

**PREASSESSMENT SCREEN DETERMINATION**

**FOR**

**ONONDAGA LAKE SYSTEM**

**IN THE VICINITY OF**

**SYRACUSE, NEW YORK**

**(Revised September, 1994)**

prepared by

THE TRUSTEE FOR NATURAL RESOURCES:

**THE STATE OF NEW YORK  
DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

**PRE-ASSESSMENT SCREEN DETERMINATION  
FOR THE ONONDAGA LAKE SYSTEM, NEW YORK**

**I. DETERMINATION**

**A. General**

A review has been undertaken of readily available information that focuses on resources for which New York State may assert trusteeship under section 107(f) of CERCLA. It has been concluded that there is a reasonable probability of making a successful NRD claim and that the time and expense of an assessment is justified. Accordingly, an assessment under this part shall be carried out.

Based on information gathered pursuant to the preassessment screen and on information gathered pursuant to the NCP, a preliminary determination has been made that all of the following criteria have been met pursuant to 40 CFR § 11.23:

(1) A discharge of oil or a release of a hazardous substance has occurred [43 C.F.R. § 11.23(e)(1)];

(2) Natural resources for which the State of New York may assert trusteeship under CERCLA have been or are likely to have been adversely affected by the discharge or release [43 C.F.R. § 11.23(e)(2)];

(3) The quantity and concentration of the discharged oil or released hazardous substance is sufficient to potentially cause injury, as that term is used in 43 CFR Part 11, to those natural resources [43 C.F.R. § 11.23(e)(3)];

(4) Data sufficient to pursue an assessment are readily available or likely to be obtained at reasonable cost [43 C.F.R. § 11.23(e)(4)]; and

(5) Response actions, if any, carried out or planned do not or will not sufficiently remedy the injury to natural resources without further action [43 C.F.R. § 11.23(e)(5)].

**B. Information on the Site**

A review has been completed based upon the readily available information on this site and on the discharge or release, including but not limited to the following:

(1) The time, quantity, duration, and frequency of the discharge or release;

(2) The name of the hazardous substance, as provided for in Table 302.4 - List of Hazardous Substances and Reportable Quantities, 40 CFR 302.4;

(3) The history of the current and past use of the site identified as the source of the discharge of oil or release of a hazardous substance;

(4) Relevant operations occurring at or near the site;

(5) Additional oil or hazardous substances potentially discharged or released from the site; and

(6) Potentially responsible parties.

Further, an examination has been conducted to determine whether the damages:

(i) Resulting from the discharge or release were specifically identified as an irreversible and irretrievable commitment of natural resources in an environmental impact statement or other comparable environmental analysis, that the decision to grant the permit or license authorizes such commitment of natural resources, and that the facility or project was otherwise operating within the terms of its permit or license, so long as, in the case of damages to an Indian tribe occurring pursuant to a Federal permit or license, the issuance of that permit or license was not inconsistent with the fiduciary duty of the United States with respect to such Indian tribe; or

(ii) And the release of a hazardous substance from which such damages resulted have occurred wholly before enactment of CERCLA; or

(iii) Resulted from the application of a pesticide product registered under the Federal Insecticide, Fungicide, and Rodenticide Act 7 U.S.C. 135-135K; or

(iv) Resulted from any other federally permitted release, as defined in section 101(10) of CERCLA; or

(v) Resulted from the release or threatened release of recycled oil from a service station dealer described in section 107(a)(3) or (4) of CERCLA if such recycled oil is not mixed with any other hazardous substance and is stored, treated, transported or otherwise managed in compliance with regulations or standards promulgated pursuant to section 3014 of the

Solid Waste Disposal Act and other applicable authorities.

The damages do not represent an irreversible and irretrievable commitment of natural resources as defined above, and did not result from any of the above. Moreover, the exceptions to CERCLA liability as provided in CERCLA 107(f), (i), and (j) and CERCLA 114(c) do not appear to apply.

**C. Preliminary Identification of Resources Potentially at Risk**

A preliminary identification of potential exposure pathways has been undertaken to facilitate identification of resources at risk. The factors considered in that determination include, as appropriate, the circumstances of the discharge or release, the characteristics of the terrain or body of water involved, and the known physical, chemical, and toxicological properties of the oil or hazardous substance. The pathways considered included, as appropriate, direct contact, surface water, ground water, air, food chains, and particulate movement.

An estimate of areas where exposure or effects may have occurred or are likely to occur has been made. This estimate identifies: areas where it has been or can be observed that the oil or hazardous substance has spread; areas to which the oil or hazardous substance has likely spread through pathways; and areas of indirect effect, where no oil or hazardous substance has spread, but where biological populations may have been affected as a result of animals moving into or through the site.

The area of ground water or surface water that may be or has been exposed has been estimated.

An estimate of the concentrations of oil or a hazardous substance in those areas of potential exposure has been developed.

Based upon the estimate of the areas of potential exposure, and the estimate of concentrations in those areas, natural resources that are potentially affected by the discharge or release have been identified. New York State has responsibility and authority to assert Trusteeship for those natural resources. This preliminary identification may be used to direct further investigations, but it is not intended to preclude consideration of other resources later found to be affected.

A preliminary estimate has been developed, based on information readily available from resource managers, of the services provided by the resources identified as potentially

affected. This estimate will be used in determining the resources for which further assessment efforts continue to be justified.

## II. SUMMARY OF PREASSESSMENT SCREEN

### A. Hazardous Substances Released

The following substances are those which have been or are suspected to have been released into the Onondaga Lake System:

1. Mercury
2. Chlorinated Benzenes
3. Polynuclear Aromatic Hydrocarbons (PAHs)
4. Benzene, Toluene & Xylenes (BTX)
5. Ammonia
6. Calcium and Calcium salts
7. Other ionic wastes

With the exception of calcium, calcium salts and other ionic wastes, these are hazardous substances as that term is defined by Section 101(14) of CERCLA and are listed as toxic pollutants pursuant to 33 U.S.C. § 1317(a) and 40 CFR § 401.15. Calcium, calcium salts and other ionic wastes are not designated as hazardous substances; however, these substances have been released into the Onondaga Lake system and have caused injury to the natural resources therein.

### B. Properties of Substances

1. **Mercury.** Mercury is an element, and one of the heavy metals. As an element, it cannot be broken down or degraded; however, environmental processes convert elemental mercury into methyl mercury. Methyl mercury accumulates in tissue, is readily absorbed via the intestines, and is the most toxic form of mercury.

Mercury has severe toxic effects upon birds and mammals, including humans. In mammals, mercury affects the liver, kidneys, brain and blood causing impairment of sensory, visual and auditory acuity as well as kidney damage, central nervous system damage, mental derangement, coma and death. Often the onset of symptoms lags behind the period of exposure by periods of time from weeks to years in length.

2. **Chlorinated Benzenes.** Chlorinated benzenes are a group of compounds in which chlorine has replaced one or more hydrogens attached to a benzene ring. There are 12

chlorinated benzenes, and their properties vary somewhat with degree of chlorination. Chlorinated benzenes are not very soluble in water and they accumulate in tissue.

Toxic effects associated with chlorinated benzenes in mammals include damage to liver and kidneys as well as central nervous system depression. Chlorinated benzenes have also been shown to affect egg hatching and embryo viability in fish.

**3. Polynuclear Aromatic Hydrocarbons (PAHs).** PAHs are compounds composed of fused benzene rings which exhibit a wide range of physical properties. PAHs of different molecular weight vary substantially in their behavior and distribution, and in their biological effects. PAHs may degrade extremely slowly in aquatic sediments and may persist indefinitely in anoxic sediments. Though they may be metabolized, PAHs exhibit high lipid solubility and may accumulate in tissue.

PAHs have shown carcinogenic, mutagenic and teratogenic effects in a wide variety of organisms including fish and other aquatic life, amphibians, birds and mammals. PAHs have been shown to decrease embryonic growth and cause abnormalities in birds, and cause liver neoplasia in fish. In mammals, PAHs cause hepatic dysfunction and other toxic effects. One PAH (benzo-a-pyrene) has been classified as a carcinogen, while six others have been classified as probable human carcinogens.

**4. Benzene, Toluene and Xylenes (BTX).** BTX compounds are often discussed together because they have similar structures and properties. BTX compounds are moderately water soluble, highly volatile, and only slightly bioaccumulated.

Benzene is classified as a carcinogen, while toluene and xylenes are considered noncarcinogenic. All BTX compounds cause hepatotoxicity and central nervous system damage in mammals.

**5. Ammonia.** Ammonia exists in the aquatic environment as both unionized ammonia and the ammonium ion. In air, ammonia is a human eye and lung irritant. Chronic toxic effects upon fish include reduction in hatching success and growth rate as well as pathological changes in organ tissues. Acute toxic effects include loss of equilibrium, increased respiration, and hyperexcitability.

**6. Calcium, Calcium Salts and other ionic wastes.** Solvay Process Waste, composed in part of calcium, calcium salts, and other ionic wastes, was deposited over the years on lands adjacent to Onondaga Lake, including approximately

1400 acres of Solvay Waste Beds near the Allied-Signal facilities, and were also discharged directly to the Lake.

Calcium, calcium salts and other ionic wastes, while not hazardous or toxic substances, have had deleterious effects upon the Onondaga Lake System. These substances are freely soluble in water, dissociating into their component ions. Enrichment of the water in Onondaga Lake with these substances has resulted in disruption of the normal lake processes. This has caused the Lake to be permanently stratified, saltier, darker, warmer and less oxidic than natural conditions, resulting in the loss of habitat for cold water fish and other biota. Also, a rare form of calcium precipitate called oncolites has been created in the sediments of Onondaga Lake. These gravelly concretions are unsuitable for the rooting of aquatic plants, which has resulted in the loss of fish spawning habitat.

### **C. Probable Pathways**

The following are probable pathways of transport for the substances listed in II. A. above to the areas of exposure discussed in II. D.

#### **1. Industrial waste water discharge.**

a) Industrial waste water discharges from two chemical manufacturing plants (Bridge Street and Willis Avenue) have discharged mercury, calcium and calcium salts, and other ionic wastes directly into the Onondaga Lake System. Between 1947 and 1970, Allied-Signal discharged an estimated 165,000 pounds of mercury in an aqueous waste effluent into Geddes Brook, Ninemile Creek, and directly into Onondaga Lake itself via a discharge known as the "West Flume".

b) Also, via the same discharges, between 1882 and 1986 significant quantities of ammonia, calcium, calcium salts, and other ionic wastes were discharged into the Onondaga Lake System.

#### **2. Groundwater.**

a) Lagoons containing wastes from the production of chlorinated benzenes were created on the shore of Onondaga Lake near the Allied-Signal Willis Avenue Plant. These lagoons presently contain approximately 100 million gallons of waste. The groundwater below these lagoons has been shown to contain benzene, toluene, xylenes, chlorinated benzenes, and PAHs, which

are believed to be discharged via the groundwater into Onondaga Lake.

b) Groundwater below approximately 1400 acres of Solvay waste beds contains elevated concentrations of calcium, calcium salts and other ionic wastes. It is estimated that significant quantities of calcium, calcium salts and other ionic wastes are discharged via groundwater from these waste beds into the Onondaga Lake System.

c) The groundwater beneath the Willis Avenue site contains elevated levels and free product of benzene and chlorobenzenes, which are believed to be discharged via groundwater to Onondaga Lake.

d) The groundwater beneath the Bridge Street Plant contains elevated levels of mercury. This groundwater discharges to Geddes Brook and Ninemile Creek, which discharges into Onondaga Lake.

### **3. Surface Water Runoff.**

As noted above, extensive areas of wastes exist on land adjacent to the Onondaga Lake system. Calcium, calcium salts and other ionic wastes are discharged via surface water runoff from the waste beds to Geddes Brook, Ninemile Creek and Onondaga Lake.

## **D. Areas of Exposure**

The following areas, known collectively as the Onondaga Lake System, are those into which significant quantities of mercury and/or other hazardous substances identified in II. A. above have been released, or those into which significant quantities of calcium, calcium salts, and/or other ionic wastes have been released, or both. The Trustee believes that New York's trust natural resources within these areas have been injured. This list represents those areas which have been identified at the present time, and may not be a complete and exhaustive listing of all impacted areas. The Remedial Investigation/Feasibility Study (RI/FS) now being performed, as well as other studies, may indicate additional areas of exposure not presently identified.

1. **Onondaga Lake.** This area includes the surface waters, sediments, submerged lands, associated wetlands and biota of Onondaga Lake. High concentrations of mercury are found in the water, sediments and fish of Onondaga Lake. Chlorinated benzenes, BTX compounds, and PAHs are all present in the sediments of Onondaga Lake. Benzene and chlorinated benzenes are present in the fish of Onondaga Lake. Ammonia, calcium, calcium salts and

other ionic wastes are present in elevated concentrations in the water and sediments of Onondaga Lake.

**2. Ninemile Creek.** This area includes the surface waters, sediments, submerged lands, associated wetlands, and biota of Ninemile Creek from the Amboy dam to the mouth of the Creek, a reach of approximately 6.5 Km. Elevated concentrations of mercury are found in the water, sediment and fish of Ninemile Creek. Elevated concentrations of calcium, calcium salts and other ionic wastes are present in the water and sediment of Ninemile Creek.

**3. Geddes Brook.** This area includes the water, sediments, submerged lands, wetlands and biota of Geddes Brook through its entire reach, from its inception to its confluence with Ninemile Creek. Elevated concentrations of mercury are found in the sediment of Geddes Brook, and elevated concentrations of mercury are found in the water of Geddes Brook. Elevated concentrations of calcium, calcium salts and other ionic wastes are found in the sediments and water of Geddes Brook.

**4. Groundwater resources.** This area includes potentially impacted groundwater beneath the Allied-Signal Waste Beds, the Bridge Street and Willis Avenue facilities, and the Semet Tar Beds. Groundwater beneath the Waste Beds contains elevated concentrations of calcium, calcium salts and other ionic wastes. The groundwater beneath the Semet Tar Beds contains elevated concentrations of chlorinated benzenes, PAHs, and BTX compounds. Groundwater beneath the Bridge Street facility contains elevated levels of mercury.

#### **E. Affected Services**

Identification of possible services provided directly or indirectly by natural resources is a key component of the natural resource damages assessment process. Once the services normally provided by the injured resource(s) (baseline services) is identified, it can be determined whether a diminution or total loss of services has resulted from the release. A reduction or loss of services may then be assessed a monetary value or "damages" which the public has suffered and which is recoverable from the responsible party(s).

The list of potentially affected services below is included in this Preassessment Screen at the recommendation of Department of Interior proposed regulations [40 CFR § 11.25]. Inclusion of this information in no way implies that the list is complete and it is not an attempt to limit

possible uses of the natural resources specified in this or subsequent studies. This preliminary list does not prohibit New York State or any co-Trustees from incorporating additional services as the natural resource damage assessment process progresses.

Services in the Onondaga Lake system are those provided directly or indirectly by potentially affected natural resources listed in this document. Principally, these include fisheries, surface waters, groundwaters and sediments, among others. Included among the many services provided is:

- 1) the provision of habitat, food and other needs of biological resources in the Lake system;
- 2) active and passive recreation;
- 3) other services related to use of the Lake system by humans including businesses, restaurants, fishing boats/guides, marinas, etc.;
- 4) flood control, ground water recharge, water supply and purification.

#### **F. Suspected Sources**

**1. Mercury.** Allied-Signal, Inc. operated plants which used mercury in the production of chlorine from 1947 to 1970, discharging the waste from this process directly into the Onondaga Lake System. An estimated 165,000 pounds of mercury was discharged during this period. Over the same period, spillage or on land disposal of mercury resulted in contamination of soil and groundwater at the Bridge Street plant. Groundwater at the Bridge Street Plant remains contaminated with mercury, which continues to be discharged to Geddes Brook, Ninemile Creek and Onondaga Lake.

**2. Chlorinated Benzenes.** Allied-Signal, Inc. operated a chlorinated benzene manufacturing plant at the Willis Avenue site from 1918 until 1977. During that period, waste streams from the procedures which contained chlorinated benzenes were discharged directly into Onondaga Lake via an outlet known as the "East Flume", as well as into holding ponds on the shore of the Lake, known as the Semet Residue Ponds. These ponds presently contain approximately 100 million gallons of chlorinated benzene-containing waste which continues to contaminate groundwater, which discharges to the lake.

**3. PAHs.** Allied-Signal, Inc. operated a large coke facility at the Willis Avenue plant site from 1892-1924. Major byproducts of coking are PAHs, many of which were disposed of directly into the Lake or into the Semet Residue

Ponds and which continue to be discharged into the environment.

**4. BTX.** Between 1892 and 1924, Allied-Signal, Inc. operated a benzol plant at the Willis Avenue plant site. The benzol plant took light oil from the coking process and separated out various components by distillation. The still bottoms and sludges from this process, which contained benzene, toluene and xylenes, were sent to the Semet Residue Ponds. Groundwater beneath the residue ponds is contaminated with BTX compounds.

**5. Ammonia.** Ammonia was either used in or generated by several different processes which occurred at the Allied-Signal facilities. Ammonia was a recoverable by-product of coke production, used as a catalyst in the chlor-alkali cells, and was actively produced for use in the manufacture of various salts, including ammonium chloride and ammonium bicarbonate. Process waste streams, including filter cakes and aqueous waste, were discharged directly into Onondaga Lake as well as being deposited on land adjacent to the Lake. This practice contributed to the production of the roughly 1400 acres of Solvay Waste Beds which are adjacent to the Lake.

**6. Calcium, calcium salts, and other ionic wastes.** For over 100 years, from 1884 to 1986, Allied-Signal, Inc. operated soda ash facilities adjacent to Onondaga Lake and used the Lake as a receptacle for the wastes from this process. For every pound of soda ash produced, one half pound of ionic waste was generated. This waste stream consisted of calcium chloride, calcium sulfate, unreacted lime, and other ionic components. The waste stream was originally sent directly into the Lake. In the 1920s, Allied-Signal began land disposal of the wastes, potentially affecting as many as 2000 acres around the lake. Land disposal resulted in the construction of the estimated 1400 acres of Solvay Waste Beds near the Allied-Signal facilities. The waste beds continue to contribute calcium, calcium salts and other ionic wastes to the lake via surface runoff and groundwater.