Draft strategies to address Drinking water supplies in Lake Champlain– 11/15/04

Draft strategies were developed with the Lake Champlain Coalition of Water Suppliers (LCCWS) during meetings on March 18, April 12, May 6 and October 28, 2004 as part of the Agency of Natural Resources' northern Lake Champlain basin planning process.

GOALS:

- **Continue to provide safe drinking water at a reasonable cost**
- **Maintain the public's confidence in their public water supply**

GENERAL APPROACH /OBJECTIVES
① **Predict problems before they occur to allow facilities to respond with appropriate treatment measures; and support pollutant reduction efforts**
② **Educate customers**

WATER QUALITY PROBLEMS AND STRATEGIES TO ADDRESS THEM

Zebra Mussels

Zebra mussels are an invasive exotic species that have been well established in the South, Central, and Northwest Lake since 1996 and have steadily worked their way northward to populate most of the Lake today. The small mussel produces large populations that densely colonize around any structure, including water intake pipes. They can also enter water supply systems as juveniles (veligers) and cause problems (contamination?). Although no method exists to eliminate or reduce zebra mussel populations in the Lake, technology is available to avoid encrusted intake pipes.

The Department of Environmental Conservation is developing monitoring techniques with the Rubenstein Lab to monitor adult zebra mussel populations in addition to the juveniles that are presently monitored. This effort will help towards identifying lake depths appropriate for intake pipes to avoid zebra mussel colonization. The Quagga mussel also colonizes around intake pipes, but at much greater depths than the zebra mussel.

Draft Strategies:

1. Continue discussions between water suppliers and researchers to prepare water suppliers for new zebra mussel settlement trends and to help water suppliers prepare for the appearance of the Quagga mussel. The Quagga mussel will result in similar problems but at greater depths.

2. Members of the Lake Champlain Coalition of Water Suppliers will continue to share information with the group on the latest technologies to reduce zebra mussel colonization around intake pipes.

Algae – general

The following northern Lake Champlain segments exceed the phosphorus levels set by the Vermont water quality standards: Northeast Arm, Main Lake, St. Albans Bay, Shelburne Bay and the Missisquoi Bay. The high levels result in excessive algal growth during certain parts of the year, which can alter the taste of water. When the algae die, their mass adds to the organic matter in the water, which must be removed from drinking water. Both add to treatment costs. Drinking water problems stemming from algal growth are generally only a problem in the most eutrophic parts of the lake: Missisquoi Bay and St. Albans Bay (?).

Draft Strategies:

Most of the phosphorus entering the lake is attached to or washed from soils. Section xx, addressing the problem of solids, includes strategies to reduce erosion. Therefore, these strategies will reduce phosphorus levels as well. An additional strategy follows:

3. Encourage the discussion between water suppliers and technical staff and researchers in the basin of new ideas to address water quality problems in the lake. The water suppliers would like to discuss the feasibility of augmenting soils with drinking water treatment residuals to bind phosphorus. Runoff from the treated soils could potentially contain less soluble phosphorus if the phosphorus binds to the alum in the residuals; however, excessive alum or its plausible transformation to the heavy metal, aluminum, may have adverse effects. The LCCWS will collect reports on previous efforts to begin the discussion.

Blue Green Algae

Unlike other algae "types," blue green algae produces a toxin, mycrocystin, which can pose health risks when ingested. Water quality testing to date by water suppliers in Lake Champlain indicate that mycrocystin levels are not of concern in the raw water even when blue green algae populations at the surface are evident. The public needs to be reassured that water from water suppliers is safe and that continued monitoring will ensure continued safety.

Strategies in "Opportunities for Action" (September 2002) support research efforts to understand blue green algae in Lake Champlain and education and outreach to the public and water suppliers.

Draft Strategies:

4. Continue to develop a blue green algae monitoring program to learn about extent of problem around water intake pipes and in treated water: Develop protocol, and identify definitive tests that water supplier can use for measuring mycrocystin levels. Water suppliers can take measurements but would need funding.

5. Encourage research that will help predict blooms: Letters from water suppliers to support grant applications.

6. Develop a protocol for public notification, action and implement. Water suppliers can implement. Look at the Canadian system as a model and discuss with DOH and others.

7. If mycrocystin levels become too high in raw water, educate water suppliers about most appropriate treatment measures.

8. Educate public about actual, not perceived health risk: Distribute information through water suppliers'mailings.

Solids

Solids, including sediment, potentially cause filtration problems. The filtration problems are more than just mechanical clogging problems. The efficiency of a filtration barrier to remove human pathogen decreases with increased levels of solids. Turbidity in the water from sediment can also lead to higher health risks from water-based human pathogens and nitrates.

Draft Strategies

9. Support studies that could increase water suppliers' ability to predict when large loads of sediments from rainstorm or snowmelt events could reach an intake pipe. This could include additional studies on the lake's hydrodynamics and the relationship between river flows and turbidity levels in the lake.

    Lead agency/organization: LCCWS
    Partners: DEC, LCBP TAC?, UVM researchers?
    Potential funding sources:
    Time-frame: Ongoing
    Benchmark:

10. Reduce erosion in the watershed, which will lead to a reduction of sediment in surface waters
    a) Streams - assist or support efforts to do geomorphic assessments on rivers that discharge sediment near intake pipes. Support restoration projects based on assessment results.
    b) Lakeshore
        i) Determine the impact of eroding shorelines on sediment levels around intake pipes.
            (1) Identify sediment as a problem around an intake pipe.
            (2) Identify shorelines that could be a source of sediment to water supplies.
            (3) Provide owners of these shorelines with list of resources available to help stabilize shoreline (include new handbook on shore stabilization coordinated by the Northwest Regional Planning Commission).
    c) General land use
        i) Agricultural practices
            (1) Support practices that reduce erosion, e.g., buffer strips, conservation tillage and cropping practices.
                (a) Provide education to farmers about benefits of practices on water supplies
                (b) Inform the Natural Resources Conservation Service about intake pipe locations in agricultural areas. Recipients of federal EQUIP funds must protect source protection areas from agricultural runoff.
        ii) Urban/suburban practices
            (1) Support practices that reduce erosion
                (a) Provide public education about importance of Lake Champlain as a pubic drinking water supply. Water suppliers: tours of water treatment plants, information in mailings, participate in collaborative efforts to educate people or use their educational material.

Toxins

Water suppliers monitor for about 200 toxins routinely, such as volatile organic compounds and inorganics. The location of intake pipes in deep water, keeps present concentrations of toxins low and at nondetectable levels. Identifying sources of potential contaminates is the best approach for keeping toxins out of the water.

Draft Strategy

11. Work with the DEC water supply division to locate potential sources of toxins during the source protection planning process and work with DEC to contain.

Pathogens from septic systems and cow (cryptosporidium) and horse manure

Grandfathered septic systems along lakeshore could be contributing contaminates/pathogens to water supplies. In addition, manure washed into surface waters can also contain pathogens that are hazardous to human health. Present monitoring at the intake pipes indicate that pathogens levels are well below the state water quality standards, however, the water suppliers' practice is to assume pathogens may be present and to treat.

Draft Strategies:

12. Provide information to customers about importance of maintaining septic systems within the watershed of an intake pipe, especially those that are on the lakeshore and close to intake pipes.

See also solutions for reducing sediment and phosphorus export from agricultural practices