review team consisted of Pamela Tames (RPM), Michael Scorca (hydrogeologist), Marian Olsen (human health risk assessor) and Charles Nace (ecological risk assessor).

Community Involvement

On November 19, 2015, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 32 Superfund sites and four federal facilities in New York and New Jersey, including the Reynolds Metals Superfund site. The announcement can be found at the following web address: http://www.epa.gov/sites/production/files/2015-11/documents/fy_16_fyr_public_website_summary.pdf.

In addition to this notification, a notice of the commencement of the five-year review was posted on the EPA's Region 2 website and sent to local public officials. The notice was provided to the Town and Village of Massena by email on March 16, 2016 with a request that the notice be posted in the respective municipal offices and on the Town of Massena webpage. The notice was also distributed via email to the Saint Regis Mohawk Tribe's Tribal Council and Environmental Division at that time. The purpose of the public notice was to inform the community that the EPA would be conducting the third five-year review to ensure that the remedy implemented at the site remains protective of public health and is functioning

as designed. In addition, the notice included the RPM and the CIC address and telephone numbers for questions related to the five-year review process or the site. The notice indicated that once the five-year review is completed, the results will be made available at the local site repositories and on EPA's Reynolds Metals site webpage; in addition, efforts will be made to reach out to stakeholders and local public officials to inform them of the results.

Document Review

The documents, data and information which were reviewed in completing this five-year review are summarized in Table 2.

Data Review

As was noted above, PCBs were used as an indicator parameter based on the assumption that the PCBs were collocated with the other chemicals of concern, PAHs and TDBFs. A review of post-dredging PAH sampling results, however, indicated that this assumption did not hold true for PAHs. PAHs were found in dredged cells that met the cleanup goals for PCBs and TDBFs. Seventy-six cells (6.08 acres) remained above the cleanup goal of 10 mg/kg for PAHs, fifty-three (4.24 acres) of which contained PAH levels ranging from 21.25 mg/kg to 248.9 mg/kg. Many of these cells were dredged numerous times (these cells met the cleanup goal of 1 mg/kg for PCBs). To complete the remedial action, the fifty-three cells were capped in 2009. Twenty-three cells containing total PAHs between 10 mg/kg and 20 mg/kg were not capped since it was determined that the low molecular weight PAHs would readily break down over a short period of time bringing the total PAH level for these cells below 10 mg/kg. Monitoring required to assess that the total PAH level of these cells has dropped to below the 10 mg/kg action level is discussed below.

A review of the young-of-year whole body sampling data indicated that the average PCB concentration in these fish has dropped approximately 80% from 0.9 mg/kg (wet) in 2010 to 0.15 mg/kg (wet) in 2014. The edible fillets of adult smallmouth bass and adult brown bullhead were analyzed in 2012 for PCBs. The levels of PCBs in the smallmouth bass ranged from 0.33 to 2.3 mg/kg with a mean of 0.79 mg/kg and in the brown bullhead ranged from 0.075 to 0.96 mg/kg with a mean of 0.48 mg/kg within the site. The levels of PCBs in the adult fish fillets remain above those allowable for the consumption of fish by humans.

A review of the 2011 and 2013 benthic community data for the Site shows that the benthic metrics generally improved or increased over time. For instance, the average number of organisms and biomass at the Site increased from 73 to 127 organisms and from 48 to 57 mg wet-weight in 2011 and 2013, respectively. The average number of taxa increased from 8 in 2011 to 12 in 2013. The diversity index increased from 2.1 in 2011 to 2.6 in 2013.

Results of the 2011 and 2013 SAV surveys comparing approximately 11,000 linear feet of Site transects show a net increase in the vegetation present since 2011. Vegetation has recolonized most of the dredged areas, and the capped areas are generally being recolonized over time. Areas that were capped in 2009 typically had less vegetation than was observed in uncapped areas. The PCB cap area (contiguous cells) observed in 2013 continues to have SAV growth occurring along the margins, encroaching towards the middle, with some small isolated stands of SAV occurring on the center portions of the cap.

In 2011 and 2013, sediment samples were collected at 16 locations. Ten sampling locations were located within capped cells. The remaining six samples were collected from dredged but uncapped cells that in 2009 contained levels of PAHs between 10 and 20 milligrams per kilogram (mg/kg). The levels of PAHs in these cells was expected to naturally decrease over time and were sampled for confirmation. Total PAH results for the July 2013 sampling event for the capped locations ranged from not detected to 0.543 mg/kg, and 0.097 to 1.50 mg/kg for the uncapped locations. Total PCB results for the capped locations were well below 1 mg/kg (ranged from not detected to 0.5 mg/kg) and results for the uncapped cells ranged from 0.164 to 1.004 mg/kg. One of the uncapped cells (A-20) that in 2009 contained 11.51 mg/kg total PAHs and 6.41 mg/kg in 2011, (see Figure 2) contained elevated levels of both PCBs and PAHs in 2013 and was resampled to determine if the contamination was limited or widespread. Four additional samples were taken in October 2013 around the original sample point, which was also resampled. Resampling showed that while there is a spot where the action levels for PCBs and PAHs are exceeded, the extent of this area is very limited. Three out of the four samples surrounding the original sample point were below the action level for both PCBs and PAHs. The fourth sample was slightly above the action level. Over time this area will be covered with clean sediment through natural processes. During the next five-year review, the sediment will be resampled.

Site Inspection

On October 21, 2015 a five-year review site inspection was conducted by the RPM, Pamela Tames. Also in attendance were Lincoln Fancher from NYSDEC, Bruce Cook from Alcoa and Heather VanDewalker from Arcadis, Alcoa's consultant.

Interviews

No interviews were conducted in conjunction with this five-year review.

Institutional Controls Verification

As was noted above, the ROD, as modified by the ROD amendment and ESD, did not call for institutional controls. Fish advisories have been posted for the entire St. Lawrence River to prevent or limit exposure to contaminated fish. The 2015 New York State Fish Advisory for the St. Lawrence Seaway is located at http://www.health.ny.gov/environmental/outdoors/fish/health_advisories/regional/.

Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

There are three decision documents associated with the site—a ROD, ROD amendment, and ESD. These documents collectively called for the removal or containment of contaminated sediments in the St. Lawrence River.

Approximately 20,200 pounds of PCBs have been removed from the St. Lawrence River, representing a 98.6% reduction of PCBs within the remediation area.

In 1990, it was estimated that 21,211 pounds of PAHs were present within the sediments of the RMC site. Based on the results of the 2002, 2003 and 2004 PAH sampling efforts, it was estimated that 747 pounds

of PAHs remain within the sediments. This constitutes a 96% decrease in the amount of PAHs present in the sediments.

Thirty-two of the 268 dredged cells (twelve percent) were sampled for TDBFs. Thirty of the sampled cells met the cleanup goal of 1 mg/kg. The two remaining cells were located within the area that was capped due to the inability to meet the cleanup goals for PCBs.

The removal of contaminated sediments from the St. Lawrence River, in addition to the River's physical constraints, has greatly reduced the potential for direct dermal contact, ingestion, and inhalation exposures to these sediments and reduces the potential uptake of RMC site-related contaminants in sediment by aquatic and piscivorous receptors.

Despite extensive dredging of the St. Lawrence River, the cleanup goals of 1 mg/kg PCBs, 10 mg/kg PAHs, and 1 µg/kg TDBFs were not achievable in all areas. As a result, a 0.75-acre, 15 cell area, containing a range of PCB concentrations from 11.1 mg/kg PCBs to 120.5 mg/kg, was capped with a three-layer cap to achieve the cleanup goal. The remaining exposed sediments average 0.8 mg/kg PCBs within the remaining 255 cells (21 acres), which is below the cleanup goal. The TDBFs also met the cleanup goal in the dredged cells.

The remedial action activities in the remaining cells containing elevated levels of PAHs above the cleanup goal have been fully implemented. Fifty-three cells (4.24 acres) containing elevated levels of PAHs were capped. Based on the physical hazards, limited access, and currents within the St. Lawrence River in the dredged area, it is anticipated that swimming and wading in the river in this area is unlikely. Additionally, the overall reduction in sediment concentrations within this area has reduced potential risks in the unlikely event that an individual recreates within this area.

In summary, the dredging and capping have been completed and the remedy is functioning as intended by the decision documents. The remediated area continues to be monitored to ensure the stability of the caps and recovery of the fish, benthic community, submerged aquatic vegetation, and sediment. A review of the monitoring reports indicate that based on the data since the caps were installed, the caps have been effective.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?

Actions implemented under the ROD and ROD amendment have interrupted the exposure pathways identified in the BHHRA. The dredging and capping of the sediments have reduced the concentrations of PCBs, PAHs, and TDBFs in the river sediments and interrupted potential direct exposure to contaminants.

The following describes the actions at the site, the effect of these actions on risks, and further evaluation that may be necessary.

St. Lawrence River

Based on the physical hazards, limited access, and currents within the river, it is anticipated that swimming and wading into the St. Lawrence River at the site in the dredged area is limited as discussed in the 1993 BHHRA. Additionally, the overall reduction in sediment concentrations will further reduce potential risks

in the event that an individual recreates within this area. These pathways have not changed from the previous five- year review.

Fish, Waterfowl and Snapping Turtle Consumption

The advisories for fish and snapping turtles will remain in place and be reviewed and updated by NYSDOH on an ongoing basis.

General advisories exist against consumption of Mergansers, which are the most heavily PCB-contaminated waterfowl species.[3]

Changes in Toxicity and Exposure Assumptions

PCBs. There have been no changes in the cancer toxicity values for PCBs since the last updates in 1996 for the cancer assessment and 1993/1994 updates for the non-cancer assessment. Currently, the Integrated Risk Information System (IRIS), EPA's consensus toxicity database, is reassessing the non-cancer toxicity of PCBs. Updates in toxicity information for PCBs will be re-evaluated in the next five year review.

PAHs. The cancer slope factor for benzo(a)pyrene has not changed. At the current time, EPA through the IRIS process, is reevaluating the toxicity of this chemical and the next five-year review will consider the revised toxicity values.

TDBFs. TDBFs are evaluated based on Toxicity Equivalence Factors (TEFs) of dioxins. The non-cancer assessment for dioxin was completed in 2012. The dioxin cancer reassessment will follow thereafter and the results of this analysis will be evaluated in future five year reviews. The document "Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessment of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-like Compounds" updated the previous TEFs, including those for furans. The addition of a non-cancer toxicity value for 2,3,7,8-TCDD and updated TEFs do not change the protectiveness of the remedy.

The previous five-year review indicated that the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy are still protective. The decision documents, subsequent five-year reviews and the 2011, 2012, 2013 and 2014 long-term monitoring reports were reviewed as part of this evaluation. The conclusions reached in the 2011 five-year review are still valid.

Long-term monitoring at the site includes tissue residue analysis for young-of-year spot-tail shiners and adult small- and largemouth bass and brown bullheads, benthic community metrics, cap inspection, SAV monitoring and sediment sampling. The results presented in the above-mentioned, long-term monitoring reports indicate that the remedy is functioning as intended, although it is too early to develop trends for the metrics being measured. Additional evaluation of the data will be presented in the next five-year review.

[3] Source: http://www.health.ny.gov/environmental/outdoors/fish/health_advisories/advice_on_eating_game.htm.

In addition to the long-term monitoring to ensure the protectiveness of the remedy, additional information may be collected and utilized as part of a regional monitoring program to evaluate the impact that other contaminated sites located within the area might have on cleanup efforts at the RMC site.

Conclusions - Protectiveness of the Remedy

The dredging and capping of the sediments to 1 mg/kg of PCBs, 10 mg/kg for PAHs, and 1 ug/kg for TBDFs as part of the remedial action have reduced potential exposures to PCBs, PAHs, and TDBFs. The monitoring of the caps show that they remain stable and effective. The fish advisories remain in place to limit potential exposures to fish from the St. Lawrence River. There have been no changes in toxicity information or exposure assumptions that call into question the remedy. The remedy remains protective.

The RAOs are still valid.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other issues have been identified that could call into question the protectiveness of the remedy.

Technical Assessment Summary

Based upon the results of the five-year review, it has been concluded that:

- The three-layer cap placed over 15 cells of PCB-contaminated sediments is intact;
- The sand and armor layer cap over the 53 cells (4.24 acres) that had total PAH concentrations ranging from 21 mg/kg to 284.9 mg/kg is intact;
- Sampling of six of the 23 uncapped cells that had total PAH concentrations from 10 mg/kg to 20 mg/kg with most cells below 13 mg/kg, indicates that the lower molecular PAHs in these cells have broken down bringing their total PAH levels to below the action level of 10 mg/kg and;
- Fish advisories have been posted for the entire St. Lawrence River to prevent or limit exposures to contaminated fish. The contaminated sediments have been addressed and post-remediation monitoring is regularly scheduled in order to assess the protectiveness of the remedy.

Issues, Recommendations and Follow-Up Actions

As a result of the stability of the caps and the progress in recovery of the benthic, fish and aquatic community, the level of required monitoring was reduced. Adult and young-of-year fish will be monitored twice over the next five year period and the benthic community, sediment, submerged aquatic vegetation and physical condition of the cap will be monitored once over the next five year period.

Table 3 summarizes some comments and suggestions stemming from this five-year review.

Protectiveness Statement

The remedy protects human health and the environment. The dredging and capping of contaminated sediments have been completed, removing ecological exposure and direct contact (i.e., ingestion of

contaminated sediments) exposures to the public. Fish advisories have been posted for the entire St. Lawrence River to prevent or limit exposure to contaminated fish.

Next Review

The next five-year review report for the site is required five years from the completion date of this review.

Tables

Table 1: Chronology of Site Events	
1958	RMC begins operations at the aluminum production plant
1987	RMC enters into an Administrative Order with NYSDEC to develop and implement a facility-wide remedial program.
1989	EPA issues a Unilateral Administrative Order requiring that RMC investigate and clean up contamination in the entire river system surrounding the facility.
1992	NYSDEC issues a ROD for the land-based portion of the facility.
1993	EPA issues a ROD to address the contamination in the sediments of the St. Lawrence River in the vicinity of the RMC
1995	NYSDEC issues a ROD amendment that modified the disposal requirements of the land-based portion of the remedy.
1998	EPA issues a ROD amendment that modified the disposal requirement of the river-based portion of the remedy.
2000	Alcoa merges with RMC
2000	Dredging and subaqueous (PCB) cap design reports completed and approved.
2001	Contaminated sediments are dredged from the St. Lawrence River in the vicinity of the RMC facility
2003	Alcoa collects additional shallow sediment samples from the River and analyzes them for PAHs
2004	Alcoa collects additional sediment sample cores from the River and analyzes them for PAHs
2005	EPA requests that Alcoa complete remedy at the RMC site.
2005	Alcoa submits a design work plan for a PAH cap.
2006	First Five-Year Review

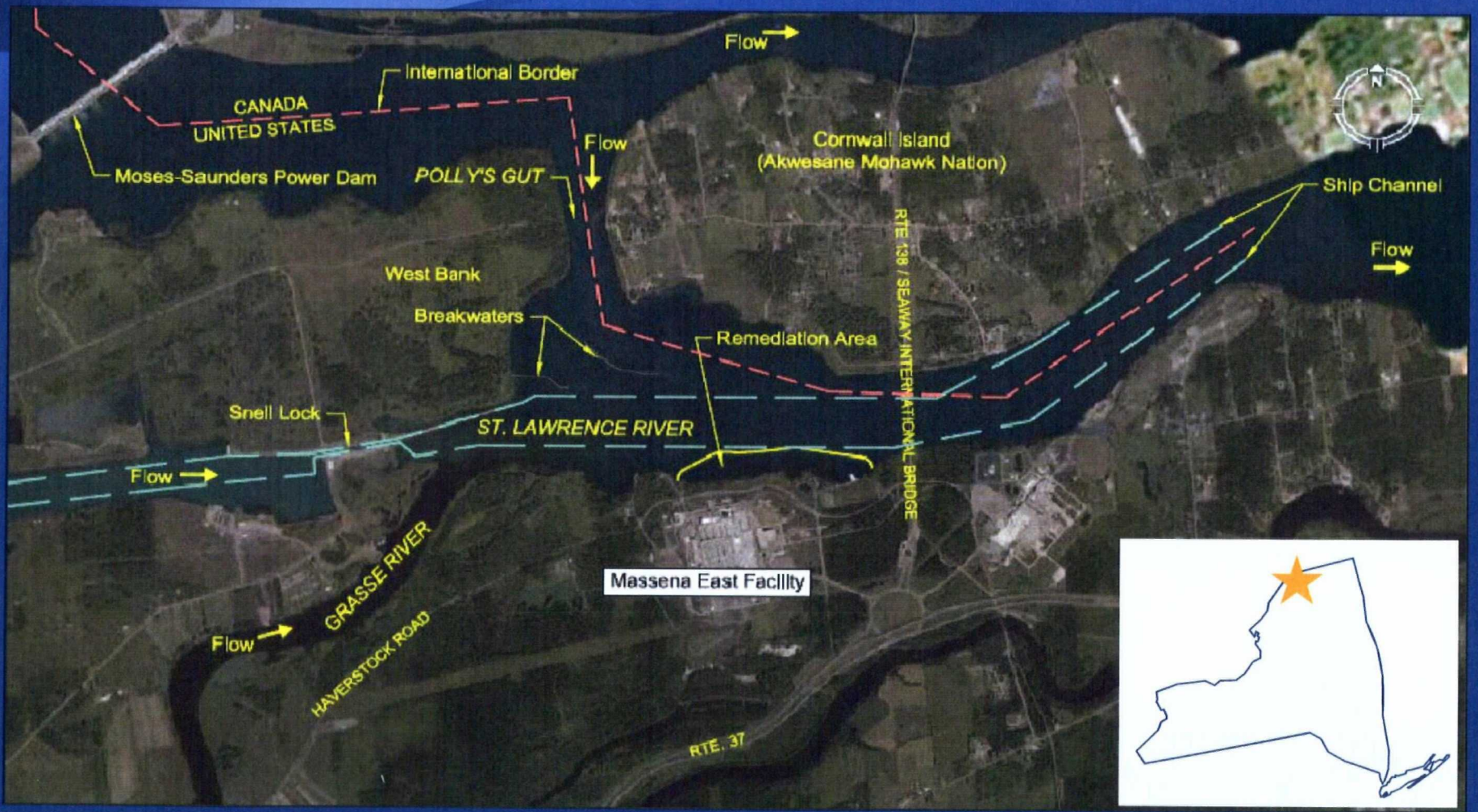
Table 1: Chronology of Site Events	
2009	Alcoa completes the PCB cap over 15 cells, caps 50 cells with a PAH cap and an additional 3 nearshore cells with a PCB cap to complete the remedial action.
2010	Remedial Action Report Approved
2011	Second Five-Year Review

Table 2: Documents, Data, and Information Reviewed in Completing the Five-Year Review	
Document Title, Author	**Date**
Record of Decision for the Reynolds Metals Company site, Massena, NY, EPA	1993
Record of Decision Amendment for the Reynolds Metals Company site, Massena, NY, EPA	1998
Final Dredging Program Work Plan for the River Remediation Project at the RMC site, Massena, NY, Bechtel	2000
Final Dredging Project Design Report for the River Remediation Project at the RMC site, Massena, NY, Metcalf & Eddy	2000
Subaqueous Cap Design for the Remediation of the St. Lawrence River at the RMC site, Massena, NY, Bechtel	2000
Draft Interim Completion Report for the St. Lawrence River at the RMC site, Massena, NY, Metcalf & Eddy	2002
Supplemental PAH Sampling Results at the RMC site, Massena, NY, Bechtel	2003
Work Plan for the Completion of Remedial Action Activities at the RMC site, Massena, NY, Alcoa	2003
2004 PAH Sampling Results, Alcoa	2005
Design/Work Plan for the Installation of PAH Cap in the St. Lawrence River, prepared by Anchor Environmental, LLC for Alcoa	2005
Detailed Comparative Analysis of Alternatives for the St. Lawrence River, prepared by Anchor Environmental for Alcoa	2005
Technical Memorandum, Supplemental Information to the Detailed Comparative Analysis of Alternatives, St. Lawrence River Remediation Project, prepared by Anchor Environmental, LLC for Alcoa	2006
EPA guidance for conducting five-year reviews and other guidance and regulations to determine if any new Applicable or Relevant and Appropriate Requirements relating to the protectiveness of the remedy have been developed since EPA issued the ROD.	
Construction Completion Report for the St. Lawrence River Remediation Project, prepared by Anchor Environmental, LLC for Alcoa	2010
Long-term Monitoring Data Summary Report, prepared by Anchor QEA, LLC and Arcadis for Alcoa	2011
Long-term Monitoring Data Summary Report, prepared by Anchor QEA, LLC and Arcadis for Alcoa	2012

Table 2: Documents, Data, and Information Reviewed in Completing the Five-Year Review	
Long-term Monitoring Data Summary Report, prepared by Anchor QEA, LLC and Arcadis for Alcoa	2013
Long-term Monitoring Data Summary Report, prepared by Anchor QEA, LLC and Arcadis for Alcoa	2014

Table 3: Other Comments on Operation, Maintenance, Monitoring, and Institutional Controls	
Comment	**Suggestion**
Now that the remediation has been completed, St. Lawrence River ecological data are needed.	The sampling of adult fish within the Site twice during each five-year review period should be performed concurrently with the adult fish sampling at the adjacent Superfund sites (Alcoa Grasse River site and General Motors site).
Twenty-three cells containing PAHs at levels between 10 and 20 mg/kg were not capped with the expectation that the PAHs would break down, but only six of these cells were sampled in 2011 and 2013 to confirm this.	The remaining seventeen cells should be sampled during the next sediment sampling event to confirm that their PAH levels have also dropped below the site action level of 10 mg/kg.
Sediment sampling data for Cell A-20 indicated PCBs and PAHs significantly above the remedial cleanup goals. Supplemental sampling data collected around this location suggest that the elevated concentrations are very limited in areal extent.	Additional follow-up monitoring of this cell should be completed to document the rate of sediment accumulation. The use of Beryllium-7 sampling may be useful to determine the rate of sediment deposition.
The caps have been stable over the last five years and progress has been made in the recovery of the benthic, fish and aquatic community since the completion of the remedial action.	As a result, the level of required monitoring can be reduced. Therefore, adult and young-of-year fish will be monitored twice over the next five year period and the benthic community, sediment, submerged aquatic vegetation and physical condition of the cap will be monitored once over the next five year period.

Site Layout


Flow
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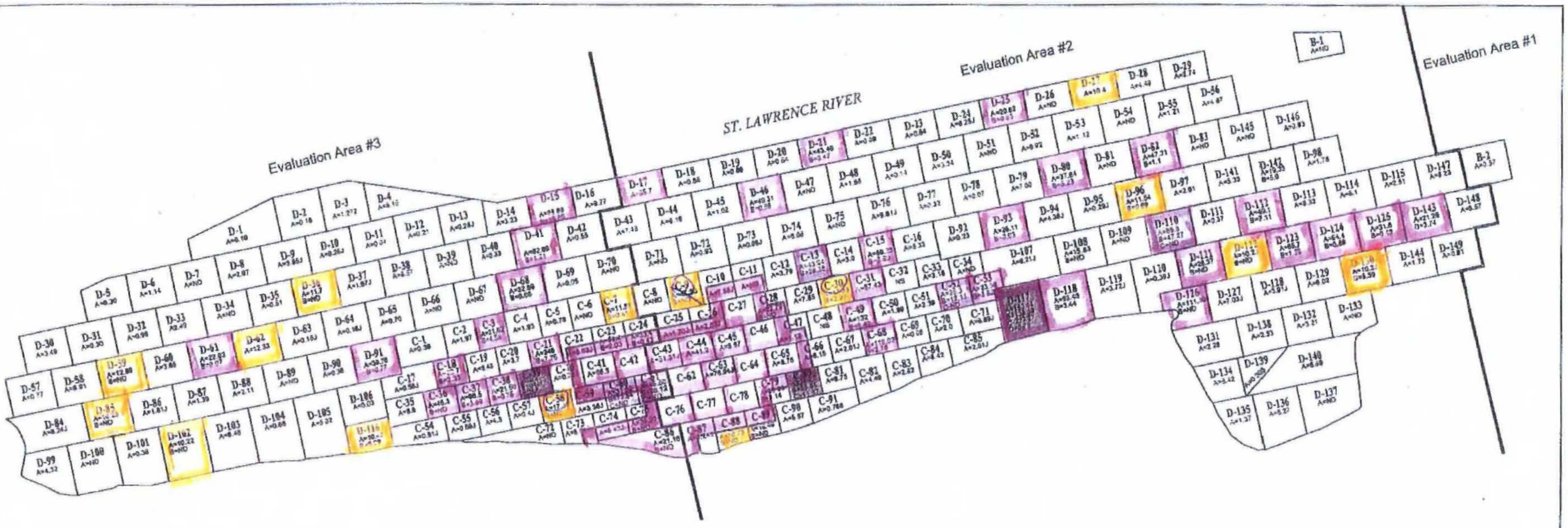
CANADA
UNITED STATES
Moses-Saunders Power Dam
POLLY'S GUT
Flow
Cornwall Island
(Akwesane Mohawk Nation)
Ship Channel
RTE 138 / SEAWAY INTERNATIONAL BRIDGE
Flow
West Bank
Breakwaters
Remediation Area
Snell Lock
ST. LAWRENCE RIVER
Flow
GRASSE RIVER
Massena East Facility
Flow
HAVERSTOCK ROAD
RTE. 37

cells to be capped — cells with 10ppm to 20ppm PAHs — ○ cells w/ PAHs > 15ppm



Legend

Interim Cap Area

Most recent total PAH results listed below cell ID
PAH Action Level=10 ppm

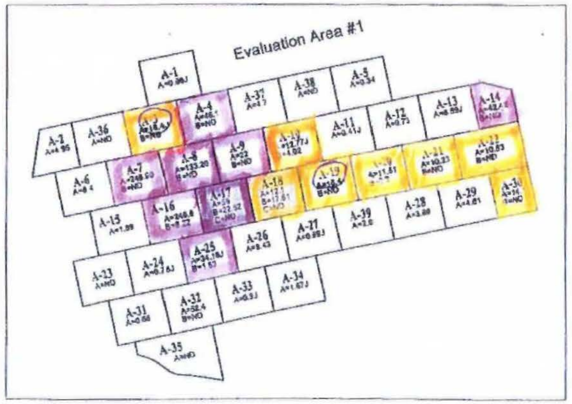
Key	Sample Depth
A	0 to 8 in.
B	8 to 16 in.
C	16 to 24 in.
D	24 to 30 in.

- Total PAH < 10 ppm
- Total PAH > = 10 ppm at a depth from 0 to 8 in.
- Total PAH > = 10 ppm at a depth from 0 to 16 in.
- Total PAH > = 10 ppm at a depth from 0 to 24 in.

0 — 150
Scale in Feet

- A=0.95 Total PAH Sample Results 2004 Sample Data Inclusive
- A=95 Total PAH Sample Results 2006 Sample Data
- ND Not Detected
- NS No Sample Recovered After Multiple Attempts
- J Estimated Value, Some Concentrations Below Reporting Limit

Notes:
1. Survey data is referenced horizontally to NAD83 and projected on the New York State Plane (east zone) and vertically to NGVD29 (ft.).
2. 10 ppm represents ROD-based action level for PAHs (EPA 1993).
3. 2004 PAH Sampling Results (Bechtel 2004)



Nov 21, 2006 10:41am cdavidson K:\Jobs\060002-ALCOA\060002-08-ST_L\26D00208-013.dwg FIG 2a

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 2a
Post-Dredge Total PAH Results (10 ppm)
St. Lawrence River