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TECHNOLOGY
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RECORD OF DECISION

for

REYNOLDS METALS COMPANY
ST. LAWRENCE REDUCTION PLANT
MASSENA, NEW YORK
NYSDEC SITE NO: 6-45-009

PREPARED BY:

NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION
REGION 6, WATERTOWN, NEW YORK

JANUARY 1992

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I. SITE LOCATION AND DESCRIPTION

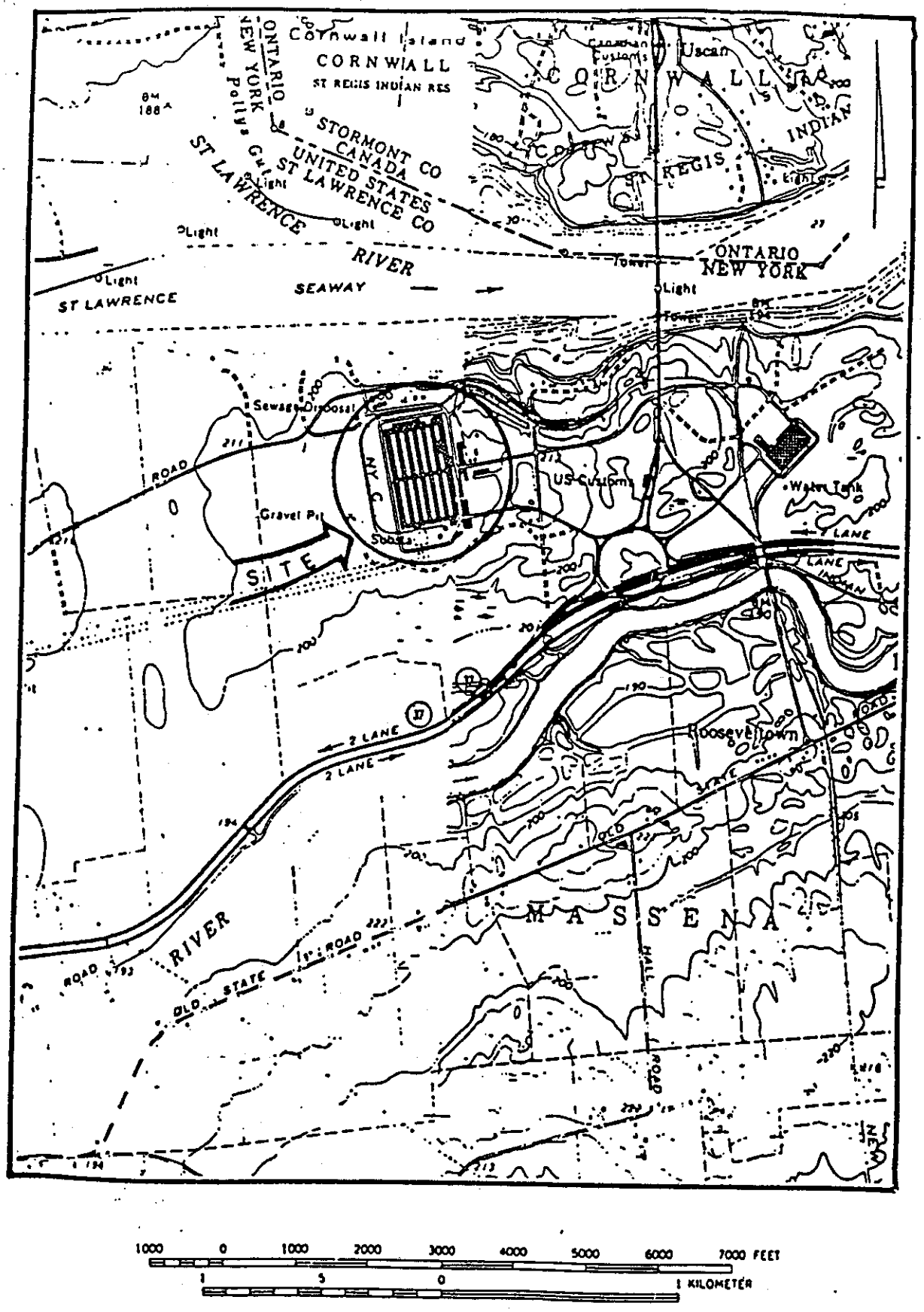
The Reynolds Metals Company (RMC) owns and operates an aluminum reduction plant in the Town of Massena, St. Lawrence County, New York. The Reynolds Property is bounded on the north by Haverstock Road (South Grasse River Road) and the St. Lawrence River; on the east by Conrail (formerly New York Central Railroad) and Haverstock Road; on the south by New York State Route 37 and the Raquette River. The Reynolds property occupies approximately 1600 acres. The plant is located off Route 37 near the Massena-Cornwall International Bridge (Figure 1).

The Reynolds St.Lawrence Plant was constructed in 1958 for the production of aluminum from alumina(aluminum oxide). The facility occupies about 7 percent or 112 acres of the total plant property owned by Reynolds. The main components of the plant include the reduction plant and any pertinent structures and facilities encompassing about 20.5 acres, the solid waste landfill (11.5 acres), and the black mud lagoon (6 acres).

As a result of production activities and years of continuous operation and expansion, various types of industrial waste, including hazardous waste, were generated, disposed and spread throughout the facility. On September 8, 1987 Reynolds entered into a Consent Order with the Department to develop and implement a facility-wide remedial program. The following disposal, storage and spill areas have been identified (see Figure I-1):

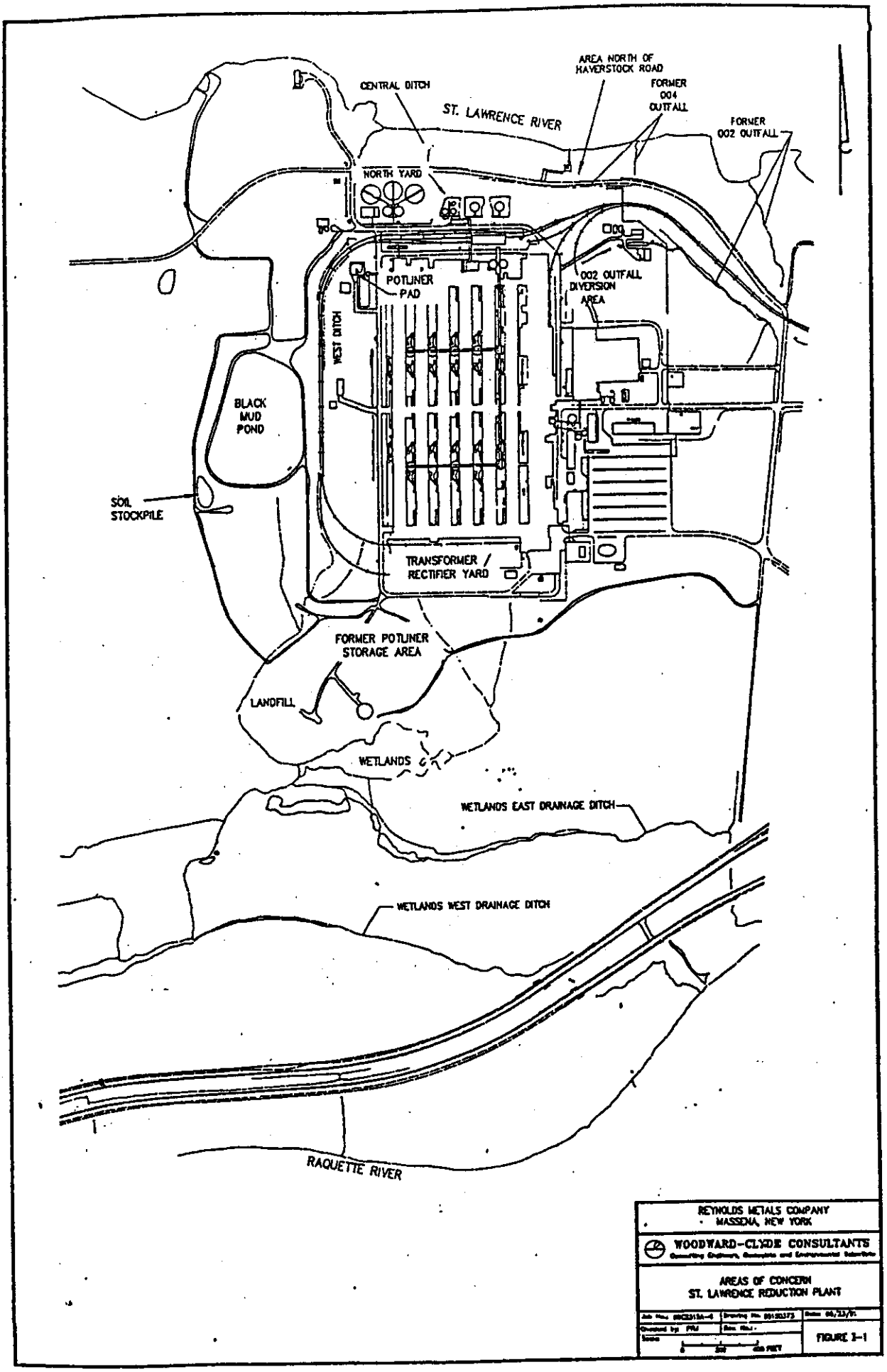
Black Mud Pond
Solid Waste Landfill and Former Potliner Storage Area
Wetlands
Potliner Pad
North Yard
Miscellaneous Areas:

- Rectifier Yard
- Soil Stock Pile
- West Ditch Outfall
- 002 Diversion Area (now designated as 005 by Division of Water)
- North of Haverstock Road
- 004 Outfall (now designated as 006 by Division of Water)



REGIONAL LOCATION PLAN

FIGURE 1


AREA NORTH OF HAVERSTOCK ROAD
CENTRAL DITCH
ST. LAWRENCE RIVER
FORMER 004 OUTFALL
FORMER 002 OUTFALL
NORTH YARD
POTLINER PAD
002 OUTFALL DIVERSION AREA
WEST DITCH
BLACK MUD POND
SOIL STOCKPILE
TRANSFORMER / RECTIFIER YARD
FORMER POTLINER STORAGE AREA
LANDFILL
WETLANDS
WETLANDS EAST DRAINAGE DITCH
WETLANDS WEST DRAINAGE DITCH
RAQUETTE RIVER
REYNOLDS METALS COMPANY
MASSENA, NEW YORK
WOODWARD-CLYDE CONSULTANTS
AREAS OF CONCERN
ST. LAWRENCE REDUCTION PLANT
FIGURE 3-1

BLACK MUD POND

The Black Mud Pond was constructed in 1973 in an unlined borrow pit on the west side of the plant. Its purpose was to hold settling carbon solids produced as a by-product of the emissions control system and cryolite recovery plant. The pond consists of a surface area of approximately 6 acres and has a volume of approximately 20 millions gallons. It is estimated that the pond currently contains 165,660 cubic yards of black mud which is underlain by approximately 22,090 cubic yards of contaminated soils.

LANDFILL AND FORMER POTLINER STORAGE AREA

The landfill is located on the southwest corner of the plant site. The 11.5 acre landfill was in operation from 1957 until June 1990 and during that time received solid waste, industrial waste, construction and demolition debris, spent potlining waste and PCB contaminated sewage sludge. PCB contaminated capacitors may also be buried in the landfill.

In 1984, work was performed at the landfill which included the installation of a partial leachate collection system, a 350,000 gallon storage tank to collect and hold leachate and surface water, and surface water controls and vegetative cover on portions of the banks on the perimeter of the landfill.

WETLANDS

The RR-6 Wetlands are located south and west of the Landfill Area. Prior to construction of the partial surface run-off controls and leachate collection system for the Landfill Area, leachate, groundwater and surface water discharged directly to the Wetlands. In addition, sediments contaminated with high concentrations of PCBs from the Rectifier Yard have migrated into the Wetlands. As a result, approximately 10 acres of the Wetlands immediately south of the Landfill Area have been impacted by surface water, groundwater and sediment contamination. Other contaminated areas in the Wetlands may exist.

The wetland area is part of a 172-acre freshwater wetland that has been mapped by the NYSDEC as Regulated Wetland RR-6, Class II. The wetland is one of the three largest wetlands in the Town of Massena. A preliminary survey of the wetland was conducted by NYSDEC in 1983 and identified the presence of four different cover types: emergent marsh, deciduous wetland, coniferous wetland and wetland/open water. The deciduous forest wetland type is the most predominant.

Background and reconnaissance surveys were performed by WCC in 1988 and again in 1989. Common flora species occurring in the emergent areas were identified as being cat-tail, soft-stem bullrush and purple loosestrife, while white elm, ash and silver maple were common in the deciduous forest areas. Common fauna species include a wide variety of mammals, birds, reptiles, amphibians and invertebrates. Game species such as white-tail deer, ruffed grouse, American woodcock and leopard frog utilize the wetland as part of their habitat. The wetland also provides a habitat for various aquatic fauna including many species of benthic fauna.

POTLINER PAD

The Potliner Pad is a concrete surface structure located adjacent to the crusher building on the northwest side of the plant. Historically the Potliner Pad was used to store spent potliner materials.

NORTH YARD

The North Yard area is the location of the Heat Transfer Medium (HTM) system. The HTM system is used to maintain the temperature and fluidity of the coal tar pitch for anode and cathode manufacturing. In the past the HTM system actively pumped a fluid containing PCBs from the Pitch Pump House to inside the plant. Through leaks and spills over the life of the system, high levels of PCBs have accumulated in the soils in the North Yard area of the plant. The HTM system was retrofitted with non-PCB oils in the early 1980's.

MISCELLANEOUS AREAS

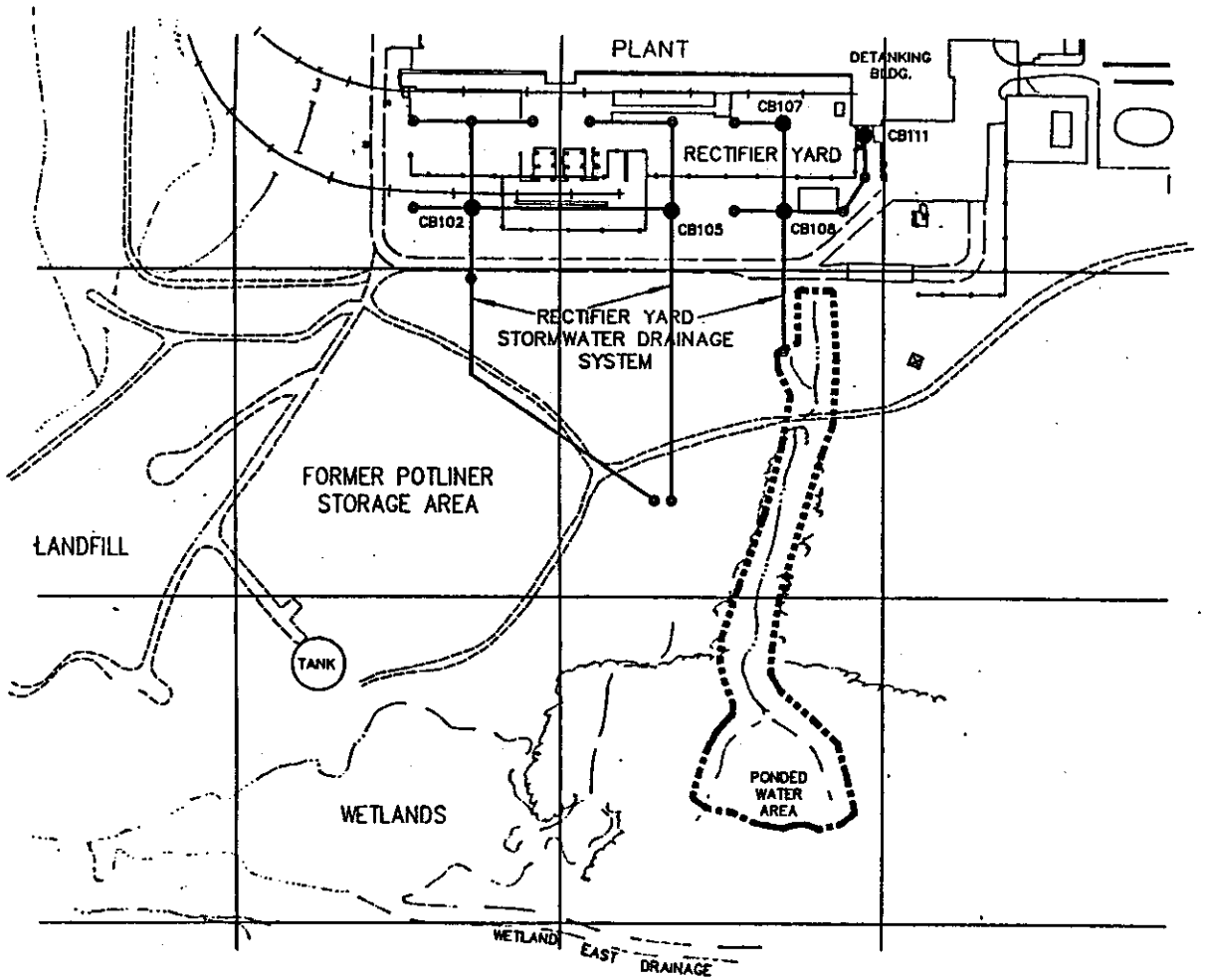
The area(s) of concern identified as the Miscellaneous Areas include the following sites around the RMC facility (see Figures I-1 and VIII-1):

1. Rectifier Yard
2. Soil Stockpile
3. West Ditch Outfall
4. Area North of Haverstock Road
5. SPDES Point Discharge 004 Outfall
6. SPDES Point Discharge 002 Diversion Area

These areas of PCB contamination are relatively small and localized. Brief descriptions are presented below.

RECTIFIER YARD

The plant rectifier yard is located adjacent to the south side of the plant. The area consists of step-down transformers, rectifiers and power lines. Surface water is drained from the yard by a network of catch basins that discharge to the south into the wetlands.



LEGEND:

DRAINAGE PATHWAY

APPROX. ARREA OF CONTAMINATED SEDIMENTS

APPROXIMATE AREA OF CONTAMINNATED SEDIMENTS
RECTIFIER YARD AREA
REYNOLDS METALS COMPANY
MASSENA, NEW YORK

Rev. No.	Date	Type of Revision	Checked by:

Woodward-Clyde Consultants
Consulting Engineers, Geologists and Environmental Scientists

Job No.: 89C2515A-1	Drawing No. 95150800	Date: 02/13/91
Drawn by: D.E.G.	Checked by: M.K.	
Scale: 0 200 FEET		FIGURE VII-1

SOIL STOCKPILE

The Soil Stockpile is located southwest of the Black Mud Pond. It consists of material which was excavated during construction activities at the RMC facility.

WEST DITCH OUTFALL

A portion of the West Ditch, between Haverstock Road and the Potliner Pad, was previously remediated by excavation of soils contaminated with PCBs. However, the downstream outfall portion of the ditch, north of Haverstock Road, was not addressed during the IRM work. It is this outfall section of the West Ditch that is being considered as a Miscellaneous Area.

AREA NORTH OF HAVERSTOCK ROAD

This area is directly north of the fuel oil containment areas of the North Yard. It is believed that the PCB contamination in the area north of Haverstock Road resulted from contaminated soils, transported across the road by rain water runoff and snow melt, from the north slope of the fuel oil containment areas of the North Yard.

OUTFALL 004 (Now Designated as 006 by DOW)

The outfall ditch portion of the SPDES point discharge outfall system is located north of Haverstock Road and east of the North Yard. In the past the outfall, system carried runoff from the fuel oil containment areas to the St. Lawrence River.

002 DIVERSION AREA (Now Designated as 005 by DOW)

In the past, surface water flow in the vicinity of the sewage treatment plant flowed eastward along a creek bed south of the railroad tracks, crossing underneath the tracks and Haverstock Road then discharging into the St. Lawrence River. IRM construction in 1989 diverted this direct point discharge to the river into a retention basin located northeast of the East Cast House. It is in this area near the retention pond that additional PCB contamination was found.

II. SITE HISTORY

The Reynolds St.Lawrence Plant was constructed in 1958 for the production of aluminum from alumina(aluminum oxide). As a result of production activities and years of continuous operation and expansion, various types of industrial waste, including hazardous waste, were generated, disposed and spread throughout the facility. On September 8, 1987 Reynolds entered into a Consent Order with the Department to develop and implement a facility-wide remedial program.

HISTORY OF WASTE DISPOSAL:

	From	To
Black Mud Pond	1973	June 30, 1990 *
Landfill/Former Potliner Storage Area	1957	June 30, 1990 *

*As required under Consent Order No. A6-0119-87-08

Chronology of Reports for Site Investigations, Risk Assessments, and Remedial Investigation/Feasibility Studies:

Report	Date
Preliminary Investigation of the RMC Black Mud Lagoon, Phase I Summary Report	December 1983
Preliminary Investigation of RMC Landfill Site Phase I Summary Report	September 1984
Subsurface Exploration and Permeability Test Report, Industrial Landfill RMC	March 1985
Preliminary Report, Evaluation of Pond Leakage, RMC	July 1985
Hydrogeologic Assessment of the Black Mud Pond Area	November 1985
Hydrogeologic Investigation for the Proposed Black Mud Pond	February 1986
Preliminary Risk Assessment RMC	February 25, 1988
Phase I Remedial Investigation Report	June 27, 1988
PCB Source Identification at the St. Lawrence Reduction Plant	July 29, 1988

Report	Date
Revised Phase I Remedial Investigation Report	September 23, 1988
Annual Report - 1988 Environmental Activities	December 22, 1988
Final Report, 1988 Studies, St. Lawrence River Sediment Sampling Program	January 1989
Interim Remediation Report	January 19, 1989
Report on PCB Source Identification Assessment	February 20, 1989
Phase I Remedial Investigation Report, Revision 2	March 31, 1989
Landfill Underdrain and Black Mud Pond Terrain Conductivity Report	June 30, 1989
Period 3 PCB Source Assessment Report	September 12, 1989
Preliminary Feasibility Study	March 30, 1990
Revised Final Remedial Investigation Report	July 2, 1990
Risk Analysis Report (Revision 2)	November 5, 1990
Draft Additional River Sampling Report St. Lawrence River System	January 24, 1991
Revised Final Feasibility Study Report	August 19, 1991

PREVIOUS INTERIM REMEDIAL MEASURES (IRMs)

A number of IRMs have been completed. The IRMs are intended to minimize releases to the environment prior to selection of a remedial action plan. Each is briefly described below.

OUTFALL 002 DIVERSION AND 002 OUTFALL DITCH (Now Designated as 005 by DOW)

Outfall 002 previously consisted of surface water flow along a creek bed located in the vicinity of the sewage treatment plant. The water flowed eastward along the south side of the railroad tracks before crossing underneath the tracks and Haverstock Road, then discharging to an embayment in the St. Lawrence River. In November of 1989, this flow was diverted to a piped system, which

collects all cooling waters that formerly discharged to Outfall 002, and most of the surface water run-off from the east side of the plant. This water flows to a retention basin located northeast of the East Cast House. Effluent then discharges to a mechanical oil skimmer, a rectangular weir and then into the pre-existing pipe which previously carried the Outfall 003 discharge to the St. Lawrence River.

The 002 Outfall Ditch is located on the northeast portion of the RMC Plant site and extends from west of the sewage treatment system area running east by south east to a catch basin located south of the railroad tracks. Approximately 1200 feet of ditch was excavated between August and October of 1990. Approximately 2876 yards of material contaminated with PCBs were excavated and disposed. The ditch was excavated to approximately 1 foot depth and deeper in areas which exhibited greater than 10 ppm PCBs. Once the ditch verification sampling showed no levels greater than 10 ppm PCB, the ditch was backfilled, rerouted in some areas, and restored. ≤10 ppm

OUTFALL 004 (Now Designated as 006 by DOW)

Outfall 004 is a ditch that previously collected drainage from the three diked areas in the North Yard. Drainage from these areas previously flowed alongside a flat area north of the dikes before entering the ditch alongside the southern side of Haverstock Road. It then flowed eastward to a culvert crossing under the road and discharged through a ditch into the St. Lawrence River. Two remedial measures have been performed relative to this outfall: 1) the use of the outfall as an outlet from the three diked areas has been discontinued. Run-off and other waters collected in these diked areas is currently pumped to the sanitary sewer system for carbon treatment and subsequent discharge through Outfall 003. Construction was initiated in 1990 and completed in 1991 to divert this flow to a permanent, dedicated North Yard GAC system for treatment; and 2) starting in 1988 the roadside ditch IRM was conducted. During 1988 the western section of the ditch, from below the diked areas to north of the pump house, was remediated. During 1989 the remainder of the ditch from the pump house to the catch basin and from the catch basin to the St. Lawrence River was remediated. The remediation consisted of removing sediments to a depth of approximately 1 foot along the entire length of the ditch to a level of less than 10 ppm PCBs and capping the underlying soils with gravel and asphalt. In addition, the reach of the ditch from the road to the river has been relocated to the east of its original location.

NORTH YARD

IRMs in the North Yard have included the covering of contaminated soils and limiting access to contaminated areas. Upon notification by WCC of the results of PCB sampling in the soils in the North Yard in June of 1988, RMC covered high concentration areas with polyethylene sheeting. Subsequently, additional layers of plastic were installed, and selected areas were paved with asphalt. Fencing was also installed to control access to contaminated areas. Additional IRMs which have been conducted in the North Yard include rerouting the storm drainage and French drain flow to a new GAC treatment system which has been operating since February of 1991.

WEST DITCH

During the construction of the new on-site overflow tank, which was implemented as a contingency for the fume control system in case of a storm event, it was determined that an access road would be placed across the West Ditch. Results of sediment sampling performed prior to the installation of the access road indicated that the ditch sediments were contaminated with PCBs. The remediation entailed removing the contaminated ditch sediment to approximately a 1 foot depth and obtaining the remedial clean up goal of less than 10 ppm at a 1 foot depth and below.

OTHER INTERIM REMEDIAL MEASURES

RMC undertook decontamination of structural surfaces in the Pitch Pump House in 1989. Also, in 1989 and early 1990, the floor of the oil storage shed was replaced and the structure decontaminated.

III. CURRENT STATUS

An evaluation has been conducted for the Reynolds Massena facility to identify the potential public health impacts associated with migration of contaminants from the site. Several human exposure routes have been identified that have the potential to impact public health. The primary exposure route of concern is the human consumption of consumable biota that have bioaccumulated contaminants from the areas of Reynolds contamination, particularly in off-site water bodies. Contaminants, primarily PCBs, have been found in consumable fish in the St. Lawrence River, which has received contaminants through plant outfalls and surface water run off. The New York State Department of Health (NYSDOH) has issued a special fish consumption advisory for the St. Lawrence River. These fish contain PCBs at elevated levels. The advisory is to eat none of these species: American eel, channel catfish, lake trout, carp, chinook salmon, coho salmon over 21", rainbow trout over 25", and brown trout over 20"; and to eat no more than one meal per month of white perch, smaller coho salmon, rainbow, and brown trout.

Other potential exposure routes from this site include on-site workers coming into contact with, ingesting or breathing site contaminants, and off-site residents and/or sportsman coming into contact with, ingesting, or breathing contaminated soils, sediments, or surface water.

The following is a summary of the remedial investigation's findings and conclusions concerning site characteristics and risks.

BLACK MUD POND

SITE CHARACTERISTICS

The black mud is a residue from the processing of spent potliners (federal waste code K088) for cryolite recovery. Black mud waste is primarily composed of alumina (30-40%) and carbon (35-45%) with fluoride at 2-5%, cyanide at 61 ppm and PCBs at 3.4-8.1 ppm. Other constituents making up the remaining 15 % of the total waste mass of the material include aluminum (7.1%), calcium (1.9%), iron (0.9%), magnesium (0.7%), sodium (4.2%), sulfate (0.06 %), PAHs (0.2%), other metals (0.1%), and other inorganics (0.02%).

A waste characterization of the black mud liquor has shown elevated levels of aluminum, arsenic, sodium, and vanadium. The liquor also contains detectable levels of barium, calcium, copper, lead, nickel, potassium, and zinc. PCBs have also been found in the liquor up to levels of 2.8 ppb. PAH compounds include benzo(b)fluoranthene, chrysene, fluoranthene, and pyrene.

The Black Mud Pond is situated on a ridge in the western portion of the plant. In general, the ridge is composed of gray glacial till. However, in some areas adjacent to the Pond, additional geologic units are present above the till. In these areas, the gray till is generally overlain, from top to bottom, by several feet of fill material, a few feet of sandy winnowed till and a few feet of brown glacial till. The till unit has an average permeability estimated at 1 X 10E-6 cm/sec. The groundwater velocities in this till unit have been estimated to be on the average of 3 feet/year. The gray till is underlain by dolomite bedrock which is thought to be present at a depth of approximately 100 feet. The Black Mud Pond groundwater data has shown cyanide, fluoride, iron, magnesium, manganese, PCBs, phenols, and sulfate in exceedance of New York State Groundwater Quality Standards or Guidance Values.

Depth to groundwater in the vicinity of the Pond generally varies from a few feet to 15 feet. A surface water divide between the St. Lawrence River and the Raquette River crosses the ridge on which the Pond is located. Based on available data, flow in the shallow groundwater flow system is radial in nature. Due to the Pond's location on the ridge, a downward vertical gradient exists in the groundwater flow system underlying the area.

SITE RISKS

Shallow groundwater is a migration pathway for contaminants from the Pond. However, due to installation of the existing groundwater containment wall and the very low permeabilities of the glacial till, the migration of contaminants to date has been very limited. Shallow groundwater has discharged to drainageways to the south and east. The berm encircling the Pond to the south and east was constructed with fill material with a higher permeability than the glacial till. The fill material is a preferred migration pathway for shallow groundwater. As a result, groundwater seeps have occurred on the southern side of the berm. The seeps have been shown to contribute contaminant loading in the sediments in the drainage pathways channeling surface water to the Wetlands located to the south of the pond.

Worker exposure to the black mud waste and airborne contaminants are additional potential migration pathways. However, airborne transport of contaminants from the Pond are below acceptable levels for human exposure.

LANDFILL/FORMER POTLINER STORAGE AREA

SITE CHARACTERISTICS

The landfill contains approximately 158,000 cubic yards of waste and approximately 89,000 cubic yards of contaminated soils beneath the waste. Landfill boring analyses have revealed the presence of PAH compounds including anthracene (150 ppm), benzo(a)anthracene (1,000 ppm), benzo(a)pyrene (1,100 ppm), benzo(b)fluoranthene (2,100 ppm), benzo(g,h,i)perylene (430 ppm), benzo(k)fluoranthene (1,000 ppm), chrysene (1,700 ppm), dibenzofuran (15 ppm), fluoranthene (2,200 ppm), pyrene (1,900 ppm), PCBs (.39 - 690 ppm), fluoride (8500 ppm), phenols (21 ppm), sulfate (13,000 ppm) and Total cyanide (300 ppm). Metals analysis has shown aluminum (87,000 ppm), arsenic (110 ppm), beryllium (11 ppm), cobalt (23 ppm), iron (330,000 ppm), manganese (4,500 ppm), sodium (59,000 ppm), and vanadium (970 ppm).

The northern portion of the landfill is underlain by approximately five to 10 feet of brown glacial till, which is underlain by gray glacial till with an average permeability estimated at 1 x 10 E-6. The average groundwater velocities have been estimated at 0.8 feet/year. The southern portion of the site is underlain by a gray clay unit whose thickness varies from a few feet to 20 feet. Gray glacial till is present beneath the clay unit.

Beryllium (13.7 ppb), cyanide (21,700 ppb), fluoride (220 ppm), iron (87,200 ppb), magnesium (80,300 ppb), manganese (3,090 ppb), PCBs (13.3 ppb), phenols (66 ppb), and sulfate (600 ppm) have been documented in the shallow groundwater in exceedance of New York State Groundwater Quality Standards or Guidance Values.

Groundwater beneath the landfill generally flows to the south to discharge to the wetland. An upward vertical gradient exists in the shallow groundwater flow system beneath the landfill.

SITE RISKS

Shallow groundwater flow is a migration pathway for contaminants from this area and discharges directly to the adjacent wetlands. The existing landfill leachate collection system is collecting some, but not all of this contaminated groundwater.

Surface water is not a major migration pathway since the majority is collected in the existing Landfill holding tank. However, small leachate seeps in the northwest corner of the Landfill have overflowed the containment berm in the past and drain to a small stream west of the Landfill which it turn drains to the wetlands. During high rainfall events, the perimeter drainage ditches overflow and allow surface water run-off to flow directly to the wetlands.

Air is not considered a significant migration pathway due to the placement of an interim cover on the Landfill. However, there is no cover on the Former Potliner Storage Area and a potential for direct worker exposure does exist.

As a result of the migration of contaminants from the area to the wetlands, impacts to the flora, fauna and biota in the wetlands have occurred. Bio-accumulation of contaminants in the biota of the wetlands is considered a significant potential migration pathway.

WETLANDS

SITE CHARACTERISTICS

The Wetlands sediments have elevated levels of aluminum, arsenic, iron, magnesium, sodium, vanadium, cyanide, fluoride, sulfate and phenols in relation to background. PCBs at levels up to 19 ppm have also been documented. In the Final Remedial Investigation Report, it was estimated that approximately 7,520 cubic yards of sediments in the Wetlands contain PCB contamination at concentrations of 1.0 ppm or greater. After further evaluation of the extent of contaminated sediments, a revised estimate was presented in the Revised Final Feasibility Study (FS). It is now estimated that 5,153 cubic yards of contaminated sediments are located in the Wetlands drainageways, and 11,132 cubic yards of contaminated sediments are located in the open water area of the "impacted" portion of the Wetlands. Therefore, the total estimated volume of sediments in the Wetlands containing PCBs at 1.0 ppm or greater is now estimated at 16,295 cubic yards.

The "impacted" portion of the Wetlands is defined in the FS as a 10.1 acre area immediately adjacent to the south side of the Landfill/Former Potliner Storage Area. However, additional PCB sampling in the Wetlands performed by the NYSDEC in 1988 has shown that the PCB contamination extends south to the NYS Route 37 median where concentrations as high as 14.1 ppm PCBs were documented. This additional area was not addressed in the FS.

The Wetlands surface water samples have shown levels of PCBs (2.6 ppb), chrysene(19 ppb), fluoride (54 ppm) and bis(2-ethylhexyl)phthalate (17 ppb) above background.

Subsurface geologic conditions beneath the Wetlands are similar to those beneath the southern portion of the Landfill and Former Potliner storage area which exhibits an average permeability estimated at 1 x 10 E - 6 and average groundwater velocities of an estimated 0.8 feet/year, except in the thicker clay unit located beneath the Wetlands which should exhibit lower permeability.

The Wetlands is a groundwater discharge area for the southern portion of the RMC facility and therefore contaminants are not likely to leave the area via the groundwater. Drainage from the Wetlands flows south via two intermittent streams, through drainage culverts under NYS Highway Route 37, into the Raquette River.

SITE RISKS

Contamination migration via the groundwater is not considered significant. However, migration via surface water flow south to the Raquette River is of concern.

The most significant threat associated with the Wetlands contamination is the bio-accumulation of contaminants in the biota and food chain.

The 1988 and 1989 field surveys showed indications of vegetative stress in the emergent wetland area adjacent to the RMC landfill/former potliner storage area. Unvegetated areas accounted for 46.2% of the emergent area in 1988 and an average of 26.3% in 1989 (surveyed in the spring, summer and fall). Relatively high concentrations of fluoride and cyanide occur where wetland vegetation is lacking. The highest sediment concentrations for fluoride and cyanide were 54,000 ppm and 91 ppm respectively. The highest water concentrations were 96 ppm and 1.3 ppm respectively. Both the sediment and water sampling results were well above background concentrations of less than 20 ppm and less than 1 ppm in the sediment for fluoride and cyanide respectively and, less than 0.45 ppm and less than 0.01 ppm in the water for fluoride and cyanide respectively.

Evidence of benthic stress was also shown as a result of the 1988 and 1989 field studies. 1989 sampling results were similar to the vegetative stress investigations; namely where increased levels of arsenic, cyanide and fluoride were found in the sediments, the test populations of the benthic communities were found to be relatively low compared to background populations. Benthic data indicates that the stations closest to the landfill/former potliner storage area and those in contact with water draining from the area are negatively impacted. These sampling stations showed the lowest population densities (averaged over three seasons) of 50, 109 and 391 individuals per square meter. Background values averaged 5150 and 3613 individuals per square meter from both control stations. Sampling data for the benthic communities located in the eastern drainageway, sampling point approximately 1,500 feet from the site, and the southwestern fringe of the landfill wetland showed no significant impact in populations.

POTLINER STORAGE PAD

SITE CHARACTERISTICS

Sediment sample results, from samples collected from the drainage pathway located west and north of the Pad, have shown elevated levels of aluminum (72,000 ppm), arsenic (46 ppm), beryllium (11 ppm), cobalt (10 ppm), cyanide (30 ppm), fluoride (2700 ppm), PCBs (6.6 ppm), sodium (24,000 ppm), sulfate (350 ppm) and vanadium (66 ppm) in comparison to background. It is estimated that there is approximately 295 cubic yards of sediment contaminated with low level PCBs (concentrations between 1 ppm and 10 ppm) and approximately 3,141 cubic yards of contaminated soils within the Potliner Pad vicinity.

The Potliner Pad is underlain by fill material (reworked till) whose thickness generally increases to the north. The fill thickness in the immediate site vicinity varies from approximately 2 to 5 feet. The fill is underlain by a brown till which overlies gray glacial till.

Depth to groundwater in this area is approximately 5 to 10 feet. Groundwater in the vicinity of the site flows to the northeast toward the St. Lawrence River. As with the other areas of concern, the permeability of the deeper brown and gray till is much less relative to the shallow fill. A backfilled drainageway which extends from the site area to the St. Lawrence River, may behave as a preferential migration pathway for contaminated groundwater.

Shallow groundwater in the Potliner Pad area has shown levels of arsenic (38 ppb), beryllium (25.3 ppb), cyanide (52,600 ppb), fluoride (374 ppm), iron 278,000), magnesium (275,000 ppb), manganese (197 ppb), PCBs (0.10 ppb), phenols (0.19 ppb), and sulfate (1690 ppm) in exceedance of New York State Groundwater Quality Standards and Guidance Values.

SITE RISKS

Contaminant migration via shallow groundwater has been documented. The plume may follow a former stream bed which runs south - to - north approximately 50 feet east of the Potliner Pad and through the North Yard. The stream was filled in during construction of the facility with approximately 10 to 12 feet of fill. The more permeable fill material may act as a preferential migration pathway. Prior to the construction of the facility, it is assumed that the stream flowed to the St. Lawrence River. The location of the stream bed in the North Yard allows for underdrain groundwater collection piping at the North Yard Thickener System to potentially intercept a portion of the contaminant migration via groundwater flow in the old stream bed. It is currently not known how much of the groundwater migration is intercepted by the underdrain system.

Surface water flow acts as another contaminant migration pathway. Run-off from the Potliner Pad flows to the St. Lawrence River via the West Ditch drainageway located west of the Pad.

Potential exposure to on-site workers due to contact with contaminated soils and sediments is also a concern. However, exposure due to airborne transport is considered minimal since potliner is no longer stored on the Pad.

NORTH YARD AREA

SITE CHARACTERISTICS

Approximately 400 soil samples have been collected in the North Yard to define the horizontal extent of PCB, Polychlorinated dibenzofurans (PCDF) and Dibenzo-P-dioxins (PCDD) contamination. In addition, 27 soil samples were taken to define the vertical extent of PCB contamination. Soils are contaminated with PCBs at levels up to 89,000 ppm. Dioxin and dibenzofurans have also been shown to exist in the North yard at levels of 9.92 ppb and 9.35 ppb, respectively.

All raw materials needed for the operation of the reduction plant and the shipment of finished products enter and leave through the North Yard area. In addition to the HTM system and the Pitch Pump House being located in the North Yard, other plant facilities in the area include: the Unloading Shed for receiving alumina, coke, soda ash and fluoride, Pitch Storage Tanks and the Truck Unloading Dock. Any remedial action within the North Yard area will need to consider impacts to the every day operations.

North of the Pitch Pump House, the North Yard area is immediately underlain by approximately 2 to 4 feet of fill (reworked till). The fill material is underlain by several feet of brown till, which overlies the gray till unit. South of the Pitch Pump House, the North Yard area was built in "cut" into the glacial till and no extra fill material was needed.

Shallow groundwater in the North Yard has been shown to contain arsenic (140 ppb), cyanide (3.920 ppm), fluoride (56.3 ppb), iron (27.700 ppm), magnesium (157.000 ppm), manganese (1.060 ppm), phenols (5.4 ppb), and sulfate 2,140 ppm). PCBs have also been recently detected at levels in exceedance of New York State Groundwater Standards or Guidance Values.

Depth to groundwater in the area varies from approximately 2 to 15 feet. North of the Pitch Pump House, shallow groundwater flows to the north to discharge to the St. Lawrence River. Shallow groundwater flow conditions south of the Pitch Pump House are much more complex due to the existence of backfilled utility trenches and french drains in this area. Based on measured groundwater levels, it is clear that groundwater flow conditions in this area are affected by the presence of these structures. However, the extent to which the trenches and drains influence groundwater flow is not known at this time. Average groundwater velocities in the North Yard utility trenches have been estimated at 2900 feet/year. Average permeability of the fill material in the North Yard has been found to be approximately 1.4x10 E-1 cm/sec. The underlying till average permeability has been found to be approximately 5x10 E-4 cm/sec.

SITE RISKS

Worker exposure to PCB contaminated soils is of main concern.

Shallow groundwater flow is a potential pathway through the fill due to its relatively high permeability. The utility trenches act as preferential pathways for groundwater flows. A surface water and shallow groundwater collection system has been installed, in the North Yard proper, as an interim measure. Prior to the installation of the collection system, shallow groundwater and surface water flowed directly to the St. Lawrence River. The collection system effectively captures surface water and shallow groundwater from the northern portion of the Yard, including the fuel oil dike areas. However, it has been documented that during high precipitation events, surface water runoff from the southern portion of the North Yard surcharges the collection system and ends up flowing, untreated, to the St. Lawrence River. Documented releases to the St. Lawrence River during high precipitation events still occur. Groundwater in the underlying glacial till, due to the till's low permeability, is not a significant migration pathway.

Surface water runoff from the area north of the fuel oil dikes is an additional migration pathway for contaminated soils and sediments. Prior to the interim remedial measure performed on the 004 Outfall ditch, surface water was allowed to flow across Haverstock Road and north directly to the St. Lawrence River. There still exists a potential for releases to the St. Lawrence River during high precipitation events.

MISCELLANEOUS AREAS

SITE CHARACTERISTICS

RECTIFIER YARD

Soils in the rectifier yard are contaminated with PCBs between 2.2 ppm - 7.1 ppm.

Surface sediment samples found in the drainageway south of the rectifier yard showed levels of PCBs up to 2300 ppm and up to 3200 ppm at a depth of 1 foot below the ground surface. There is approximately 4,330 cubic yards of contaminated sediments with levels of PCBs greater than 1 ppm.

It is assumed that the subsurface geologic conditions are similar to those present beneath the Landfill and Former Potliner Storage Area.

Groundwater in this area is believed to flow to the south or southeast to discharge to the wetland.

SOIL STOCKPILE

This area of concern contains approximately 2,700 cubic yards of material containing less than 10 ppm PCBs. It is assumed that Hydrogeologic conditions are similar to those described for the Black Mud Pond.

WEST DITCH OUTFALL

A portion of the West Ditch, between Haverstock Road and the Potliner Pad, was previously remediated by excavation of soils contaminated with PCBs. However, the downstream outfall portion of the ditch, north of Haverstock Road, was not addressed during the IRM work. It is this outfall section of the West Ditch that is being considered as a Miscellaneous Area. Past sediment sampling along the shoreline of the St. Lawrence River adjacent to this outfall had shown low levels of PCB contamination (less than 10 ppm).

AREA NORTH OF HAVERSTOCK ROAD

It is believed that the PCB contamination in the area north of Haverstock Road resulted from contaminated soils, transported across the road by rain water runoff and snow melt, from the north slope of the fuel oil containment areas of the North Yard. Previous sampling in this area indicated PCB contamination levels in the soils ranged from 4.2 ppm to 1,800 ppm (at a depth of 2 feet).

OUTFALL 004 (Now Designated as 006 by DOW)

Additional sampling in the previously remediated 004 outfall ditch (March 1991) has revealed elevated PCB levels in the ditch sediments (up to 1.48 ppm) that require action. It is believed that the PCB contaminated sediments originated from the same area as the PCB contaminated soils located north of Haverstock Road.

002 DIVERSION AREA (Now Designated as 005 by DOW)

As part of the 002 diversion project, completed in 1989, soil was excavated in the vicinity of the retention basin to enable the installation of the Outfall 002 drainage pipeline. During the work, confirmatory soil samples were taken to verify PCB levels in the soils to be left in place. PCB contamination was confirmed in two areas where sampling results showed PCB levels of over 10 ppm and over 50 ppm respectively.

SITE RISKS

All areas are susceptible to contaminant migration via surface water runoff to either the Wetlands or the St. Lawrence River. On-site worker exposure and off-site public exposure due to direct contact of the contaminated soil and sediments is also a major concern.

No contamination of the groundwater has been documented in the Miscellaneous Areas therefore, contaminant migration via groundwater movement is not a significant concern.

IV. ENFORCEMENT STATUS

As a result of Reynolds Metals Company's handling and disposal of certain hazardous wastes, the Department originally listed two specific sites in the NYSDEC Registry of Inactive Hazardous Waste Disposal Sites in New York State. These were site no. 6-45-009(a), Black Mud Pond, and site no. 6-45-009(b), Landfill/Former Potliner Storage Area. Following the listing in the Registry, the Department entered into a Consent Order (Index No. A6-0119-87-08) with Reynolds on September 8, 1987 to develop and implement a facility-wide remedial program. The two sites mentioned above are identified in the Order as being known waste disposal sites.

Since the original listing, the two separate sites have been consolidated into one site listing (site no. 6-45-009) containing five major areas of concern: Black Mud Pond, Landfill/Former Potliner Storage Area, Wetlands, Potliner Pad and North Yard.

Under the current Order, Reynolds has satisfactorily completed all of the following requirements:

Submittal of a Preliminary Report based on the results of a Step I remedial investigation.

Submittal of a Final Report based on the results of a Step II remedial investigation.

Submittal of a Final Feasibility Study Report.

Submittal of a Solid Waste Management Plan.

Stopping all solid waste disposal into the Black Mud Pond and Landfill/Former Potliner Storage Area, effective June 30, 1990, and the interim capping of the Landfill.

The current Consent Order does not address remedial design and construction requirements. These requirements will be included under a new Consent Order once the Remedial Investigation and Feasibility Study phase of the remedial program has been completed. Also not addressed under the Consent Order is the investigation of the St. Lawrence River and the design and construction of a remedial action to clean up any areas impacted by contamination migration from the Reynolds site. Impacts to the St. Lawrence River are currently being addressed under a separate administrative "106" Order between Reynolds and the USEPA.

V. GOALS FOR THE REMEDIAL ACTIONS

In order to insure the proper development of a remedial program, Treatment Goals, Clean-up Goals and Treatment Thresholds for the various contaminants were identified and remedial action objectives (RAOs) were established for each of the areas of concern (AOC). For purposes of this ROD, the following definitions apply:

Treatment Goal: The level of residual contamination in the treated material after permanent treatment. The goals for treatment of wastes and contaminated soils are based on the USEPA Land Disposal Restrictions, 40 CFR 268. Also, treatment of PCB waste must comply with USEPA TSCA requirements contained in 40 CFR 761. For the purposes of this ROD, the goal for those soils and wastes containing PCB that require treatment is treatment to less than 2 ppm PCBs.

Clean-up Goal: The level of contamination in the media of concern where contaminant levels below this concentration would be considered protective of human health and the environment, and no further remedial action is required. Clean-up goals are developed according to the threat that a hazardous waste may present to various receptors and at various locations on the facility. Clean-up goals are normally most stringent where contaminants may directly impact off-site human receptors; where contaminants could migrate uncontrolled to receiving streams or a usable aquifer; or in biologically sensitive areas, such as wetlands. On industrial sites where public access is strictly controlled and contaminant migration can be monitored and controlled, the clean-up goals are normally obtained by excavating the contaminated material.

Treatment Threshold: The level of contamination in the media of concern above which the toxic substances must be destroyed or permanently immobilized. Lower level contamination is either contained in-place by capping or groundwater control, or the waste is excavated down to clean-up goals and moved to a landfill for secure disposal. The treatment threshold for PCBs in soils/sediments at RMC is 25 ppm.

CLEAN UP GOALS

The Department believes that many of the RAOs are best achieved through excavation of contaminated wastes, soils and sediments. The degree of excavation is dependent upon soil clean-up goals which are based on criteria specific to the individual AOC including: location, contaminants of concern, potential human and environmental receptors and controls to be implemented.

For purposes of clarification, excavation alternatives utilize an overall clean-up goal of 1.0 ppm. Modifications to this clean-up goal apply only to those areas that are within a groundwater/surface water management area. The clean-up goal within these areas is 10 ppm. In addition, once excavated, the treatment threshold applies to those excavated materials with PCB concentrations of 25 ppm or greater. All material with PCB concentrations of less than 25 ppm will not be treated, but instead will be managed on-site.

For those remedial alternatives that include excavation, the following soil clean-up goals have been established. These goals are considered to be protective of the groundwater quality.

Recommended Soil Organic Contaminants	Cleanup Goal(ppm)
Benzo(b)fluoranthene	0.330
Benzo(k)fluoranthene	0.330
Chrysene	0.330
Fluoranthene	19.0
Pyrene	6.5
PCBs # (Wetland)	0.1
PCBs * (Areas Outside Groundwater and Surface Water Management Areas)	1.0
PCBs * (Areas Within Groundwater and Surface Water Management Areas)	10.0
Dibenzo-P-dioxins(PCDD)	0.0005
2,3,7,8 TCDD	0.0005

Note: Soil cleanup goals are developed for soil organic content of 1 % ; and using the Allowable Soil Concentration (Cs) Equation: Cs = f x Cw x Koc; where f = % organic carbon content, Cw = Part 703 groundwater quality standard and Koc = Partitioning Coefficient.

For the Potliner Pad and Wetlands, the soil clean-up levels will also be determined using the leachate extraction procedure (TCLP) on soils or sediment. The pH of the extraction fluid will be adjusted to background overburden groundwater pH conditions. The extracted leachate will be analyzed, and the results compared to NYS effluent standards (6 NYCRR Part 703.6) for cyanide, fluoride, and sulfate.

*Areas "within" groundwater/surface water management units are considered areas within the influence of groundwater pumping wells, groundwater drains, groundwater monitoring wells, or surface water runoff management areas under SPDES permits. Areas "outside" of groundwater management units are all other areas.

Potliner Pads Cal not PCB?

#It is recognized that, due to analytical and construction constraints and the widespread dispersion of contaminants, a clean-up goal of 0.1 ppm may be impractical. Accordingly, a clean-up goal of 1.0 ppm will be utilized in this area. The potential injuries to biota related to residual contamination below 1.0 ppm PCBs will be quantified and evaluated from a natural resources damages stand point. RMC is encouraged to eliminate as much of the contamination in this sensitive area as possible while in the process of remediation, and to pursue the lowest possible clean-up level that is feasible under existing conditions.

REMEDIAL ACTION OBJECTIVES

BLACK MUD POND

The RAOs that were developed for the Black Mud Pond are listed below:

Affected Media	Remedial Action Objective
Soils/Sediment:	Prevent direct contact by site workers. Prevent adverse impacts on groundwater and surface water.
Groundwater:	Prevent further migration of contaminants in groundwater.
Surface Water:	Prevent exceedance of water quality standards in downstream surface water. Prevent bio-accumulation in biota.

LANDFILL/FORMER POTLINER STORAGE AREA

The RAOs that were developed for the Landfill and Former Potliner Storage Area are listed below:

Affected Media	Remedial Action Objective
Soil/Sediment:	Prevent direct contact by site workers and biota. Prevent adverse impacts on groundwater and surface water.
Groundwater:	Prevent further migration of contaminants in groundwater.
Surface Water:	Prevent exceedance of water quality standards in downstream surface water and wetlands. Prevent bio-accumulation in biota.

WETLANDS

The RAOs that were developed for the Wetlands are listed below:

Affected Media	Remedial Action Objective
Surface Water & Sediments	Prevent exceedance of water quality standards in downstream surface water. Prevent adverse impacts on Wetlands biota, downstream aquatic biota, and any users of the Wetlands and downstream surface water (Raquette River). Prevent bio-accumulation in biota.
Flora & Fauna	Provide a Wetlands habitat, either by restoration or by creating a new Wetlands to sustain a viable ecosystem.

POTLINER PAD

The RAOs that were developed for the Potliner Storage Pad are listed below:

Affected Media	Remedial Action Objective
Soil/Sediment:	Prevent direct contact. Prevent adverse impacts on groundwater and surface water.
Groundwater:	Prevent further migration of contaminants and remediate existing contamination.
Surface Water:	Prevent exceedance of water quality standards in downstream surface water. Insure conformance with SPDES discharge requirements. Prevent bio-accumulation in biota.

NORTH YARD

The RAOs that were developed for the North Yard are listed below:

Affected Media	Remedial Action Objective
Soils:	Prevent direct contact by site workers. Prevent adverse impacts on groundwater and surface water. Insure conformance with SPDES discharge requirements.

Groundwater:	Prevent further migration of contaminants and remediate existing contamination. Insure conformance with SPDES discharge requirements.
Surface Water:	Prevent exceedance of water quality standards in downstream surface water. Insure conformance with SPDES discharge requirements. Prevent bio-accumulation in biota.

MISCELLANEOUS AREAS

The RAOs that were developed for the Miscellaneous Areas are listed below:

Affected Media	Remedial Action Objective
Soils:	Prevent direct contact by site workers or pedestrians near site. Prevent adverse impacts on groundwater and surface water. Insure conformance with SPDES discharge requirements.
Groundwater:	Prevent potential impacts to groundwater. Insure conformance with SPDES discharge requirements.
Surface Water:	Prevent exceedance of water quality standards in downstream surface water. Insure conformance with SPDES discharge requirements. Prevent bio-accumulation in biota.

VI. SUMMARY OF EVALUATION OF ALTERNATIVES

The Preliminary Feasibility Study identifies general response actions that could be applied to the media known to be contaminated above the site-specific clean-up goals. For each combination of response action and medium, specific treatment technologies were identified, thereby defining a list of possible remedial processes. The list was then narrowed by screening out those technologies that cannot be implemented or are not applicable to the site. The treatment technologies identified were screened on the basis of effectiveness and implementability.

Remedial alternatives for each area of concern were then created by combining response actions appropriate to address the media of concern in the area. The remedial alternatives were screened on the basis of effectiveness and implementability. The screening eliminated those alternatives for which detailed analysis is inappropriate.

As a final step, a detailed analysis was performed on the remaining alternatives utilizing the following criteria:

- Short Term Impacts and Effectiveness
- Long Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility or Volume
- Implementability
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)
- Overall Protection of Human Health and the Environment
- Cost

A comparison of the results of the detailed analysis was then conducted to enable the selection of a final remedy for each area of concern. The results of the detailed analysis are discussed in the Proposed Remedial Action Plan (PRAP). The following is a brief discussion of the remedial alternatives for each area of concern.

BLACK MUD POND

Ten preliminary alternatives have been evaluated for the Black Mud Pond, these are presented below:

Alternative 1A - Resource Recovery for Black Mud Material/Capping Soils & Sediments/Institutional Controls/Monitor

This alternative includes the excavation of approximately 165,660 cubic yards of black mud material to be transported to a cement manufacturing facility for reuse. The residual soils will be capped in-place with a permanent RCRA style cap (meeting current NYSDEC and RCRA regulations) and the groundwater and surface water will be monitored. The total cost breakdown of this alternative is estimated to be:

Capital Cost:	$12,340,000
Annual O&M Cost:	$ 120,000
Total Estimated Cost: (Present Worth)	$14,400,000

Alternative 1B - Resource Recovery for Black Mud Material, Capping of Soils and Sediments, Collect/Treat/Monitor Groundwater and Surface Water

This alternative is the same as alternative 1A with the addition of groundwater and surface water collection and treatment. The total cost of this alternative is estimated to be:

Capital Cost:	$13,000,000
Annual O&M Cost:	$ 198,000
Total Estimated Cost: (Present Worth)	$16,500,000

Alternative 2A - Dewater, Cap Entire Area, Institutional Controls, Monitor Surface Water and Groundwater

This alternative includes the dewatering of the Black Mud Pond and installing a RCRA cap over the entire area. Institutional controls will be put in place and surface water and groundwater monitoring will be performed. The total estimated cost of this alternative is: -

Capital Cost:	$ 2,300,000
Annual O&M Cost:	$ 168,000
Total Estimated Cost: (Present Worth)	$ 5,200,000

Alternative 2B - Dewater, Cap Entire Area, Institutional Controls, Monitor Surface Water and Groundwater, Collect and Treat Groundwater and Surface Water

This alternative is the same as alternative 2A with the addition of groundwater and surface water collection and treatment. The total cost of this alternative is estimated to be:

Capital Cost:	$ 3,000,000
Annual O&M Cost:	$ 249,000
Total Estimated Cost: (Present Worth)	$ 7,300,000

Alternative 4C - Dewater, Excavate, Off-Site Incineration Black Mud and Soil, Collection and Treatment of Groundwater and Surface Water

This alternative requires that the Black Mud Pond be dewatered, all black mud and underlying residual soils will be excavated and transported off-site for incineration. Groundwater and surface water will be monitored, collected and treated. The total cost of this alternative is estimated to be:

Capital Cost:	$320,000,000
Annual O&M Cost:	$ 173,000
Total Estimated Cost: (Present Worth)	$323,000,000

Alternative 5A - Dewater, Excavate Black Mud and Soils for Off-Site Landfilling, Institutional Controls for Groundwater and Surface Water

This alternative requires that the Black Mud Pond be dewatered, all Black Mud and underlying residual soils will be excavated and transported off-site for landfilling at an approved facility. Groundwater and surface water will be monitored. The total cost of this alternative is estimated to be:

Capital Cost:	$81,000,000
Annual O&M Cost:	$ 116,000
Total Estimated Cost: (Present Worth)	$83,000,000

Alternative 5B - Dewater, Excavate Black Mud and Soils for Off-Site Landfilling, Monitor, Collect and Treat Surface Water and Groundwater

This alternative is same as alternative 5A with the addition of groundwater and surface water collection and treatment. The total cost of this alternative is estimated to be:

Capital Cost:	$82,000,000
Annual O&M Cost:	$ 173,000
Total Estimated Cost: (Present Worth)	$85,000,000

Alternative 6A - Dewater, Excavate and Dispose of Black Mud and Underlying Residual Soils in On-Site Landfill, Institutional Controls for Groundwater and Surface Water

This alternative requires that all the Black Mud material and underlying residual soils be excavated and placed in an on-site secure RCRA cell. Institutional controls will be put in place and surface water and groundwater will be monitored. The estimated total cost of this alternative is:

Capital Cost:	$14,100,000
Annual O&M Cost:	$ 225,000
Total Estimated Cost: (Present Worth)	$18,000,000

Alternative 6B - Dewater, Excavate and Dispose of Black Mud and Underlying Residual Soils in On-Site Landfill, Monitor, Collect and Treat Groundwater and Surface Water

This alternative is the same as alternative 6A with the addition of groundwater and surface water collection and treatment. The total cost of this alternative is estimated to be:

Capital Cost:	$14,900,000
Annual O&M Cost:	$ 295,000
Total Estimated Cost: (Present Worth)	$20,000,000.

Alternative 7 - Dewater, Excavate, Incinerate On-Site, Landfill Treated Residuals in On-Site RCRA Cell, Monitor, Collect, and Treat Groundwater and Surface Water

This alternative requires that the Black Mud Pond be dewatered, the black mud and the underlying residual soil be excavated and incinerated on-site. The treated residuals would be disposed and managed in an on-site secure RCRA cell. Groundwater and surface water will be monitored, collected and treated. The total cost of this alternative is estimated to be:

Capital Cost:	$71,800,000
Annual O&M Cost:	$ 242,000
Total Estimated Cost: (Present Worth)	$76,000,000.

LANDFILL/FORMER POTLINER STORAGE AREA

Four alternatives have been evaluated for the Landfill and Former Potliner Storage Area.

Alternative 1B - RCRA Cap, Groundwater/Leachate/Recovery and Treatment

This alternative includes the installation of a permanent cap, meeting current NYSDEC and RCRA Regulations, over the entire area with collection and treatment of groundwater and leachate. In addition, surface water controls will be installed to reduce run-on and run-off. The total cost breakdown of this alternative is as follows:

Capital Cost:	$ 4,000,000
Annual O & M Cost:	$ 220,000
Total Estimated Cost: (Present Worth)	$ 7,800,000

Alternative 2A - Dewater, Excavate Waste and Soils, Off-Site Incineration, and Backfill

This alternative includes the installation of a temporary leachate collection system to dewater the waste and excavation of the waste and contaminated soils. The material would then be sorted and transported off-site to a commercial incinerator. Large construction and demolition debris and other non-treatable material will be used for backfill. The excavated area would be backfilled, graded and seeded and run-on/run-off controls will be installed for surface water. The total cost breakdown of this alternative is as follows:

Capital Cost:	$540,000,000
Annual O & M Cost	$ 0
Total Estimated Cost: (Present Worth)	$540,000,000

Alternative 3A - Dewater, Excavate Waste and Soils, Off-Site Commercial Landfill and Backfill

This alternative includes dewatering of the landfill by installation of a temporary leachate collection system and excavation of the waste and contaminated soils. The materials would then be sorted and transported off-site to a commercial landfill for disposal. The excavated area would be backfilled, graded and seeded and run-on/run-off controls will be installed for surface water. The total cost breakdown for this alternative is as follows:

Capital Cost:	$130,000,000
Annual O & M Cost:	$ 0
Total Estimated Cost: (Present Worth)	$130,000,000

Alternative 3B - Dewater, Excavate Waste and Soils, On-Site Disposal RCRA Cell

This alternative contains the same components as alternative 3A except the waste will be excavated and placed in a newly constructed on-site RCRA cell. The total cost breakdown for this alternative is as follows:

Capital Cost:	$21,000,000
Annual O & M Cost:	$ 108,000
Total Estimated Cost: (Present Worth)	$23,000,000

<u>WETLANDS</u>

Three remedial alternatives have been considered for this site.

Alternative 1A - Excavate Drainage Ways, RCRA Cap, Groundwater Recovery and Treatment, Create New Wetlands Area

This alternative includes the installation of surface water controls to isolate the impacted area, dewater the 10 acre impact area, excavation of the drainageways surrounding the Wetlands and placing the material in the open water portion of the impacted Wetlands, removal of stumps and vegetation and install a RCRA style cap. In addition, a leachate collection system would be installed to collect contaminated groundwater and leachate. The drainageways would be backfilled and a new Wetlands of equal or greater acreage would be created. The total cost breakdown for this alternative is estimated to be:

Capital Cost:	$ 7,000,000
Annual O & M Cost:	$ 180,000
Total Estimated Cost: (Present Worth)	$10,000,000

Alternative 2A - Excavate, Dispose in Former Potliner Storage Area, Backfill and Restore

This alternative includes dewatering of the Wetlands, excavate drainageways and Wetlands materials and place in the Former Potliner Storage Area to be managed under a RCRA Cap. In addition, the excavated area will be backfilled, re-vegetated and a newly constructed drainageway will be directed towards the south. Also included, would be the establishment of a surface water monitoring program. The total cost breakdown of this alternative is estimated to be:

Capital Cost:	$ 2,700,000
Annual O & M Cost:	$ 60,000
Total Estimated Cost: (Present Worth)	$ 3,700,000

Alternative 4A - Excavate, Off-Site Incineration, Backfill and Restore

This alternative has the same components as alternative 2A including the restoration of new Wetlands in a nearby location except the excavated material would be transported off-site for incineration. The total cost breakdown of this alternative is estimated to be:

Capital Cost:	$40,000,000
Annual O & M Cost	$ 60,000
Total Estimated Cost: (Present Worth)	$41,000,000

POTLINER PAD

Eight remedial alternatives have been considered for the Potliner Pad.

Alternative 1A - No Action

This alternative includes the continuous monitoring of surface water and groundwater with institutional controls for all media of concern. The total cost breakdown for this alternative is as follows:

Capital Cost:	$ 0
Annual O & M Cost:	$ 54,000
Total Estimated Cost: (Present Worth)	$ 1,000,000

Alternative 1B - Monitor, Pave Ditch, Rehabilitate Pad, and Collection and Treatment of Groundwater and Surface Water

This alternative includes paving over the contaminated sediments in the surface water drainage ditches, rehabilitation of the Potliner Pad, institutional controls for soils, and groundwater and surface water collection and treatment. Rehabilitation of the Potliner Pad includes: redirecting drainage from the Pad to the North Yard GAC water treatment system, inspecting the Pad for cracks and resurfacing with asphalt if necessary and performing regular maintenance on the Pad drainage system (ie., cleaning accumulated sediments regularly to avoid plugging the drainage pathway). In addition, monitoring of surface water and groundwater will be conducted. The total cost breakdown of this alternative is as follows:

Capital Cost:	$ 260,000
Annual O & M Cost:	$ 83,000
Total Estimated Cost: (Present Worth)	$ 1,700,000

Alternative 1C - Monitor, Excavate Ditch Sediments, Rehabilitate Pad and Groundwater and Surface Water Collection and Treatment

This alternative contains the same components as alternative 1B, except the ditch sediments will be excavated and placed in the Former Potliner Storage Area where the material will be managed under a RCRA style cap. The drainage ditch will be backfilled with crushed stone. The total cost breakdown for this alternative is as follows:

Capital Cost:	$ 210,000
Annual O & M Cost:	$ 80,000
Total Estimated Cost: (Present Worth)	$ 1,600,000

Alternative 2B - Monitor, Pave Ditches and Soils, Rehabilitate Pad and Groundwater Collection and Treatment

This alternative includes the paving of all unpaved areas, paving the drainage ditch, and rehabilitation of the pad. In addition, groundwater collection and treatment and a surface water and groundwater monitoring program would be established. The total cost breakdown for this alternative is as follows:

Capital Cost:	$ 520,000
Annual O & M Cost:	$ 86,000
Total Estimated Cost: (Present Worth)	$ 2,000,000

Alternative 2C - Monitor, Pave Soils, Excavate Ditch, Rehabilitate Pad, and Groundwater Collection and Treatment

This alternative contains the same components as alternative 2B, except the ditch sediments will be excavated and placed in the Former Potliner Storage Area. The ditch will be backfilled with crushed stone. The total cost breakdown for this alternative is as follows:

Capital Cost:	$ 470,000
Annual O & M Cost:	$ 83,000
Total Estimated Cost: (Present Worth)	$ 1,900,000

Alternative 2D - Monitor, Pave Ditch and Soils, and Rehabilitate Pad

This alternative contains the same components as alternative 2B, except there will be no groundwater collection or treatment. The total cost breakdown for this alternative is as follows:

Capital Cost:	$ 490,000
Annual O & M Cost:	$ 76,000
Total Estimated Cost: (Present Worth)	$ 1,800,000

Alternative 3A - Monitor, Excavate Soils, Pave Ditch, Rehabilitate Pad, Collect and Treat Groundwater

This alternative includes the excavation of soils to be placed and managed at the Former Potliner Storage Area and capped. The drainage ditch will be paved, with sediments in-place and the Potliner Pad rehabilitated. In addition, groundwater will be collected and treated and a surface water and groundwater monitoring program will be established. The total cost breakdown for this alternative is as follows:

Capital Cost:	$ 620,000
Annual O & M Cost:	$ 86,000
Total Estimated Cost: (Present Worth)	$ 2,100,000

Alternative 3B - Monitor, Excavate Soils and Sediment, Rehabilitate Pad and Collect and Treat Groundwater

This alternative contains the same components as alternative 3A, except the drainage ditch sediments will be excavated along with the soils and placed and managed in the Former Potliner Storage Area under a RCRA cap. The total cost breakdown for this alternative is as follows:

Capital Cost:	$ 570,000
Annual O & M Cost:	$ 84,000
Total Estimated Cost: (Present Worth)	$ 2,000,000

NORTH YARD

Five remedial alternatives have been considered for this site.

Alternative 1 - Pave, Collection and Treatment of Shallow Groundwater and Surface Water, Monitor and, at Year 30 (For Comparison Purposes), Excavate All Soil, Treat and Dispose in On-Site RCRA Cell.

This alternative includes the capping of the contaminated soils, monitoring surface water and groundwater and the collection and treatment of surface water and shallow ground water from year 0 to year 30. At year 30, after the plant shuts down, excavate the cap, the underlying contaminated soils with PCB concentrations greater than 25 ppm and permanently treat. The treated residuals would then be placed in an on-site secure RCRA cell. The total cost breakdown for this alternative is as follows:

Capital Cost:	$23,800,000
Annual O & M Cost:	$ 240,000
Total Estimated Cost: (Present Worth)	$28,800,000

Alternative 2A - Excavate All Soil and Treat Soils On-Site, Backfill Treated Soils, Grade, Pave, Collect and Treat Surface Water and Groundwater, Monitor.

This alternative includes the immediate excavation and treatment of all contaminated materials above 25 ppm PCBs. The soils will be treated and utilized as backfill. The excavated area will then be graded and paved. A surface water and shallow groundwater collection and treatment program, as well as, a monitoring program will be established. The total cost breakdown for this alternative is as follows:

Capital Cost:	$20,900,000
Annual O & M Cost:	$ 230,000
Total Estimated Cost: (Present Worth)	$24,900,000

Alternative 2B - Excavate All Soil, Dispose in On-Site RCRA Cell, Backfill, Collect and Treat Surface Water and Groundwater, Monitor.

This alternative contains the same components as alternative 2A, except the excavated material above 25 ppm PCBs would not be treated but would be placed in an on-site secure cell. The total cost breakdown for this alternative is as follows:

Capital Cost:	$ 6,728,000
Annual O & M Cost:	$ 230,000
Total Estimated Cost: (Present Worth)	$10,710,000

Alternative 3A - Excavate Hot Soil, Treat Soils On-Site and Dispose in Secure Cell, Backfill, Cap, Collect and Treat Surface Water and Groundwater, Monitor.

This alternative includes the excavation of only the contaminated soils above 500 ppm PCB and treating the material on-site. The treated material would then be disposed in a secure on-site cell. The excavated area would be backfilled, graded and paved and a surface water and groundwater collection and treatment program established as well as a surface water and groundwater monitoring program. The total cost breakdown for this alternative is as follows:

Capital Cost:	$ 11,800,000
Annual O & M Cost:	$ 230,000
Total Estimated Cost: (Present Worth)	$ 16,000,000

Alternative 3B - Excavate Hot Soil, Dispose Soils in On-Site Secure RCRA Cell, Backfill, Cap, Collect and Treat Surface Water and Groundwater, Monitor.

This alternative contains the same components as alternative 3A, except the excavated soils above 500 ppm PCBs would not be treated but would be disposed of in a secure on-site cell. The total cost breakdown for this alternative is as follows:

Capital Cost:	$ 5,400,000
Annual O & M Cost:	$ 230,000
Total Estimated Cost: (Present Worth)	$ 9,400,000

MISCELLANEOUS AREAS

Four remedial alternatives were considered for the miscellaneous areas.

Alternative 1 - Excavate Contaminated Sediments and Soils and Dispose of Material < 50 ppm PCBs in Potliner Storage Area, Dispose of Material > 50 ppm PCBs in and On-Site RCRA Cell, Monitor Surface Water, Backfill, Grade and Seed With Surface Water Run-On and Run-Off Controls

Capital Cost:	$ 1,120,000
Annual O & M Cost:	$ 0
Total Estimated Cost: (Present Worth)	$ 1,120,000

Alternative 2 - Excavate Contaminated Sediments and Soils and Dispose of Material < 10 ppm PCBs in Potliner Storage Area, Dispose of Material > 10 ppm PCBs at an Off-Site Hazardous Waste Landfill, Monitor Surface Water, Backfill, Grade and Seed With Surface Water Run-On and Run-Off Controls

Capital Cost:	$ 7,200,000
Annual O & M Cost:	$ 0
Total Estimated Cost: (Present Worth)	$ 7,200,000

Alternative 3 - Excavate Contaminated Sediments and Soils and Dispose of Material < 10 ppm PCBs in Potliner Storage Area, Dispose of Material > 10 ppm PCBs at an On-Site RCRA Cell, Monitor Surface Water, Backfill, Grade and Seed With Surface Water Run-On and Run-Off Controls

Capital Cost:	$ 1,200,000
Annual O & M Cost:	$ 0
Total Estimated Cost: (Present Worth)	$ 1,200,000

Alternative 4 - Excavate Contaminated Sediments and Soils and Dispose of Material < 25 ppm PCBs in Potliner Storage Area, Treat All Material > 25 ppm PCBs Using Same Treatment Technology as Selected for North Yard Remediation, Monitor Surface Water, Backfill, Grade and Seed With Surface Water Run-On and Run-Off Controls

Capital Cost:	$ 6,160,000
Annual O & M Cost:	$ 0
Total Estimated Cost: (Present Worth)	$ 6,160,000

VII. SUMMARY OF THE GOVERNMENT'S DECISION

Based on detailed analyses performed on the remedial alternatives presented under Section VI "Summary of the Evaluation of the Alternatives", the Department has chosen the following remedial actions to be performed at the areas of concern at the Reynolds Metals Company site. The Department believes that the selected remedies are protective of human health and the environment, comply with applicable State Environmental Quality Standards and are economically viable.

BLACK MUD POND

All wastes within the Black Mud Pond, and the soils beneath contaminated by the wastes, will be dewatered and capped in-place. The cap will conform to the requirements for an approved hazardous waste disposal facility. As part of remedial design, additional borings will be drilled through the site to precisely define the thickness of waste and vertical extent of soil contamination, and monitoring wells will be screened in the waste and contaminated soils. Following capping, groundwater levels will be measured monthly to monitor the effectiveness of capping. If the monitoring data indicate to the Department that the water table has not been lowered below the contaminated soil and waste as the result of capping, the installation and operation of a perimeter groundwater collection trench system will be required and the collected groundwater will be treated. A long term groundwater monitoring program will be implemented to monitor both the vertical migration and the horizontal migration of contaminants and ensure further releases of contaminants are not occurring to the groundwater system in the vicinity of the pond.

All surface water runoff from the pond, and those areas from the rail yard located to the east of the pond, will be monitored for contaminant migration in the drainageways to the south and east of the Pond. If surface water discharge does not meet effluent limits, additional remedial actions will be performed to address any impacts to human health and the environment.

If required, all groundwater and surface water collected will be treated at RMC's existing Granular Activated Carbon (GAC) treatment system prior to discharge. The capacity and effectiveness of the GAC system will be evaluated and approved by the Department. If necessary, a pretreatment system will be installed. Discharge requirements will conform with current SPDES permit conditions.

LANDFILL/FORMER POTLINER STORAGE AREA

A new and upgraded groundwater and leachate recovery system will be installed, which will be keyed into highly impermeable material below the landfill, and all collected contaminated water will be treated. Collected groundwater will be treated at the

North Yard GAC System. The capacity and effectiveness of the GAC System will be evaluated, and approved by the Department. If necessary a pre-treatment system will be installed. A hazardous waste landfill cap will be installed over the entire area to contain the waste in-place and significantly reduce infiltration of precipitation and subsequent leachate generation.

Before the installation of the landfill cap, low level contaminated soils (less than 25 ppm PCBs) from the Wetlands, Potliner Storage Pad and the Miscellaneous Areas, may be consolidated in the Landfill and Former Potliner Storage Area.

Surface water controls will be installed to reduce the amount of surface water run-on entering the site and to control the erosional effects of surface water running off the site. A comprehensive Operation and Maintenance Plan will be developed to monitor the landfill conditions and to monitor the peripheral conditions to ensure that off-site migration does not occur, via the groundwater and/or the surface water runoff.

WETLANDS

The remedial action entails the dewatering of the currently identified impacted area of the Wetlands and excavating the soils in the impacted area and the adjacent drainageways to meet clean up goals. The excavated material will be placed in the Former Potliner Storage Area for management under a RCRA cap and leachate collection system.

Restoration and/or mitigation of the Wetlands destroyed or impacted as a result of RMC's activities will be the subject of a further study, acceptable to the Department, to determine the scope of applicable alternatives consistent with applicable State laws, regulations, policy and guidance and any amendments or changes thereto. The study will thoroughly identify additional impacts to the Wetlands, if any, and consider impacted Wetlands restoration and/or mitigation. It is the Department's policy that wetland restoration is the first priority and preferred course of action. In the event that Wetlands restoration and/or mitigation is determined not to be technically feasible, the study shall analyze and evaluate alternatives regarding off-site mitigation, enhancement, wetlands creation, land acquisition or on-site restoration and/or mitigation combined with off-site measures. The goal of the study will be to assess these measures as components of a program that, when implemented, will fully restore the Wetlands values and benefits diminished, harmed, lost or destroyed as a result of the contamination of the impacted Wetlands. Upon the Department's approval of the study, the Department will advise RMC of the appropriate course of action for remediation of the Wetlands.

POTLINER STORAGE PAD

All contaminated soils and sediments at the Potliner Storage Pad and adjacent drainage ditches will be excavated. The soils/sediments will be removed to achieve clean-up goals and will be transported to the Former Potliner Storage Area for disposal under the Landfill cap. Once the excavation is completed in the ditches, they will be backfilled with crushed stone. The excavated area surrounding the Potliner Pad will be backfilled and paved and the Potliner pad may be rehabilitated.

The groundwater and the surface water from the newly paved area and the West Ditch will be monitored. This will involve the installation of additional wells. One purpose of the monitoring will be to evaluate the effectiveness of the North Yard Thickener System sump for collecting the contaminated groundwater migrating from the Potliner Storage Pad, and documenting that the treatment system currently being used for this groundwater is providing satisfactory treatment of the effluent. The potential for groundwater to flow to the West Ditch will also be included in the monitoring program.

If monitoring indicates the potential for continuing environmental impacts from contaminant migration via the surface water and/or groundwater, additional remedial actions will be considered which will include the installation of groundwater and/or surface water collection/treatment systems. If necessary, collected groundwater and surface water will be treated. The North Yard GAC system may be used for groundwater and surface water treatment. The capacity and effectiveness of the GAC system will be evaluated and approved by the Department. If necessary, a pretreatment system will be installed. Discharge requirements will conform with current SPDES permit conditions.

NORTH YARD

All the soils in the North Yard contaminated with 25 ppm PCBs or above will be excavated. The soils will be treated in an on-site treatment unit and the treated residuals may be used as backfill. The use of the treated residuals may include utilization at the Black Mud Pond as the foundation for construction of the cap, and fill for site grading prior to final restoration. Once excavation is complete, the remaining area where PCB contamination exceeds 10 ppm in soils will be graded and capped to provide proper drainage and reduce infiltration and migration of contaminants. The existing surface water and shallow groundwater collection system will be modified and enhanced and/or a new surface water and shallow groundwater collection and treatment system will be installed and long term monitoring of surface water and groundwater will be performed. The capacity and effectiveness of the GAC system will be evaluated and approved by the Department. If necessary, a pretreatment system will be installed. Discharge requirements will conform with current SPDES permit conditions.

The on-site treatment technology evaluated in the Feasibility Study is the infrared thermal treatment system. However, this does not preclude further evaluation and consideration of alternate treatment technologies, including solvent extraction, prior to the implementation of the remedial action at the North Yard. RMC may submit additional treatability studies, during the remedial design phase, for additional alternate treatment technologies not already addressed in the Revised Final Feasibility Study.

MISCELLANEOUS AREAS

The area(s) of concern identified as the Miscellaneous Areas include the following sites around the RMC facility:

- Rectifier Yard
- Soil Stockpile
- West Ditch Outfall
- Area North of Haverstock Road
- SPDES Point Discharge 004 Outfall (now designated 006 by DOW)
- SPDES Point Discharge 002 Diversion Area (now designated 005 by DOW)

The remedial action entails the excavation of soils and sediments with PCB concentrations exceeding the clean up goals outlined in Section V of this document. The excavated areas will be backfilled, graded and seeded. Once restoration is completed, the surface water from each area will be monitored to determine the adequacy of the remediation and to insure that ARARs have been met concerning surface water discharge standards. In the case of the Rectifier Yard surface water drainage monitoring, the point of compliance of surface water discharge standards will be at the point of entering the Wetlands.

All soils with PCB contamination above the clean-up goal from the area north of Haverstock Road and from the Rectifier Yard drainage ditch will be excavated immediately. Excavated soils contaminated with PCBs at 50 ppm or greater will be shipped off-site to an USEPA approved PCB landfill. Lower level contaminated soils may be stored pending the start-up of the treatment unit.

All other soils in the Miscellaneous Areas contaminated with PCBs will be treated in accordance with the treatment threshold (25 ppm PCBs or greater) or disposed in the Landfill/Former Potliner Storage area prior to capping (soils containing less than 25 ppm PCBs).

PREVIOUSLY COMPLETED INTERIM REMEDIAL MEASURES (IRMs)

For those IRMs described under Section II, an Engineering Report, subject to the approval of the Department, will be required which addresses the effectiveness of each IRM. The report will expand on the information presented in the Revised Final Feasibility Study and include, in detail, an evaluation of the IRMs relative to clean-up goals and environmental quality standards.

MONITORING AND REVISITING

A monitoring and maintenance program will be developed for each site where waste or waste constituents are left in-place or relocated. The objective of the monitoring and maintenance program is to ensure that all remedial work is functioning according to design specifications, and to monitor environmental media to ensure that human health and the environment are being protected.

At each site where untreated hazardous waste remains, the remedial work will be re-evaluated, or revisited, at least once every five years to determine if additional remedial work is appropriate.

REMEDIAL COSTS

BLACK MUD POND

Alternative 2A — $ 5,200,000

- De-water Black Mud and Soils
- RCRA Cap Black Mud and Soils
- Long-term Groundwater and Surface Water Monitoring

LANDFILL AND FORMER POTLINER STORAGE AREA

Alternative 1B — $ 7,800,000

- Cap Contaminated Soils and Waste In-Place
- Install New Leachate Collection System
- Collect and Treat Collected Leachate
- Control Surface Run-On and Run-Off

WETLANDS

Alternative 2A — $ 3,700,000

- Excavate Contaminated Sediments and Place on Landfill Area for Capping
- Perform study to determine scope of applicable alternatives

POTLINER PAD AREA

Alternative 3B — $ 1,880,000

- Excavate Soils and Sediments and Place on Landfill Area for Capping
- Rehabilitate Pad
- Long-term Groundwater and Surface Water Monitoring

NORTH YARD

Alternative 2A — $24,900,000

- Excavate Contaminated Soils with PCB Concentration Equal to or Greater Than 25 ppm
- Incinerate Soils On-Site
- Backfill, Grade and Pave Using Treated Soils as Backfill
- Collect and Treat Shallow Groundwater and Surface Water
- Monitor Surface Water and Groundwater

MISCELLANEOUS AREAS

Alternative 4 — $ 6,160,000

- Excavate Soils and Sediments With PCB Concentrations Equal to or Greater Than 1 ppm
- Off-Site Disposal of Soils with PCB Concentrations Greater than or Equal to 50 ppm
- On-Site Treatment of Soils and Sediments With PCB Concentrations Equal to or Greater Than 25 ppm and Less than 50 ppm Using Treated Soils as On-Site Backfill Material
- Place Remaining Soils and Sediments With PCB Concentrations Less Than 25 ppm on Landfill Area for Capping
- Backfill, Grade and Seed Excavated Areas
- Monitor Surface Water

AOC *	Estimated Capital Cost	Estimated Annual O&M Cost	Estimated Total O&M Cost	Total Estimated Present Worth Cost
Black Mud Pond:	$ 2,300,000	$ 170,000	$ 2,900,000	$ 5,200,000
Landfill/Former Potliner Storage Area:	4,000,000	220,000	3,800,000	7,800,000
Wetlands:	2,700,000	60,000	1,000,000	3,700,000
Potliner Pad Area:	590,000	74,000	1,290,000	1,880,000
North Yard:	20,900,000	230,000	4,000,000	24,900,000

Miscellaneous Areas:			
6,160,000	0	0	6,160,000
TOTALS:			
$36,650,000	$ 754,000	$12,990,000	$49,640,000

*AOC = Area of Concern

VIII. ADMINISTRATIVE RECORD

The following is a comprehensive list of reports and correspondence that was utilized by the Department during the final decision-making process. All of this information is available for public review.

1. Responsiveness Summary and Comments on RMC PRAP submitted by Woodward-Clyde Consultants on behalf of Reynolds Metals Company, dated November 27, 1991.

2. Responsiveness Summary and Comments on RMC PRAP submitted by Public

   a. Remarks by Fred Swafford, Plant Manager, St. Lawrence Reduction Plant, Reynolds Metals Company, Massena, New York, dated October 23, 1991.

   b. Comments on PRAP by Jon R. Montan, Planner III, St. Lawrence County Environmental Management Council, dated November 21, 1991.

   c. Comments on Reynolds Metals Company PRAP, by Jim Peets, President, ABGWIU, Local 450, dated November 22, 1991.

   d. Comments on PRAP by Frank Alquire, Executive Director, Massena Economic Development Council, dated November 26, 1991.

   e. Comments on the PRAP, submitted by Ken Jock, Director, Environmental Division, St. Regis Mohawk Tribe, dated November 27, 1991.

   f. Comments on the PRAP, submitted by Douglas C. Premo, Superintendent, Plant/Environmental Engineering, General Motors, dated November 27, 1991.

   g. Comments on PRAP by John E. Milnes, Public Advisory Committee for the St. Lawrence River at Cornwall, Ontario, Canada, dated November 30, 1991.

   h. Comments on PRAP by Luke Dailey, League of Women Voters, dated November 30, 1991.

i. Review of the PRAP for the RMC Site, Position Paper and Summary of Comments From the Canadian Review Panel, Submitted by David L. Egar, Regional Director General, Conservation and Protection, Environment Canada, Through: Peter L. McKellar, Consul and Head, Political/Economic Relations and Public Affairs, Canadian Consulate General, Dated November 27, 1991.

3. News Release Regarding October 23, 1991 Public Meeting

   a. Agenda, October 23, 1991 Public Meeting on PRAP

   b. Sign-In Sheet for October 23, 1991 Public Meeting

   c. Memorandum Dated October 25, 1991 Regarding Public Meeting

4. Citizen Participation Plan

5. Order On Consent, Index No. A6-0119-87-08

6. Black Mud Issue Correspondence:

	Date	From	To
a.	7/23/90	John Kenna, NYSDEC	Robert Lenny, RMC
b.	7/31/90	Dale DeLisle, RMC	John Kenna, NYSDEC
c.	10/5/90	John Kenna, NYSDEC	Dale DeLisle, RMC
d.	10/22/90	Dale DeLisle, RMC	John Kenna, NYSDEC
e.	10/24/90	John Kenna, NYSDEC	Dale DeLisle, RMC
f.	11/14/90	John Kenna, NYSDEC	Dale DeLisle, RMC
g.	11/30/90	Tom Morgan, NYSDEC	Dale DeLisle, RMC
h.	12/14/90	Jerry Newman, RMC	Thomas Brown, NYSDEC

7. Proposed Remedial Action Plan (PRAP) dated September 24, 1991.

8. NYSDEC Division of Hazardous Waste Remediation Technical and Administrative Guidance Memoranda (TAGM).

   a. HWR-89-4022 Records of Decision for Remediation of Class 2 Inactive Hazardous Waste Disposal Sites, February 7, 1989. (Commissioner's Organization and Delegation Memorandum 89-05, January 26, 1989.)

   b. HWR-90-4030 Selection of Remedial Actions at Inactive Hazardous Waste Sites, May 15, 1990.

9. Remedial Report Chronology

	Report	Date
1.	Preliminary Investigation of the Black Mud Lagoon, Phase I Summary Report	December 1983
2.	Preliminary Investigation of Landfill Site Phase I Summary Report	September 1984
3.	Subsurface Exploration and Permeability Test Report, Industrial Landfill	March 1985
4.	Preliminary Report, Evaluation of Pond Leakage	July 1985
5.	Hydrogeological Assessment of the Black Mud Pond Area	November 1985
6.	Hydrogeologic Investigation for the Proposed Black Mud Pond	February 1986
7.	Remedial Investigation Scope of Work	May 4, 1987
8.	Remedial Investigation Work Plan	June 30, 1987
9.	Remedial Investigation Work Plan (Revised)	July 24, 1987
10.	Preliminary Risk Assessment RMC	February 25, 1988
11.	Work Plan for PCB Sampling (Phase I)	April 18, 1988
12.	Remediation Investigation Work Plan Addendum	May 8, 1988
13.	Sampling Plan Addendum, PCBs (Phase II)	June 2, 1988
14.	Phase I Remedial Investigation Report	June 27, 1988
15.	Preliminary Conceptual Remediation Plan	July 29, 1988

16.	PCB Source Identification at the St. Lawrence Reduction Plant	July 29, 1988
17.	PCB Sampling Program Phases I, II, III and IV	August 12, 1988
18.	Revised Phase I Remedial Investigation Report	September 23, 1988
19.	Work Plan Addendum I	September 30, 1988
20.	Interim Remediation Plan	October 19, 1988
21.	Work Plan Addendum II	October 20, 1988
22.	Annual Report - 1988 Environmental Activities	December 22, 1988
23.	Final Report, 1988 Studies, St. Lawrence River Sediment Sampling Program	January 1989
24.	PCDF/PCDD Sampling Report	January 10, 1989
25.	Interim Remediation Report	January 19, 1989
26.	Report on PCB Source Identification Assessment	February 20, 1989
27.	Plan for Completion of Interim Remediation	March 1, 1989
28.	Final Work Plan Addendum I	March 31, 1989
29.	Phase I Remedial Investigation Report, Revision 2	March 31, 1989
30.	Final Work Plan Addendum II	March 31, 1989
31.	Outfall 002 Diversion Plan	April 14, 1989
32.	Interim Remediation Completion (Revised Plan)	May 1, 1989
33.	Quarterly Groundwater Sampling Results (1st Quarter)	May 1, 1989
34.	Phase II PCDF/PCDD Sampling Plan	May 11, 1989
35.	Quarterly Groundwater Sampling Results (2nd Quarter)	June 28, 1989
36.	Work Plan Addendum II	June 30, 1989

37.	Landfill Underdrain and Black Mud Pond Terrain Conductivity Report	June 30, 1989
38.	Revised Phase II PCDF/PCDD Sampling Plan	June 30, 1989
39.	PCB 1248 Method Detection Limit Study	July 21, 1989
40.	Period 3 PCB Source Assessment Report	September 12, 1989
41.	Quarterly Groundwater Sampling Results (3rd Quarter)	November 2, 1989
42.	Phase II PCDF/PCDD Sampling	November 6, 1989
43.	RI/FS Scope of Work	November 7, 1989
44.	Work Plan for Additional Soil Sampling (002)	November 8, 1989
45.	Work Plan for Phase 4 PCB Source Assessment	February 28, 1990
46.	Work Plan for Soil Sampling 002 Ditch and Diversion Area	February 28, 1990
47.	Work Plan for Soil Sampling North of South Grasse River Road	February 28, 1990
48.	Final Remediation Investigation Report	March 30, 1980
49.	Risk Analysis Report	March 30, 1990
50.	Preliminary Feasibility Study	March 30, 1990
51.	Fourth Quarter 1989 Ground-Water Analysis Results	April 5, 1990
52.	First Quarter 1990 Ground-Water Analysis Results	April 5, 1990
53.	Revised Final Remedial Investigation Report	July 2, 1990
54.	Work Plan for Drum Sampling PCB Building	August 7, 1990
55.	PCDF/PCDD Analysis for Soil Samples North of the South Grasse River Road	August 10, 1990

56.	Work Plan North Yard Treatability Studies	September 20, 1990
57.	PCDF/PCDD Analysis of Soil Samples North of the South Grasse River Road	October 15, 1990
58.	Additional Sediment Sampling, Rectifier Yard Area	October 15, 1990
59.	Second Quarter 1990 Ground-water Sampling Results	October 24, 1990
60.	Risk Analysis Report (Revision 2)	November 5, 1990
61.	Third Quarter 1990 Ground-Water Sampling Results	November 14, 1990
62.	Drum Sampling Analytical Results	November 27, 1990
63.	002 Diversion Area Sampling	November 30, 1990
64.	Fourth Quarter 1990 Ground-water Sampling Results	January 17, 1991
65.	Draft Additional River Sampling Report St. Lawrence River System	January 24, 1991
66.	Galson Remediation Corporation's Final Report, Treatability Study on Soils at the Reynolds Metals Plant	February 11, 1991
67.	OHM's Thermal Treatment Feasibility Study, Final Report	February 11, 1991
68.	First Quarter 1991 Ground-water Sampling Results	March 20, 1991
69.	Final Report for Interim Remediation 002 Outfall Ditch	April 1991
70.	Second Quarter 1991 Ground-Water Sampling Results	August 5, 1991
71.	Revised Final Feasibility Study Report	August 19,1991

APPENDIX A

RESPONSIVENESS SUMMARY

TO COMMENTS FROM

REYNOLDS METALS COMPANY

SUBMITTED BY WOODWARD CLYDE

GENERAL

Q/C The entire plant site should be considered as being part of a surface water management unit.

R The Recifier Yard, Soil Stockpile and the miscellaneous area north of Haverstock Road are <u>not</u> part of any SPDES monitoring program.

Q/C The "pump and treat" technology for groundwater remediation would be ineffective and expensive.

R The Department's response is addressed below.

BLACK MUD POND

Q/C RMC believes that the NYSDEC's stated Remedial Action Objectives for this area can be obtained by capping the waste without groundwater recovery and treatment. It is highly probable that "pump and treat" technologies employed would be inefficient and therefore ineffective.

R One of this site's Remedial Action Objectives is to prevent <u>further</u> migration of contamination already documented to be present in the groundwater, not to pump an existing plume. It is the Department's understanding that some of the difficulties that have been experienced with "pump and treat" have been with achieving clean-up goals, such as groundwater quality standards. However, the use of groundwater collection systems for the hydraulic containment of contaminant plumes has been quite successful. The Department believes that the proper design, installation and operation of a groundwater collection trench system around the perimeter of the Black Mud Pond would prevent the lateral migration out of the waste as the groundwater "mound" within the site is reduced by capping.

The PRAP indicated that the Department's preferred alternative is site containment. The purpose of containment is to isolate the site so that there are no further releases of contaminants to the environment. The Department is concerned that further releases to the groundwater system may occur if containment does not include the installation and operation of a perimeter groundwater collection trench system. However, it is the belief of RMC and their consultants that following the capping of the site, groundwater levels will drop to below the waste and that the hydraulic gradient would be "essentially flat". The Department believes that this possibility exists and believes that if the groundwater levels were to drop to

below the level of the waste, and the underlying contaminated soils, the installation and operation of a perimeter trench collection system may not be necessary. Therefore, the ROD requires an approach which is different from that proposed in the PRAP. As part of remedial design, additional borings will be drilled through the site to define the thickness of waste and vertical extent of soil contamination. As part of this effort, monitoring wells will be installed in the waste and in the contaminated soils. Following capping, groundwater levels will be measured monthly to monitor the effectiveness of capping. If the monitoring data indicate to the Department that contaminants are and will continue to be released to the groundwater, the installation and operation of a perimeter groundwater collection trench system may be required.

Q/C RMC believes that collecting and treating surface water runoff from nearby this area is not warranted. ....The results of subsequent surface water monitoring would indicate the need for further action, such as surface water collection and treatment and/or the removal of contaminated sediments.

R The Department is concerned with the documented contamination of the drainage ditches south and east of the Pond. Contaminant migration from these ditches via surface water flow to the Wetlands must be eliminated. Monitoring, as a minimum, is needed, and treatment is needed if the discharge will not meet effluent limits.

WETLANDS

Q/C ...the 0.1 ppm PCB clean-up goal is inappropriate because it is inconsistent with the goals proposed for other areas of concern. RMC proposes that the PCB clean-up goal of 10 ppm being used for soils in surface water management areas would be appropriate for the wetlands, since after sediment excavation, the wetland area will be covered by several feet of soil, thereby creating an upland....RMC has further concerns about the use of a 0.1 ppm criteria in any location (e.g., in the transition zone between wetlands and uplands). This level is below the reliable analytical levels that could be expected, and could not therefore be put to practical use in remediation.

R Exceedance of PCB contamination over the 0.1 ppm clean-up level is considered by the Department as potentially resulting in some specific adverse effects. However, since implementation of such a low clean-up level in the field would be impractical, the Department will utilize the same clean-up levels for those areas outside of surface water and

groundwater management areas, 1.0 ppm. If a shallow groundwater monitoring system is installed and if the groundwater is treated as necessary, the clean-up level could be increased to 10 ppm. Establishing a 1.0 ppm clean-up level, however, would eliminate this requirement, minimize O&M, and be more environmentally protective in the long term.

POTLINER PAD AREA

Q/C ...a soil PCB clean-up level of 25 ppm would be consistent with those intended for the North Yard area located adjacent to the Potliner Pad Area.

R The site-wide PCB clean-up goal, for areas planned to be within the influence of groundwater and surface water monitoring and/or collection systems, is 10 ppm. The 25 ppm goal is, in fact, a criteria for treatment, not a clean-up goal. In the North Yard, consideration was given to the volume of contaminated material to be treated.

Q/C RMC does not agree with the proposed groundwater collection and treatment as part of the remedial action....Hence, the Potliner Pad Area already has groundwater collection and treatment (due to the underdrain and sump at the Thickener System). In addition, soils in this area will be remediated to meet criteria, further reducing the need for groundwater collection. Monitoring groundwater would allow for future remedial actions if warranted.

R WCC indicates that the proposed groundwater collection and treatment system at the Potliner Pad Area is not necessary since it is their belief that the contaminated groundwater flows northward through a filled drainage swale (located to the east of the area) and discharges to the thickener system sump. Water in the sump is treated by the thickener system. However, the July 2, 1990 Revised RI Report stated that the contaminant plume "...may follow a former stream bed..." and that this "...zone of more permeable soil may serve as a preferred groundwater migration pathway." Based on its own interpretations and those contained in the RI Report, the Department is concerned that the sump may not be entirely effective in collecting the contaminated groundwater migrating away from the Potliner Pad area. If some of the contaminated groundwater is bypassing the sump, then it is likely discharging either to the West Ditch which flows to the St. Lawrence River, or directly to the St. Lawrence River itself.

In light of RMC's comments, and to ensure that the Department's concerns are adequately addressed, the following actions will be incorporated into the ROD. During remedial design, additional monitoring wells will be installed downgradient of the Potliner Pad area. If the groundwater monitoring results indicate that a significant portion of the plume is not being collected by the Thickener System sump, the Department will make a determination as to the need for the installation and operation of a groundwater collection trench system. RMC will be required to provide satisfactory evidence to the Department that quality of the effluent from the Thickener System meets remedial discharge limits.

NORTH YARD

Q/C Alternative 1 would be more protective of RMC employee's exposure and adequately address all other RAOs. Importantly, as demonstrated in the FS, Alternative 1 has the potential to be significantly less costly than Alternative 2A.

R The North Yard is an area of worker activity, resulting in potential worker exposure every time maintenance work is undertaken. The Department believes that implementing the PRAP at the North Yard would be more protective since soils, highly contaminated with PCBs, will be removed and permanently destroyed. Regarding the cost comparison; the Department utilizes Technical and Administrative Guidance Memorandum (TAGM) no. 4030 to provide consistency in the development of cost estimates for feasibility studies and remedial action. The method of assuming an initial investment will grow in value over thirty years to an amount equal to the remedial cost at year 30 is inconsistent with TAGM 4030. This method is considered by the Department as an "investment" scenario and not a "present worth" scenario as stipulated in TAGM 4030. The Department does not believe that it is appropriate to delay the remediation of hazardous waste sites, and leave a legacy of environmental problems for the next generation to clean up.

Q/C Alternative 2A would take from 3 to 5 years to be completed, would require significant coordination to proceed in a safe and orderly fashion, and some impacts on plant operations are inevitable.

R In developing the PRAP, the Department took into consideration what the impacts of remedial action at the North Yard would have during every day operations. The Department believes that by utilizing a staged approached during the remedial action, in combination with minor modifications in raw materials receiving and finished product shipping methods, and appropriate contingency plans, the Remedial Action Objectives can be met with minimal impact to RMC's operations.

Q/C Because remediation would proceed so slowly (under Alternative 2A) health impacts associated with worker exposure are increased.

R The Department will require, prior to the implementation of any treatment technology, the submittal and approval of a comprehensive health & safety plan and contingency plan. These plans must encompass the full operational aspects of the technology including hazardous materials handling and worker safety.

Q/C Under Alternative 2A, some facilities could be left in place, with underlying residuals above 25 ppm. There is a high probability that the area would have to undergo a second remediation of facility-related contamination at plant closure, to remove residuals beneath such structures.

R The Department agrees that a second remediation of the RMC site will probably be necessary at the plant closing, however it would be insignificant. Alternative methods to address any contaminated material inaccessible to normal excavation will be considered and implemented in the same time frame as the remaining remedial program for the site.

MISCELLANEOUS AREAS

Q/C In order to be consistent with other site areas, a 10 ppm clean-up goal (instead of the proposed 1 ppm) should be applied to those areas that are part of a surface water or point source management area.

R It is the Department's position that the following Miscellaneous Areas do not fall into specific surface water or point source management areas: area north of Haverstock Road, the Soil Stockpile and the Rectifier Yard. Therefore the 1.0 ppm clean-up level is proposed. Surface water runoff from the plant is monitored at numerous discharge points including the St. Lawrence River and the Wetlands. However, to better address any contaminant loading <u>prior</u> to impacting potential receptors, the Department believes that contaminant migration via the groundwater and surface water

must be addressed specifically at each area of concern. By doing this, effluent from SPDES point discharges will not be impacted from PCB migration from the plant site.

Q/C ...for the soils with greater than or equal to 25 ppm PCBs, the disposition of these soils should not be linked to the treatment method for the North Yard soils.

R The Department will only allow low level contaminated soil/sediment to be placed under the cap at the Landfill/Former Potliner Storage Area. Any soils/sediments containing PCB concentrations of 25 ppm or greater must be treated on-site. In proposing using the same treatment technology as the North Yard, it was the Department's intent to facilitate the mobilization and treatment of contaminated soils/sediments by using one treatment technology for the whole site.

Q/C NYSDEC has used contradictory treatment criteria listed on pp. MA-5 and MA-6 of the PRAP.

R On page MA-5 of the PRAP, Section VI., Item 4., first sentence; the 10 ppm treatment criteria should be changed to 25 ppm.