



ENTHALPY
ANALYTICAL

**TOXICOLOGICAL EVALUATION
OF SEDIMENTS FOR THE NATIONAL COASTAL CONDITION ASSESSMENT:**

**10 Day *Leptocheirus plumulosus* Marine Sediment Assay
Qualifications and Procedures Overview**

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1.0 INTRODUCTION

Enthalpy Analytical, a subsidiary of Montrose Environmental, Inc., maintains a state of the art toxicological and analytical chemistry laboratory in Hampton, New Hampshire. Originally established in 1981 as EnviroSystems (ESI), the laboratory continues to provide environmental toxicity and analytical chemistry testing services to various industrial, municipal and governmental clients.

Enthalpy Analytical's Hampton laboratory (EAH) provides a full range of environmental toxicity testing and analytical chemistry designed to support: dredge spoil disposal evaluations, ecological risk assessments of waters, soils and sediments, effluent biomonitoring; toxicity reduction evaluations; water effect ratio studies; industrial chemical evaluations and chemical registration. These tests are conducted in compliance with DOD, NPDES, SARA, CERCLA, OECD and other regulatory programs. The EAH facility provides its clients with expertise in performing standard environmental tests as well as furnishing specialized research, training and consulting services. Enthalpy Hampton staff specialists have extensive experience in all related environmental testing, quality assurance and regulatory affairs.

EAH's quality assurance program is based on Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP), ISO 17025, Quality Assurance Manual 5.3 criteria. The program also meets all criteria for TNI 2009 standards. The EAH laboratory maintains DoD ELAP accreditation for all its toxicological testing programs plus the majority of its analytical chemistry services. The Hampton laboratory also maintains primary NELAP accreditation through the State of New Hampshire Department of Environmental Services, with secondary accreditations for the States of Massachusetts, Maine, Rhode Island and Connecticut based on either our New Hampshire or DoD accreditations.

Enthalpy is pleased to partner with Normandeau Associates, Inc in assessing marine coastal sediments under the National Coastal Condition Assessment (NCCA) for the state of Massachusetts. The information provided in this document and associated materials is intended to cover the scope of laboratory capabilities and quality assurance associated with the program, as outlined in Chapter 8 of the NCCA Laboratory Operations Manual (USEPA 2015). Additional information can be furnished upon request.

1.1 General Requirements and Qualifications

EAH has extensive experience performing sediment toxicity assays. One of the assays performed most routinely by the laboratory is the whole sediment, 10-day acute exposure bioassay using *Leptocheirus plumulosus*. The species is frequently selected in assessing marine sediments, and the 10-day assay is included as part of the dredge sediment evaluation for several USEPA regions which the laboratory services. EAH maintains control charts of organism performance for these assays, as well as, historic reference toxicant data. Summaries of both these data sets have been provided under separate cover. In addition, the laboratory's standard operating procedure (SOP), Capabilities Statement, and Quality Assurance Manual are provided to detail the laboratory's quality control systems.

2.0 MATERIALS AND METHODS

2.1 Sample Collection, Preservation and Storage

Sediment samples used for toxicological analysis are submitted to the laboratory under chain of custody in containers supplied by the laboratory appropriate for the work being performed (i.e. 1-gallon high density polyethylene buckets). Upon arrival at the laboratory, all samples receive an internal sample control number and are logged into the project sample control system. Samples are assessed during this process to ensure sample container integrity, sample thermal preservation conditions, and to note any discrepancies. Sample receipt conditions are summarized and provided to the client within 24 hours of receipt. For this program, the notations in section 8.4 of the NCCA Laboratory Operations Manual will be utilized. Prior to testing, samples are placed in a secure refrigerator and stored at a temperature of $4\pm 2^{\circ}\text{C}$ until test initiation.

2.2 Control Sediment and Laboratory Seawater

Sediment for the laboratory control treatment is collected from the Hampton-Seabrook Estuary, Hampton, New Hampshire. The area is not known to receive any direct industrial inputs and has been used as laboratory control sediment in the testing of marine sediments since 1978. Data in the noted control charts represents this sediment.

Overlying seawater used in these assays is from the Hampton-Seabrook Estuary and is stored in holding tanks. Seawater is obtained through a filter system located on the bottom of the estuary at a point approximately 1 mile from the open ocean. Water in the holding tanks is re-circulated, which helps to ensure proper mixing and provides aeration. Water from the estuary has been used for the culture and maintenance of test organisms at Enthalpy since 1978.

2.3 Sediment Preparation

Prior to testing, samples are press sieved through a 2-mm stainless steel screen to remove large stones, sticks, roots, man-made material and indigenous organisms. Test vessels are then loaded with sediment and overlying water during the pre-assay phase, and allowed to stabilize for a minimum of 24 hours. Ammonia levels in the overlying and pore water are measured, and if the unionized ammonia level is ≥ 0.8 mg/L in pore water, then test initiation is delayed and the sediments are monitored until the ammonia levels reach an acceptable level. Test vessels are renewed daily with 1 volume additions of overlying water during the pre-assay phase.

2.4 Organism Procurement and Bioassay Procedures

L. plumulosus are obtained from cultures maintained by Aquatic Research Organisms (ARO), of Hampton, NH. Organisms are received directly from the supplier, as ARO's facility is directly adjacent to EAH. The same water source is used in ARO's cultures and EAH's tests. Prior to use, test organisms are held for a minimum of 2 hours under temperature, salinity, and photoperiod conditions similar to those used in testing.

The assay is performed following procedures outline in SOP QA-1446 *Acute Toxicity of Sediments to the Marine Amphipod L. plumulosus*. A copy of this protocol is provided under separate cover. Generally, the laboratory's protocol aligns with NCCA guidance, however, some modifications may be necessary (i.e. performing the assay in static mode, and applying 24-hour light for photoperiod). The laboratory will ensure that all required elements noted in sections 8.3.2 through 8.5 are met.

3.0 SUPPORT DOCUMENTS (Issued Separately)

3.1 2019-09 Enthalpy Capabilities Statement (PDF)

3.2 Enthalpy Analytical, LLC – Hampton, NH (EnviroSystems, Inc.) Quality Assurance Manual (QAM) (PDF)

3.3 SOP QA-1446-R10-*Acute Toxicity of Sediments to the Marine Amphipods L. plumulosus*-2020 (PDF)

3.4 *L. plumulosus* 10-day Laboratory Control Chart (PDF)

3.5 *L. plumulosus* Reference Toxicant Data Summary (PDF)