

**SEDIMENT SAMPLE COLLECTION &
QUALITY ASSURANCE PROJECT PLAN (QAPP)
IMPLEMENTATION REPORT**
for
**QUALITATIVE SEDIMENT ASSESSMENT
MILL RIVER AREAS I - V
THE FORMER EXIDE BATTERY FACILITY PROJECT
FAIRFIELD, CONNECTICUT**

Pertaining to:
**CTDEP Approval Letter of September 26, 2008
& Consent Order No. SRD – 193 dated October 20, 2008**

Prepared for:
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EXECUTIVE SUMMARY

I. INTRODUCTION

The activities documented herein were performed in accordance with the Sediment Sample Collection & Quality Assurance Project Plan (QAPP – cumulatively herein referred to as “the SedQAPP”) approved by the Connecticut Department of Environmental Protection (CTDEP) on September 26, 2008. The SedQAPP is presented in the document “*Sediment Sample Collection & Quality Assurance Project Plan for Qualitative Sediment Assessment, Mill River Areas I–V, Former Exide Storage Battery Facility Project, Fairfield, Connecticut*” prepared by CCA, LLC (CCA) dated March 2008 (as revised by *Addendum I* prepared in response to CTDEP comments received via telephone on September 12, 2008).

The full report documents the implementation of a comprehensive mapping of the distribution of lead impacted sediments in the Mill River study area. (an aerial image depicting the study area is presented as Figure 1). In addition to mapping the vertical and horizontal limits of lead impacted sediments, the effort also involved the collection and analysis of sediment samples for physical parameters and RCRA hazardous waste characterization (both sets of information will be useful in evaluation of alternative sediment handling, treatment and disposal options during remedial action plan (RAP) development). As detailed herein, a study of surficial soils located along the river bank adjacent to the eastern shore of Area II (Mill Pond) was also undertaken coincident with the sediment mapping effort.

The field activities which generated the information presented herein were initiated at the end of October 2008 and completed in February 2009 (including a three week break in sampling due to the formation of ice in the river). Supplemental sampling activities were performed in March 2009 in response to evaluation of data obtained from initial sampling efforts.

Following receipt of all laboratory data at the end of April 2009, the tables, graphic illustrations and body of this report were prepared to present the findings of the effort.

II. BACKGROUND

The following is a brief overview of project history in relation to Mill River issues. The complete project history is lengthier than would be appropriate to discuss in an executive summary. From 1951 through June 1981, ESB Incorporated and its corporate successors, operated the Site, an automotive battery manufacturing facility at 2190 Post Road in Fairfield, Connecticut. In 1974, the International Nickel Company of Canada, (Inco Limited), now Vale Inco, acquired ESB Incorporated. In December 1981, Inco Limited began an orderly withdrawal from the ESB battery business. In January 1983, the last part of that withdrawal was completed with Inco's sale of the automotive battery business of Exide Corporation. Under the terms of that sale, certain parts of the battery business were retained by Inco, one of which was the Fairfield, Connecticut automotive battery plant. Exide Group Incorporated (EGI), retained the site following the sale and assumed responsibility for addressing any resulting environmental issues and acquired the right to sell the Site.

In January 1982, the CTDEP, prior to Inco's sale of the automotive battery business, issued a Consent Order requiring Exide Corporation, the then owner of the Site, to remove 4,100 cubic yards of

contaminated sediment from the Mill Pond which had allegedly emanated from the Site. Compliance with the consent order was achieved by EGI in May 1983.

Subsequent to completion of the sediment removal effort, follow-up sediment studies performed by CTDEP and EGI indicated an increase in lead concentration in Mill River sediments. In November 1989, CTDEP issued an Order (Administrative Order No. WC4893) dated November 29, 1989 (the "Order") to Inco United States, Inc. and Exide Group Incorporated (EGI) requiring them to determine the sources and degree of Mill Pond contamination, if any, which might be emanating from the former ESB battery production facility at 2190 Post Road, Fairfield, CT (the "Site") and to present remediation alternatives for removal of contamination from the Mill Pond. In June 1992, EGI presented the report (June 1992 Engineering report) required by the Order in compliance with the time schedule called for in the Order.

CTDEP responded to the 1992 Engineering Report in 1998 by requiring additional investigations, primarily relating to issues pertaining to the upland factory grounds. Said investigations were performed coincident with River Sediment Human Health and Ecological Risk Assessments on behalf of EGI which resulted in a multiple submissions to and responses from CTDEP during the period of 1998 through 2003. In 2003 CTDEP approved 220 mg/kg as the remediation standard preliminary remediation goal (PRG) for lead in Mill River sediments.

From 2006 through 2008 CTDEP and EGI had several correspondences regarding the sediment remediation standard, the ultimate result of which was a January 2008 letter from CTDEP setting the sediment lead standard for Mill River at 220 mg/kg. This letter also granted EGI the opportunity to present an alternative remediation standard following an additional ecological risk based study.

In response to the January 2008 letter, EGI, 1) authorized performance of an additional ecological risk based study (approved by the CT DEP) that is currently underway and 2) submitted the SedQAPP in March 2008. The report presented herein was prepared following field activities which were initiated immediately following CTDEP's September 26, 2008 approval of the SedQAPP.

On October 10, 2008 CTDEP and EGI signed Consent Order # SRD-193 (superseding Administrative Order WC4893 and all other outstanding Consent Orders and Administrative Orders) which among other issues formalized the sediment mapping requirements.

III. SEDQAPP IMPLEMENTATION OVERVIEW

The goal of the SedQAPP was to present a proposed methodology for mapping the distribution of lead impacted sediments in the Mill River study areas with the understanding the information gathered would be used to prepare a remedial action plan (RAP) for lead impacted sediments. The methodology, as proposed, involved the collection of 440 sediment cores (to a depth of three feet below the river bottom) distributed across the individual river reaches as summarized below:

	<u>Area I</u> Upstream	<u>Area II</u> Mill Pond	<u>Area III</u> Downstream	<u>Area IV</u> Southport Harbor	<u>Area V</u> Upriver
Anticipated Individual Core Locations ¹	31	52	75	42	240

- Four sediment sample points, outside of the above described grid, were located in the Southport Harbor Mud Flats sub-area and were placed to replicate samples collected there during the 1992 Engineering Report.

Following CTDEP approval, SedQAPP implementation activities began immediately with coordination with analytical laboratories, field personnel, establishment of a global positioning system (GPS) base station and set-up of a sample processing center on the former Exide Storage Battery Facility Site (Site). Mobilization was completed and sampling activities were initiated on October 27, 2009.

Sediment cores were collected from an aluminum row boat which was positioned at approved sample grid points using in-boat GPS equipment. Sediment core samples were collected using a WaterMark™ Universal Core Head Sediment Sampler. The core head is essentially a hard nylon sleeve with a check valve onto which the sample liners (approximately 2.75" diameter X 48" long polycarbonate tubes) are attached using hose clamps and a Fernco®. The sampler was initially advanced by pushing down on a T-handle and driven deeper using a sledge hammer until a depth of three feet below river bottom was achieved (in several locations sampler refusal was encountered due to impenetrable river bottom).

At typical locations where the three foot sediment depth was achieved, retrieved sediment cores were divided into six segments and submitted for laboratory analysis (as noted in the report, Area IV cores were divided into four segments). All core samples were analyzed for total lead and percent solids. At select locations additional cores were collected for the determination of physical properties (grain size, pH & specific gravity). Portions of all sample segments contributed to preparation of composite samples which were analyzed for RCRA hazardous waste characteristic parameters. The purpose of both the physical and RCRA hazardous waste testing was to aid in the evaluation of alternative remedial activities including sediment handling, treatment and disposal methodologies during remedial action plan development.

During sample activities (and coincident plotting of actual sampling locations), it was determined that the historical aerial images used in the preparation of the SedQAP grid drawings did not accurately depict the shoreline in portions of the study area, particularly in Area V. To remedy this, a GPS survey of the project area shoreline (with the exception of Area IV) was undertaken by the field staff. Using this survey, Drawings 3 through 18 of this report were prepared which depict the current shoreline as field located.

The shoreline adjustment required the expansion of the sample grid beyond the original boundaries and resulted in the collection of supplemental core locations/samples in areas between the historically depicted shoreline and the actual shoreline encountered in the field. Deep supplemental sampling was also performed at core sample locations where the 220 mg/kg PRG for lead was exceeded in the deepest sample segment (30-36"). The purpose of the deep supplemental sampling was to effectively put a floor on the vertical extent of sediment exhibiting lead concentrations above the PRG.

As stated in Addendum I to the SedQAPP, a limited out-of-water soil investigation along the western edge of the Former Exide Battery Facility site was performed during the sediment mapping effort. Shallow soil samples were collected at twenty-eight (28) locations along the vegetated river bank and analyzed for total and leachable lead.

IV SEDQAPP IMPLEMENTATION HIGHLIGHTS

Implementation of the SedQAPP resulted in sediment core collection at four hundred and eleven (411) locations and analysis of more than two thousand individual sediment (>2,000) samples.

The following table presents the distribution of completed sediment cores across the five river reaches within in the study area.

River Reach	SedQAPP Proposed # of Core Locations	Core Locations Where Samples Were Collected ¹
AREA I	31	30
AREA II	52	50
AREA III	75	60
AREA IV	42	37
AREA V	240	234
TOTALS	440	411

¹ = Number of completed in river core locations where immediate refusal (primarily along bridge abutments and boulder reinforced shoreline areas etc.) was not encountered and a least one sediment sample was submitted for laboratory analysis.

As depicted above, samples were collected at four hundred (411) core locations. Immediate sampler refusal was encountered at less than 10% of the sample core locations.

The findings of the total lead analysis on the core sample segments, per study area, were as follows:

River Reach	Lead Concentration (mg/kg) Range/Avg. @ Given Sample Depth Below River Bottom					
	0-6"	6-12"	12-18"	18-24"	24-30"	30-36"
Area I	19 – 1,000 Avg. = 419.1	<3.0 – 2,500 Avg. = 755.0	7.5 – 1,800 Avg. = 626.1	<3.0 – 3,300 Avg. = 874.8	<3.0 – 3,600 Avg. = 879.8	<3.0 – 970 Avg. = 202.1
Area II	5.0 – 88,000 Avg. = 5,786.8	<8.0 – 45,000 Avg. = 5,929.6	<6.0 – 170,000 Avg. = 7,571.8	<5.0 – 28,000 Avg. = 2,012.0	<5.0 – 3,100 Avg. = 163.1	4.0 – 780 Avg. = 38.8
Area III	25 – 3,000 Avg. = 557.9	<4.0 – 3,200 Avg. = 712.9	<2.5 – 2,400 Avg. = 440.5	<3.0 – 1,100 Avg. = 136.6	1.25 – 580 Avg. = 49.4	<2.5 – 640 Avg. = 36.4
Area IV	9.1 – 220 Avg. = 85.4	<3.0 – 540 Avg. = 93.3	<3.0 – 1,300 Avg. = 114.8		<3.0 – 1,000 Avg. = 79.8	
Area V	4.9 – 6,200 Avg. = 264.0	<2.5 – 1,600 Avg. = 210.7	<2.5 – 3,500 Avg. = 190.6	<2.5 – 1,900 Avg. = 76.3	<2.5 – 840 Avg. = 24.3	<2.5 – 350 Avg. = 15.2

V CONCLUSIONS & PROJECT STATUS

Data gathered during the SedQAPP implementation has been tabulated and plotted graphically, as presented and discussed in greater detail in the following full report. The tabulated data was compared to the sediment lead data presented in the 1992 Engineering Report. While the grid method, sample collection methodologies and sediment segmentation varied between the 1992 Engineering Report and the SedQAPP, the volume of lead impacted sediment determined to exist in the study areas did not vary greatly. The distribution of lead impacted sediments varied in some areas, in particular, it was observed that shallow sediments in some areas were not determined to be impacted during the SedQAPP implementation as they were during the 1992 studies (this was attributed to natural river processes depositing “clean” sediments overtop impacted sediments now

that any significant lead sources to the river from the Site have been removed during upland remediation efforts in the interim between the two sediment mapping projects).

The following table presents a summary of the calculated estimate of the volume of sediment (as illustrated as the pink and blue shaded areas on Drawings 7 through 18) determined to exhibit lead concentrations greater than the approved PRG of 220 mg/kg:

	Area I	Area II	Area III	Area IV	Area V	Total Vol.
Volume of lead impacted sediment > 220 mg/kg (cubic yards)	4,440	4,980	5,910	900	12,000	28,230

As discussed above, an ecological risk (Sediment Toxicity) study of the impacts of lead in Mill River sediments on benthic organisms is underway. As presented in CTDEP Consent Order SRD-193 dated October 20, 2008, the results of this study may affect a change in the PRG for lead impacted sediment in the Mill River study area. Historically, ecological risk studies performed on behalf of EGI have indicated that a value of approximately 400 mg/kg lead in sediment is protective of the benthic community in the river. The volume of sediment in the Mill River study area which has been mapped to exhibit lead concentrations in excess of this value (400 mg/kg – illustrated as the pink shading on Drawings 7 through 18) is as follows:

	Area I	Area II	Area III	Area IV	Area V	Total Vol.
Volume of lead impacted sediment >400 mg/kg (cubic yards)	3,470	4,440	3,950	430	5,210	17,500

PROJECT STATUS

Implementation of the SedQAPP was the first step in development of a remedial action plan for lead impacted sediments (SedRAP) in the Mill River study areas. Development of the SedRAP is underway as is the evaluation of pertinent alternative remediation methodologies and compilation of lists of qualified contractors to complete the work. In addition to development of the SedRAP, the following items are being effected to expedite the start of sediment remediation activities:

Work Plan for Sediment/Soil Collection in Overbank Areas – the SedQAPP called for evaluation of areas along the study area sections of the river that may be subject to periodic flooding and therefore deposition of potentially lead impacted sediments. The details of this evaluation are presented herein. Currently, preparation of a work plan for evaluating these sediments/soils is under development.

Work Plan for Evaluation of Soils Along River Bank Located Along Eastern Shore of Area II – as detailed in the following report, portions of the surficial soils located in this area have been determined to exhibit total and leachable lead concentrations above applicable RSRs criteria. A work plan for further investigation/remediation of these soils will be presented within the SedRAP.

Permitting – in consideration of the complexity and long lead time necessary to receive many of the permits needed to implement the SedRAP, contact has already been made with several regulatory agencies and a meeting was held in June 2009 with the CTDEP permit ombudsmen and representatives of individual CT DEP bureaus to help streamline the permitting process.

Outstanding Upland Issues – as noted in the October 2006 Upland RAP Implementation Report, there are a few residual upland issues that bear addressing before/during implementation of a SedRAP in Mill River. Plans for dealing with these issues will be forthcoming once EGI has reviewed comments on the Upland RAP Implementation Report from CTDEP, specifically, the CTDEP’s position on some of these issues.