# ONONDAGA LAKE:TECHNICAL SUPPORT DOCUMENT FOR EXPLANATION OF SIGNIFICANT DIFFERENCES

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# 1. INTRODUCTION

In accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and Section 300.435(2)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), if the United States Environmental Protection Agency (USEPA) or New York State Department of Environmental Conservation (NYSDEC) selects a remedial action and, thereafter, determines there is a significant change with respect to that action, an Explanation of Significant Differences (ESD) and the reason for such changes must be issued.

The USEPA and NYSDEC issued a Record of Decision (ROD) in July, 2005 which selected a remedy for the Onondaga Lake Bottom Subsite of the Onondaga Lake Superfund Site (Site). A key element, among others, of the selected remedy is the dredging of as much as an estimated 2,653,000 cubic yards (cy) of contaminated sediment/waste from the littoral zone in Sediment Management Units (SMUs) 1 through 7 to a depth that will prevent the loss of lake surface area, ensure cap effectiveness, remove non-aqueous-phase liquids (NAPLs), reduce contaminant mass, allow for erosion protection, and reestablish the littoral zone habitat. Most of the dredging would be performed in the in-lake waste deposit (ILWD) (which largely exists in SMU 1) and in SMU 2.

The remedy described in the ROD was selected based largely on data collected as part of the Remedial Investigation (RI) for the site. Specific to SMU 2, the selected remedy includes dredging to remove non-aqueous phase liquids (NAPLs) to an estimated 30-ft (9-m) depth in the vicinity of the causeway over an area of approximately 4.8 acres. Subsequent to issuance of the ROD, additional data were generated in 2005 and 2006 in SMU 2 as part of the first phase of the pre-design investigation to more accurately define the extent of NAPLs in this area. These new data show that the site conditions and contaminant distribution are significantly different than was previously thought in SMU 2 along the causeway, and in a small adjacent area in SMU 1. Based on the new information, an Explanation of Significant Differences (ESD) is needed to document the change in the remedy that pertains to the SMU 2 causeway area (and a small adjacent area in SMU 1). The ESD addresses only that component of the remedy which included dredging to recover pooled NAPLs[1] in the SMU 2 causeway area (and a small adjacent area in SMU 1). Technical details pertaining to the new information and resulting engineering evaluations which resulted in the need for the ESD are documented in this report.

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[1] These “pooled NAPLs” in the causeway area are in contrast to the NAPLs in the ILWD in SMU 1 that are primarily distributed weathered NAPLs, consisting of disconnected globules, that were likely introduced to the lake with the surface discharges of waste material (see page 22 of the ROD).

## 2. SITE HISTORY AND SELECTED REMEDY

### 2.1 Site Description and History

On June 23, 1989, Onondaga Lake was added to the New York State Registry of Inactive Hazardous Waste disposal sites. On December 16, 1994, Onondaga Lake and areas upland that contribute or have contributed contamination to the lake system were added to the USEPA's National Priorities List (NPL). This NPL listing means that the lake system is among the nation's highest priorities for remedial evaluation and response under the federal Superfund law for sites where there has been a release of hazardous substances, pollutants, or contaminants. In November 2004, Honeywell completed the Feasibility Study (FS) for the Site. On November 29, 2004, the Proposed Plan was released for public comment. Following an extensive public outreach program and the review of public comments, USEPA and NYSDEC issued the ROD on July 1, 2005, documenting the selection of a remedy for the Site.

### 2.2 Selected Remedy

As mentioned above, based on the results of the RI/FS, USEPA and NYSDEC issued a ROD in July 2005 which selected a remedy for the site. Among other actions, the ROD provides for a total dredging of as much as an estimated 2.65 million cubic yards of sediments and/or waste material. Specific to SMU 2, the selected remedy included dredging of an estimated 403,000 CY of sediments and/or wastes prior to capping. This includes dredging to remove NAPLs to an estimated 30-ft (9-m) depth in the vicinity of the causeway. The area where NAPLs were assumed to be present in the ROD is shown on Figure 1. These NAPLs are thought to be present beneath the lake bottom due to subsurface migration from an upland source. To prevent ongoing migration of NAPLs and contaminated groundwater from upland sources to the lake, a subsurface barrier wall and groundwater containment system will be constructed in the vicinity of the SMU 2 lakeshore prior to remediation of the lake as part of the Willis/Semet Barrier Interim Remedial Measure (IRM).

The SMU 2 remedy also includes dredging to shallower depths in other areas to prevent loss of lake surface area, for erosion protection and to reestablish habitat, and to remove sediments and/or wastes from the portion of the ILWD that extends into SMU 2. In addition, the SMU 2 remedy includes capping of sediments that exceed cleanup criteria.

## 3. 2005 AND 2006 PRE-DESIGN INVESTIGATION RESULTS

Extensive Pre-Design Investigations (PDIs) of the lake bottom and subsurface were conducted during the Fall of 2005 and Spring of 2006. This included collection and visual analysis of more than 65 sediment cores to depths ranging from 28 ft to 42 ft (beneath the lake bottom) to determine the extent of pooled NAPLs in SMU 2 and adjacent areas. This investigation was completed as part of the first phase of the pre-design investigation to provide the necessary information to support the detailed design of the remedy. Results from these investigations allowed more accurate delineation of the extent and depth of pooled NAPLS in this area, as shown on Figure 1. Each sample location is color coded to indicate the presence (yellow) or absence (white) of pooled NAPLs in the core. Non-pooled NAPLs (e.g., discontinuous thin layers of NAPLs that generally vary from 0.5 to 5 centimeters in thickness) were also noted at a number of the core locations. Non-pooled NAPLs will be addressed by the remedy through capping and/or removal. Each location has a unique station ID that was assigned during this investigation to identify the location number and type of sample collection method (e.g. VC is a Vibracore). The extent of pooled NAPLs and the approximate barrier wall location based on the new information and subsequent engineering evaluations is also shown on Figure 1.

The pooled NAPLs were found to extend a shorter distance into the lake and are shallower than was assumed in the ROD, although, the extent reaches a short distance (approximately 300 feet) into the adjacent SMU 1. The ROD was based on the assumption that the NAPLs were present beneath the lake bottom over an area of approximately 4.8 acres, while the investigation results indicate the pooled NAPLs extend over a much smaller area. Similarly, the ROD assumed the NAPLs extended to a depth of approximately 30 feet beneath the lake bottom, while the investigation results indicate the pooled NAPLs are typically present in the 15 to 25 foot range. In addition, the average thickness of NAPLs-impacted material was only approximately 1.6 feet. As a result, there is significantly less volume of NAPLs-impacted material beneath the lake than was assumed during the FS and ROD. The limited extent of pooled NAPLs found during the PDI is likely due to the lower-than-anticipated permeability of the fine silt layer, commonly referred to as the marl unit, present beneath the lake. Logs for the borings shown on Figure 1, which include information regarding the presence or absence of NAPLs, are provided in Attachment A.

## 4. GEOTECHNICAL STABILITY EVALUATION

In addition to the information on NAPL extent discussed above, the 2005 and 2006 PDI generated information on the types of sediments and soils present beneath the lake and their engineering properties. This information was used during the design of the Willis/Semet IRM barrier wall to determine the most appropriate method for construction of the barrier wall. During the course of this evaluation, it was determined that the wall would be unstable during deep dredging to remove pooled NAPLs in SMU 2. The stability of the wall and the adjacent upland area is particularly critical due to the presence of a major sewer pipeline, other utilities and interstate highway I-690 immediately adjacent to the shoreline. The detailed stability evaluation is included as Attachment B and is discussed below.

Geotechnical stability was evaluated for the remedy for SMU 2 adjacent to the causeway as included in the ROD, using the pre-design investigation results. Under this scenario, the sheet pile barrier wall would be located 15 to 20 feet out from the edge of the causeway in order to avoid impacts to shoreline utilities and to facilitate construction. The wall would be keyed into the clay confining unit, which underlies the Solvay Waste and marl units where the NAPLs reside, and which acts as a barrier preventing downward migration of NAPLs. Removal of the pooled NAPLs would require dredging to an average depth of approximately 25 feet below the current lake bottom. This assumed dredge depth is consistent with the average pooled NAPLs depth in this area of 24 feet, plus an additional foot of over-dredging. Dredging would be completed to the outermost extent of pooled NAPLs determined during the pre-design investigation, which is represented by the yellow line in Figure 1. The maximum extent of deep dredging would be approximately 50 feet off-shore of the causeway in order to remove pooled NAPLs within the marl. Results from this evaluation indicate that the wall would likely collapse during dredging to 25 feet for pooled NAPLs removal. This slope failure could result in collapse of the causeway, the vicinity utilities (including 36" and 12" force mains), and potentially the I-690 highway. In this type of failure, the sheet pile wall, anchor rods and anchor system, causeway, utilities and upland soil would potentially all slide towards the lake. Increasing the strength of the sheet pile and anchors would not reduce the risk because the failure surface would be below the bottom of the sheet pile wall.

Geotechnical stability was also evaluated for the adjacent area in SMU 1 where the pre-design investigation identified NAPLs that was not anticipated by the ROD. Under this scenario, the barrier wall would be along the lake shoreline and would be keyed into the underlying clay layer. Removal of the pooled NAPLs would require dredging to an average depth of approximately 22 feet below the current lake bottom. This assumed dredge depth is consistent with the average pooled NAPLs depth in this area of 21 feet, plus an additional foot of over-dredging. Dredging would be completed to the outermost extent of pooled NAPLs determined during the pre-design investigation, as shown in Figure 1. Consistent with the evaluation in the vicinity of the causeway, it was concluded that the shoreline barrier wall would be unstable during dredging for pooled NAPLs removal.

To achieve the required wall stability during dredging to remove the NAPL would require installation of a high-strength wall through the clay and into the underlying sand. Preliminary estimates indicate that this wall would have to be constructed with heavy steel H-piles on close spacing (i.e. 6 feet apart) with deep tieback anchorages that would also penetrate the clay layer into the sand layer. Breaching a confining unit beneath NAPLs is contrary to good engineering principles because of the risk of spreading contamination into the underlying units. Therefore, fully penetrating the clay with a barrier wall is not a preferable option.