

MERRIMACK RIVER MONITORING PROGRAM

SUMMARY REPORT

Prepared for

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as river discharge increases. Thus, under low flow conditions (<30 cms), stratification is often evident as far downstream as Station S-24 which is immediately upstream of Hooksett Dam (Appendix Figures B-3 and B-7). Under higher flow conditions, the plume mixes completely with the ambient water farther upstream (Appendix Figures B-13 to B-17). Water leaving the pond over Hooksett Dam is usually fully mixed, with a  $\Delta T$  of 0.4 to 2.3°C from ambient (Figure 3-3). Part of this  $\Delta T$  is attributable to insolation warming the river downstream of the discharge, although this contribution of solar radiation has not been quantified.

During 1975 an oil containment boom was used to test the potential for confining the thermal plume along the west bank. Thermal surveys after installation of the boom, indicated that water which would normally be found only on the surface was more thoroughly mixed with ambient water. This had the effect of increasing thermal mixing at depth and decreasing the zone of passage. It was concluded that the boom was not a successful method of containing the plume to the west bank.

Permit guidelines since 1975 have stated that Merrimack Station "...shall not at any time cause, directly or indirectly, the maximum temperature rise in the Merrimack River to exceed 5°F [2.8°C], or 1°F [0.6°C] when the ambient temperature of the river is 68°F [20.0°C] or higher, unless it can be demonstrated to the satisfaction of the New Hampshire Water Supply and Pollution Control Commission and the Environmental Protection Agency that greater rises at various times will not be harmful to fish, other aquatic life, or other uses. Cognizance will be given to reasonable time and distance to allow for mixing of the heated effluent and receiving waters." According to these criteria and based on weekly thermal monitoring at the mixing zone station (S-4), Merrimack Station exceeded operating guidelines intermittently during approximately 16 weeks per year from 1972 to 1978 (Table 3-3; Appendix Table B-1). These dates of non-attainment generally occurred during periods of low flow when ambient river temperature was greater than 20°C.

However, the chemical and biological portions of the monitoring program have consistently demonstrated that these temperature increases have not been "harmful to fish, other aquatic life, or other uses," even though the NPDES Permit thermal guidelines were exceeded during certain weeks. As will be indicated in later sections of this report, the dispersal of the thermal plume along the surface as well as the thermal tolerance of the aquatic communities are largely responsible for the absence of adverse temperature influences on the Hooksett Pond biota.

### 3.4 Conclusions

The addition of heat is the primary physical influence of Merrimack Station on Hooksett Pond. Modifications of the cooling water system during 1972 effectively decreased the mean temperature of the discharged cooling water by 4°C. Present levels of thermal addition to Hooksett Pond sometimes exceed the conditional guidelines established in 1975 for operation of Merrimack Station, but the chemical and biological portions of this monitoring program have consistently demonstrated that existing levels of thermal loading have not been harmful to fish or other aquatic life forms. Stratification of the thermal plume provides an ambient zone of passage throughout the mixing zone.

