State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION

Department of Fish and Game
Department of Forests, Parks, and Recreation
Department of Water Resources & Environmental Engineering
Natural Resources Conservation Council

Montpelier, Vermont 05602
Department of Water Resources
and
Environmental Engineering

WATER QUALITY DIVISION
February 2, ~~1982~~ 1983

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Frog Hollow

Mr. William Martinez
Central Vermont Public Service Corporation
77 Grove Street
Rutland, VT 05701

Dear Mr. Martinez;

The enclosed Water Quality Certification for the Frog Hollow Hydroelectric Project is being issued in accordance with the Federal Clean Water Act. Please review the Certification carefully and let us know if you have any questions.

Sincerely,

Thomas Willard, P.E.
Environmental Engineer

TW/rh
Encl.

cc: Stephen B. Sease, Director, Environmental Conservation Planning
Angelo Incerpi, Chief, Fisheries Management
David Callum, District Fisheries Biologist
Wayne Foster, Public Service Board
Public Service Department
Federal Energy Regulatory Commission
Cathy Castagna, Environmental Protection Agency
Gordon Beckett, U.S. Fish & Wildlife Service, N.H.

WATER QUALITY CERTIFICATION

(P.L. 92-500, Section 401)

In the matter of: Central Vermont Public Service Corporation
77 Grove Street
Rutland, Vermont 05701
Application for Frog Hollow Hydroelectric Project

The Water Quality Division of the Vermont Department of Water Resources and Environmental Engineering (the Department) has reviewed the Water Quality Certificate application dated July, 1981 and submitted by letter dated August 3, 1981, the Appendix A supplement dated December, 1981 and the Appendix B supplement dated February, 1982, all furnished by the applicant, Central Vermont Public Service Corporation (CVPS) to support certification of the project. The Department makes the following findings:

1. For the purpose of generating hydroelectric power, CVPS proposes to develop the falls on the Otter Creek downstream of the Battell Bridge on Main Street in Middlebury. A concrete cap would be placed across the falls at an elevation of 337.0' NGVD. An excavated intake channel, intake structure, a two-cell concrete conduit, powerhouse and tailrace would be constructed along the west (left) side of the stream. The design tailwater elevation is 314' NGVD, or about equal to the crest elevation of the Middlebury lower power dam (FERC 2737). The gross available head is 23 feet. There is no bypassed reach at this site.

2. Two horizontal turbines would be installed. The 500 kw unit would have a hydraulic capacity on the low end of 150 cfs and would pass 340 cfs to generate a peak efficiency. The larger 1250 kw unit would pass 840 cfs to generate at peak efficiency. Operation has been classified by CVPS as "true run-of-the-river", as there is essentially no pool storage. Flashboards would not be installed.

3. Stream flows on Otter Creek are gaged by the U.S. Geological Survey at a station (#42825) located 150 feet upstream of the Battell Bridge.

The drainage area at the gage is 628 square miles, and there is no significant inflow between the gage and the falls. There is some flow regulation by Chittenden Reservoir on East Creek and upstrream hydroelectric facilities. Following are several hydrologic values:

Parameter	Value (cfs)
Mean flow	982 (21.2 inches/yr.)
95% exceedance	210
50% exceedance (median)	610
10% exceedance	2300
7Q10	156
Minimum daily	92 (Aug. 9, 1965)

The site is 3.5 miles downstream of the Middlebury River confluence and 3.8 miles upstream of the New Haven River confluence.

4. Otter Creek has been classified by the Vermont Water Resources Board as Class B waters upstream of the Middlebury municipal wastewater treatment plant located 1/2 mile downstream of the site. From the treatment plant downstream to the New Haven River confluence the river is Class C waters. Class B waters are suitable for bathing and recreation; irrigation and agricultural uses; good fish habitat; good aesthetic value; acceptable for public water supply with filtration and disinfection. Class C waters are suitable for recreational boating; irrigation of crops not used for consumption without cooking; habitat for wildlife and for common food and game fishes indigenous to the region; and such industrial uses as are consistent with other class uses.

Otter Creek is considered a Water Management Type I or II stream. As such, for the maintenance of a coldwater or a mixed fishery, a minimum dissolved oxygen (D.O.) limit of 6 mg/l has been set as a standard. At and near spawning areas, a limit of 7 mg/l may be required. The turbidity standard is 10 Jackson Turbidity Units.

5. Water quality sampling conducted by both the applicant and the Department indicates that the D.O. standard is often violated upstream of the proposed Frog Hollow facility.

6. Water quality sampling downstream of the proposed facility indicates that D.O. concentrations exceed the standard due to the substantial reoxygenation provided by the falls at Frog Hollow. The only other significant opportunity for reaeration between Middlebury and the New Haven River is the rapids just upstream of the New Haven River confluence. Two other hydroelectric facilities (Beldens and Lower Middlebury) presently reduce reaeration when operating. The existing rapids are proposed for development by Middlebury College as the Battell Project.

7. Appendix B of the Frog Hollow Hydroelectric Station Water Quality Investigations, submitted as part of the application for this Certification, indicates that a continuous spillage of 142 cfs at the falls in Middlebury should assure minimum standards for D.O. would be maintained even though existing D.O. concentrations would be significantly lowered. This analysis assumed a 10% reduction in oxygen deficit for water which was passed through the turbines.

8. Simulations indicate that even at river flows of 660 cfs, spillage may be required at the proposed project in order to maintain minimum dissolved oxygen concentrations downstream.

9. CVPS proposes a method of operation based on variable spillage determined by the measured upstream D.O. concentrations and the stream flow. Spillage would be controlled to provide a D.O. level of the greater of either 6.1 mg/l or $(7.1 - \frac{Q}{900})$ at the base of the falls. In theory, this would result in the maintenance of a 6.0 mg/l standard below Frog Hollow.

10. The water quality model presented in Appendix B of the Frog Hollow Hydroelectric Station Water Quality Investigations and historical water

quality and flow data indicate that 142 cfs from June 15 to September 15 and 130 cfs for 12 hours/day from June 1 to June 15 and from September 15 to October 31, when spilled over the falls at Frog Hollow will maintain Vermont Water Quality Standards for dissolved oxygen.

11. The pool at the base of the falls will remain fresh due to circulation of water from the tailrace. Accordingly, bottom fauna and fish habitat will not be affected by this proposal.

CONDITIONS

The Department certifies that this project will meet Vermont Water Quality Standards with the following conditions:

A. The hydroelectric facility will be operated in a strict run-of-the-river manner with instantaneous flows below the tailrace equivalent to instantaneous inflows to the impoundment.

B. The facility shall spill a minimum flow over the falls according to the following schedule:

Period	Minimum Flow
June 1 to June 15	130 cfs for 12 hours/day
June 15 to September 15	142 cfs
September 15 to October 31	130 cfs for 12 hours/day
November 1 to May 31	15 cfs for 8 hours/day
Whenever natural river flow is less than 135 cfs	All inflows spilled

CVPS shall provide the Department with a description and plans detailing how such releases will be made for review and approval before construction may commence. If D.O. violations are found to occur as a result of operation of this project, the Department may order the passage of higher minimum flows over the dam in order to prevent D.O. violations at any time in the future.

C. The applicant shall file a comprehensive erosion and sediment control plan with the Department of Water Resources and Environmental Engineering for review and approval. The plan shall cover temporary and permanent measures to limit adverse impacts on water quality from turbidity and sedimentation with regard to construction activities. The plan shall also specify how flows will be managed during construction. It may be beneficial to consult with the Department for input during the development of the plan.

D. The applicant shall insure that every reasonable precaution is taken during construction to prevent the discharge of petro chemicals, wet concrete and debris to state waters.

E. Any debris removed from the project area during construction and later operation shall be disposed of properly.

F. Any significant changes to the project, including the operational scheme, must be submitted to the Department of Water Resources and Environmental Engineering for review and approval.

G. No construction may commence until the Department of Water Resources and Environmental Engineering has issued written approval under condition B, C, and F. Operational changes made after project completion are subject to condition F and must be approved prior to effecting the change.

John R. Ponsetto, Commissioner
Department of Water Resources
and Environmental Engineering

Dated at Montpelier, Vermont this
2nd day of February, 1983.

JRC/rh