TAB 4

401 Water Quality Certification (WQC) Documentation

1. 401 WQC 1983
2. FERC Exemption from Licensing Application 1984 – Including the 401 WQC and the Certificate of Public Good
3. Agency Comments on WQC Compliance (2 letters)
4. Amended WQC 1985
WATER QUALITY CERTIFICATION
(P.L. 92-500, Section 401)

In the matter of: C.T.I.P., Inc.
E. Frank Hall, Vice President
7 Belknap Avenue
Northfield, Vermont 05663
Application for the C.T.I.P., Inc. Hydroelectric Project

The Water Quality Division of the Vermont Department of Water Resources and Environmental Engineering (the Department) has examined the Water Quality Certification application filed by C.T.I.P., Inc. (the applicant) for the C.T.I.P., Inc. Hydroelectric Project. The application, which is dated September 30, 1982, includes a copy of the Federal Energy Regulatory Commission license exemption request as supporting documentation for this certification. The Department makes the following findings:

1. The applicant proposes to develop the site of an existing dam located on the Dog River at the former Nantana Woolen Mill in the Village of Northfield. The penstock, one turbine and the powerhouse are also existing. The dam, built by Northfield Mills between 1947 and 1950, is a reinforced concrete arch structure, 90 feet long and 22 feet high. The principal spillway crest elevation is 686' NGVD.

2. Three (3.0) feet of flashboards are to be installed across the crest, raising the pool elevation to 689' NGVD and increasing the surface area from about 1.0 acre to 1.6 acres. The applicant has indicated that this is the historic operating level. The gross storage volume will be about 8 acre-feet; however, the project will not be operated from storage.

The application does not indicate how much further the backwater from the dam will extend as a result of the installation of flashboards. It does state, however, that the backwater will not extend past the sewerline crossing downstream of the Vermont Route 12 bridge. That would suggest that the additional backwater would not extend more than about 1800 feet upstream of the dam. Located between that point and the bridge is the Cross Brothers dam,
which is now partially breached. The District Fisheries Biologist, in reviewing this project, concludes that there will be about 300 feet of additional backwater and that a 100 foot cobble riffle section will be flooded.

3. The existing 21-inch Hunt-McCormick turbine would be refurbished, and a 30-inch Hunt or Loffel turbine installed. A 153 kw and a 75 kw generator would provide an installed capacity of 228 kw. The gross head available is 25 feet. The estimated hydraulic capacity of the powerhouse is 30-169 cfs. The steel penstock is 7 feet in diameter and 40 feet long.

4. The U.S.G.S. has operated two surface water gaging stations in the Dog River Basin - gage #42865 was operated at Northfield from water years 1913 to 1934 and gage #42870 has been operated at Northfield Falls from October, 1934 to the present. The watershed areas at the gaged sites are 52 square miles and 76.1 square miles, respectively. At the dam, the watershed area is 62 square miles. Based on an adjustment for the watershed area and for the gage periods of record, following are several estimated hydrologic values for the site of this project:

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5. The project is run-of-the-river. On a long term, flows should be sufficient for operation about 60% of the time. Some flow is withdrawn from the impoundment in order to facilitate operation of the Northfield wastewater treatment plant.

6. Water from the powerhouse is returned to the river about 130 feet downstream of the dam via an unlined earthen tailrace channel. The bypass section is comprised of a short plunge pool and a shallow ledge portion. The applicant has agreed to pass some flow over the dam in order to maintain the bypassed section.
7. The Dog River has been classified by the Vermont Water Resources Board as Class C waters from the southern limits of Northfield Village downstream. 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 fish species indigenous to the region, and such industrial uses as are consistent with other class uses. At the north end of the village, about one mile downstream of the project, the river receives a treated waste discharge from the Northfield Village plant. The Dog River is Water Management Type I or II. The minimum standard for dissolved oxygen (D.O.) is 6 mg/l, with the possible limit of 7 mg/l in spawning areas.

8. No water quality data has been collected by the applicant; however, it is not anticipated that the project as proposed will lower D.O. levels significantly. The facility will not be operating during periods of low flow. By condition of this certification, a minimum flow of 5 cfs will be required over the dam at all times and, whenever the facility is shut down, all inflows will be spilled.

9. The Dog River has an excellent coldwater fishery, mainly comprised of rainbow and brown trout. It is felt that the fishery population between the two dams is a result of downstream drift.

The basin will soon be evaluated as a potential spawning area for inclusion in the Vermont Department of Fish and Game's programs for the restoration of steelhead and landlocked Atlantic salmon fisheries in Lake Champlain.

10. Following each reinstallation of flashboards, special provision for the passage of flows at the dam must be made in order to maintain aquatic life downstream and to provide stream flow at the wastewater treatment plant to receive the effluent discharge.
CONDITIONS

The Vermont Department of Water Resources and Environmental Engineering certifies that this project will meet Vermont Water Quality Standards with the following conditions:

A. Except as covered in Condition B, the hydroelectric facility shall be operated in a strict run-of-the-river manner, with instantaneous flows downstream of the tailrace equivalent to instantaneous inflows to the impoundment. A minimum flow of 5.0 cfs, or instantaneous inflow to the impoundment, if less, shall be spilled at the dam at all times. All flows shall be passed at the dam when the facility is not operating. The applicant shall provide the Department with a description and plans detailing how releases will be made at the dam for review and approval before construction may commence.

B. The Department recognizes that there will be times when some inflow must go into storage resulting in an alteration of the natural flow regime. Two such cases would be when flashboards are installed and when the pool is drawn for a maintenance operation. During such periods, the facility must maintain a minimum instantaneous flow below the tailrace of 17 cfs (0.28 cfs/square/mile, or the estimated August median flow), or the instantaneous impoundment inflow, if less.

C. During the final engineering phase or earlier, the applicant shall file a comprehensive erosion and sediment control plan with the Department. The plan shall cover temporary and permanent measures to limit adverse impacts on water quality from turbidity and sedimentation with regard to construction activities. It is recommended that the applicant 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 for approval.

G. Upon completion of the project, the applicant shall provide the Department with an as-built set of plans for the record.

H. No construction may commence until the Department has issued written approvals under conditions A, 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. Ponsotto, Commissioner
Department of Water Resources
and Environmental Engineering

Dated at Montpelier, Vermont this 61st day of Jan., 1983.

JRC/rh
Mr. Kenneth F. Plumb, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.W.
Washington, D.C. 20426

Dog River Project Application for Exemption (5 MW or Less)

COMMENTS

Dear Mr. Plumb:

This project has been issued a Water Quality Certificate pursuant to Section 401 of P.L. 92-500. A copy is enclosed.

This project has been issued a Certificate of Public Good pursuant to 30 V.S.A. §248. A copy is enclosed.

Site Analysis by the Agency of Environmental Conservation

Water Quality. The Dog River is rated Class C by the State of Vermont Water Resources Board. The river is designated Water Management Type 1 or II for the protection and management of aquatic life. Dissolved oxygen content of these waters by Vermont Water Quality Standards cannot be less than 6 mg/l with the possible limit of 7 mg/l in spawning areas.

Fisheries. There is another existing dam approximately 2000 feet upstream of this dam and proposed hydro site. The Dog River has an excellent cold water fishery, comprised mainly of rainbow and brown trout. It is felt the fishery between these two dams results from downstream drift. The Vermont Fish and Wildlife Department's review indicates that the conditions contained herein are executed to preserve the fisheries resource at this site and to provide for future restoration of anadromous and migratory fish species.

Future Migratory Fish Restoration Program. Historical records show that the major tributaries of Lake Champlain at one time supported migratory salmonids. Studies are currently underway to evaluate the potential trout and salmon spawning and nursery areas in the tributary systems of Lake Champlain. This is in conjunction with the Lake Champlain Fish Restoration Project and the planned fish trap and truck operation to
be located at the proposed Chico Mill project on the Lower Winnoski. Suitable fish would be trapped at this site and then transported by truck to selected sites upstream in the main stem and tributary waters. There is no present need for a fish passage facility at the C.T.I.P. project. A decision concerning fish passage facilities at this project site will probably be deferred until the 1990’s. If passage is required, it would in all likelihood take the form of a cooperative operation and maintenance effort with Burlington Electric at the Chico Mill facility.

The tailrace and penstock will bypass approximately 100 feet of the river that consists of ledge and shallow water with a deeper pool approximately 20 feet in length at the base of the dam. In order to maintain the integrity of this pool and the water quality of the bypassed reach, we recommend a minimum flow of at least 70 cfs passed over the dam at all times. During periods of low flow when the plant is not generating, all the flow would be passed over the dam. This condition is included below.

Recreation. The main recreational activity in the project area is fishing. Access to the area for fishing should be provided within the limits of safety.

Aesthetics. Aesthetics are not a concern at this site.

Conditions of Exemption

The Agency of Environmental Conservation concludes that the following conditions are necessary to prevent loss or damage to the fisheries resources of the project area:

A. The applicant shall provide such fish passage facilities or enter into such cooperative efforts as may be prescribed in the future by the Vermont Agency of Environmental Conservation to restore migratory salmonids to Lake Champlain and its tributaries.

B. Except as covered in Condition C, the hydroelectric facility shall be operated in a strict run-of-the-river manner, with instantaneous flows downstream of the tailrace equivalent to instantaneous inflow to the impoundment. A minimum flow of 5.0 cfs, or instantaneous inflow to the impoundment, if less, shall be spilled at the dam at all times. All flows shall be passed at the dam when the facility is not operating. The applicant shall provide the Department with a description and plans detailing how releases will be made at the dam for review and approval before construction may commence.

C. The Department recognizes that there will be times when some inflow must go into storage resulting in an alteration of the natural flow regime. Two such cases would be when flashboards are installed and when the pool is drawn for a maintenance operation. During such periods, the facility must maintain a minimum instantaneous flow below the tailrce of 17 cfs (0.28 cfs/square mile, or the estimated August median flow), or the instantaneous impoundment inflow, if less.
D. During the final engineering phase or earlier, the applicant shall file a comprehensive erosion and sediment control plan with the Department. The plan shall cover temporary and permanent measures to limit adverse impacts on water quality from turbidity and sedimentation with regard to construction activities. It is recommended that the applicant consult with the Department for input during the development of the plan.

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

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

G. Any significant changes to the project including the operational scheme must be submitted to the Department for approval.

H. Upon completion of the project, the applicant shall provide the Department with an as-built set of plans for the record.

I. No construction may commence until the Department has issued written approvals under Conditions B, D, and G. Operational changes made after project completion are subject to Condition G and must be approved prior to effecting the change.

Respectfully submitted,

[Signature]

Stephen B. Sense
Director of Planning

SBS/te
Enclosures 2

Original and 14 copies

cc: Robert P. Lord
    Fred E. Springer
    Elizabeth Higgins
    Northfield Board of Selectmen
    Central Vermont Regional Planning Commission
    William P. Patterson
    Gordon E. Beckett
WATER QUALITY CERTIFICATION
(P.L. 92-500, Section 401)

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this project, concludes that there will be about 300 feet of additional backwater
and that a 100 foot cobble riffle section will be flooded.

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and a 30-inch Hunt or Leffel turbine installed. A 153 kw and a 75 kw generator
would provide an installed capacity of 228 kw. The gross head available is
25 feet. The estimated hydraulic capacity of the powerhouse is 30-160 cfs.
The steel penstock is 7 feet in diameter and 40 feet long.

4. The U.S.G.S. has operated two surface water gaging stations in the
Dog River Basin - gage #42065 was operated at Northfield from water years 1913
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7. The Dog River has been classified by the Vermont Water Resources Board as Class C waters from the southern limits of Northfield Village downstream. 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. At the north end of the village, about one mile downstream of the project, the river receives a treated waste discharge from the Northfield Village plant. The Dog River is Water Management Type I or II. The minimum standard for dissolved oxygen (D.O.) is 6 mg/l, with the possible limit of 7 mg/l in spawning areas.

8. No water quality data has been collected by the applicant; however, it is not anticipated that the project as proposed will lower D.O. levels significantly. The facility will not be operating during periods of low flow. By condition of this certification, a minimum flow of 5 cfs will be required over the dam at all times and, whenever the facility is shut down, all inflows will be spilled.

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10. Following each reinstallation of flashboards, special provision for the passage of flows at the dam must be made in order to maintain aquatic life downstream and to provide stream flow at the wastewater treatment plant to receive the effluent discharge.
CONDITIONS

The Vermont Department of Water Resources and Environmental Engineering certifies that this project will meet Vermont Water Quality Standards with the following conditions:

A. Except as covered in Condition B, the hydroelectric facility shall be operated in a strict run-of-the-river manner, with instantaneous flows downstream of the tailrace equivalent to instantaneous inflows to the impoundment. A minimum flow of 5.0 cfs, or instantaneous inflow to the impoundment, if less, shall be spilled at the dam at all times. All flows shall be passed at the dam when the facility is not operating. The applicant shall provide the Department with a description and plans detailing how releases will be made at the dam for review and approval before construction may commence.

B. The Department recognizes that there will be times when some inflow must go into storage resulting in an alteration of the natural flow regime. Two such cases would be when flashboards are installed and when the pool is drawn for a maintenance operation. During such periods, the facility must maintain a minimum instantaneous flow below the tailrace of 17 cfs (0.28 cfs/square/mile, or the estimated August median flow), or the instantaneous impoundment inflow, if less.

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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 for approval.

G. Upon completion of the project, the applicant shall provide the Department with an as-built set of plans for the record.

H. No construction may commence until the Department has issued written approvals under conditions A, C, and F. Operational changes made after project completion are subject to condition F and must be approved prior to effecting the change.

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

Dated at Montpelier, Vermont this _9_ day of _January_ 1983.
Docket No. 4776

Petition of C.T.I.P., Inc. for
a Certificate of Public Good
under 30 V.S.A. §248 for the
construction of a hydroelectric
generation station on the
Dog River in the Town of
Northfield, Vermont.

Hearing at
Northfield, Vermont
April 11, 1983

Order Entered: 5/26/83

PRESENT: Wayne L. Foster, Hearing Examiner

APPEARANCES: E. Frank Wall
for C.T.I.P., Inc.

Laurie S. Parker, Esq.
for the Department of Public Service

INTRODUCTION

This case concerns a petition filed by C.T.I.P., Inc. on January 20, 1983, requesting a Certificate of Public Good under 30 V.S.A. §248 for the construction of a hydroelectric generation station on the Dog River in the Town of Northfield, Vermont. The proposed generation facility will add an electrical source to an existing electrical distribution system.

Notices of the hearing were sent by certified mail on March 11, 1983, to all parties specified in 30 V.S.A. §248. Notice was also sent to the Village of Northfield Electric Department and the Vermont Department of Agriculture. In addition, notice of the hearing was published in the "Times Argus" on March 23 and 29, 1983, and the "Northfield News" on March 28, 1983. The hearing was held as scheduled on Monday, April 11, 1983, at the Northfield Savings Bank in Northfield, Vermont. No one appeared in opposition to the petition and substantial evidence was presented in support of the petition.
FINDINGS

Based upon the substantial evidence of record and the testimony presented at the hearing, I hereby report the following Findings to the Board in accordance with 30 V.S.A. §8:

1. C.T.I.P., Inc. is a Vermont corporation, formed under the laws of the State of Vermont.

2. C.T.I.P. is a partnership which owns a dam, adjacent structures, land, and water rights on the Dog River in the Town of Northfield, Vermont.

3. C.T.I.P. intends to lease to C.T.I.P., Inc. the dam and associated structures, plus all the necessary land and water rights for the purpose of constructing and operating a hydroelectric generating station.

4. The existing dam, constructed by Northfield Mills in the late 1940's, is a reinforced concrete arch structure, 90 feet in length, with a maximum height of 22 feet. C.T.I.P., Inc. is proposing to install three (3) feet of flashboards to raise the water level to the elevation of the pond when the dam was last in operation. The surface area of the impoundment will increase from the existing 1 acre to a proposed 1.6 acres.

5. The existing dam has been visually inspected by various engineering personnel and appears to be safe and in good condition. No repairs to the existing dam are necessary. Should, however, failure of the dam occur, it is unlikely that any residences would be damaged. Some minor state highway flooding might occur; however, any potential flooding would be minimal and of short duration due to the small size of the proposed impoundment.
6. The existing 40 foot penstock and associated equipment will require minor repairs. The existing powerhouse is attached to a large industrial building which was formerly a woolen mill and is now undergoing extensive renovation for use as shops and other small industries. The existing powerhouse will require minor modifications. An existing 21 inch turbine within the powerhouse is planned for restoration and an additional 30 inch vertical turbine is proposed for installation.

7. The electrical output of the proposed facility will be connected to the existing electrical distribution system of the Village of Northfield Electric Department at an existing distribution substation immediately adjacent to the existing powerhouse. No new substation or transmission facilities will be required.

8. The electrical protection and interconnection of the proposed facility with the existing Northfield system will fully comply with the requirements of Northfield and of Public Service Board General Order No. 65 to provide a safe and reliable facility. The proposed facility should cause no adverse impact upon the electrical stability of the existing distribution system.

9. All construction will be in accordance with the National Electrical Safety Code and any other applicable industry standards.

10. The installed capacity of the proposed project is 222 kilowatts (KW) with an estimated annual energy output of 700,000 kilowatt hours (KWH).

11. The proposed construction schedule of C.T.I.P., Inc. would place the proposed hydro facility on-line December 31, 1983.
12. The estimated cost of the proposed project is $249,500. This estimated project costs is broken down as follows:

- Direct Construction $154,000
- Engineering $30,000
- Interest During Construction $17,000
- Fees, Licenses, Legal $10,000
- Contingency $38,500

**TOTAL** $249,500

13. The estimated annual operating and maintenance costs for the initial year of operation of the proposed facility are as follows:

- Salary and Wages $10,000
- Benefits $3,000
- Supplies and Miscellaneous $4,000
- Utilities $2,000
- Local Taxes $3,000
- Insurance $1,000
- FERC License, Fees $4,000

**TOTAL** $27,000

14. Equity capital in an amount of $10,000 will be provided by E.F. Wall and R.P. Lord. All remaining financing will be obtained from loans from a Vermont banking institution. The estimated financing rate is 14%.

15. Any tax credits from the proposed project will flow to E.F. Wall and R.P. Lord.

16. The estimated annual revenue, based upon a KWH sale price of $0.078, is $54,600. C.T.I.P., Inc. did not provide any economic analysis information based upon an energy sale price of less than $0.078 per KWH.
17. C.T.I.P., Inc. is proposing to sell at wholesale the entire output of the proposed hydroelectric facility to the Village of Northfield Electric Department (Northfield). It does not intend to and will not operate as an electric distribution utility.

18. C.T.I.P., Inc. and Northfield are currently negotiating an agreement consistent with the requirements of Public Service Board General Order No. 65 for the interconnection to and sale of output to Northfield.

19. The possibility exists that at some time in the future, the proposed project may be either sold or leased to the Village of Northfield. Such an agreement was only in the very preliminary stages of discussion at the time of the hearing and no formal proposals have been made.

20. The proposed power sale rate to Northfield is that specified in Public Service Board General Order No. 65, currently set at $0.078 per KWH. Due to the pending replacement of Public Service Board General Order No. 65 by Public Service Board Rule No. 4.100, it is not likely that C.T.I.P., Inc. and Northfield will finalize any power sale agreement until after Public Service Board Rule No. 4.100 is in effect.

21. The proposed project will produce electricity from a renewable resource. This energy will be sold to a public utility (Northfield) to reduce its present and future use of fossil fuel derived energy. As a result, the energy output is needed now and in the future to reduce the need for imported and domestic fossil fuels.

22. Based upon the testimony presented at the hearing, C.T.I.P., Inc. satisfies the criteria for exemption from utility
regulation under paragraph 9 of Public Service Board General Order No. 65.

23. The proposed project will not flood or affect any existing or potentially productive agricultural lands. The proposed project will have no adverse effect on the criteria of Executive Order No. 52, as it relates to agricultural lands.

24. C.T.I.P., Inc. has filed an application with the Federal Energy Regulatory Commission (FERC) for an exemption from licensing as a small hydroelectric power producer. At the time of the hearing, such exemption had not been issued to C.T.I.P., Inc. by FERC.


26. The proposed project will be operated in the run-of-the-river mode, with no peaking operation. Instantaneous flows below the proposed project will equal the instantaneous inflows to the impoundment.

27. There are no known endangered or threatened animals or plants in the proposed project area and no known critical habitats or migratory fish areas in the proposed project area.

28. At some point in the future, a migratory salmonid restoration program for the Dog River may be undertaken by the AEC. The AEC, by letter to the Board prior to the hearing, requested that a condition be included in the certificate which would require C.T.I.P., Inc. at that time to either install fish passage facilities or participate in some other appropriate fish passage arrangement.
29. Should migratory salmonids return to the Dog River, the issue of fish passage facilities at the proposed C.T.I.P., Inc. facility may be addressed at that time by petitioning the Board under 30 V.S.A. §209(a)(3). The issue of provision of fish passage facilities at the proposed hydroelectric facility is a matter subject to continuing jurisdiction of the Board as to the convenience and accommodation of the public pursuant to 30 V.S.A. §209.

30. From the standpoint of aesthetics, the proposed project is located to the rear of a large industrial building and will not be readily visible. The proposed repair and reconstruction of the existing penstock, gates, and powerhouse will mostly be visible as a general cleanup of the area which will result in an aesthetic improvement.

31. The Public Service Department requested the opportunity to review the proposed project after the completion of construction to determine if any landscaping or erosion control measures are necessary. C.T.I.P., Inc. is in agreement to such a review.

32. Plans for the proposed project were submitted to the Central Vermont Regional Planning Commission and the Northfield Planning Commission. Each commission waived the statutory requirement of submittal 45 days prior to formal filing for a certificate of public good with the Public Service Board.

33. The proposed project complies with local zoning and the regional energy plan.

34. The proposed project will not affect any properties of historic, architectural or archeological significance which are included in or eligible for inclusion in the National Register of Historic Places.
35. Based upon all the above evidence, the proposed construction will not have an undue adverse effect on the orderly development of the region; is required to meet the need for present and future demand for service; will not adversely affect system stability and reliability and economic factors; will not have an undue adverse effect on aesthetics, historic sites, air and water purity, the natural environment, and the public health and safety; plans have been submitted to the municipal and regional planning commissions in accordance with 30 V.S.A. §248; and there exists good cause to permit the proposed action.

A Proposal for Decision pursuant to 3 V.S.A. §811 has been served upon the parties to this case.

Dated at Montpelier, Vermont this 17th day of May, 1983.

Wayne L. Foster, Hearing Examiner
ORDER

IT IS HEREBY ORDERED, ADJUDGED AND DECREED by the Public Service Board of the State of Vermont that:

1. The Findings of the Hearing Examiner in this case are adopted.

2. The construction of a hydroelectric generation station on the Dog River in the Town of Northfield, Vermont, will promote the general good of the State of Vermont in accordance with 30 V.S.A. §248 and a certificate of public good shall be issued in this matter.

Dated at Montpelier, Vermont this 26th day of [May], 1983.

V. Camila Mizen
PUBLIC SERVICE BOARD
OF VERMONT

OFFICE OF THE CLERK
FILED: May 26, 1983
ATTEST: M. Hudson
CLERK OF THE BOARD
Docket No. 4776

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a Certificate of Public Good
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tric generation station on the
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Northfield, Vermont.

CERTIFICATE OF PUBLIC GOOD
PURSUANT TO 30 V.S.A. §248

IT IS HEREBY CERTIFIED that the Public Service Board
of the State of Vermont this day found and adjudged that the
proposed construction by C.T.I.P., Inc. of a hydroelectric
generation station on the Dog River in the Town of Northfield,
Vermont, will promote the general good of the State, subject
to the following conditions:

1. Prior to the beginning of construction, C.T.I.P.,
   Inc. shall submit to the Board a copy of its license exemption
   from the Federal Energy Regulatory Commission.

2. C.T.I.P., Inc. shall comply with all conditions of
   the Section 401 Water Quality Certificate, issued by the Agency
   of Environmental Conservation.

3. C.T.I.P., Inc. shall submit to the Board a copy
   of the interconnection agreement and power sale contract with
   the Village of Northfield Electric Department.

4. Within ninety (90) days after the completion of
   construction, the Public Service Board staff and Public Service
   Department staff shall review the site to determine any necessary
   landscaping or erosion control measures. Should such be found
   to be necessary, C.T.I.P., Inc. shall submit to the Board for
   approval, a detailed landscaping and erosion control plan to be
   completed within one (1) year after the completion of construction.
5. Within thirty (30) days of the start-up of the hydro facility, C.T.I.P., Inc. shall so notify the Board in writing.

6. The Certificate of Public Good for this project may not be transferred without approval by the Board.

Dated at Montpelier, Vermont this 26th day of

May, 1983.

V. Laverne McCann

PUBLIC SERVICE BOARD

OF VERMONT

OFFICE OF THE CLERK

FILED: May 26, 1983

ATTEST: Susan M. Hudson

CLERK OF THE BOARD
February 1, 1985

Jeffrey R. Cueto, P.E.
Agency of Environmental Conservation
Montpelier, Vermont
05602

Dear Mr. Cueto,

Thank you for your letter dated January 18 in response to our 401 Water Quality Certificate compliance.

We appreciate your concerns and feel we can address them as follows:

**Condition A**

The project will be operated with flashboards year-round. We will monitor the minimum flow release on a regular basis to ensure its operation. If there is a problem maintaining the 5 cfs, the Rodney Hunt drain down gate can be opened to allow the necessary minimum release.

**Condition C**

Concerning the tailrace, the banks presently are composed of rock with earth fill, covered in part with grass and some plantings. While tree trunks have been used to stabilize some of the banks, some reseeding with an appropriate ground cover is necessary.

The present headgate is sound and no leakage is present there. For this reason, the haybales across the lower end of the tailrace should present adequate closure during excavation. A typical section of the installation is shown on the enclosed drawing.

An access road to the tailrace needs to be built, as there is presently a bridge across the tailrace which gives good access. Finally, any excavated material from the site will indeed be taken to a landfill.
Condition F

Our final selection for turbines at this site is two crossflow units built by the New Found Power Company of Hope Valley, Rhode Island. These will have an estimated maximum hydraulic capacity of 140 cfs and minimum capacity of 20 cfs. This compares with the earlier plan in which C.T.I.P. would have used rehabilitated units, the total estimated hydraulic capacity of which would have ranged from 30 to 160 cfs.

Thank you again for allowing us to address your concerns. Should there be any questions, please contact us at your convenience.

Yours Truly,

[Signature]

Dermot McGuigan

dm/mw
enc.

Schedule 2.16

COPY
SECTION A-A

SCALE ←→

1 FOOT

C.T.I.P. Inc.

Schedule 8.11a
February 22, 1985

Dermot McGuigan
Vermont Hydroelectric, Inc.
Chace Mill
1 Mill St.
Burlington, VT 05401

Dear Mr. McGuigan:


Condition H of the certification requires approvals by the Department under conditions A, C and F before construction may commence. This letter provides you with that approval, with the following provisions:

1. Reference Condition A. The pond level sensor shall be installed such that a minimum head of ten (10.0) inches is maintained on the 12" x 24" long rectangular weir. The weir section shall be kept free of ice and/or debris to assure its proper operation. The weir section shall be installed in an alternate location if locating it under the operator's platform does not provide sufficient circulation through the plunge pool. We recommend consulting the District Fisheries Biologist relative to its location.

2. Reference Condition C. The banks of the tailrace are to be stabilized where necessary with rock or vegetative plantings prior to the start of operation. The temporary hay bales must be staked in place. There is to be no excavation in the river proper, unless given prior written approval by the Department. If an access road is to be built to the tailrace, plans must be furnished to the Department for prior approval. A tentative construction schedule must be provided to the Department before the start of work.

3. Reference Condition F. Approval of the new units is provided in the amended water quality certification presently being acted upon. Routing

Do not hesitate to contact us if you have any questions.

Sincerely,

Jeffrey R. Cueto, P.E.
Hydrologist

CC: S. Sease
    L. Gerardi
    J. Claussen

JRC/gp
AMENDED WATER QUALITY CERTIFICATION
(P.L. 92-500, Section 401)

In the matter of: Nantana Mill Dam Partnership
1 Mill Street
Burlington, VT. 05401
Application for C.T.I.P., Inc.
Hydroelectric Project

The Water Quality Division of the Vermont Department of Water Resources and Environmental Engineering (the Department) originally issued a certification to C.T.I.P., Inc. on January 5, 1983. The ownership of C.T.I.P., Inc. subsequently changed, and on January 28, 1985, the rights to develop the hydroelectric project were transferred to Nantana Mill Dam Partnership. They are, therefore, now considered to be the "Applicant" in this certification. Additionally, this new certification includes the review of a proposal filed by Vermont Hydroelectric, Inc. on behalf of the applicant to change the equipment to be installed. The Department has made the following findings:

1. The applicant proposes to develop the site of an existing dam located on the Dog River at the former Nantana Woolen Mill in the Village of Northfield. The penstock, one turbine and the powerhouse are also existing. The dam, built by Northfield Mills between 1947 and 1950, is a reinforced concrete arch structure, 90 feet long and 22 feet high. The principal spillway crest elevation is 686' NGVD.

2. Three (3.0) feet of flashboards are to be installed across the crest, raising the pool elevation to 689' NGVD and increasing the surface area from about 1.0 acre to 1.6 acres. The applicant has indicated that this is the historic operating level. The gross storage volume will be about 8 acre-feet; however, the project will not be operated from storage.
The application does not indicate how much further the backwater from the dam will extend as a result of the installation of flashboards. It does state, however, that the backwater will not extend past the sewerline crossing downstream of the Vermont Route 12 bridge. That would suggest that the additional backwater would not extend more than about 1800 feet upstream of the dam. Located between that point and the bridge is the Cross Brothers Dam, which is now partially breached. The District Fisheries Biologist, in reviewing this project, concludes that there will be about 300 feet of additional backwater and that a 100-foot cobble riffle section will be flooded.

3. Since the original January 5, 1983 certification, the turbine/generator units to be installed have changed. Two new crossflow units manufactured by New Found Power Company of Hope Valley, Rhode Island are to be used. As a result, the hydraulic capacity range of the units has changed from 30-169 cfs to 20-140 cfs. The gross head available is 25 feet. The steel penstock is 7.0 feet in diameter and 40 feet long.

4. The U.S.G.S. has operated two surface water gaging stations in the Dog River Basin - gage #42865 was operated at Northfield from water years 1913 to 1934 and gage #448270 has been operated at Northfield Falls from October, 1934 to the present. The watershed areas at the gaged sites are 52 square miles and 70.1 square miles, respectively. At the dam, the watershed area is 62 square miles. Based on an adjustment for the watershed area and for the gage periods of record, following are several estimated hydrologic values for the site of this project:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Flow</td>
<td>97</td>
</tr>
<tr>
<td>7Q10</td>
<td>4</td>
</tr>
<tr>
<td>95% exceedance</td>
<td>9</td>
</tr>
<tr>
<td>50% exceedance (median)</td>
<td>46</td>
</tr>
<tr>
<td>10% exceedance (median)</td>
<td>222</td>
</tr>
</tbody>
</table>
5. The project is run-of-the-river. On a long term, flows should be sufficient for operation about 60% of the time. Some flow is withdrawn from the impoundment in order to facilitate operation of the Northfield wastewater treatment plant.

6. Water from the powerhouse is returned to the river about 130 feet downstream of the dam via an unlined northern tailrace channel. The bypass section is comprised of a short plunge pool and a shallow ledge portion. The applicant has agreed to pass some flow over the dam in order to maintain the bypassed section.

7. The Ong River has been classified by the Vermont Water Resources Board as Class C waters from the southern limits of Northfield Village downstream. 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. At the north end of the village, about one mile downstream of the project, the river receives a treated waste discharge from the Northfield Village plant. The Ong River is Water Management Type I or II. The minimum standard for dissolved oxygen (D.O.) is 6 mg/l, with the possible limit of 7 mg/l in spawning areas.

8. No water quality data has been collected by the applicant; however, it is not anticipated that the project as proposed will lower D.O. levels significantly. The facility will not be operating during periods of low flow. By condition of this certification, a minimum flow of 5 cfs will be required over the dam at all times and, whenever the facility is shut down, all inflows will be spilled.
9. The Don River has an excellent coldwater fishery, mainly comprised of rainbow and brown trout. It is felt that the fishery population between the two dams is a result of downstream drift.

The basin will soon be evaluated as a potential spawning area for inclusion in the Vermont Department of Fish and Wildlife's programs for steelhead and landlocked Atlantic salmon fisheries in Lake Champlain.

10. Crossflow turbines characteristically have high mortality rates for fish passing through the units. The District Fisheries Biologist has requested that the intake be screened in order to protect fish moving downstream.

11. Following each reinstallation of flashboards, special provisions for the passage of flows at the dam must be made in order to maintain aquatic life downstream and to provide stream flow at the wastewater treatment plant to receive the effluent discharge.
The Vermont Department of Water Resources and Environmental Engineering certifies that this project will meet Vermont Water Quality Standards with the following conditions:

A. Except as covered in Condition B, the hydroelectric facility shall be operated in a strict run-of-the-river manner, with instantaneous flows downstream of the tailrace equivalent to instantaneous inflows to the impoundment. A minimum flow of 5.0 cfs, or instantaneous inflow to the impoundment, if less, shall be spilled at the dam at all times. All flows shall be passed at the dam when the facility is not operating. The applicant shall provide the Department with a description and plans detailing how releases will be made at the dam for review and approval before construction may commence.

B. The Department recognizes that there will be times when some inflow must go into storage resulting in an alteration of the natural flow regime. Two such cases would be when flashboards are installed and when the pool is drawn for a maintenance operation. During such periods, the facility must maintain a minimum instantaneous flow below the tailrace of 17 cfs (0.28 cfs/square/mile, or the estimated August median flow), or the instantaneous impoundment inflow, if less.

C. During the final engineering phase or earlier, the applicant shall file a comprehensive erosion and sediment control plan with the Department. The plan shall cover temporary and permanent measures to limit adverse impacts on water quality from turbidity and sedimentation with regard to construction activities. It is recommended that the applicant consult with the Department for input during the development of the plan.
D. The applicant shall ensure that every reasonable precaution is taken during construction to prevent the discharge of petrochemicals, 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 changes to the operational scheme must be submitted to the Department for approval.

G. Upon completion of the project, the applicant shall provide the Department with an as-built set of plans for the record.

H. No construction may commence until the Department has issued written approvals under conditions A, C, and F. Operational changes made after project completion are subject to condition F and must be approved prior to affecting the change.

I. No construction may commence until the Vermont Department of Fish and Wildlife approves a proposal for screening the intake to minimize turbine mortality. The screening shall be maintained and kept in place during all operating periods.

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

Dated at Montpelier, Vermont this 11 day of Nov, A., 1985

JRC/gg