St. Lawrence River Area of Concern Beneficial Use Impairments

Fish Consumption Restrictions:
The fish consumption use impairment is caused by PCBs, Mirex, and Dioxin in fish flesh. The sources of the historic cause of this use impairment include local and upstream industrial discharges, inactive hazardous waste sites, contaminated river sediments, air deposition, and Lake Ontario. Following the removal of sediments from the St. Lawrence and Grasse Rivers by the three major Massena industries, and the completion of land-based hazardous waste site remediation, investigations and long term monitoring will be needed to evaluate the extent of any remaining impairment. Ongoing land-based and river-based waste site remediation, along with improved treatment of point source discharges, has contributed to the restoration and protection of the beneficial uses. Establishment and implementation of Best Management Practices (BMPs) involving fish, aquatic and wildlife as well as human health, will also contribute to the restoration and protection of fish consumption as well as other problems identified by the use impairment indicators.

Following reports on the success of remediation in the AOC, it is expected that the three major industries will continue to document the accomplishments. Industries will need to verify that hazardous waste site cleanup standards have been achieved. When fish and wildlife studies indicate that contaminant levels are acceptable and when there are no health advisories due to causes from the AOC and its watershed, modification to the use impairment status can be reconsidered. Additional fish and wildlife or human health management strategies may be required.

Loss of Fish and Wildlife Habitat:
This use impairment is due to contaminated river sediments and physical disturbances caused by the construction of the power dam and St. Lawrence River Seaway. Loss of habitat involves the presence of elevated levels of PCBs, metals and PAHs that are likely to adversely impact benthic organisms. Dredging, natural erosion, and other sediment disturbances (e.g. ship propeller wash) are other sources that contribute to the cause of this use impairment.

There are three key actions that will contribute to the restoration and protection of habitat: 1) completion of hazardous waste site remediation and implementation of Best Management Practices including wetland restoration projects by the three major industries, 2) the implementation by the New York Power Authority of Federal Energy Regulatory Commission (FERC) licensing requirements affecting habitat concerning the power dam, and 3) the assessment and verification by NYSDEC that the type, quantity, and quality of habitat in the AOC is adequate and that management plans (including seaway dredging) are in-place to protect this beneficial use. Also, the documentation of the improvements to the abundant existing and new habitat outside the AOC will contribute to resolving this use impairment.

Degradation of Fish & Wildlife Populations:
This probable use impairment is caused by PCBs, mercury, DDE, physical disturbances and fish over-harvesting. The historic sources include industrial discharges, inactive hazardous waste sites, contaminated sediments, Lake Ontario, the Cornwall AOC and the construction and operation of the power dam and international seaway. Further studies are needed to define the extent of any impairment and to assess the results of implementing the required remedial activities that address the fish consumption advisories and habitat impairments above. The construction of the seaway and power dam and the introduction of invasive species have had a profound impact on river ecology. At present, a post-1959 fish and wildlife baseline, to define the desired fish and wildlife community structure (number and balance), is needed in order to establish any remaining impairment subject to further remedial measure.

The following items need to be addressed in order to resolve this use impairment: demonstrate that environmental threats are addressed, document that fish and wildlife management goals are achieved, document no toxicity from sediments, and verify that a healthy, reproducing population of benthivores and piscivores exists. Also the fish and wildlife habitat, that is near the AOC but outside the defined boundary and was created as a result of the St. Lawrence Seaway construction, needs to be assessed in order to evaluate its contribution towards restoration of this beneficial use.

Fish Tumors or Other Deformities:
This possible use impairment was identified as likely due to PAHs from contaminated St. Lawrence River sediments. When the contaminated sediment remediation has been completed, a fish pathology study will be appropriate. Now that the sediment removal has been completed at both the ALCOA and Reynolds sites, a fish pathology study may be appropriate for comparing and making a determination of the existence of tumors. The use impairment is considered resolved when the incidence rates of fish tumors and other deformities do not exceed non-impacted reference site areas, survey data confirm the absence of liver tumors in bullheads or suckers, fish tissue standards are achieved, and there are no deformities observed in resident species. No scientific studies have been conducted to determine the presence of fish tumors (internal or external); however, it is noted that fish tumors have not been reported by sportspeople or observed in other studies involving fish.

Bird or Animal Deformities or Reproductive Problems:
This possible use impairment could be due to PCBs from contaminated river sediments. After completing the land-based hazardous waste site and contaminated river sediment remediation work, investigations and longer term monitoring is needed to define the existence and extent of any use impairment. Enhancements to fish/aquatic/wildlife management plans may also be needed.

The delisting criteria are satisfied when studies demonstrate compliance with tissue standards or objectives as a protection level and when wetland assessment indicates healthy communities of significant species. Incidence rates should not exceed control sites. Without sufficient evidence to suggest that deformities or reproductive impairment is probable, an extensive bio-monitoring program is not warranted.

Degradation of Benthos:
This probable use impairment is due to PCBs, PAHs, lead, copper and physical disturbances that come from industrial discharges, contaminated river sediments, inactive hazardous waste sites, non-point sources and shipping activity. After completing the land-based hazardous waste site and contaminated river sediment remediation work, investigations and longer term monitoring will be needed to define the existence and extent of any use impairment. Enhancements to fish and wildlife community management plans may also be needed. PAHs have been added as a cause of the degradation of benthos because studies show PAHs to have substantially altered benthic populations at Reynolds Metals. These studies were required by NYSDEC as preliminary monitoring for the dredging project.

The delisting criteria will be satisfied when benthic surveys demonstrate a healthy community. In the absence of community data, sediment quality criteria must be achieved such that no threat is evident. The emphasis is placed on demonstrating the absence of toxic effects of sediment associated contaminants and on demonstrating bioassay results comparable to controls.

Restrictions on Dredging Activities:
Although this use impairment indicator has been determined to be unimpaired for the ongoing St. Lawrence Seaway navigational channel maintenance dredging, it is possible that an impairment could exist when considering expanded dredging proposals outside the seaway maintenance channel. There is a present concern regarding chemicals such as PCBs, arsenic, chromium, copper, nickel and zinc that are known to be present in contaminated river sediments. After

implementing the required contaminated river sediment removal projects and further defining further the contaminated sediment guidelines, investigations will be needed for the following: sediment analyses, toxicity tests, benthic studies, bioaccumulation studies, fish surveys and deformity assessment. Based on these investigations, determinations of the extent to which any dredging restrictions and/or any further required remedial actions and/or sediment strategy can then be defined.

Under the existing enforcement orders, the required remedial dredging activities will have substantial controls on conducting the dredging and on the disposal of the dredged materials and associated water effluent. For example, dredged materials are to be placed in an approved secure landfill, return water is to be treatment by flocculants and activated carbon, and certain monitoring activities and studies must be conducted.

Delisting criteria are satisfied when sediment criteria are achieved. Further, restricted dredging activities must be approved and can not be the result of active AOC or watershed sources. Study results should confirm this. Dredging approvals need to verify that dredged material disposal does not contribute to use impairments and that beneficial uses are protected.

Beach Closings:
Although this use impairment indicator has been determined unimpaired for the New York State portion of the AOC, further assessment is needed concerning the existence and extent of any partial-body contact use impairment in non-bathing beach areas downstream of combined sewer overflows (CSOs). Following the development and evaluation of additional data, which should include fecal coliform bacteria enumerations, an assessment of any impairment is to be made.

Delisting criteria are satisfied when bathing beach and partial body contact water standards and guidelines are achieved. Concentrations of fecal coliform and *E. coli* should be consistently below 100 colonies per 100 ml sampled. All AOC beaches are open to swimming. Beach data and water quality results support the not impaired status.

Degradation of Phytoplankton & Zooplankton Populations:
At present, the existence and extent of any plankton use impairment is unknown: current studies are needed. In addition, investigations and long-term monitoring are required to assess the status of this use impairment indicator following the completion of ongoing and planned land-based hazardous waste site and contaminated river sediment remediation. Clarkson University's Great Rivers Center is developing surveying methods using advanced instrumentation to measure phytoplankton community composition and health. These techniques should be applicable for use in other AOCs in the Great Lakes community.

Delisting criteria are satisfied when a healthy fish community can be demonstrated. Bioassay data should confirm that no significant toxicity occurs in ambient waters. When compared to non-impacted areas, the plankton community structure should be favorable (population, size and variability). In the absence of community structure data, an evaluation requires plankton bioassays to confirm no toxic impact in ambient waters. A helpful indicator is to observe a healthy fish community in the AOC.

Drinking Water Restrictions, Taste and Odor Problems:
Taste and odor problems were not considered impaired in the 1990 Stage 1 document. The invasion by exotic species dreissenid mussels in the Great Lakes and the St. Lawrence River and concomitant increase in water clarity is hypothesized to contribute to the presence of the compounds geosmin and MIB. This in turn has created taste and odor events in the drinking water supply that have seasonal characteristics and are managed as a nuisance condition. In some years, the condition has occurred more frequently than seasonally such that localities along the St. Lawrence River, may have to (or have had to) provide additional carbon filtration treatment to the drinking water supply to remove the taste and odor. For Massena, complaints on this

problem peaked in 1998; it is not currently an actionable issue. The St. Lawrence River Institute of Environmental Sciences in Cornwall, Ontario has conducted research on the cause of taste and odor problems in the St. Lawrence River; these studies are ongoing.

Early in RAP development, steps were taken to assure safe drinking water in the Dennison Road area near the Alcoa West main plant property. Likewise, residents using well water on Racquette Point Akwesasne lands shared a concern for groundwater contamination regarding their drinking water. This area is now serviced by the Mohawk Tribe's drinking water supply. The intake pipe for the community's supply is in the St. Lawrence River within the international AOC. Cooperative monitoring by the Mohawks Environmental Division and NYSDOH has occurred. For the Massena RAP, issues related to downstream effects, such as drinking water are addressed under the Transboundary Impacts indicator.

Tran boundary Impacts:
This additional use impairment indicator (used to address intergovernmental considerations) is rated as impaired and is believed to be historically caused by the pollution transport of PCBs, phosphorus, nitrogen, metals and contaminated sediments to downstream Canadian St. Lawrence River areas. The completion of remedial measures will significantly reduce sources of pollutant transport from land-based hazardous waste sites, contaminated river sediments, and point source discharges including combined sewer overflows (CSOs). Other upstream sources are more difficult to address and include components outside the scope of the RAP. These sources are nonpoint in nature and involve stormwater runoff, erosion, Lake Ontario inputs, and atmospheric deposition.

Once the contaminated river sediment and land-based remediation has been completed, the accomplishment of cleanup levels and the existence of any remaining contributions to downstream impacts will need to be assessed. Achieving ambient water quality standards, air discharge standards, sediment criteria, and flora/fauna criteria will each be important and require monitoring. Upstream watershed plans (e.g. the Lake Ontario Lakewide Management Plan) will need to address the effects of Lake Ontario water quality on the St. Lawrence River. Monitoring will be needed to assess any impact. For example, under the beach closings indicator, further assessment is needed concerning the existence and extent of any partial-body contact use impairment in non-bathing beach areas.

Transboundary impacts include impacts to both the Cornwall AOC and the Mohawks at Akwesasne territory located in both the US and Canada boundaries of the St. Lawrence. As such, the Mohawks at Akwesasne are a sovereign nation seeking restoration from ecological as well as cultural impacts. The Great Lakes Water Quality agreement supports this goal.