

Appendix C.1

Merrimack River Project Water Quality Certificate

C12665



The State of New Hampshire
Department of Environmental Services



Michael P. Nolin
Commissioner

Public Service Company of New Hampshire
Attn: Robert Gunderson, Hydro Manager
PSNH Energy Park
780 North Commercial Street
Manchester, NH 03101



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WATER QUALITY CERTIFICATION

In Fulfillment of

Section 401 of the United States Clean Water Act (33 U.S.C 1341)

WQC # 2003-006.1 (modified)

Project Name:	Merrimack River Hydroelectric Project
Project Location:	Concord, Hooksett, and Manchester, New Hampshire
Affected Waterbody:	Merrimack River
Owner/Applicant:	Public Service Company of New Hampshire 780 North Commercial Street Manchester, NH 03101
Appurtenant License:	Federal Energy Regulatory Commission No. P-1893
Date of Initial Approval:	December 16, 2004
Date of Modification #1:	May 10, 2005
(subject to Conditions below)	

A. INTRODUCTION

Public Service Company of New Hampshire (Applicant) owns and operates the Merrimack River Hydroelectric Project (Project) and proposes the continued operation of the Project for hydropower generation.

The Project consists of the Garvins Falls, Hooksett, and Amoskeag developments, all of which include a dam, powerhouse, and Project works such as turbines, generators, transmission lines, etc. According to the Applicant, the Project boundary, as defined by the U.S. Federal Energy Regulatory Commission (Commission), extends from approximately one-half mile south of the breached Sewalls Falls dam to approximately 400 feet below the Amoskeag dam in the bypass reach and approximately 1,000 feet below the Amoskeag dam in the tailrace. The Commission issued a license for the Project on May 8, 1980; the license expires on December 31, 2005.

This modified 401 Water Quality Certification (Certification) addresses all surface waters that may be impacted by the Project, including, but not necessarily limited to, the waters included in the Project boundaries defined by the Commission, and the Merrimack River downstream to the southernmost terminus of the Amoskeag bypass reach where the bypass reach rejoins the mainstem of the Merrimack River. Further, this 401 Certification documents laws and regulations, determinations, and 401 Certification conditions relative to the attainment/maintenance of NH surface water quality standards defined under NH RSA 485-A:8 II, which includes the support of designated uses defined under NH Code of Administrative Rules Env-Ws 1700.

On December 16, 2004, the Department issued 401 Certification No. 2003-006 for the Project. On January 18, 2005, the Applicant filed a Notice of Appeal of 401 Certification No. 2003-006. Upon further review of the information available in the 401 Certification application and based on subsequent discussions with the Applicant, the Department determined that 401 Certification No. 2003-006 be modified. The 401 Certification number for this modification is 2003-006.1.

B. WATER QUALITY CERTIFICATION APPROVAL

Based on the findings described in Section D and the conditions in Section E of this modified 401 Certification, the New Hampshire Department of Environmental Services (Department) hereby issues this modified 401 Certification subject to the conditions defined in Section E of this modified 401 Certification, in accordance with Section 401 of the United States Clean Water Act (33 U.S.C. 1341). This modified 401 Certification supersedes in its entirety the 401 Certification dated December 16, 2004 for this Project.

C. STATEMENT OF FACTS AND LAW

- C-1. Section 23 of the United States Federal Power Act (Title 16 U.S. Code, Chapter 12, Subchapter I, Section 817(1)) states

[I]t shall be unlawful for any person, State, or municipality, for the purpose of developing electric power, to construct, operate, or maintain any dam, water conduit, reservoir, power house, or other works incidental thereto across, along, or in any of the navigable waters of the United States, or upon any part of the public lands or reservations of the United States (including the Territories), or utilize the surplus water or water power from any Government dam, except under and in accordance with the terms of a permit or valid existing right-of-way granted prior to June 10, 1920, or a license granted pursuant to this chapter.

- C-2. Section 4 of the United States Federal Power Act (Title 16, U.S. Code, Chapter 12, Subchapter I, Section 797(e)) authorizes the Federal Energy Regulatory Commission

[t]o issue licenses to citizens of the United States, or to any association of such citizens, or to any corporation organized under the laws of the United States or any State thereof, or to any State or municipality for the purpose of constructing, operating, and maintaining dams, water conduits, reservoirs, power houses, transmission lines, or other Project works necessary or convenient for the development and improvement of navigation and for the development, transmission, and utilization of power across, along, from, or in any of the streams or other bodies of water over which Congress has jurisdiction...

- C-3. Section 401 of the United States Clean Water Act (Title 33 U.S. Code, Chapter 26, Subchapter IV, Section 1341) states

[a]ny applicant for a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates or will originate...that any such discharge will comply with the applicable provisions of sections 301, 302, 303, 306, and 307 of this title.

- C-4. Clean Water Act Section 401(a) states "[n]o license or permit shall be granted until the certification required by this section has been obtained or has been waived...No license or permit shall be granted if certification has been denied by the State..."
- C-5. Clean Water Act Section 401(a) authorizes the Department to verify that the Project maintains compliance with NH surface water quality standards.
- C-6. Env-Ws 1700, Surface Water Quality Regulations, effective December 3, 1999, fulfills the requirements of Section 303 that the State of New Hampshire adopt water quality standards consistent with the provisions of the Clean Water Act.
- C-7. Env-Ws 1701.02 provides that the surface water quality regulations shall apply to all surface waters and to any person who causes point or nonpoint source discharge(s) of pollutants to surface waters, or who undertakes hydrologic modifications, such as dam construction or water withdrawals, or who undertakes any other activity that affects the beneficial uses or the level of water quality of surface waters.
- C-8. Env-Ws 1702.18 defines a discharge as:
- a. (1) The addition, introduction, leaking, spilling, or emitting of a pollutant to surface waters, either directly or indirectly through the groundwater, whether done intentionally, unintentionally, negligently, or otherwise; or
 - b. (2) The placing of a pollutant in a location where the pollutant is likely to enter surface waters.

- C-9. Env-Ws 1702.39 defines pollutant as dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.
- C-10. Env-Ws 1702.46 defines surface waters as "perennial and seasonal streams, lakes, ponds and tidal waters within the jurisdiction of the state, including all streams, lakes, or ponds bordering on the state, marshes, water courses and other bodies of water, natural or artificial," and waters of the United States as defined in 40 CFR 122.2.
- C-11. Env-Ws 1703.01 (c) states that "[a]ll surface waters shall provide, wherever attainable, for the protection and propagation of fish, shellfish and wildlife, and for recreation in and on the surface waters."
- C-12. Env-Ws 1703.01 (d) states that "[u]nless the flows are caused by naturally occurring conditions, surface water quantity shall be maintained at levels adequate to protect existing and designated uses."
- C-13. Env-Ws 1703.19 states that
- a. (a) The surface waters shall support and maintain a balanced, integrated and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region; and
 - b. (b) Differences from naturally occurring conditions shall be limited to non-detrimental differences in community structure and function.
- C-14. Env-Ws 1703.07(d) provides that
- [u]nless naturally occurring...surface waters within the top 25 percent of depth of thermally unstratified lakes, ponds, impoundments and reservoirs or within the epilimnion shall contain a dissolved oxygen content of at least 75 percent saturation, based on a daily average and an instantaneous minimum dissolved oxygen content of at least 5 mg/l. Unless naturally occurring, the dissolved oxygen content below those depths shall be consistent with that necessary to maintain and protect existing and designated uses.
- C-15. Env-Ws 1705.02(d) provides that with respect to the flow used to calculate permit limits for rivers and streams, the 7Q10 flow shall be used to apply aquatic life criteria and human health criteria for non-carcinogens.
- C-16. RSA 485-A:8(II) provides that "[a]ny stream temperature increase associated with the discharge of treated sewage, waste, or cooling water, water diversions, or releases shall not be such as to appreciably interfere with the uses assigned to this class."

D. FINDINGS

- D-1.** The Applicant owns and operates the Merrimack River Hydroelectric Project, which requires a federal license under Section 23 of the Federal Power Act. The Applicant filed an application for a New Major License to the Federal Energy Regulatory Commission on December 30, 2003.
- D-2.** The unnamed wetlands and the Merrimack River in the Project area are surface waters of the state under Env-Ws 1702.46.
- D-3.** According to the Department, the releases of water through Project structures and equipment, including but not limited to turbines and spillways, constitute a discharge under Env-Ws 1702.18.
- D-4.** The Merrimack River is the primary surface water body associated with the Project. The Merrimack River is a Class B waterbody; Class B New Hampshire surface water quality standards (SWQS) apply to this Project. Class B waterbodies are considered suitable for fishing, swimming, and, after adequate treatment, as a water supply.
- D-5.** According to the Applicant, the Project boundary, as defined by the U.S. Federal Energy Regulatory Commission (Commission), extends from approximately one-half mile south of the breached Sewalls Falls dam to approximately 400 feet below the Amoskeag dam in the bypass reach and approximately 1,000 feet below the Amoskeag dam in the tailrace. This does not, however, necessarily encompass the extent of surface waters that may be affected by the Project which, according to the Department, extends at least to the southernmost terminus of the Amoskeag bypass reach where the bypass reach rejoins the mainstem of the Merrimack River. The Merrimack River within the Project boundary is regulated entirely by the Project and consists of three impoundments; three bypass reaches, and three tailraces. In addition, the regulated river flows from the Project influence the river flows downstream. The impoundments, bypass reaches, and tailraces are created by the presence of the Garvins Falls, Hooksett, and Amoskeag developments. The diversion of water through Project powerhouses during hydroelectric power generation reduces the quantity of water available to bypass reaches. The presence of dams and the subsequent creation of impoundments at each development reduces water velocities and increases river residence time beyond that which occurs under unimpounded conditions. These conditions may promote variable water quality conditions, particularly regarding water temperature and dissolved oxygen, and can foster the development of aquatic plant communities, including phytoplankton, that can influence other water quality parameters such as pH and water clarity.
- D-6.** The Applicant studied the water quality of the Merrimack River from the breached Sewalls Falls Dam to the Amoskeag tailrace during 2002-2003 to address the water quality concerns raised by the Department and other resource agencies during the pre-filing consultation period. Water temperatures at the inflow to the Project area (Sewalls Falls) ranged from 21-28°C during July and

August 2002 and from 18-26°C during September 2002. River flows in the Project area from July 15-October 1, 2002 ranged from 632-1,510 cubic feet per second (cfs) near the Amoskeag development and from 445-1,096 cfs near Sewalls Falls. The 7Q10 flows near Amoskeag and Sewalls Falls approximate 650 cfs and 620 cfs, respectively. The Department acknowledges that the water quality data collected by the Applicant adequately represented the Merrimack River under near-limiting conditions and that on some occasions, samples were collected when flows were less than the 7Q10 flow of the Merrimack River in the Project boundary.

- D-7. The Applicant measured water temperature and dissolved oxygen in the water column of Garvins Falls, Hooksett, and Amoskeag impoundments during 2002. On July 25-26, 2002 and August 22-23, 2003, the water temperatures were generally 2-4°C greater in the Hooksett impoundment than in the Garvins Falls impoundment. The Hooksett and Garvins Falls impoundments experienced thermal stratification on July 26, 2002, but the magnitude of stratification was higher in the Hooksett impoundment. During both sampling dates, only the Hooksett impoundment experienced chemical (dissolved oxygen) stratification. The Merrimack Station, a coal-fired power facility owned by the Applicant, discharges cooling water into the Hooksett impoundment downstream from the Garvins Falls tailrace. The National Pollutant Discharge Elimination System (NPDES) permit for this thermal discharge is up for reissuance and is being prepared by the U.S. Environmental Protection Agency and other state and federal regulatory/resource agencies. However, the date of issuance of a new NPDES permit has not been established. It is expected that any water temperature concerns associated with the discharge from the Merrimack Station facility will be addressed through the NPDES permitting process.
- D-8. The Department reviewed dissolved oxygen and pH data from the Merrimack River in the Project boundary; dissolved oxygen and pH represent the Department's primary chemical indicators for assessing non-wadeable rivers and streams relative to the support of aquatic life. The Department also analyzed other water quality data, including but not limited to, water temperature, nutrients, and chlorophyll *a* to better understand the effect of Project operations on water quality. The Department recognizes that the ambient water quality conditions of rivers, streams, and impoundments in New Hampshire are typically lowest during periods of seasonally low river/stream flow rates and warm ambient air and water temperatures that typically occur during, but not limited to, mid-late summer. To the extent practicable, the Department analyzed surface water quality data collected by the Applicant under these conditions to assess the support of aquatic life by the waterbody.
- D-9. The Department has determined that the Merrimack River throughout the Project boundary and immediately upstream from the Project boundary at the Inflow to Sewalls Falls did not attain Class B NH surface water quality standards for dissolved oxygen; subsequently, the Merrimack River downstream from Sewalls Falls and downstream from the Garvins Falls, Hooksett, and Amoskeag developments was included as a Category 5 waterbody (i.e., the 303(d) list of impaired waters) published by the Department in 2004. The list does not

specify the source of the impairment. A Total Maximum Daily Load (TMDL) study is required for all Category 5 waterbodies.

- D-10. The Department has determined that the Merrimack River downstream from Sewalls Falls and the Hooksett development did not attain Class B NH surface water quality standards for pH. Subsequently, the Merrimack River downstream from Sewalls Falls and downstream from the Hooksett development was included as a Category 5 waterbody (i.e., the 303(d) list) of impaired waters) published by the Department in 2004. The list does not specify the source of the impairment. A Total Maximum Daily Load (TMDL) study is required for all Category 5 waterbodies.
- D-11. The existing minimum flow releases in the tailraces of Garvins Falls, Hooksett, and Amoskeag (under the May 1980 license) are 719 cfs, 819 cfs, and 833 cfs, respectively, for the protection of aquatic life.
- D-12. Minimum river flows do not exist in any of the bypass reaches under the May 1980 license, and aquatic habitats are seasonally wetted under leakage and/or spillage flows during various times of the year. The Department identified the three bypass reaches as Impaired waterbodies (Category 4C) in its 2004 assessment and has identified the Project as the source of the impairment.
- D-13. The Applicant studied the physical aquatic habitat in the Amoskeag bypass reach from 2002-2004 to address the aquatic habitat concerns raised by the Department and other resource agencies during the pre-filing consultation period.
- a. The bypass study was consistent with the principles of the Interim Regional Policy for New England Stream Flow Recommendations, published by the U.S. Fish and Wildlife Service.
 - b. According to the Department, the bypass reach consists of a network of individual channels and islands under variable river flow conditions and represents a relatively uncommon complex riverine environment not inundated by impoundments in the Merrimack River. The channels were collectively divided into an east channel and a west channel relative to the geomorphologic and hydraulic characteristics of the individual channels. The west channel was further divided into a northern and southern segment, and represented by riffle 15 and riffle 16, respectively, as shown on the Amoskeag Dam Bypass Habitat Map dated October 9, 2002.
 - c. A multi-scale (meso-scale and micro-scale) survey of available aquatic habitats was conducted due to the size and complexity of the bypass reach. The survey was conducted to define the primary aquatic habitat types such as pools, riffles, and cascades and to identify potential sources of controlled and uncontrolled discharges usable for aquatic habitat augmentation. The bypass reach contained 17.96 surface acres of aquatic meso-habitat. Riffles, pools, and runs/cascades represented 54%, 28%, and 18% of the habitat, respectively. Under existing conditions, water in the east channel is conveyed from the dam through leakage and spillage, and water in the west

channel is conveyed from the downstream fish bypass structure and from the dam under various river flow conditions.

- d. The aquatic habitat types were quantitatively analyzed in additional detail as a component of the micro-scale survey. The survey incorporated elements of the Instream Flow Incremental Methodology (IFIM), including the establishment of transects perpendicular to river flow to determine stream bed substrates and water column depths and velocities. The aquatic habitat types were quantitatively analyzed relative to the availability of suitable habitat for various benthic macroinvertebrate groups (Ephemeroptera, Plecoptera, and Trichoptera) and life stages of various fishes (smallmouth bass, longnose dace, common shiner, fallfish, and blueback herring). These groups and fishes represent common aquatic biota in the Merrimack River that can utilize the diverse habitats offered in the Amoskeag bypass reach.
- e. The micro-scale survey included the evaluation of aquatic habitats under four river flow releases (50, 150, 280, and 410 cfs). Empirical data were collected from 10 transects established throughout the bypass reach to represent the available aquatic habitats in the bypass reach.
- f. The composition and distribution of aquatic habitats under the four river flow releases (50, 150, 280, and 410 cfs) were identified and categorized as shallow-coarse, shallow-slow, deep-fast, slow-cover, and shallow-fast. The aquatic habitat categories are commonly used in instream flow studies to represent the aquatic habitat typically used by aquatic biota. The aquatic habitat composition was similar for the majority of the categories under the 280 cfs and 410 cfs river flow releases.
- g. Weighted useable area (WUA) is a common measure used in instream flow studies to represent the aquatic habitats available to aquatic biota. Of the four river flow releases evaluated, 280 cfs and 410 cfs provided the highest amounts of WUA for the benthic macroinvertebrate groups and the overall general benthic macroinvertebrate diversity. The WUA for the majority of benthic macroinvertebrate groups were similar at the 280 cfs and 410 cfs river flow releases. The majority of the WUA for the selected fish species and life stages were higher at the 280 cfs river flow release as compared to 410 cfs river flow release.
- h. The agencies observed various river flow release configurations from Project structures and corresponding river flow rates in the bypass reach to determine the appropriate minimum river flow release and distribution through the east and west channels of the bypass reach. Of the four river flow releases evaluated, 280 cfs and 410 cfs, as released over the spillway along the eastern abutment of the dam at full pond elevation, provided sufficient aquatic habitat in the east and west channel for the aquatic biota described in D-13(d) above. At the 280 cfs and 410 cfs river flow releases, 249 cfs and 335 cfs respectively, flowed through the east channel of the bypass reach. Of the four river flow releases evaluated, 280 cfs and 410 cfs integrated the aquatic habitats in the east and west channels through crossover flows of 31 and 75 cfs, respectively, from the east channel to the west channel. Of the 31 cfs corresponding to a river flow of 280 cfs, 5 cfs flowed through the northern segment of the west channel (i.e., Riffle 15) and

26 cfs flowed through the southern segment of the west channel (i.e., Riffle 16). Of the 75 cfs corresponding to a river flow of 410 cfs, 10 cfs flowed through Riffle 15 and 65 cfs flowed through Riffle 16. The WUA in Riffle 16 for most selected fish species and life stages studied was greater at a flow of 26 cfs as compared to 65 cfs.

- i. According to the Applicant, during the periods from approximately April 1 to June 30 and September 15 to October 31, 149 cfs is currently provided to the western channels by passing two feet of water over the crest of the existing downstream fish bypass gate on the western portion of the spillway for downstream migratory fish passage. Of the 149 cfs flow from the bypass gate, 125 cfs flows to Riffle 15 and 24 cfs to Riffle 16.

D-14. The Applicant evaluated the physical aquatic habitat in the Hooksett bypass reach during 2003 and 2004 to address the aquatic habitat concerns raised by the Department and other resource agencies during the pre-filing consultation period.

- a. A meso-scale survey of available aquatic habitats was conducted to define the primary aquatic habitat types such as pools, riffles, and cascades and to identify potential sources of controlled discharges usable for augmentation of aquatic habitat. The bypass reach contained 1.44 surface acres of aquatic meso-habitat. Pools/pool complexes and riffles each represented 50% of the habitat.
- b. The agencies observed various water release configurations from Project structures and corresponding river flow rates in the bypass reach to determine the appropriate flow distribution and minimum flow rate through the bypass reach. Sufficient aquatic habitat was created in the bypass reach under a 64 cfs flow rate. The flow rate was achieved through the removal of the two westernmost (abutting the concrete abutment on the west river bank) flashboards (total dimension = 7'8" long x 1'10" high) and the placement of five notches at the base of five flashboards (as configured during a site visit on October 14, 2004) at full pond elevation.

D-15. The Applicant evaluated the physical aquatic habitat in the Garvins Falls mainstem bypass reach in 2003 and 2004 to address the aquatic habitat concerns raised by the Department and other resource agencies during the pre-filing consultation period. In addition, the Applicant evaluated flow releases through the downstream fish bypass reach.

- a. A meso-scale survey of available aquatic habitats was conducted to define the primary aquatic habitat types such as pools, riffles, and cascades and to identify potential sources of controlled discharges usable for augmentation of aquatic habitat. The mainstem bypass reach contained 2.5 surface acres of aquatic meso-habitat. Deep runs, pools and cascades, wetted ledges, and riffles represented 53%, 22%, 19%, and 6% of the habitat, respectively.
- b. The Applicant and agencies observed various water release configurations from Project structures and corresponding river flow rates in the mainstem and downstream fish bypass reaches to determine the appropriate flow distribution and minimum flow rate through the bypass reaches. Sufficient

aquatic habitat was created in the mainstem bypass reach under a 55 cfs flow rate and in the downstream fish bypass reach under a 23 cfs flow rate. The flow rate in the mainstem bypass reach was achieved through the removal of one flashboard at the middle of the dam plus leakage through the dam at full pond elevation (as configured during a site visit on July 15, 2003). The flow rate in the downstream fish bypass reach was achieved through a one-foot opening in the fish bypass gate at full pond elevation.

- D-16. In the 1800s, prior to the construction of dams, the Merrimack River naturally supported migratory fishes such as alewife, American eel, Atlantic salmon, American shad, and blueback herring. The U.S. Fish and Wildlife Service (USFWS) and the New Hampshire Fish and Game Department (NH F&G) manage Atlantic salmon in the Merrimack River and its tributaries. USFWS has coordinated a restoration program for salmon and other migratory fishes since 1976, but a naturally occurring salmon population has not yet been restored in the Merrimack River. The Cooperative Interstate and Federal Policy and Technical Committees are the decision-making entities relative to restoration.
- D-17. A comprehensive plan was developed in 1986 by the Applicant and the Policy and Technical Committees for Anadromous Fishery Management on the Merrimack River for providing anadromous fish passage at hydroelectric facilities on the Merrimack River and Pemigewasset River, including the Amoskeag, Hooksett, and Garvins Falls developments. Upstream and downstream fish passage facilities for anadromous fishes were subsequently created at the Amoskeag development and downstream passage facilities were created at the Garvins Falls and Hooksett developments. The Applicant studied the effectiveness of the passage facilities from 1986 through 2004 relative to alewife, American eel, American shad, Atlantic salmon, and blueback herring and found variable results.
- D-18. The Applicant operates the Project in a limited store-and-release mode, except during periods of low river flow when the developments are operated in run-of-river mode.
- a. The water surface elevations of the Garvins Falls impoundment experienced average daily fluctuations from 0.5-1.0 feet on a daily basis, but occasional fluctuations up to three feet have occurred during the past several years. The water surface elevations of the Amoskeag impoundment experienced average daily fluctuations from 1.0-1.5 feet, but occasional fluctuations up to five feet have occurred during the past several years primarily to allow for maintenance activities at the Amoskeag dam and to allow abutters of the Amoskeag impoundment to repair docks and other shoreline structures.
 - b. The existing run-of-river mode during periods of low flow is defined as inflow equals outflow.
 - c. The water surface elevations of the Garvins Falls, Hooksett, and Amoskeag impoundments will periodically fluctuate under the new license in response to individual dam maintenance events, outages, and other releases.

- d. The Applicant proposed run-of-river operations for the Project throughout the new license term, and during 2004 proposed to evaluate the ability of the developments to maintain constant water surface elevations and/or constant downstream flows during times of daily power generation. The evaluation was not conducted during 2004.

D-19. Monitoring requirements are appropriate for this Project during operational and non-operational periods to achieve the goals stated in Section E of this modified 401 Certification, pursuant to Section 401 of the United States Clean Water Act (Title 33 U.S. Code, Chapter 26, Subchapter IV, Section 1341(d)), which provides that

[a]ny certification provided under this section shall set forth any effluent limitations and other limitations, and monitoring requirements necessary to assure that any applicant for a Federal license or permit will comply with any applicable effluent limitations and other limitations...and shall become a condition on any Federal license or permit subject to the provisions of this section.

E. WATER QUALITY CERTIFICATION CONDITIONS

- E-1. A copy of this modified 401 Certification shall be posted within each of the Project powerhouses within seven days of issuance of the new Commission license.
- E-2. The Applicant shall allow the Department to inspect the Project at any time to monitor compliance with the conditions of this modified 401 Certification.
- E-3. The Applicant acknowledges a Total Maximum Daily Load (TMDL) study will occur in the Merrimack River that will include segments of the Merrimack River within the Project boundary. The issuance of this modified 401 Certification shall not affect or change the obligation of the Applicant to participate in any TMDL study and to comply with any TMDL requirement. Participation may include, but is not limited to, assistance with monitoring or dam operation to facilitate development of the TMDL. The Applicant may be asked to consult with the Department during the development of the TMDL and to comply with all applicable provisions of any final TMDL.
- E-4. The Applicant shall provide minimum flow releases in Project tailwaters, as follows, for the protection of aquatic life until such time that the Project is operated in run-of-river mode in accordance with the approved operations plan described in section E-7 of this certification.
 - a. Garvins Falls: 719 cfs or inflow, whichever is lower;
 - b. Hooksett: 819 cfs or inflow, whichever is lower; and
 - c. Amoskeag: 833 cfs or inflow, whichever is lower.
- E-5. Unless otherwise permitted in the approved operations plan, and upon implementation of the approved operations plan as described in section E-7 of this modified 401 Certification, the Applicant shall, at all times, provide

minimum flow releases in Project bypass reaches for the protection of aquatic life, as follows:

- a. Garvins Falls: 55 cfs in the mainstem bypass and 23 cfs in the downstream fish bypass channel;
- b. Hooksett: 64 cfs; and
- c. Amoskeag: In accordance with Table 1.

Table 1. Minimum river flow releases in the Amoskeag bypass for the Merrimack River Hydroelectric Project, FERC No. 1893.

Period	Description	East Channel	West Channels			Bypass Total
			Riffle 15	Riffle 16	Total	
Apr 1 – Jun 30 and Sep 15- Oct 31	280 cfs from eastern spillway	249	5	26	31	429
	149 cfs from 2.0 ft opening in the fish bypass gate (crest-gate)		125	24	149	
	Total	249	130	50	180	
July 1 – Sep 14 and Nov 1 – Mar 31	280 cfs from eastern spillway	249	5	26	31	280

E-6. The Applicant shall evaluate the ability of the developments to maintain constant water surface elevations and/or constant downstream flows during times of daily power generation. The evaluation shall include, but not be limited to, a run-of-river scenario where water levels fluctuations in Project impoundments do not exceed 0.25 feet. Unless otherwise approved by the Department, the Applicant shall complete the evaluation by September 30, 2005 and submit a report containing the results of the evaluation to the Department by October 31, 2005. The results of the evaluation shall be used to develop the run-of-river operations plan described in E-7 of this modified 401 Certification.

E-7. The Applicant shall operate the Project in run-of-river mode, as follows:

- a. The Applicant shall develop an operations plan that shall
 - i. Define, in detail, run-of-river operations, including, but not limited to, provisions for the maintenance of constant water levels in the impoundments and/or constant river flows downstream from Project dams;
 - ii. Provide compliance monitoring, including reservoir levels, outflow, and if necessary, inflow, at the Garvins Falls, Hooksett, and Amoskeag developments unless otherwise approved by the Department;
 - iii. Describe the spillway and downstream fish bypass configurations, including design drawings, used to maintain the minimum flows in the

bypass reaches described in Condition E-5 of this modified 401 Certification;

- iv. Describe contingency procedures to maintain minimum flows in the bypass reaches or tailraces during periods of failures of the spillway flashboards or fish bypass configurations (e.g., obstructions) or emergency shutdowns;
 - v. Identify spillway and downstream fish passage facility configurations at the Amoskeag dam for distributing water to the east and west channels of the Amoskeag bypass reach;
 - vi. Describe how the tailrace and bypass channel flows will be impacted when inflows are less than the sum of the permitted minimum tailrace and bypass channel flows described in section E-4 and E-5 of this modified 401 Certification; and
 - vii. Provide a design and implementation schedule for all activities included in the operations plan.
- b. The Applicant shall develop the operations plan in consultation with the Department, New Hampshire Fish and Game Department (NH F&G), U.S. Fish and Wildlife Service (USFWS), and U.S. Environmental Protection Agency (USEPA). The operations plan shall be submitted to the Department for review and approval by December 31, 2005, unless otherwise approved by the Department.
 - c. The Applicant shall implement the operations plan, excluding the construction of a new minimum river flow release structure, as soon as possible, but not later than 90 days after Issuance of the new Commission license for the Project, unless otherwise approved by the Department. The construction and operation of a new minimum river flow release structure shall be completed no later than December 31, 2006. Any proposed modifications to the approved operations plan shall be submitted to the Department for review and approval. Proposed modifications shall not be implemented until after approval by the Department.
 - d. The Applicant shall notify the Department not more than 24 hours after any substantial deviation from the approved operations plan and shall maintain a log of deviations, which shall be submitted annually to the Department not later than December 31 of each year.
 - e. Exceptions to run-of-river operations may be granted by the Department, as necessary, in consultation with the Applicant, USFWS, NH F&G, and USEPA for reasons including, but not limited to, flashboard failure and reinstallation and the installation of new minimum flow release structures.

E-8. The Applicant shall enhance upstream and downstream fish passage at the Amoskeag, Hooksett, and Garvins Falls developments according to the prescriptions defined in *A Comprehensive Plan for the Provision of Anadromous Fish Passage Measures and Facilities at PSNH's Merrimack-Pemigewasset River Hydroelectric Dams, FERC Project Nos. 1893, 2456, and 2457* (Comprehensive Plan) published in 1986. The Applicant shall maintain the agreements established under the Comprehensive Plan, including, but not limited to, the

construction of upstream fish passage at the Hooksett development after the fifth year following the annual passage of 15,000 American shad at the Amoskeag development, and the construction of upstream passage facilities at the Garvins Falls development after the fifth year following the annual passage of 15,000 American shad at the Hooksett development. The Applicant shall also conduct studies, as necessary, to determine the effectiveness of the downstream passage facilities at the Garvins Falls, Hooksett, and Amoskeag developments relative to Atlantic salmon smolts, American shad, and alewife. After the fourth year following the annual passage of 15,000 American shad at either the Amoskeag or Hooksett development, the Applicant shall submit annual status reports to the Department by December 31 regarding the design, construction, and anticipated completion date of fish passage facilities.

- E-9. The Applicant shall operate and maintain the Project consistent with the conditions of this modified 401 Certification.
- a. The manner in which the Project is operated shall not contribute to violations of NH surface water quality standards. If it is determined that the manner of project operation contributes to violations of surface water quality standards, additional conditions may be imposed or conditions amended by the Department, when authorized by law and after notice and opportunity for hearing.
 - b. The Applicant shall consult with the Department regarding any proposed modifications to the Project or its operation that may not be in accordance with this modified 401 Certification to determine whether this modified 401 Certification requires amendment or if a new 401 Certification is required for the Project. Any amendment of this modified 401 Certification or the issuance of a new 401 Certification, determined appropriate by the Department, shall be required prior to the implementation of any modifications to the Project.
- E-10. The conditions of this modified 401 Water Quality Certification may be amended and additional terms and conditions added as necessary to ensure compliance with NH surface water quality standards, when authorized by law, and after notice and opportunity for hearing.
- E-11. The Department may, at any time, request from the Commission the reopening of the license to consider modifications to the license as necessary to ensure compliance with NH surface water quality standards.

F. APPEAL

If you are aggrieved by this decision, you may appeal the decision to the Water Council. Any appeal must be filed within 30 days of the date of this decision, and must conform to the requirements of Env-Wc 200. Inquiries regarding appeal procedures should be directed to Michael Sciafani, NHDES Council Appeals Clerk, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095; telephone 603-271-6072.

If you have questions regarding this Certification, please contact Paul Piszczek at (603) 271-2471.

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Paul M. Currier, P.E.
Administrator, NHDES Watershed Management Bureau

cc: Steve Kartalia, FERC
Jennifer Patterson, NH DOJ
Bill Ingham, NH F&G
Ralph Abele, USEPA
John Warner, USFWS
City of Concord Conservation Commission
Town of Bow Conservation Commission
Town of Hooksett Conservation Commission
City of Manchester Conservation Commission