

2013 Sediment Sampling Plan

Pompton Lake Acid Brook Delta Area Project

DuPont Pompton Lakes Works

Pompton Lakes, New Jersey

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1. Introduction

A conceptual site model (CSM) describing conditions in Pompton Lake resulting from releases of site-related constituents from the former operations of the DuPont Pompton Lakes Works (PLW) in Pompton Lakes, NJ was used in the development of remedial alternatives for addressing impacted sediment within the lake (ARCADIS et. al, September 2011). The CSM was based on existing data collected from 1997 to 2010 as part of environmental investigations conducted within and around the Lake that consisted of: sediment sampling; surface water sampling; environmental biota sampling; benthic and methylmercury flux chamber analysis; and laboratory ecosystem testing. These investigations were completed under direct oversight of the U.S. Environmental Protection Agency (USEPA) and the New Jersey Department of Environmental Protection (NJDEP).

USEPA has recently requested additional sediment investigations to determine current conditions of the sediments within the Lake. A series of meetings were conducted through April and June 2013 with technical resources from the regulatory agencies and DuPont to discuss the scope of additional investigations. Following these meetings, DuPont submitted an updated CSM to the agencies in June 2013 to provide additional information collected after the submission of the CMI; identify areas of uncertainty within the CSM; and provide recommendations on additional sampling to address the data gaps (ARCADIS et al., June 2013). Subsequent discussions between DuPont and the regulatory agencies defined the specific tasks and details for the data collection efforts in resolving the identified data gaps.

The purpose of this document is to describe the tasks to be completed and identify the methods to be used to address the areas of uncertainty. Sampling procedures will follow those described in previous sampling plans [e.g., DuPont Corporate Remediation Group (CRG), August 2004; CRG, January 2009] and are included in Appendix A.

2. Areas of Uncertainty

Based on a review of the current CSM and existing data as provided in the draft CSM technical memorandum (ARCADIS et al., June 2013), the following areas of uncertainty were identified for further investigation.

- 1) The 2011 and 2007 bathymetry comparison showed that, within the Ramapo River channel, two general areas of apparent sediment surface elevation decreases are

observed along with some larger areas of apparent sediment surface elevation increases. The 2011 survey did not extend down the lower Ramapo River channel to the dam, so potential changes in this area are unknown.

- 2) USEPA expressed concerns regarding the age and extent of data used to develop the CSM; and the ability of the CSM to provide a comprehensive understanding of the nature and extent of mercury as it relates to defining the final remedy for sediments within the lake. While data used to construct the CSM has been collected over time, DuPont believes the data are sufficient to understand the distribution of mercury within the lake, the fate and transport of mercury and sediments, and the potential exposure pathways. In order to confirm the CSM, additional data collection activities will be completed to meet the following objectives:
 - Historical Validation: Confirm the current understanding of mercury deposition within the lake – a subset of historical sediment sampling locations outside the 26-acre remedial area will be sampled and analyzed for mercury to evaluate whether the historical data are still valid
 - Data Set Adequacy: Confirm that the extent of the mercury concentrations in sediment has been adequately defined – additional sediment sampling will be conducted outside the 26-acre remedial area to verify that the extent of mercury is consistent with the CSM (i.e., in the lower Ramapo River channel) and to confirm mercury concentrations in areas where the sediment surface elevation has changed
- 3) In order to confirm the CSM and ecological exposure and receptors based on any new data, impacts or changes to the ecological evaluation need to be assessed. New data collected outside the proposed 26 acre remedial limit should be evaluated for the potential fate of mercury and associated exposure within the Ramapo River channel sediments to verify the current understanding that mercury in sediment does not pose a significant threat to ecological receptors.

3. Data Collection Efforts

Additional investigations will be conducted in 2013 to address the uncertainties identified in Section 2. Investigations to address uncertainties #1 and 2 are summarized below. Ecological evaluations to address data uncertainty #3 were submitted under separate cover in the Pompton Lake Ecological Investigations

Framework Document (URS Corporation [URS], June 2013), and are not discussed further herein.

3.1 Sediment Characterization (Uncertainty #1)

As indicated in the comparison of the 2011 and 2007 bathymetry, sediment surface decreases in elevation were noted in two areas. In addition, there was a data gap in the lower Ramapo River channel to the Pompton Lake Dam since no data for this stretch was available from 2011. To address the uncertainties and data gap, a bathymetric survey was performed in May 2013 to obtain current bathymetry and river bed characterization.

The survey consisted of single beam bathymetry and side scan sonar from Lakeside Avenue Bridge to the Pompton Lake Dam (excluding the area west of the previously identified RAO line). Completion of the side scan sonar work also included the collection of 30 representative samples (top 4 inches) for analysis of grain size distribution to assess the physical properties of the bed material. The resulting bathymetric and side scan sonar data (and grain size sample locations) are provided on Figures 3-1 through 3-3, respectively. Figures 3-4 and 3-5 provide a comparison of the 2007/2013 and 2011/2013 bathymetry, respectively. The following initial general observations have been noted based on the results of these comparisons; these data are undergoing further evaluation.

- The 2013 bathymetry shows an area of deeper water just downstream of Lakeside Avenue Bridge, along with deeper water areas along the length of the lower Ramapo River channel.
- The 2013 side scan sonar results show areas of gravel/sand just downstream of Lakeside Avenue Bridge, a large area with vegetation in the lake, and primarily sand along the western portion of the lower Ramapo River and silt along the eastern portion.
- The bathymetric comparisons (2007/2011 versus 2013) show that the area downstream of Lakeside Avenue Bridge has decreased sediment surface elevations with changes within the majority of the remainder of the lake within the accuracy of the surveys (or showing increased sediment surface elevations). The lower Ramapo River primarily shows areas of decreased surface elevations along the length of the center area, and areas of no change or increased surface elevations along the shorelines.

- In general, areas of decreased surface sediment elevation exhibited in the 2007/2011 comparison appear to have increased surface sediment elevation when considering differences between 2011/2013, thereby indicating these areas have filled in since the 2011 higher flow events. These data are undergoing further evaluation.

The results from the bathymetry comparisons were used to guide selection of sample locations and will be used to inform future investigative and evaluation efforts.

3.2 Additional Sampling (Uncertainty #2)

Sampling will specifically be performed to validate historic data outside the 26-acre remedial area and obtain additional data in areas with potential profile changes; and supplement existing data within the lower Ramapo River channel. These sampling efforts are further described below. The standard operating procedure (SOP) for core collection and processing is provided in Appendix A.

- **Historic Validation:** To address the uncertainty that the historical core data may not be representative of current conditions, sediment cores will be collected from approximately 30% of the historical core locations outside of the 26-acre remedial area (including the lower Ramapo River channel) and analyzed for mercury. The target locations were selected to include locations with higher mercury concentrations considering historic data results. A total of 54 sediment cores will be collected (see Figures 3-5 and 3-6), with 42 locations in Pompton Lake and 12 locations in the lower Ramapo River channel. The sampling intervals are intended to mimic previous core collection, and will target the top and bottom of the sediment layer (0 to 0.5 feet and 0.5 feet of bottom sediment layer), with the intermediate 0.5 foot layer also submitted for analysis if the recovered core has greater than 2 feet of sediment thickness. The sediment data from both the historical and newly collected core will be compared to verify whether conditions have significantly changed using the statistical evaluation approach outlined in Appendix B.
- **Data Set Adequacy:** To confirm that the extent of mercury is consistent with the CSM and determine concentrations in areas where the sediment surface elevation has changed, sediment cores will be collected in areas with limited data in the lower Ramapo River and in area(s) with a change in surface sediment elevation where mercury was previously identified in sediment above the delineation criteria

(see Figures 3-5 and 3-6) and analyzed for mercury. These cores can be further grouped into the subcategories listed below.

- Areas with similar to or increased surface sediment elevation: Cores will be collected on an approximate 100-meter by 100-meter grid (approximately 300 feet by 300 feet). A total of 18 cores will be collected.
- Areas with decreased surface sediment elevation: Cores in these areas will be collected on an approximate 50-meter by 50-meter grid (approximately 150 feet by 150 feet). A total of 8 cores will be collected.
- Supplemental data: Cores will be collected in groupings of five in between existing historic transects in the lower Ramapo River channel to increase the sampling frequency in this area. A total of 25 cores (5 groupings) will be collected.

Collected cores will be visually evaluated for material type and stratigraphic layers, and then segmented 0-6, 6-12, 12-30 inches, and every 18 inches thereafter to the bottom of sediment to assess mercury levels at surface and at depth. The segmentation scheme will be altered as necessary to accommodate stratification in recovered material layers. The segment below the sediment layer will be archived for potential future analysis.

3.3 Additional Investigations Downstream of Pompton Lake Dam (Uncertainty #2)

A general stream characterization will be conducted downstream of the Pompton Dam to Riverside Park to determine areas of deposition and guide selection of potential future sample collection locations. These efforts will consider the existing data downstream of the Pompton Dam in the planning and evaluation of potential downstream deposition of materials from Pompton Lake, including the 2004/2012 dam evaluation sampling (2004 sample result was 2.4 mg/kg and 2012 mercury results range from 0.11 to 0.34 mg/kg) and 2010 field reconnaissance and sampling (lead and mercury levels ranged from 3.9 to 80 mg/kg and non-detect to 1.4 mg/kg, respectively) (ARCADIS et al., June 2013). The investigations will include qualitative characterization of substrates to identify sediment depositional areas, collection of grab samples to visually validate substrate type (top 4 inches), and field mapping of locations and flood plain features. The number and locations of grab samples will be determined in the field during investigation efforts.

3.4 Quality Assurance/Quality Control

All cores will be collected and processed consistent with previous efforts and in accordance with the SOPs provided in Appendix A. It is anticipated that all sampling will be conducted with disposable equipment. All samples will be submitted to Lancaster Laboratories, a New Jersey certified laboratory for total mercury analysis. Quality Assurance/Quality Control (QA/QC) sampling and procedures will be performed consistent with past sampling events (Parson, June 2010), and will be collected in accordance with the QA/QC methods described in the 2005 New Jersey Department of Environmental Protection (NJDEP) *Field Sampling Procedures Manual*. A summary of analytical method and quality assurance indicators is provided in the table below.

Parameter	Mercury
Matrix	Sediment
Analytical Method	7471A
Sample Container	300 ml glass jar
Preservative	None
Preservations	Cool, 4°C
Holding Time	28 days
Method Detection Limit (mg/kg)	0.012
Practical Quantitation Limit (Reporting Limit) (mg/kg)	0.1
Required Precision (Maximum Relative % Difference)	35
Required Accuracy (Relative % Recovery)	70-130

The electronic data resulting from the sampling efforts will be reviewed via the DuPont Data Review (DDR) process. The DDR is an automated internal review process used by the ADQM group to determine if the data are usable. The data are run through an automated program and a series of checks are performed. The data are evaluated against hold time criteria, checked for blank contamination, and assessed against matrix spike (MS)/matrix spike duplicate (MSD) recoveries, relative percent differences (RPDs) between these samples, and laboratory control sample (LCS)/control sample duplicate (LCSD) recoveries, RPDs between these samples, RPDs between laboratory replicates, and surrogate spike recoveries. The DDR applies the following data qualifiers to analysis results, as warranted.

Qualifier	Definition
B	Not detected substantially above the level in the laboratory of field blanks.
R	Unusable result. Analyte may or may not be present in the sample.
J	Analyte present. Report value may not be accurate or precise.
UJ	Not detected. Reporting limit may not be accurate or precise.

QA/QC will be performed on field samples to assess the accuracy and representativeness of samples collected. Field QA/QC checks will include the following:

- Duplicate – 1 per 20 samples minimum
- Equipment Blank – 1 per 50 samples (as needed when using non-disposable equipment)
- Temperature Blank – one per shipment container

Laboratory QA/QC checks will include the following:

- MS/MSD – 1 per 20 samples minimum

All QA/QC samples will be analyzed for total mercury using the method presented above. The DDR process outlined above will be performed to determine data useability. It should be noted that inherent variability is anticipated due to the nature of the matrix and constituents and that differences may not be an indicator of data quality issues.

3.5 Schedule

It is anticipated that collection and processing of the sediment cores (total of 105 cores) will require 2 to 3 weeks to complete, excluding the additional investigations downstream of the Pompton Dam (Section 3.3) as the extent of these efforts will be determined in the field. An additional 6 to 8 weeks is estimated to be necessary for laboratory analyses, the DDR process, and data and statistical evaluations.

3.6 Health and Safety Plan

A site-specific Health and Safety Plan has been developed that is consistent with the requirements of OSHA 1910.120. DuPont has also developed a series of tools (e.g., project safety analysis, site work permits, etc.) that are used to ensure hazards are identified and where possible eliminated or measures put into place to mitigate the potential for injury. A copy of the project safety analysis (SOP) is included in Appendix A.

4. References

ARCADIS, O'Brien & Gere, Parsons, and URS. September 2011. *Pompton Lake Acid Brook Delta Area Revised Corrective Measures Implementation Work Plan. DuPont Pompton Lakes Works, Pompton Lakes, New Jersey.*

ARCADIS, O'Brien & Gere, Parsons, and URS. June 2013. *Draft Technical Memorandum: Conceptual Site Model. Pompton Lake Acid Brook Delta Project. DuPont Pompton Lakes Works.*

CRG. August 2004. *Delta Sampling Work Plan.* Draft submitted April 2004, and finalized August 2004.

CRG. January 2009. *Acid Brook Delta Uplands Remedial Investigation Work Plan. DuPont Pompton Lakes Works, Pompton Lakes, New Jersey.*

NJDEP. 2005. *Field Sampling Procedures Manual.*

Parsons. June 2010. *Uplands Remedial Investigation Report. PI#007411. Pompton Lakes Works, Pompton Lakes, New Jersey.*

URS. June 2013. *Draft Pompton Lake Ecological Investigations Framework Document. DuPont Pompton Lakes Works, Pompton Lake, New Jersey.*