

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

In the matter of: James C. Hansen  
114 Monument Hill Road  
Springfield, VT 05156

John J. Lupien  
PO Box 4  
Cambridge, VT 05444

Application for North Troy Hydropower  
Project

By letter dated November 18, 1986, Mr. James C. Hansen and Mr. John J. Lupien (the applicants) submitted a copy of the Federal Energy Regulatory Commission (FERC) exemption application to the Agency of Environmental Conservation (the Agency) Planning Director and requested a Water Quality Certification. This letter and the copy of the FERC application have been transmitted to the Vermont Department of Water Resources and Environmental Engineering (the Department) for processing of the certification application. The Department has completed its review of this information and finds:

1. The applicant intends to develop the site of a concrete dam located directly downstream of the Vermont Route 105 bridge on the Missisquoi River at North Troy for hydroelectric power generation. Until operation was suspended in the 1960's, the site was used to produce energy for an adjacent paper mill owned by the Weyerhaeuser Company. The present dam height is about 12 1/2 feet. The dam crest varies in elevation from about 536.4' NGVD to 536.7' NGVD, and the structure will not be modified. The project is essentially a rehabilitation

of the present abandoned facility on the east (right) side of the river. Repairs would be made to the 225' long, six foot diameter steel penstock. The gatehouse would be removed. The concrete thrust block near the powerhouse and the retaining wall along the river side of the penstock would be repaired.

The existing 22' x 24' powerhouse would be utilized with the replacement of the turbine room west wall. A new access road to the powerhouse would be constructed. A former paper mill within the project limits may be refurbished for use during construction and later as a maintenance shop.

2. The original vertical turbine/generator unit remains in place. It is estimated to have a 250 kw output. The turbine may be restored or replaced with a new 27 inch runner unit to develop a hydraulic capacity of 95 cfs to 193 cfs. A new generator rated at 400 kw is to be installed. The unit would be a horizontal synchronous type. The net operating head is 26 feet.

A second unit would be installed at the intake structure to provide a continuous minimum flow in the penstock-bypassed section of river. It would have a rated capacity of 60 kw. The unit would be a self-contained vertical propeller unit with a net operating head of 12 feet and a hydraulic range of 35 cfs to 75 cfs.

3. The project would be operated run-of-the-river. The smaller unit would operate almost continuously and the larger unit when available flows are sufficiently high to

operate both units simultaneously. The operation would be manual start-up with automatic operation and shutdown. Inflows which exceed total project capacity, 268 cfs, would be spilled over the dam.

4. By letter dated October 31, 1986, the Agency requested that the applicants spill 55 cfs minimum flow over the dam to preserve fisheries and aesthetic values in the by-passed section of river. The applicants had formerly proposed to pass 21 cfs (7Q10) at the dam. The applicants have revised the project (letter dated November 18, 1986) to accommodate the Agency's concerns. They now propose to route 35 cfs through the turbine at the intake while maintaining a spillage of 21 cfs over the dam crest. They estimate that a 3/4 inch depth of spillage over the main spillway section would provide 4 cfs over the main section and 17 cfs over the shorter L-section adjacent to the left bank. The L-section is the lower portion of the crest (about 536.4' NGVD). The impoundment would be maintained at a fixed level of about 536.7' NGVD under this proposal.

5. A USGS gaging station (#42930) is located about 2 1/2 miles upstream just above Big Falls. It has been active since August, 1931. The watershed area is 131 square miles. About five (5) square miles of watershed contribute to the river between the gage and the dam site (total drainage area 136 square miles). Flows are regulated to a certain degree by an upstream power plant. Based on the gaging station, the

following tabulation indicates some of the hydrologic values for the project site.

Mean discharge	280 cfs (28.0 inches/year)
95% exceedance	35 cfs
75% exceedance	74 cfs
50% exceedance (median discharge)	125 cfs
25% exceedance	290 cfs
7Q10	21.6 cfs

The project would be unable to operate when inflows fall below 56 cfs - 21 cfs spillage plus 35 cfs, the minimum hydraulic capacity of the smaller turbine. On an annual basis, this is approximately 15% of the time.

6. The size of the existing impoundment is about 17 acres, with a gross storage capacity of about 60 acre-feet. It extends about 8,000 feet upstream. The river backwater is generally contained within bank (average width about 90 to 100 feet), and the depths are typically two to six feet.

7. The normal tailwater elevation has been estimated at 509' NGVD, providing a gross head of about 27 1/2' for the larger unit. The applicants state that no tailrace excavation is required but that "accumulated silt and debris" will be removed.

8. The Vermont Water Resources Board has classified the Missisquoi River downstream of the sewage treatment plant at North Troy to the Canadian border as Class C. Class C waters are managed to provide habitat for aquatic biota, fish and wildlife, and to support uses including 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 stream has been designated as cold water fish habitat for fisheries management purposes. The dissolved oxygen (D.O.) standard is 6 mg/l or 70 percent saturation unless the Agency Secretary determines the river is important for salmonid spawning or nursery habitat and higher standards are applied.

9. The Missisquoi River in the Troy-North Troy reach contains a fish species assemblage consisting of brown trout, brook trout, white suckers, yellow perch, various minnow species, and chain pickerel. Brown trout provide the principal fishery throughout the area. The brown trout population is maintained by natural reproduction and by stocking by the Vermont Department of Fish and Wildlife. Yellow perch and chain pickerel originate primarily in the flowages behind the North Troy and Bakers Falls Dams. Brook trout in this area stem from downstream drift of stocked fish and natural reproduction in tributaries.

Spawning and/or nursery habitat for brown trout exists upstream of the North Troy impoundment and from the North Troy Dam downstream into Canada. Habitat for adult brown trout is present throughout the area. Yellow perch and chain pickerel are believed to spawn in the impoundment and become resident in pools and other low velocity areas.

10. For study of an earlier proposed hydroelectric project, three water quality sampling stations were established in the vicinity of the project area:

Station 8 - 150 feet downstream of North Troy dam

Station 9 - upstream of North Troy dam

Station 10 - near USGS gage and about 600 feet  
upstream of Big Falls

Data was collected for one year beginning February, 1980. Late summer low flows during sampling were as low as 150% of 7Q10 (33 cfs on August 25).

The data revealed that dissolved oxygen levels are generally at saturation entering the impoundment due to Big Falls, a large waterfall upstream of the project impoundment. Dissolved oxygen concentrations decrease up to 2 to 3 mg/l in going through the impoundment. During low flows (48 cfs - September 10, 1980), about 1 1/2 mg/l dissolved oxygen is added at the dam certain periods of the day.

11. Spillage of 21 cfs over the dam crest and discharge of flows from the smaller turbine over the lower portion of the cascade should insure that D.O. standards will continue to be met downstream of the project. Shallow channel depths downstream will provide rapid reaeration.

Flashboards are not to be utilized. As there are no proposed changes to the existing impoundment level and operation is to be run-of-the-river, the travel time through the impoundment will remain the same.

12. The spillage and smaller turbine discharge would

also protect fish residing in pools in the penstock-bypassed section of river. Strict run-of-the-river operation would insure continuation of the natural flow regime downstream of the project. There would be no peaking or store-and-release operation.

The intake would be screened to minimize the potential for fish impingement or turbine mortality. By condition of this certificate, the applicants shall be required to submit downstream passage plans to the Vermont Department of Fish and Wildlife for approval.

The applicants would provide parking for angler access as part of the project.

13. The Missisquoi River receives some boating use in this reach. The applicants would construct a portage at the project to enhance this use.

### CONDITIONS

In certifying that this project will meet Vermont Water Quality Standards, the Department imposes the following conditions:

A. When available from inflow, a minimum instantaneous flow of 55 cfs shall be maintained in the penstock-bypassed section of stream at all times. If the instantaneous inflow falls below this minimum, all flows shall be spilled at the dam. The minimum flow shall be apportioned between the small unit at the dam and spillage over the dam crest with the latter flow comprising at least 21 cfs. Before the start of construction, the applicant shall furnish a description, hydraulic design calculations, and plans for the measure to be used to pass this minimum flow.

B. The facility shall be operated in a strict run-of-the-river mode where instantaneous flows below the tailrace shall equal instantaneous inflow to the impoundment at all times. The impoundment shall be maintained at or above that level necessary to provide the spillage flow required under Condition A. The impoundment may not be drawn down without prior approval by the Department. When the facility is not operating, all flows shall be spilled at the dam.

C. Prior to the start of construction, the applicant shall file, for review and written approval, a comprehensive erosion control and water management plan to cover construction activities. This plan shall address the maintenance of stream

flow during construction and measures taken to prevent the discharge of sediment, wet concrete, and debris into State waters to limit adverse impacts on water quality, aquatic habitat, and biota. It may be beneficial to consult with the Department during the development of this plan.

D. The applicant shall submit a plan for downstream fish passage to the Vermont Department of Fish and Wildlife for review and written approval prior to project construction. This plan shall include provisions to:

- 1) minimize passage of fish into the generating unit if injury or mortality can result;
- 2) minimize impingement of fish on trashracks, screens, or other intake devices; and
- 3) convey fish safely and effectively downstream of the facility.

The project shall not be operated without the approved passage plan in place. The applicant shall file a copy of the approval letter and any appropriate plans with the Department within two weeks of the Department of Fish and Wildlife's action.

E. 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.

F. Debris associated with project construction and operation, including trashrack debris, shall be disposed of properly.

G. 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.

H. Any significant changes to the project, including project operation, must be submitted to the Department for prior review and written approval.

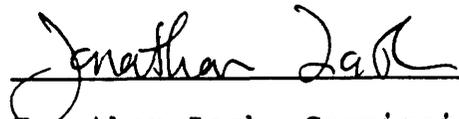
I. The applicant shall provide the Department with an as-built set of plans and a copy of the turbine rating curves for the record within one year of the completion of construction.

J. No construction may commence until after the Department has issued written approval under Conditions A, C, and H, and the Department of Fish and Wildlife has issued written approval under Condition D. Operational changes made after project completion are subject to Condition H and must be approved prior to effecting the change.

K. The applicant shall notify the Department when project construction has been completed. This shall be done in writing within two weeks of completion.

The Department maintains continuing jurisdiction over water quality aspects of this project including resource management provisions of the Vermont Water Quality Standards.

Dated at Waterbury, Vermont this 25 day of May,  
1987.

  
\_\_\_\_\_  
Jonathan Lash, Commissioner  
Department of Water Resources  
and Environmental Engineering

JRC/eh

