

WATER QUALITY CERTIFICATION
(P.L. 92-500, Section 401)

In the matter of : Vermont Public Power Supply Authority
P.O. Box 425
Williston, Vermont 05459
Application for Enosburg Falls
Hydroelectric Project

The Water Quality Division of the Vermont Department of Water Resources and Environmental Engineering (the Department) has reviewed the Water Quality Certification application dated November 21, 1985 and filed by Vermont Public Power Supply Authority (the applicant). A copy of the Federal Energy Regulatory Commission (FERC) license amendment application was submitted in support of this application. The Department has made the following findings:

1. The Department issued a Water Quality Certification to the applicant on June 10, 1982 for a modified hydroelectric project at the existing Enosburg Falls Hydroelectric Station on the Missisquoi River downstream of the Vermont 108 bridge in the Village of Enosburg Falls. Since the issuance of that certification, the applicant has amended its proposal to only include existing project features. There is no additional construction proposed at this time. Certification is being requested for these existing features.
2. Existing project features include a concrete overflow dam with a crest elevation of 384.5' NGVD, maintenance and control building, switch yard, two powerhouse structures and the associated headrace and tailrace channels and conduits. The Village plant contains a single 600 kw turbine-generator unit and bypasses 1200 feet of stream via a headrace and tailrace channel. The Kendall plant contains a single 150 kw turbine-generator unit and utilizes a short penstock and

discharges into the main stream channel 120 feet downstream of the dam. The rated heads of the Village and Kendall plants are 21.5 feet (364' NGVD tailwater under full load) and 16 feet respectively.

3. The size of the impoundment with the water level at the dam crest (384.5'NGVD) is 116 acres and the backwater extends about 4.3 miles upstream almost to Samsorville. The project operates with two (2.0) feet of flashboards (386.5' NGVD) which extend the backwater an additional 300 feet upstream and increases the surface area by five acres. With a drawdown of two (2.0) feet from the top of the flashboards, the project has a usable storage of 240 acre-feet. The flashboards are designed to fail when the reservoir level exceeds 388.0' NGVD.

4. A U.S.G.S. gaging station (#4293500) is located 6 1/2 miles upstream at East Berkshire. Active since 1928, the station has a watershed area of 479 square miles. The intervening watershed area includes the Trout River, a major tributary, and results in a watershed area of 586 square miles at the dam. Based on the gage, the following hydrologic values have been estimated for the site:

<u>Value</u>	<u>Flow (cfs)</u>
7Q10	69
25% exceedance	1220
50% exceedance	560
70% exceedance	340
90% exceedance	170
95% exceedance	120
Mean	1130 (26.1 inches/yr.)

5. The applicant states that the project is essentially a run-of-the-river project, however, use is made of the usable storage between the top of the flashboards and dam crest to allow the Village plant to operate at near optimum efficiency by drawing on the pond. Maximum drawdown is two feet from the top of the flashboards. When the flashboards are out, the project will operate in a strict run-of-the-river mode. The hydraulic capacity of the Village and Kendall facilities is 370 cfs and 150 cfs respectively.

6. The applicant proposes the following minimum flow requirements:

- a. 293 cfs below the Kendall plant between April 15 and June 15 or inflow to the reservoir, whichever is less;
- b. 120 cfs from the Kendall powerhouse between June 16 and April 14, or inflow to the reservoir, whichever is less; and
- c. 293 cfs below the Village plant tailrace or inflow to the reservoir, whichever is less.

These flow requirements were established by the Department in the June 10, 1982 Water Quality Certification issued for the modified project. The Department's justification for these flow requirement is provided in Finding #9 of this certification.

7. The Vermont Water Resources Board has classified the Missisquoi River in the Town of Enosburg as Class B upstream of the Enosbury Falls wastewater treatment facility outfall and Class C downstream. Class B

water is of a quality which consistently exhibits good aesthetic value and provides high quality habitat for aquatic biota, fish and wildlife; is compatible with swimming, recreation, public water supply with filtration and disinfection; irrigation and other agricultural uses. Class C water is of a quality which provides habitat suitable for aquatic biota, fish and wildlife; and is compatible with recreational boating and any recreational or other water uses in which contact with the water is minimal and where ingestion of the water is not probable; irrigation of crops not used for human consumption without cooking; and compatible industrial uses.

The Missisquoi River from the outfall of the Enosburg treatment facility downstream to the Swanton Dam in Swanton is warm water fish habitat. From the treatment facility upstream it is cold water fish habitat. The dissolved oxygen (D.O.) content of warm water fish habitat shall not be less than 5 mg/l or 60% saturation at all times. The D.O. content of cold water fish habitat shall not be less than 7 mg/l or 75% saturation at all times, nor less than 95% saturation during late egg maturation and larval development of salmonids in areas which the Secretary determines are salmonid spawning or nursery areas important to the establishment or maintenance of the fishery resource. In all other cold water fish habitat, the D.O. content shall not be less than 6 mg/l or 70 percent saturation at all times.

8. The applicant plans to restore the impoundment to the dam crest during low flow periods to insure that the project will not violate

Vermont Water Quality Standards. This proposed operating mode is based on the results of a water quality sampling program and D.O. modeling analysis presented in the applicant's October 7, 1981 FERC license application for the formerly proposed modified project. This sampling and modeling was conducted to identify what impact the installation of two feet of flashboards would have on water quality as the original project operated without flashboards. The Department notes that though the modified project was never developed, the two feet of flashboards proposed as part of that project have since been installed.

A review of the water quality sampling and D.O. modeling results as presented in the 1981 FERC license application is as follows:

Water quality data was collected for a 12 month period beginning February, 1980. The lowest measured D.O. was 7.9 mg/l for samples taken on July 24, 1980 (flow at eleven times 7Q10) just upstream of the dam and on August 12, 1980 (flow at six times 7Q10) seven miles upstream of the dam. Sampling from July through September was bimonthly.

D.O. modeling analyses presented by the applicant indicate that D.O. levels upstream of the dam may go substandard during low flow periods as a result of the installation of two feet of flashboards. Under certain assumptions made by the applicant's consultant, the D.O. level at the dam would be reduced as a result of this project from

7.2 mg/l to 6.4 mg/l for a flow of 130 cfs and from 6.6 mg/l to 5.5 mg/l for a flow 65 cfs. For higher flow rates, the effect on D.O. levels will be less due to higher reoxygenation coefficients and the decrease in travel time through the impoundment.

9. The primary fish species in the Enosburg Falls-Highgate reach of the river are rainbow trout, brown trout and smallmouth bass. The presence of walleye pike has been reported downstream of the Enosburg Falls dam. Walleyes spawn commonly in rocky areas in rapids at the base of falls and dams after the spring ice flow. They are often found in association with smallmouth bass, yellow perch and white suckers.

Walleyes are considered to be a significant game species. This project will cause flow to be artificially regulated both downstream of the Village plant tailrace when flashboards are in place and in the 1200 foot bypassed section of river.

The applicant has not performed any field studies of sensitivity of food production and fishery needs as related to flow downstream of the dam. That being the case, the Department must set aquatic base flows (or minimum flows) utilizing an empirical approach with due consideration given to the fact that this is an existing facility. The U.S. Fish and Wildlife Service Flow Recommendation Policy for the

New England area recommends instantaneous base flows sufficient to sustain indigenous aquatic organisms during periods critical to their survival and maintenance. As an absolute minimum, the policy recommends that the August median flow be released whenever available from inflow to the project. The estimated regional value for the August median flow is 0.5 csm (293 cfs for this site). During the walleye spawning and incubation period (about mid-April through mid-June), it would be desirable to maintain this flow in the bypassed section, with a flow of 120 cfs (about 0.2 csm) at all other times in order to provide some residency for other species.

Downstream of the bypassed section, an aquatic base flow of 293 cfs year around whenever available from inflow is necessary to provide good habitat conditions between Sheldon Springs and Enosburg Falls.

It is noted that the recommended spring spawning flow of 293 cfs was available throughout the three month period of April to June in water year 1952, which may be considered average in terms of mean annual flow.

CONDITIONS

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

A. Flows directly downstream of the Village plant tailrace shall be maintained at an instantaneous flow of no less than 293 cfs when available from instantaneous inflow to the impoundment. Whenever instantaneous inflows fall below 293 cfs, the instantaneous flow below the Village plant tailrace shall be maintained equivalent to the instantaneous inflow.

Flows directly downstream of the Kendall plant tailrace located at the dam shall be maintained at an instantaneous flow of no less than 293 cfs from April 15 through June 15 and 120 cfs from June 16 through April 14 unless instantaneous inflows to the impoundment fall below those levels, during which periods, the instantaneous release below the Kendall plant shall be equal to the instantaneous inflow.

When the project is not operating, all flows shall be spilled at the dam. The applicant shall provide the Department with the design and hydraulic sizing calculations of the technique or device to be used to pass flows at the dam when the project is not operating for review and written approval prior to June 15, 1986. For a shutdown during low flow periods, it may be necessary to remove the flashboards to maintain the pool at the dam crest level and spill all flows.

B. Whenever instantaneous inflow to the impoundment falls below 130 cfs, the impoundment shall be drawn down to the present crest elevation (about 384.5' NGVD).

C. The impoundment shall not be drawn below the crest elevation without prior approval by the Department.

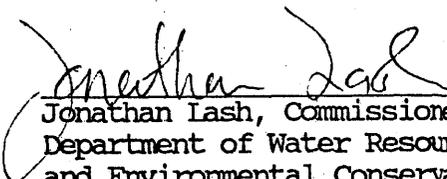
D. Any desilting of the dam impoundment shall be done in accordance with the Agency of Environmental Conservation's Desilting Policy, a copy of which is attached. The Department shall be contacted prior to any desilting activity.

E. The applicant shall submit existing trashrack designs to the Department of Fish and Wildlife (Fish and Wildlife) for review and written approval. The applicant shall redesign existing trashracks, and submit this design to Fish and Wildlife for review and written approval if existing trashrack designs are not approved. The applicant shall file a copy of the approval letter and approved trashrack designs with the Department within two weeks of Fish and Wildlife's actions.

Should redesigned trashracks be required, these racks shall be installed within a year of the date of Fish and Wildlife's approval letter. The applicant shall notify the Department in writing when redesigned racks are installed.

F. Any debris removed from the project area during operation shall be disposed of properly.

G. Any significant changes to the project including the operational scheme must be submitted to the Department for review and approval prior to implementing that change.


Jonathan Lash, Commissioner
Department of Water Resources
and Environmental Conservation

Dated at Montpelier, Vermont
this 25 day of Feb., 1986.