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United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-248231

May 19, 1992



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The Honorable Alfonse M. D'Amato
United States Senate

Dear Senator D'Amato:

This letter responds to your October 7, 1991, request that we examine water quality problems in Long Island Sound and the strategies designed to address them. In response to the water pollution caused by excessive nitrogen, the Environmental Protection Agency (EPA) and the states of New York and Connecticut agreed in 1991 to implement a strategy to prevent net increases of nitrogen in the Sound. In addition, EPA, the states, and others are considering what further actions may be needed in the future to reduce nitrogen levels to restore water quality. Given the potential economic impact of these strategies, you asked us to provide information on (1) the sources of the nitrogen entering Long Island Sound and (2) the costs associated with the no-net-increase strategy. We are also providing information on the strategies under consideration to reduce nitrogen loadings (discharges) into the Sound.

In summary, sewage treatment plants are the primary source of the nitrogen produced from human activities that enters the Sound. In general, treatment plants are not designed to remove nitrogen. Although implementing the no-net-increase strategy will impose some costs on municipal sewage treatment facilities, EPA and state officials believe that the strategy can be implemented with available funds. However, other strategies under consideration to reduce nitrogen discharges from treatment facilities could cost as much as \$6.5 billion. Given the potential costs and political sensitivity of the various strategies, EPA and the states have solicited public participation to ensure that the views of affected parties are represented.

GAO/RCED-92-171R, Nitrogen Pollution in Long Island Sound

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BACKGROUND

Since 1985, EPA has been involved in conducting a research, monitoring, and water quality assessment program for Long Island Sound. In 1988, a study group comprising representatives from EPA's Regions I and II, the states of New York and Connecticut, industry, environmental groups, and other organizations was formed to develop a Comprehensive Conservation and Management Plan for Long Island Sound. In December 1990, the study group issued a status report that contained information on the sources and effects of nitrogen loadings into the Sound, along with recommendations for interim actions pending completion of the final management plan.¹ Among other things, the status report recommended that New York and Connecticut adopt a "no-net-increase" policy for nitrogen --the pollutant of primary concern in the Sound. Under this policy, point sources of nitrogen would be required to limit their discharges to 1990 levels. This recommendation was formally adopted by the states in September 1991. The study group is currently completing the Comprehensive Conservation and Management Plan, scheduled for issuance in November 1992.

SOURCES AND EFFECTS OF NITROGEN IN LONG ISLAND SOUND

According to the 1990 status report, the levels, sources, and effects of nitrogen entering Long Island Sound are well understood. The report estimated that approximately 91,000 tons of nitrogen enters the Sound annually. Of this amount, slightly more than half (about 51,000 tons, or 56 percent) originates from human activities rather than natural sources. The majority of the nitrogen generated from human activities comes from sewage treatment plants that discharge wastewater into the Sound or its tributaries. Other human sources of nitrogen include effluent from industrial facilities, deposition from the atmosphere, overflows from combined stormwater and sewer systems, and runoff from diffuse, or nonpoint, sources. Most of the roughly 40,000 tons of nitrogen from natural sources comes from the ocean, entering the Sound through the East River off Manhattan and The Race off the coast of Connecticut.

¹Long Island Sound Study: Status Report and Interim Actions for Hypoxia Management (Dec. 1990).

High levels of nitrogen deplete the amount of dissolved oxygen in water, creating a condition known as hypoxia. Although nitrogen from natural sources can cause hypoxia in estuaries, the high levels of nitrogen from human activity near the Sound have extended the area affected by hypoxia and the duration of the condition beyond what once occurred naturally. An ongoing study of oxygen depletion in the Sound indicates that minimum dissolved oxygen levels have fallen over the last four decades, especially in the extreme western Sound.

Hypoxia typically occurs in the late summer in the Sound. Its effects on marine life have been severe. For example, in late July and August of 1987, researchers found extremely low levels of dissolved oxygen in the western Sound and almost no oxygen in some of the waters along the north shore of Long Island. Marine life samples taken in these areas revealed an absence of fish and an 80-percent mortality rate among invertebrates such as starfish and crabs. Unable to escape the low-oxygenated waters, lobsters caught in traps also died. More recent data show that during the summer of 1989, approximately 40 percent of the Sound had extremely low levels of dissolved oxygen, resulting in 42 percent fewer fish and lobsters in these areas. According to the status report, computer simulations forecast worsening conditions if nitrogen controls are not implemented.

COSTS ASSOCIATED WITH THE NO-NET-INCREASE STRATEGY

According to EPA and state officials, the no-net-increase policy can be implemented with available funds. Under the policy, 1990 baseline levels are calculated for major point-source dischargers of nitrogen into the Sound or its tributaries--almost all of which are municipal sewage treatment plants. These facilities will then, for the most part, be required to limit their nitrogen discharges to these levels. A number of these facilities have also been identified as candidates for relatively minor modifications that will allow them to reduce their nitrogen discharges below 1990 levels. These reductions can then be used to offset, or credit, the discharges of facilities that are unable to meet their 1990 discharge

limits so that all of the plants' total discharges remain at or below 1990 levels.²

According to an official from Connecticut's Department of Environmental Protection, the minor modifications planned at 15 sewage treatment plants to implement the no-net-increase strategy can be achieved with available funds and should cost less than \$15 million. Furthermore, these modifications should even result in net reductions of nitrogen discharges from the state's sewage treatment facilities. Officials from New York's Department of Environmental Conservation believe that the no-net-increase strategy can be implemented without significant costs. Both states have agreed to provide technical and financial assistance, where possible, to facilities undergoing plant modifications.

POTENTIAL COSTS OF STRATEGIES TO REDUCE NITROGEN DISCHARGES

Although EPA and the states maintain that the no-net-increase policy should not involve substantial costs, other strategies under consideration to reduce overall nitrogen levels may be expensive. The 1990 status report notes that alternative strategies and associated costs are still under development and will be discussed in greater detail in the final Comprehensive Conservation and Management Plan. The status report briefly describes three potential strategies and provides a cost estimate for the most comprehensive of these:

- The low-level management scenario calls for reducing nitrogen loads from coastal sewage treatment plants by 20 percent and from point and nonpoint sources along two major tributaries by 8 percent. These actions would reduce human-derived nitrogen by 14 percent overall.
- The mid-level management scenario calls for reducing nitrogen from coastal sewage treatment plants by 50 percent and from sources along tributaries by 25 percent, for an overall reduction of 37 percent.

²New facilities will be required to install "best treatment technology" for nitrogen removal. Reductions of nitrogen resulting from modifications to existing plants are anticipated to more than offset any nitrogen loadings from new facilities.

-- The high-level management scenario calls for reducing nitrogen from coastal sewage treatment plants by 72 percent, from sources along tributaries by 35 to 40 percent, from coastal nonpoint sources by 13 percent, and from atmospheric deposition by 30 percent. According to the status report, this option would reduce nitrogen overall by 55 percent. Costs of capital improvements for sewage treatment plants could run as high as \$6.5 billion.

According to EPA and state officials, decisions on how best to address the nitrogen problem in the Sound have incorporated, and will continue to incorporate, environmental and economic considerations. Given the potential cost and political sensitivity of the various strategies, EPA and the states have formed a citizens' advisory committee to ensure that the views of affected parties are represented. The citizens' advisory committee includes representatives from the fishing and construction industries, municipalities, and environmental groups. In addition, 14 public meetings were held in January and February 1991 to publicize and obtain comments on the status report. Comments voiced at these meetings ranged from concerns that the no-net-increase policy was not stringent enough to concerns that the policy would have a negative impact on the local economy. According to EPA, these comments will be addressed in the final Comprehensive Conservation and Management Plan, and additional public meetings will be held when that document is released.

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To obtain information on the issues discussed in this letter, we conducted in-person and/or phone interviews with officials from EPA's Region II Water Management Division, New York's Department of Environmental Conservation, Connecticut's Department of Environmental Protection, and the building industry's representative to the Long Island Sound Study Citizens Advisory Committee. Additionally, we examined a number of documents, including the 1990 Long Island Sound Study: Status Report and Interim Actions for Hypoxia Management and a summary of public comments on the status report.

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If you have any questions on the information contained in this letter, please call me on (202) 275-6111.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Richard L. Hembra".

Richard L. Hembra
Director, Environmental Protection
Issues

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