Meeting the Long Island Sound Watershed Challenge
Presentation Outline

- Introduction
- Early work
- Regulatory Milestones
- No-Net Program
  - Local concerns
- Interim Upgrades
  - Funding mechanism
- Trading Program
  - Concerns and acceptance
  - Value to municipalities
- Upper LIS Watershed Program
Introduction

• Long Island Sound watershed approach
  • Stepwise
  • CT and NY
  • Upper Long Island Watershed (MA, NH, VT)

• Involved
  • Treatment plant personnel
  • Government agencies
  • NGOs and citizen action groups
Early Work

- Mid-late 1980’s Long Island Sound water quality impaired
  - First discussions of nitrogen impacting Long Island Sound
  - 1987 Designated Estuary of National Significance
  - Implemented monitoring program
    - Both influent and effluent
Early Work

- Starting experimenting with modifying operation at Stamford treatment plant
- Received grant from CT-DEP to continue research
- Published “Minor Process Changes for Major Nitrogen Reductions” July 1991
Creating an Anoxic Zone

Influent or Primary Effluent → Anoxic Zone → Aerobic Zone → Nitrate Recycle → WAS

RAS
Stamford Results

- **Anoxic (no-cost)**
  - Annual average 8.5 mg/L over temperature range of 11° C to 23° C
  - Without recycle except for RAS
  - Nitrate recycle would have improved results

- **Cyclic Aeration (turning mechanical aerators on and off a specific time intervals) (no-cost)**
  - Average effluent total nitrogen over thirty day operating period-9 mg/l over temperature of 19° C to 24° C
No-Net Policy

- 1991 “No Net Nitrogen Increase Policy”
- Concern from plants and municipal leaders
  - Penalties
  - Law suits
  - Impact on development
- CT Conference of Municipalities and citizen groups
  - Believers and non-believers
  - Concern about New York
Interim Upgrades

- EPA approved CCMP in 1994
  - Nitrogen discharge results in hypoxia
- CT-DEP provided grants (up to $3 M) for coastal CT treatment
  - Based, in part, on results of operational modification research
Nitrogen General Permit and Trading Program

- TMDL approved in 2001 for TN
  - Reduction of 64% TN discharged by 2014
- CT created Nitrogen Credit Trading Program
  - Controversial
  - Treatment plant personnel
  - CT Conference of Mayors
Nitrogen Trading Program

- All POTW's faced a permit limit (N General Permit)
- Municipalities liked
  - If it is cheaper for them, they could buy credits at a rate determined by its trading ratio (distance from the Sound) to meet its permit instead of pursuing an upgrade.
  - Plants that upgrade could sell credits for N reduced beyond the permit limit
    - Some plants, such as Stamford, are making about $1 million/yr
Upgrading Plants

- Most treatment plants in CT were built during construction grants program and needed upgrading
- CT-DEP provided
  - SRL funding for general plant upgrades
  - Provided 30% grants for incremental nitrogen upgrades
Upper Basin Water Shed
Upper Long Island Sound Watershed
Low-Cost N Removal Program

The objectives of this Project were to:

- Perform a detailed and accurate evaluation of the treatment plants:
  - existing and design capacity,
  - expected near term future flows, seasonal flow and load variation,
  - capacity of bioreactors and clarifiers and
  - wastewater characteristics
- Evaluate ability to configure existing tankage and pumps for nitrogen removal
Upper Long Island Sound Watershed
Low-Cost N Removal Program

The objectives of this Project were to:

- Determine impact on operation and maintenance budgets
- Determine training needs for plant staff
- Recommend whether operational and/or low cost modifications will be practical and
- Quantify the achievable reduction in effluent nitrogen concentrations and mass.
Special Testing Program

- Very little if any N data
- Some on effluent but virtually none in influent
- Testing program
  - Over three consecutive days
  - Influent or Primary effluent and final effluent
Superintendents Concerns

- All viewed study as beneficial
  - Why us?
  - Very cooperative in sharing concerns and information
  - Regulators were in meetings sometimes and the plants were very frank with their concerns
  - Concerned about plant being able to perform in cold temperatures
  - Concerned about permits and permit limits
Typical Low-cost Modifications

• Creating anoxic zone from existing aerobic bioreactors
  • Nitrate recycle

• Cyclic anoxic/aerobic environments
  • Effect on mechanical aerators

• Issues
  • Aerobic volume
  • De-rating of plants
Summary

- Need step-wise plan
- Good solid science to support why N removal is needed
- Establish good, open and trustworthy relationships between regulators, Utility Managers/operators, and other agencies
- Educational forums for operations personnel
  - Operators always concerned about “if I do it will it be in my permit”
- Look at low-cost, “low hanging fruit” N removal