TABLE 1.1
PARAGRAPHS 20-22 OF THE *STATE OF NEW YORK V. ALLIED-SIGNAL INC.* CONSENT DECREE

Excerpted Text
20. Allied shall conduct, subject to State oversight and approval, a Remedial Investigation and Feasibility Study ("RI/FS") in compliance with CERCLA, 42 U.S.C. §9601 *et seq.,* as amended; the National Contingency Plan ("NCP"), 40 CFR Part 300 and any subsequent amendments thereto; applicable EPA guidance documents relating to the performance of the RI/FS including the EPA draft guidance document entitled "Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA," EPA/540/G-89/004, dated October 1988 and any subsequent revisions thereto; the New York State ECL, regulations promulgated there under and, as appropriate, NYSDEC Technical and Administrative Guidance Memoranda, and any subsequent amendments or revisions thereto; and in compliance with the requirements of paragraphs 21 and 22, below. In the event of a conflict between Federal and State requirements, Allied shall comply with the more stringent requirements as determined by the State. In the event that any of the regulations, rules or guidance documents are amended after Allied has commenced work pursuant to this consent decree and compliance with the provision, as amended, would require Allied to re-perform work previously performed, then the State shall determine whether and to what extent Allied shall re-perform such work. If Allied disagrees with the State's determination, it may invoke the dispute resolution provision in paragraph 42.
21. The RI/FS shall address contamination and the threat of further contamination of the Onondaga Lake System, including the threat of further contamination posed by the [Other Relevant Areas] ORAs[1], resulting from Allied's waste substances and the degradation products of such substances. The RI shall also identify and quantify other hazardous substances and contaminants that may be present in the [Onondaga Lake System] OLS[2]. To the extent necessary to accurately determine the impact on the OLS of Allied's waste substances, the RI shall evaluate other hazardous substances and contaminants. The FS shall also address contamination resulting from the presence of substances that were generated or disposed of by entities other than Allied to the extent necessary for the purposes of evaluating and developing a remedial program with respect to Allied's waste substances. In addition, as data is generated under the RI, the scope of the RI/FS may be modified subject to the agreement of the parties.
22. It is hereby acknowledged that CERCLA, the NCP and CERCLA guidance documents apply to releases of hazardous substances as defined in CERCLA. It is the intention of the parties, for purpose of performing the RI/FS, that CERCLA and regulations and guidance documents there under, shall provide general guidance, as appropriate, with respect to such matters as the overall approach, quality and quantity of data, format, analytical methods and quality assurance/quality control methods for substances that may otherwise not be subject to such regulations and documents. It is not the intention of the parties to otherwise expand, by this provision, the applicability of CERCLA. Thus, for example, the standards and criteria by which the need for remedial action is determined for substances not covered by CERCLA, shall be established by reference to the State common law of public nuisance and other statutes and regulations, and not necessarily by reference to CERCLA.

[1] Other Relevant Areas are defined as "…the Waste Beds, the Semet Tar Beds, the Willis Avenue Site and such other areas, as identified in the RI/FS Workplan or identified by information generated during the course of the RI/FS, from which there is a release or threat of release of Allied's waste substances into the Onondaga Lake System."

[2] The Onondaga Lake System is defined as "…the waters, beds and associated biota of Onondaga Lake, such tributaries of Onondaga Lake or portions thereof as may have been contaminated by Allied's waste substances, including Geddes Brook and Ninemile Creek, and the outlet of Onondaga Lake known as the 'Lake Outlet.'"

TABLE 1.2
PRODUCT LINES AND PERIODS OF PRODUCTION
AT THE SYRACUSE WORKS

Facility	Product Line	Period of Production
Main Plant	Soda ash and related products	1884-1986
	Benzene, toluene, xylene, naphthalene	1915-1970
Willis Avenue	Chlorinated benzenes and hydrochloric acid	1918-1977
	Chlor-alkali products	1918-1977
Bridge Street	Chlor-alkali products	1953-1979[a]
	Hydrogen peroxide	1956-1969

[a] The Bridge Street Plant was sold to Linden Chemicals and Plastics (LCP) in 1979. LCP operated the plant until it closed in 1988.

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TABLE 1.3
WASTE CHARACTERIZATION AND DISPOSAL AT THE SYRACUSE WORKS

Facility	Waste Material	Disposal
Main Plant	Cooling water, spills, leaks, washings	East Flume
	Solvay waste[a] (i.e., distiller waste muds, brine muds, waste lime, washings, spills)	Wastebeds
	Residue from BTX production[b]	Semet Residue Ponds[c]
	Fly ash, soot, water purification muds, and washings from power plant	Wastebeds
Willis Avenue	Residue from chlorinated benzenes production[d]	Wastebeds, East Flume
	Cooling water, spills, leaks, washings, tail gas absorber discharge[e]	East Flume
	Asbestos, washings, spills, lead, mercury, and occasional still bottoms	Wastebeds
Bridge Street	Cooling water, spills, leaks, washings, tail gas absorber discharge[e]	West Flume
	Spills, washings, lead, mercury, asbestos, cooling water	Wastebeds

Note: BTX – benzene, toluene, xylene

Table adapted from Figure 18 of Site History Report and associated text (PTI 1992).

[a] Solvay wastes were 60 to 70 percent water and composed primarily of calcium carbonate, calcium sulfate, and magnesium hydroxide, with lesser amounts of calcium oxide-calcium chloride complex, silicon dioxide, sodium chloride, calcium chloride, aluminum or iron oxides, calcium hydroxide, calcium sulfate, and metals

[b] Consisting of acid sludge, waste caustic solution, and heavy gums (O'Brien and Gere 1990).

[c] The Semet Residue Ponds are located on what was formerly Solvay Wastebed A.

[d] Characterized as "heavy organic" residue consisting primarily of tri- and tetrachlorobenzenes. These wastes were periodically sold when there was a market for these products.

[e] Consisting primarily of chlorine, salts, and carbonates. Tail gas absorber discharge was a residual portion of chlorine gas that could not be compressed and liquefied and was absorbed in caustic soda.

TABLE 1.4
GLOSSARY OF TERMS

Term	Definition
anoxic	Containing no dissolved oxygen. Commonly used to indicate an environment that cannot support life, except for some types of bacteria.
benthic	Associated with sediment.
benthic macroinvertebrate	Small but visible animals (e.g., insects, worms, clams, and snails) that live in or on the sediment at the bottom of a lake or stream.
bioaccumulation	The uptake and retention of substances from their surroundings by plants and animals.
biologically active sediment	Generally, the top 6 inches (15 cm) of sediment where the majority of benthic macroinvertebrates reside and biological activity occurs.
calcite	A mineral composed of calcium and carbonate.
diffusion	The movement of dissolved constituents from areas of high concentration to areas of low concentration.
epilimnetic	Associated with the epilimnion.
epilimnion	During summer stratification, the upper portion of the water column located between the 0 and 30 ft (9 m) water depth in Onondaga Lake. The epilimnion is warm and well-mixed by wind and waves.
eutrophication	The change in biological, chemical, and physical conditions in a lake caused by increasing concentrations of algal nutrients (e.g., phosphorus) usually associated with human activities. Results of eutrophication include low water clarity, low dissolved oxygen, floating algae, anoxic conditions in the hypolimnion, changes in biological communities, and unpleasant odors.
hypolimnetic	Associated with the hypolimnion.
hypolimnion	During summer stratification, the lower portion of the water column located between the 30 and 60 ft (9 to 18 m) water depth in Onondaga Lake. The hypolimnion is cool and not well-mixed by wind and waves.
littoral sediment	Sediments located beneath epilimnetic water in water depths less than 30 ft (9 m).
macrophyte	Plants large enough to be seen without magnification. They may be rooted or free floating.
mass balance analysis	A method to account for the amount (mass or weight) of material that enters, exits, or accumulates in a lake by identifying and quantifying sources, sinks, and changes in concentration over a period of time. Ideally, the sum of sources and sinks balances the amount that accumulates.
mercury methylation	The process of bonding an organic molecule (a methyl group) to a mercury atom (mercuric ion) to form a new chemical, methylmercury.
methane gas ebullition	The process whereby gas bubbles that contain methane formed by bacteria in the sediments are released from the sediment to overlying lake water.

TABLE 1.4 (CONTINUED)
GLOSSARY OF TERMS

Term	Definition
oncolites	Irregularly rounded, calcareous nodules that range in size from 0.5 to 30 cm and are not attached to substrates
oxic	Containing dissolved oxygen. Commonly used to indicate a chemically oxidizing environment where substances like sulfide are not stable.
oxygenated	Water that was exposed to air/oxygen and as a result has dissolved oxygen.
pelagic	Associated with the water column.
phytoplankton	Microscopic plant life (i.e., algae) that live in the water column of a lake and serve as food for zooplankton and some fish species.
plankton	Passively floating or weakly swimming, usually minute animals and plant life of a body of water.
profundal sediment	Sediments located beneath hypolimnetic water in water depths greater than 30 ft (9 m).
resuspension	The process of lifting sediment particles from the bottom of a lake into the overlying water. Resuspension can be caused by forces such as water turbulence from waves and currents, bottom-feeding fish (e.g., carp), and methane gas ebullition. The particles may settle back to the bottom or be carried away by currents.
stratification	Containing distinct layers. During summer stratification, from approximately mid-May to mid-October, Onondaga Lake consists of two layers of water (i.e., the hypolimnion and the epilimnion).
thermocline	The boundary between the epilimnion and hypolimnion where the water temperature changes the fastest with changing depth.
unconsolidated sediment	Sediment with no discernible layers.
zooplankton	Small planktonic animals that live in the water column of the lake and serve as food for some fish species.

Note: Definitions specific to Onondaga Lake are so noted.

TABLE 1.5
HONEYWELL UPLAND SITES AND THEIR CONTRIBUTION OF CPOIs TO ONONDAGA LAKE

Site	Transport Pathway	Primary CPOIs
Willis Avenue / East Flume	Surface runoff, surface water, I-690 drains, shoreline seeps, groundwater	Mercury, BTEX, chlorinated benzenes (dissolved and DNAPL), PAHs, PCDD/PCDFs
Semet Residue Ponds	Groundwater discharge to Tributary 5A and Willis Avenue Site	BTEX, PAHs
Harbor Brook / Wastebed B[a]	Surface runoff, seeps, contaminated sediment, groundwater	Mercury, BTEX, PAHs, naphthalene, NAPL
Wastebeds 1 to 8[b]	Erosion	Solvay waste[c]
LCP Bridge Street / West Flume	Surface runoff, surface water, and groundwater to Geddes Brook	Mercury
Wastebeds 9 to 15	Surface runoff, seeps, and groundwater to Geddes Brook and Ninemile Creek	Dissolved ionic waste[d]
Geddes Brook / Ninemile Creek	Surface water	Mercury, total suspended solids

NOTES:

[a] Including former Barrett Paving facility

[b] Wastebeds 1 to 8 are under investigation. Transport pathways and CPOIs relevant to Onondaga Lake have not been determined.

[c] Solvay waste generally refers to material produced during the Solvay Process that was disposed in the waste beds. Solvay waste is considered a CPOI, present as a solid material, that is being eroded from Wastebeds t to 8 into to Geddes Brook / Ninemile Creek and Onondaga Lake.

[d] Dissolved ionic waste contains calcium, chloride, iron, magnesium, manganese, potassium, sodium, and total dissolved solids. These dissolved ionic constituents are considered CPOIs that are potentially being transported from the Wastebeds to Geddes Brook / Ninemile Creek and Onondaga Lake via surface runoff, seeps and groundwater.

TABLE 1.6
NON-HONEYWELL UPLAND SITES AND THEIR CONTRIBUTION OF CPOIs TO ONONDAGA LAKE

Site	Transport Pathway	Primary CPOIs
General Motors former Inland Fisher Guide facility and Ley Creek Deferred Media Site	Surface runoff, surface water via Ley Creek	PCBs, solvents, copper, nickel, chromium
GM Old Ley Creek Channel Site	Surface water via Ley Creek	PCBs, metals
GM Dredgings Site	Surface water via Ley Creek	PCBs
Town of Salina Landfill	Surface water via Ley Creek	PCBs, paint sludges
Oil City area	Groundwater and Onondaga Creek	BTEX, PAHs, chlorinated hydrocarbons, PCBs
Former Niagara Mohawk Power Corporation manufactured gas plants on Hiawatha and Erie Boulevards	Groundwater from Hiawatha Boulevard site and groundwater-surface water to Onondaga Creek	PAHs, BTEX, phenols, cyanides, metals (DNAPL plume observed at both sites)
Metro Plant	Treated wastewater and stormwater	Metals (including mercury), other urban and industrial compounds
American Bag and Metal Site	Surface water via Onondaga Creek	PCBs, paint wastes
Roth Steel	Surface water via Onondaga Creek	PCBs
Crucible Materials Corporation and Crucible Lake Pump Station disposal site	Surface water via Tributary 5A	Metals
Electronics Park facility	Surface water via Bloody Brook	Cadmium
Urban runoff	Overland flow	PAHs, lead, chromium, copper, nickel, zinc

Based on information provided in the RI report (TAMS, 2002c).

TABLE 1.7

SUMMARY OF TOTAL EXCESS LIFETIME CANCER RISKS FOR PATHWAYS EXCEEDING 1x10^{-6} RISK LEVEL

Exposure Pathway and Receptor	Cancer Risks: Risk > 10^{-4} RME	Risk > 10^{-4} CT	Risk > 10^{-5} RME	Risk > 10^{-5} CT	Risk > 10^{-6} RME	Risk > 10^{-6} CT	Primary Chemicals Contributing to Risks for Pathways with Risk Estimates Greater than 10^{-6} [a]
Fish consumption [b]							
All areas - Recreational user scenario							
Fish consumption - Adult	x	--	x	x	x	x	PCDDs/PCDFs; PCBs (total); arsenic
Fish consumption - Younger child	x	--	x	x	x	x	PCDDs/PCDFs; PCBs (total); arsenic
Fish consumption - Older child	x	--	x	x	x	x	PCDDs/PCDFs; PCBs (total); arsenic
Sediments							
Northern Basin							
Sediments - Adult recreational	--	--	--	--	x	--	Arsenic; benzo(a)pyrene; hexachlorobenzene
Sediments - Younger child recreational	--	--	--	--	x	--	Arsenic; benzo(a)pyrene; hexachlorobenzene
Sediments - Older child recreational	--	--	--	--	x	--	Arsenic; benzo(a)pyrene; hexachlorobenzene
Sediments - Construction worker	--	--	--	--	--	--	NA
Southern Basin							
Surface sediments - Adult recreational	--	--	x	--	x	--	Benzo(a)pyrene; dibenz(a,h)anthracene; PCDDs/PCDFs; hexachlorobenzene
Surface sediments - Younger child recreational			x	--	x	x	Benzo(a)pyrene; dibenz(a,h)anthracene & other PAHs[c]; PCDDs/PCDFs; hexachlorobenzene; arsenic
Surface sediments - Older child recreational	--	--	x	--	x	x	Benzo(a)pyrene & other PAHs; PCDDs/PCDFs; hexachlorobenzene; arsenic
Surface sediments - Construction worker	--	--	--	--	x	--	Benzo(a)pyrene; PCDDs/PCDFs; dibenz(a,h)anthracene
Wetland SYW-6 (North)							
Surface sediments - Adult recreational	--	--	x	--	x	x	Benzo(a)pyrene; dibenz(a,h)anthracene; benz(a)anthracene; benzo(b) and (k)fluoranthene; indeno(1,2,3-cd)pyrene
Surface sediments - Older child recreational	x	--	x	x	x	x	Benzo(a)pyrene; dibenz(a,h)anthracene; arsenic; benzo(b)fluoranthene; indeno(1,2,3-cd)pyrene
Surface sediments - Construction worker	--	--	--	--	x	x	Benzo(a)pyrene; dibenz(a,h)anthracene
Wetland SYW-10 (North)							
Surface sediments - Adult recreational	--	--	--	--	x	--	Arsenic; benzo(a)pyrene
Surface sediments - Older child recreational	--	--	x	--	x	x	Arsenic; benzo(a)pyrene; dibenz(a,h)anthracene
Surface sediments - Construction worker	--	--	--	--	--	--	Arsenic; benzo(a)pyrene
Wetland SYW-12 (South)							
Surface sediments - Adult recreational	--	--	--	--	x	--	Benzo(a)pyrene
Surface sediments - Older child recreational	--	--	x	--	x	--	Benzo(a)pyrene; benz(a)anthracene
Surface sediments - Construction worker	--	--	--	--	x	--	Benzo(a)pyrene
Wetland SYW-19 (South)							
Surface sediments - Adult recreational	--	--	x	--	x	--	Benzo(a)pyrene; PCDDs/PCDFs; dibenz(a,h)anthracene
Surface sediments - Older child recreational	--	--	x	--	x	x	Benzo(a)pyrene and other PAHs[d]; PCDDs/PCDFs; hexachlorobenzene

TABLE 1.7

SUMMARY OF TOTAL EXCESS LIFETIME CANCER RISKS FOR PATHWAYS EXCEEDING 1x10^{-6} RISK LEVEL

Exposure Pathway and Receptor	Cancer Risks: Risk > 10^{-4} RME	Risk > 10^{-4} CT	Risk > 10^{-5} RME	Risk > 10^{-5} CT	Risk > 10^{-6} RME	Risk > 10^{-6} CT	Primary Chemicals Contributing to Risks for Pathways with Risk Estimates Greater than 10^{-6} [a]
Surface sediments - Construction worker	--	--	--	--	x	x	Benzo(a)pyrene; PCDDs/PCDFs; dibenz(a,h)anthracene
Soils							
Dredge Spoils							
Surface soils - Adult recreational	--	--	--	--	x	--	Arsenic; benzo(a)pyrene
Surface soils - Older child recreational	--	--	--	--	x	--	Arsenic; benzo(a)pyrene; hexachlorobenzene
Surface soils - Construction worker	--	--	--	--	--	--	NA
Subsurface soils - Construction worker	--	--	--	--	x	--	Benzo(a)pyrene; arsenic; dibenz(a,h)anthracene
Surface Water							
Surface water - Adult recreational	--	--	--	--	--	--	NA
Surface water - Younger child recreational	--	--	--	--	--	--	NA
Surface water - Older child recreational	--	--	--	--	--	--	NA
Surface water - Construction worker	--	--	--	--	--	--	NA

Notes: CT - Central tendancy PAH - Polycyclic aromatic hydrocarbon PCDF - Polychlorinated dibenzofuran
NA - Not applicable PCDD - Polychlorinated dibenzo-*p* -dioxin RME - Reasonable maximum exposure

[a] Based on Tables ES-4 from TAMS (2002b). Primary chemicals are those presenting 10 percent or more of risk for all pathways (except fish ingestion) contributing risk of 10^{-6} or more.

[b] Principal chemicals for fish ingestion pathway are those accounting for a total of more than 90 percent of risk. Several semivolatile organic compounds and pesticides also contributed RME risk of 10^{-6} or more.

[c] Other PAHs not listed individually (with RME risks greater than 10^{-6}) include dibenz(a,h)anthracene and benzo(b)fluoranthene.

[d] Other PAHs not listed individually (with RME risks greater than 10^{-6}) include dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, benz(a)anthracene and benzo(b)fluoranthene.

TABLE 1.8

SUMMARY OF NON-CANCER HAZARDS FOR PATHWAYS EXCEEDING A HAZARD INDEX OF 1

Exposure Pathway and Receptor [a]	Non-Cancer Hazards HI > 1 RME	Non-Cancer Hazards HI > 1 CT	Primary Chemicals Contributing to Hazard Indicies [b]
Fish consumption			
All areas - Recreational user scenario			
Fish consumption - Adult	x	x	Low and high molecular weight PCBs, mercury (as methylmercury)
Fish consumption - Younger child	x	x	Low and high molecular weight PCBs, mercury (as methylmercury)
Fish consumption - Older child	x	x	Low and high molecular weight PCBs, mercury (as methylmercury)

Notes:

CT - Central tendancy
HI - Hazard index
PCB - Polychlorinated biphenyl
RME - Reasonable maximum exposure

[a] Sediment, soil, and surface water pathways did not have non-cancer hazard indices greater than 1.

[b] Based on Table ES-5 from TAMS (2002b). Primary chemicals are those with hazard quotients greater than 1.

TABLE 1.9
CHEMICALS OF CONCERN SELECTED IN THE BERA FOR ONONDAGA LAKE MEDIA BASED ON INITIAL SCREENING

Chemical	Water	Sediment	Soil	Plants
Metals				
Antimony	--	x	x	--
Arsenic	--	x	x	x
Barium	x	--	x	--
Cadmium	--	x	x	x
Chromium	--	x	x	x
Copper	x	x	x	x
Iron	--	--	x	--
Lead	x	x	x	x
Manganese	x	x	x	--
Mercury/Methylmercury	x	x	x	x
Nickel	--	x	x	x
Selenium	--	x	x	x
Silver	--	x	x	x
Thallium	--	--	x	x
Vanadium	x	x	x	x
Zinc	x	x	x	x
Cyanide	--	--	x	--
Volatile Organic Compounds				
Benzene	--	x	x	--
Chlorobenzene	x	x	x	--
Dichlorobenzenes (Sum)	x	x	x	--
Ethylbenzene	--	x	--	--
Toluene	--	x	--	--
Trichlorobenzenes (sum)	x	x	x	--
Xylene isomers	--	x	--	--

TABLE 1.9
CHEMICALS OF CONCERN SELECTED IN THE BERA FOR ONONDAGA LAKE MEDIA BASED ON INITIAL SCREENING

Chemical	Water	Sediment	Soil	Plants
Semivolatile Organic Compunds				
Bis(2-ethylhexyl)phthalate	x	--	--	--
Dibenzofuran	--	x	--	--
Hexachlorobenzene	--	x	x	--
Phenol	--	x	x	--
Polycyclic aromatic hydrocarbons (total)	--	x	x	--
Pesticides/Polychlorinated Biphenyls				
Aldrin	--	--	x	--
Chlordane isomers	--	x	x	--
DDT and metabolites	--	x	x	--
Dieldrin	--	x	x	--
Endrin	--	--	--	--
Hexachlorocyclohexanes	--	--	x	--
Heptachlor and heptachlor epoxide	--	x	--	--
Polychlorinated biphenyls (total)	--	x	x	--
Dioxins/Furans				
PCDD/PCDFs (total)	--	x	x	--

Notes: PCDD - Polychlorinated dibenzo-*p* -dioxin
PCDF - Polychlorinated dibenzofuran

Based on Table 8-1 from TAMS (2002a). Risks to fish and wildlife receptors were evaluated in the exposure assessment (see Table 1.10).

TABLE 1.10

HAZARD QUOTIENTS FOR ECOLOGICAL RECEPTORS

Receptor [a]	95% UCL NOAEL	Mean NOAEL	95% UCL LOAEL	Mean LOAEL
FISH [b]				
Arsenic	4.0 - 1.4	2.4 - 0.70	1.5 - 0.50	0.90 - 0.30
Chromium	61 - 2.5	16 - 2.3	18 - 0.90	4.6 - 0.70
Mercury	15 - 4.3	14 - 2.7	5.2 - 1.4	4.6 - 0.90
Methylmercury	18 - 2.3	15 - 2.1	6.1 - 0.80	5.1 - 0.70
Selenium	20 - 7.8	10 - 4.8	2.0 - 0.80	1.0 - 0.50
Vanadium	29 - 20	20 - 11	2.9 - 2.0	2.0 - 1.1
Zinc	13 - 0.50	6.1 - 0.50	11 - 0.40	5.2 - 0.40
Endrin	1.0 - 0.10	0.50 - 0.12	0.10 - 0.014	0.016 - 0.012
PCBs	2.8 - 0.50	1.5 - 0.30	0.60 - 0.10	0.30 - 0.10
PCDD/PCDFs	2.6 - 0.40	1.0 - 0.10	1.2 - 0.20	0.50 - 0.10
BIRDS				
Tree Swallow				
Barium	10	8.3	5.1	4.1
Cadmium	7.0	4.6	0.50	0.30
Chromium	53	57	11	11
Lead	1.8	1.3	0.18	0.13
Mercury	6.5	3.1	3.3	1.5
Methylmercury	19	11	1.9	1.1
Selenium	6.8	5.7	3.4	2.7
Zinc	6.4	5.6	0.64	0.56
Dichlorobenzenes	3.0	1.4	0.30	0.14
PAHs	287	292	29	29
PCBs	1.9	1.8	0.19	0.18
PCDD/PCDFs	5.6	1.3	0.60	0.13
Mallard				
Barium	2.4	1.8	1.2	0.90
Cadmium	1.0	0.7	0.10	0.047
Chromium	10	9.7	2.1	1.9
Methylmercury	4.3	2.7	0.43	0.27
Zinc	1.2	1.0	0.13	0.10
Dichlorobenzenes	2.1	0.30	0.21	0.03
PAHs	393	118	39	12
PCDD/PCDFs	1.4	0.31	0.14	0.031
Belted Kingfisher				
Methylmercury	23	20	2.3	0.20
PAHs	12	3.7	1.2	0.40
DDTr	19	12	1.9	1.2
PCBs	11	3.1	1.1	0.31
PCDD/PCDFs	1.8	1.4	0.18	0.14
Great Blue Heron				
Methylmercury	18	15	1.8	0.15
Zinc	1.1	0.80	0.11	0.08
PAHs	4.0	1.2	0.40	0.12
DDTr	8.0	5.3	0.80	0.53
PCBs	2.7	1.4	0.27	0.14
Osprey				
Methylmercury	24	20	2.4	2.0
Zinc	1.6	1.2	0.16	0.12
DDTr	9.3	6.3	0.93	0.63
PCBs	2.5	0.20	0.25	0.02
Red-Tailed Hawk				
PAHs	252	14	25	1.4
DDTr	1.5	0.33	0.15	0.033
PCDD/PCDFs	9.9	1.0	0.99	0.10

TABLE 1.10 (Continued)

HAZARD QUOTIENTS FOR ECOLOGICAL RECEPTORS

Receptor [a]	95% UCL NOAEL	Mean NOAEL	95% UCL LOAEL	Mean LOAEL
MAMMALS				
Mink				
Methylmercury	12	9.4	0.12	0.94
Hexachlorobenzene	9.2	1.1	0.92	0.11
PAHs	33	4.5	3.3	0.45
PCBs	109	34	11	0.34
PCDD/PCDFs	42	4.9	4.2	0.49
River Otter				
Methylmercury	43	36	4.3	3.6
PAHs	5.2	1.6	0.52	0.16
DDTr	5.9	2.3	1.2	0.50
PCBs	130	69	13	6.9
PCDD/PCDFs	2.8	1.5	0.28	0.15
Little Brown Bat				
Arsenic	1.1	0.80	0.10	0.080
Barium	2.1	1.7	1.3	1.0
Cadmium	4.5	3	0.45	0.30
Chromium	7.2	7.8	1.8	1.9
Copper	1.4	1.1	1.1	0.9
Methylmercury	21	13	2.1	1.3
Mercury	1.3	0.60	0.13	0.06
Vanadium	2.7	1.9	0.27	0.19
Total Xylenes	2.3	0.5	1.9	0.40
Hexachlorobenzene	6	4.6	0.60	0.46
PAHs	18	19	1.8	1.9
PCDD/PCDFs	11	2.9	1.1	0.29
Short-Tailed Shrew [c]				
Arsenic	2.0-1.4	1.1 - 0.99	0.20 - 0.14	0.10 - 0.099
Cadmium	11 - 7.5	5.0 - 3.5	1.1 - 0.75	0.50 - 0.35
Chromium	1.0 - 0.70	0.40 - 0.30	0.20	0.10
Lead	1.5 - 1.0	0.7	0.1	0.1
Methylmercury	22 - 19	19	2.2 - 1.9	1.9
Selenium	1.7 - 0.7	0.70 - 0.40	1.0 - 0.50	0.40 - 0.30
Thallium	2.6 - ND	1.4 - ND	0.26 - ND	0.14 - ND
Vanadium	2.9 - 2.0	1.7 - 1.1	0.29 - 0.20	0.17 - 0.11
Hexachlorobenzene	1.8 - ND	0.49 - ND	0.18 - ND	0.049 - ND
PAHs	213 - 191	61 - 47	21 - 19	6.1 - 4.7
Dieldrin	1.1 - ND	0.60 - ND	0.60 - ND	0.30 - ND
PCDD/PCDFs	15	5.9	1.5	0.59

Notes:

DDTr - Dichloro-diphenyl-trichloroethane and its natural metabolites
LOAEL - Lowest observed adverse effect level
ND - Not detected
NOAEL - No observed adverse effect level
PAH - Polycyclic aromatic hydrocarbon
PCB - Polychlorinated biphenyl
PCDD - Polychlorinated dibenzo-*p*-dioxin
PCDF - Polychlorinated dibenzofuran

[a] Fish hazard quotients are based on measured fish concentrations. Bird and mammal hazard quotients are based on modeled exposure.

[b] Range represents the minimum and maximum hazard quotients for all fish species assessed.

[c] Range represents the minimum and maximum hazard quotients assessed for Wetlands SYW-6 and SYW-12 only.

Boxed entries equal or exceed a hazard quotient of 1.0.
This table is based on Tables 8-4, 8-5, 8-6, and 8-7 in the RI report (TAMS 2002c).

TABLE 1.11
SITE-SPECIFIC SEDIMENT EFFECT CONCENTRATIONS DERIVED FOR ONONDAGA LAKE BASED ON 1992 DATA

	ER-L	TEL	ER-M	PEL	AET	PEC
Metals (mg/kg)						
Antimony	3.1	4	3.1	4.3	NC	3.6
Arsenic	0.90	1.29	4.4	3.55	4.3	2.4
Cadmium	0.94	1.42	2.1	3.11	8.6	2.4
Chromium	17.6	29.3	47.9	67.3	195	50.3
Copper	12.3	19.1	40.7	48.3	83.7	32.9
Lead	9.68	13.3	56.9	57.6	116	34.5
Manganese	197	231	280	295	445	278
Total Mecury	0.51	0.99	2.8	2.84	13	2.2
Nickel	5.22	8.37	20.9	25.8	50	16.4
Selenium	0.42	0.4	0.6	0.68	0.94	0.58
Silver	0.82	0.9	1.2	1.42	2.7	1.28
Vanadium	2.7	3.4	6	8.3	12.2	5.6
Zinc	37.9	56.7	94.6	120	218	88
Organic Compounds						
BTEX Compounds (ug/kg)						
Benzene	27.3	42.4	42	299	5300	150
Ethylbenzene	142	206.0	657	657	13.3	176
Toluene	13.1	15.9	27.5	50.3	443	41.8
Xylenes	153	367	1,640	997	606	560.8
Chlorinated Benzenes (ug/kg)						
Chlorobenzene	64.4	48.3	580	799	10000	428
Dichlorobenzenes	21.5	44.2	773	765	1373	239
Trichlorobenzenes	186	209	930	482	287	347
Hexachlorobenzene	7.16	8.9	28	23.6	28	16.4
Polychlorinated Biphenyls (ug/kg)						
Aroclor 1016	99	104	135	135	90	111
Aroclor 1248	82	99	300	307	470	204
Aroclor 1254	68.5	74	82.5	79.7	77	76
Aroclor 1260	80	115	240	221	240	164
Total PCBs	136	151	400	382	710	295
PAH Compounds (ug/kg)						
Acenaphthene	469	478	1,200	1,030	1700	861
Acenaphthylene	507	673	1,850	1,970	3000	1301
Anthracene	33	49.6	210	249	4400	207
Benz[a]anthracene	60.7	118	415	451	NC	192
Benzo[a]pyrene	62.8	98.2	210	355	NC	146

TABLE 1.11 (Continued)
SITE-SPECIFIC SEDIMENT EFFECT CONCENTRATIONS DERIVED FOR ONONDAGA LAKE BASED ON 1992 DATA

	ER-L	TEL	ER-M	PEL	AET	PEC
Benzo[b]fluoranthene	63.1	80.9	240	253	1100	908
Benzo[ghi]perylene	228	307	1,300	1,170	2700	780
Benzo[k]fluoranthene	63.1	*80.9*	240	253	1100	203
Chrysene	100	172	440	541	NC	253
Dibenz[a,h]anthracene	49.4	67.7	180	218	730	157
Dibenzofuran	340	295	340	561	NC	372
Fluoranthene	140	483	1,400	2,482	26000	1436
Fluorene	55.2	66.9	305	327	3500	264
Indeno[1,2,3-cd]pyrene	58.8	102	370	503	NC	183
Naphthalene	340	471	1,400	1,380	2100	917
Phenanthrene	92.2	135	480	491	16000	543
Pyrene	114	238	650	795	NC	344
Other SVOCs (ug/kg)						
Phenol	45	45	45	45	45	45
Pesticides (ug/kg)						
DDT and Metabolites	47	23.7	47	26.6	16.3	29.6
Chlordane	NC	5.08	NC	5.08	NC	5.1

Notes:

AET - apparent effects threshold
BTEX - benzene, toluene, ethylbenzene, xylenes
ER-L - effects range-low
ER-M - effects range-median
NC - Not calculated due to insufficient number of detected observations or data points
PCB - polychlorinated biphenyl
PAH - polycyclic aromatic hydrocarbon
PEC - probable effect concentration (defined as the geometric mean of the five SECs for each analyte)
PEL - probable effect level
TEL - threshold effect level

[a] Based on Table 8-3 from TAMS (2002a).

TABLE 1.12
CPOIS CONTRIBUTING TO SEDIMENT TOXICITY TO BENTHIC MACROINVERTEBRATES IN ONONDAGA LAKE

Group	CPOI
Metals	Mercury
BTEX	Ethylbenzene Xylenes
Chlorinated Benzenes	Chlorobenzene Dichlorobenzenes Trichlorobenzenes
PAHs	Acenaphthene Acenaphthylene Anthracene Benz[a]anthracene Benzo[a]pyrene Benzo[b]fluoranthene Benzo[ghi]perylene Benzo[k]fluoranthene Chrysene Dibenz[a,h]anthracene Fluoranthene Fluorene Indeno[1,2,3-cd]pyrene Naphthalene Phenanthrene Pyrene
PCBs	Total PCBs

See Appendix J for description of how CPOIs were identified.

TABLE 1.13
KEY HUMAN HEALTH RISK CONCERNS IN ONONDAGA LAKE

Medium	Human Health Risk Concerns	
	Pathways	**CPOIs**
Sediment[a]	Direct exposure	Arsenic, PAHs, PCDD/PCDFs, hexachlorobenzene
Fish Tissue	Fish consumption	Methylmercury, PCBs, PCDD/PCDFs, arsenic
Water[b]	Fish consumption	Methylmercury

NOTES:

[a] Estimated cancer risks related to direct exposure were highest (i.e., exceeded 1 x 10^{-5}) for sediments in the south basin. Estimated cancer risk related to exposure to sediment in the north basin only exceeded 1 x 10^{-6} for the reasonable maximum exposure and was not further evaluated in the FS.

[b] Cancer risks related to direct exposure, including incidental ingestion, were estimated in the HHRA to be less than 1 x 10^{-6}. NYSDEC surface water quality standards protective of human health via direct exposure were occasionally exceeded for benzene, chlorobenzene, and dichlorobenzenes and were regularly exceeded for dissolved mercury (via fish consumption).

TABLE 1.14
KEY ECOLOGICAL RISK CONCERNS IN ONONDAGA LAKE

Medium	Ecological Risk Concerns		
	Receptors	**Pathways**	**CPOIs[a]**
Sediment[b]	Benthic macroinvertebrates	Direct exposure	Mercury, ethylbenzene, xylenes, chlorobenzene, dichlorobenzenes, trichlorobenzenes, PAHs, total PCBs
	Wildlife	Benthic macroinvertebrates/insect consumption	PAHs, barium, chromium, mercury, methylmercury, selenium
		Fish consumption	Methylmercury, PCBs, DDT
Fish Tissue[c]	Wildlife	Fish consumption	Methylmercury, PCBs, DDT
Water[d]	Wildlife	Fish consumption	Methylmercury

[a] Identification of CPOIs for key risk concerns focused on CPOIs contributing to sediment toxicity to benthic macroinvertebrates and CPOIs for which the mean LOAEL HQs exceeded 1.0 (for risk to wildlife).

[b] Stressors of concern were noted for direct exposure. These included calcitic sediments and oncolites. Impaired benthic communities were noted in various areas of the lake.

[c] Risks (mean LOAEL HQs greater than 1.0) were also identified for fish exposed to various CPOIs (chromium, mercury, methylmercury, selenium, vanadium, zinc) by comparison of fish tissue data to literature-derived toxicity reference values.

[d] Exceedance of narrative water quality standards (turbidity and suspended solids) and presence of stressors (salinity, dissolved oxygen, ammonia, phosphorus, sulfide, chloride, low transparency) was also noted in the BERA. Occasional exceedances of NYSDEC surface water quality standards for barium, copper, lead, manganese, zinc, trichlorobenzenes, bis(2-ethylhexyl)phthalate were also noted in the BERA (TAMS, 2002a).