Admin #284

PSNH

August 20, 1992

Public Service of New Hampshire

U.S. Environmental Protection Agency
Region I
Wastewater Management Branch
JFK Federal Building
Boston, MA 02203-2211

ATTN: Mr. Ted Landry, Mail Code: WMN
Senior Permit Engineer

SUBJECT: Merrimack Station; Bow, NH
NH0001465

Dear Mr. Landry:

The NPDES permit for Merrimack Station that was issued on June 25, 1992, requires PSNH to assess the effects of the thermal discharge on the anadromous and indigenous fish populations in the local waterbody. Part I, Section A.17. of the permit identifies six specific issues that must be addressed relative to the thermal impact of the once-through cooling water system on the aquatic community. PSNH proposes to perform the task in two stages. Phase I will conclude with a preliminary report that summarizes existing resources and establishes a biological and hydrological program as required by Section A.18.a. Phase II will involve the actual field studies to resolve any remaining concerns.

Enclosed are five copies of a proposed scope of work to accomplish the objectives as required by Section A.17.h. An agenda is also provided for a meeting to discuss the proposal. The meeting is scheduled for 10:00 on August 31 at the Amoskeag Fishways Visitor Center in Manchester, NH. Travel instructions are enclosed.

The document has been submitted to the Technical Advisory Committee members; Ken Carr, Bob Estabrook, Bill Ingham and Peter Nolan. It appears that Ken Warren will substitute for Bob Estabrook on August 31. Jeff Andrews also may attend the planning meeting and I understand that you will invite additional EPA representatives. Please confirm the attendees with me next week. PSNH has contracted the services of Stetson-Harza of Concord, NH; Peter Saunders is the project manager. Peter has extensive experience with the anadromous fish restoration program through his involvement with PSNH hydroelectric power stations. Richard Dumore will also attend as our company biologist.

I look forward to meeting the committee members. Thank you for assisting with the arrangements.

Very truly yours,

Allan G. Palmer
Senior Engineer

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Enclosure
cc: J. G. Andrews - NHWSPCD
N. W. Prodany - USEPA

AGENDA

MERRIMACK STATION TECHNICAL ADVISORY COMMITTEE

PLANNING MEETING - AUGUST 31, 1992

AMOSKEAG FISHWAYS VISITOR CENTER - 10:00 AM

1. Introductions

2. Target Species

    Anadromous Fish
    Indigenous Fish

3. Anadromous Fish Migration Seasons

4. Evaluation of Issues a-f

5. Schedule

6. Other Business

7. Next Meeting

PROPOSED WORK SCOPE
(PLANNING DOCUMENT)

FOR

RESOLUTION OF ISSUES RELATED TO EFFECTS OF THERMAL DISCHARGE AT MERRIMACK STATION ON ANADROMOUS AND INDIGENOUS FISH OF THE MERRIMACK RIVER

Prepared by:

W. Peter Saunders, Jr.
Stetson-Harza

Prepared for:

Public Service Company of New Hampshire

Submitted to:

Merrimack Station Technical Advisory Committee

INTRODUCTION

Public Service Company of New Hampshire (PSNH) has developed this scope of work for Phase I studies related to assessment of the effects of the Merrimack Station thermal discharge on anadromous and indigenous fish populations of the Hooksett Pool of the Merrimack River. This scope of work presents PSNH's approach, in part, to addressing the requirements of Part I.17 of NPDES Permit No. NH0001465 for the Merrimack Generating Station in Bow, NH. The background, proposed approach, and schedule for Phase I studies are presented in this document.

BACKGROUND

Part I, Sub-part 17 of the NPDES Permit for Merrimack Station identifies six issues (Part I.17. a-f) that must be addressed by PSNH to resolve resource agencies' concerns relative to thermal effects of once-through operation of Merrimack Station on the aquatic community of the Merrimack River. Extensive information relevant to those issues is available in a series of reports on biological monitoring and impact assessment studies conducted from 1967 through 1978 for PSNH by Normandeau Associates, Inc. (NAI), St. Anselm's College, and by the N. H. Fish and Game Department. Additional information is available from literature published since 1979, files of State and Federal resource agencies, other utilities, local organizations and from PSNH. PSNH believes that the information available substantively addresses Part I.17.a-f and that, following review and assessment of the available information as per Part I.17.g of the NPDES permit, it is likely that several of the issues will have been resolved and that the scope of studies required to address the remaining issues (i.e., Phase II) will be focused on a few critical areas.

APPROACH

Overview

The approach described herein is intended to result in a scope of work for Phase II studies to be conducted by PSNH in the summer of 1993. Preparation

of the actual scope of work for 1993 studies will be conducted in consultation with the TAC following a review of presently available information that describes effects of the Merrimack Station thermal discharge on resident and anadromous fish and the aquatic community. The purpose of the review will be to summarize information that relates specifically to each of the issues identified in Part I.17.a-f of the NPDES Permit, evaluate the quality and completeness of that information relevant to each issue, and identify the type of information required to complete assessment of the issue.

Following completion of the information review, PSNH and its consultant, Stetson-Harza (S-H), will meet with the TAC to discuss the information needs identified in the review and to determine acceptable approaches for providing additional information. PSNH will then prepare a draft study plan for studies to be conducted to satisfy information needs. The study plan will be provided to the TAC for review and comment, prior to January 1, 1993 (as per Part I.16.b) and, following incorporation of TAC comments, finalized in early 1993. The target date for finalization of the study plan is January 22, 1993.

Target Species

The NPDES permit for Merrimack Station identifies anadromous and indigenous fish as the main focus for studies of the effects of heated water discharge on the aquatic community. Anadromous fish that may be expected to occur in the vicinity of Merrimack Station include Atlantic salmon, American shad, alewife, sea lamprey and, potentially, blueback herring. Indigenous gamefish species include largemouth and smallmouth bass. Additional gamefish species adults that may occur as a result of stocking include domestic Atlantic salmon (i.e., offspring of anadromous parents raised to adult size in the hatchery and spawned prior to release) and brook, brown and rainbow trout. Nineteen additional resident species have been collected from the vicinity of Merrimack Station (NAI, 1979). species that were numerous in resident fish collections conducted from 1967 through 1978 include yellow perch, pumpkinseed, brown bullhead, white sucker, golden and common shiners, and redbreast sunfish.

Of the anadromous species American shad is the only one expected to spawn in

the river mainstem in the vicinity of Merrimack Station. There is no spawning and nursery habitat for Atlantic salmon in the Hooksett Pool. Alewife, blueback herring and sea lamprey typically spawn in smaller tributaries. Thus, analysis of thermal effects should consider all life stages of shad, late juvenile and migratory stages of alewife, and migratory stages of Atlantic salmon. Blueback herring and lamprey are not considered because they are likely to have higher thermal tolerances than the other anadromous species and they are not likely to occur in large numbers in the foreseeable future.

PSNH recommends that the following resident species be considered target species for purposes of this study:

Smallmouth bass
Largemouth bass
Pumpkinseed
Yellow Perch

Stocked salmonids (trout and domestic salmon) are not considered. Temperature monitoring records show that ambient temperatures approach or exceed incipient lethal temperatures for adult salmonids annually. In addition, there is no spawning and nursery habitat in the Hooksett Pool (although there may be access to suitable habitat in the Soucook River). Because salmonids would be expected to be maintained only by put-and-take management due to naturally limiting conditions, PSNH believes that it is unreasonable to consider them species representative of the indigenous fish community.

Preliminary Report

A preliminary report will be prepared in response to Part I.17.g. The report will include a section identifying all potential sources of information consulted and describing the methods used to summarize information. At a minimum, the sources reviewed will include studies, reports, information, etc. from the following entities:

- Normandeau Associates, Inc. (Available from PSNH)

- Merrimack Station and other applicable studies

o State Government Agencies (Available via TAC members)
  - F&GD, WSPCD, OSP, etc.

o Federal Government Agencies (Available via TAC members)
  - EPA, F&WS, etc.

o Local Organizations
  - Merrimack River Watershed Council, Conservation Commissions, etc.

o PSNH
  - Cooling canal studies, information from Dennis R. Brown, Director of Production, station operational records, river monitoring annual reports, etc.

o Environmental Organizations
  - Audubon Society, etc.

o Electric Utilities
  - Vermont Yankee, Connecticut Yankee, etc.

The above sources will be contacted and arrangements will be made to obtain relevant data. In addition, a computerized key-word literature search will be used to identify recent scientific reports, papers, etc. relating to thermal effects on the representative important species.

The report also will contain a section for each of the issues that provides a summary of the results of pertinent studies or reports and an analysis/interpretation of those results with respect to the issue being addressed. If the information available is insufficient to address resource agency concerns on a particular issue, the types of information that are lacking will be identified.

TABLE 1

CHRONOLOGICAL BIBLIOGRAPHY: MONITORING STUDIES CONDUCTED AT MERRIMACK STATION 1967-1978

Normandeau, D.A. 1969. The Effects of Thermal Releases on the Ecology of the Merrimack River. Institute for Research and Services, St. Anselm's College, Manchester, NH. 234 p.

Normandeau Associates, Inc. 1970. The Effects of Thermal Releases on the Ecology of the Merrimack River, Supplemental Report No. 1, Physical Studies - Fisheries Investigations 1969. NAI, Manchester, NH. 70 p.

Normandeau Associates, Inc. 1971. Merrimack River Monitoring Program; A Report for the Study Period 1970. Normandeau Associates, Inc., Manchester, NH. 117 p.

Wightman, P.H. 1971. Merrimack River Thermal Pollution Study. Job Completion Report for Federal Aid Project F-22-R. N.H. Fish and Game Department. 111 p.

Normandeau Associates, Inc. 1972. Merrimack River Monitoring Program: A Report for the Study Period 1971. Normandeau Associates, Inc., Manchester, NH. 108 p.

Normandeau Associates, Inc. 1973a. Merrimack River Monitoring Program; A Report for the Study Period 1972. Normandeau Associates, Inc., Manchester, NH. 91 p.

Normandeau Associates, Inc. 1973b. Merrimack Temperature and Dissolved Oxygen Studies 1972. Normandeau Associates, Inc., Manchester, NH. 38 p.

Normandeau Associates, Inc. 1974. Merrimack River Monitoring Program: A Report for the Study Period 1973. Normandeau Associates, Inc., Manchester, NH. 109 p.

Normandeau Associates, Inc. 1975. Merrimack River Monitoring Program 1974. Normandeau Associates, Inc., Manchester, NH. 212 p.

Normandeau Associates, Inc. 1976a. Merrimack River Anadromous Fisheries Investigations: Annual Report for 1976. Normandeau Associates, Inc., Manchester, NH. 149 p.

Normandeau Associates, Inc. 1976b. Merrimack River Monitoring Program 1975. Normandeau Associates, Inc., Manchester, NH. 207 p.

Normandeau Associates, Inc. 1977a. Merrimack River Anadromous Fisheries Investigations 1975-1976. Normandeau Associates, Inc., Manchester, NH. 168 p.

Normandeau Associates, Inc. 1977b. Merrimack River Monitoring Program 1976. Normandeau Associates, Inc., Manchester, NH. 171 p.

TABLE 1
(Continued)

CHRONOLOGICAL BIBLIOGRAPHY: MONITORING STUDIES CONDUCTED AT MERRIMACK STATION 1967-1978

Normandeau Associates, Inc. 1978. Merrimack River Monitoring Program 1977. Normandeau Associates, Inc., Manchester, NH. 293 p.

Normandeau Associates, Inc. 1979a. Merrimack River Anadromous Fisheries Investigations 1978. Normandeau Associates, Inc., Bedford, NH. 101 p.

Normandeau Associates, Inc. 1979b. Merrimack River Monitoring Program 1978. Normandeau Associates, Inc., Bedford, NH. 268 p.

Normandeau Associates, Inc. 1979c. Merrimack River Monitoring Program; Summary Report. Normandeau Associates, Inc., Bedford, NH. 227 p.

Evaluation of Issues

PSNH proposes to summarize information presently available to address the issues identified in the NPDES Permit prior to recommending further studies. Table 1 presents a chronological partial bibliography of biological and thermal monitoring studies conducted at Merrimack Station from 1967 through 1978. Table 2 presents the results of a preliminary review of the contents of the studies as they relate to the issues. Additional temperature monitoring, and sport fishing catch data are available for Merrimack Station. Additional information on fish passage through thermal plumes is available from scientific literature and monitoring studies conducted by other utilities.

PSNH's proposed approach to summarizing information related to each of the issues is presented below.

a. Determine the seasons at which the anadromous fish will migrate and the temperatures that would affect/impede this migration and life cycle temperature requirements related to each species.

Table 3 addresses the first element of this issue. Information relevant to determination of life cycle temperature requirements and thermal impediment of migration is available from studies conducted at Merrimack Station and elsewhere (e.g., Connecticut Yankee, Vermont Yankee). For example, radio telemetry studies of American shad migration past Merrimack Station were conducted in 1978.

b. Determination of the thermal plume-configuration in the river and its effect(s): 1) on anadromous fish during the migration seasons; and 2) upon indigenous fish under low water conditions.

Thermal cross-section data were collected regularly during the summer months as part of the monitoring studies. The thermal cross-section data will be reviewed and the operational conditions (river flow, ambient temperature, generator thermal output) during each sampling will be determined. Monthly flow duration curves for the Merrimack River will be used to identify how

TABLE 2

PRELIMINARY REVIEW OF INFORMATION RELEVANT TO NPDES PERMIT ISSUES THAT CAN BE FOUND IN MERRIMACK STATION MONITORING STUDIES

	NPDES PERMIT ISSUE: PART I.17					
	a Anadromous Fish Migration Season	b Plume Configuration	c T_{max}	d Summer ΔT	e Winter ΔT	f Resident Fish In Canal
Normandeau 1969		X				
NAI 1970		X				
NAI 1971		X				
Wightman 1971		X	X			X*
NAI 1972		X				X
NAI 1973a		X	X			X
NAI 1973b		X				
NAI 1974		X	X			X
NAI 1975		X	X			X
NAI 1976a	X	X	X	X		
NAI 1976b		X	X			X
NAI 1977a	X	X	X	X		
NAI 1977b		X	X			X
NAI 1978		X	X			X
NAI 1979a	X	X	X	X		
NAI 1979b		X	X			
NAI 1979c		X	X	X		X

* Refers to original (short) configuration of canal

TABLE 3

ANADROMOUS SPECIES INFORMATION RELATIVE TO SEASONAL PRESENCE OF MIGRATORY AND DEVELOPMENTAL LIFE STAGES IN HOOKSETT POOL

Target Species	Life Stage	Season
Atlantic Salmon	Adult Upstream Migration	May 15 - July 15* Sept - Nov
	Adult Downstream Migration	Oct - Dec Apr - May
	Smolt Downstream Migration	Apr 15 - Jun 15
	Parr	N/A**
	Fry	N/A
	Egg	N/A
American Shad	Adult Upstream Migration	May - June
	Adult Downstream Migration	June - July (Aug?)
	Egg	June - July
	Larvae	June - July
	Fry - Juvenile	July - Sept
	Emigrating Juvenile	Sept - Oct
Alewife	Adult Upstream Migration	May - June
	Adult Downstream Migration	June - July
	Egg	N/A
	Larvae	N/A
	Fry - Juvenile	July - Sept
	Emigrating Juvenile	Sept - Oct
Sea Lamprey	Adult Upstream Migration	Apr - June
	Egg	N/A
	Larvae/Ammocoete	N/A
	Immature Adult Downstream Migration	Oct - Nov Apr - May

* underline indicates principal migration period
** N/A = Not Applicable - Life stage not expected to occur in Holyoke Pool.

applicable the available data are to the conditions identified under issue b.

Using the most applicable data, an assessment of anadromous fish zone of passage (which will also utilize data collected in response to issue a.) will be developed. Resident fish ability to tolerate temperatures in the thermal plume and an assessment of any areas from which they might be excluded by temperature will be developed using information collected in response to issue c.

c. Determination of a seasonal T_{max} at the point of discharge from the canal into the river, that would protect the anadromous and indigenous fish.

The Merrimack Station monitoring studies contain the results of a comprehensive review of the literature (as of 1978) on thermal tolerances of resident species as well as point-of-capture temperatures for fish sampling and results of <u>in situ</u> and laboratory thermal bioassays. The literature review will be expanded to include more recent information for resident and anadromous species. This information will be used in conjunction with information on the seasonal occurrence of various life stages of target species and information on the thermal plume configuration (issue b.) to identify seasonal T_{max} values that will be protective of the species-life stages present in the river during each season.

d. Determine, if found to be necessary, a summer Delta-T (downstream temperature minus upstream temperature) that would protect the anadromous and indigenous fish from artificially-heated river water that would be injurious to the aquatic community.

The approach to this issue is essentially the same as that for issue c.

e. Determination of a maximum "Delta-T" (discharge temperature minus intake temperature) at the head of the canal due to a major plant/condenser shutdown. (Note: This is the maximum temperature excursion expected in the canal during an abrupt shutdown of the

power plant during the winter).

The information presently available do not appear to address this issue specifically (based on a preliminary review). Information relevant to this issue should be available both from Merrimack Station operational records and from the technical literature and studies conducted by other utilities. A literature review will be provided and operational measures that reduce or eliminate the potential impact of winter shutdowns will be identified.

f. Assess the resident fish population in the cooling-water canal, and determine if this population is a significant portion of the local fishery and must be protected. If the resident fish require protection, recommendations are to be made as to the type of physical or operational improvements are required.

Fish sampling in the canal (mainly at the lower end) and fish mark-recapture studies were conducted at various times during 1967-1978. Such data should provide a strong indication of the importance of the canal "fish population" to the fish community of the Hooksett Pool. Analysis of catch-per-unit effort data for the canal vs other sampling locations and a review of relevant recapture information will be provided.

Scope of Work for Additional Studies

Following submittal of the preliminary report to the TAC, a meeting of the TAC will be held to discuss the findings of the preliminary report and to present an outline for any proposed studies to provide outstanding information. PSNH will prepare the agenda for the meeting and a recommended work scope outline.

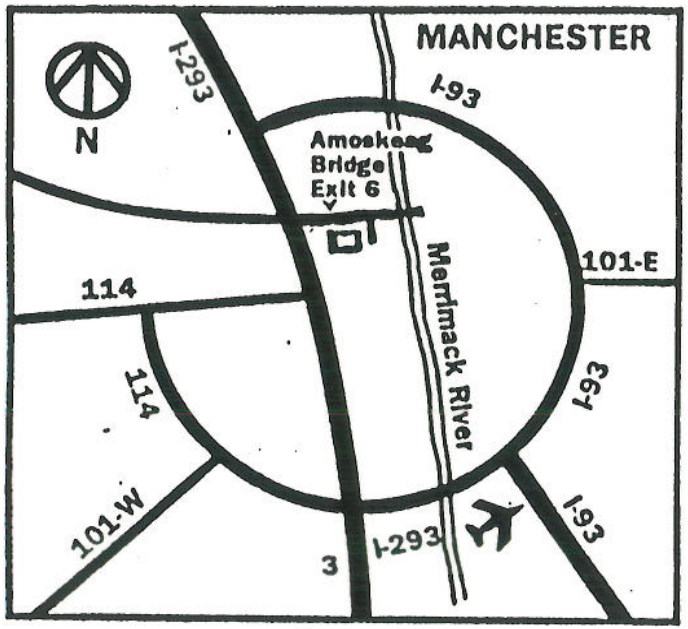
The TAC members are expected to offer substantial comments on the types of studies that may be required. This suggested approach should provide for more efficient development of the work scope for additional studies by providing for a discussion of the utility, merits, and acceptability of alternative approaches prior to preparation of the work scope.

Following the TAC meeting, the draft summary of available information will be revised to incorporate comments received from the TAC. A draft work scope for additional studies will be developed for incorporation into the Phase I Report. The draft Phase I Report will be submitted to TAC members for review and comment on the draft scope for additional studies. A TAC meeting will be held to comment on/finalize the draft scope. TAC comments will be incorporated into the Phase I Final Report.

SCHEDULE

To meet deadlines identified in the Permit, PSNH proposes the following schedule:

August 31	Initial Planning Meeting (Discussion of this work scope)
November 13	Preliminary Report to TAC for Review
November 30 - December 4	(week of) TAC meeting to review Preliminary Report findings and identify work scope elements for additional studies
December 23	Draft Phase I Report (with work scope) to TAC for review
January 11 - January 15	(week of) TAC meeting to finalize work scope for additional studies
January 22	Phase I Final Report to TAC



DIRECTIONS: From I-293 and Route 3 (Everett Turnpike), take Amoskeag Bridge Exit 6. From 101 East (Seacoast), take 93 South to 293 North. Amoskeag Bridge Exit 6 from 293. The Fishway is located next to the Holiday Inn West. Entrance is on Fletcher Street with free parking adjacent.