

North Park Lake Sediment Characterization
Allegheny County, PA
Executive Summary

Altech Environmental Services, Inc. (Altech) prepared this Sediment Characterization Report for the US Army Corps of Engineers (USACE), Pittsburgh District (CELRP). The purpose of the report is to support a CELRP Feasibility Study for an Aquatic Ecosystem Restoration Project to remove accumulated sediment from North Park Lake and Marshall Lake, in McCandless Township, Allegheny County, Pennsylvania. Dredging specific portions of each lake is intended to significantly decrease the amount of accumulated sediment, thus expanding the quantity and improving the quality of aquatic habitat in the lakes.

North Park Lake is 75 acres in size, and as shown in the figures, the North Park Dam is situated just below the confluence of North Fork Pine Creek (which flows from the north), and Pine Creek (which flows from the west). The North Park Lake water surface level is controlled by a fixed weir located at the dam at an elevation 960 feet above Mean Sea Level (MSL). Marshall Lake, which is much smaller, is located about a mile and a half upstream of the North Park Lake Dam on the North Fork Pine Creek. A fixed weir at elevation 989 MSL controls the water level in Marshall Lake.

The purpose of the CELRP Feasibility Study is to characterize project site conditions, develop viable remedial alternatives and relative costs, propose an optimum plan, and provide a programming level cost estimate and schedule for completion of design and construction.

Remedial action alternatives currently being considered include:

- Dredging North Park Lake and repair or replacement of the outlet works at the Marshall Lake Dam;
- Complete draining and excavating lake sediments in the dry;
- Hydraulic dredging of the lake; and
- Partial draining and a combination of dredging and dry excavation.

Each of these options will require the removal and placement of a large volume of accumulated sediments. The work performed by Altech was designed to accomplish a combination of geotechnical and chemical data acquisition to support the Feasibility Study objectives. However, the primary objective of the sediment characterization was to answer the following principal study question:

Is there any chemical contaminant in sediments to be dredged from Marshall Lake or North Park Lake present at a concentration that could pose a significant risk to human health or the environment if the dredged sediments are placed in an upland area within North Park?

To answer this question, sampling, analyses and regulatory protocol were specified in the project scope of work to measure the chemical content of the most likely potential contaminants to the parts per billion level in the subject sediments. The scope of work was

based on results of a CELRP request to the Pennsylvania Department for Environmental Protection (PaDEP) for review and comment on the North Park Lake project. The scope of work included a copy of the PaDEP Draft Dredging Guidelines as the primary basis for the sampling and analyses specified.

Because measured data is at best, an approximation of actual conditions, a detailed Sampling and Analysis Plan (SAP) was designed to control the variables that effect data precision, accuracy and representativeness to within prescribed levels. As specified in the scope of work, the SAP was also based on review of relevant and applicable regulations. This review indicated that the regulation of fill materials has been contentious in Pennsylvania, and that PaDEP is in the process of promulgating a new regulation based on its current "Safe Fill" policy. The final SAP was designed to answer the principal study question by resulting in the quantity and quality of data needed to properly characterize the chemical content of the sediments by direct comparison of the results to the PaDEP [Draft] Dredging Guidelines, Clean Fill, Safe Fill and Act 2 Medium Specific Concentration criteria.

In accord with the SAP, North Park lake was subdivided into eight hypothetical Management Units (MU-1 through MU-8), representing nearly equal volumes of sediment proposed to be dredged. Sediment proposed to be dredged in Marshall Lake was defined as one Management Unit, (MU-9). Four borings were scheduled in each MU for the collection of a variety of samples for geotechnical and chemical analyses. Samples for chemical analysis were subdivided into three categories, Primary, Secondary and Tertiary. All Primary Samples were to be composite samples comprised of representative portions of all four borings in the MU and were scheduled for analysis for the presence of Total Petroleum Hydrocarbons (TPH), Total Extractable Organic Halogens (EOX), Polychlorinated Biphenyls (PCBs), chlordane, total chlorides and Target Analyte List (TAL) metals.

The analysis of Secondary and Tertiary Samples was contingent upon the results of analysis of the Primary Samples. There were four Secondary Samples from each MU for potential analysis, each was a composite of the material from the total length of one of the four borings in the MU. The Tertiary Samples were for potential analysis of USEPA Target Compound List Volatile and/or Semi-Volatile Organic Compounds (VOCs and/or SVOCs) if high values of the indicator parameters TPH and/or EOX were detected.

All field sampling of sediment was accomplished from a floating plant between October 1 and October 11, 2002 in close compliance with the approved SAP. All chemical laboratory analyses were conducted by a USACE certified laboratory in accord with rigorous quality control requirements. Remarkably consistent geotechnical and chemical results were obtained.

The boring records appear to confirm that the major source of sediment load to North Park Lake has been Pine Creek. The thickness of very soft sediments (> 11 feet) was far greater in MU-1 through MU-5, (which encompass the Pine Creek Arm of the lake and the area adjacent to the dam), than in MU-6, MU-7 or MU-8, (which extend up the North Fork Arm of the lake). It appears that Marshall Lake has performed as a retention basin where sediment carried from upstream in the North Fork watershed has been retained, or that there has been far less soil disturbing development in the upstream North Fork Pine Creek watershed.

Ten Primary Samples were analyzed, one from each of the nine MUs (PS-1 through PS-9), plus one field duplicate from MU-5, labeled PS-10. There were no PCBs, chlordane or EOX detected in any of the ten samples, and none of the detected values of TPH, TAL Metals or Chloride indicated the presence of any chemical contaminants at a highly toxic concentration. However, TPH concentrations detected in PS-1, PS-3 and both samples from MU-5, PS-5 and PS-10 exceeded the "Unrestricted Use" criteria specified in the [Draft] Dredging Guideline of 120 mg/Kg. Lead concentrations detected in samples PS-3, PS-5 and PS-10 also exceeded the [Draft] Dredging Guideline for total lead of 45 mg/Kg.

The four Secondary Samples from MU-3 and eight from MU-5 were subsequently analyzed for both TPH and lead, and the four Secondary Samples from MU-1 were analyzed for TPH. Following the [Draft] Dredging Guideline procedure, the mean concentration for the Primary and four Secondary Sample results from each MU was then calculated and substituted into the original data set for the initial primary Sample value to establish a mean and upper confidence level for the mean concentration of TPH and lead found in the subject sediment. For instance, the mean concentration value of the PS-1, SS-1a, SS-1b, SS-1c and SS-1d results for TPH was substituted into the original set of Primary Sample results for the PS-1 value.

Following this procedure, the mean value of TPH in the combined North Park Lake and Marshall Lake samples was calculated to be 59 mg/Kg, and the 95% upper confidence level for the mean concentration was 95 mg/Kg, well below the "Unrestricted Use" criteria. For North Park Lake alone, the mean TPH value was 63.5 mg/Kg and the 95% upper confidence level value was 104 mg/Kg, still well below the applicable "Unrestricted Use" criteria of 120 mg/Kg.

The mean value of lead in the combined North Park Lake and Marshall Lake samples was calculated to be 36.6 mg/Kg, and the 95% upper confidence level for the mean concentration was 49.3 mg/Kg, above the "Unrestricted Use" criteria of 45 mg/Kg. For North Park Lake alone, the mean lead value was 38.2 mg/Kg and the 95% upper confidence level value was 52.7 mg/Kg, again above the applicable criteria. While the lead data reflects levels that may be above naturally occurring lead levels, the results do not indicate significant contamination. The table of, "Trace Chemical Element Content of Natural Soils," published by the USEPA OSWER in 1983 indicates the common range of lead concentrations in soil is 2 mg/Kg to 200 mg/Kg, with an average value of 10 mg/Kg. The numerical standard proposed in the Safe Fill policy is 450 mg/Kg, 8-10 times higher than 95% upper confidence level values calculated for the mean concentration of lead in the subject sediments.

The chemical analyses results corresponded to the boring observations and geotechnical laboratory results, indicating that albeit low, nearly each measured level of each target chemical was consistently higher in MU-1 through MU-5 samples, than in MU-6 through MU-8 or MU-9 samples. The results of the sediment characterization provide defensible quantitative data to indicate that if dredged sediments from North Park Lake or Marshall Lake are placed in upland areas of the park for landscaping or recreational purposes, the in-place sediments will pose no significant risk to human health or the environment.