

TOXIC CONTAMINATION

Introduction

The contaminants component of the LIS Monitoring Program should be capable of yielding answers to the following questions:

- What are the spatial and temporal trends in contaminant levels in the LIS ecosystem? (Emphasis should be placed on those contaminants that already exceed, or that are approaching, regulatory or toxicological limits.)
- What are the sources -- their locations and strengths -- of contaminants to LIS?
- What are the sinks -- their locations and strengths -- of contaminants within LIS?
- Are contaminant levels adversely affecting the health of living resources?
- Are contaminant levels in seafood harvested from the Sound of public health concern?

Background

To protect and restore Long Island Sound from the adverse effects of toxic substances, the Management Conference recommends existing regulatory and pollution prevention programs be continued and, where

appropriate, enhanced to reduce toxic substance inputs to Long Island Sound. The plan also highlights the need to further evaluate sediments where toxic contamination problems exist to determine the feasibility of remediation and to coordinate and strengthen monitoring activities for toxic substances to improve understanding and management of toxic contamination problems.

The following sections describe the recommended monitoring program for Long Island Sound. The monitoring program is divided into a minimalist program and a set of desirable additions. The minimalist section would provide the minimum information needed to adequately describe the condition of LIS with respect to contaminants. The desired additions represent a mixture of research and monitoring activities that would be highly desirable if resources permit.

The following existing monitoring programs are of direct relevance to the LIS Monitoring Program.

- NOAA's National Status and Trends (NS&T). The Benthic Surveillance and Mussel Watch components of NS&T sample LIS at a frequency of once every two years. This is down from an annual frequency.
- EPA's Environmental Monitoring and Assessment Program - Estuaries (EMAP-E). This program has sampled LIS on an annual basis for the past four years (1990-94).

The sampling frequency will be decreased, at least temporarily. The next sampling of LIS is not scheduled until 1997.

- EPA's REGIONAL ENVIRONMENTAL MONITORING AND ASSESSMENT PROGRAM (REMAP). This two-year program will assess sediment quality over the entire New York-New Jersey Harbor, Bight Apex and western Long Island Sound. Information on toxic contaminants in sediment and biological effects indicator) benthic community gradients, toxicity tests), will be summarized and compared for the entire region.
- NEW YORK STATE AND CONNECTICUT POINT SOURCE COMPLIANCE MONITORING PROGRAMS. New York State and Connecticut require compliance monitoring that can be used to document the inputs of a suite of contaminants from point sources to the Sound and to rivers and streams that discharge into the Sound.
- NEW YORK STATE AND CONNECTICUT FISH AND SHELLFISH TISSUE MONITORING PROGRAMS. New York State currently monitors striped bass and other fish and shellfish tissues for PCBs, organochlorine, and metal contamination. Connecticut monitors lobster tissue for PCB and metal contamination.
- U.S. GEOLOGICAL SURVEY (USGS) MONITORING OF TRIBUTARIES. The USGS monitors flow, suspended solids, contaminants -- mostly metals -- and other constituents at a

network of stations on major tributaries to the Sound. The most seaward stations are above the limits of tidal influence.

- U.S. ARMY CORPS OF ENGINEERS DISPOSAL AREA MONITORING SYSTEM (DAMOS). The U.S. ACOE performs monitoring studies to better manage dredged material disposal effects at the Long Island Sound disposal sites.

Adequacy of Existing Programs to Answer Key Questions Regarding Contaminants in LIS.

The following conclusions were arrived at during the workshops.

- NOAA'S NS&T Program is adequate to chronicle temporal changes in contaminants at the locations sampled in LIS and offers the opportunity to compare LIS sites with other sites locally, regionally and nationally. However, the NS&T Program does not provide adequate spatial resolution to identify the specific source(s) of contaminants from among the array of point and nonpoint sources. This is not the intent of NS&T Program, but it needs to be an objective for the LIS Monitoring Program.

The adequacy of the characterization of inputs of contaminants to LIS remains an open question.

Minimalist Program

Programmatic Monitoring

There are many existing programs and authorities focusing on the management of toxic substances. The LISS management plan highlights within tables specific actions to manage toxic substances through regulatory and pollution prevention programs, sediment contamination management, and risk communication. Of particular importance are permit and enforcement programs for direct and indirect discharges.

Following are general programmatic areas for which progress must be tracked and evaluated.

- The review of municipal and industrial discharge permits by the states of New York and Connecticut to reduce the allowable concentrations of toxic pollutants from previous values in order to meet adopted criteria for toxic substances.
- The number of multimedia pollution prevention assessments.
- The number of evaluations of consumption advisories performed.
- The development of Total Maximum Daily Loads, Waste Load Allocations for point sources, and Load Allocations for nonpoint sources to ensure that water quality standards for mercury are

met in New York Harbor (thereby improving conditions in the western Sound).

Environmental Monitoring

NOAA's NS&T Program should be the core of the LIS Monitoring Program's contaminants component. To provide the level of spatial detail needed, however, some additions are required. Additions to existing programs are in italics.

Where: The NS&T program has 12 sites in LIS. *The LIS Monitoring Program should develop a network of 10 LIS harbor stations to complement NOAA'S NS&T stations.*

When: The 12 NS&T sites are visited every two years. The additional harbor status should be sampled every four years.

How: NOAA should be asked officially to supplement, once every four years, their routine sampling program to include selected LIS harbors. The Director of the NS&T program indicated that NOAA would collect the desired sediment and bivalves samples at no cost to the LIS Monitoring Program and would arrange to have the samples analyzed by the same laboratories that analyze their samples. The LIS Monitoring Program would have to cover the costs of analysis. NOAA's NS&T Program will supply data and information in the near future which will provide the basis for selecting specific harbors for study. Sites with

contamination problems could then be subject to remediation assessment. The LISS has already identified Black Rock Harbor in CT and Glen Cove Creek in NY as areas where additional assessments should be conducted and site plans developed to address the feasibility, technical approach, cost, and value of conducting sediment remediation projects.

Data: All sampling of dissolved contaminants in the water column should be dropped. Measurements of Antimony should be dropped from all media. Methyl Mercury should be added.

Who: NOAA's NS&T Program is adequate to chronicle temporal changes in contaminants at the locations sampled in LIS and offer the opportunity to compare LIS sites with other sites locally, regionally and nationally.

The Benthic Surveillance and Mussel Watch components of NS&T sample LIS at a frequency of once every two years. This is down from an annual frequency. However, the existing Mussel Watch Program was not designed to identify the specific source(s) of contaminants from among the array of point and nonpoint sources, which is an objective of this monitoring program.

Fish and Shellfish Flesh Analysis

A comprehensive monitoring program for toxic substances in edible fish and shellfish should be implemented to ensure compliance with the newly proposed Food and Drug Administration's fish safety initiative. The primary objective is to protect the public health, but there are other scientific reasons for analyzing fish and shellfish flesh.

Who: Sampling is currently being done by New York and Connecticut but at a minimal scale. The LISS has already estimated the additional cost of implementing such a program at \$300,000 per year.

Desirable Additions

- *Sampling of Dioxin, Coprostanol, and Linear Alkyl Benzenes*

Sampling of these constituents at infrequent intervals might provide important information on patterns and trends of contaminants in LIS and on their sources.

- *Brown Macroalgae Research*

Brown macroalgae may be effectively used to provide additional information on the levels and biological availability of dissolved contaminants. Since the only forms of contaminants that macroalgae can take up are dissolved forms, they may provide low

cost, sensitive indicators of patterns and trends of dissolved contaminants.

Where: In a few carefully selected harbors.

How: Ascophyllum occurs all along LIS shorelines throughout the year and would be a good candidate for the brown macroalga.

We recommend a highly focused research project to be carried out. The analyses should be conducted by the same laboratories used by NOAA's NS&T to ensure QA/QC.

- *Determination of the Atmospheric Inputs of Contaminants*

The initial task is to assess whether the atmosphere is a significant input of contaminants. If it is, an appropriate atmospheric component should be added to the LIS Monitoring Program.

Where: We recommend that the current research effort be supplemented by adding one station in WLIS, and one either in the Central Sound or in the Eastern Sound.

How: Standard sampling protocols, such as those developed in the SEAREX Program, should be used. These might be supplemented with a very few salt marsh sites.

Who: A modest research effort is already underway at Stony Brook's Marine Sciences Research Center using salt marshes to measure atmospheric deposition of contaminants. This effort could be expanded.

Other Important Research Topics

Listed below are other important research topics. They are generic in their importance to interpreting contaminant monitoring data from coastal marine systems, including LIS.

- Contaminated sediments need to be evaluated as sources of contaminants and not simply as sinks. The physical, chemical, biological and geological conditions that determine whether sediments are sources, or sinks, need to be assessed more fully. Contaminated sediments may exert an influence on the biota and on the overlying waters long after the ultimate sources of contaminants to the sediment have been shut-off.
- Long-term, chronic toxicity studies need to be carried out to permit development of more diagnostic sediment quality criteria. It is time to move beyond short-term, acute toxicity tests.
- The search for more sensitive, more subtle, and more diagnostic bioindicators and biomarkers of toxic conditions needs to be enhanced and sustained.

- Research needs to focus on the relationships between body burdens and toxicity, rather than on the more conventional approaches of relating environmental concentrations to toxicity. Organisms respond to what's in them; not to what's around them.
- Research needs to focus on the role of Acid Volatile Sulfides in sediments in modifying sub-lethal effects of metals on organisms.
- The large variations in the levels of contaminants in bivalves from nearby harbors cannot be explained. Research is needed to quantify the source terms of potential contaminants to bivalves. These include: contaminants in food, and contaminants dissolved and bound to sediments.
- Research is needed to clarify synergistic/antagonistic toxicity interactions between or among contaminants when more than one contaminant is present.

