

UNITED STATES OF AMERICA 116 FERC ¶62,078
FEDERAL ENERGY REGULATORY COMMISSION

TransCanada Hydro Northeast Inc

Project No. 1904-042

ORDER AMENDING LICENSE AND REVISING ANNUAL CHARGES

(Issued July 28, 2006)

On March 1, 2006, TransCanada Hydro Northeast, Inc. (TransCanada), licensee for the Vernon Hydroelectric Project, FERC No. 1904 filed an application for amendment of its license to replace certain generating units. TransCanada is proposing to replace four existing 2.0-MW turbine/generator units with four new 4.0-MW units. The proposed change would decrease the project's total installed capacity from the authorized 44.4 MW to about 32.4 MW. The maximum authorized hydraulic capacity would decrease from 20,930 cubic feet per second (cfs) to 17,130 cfs. The project is located on the Connecticut River, in Cheshire County, New Hampshire and Windham County, Vermont.

BACKGROUND

A new license was issued on June 25, 1979,¹ and authorized the project with a powerhouse containing ten turbine generator units: eight units of 2.0-MW each, and two units of 4.2 MW each, for a total installed capacity of 24.4 MW. By an order Amending License and Revising Annual Charges, issued on June 12, 1992,² the license was amended to increase the installed capacity of the project by 20.0 MW. The project was authorized to replace four 2.0-MW turbine/generator units with two 14.0-MW turbine/generator units. The installed capacity of the project was revised from 24.4 MW to 44.4 MW, and the total hydraulic capacity of the project was revised from 15,530 cfs to 20,930 cfs.

Article 301 of the 1992 order requires the licensee to start construction of the authorized features within two years from the issuance date of the order, and complete installation within four years from issuance date of the order.

The Commission granted several extensions of times for the construction of the project upgrade, with the last extension setting June 11, 2006 to start construction, and

¹ See, 7 FERC ¶ 61,292, Order Issuing New License (1979).

² See, 59 FERC ¶ 62,267 (1992).

June 11, 2008 to complete construction.³

PROPOSED AMENDMENT

In its application, TransCanada explains that due to economic factors, such as wholesale power restructuring in the New England market, changes in the marketplace, and changes in project ownership, including most recently, the bankruptcy status of USGen New England, (former licensee), the installation of the two 14.0-MW units never took place. In its application, TransCanada states that currently, Units Nos. 5 through 8 are not operating, and are officially out of service. TransCanada had re-evaluated the turbine replacement, and is now proposing to install four new 4.0-MW units, instead of the two 14.0-MW units approved by the 1992 order.

In its application TransCanada proposes the following modifications to the project:

1. Install four 4.0-MW vertical axial flow semi-Kaplan turbine/generator units with 3.1-meter diameter runner, and auxiliary equipment. The 4.0-MW units would be located in the same existing bays, and the existing concrete associated with wheel pit and draft tubes for Unit Nos. 5 through 8 would be removed. The maximum hydraulic capacity per proposed unit would be 1,800 cfs, for a total of 7,200 cfs for the four units.
2. Excavate a minor portion of the underlying bedrock within the borders of the station to accommodate the draft tubes associated with the new units, and deepen the draft tube as much as 10 feet, as approved in the 1992 order. The draft tube extension ceiling would be shorter than existing, with an exit height of 12 ft. The ceiling would extend to the exit, and the existing stop logs would be refurbished. New stop logs slots would be built into the draft extension walls, and a single gantry hoist system would be provided to accommodate all four units.
3. Replace the existing trashracks and maintain the existing bar spacing of 2 inches on center.
4. Replace bottom-hinged head gates and hoist removal with self-closing, vertical single-leaf wheel gates and new hoist.

³ Commission orders granting extension of time issued on June 8, 1994; May 15, 1996; March 25, 1998; June 23, 2000; and July 6, 2004.

5. Upgrade auxiliary equipment at the Vernon Powerhouse including: a new powerhouse bridge crane; upgrade transmission cables between the 13.4-kV bus in the plant to the yard transformers; station service upgrades including new breakers; and replacement of the 2.4-kV switchgear for Unit Nos. 1 through 4.
6. Implement an Erosion and Sedimentation Control Plan that would provide measures for protection against erosion, sedimentation, and spills into public waters due to any potential land-disturbing, demolition or construction related activities associated with the installation of the units.
7. Continue prescribed first-on, last-off operation of either Unit Nos. 9 or 10 during upstream fish ladder operation when flows are at or below about 12,000 cfs.
8. Complete an evaluation of the tailrace flow patterns associated with the proposed units, and how those patterns affect attraction flows from the fish ladder using computational fluid dynamic models. Provide agencies with a copy for comment prior to submitting it to the Commission.
9. Develop a study plan in consultation with Connecticut River Atlantic Salmon Restoration Commission (ASRC) agency representatives to evaluate the effectiveness of the fish ladder under the re-powered station flow regimes during the first two years of commercial operation of the new units.
10. Execute a Memorandum of Agreement (MOA) among TransCanada, the New Hampshire State Historic Preservation Officer (SHPO), the Vermont SHPO, and the Commission that stipulates measures for the documentation and protection of historic properties within the Vernon Project.

CONSULTATION

A. Pre-Filing

Prior to filing its amendment application, TransCanada solicited comments from the following agencies: United States Department of Interior Fish and Wildlife Service (DOI), New Hampshire Department of Environmental Services (NHDES), New Hampshire Fish and Game Department (NHFGD), Vermont Department of Fish and Wildlife (VDFW), Vermont Agency of Natural Resources (VANR), New Hampshire Division of Historic Resources (NHDHR), Vermont Division of Historic Preservation

(VTDHP), US Army Corps of Engineers (USACE). In addition, the licensee states in the filing that, the proposal has been reviewed with the Town of Hinsdale Conservation Commission, as well the Connecticut River Local Advisory Committee to the Connecticut River Joint Commissions. None of the agencies objected to the proposed project.

B. FERC's Public Notice

On March 30, 2006, the Commission issued a public notice concerning the proposed amendment application. The notice set May 1, 2006, as the deadline for filing protests and motions to intervene. Table 1 provides a listing of the agencies that provided comments and motions to intervene (MOI) and the dates they were filed. On May 15, 2006, TransCanada responded to agency comments.

Table 1

Agency/Entity	Type of Filing	Filing Date
United States Department of the Interior (DOI)	Comments	4/27/2006
Northeast Generation Company (NGC)	MOI	4/28/2006
State of Vermont Agency of Natural Resources (VANR)	MOI	4/28/2006
New Hampshire Department of Environmental Services (NHDES)	Comments	4/28/2006
Connecticut River Watershed Council (CRWC)	MOI	5/1/2006
Windham Regional Commission (WRC)	Comments	5/2/2006
Vernon, Vermont Board of Selectmen	Comments	5/10/2006

C. Agencies Recommendations

In its comments, the DOI states that the proposed modification will have an adverse impact on anadromous fish passage, and recommends plans to be prepared by the licensee for mitigative measures, following consultation with the appropriate agencies. In its MOI and Protest, NGC raises concerns about the impact of the proposed changes in project discharge on the Vernon tailrace and downstream areas, and makes recommendations for terms and conditions. In its letter, the NHDES states that the proposed amendment requires a new 401 Water Quality Certification (WQC). In its MOI, the VANR states it would waive its jurisdiction and would participate in New Hampshire's Water Quality Certification process to insure the Vermont's water quality standards are met in addition to those of New Hampshire. In addition, the VANR concurs with the recommendations made by the DOI related to anadromous fish passage. In its motion to intervene CRWC

states that TransCanada should be required to work with NGC to determine the potential impacts on the downstream projects with respect to the on-going erosion in the northern reaches of that pool. In its MOI, the WRC recommends that the Commission include measures to minimize erosion impacts. Finally, in its letter, the Vernon Vermont Board of Selectmen expressed their support to the proposed application.

REVIEW

A. Installed Capacity And Hydraulic Capacity

In the filing, the licensee provided the existing and proposed installed and hydraulic capacities of the units, as shown in Table 1.

Table 1

Units	Existing Capacity (MW)	Authorized Capacity by 1992 Order (MW)	Proposed Capacity (MW)	Authorized Hydraulic Capacity by 1992 Order (cfs)	Proposed Hydraulic Capacity (cfs)
1	2	2	2	1,465	1,465
2	2	2	2	1,465	1,465
3	2	2	2	1,465	1,465
4	2	2	2	1,465	1,465
5	2	14	4	5,500	1,800
6	2	--	4	--	1,800
7	2	14	4	5,500	1,800
8	2	--	4	--	1,800
9	4.2	4.2	4.2	2,035	2,035
10	4.2	4.2	4.2	2,035	2,035
Total	24.4	44.4	32.4	20,930	17,130

In its application, TransCanada proposes to replace four inoperable 2.0-MW units (Unit Nos. 5 through 8), instead of installing two 14.0-MW units, as authorized in the 1992 order. This change represents a 12.0 MW decrease in the authorized installed capacity, but an 8.0 MW increase in the existing operating capacity of the project. The proposed action would result in the 4.0-MW units operating with a maximum discharge of 1,800 cfs each, as compared to the authorized 14.0-MW units, which would have had a maximum discharge capacity of 5,500 cfs each. The installation of the proposed units

would result in a reduction in the authorized maximum hydraulic capacity from 20,930 cfs to 17,130, but an increase of 1,600 cfs in the existing overall hydraulic capacity of the project. The proposed action will not change project operation, which will continue to operate in its current mode of operation.

This order will approve the installation of the 4.0-MW units, and revises the authorized installed capacity of the project from 44.4MW to 32.4 MW. Therefore, we are revising Article 30 of the license regarding annual charges for the purpose of reimbursement to the United States Government for the costs of administration of Part I of the Federal Power Act (FPA). In accordance with 18 CFR §11.1(c)(5), the annual charges for the project will be based on an installed capacity of 24.4 MW effective with the issuance date of this order, and 32.4 MW, effective on the date of commencement of construction of the proposed capacity. As such, we are requiring the licensee to report the date of commencement of construction of the proposed units, within 30 days of such date; we will use the commencement date to further revise the annual charges under Article 30. Furthermore, we are requiring the licensee to start construction of the proposed units within two years, and complete construction within four years from the date of this order

B. Revised Exhibits

As part of the application, TransCanada filed a revised Exhibit A – Project Description, describing the project features including the changes in the powerhouse, and transmission facilities proposed in the application. The revised Exhibit A conforms to the Commission’s rules and regulations and is approved by this order. This order will revise the project description in the license to reflect the proposed changes to the project.

In a separate filing, submitted on the same date the application was filed, TransCanada submitted five revised Exhibit F drawings for approval with the Commission. The revised Exhibit F drawings (F-1, F-3, F-5, F-7, and F-8) reflecting the proposed changes to the project, conform to the Commission’s rules and regulations and are approved by this order. We are requiring the licensee to coordinate with the Commission’s New York Regional Office for the construction work. In addition, this order requires the licensee to submit, after completion of construction, revised Exhibits A, and F, as needed, describing and showing the characteristics of the as-built conditions of the powerhouse and generating units.

C. Memorandum Of Agreement

The licensee will implement the “Memorandum of Agreement Pursuant to 36 CFR 800.6(c) Regarding the Proposed Amendment to the License of the Vernon Hydroelectric Project Vernon, Vermont and Hinsdale, New Hampshire” (MOA). The MOA was executed on April 17, 2006, between the New Hampshire and Vermont State Historic Preservation Officers (SHPOs), the licensee, and the Commission, including but not limited to the filing of the Historic Properties Management Plan (HPMP) for the project. Under the executed MOA, the licensee will: (1) conduct photographic documentation of the powerhouse; (2) conduct digital video documentation at key stages of the project to record the removal of the original equipment and installation of the new equipment; (3) conduct archaeological investigations to identify known archaeological sites and areas within project boundaries that have a likelihood of containing archaeological deposits; (4) prepare a Historic Properties Management Plan for the project; and (5) offer, and if accepted, donate generating and electrical equipment removed from the powerhouse to museums and educational organizations. The Commission reserves the authority to require changes to the HPMP at any time during the term of the license. If the MOA is terminated prior to Commission approval of the HPMP, the licensee shall obtain approval before engaging in any ground-disturbing or land-clearing activities or taking any other action that may affect any historic properties within the project’s area of potential effect.

D. Construction Erosion and Sedimentation Control Plan- Article 401

Under the existing 1992 license amendment, Article 401 requires the licensee, in consultation with the New Hampshire Water Supply and Pollution Control Division (NHWSPC) and the VANR, to prepare a soil erosion control plan prior to commencing any land clearing or land disturbing activities associated with the turbine replacement. Article 401 requires the licensee, at least 90 days before commencing any project-related land clearing or land disturbing activities, to prepare and file for Commission approval a final plan and schedule to control erosion, slope stability, and fugitive dust, and to minimize the quantity of sediment resulting from project construction and operation.

The licensee filed an Erosion Control Plan with the Commission on June 6, 2006. Under the plan, the licensee is proposing to provide measures for protection against erosion, sedimentation, and spills into public waters due to any potential land-disturbing, demolition, or construction-related activities associated with the installation of the proposed turbine units, as well as operation of the project. The plan was developed in consultation with NHDES and the VANR, and filed for Commission approval in advance of any land clearing or land disturbing activities as required by license article 401. The plan includes an implementation schedule, soil erosion and sedimentation control

measures such as a temporary bulkhead, a sediment control basin, spill prevention and hazardous materials control measures, and site restoration measures. Implementation of an erosion control plan should ensure that appropriate erosion and sediment controls are employed to prevent suspended sediments, as well as construction related pollutants and debris, from entering the Connecticut River. Staff finds the plan consistent with the requirement of Article 401 of the license and is approved by this order.

E. 401 Water Quality Certification

Under Section 401(a)(1) of the Clean Water Act, the project is subject to the water quality standards of New Hampshire and Vermont. Under the 1992 license amendment, the licensee received a 401 Water Quality Certificate from the NHDES for the installation and operation of the two 14-MW units. The WQC stated that 401 Certification shall be void and a new 401 Certification must be applied for if additional structural and/or operational modifications are made at the Vernon Project. In its April 28, 2006 letter, the NHDES commented that the proposed amendment requires a new 401 WQC. In addition, in its motion to intervene, the VANR states it would waive its jurisdiction and would participate in New Hampshire's WQC process to insure the Vermont's water quality standards are met in addition to those of New Hampshire.

The licensee filed for an amended WQC from the NHDES in February of 2006, based upon the proposed changes in re-powering units 5 through 8. On July 3, 2006, the NHDES issued a new WQC for the proposed turbine installation and operation. The WQC requires the licensee to develop various monitoring plans for operations, flow releases, impoundment levels, dissolved oxygen, water temperature erosion and debris removal. The conditions of the WQC are included in Appendix A, which is attached to this order.

F. Environmental Review

Staff fully considered the agencies and public comments and prepared an Environmental Assessment (EA) for the proposed action, which is attached to this order. The EA evaluates the environmental effects of the proposal, and identifies environmental issues in relation to erosion, water quality and fish passage. In order to mitigate or reduce these impacts, or to monitor potential impact, staff makes a number of recommendations, which are discussed below. The EA concludes that approving the proposed changes, along with implementation of some staff recommendations, would not constitute a major federal action significantly affecting the quality of the human environment.

1. Erosion

As stated in their comments filed April 28, 2006, NGC, the owner and operator of the two downstream projects, is concerned with the potential impact of changes in project discharge in the Vernon tailrace. NGC states that an increase in peak discharges may have the potential for increasing the rate of erosion downstream of the Vernon dam.

Subsequently, NGC states that monitoring of physical changes to the bed and banks of the Connecticut River is necessary to determine if the proposed changes in operation adversely impact erosion in the area. The licensee states in its comments filed May 15, 2006, that installation of the 4-MW units will not substantially increase peak discharges, rather it would allow the licensee to pass flows currently spilled through the turbines instead. It further states that erosion in the tailrace area and downstream is primarily caused by naturally occurring high flood flows. The licensee has been monitoring the erosion site on the east bank of the Connecticut River just downstream of the Vernon spillway since commencement of the project operation. Since 1996, the licensee has been filing east bank erosion reports with the Commission. In its February 28, 2005, report, the licensee notes that relatively minor and normal settling, which is a common occurrence for the types of area and soil, was taking place along the base of the east bank. Neither significant erosion nor bottom scouring was reported as being observed.

As stated in the licensee's WQC, issued on July 3, 2006, the licensee will be required to develop and implement an erosion monitoring plan at the project. The WQC requires that the erosion monitoring methods in the plan be consistent with the methods used by the licensee from 1996 through 2005. A monitoring results report is to be filed by December 31 of every other year. Consequently, continued erosion monitoring through implementation of the WQC will provide adequate measures to ensure that erosion and sediment controls are in place at the project.

The CRWC and the Windham Regional Commission recommend that the licensee work with NGC to determine what effects each project (Vernon Project, Northfield Mountain Pump Storage Project, FERC No. 2585 and Turners Falls Project, FERC No. 1889) has on the Turners Falls pool. The Commission encourages the licensee to work with the downstream licensees during the development and consultation of their erosion monitoring plan pursuant to WQC condition E-6.

2. Impacts to migrating anadromous fish

Per its comments filed April 27, 2006, the DOI requests that the licensee file a plan and schedule for the excavation of the turbine pit area that addresses scheduling to minimize impacts to upstream or downstream migrating anadromous fish from excavation

noise. DOI recommends that excavation activity be restricted to the non-passage season to the extent possible. They also recommend that hydraulic fracturing or use of expansive fluid be considered as a lower impact alternative. Per its comments filed July 17, 2006, the DOI recommends that the licensee file periodic construction reports relative to the excavation schedule. They recommend that the reports identify the status of ongoing excavation activities, updated schedules for completion of these activities and should identify if and when the licensee has implemented double shifts to expedite completion of excavation. If excavation is not completed prior to the 2007 fish passage season, the DOI recommends that the licensee be required to consult with the FWS, VANR and NHFGD regarding a plan and schedule for excavation activities during the 2007 upstream and downstream passage seasons, and file that plan as part of the periodic reporting.

The licensee, in its comments filed May 15, 2006, propose a plan and schedule for minimizing impacts to migrating anadromous fish. The licensee states it will, to the best of its ability, complete all concrete and bedrock related demolition before the spring 2007 fish passage season related to upstream migrating adult salmon and downstream migrating salmon smolts. The licensee also proposes to avoid, to the extent possible, the downstream juvenile shad season (September 1-November 15) with priority avoidance of the period between September 15 and October 15. Additionally, the licensee proposes not to utilize explosives or rock hammers, and will use medium size jack hammers or drills in association with the use of expansive grouts. The licensee's proposal adequately minimizes impact to migrating anadromous fish, and should be implemented during excavation.

3. Upstream Fish Passage

The licensee is proposing to develop an upstream fish passage study plan in coordination with the CRASRC agency representatives to evaluate the effectiveness of the fish ladder under the revised re-powering proposal. The proposed effectiveness studies would be conducted within the first two years of commercial operation and the associated fish passage seasons. At the conclusion of the second year of effectiveness studies, the licensee proposes to prepare a report discussing the result of the studies. The report would be submitted to CRASRC representatives for review and comment. Upon receipt of the CRASRC comments, the licensee proposes to submit a copy of the report to the Commission describing the results, addressing any comments and include a discussion of any proposed changes to station operation or the need for additional studies.

The licensee's proposed upstream fish passage monitoring plan should be developed and filed with the Commission for approval prior to operation of the new units. This monitoring plan should include, at a minimum, the licensee's proposed fish behavior

studies during the first two years of commercial operation of the new units. Since the licensee is proposing to complete installation by the end of 2007, the plan should be filed with the Commission by June 1, 2007.

Per its comments filed April 27, 2006, the DOI(FWS) states it will need to review the modeling results to be assured that no additional measures are needed before it can accept the proposed unit 9 or 10 operation. Additionally, the original license article 402 requires the licensee to consult with the VDFW and the NHFGD. Therefore, the licensee should consult with the FWS, VDFW and NHFGD, in addition to the CRASRC, when developing its upstream monitoring plan. The plan would allow the FWS to address its concerns and make recommendations regarding upstream passage.

4. Downstream Fish Passage

The DOI commented that the previous studies may be insufficient to adequately characterize the conditions downstream migrants would experience for bypassing the new units or passing through the new turbines. Additionally, the DOI stated that the results of the desktop elevation suggest that turbine passage could result in up to 21 percent mortality of salmon smolts and 37 percent mortality of adult shad. It stated that if more fish are entrained with the new units and the mortality is substantial, the new configuration could result in a significant increase in fish loss. The DOI suggested that the previously required post-construction monitoring of downstream passage should be conducted.

On May 23, 1997, the licensee filed a request with the Commission for a waiver of the remaining downstream fish passage effectiveness studies required pursuant to the Commission's 1993 *Order Approving and Modifying A Fish Passage Plan*.⁴ On February 27, 1998, the Commission waived the requirement for the remaining studies, however, additionally stated that should redevelopment of the project be initiated in the future, the studies under the February 12, 1993 order would still be required.

Although the licensee believes that there is no indication that installation of the new units would change fish survival during downstream passage, the licensee is required, pursuant to the Commission's February 1998 letter, to implement the downstream fish passage studies required by the Commission's February 12, 1993 order. Therefore, downstream effectiveness studies should be required after installation of the new units. The licensee, as stated in its May 15, 2006 filing, requests that the deadline for filing a downstream passage monitoring plan be extended to six months from the date of the order approving the amendment is issued. It does not anticipate that this extension would cause

⁴ 62 FERC ¶ 62,097.

delay in implementing any monitoring studies during the initial downstream migration season following the initiation of operation of the new units.

5. Water Quality

As stated in the licensee's WQC, issued on July 3, 2006, the licensee will be required to monitor for flow releases, impoundment levels, dissolved oxygen and water temperature, erosion, debris removal and downstream fish passage. The WQC also requires the licensee to conduct the proposed action in a manner that will not contribute to or cause violations of the New Hampshire or Vermont surface water quality standards. Consequently, implementing the WQC will provide protection to the water quality of the Connecticut River during construction and operation of the project. Pursuant to section 401(d) of the Clean Water Act the WQC should become a condition of the project license.

6. Environmental Review Summary

The proposed action of installing four new 4.0-MW units may cause some adverse impacts to water quality, and upstream and downstream fish passage during and after construction. In order to mitigate or reduce these impacts, or to monitor potential impact, we recommended that the following conditions be included in any order approving installation of the new 4-MW units. Pursuant to section 401(d) of the Clean Water Act the WQC should become a condition of the project license. The current license should be amended to include these recommendations, as are discussed in the attached Environmental Assessment.

1. Implementation of the conditions as stated in the NHDES' Water Quality Certification, approved on July 3, 2006.
2. Implementation of licensee's plan and schedule for minimizing impacts to migrating anadromous fish.
3. Implementation of an upstream fish passage study plan to evaluate the effectiveness of the fish ladder under the re-powering proposal.
4. Implementation of a downstream fish passage study, as required by the Commission's February 12, 1993 order.

SUMMARY

The four 4.0-MW units would fit in the same station footprint as the existing units, and the licensee would not need to conduct some of the more significant modifications that would be associated with installation of the two 14.2-MW authorized by the 1992 order. According to the licensee, the proposed change would increase the project's existing installed capacity from 24.4 MW to 32.4 MW, and would increase its average annual generation from 123,276 megawatt-hours (MWh) to about 188,544 MWh. The proposed action would result in less demolition and modification of the powerhouse and equipment as compared with what would be required under the installation of the two 14.0-MW units. The proposed change will not modify the operation of the project, which will continue to operate in its current mode. For the reasons stated above, we conclude that issuance of this order, with implementation of the above recommendations, would not constitute a major federal action significantly affected the quality of the human environment.

This order approves installation of the new four 4.0-MW units, including changes associated with the proposed turbine replacement, as directed in paragraph (A) of this order. In ordering paragraph (B) we are approving the revised Exhibit A filed with the amendment application, and revising the project description to reflect the proposed changes to the project, as directed in paragraph (C) of this order. In ordering paragraph (D) we are revising Article 30 of the license regarding the annual charges pursuant to Part I of the Act. In ordering paragraph (E) we are requiring the licensee to start construction of the generating units within two years, and complete construction within four years from the date of this order. In ordering paragraph (F) we are requiring the licensee to report the date of commencement of construction of the proposed units, within 30 days of such date. In ordering paragraph (G) we are approving the revised Exhibit F drawings filed with the application, and requiring aperture cards of the approved drawings, as directed in ordering paragraph (H). In ordering paragraph (I) we are requiring the licensee to coordinate with the New York Regional Office for the construction work. In ordering paragraph (J) we are requiring the licensee to submit revised Exhibits A, and F, as needed, describing and showing the characteristics of the as-built conditions of the powerhouse and generating units, 90 days after the installation of the units have been completed. In ordering paragraph (K) we are approving the Erosion Control Plan filed on June 6, 2006, pursuant to Article 401 of the license. In ordering paragraph (L) we are requiring the licensee to implement its plan and schedule for minimizing impacts to migrating anadromous fish. In ordering paragraph (M) we are revising Article 402 of the license and requiring the licensee to file by June 1, 2007, for Commission approval, a monitoring plan to ensure the safe and efficient upstream passage of Atlantic salmon, American shad, and other anadromous fishes during operation of the new units. In ordering paragraph (N) we are

revising Article 403 of the license, and requiring the licensee to file, 6 months after issuance of this order, a plan and schedule to monitor the effectiveness of the downstream fish passage facilities to assure passage past the project by downstream migrating Atlantic salmon and American shad. In ordering paragraph (O) we are adding a new license Article 405, which requires the licensee to prepare five plans, pursuant to its WQC, for approval by the NHDES, and file them with the Commission within 120 days after issuance of this order.

The Director orders:

(A) The license for the Vernon Hydroelectric Project, FERC No. 1904, is amended as provided by this order, effective the first day of the month in which this order is issued.

(B) The revised Exhibit A, entitled Project Description, filed with the application March 1, 2006, is approved and made part of the license.

(C) Ordering paragraph B(2) of the license is revised as follows:

(2) Project works consisting of: (1) a concrete gravity dam comprising of a 500-foot-long overflow spillway with 10-foot high flashboards, a 100-foot-long gated sill block with two 20-foot-high by 50-foot-long tainter gates, and a 336-foot-long non-overflow section; (b) Vernon Reservoir with a water surface area of 2,550 acres at normal pool elevation 220.13 NGVD extending about 27 miles upstream; (c) a powerhouse containing four 2.0-MW, four 4.0-MW, and two 4.2 MW generating units, for a total installed capacity of 32.4 MW and a hydraulic capacity of 17,130 cfs (see details in table 1 of this order); (d) transmission facilities consisting of (i) generating leads; (ii) four 6,000 KVA 13.8/2.3 -kV step-up transformers located within the powerhouse; (iii) an underground 13.8-kV interconnection to two outdoor 13.8 to 69-kV step-up transformers; and (e) appurtenant facilities.

(D) Article 30 of the license is amended to read:

For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, a reasonable annual charge as determined by the Commission in accordance with the provisions of its regulations in effect from time to time. The authorized installed capacity for that purpose is 24.4 MW, effective on the issuance day of this order.

(E) The licensee shall start construction of the proposed generating units within two years from the date of this order and complete construction within four years from the date of this order.

(F) The licensee must report the date of commencement of construction of the proposed generating units, within 30 days from such date. This information will be used to further revise the annual charges under Article 30 to be based on an authorized capacity of 32.4 MW.

(G) The following revised Exhibit F drawings, filed on March 1, 2006, conform to the Commission's rules and regulations, and are approved and made a part of the license. The superseded drawings are eliminated from the license.

EXHIBIT No.	FERC. DRAWING No.	DRAWING TITLE	SUPERSEDED DRAWING No.
F-1	1904-109	GENERAL LAYOUT OF THE PLANT	1904-93
F-3	1904-110	POWERHOUSE AND SWITCHYARD	1904-95
F-5	1904-111	SECTION OF POWERHOUSE UNITS 5-8	1904-97
F-7	1904-112	FISH PASSAGE FACILITIES BUBLER AIR PIPING	1904-100
F-8	1904-113	FISH PASSAGE FACILITY DOWNSTREAM MIGRATION, GENERAL ARRANGEMENT	1904-101

(H) Within 45 days of the date of issuance of this order, the licensee shall file the approved exhibit drawings in aperture card and electronic file formats.

a) Three sets of the approved exhibit drawing shall be reproduced on silver or gelatin 35mm microfilm. All microfilm shall be mounted on type D (3-1/4" X 7-3/8") aperture cards. Prior to microfilming, the FERC Drawing Number (i.e., P-1904-109 through 1904-113) in the margin below the title block of the approved drawing. After mounting, the FERC Drawing Number shall be typed on the upper right corner of each aperture card. Additionally, the Project Number, FERC Exhibit (i.e., F-1 through F-8), Drawing Title, and date of this order shall be typed on the upper left corner of each aperture card. See Figure 1.

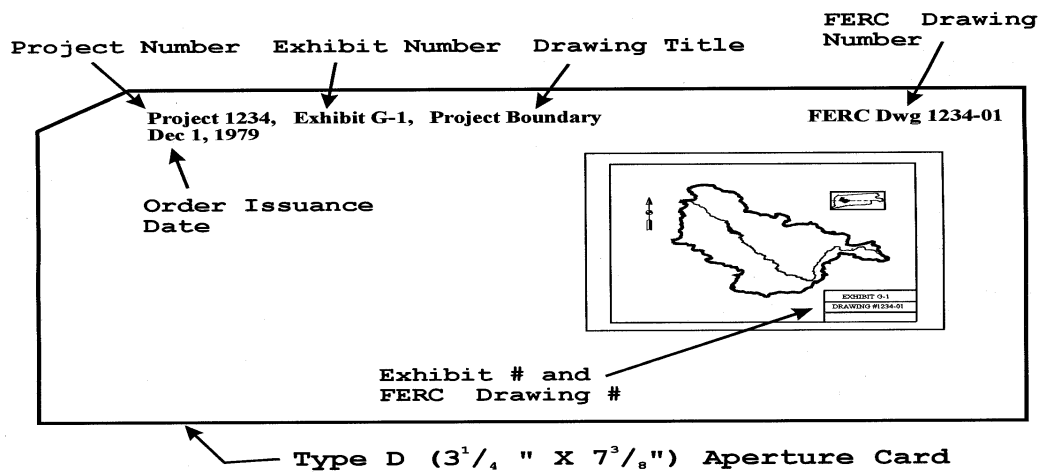


Figure 1 Sample Aperture Card Format

Two of the sets of aperture cards shall be filed with the Secretary of the Commission, ATTN: OEP/DHAC. The third set shall be filed with the Commission's Division of Dam Safety and Inspections New York Regional Office.

- b) The licensee shall file two separate sets of exhibit drawings in electronic raster format with the Secretary of the Commission, ATTN: OEP/DHAC. A third set shall be filed with the Commission's Division of Dam Safety and Inspections New York Regional Office. Exhibit F drawings must be identified as **(CEII) material under 18 CFR § 388.113(c)**. Each drawing must be a separate electronic file, and the file name shall include: FERC Project-Drawing Number, FERC Exhibit, Drawing Title, date of this order, and file extension in the following format [P- 1904-109, F-1, General Layout of the Plant Vernon Project, MM-DD-2006.TIF]. Electronic drawings shall meet the following format specification:

IMAGERY - black & white raster file
 FILE TYPE – Tagged Image File Format, (TIFF) CCITT Group 4
 RESOLUTION – 300 dpi desired, (200 dpi min.)
 DRAWING SIZE FORMAT – 24” X 36” (min), 28” X 40” (max)
 FILE SIZE – less than 1 MB desired

(1) The licensee shall, at least 60 days prior to the start of construction, submit one copy to the Commission's New York Regional Director and two copies to the Commission (one of these shall be courtesy copy to the Director, Division of Dam Safety and Inspections), of the final contract drawings and specifications for the proposed work

including design and construction of the cofferdam. The Commission may require changes in the plans and specifications to assure a safe and adequate project. If the licensee plans substantial changes to location, size, type, or purpose of the proposed work, the plans and specifications must be accompanied by revised Exhibit F and G drawings, as necessary.

(J) Within 90 days from completion of construction of the project and installation of the units, the licensee must submit as-built exhibits A, and F, as needed, describing and showing the characteristics of the as-built conditions of the units.

(K) The Erosion and Sedimentation Control Plan filed by the licensee on June 6, 2006, complies with the requirement of Article 401 of the license and is approved by this order.

(L) The license shall implement its plan and schedule for minimizing impacts to migrating anadromous fish. The licensee shall, to the best of its ability, complete all concrete and bedrock related demolition before the spring 2007 fish passage season related to upstream migrating adult salmon and downstream migrating salmon smolts. The licensee shall avoid, to the extent possible, the downstream juvenile shad season (September 1-November 15) with priority avoidance of the period between September 15 and October 15. Additionally, the licensee shall not utilize explosives or rock hammers, and should use medium size jack hammers or drills in association with the use of expansive grouts. The licensee shall submit periodic construction reports to the FWS relative to the excavation scheduling. These reports shall identify the status of ongoing excavation activities, updated schedules for completion of these activities and should identify if and when the licensee has implemented double shifts to expedite completion of excavation. If excavation is not completed prior to the 2007 fish passage season the licensee shall consult with the U.S Fish and Wildlife Service, Vermont Agency of Natural Resources and the New Hampshire Fish and Game Department regarding a plan and schedule for excavation activities during the 2007 upstream and downstream passage seasons, and file that plan as part of the periodic reporting.

(M) Article 402 of the license is revised to read as follows:

Article 402. The licensee shall file, by June 1, 2007, for Commission approval, a monitoring plan to ensure the safe and efficient upstream passage of Atlantic salmon, American shad, and other anadromous fishes during operation of the new units. The upstream passage monitoring plan shall include, but not be limited to: (1) the results of the licensee's hydraulic modeling study showing the effects of the new units' discharges on the hydraulic conditions in the project tailrace; (2) recommendations, based on the results

of the modeling study or on-site observations, for any changes to the project's structures or operation needed to ensure safe and efficient upstream passage of anadromous fishes; (3) a proposed plan and schedule for monitoring the effectiveness of the fish ladder during operations of the new units; and (4) a schedule for filing with the Commission the results of the monitoring and, for approval, any additionally recommended changes to the project's structures or operations, based on the monitoring results, to ensure safe and efficient upstream passage of anadromous fishes.

The licensee shall prepare the monitoring plan following consultation with the Connecticut River Atlantic Salmon Commission, the U.S. Fish and Wildlife Service, the Vermont Department of Fish and Wildlife, and the New Hampshire Fish and Game Department. The licensee shall include with the plan documentation of consultation and copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and make recommendations prior to filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan or schedule. Upon Commission approval, the licensee shall implement the plan according to the approved schedule, including any changes to the plan or schedule required by the Commission.

The results of the studies shall be filed with the Commission according to the approved schedule. If the results indicate that modifications are needed to improve upstream fish passage, the licensee shall also file recommendations for these changes with the Commission for approval. The licensee shall consult with the agencies listed above on the monitoring results and on the proposed modifications. The Commission reserves the right to require any changes to project structures or operations to improve the effectiveness of upstream passage of anadromous fishes at the project.

(N) Article 403 of the license is revised to read as follows:

Article 403. The licensee, 6 months after issuance of this order, shall file for Commission approval a plan and schedule to monitor the effectiveness of the downstream fish passage facilities to assure passage past the project by downstream migrating Atlantic salmon and American shad. The plan shall include measures to assess the effectiveness of the project's downstream passage facilities and/or assess fish survival through the project turbines.

The licensee shall prepare the plan and schedule following consultation with the U.S. Fish and Wildlife Service, the Vermont Department of Fish and Wildlife, and the New Hampshire Fish and Game Department. The licensee shall include with the plan documentation of consultation and copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and make recommendations prior to filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan or schedule. Upon Commission approval, the licensee shall implement the plan according to the approved schedule, including any changes to the plan or schedule required by the Commission.

(O) The following article is added to and made part of the license for the Vernon Project.

Article 405. The licensee is subject to the conditions of the Water Quality Certificate, issued by the New Hampshire Department of Environmental Services, pursuant to Section 401 of the Clean Water Act. The Water Quality Certificate is set forth in Appendix A to this order and is incorporated in the license. The Water Quality Certificate requires the licensee to prepare the following plans for approval by the New Hampshire Department of Environmental Services. After agency approval, these plans shall be submitted to the Commission for approval 120 days after the issuance date of this order.

Condition	Description
E-3	Operations Plan
E-4	Flow Release Monitoring Plan
E-5	Dissolved Oxygen and Water Temperature Monitoring Plan
E-6	Erosion Monitoring Plan
E-9	Debris Removal Plan

The licensee shall submit to the Commission documentation of its consultation, copies of comments and recommendations made in connection with each plan, and a description of how each plan accommodates the comments and recommendations. If the

licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information. The Commission reserves the right to make changes to any plan submitted. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

(P) This order constitutes final agency action. Requests for a rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. § 385.713.

Mohamad Fayyad
Engineering Team Lead
Division of Hydropower Administration
and Compliance

Appendix A**WATER QUALITY CERTIFICATION**

In Fulfillment of

Section 401 of the United States Clean Water Act (33 U.S.C 1341)

WQC # 2006-008

Activity Name	Vernon Hydroelectric Project (FERC No. 1904), Turbine Unit Upgrade
Activity Location	Hinsdale, New Hampshire; Vernon, Vermont
Affected Surface Waters	Connecticut River
Owner/Applicant	TransCanada Hydro Northeast, Inc. 4 Park Street Concord, NH 03301-6373
DATE OF APPROVAL (subject to Conditions below)	July 3, 2006

A. INTRODUCTION

TransCanada Hydro Northeast, Inc. (Applicant) owns and operates the Vernon Hydroelectric Project. The Applicant proposes the installation and operation of four 4-MW units (Activity), rather than the installation and operation of two 14-MW units authorized under a license amendment in 1992. Economic infeasibility precluded the Applicant from installing the two 14-MW units, which were intended to replace the existing four 2-MW units. The Vernon Hydroelectric Project consists of a dam, powerhouse, and appurtenances. The powerhouse contains a total of 10 turbine units. Unit #5 through Unit #8 is the subject of the proposed changes to the Activity.

This 401 Water Quality Certification (Certification) applies to the Activity described above, and addresses all surface waters that may be impacted by the Activity, including, but not necessarily limited to, the waters included in the Activity boundary. Pursuant to the New England Interstate Water Pollution Control Compact under RSA 484

and 10 VSA §1331-1342, this 401 Certification documents laws and regulations, determinations, and 401 Certification conditions relative to the attainment/maintenance of NH surface water quality standards including NH RSA 485-A:8 II, NH Code of Administrative Rules Env-Ws 1700, Vermont 10 VSA Chapters 41 (Regulation of Stream Flow) and 47 (Water Pollution Control), and the Vermont Water Quality Standards adopted on June 10, 1999.

B. WATER QUALITY CERTIFICATION APPROVAL

Based on the findings and conditions noted below, the New Hampshire Department of Environmental Services (DES), in consultation with the Vermont Department of Conservation (VTDEC), has determined that any discharge associated with the Activity will not violate surface water quality standards, or cause additional degradation in surface waters not presently meeting water quality standards. DES hereby issues this 401 Certification subject to the conditions defined in Section E of this 401 Certification, in accordance with Section 401 of the United States Clean Water Act (33 U.S.C. 1341).

C. STATEMENT OF FACTS AND LAW

- C-1. Section 23 of the United States Federal Power Act (Title 16 U.S. Code, Chapter 12, Subchapter I, Section 817(1)) states, in part: “It shall be unlawful for any person, State, or municipality, for the purpose of developing electric power, to construct, operate, or maintain any dam, water conduit, reservoir, power house, or other works incidental thereto across, along, or in any of the navigable waters of the United States, or upon any part of the public lands or reservations of the United States (including the Territories), or utilize the surplus water or water power from any Government dam, except under and in accordance with the terms of a permit or valid existing right-of-way granted prior to June 10, 1920, or a license granted pursuant to this chapter.”
- C-2. Section 4 of the United States Federal Power Act (Title 16, U.S. Code, Chapter 12, Subchapter I, Section 797(e) authorizes the Federal Energy Regulatory Commission “To issue licenses to citizens of the United States, or to any association of such citizens, or to any corporation organized under the laws of the United States or any State thereof, or to any State or municipality for the purpose of constructing, operating, and maintaining dams, water conduits, reservoirs, power houses, transmission lines, or other Project works necessary or convenient for the development and improvement of navigation and for the development, transmission, and utilization of power across, along, from, or in any of the streams or other bodies of water over which Congress has jurisdiction...”

- C-3. Section 401 of the United States Clean Water Act (Title 33 U.S. Code, Chapter 26, Subchapter IV, Section 1341) states, in part: “Any applicant for a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates or will originate...that any such discharge will comply with the applicable provisions of sections 301, 302, 303, 306, and 307 of this title.”
- C-4. Section 401 states, in part: “No license or permit shall be granted until the certification required by this section has been obtained or has been waived...No license or permit shall be granted if certification has been denied by the State...”
- C-5. Section 401 states, in part “Any certification provided under this section shall set forth any effluent limitations and other limitations, and monitoring requirements necessary to assure that any applicant for a Federal license or permit will comply with any applicable effluent limitations and other limitations...and shall become a condition on any Federal license or permit subject to the provisions of this section.”
- C-6. The boundary between New Hampshire and Vermont is the low-water mark of the Connecticut River on the western (Vermont) side, as it existed before the creation of the reservoirs. Project facilities and reservoirs are located in both states, and the discharge affects the quality of the waters of both states. Consequently, under the provisions of Section 401, the Project is subject to the water quality standards of New Hampshire and Vermont.
- C-7. In New Hampshire, Env-Ws 1700, Surface Water Quality Regulations, effective December 3, 1999, fulfills the requirements of Section 303 that the State of New Hampshire adopt water quality standards consistent with the provisions of the Clean Water Act.
- C-8. In Vermont, 10 VSA Chapters 41 (Regulation of Stream Flow) and 47 (Water Pollution Control) and the Vermont Water Quality Standards adopted on June 10, 1999, fulfill the requirements of Section 303 of the Act that Vermont adopt and administer water quality standards consistent with the provisions of the Clean Water Act.
- C-9. Env-Ws 1701.02, entitled “Applicability”, states that:
- “(a) These rules shall apply to all surface waters.
- (b) These rules shall apply to any person who causes point or nonpoint source

discharge(s) of pollutants to surface waters, or who undertakes hydrologic modifications, such as dam construction or water withdrawals, or who undertakes any other activity that affects the beneficial uses or the level of water quality of surface waters.”

- C-10. The reaches of the Connecticut River potentially affected by the Activity have been designated by the New Hampshire legislature as Class B waters. Class B waters shall be high quality waters with no objectionable physical characteristics, are acceptable for fishing, swimming and other recreational purposes and, after adequate treatment, for use as water supplies.
- C-11. The DES assessment unit identification numbers for the reaches of the Connecticut River potentially affected by the Activity are NHIMP801070507-01 (upstream from Vernon Dam) and NHRIV802010501-05 (downstream from Vernon Dam).
- C-12. The reaches of the Connecticut River affected by the Activity have been designated by the Vermont Water Resources Board as Class B waters. 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, including fishing.
- C-13. RSA 484 and 10 VSA §1331-1342 established the New England Interstate Water Pollution Control Compact (Compact). Article V of the compact provides “...technical experts employed by state departments of health and state water pollution control agencies are authorized to confer on questions relating to classification of interstate waters affecting 2 or more states.” Article VI provides “Each of the signatory states pledges to ... maintain the waters thereof in a satisfactory condition consistent with the highest classified use of each body of water.”
- C-14. Env-Ws 1701.02 provides that the surface water quality regulations shall apply to all surface waters and to any person who causes point or nonpoint source discharge(s) of pollutants to surface waters, or who undertakes hydrologic modifications, such as dam construction or water withdrawals, or who undertakes any other activity that affects the beneficial uses or the level of water quality of surface waters.
- C-15. Env-Ws 1702.46 defines surface waters as “perennial and seasonal streams, lakes, ponds and tidal waters within the jurisdiction of the state, including all streams,

lakes, or ponds bordering on the state, marshes, water courses and other bodies of water, natural or artificial,” and waters of the United States as defined in 40 CFR 122.2.

- C-16. Surface waters are navigable waters for the purposes of certification under Section 401 of the Clean Water Act. Surface waters are jurisdictional wetlands for the purposes of wetlands permitting under RSA 482-A.
- C-17. Env-Ws 1703.01 (c) states that “[a]ll surface waters shall provide, wherever attainable, for the protection and propagation of fish, shellfish and wildlife, and for recreation in and on the surface waters.”
- C-18. Env-Ws 1703.01 (d) states that “[u]nless the flows are caused by naturally occurring conditions, surface water quantity shall be maintained at levels adequate to protect existing and designated uses.”
- C-19. Env-Ws 1703.03(c)(1) states that “All surface water shall be free from substances in kind or quantity which:
- a. Settle to form harmful deposits;
 - b. Float as foam, debris, scum or other visible substances;
 - c. Produce odor, color, taste or turbidity which is not naturally occurring and would render it unsuitable for its designated uses;
 - d. Result in the dominance of nuisance species; or
 - e. Interfere with recreational activities.”
- C-20. Env-Ws 1703.07(d) provides that “Unless naturally occurring...surface waters within the top 25 percent of depth of thermally unstratified lakes, ponds, impoundments and reservoirs or within the epilimnion shall contain a dissolved oxygen content of at least 75 percent saturation, based on a daily average and an instantaneous minimum dissolved oxygen content of at least 5 mg/l. Unless naturally occurring, the dissolved oxygen content below those depths shall be consistent with that necessary to maintain and protect existing and designated uses.”
- C-21. For waters designated cold water fish habitat, the Vermont water quality standards provide for a dissolved oxygen concentration of “(n)ot less than 7 mg/l or 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. Not less than 6 mg/l or 70 percent saturation at all times in all other waters designated as a cold water fish habitat.”

C-22. Env-Ws 1703.19, entitled “Biological and Aquatic Community Integrity”, states that

“a. The surface waters shall support and maintain a balanced, integrated and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region; and

b. Differences from naturally occurring conditions shall be limited to non-detrimental differences in community structure and function.”

C-23. RSA 485-A:8(II) provides that “Any stream temperature increase associated with the discharge of treated sewage, waste, or cooling water, water diversions, or releases shall not be such as to appreciably interfere with the uses assigned to this class.”

C-24. The Activity reviewed for this 401 Certification requires a federal license under the federal Power Act Section 23. The Applicant filed an application for a Non-Capacity Amendment of License to the Federal Energy Regulatory Commission (FERC) on February 27, 2006. FERC provided public notice for the Activity on March 30, 2006.

C-25. The Applicant is responsible for the Activity, which includes construction and operation.

C-26. The Applicant, under letter dated February 27, 2006, filed for an amendment of the 401 Certification issued by DES on December 9, 1991. The 401 Certification issued by DES on December 9, 1991 was for the installation and operation of two 14-MW units subsequently authorized under a 1992 FERC license amendment. Economic infeasibility precluded the Applicant from installing the two 14-MW units, which were intended to replace the existing four 2-MW units. The 401 Certification issued on December 9, 1991 stated that the 401 Certification is “void and a new 401 Certification must be applied for if additional structural and/or operational modifications are made at the Vernon Project”.

C-27. The Applicant submitted an Application for Review of Existing Water Quality Certification (Application) under letter dated February 27, 2006, which was

received by DES on March 1, 2006. The Applicant also submitted a Computational Fluid Dynamic Flow modeling report, under letter dated May 3, 2006, received by DES on May 5, 2006, to address fish passage relative to the Activity. The Applicant submitted an Answer of TransCanada Hydro Northeast, Inc. to Motions to Intervene, Protest, Comments, and Recommendations on the Application for Non-Capacity Amendment of License for the Vernon Project No. 1904, dated May 15, 2006, received by DES on May 15, 2006. These documents and other correspondence from and with the Applicant are the basis for this 401 Certification review.

- C-28. The Vermont Yankee Station, a nuclear-powered facility owned by Entergy Nuclear Vermont Yankee, discharges cooling water into the Vernon impoundment. A National Pollutant Discharge Elimination System (NPDES) permit renewal (no. VT000264) for the facility was issued on July 11, 2001 by the Vermont Department of Environmental Conservation (VTDEC). Amended discharge permit number 3-1199 was issued on March 30, 2006 by VTDEC, which allowed for an increase in the temperature of the cooling water.
- C-29. The Turners Falls Hydroelectric Project (FERC No. 1889), owned and operated by Northeast Generating Company, creates an impoundment that extends to the downstream face of the Vernon Hydroelectric Project dam and powerhouse. The Turners impoundment is used for the Turners Falls Hydroelectric Project and the Northfield Hydroelectric Project, a pumped storage facility also owned and operated by Northeast Generating Company.
- C-30. A concern over the potential effect of the Activity on erosion in the Turners Falls impoundment has been expressed by Northeast Generating Company and the Connecticut River Watershed Council. The two specific areas of concern for erosion are immediately downstream from the Vernon Hydroelectric Project, including: (1) an instream island that currently supports a nesting pair of bald eagles, and (2) approximately 1,000 feet of the east river bank.

D. FINDINGS

- D-1. The Activity will result in a discharge to navigable waters
- D-2. The Activity may cause the permanent alteration of, or temporary impacts to, surface waters, particularly relative to dissolved oxygen and water temperature dynamics.

- D-3. The Activity requires water quality certification under Section 401 of the federal Clean Water Act.
- D-4. The Activity for this 401 Certification, proposed under letter dated February 27, 2006 constitutes “structural and/or operational modifications” referenced in the 401 Certification dated December 9, 1991. Thus, DES considers the application materials submitted under letter dated February 27, 2006 by the Applicant as an application for a new 401 Certification, rather than for an amended 401 Certification, as noted by the Applicant.
- D-5. The Activity, which is a component of the Vernon Hydroelectric Project as a whole, will cause hydrologic modifications to the Connecticut River, including changes in flow regime upstream and downstream from the Vernon Dam beyond that which occurs under un-regulated conditions.
- D-6. According to the Applicant, the upstream terminus of the Activity boundary is located approximately 26 miles upstream from the Vernon Dam. However, the upstream boundary may extend to the base of the Bellows Falls station during natural high-water conditions. The downstream terminus of the Activity boundary is the downstream side of the Vernon Dam, as the upstream terminus of the Turners Falls Hydroelectric Project impoundment at normal reservoir elevation abuts the downstream face of the Vernon Dam. The Turners Falls Hydroelectric Project is owned and operated by Northeast Generating Company (NGC).
- D-7. The Connecticut River in the area of the Activity is a surface water of the state under Env-Ws 1702.46.
- D-8. Class B New Hampshire and Vermont surface water quality standards (SWQS) apply to the Activity.
- D-9. According to DES, the releases of water by the Activity constitute a discharge under Env-Ws 1702.18.
- D-10. The segments of the Connecticut River affected by the Activity consist of the Vernon impoundment, which extends from Vernon Dam to an area approximately 26 miles upstream from the dam, and immediately downstream from the Vernon Dam.
- D-11. The Connecticut River within the Activity area is directly regulated by the entirety of the Vernon Hydroelectric Project, including the Activity. In addition, the Turners Falls Hydroelectric Project and the Northfield Hydroelectric Project contribute to regulated flows in the Activity area. Un-regulated, natural inflows

also occur within the Activity area. The Activity will contribute to the regulation of the upstream Vernon impoundment and downstream tailwater. Further, the regulated river flows from the Vernon Hydroelectric Project as a whole will influence the river flows in downstream segments of the Connecticut River.

- D-12. The Vernon impoundment is created by the Vernon Hydroelectric Project, which reduces water velocities and increases hydraulic residence time of the Connecticut River in the area of the Activity beyond that which occurs under un-impounded conditions. These conditions may promote variable water quality conditions, particularly regarding water temperature and dissolved oxygen. In addition, these conditions can foster the development of aquatic plant communities, including phytoplankton, which can influence other water quality parameters such as pH and water clarity. Condition E-5 of this 401 Certification provides for dissolved oxygen and water temperature monitoring.
- D-13. The Activity will discharge directly into the upstream terminus of the Turners Falls impoundment at the downstream side of the Vernon powerhouse. The Applicant and NGC are responsible for developing and maintaining agreements relative to water rights and management while operating the Vernon and Turners Falls Hydroelectric Projects.
- D-14. An instream island that currently supports a nesting pair of bald eagles and approximately 1,000 feet of the east river bank of the Connecticut River immediately downstream from the Vernon Hydroelectric Project are susceptible to erosion as a result of unknown mechanisms.
- a. Discharges from the Vernon Hydroelectric Project, water level fluctuations as a result of operation of the Turners Falls Hydroelectric Project, operation of the Northfield Hydroelectric Project, and natural processes may contribute to some level of bank erosion.
 - b. The Applicant, in its response to motions to intervene, included a circa 1907 (i.e., pre-Project construction) drawing of the Vernon Hydroelectric Project site that indicated the presence of a cove along the east bank, immediately downstream of the proposed Vernon project. This area is an area of concern by the interested parties. The cove is present today, as shown in an aerial photograph circa 1998, which indicates that the cove was likely formed through natural geomorphologic processes under a range of river flows that are likely similar to or greater than the flows to be passed by the Activity.
 - c. The Applicant, in its response to motions to intervene, surveyed the east bank between 1996 and 2005. The data from the surveys indicated that “[m]ajor changes to the bank have occurred from two causes: (1) high (flood) flows

directed toward the bank from coarse gravel and bedrock deposits in the river channel below Vernon Dam that existed prior to the construction of Vernon; and (2) the 5.4-foot increase in the Turners Falls Pool that was implemented in the mid 1970's to provide for the operation of Northfield that (a) created a new soil and water interface elevation on a previously stable but susceptible slope and (b) inundated the sand bar that protected and contributed to the stabilization of the toe of the bank during normal flow conditions.”

Continued monitoring following implementation of the Activity will provide for a pre- and post-Activity analysis of erosion potential immediately downstream from the Vernon Hydroelectric Project.

- D-15. The Applicant operates the Vernon Hydroelectric Project on a daily cycle, receiving inflow from upstream hydroelectric storage and un-regulated inflow. The Applicant stated that water level fluctuations greater than two feet occur infrequently in the Vernon impoundment, as the normal reservoir operating range is 218-220 ft above mean sea level.
- D-16. The Applicant, under the existing (1979) federal license, provides a year-round minimum flow release 1,250 cubic feet per second through the Vernon powerhouse for the protection of aquatic life immediately downstream from the powerhouse.
- D-17. Prior to the construction of dams in the Connecticut River, the Connecticut River naturally supported migratory fishes such as Atlantic salmon, American shad, sea lamprey, and blueback herring. Migratory fishes in the Connecticut River and its tributaries are managed by the New Hampshire Fish and Game Department (NH F&G), U.S. Fish and Wildlife Service (USFWS), and other fishery resources agencies through the Connecticut River Atlantic Salmon Commission (CRASC). CRASC is the decision-making entity relative to migratory fisheries management activities.
- D-18. The Activity may affect the efficiency and effectiveness of fish passage at the Vernon Hydroelectric Project. The Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River (Strategic Plan), revised July 1, 1998, was developed by CRASC. Consistency with the Strategic Plan or subsequent revisions approved by CRASC will satisfy the requirements of Env-Ws 1703.19, Biological and Aquatic Community Integrity relative to anadromous fish.
- D-19. The administration of this 401 Certification will require periodic review of compliance data, review and approval of management plans, and other consultation with the Applicant and other parties. These actions will be undertaken jointly by the states of New Hampshire and Vermont, given the interstate nature of the waters

affected by the Activity.

- D-20. Vermont's responsibilities in post-certification reviews, approvals and compliance monitoring are specified in the 401 Certification conditions. Reviews by VTDEC will address compliance with Vermont water quality standards only. New Hampshire's determination of compliance will include an incorporation of a review by the State of Vermont.
- D-21. In accordance with the provisions of the Compact described in C-13 of this 401 Certification, the elements of water quality requirements from both New Hampshire and Vermont are incorporated into this 401 Certification.
- D-22. Implementation of the Activity in accordance with the operations and monitoring plans described in E-3 and E-4 of this 401 Certification will satisfy the requirements of Env-Ws 1703.01 and Env-Ws 1703.19 relative to minimum flow requirements for designated uses, including aquatic life and recreation.
- D-23. The Activity may generate or cause the introduction of debris to surface waters from adjacent inundated lands, which may not meet the requirements of Env-Ws 1703.03(c)(1).
- D-24. Monitoring requirements are appropriate for the Activity during operational and non-operational periods to achieve the goals stated in Section 401 of the United States Clean Water Act (Title 33 U.S. Code, Chapter 26, Subchapter IV, Section 1341(d)).

E. WATER QUALITY CERTIFICATION CONDITIONS

- E-1. A copy of this 401 Certification shall be prominently posted within the Vernon Hydroelectric Project powerhouse within seven days of issuance of the amended FERC license.
- E-2. The Applicant shall allow DES to inspect the Activity at any time to monitor compliance with the conditions of this 401 Certification.
- E-3. The Applicant shall develop and file with DES an operations plan detailing impoundment water level fluctuations and the approach to complying with the minimum flow release described in D-16 of this 401 Certification. The plan shall include information on minimization, avoidance, and control of lag times and shall describe contingencies for periods of non-compliance with the minimum flow requirements. The plan shall also include procedures for reporting deviations from prescribed operating conditions. The plan shall be developed in consultation with

DES, VTDEC, New Hampshire Fish and Game Department (NH F&G), and U.S. Fish and Wildlife Service (USFWS), with final approval by DES. DES reserves the right of review and approval of any material changes made to the plan. Proposed modifications shall not be implemented until after approval by DES. Unless otherwise approved by DES, the Applicant shall submit the operations plan to DES, VTDEC, NHF&G and USFWS at least 180 days prior to the date the plan is to be implemented. The Applicant shall implement the operations plan not later than 90 days after issuance of the amended FERC license for the Activity, unless otherwise approved by DES. The Applicant shall notify DES not more than 24 hours after any substantial deviation from the approved operations plan and shall maintain a log of deviations, which shall be submitted annually to DES and VTDEC not later than January 31 of each year. Exceptions to the plan may be granted by DES, as necessary, in consultation with the Applicant, VTDEC, USFWS, and NH F&G.

- E-4. The Applicant shall develop a plan for continuous monitoring and reporting of flow releases through spillage 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, if requested by DES or VTDEC. The plan shall be developed in consultation with DES, VTDEC, USFWS, and NH F&G, with final approval resting with DES. The Applicant shall consult DES regarding any proposed material changes made to the plan.
- E-5. The Applicant shall develop a plan to monitor dissolved oxygen and water temperature in the Connecticut River to ensure the Activity complies with New Hampshire and Vermont Class B surface water quality standards. The plan shall be submitted to DES and VTDEC for review and approval, not less than 90 days before the new units are operated for normal power. The plan shall include a schedule for implementation. If violations of Class B surface water quality standards occur or persist, the Applicant shall revise the operations plan to include additional measures to meet dissolved oxygen standards. Any revised plan shall be submitted to DES and VTDEC, for review and approval, prior to implementation.
- E-6. The Applicant shall continue to monitor for erosion at the Vernon Hydroelectric Project. The Applicant shall submit an erosion monitoring plan to DES within 90 days of issuance of the amended license, for review and approval by DES. The plan shall include provisions for monitoring erosion consistent with the methods used from 1996-2005. The Applicant shall conduct monitoring according to the approved plan, and shall submit all monitoring results every other year, not later

than December 31.

- E-7. The Applicant shall address downstream fish passage at the Vernon Hydroelectric Project in accordance with fish passage provisions described in the Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River (Strategic Plan), revised July 1, 1998, or subsequent revisions, as approved by CRASC. The Applicant shall consult DES regarding the downstream fish passage studies, which were agreed-to by the Applicant and U.S. Fish and Wildlife Service (USFWS).
- E-8. The Applicant shall provide DES and VTDEC with a copy of the turbine rating curves for all turbines at Vernon that accurately depict the relationship between flow and energy production. The rating curves shall be provided to DES and VTDEC within one year of the issuance of the amended license.
- E-9. The Applicant shall develop a plan for proper disposal of debris associated with the Activity, including trashrack debris. The plan shall be developed in consultation with DES and VTDEC, with final approval by DES.
- E-10. The Applicant shall file with DES and VTDEC, for prior review and approval, any proposals for maintenance or repair work relative to the Activity, including impoundment drawdowns below the normal operating range, necessary to facilitate repair/maintenance work, 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 surface waters.
- E-11. The Applicant shall allow public access to the lands associated with the Activity 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 DES and VTDEC. The Applicant shall receive approval by VTDEC for access points and limitations that occur on Vermont jurisdictional lands. The Applicant shall receive approval by DES for access points and limitations that will occur on New Hampshire jurisdictional lands. In cases where an immediate threat to public safety exists, access may be restricted without prior approval; the Applicant shall so notify DES and VTDEC 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.
- E-12. The Applicant shall conduct the Activity consistent with the conditions of this 401 Certification.

- a. The manner in which the Activity is conducted shall not contribute to or cause violations of NH or VT surface water quality standards. If it is determined that the manner of project operation contributes to violations of surface water quality standards, additional conditions may be imposed or conditions amended by DES, when authorized by law and after notice and opportunity for hearing.
 - b. The Applicant shall consult with DES and VTDEC regarding any proposed modifications to the Activity that may not be in accordance with this 401 Certification to determine whether this 401 Certification requires amendment or if a new 401 Certification is required for the Activity. Any amendment of this 401 Certification or the issuance of a new 401 Certification, determined appropriate by DES, shall be required prior to the implementation of any modifications to the Activity.
- E-13. The conditions of this 401 Certification may be amended and additional terms and conditions added as necessary to ensure compliance with New Hampshire and Vermont surface water quality standards during the life of the Activity, when authorized by law, and after notice and opportunity for hearing.
- E-14. DES may, at any time, request from FERC the reopening of the license to consider modifications to the license as necessary to ensure compliance with New Hampshire and Vermont surface water quality standards.
- E-15. Any change to the Activity that would have a significant or material effect on the findings, conclusions or conditions of this 401 Certification, must be submitted to DES for prior review and written approval where appropriate and authorized by law and only as related to the proposed change.

F. APPEAL

If you are aggrieved by this decision, you may appeal the decision to the Water Council. Any appeal must be filed within 30 days of the date of this decision, and must conform to the requirements of Env-Wc 200. Inquires regarding appeal procedures should be directed to Michael Sclafani, DES Council Appeals Clerk, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095; telephone 603-271-6072.

If you have questions regarding this Certification, please contact Paul Piszczek at (603) 271-2471.

Harry T. Stewart, P.E.
Director, DES Water Division

cc: Jeffrey Cueto, VANR
Anumzziatta Purchiaroni, FERC
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David Deen, Andrea Donlon, CRWC
Catherine Shively, Esq., NGC
Town of Hinsdale Conservation Commission
Town of Hinsdale Planning Board

Environmental Assessment
Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Administration and Compliance

Vernon Project
FERC Project No. 1904-042
New Hampshire and Vermont

1. Application

On March 1, 2006, TransCanada Hydro Northeast, Inc. (TransCanada), licensee for the Vernon Hydroelectric Project, FERC No. 1904, filed an application for a non-capacity amendment of its license. TransCanada is proposing to replace four existing 2.0-MW turbine/generator units with four new 4.0-MW units. The proposed change would decrease the project's total installed capacity from the authorized 44.4-MW to about 32.4-MW. The maximum authorized hydraulic capacity would decrease from 20,930 cubic feet per second (cfs) to 17,130 cfs. The project is located on the Connecticut River, in Cheshire County, New Hampshire and Windham County, Vermont.

2. Background

A new license was issued on June 25, 1979,⁵ and authorized the project with a powerhouse containing ten turbine/generator units: eight units of 2.0-MW each, and two units of 4.2-MW each, for a total installed capacity of 24.4-MW. By Order Amending License and Revising Annual Charges,⁶ issued on June 12, 1992, the license was amended to increase the installed capacity of the project by 20.0-MW. The project was authorized to replace four 2.0-MW turbine/generator units with two 14.0-MW turbine/generator units. The installed capacity of the project was revised from 24.4-MW to 44.4-MW, and the total hydraulic capacity of the project was revised from 15,530 cfs to 20,930 cfs.

Article 301 of the 1992 order requires the licensee to start construction of the authorized features within two years from the issuance date of the order and complete installation within four years from issuance date of the order. The Commission granted several extensions of time for the construction of the project upgrade.⁷ By an order issued

⁵ 7 FERC ¶ 61,292, Order Issuing New License (1979).

⁶ 59 FERC ¶ 62,267 (1992).

⁷ Commission Orders granting extension of time were issued on June 8, 1994; May

on July 6, 2004, the licensee was granted an extension of time to start construction of the project by June 11, 2006, and to complete construction of the project by June 11, 2008.

3. Proposed Action and Alternatives

3.1 Proposed Action

In its application, TransCanada explains that due to economic factors, such as wholesale power restructuring in the New England market, changes in the marketplace, and changes in project ownership, including most recently, the bankruptcy status of USGen New England (former licensee) the installation of the two 14.0 MW units never took place. In the application, TransCanada states that currently, Units Nos. 5 through 8 are not operating, and the units are officially out of service. TransCanada had re-evaluated turbine replacement, and is proposing to install four new 4.0-MW units, instead of the two 14.0-MW units approved by the 1992 order.

In its application TransCanada proposes the following modifications to the project:

- Install four 4.0-MW vertical axial flow semi-Kaplan turbine/generator units with 3.1-meter diameter runner, and auxiliary equipment. The 4.0-MW units would be located in the same existing bays, and the existing concrete associated with wheel pit and draft tubes for Unit Nos. 5 through 8 would be removed. The generator would be of the hydraulic turbine drive, alternating current, and synchronous type with vertical shaft. The maximum hydraulic capacity per proposed unit would be 1,800 cfs, for a total of 7,200 cfs for the four units.
- Excavate a minor portion of the underlying bedrock within the borders of the station to accommodate the draft tubes associated with the new units, and deepen the draft tube as much as 10 feet, as approved in the 1992 order. The draft tube extension ceiling would be shorter than existing, with an exit height of 12 feet. The ceiling would extend to the exit, and the existing stop logs would be refurbished. New stop log slots would be built into the draft extension walls, and a single gantry hoist system would be provided to accommodate all four units.
- Replace the existing trashracks and maintain the existing bar spacing of 2 inches on center.

- Replace bottom-hinged head gates and hoist removal with self-closing, vertical single-leaf wheel gates and new hoist.
- Upgrade auxiliary equipment at the Vernon Powerhouse including: a new powerhouse bridge crane; upgrade transmission cables between the 13.4- kV bus in the plant to the yard transformers; station service upgrades including new breakers; and replacement of the 2.4- kV switchgear for Unit Nos. 1 through 4.
- Implement an Erosion and Sedimentation Control Plan that would provide measures for protection against erosion, sedimentation, and spills into public waters due to any potential land-disturbing, demolition or construction related activities associated with the installation of the units.
- Continue prescribed first-on, last-off operation of either Unit Nos. 9 or 10 during upstream fish ladder operation when flows are at or below about 12,000 cfs.
- Complete an evaluation of the tailrace flow patterns associated with the proposed units, and how those patterns affect attraction flows from the fish ladder using computational fluid dynamic models. Provide agencies with a copy for comment prior to submitting it to the Commission.
- Develop a study plan in consultation with the Connecticut River Atlantic Salmon Restoration Commission (CRASRC) agency representatives to evaluate the effectiveness of the fish ladder under the re-powered station flow regimes during the first two years of commercial operation of the new units.
- Execute a Memorandum of Agreement (MOA) among TransCanada, the New Hampshire State Historic Preservation Officer (SHPO), the Vermont SHPO, and the Commission that stipulates measures for the documentation and protection of historic properties within the Vernon Project.

3.2 Action Alternative

No probable action alternative was identified for this application.

3.3 No Action Alternative

Under the no action alternative, the licensee would be required to replace four 2.0-MW turbine/generator units with two 14-MW turbine/generator units, as stated in the 1992

license amendment. This would revise the capacity of the project from 24.4-MW to 44.4-MW, and increase the hydraulic capacity from 15,530 cfs to 20,930 cfs.

4. Consultation and Compliance

Prior to filing its amendment application, the licensee solicited comments from the following agencies: United States Fish and Wildlife Service (FWS), New Hampshire Department of Environmental Services (NHDES), New Hampshire Fish and Game Department (NHFGD), Vermont Department of Fish and Wildlife (VDFW), Vermont Agency of Natural Resources (VANR), New Hampshire Division of Historic Resources (NHDHR), Vermont Division of Historic Preservation (VTDHP) and the US Army Corps of Engineers (USACE). In addition, the licensee states the proposal has been reviewed with the Town of Hinsdale Conservation Commission, as well the Connecticut River Local Advisory Committee to the Connecticut River Joint Commissions. None of the agencies objected to the proposed project.

On March 30, 2006, the Commission issued a public notice concerning the proposed amendment application. The notice set May 1, 2006, as the deadline for filing protests and motions to intervene. Table 1 provides a listing of the agencies that provided comments and the dates comments were filed:

Table 1: Comments filed in response to Public Notice

Agency/Entity	Comment Filing Date
United States Department of the Interior	4/27/2006
Northeast Generation Company	4/28/2006
State of Vermont Agency of Natural Resources	4/28/2006
New Hampshire Department of Environmental Services	4/28/2006
Connecticut River Watershed Council	5/1/2006
Windham Regional Commission	5/2/2006
Vernon, Vermont Board of Selectmen	5/10/2006

By a single filing submitted on May 15, 2006, the licensee responded to each agency concern and comment, which are discussed in detail under section 6.

On April 27, 2006, the United States Department of the Interior (DOI) filed a letter stating that the proposed modification would have an adverse impact on anadromous fish

passage, and recommends plans be prepared by the licensee for mitigative measures following consultation with the appropriate agencies.

On April 28, 2006, the VANR filed a motion to intervene. In its filing the VANR states it would waive its jurisdiction and would participate in New Hampshire's water quality certification process to insure the Vermont's water quality standards are met in addition to those of New Hampshire. Additionally, in its filing the VANR concurs with the recommendations made by the DOI related to anadromous fish passage.

On April 28, 2006, NHDES filed comments stating that the proposed amendment requires a new 401 Water Quality Certification, and that NHDES and VANR will participate in a joint 401 Certification review for the proposed activity.

On May 1, 2006, the Connecticut River Watershed Council (CRWC) filed a Motion to Intervene. In its motion to intervene, the CRWC states that the licensee should be required to: (1) work with NGC to determine what effects each project has on the Turners Fall Pool; (2) propose operation techniques to minimize erosive effects, if any; (3) study the effect of operation on fish passage; and (4) determine how operation of the dam affects the mixing zone of the thermal discharge of the upstream nuclear power plant.⁸

On May 2, 2006, the Windham Regional Commission (WRC) filed comments on the proposed application. The WRC recommends that the licensee be required to take reasonable measures to minimize downstream erosion, possibly through cooperation with the downstream licensees.

By letter filed on May 10, 2006, the Vernon, Vermont Board of Selectmen stated its support for the proposed project.

On April 28, 2006, Northeast Generation Company (NGC) filed a Motion to Intervene, Protest and Recommendations for Terms and Conditions on the proposed application. NGC is the owner and operator of two downstream projects: the Northfield Mountain Pump Storage Project, FERC No. 2585, and the Turners Falls Project, FERC No. 1889. The project boundary of the Turners Falls Project extends to the Vernon Dam tailrace area. Water released from the Vernon Dam empties into the Turners Falls pond,

⁸ Regarding the thermal discharge of the upstream nuclear power plant, the licensee states that it is not aware of, and CRWC has not presented, any evidence that current or future operations have, or will have, any influence on the mixing zone. The licensee is willing to cooperate with the owner of the plant and provide information that may be needed for studies of thermal discharge effects.

which serves as the lower reservoir for the Northfield Project and as the impoundment for the Turners Falls Project. In its Motion to Intervene, NGC is concerned with the impact of the proposed modifications upon coordinated river operations between the licensee and NGC, the impact of changes in project discharge on erosion in the Vernon tailrace area downstream, and the impact on upstream fish passage at Turners Falls.

5. Statutory Requirements

Clean Water Act

Under Section 401(a)(1) of the Clean Water Act, an applicant for a federal license or permit to conduct an activity that may result in a discharge into waters of the United States must provide the licensing or permitting agency with water quality certification (WQC) that the discharge would not violate water quality standards from the applicable state. The federal agency may not authorize the activity unless certification has been obtained or the state has waived certification through failure to act on the request for certification within 1 year after receipt of that request.

The boundary between New Hampshire and Vermont is the low-water mark of the Connecticut River on the western side. Project facilities and reservoirs are located in both states, and the discharge affects the quality of the waters of both states. Consequently, under the provisions of Section 401, the project is subject to the water quality standards of New Hampshire and Vermont.

Under the 1992 license amendment, the licensee received a 401 Water Quality Certificate from the NHDES for the installation and operation of the two 14-MW units. The WQC stated that 401 Certification shall be void and a new 401 Certification must be applied for if additional structural and/or operational modifications are made at the Vernon Project. The licensee filed for an amended WQC from the NHDES in February of 2006, based upon the proposed changes in re-powering units 5 through 8. The intent of the licensee was that the revised WQC would be developed through a cooperative consultation process between the NHDES and VANR, such that the NHDES issued WQC would satisfy the State of Vermont's interest and VANR would waive the requirement for a Vermont WQC. In their letter filed April 28, 2006, the NHDES stated that it and VANR concluded that a joint 401 Certification review, and subsequent issuance of 401 certification by NHDES, is appropriate for the proposed activity.

On July 3, 2006, the NHDES issued a WQC for the proposed turbine installation and operation. The WQC requires the licensee to develop various monitoring plans for operations, flow releases, impoundment levels, dissolved oxygen, water temperature,

erosion and debris removal. The licensee is also required to address downstream fish passage.

Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of critical habitat of such species.

A bald eagle nest is located approximately 700 meters downstream of the Vernon dam on the southern tip of an unnamed island. Considering that construction activities associated with the proposed action would occur primarily inside the existing powerhouse, and would not cause any disturbances as far downstream to where the nest is located, the Commission concludes that the proposed action would not adversely effect the continue existence of the bald eagle, or result in the destruction or adverse modification to critical habitat.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) requires federal agencies to manage cultural resources under their jurisdiction and authorizes the Secretary of the Interior to maintain the National Register of Historic Places (National Register). Section 106 of the NHPA requires federal agencies to take into account the effect of the proposed undertaking on any district, site, building, structure, or object that is included in, or eligible for inclusion in, the National Register. The agency must afford the Advisory Council on Historic Preservation (ACHP), established under Title II of NHPA, a reasonable opportunity to comment on such undertaking. The NHPA also provides for the appointment of SHPOs to facilitate the implementation of federal cultural resource policy at the state level, and requires the federal agency to consult with Native American tribes who attach religious or cultural importance to cultural resources under their jurisdiction.

A MOA was executed on April 17, 2006, between the New Hampshire and Vermont SHPOs, the licensee, and the Commission. Under the executed MOA, the licensee will: (1) conduct photographic documentation of the powerhouse; (2) conduct digital video documentation at key stages of the project to record the removal of the original equipment and installation of the new equipment; (3) conduct archaeological investigations to identify known archaeological sites and areas within project boundaries that have a likelihood of containing archaeological deposits; (4) prepare a Historic

Properties Management Plan for the project; and (5) offer, and if accepted, donate generating and electrical equipment removed from the powerhouse to museums and educational organizations.

6. Environmental Analysis

6.1. Description of Project Area

The Vernon Project is located on the Connecticut River at about river mile 142, near the towns of Hinsdale in Cheshire County, New Hampshire, and Vernon in Windham County, Vermont. The Connecticut River originates at the mouth of the Fourth Connecticut Lake near the Canadian border and flows southward a total of 410 miles to its mouth on Long Island Sound. The Connecticut River drains a watershed of approximately 11,265 square miles in the states of Connecticut, Massachusetts, New Hampshire and Vermont. The major tributaries of the Connecticut River in and just above the Vernon reservoir are the West River and the Saxtons River from the west and the Cold River from the east. There are 17 dams on the mainstem of the Connecticut River; 3 are breached and 11 are associated with hydroelectric facilities. Major land uses in the watershed include predominantly forest and recreation in the northern counties, open agricultural land in the rolling hills and along alluvial floodplains and terraces, and mixed residential, commercial and industrial uses in population centers and along transportation routes.

The project consists of a concrete gravity dam comprising of a 356-foot-long powerhouse and a 600-foot-long spillway with six tainter gates, eight underwater sluice gates, hinged hydraulic flashboards, stanchion flashboards and a trash sluice to discharge flows in excess of powerhouse capacity. The project reservoir has a water surface area of 2,550 acres at normal pond elevation of 220.13 National Geodetic Vertical Datum (NGVD), and extends about 26 miles upstream for a maximum of 54,000 acre-feet of storage.

6.2. Proposed Action

In this section we discuss the effects of the proposed action on the environmental resources of the area. For each resource, we first describe the existing environment, and then discuss the environmental effects of the proposed action. In Section 6.3 we describe the effects of the no-action alternative.

Installation of the new units would result in a decrease in the maximum hydraulic capacity by 3,800 cfs, and an increase in the amount and duration of spill over the Vernon dam during high-flow events, compared to what would occur if the two 14-MW units were

installed. Under the licensee's proposal, construction activities associated with the proposed action would occur primarily inside the existing powerhouse, isolated from the river. The project would continue to operate in its current mode with no changes in minimum flows or operating procedures. Therefore, the licensee's proposal is unlikely to cause any effect to terrestrial resources, recreational resources, land use or aesthetics.

The only potential environmental effects would be to soil erosion, water resources, aquatic resources and fish passage, which are discussed below.

6.2.1 Erosion and Sedimentation Control

Effected Environment

The landscape downstream of the Vernon dam is composed primarily of sandy soil. There is one significant erosion site on the east bank below Vernon, which has been monitored continuously by Vernon licensees since operation began at Vernon. According to the licensee, data indicates that major changes to the bank have occurred due to: (1) high flood flows directed toward the bank as a result of coarse gravel and bedrock deposits in the river channel below the Vernon dam that existed prior to the construction of the dam; and (2) the 5.4-foot increase in the Turners Falls Pool to provide for the operation of the Northfield Project.

Environmental Effects of Proposed Action

Under the existing 1992 license amendment, article 401 requires the licensee, in consultation with the New Hampshire Water Supply and Pollution Control Division (NHWSPC) and VANR, to prepare a soil erosion control plan prior to commencing any land clearing or land disturbing activities associated with the turbine replacement. Article 401 requires the licensee, at least 90 days before commencing any project-related land clearing or land disturbing activities, to prepare and file for Commission approval a final plan and schedule to control erosion, slope stability, and fugitive dust, and to minimize the quantity of sediment resulting from project construction and operation.

The licensee filed an Erosion and Sediment Control Plan with the Commission on June 6, 2006. Under the plan, the licensee is proposing to provide measures for protection against erosion, sedimentation, and spills into public waters due to any potential land-disturbing, demolition, or construction-related activities associated with the installation of the proposed turbine units, as well as operation of the project. The plan was developed in consultation with the NHDES and the VANR, and filed for Commission approval in advance of any land clearing or land disturbing activities as required by license article

401. The plan includes an implementation schedule and soil erosion and sedimentation control measures such as a temporary bulkhead, a sediment control basin, spill prevention and hazardous materials control measures and site restoration measures. Implementation of an erosion control plan should ensure that appropriate erosion and sediment controls are employed to prevent suspended sediments, as well as construction related pollutants and debris, from entering the Connecticut River.

As stated in their comments filed April 28, 2006, NGC, the owner and operator of the two downstream projects, is concerned with the potential impact of changes in project discharge in the Vernon tailrace. NGC states that an increase in peak discharges may have the potential for increasing the rate of erosion downstream of the Vernon dam. Subsequently, NGC states that monitoring of physical changes to the bed and banks of the Connecticut River is necessary to determine if the proposed changes in operation adversely impact erosion in the area. The licensee states in its comments filed May 15, 2006, that installation of the 4-MW units will not substantially increase peak discharges, rather it would allow the licensee to pass flows currently spilled through the generators instead. It further states that erosion in the tailrace area and downstream is primarily caused by naturally occurring high flood flows. The licensee has been monitoring the erosion site on the east bank of the Connecticut River just downstream of the Vernon spillway since commencement of the project operation. Since 1996, the licensee has been filing east bank erosion reports with the Commission. In its February 28, 2005, report, the licensee notes that relatively minor and normal settling, which is a common occurrence for the types of area and soil, was taking place along the base of the east bank. Neither significant erosion nor bottom scouring was reported as being observed.

As stated in the licensee's WQC, issued on July 3, 2006, the licensee will be required to develop and implement an erosion monitoring plan at the project. The WQC requires that the erosion monitoring methods in the plan be consistent with the methods used by the licensee from 1996 through 2005. A monitoring results report is to be filed by December 31 of every other year. Consequently, continued erosion monitoring through implementation of the WQC will provide adequate measures to ensure that erosion and sediment controls are in place at the project.

The CRWC and the Windham Regional Commission recommend that the licensee work with NGC to determine what effects each project (Vernon Project, Northfield Mountain Pump Storage Project, FERC No. 2585 and Turners Falls Project, FERC No. 1889) has on the Turners Falls pool. The Commission encourages the licensee to work with the downstream licensees during the development and consultation of their erosion monitoring plan pursuant to WQC condition E-6.

6.2.2 Water Quantity and Quality

Effected Environment

The Vernon reservoir is about 26 miles long, covering 2,550 acres at a normal pool elevation of 220.13 feet. A U.S. Geological Survey (USGS) gage is located in North Walpole, New Hampshire on the main stem of the Connecticut River about 30 miles upstream of the dam. The drainage area at the gage is 5,493 square miles, while the drainage at the Vernon Project is 6,266 square miles, or 773 square miles (14 percent) greater than at the gage site. Based on average monthly flows from the North Walpole gage, the highest flows typically occur during the spring freshet of March, April, and May, and the lowest flows occur during the later summer months of July, August and September. High flows may occur during any time of the year due to storm events. Flows in this reach of river are highly regulated by upstream hydroelectric projects, except under high flow conditions. Typically when flows are less than the project's hydraulic capacity, the project operates in a daily cycle run-of-river mode, where daily inflow matches daily outflow. Generation can vary in the day between the required minimum flow and full capacity if flows are available. The minimum flow at the project is 1,250 cfs or inflow, whichever is less.

The Connecticut River in the vicinity of the project is classified by the state of New Hampshire as Class B water, requiring instantaneous dissolved oxygen (DO) concentrations greater than 5 mg/l, and at least 75 percent DO saturation based on a daily average. Other criteria for Class B waters include a pH between 6.5 and 8.0, and E. coli concentrations less than 406 counts per 100 ml of water on an instantaneous basis, and 126 counts per 100 ml as a geometric mean using three samples over a 60-day period.

Environmental Effects of Proposed Action

The primary change in water quantity would be the changes in volume and duration of spill during high flow. Installing four 4-MW generator units instead of installing two 14-MW units, as authorized under the 1992 amendment, would increase the amount of spill and duration of spill over the dam during high flow events. Secondly, installation of four 4-MW units would provide a wider operating range, allowing the project to operate at a higher head by matching changes in inflow more closely than with the 14-MW units. The 14-MW units would have a higher discharge capability, resulting in a more rapid drawdown. The licensee will continue to operate the project as it has in the past, therefore, minimum flows will remain unchanged.

Once the units are operational, any change in the amount of spillage during high

flow events is unlikely to have a significant effect on water temperature or dissolved oxygen. Any changes in spill would occur during high flow periods when DO is typically at saturation and temperatures are cool. Additionally, the four 4-MW units may operate more continuously on the same volume of water as compared to the two 14-MW units, which would reduce flow fluctuations and any potential water quality effects, such as downstream erosion.

During construction, the licensee proposes to install cofferdams (upstream and downstream) and a sediment control basin, which would adequately isolate the work area from the Connecticut River. The sediment control basin would be placed on the downstream side of the powerhouse, above the existing fishway collection channel, and would collect any outflow of water from the work area.

As stated in the licensee's WQC, issued on July 3, 2006, the licensee will be required to monitor for flow releases, impoundment levels, dissolved oxygen and water temperature, erosion, debris removal and downstream fish passage. The WQC also requires the licensee to conduct the proposed action in a manner that will not contribute to or cause violations of the New Hampshire or Vermont surface water quality standards. Consequently, implementing the WQC will provide protection to the water quality of the Connecticut River during construction and operation of the project.

6.2.3 Aquatic and Fisheries Resources

Effected Environment

The mainstem of the Connecticut River in the project area provides habitat for warmwater and coolwater resident species, and anadromous fishes. Primary resident game fishes include smallmouth and largemouth bass, walleye, pickerel, northern pike, yellow perch, and rainbow, brook and brown trout in the cooler water tributaries to the river. The anadromous fishery consists of Atlantic salmon, American shad, blueback herring, lamprey and striped bass. There are numerous fishways to facilitate both upstream and downstream anadromous passage. Vernon dam is the third dam upstream from the mouth of the Connecticut River. The lowermost dam is the Holyoke Hydroelectric Project at river mile 86, and the second dam is the Turners Falls Project about 20 miles downstream of Vernon. The fish passage facilities at Holyoke annually pass upstream adult shad and herring typically numbering up to the hundreds of thousands, and small numbers of Atlantic salmon. Table 2 provides a summery of the fish counts for 2003 to 2005.

Table 2: Fish Counts for 2003 to 2005 for Holyoke, Turners Falls and Vernon Dams

Dam	American shad	Blueback Herring	Atlantic Salmon	Sea lamprey	Shortnose sturgeon	Striped bass
2005						
Holyoke	116,511	534	132	28,134	1	226
Turners Falls	1,500	2	5	15,798	0	2
Vernon	167	0	5	3,586	0	0
2004						
Holyoke	191,555	151	45	59,461	0	256
Turners Falls	2,092	43	1	8,229	0	9
Vernon	653	0	1	3,668	0	0
2003						
Holyoke	286,814	1,392	28	53,030	0	883
Turners Falls	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported
Vernon	267	0	0	8,048	0	0

Upstream passage at the project is provided by a 984 foot-long concrete combination fish ladder (Ice Harbor and vertical slot design). Downstream passage is provided by a fishpipe that discharges through one of the two old exciter turbine waterways located between units 4 and 5 approximately midway through the powerhouse, a second smaller fishpipe at the Vermont end of the powerhouse, and a 156- foot-long louver array that extends from the third log boom pier from the Vermont shoreline to the entrance of the fishpipe.

The 1992 license amendment added articles 402 and 403 to the project license, requiring the licensee to file plans to provide safe and efficient upstream and downstream fish passage at the project. The licensee filed a Fish Passage Plan with the Commission on November 27, 1992, which was approved February 12, 1993.⁹

Environmental Effects of Proposed Action

Aquatic resources

Major construction activities would occur in the dry behind cofferdams. Any discharges of water from the construction area would be cycled through the sediment

⁹ 62 FERC ¶ 62,097.

control basin, resulting in no discharge of turbine water and associated sedimentation downstream of the dam. However, there may be some disturbance to resident or migrating fish due to noise from excavation.

Per its comments filed April 27, 2006, the DOI requests that the licensee file a plan and schedule for the excavation of the turbine pit area that addresses scheduling to minimize impacts to upstream or downstream migrating anadromous fish from excavation noise. DOI recommends that excavation activity be restricted to the non-passage season to the extent possible. They also recommend that hydraulic fracturing or use of expansive fluid be considered as a lower impact alternative. Per its comments filed July 17, 2006, the DOI recommends that the licensee file periodic construction reports relative to the excavation schedule. They recommend that the reports identify the status of ongoing excavation activities, updated schedules for completion of these activities and should identify if and when the licensee has implemented double shifts to expedite completion of excavation. If excavation is not completed prior to the 2007 fish passage season, the DOI recommends that the licensee be required to consult with the FWS, VANR and NHFGD regarding a plan and schedule for excavation activities during the 2007 upstream and downstream passage seasons, and file that plan as part of the periodic reporting.

The licensee, in its comments filed May 15, 2006, propose a plan and schedule for minimizing impacts to migrating anadromous fish. The licensee states it will, to the best of its ability, complete all concrete and bedrock related demolition before the spring 2007 fish passage season related to upstream migrating adult salmon and downstream migrating salmon smolts. The licensee also proposes to avoid, to the extent possible, the downstream juvenile shad season (September 1-November 15) with priority avoidance of the period between September 15 and October 15. Additionally, the licensee proposes not to utilize explosives or rock hammers, and will use medium size jack hammers or drills in association with the use of expansive grouts. The licensee's proposal adequately minimizes impact to migrating anadromous fish, and should be implemented during excavation.

Upstream fish passage

The licensee is not proposing any in-water construction during the spring upstream migration period, thereby reducing any potential impact to anadromous species. However, during operation, potential changes in the flow patterns in the tailrace as a result of the new units could affect the ability of anadromous species to find the fish ladder entrance. To address this, the licensee contracted with Alden Research Laboratory (ARL) to conduct a computational fluid dynamic model to assess the tailrace flow patterns associated with the four 4-MW units and how those patterns may affect attraction flows from the fish

ladder. Based on the results of the study,¹⁰ a back eddy would likely occur under the 4-MW proposal unless either or both units 9 or 10 run simultaneously with the new units. The licensee therefore proposes to operate Unit 9 or 10 on a first-on, last-off basis during fish ladder operation when project flows are under the nominal station capacity of approximately 15,000 cfs.

The licensee also proposes an interim operating protocol during fish ladder operation until physical operations can be made following the commissioning of the proposed units 5-8 to verify the absence of eddy formation under certain operating scenarios. The interim protocol would include operating both units 9 and 10 before continuing to increase generation using units 5 or 6.

The licensee is also proposing to develop an upstream fish passage study plan in coordination with the CRASRC agency representatives to evaluate the effectiveness of the fish ladder under the revised re-powering proposal. The proposed effectiveness studies would be conducted within the first two years of commercial operation and the associated fish passage seasons. At the conclusion of the second year of effectiveness studies, the licensee proposes to prepare a report discussing the result of the studies. The report would be submitted to CRASRC representatives for review and comment. Upon receipt of the CRASRC comments, the licensee proposes to submit a copy of the report to the Commission describing the results, addressing any comments and include a discussion of any proposed changes to station operation or the need for additional studies.

The licensee's proposed upstream fish passage monitoring plan should be developed and filed with the Commission for approval prior to operation of the new units. This monitoring plan should include, at a minimum, the licensee's proposed fish behavior studies during the first two years of commercial operation of the new units. Since the licensee is proposing to complete installation by the end of 2007¹¹, the plan should be filed with the Commission by June 1, 2007.

Per its comments filed April 27, 2006, the DOI(FWS) states it will need to review the modeling results to be assured that no additional measures are needed before it can accept the proposed unit 9 or 10 operation. Additionally, the original license article 402 requires the licensee to consult with the VDFW and the NHFGD. Therefore, the licensee should consult with the FWS, VDFW and NHFGD, in addition to the CRASRC, when developing its upstream monitoring plan. The plan would allow the FWS to address its concerns and make recommendations regarding upstream passage.

¹⁰ Filed with the Commission on May 5, 2006.

¹¹ As stated in the licensee's May 15, 2006, filing.

Downstream fish passage

Permanent fish passage facilities were completed at the project in 1995. The licensee conducted studies on the effectiveness of downstream fish passage facilities at the project in 1995 and 1996. These studies found that the guidance efficiency of the louver system improved during those two years, corresponding to an increase in the percentage of fish passing through the fishpipe, and a decrease in the percentage of fish passing through the turbines. Following the efficiency and survival studies, the licensee consulted with state and federal fisheries agencies regarding the results of the studies, and based on the improved bypass efficiency, and overall high project survival, the agencies stated that further passage studies and facility modification were not needed at that time.

On May 23, 1997, the licensee filed a request with the Commission for a waiver of the remaining downstream fish passage effectiveness studies required pursuant to the Commission's 1993 Order Approving and Modifying A Fish Passage Plan.¹² On February 27, 1998, the Commission waived the requirement for the remaining studies, however, additionally stated that should redevelopment of the project be initiated in the future, the studies under the February 12, 1993 order would still be required.

During operation of the proposed units there would be little effect on downstream migrations because the intakes to the new units would be located behind the louver array, so most downstream migrating fish would be intercepted and diverted toward the fishpipe before they reach the unit intakes. The reduction in the maximum hydraulic capacity as compared to the authorized maximum hydraulic capacity would result in a reduction in the potential for fish entrainment and mortality.

To address the issue of fish entrainment, the licensee, using modeling, conducted a desktop evaluation of potential fish passage survival through the proposed 4-MW units. The model represented fish sizes for juvenile and adult shad and salmon smolts. Other variables included turbine operating efficiency, fish entry point along the runner blade, and a correlation factor. The assessment predicted survival for 4-inch fish (representing juvenile shad) from 92 to 98 percent, for smolt size fish from 79 to 97 percent, and for 12-18 inch fish (representing adult shad) from 63 to 94 percent. These predicted values show that survival decreases with increasing fish length, and that survival is generally higher at higher turbine efficiency. The licensee states that these values are within the range of survivals observed at the Vernon Station in past survival studies, and that there is no indication that the installation of the new units would change fish survival during

¹² 62 FERC ¶ 62,097.

downstream passage.

The DOI commented that the previous studies may be insufficient to adequately characterize the conditions downstream migrants would experience for bypassing the new units or passing through the new turbines. Additionally, the DOI stated that the results of the desktop elevation suggest that turbine passage could result in up to 21 percent mortality of salmon smolts and 37 percent mortality of adult shad. It stated that if more fish are entrained with the new units and the mortality is substantial, the new configuration could result in a significant increase in fish loss. The DOI suggested that the previously required post-construction monitoring of downstream passage should be conducted.

Although the licensee believes that there is no indication that installation of the new units would change fish survival during downstream passage, the licensee is required, pursuant to the Commission's February 1998 letter, to implement the downstream fish passage studies required by the Commission's February 12, 1993 order. Therefore, downstream effectiveness studies should be required after installation of the new units. The licensee, as stated in its May 15, 2006 filing, requests that the deadline for filing a downstream passage monitoring plan be extended to six months from the date of the order approving the amendment is issued. It does not anticipate that this extension would cause delay in implementing any monitoring studies during the initial downstream migration season following the initiation of operation of the new units.

6.2.4 Threatened and Endangered Species

Affected Environment

The only federally listed animal species that occurs in the vicinity of the project is the threatened bald eagle (*Haliaeetus leucocephalus*). A bald eagle nest is located approximately 700 meters downstream of the Vernon dam on the southern tip of an unnamed island. During a recent survey in 2006 by the NHFGD, a total of 12 bald eagles were seen in the Connecticut River.

Environmental Effects of Proposed Action

Considering that construction activities associated with the proposed action would occur primarily inside the existing powerhouse, and would not cause any disturbances as far downstream to where the nest is located, the Commission concludes that the proposed action would not adversely effect the continue existence of the bald eagle, or result in the destruction or adverse modification to critical habitat.

6.2.5 Historical Properties

Effected Environment

In May 1991, as part of further review associated with the 1992 license amendment proposal, the Vermont SHPO conducted a site visit and determined that the Vernon Station was eligible for inclusion in the National Register. The Vernon station is architecturally significant in both design and scale and it is virtually intact from when it was built in 1909. At that time the station was unique for its state-of-the-art technology and was the first facility in the county to ship its power out.

Environmental Effects of Proposed Action

Under the proposed action, the licensee will implement the MOA, executed on April 17, 2006, between the New Hampshire and Vermont SHPOs, the licensee, and the Commission. Under the executed MOA, the licensee will; (1) conduct photographic documentation of the powerhouse; (2) conduct digital video documentation at key stages of the project to record the removal of the original equipment and installation of the new equipment; (3) conduct archaeological investigations to identify known archaeological sites and areas within project boundaries that have a likelihood of containing archaeological deposits; (4) prepare a Historic Properties Management Plan for the project; and (5) if accepted, donate generating and electrical equipment removed from the powerhouse to museums and educational organizations.

Placement of cofferdams during construction would not be permanently attached to the powerhouse and would be removed following the installation of the units. Also, bedrock removal would occur within the confines of the powerhouse, and the licensee states that no archeological resources are present. Therefore, the proposed construction-related activities would not cause an adverse effect to this historical property. Removal of the historic equipment would be mitigated through photographic and video documentation, as well as donation of the equipment to local museums.

6.3. No Action Alternative

Under the no action alternative, the licensee would be required to replace the four 2.0-MW turbine generator units with two 14-MW turbine generator units, as stated in the 1992 license amendment. As stated in the Environmental Assessment for the 1992 license amendment, this action has the potential to cause short-term impacts to water quality due to construction activities, and would have the potential to cause impacts to upstream and downstream fish passage. These potential impacts are similar to the impacts that would

be anticipated if the licensee were to install the proposed four 4-MW units, as reviewed, in detail, in section 6.2. A detailed review of the no-action alternative is given in the 1992 EA.

7. Conclusions and Recommendations

7.1. Proposed Action

The proposed action of installing four new 4.0-MW units may cause some adverse impacts to water quality, and upstream and downstream fish passage during and after construction. However, installation of the four 4.0-MW units would allow the licensee to operate the project at a higher head, thereby matching changes in inflow more closely than with the approved installation of the two 14.0-MW units (no-action alternative). In order to mitigate or reduce these impacts, or to monitor potential impact, we recommended that the following conditions be included in any order approving installation of the new 4-MW units. Pursuant to section 401(d) of the Clean Water Act the WQC should become a condition of the project license. The current license should be amended to include these recommendations.

1. Implementation of the conditions as stated in the NHDES' Water Quality Certification, approved on July 3, 2006.
2. Implementation of licensee's plan and schedule for minimizing impacts to migrating anadromous fish. The licensee should, to the best of its ability, complete all concrete and bedrock related demolition before the spring 2007 fish passage season related to upstream migrating adult salmon and downstream migrating salmon smolts. The licensee should avoid, to the extent possible, the downstream juvenile shad season (September 1- November 15) with priority avoidance of the period between September 15 and October 15. Additionally, the licensee should not utilize explosives or rock hammers, and should use medium size jack hammers or drills in association with the use of expansive grouts. The licensee should submit periodic construction reports to the FWS relative to the excavation scheduling. These reports should identify the status of ongoing excavation activities, updated schedules for completion of these activities and should identify if and when the licensee has implemented double shifts to expedite completion of excavation. If excavation is not completed prior to the 2007 fish passage season the licensee should consult with the FWS, VANR and NHFGD regarding a plan and schedule for excavation activities during the 2007 upstream and downstream passage seasons, and file that plan as part of the periodic reporting.
3. Implementation of an upstream fish passage study plan to evaluate the effectiveness of

the fish ladder under the re-powering proposal. The proposed effectiveness studies should be conducted within the first two years of commercial operation and the associated fish passage seasons. At the conclusion of the second year of effectiveness studies, the licensee should prepare a report discussing the result of the studies. The report should be submitted to CRASRC representatives for review and comment. Upon receipt of the CRASRC comments, the licensee should submit a copy of the report to the Commission describing the results, addressing any comments and include a discussion of any proposed changes to station operation or the need for additional studies.

This study plan should be developed and filed with the Commission for approval, and implemented prior to operation of the new units. This monitoring plan should include, at a minimum, the licensee's proposed fish behavior studies during the first two years of commercial operation of the new units. Since the licensee is proposing complete installation by the end of 2007, the plan should be filed with the Commission by June 1, 2007. The licensee should consult with the FWS, VDFW and NHFGD, in addition to the CRASRC, when developing their upstream monitoring plan.

4. Implementation of a downstream fish passage study, as required by the Commission's February 12, 1993 order.

7.2. No-Action Alternative

As stated in section 6.3, the no-action alternative would have similar potential impacts to water quality, and upstream and downstream fish passage. The no-action alternative would not provide a significantly less environmentally adverse action over the proposed action.

7.3 Recommendation

Staff recommends that the propped action of installing four new 4.0-MW units be approved, along with the above mentioned measures. Installation of the 4.0-MW units would allow the licensee to operate at a higher head by matching changes in inflow more closely that the with the no-action alternative, thereby allowing flows that are currently spilled be passed through the generators.

8. Finding of No Significant Impact

For the reasons stated above, we conclude that the proposed action of installing four 4-MW units, along with implementation of the above mentioned recommendations, would not constitute a major federal action significantly affecting the quality of the human

environment.

9. References

Federal Energy Regulatory Commission. 1992. Environmental Assessment. FERC Project No. 1904-008 (59 FERC ¶ 62, 267).

Moore, William and David Gessler. 2006. CFD Modeling of the Vernon Generating Station Tailrace. Alden Research Laboratory, Inc.

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10. Preparers

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