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

In the matter of: Barton Village, Inc.
17 Village Square
P.O. Box 519
Barton, VT 05822

APPLICATION FOR BARTON VILLAGE HYDROELECTRIC PROJECT

The Water Quality Division of the Vermont Department of Environmental Conservation (the Department) has reviewed a water quality certification application dated September 26, 2002 and filed by Barton Village, Inc. (the applicant) for the Barton Village Hydroelectric Project. The supporting documentation for the application is considered to be the applicant's Federal Energy Regulatory Commission (FERC) license application filed with FERC under a cover letter dated September 26, 2002; and a January 24, 2003 FERC Additional Information Request (AIR) response.

The current application is subject to review under the Vermont Water Quality Standards adopted by the Water Resources Board on June 10, 1999 (Standards). Standards became effective on July 2, 2000. (Standards, Section 1-01)

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

Findings

Background and General Setting

1. The Barton Village Hydroelectric Project is in the town of Charleston, Vermont at the Great Falls of the Clyde River, between Pensioner Pond (upstream) and Charleston Pond (Lubber Lake). The project dam is at river mile 12.0.

2. The Clyde River drainage basin covers 142 square miles of Vermont's Northeast Kingdom, spanning two counties and ten towns. The basin encompasses 40 miles of river, over 35 miles of tributaries, and more than ten lakes and ponds totaling more than 4,500 acres. The Clyde River basin, with its abundance of water resources, is one of the Kingdom area's greatest natural assets. (*The Clyde River Futures Project*

Preliminary Report: An Inventory of Uses, Values and Goals, Department of Environmental Conservation, April 1991)

3. The Clyde River is located entirely within Vermont just south of the Canadian border. Originating as the Pherrins River in Warren Gore at an elevation of 1,350 feet above mean sea level (msl), it becomes known as the Clyde River at the confluence of the Pherrins with Oswegatchie Brook in Brighton. From there, the Clyde flows some 30 miles in a northwesterly direction through five ponds to empty into Lake Memphremagog at Newport, elevation 682 feet msl. The river above Pensioner Pond in Charleston is unregulated and relatively undeveloped, bordered by a significant wetland area along much of its length. From Pensioner Pond downstream to Lake Memphremagog, the gradient increases dramatically.

4. The 800-foot reach bypassed by the Barton Village Project has a steep gradient with a series of ledge drops, rapids, and pools. The cascade in this reach is known as the Great Falls of the Clyde.

5. The Clyde River received its name from an early surveyor by the name of Mr. Whitlaw who was partial to the River Clyde in Scotland. The river was once the favored route of the St. Francis and Algonquin Indians in their travels from Canada to the southern part of New England. Water routes used during the French and Indian Wars extend through the Clyde River watershed.

6. Of the Clyde River's 142 square mile watershed, the project utilizes runoff from an area of approximately 108 square miles.

7. The project is currently operated under the terms of a FERC license issued on October 11, 1984.

Project and Civil Works

8. The project was originally constructed in 1895, when a granite stone-masonry dam replaced an earlier log-crib structure that powered a saw and card mill. The dam has undergone several changes since its construction. The site was redeveloped in 1930, at which time the dam was encased in concrete. The dam was refaced with concrete in 1968

9. The dam is approximately 77 feet long with a maximum height of 24 feet. The spillway crest elevation is 1,139.44 feet msl. There are pin-type timber flashboards, 1.5 feet high, on the fixed crest spillway. The headworks are located at the east end of the dam, and there is a gate structure at the west end. The gate structure includes a 5-foot by 5-foot low-level slide gate with a sill elevation of approximately 1,131.94 feet msl. Directly above the slide gate are two ungated openings. One is 5 feet wide

90 percent exceeds	48 cfs
7Q10	22 cfs (period of record 1911 through 1981)

Applicant Proposal for Relicensing

20. The applicant proposes to operate the Barton Village Project in strict run-of-river mode.

21. The applicant proposes a continuous release of 45 cfs, or inflow if less, at the dam.

22. All flows will be spilled at the dam when inflow is less than 85 cfs, the sum of minimum station capacity and bypass flow.

23. The 1.5-foot flashboards will be replaced at four-year intervals, or more frequently if they are damaged. The flashboards will be replaced in sections while maintaining the Pensioner Pond water level at the full-pond elevation.

24. The applicant proposes to upgrade the plant automation system to provide for remote operation and data acquisition for compliance monitoring.

Standards Designation

25. The Vermont Water Quality Standards (Standards) are 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 Board to adopt standards of water quality to achieve the purpose of classification.

26. The Clyde River has been designated by the Vermont Water Resources Board as Class B waters.

27. With the adoption of the current version of Standards, the Water Resources Board created a system allowing Class B waters to be placed in one of three water management types (WMT). The system allows Class B waters to be assigned different levels of protection based on the attainability of uses or the current level of protection already afforded by the anti-degradation policy. (Standards, Section 1-03) No waters in the Clyde River basin have as yet been typed. (Standards, Section 3-06)

28. Class B waters are managed 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))

29. The waters of the Clyde River are designated coldwater fish habitat for the protection and management of fisheries. (Standards, Section 3-05)

30. In Class B waters, the 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))

31. The temperature standard for coldwater fish habitat limits increases to 1.0° F from ambient conditions. (Standards, Section 3-01(B)(1)(b))

32. The turbidity standard is 10 NTU for coldwater fish habitat. (Standards, Section 3-04(B)(1)(a))

33. Under the Class B criterion for aquatic biota, wildlife and aquatic habitat, the 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))

34. 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))

35. The Hydrology Criteria require that, for Class B waters that have not been classified as WMT 1, streamflows be protected in such a manner that the change from the natural flow regime "provide for maintenance of flow characteristics that ensure the full support of uses and comply with the applicable water quality criteria." There is a preference for study-based, site-specific streamflow protection standards; however, use of general hydrologic standards is also accepted. (Standards, Section 3-01(C))

36. In 10 V.S.A. §1250, the legislature enumerated the State water quality policy. The State's policy is to upgrade the quality of its waters and reduce existing risks to water quality over the long term and to protect and enhance the quality, character and usefulness of its surface waters. Further, it is the State's policy to allow beneficial and environmentally sound development.

37. Existing hydroelectric projects are beneficial developments in terms of serving the public good, if they are properly controlled for consistency with Standards, including the designated and existing uses of the waters.

38. On July 15, 2002, the Department forwarded to USEPA, under Section 303(d) of the Federal Clean Water Act, a list of waters considered to be impaired based on water quality monitoring efforts. No waters affected by the project are listed.

39. The Department also issued a draft four-part list, List of Priority Surface Waters (July 15, 2002). Part F lists those surface waters where water quality or habitat are being impacted by flow regulation. The reach from the project dam to Charleston Pond is listed due to artificial flow regulation by the project.

Water Chemistry

40. The Clyde River receives permitted discharges from five sources: the Brighton and Newport wastewater treatment facilities; cooling water discharges from diesel-powered generators at the Barton Village electric plant and the Newport 1,2,3 electric plant; and a stormwater discharge from a subdivision in Derby. Nonpoint sources include hydroelectric facilities, logging jobs, agricultural runoff, failed or poorly operating septic systems, and a former hazardous waste site.

41. From the confluence of the tributary from Echo and Seymour lakes downstream to the river's mouth, designated uses of 3.6 miles of the reach are threatened by contaminants, and designated uses of 4.6 river miles are not fully supported. The remaining riverine portions of the reach fully support designated uses. The non-support and partial support is primarily attributed to flow regulation and impounding, not contamination. Due to mercury contamination, fish consumption is only partially supported in the Newport 1,2,3 and Charleston tailrace reaches. (*General Report on all Waterbody Data*, Department of Environmental Conservation, February 1996)

42. Temperature and dissolved oxygen data collected by the Department in 1982 from stations at Citizens Utilities (now Citizens Communications) West Charleston facility indicated supersaturated dissolved oxygen concentrations at points above and below that facility, with stratification and dissolved-oxygen depletion occurring in Charleston Pond. (*Hydropower In Vermont: An Assessment of Environmental Problems and Opportunities*, Department of Environmental Conservation, 1988). The recorded supersaturated conditions are evidence of algal activity in the river. Such activity can cause large diurnal fluctuations in dissolved oxygen levels.

43. Data collected by the Department on August 6, 1982 at Station I-2 located in Charleston Pond 410 feet upstream of the West Charleston dam revealed a dissolved oxygen profile displaying stratified conditions. Samples were taken to a depth 26.2 feet (elevation 1030.8 feet msl). A dissolved oxygen concentration at 59 percent of

saturation was recorded at a depth of 23 feet. This was the lowest saturation recorded. The Department recorded dissolved oxygen concentrations of 88 percent saturation at elevations 1037.3 and 1043.9 feet msl.

44. The applicant measured dissolved oxygen concentrations between August 10 and September 28, 2001. Data were collected at four locations: 0.25 mile upstream of the Pensioner Pond inlet, in the Pensioner Pond outlet above the dam, in the lower end of the bypass, and in the east tailrace. During the monitoring period, the project did not operate due to low-flow conditions.

45. Results showed that, in general, dissolved oxygen levels were lower upstream of the Pensioner Pond inlet than at other locations. A diurnal fluctuation was observed at all sites. The dissolved oxygen standard for coldwater fish habitat was met at the pond outlet and bypass sites on all occasions. Standards were not always met upstream of the pond. The minimum values recorded at that site were 5.2 mg/L and 61 percent saturation. In the east tailrace, the concentration criterion was always met, but the percent saturation criterion was not. The saturation value at the minimum concentration in the east tailrace was 65 percent.

46. Temperature was monitored at the same sites as dissolved oxygen using continuous monitors from July 28 to September 28, 2001. The average, minimum, and maximum temperature differences between the Pensioner Pond inlet and outlet were $^{+}2.3°F$, $^{-}1.1°F$, and $^{+}5.9°F$, respectively. The temperature increase between the outlet station and the bypass and east tailrace stations never exceeded 1.4°F.

Aquatic Biota and Habitat

47. Class B waters are managed to provide high quality habitat for aquatic biota. (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." Included, for example, are fish, aquatic insects, amphibians and some reptiles, such as turtles. Aquatic habitat is defined as "the physical, chemical, and biological components of the water environment." (Standards, Section 1-01(B))

48. The Clyde River basin contains a diversity of recreationally important fishery resources in lake and riverine habitats. In addition to its resident fish populations, the river supports spawning runs of Atlantic salmon, brown and rainbow trout, walleye, yellow perch, and suckers, contributing significantly to those lake populations.

49. Fish species found in the Clyde River above Pensioner Pond include white sucker, longnose sucker, smallmouth bass, slimy sculpin, chain pickerel, brook trout, brown trout, and several minnow species. In addition, lake trout, landlocked Atlantic salmon, rainbow trout, round whitefish, burbot, rainbow smelt, largemouth bass, yellow perch, walleye, pumpkinseed, rock bass and brown bullhead are found in

Seymour Lake, Echo Lake or Island Pond and have access to the Clyde River through downstream drift.

50. No fish community data exists based on sampling at Pensioner Pond. Warmwater fish species found in the upper Clyde River basin, including smallmouth bass, largemouth bass, and yellow perch are likely to be found here. Seasonally, coincident with cooler water temperatures, brook, brown and rainbow trout also are likely to occur.

51. The bypassed reach between Pensioner Pond and Charleston Pond has not been sampled, but brown trout are believed to inhabit it. Landlocked Atlantic salmon fry may be stocked in this reach in the future. The bypass has the potential, given an adequate flow regime, to provide high quality habitat for these species as well as other fishes (such as minnows and sculpin) and macroinvertebrates.

52. Charleston Pond contains self-sustaining populations of largemouth bass, smallmouth bass, and yellow perch and seasonally occurring trout species attributable mainly to downstream drift.

53. The reach below the West Charleston dam provides habitat for juvenile Atlantic salmon, brook and brown trout, walleye, several minnow species, and smallmouth bass.

54. The Agency has several fishery management goals for the Clyde River upstream of Salem Lake. They include wild brook and brown trout populations upstream of Pensioner Pond, a naturally diverse warmwater fish community in Pensioner Pond, and a naturally diverse riverine fish community and landlocked Atlantic salmon smolt production through fry stocking in the reach bypassed by the Barton Village project. The principal management objective for Charleston Pond is maintenance of largemouth and smallmouth bass fisheries supported entirely by natural production. In all cases, the Agency's habitat management goals include protection of habitat for macroinvertebrates and other aquatic organisms in addition to fish.

Flow Needs for Protection of Aquatic Habitat

55. A substantial amount of salmonid spawning is not anticipated in the bypass due to the coarse nature of the substrate. The lack of gravel is due in part to the steepness of the channel and in part to a lack of bedload inputs from upstream of the dam. Therefore, flows to provide for salmonid spawning were not addressed.

56. A habitat-flow study was conducted in the project bypass to determine flow needs for aquatic life. It is possible to assess the relationship between habitat and flow using just a few target species/life stages, with those selected acting as surrogates for the others that occur in the bypass. Interpretation of model results must keep this

representative approach in mind. The most prevalent trout species in the bypass and vicinity is brown trout. The adult stage was selected as a target life stage since the bypass has the potential to provide suitable adult habitat. The juvenile stage of Atlantic salmon was also considered, for its own sake and as a proxy for other juvenile salmonids, non-game fishes, and macroinvertebrates.

57. Much of the bypass consists of steep riffle habitat. The study section was located within the steep riffle habitat located upstream of the left tailrace. The results were also considered to represent the similar habitat upstream of the ledge falls.

58. Habitat in the bypass is very heterogeneous making it important to obtain an adequate number of measurements at unbiased locations. To achieve this objective, depth, velocity and substrate data were collected at one-foot intervals across each of three transects in the bypass, using the transects as a random sampling scheme for getting point measurements. Measurement points were the same for each flow, and each point measurement was given equal weight. For a given flow, the habitat suitability for each point, or "cell," is calculated based on the data and pre-defined habitat suitability criteria. The average suitability for all points is then multiplied by the wetted width to provide a measure of habitat quality and quantity.

59. The three transects were located in riffles between the falls and the tailrace. Transect 1 was located approximately 130 feet upstream from the west tailrace. Transect 2 was located approximately 140 feet upstream from Transect 1. Transect 3 was located in the same riffle as Transect 2, and another 50 feet upstream.

60. Data were collected at flows of 32, 44, 60 and 75 cfs. Data collection at 108 cfs was determined to be unnecessary since the data from the lesser flows indicated habitat for adult brown trout was likely to be similar to that observed at 60-75 cfs, and juvenile salmon habitat was likely to continue to increase at a rate similar to that observed from 60 to 75 cfs.

61. The section of the bypass immediately above the left tailrace includes a second channel on the right side that included some water at 32 cfs – the lowest measured flow. At high flows it would provide an area of refuge in that it would not experience velocities as high as most other parts of the bypass (although the habitat structure does offer a number of refugia). At intermediate flows, this channel would offer a different habitat from the other channel, increasing the overall habitat diversity. This section was examined in the study as part of Transect 1.

62. Winter ice conditions in the bypass are a concern in that frazil and anchor ice generation can be substantial for this type of channel. It is likely that the temperature regime is moderated by the fact that the water is drawn from beneath the surface ice upstream of the dam. The warmer water would decrease frazil ice formation.

63. The amount of usable habitat for adult brown trout in both the main and side channels is shown in the following table for each flow assessed. Adult brown trout habitat (all transects combined) increases from 32 to 60 cfs and then levels off. This leveling off suggests that suitable habitat will not increase further at higher flows. A flow of 45 cfs provides about 90 percent of the habitat observed at 75 cfs. For the flows assessed, most areas are too shallow to provide suitable habitat. Some have excessive velocities, and the number of these areas increases with flow. Depth improves as flow increases, but above 44 cfs the number of cells with excessive velocity increases.

Flow (cfs)	Brown Trout Adult — Usable Habitat			
	Transect 1	Transect 2	Transect 3	Transects Combined
32	4.9	5.4	11.3	7.2
44	4.0	8.4	17.1	9.8
60	5.6	11.0	16.8	11.1
75	6.0	11.7	15.8	11.1

64. The usable habitat for juvenile landlocked Atlantic salmon in both the main and side channels is shown in the following table for each flow assessed. Juvenile salmon habitat (all transects combined) increases across the entire range of study flows, although the rate of increase (slope of the habitat-flow curve) decreases as flow increases. More than half the potential habitat is too shallow at 32 cfs; the amount of habitat that is deep enough increases with flow. As a result, the amount of suitable habitat continues to increase across all measured flows. A flow of 45 cfs provides between 85 and 90 percent of the habitat observed at 75 cfs. However, since higher flows were not assessed, the flow at which habitat is maximized is unknown.

Flow (cfs)	Juvenile Landlocked Atlantic Salmon — Usable Habitat			
	Transect 1	Transect 2	Transect 3	Transects Combined
32	10.5	14.0	20.6	15.0
44	12.1	20.5	25.7	19.4
60	13.4	25.6	25.3	21.4
75	15.3	28.3	23.9	22.5

65. While its wetted width is significant at the measurement flows of 44 cfs and above, the side channel at Transect 1 provides very little adult brown trout habitat at any of the measurement flows. It provides only a small amount of juvenile salmon habitat

since the quality index value (also referred to as the habitat suitability index, or HSI) is low for all flows. Its contribution as juvenile salmon habitat is modest across the range of measurement flows.

Flow (cfs)	Habitat for Juvenile Salmon at Transect 1					
	Main Channel			Side Channel		
	Mean HSI	Usable Habitat	Wetted Width (ft.)	Mean HSI	Usable Habitat	Wetted Width (ft.)
32	0.52	10.50	20	0.01	0.04	5
44	0.44	11.78	27	0.02	0.28	16
60	0.46	12.34	27	0.05	1.01	20
75	0.51	13.78	27	0.06	1.50	23

66. When inflow exceeds the project capacity plus the bypass flow requirement, the amount of water in the bypass will exceed the flow requirement. During such higher flows, the side channel is likely to provide suitable habitat. However, the amount of suitable habitat in the main channel is likely to decline at high flows.

67. Almost all of the dominant substrate types are cobble (4-10 in.) and boulder (10-24 in.). Therefore, analyzing the spawning and incubation habitat for species that require gravel will only show that this habitat is lacking. Agency field inspections verified that gravel and finer substrates are in very short supply. These materials are scoured out of the reach under high flow conditions, and incoming material presumably settles out in Pensioner Pond. The Agency did not seek flows for salmonid spawning and incubation in the bypass due to the lack of spawning substrate. Various other fishes that may occur in the bypass (fallfish, white sucker, common shiner, creek chub) typically prefer gravels as well. Longnose and blacknose dace are exceptions; Edwards et al (1983)[2] list the suitable spawning substrate for longnose dace as 5-20 cm. (2.0-7.9 in.), and in other studies the Agency has used even more inclusive criteria, based on additional references.

68. Transect data were analyzed by the Agency to also determine the flow needs associated with spawning and incubation for longnose dace, as shown in the following table. Much of the habitat has suitable depths at 44-75 cfs, although the amount of habitat that is too deep increases somewhat with flow. There does not seem to be much improvement in habitat above 44 cfs. Therefore, a higher flow for spawning and incubation does not appear necessary.

[2]Edwards, E.A., H. Li and C.B. Schreck. 1983. Habitat suitability index models: longnose dace. U.S.D.I., Fish and Wildlife Service FWS/OBS-82/10.33. 13pp.

Flow (cfs)	Longnose Dace Spawning and Incubation — Usable Habitat			
	Transect 1	Transect 2	Transect 3	Transects Combined
32	5.9	7.7	5.2	6.3
44	6.2	13.0	6.2	8.5
60	4.0	12.2	4.7	7.0
75	6.0	16.3	4.0	8.7

69. Overall, much of Transect 1 and part of Transect 2 are too shallow for the target organisms. Channel structure is complex and heterogeneous, and velocities tend to be a mix at all measured flows.

Fish Passage

70. The Department of Fish and Wildlife (VDFW) is restoring landlocked Atlantic salmon to the Clyde River. However, VDFW does not anticipate the inclusion of habitat upstream of the Barton project in this restoration.

71. Resident fish do migrate within river systems, so measures should be in place to facilitate their safe downstream passage past the dam. The project intake bar screen has 1.0-inch clear spacing, which should minimize entrainment of resident fish attempting to move downstream. A section of flashboards adjacent to the intake should be removed so that fish attempting to move downstream can do so safely. However, additional measures will be necessary to convey fish downstream without injury.

Wildlife and Wetlands

72. Extensive wetlands exist around Pensioner Pond and along the upstream reach of the Clyde River that is impounded by the dam. There is a 744 acre palustrine forested, saturated/semipermanent/seasonal wetland between Pensioner Pond and the Toad Pond tributary, which is approximately 3 miles upstream. A palustrine scrub-shrub seasonally flooded wetland of 2.3 acres is located along the southwest shore of Pensioner Pond. Two other wetland areas, totaling 18.6 acres, are located along the north shore near the pond outlet. They are classified as palustrine forested, palustrine scrub-shrub, and lacustrine limnetic, possibly flooded wetlands. Finally, a two-acre palustrine emergent wetland is located along the Clyde River near the Vermont Route 105 bridge.

73. There is a 14-acre palustrine scrub-shrub, saturated/semipermanent/seasonal wetland along the eastern shore of Charleston Pond.

74. All of the described wetlands are Class Two under the Vermont Wetland Rules.

Rare and Endangered Species and Outstanding Natural Communities

75. No federally listed threatened or endangered species are known to inhabit the project area.

76. The Vermont Endangered Species Law (10 V.S.A. §§5401 to 5403) governs activities related to the protection of endangered and threatened species.

77. Mare's-tail (*Hippuris vulgaris*), a state endangered species, is known to occur near Pensioner Pond.

Shoreline Erosion

78. No shoreline erosion problems that may be attributable to project operation have been identified either around Pensioner Pond or downstream.

Recreational Use

79. Recreational use of the Clyde River in the vicinity of the Barton Village Project consists largely of fishing, paddling, wildlife observation, and scenic appreciation. The only existing public recreational facility is a fishing access on Pensioner Pond owned by Citizens Communications and operated by the Vermont Department of Fish and Wildlife. Informal access to Charleston Pond for fishing or launching canoes and kayaks is available at the Barton Village Project. Paddlers may also carry around the project by taking out near the Vermont Route 105 bridge and carrying along the project access road to Charleston Pond.

80. The Clyde River is a segment of the Northern Forest Canoe Trail between Old Forge, New York and Fort Kent, Maine.

81. The applicant has proposed recreation facility enhancements consisting of parking near the powerhouse and a footpath that will provide access to the bypass reach.

82. The applicant has proposed a canoe/kayak take-out upstream of the dam. On Charleston Pond, the applicant has proposed an access path, canoe/kayak launch site, and primitive campsites near the eastern shore. However, the applicant does not own the property necessary to develop these facilities. The applicant proposes to work with adjoining landowners and other interested groups to secure permission to construct these enhancements.

Aesthetics

83. The Barton Village Project was constructed at the Great Falls of the Clyde.The Agency publication *The Waterfalls, Cascades and Gorges of Vermont* report (1985) describes the gorge as 800 feet long, and 40-60 feet wide and deep. There is a low angle cascade below the dam for about 200 feet, a 20-foot high steep cascade or falls with a pool at the base, and a series of boulders and pools to the mouth. The total drop is about 75 feet. The gorge is most notable for the abundance and diversity of its moss and fern flora. The aesthetics have been degraded somewhat by the dam and penstock.

84. In conjunction with the bypass habitat study, the applicant videotaped and photographed flows of approximately 32, 44, 60, and 75 cfs at various locations throughout the gorge. The results of the aesthetics study were included in the bypass habitat study report.

State Comprehensive River Plans

85. 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)

86. 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.

87. With respect to the Barton Village Project, the plan included a recommendation that compliance with the conditions of the 1984 FERC license should be confirmed.

Clyde River Futures Project (November 1992)

88. The Department's *Clyde River Futures Project* Final Report is another state comprehensive river plan. The Project, which was initiated in 1990 and involved a public participation process, has resulted in a plan that identifies river management goals and recommended actions to reach those goals. The plan also identifies current river issues.

89. The impact of the Barton Village Project on river uses and values was an issue identified through the public participation process, although it was overshadowed by the larger Clyde River Hydroelectric Project. Project participants identified river management goals which relate to hydroelectric use, including:

> Continue to use the river for the generation of electricity; however, this use must be more compatible with the many other uses and values, in particular fish habitat, and must preserve, maintain, and enhance a healthy functioning river ecosystem which can be enjoyed by everyone.
>
> Improve fisheries and restore the historic salmon fishery to the Clyde River. The river's fisheries have a value in and of themselves and have been and could again be a great economic asset to the area. Restoration of the salmon fishery and improving fisheries overall equates with a healthy river environment.
>
> Maintain water level management regimes in lakes and impoundments that eliminate extreme drawdowns and reflect more natural water level fluctuations to protect and enhance uses and values.
>
> Restore river uses and values by maintaining run-of-river flows below Seymour Lake, Echo Lake, and West Charleston powerhouse and, as a minimum, improved flow regimes in project bypasses and downstream of the Newport 1,2,3 and Newport 11 powerhouses in accordance with the State flow procedure.
>
> Improve river water quality and minimize threats to aquatic life.
>
> Provide improved public access to the Clyde River and basin impoundments through acquisition and/or development of sites that meet the needs of a variety of water-based recreational activities, particularly canoeing and fishing.
>
> Increase public's awareness and resulting use of the Clyde River as an important recreational resource for activities ranging from bird watching to whitewater canoeing.
>
> Improve public viewing at hydroelectric facilities.

1993 Vermont Recreation Plan

90. 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, loss of public access to Vermont's waters, and shoreland development.

91. 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.

92. The applicant proposes to provide access to the river in the project area. This access and improved flows for habitat and aesthetics 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.

93. 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."

94. 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.

Analysis

Water Chemistry

95. Water quality sampling by the applicant indicates that the dissolved oxygen standard for coldwater fish habitat is met upstream and downstream of the project. The standard may not be met in the east tailrace during periods when the project is not operating, but this is basically an artificial channel connecting the plant to the pond. During those periods, inflow will be passed over the dam and through the bypass. Reaeration to or close to saturation levels would be expected.

Flow and Water Level Management

96. The project is proposed to be operated run-of-river, so artificial water level fluctuations in Pensioner Pond and flow fluctuations downstream will be avoided. Run-of-river operation will be achieved through a plant automation system that will monitor water levels at Pensioner Pond and the project tailraces and flows in the bypass and through the turbines. The system will adjust the turbines to maintain bypass flows and the water level of Pensioner Pond.

97. The wetlands adjacent to Pensioner Pond are significant for wildlife habitat and the maintenance of water quality. Occasionally, the water level will drop as a result of flashboard failure, but this occurrence will be largely avoided by routine flashboard replacement. Failure of the boards reduces the water level by less than 1.5 feet. These infrequent drops in pond elevation will not compromise wetland habitat or water quality. In the event of flashboard failure, water will need to be placed in storage after the boards are replaced, while providing adequate flows to protect downstream habitat. The water level in Pensioner Pond will be maintained during routine flashboard replacement, eliminating the need to refill the pond.

98. The bypass flow study results show that a continuous flow of 45 cfs, or inflow if less, provides good habitat conditions. Higher flows would provide only small improvements in suitable habitat. During times of high inflow in excess of project capacity, flows much higher than 45 cfs will pass through the bypass. These flows will help minimize the encroachment of terrestrial vegetation.

99. Aesthetics are an important consideration at the project, which was constructed at the Great Falls of the Clyde. While not categorized as having statewide significance in *The Waterfalls, Cascades and Gorges of Vermont*, the gorge is locally important, and the applicant proposes to provide improved access to the lower section of the gorge.

100. A review of the video taken during the aesthetics flow study indicates that the 45 cfs flow needed to provide aquatic habitat will be adequate to support the designated use of aesthetics, as well.

101. Run-of-river operation will protect downstream habitat. Compliance at the West Charleston station, also run-of-river, will be dependant on proper operation of the Barton Village Project.

102. By condition of this certification, the applicant shall be required to maintain run-of-river operation and provide a bypass flow of 45 cfs, or inflow if less. A further condition shall be to pass 90 percent of inflow downstream during periods when Pensioner Pond is being refilled following flashboard failure or dam maintenance. Finally, the applicant shall prepare a plan that addresses flow and water level management. The plan shall be subject to review and approval by the Department.

Fish Passage

103. Upstream fish passage facilities are not considered necessary at the Barton Village Project.

104. Provisions are needed to allow fish to safely pass downstream past the dam. By condition of this certification, this issue will be addressed in the flow management plan.

Recreation

105. 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.

106. 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

107. 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

108. 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 Vermont's 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 Barton Village 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.

B. **Flow and Water Level Management.** Except as provided in Condition C below, the facility shall be operated in a true run-of-the-river mode (see footnote 1, p. 4). When the facility is not operating, all flows shall be spilled at the dam.

A flow of 45 cfs, or inflow if less, shall be released into the bypass at all times.

Except as provided in Condition C below, Pensioner Pond shall be maintained at or above elevation 1,140.94 feet msl (the top of the flashboards) at all times, except

under circumstances when the Department has granted special approval or the flashboards have failed.

C. **Flow Management During Pensioner Pond Refill.** When restoring the elevation of Pensioner Pond after replacement of failed flashboards, or an approved drawdown related to dam maintenance or an emergency, the applicant shall release at least 90 percent of instantaneous inflow below the project. While the pond is being refilled, bypass flow requirements shall be met at all times. Normal flashboard replacement shall be done without lowering the pond level.

D. **Flow Management Plan.** The applicant shall develop a flow management plan detailing how the project will be operated to comply with the conservation flow and water level 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, how downstream fish passage will be provided, and procedures for reporting deviations from prescribed operating conditions. The plan shall be developed in consultation with the Department and the U.S. Fish and Wildlife Service, and a draft shall be submitted to the Department for review within 180 days of the issuance of a federal license. The final plan shall be subject to Department approval. The Department reserves the right of review and approval of any material changes made to the plan at any time.

E. **Monitoring Plan for Impoundment and Flow Management.** The applicant shall develop a plan for continuous monitoring and reporting of flow releases at the project (bypass flow release and turbine discharge), impoundment levels, and inflows. The plan shall include procedures for reporting deviations from prescribed operating conditions. 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 and the U.S. Fish and Wildlife Service, and a draft shall be submitted to the Department for review within 180 days of the issuance of a federal license. The final plan shall be subject to Department approval. The Department reserves the right of review and approval of any material changes made to the plan at any time.

F. **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 issuance of a federal license.

G. **Flashboards.** The applicant shall replace flashboards at four-year intervals. In addition, the flashboards shall be inspected annually following spring runoff, and damaged boards replaced as necessary.

H. **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 a draft shall be submitted to the Department for review within 90 days of the issuance of a federal license. The final plan shall be subject to Department approval. The Department reserves the right of review and approval of any material changes made to the plan at any time.

I. **Maintenance and Repair Work.** Any proposals for project maintenance or repair 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 State waters.

J. **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 State waters to be imposed by the applicant shall first be subject to written approval by the Department. Access may be restricted without prior approval when an immediate threat to public safety exists. In those cases, the applicant shall so notify the 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.

K. **Recreational Facilities.** Recreational facilities shall be constructed and maintained consistent with a recreation plan. The plan shall include an implementation schedule and, where appropriate, details on erosion control. The plan shall be developed in consultation with the Department, and a draft shall be submitted to the Department for review within one year of the issuance of a federal license. The final plan shall be subject to Department approval. The plan shall be updated at the end of each subsequent six-year period. The Department reserves the right of review and approval of any material changes made to the plan at any time.

L. **Erosion Control.** Upon a written request by the Department, the applicant shall design and implement erosion control measures as necessary to address erosion occurring as a result of use of the project lands for recreation. Any work that exceeds minor maintenance shall be subject to prior approval by the Department and FERC.

M. **Compliance Inspection by Department.** The applicant shall allow the Department to inspect the project area at any time to monitor compliance with certification conditions.

N. **Posting of Certification.** A copy of this certification shall be prominently posted within the project powerhouse.

O. **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.

P. **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 Water Quality Standards.

Q. **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
19th day of May, 2003

Jeffrey Wennberg, Commissioner
Department of Environmental Conservation

By /s/
Wallace McLean, Director
Water Quality Division

WMcL/BTF

c: Distribution List