Interim Remedial Measure
Wastebeds 1-8 Site
Subsite of the Onondaga Lake Site
Onondaga County, New York

December 2010

PURPOSE OF THIS DOCUMENT

This Proposed Response Action Document (PRAD) describes the preferred response action considered for controlling contaminated groundwater and seeps, addressing contaminated sediments, stabilizing the shoreline along Onondaga Lake, and addressing contaminated soils within the lakeshore area of the Solvay Wastebeds 1-8 Site, a subsite of the Onondaga Lake site. This document identifies the preferred response action to address each of these areas/media with the rationale for this preference.

This document was developed by the New York State Department of Environmental Conservation (NYSDEC) and the U.S. Environmental Protection Agency (EPA). NYSDEC and EPA are issuing this document as part of its public participation responsibilities under Section 113(k)(2)(A) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The response actions summarized here, which will be performed as an Interim Remedial Measure (IRM) under the State remedial program[1], are described in more detail in the *Focused Feasibility Study (FFS), Wastebeds 1 through 8*, O'Brien and Gere, June 2010 (O'Brien and Gere, 2010)[2]. NYSDEC and EPA encourage the public to review the FFS to gain a more comprehensive understanding of the site and the proposed response action.

This document is being provided as a supplement to the FFS to inform the public of NYSDEC and EPA's preferred response action and to solicit public comments pertaining to the preferred response action, as well as the other response actions that were evaluated in the FFS.

NYSDEC and EPA's preferred response action consists of constructing a groundwater collection trench system along the eastern lakeshore area to control the contaminated shallow and intermediate groundwater that is moving toward the lake, achieving hydraulic control of groundwater within the former Ninemile Creek Channel Sand and Gravel (NMCSG) unit, constructing a groundwater collection trench to intercept the groundwater that seeps out along the face of the wastebeds, removing contaminated sediment from Ditch A, placing a soil cover over the remaining eastern lakeshore soils and placing gravel and vegetation along the shoreline to stabilize the remaining wastebed material found along the lake shore. This response action would be coordinated with the construction of 7.7 acres of compensatory mitigation wetlands

[1] An IRM is an activity that is necessary to address either emergency or non-emergency site conditions, which in the short-term, need to be undertaken to prevent, mitigate or remedy environmental damage or the consequences of environmental damage attributable to a site. An IRM is equivalent to a non-time critical removal under the CERCLA removal program.

[2] The FFS provides the supporting information of an Engineering Evaluation/Cost Analysis, which is a requirement for non-time critical removals under the CERCLA removal program.

proposed in the Onondaga Lake Habitat Plan, Parsons, 2009[3]. These wetlands would include 2.3 acres of lake connected wetlands. The primary purpose of this response is to facilitate the cleanup of Onondaga Lake and Ninemile Creek via elimination or control of Wastebed 1-8 contaminant sources.

The response action described in this document is the preferred response action for the site. Changes to the preferred response action or a change from the preferred response action to another response action may be made if public comments or additional data indicate that such a change will result in a more appropriate response action. The final decision regarding the selected response action will be made after NYSDEC and EPA have taken into consideration all public comments. NYSDEC and EPA are soliciting public comment on all of the response actions considered in the FFS because NYSDEC and EPA may select a response action other than the preferred response action. The final decision regarding the selected response action will be documented in a Response Action Document (RAD), the document that will formalize the selection of the response action.

COMMUNITY ROLE IN THE SELECTION PROCESS

NYSDEC and EPA rely on public input to ensure that the concerns of the community are considered in selecting an effective response action for each Superfund site. To this end, the FFS and this document have been made available to the public for a public comment period which begins on December 27, 2010 and concludes on February 10, 2010.

A public availability session and public meeting will be held during the public comment period at the Martha Eddy Room in the Art and Home Center at the New York State Fairgrounds on January 13, 2011. The public meeting will be held at 7:00 PM and open house from 6:00 – 7:00 PM to answer questions on the response actions presented in this PRAD, further elaborate on the reasons for recommending the preferred response action, and to receive public comments. In addition, the PRAD for the Wastebed B/Harbor Brook site IRM will also be discussed.

Comments received during the comment period will be incorporated into the RAD.

The FFS Report and the Focused Remedial Investigation Data Summary Report, which contain the information upon which the selection of the response action will be based, are available at the following locations:

Onondaga County Public Library
Syracuse Branch at the Galleries
447 South Salina Street
Syracuse, NY 13202-2494
Hours: M, Th, F, Sat, 9:00 a.m. – 5:00 p.m.; Tu, W, 9:00 a.m. – 8:30 p.m.
Telephone: (315) 435-1800

Atlantic States Legal Foundation
658 West Onondaga Street
Syracuse, NY 13204-3711
(315) 475-1170
Please call for hours of availability

[3] Impacts associated with the installation of a portion of the barrier wall along the Willis Avenue site, another Onondaga Lake subsite, resulted in the loss of approximately 2.3 acres of lake surface area. Wetland areas adjacent to the lake on the Wastebed B/Harbor Brook site, also an Onondaga Lake subsite, will also be affected by the installation of a barrier wall and other remediation activities. These impacts will be compensated for by the creation of a wetland/open water complex on the low lying portion of Wastebeds 1-8. The compensatory mitigation will consist of creating aquatic habitat and wetlands adjacent to the lake. The current design provides for 5.4 acres of inland wetland and 2.3 acres of lake connected wetlands.

Solvay Public Library
615 Woods Road
Solvay, NY 13209
Phone: (315) 468-2441

NYSDEC Central Office
625 Broadway
Albany, NY 12233-7013
(518) 402-9676
Hours: M – F 8:30 a.m. – 4:45 p.m.
Please call for an appointment

NYSDEC Region 7 Office
615 Erie Boulevard West
Syracuse, NY 13204-2400
(315) 426-7400
Hours: M – F 8:30 a.m. – 4:45 p.m.
Please call for an appointment

Written comments should be addressed to:

Mr. Tracy A. Smith
Wastebeds 1-8 IRM Public Comments
New York State Department of Environmental Conservation
625 Broadway, 12th Floor
Albany, New York 12233-7013
E-mail: DERweb@gw.dec.state.ny.us
(Indicate "Wastebeds 1-8 IRM Comments" in the subject line of the e-mail)

SCOPE AND ROLE OF ACTION

Since many Superfund sites are complex and have multiple contamination problems and/or areas, they are often divided into several operable units to manage the site-wide response actions. Section 300.5 of the NCP defines an operable unit as "a discrete action that comprises an incremental step toward comprehensively addressing site problems." This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site. Operable units may address geographical portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site."

On June 23, 1989, the Onondaga Lake site was added to the New York State Registry of Inactive Hazardous Waste disposal sites. On December 16, 1994, Onondaga Lake and its tributaries and the upland hazardous waste sites which have contributed or are contributing contamination to the lake (sub-sites) were added to EPA's National Priorities List (NPL). NYSDEC and EPA have, to date, organized the work for the Onondaga Lake NPL site into 11 subsites. These subsites are also considered by EPA to be operable units of the NPL site. The Solvay Wastebeds 1-8 site is one of the sites near the lake that is considered by the EPA and NYSDEC as a subsite. This PRAD focuses only on the Solvay Wastebeds 1-8 site. The IRM for the Wastebeds 1-8 site is intended to be consistent with, and an integral part of, the final site-wide remedy.

Status of Onondaga Lake NPL Subsites

Onondaga Lake Bottom Subsite

In July 2005, NYSDEC and EPA issued a Record of Decision (ROD) for the Onondaga Lake Bottom subsite of the Onondaga Lake NPL site. The selected remedy includes dredging an estimated 2.65 million cubic yards of contaminated sediments and isolation capping of an estimated 425 acres in the littoral zone (water depths ranging from 0 to 30 ft), thin-layer capping of an estimated 154 acres in the profundal zone (water depths exceeding 30 ft), and monitored natural recovery (MNR) in the profundal zone. It is anticipated that the most highly contaminated materials would be treated and/or disposed of off-site. The balance of the dredged sediment would be placed in the Sediment Consolidation Area (SCA) at Wastebed 13. In January 2007, Honeywell entered into a consent decree with the State of New York whereby Honeywell committed to implement the remedy at the Onondaga Lake Bottom subsite. Extensive pre-design investigations commenced in September 2005 and are ongoing, along with remedial design activities. Dredging in the lake is scheduled to begin in 2012.

Other Subsites

In September 2000, NYSDEC issued a ROD for the LCP Bridge Street Subsite. In March 2002, Honeywell entered into an administrative consent order whereby Honeywell committed to implement the remedy. The remediation was substantially completed in 2007. Remedial construction included removal of contaminated sediments from the West Flume, on-Site ditches, and wetlands; restoration of wetlands; installation of a low-permeability cutoff wall around the Site; installation of an interim low-permeability cap; and capture of contaminated groundwater inside the cutoff wall.

The Ley Creek PCB Dredgings Subsite ROD was issued in 1997 and remedial construction activities were completed in 2001. Remedial activities included: removal of soil containing levels of PCBs greater than 50 ppm; construction of a low permeability/soil cover; and construction of a wetland buffer.

The Semet Residue Ponds Subsite ROD was issued in 2002. Construction activities associated with a portion (lakeshore barrier wall/collection system for the shallow and intermediate zones) of the groundwater remedy component were completed in 2007. Construction of the remaining portion (groundwater collection system adjacent to Tributary 5A) is underway. NYSDEC and EPA are evaluating a potential modification to the portion of the remedy that addresses the pond residues.

The Town of Salina Landfill Subsite ROD was issued in March 2007. The ROD called for the capping of two individual landfilled areas. During the ongoing design, it was determined that one of the landfills does not contain significant hazardous waste. In September 2010, NYSDEC and EPA executed a ROD amendment for the excavation and consolidation of the landfilled area located south of Ley Creek into the landfilled area north of Ley Creek prior to capping. Site mobilization for remedial construction commenced on November 29, 2010; the remedy is scheduled for completion in 2013.

RODs for two portions of the Geddes Brook/Ninemile Creek subsite were signed in April and October 2009. The selected remedies include the dredging/excavation and removal of an estimated 120,000 cubic yards of contaminated channel sediments and floodplain soils/sediments over approximately 30 acres. Depending on the location, clean materials, consisting of a habitat layer and, if needed, backfill, will be placed in the dredged/excavated areas. Contaminated sediments and soils removed from the stream and floodplains will be disposed of at either the LCP Bridge Street subsite containment system, which was designed and constructed pursuant to the requirements of a September 2000 ROD, or the SCA, which will be constructed at Wastebed

13 as part of the remediation of the Onondaga Lake Bottom subsite in accordance with the 2005 ROD.

A ROD for the Niagara Mohawk – Hiawatha Boulevard – Syracuse Former MGP subsite was signed on March 31, 2010. The selected remedy calls for contaminated soil in the northeastern portion of the site that could leach contaminants to ground water to be solidified in place and ground water along the northern perimeter of the site to be treated using enhanced bioremediation. The design for the remedy is currently underway and is anticipated to be completed by mid 2012.

In addition to the RI/FS ongoing at the Solvay Wastebeds 1-8 site, RI/FSs are presently being performed at four other subsites: General Motors: Inland Fisher Guide and Ley Creek Deferred Media; Wastebed B/Harbor Brook; Willis Avenue; and Lower Ley Creek. It is anticipated that the RI/FSs for these sites will be completed in the next few years.

SITE BACKGROUND

Site Location, Setting and Operations

The Wastebeds 1-8 site is located in Onondaga County, New York on the southwest side of Onondaga Lake. The area subject to the IRM consists of the mouth of Ditch A, the low lying area adjacent to Onondaga Lake, the "cliff" portion facing to the northwest, and an area adjacent to Ninemile Creek (see Figure 1).

The wastebeds were constructed over a portion of the Geddes marsh, which was reclaimed from Onondaga Lake when the lake was lowered in 1822 (Blasland, Bouck and Lee, 1989). The wastebeds are composed of perimeter dikes that were constructed of wooden piles and bulkheads, or earth, depending on the location. These dikes were used to contain waste materials (primarily Solvay waste) which consist largely of calcium carbonate, gypsum, sodium chloride (salt), and calcium chloride. These wastes were generated at the former Solvay Process Company Main Plant as part of soda ash production using the Solvay Process method. Soda ash production began at the plant in 1884 and continued until 1986.

The Solvay Process Company operated a coke plant from 1892 through 1923. A phenol production plant operated from 1942 to 1946 (PTI 1992). Compounds associated with these and other operations may have been disposed of in Wastebeds 1-8 with the Solvay waste slurry or by alternate means.

Wastebeds 1-6 were in use before 1926 and may have been in use by 1916 or earlier, although no definitive construction dates or disposal records are available. Ninemile Creek was rerouted to the north to permit the construction of Wastebeds 5 and 6. Wastebeds 7 and 8 were not utilized until after 1939 and remained in use until 1943 (BBL, 1989). The location of each wastebed is presented in Figure 2.

The area encompassed by the site was deeded to the people of New York State in 1953 and is currently owned by the State of New York and Onondaga County (C&S, 1986). More than one mile of Interstate Route 690 is located on the southwestern portion of the site. In addition, approximately 80 acres of the Site are currently used by the State of New York for State Fair parking. The parcel owned by Onondaga County is required by the deed to be maintained as parkland.

Summary of Remedial Investigations

Based on RI data collected from 2005 through 2009, the following chemical parameters of interest (CPOIs) were identified for the Site: benzene, toluene, ethylbenzene, and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), phenols; and various inorganics. The RI results for the media which are the subject of this IRM are summarized below and further discussed in Section 2.4 of the FFS.[4]

Shallow and Intermediate Groundwater Discharge to Onondaga Lake

BTEX, naphthalene, and phenol were observed in shallow and intermediate groundwater discharging from the Solvay waste and marl units along the eastern shore. New York State groundwater standards for these compounds are benzene - 1 microgram per liter (µg/L), toluene, ethylbenzene and xylene (TEX) - 5 µg/L, naphthalene - 10 µg/L, and phenol - 1 µg/L. Data from groundwater monitoring wells indicate that the highest BTEX, naphthalene, and phenol concentrations in the shallow groundwater were detected along the eastern shore. Benzene concentrations in shallow groundwater along the eastern shore ranged from 130 µg/L to 9,600 µg/L. Benzene concentrations in shallow groundwater on the remainder of the Site ranged from less than the detection limit to 120 µg/L. The highest concentrations of BTEX in the intermediate groundwater were detected inland and upgradient of the eastern shore, where concentrations of benzene and TEX ranged from 38 µg/L to 40,000 µg/L, and 4,250 µg/L to 39,920 µg/L, respectively. Concentrations of benzene in the intermediate groundwater on the eastern shore of the Site ranged from less than the detection limit to 6,600 µg/L, with all but one of these wells exhibiting concentrations of 310 µg/L or less. Concentrations of TEX in intermediate groundwater on the eastern shore of the Site ranged from less than detection limits to 49.5 µg/L.

Former Ninemile Creek Channel Sand and Gravel Unit (NMCSG Unit)

The NMCSG unit is located beneath the Solvay waste in beds 5 & 6. Primarily, BTEX and phenol are present in the groundwater in the former NMCSG unit at levels that exceed NYS groundwater standards. This PRAD includes elements to address discharge of the former NMCSG unit groundwater to Onondaga Lake and NMC. The extent of these elements may change during the design based upon further evaluation of the NMCSG unit. It also may be necessary to achieve hydraulic control of groundwater via a trench system in the same area along the western shoreline of the site to minimize the upwelling of groundwater through the cap being designed for the sediment in Onondaga Lake (SMU4).

Seep Discharge to Ninemile Creek (NMC) and Onondaga Lake

Seeps have been observed along NMC and the Onondaga Lake shore. The analytical results for samples collected from several seep locations show that CPOIs, including BTEX, PAHs, and naphthalene, were detected in several seeps along the eastern shore, while naphthalene was detected along the northern shore. No CPOIs were detected in the one sample collected along NMC. However, calcite precipitation and erosion of Solvay waste associated with seep flow also present potential impacts to the Onondaga Lake and NMC remedies.

The majority of the eastern shore and NMC shore seeps is aligned near the toe of the slope at about the ground elevation of 370 ft, and is located primarily along a stretch of approximately 4,600 ft at the northwestern end of the eastern shore, and along a stretch of approximately 1,800 ft along the NMC shore.

Surface Water Erosion of Solvay Waste at the Eastern Shore to Onondaga Lake

The surface of the eastern shore nearest to Onondaga Lake is characterized by low lying terrain consisting of Solvay waste, exposed in some areas and covered with varying amounts of vegetation in other areas. Several locations along the eastern shore exhibit erosion of Solvay waste that appears to occur due to surface water flow. The analytical results of samples collected during the RI indicated the presence of organic CPOIs in Solvay waste on the eastern

[4] The draft RI Report is currently being revised.

shore. Total BTEX concentrations are generally low at the surface, increasing with depth. Specifically, total BTEX concentrations ranged from less than detection limits to 1,548 micrograms per kilogram (µg/kg) in the 0 to 1-ft interval for soil samples, with most sample concentrations in the 0 to-1-ft interval being less than 200 µg/kg. Most total BTEX concentrations in the 2 to 6-ft interval exceeded 200 µg/kg. Total BTEX concentrations in soil samples from the 6 to 10-ft interval ranged from less than detection to 103,300 µg/kg, with most detected concentrations above 200 µg/kg. The relatively higher concentrations present at depth are present across the eastern shore over approximately 27 acres. The depth of Solvay waste is approximately 6 to 15 ft along the eastern shore.

Wind/Wave Erosion of Solvay Waste along the Surf Zone to Onondaga Lake

Solvay waste is exposed along the surf zone of the eastern and northern shores at the Site.[5] In areas where the shore is shallow sloped, wind and lake wave action result in erosion of exposed Solvay waste into the lake, while in areas where the shore is steep, such as along portions of the northern shore, lake wave action results in the undermining of the steep embankments.

Ditch A Discharge into NMC and Onondaga Lake

Ditch A discharges to NMC at its northwestern end (upper reach) and to Onondaga Lake at its southeastern end (lower reach). The upper and lower reaches of Ditch A that discharge to NMC and Onondaga Lake, respectively, are being addressed as part of this IRM. CPOI detections in the surface water in the upper reach of Ditch A consist, primarily, of phenol, PAHs and naphthalene, whereas the CPOIs in ditch substrate consist, primarily, of PAHs. The surface water CPOI detections within Ditch A near the outlet to Onondaga Lake consist, primarily, of BTEX and naphthalene, whereas the CPOIs in ditch substrate in this area consist, primarily, of PAHs. Surface water concentrations may be reflective of groundwater discharge to Ditch A. The upper portion of Ditch A discharges to NMC through a drainage pipe, seep water has also been observed to discharge to NMC via this drainage pipe.

SUMMARY OF SITE RISKS

A Streamlined Risk Evaluation (SRE) was prepared for this portion of the Wastebeds 1-8 site and is included in the FFS. The objective of the SRE was to provide a concise evaluation of potential risks to human and ecological receptors, assuming no removal or clean-up actions are taken at the Site, as it relates to exposure to the contaminated Site media being addressed by this IRM and the contribution these media may have to unacceptable risks in Onondaga Lake and NMC. A summary of the human health and ecological evaluations are provided below.

Human Health Evaluation

The intended future use of the portion of the site affected by the IRM is for habitat enhancements, including wetland improvements. In addition, the area may be accessed by recreational users of the bike trail and Onondaga Lake (e.g., biking along a bike trail). Although unlikely, it is possible that the groundwater could be used as a drinking water source, which would impact a residential receptor. Also, potentially, a future construction worker may work in the area. A complete baseline human health risk assessment (HHRA) that provides a detailed, Site-specific evaluation of the risks associated with the entire Wastebeds 1-8 Site is being finalized. That Site-wide HHRA considered a number of current and future exposure scenarios for different receptors, including a trespasser, utility worker, commercial worker, all-terrain-vehicle (ATV) rider, construction worker, state fair attendee, ditch maintenance worker, fisherperson, and resident. Of those receptors, only the older child trespasser, construction worker, ATV rider, fisherperson, ditch maintenance worker and resident are expected to come in contact with the contaminated media being addressed by this IRM.

[5] The surf zone includes the region of breaking surface waves up to the shoreline.

The SRE provides an assessment of the potential threats to human health and the environment prior to any response action being taken by comparing the maximum concentrations of contaminants in the Site media that will be addressed by the IRM to health-protective screening criteria that are appropriate for the receptors who would be expected to come in contact with this material to establish chemicals of potential concern (COPCs). The SRE then compared the COPCs to the COCs identified in the HHRA for Geddes Brook/NMC and the Onondaga Lake Bottom Subsite to determine which constituents from Wastebeds 1-8 may be contributing to unacceptable risk and hazard in the Lake and NMC.

Based on the screening, there is a potential threat to human health and the environment from exposure to multiple COPCs found in the eastern shore groundwater and seeps, NMC seeps, surface Solvay waste along the eastern shore, Solvay waste substrate and sediment in the lower reach of Ditch A, and surface water in the lower reach of Ditch A. Some of the COPCs identified in the SRE were also identified as risk drivers in the lake and Geddes Brook/NMC based on consumption of fish. Specifically, the SRE identified arsenic as a COPC for groundwater, Solvay waste, and seep water. Mercury and PCBs were also identified as COPCs for groundwater and Solvay waste. The HHRA for the Lake Bottom subsite determined that arsenic, mercury (as methyl mercury), and PCBs were primary risk drivers associated with the consumption of fish from the lake. For the lake, EPA acceptable risk thresholds were exceeded for both potential cancer and non-cancer risks (i.e. potential cancer risks exceed the 10^{-4} to 10^{-6} risk range and potential non-cancer risks exceeded a hazard index [HI] of 1). The HHRA for Geddes Brook/NMC determined that mercury (as methyl mercury) and PCBs were primary risk drivers associated with the consumption of fish from Geddes Brook/NMC. For Geddes Brook/NMC, EPA acceptable risk thresholds were exceeded for non-cancer risks (i.e. potential non-cancer risks exceeded a HI of 1). The IRM is expected to reduce impacts to the Lake Bottom and Ninemile Creek (NMC) from contaminants that presented unacceptable risk and hazard in the risk assessments for those subsites.

Ecological Evaluation

In a manner similar to how potential human health threats from the site were evaluated, the SRE compared the chemicals of potential ecological concern (COPECs) to the COCs identified in the baseline ecological risk assessment (BERA) for Geddes Brook/NMC and Onondaga Lake Bottom Subsites to determine which constituents from Wastebeds 1-8 may be contributing to unacceptable hazards to ecological receptors in the Lake and NMC. Copper, lead, mercury, and zinc levels in site groundwater which discharges to Onondaga Lake exceeded their respective screening criteria by more than two orders of magnitude. These COPECs were identified as surface water COCs in the Onondaga Lake BERA. Mercury levels in site groundwater which discharges to Ninemile Creek exceeded screening criteria by more than two orders of magnitude. Mercury was also identified as a surface water COC in the Geddes Brook/Ninemile Creek BERA.

In the top 2 feet of Solvay waste on the lake shoreline and in the surf zone, chromium exceeded its screening criterion by more than two orders of magnitude. Chromium was identified as a COC in sediment in the Onondaga Lake BERA.

Lead in seep water which discharges towards Ninemile Creek was at a level which is approximately 6 times higher than its screening criterion. Lead was also identified as a COC in the Geddes/Brook Ninemile Creek BERA.

Conclusions

The identification of COPCs and COPECs indicate that there is a potential threat to human health and the environment. Many of these COPCs and COPECs are also identified as COCs in the Onondaga Lake HHRA and BERA. Contaminated Solvay waste, groundwater and surface water from the Site have the potential to directly impact sediment, surface water and fish in the lake.

Therefore, response actions at the portion of the Site being evaluated by the FFS are warranted based on the following factors acknowledged in 40 CFR Section 300.415 (b)(2):

- Potential threat of exposure to nearby human populations and ecological receptors from COPCs and COPECs, respectively; and
- Potential contamination of drinking water supplies/groundwater or sensitive ecosystems.

RESPONSE ACTION OBJECTIVES

The response action objectives (RAOs) were developed based on the SRE and on potential impact(s) to nearby Sites; specifically, as identified above, the SRE identified that media considered in the FFS pose a potential threat to human health and the environment, based on unacceptable risks identified in the Geddes Brook/Ninemile Creek and Onondaga Lake risk assessments. Specifically, as described above, COPCs and COPECs in shallow and intermediate groundwater discharging to Onondaga Lake, selected seeps having the potential to flow into NMC and Onondaga Lake, surface water erosion of COPCs and COPECs in Solvay waste at the eastern shore, wind/wave erosion of Solvay waste along the surf zone, Solvay waste substrate in the lower reach of Ditch A, and seep discharge from the upper reach of Ditch A have the potential to adversely affect the NMC OU-2 and Onondaga Lake remedies. For these reasons, the RAOs are to mitigate, to the extent necessary and practicable, the following:

- Direct contact with and ingestion of exposed Solvay waste and other contaminated soil along the eastern shore;
- Discharge of NMCSG unit and eastern shore groundwater to Onondaga Lake and NMC;
- Discharge of shallow and intermediate groundwater to Ditch A;
- Direct contact with and discharge of NMC bank seep water, and eastern and northern shore seep water to Onondaga Lake and NMC;
- Erosion of Solvay waste from the eastern shore to Onondaga Lake;
- Erosion of Solvay waste along the surf zone of Onondaga Lake SMU-4 due to wind and wave action;
- Erosion of Solvay waste substrate and sediment from the lower reach of Ditch A to Onondaga Lake; and
- Discharge of seep water from the upper reach of Ditch A to NMC.

IDENTIFICATION, SCREENING, AND EVALUATION OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS

Potentially applicable remedial technology types and process options for each general response action were identified and screened in the FFS. Technologies and process options were screened on the basis of technical implementability. Technical implementability for each identified process option was evaluated with respect to contaminant information, physical characteristics, and areas and volumes of affected media.

The remedial technologies and process options remaining after the initial screening were evaluated further in the FFS according to the criteria of effectiveness, implementability, and cost. The effectiveness criterion included the evaluation of:

- potential effectiveness of the process options in meeting IRM objectives and handling the estimated volumes or areas of media;
- potential effects on human health and the environment during construction and implementation; and
- reliability of the process options for site contaminants and conditions. Based on the evaluation, the more favorable process options of each technology type were chosen as representative process options.

SUMMARY OF RESPONSE ACTIONS

Four response actions were developed by assembling general response actions and representative process options into combinations that address shallow and intermediate groundwater (including the former NMCSG unit groundwater, as necessary) discharge to Onondaga Lake and NMC, seep discharge to NMC and Onondaga Lake, surface water erosion of Solvay waste at the eastern shore, wind/wave erosion of Solvay waste along the surf zone, direct contact with lakeshore soils, and transport of Solvay waste substrate and sediment in the lower reach of Ditch A into Onondaga Lake.

Common Components

Each response action, except for the No Action Response Action, includes the following common components:

- Hydraulic control of the former NMCSG unit;
- Hydraulic control of seeps along NMC and the northern shore;
- Shoreline stabilization of Solvay waste along the Surf Zone;
- Conveyance and treatment of collected water;
- Lower Ditch A excavation/containment; and
- Upper Ditch A pipe rehabilitation.

These components are described in more detail below.

Hydraulic Control of the Former NMCSG Unit Discharge

The groundwater within the NMCSG unit contains elevated levels of benzene, toluene, xylene and phenol. In order to prevent the migration of contaminated groundwater to NMC and/or to Onondaga Lake, groundwater discharging through the former NMCSG unit would be collected using recovery wells, or, if necessary, controlled via a trench system similar to that proposed for the eastern shoreline. At the Onondaga Lake discharge of the NMCSG unit, up to five 4-inch diameter wells would be installed to a depth of approximately 45 feet below ground surface. Well pumps would discharge the recovered groundwater to the eastern shore collection system via High Density Polyethylene (HDPE) piping. The distance of the conveyance piping would be approximately 500 feet. At the NMCSG unit discharge to NMC, two 4-inch diameter wells would be installed to a depth of 75 feet below ground surface. Well pumps would discharge the recovered groundwater to the eastern shore collection system via 500 linear feet of HDPE piping. An estimated flow of 7 gallons per minute (gpm) is anticipated to come from these 7 wells. See Figures 3, 4, and 5 for the approximate location of these wells.

Hydraulic Control of Seeps along the Northern Shore

At various locations, groundwater along the northern shore of the site seeps out along the 370-foot elevation contour. These seeps contain elevated levels of benzene, toluene, xylene, phenol and PAHs which, if not collected, could migrate to Onondaga Lake. Seep collection along the northern shore would address four observed seeps from drainage pipes and two localized areas of groundwater seeps along the northern shore. The observed seeps from the drainage pipes would be eliminated by physically plugging the drainage pipes and abandoning the associated weir boxes. The seeps would be collected through use of a perforated collection pipe embedded in a gravel apron installed at grade in the area of the seeps (see Figure 6). The collection system would be connected to a manhole and pumped to the eastern shore collection system for final conveyance to the treatment plant at Willis Avenue. A geomembrane and vegetative cover would be placed over the collection area to minimize infiltration of surface runoff into the seep collection system.

Hydraulic Control of Seeps along NMC

Seeps have also been observed along the banks of the wastebeds facing NMC. The seeps extend approximately 1,800 feet along the bank. The seeps may contribute to calcite formation and erosion of Solvay waste in the area which could migrate through surface flow to the ponded area (see Figure 2 for location) and/or NMC. To control the seeps, a collection trench would extend northwest from the ponded area for approximately 1,800 linear feet along the 370 ft elevation contour (see Figure 3). A gravel drainage layer would be installed on top of the existing seeps and along, and connected to, the collection trench to capture seeps from varying locations near the 370 ft elevation contour. This drainage layer would be covered with a geomembrane and topsoil and restored with vegetation. An estimated combined volume of 12 gpm could be conveyed from this system. Similar to the NMCSG conveyance system, the collected water would be transported to the eastern shore collection system via HDPE piping.

Shoreline Stabilization of Solvay Waste along the Surf Zone

Shoreline stabilization material would be placed along 1,900 linear feet of the northern shore (the shore bordering Onondaga Lake SMU-4). The shore stabilization would be graded gravel with live fascines, live staking and branch layering that would be placed within the surf zone (approximately at elevation 360 ft to 365 ft.) to stabilize the substrate to reduce resuspension of Solvay waste due to wind and wave action.[6] The graded gravel would improve habitat through stabilization of the shore Solvay waste and promotion of submerged macrophyte growth (see Figure 7). Additionally, live crib walls would be installed along approximately 500 linear ft of the northern shore along Onondaga Lake SMU-4. The live crib wall would be composed of 6-inch square timbers and built to a width of 8 ft and a height of approximately 5.5 ft (see Figure 8). The sides and top of the walls would be vegetated.

Conveyance and Treatment of Collected Water

The water collected from all of the seep collection systems and NMCSG unit collection system would be conveyed to the eastern shore collection system and pumping station situated at the southern end of the eastern shore collection system adjacent to Ditch A. The water would then be conveyed to the treatment plant at Willis Avenue.

Ditch A Sediment Removal and Pipe Rehabilitation

The lower reach of Ditch A (approximately 380 linear feet from the mouth and then inland) would be excavated to remove Solvay waste and contaminated sediment to a minimum depth of 2 feet. Solvay waste and sediment would also be removed from the conveyance pipes beneath Route 690 and beneath the State Fair Parking lot access road. Ditch A would be lined with a low permeability cover/habitat cover to prevent any remaining contaminated substrate from adversely affecting the surface water or habitat. Pipes that convey water from Ditch A to Ninemile Creek at the western end of Ditch A would be rehabilitated to eliminate infiltration of groundwater and or seep water from entering the Ditch and migrating to Ninemile Creek.

[6] Based on the wind/wave analysis, the surf zone (and corresponding wave height) extends to a water depth of approximately 2.5 feet for waves associated with the 10-year storm event, which was the return event selected as the basis of design for defining the treatment area. (Parsons, 2009).

RESPONSE ACTION 1 - No Action

Capital Cost:	$0
Annual Post-Removal Site Control Costs:	$0
Present-Worth Cost:	$0
Construction Time:	0 months

The no action Response Action is required by the NCP and serves as a benchmark for comparison with the other response actions. The no-action response does not include any physical remedial measures that address the contamination problems at the property.

RESPONSE ACTION 2 - Low Permeability Vegetative Cover with Inland Groundwater Collection

Capital Cost	$17,443,000
Annual O & M Cost (1-5 years)	$1,420,900
Periodic O & M Cost (year 5)	$422,500
Total Present-Worth Cost	$23,570,000
Construction Time	2 to 3 years

Response Action 2 would include:

- Hydraulic control along the 370 ft elevation (approximately the toe of the slope) of the eastern shore
- 16.7-acre low permeability vegetative cover along the eastern shore, and the following common components
    - Hydraulic control of the NMCSG unit groundwater;
    - Hydraulic control of selected seeps along the NMC and northern shores;
    - Treatment of collected seep and groundwater;
    - Shore stabilization along the surf zone of SMU-4 of Onondaga lake;
    - Excavation/containment of the Solvay waste and sediment substrate in the lower reach of Ditch A; and
    - Pipe rehabilitation in the upper reach of Ditch A.

In addition to the components described in more detail in the section entitled Common Components above, Response Action 2 would include a combined groundwater and seep collection system, 6,900 feet in length, installed at the 370 ft elevation contour along the eastern shore and a 16.7 acre low permeability vegetative cover on the eastern shore. The groundwater and seep collection system would include an integrated seep and shallow groundwater collection trench, passive wells to collect groundwater from the intermediate unit, collection sumps and conveyance piping, and a monitoring system. Collected seep water and groundwater would be treated at the Willis Avenue Groundwater Treatment Plant (GWTP) and discharged to the Metropolitan Syracuse Wastewater Treatment Plant (METRO). Figure 3 shows the layout of this Response Action.

The trench alignment depicted in this response action would accommodate the compensatory mitigation wetlands proposed for this area of 7.7 acres, including 2.3–acres of connected wetlands. Although envisioned as part of the future use of this area, the wetlands are not part of this response action. Further discussion of these compensatory wetlands is included in the Onondaga Lake Habitat Plan, Parsons, 2009. More specific details of this response action are found in the FFS.

RESPONSE ACTION 3 - Vegetative Cover with Lakeshore Groundwater Collection

Capital Cost	$17,122,000
Annual O & M Cost (1-5 years)	$1,499,000
Periodic O & M Cost (year 5)	$748,000
Total Present-Worth Cost	$23,801,000
Construction Time	2 to 3 years

Response Action 3 would include:

- Hydraulic control, via a collection trench, along the eastern shore;
- A 14.4-acre vegetative cover along the eastern shore, and the following common components:
    - Hydraulic control of the NMCSG unit groundwater;
    - Hydraulic control of selected seeps along the NMC and northern shores;
    - Treatment of collected seep and groundwater;
    - Shore stabilization along the surf zone of SMU-4 of Onondaga lake;
    - Excavation/containment of the Solvay waste and sediment substrate in the lower reach of Ditch A; and
    - Pipe rehabilitation in the upper reach of Ditch A.

In addition to the components described in more detail in the section entitled Common Components above, Response Action 3 would include a seep collection system, 4,200 feet in length, installed at the elevation where seeps are observed (approximately at the 370 ft elevation contour) along the eastern shore and a 6,250 linear ft trench along the lakeshore, with a 850 linear foot trench installed inland, inboard of the connected 2.3 acre wetland proposed for this area in the Onondaga Lake Habitat Plan, Parsons, 2009. A vegetative cover would be placed on the remaining 14.4 acre area along the eastern lakeshore. The groundwater collection system would include a shallow groundwater collection trench, passive wells to collect groundwater from the intermediate unit, collection sumps and conveyance piping, and a monitoring system. A separate seep collection system would be installed along the area where the seeps are present. The seep system would be integrated with the groundwater system in the vicinity of the wetland. Collected seep water and groundwater would be treated at the Willis Avenue GWTP and discharged to METRO. Figure 4 shows the layout of this Response Action.

The trench alignment depicted in this response action would accommodate the compensatory mitigation wetlands proposed for this area of 7.7 acres, including 2.3 acres of connected wetlands. Although envisioned as part of the future use of this area, the wetlands are not part of this response action. Further discussion of these compensatory wetlands is included in the Onondaga Lake Habitat Plan, Parsons, 2009.

RESPONSE ACTION 4 - Excavation with Inland Groundwater Control

Capital Cost	$106,888,000
Annual O & M Cost (1-5 years)	$1,416,000
Periodic O & M Cost (year 5)	$487,500
Total Present-Worth Cost	$113,042,000
Construction Time	6 to 8 years

Response Action 4 would include:

- Hydraulic control along the 370 feet elevation contour of the eastern shore;
- Removal of 27.6 acres of Solvay waste along the eastern shore, and the following common components:
    - Hydraulic control of the NMCSG unit groundwater;
    - Hydraulic control of selected seeps along the NMC and northern shores;
    - Treatment of collected seep and groundwater;
    - Shore stabilization along the surf zone of SMU-4 of Onondaga lake;
    - Excavation/containment of the Solvay waste and sediment substrate in the lower reach of Ditch A; and
    - Pipe rehabilitation in the upper reach of Ditch A.

In addition to the components described in more detail in the section entitled Common Components above, this response action would also include excavation of Solvay waste from the entire eastern shore, an average depth of approximately 10 feet. Approximately 150,000 cubic yards (cy) of the excavated soils would be managed on-site and the remaining 290,000 cy of soil would be disposed off-site. Also, a groundwater and seep collection system, 6,800 feet in length, would be installed along the new eastern shoreline, along the 370 ft contour elevation. The groundwater and seep collection system would include an integrated seep and shallow groundwater collection trench, passive wells to collect groundwater from the intermediate unit, collection sumps and conveyance piping, and a monitoring system. Collected seep water and groundwater would be treated at the Willis Avenue GWTP and discharged to METRO. Figure 5 shows the layout of this Response Action.

The 27.6-acre excavated area would be restored as open water. The area would be restored with 3.5 feet of sand and a small lift of fine gravel, consistent with the Onondaga Lake Habitat Plan requirements for restored open water. The creation of open water via this response action would not be conducive to the intended future ecological land use of the area as diverse wetlands.

EVALUATION OF RESPONSE ACTIONS

To select a response action for a site, NYSDEC and EPA conduct a detailed analysis of the viable response actions. The detailed analysis consists of an assessment of the individual response actions using each of three evaluation criteria (effectiveness, implementability, and cost) and a comparative analysis focusing upon the relative performance of each response action against those criteria.

Effectiveness

This criterion refers to a response action's ability to meet the removal action objectives. The overall assessment of effectiveness is based on a composite of factors, including overall protection of public health and the environment, compliance with Applicable or Relevant and Appropriate Requirements (ARARs), long-term effectiveness and permanence, reduction of toxicity, mobility, and volume through treatment, and short-term effectiveness, as follows:

- Overall protection of human health and the environment assesses whether the response actions are protective of public health and the environment. The evaluation will focus on how each response action achieves adequate protection and describe how the response action will reduce, control, or eliminate risks at the site through the use of treatment, engineering, or institutional controls.

- Compliance with ARARs addresses whether or not a response action would meet all of the applicable or relevant and appropriate requirements (ARARs) of other federal and state environmental statutes. Other federal or state advisories, criteria, or guidance are "To-Be-Considered" (TBC) criteria. TBCs are not required by the NCP, but may be useful in determining what is protective of a site or how to carry out certain actions or requirements.

- Long-Term Effectiveness and Permanence involves the evaluation of the extent and effectiveness of the controls that may be required to manage the risk posed by treatment residuals and/or untreated wastes at the site. This criterion also considers the adequacy and reliability of controls and addresses the need for post-removal site control.

- Reduction of Toxicity, Mobility, and Volume through Treatment includes evaluating the anticipated performance of specific treatment technologies. This evaluation addresses the statutory preference for selecting response actions that employ treatment technologies to permanently and significantly reduce toxicity, mobility, or volume of wastes. Factors that will be considered, as appropriate, include: the treatment or recycling processes the response actions employ and the materials they would treat; the amount of hazardous materials to be destroyed or treated; the degree of reduction expected in toxicity, mobility, or volume; the degree to which the treatment would be irreversible; the type and quantity of residuals that would remain after treatment; and whether the response action would satisfy the preference for treatment.

- Short-Term Effectiveness examines the effectiveness of response actions in protecting public health and the environment during the construction and implementation period until the removal action objectives have been met. The following factors will be considered: potential for short-term risks to the affected community as a result of the response action; potential impacts on workers during the response action, and the effectiveness and reliability of protective measures that would be taken; potential adverse environmental impacts of the response action, and the effectiveness and reliability of protective measures that would be taken; and time until protection is achieved.

Implementability

Under this criterion, the ease of implementing the response actions will be assessed by considering the following factors: technical feasibility, including technical difficulties and unknowns associated with the construction and operation of a technology, the reliability of the technology, ease of undertaking additional response actions, the ability to monitor the effectiveness of the response action, and the extent to which the removal action contributes to the efficient performance of any long-term remedial action; administrative feasibility, including activities needed to coordinate with other offices and agencies, the ability to obtain necessary approvals and permits from other agencies (for off-site actions), and statutory limits on removal actions; availability of services and materials, including the availability of adequate on or off-site treatment, storage capacity, and disposal capacity and services; and the availability of necessary equipment and specialists, and provisions to ensure any necessary additional resources; and the availability of prospective technologies for full-scale application. This criterion will also assess support agency and community acceptance, as described below.

- Support Agency Acceptance indicates whether, based on its review of the FFS and this document, the New York State Department of Health (NYSDOH) agrees with, opposes, or has no comment on the preferred response action at the present time.

- Community Acceptance, which will be assessed during the public review period, refers to the public's general response to the response actions described in the FFS and this document.

Cost

The costs that will be assessed include the capital costs, including both indirect and direct costs; post-IRM site management costs, which include operation, annual maintenance and residual disposal costs; and present-worth costs, which include the capital costs plus the present value of 5 years of post-IRM site management costs (calculated at a 7 percent discount rate).

Comparative Analysis of Response Actions

A comparative analysis of the response actions based upon the evaluation criteria noted above follows:

Effectiveness

Response Action 1 (No Action) would not be protective of human health and the environment. Response Actions 2, 3 and 4 would each provide equal protection of human health and the environment as they would each meet the RAOs for this IRM.

Response Actions 2 and 3 both would afford protectiveness of human health and the environment through the use of a cover and the use of a groundwater collection trench that would mitigate shallow and intermediate groundwater discharge to Onondaga Lake along the eastern shore. The alignment of this collection trench differs for each of these Response Actions, with Response Action 3 aligned mostly along the lakeshore, and with Response Action 2 aligned inland from the lakeshore. Both alignments would provide similar protectiveness relative to groundwater and Solvay waste impacts to the Onondaga Lake remedy.

Protectiveness of human health and the environment would be provided in Response Action 4 through the use of a groundwater collection trench and excavation of Solvay waste material outboard of the collection trench. Response Action 4 would provide similar protectiveness relative to groundwater and Solvay waste that would potentially impact Onondaga Lake.

Response Action 1 would not address the ARARs identified for this IRM, whereas Response Actions 2, 3, and 4 would address the ARARs identified for the IRM. Specifically, interception of shallow and intermediate groundwater and seep water would mitigate contravention of groundwater standards directly related to the migration of water from the lakeshore and NMCSG areas. Compliance with the TBCs for Solvay waste substrate in the lower reaches of Ditch A would be addressed through Solvay waste substrate and sediment removal and installation of a low permeability habitat cover. With regard to location-specific ARARs and TBCs, Response Actions 2, 3 and 4 would be completed in a manner consistent with federal and state floodplain and wetland requirements, as well as the requirements for cultural, archaeological and historical resources. Compliance with action-specific ARARs would be addressed by conducting proposed actions in a manner consistent with Fish and Wildlife Coordination Act requirements for protection of Onondaga Lake and NMC. Excavation activities would meet air quality requirements.

Response Action 1 would not provide long-term effectiveness and permanence, whereas Response Actions 2, 3, and 4 would. The common elements of Response Actions 2, 3, and 4 would provide long term effectiveness and permanence through control of the seeps along the NMC shore, addressing seep discharge and Solvay waste substrate in the upper and lower reaches of Ditch A, respectively, controlling groundwater discharge from the former NMCSG unit to Onondaga Lake and/or NMC, and controlling shore erosion along Onondaga Lake. In addition, the groundwater collection system, cover and/or Solvay waste removal technologies included in these response actions can be designed to adequately and reliably manage residual risks following IRM construction.

Response Actions 2 and 3 both would provide long-term effectiveness and permanence through the use of a groundwater collection trench, which would be both an adequate and reliable means for cutting off pathways for groundwater discharge to Onondaga Lake. Containment of shore Solvay waste using a cover included in Response Actions 2 and 3 would be an adequate and reliable method of addressing erosion of Solvay waste at the eastern shore.

Long-term effectiveness and permanence would be provided in Response Action 4 through the use of a groundwater collection trench and excavation of Solvay waste material outboard of the collection trench. The groundwater collection trench included in Response Action 4 would be an adequate and reliable means for controlling groundwater reaching the collection trench. In summary, Response Actions 2, 3, and 4 each would provide long-term effectiveness and permanence.

There would be no reduction in toxicity, mobility or volume provided in response Action 1. Response Actions 2, 3 and 4 would each afford reductions in toxicity, mobility or volume through treatment. Response Action 4 would provide a higher reduction in toxicity, mobility and volume which are afforded through removal of Solvay waste from the eastern shore.

The common elements of Response Actions 2, 3, and 4 would provide reduction in mobility through control of seeps along the NMC shore, control groundwater discharge from the former NMCSG unit to Onondaga Lake and/or NMC, and control of wind/wave erosion of Solvay waste along the surf zone of Onondaga Lake SMU-4. Response Actions 2, 3, and 4 each would provide for reduction in mobility of eastern shore groundwater and seep water through the use of a groundwater collection system and seep collection system that would mitigate shallow and intermediate groundwater and seep water discharge to Onondaga Lake along the eastern shore. Treatment of the collected groundwater would afford a reduction in toxicity of the groundwater for each of these Response Actions.

There are no short-term effects relative to Response Action 1. Response Actions 2, 3 and 4 would be constructed using proper protective equipment to manage risks to onsite workers, and proper precautions and monitoring to be protective of the general public and the environment. Due to the extensive excavation included in Response Action 4, potential impacts to the surrounding community related to transportation of material would be substantially greater than for Response Actions 2 and 3. While Response Action 4 would provide similar protectiveness as Response Actions 2 and 3, the effort to remove 27 acres of Solvay waste along the eastern shore would be significantly greater than that required for Response Actions 2 and 3, and is therefore more energy intensive as compared to Response Actions 2 and 3. Response Actions 2 and 3 would take approximately 2 to 3 years to implement. Response Action 4 would take approximately 4 to 5 years longer to implement that Response Actions 2 and 3, and, if selected, could potentially delay the implementation of the lake remedy.

Potential risks to construction workers in areas of contamination in Response Actions 2, 3 and 4 through dermal contact, incidental ingestion and inhalation related to the removal, handling, and processing of the sediment, Solvay waste, groundwater, and seep water would be mitigated by utilizing proper protective equipment. Impacts related to noise and odor associated with the extensive excavation and transportation of Solvay waste included in Response Action 4 would also be mitigated through use of proper protective equipment and proper construction practices. Excavation activities would meet air quality requirements, and construction activities would meet current Occupational Safety and Health Administration requirements.

Under Response Actions 2, 3 and 4, disturbance of the land during excavation activities would be anticipated to result in the need to manage construction water. This construction water would be properly managed to minimize adverse impacts. Due to the significantly larger amount of excavation associated with Response Action 4, these impacts would be significantly greater than for Response Actions 2 and 3. Appropriate measures would have to be taken during excavation activities to minimize generation of nuisance dust and release of volatile organic compounds.

Each of the above-mentioned response actions would increase vehicle traffic and impact the local roadway system, and could subject nearby residents to increased noise and odor levels; however, the amount of vehicular traffic and impact to the local roadway system would be substantially higher for Response Action 4, due to the material handling necessary for the excavation of the approximate 440,000 cy of Solvay waste (approximately 44,000 truck loads), as well as the material handling required for placement of material for the associated lake bottom restoration. The greater fuel requirements associated with excavation and transportation of larger excavation quantities for Response Action 4 contribute to the greater energy/resource requirements for this Response Action, when compared to Response Actions 2 and 3.

Response Actions 2 and 3 would be expected to be completed within an approximately 2- to 3-year timeframe. Due to the significant volumes of excavation and associated construction activities included in Response Action 4, it is anticipated that the construction of Response Action 4 would take substantially longer (4-5 yrs longer) to complete than Response Actions 2 and 3. Maintenance and operation of the collection trench and associated equipment and treatment systems, for each Response Action, would be required in the long-term.

Implementability

Response Actions 2, 3, and 4 are all implementable both technically and administratively, and incorporate readily constructible and reliable technologies. Response Action 4 would be expected to be more difficult to execute than Response Actions 2 and 3, as the additional proposed excavation of Solvay waste outboard of the collection trench would require management of groundwater, storm water, and lake infiltration during excavation.

Monitoring the effectiveness of Response Actions 2, 3, and 4 would be accomplished through monitoring of groundwater levels within and near the collection trench. Response Actions 2 and 3 would include inspection and maintenance of the low-permeability and/or vegetative cover systems. Inspection and maintenance requirements of the low-permeability cover system proposed in Response Action 2 would be slightly higher than that of the vegetative cover proposed in Response Action 3. Seep control and erosion control would be monitored through site inspection and maintenance of these systems

Each response action would require coordination with governmental groups, including Onondaga County, and the Town of Geddes. Treatment facilities for collected groundwater would be readily available at the Willis-Semet GWTP. The necessary equipment and specialists would be available for each Response Action.

NYSDOH was provided an opportunity for input on the FFS during its preparation and agrees with the preferred response action.

Community acceptance of the preferred response action will be assessed in a decision document following review of the public comments received on the FFS and this document.

Cost

The estimated capital costs, and present-worth costs for each of the response actions are presented below.

Response Action	Capital Cost	Periodic O & M Costs	Annual O & M Cost	Present-Worth Cost
1	$0	$0	$0	$0
2	$17,443,000	$422,500	$1,420,900	$23,570,000
3	$17,122,000	$748,000	$1,499,000	$23,801,000
4	$106,888,000	$488,000	$1,416,000	$113,042,000

As can be seen by the cost estimates, of the viable response actions, Response Actions 2 and 3 are lower in cost with present-worth costs between $23-24 million. Response Action 4, which includes excavation and disposal of Solvay waste outboard of the trench, is the most costly response action at an estimated present-worth cost of $113,042,000.

PREFERRED RESPONSE ACTION

NYSDEC and EPA's preferred response action is Response Action 3 which includes:

- hydraulic control of groundwater primarily along the eastern shore via a groundwater collection trench and passive collection system,
- a 14.4 acre vegetative cover along the eastern shore
- hydraulic control of the NMCSG unit groundwater via collection wells
- hydraulic control of seeps along the eastern shore, and selected seeps along NMC and the northern shore, via installation of seep collection trenches
- treatment of collected seep water and groundwater at the Willis GWTP
- shore stabilization along the surf zone of SMU-4 and a portion of SMU-3 shores of Onondaga Lake, using gravel and crib walls
- excavation of and containment of Solvay waste substrate and sediment in the lower reach of Ditch A via a low permeability cover and habitat layer
- pipe rehabilitation in the upper reach of Ditch A.

The environmental benefits of the preferred response action may be enhanced by consideration, during the design, of technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green policy[7] and NYSDEC's Division of Environmental Remediation Program Policy *Green Remediation* (DER-31)[8]. This will include consideration of green remediation technologies and practices.

[7] See http://epa.gov/region2/superfund/green_remediation

[8] See http://www.dec.ny.gov/docs/remediation_hudson_pdf/der31.pdf

BASIS FOR THE PREFERRED RESPONSE ACTION

This preferred response action would be protective of human health and the environment, both in the short and long-term, and would meet federal and state ARARs. The volume of contaminants would be reduced through collection and treatment of the groundwater. The preferred response action is more readily implementable, and would take significantly less time to implement. The preferred response action includes a groundwater collection trench which would be both a physical and hydraulic containment system for the Solvay waste and constituents within the waste. The preferred response action is also complimentary with the anticipated ecological and recreational land use of this area, which includes wetlands, county parkland, and ecologically compatible recreation such as bird watching. Construction of a vegetated cover system in the preferred response action versus a low-permeable cover system (Response Action 2) allows for a more varied habitat around the planned wetlands. Response Action 3 will also contain more contaminated groundwater within the limits of the trench than Response Action 2. Response Action 3 is also preferred over Response Action 4, as it allows for the intended end-use of this area for inland and connected wetlands which would enhance the environmental benefit of this area.

In addition, the preferred response action would address the RAOs as follows:

- Direct contact with and ingestion of exposed Solvay waste and contaminated soil along the eastern shore would be addressed by the vegetative cover system;
- Migration of eastern shore shallow and intermediate groundwater to Onondaga Lake would be addressed by means of a collection trench and passive wells;
- Migration of NMCSG unit groundwater to NMC and Onondaga Lake would be addressed by means of groundwater collection wells;
- Migration of site shallow and intermediate groundwater to the lower reach of Ditch A would be addressed by means of a collection trench and passive wells;
- Discharge from and direct contact with, selected seeps along the NMC, northern, and eastern shores would be addressed by seep collection systems;
- Erosion of exposed Solvay waste at the eastern shore would be addressed by the vegetative cover system;
- Erosion of Solvay waste due to wind- and wave action along the surf zone of Onondaga Lake SMU-4 would be addressed by a combination of graded gravel and live crib walls;
- Erosion of Solvay waste and sediment from the lower reach of Ditch A to Onondaga Lake would be addressed by excavation and installation of a low-permeability cover/habitat cover; and
- Seep discharge to NMC via the upper reach of Ditch A would be addressed by rehabilitation of the existing pipe that discharges to NMC.

NYSDEC and EPA believe that the preferred response action would provide the best balance among the response actions with respect to the evaluating criteria. NYSDEC and EPA also believe that the preferred response action would be protective of human health and the environment, would comply with ARARs, and would utilize permanent solutions and response action treatment technologies or resource recovery technologies to the maximum extent practicable.

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ACRONYMS

ATV – All Terrain Vehicle
ARAR – Applicable or Relevant and Appropriate Requirement
BERA – Baseline Ecological Risk Assessment
BTEX – Benzene, Toluene, Ethylene, (Total) Xylenes
CERCLA – Comprehensive Environmental Response, Compensation and Liability Act
COC – Chemical of Concern
COPC – Chemical of Potential Concern
COPEC –Chemical of Potential Ecological Concern
CPOI – Chemical Parameters of Interest
C&S - Calcerinos & Spina
cy – Cubic Yards
EPA- United States Environmental Protection Agency
FFS – Focused Feasibility Study
ft – Feet or Foot
gpm – Gallons per Minute
GWTP – Groundwater Treatment Plant
HDPE – High Density Polyethylene
HHRA – Human Health Risk Assessment
HI – Hazard Index
IRM – Interim Remedial Measure
NCP – National Oil and Hazardous Substances Pollution Contingency Plan
NMC – Ninemile Creek
NMCSG – Ninemile Creek Sand and Gravel
NYSDEC – New York State Department of Environmental Conservation
NYSDOH – New York State Department of Health
O&M – Operation and Maintenance
PAHs – Polycyclic Aromatic Hydrocarbons
PRAD – Proposed Response Action Document
PSA – Preliminary Site Assessment
PTI – PTI, Inc. (Exponent)
RAO –Response Action Objective
RI – Remedial Investigation
ROD – Record of Decision
SCA – Sediment Consolidation Area
SMU – Sediment Management Unit
SRE – Streamlined Risk Evaluation
TBC – To Be Considered
yr - Year