

Water Quality Certification
(33 U.S.C. §1341)

In the matter of: Public Service Company of New Hampshire
 PO Box 330
 Manchester, NH 03105-0330

APPLICATION FOR CANAAN HYDROELECTRIC PROJECT

The Vermont Department of Environmental Conservation (the Department) has reviewed a water quality certification application dated November 20, 2007 and filed by the Public Service Company of New Hampshire (PSNH, the licensee, or the applicant) for the Canaan Hydroelectric Project. The supporting documentation for the application includes the applicant's Federal Energy Regulatory Commission (FERC) license application filed with FERC under a cover letter dated July 30, 2007; the applicant's response of October 23, 2007 to FERC's request for additional information (September 26, 2007); a video of the turbine shutdown study; and certain excerpts from the N.H. Department of Fish and Game website. The Department has also considered FERC's environmental assessment, *Environmental Assessment for Subsequent Hydropower License, Canaan Project, FERC Project No. 7528-009, New Hampshire/Vermont*, March 2008 (FERC EA).

The current application is subject to review under the Vermont Water Quality Standards adopted by the Water Resources Panel effective January 1, 2008 (Standards). (Standards, Section 1-01. Applicability and Definitions). Since the Connecticut River is a border water, the application is also being reviewed in cooperation with the State of New Hampshire Department of Environmental Services for consistency with New Hampshire Water Quality Standards. Where a reference is made to Water Quality Standards or criteria without citing a specific state, the reference relates to Vermont Water Quality Standards and criteria.

The Department held a public hearing on October 31, 2008 under the rules governing certification and received testimony during the hearing and, as written filings, until November 4, 2008. At the applicant's request, a post-notice meeting was held with interested parties on November 17, 2008 and additional comments and recommendations accepted into the record.

The Department, based on the application and record before it, makes the following findings and conclusions.

Findings

Background and General Setting

1. The Canaan Hydroelectric Project is located at river mile 370 on the Connecticut River, ten miles below Murphy Dam and 80 miles upstream of Gilman Dam. The project is located in the towns of Canaan, Vermont and Stewartstown, New Hampshire. It was originally constructed by the W.F. Allen Company in 1927; the dam, a concrete gravity structure, was reconstructed in 1943 to replace the timber dam that failed.

2. The Connecticut River, New England's largest river, flows 407 miles from its headwaters at the Connecticut Lakes in northern New Hampshire to Long Island Sound at Old Saybrook, Connecticut. The river is dammed and impounded over much of its length in Massachusetts, New Hampshire, and Vermont to provide hydroelectric generation. The reach directly below Canaan Dam represents the river's longest free-flowing stretch upstream of Holyoke Dam in southern Massachusetts. Below the Connecticut Lakes, twelve mainstem dams are still intact and operating.
3. The project utilizes runoff from an area of 381 square miles, or about 3% of the river's 11,250 square mile watershed.
4. The project was last granted a federal license on August 24, 1984, with the license term running 25 years from August 1, 1984. As part of that licensing proceeding, the Department issued a water quality certification on May 10, 1984.

Project and Civil Works

5. Canaan Dam, about 275 feet in length, has a main spillway with an ogee section, 150 feet long and a crest elevation of 1051.5 feet msl. The crest is surmounted by 3.5-foot flashboards that raise the effective crest to elevation 1055.0 feet msl. A waste gate is located on the Vermont side; it is 20-foot wide and controlled by a 15-foot high Tainter gate. The wastegate sill is at elevation 1040.75 feet msl. The New Hampshire abutment incorporates a stoplog sluice, 56 feet wide with a sill elevation of 1046.0 feet msl; the stoplogs are supported by steel stanchions and extend to a height 0.7 foot above the top of the flashboards.
6. The intake is on the Vermont end of the dam. The intake incorporates a trashrack with a bar clear spacing of three inches. The penstock is of wood stave construction, has a 9-foot inside diameter, and is 1,360 feet in length; the inlet invert is at elevation 1040.0 feet msl.
7. At the current normal pool elevation of 1055.2 feet msl, the impoundment extends 4,000 feet upriver. The surface area is approximately 20 acres. The impoundment has a gross storage capacity of 200 acre-feet and a maximum depth of about 16.5 feet.
8. The brick powerhouse houses a single 1,550 hp vertical Francis turbine (S. Morgan Smith) driving a General Electric generator that is rated at 1,100 kW. With a typical tailwater elevation of 1031.5 feet msl, the gross head is about 35 feet. The turbine's hydraulic capacity is about 466 cfs; it can operate down to 1/8 gate at about 55 cfs.
9. The plant produces an average annual output of 7,300,000 kWh.

River Hydrology and Streamflow Regulation

10. Inflows to the Canaan impoundment are highly regulated by managed outflows from First and Second Connecticut Lakes and Murphy Dam, which controls Lake Francis. TransCanada Hydro Northeast Inc., the licensee for the Fifteen Mile Falls Project dams (Moore, Comerford, and McIndoes), Wilder Dam, Bellows Falls Dam, and Vernon Dam, manipulates storage in the upper Connecticut River lakes to enhance power production at its facilities. It owns the dams at

the First and Second Connecticut Lakes; the N.H. Department of Environmental Services Water Resources Council owns Murphy Dam. TransCanada, as the primary beneficiary of storage manipulation, operates Murphy Dam and pays the State of New Hampshire an annual fee for the storage benefits. PSNH and Dodge Falls Associates (Dodge Falls Dam at East Ryegate, Vermont) also pay fees. Minimum flows are now provided below Murphy Dam in accordance with the Connecticut Lakes Supplementary Agreement (August 14, 1997), which was negotiated during the settlement discussions related to the Fifteen Mile Falls Project relicensing. The minimum flows are 85 cfs, or inflow if less, from April through September and 170 cfs, or inflow if less, from October through May. With a drainage area of 170 square miles, Murphy Dam controls flow from 45% of the watershed above Canaan Dam.

11. The U.S. Geological Survey monitors Connecticut River flows at a surface water gaging station (No. 01129200) below the confluence of Indian Stream near Pittsburg, N.H. where the drainage area is 254 square miles. The U.S. Geological Survey also monitors flows at a gage (No. 01129300) on Halls Stream near East Hereford, Quebec. The drainage area at that gage is 85 square miles. Consequently, records are available for 89% of the watershed runoff at Canaan.
12. The Canaan Project operates in a run-of-river mode when sufficient inflow is available to both operate the turbine and maintain a minimum flow of 50 cfs in the 1600-foot bypassed reach of river. The bypass flow is provided by setting the headpond elevation such that there is no less than 0.2 foot of water spilling over the flashboards. Under the current license application, PSNH proposes to maintain a bypass flow of 165 cfs.
13. Based on the U.S. Geological Survey records, the mean annual flow has been estimated at 821 cfs, or 2.15 csm (cfs per square mile of watershed area).

Applicant Proposal for Relicensing

14. The applicant proposes to continue operating the station in a strict run-of-river mode¹.
15. The applicant proposes a continuous release of 165 cfs, or inflow if less, at the dam.
16. All flows will be released at the dam when inflow is less than 220 cfs, the minimum capacity of the turbine (55 cfs) plus the 165 cfs release at the dam.
17. Although the Department's understanding of the proposal is that operation will be strictly run-of-river, it notes that the license application (Exhibit E, Section 2.5.1, p. E-4) indicates that the downstream minimum flow will be equivalent to the bypass minimum flow of 165 cfs. Technically, the project would only cause the downstream reach to experience a flow of 165 cfs when there is a station shutdown due to low inflows. This would cause a transition from 165 cfs to 220 cfs as the headpond rises until spillage matches inflow.

¹A true run-of-river project is one which does not operate out of storage and, therefore, does not artificially regulate streamflows below the project's tailrace. Outflow from the project is equal to inflow to the project's impoundment on an instantaneous basis. The flow regime below the project is essentially the river's natural regime, except in special circumstances, such as following the reinstallation of flashboards and project shutdowns. Under those circumstances, a change in storage contents is necessary, and outflow is reduced below inflow for a period.

18. To protect downstream aquatic biota, FERC staff, in the FERC EA at p. 78, recommended that the applicant release 90% of instantaneous inflow during refills following maintenance drawdowns, such as flashboard replacement.

Standards Designation

19. The current Vermont Water Quality Standards (Standards) were promulgated by the Vermont Water Resources Board pursuant to 10 V.S.A., Chapter 47, Water Pollution Control. Section 1252 of the chapter provides for the classification of State waters as either Class A or Class B and authorizes the adoption of standards of water quality to achieve the purpose of classification.
20. The entire Connecticut River bordering Vermont has been designated by the Vermont Water Resources Board as Class B waters. The State of New Hampshire has assigned the same classification.
21. Vermont manages Class B waters to achieve and maintain a high level of quality compatible with certain beneficial values and uses. Values are high quality habitat for aquatic biota, fish and wildlife and a water quality that consistently exhibits good aesthetic value; uses are public water supply with filtration and disinfection, irrigation and other agricultural uses, swimming, and recreation. (Standards, Section 3-04(A) *Class B Waters: Management Objectives*). Class B waters in New Hampshire are considered acceptable for fishing, swimming and other recreational purposes, and after adequate treatment, for use as water supplies (NH RSA 485-A:8,II)
22. The waters of the Connecticut River bordering Vermont are designated coldwater fish habitat for the protection and management of fisheries. (Standards, Section 3-05 *Fish Habitat Designation*)
23. In Class B waters, the Vermont's dissolved oxygen standard for coldwater fish habitat streams is not less than 7mg/l and 75 percent saturation at all times, nor less than 95 percent saturation during late egg maturation and larval development of salmonids in areas that the Secretary determines are salmonid spawning or nursery areas important to the establishment or maintenance of the fishery resource. At all times in all other waters designated as a coldwater fish habitat, the standard is not less than 6 mg/L and 70 percent saturation. (Standards, Section 3-04(B)(2) *Water Quality Criteria for Class B waters: Dissolved Oxygen*) New Hampshire's D.O. standards for Class B waters (Env-Wq 1703.07) are provided below:

Env-Wq 1703.07 Dissolved Oxygen.

(b) Except as naturally occurs, or in waters identified in RSA 485-A:8, III, or subject to (c), below, class B waters shall have a dissolved oxygen content of at least 75% of saturation, based on a daily average, and an instantaneous minimum dissolved oxygen concentration of at least 5 mg/l.

(c) For the period from October 1st to May 14th, in areas identified by the fish and game department as cold water fish spawning areas of species whose early life stages are not directly exposed to the water, the 7 day mean dissolved oxygen concentration shall be at least 9.5 mg/l and the instantaneous minimum dissolved oxygen concentration shall be at

least 8 mg/l. This period shall be extended to June 30 for a particular waterbody if the fish and game department determines it is necessary to protect spring spawners or late hatches of fall spawners, or both.

(d) Unless naturally occurring or subject to (a), above, 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.

24. Vermont's temperature standard for coldwater fish habitat limits increases to 1.0°F from ambient conditions, or background. (Standards, Section 3-01(B)(1) *General Criteria: Temperature*).
25. Vermont's turbidity standard is 10 NTU for coldwater fish habitat. (Standards, Section 3-04(B)(1) *Water Quality Criteria for Class B waters: Turbidity*). New Hampshire's turbidity standard for Class B waters (Env-Wq 1703.11) is provided below:

Env-Wq 1703.11 Turbidity.

(b) Class B waters shall not exceed naturally occurring conditions by more than 10 NTUs.

(d) For purposes of state enforcement actions, if a discharge causes or contributes to an increase in turbidity of 10 NTUs or more above the turbidity of the receiving water upstream of the discharge or otherwise outside of the visible discharge, a violation of the turbidity standard shall be deemed to have occurred.

26. Under the Class B criterion for aquatic biota, wildlife and aquatic habitat, Vermont's Standards require "[n]o change from the reference condition that would prevent the full support of aquatic biota, wildlife, or aquatic habitat uses. Biological integrity is maintained and all expected functional groups are present in a high quality habitat. All life-cycle functions, including overwintering and reproductive requirements are maintained and protected." (Standards, Section 3-04(B)(4) *Water Quality Criteria for Class B Waters: Aquatic Biota, Wildlife and Aquatic Habitat*). New Hampshire's standard for biological and aquatic community integrity (Env-Wq 1703.19) are provided below:

Env-Wq 1703.19 Biological and Aquatic Community Integrity.

(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.

(b) Differences from naturally occurring conditions shall be limited to non-detrimental differences in community structure and function.

27. The Hydrology Policy requires that "[t]he proper management of water resources now and for the future requires careful consideration of the interruption of the natural flow regime and the fluctuation of water levels resulting from the construction of new, and the operation of existing,

- dams, diversions, and other control structures.” (Standards, Section 1-02(E)(1) *General Policy: Hydrology Policy*) For Class B waters, “[a]ny change from the natural flow regime shall provide for maintenance of flow characteristics that ensure the full support of uses and comply with the applicable water quality criteria.” (Standards, Section 3-01(C)(1) *Hydrology Criteria: Streamflow Protection*)
28. The Anti-Degradation Policy provides for protection of existing uses and water quality of all waters. (Standards, Section 1-03. *Anti-Degradation Policy*). New Hampshire’s anti-degradation policy is provided in Env-Wq 1708 Antidegradation.
 29. On August 30, 2007, the USEPA approved a list of waters considered to be impaired based on water quality monitoring efforts. The list was submitted by the Department under Section 303(d) of the Federal Clean Water Act. No waters affected by the project are listed. New Hampshire’s 2006 list includes the Canaan impoundment for polychlorinated biphenyl (PCB) contamination impairing fish consumption use and bacteriological pollution (*E. coli*) impairing primary contact recreation. PCB contamination is also listed as impairing fish consumption use for ten miles below Canaan. Indicating that the original lists were erroneous, the N.H. Department of Environmental Services has submitted its 2008 303(d) list to EPA for final approval without PCB contamination as a cause of impairment. The 2008 list only maintains the impoundment on the list for the bacteriological impairment. The downstream reach is listed as impaired by invasive aquatic algae.
 30. The Department has also issued a six-part list, *List of Priority Surface Waters Outside the Scope of the Clean Water Act Section 303(d)* in 2006. No waters affected by the project are listed.

Water Chemistry

31. A municipal wastewater treatment plant at Canaan discharges into the Connecticut River just upstream of Leach Creek (about 1.5 miles below the dam). The plant receives wastewater from both Canaan village and West Stewartstown. The discharge results in an organic loading of pollutants that reduces dissolved oxygen (D.O.) levels during the decay process. The watershed also contributes organic and nutrient loadings from natural and other cultural (land use) sources.
32. As noted on p. A-3 of Appendix A of the license application, PSNH was not able to collect dissolved oxygen data under critical low flow conditions prior to the filing of the license application. Nor was PSNH able to collect data during Summer 2008. The run-of-river operation and increase in bypass conservation flows should assure that dissolved oxygen standards will be met in the future. During critical summer low flows below 220 cfs (165 cfs bypass flow plus 55 cfs minimum turbine capacity at 0.125 gate), the station will be off line and all inflows will be spilled, providing full reaeration benefits. However, the collection of data to define the river’s dissolved oxygen regime and provide a full understanding of project impacts is a continuing need for the purposes of the water quality certification review.

Aquatic Biota and Habitat

33. Class B waters are managed to provide high quality habitat for aquatic biota (Vermont Standards, Section 3-03(A)). Aquatic biota are defined as “organisms that spend all or part of

their life cycle in or on the water.” (Standards, Section 1-01(B)) Included, for example, are fish, aquatic insects, amphibians and some reptiles, such as turtles. New Hampshire’s standards for maintaining biological and aquatic community integrity are provided in Finding 26 of this certification. Definitions for biological integrity, biota and community are provided below:

Env-Wq 1702.07 “Biological integrity” means the ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region.

Env-Wq 1702.08 “Biota” means species of plants or animals occurring in surface waters.

Env-Wq 1702.13 “Community” means one or more populations co-occurring in surface waters.

34. Sport and recreational fisheries between Murphy Dam and Canaan are provided primarily by populations of rainbow, brown and brook trout. Self-sustaining populations of rainbow and brown trout are supplemented by stocking. The indigenous population of brook trout is also supplemented by stocking. Annual stocking of salmonid species in the upper reach is concentrated primarily in the Pittsburg-Clarksville, N.H. area below Murphy Dam. The Canaan impoundment is also stocked with trout. Common white sucker and dwarf longnose suckers are also present.
35. Salmonid species provide the sport fishery in the upper 11 mile reach and below Canaan Dam. Other species, including chain pickerel, northern pike, yellow perch, smallmouth bass, largemouth bass, and rock bass become components of the fish community and recreational fishery in the Lancaster, NH river reach, much further downstream.
36. The N.H. Department of Fish and Game is responsible for sports fisheries management in the Connecticut River. The reach receives a substantial amount of angling pressure. Both upstream and downstream of Canaan Dam, the Department of Fish and Game annually stocks catchable-size trout to supplement natural reproduction of the three trout species.

Flow Needs for Protection of Aquatic Habitat

37. Flows discharged below the project are not regulated by the Project, except during impoundment refilling following flashboard reinstallation. Since inflows are highly regulated by upstream dams, the downstream flow will continue to reflect this condition.
38. With adequate flows, the bypass reach can provide habitat for salmonids and macroinvertebrates; due to the lack of gravel substrate, it has limited suitability for spawning. To define a conservation flow to support adult and juvenile fish and macroinvertebrates four flows were assessed as part of an instream flow study targeting brook and rainbow trout, longnose dace, and macroinvertebrates (*Canaan Hydroelectric Project Bypass Reach Aquatic Habitat Study and Turbine Shutdown Study Report*, Normandeau Associates, February 2007). Brook trout were considered as a surrogate for brown trout, which would also use the bypass habitat given a suitable flow regime. Data was collected for four flows, each corresponding to a different headpond elevation, as noted in the following table.

Scenario	Headpond Elevation (ft)	Flow (cfs)
Approx. Baseline	1055.2	78
Study Flow 1	1055.3	130
Study Flow 2	1055.4	165
Study Flow 3	1055.5	213

39. All of the study's river transects were located in run or rapid mesohabitat types because these areas were more abundant (representing 70% of overall habitat in the bypass reach) and were more likely to exhibit greater changes in habitat suitability with changes in flow.
40. Study results suggested that the third test flow (Study Flow 2), estimated at 165 cfs, provides a significant improvement in habitat relative to the baseline condition and Study Flow 1 (130 cfs). The results also suggested that higher flows contribute relatively little habitat improvement over Study Flow 2 and could decrease habitat suitability for certain species or life stages (such as longnose dace and brook trout).
41. The wading flow measurement for Study Flow 2 was done under non-steady state conditions. Field records indicated that the water level in the river changed between the start and end of the transect depth and velocity measurements. The Department asked the applicant to repeat the flow measurement in order to derive a more accurate flow estimate. Normandeau Associates repeated the flow measurement twice under more favorable conditions on September 23, 2008, with estimates of 163 cfs and 164 cfs (letter of September 26, 2008 from Normandeau Associates to PSNH). The work supports the earlier estimate of 165 cfs.
42. The habitat study report included information on a special turbine shutdown study that analyzed the extent of habitat dewatering and fish stranding during the transient period between the station shutdown and reestablishment of run-of-river conditions below the tailrace. This phenomenon, commonly known as lag time, results when initially the only water available below the tailrace is the bypass flow. The flow below the dam increases as the headpond builds up and more water spills over the flashboards. Eventually steady state conditions are again established. When the station goes back on line, another transient period begins but in reverse, with initially higher flows downstream. The study focused on the shutdown, which tends to be more detrimental to the aquatic community. The study indicated that the higher bypass flow proposed by the applicant will limit the extent of dewatering and stranding.

Impoundment

43. Fisheries habitat that was formerly riverine has been impounded by the dam. The limited depth of the impoundment and its small volume relative to the size of the contributing drainage assure that thermal stratification does not occur. The impoundment provides limited aquatic habitat value.

Fish Passage and Movement

44. The two states and PSNH have had extensive discussions regarding the need to accommodate upstream and downstream movement of trout. The dam constitutes a physical barrier between the two longest reaches of coldwater fish habitat on the Connecticut River. The Vermont Department of Fish and Wildlife, N.H. Department of Fish and Game, and the U.S. Fish and Wildlife Service prepared a whitepaper entitled *Justification for Fish Passage at the Canaan Hydropower Project* and provided it to PSNH on April 12, 2007. The Vermont Agency of Natural Resources subsequently filed it with FERC requesting that both upstream and downstream fish passage facilities be constructed at the project (letter from Jeffrey Cueto, Chief Hydrologist, Vermont Agency of Natural Resources to Kimberly Bose, Secretary, FERC, November 27, 2007).
45. PSNH analyzed the technical feasibility and cost of installing upstream and downstream passage facilities at Canaan Dam and concluded that the investment in such facilities was not warranted (*Evaluation of the Technical and Economic Feasibility of Upstream Fish Passage* (April 2006); *Evaluation of the Technical and Economic Feasibility of Downstream Fish Passage* (April 2006)). PSNH also mapped and quantified habitat types for 11 miles upstream and 37 miles downstream of the project (*Connecticut River Trout Habitat Assessment*, July 2007).
46. The reach upstream of the Canaan impoundment is dissimilar to the downstream reach, providing different habitat characteristics suitable to different life stages of trout. The upstream reach includes predominantly riffle habitat, with water depths less than one foot in many places; as a percentage, there is over twice as much riffle habitat upstream (61% compared to 29%). There are also a few deep pools. The downstream reach is predominantly meandering and slow moving with mostly sandy substrate. It includes a considerable amount of deep, low-velocity habitat that is used by adult trout for both feeding and overwintering. Riffle habitat that may support spawning is virtually absent downstream between the dam and Columbia, N.H., a distance of over 12 miles.
47. The Vermont Department of Fish and Wildlife conducted electrofishing surveys during August 2008 on Capon Brook, Keyer Brook, Clough Brook, Blodgett Brook, and Mill Brook, tributaries to the Connecticut River in the towns of Canaan, Lemington, and Bloomfield. They observed resident brook trout and juvenile brown trout in all of these brooks and juvenile rainbow trout in Clough Brook, Blodgett Brook, and Mill Brook. Although the Department of Fish and Wildlife found that brown and rainbow trout from the Connecticut River are using tributaries for spawning, the productivity of these brooks was determined to be very low. Juvenile brown and rainbow trout densities are many times lower than more productive nursery waters in other parts of Vermont. This low productivity is due to these streams' low alkalinity attributed to the granitic bedrock of the watersheds.
48. The New Hampshire Department of Fish and Game has also completed electrofishing surveys of tributaries on its side of the river. Simms Stream, surveyed in 2001-2002, and the Mohawk River, surveyed annually since 2000, were found to be supporting natural reproduction of all three trout species. Bishop Brook, surveyed in 2003-2004, supports natural reproduction of brook trout and brown trout, with one of its tributaries, Cedar Brook, supporting natural reproduction of rainbow trout and brook trout.

49. Fisheries biologists working for the resource agencies have stated that trout residing in the reach downstream to Columbia would have a natural tendency to seek spawning habitat by moving in an upstream direction and that the dam blocks the fish from the extensive suitable habitat upstream of Canaan. The upstream reach also provides excellent fry and juvenile habitat. The lack of access may reduce overall productivity and increase the dependence on supplemental stocking to support angling. The biologists consider this to be a critical habitat fragmentation issue that justifies passage facilities.
50. Maintenance of the existing trout fishery is heavily dependent on annual stocking of catchable size trout. In 1999, the N.H. Department of Fish and Game drafted a management plan for the Upper Connecticut, *Upper Connecticut River Strategic Fisheries Management Plan* (draft, June 1999). The plan, which was never formally adopted, constituted a vision of the Connecticut River fishery to be attained by the year 2012. It foresaw the river as "one of the finest coldwater fisheries in the Eastern United States... support[ing] abundant and diverse, self-sustaining coldwater fish populations. Brook, brown, and rainbow trout are the featured species of management sought after by anglers." Objective 2.1 of the plan is "Protect, conserve, and enhance wild populations of coldwater fish." One of the strategies (2.1.4) to meet that objective is to "minimize potential impacts of cultured fish on wild populations through prudent management of cultured salmonid strains, diseases, stocking densities, and species introductions." Provision of passage at the dam is expected to reduce the dependency on stocking.

Wildlife and Wetlands

51. Section 4.3.4 of Exhibit E of the license application provides a discussion of the results of a wetlands survey performed by PSNH's consultant, Kleinschmidt Associates). Several wetland types were identified adjacent to the impoundment and bypass reach. Wetland areas identified in the impoundment are characteristic of palustrine emergent and palustrine scrub/shrub type. The wetland area along the Vermont shoreline, adjacent to Vermont Route 253, consists of a 25-75 foot long segment that extends from the dam to middle of the impoundment. This is an area of shallow sloped shoreline near the dam that gives way to a steeper slope where the highway borders the shoreline. Herbaceous emergent species are prevalent in the shallow sloped sections, which transition to grasses and woody shrubs in the steeper sloped segment characterized by scrub/shrub wetlands. With the exception of small segments of palustrine emergent wetlands along the New Hampshire side of the river, the shoreline is dominated by upland forest extending to the edge of water. Those wetlands found in the bypass reach were predominantly fringe feature, palustrine forested and palustrine scrub/shrub segments, along channel islands where the floodplain meets the steep-sloped riverbank.
52. According to Section 4.3.4 of Exhibit E of the license application, limited wildlife habitat exists within the project area. While the habitat that does exist around the impoundment can be classified as good to high quality and large tracts of forested and open habitat surround the project area beyond the roads that border the project, wildlife access is limited by surrounding commercial and residential development and paved roadways. Wildlife habitat immediately downstream of the dam is generally poor quality. What limited habitat does exist in the impoundment has been documented by PSNH to have historically been occupied by nesting wood ducks, black ducks, and American merganser. Both resident and migratory species are

reported to utilize the lowland areas and floodplain downstream of the project. Wildlife observations made during the 2006 assessment by Kleinschmidt Associates included: great blue heron, various small birds, minnows, frogs, an unidentified snake, beaver, rodents, and moose. During this field assessment observations were also made that indicate wildlife usage in the project area such as game trails in the dense understory as well as beaver activity.

Rare and Endangered Species and Outstanding Natural Communities

53. PSNH, in Section 4.3.5 of Exhibit E of the license application, states that based on review of existing information and personal communications with New Hampshire Audubon Society, U.S. Fish and Wildlife Service, and New Hampshire Natural Heritage Bureau staff, no endangered or threatened species are known to inhabit the project area and there is no critical habitat for these species within the project area..

Shoreline Erosion

54. PSNH retained Field Geology Services to complete a shoreline erosion study (*Shoreline Erosion Study for the Canaan Hydroelectric Project*, October 2006). The purpose of the study was to determine if project operations contributed to bank instability and changes in channel morphology. Four eroded sites were identified on the impoundment on the upper portion of a high bank of glacial deposits. These slumps were determined to have resulted from runoff from U.S. Route 3 at the top of the bank. The report indicates that, because the project has contributed to sediment storage, some erosion of low banks and gravel bars has occurred in the bypass reach. The 2006 study concluded that current project operations have a minimal effect on bank erosion, because natural flood flows through the run-of-the-river dam exert a much stronger influence on bank stability and channel morphology than pond level fluctuations resulting from maintenance activities or emergency releases and bank erosion downstream of the dam is restricted to low banks inset into higher banks of glacial deposits.
55. No remediation has been proposed. Instead PSNH proposes to monitor the erosion using photographic documentation to determine the erosion rates, with the documentation collected initially one year and five years after license issuance. With the license application, PSNH filed a study plan, *Canaan Hydroelectric Project Bypass Reach Erosion Monitoring Plan*, July 2007). The monitoring proposal differs from that recommended by the consultant in Section 8.3 of the Field Geology Services report. The consultant recommends annual and post-flood monitoring, including both photographic documentation (repeating the photograph series contained in Appendix 1 of the report, which includes areas not presently eroding but with significant risk of failure) and cross-sectional surveys. The consultant also recommends monitoring both the impoundment and the bypass, but PSNH proposes to limit monitoring to the bypassed reach.

Recreational Use

56. According to Section 4.3.6 of Exhibit E of the license application, recreational activity primarily occurs at six informal public recreation sites along the lands of the Canaan Project. These six areas are known as Dam Gatehouse Area, Dam Abutment Area, Powerhouse Area, Vermont

Route 114 Bridge Area, Upper Reservoir Access Area, and the 45th Parallel Historic Marker Area. Local area residents enjoy primarily walking and bank fishing, and there is some sightseeing in the area. There are no private residences along the reservoir; therefore, no private boat launches or docks exist. As discussed previously, the project is in the middle of a long reach of the Connecticut River that is extremely popular for angling.

57. The project area would continue to be available for recreational access to the river. PSNH proposes enhancements in three areas: a canoe portage around the Project dam, a canoe/kayak access point below the Project dam, and enhancement of the day use area near the powerhouse. These proposed enhancements and the currently available amenities are detailed in the license application.
58. In its letter of November 27, 2007 to FERC, the Vermont Agency of Natural Resources repeated an earlier request that PSNH include interpretive signs in its recreation plan in order to enhance user experience. The Agency recommended that the signs include information on the project, the cultural and natural history of the river, and recreational opportunities. PSNH indicated in the license application that it would consider such signs in the future but not include them in the current plan. FERC staff, in the FERC EA, also recommended that signs be provided to direct the public to designated access areas and to provide information on the significance of the project.
59. FERC staff, in the FERC EA, noted that the existing boat access and parking area at the Vermont Route 114 bridge is the only access available downstream of the project and that the access is a key component of the proposed portage. FERC staff recommended that the project boundary be revised to include this site.

Aesthetics

60. In 1999, the States of Vermont and New Hampshire designated a bi-state route for the Connecticut River Scenic Byway along New England's largest river. The Connecticut River Scenic Byway contains a system of over 500 miles of state roads bordering the Connecticut River in both Vermont and New Hampshire. Their goals are to balance the preservation, promotion, enjoyment, and stewardship of the Connecticut River Valley and to link people, organizations, communities, and agencies in promotion of the Connecticut River Byway as a tourism asset. On September 22, 2005, the Federal Highway Administration awarded the Connecticut River Byway national status. U.S. Route 3 from Canadian border in Pittsburg to Lancaster; Vermont Route 102 from Canaan to Lunenburg; and New Hampshire Route 145 from Clarksville to Colebrook have been designated as Scenic Byways within the Connecticut River Byway.
61. PSNH's license application includes, in Section 4.3.6.11 of Exhibit E, a discussion of the results of a special study evaluating the aesthetics value of a range of bypass flows.
62. Under the current minimum bypass flow of 50 cfs, the pond level control set point is 1055.20 feet msl to maintain the pond level between elevations 1055.15 and 1055.25 feet msl. With the increased minimum flow, the sensor will be set to maintain the impoundment between elevation

1055.4 feet and 1055.5 feet msl. With the flashboard crest at 1055.00 feet msl, this change will increase the minimum spillage depth from 0.15 foot to 0.40 foot.

63. PSNH proposes to replace the vinyl siding on the gatehouse, storage building, and shed with wood siding to make those structures more compatible with the historic character of the project area.

State Comprehensive River Plans

64. The Agency, pursuant to 10 V.S.A. Chapter 49, is mandated to create plans and policies under which Vermont's water resources are managed and uses of these resources are defined. The Agency must, under Chapter 49 and general principles of administrative law, act consistently with these plans and policies whenever possible.

Hydropower in Vermont, An Assessment of Environmental Problems and Opportunities (May 1988)

65. The Department publication *Hydropower in Vermont, An Assessment of Environmental Problems and Opportunities* is a state comprehensive river plan. The hydropower study, which was initiated in 1982, indicated that hydroelectric development has a tremendous impact on Vermont streams. Artificial regulation of natural stream flows and the lack of adequate minimum flows at the sites were found to have reduced to a large extent the success of the state's initiatives to restore the beneficial values and uses for which the affected waters are managed.
66. As with the other Connecticut River dams, the Canaan Hydroelectric Project was not specifically included in the study, which did include individual reports on 62 hydroelectric facilities.

1993 Vermont Recreation Plan

67. The 1993 Vermont Recreation Plan (Department of Forests, Parks and Recreation), through extensive public involvement, identified water resources and access as top priority issues. The planning process disclosed that recreational use of surface waters is increasing, resulting in greater concern about water quality, public access to Vermont's waters, and shoreland development.
68. The plan's Water Resources and Access Policy is:

It is the policy of the State of Vermont to protect the quality of the rivers, streams, lakes, and ponds with scenic, recreational, cultural and natural values and to increase efforts and programs that strive to balance competing uses. It is also the policy of the State of Vermont to provide improved public access through the acquisition and development of sites that meet the needs for a variety of water-based recreational opportunities.
69. The applicant proposes to provide continued access to the river in the project area. This access and improved aesthetic and bypass flows would be compatible with this policy and balance the

competing uses of recreation and hydropower. Failure to provide access would exacerbate a critical state recreational problem.

70. Another priority issue identified in the Recreation Plan is the loss or mismanagement of scenic resources. The plan notes “[t]he protection of the scenic and visual resources in Vermont is paramount if Vermont is to maintain its renowned charm and character.”
71. The Scenic Resources Protection and Enhancement Policy in the Recreation Plan is:

It is the policy of the State of Vermont to initiate and support programs that identify, enhance, plan for, and protect the scenic character and rural traditions of Vermont.

Connecticut River Corridor Management Plan

72. The Connecticut River Joint Commissions (CRJC), an advisory body whose members are appointed by the states of Vermont and New Hampshire, published the *Connecticut River Corridor Management Plan* in 1997. The plan was developed with extensive public participation. In 2008, the CRJC published an update, the *Water Resources Riverwide Overview*.
73. The 1997 plan specified that “[a]ny flow policies developed for the Connecticut River must maintain water flows at levels which will support the full range of its uses and values.” Further, the plan states that “[m]anagers of tributary and mainstem dams should communicate and cooperate to manage flow effectively on the river” and that all dam owners should have an integrated flow control system. The 1997 plan identified low flows in the Canaan Project bypass as a threat to spawning and rearing habitat in that reach. The applicant is addressing flow issues in this relicensing proposal.
74. The 2008 plan update noted expansion of river ecosystem and recreation benefits at existing dams as an issue, and recommended continuation and enhancement of good river stewardship by dam owners. The applicant is proposing several enhancements that the project that will contribute to meeting this goal.
75. The 1997 plan and the 2008 update both identified bank erosion as a significant problem affecting water quality and aquatic habitat. The plans specified protection of riparian buffers and floodplains as an effective strategy to mitigate erosion along the mainstem and its tributaries. Protection of these areas has the additional benefit of protecting wildlife habitat and migration corridors. The applicant, under the conditions of this certification, will enhance riparian vegetation management and monitor and correct erosion problems caused by project operations.

Analysis

Water Chemistry

76. The applicant had planned to do water quality sampling to determine whether any significant dissolved oxygen deficits occur at the project but critical conditions for sampling did not occur during the two available study seasons. The increase in bypass flows and continued run-of-river operations should assure that substandard conditions do not occur below the dam. All inflows will benefit from reaeration at the dam during low flow periods when inflows decline below 220 cfs (0.58 csm)(the bypass minimum flow of 165 cfs plus the minimum station capacity of 55 cfs). By condition of this certification, the applicant is required to complete the study and furnish the results to both States.

Flow and Water Level Management

Habitat Protection – Downstream

77. Run-of-river operation will provide aquatic habitat and wetland protection below the project.
78. The turbine shutdown study did not disclose any significant lag-time impacts below the Vermont Route 114 bridge. The bypass flow is sufficiently high to minimize the effects of this transient condition.
79. During periods when the impoundment is refilled following flashboard replacement and other maintenance activities, adequate flows must be provided to protect downstream habitat.

Habitat Protection – Bypass

80. Adequate bypass flows must be provided to address year-round habitat needs and enable fish movement through the bypass reach. The habitat flow study indicates that a flow of 165 cfs provides high quality aquatic habitat in this reach.

Habitat Protection – Impoundment

81. The project impoundment water levels will be maintained at a level that normally will only vary about 0.1 foot (elevation 1055.4 feet to 1055.5 feet) as a result of project operations. Periodic replacement of the flashboards will result in drawdowns on the order of five feet. This is unavoidable unless the existing conventional flashboard system design is changed to a different technology, such as a rubber inflatable flashboard system.

Aesthetics

82. The release of 165 cfs at the dam to support aquatic habitat in the bypass will result in a spillage of 0.4 foot or more of water. This will provide an attractive veil of water over the downstream dam face. It will also provide for attractive flows over the bypass reach as noted in the applicant's special aesthetic/flow study. Steps to improve and preserve project infrastructure as

proposed by the applicant and subject to a historic properties management plan (FERC EA at pp. 82-84) will also enhance the project site. These together with the recreation plan will help support the aesthetic value of the river and be compatible with the byway designation.

Conclusions

83. Run-of-river operation will be necessary to protect impoundment and downstream habitat. A limited deviation from run-of-river may occur when the impoundment is being refilled following flashboard replacement or a maintenance drawdown. To address this issue, this certification is being conditioned to require that 90 percent of inflow be released downstream during refill periods and that the impoundment not be drawn more than half a foot below the fixed crest.
84. Adequate bypass flows will be needed to provide high quality aquatic habitat in that reach. Based on the current record, this objective can be met by providing a conservation flow of 165 cfs.
85. Another flow management objective is support of aesthetics by providing a veil of water over the spillway and through the bypassed reach. Based on the current record, these objectives can be met by providing a spillage of 165 cfs.
86. Precise control of the impoundment elevation will be necessary to consistently provide the required flows over the spillway. The automated equipment will maintain a spillage of 0.40 to 0.50 foot. This corresponds to estimated flows of 165 cfs to 213 cfs.
87. By condition of this certification, the applicant shall be required to maintain run-of-river operation and provide bypass flows as described above by spilling water over the spillway. The applicant, at its discretion, may consider alternate methods for discharging the bypass conservation flow; however, any alternative other than full crest spillage shall be subject to prior Department approval to insure that habitat and aesthetics will be supported.

Fish Passage

88. The dam obstructs the movement of fish between two exceptional free-flowing reaches of the Connecticut River. The three fisheries resource agencies that have evaluated this issue all support the provision of upstream and downstream passage facilities at this dam in order to mitigate the dam's impact. An important consideration is the distribution of different habitat types in the reaches above and below the dam, especially given the cost of mitigation. The Vermont Department of Fish and Wildlife had intended to evaluate the habitat types and distribution during the 2008 field season, but unusually high flows barred this effort.
89. Passage is less critical as long as New Hampshire continues heavily stocking the reach. Provision of passage, however, presents the opportunity to increase natural reproduction, reduce stocking rates, and strengthen the wild trout population. The action would be consistent with the N.H. Department of Fish and Game draft management plan (see Finding 50). Assuming that the Vermont Department of Fish and Wildlife field evaluation work verifies the need, passage

facilities are justified if New Hampshire adopts the management plan and reduces stocking rates as the wild population of trout expands after the facilities are in place and operating.

90. The Department is issuing this certification with a provision requiring upstream and/or downstream passage should 1) New Hampshire adopt a management plan that emphasizes self-sustaining wild fish; 2) New Hampshire plan a concomitant reduction in stocking rates as wild fish production increases after passage is in place; and 3) the Department make the request for passage based on a determination of need provided by the Vermont Department of Fish and Wildlife and done in consultation with the N.H. Department of Environmental Services, the N.H. Department of Fish and Game, the U.S. Fish and Wildlife Service, the Connecticut River Watershed Council, CRJC, Trout Unlimited, and PSNH.

Recreation

91. Vermont Water Quality Standards require the protection of existing water uses, including the use of water for recreation. Standards also requires the management of the waters of the State to improve and protect water quality in such a manner that the beneficial uses and values associated with a water's classification are attained. (Standards, Section 1-03)
92. Beneficial values and uses of Class B waters include water that exhibits good aesthetic value and swimming and recreation. (Standards, Section 3-03(A)) Regulation of river flows in a manner that would result in an undue adverse effect on any existing use or beneficial value or use are prohibited. (Standards, Section 2-02(B))
93. The applicant will provide continued public access to the project area and has proposed several recreational improvements. The proposed improvements will enhance the existing uses of fishing, canoeing, wildlife observation and scenic appreciation.
94. The Department is requiring the applicant to include signage in it recreation plan and to investigate inclusion of the downstream boat access within the project boundaries.
95. By condition of this certification, the applicant shall be required to provide continued public access to the area and to develop a recreation plan, subject to review and approval by the Department.

Erosion

96. Erosion, if severe, can impair recreational use and cause turbidity and the discharge of suspended solids, potentially violating the standards for those parameters. (Standards, Section 3-03(B)(1) and Section 3-01(B)(7)) The Department agrees with PSNH's proposal to initially evaluate erosion one and five years after license issuance, then determine whether additional monitoring is warranted; however, the Department also concurs with PSNH's consultant that the data collection should include repeating of the cross sectional surveys and monitoring of the impounded reach, not just the bypass.

97. Recreational use of project lands may cause some localized erosion. Proper recreation planning limits the risk of significant erosion, but the Department will maintain continuing jurisdiction over this issue and require modifications where found necessary to abate erosion.

Debris

98. The applicant does not provide information on the handling and disposal of trashrack debris and other project related debris. The depositing or emission of debris and other solids to state waters violates the state solid waste laws and Standards, Section 3-01(B)(7). Debris may also impair aesthetics and boating. A debris disposal plan shall be required as a condition of this certification.

Decision and Certification

Based on its review of the applicant's proposal and the above findings, the Department concludes that there is reasonable assurance that operation and maintenance of the Canaan Hydroelectric Project as proposed by the applicant and in accordance with the following conditions will not cause a violation of Vermont Water Quality Standards and will be in compliance with sections 301, 302, 303, 306, and 307 of the Federal Clean Water Act, 33 U.S.C. §1251 et seq., as amended, and other appropriate requirements of state law:

- A. **Compliance with Conditions.** The applicant shall operate and maintain this project consistent with the findings and conditions of this certification, where those findings and conditions relate to protection of water quality and support of designated and existing uses under Vermont Water Quality Standards and other appropriate requirements of state law and New Hampshire Water Quality Standards where applicable.
- B. **Flow Management.** Except as allowed in Condition C below, the facility shall be operated in a true run-of-the-river mode where instantaneous flows below the tailrace shall equal instantaneous inflow to the impoundment at all times. When the facility is not operating, all flows shall be spilled at the dam. In the river reach bypassed by the penstock, a flow of 165 cfs, or instantaneous inflow if less, shall be maintained at all times; the bypass flow shall be provided as full crest spillage unless an alternate method is approved by the Department after review and consultation with the N.H. Department of Environmental Services to assure that aquatic habitat and aesthetics will be supported.
- C. **Impoundment Water Level Management.** The conservation flow shall be maintained as full crest spillage unless an alternative method combining spillage with a gate discharge and/or fishway flows is approved by the Department after the Department's consultation with the N.H. Department of Environmental Services, and a determination that aesthetics will continue to be fully supported. During maintenance drawdowns, the water level will be maintained at or above twelve inches below the fixed dam crest (at or above elevation 1050.5 feet msl), unless special approval is granted by the Department under Condition M below. Any drawdown for maintenance or repair work shall be done at a controlled rate so as to limit the impact on public safety and on aquatic habitat in the impoundment and downstream of the dam.
- D. **Flow Management during Impoundment Refill.** During refilling of the project impoundment after flashboard replacement, an approved dam maintenance operation or an emergency drawdown, the applicant shall release at least 90 percent of instantaneous inflow below the project. While the impoundment is being refilled, bypass flow requirements shall be met at all times.
- E. **Flow Management Plan.** The applicant shall develop and file with the Department and the N.H. Department of Environmental Services a flow management plan detailing how the project will be operated to comply with the conservation flow and impoundment fluctuation limitations described above. The plan shall include information on how the project will be managed to control lag times and avoid related non-compliance with the conservation flow requirements. The plan shall be subject to Department review and approval after consultation with the N.H.

Department of Environmental Services. The Department reserves the right of review and approval of any material changes made to the plan.

- F. **Monitoring Plan for Impoundment and Flow Management.** The applicant shall develop a plan for continuous monitoring and reporting of flow releases at the project (spillage and turbine discharge), impoundment levels, and inflows. The plan shall include procedures for reporting deviations from prescribed operating requirements to the Department, explaining the reasons for those deviations and indicating measures to be taken to avoid recurrences. The applicant shall maintain continuous records of flows and impoundment levels and provide such records on a regular basis as per specifications of the Department. The plan shall be developed in consultation with the Department, the N.H. Department of Environmental Services, and the U.S. Fish and Wildlife Service. The plan shall be subject to Department review and approval. The Department reserves the right of review and approval of any material changes made to the plan.
- G. **Dissolved Oxygen Sampling Study.** When technically feasible based on critical river flow and water temperature conditions, the licensee shall complete the dissolved oxygen study following the protocol agreed upon with the Department and the New Hampshire Department of Environmental Services. The study report shall be filed by the December following the season of sampling and shall include proposed remediation to address substandard conditions, if identified, and an implementation schedule, both subject to Department approval. The Department, after consultation with the N.H. Department of Environmental Services, may require additional sampling, if needed, or post-remediation sampling to determine effectiveness. The licensee shall notify the Department by October 1 of each year as to whether it was successful in completing the sampling effort.
- H. **Downstream Fish Passage.** The licensee shall implement permanent downstream fish passage within two years of a request by the Department, which request shall only occur after the N.H. Department of Fish and Game adopts a management plan emphasizing self-sustaining wild trout populations and provides the Department with a plan for reducing or eliminating stocking and/or harvest in the towns of Stewartstown, Colebrook, and Columbia after implementation of passage. Any request shall be made based on a written evaluation by the Vermont Department of Fish and Wildlife of the need for downstream fish passage, said evaluation to be done in consultation with the N.H. Department of Environmental Services, the N.H. Department of Fish and Game, the U.S. Fish and Wildlife Service, the Connecticut River Watershed Council, CRJC, Trout Unlimited, and PSNH. The design shall include provisions to prevent entrainment and impingement, and shall be functional at all normal impoundment levels (e.g., with and without flashboards). The Vermont Department of Fish and Wildlife evaluation shall address whether the facility should be operated year-round or for an alternate schedule, and the Department shall specify the operating schedule in its request. The Department may authorize or order an adjustment of the operating schedule based on experience or specific conditions during a given year, either at the PSNH's request, after consultation with the state fisheries resource departments, or pursuant to a mutual request by the state fisheries resource departments. The applicant shall develop the design in consultation with the Department, the Vermont Department of Fish and Wildlife, the N.H. Department of Fish and Game, and the U.S. Fish and Wildlife Service, and it shall be subject to Department approval prior to implementation.

The design for any trashrack replacement is subject to prior approval by the Department, after consultation with the Vermont Department of Fish and Wildlife, the N.H. Department of Environmental Services, the N.H. Department of Fish and Game, and the U.S. Fish and Wildlife Service

- I. **Upstream Fish Passage.** Within two years of a request by the Department, the licensee shall institute upstream fish passage, subject to plan approval by the Department. Said request shall only occur after the N.H. Department of Fish and Game adopts a management plan emphasizing self-sustaining wild trout populations and provides the Department with a plan for reducing or eliminating stocking and/or harvest in the towns of Stewartstown, Colebrook, and Columbia after implementation of passage. Any request shall be made based on a written evaluation by the Vermont Department of Fish and Wildlife of the need for upstream fish passage, said evaluation to be done in consultation with the N.H. Department of Environmental Services, the N.H. Department of Fish and Game, the U.S. Fish and Wildlife Service, the Connecticut River Watershed Council, CRJC, Trout Unlimited, and PSNH. The applicant shall consult the Department, the Vermont Department of Fish and Wildlife, the N.H. Department of Environmental Services, the N.H. Department of Fish and Game, and the U.S. Fish and Wildlife Service during plan development. The plan shall include an erosion control and water management plan designed to assure compliance with water quality standards during construction. The facility shall be operated from April 1 through June 30 and September 1 through December 15. The Department may authorize or order an adjustment of the operating schedule based on experience or specific conditions during a given year, either at the PSNH's request, after consultation with the state fisheries resource departments, or pursuant to a mutual request by the state fisheries resource departments.
- J. **Passage Effectiveness Study.** Upon a request by the Vermont Agency of Natural Resources, the applicant shall complete a passage effectiveness study, or studies, based on a study plan(s) and schedule(s) approved by the Department after consultation with the U.S. Fish and Wildlife Service, the Vermont Department of Fish and Wildlife, the N.H. Department of Environmental Services, and the N.H. Department of Fish and Game. Any study shall be limited to monitoring utilization of the fishway(s) during applicable operating periods and shall not include studies of fish behavior and movement. The results of such effectiveness studies may serve as the basis for the Department to require modifications of any facilities required under conditions H and I above.
- K. **Turbine Rating Curves.** The applicant shall provide the Department with a copy of the turbine rating curves, accurately depicting the flow/production relationship, for the record within one year of the effective date of the license.
- L. **Debris Disposal Plan.** The applicant shall develop a plan for proper disposal of debris associated with project operation, including trashrack debris. The plan shall be developed in consultation with the Department and shall be subject to Department review and approval. The Department reserves the right of review and approval of any material changes made to the plan at any time.
- M. **Maintenance and Repair Work.** Any proposals for project maintenance or repair work, including drawdowns lower than six inches below the fixed dam crest to facilitate

repair/maintenance work, shall be filed with the Department for prior review and approval, if said work may have a material adverse effect on water quality or cause less-than-full support of an existing use or a beneficial value or use of the waters. The applicant shall file any proposals concurrently with the N.H. Department of Environmental Services to facilitate the Department's consultation with the N.H. Department of Environmental Services.

- N. **Public Access.** The applicant shall allow public access to the project lands for utilization of public resources, subject to reasonable safety and liability limitations. Such access should be prominently and permanently posted so that its availability is made known to the public. Any proposed limitations of access to the waters to be imposed by the applicant shall first be subject to written approval by either the Department or the N.H. Department of Environmental Services, depending on which bank of the river is involved. In cases where an immediate threat to public safety exists, access may be restricted without prior approval; the applicant shall so notify the appropriate department and shall file a request for approval, if the restriction is to be permanent or long term, within 14 days of the restriction of access.
- O. **Riparian Zone Management Plan.** The applicant shall develop, and file for Department approval within six months of the effective date of the license, a riparian zone management plan that establishes and maintains an undisturbed, naturally vegetated riparian zone along the river. The applicant shall prepare the plan in consultation with the Department, the N.H. Department of Environmental Services, the Connecticut River Watershed Council, the towns of Canaan and Stewartstown, CRJC, Trout Unlimited, and either or both of the state highway agencies, if interested. Documentation of consultation will be included in the plan and a specific explanation of how the comments have been addressed. The applicant shall provide a minimum of 30 days for the entities to comment and make recommendations before the plan is finalized.
- P. **Recreational Facilities.** Recreational facilities shall be constructed and maintained consistent with a recreation plan approved by the Department after consultation with the N.H. Department of Environmental Services. The plan shall include interpretive and directional signs. The plan shall be filed with the Department within one year of the effective date of the license and shall include an implementation schedule. Where appropriate, the recreation plan shall include details on erosion control. The applicant shall prepare the plan in consultation with the Department, the N.H. Department of Environmental Services, the Connecticut River Watershed Council, the towns of Canaan and Stewartstown, the Connecticut River Joint Commissions, and Trout Unlimited. The plan shall be updated at the end of each subsequent five-year period. Modifications to the recreation plan shall also be subject to Department approval over the term of the license. If the applicant determines that the plan does not need to be updated, a statement stating such shall be filed with the two departments.
- Q. **Boat Put-in at Vermont Route 114 Bridge.** The applicant shall evaluate the feasibility of including the existing boat access at the Vermont Route 114 bridge within the project boundary and report its findings, and a schedule if found feasible, to the Department within one year of the effective date of the license.

- R. **Erosion Prevention and Sediment Control.** Upon a written request by the Department or the N.H. Department of Environmental Services, the applicant shall design and implement erosion prevention and sediment control measures as necessary to address erosion occurring as a result of project operation or use of the project lands for recreation. Any work that exceeds minor maintenance shall be subject to prior approval by the Department, which shall consult with the N.H. Department of Environmental Services where appropriate.

The applicant shall collect data on shoreline erosion during the first and fifth summers following the effective date of the license and following any flood event exceeding a flow of 5,000 cfs. The scope and type of data collected shall be consistent with the recommendations in *Shoreline Erosion Study for the Canaan Hydroelectric Project*, October 2006. The data shall be compared to the reference data collected for that study report to determine where active erosion is occurring, how that may affect water quality, and what, if any, risk the erosion presents to project works and roadways and other public infrastructure. A report shall be filed with the Department by the first December 1 following the fifth summer. The report shall provide the comparative evaluation, impact/risk assessment, a remediation proposal based on the assessment, and recommendations on subsequent monitoring. After consultation with the N.H. Department of Environmental Services, the Department may require continued monitoring and/or remediation.

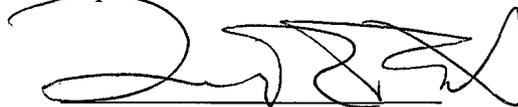
- S. **Compliance Inspection by Department.** The applicant shall allow the Department and N.H. Department of Environmental Services to inspect the project area at any time to monitor compliance with certification conditions.
- T. **Posting of Certification.** A copy of this certification shall be prominently posted within the project powerhouse.
- U. **Approval of Project Changes.** Any change to the project that would have a significant or material effect on the findings, conclusions or conditions of this certification, including project operation, must be submitted to the Department for prior review and written approval where appropriate and authorized by law and only as related to the change proposed, after consultation with the N.H. Department of Environmental Services.
- V. **Reopening of License.** The Department may request, at any time, that FERC reopen the license to consider modifications to the license as necessary to assure compliance with Vermont and/or New Hampshire Water Quality Standards.

- W. **Continuing Jurisdiction.** The Department reserves the right to add and alter the terms and conditions of this certification, when authorized by law and as appropriate to carry out its responsibilities with respect to water quality during the life of the project.

Dated at Waterbury, Vermont this
20th day of November, 2008

Laura Q. Pelosi, Commissioner
Department of Environmental Conservation

By



Larry R. Fitch, Director
Facilities Engineering Division

c Distribution List

LRF/JRC