ONONDAGA LAKE PRE-DESIGN INVESTIGATION: PHASE III WORK PLAN

Onondaga County, New York

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PHASE III PRE-DESIGN INVESTIGATION WORK PLAN

1.0 INTRODUCTION

Onondaga Lake is a 4.6-mi^2 (2900-acre) lake located northwest of the City of Syracuse in central New York State (Figure 1). The Lake, its tributaries, and the upland hazardous waste sites related to the Lake that were affected by former Honeywell operations have been identified as a federal Superfund site on USEPA's National Priorities List (CERCLIS NYD986913580). The remedial investigation (RI) for Onondaga Lake was completed in December 2002, the feasibility study (FS) was completed in November 2004, the Phase I Pre-Design Investigation (PDI) was completed in 2005, and the Phase II PDI was completed in 2006. Additional information on the site can be found in the FS (Parsons, 2004) and the Record of Decision (ROD) issued by the New York State Department of Environmental Conservation (NYSDEC) and the United States Environmental Protection Agency (USEPA) on July 1, 2005 (NYSDEC and USEPA, 2005).

The Phase III PDI will be structured in a similar fashion as the Phase II effort to collect additional information for the design. Unless otherwise noted, all Phase III field activities will be conducted in accordance with the procedures outlined in the Phase I and II PDI Work Plans and associated appendices (Parsons, 2005 and 2006).

2.0 PROJECT OBJECTIVES

Before any of the remedial actions are implemented, additional information is required to complete the detailed design of the remedy. The Phase III PDI will be focused on collecting additional data to advance each aspect of the conceptual design. Since many of the details around the design have not been finalized, this work plan is intended to address several gaps within the existing data set. Additional PDI will be required in 2007 beyond the scope of this work plan. The additional scope will be submitted to NYSDEC as addenda to this work plan. In addition, a separate work plan for the continued evaluation of nitrate addition in 2007 was submitted to NYSDEC for review and a comprehensive baseline monitoring program will begin in 2008.

The Phase III information will be combined with the existing data set for the Lake for use during remedial design. An overall assessment of remaining data gaps for intermediate and/or final design will need to be conducted based on a review of data collected through the Phase III PDI.

3.0 MOBILIZATION AND LOGISTICS

Health and Safety

Parsons ranks health and safety as the highest priority. Parsons Project Safety Plan (PSP) and our Subcontractor's Safety Plans (SSP) prepared for previous PDI activities will be used for this investigation and will be strictly followed by all personnel. Any task outside of the current scope defined in the PSP will have a new Job Safety Analysis (JSA) completed before the task begins. Minor modifications to the PSP have been made to account for the activities identified in this work plan. A summary of the revised roles/responsibilities, contact information, and JSAs have been included in Appendix A of this work plan. Copies of the PSP and SSPs will be maintained at the support zone and on each vessel.

Site Facilities, Decon and Waste Handling

The support zone and facilities established during the Phase I/II PDI will be used for the Phase III investigation. All decontamination and waste management activities will be conducted in accordance with Phase I PDI Work Plan (Parsons, 2005).

4.0 POREWATER INVESTIGATION

Additional sampling is needed to characterize porewater concentrations in the SMUs where capping is part of the lake remedy. In order to address existing data gaps and further the design process, porewater samples will be collected from SMUs 1, 2, 3, 4, 6, and 7. Due to the presence of hard calcite crust from waste deposits in the lake, the extended peepers used during previous PDI activities cannot be deployed at all locations. In order to collect the data required for design, the extended peepers will be supplemented with centrifuged porewater from sediment cores during this investigation.

4.1 Extended Peepers - Porewater

Preparation and Deployment

An equilibration study and membrane evaluation was conducted during the Phase II PDI to determine the appropriate deployment time and membrane type for the peepers. This study recommended the use of a Tuffryn membrane and a three week deployment time. Future peeper applications will be conducted using the Tuffryn membrane. However, the three rounds of extended peepers for the porewater investigation specified in this work plan will be installed for five weeks at the request of NYSDEC.

All peepers will be decontaminated, prepared, and installed in accordance with the procedures outlined in the Phase I PDI Work Plan (Parsons, 2005). The sample locations for the extended peepers in SMUs 2, 4, 6, and 7 correspond to areas that currently have little or no porewater data (Figures 2, 3, and 4). The locations in the SMU 6/7 region were selected to focus on the area between Onondaga Creek and the ILWD rather than the area north of Onondaga Creek due to the presence of higher concentrations of CPOIs.

For the peepers to be deployed within the in-lake waste deposit (ILWD) portion of SMU 2 (OL-PP-20101, OL-PP-20104, and OL-PP-20106) an attempt will be made to install the peepers 1 to 2 meters below the sediment-water interface. Assuming there are no issues with the installation, collecting samples below the top 1 or 2 meters of the ILWD may provide more useful porewater data for use in cap design.

The data from the proposed samples will be used during the design process to support cap evaluations in these areas.

Sampling and Analysis

Samples will be analyzed for the same parameters as the Phase II effort to support the cap design; however, the cap will be designed to be protective of the CPOIs identified in the ROD. In addition, cations/anions and specific conductivity (salinity will be calculated) will also be analyzed at these locations to support the groundwater discharge evaluation (Table 1). To obtain the volume required for these analyses (and associated dilutions), samples for the porewater evaluation will be composited over 2 ft intervals (16 sampling ports) to generate four samples from each extended peeper. The length of the intervals to be sampled was increased from 1 ft in Phase II to 2 ft in Phase III to allow for the analysis of additional parameters and to ensure all reporting limits are met. In addition, one composite sample will be collected from 1-ft intervals and analyzed for anions, cations and specific conductivity to support the groundwater discharge evaluation.

Per the requirements stated in the QAPP, MS/MSD and duplicate samples are required for chemical analysis to evaluate potential influences of the sampling or lab procedures. Due to the limited volumes available with this type of sampling, one set of QA/QC samples will be collected during each round of sampling. The 8 to 9 ft interval on one of the 9-ft peepers will be composited with the 6 to 8 ft interval to generate the volume required to analyze the QA/QC samples. Due to limited sample volume, the QA/QC samples will only be analyzed for VOCs and Mercury. All sample analysis will be conducted by Severn Trent Laboratories in accordance with the procedures outlined in the Phase I PDI WP (Parsons, 2005).

4.2 Sediment Cores - Porewater

Sampling

Sediment samples will be advanced approximately 10 ft into the sediment in SMU 3 using Vibracore sampling techniques (Figure 5). Following extraction, each core will be cut into 2-ft sections, capped, sealed, and shipped to the lab for processing. The proposed sample locations in SMU 3 focus on several areas where capping is currently proposed based on exceedances of the Mean PECQ of 1 and/or the Mercury PEC of 2.2 (Figure 5). Extended peepers are not an option in this area due to the presence of hard waste material.

Since the dredge cut has not been defined for SMU 1, samples will be collected later in 2007 to evaluate porewater concentrations in this area.

Processing and Analysis

The cores collected during the Phase III PDI will be processed and analyzed by Severn Trent Labs in Pittsburgh, PA in accordance with the Phase I PDI WP and SOPs (Parsons, 2005). However, the following modifications to those procedures have been proposed for the Phase III effort:

- Two feet of material from one 3.5-inch diameter core will be sent to the laboratory for each sample. The 10-ft core will be maintained upright until the 2-ft sections are selected, cut, capped, and labeled in the field before shipment to the lab.
- Any lake water on top of the surface interval will be decanted at the site. Any fluid that separates from the sediment within the core during sample shipment will be considered porewater and included in the analysis. Due to this modification samples do not need to be kept vertical prior to processing.
- The raw sediment will be sampled prior to centrifugation and analyzed for mercury, VOC CPOIs (including benzene and toluene), percent moisture and specific gravity (for porosity calculations).
- The centrifugation process will be conducted in a refrigerated environment to minimize volatilization.
- Additional groundwater parameters have been added as noted on Table 1 of this work plan.
- The dissolved fraction of the porewater generated from these cores will be analyzed. For the dissolved porewater fraction, the non-volatile parameters (Hg, TOC, and pH) will be pressure filtered through 0.7 um TCLP filtration paper. The volatiles will be centrifuged for 10 minutes and decanted into pre-preserved VOA vials.
- Spiked samples will be run at 2000 ppb rather than 10 ppb to be more representative of concentrations at the site. The spiked blanks will be handled in a similar fashion to the VOC samples with an initial 30 to 90 minute centrifuge plus 10 additional minutes after being decanted into a smaller vessel.

5.0 GROUNDWATER INVESTIGATION

Several groundwater sampling methods will be evaluated during this investigation to identify the best approach for collecting data to estimate groundwater upwelling velocities. This portion of the Phase III PDI will be focused on collecting data in two portions of the lake: SMU 4 and SMU 7. This portion of the groundwater discharge evaluation investigation will focus on the following technologies:

- Near-bottom temperature/conductivity survey using a towed instrument;
- Temperature/conductivity probes (Geoprobes);
- Centrifugation of sediment cores to analyze porewater for chloride profiling;
- Extended peepers to analyze porewater for chloride profiling; and
- Seepage meters and associated control devices.

The temperature/conductivity surveys will be conducted at the beginning of the investigation as a screening tool. Based on the initial results, three locations in SMU 4 and two locations in SMU 7 will be selected for this evaluation. Following agreement with NYSDEC on the specific locations, the other sampling techniques noted above will be conducted in these areas (Table 3).

The following subsections describe how each one of these techniques will be used to evaluate groundwater discharge to Onondaga Lake.

5.1 Near-Bottom Temperature/Conductivity Survey

Identification of physical and chemical differences in surface water and groundwater is one method for identifying potential areas of groundwater discharge. These differences can be measured by using a conductivity, temperature, depth sensor (CTD) towed along the lake bottom to identify differences in these parameters. Water column profiling technologies will be employed during this investigation to determine if they are a useful tool for identifying areas of groundwater discharge in Onondaga Lake. These activities are scheduled to take place in April after the ice is no longer present and the temperature gradient is high between the surface water and groundwater. This work is intended to help resolve the technical issues surrounding the analysis of groundwater data as it pertains to cap design. Specifically, identification of areas with high upwelling velocities will be key information for cap design.

As a pilot approach to this assessment, CR Environmental will be contracted to perform an initial study to determine if the CTD sensors can be used to identify discharge areas in the lake. CR Environmental will utilize a YSI 6600 series multiparameter Sonde to simultaneously measure water temperature, specific conductivity, salinity, dissolved oxygen, turbidity, and sensor depth. The Sonde will be mounted in a custom-built steel cage to minimize potential damage. The instrument package will be towed with a 15-ft Jon-boat as close to the bottom as possible. Ideally the instrument will be maintained within 1 to 2 ft of the mud line. However, debris and hazards to navigation identified by the 2005 side-scan sonar survey may necessitate modification of the sensor altitude as judged appropriate and timely by the field scientist(s) and the vessel Captain to prevent instrument damage and to minimize risks to personnel in the small vessel. An underwater camera will also be mounted to the frame of the instrument package to monitor the height from the bottom and to identify any potential obstructions. The Sonde will output data directly to the HYPACK navigation survey software and will be recorded once per second with DGPS position data.

Initially, the survey will be conducted within Onondaga Creek in an area where a significant groundwater discharge area has been identified to “calibrate” the survey equipment. The area of the brine spring present in the creek is shown on Figure 6. Multiple transects will be run through this area to establish the signature of the groundwater discharge. Data from this survey will be processed onsite and reviewed with NYSDEC to determine the effectiveness of this approach for identifying areas of groundwater discharge.

If the initial survey of Onondaga Creek demonstrates that any of the analyzed parameters are capable of detecting the upwelling area, an in-lake evaluation of the approach will be conducted targeting areas of suspected groundwater discharge in SMU 4 and SMU 7 (Figures 7 and 8). The focus of the in-lake surveys will be the near-shore areas in 2 to 6 ft of water where the highest discharge rates are expected. The survey will be conducted by navigating along transects spaced 25 ft apart from a shallow draft boat. The digital georeferenced side-scan sonar mosaic, bathymetric contour map, and magnetic maps developed during the 2005 surveys will be displayed to aid navigation and minimize the potential for sensor damage due to debris. Data from this survey will be analyzed onsite and contour plots of each parameter will be reviewed to determine if this approach can be utilized in other areas of the Lake.

5.2 Temperature/Conductivity Profiles

Temperature/conductivity probes will be advanced into the sediments to determine if this is a reliable tool for collecting data to support the groundwater discharge evaluation. Geoprobe® developed a probe that was utilized during the Phase II PDI to rapidly collect temperature and conductivity data from the lake sediments. The probes utilized during the Phase II effort have been updated with new sensors and new cables for use during the Phase III PDI.

Prior to the start of daily data collection, the Geoprobe will be checked using the test jig apparatus to perform three tests. The first test is the instrument calibration check. The second test will be conducted to verify the existence of a good electrical connection between the field instrument and each probe dipole by performing a Probe continuity test. The third test is to verify that no dipoles are shorted together (i.e. from damaged cables or connectors) by conducting an isolation test. All instrument check data will be stored in the Geoprobe computer and downloaded to a disk at the end of the day. The probe will also be checked prior to use by submerging the probe in a 5-gallon bucket of a known brine solution. Results will be recorded on a instrument check log each day by the field team.

Based on the results of the temperature/conductivity survey conducted by CR Environmental, a minimum of three temperature/conductivity profiles will be collected from three areas in SMU 4 and two areas in SMU 7 (Table 3). The probes will be spaced approximately 5 to 10 ft apart and will be advanced 20 ft into the sediments. The location of each probe will be recorded so the placement of the seepage meters in that area will be at least 10 ft from any of the probe locations. In addition, one transect perpendicular to shore will be conducted in SMU 4 to acquire conductivity profiles that are within the range of the instrument. This will also allow a further assessment of the conductivity deflections seen in the top 15 cm of the sediments from the Phase II Geoprobe conductivity profiles. The exact location of the transect will be identified after the temperature/conductivity results are evaluated. The temperature/conductivity probes will be conducted using the same procedures as outlined in the Phase II PDI WP - Addendum 4 (Parsons, 2006).

The results of the probe will be reviewed in real time to determine if temperature and conductivity profiles have been established. This data will be used to evaluate the relationship between bulk saturated sediment conductivity and the chloride concentrations in the porewater from the extended peepers and sediment cores. If suitable profiles are obtained, these data could be used to estimate groundwater upwelling rates along with the other methods being evaluated during the Phase III PDI.

5.3 Sediment Cores - Groundwater

Three 10-ft sediment cores will be collected at each one of the areas in SMU 4 and SMU 7 where the temperature/conductivity probes were conducted. The Vibracores will extend to a depth of 10 ft and the sediment will centrifuged to generate porewater. Each core will be cut into the subsections noted below to collect more data near the sediment-water interface and still meet the volume requirements for parameters identified on Table 3. These intervals were selected to focus data collection near the sediment-water interface, which is critical for interpreting the temperature/conductivity profiles.

Sample Intervals

0.5-1.0 ft	1.0-1.5 ft	1.5-2.0 ft
2.0-2.5 ft	2.5-3.0 ft	3.5-4.0 ft
4.5-5.0 ft	6.0-6.5 ft	7.5-8.0 ft

One additional 20 ft core will also be collected to allow the onsite geologist to describe the lithology in that area. Due to depth constraints of the field equipment, the 20 ft core will be collected this summer as part of a subsequent field effort. The location of each core will be recorded to ensure the seepage meters are installed at least 10 ft from any one of the core holes. All field and lab procedures will be conducted in accordance with the Phase I PDI WP (Parsons, 2005).

5.4 Extended Peepers - Groundwater

Extended peepers will also be installed in each of the five areas where the temperature/ conductivity probes and sediment cores were conducted. Two peepers will be installed in each area to a depth of approximately 8 ft below the sediment-water interface. They will be allowed to equilibrate for one week prior to sampling for the parameters listed on Table 3. The peepers will be prepared, installed, extracted, and sampled in accordance with the Phase I PDI WP (Parsons, 2005).

The extended peepers will be sampled for the same analytes and depth intervals as the sediment cores discussed in Section 5.3 (Table 3). This data will be used to generate chloride profiles for estimation of upwelling velocities, which will be compared with the other methods described in this work plan.

5.5 Seepage Meters

The last technology that will be evaluated during the Phase III PDI is a seepage meter, which is also known as a flux meter. Seepage meters were utilized during the Phase I PDI to evaluate groundwater discharge to the Lake. Using seepage meters to measure groundwater discharge to Onondaga Lake has proven difficult as a result of wind/wave action, settlement, and very low discharge rates. Due to the impact of these external variables, the seepage meters used during the Phase I PDI will be modified to reduce the impact from these external variables. In addition, seven new meters will be constructed using the modified design to support this evaluation.

Seepage meters are typically deployed where Darcy flux rates are greater than 36.5 cm/year (Rosenberry, 2004). However, the estimated Darcy flux in many deeper areas of the littoral zone may be less than this value (36.5 cm/year). Given the difficulty and limitations in using seepage meters in low discharge environments, the Phase III PDI seepage meter program has been designed to:

- focus measurements of groundwater discharge in nearshore areas where upwelling velocities are expected to be highest;
- measure the effect of other environmental factors that may influence the volume of water collected by the seepage meters;
- assess the accuracy of the seepage meters through the use of field duplicates; and
- provide field verification of groundwater upwelling velocities calculated from chloride profiles.

The Phase III PDI program will consist of installing multiple seepage meters at three locations in SMU 4 and two locations in SMU 7. These locations will be determined based on the temperature/conductivity survey conducted by CR Environmental during the first portion of the program. If no usable data is obtained from the temperature/conductivity survey, proposed locations will be determined in consultation with NYSDEC prior to commencement of any field activities. All five locations will have a standard meter and a duplicate meter to evaluate the amount of groundwater discharge in that portion of the Lake. In addition, a third meter will be installed at one of the areas within SMU 4 and one area within SMU 7 to evaluate variability. The seepage meters will be placed in the same areas that the Geoprobes, cores for centrifugation, and peepers were collected to evaluate the various methods. The details of the program are described in the following subsections.

Design Modifications

The Phase I PDI seepage meter program demonstrated that several environmental factors may affect the amount of water collected in the seepage meter. To reduce the impact of external factors, the following principals have been integrated into the Phase III design: reduce the impact from wind and wave action by installing the meters below lake level and using a baffle system, and, reduce the settlement by enhancing the anchor system and using the flange for additional support at the mudline. A summary of modifications to the seepage meter design is described below and illustrated in Figure 9:

- Cut the bottom section at 12 inches below the lower flange so the flange may rest on the mudline;
- Cut top of section of the meter at 4 inches above the top of cone;
- Weld the top and bottom sections of the meter together;
- Remove the large hosing from the side of the meter (lower section) and weld a cover over the hole;
- Replace the valve on the top of the cone with a larger valve to ensure flow is not restricted by any debris; and
- Install anchors to refusal to ensure they are secure.

Water Depth

Placing the meters in the appropriate water depth is important to the successful installation and monitoring of these meters. It is critical to install the meters in water that is deep enough to limit wave action and shallow enough to allow for monitoring of the sample bag. However, the length of tubing must be kept as short as possible to limit the impact of flow resistance resulting from the tubing.

The meter modifications have been designed for a water depth of approximately 2.2 ft during average lake level or 1.8 ft during average minimum lake level. The height of the meter from the bottom of the flange to the top of the nipple is approximately 1.5 ft. Allowing 0.3 ft for the sample bag, approximately 1.8 ft of water is required to allow the meter to collect groundwater discharge. The meters will be installed so the nipple is approximately 0.3 ft below the minimum average lake level and the bottom of the meter is approximately 12 inches into the sediment.

The minimum daily average lake level from 1997 to 2005 was 363.0 ft, the mean daily lake level was 363.4 ft, and the average daily maximum was 364.2 ft (USGS Onondaga Lake Stream Gage - NGVD 1929). The bag should be retrievable during most water levels if the meter nipple is installed at 362.7 ft (0.3 ft below the average minimum). During extreme storm events, the water depth will increase, however, extreme events in this region usually pass within several days. The monitoring program discussed in the following sections allows for measurements to be collected on days when the lake is relatively calm.

Seepage Meter Controls

Studies have shown that seepage meters measurements can be influenced by non-groundwater flux anomalies, such as wave action and mechanical property of the measurement bag (Shaw and Prepas, 1989 and Cable et. al., 1997). These non-flux anomalies, similar to “background noise”, cause errors in the measured fluxes, especially when the flux rate is low (Shaw and Prepas, 1989). Evaluating the influence of the external factors impacting the amount of water collected by the meter is an important step in the process of measuring seepage rates. The seepage meter program discussed below will evaluate the impact of these external factors by using control bags.

Control Bags

Control sample bags will be made of similar construction to the measurement bags used in the seepage meter assembly. However, the tubing of the control bag will not be connected to the dome of the meter but left open to the lake water. With this configuration, the sample bag cannot collect groundwater and water that does accumulate in the bag can be attributed to other factors.

Six control bags will be monitored throughout the seepage meter program. Each control bag will be situated in the top of a duplicate meter such that they are under the same lake influences (i.e., waves) as the measurement bags. Five of bags will be pre-filled with the same quantity of water as the monitoring bags (1 liter) and will be placed in the duplicate meters at each of the five areas discussed above. The additional bag will be pre-filled with 60 ml of water and placed in SMU 7 to assist in evaluating potential anomalies of the previous seepage meter measurements.

Wave Height Measurements

Since one potential external influences on the seepage meters is wave action, transducers with data loggers will be used to measure wave height in SMUs 4 and 7 (one transducer in each SMU). These will be attached to an anchor pole on a seepage meter, near the sediment water interface. Pressure data will be collected multiple times each hour to calculate wave heights for this program. Each week during monitoring the data will be downloaded from the data loggers.

Monitoring Program

The meters will be monitored weekly for two months to evaluate the usability of the data. The meters will be monitored in accordance with SOP 17 from the Phase I PDI work plan (Parsons, 2005). In addition, the elevation of each meter will be surveyed each week using a Global Positioning System (GPS) accurate to 0.01 ft from three pre-marked locations on the top of each meter. This will be done to ensure that the meters are not shifting from their installed locations. The measurements will be reviewed during the monitoring period to evaluate the performance of the meters. Following the first two months of monitoring, the data from the seepage meters will be evaluated with the other groundwater data to determine if they should be used as part of future PDI activities and potentially post-remediation (for hydraulic containment) monitoring.

Groundwater levels will also be monitored approximately four times per day with a data logger during the seepage meter study from one monitoring well near SMU 4 (WB18-MW-05S) and one well near SMU 7 (HB-20S). Lake level data will also be obtained from the USGS lake gage during this study. These data will be used to evaluate changes in hydraulic gradients towards the lake during the seepage meter study.

5.6 Borings For Willis/Semet IRM

Multiple borings will be conducted near the Causeway to collect additional geotechnical data to support the offshore alignment of the Willis/Semet IRM barrier wall (Parsons, 2007). Three of those borings are intended to identify the depth of the silt/clay layer, which was not reached during the DNAPL investigation in 2006. A total of 24 samples will be collected from these borings (OL-STA-20042, OL-STA-20053, OL-STA-20058) and analyzed for specific conductivity (salinity will be calculated), cations and anions (Table 3). Sediment samples will be collected using a 3-inch split spoon (or equivalent) from 1-ft intervals and centrifuged to generate porewater. This data will be used to generate a chloride profile within the silt/clay unit to estimate the amount of vertical flow through this unit. These data would be used to confirm that the groundwater upwelling rate (including the groundwater advection into the lake from beneath the silt and clay layer) is consistent with and not greater than that assumed in the ROD.

6.0 ODOR CHARACTERIZATION

During the Phase II PDI, sampling and analysis was conducted to identify odor-causing compounds in SMUs 1, 6, and 7. To ensure that adequate characterization was achieved during the Phase II effort, additional locations have been proposed to support the odor evaluations.

In order to identify the key odorants in the sediments, samples will be collected from two locations in SMU 6 for analysis (Figure 3). The additional sample locations were selected based on review of the boring log descriptions and discussions with field staff. These additional samples are intended to identify sediment that will be most likely to generate odors representative of SMU 6. Sample collection, processing, and shipping will be conducted in accordance with the Phase II PDI WP - Addendum 5 (Parsons, 2006), which outlines the procedures for the odorant testing.

Service Engineering will conduct the odorant characterization tests in conjunction with the laboratory at St. Croix Sensory. The combination of the odor panel reports (thresholds and descriptors) and the quantified odorant concentrations will enable an assessment of which compounds would be the primary targets of odor mitigation techniques, if any are necessary.

7.0 DATA MANAGEMENT AND REPORTING

Field Database

An electronic database will be developed for the Phase III PDI to ensure consistency in field sample ID assignment and compatibility with the Locus Focus data management system. The data collection program prepared for the Phase III field program will be similar to the one used during the Phase I and II PDI.

Quality Assurance/Quality Control (QA/QC)

Field QA/QC will consist of the collection and analysis of field duplicates, and matrix spike/matrix spike duplicate samples in accordance with the Phase I PDI WP (Parsons, 2005). Since most of the samples will be collected from dedicated tubes/liners, rinse blanks will be collected at a rate of one per batch of dedicated sampling equipment. All field QA/QC samples will be identified using standard sample identifiers and collected in accordance with the Phase I PDI WP (Parsons, 2005).

Sample Holding, Collection, and Recordkeeping

Samples will be collected and handled according to the procedures outlined in the Phase I PDI WP and associated appendices. Samples will be managed by the field database as described above. All sample recordkeeping and database entry (Locus Focus) will be conducted in accordance with the Phase I PDI WP (Parsons, 2005).

Data Validation and Reporting

Analytical data generated during this investigation will be reviewed and validated in accordance with the Phase I PDI WP (Parsons, 2005). The results will be incorporated into the Locus Focus database following validation.

Upon completion of the Phase III PDI field activities and laboratory analyses, Parsons will submit unvalidated and validated data to NYSDEC in accordance with the Consent Decree for the Lake. Once the Phase III investigation and evaluation has been completed, a data summary report will be prepared and submitted to NYSDEC.

8.0 REFERENCES

Cable, J.E., Burnett, W.C., Chanton, J.P., Corbett, D.R. and Cable, P.H., 1997, "Field Evaluation of Seepage Meters in the Costal Marine Environment" *Estuarine, Coastal and Shelf Sciences* (1997) 45, 367-375.

NYSDEC and USEPA, 2005. *Onondaga Lake Bottom Subsite of the Onondaga Lake Superfund Site Syracuse, New York Record of Decision.* Albany, New York.

Parsons, 2004, *Onondaga Lake Feasibility Study Report, Onondaga County, New York*. Prepared for Honeywell, Morristown, New Jersey. Syracuse, New York.

Parsons, 2005, *Onondaga Lake Pre-Design Investigation: Phase I Work Plan and Appendices*. Prepared for Honeywell, Morristown, New Jersey. Syracuse, New York.

Parsons, 2006, *Onondaga Lake Pre-Design Investigation: Phase II Work Plan and Addenda.* Prepared for Honeywell, Morristown, New Jersey. Syracuse, New York.

Parsons, 2007, *Willis-Semet IRM Causeway DNAPL Investigation: Addendum 1 Work Plan.* Prepared for Honeywell, Morristown, New Jersey. Syracuse, New York.

Rosenberry, Donald O. and Morin, Roger H., 2004, "Use of an Electromagnetic Seepage Meter to Investigate Temporal Variability in Lake Seepage," *Groundwater*, Vol. 42, No. 1, pp. 68-77.

Shaw, R. D. & Prepas, E. E. 1989 "Anomalous, short-term influx of water into seepage meters". *Limnology and Oceanography* 34, 1343–1351.

APPENDIX A

PROJECT SAFETY PLAN MODIFICATIONS

Table C4.1 ONONDAGA LAKE Program/Project Level Authority and Responsibility	
Industrial Division Safety Manager **Greg Beck, CSP**	Has overall authority of Parsons' Industrial Division Safety Program.
Honeywell Portfolio Safety Director **Jeff Parsons, CIH (OBG)**	Has overall authority for the Honeywell Portfolio Safety Program.
Honeywell Portfolio Safety Manager **Jerry Clark, CSP, CIH**	Has authority for Honeywell Portfolio Projects.
Program Manager/Project Manager **Stephen Warren/ Edward Glaza, P.E.**	Reports to upper-level management, has authority to direct response operations, assumes total control over Program/Project site activities.
Project Safety Manager (PSM) **Jerry Clark, CSP, CIH**	Advises the Program/Project Manager and SSO on all aspects of health and safety.
Site Safety Officer (SSO) **Sara Chmura/Matthew Vetter**	Reports to the PSM on all aspects of Health and Safety onsite, performs day-to-day health and safety tasks, stops work if any operation threatens worker or public health and/or safety.
Parsons Project Staff and Subcontractors **C. Kiehl-Simpson; J. Scheutz; S. Dillman; S Chmura; M. Vetter; T. Drachenberg; T. Johnson; Pete Petrone; TBD; QEA: OSI; and CR.**	Act proactively with regard to project-specific and general health.

Table C4.2 Onondaga Lake Project Contact Information	
Project:	Onondaga Lake Pre-Design Investigation
Project Location:	Onondaga Lake, Onondaga County, New York
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Address:	290 Elwood Davis Road, Suite 312, Liverpool, NY 13088
Telephone:	(315) 451-9560
Fax:	(315) 451-9570
Program Manager:	Mr. Stephen Warren
Contact No.:	(315) 451-9560
Project Manager:	Mr. Edward Glaza, P.E.
Contact No.:	(315) 451-9560
Deputy Project Manager:	Mr. Timothy Johnson
Contact. No.:	(315) 451-9560
Task Manager:	Mr. Peter Petrone, P.E.
Contact. No.:	(315) 451-9560
Project Safety Manager:	Mr. Jerry Clark, CSP, CIH
Contact No.:	(315) 657-2729
Field Team Leader:	Ms. Sara Chmura/Mr. Matthew Vetter
Contact No.:	(315) 451-9560
Site Safety Officer:	Ms. Sara Chmura/Mr. Matthew Vetter
Contact No.:	(315) 451-9560
Client - Project Management:	Mr. John McAuliffe
Contact No.:	(315) 431-4443 ext. 4 (office)

PARSONS

Job Safety Analysis

Hot Work

JSA 024

Project Name & Number: Onondaga Lake Pre Design Investigation 441797	**JSA No.** 024	**Date:** August 2, 2005	**New:** Yes
Location: Onondaga Lake, Onondaga County, New York	**Contractor:** Parsons		**Revised:** **April 2, 2007**
Required Personal Protective Equipment:	Level D-Long pants, safety glasses, hard hat (non conductive) non-conductive metal free boots, gloves (rubber gloves for electrical work).	**Analysis by:** R. Absolom	**Date:** August 2, 2005
	Superintendent/Competent Person	**Reviewed by:** M. Raybuck	**Date:**
Work Operation: Hot Work		**Approved by:**	**Date:**

Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
Hot Work (welding, open flame)	Burns, eye injuries	▪ Wear appropriate PPE (e.g., think leather welding gloves, welding shield/ goggles with appropriate filtered lenses; long sleeves and pants, etc.). ▪ During welding operations all employees not performing the work or providing assistance will remain back from the work zone.	
	Fire/ Explosion	▪ Have adequate fire suppression available in immediate work area. ▪ Inspect all torches, tanks, hoses prior to starting. ▪ Remove all flammable material around the work area. ▪ Provide a firewatcher. ▪ Ensure that all fuel valves and torch supply valves are shut off when not in use. ▪ Ensure that all cylinders are properly marked and kept away from heat sources.	
	Rain	▪ Be aware of work conditions and do not work in wet areas.	

	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Personnel will notify the SSO of any unsafe conditions.	
	Injury from Power Tool Operation	▪ All tools will be in good working order and properly grounded. ▪ No damaged equipment will be issued until repaired or replaced. ▪ When power operated tools are designed to accommodate guards, the guard must be in place on the tool.	▪ Follow operations and maintenance procedures for each piece of equipment used on site.
	Lack of Communication	▪ Prior to commencement of daily activities, the methods of communication will be discussed. ▪ Personnel will have access to a cell phone or other means of communication. ▪ The activities for the day will be discussed and understood prior to daily start up with review of safety issues. ▪ Batteries will be checked and recharged prior to start of days work.	

Training Requirements

All personnel engaged in the hot work will have knowledge and experience working with welding equipment, torches and other necessary equipment. All necessary certification and permits will be provided prior to start of work. All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS

Job Safety Analysis

Peeper Installation and Retrieval

JSA 025

Project Name & Number: Onondaga Lake Pre-Design Investigation Phase III	**JSA No.** 025	**Date:** January 31, 2007	**New:** Yes
Location: Onondaga Lake, Onondaga County, New York	**Contractor:** Parsons		**Revised:** **April 2, 2007**
Required Personal Protective Equipment:	Modified Level D- Long pants, safety glasses/ splash goggles, hard hat, steel-toed boots, nitrile outer gloves and latex inter gloves, tyvek coveralls, and personal floatation device.	**Analysis by:** M. Vetter	**Date:** January 31, 2007
Work Operation: Peeper Installation and Retrieval Operation	**Superintendent/Competent Person:** TBD	**Reviewed by:**	**Date:** July 5, 2005
		Approved by:	**Date:**

Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
Driving and retrieving Peepers into sediment.	Lack of Communication	▪ Prior to commencement of daily activities, the methods of communication will be discussed. ▪ Personnel will have access to a cell phone or other means of communication. ▪ The activities for the day will be discussed and understood prior to daily start up with review of safety issues. ▪ Batteries will be checked and recharged prior to start of days work.	
	▪ Inhalation of contaminated dust ▪ Inhalation of volatile contaminants ▪ Ingestion of contaminants ▪ Skin/eye contact with contaminated materials	▪ If exposure to contaminated materials occurs, promptly wash contaminated skin using soap or mild detergent and water. ▪ Wash eyes with large amounts of water. ▪ If a person breathes in a large amount of organic vapor, move the exposed person to fresh air. Perform artificial respiration if breathing stops. ▪ Keep the affected person warm and at rest. Obtain medical treatment for all of these situations as required. ▪ Wear appropriate safety equipment (i.e., goggles, gloves, boots) as appropriate for reducing risk of contamination.	

		▪ When transferring equipment and samples to land, follow procedures for demobilization.	
	Pinch Points/Overhead equipment	▪ Maintain awareness of procedures underway and be attentive of hammer and winch operations. ▪ Wear hard hats when around machinery and equipment. ▪ Keep observers back from active operations. Get operators attention before approaching.	
	Working with underwater camera and retrieval hook	▪ Be aware of other personnel and equipment that could be hit when using long poles. ▪ Use a GFCI when operating underwater camera. ▪ Be aware of camera cord that could be a potential slip hazard.	
	Muscle strain/injuries from improper lifting	▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting objects.	
	Working on the Lake-trip, slip, fall off boat Drowning	▪ Wear footwear that has sufficient traction to reduce risk of slipping. ▪ Wear personal flotation device. ▪ Be aware of any obstacles on deck.	
	Noise exposure	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or equipment. ▪ Wear earplugs when noise level from equipment exceeds 90 decibels (dBA) averaged over an eight-hour day.	
	Cold/Heat Stress	▪ Implement the cold/heat stress control program. ▪ Personnel will wear appropriate clothing to reduce the risk of heat or cold stress injury. ▪ SSO will monitor workers body conditions in extreme heat/cold.	
	Ultraviolet Radiation Hazard	▪ Personnel will wear appropriate PPE (e.g., long pants, long sleeves, etc.) and use sunscreen when appropriate.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8-hour Supervisor and annual 8-hour refresher training.

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS

Job Safety Analysis

Seepage Meter Installation And Sampling

JSA 026

Project Name & Number: Onondaga Lake Pre-Design Investigation Phase III	**JSA No.** **026**	**Date:** February 5, 2007	**New:** Yes
Location: Onondaga Lake, Onondaga County, New York	**Contractor:** Parsons		**Revised:** **April 2, 2007**
Required Personal Protective Equipment:	Modified Level D- Long pants, safety glasses/ splash goggles, hard hat, steel-toed boots, nitrile outer gloves and latex inter gloves, tyvek coveralls, and personal floatation device.	**Analysis by:** M. Vetter	**Date:** January 31, 2007
Work Operation: Seepage Meter Installation	**Superintendent/Competent Person:** TBD	**Reviewed by:**	**Date:**
		Approved by:	**Date:**

Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
Install seepage meter into sediment and collect data	Lack of Communication	▪ Prior to commencement of daily activities, the methods of communication will be discussed. ▪ Personnel will have access to a cell phone or other means of communication. ▪ The activities for the day will be discussed and understood prior to daily start up with review of safety issues. ▪ Batteries will be checked and recharged prior to start of days work.	
	▪ Inhalation of contaminated dust ▪ Inhalation of volatile contaminants ▪ Ingestion of contaminants ▪ Skin/eye contact with contaminated materials	▪ If exposure to contaminated materials occurs, promptly wash contaminated skin using soap or mild detergent and water. ▪ Wash eyes with large amounts of water. ▪ If a person breathes in a large amount of organic vapor, move the exposed person to fresh air. Perform artificial respiration if breathing stops. ▪ Keep the affected person warm and at rest. Obtain medical treatment for all of these situations as required. ▪ Wear appropriate safety equipment (i.e., goggles, gloves, boots) as appropriate for reducing risk of contamination.	

		▪ When transferring equipment and samples to land, follow procedures for demobilization.	
	Pinch Points	▪ Maintain awareness of procedures underway and be attentive of operations. ▪ Wear hard hats when installing seepage meters. ▪ Keep observers back from active operations.	
	Muscle strain/injuries from improper lifting	▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting objects. ▪ Do not overexert muscles when pushing seepage meter into sediments. If refusal is encountered, relocate to a new location and attempt installation.	
	Equipment Handling	▪ Maintain awareness of other personnel in area to prevent striking them with equipment.	
	Working on the Lake-trip, slip, fall off boat Drowning	▪ Wear footwear that has sufficient traction to reduce risk of slipping. ▪ Wear personal flotation device. ▪ Be aware of any obstacles on deck.	
	Cold/Heat Stress	▪ Implement the cold/heat stress control program. ▪ Personnel will wear appropriate clothing to reduce the risk of heat or cold stress injury. ▪ SSO will monitor workers body conditions in extreme heat/cold.	
	Ultraviolet Radiation Hazard	▪ Personnel will wear appropriate PPE (e.g., long pants, long sleeves, etc.) and use sunscreen when appropriate.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8-hour Supervisor and annual 8-hour refresher training.

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS

Job Safety Analysis

Seepage Meter Installation And Sampling

JSA 026

Project Name & Number: Onondaga Lake Pre-Design Investigation Phase III	**JSA No.** 026	**Date:** January 31, 2007	**New:** Yes
Location: Onondaga Lake, Onondaga County, New York	**Contractor:** Parsons		**Revised:** **April 2, 2007**
Required Personal Protective Equipment:	Modified Level D- Long pants, safety glasses/ splash goggles, hard hat, steel-toed boots, nitrile outer gloves and latex inter gloves, tyvek coveralls, and personal floatation device.	**Analysis by:** M. Vetter	**Date:** January 31, 2007
Work Operation: Vibracore Operation	**Superintendent/Competent Person:** TBD	**Reviewed by:**	**Date:**
		Approved by:	**Date:**

Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
Drive Vibracore into sediment and collect data	Lack of Communication	▪ Prior to commencement of daily activities, the methods of communication will be discussed. ▪ Personnel will have access to a cell phone or other means of communication. ▪ The activities for the day will be discussed and understood prior to daily start up with review of safety issues. ▪ Batteries will be checked and recharged prior to start of days work.	
	▪ Inhalation of contaminated dust ▪ Inhalation of volatile contaminants ▪ Ingestion of contaminants ▪ Skin/eye contact with contaminated materials	▪ If exposure to contaminated materials occurs, promptly wash contaminated skin using soap or mild detergent and water. ▪ Wash eyes with large amounts of water. ▪ If a person breathes in a large amount of organic vapor, move the exposed person to fresh air. Perform artificial respiration if breathing stops. ▪ Keep the affected person warm and at rest. Obtain medical treatment for all of these situations as required. ▪ Wear appropriate safety equipment (i.e., goggles, gloves, boots) as appropriate for reducing risk of contamination.	

		▪ When transferring equipment and samples to land, follow procedures for demobilization.	
	Pinch Points/Overhead equipment	▪ Maintain awareness of procedures underway and be attentive of vibracore operations. ▪ Wear hard hats when around machinery and equipment. ▪ Keep observers back from active operations. Get operators attention before approaching.	
	Muscle strain/injuries from improper lifting	▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting objects.	
	Working on the Lake-trip, slip, fall off boat Drowning	▪ Wear footwear that has sufficient traction to reduce risk of slipping. ▪ Wear personal flotation device. ▪ Be aware of any obstacles on deck.	
	Noise exposure	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or equipment. ▪ Wear earplugs when noise level from equipment exceeds 90 decibels (dBA) averaged over an eight-hour day.	
	Cold/Heat Stress	▪ Implement the cold/heat stress control program. ▪ Personnel will wear appropriate clothing to reduce the risk of heat or cold stress injury. ▪ SSO will monitor workers body conditions in extreme heat/cold.	
	Ultraviolet Radiation Hazard	▪ Personnel will wear appropriate PPE (e.g., long pants, long sleeves, etc.) and use sunscreen when appropriate.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8-hour Supervisor and annual 8-hour refresher training.

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.