# New York Harbor Complex UAA

## *Abstract*

**Complexity:** Medium
**Type of Action:** Assign aquatic life & recreational uses
**Region:** 2
**131.10(g) Factors:** 3

A 1985 use attainability analysis (UAA) documents the assessment of waters in the New York Harbor Complex that were not thought to meet Clean Water Act (CWA) section 101(a)(2) goals. In the UAA the New York State Department of Environmental Conservation (NYSDEC) presents historical data on total and fecal coliform and dissolved oxygen, as well as the results of steady-state modeling. The segments considered are effluent-limited waters (i.e., the technology-based effluent limitations required by the CWA are inadequate to meet the water quality standards), with impairment from urbanization, combined sewer overflows (CSOs), and other point and nonpoint source discharges. In the UAA NYSDEC recommends that several segments should be assigned both aquatic life and recreational uses. NYSDEC also recommends that some uses be retained and proposes future monitoring and assessment.

## *Background*

The New York Metropolitan Area, with its dense population and development, severely affected the marine ecosystems of the Hudson, the East River, and other waterbodies in the New York Harbor System. Historically, these waters were forced to assimilate large discharges of municipal and industrial waste, as well as intermittent waste from wet weather discharges. A large portion of the waste had not been treated prior to discharge. In addition to conventional pollutants, the discharges contained a wide assortment of toxic substances that polluted the water and sediments in the harbor.

Sources of pollution in the New York Harbor System included stormwater discharges, combined sewer overflows (CSOs), discharges from water pollution control plants, untreated sewage discharges, urban runoff, wastewater treatment plant and sewer leaks, and bypasses on both sides of the river. In 1985 New York Department of Environmental Conservation (NYSDEC) conducted a use attainability analysis (UAA) to further identify the sources of pollution and water quality conditions. In the UAA the NYSDEC found impairment from total and fecal coliforms, suspended solids, dissolved oxygen (DO), biochemical oxygen demand (BOD), and sediment.

### Applicable New York Water Quality Standards

Marine waters in New York are classified on a best use basis. The best uses are ranked according to the water quality requirements of the use. Four designated uses are considered in the classification scheme—shellfishing (SA), bathing/primary recreation (SB), fishing (SC), finfish propagation (I), and fish survival (SD). General aquatic uses (e.g., aesthetic enjoyment and maintenance of fish and wildlife) are assumed in all classifications. A best use classification includes all the uses in the lower classifications and excludes the uses specified in the higher classifications. For example, a primary recreation classification would show all uses except the taking of shellfish for market purpose, which is a higher use specified in the shellfishing classification. The classification system also precludes a higher use if the standards of a lower use are being used. For example, if the waterbody is not suitable for fishing, it is also unsuitable for swimming.

For best use classification, the state has water quality standards that must be met to protect and preserve the intended use of the water, and criteria for DO, coliform bacteria, pH, temperature, dissolved solids, turbidity, color, taste and odor, floating materials, oil, and toxic wastes apply. Because all waters in New York are intended for general uses, such as aesthetic enjoyment and maintenance of fish and wildlife, most criteria apply to all the marine waterbodies regardless of classification. Only the DO, coliform bacteria, and toxic waste criteria vary among different classifications.

### *Data Collection and Analysis*

In 1985 NYSDEC performed a UAA because several portions of the Harbor did not meet the section 101(a)(2) goals of the CWA (fishable/swimmable). The UAA used data from the New York City 208 planning process, as well as an environmental impact statement from the North River Pollution Control Project, a final report for the Red Hook Water Pollution Control Project, New York State Department of Health pre-classified studies of the Lower Hudson and Lower East River, a NYSDEC study of water quality and waste assimilative capacity of the Hudson River, a water quality assessment of marine CSO abatement along the New Jersey shore, surface water quality standards for New Jersey, facility plans for the Coney Island and Owls Island water pollution control plants, a New York Harbor Complex UAA performed by New Jersey Department of Environmental Protection in 1985, and the New York State Water Quality Standards Attainable Strategy.

In the 1985 UAA, the authors estimated wastewater flow to the New York Harbor Complex from sources such as CSOs, untreated sewage discharges (point sources), other urban nonpoint sources, and treated effluent (not disinfected in winter) from New York and New Jersey. The goal of the UAA was to refine water classifications, create new criteria, and modify standards. The New York City Department of Environmental Protection assessed attainable uses in each of the waterbodies and evaluated various water quality alternatives to determine the amount of treatment necessary to attain the objectives of each alternative. In some cases, it was determined that treatment would allow the classification and use to be upgraded.

Various treatment alternatives were examined for each waterbody in an effort to upgrade each waterbody's classification and use when possible. Such alternatives included the secondary treatment alternative (all water pollution control plants achieve secondary treatment of waste) and the zero discharge alternative (zero discharge of pollution with 90 percent CSO control).

#### Hudson River and Upper New York Bay

On the basis of its analysis, the New York City Department of Environmental Protection did not believe that there were potentially exploitable commercial shellfish populations in the Hudson River within New York City and Westchester and Rockland counties. The assessment was based on a review of biological data collected by a number of institutions and consultants documenting that there was not an extensive population of commercially important shellfish species in the area. At the time of the study, it was not clear whether the absence of shellfish was due to pollutants or to physical or environmental reasons.

For the Hudson River and Upper New York Bay (classified as I), the authors assessed shellfish and bathing potential. Designation of the swimming use for the Hudson River and Upper New

York Bay depended on attaining the coliform standard of 200 most probable number (MPN) fecal coliforms per 100 mL. At the time of the UAA, significant bacterial pollution was present in most of the metropolitan Hudson, especially below its confluence with the Harlem River. The principal sources of bacterial pollution were heavy discharges of untreated and inadequately treated sewage from New York and New Jersey. Other sources of coliforms might have included CSOs, urban runoff, treatment plant and sewer leaks, and bypasses on both sides of the river. It was estimated that with the secondary treatment level alternative (all plants at the secondary level), fecal coliform levels in the Hudson River between the state line and its confluence near the Harlem River would fall below the criterion for SB classification (swimmable). On the basis on anticipated future improvements, it was recommended that the Hudson River segment between the state line and its confluence with the Harlem River be upgraded to SB classification.

For the Hudson River segment between the Harlem River junction, the Battery, and the Upper New York Bay, secondary treatment was predicted to lower the fecal coliform level to less than the existing Class I criterion, but not enough to meet the SB classification. Only the zero discharge alternative with 90 percent CSO control was predicted to reduce coliforms to achieve swimmable goals (but not enough to attain shellfish goals).

**East River and Harlem River**

The East River (classified as SD) was assessed for fish passage. At the time of the UAA, the river had strong tidal currents and a deep hard substrate, which provided a limited and harsh environment. River encroachment by a landfill, dredging, blasting, and pollution had caused severe physical changes to the river. However, several studies indicated that fish, benthic organism, phytoplankton, zooplankton, and periphyton populations existed in the East River. In fact, the community in 1985 was similar to that which had existed 200 years before and consisted of species that can tolerate a harsh environment. On the basis of this information, the authors concluded that the classifications for the East River and Harlem River should be upgraded to Class I for fish propagation.

The principal sources of bacterial pollution in the East River were discharges of untreated sewage from the Red Hook drainage area in Brooklyn. Other sources of coliforms might have included CSOs, urban runoff, plant and sewer leaks, and bypasses on both sides of the river. Analyses showed that with the secondary treatment alternative (all plants at the secondary treatment level), fecal coliform would not fall below the criterion for SB classification. Even the zero discharge alternative with 90 percent CSO control was not predicted to achieve sufficient reduction of coliforms to meet swimmable or shellfishing goals.

**Jamaica Bay**

At the time of the UAA, Jamaica Bay was classified for swimming (SB). It was noted that hard clams existed in the bay. For the bay to be designated SA (direct shellfish harvesting), a coliform standard of 70 MPN total coliform per 100 mL had to be met. The principal sources of bacterial pollution in Jamaica Bay were attributed to CSOs. Various treatment alternatives were considered in the analysis. The secondary treatment alternative was not predicted to lower total coliform levels below the criterion for direct shellfishing (SA). In addition, the zero discharge alternative with 90 percent CSO control was not predicted to achieve sufficient coliform reduction to meet swimmable or shellfishing goals.

**Lower New York Bay**

Lower New York Bay was classified for swimming (SB). As in Jamaica Bay, hard clams were present. For the bay to be designated SA (direct shellfish harvesting), a coliform standard of 70 MPN total coliform per 100 mL had to be met. The principal source of bacterial pollution in Lower New York Bay was carry-over discharges of untreated and inadequately treated sewage from New York and New Jersey. Other sources of coliforms might have included CSOs, urban runoff, plant and sewer leaks, and bypasses on both sides of the river. The secondary treatment alternative was not predicted to lower total coliform levels below the criterion for direct shellfishing (SA). However, the zero discharge alternative with 90 percent CSO control was predicted to achieve sufficient coliform reduction to meet direct shellfishing goals.

Table 1 describes classifications pre-UAA and recommended classifications post-UAA, based on water quality in the waterbodies and anticipated future improvements.

**Table 1. Classification and Best Use Specification of Waterbodies Not Meeting CWA Section 101(a)(2) Goals and Recommended Classification Upgrades (from the 1985 UAA)**

| Waterbody | Classification (pre-UAA) | Recommended classification (post-UAA) | Change |
|---|---|---|---|
| Hudson River<br>- From the Harlem River confluence to the New Jersey/New York border | I (Fishing) | SB (Bathing) | Use upgrade |
| - From the Harlem River to Battery | I (Fishing) | I (Fishing) | No change |
| Upper New York Bay | I (Fishing) | I (Fishing) | No change |
| Lower New York Bay | SB (Bathing) | SB (Bathing) | No change |
| Jamaica Bay | SB (Bathing) | SB (Bathing) | No change |
| East River (from the Battery to Flushing Bay) | SD (Fish Passage) | I (Fishing) | Use upgrade |
| Harlem River<br>- East River to Washington Bridge | SD (Fish Passage) | I (Fishing) | Use upgrade |
| - Washington Bridge to Hudson River | I (Fishing) | I (Fishing) | No change |

**Assessment of Alternatives**

In assessing possible alternatives, only the zero discharge alternative with 90 percent CSO control was predicted to achieve sufficient coliform reduction to achieve the shellfishing/swimming goals for most of the New York Harbor Complex. In some cases, the zero discharge alternative was not predicted to produce sufficient coliform reductions to achieve shellfishing goals. However, the New York City 208 report, from which data were taken for the 1985 UAA, concluded that environmental, technical, and institutional factors made this alternative unfeasible. If the alternative were implemented, projected improvements in water quality might not occur because the precision of the model used to predict the improvements was not demonstrated for total and fecal coliforms. In addition, the remaining 10 percent of CSOs not controlled by the alternative would still affect the Lower New York Bay. The estimated reductions in coliforms (from chlorination of primary-treated captured CSOs) might also have been overestimated. The New York City 208 report also noted that the applicability of steady-state models to CSO and coliform bacteria analysis is limited.

To meet the fishable/swimmable water quality goals of the CWA, CSO abatement in the New York Harbor area was found to be crucial. The zero discharge alternative would entail in-line (sewer) and off-line storage, followed by primary treatment and disinfection. The total cost of this control method was found to be significant, and the engineering feasibility had not yet been established at the time of the 1985 UAA. A detailed study throughout the harbor was deemed necessary to demonstrate the feasibility of the control option.

### *Conclusions*

The 1985 UAA had several conclusions. First, NYSDEC recommended an upgrade of classification and best use for several waterbodies analyzed in the UAA. NYSDEC concluded that a CSO abatement program might be necessary to comply with current water quality standards and to protect the designated uses. A more detailed evaluation of CSO problems and abatement alternatives for the New York Harbor Complex was deemed necessary. Finally, the study showed that additional research should be performed because other treatment/abatement alternatives for CSOs, which had not been evaluated in the New York City 208 planning process, might result in the goal of water quality suitable for swimming and shellfishing. EPA approved the changes to designated uses as part of a water quality standards review.

### *References*

NYNYSDEC. 1985. *Use Attainability Analysis of the New York Harbor Complex*. New York State Department of Environmental Conservation, Division of Water.