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February 27, 2006

Honorable Magalie Roman Salas
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

Re: TransCanada Hydro Northeast Inc.; Vernon Project, P-1904; Application for Non-Capacity Amendment of License

Dear Secretary Salas:

Pursuant to 18 CFR Section 4.20 of the Commission's regulations, TransCanada Hydro Northeast, Inc. (TransCanada) submits an original and eight copies of the Application for a Non-Capacity Amendment for the Vernon Hydroelectric Project (FERC No. 1904). TransCanada proposes to amend its existing license for the Vernon Project to revise the number, generating capacity, and design of replacement turbine units that were authorized under the 1992 license amendment[1] approving turbine replacement. The 1992 license amendment authorized replacement of four existing 2.0-megawatt (MW) turbine/generator units (Units No. 5 through 8) with two 14-MW turbine/generator units. TransCanada wishes to amend the current license as amended in 1992 by instead replacing the four units with four new 4-MW units.

The two 14-MW unit installation has not moved forward due to economic factors, wholesale power restructuring in the New England market, changes in the marketplace, and changes in project ownership. With the improved conditions in the generating market, TransCanada re-evaluated the turbine replacement at the Vernon Project and is looking instead at replacing the units with four 4-MW units. The four 4-MW units would fit in the same station footprint as the existing units, and TransCanada would not need to conduct some of the more significant modifications that would be associated with installation of two 14-MW units.

With the turbine replacement, TransCanada will continue to operate the Vernon Project under the existing FERC license requirements and would continue to meet the conditions specified in the existing New Hampshire 401 Water Quality Certification (WQC) and all applicable water quality standards. Under the 1992 license amendment process, the New Hampshire Department of Environmental Services (NHDES) placed conditions on the Vernon Project WQC relevant to the 1992 license amendment, and the state of Vermont, pursuant to a

[1] Application filed by New England Power Company on February 22, 1991, to amend the Vernon Project and approved by Commission Order issued on June 12, 1992 (59 FERC ¶62,267).

Settlement Agreement with the Licensee filed with the Commission November 20, 1991,[2] agreed to waive 401 Certification, to the extent that it may have been required by Vermont.

Similar to the Licensee position in 1991, TransCanada is filing for an amended 401 WQC (concurrent with the filing of this application with the Commission) from the NHDES based upon the proposed change in re-powering Units 5 through 8. The intent is that any potential revised conditions placed on the NH 401 WQC as a result of the revised scope of unit replacement would be conducted through a cooperative consultation process between the NHDES and Vermont Agency of Natural Resources, Department of Environmental Conservation (VANR). TransCanada suggests that through a cooperative effort the NHDES-issued WQC would satisfy the state of Vermont's interests, and VANR would continue to waive a requirement for Vermont 401 Certification associated with this amendment. TransCanada further believes that the Settlement Agreement regarding the 401 WQC, pursuant to the proposed turbine replacement entered into between New England Power Company and the VANR and filed with the Commission on November 18, 1992, remains binding upon the VANR and TransCanada through the transfer of the License as amended by the FERC. The 1992 Order approving the increase in authorized capacity for the Vernon Project incorporated the terms of the 1991 Settlement Agreement; as such the Settlement Agreement should be considered as remaining in effect.

TransCanada is concurrently distributing this non-capacity amendment application to the New Hampshire Department of Environmental Services (NHDES), Vermont Agency of Natural Resources (VANR), the U.S. Fish and Wildlife Service (FWS), New Hampshire Fish and Game Department (NHFG), Vermont Department of Fish and Wildlife (VDFW), Connecticut River Atlantic Salmon Commission (CRASC), New Hampshire Division of Historic Resources (NHDHR), Vermont Division for Historic Preservation (VTDHP), US Army Corps of Engineers – NE District (USACE), and the New York Regional Office of the FERC. Following a 30 day agency review period, TransCanada will provide the FERC with copies of comments received along with TransCanada's response to comments and any resulting modifications to the application.

Attachment 1 and Exhibit F of this amendment application has been filed under separate cover as it contains Critical Energy Infrastructure Information detailing the Vernon Project Facilities.

Please contact John Ragonese at 603-498-2851 or john_ragonese@transcanada.com if you have any questions regarding this filing.

Sincerely,

John Ragonese
FERC License Manager
TransCanada Hydro Northeast, Inc.

Enclosures
cc: External Distribution List (below)

[2] Offer of Settlement submitted by Mark Slade, attorney for New England Power Company, and William Brierly, Chief of Operations, Vermont Department of Environmental Conservation, to the Commission on November 20, 1991.

Distribution List:

New Hampshire Department of Environmental Services (NHDES)
Paul Piszczek, Water Quality Biologist
NHDES-Watershed Management Bureau
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Concord, NH 03302-0095
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Vermont Agency of Natural Resources (VANR)
Mr. Jeff Cueto
VT Dept. of Environmental Conservation
Vermont Agency of Natural Resources
103 South Main St., 10 North
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U.S. Fish and Wildlife Service (FWS)
Mr. John Warner, Ecological Services
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Mr. Ben Rizzo
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New Hampshire Fish and Game Department (NHFG)
Mr. Bill Ingham,
New Hampshire Fish and Game Dept.
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Vermont Department of Fish and Wildlife (VDFW)
James R. McMenemy, District Fisheries Biologist
Vermont Fish & Wildlife Department
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Connecticut River Atlantic Salmon Commission (CRASC)
Ms. Jan Rowen
US Fish and Wildlife Service
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New Hampshire Division of Historic Resources (NHDHR)
James McConaha, SHPO & Director
New Hampshire Division of Historical Resources
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Vermont Division for Historic Preservation (VTDHP)
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(802) 828-3211

US Army Corps of Engineers (USACE)
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696 Virginia Road
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978-318-8111

New York Regional Office of the FERC (NYRO)
Mr. Charles Goggins, Acting Regional Director
Federal Energy Regulatory Commission
New York Regional Office
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New York, NY 10001
(212) 273-5917

APPLICATION FOR A NON-CAPACITY AMENDMENT

VERNON HYDROELECTRIC PROJECT
New Hampshire/Vermont

FERC No. 1904

Submitted by:
TransCanada Hydro Northeast, Inc.
4 Park Street
Concord, NH 03301

February 2006

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

TransCanada Hydro Northeast, Inc. Project No. 1904

APPLICATION FOR A NON-CAPACITY AMENDMENT FOR THE VERNON HYDROELECTRIC PROJECT

INITIAL STATEMENT

TransCanada Hydro Northeast, Inc. (TransCanada or Licensee) applies to the Federal Energy Regulatory Commission (FERC or Commission) for a non-capacity amendment of license pursuant to 18 CFR §4.200 for the Vernon Hydroelectric Project. As explained below, this amendment qualifies as non-capacity amendment because the maximum hydraulic capacity of the project will decrease and will not result in an increase in the installed nameplate capacity.[1]

(1) Water body: Connecticut River

State: New Hampshire and Vermont

County: Cheshire County, New Hampshire
Windham County, Vermont

Township or Nearby Towns:
New Hampshire – Hinsdale, New Hampshire
Vermont – Vernon, Vermont

(2) The exact name, business address, and telephone number of the Applicant are:

TransCanada Hydro Northeast, Inc.
203, 110 Turnpike Road
Westborough, MA 01581-263
Telephone: (508) 871-1852
Fax: (508) 898-0433

[1] 18 CFR §4.201(c) describes non-capacity amendments as those that do not 1.) increase the actual or proposed total installed capacity of the project; 2.) would result in an increase in the maximum hydraulic capacity of the project of 15 percent or more; and 3.) would result in an increase in the installed nameplate capacity of 2 megawatts or more.

The exact name and business address of the person authorized to act as agent for the Applicant in this application is:

John Ragonese, FERC License Manager
TransCanada Hydro Northeast, Inc.
4 Park Street, Suite 402
Concord, NH 03301-6313
Telephone: (603) 224-5528
Fax: (603) 225-3260

(3) The Applicant is a domestic corporation, Licensee for the waterpower project designated as Project No. 1904 in the records of the FERC, issued on June 25, 1979.[2] The existing FERC license expires on April 30, 2018.

(4) The amendments of license proposed and the reason(s) why the proposed changes are necessary, are:

TransCanada Hydro Northeast, Inc. (TransCanada or Licensee) proposes to amend its existing license for the Vernon Project to revise the number, generating capacity, and design of replacement turbine units that were authorized under the 1992 license amendment[3] approving turbine replacement. The 1992 license amendment authorized replacement of four existing 2.0-megawatt (MW) turbine/generator units (Units No. 5 through 8) with two 14-MW turbine/generator units. TransCanada seeks to amend the current license, as amended in 1992, by replacing the four units with four new 4-MW units instead of two 14 MW units.

The two 14-MW unit installation has not moved forward due to economic factors, wholesale power restructuring in the New England market, changes in the marketplace, and changes in project ownership, including most recently, the bankruptcy status of USGenNE (the previous owner of the Vernon Project). With the improved conditions in the generating market, TransCanada re-evaluated the turbine replacement at the Vernon Project and is looking instead at replacing the units with four 4-MW units. The four 4-MW units would fit in the same station footprint as the existing

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[2] On October 29, 2004, and supplemented on November 2, 2004, USGen New England, Inc. and TransCanada Hydro Northeast, Inc. applied for the transfer of the Vernon Project license. On January 24, 2005, the Federal Energy Regulatory Commission approved the transfer of the Vernon Project from USGen New England, Inc. to TransCanada Hydro Northeast, Inc.

[3] Application filed by New England Power Company on February 22, 1991, to amend the Vernon Project and approved by Commission Order issued on June 12, 1992 (59 FERC ¶62,267).

units, and TransCanada would not need to conduct some of the more significant modifications that would be associated with installation of two 14-MW units.

See Section IV of this amendment application, *Description of Proposed Action*, for more detailed information about the proposed action.

(5)(i) The statutory or regulatory requirements of the state of New Hampshire and the state of Vermont in which the Vernon Hydroelectric Project is located that affect the project as proposed with respect to bed and banks and to the appropriation, diversion, and use of water for power purposes are:

NHCAR Env. Ws 451-455 Water Quality Certification

(ii) The steps that the Applicant has taken or plans to take to comply with each of the laws cited above are:

With the turbine replacement, TransCanada will continue to operate the Vernon Project under the existing FERC license requirements and would continue to meet the conditions specified in the existing New Hampshire 401 Water Quality Certification (WQC) and all applicable water quality standards. Therefore, the Vernon Project, with the proposed turbine replacement, will remain in compliance with the applicable laws and regulations.

The Connecticut River forms the boundary between the states of Vermont and New Hampshire. Consequently, the river is a shared resource that lends itself to a coordinated approach by the two states with regard to compliance with state water quality standards. Under the 1992 license amendment process, the New Hampshire Department of Environmental Services (NHDES) placed conditions on the Vernon Project WQC relevant to the 1992 license amendment, and the state of Vermont, pursuant to a Settlement Agreement with the licensee filed with the Commission November 20, 1991,[4] agreed to waive 401 Certification, to the extent that it may have been required by Vermont.

Similar to the licensee position in 1991, TransCanada is filing for an amended 401 WQC from the NHDES based upon the proposed change in re-powering Units 5 through 8 (*see* Attachment 3). The intent is that any potential revised conditions placed on the NH 401 WQC as a result of the

[4] Offer of Settlement submitted by Mark Slade, attorney for New England Power Company, and William Brierly, Chief of Operations, Vermont Department of Environmental Conservation, to the Commission on November 20, 1991.

revised scope of unit replacement would be conducted through a cooperative consultation process between the NHDES and Vermont Agency of Natural Resources, Department of Environmental Conservation (VANR). TransCanada suggests that through a cooperative effort the NHDES-issued WQC would satisfy the state of Vermont's interests, and VANR would continue to waive a requirement for Vermont 401 Certification associated with this amendment. TransCanada further believes that the Settlement Agreement regarding the 401 WQC, pursuant to the proposed turbine replacement entered into between New England Power Company and the VANR, filed with the Commission on November 18, 1992 and in incorporated in the 1992 Order, remains binding upon the VANR and TransCanada through the transfer of the License as amended by the FERC.

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ATTACHMENTS

TransCanada Hydro Northeast, Inc.

APPLICATION FOR A NON-CAPACITY AMENDMENT VERNON HYDROELECTRIC PROJECT Project No. 1904

I. INTRODUCTION

TransCanada Hydro Northeast, Inc. (TransCanada or Licensee) proposes to amend its existing license for the Vernon Project. Specifically, TransCanada proposes to revise the number, generating capacity, and design of replacement turbine units authorized by the Commission under the 1992 license amendment[5] approving turbine replacement (*see* Attachment 2 for the 1992 license amendment order). The 1992 license amendment authorized replacement of four existing 2.0-megawatt (MW) turbine/generator units (Units No. 5 through 8) with two 14-MW turbine/generator units. TransCanada seeks to amend the current license, as amended in 1992, by replacing the four units with four new 4-MW units instead of two 14 MW units. The proposed change would decrease the project's total installed capacity from 44.4 MW (as authorized by the 1992 amendment) to 32.4 MW.

The Federal Energy Regulatory Commission (FERC or Commission) issued a new license for a major project for the existing Vernon Hydroelectric Project (FERC No. 1904) on June 25, 1979. The license expires on April 30, 2018. The Vernon Project is located on the Connecticut River at about river mile 142, near the town of Hinsdale in Cheshire County, New Hampshire, and the town of Vernon in Windham County, Vermont (*see* Attachment 1). The project has a total authorized installed capacity of 44.4 MW. There are no federal lands within the project boundary.

The Vernon Project was constructed in 1909 with eight turbine generator units: Units 1 through 4 each with a capacity of 1.5 MW and Units 5 through 8 with a capacity of 2.0 MW. The original turbines had three runners on a common shaft in a vertical configuration. In 1917, an additional two units (Units 9 and 10), which are Francis-type turbines, were added. These units had a capacity of 4.2 MW each. In the 1920s, Units 1 through 4 were upgraded to single Francis runners with a unit capacity of 2 MW each. The Commission was notified that

[5] Application filed by New England Power Company on February 22, 1991, to amend the Vernon Project and approved by Commission Order issued on June 12, 1992 (59 FERC ¶62,267). See also discussion under Section II.A., *Procedural Background.*

Units 8 and 5 were declared out-of-service in 1992[6] and 1994,[7] respectively. In 2004, the remaining Units 6 and 7 ceased to operate, and their status was awaiting the decision to repair or replace these units through the commencement of the re-powering project. Concerns over confined-space issues also led to the decision to discontinue service. In 2006, these last two units also will be officially retired and the New York Regional Office of the FERC notified.

As approved by the 1992 license amendment, the project facilities would include a powerhouse containing four 2-MW, two 14-MW, and two 4.2-MW generating units for a total installed capacity of 44.4 MW. Also included were transmission facilities consisting of generating leads, four 66/2.3-kilovolt (kV) and two 72/2.3-kV step-up transformers located within the powerhouse, an underground 13.8-kV interconnection to two outdoor 13.8 to 69-kV step-up transformers, and appurtenant facilities. The approved 1992 unit upgrade resulted in a change in the project's total authorized capacity from 24.4 MW (as authorized under the project license issued on June 25, 1979) to 44.4 MW (as authorized by the 1992 order to amend the license).

Following is a summary of the procedural background associated with the turbine replacement at the Vernon Project, a description of the proposed action, and a summary of the consultation conducted to date regarding this non-capacity amendment application. In addition, pursuant to 18 CFR §4.201(1)(c), this application for non-capacity amendment includes the exhibits, or portions thereof, relative to the revisions at the Vernon Project associated with the proposed turbine replacement, including the following: Exhibit A – Project Description; Exhibit B – Project Operation Description; Exhibit E – Environmental Report– Applicant Prepared Environmental Assessment; and Exhibit F – Project Drawings. Revisions to Exhibits A, B, and F reflect: (1) changes anticipated by this proposal; (2) other changes due to transfer of generation assets only from New England Power Company (NEP) to USGen New England (USGenNE) to TransCanada, and resulting in the removal of all transmission facilities; (3) changes due to automation of station; (4) changes due to upgrades of failed and past-service life equipment; and (5) construction of permanent fish passage facilities. Exhibits A, B and F provide the description of the project facilities and project operations as would occur with the implementation of the proposed turbine upgrades, pending FERC approval and authorization of the upgrade. Based on the actions associated with this proposed turbine upgrade, there would are no revisions to Exhibit G – Project Maps.

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[6] Letter from H.W. Sullivan, New England Power Company, to Anton Sidoti, FERC, NYRO, dated March 6, 1992, informing the NYRO that Unit 8 was permanently out-of-service.

[7] Letter from Ernest Griggs, New England Power Company, to Anton Sidoti, FERC, NYRO, dated December 1, 1994, informing the NYRO that Unit 5 was permanently out-of-service.

II. SUMMARY OF 1992 LICENSE AMENDMENT

A. Procedural Background

On February 22, 1991, NEP, the licensee at the time for the Vernon Project,[8] filed an application for an amendment of license to replace four existing 2-MW turbine/generator units (Units Nos. 5 through 8) with two 14-MW turbine/generator units (Unit Nos. 11 and 12). The proposed change would increase the project's total installed capacity from 24.4 to 44.4 MW and increase the total hydraulic capacity from 15,530 to 20,930 cubic feet per second (cfs). In addition, the licensee also proposed the following additional modifications to the project: (1) installation of two new outdoor 13.8-kV to 69-kV step-up transformers; (2) replacement of the existing interior 69-kV bare conductor overhead busses with an underground 13.8-kV interconnection to the new step-up transformers; (3) installation of two new draft tube extensions for the two 14-MW units; and (4) replacement of all interior electrical equipment for the turbine/generator units with a modern control system and a new control room.

On June 12, 1992, the Commission approved the proposed license amendment authorizing the replacement of four 2-MW units with two new 14-MW units (59 FERC ¶62,267). This amendment required commencing construction within 2 years of the amendment being granted and completion within 4 years. Former licensees for Vernon, NEP and USGenNE, requested several subsequent extensions to this deadline citing changes in capacity market, wholesale generation de-regulation in New England, asset ownership transfer, and bankruptcy issues. These extensions were granted by the Commission.[9] Currently, the 1992 amendment requires TransCanada to commence construction of these units by June 11, 2006, and complete the installation by June 11, 2008. With the improved conditions in the generating market, TransCanada re-evaluated turbine replacement at the Vernon Project and proposes instead to replace the units with four 4-MW units. The four 4-MW units will basically fit in the same station

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[8] On October 17, 1997, NEP applied for Commission approval to transfer the licenses for all of its hydroelectric assets, including the Vernon Project (Project No. 1904) from NEP to USGen New England, Inc. On February 27, 1998, the Commission approved the transfer of the licenses, and transfer of the assets for these hydroelectric projects from NEP to USGenNE was finalized on September 1, 1998. The license transfer was completed on November 20, 1998. On October 29, 2004, and supplemented on November 2, 2004, USGen New England, Inc. and TransCanada Hydro Northeast, Inc. applied for the transfer of the Vernon Project license. On January 24, 2005, the FERC approved the transfer of the Vernon Project license from USGen New England, Inc. to TransCanada Hydro Northeast, Inc.

[9] Commission Orders granting extension of time issued on June 8, 1994; May 15, 1996; March 25, 1998; June 23, 2000; May 8 2002; and July 6, 2004.

footprint as the existing units, and TransCanada will not need to conduct some of the more significant modifications that would be associated with installation of the two 14-MW units that were approved under the 1992 license amendment.

As part of the 1992 license amendment application, the licensee requested clarification from the New Hampshire Department of Environmental Services (NHDES) regarding the 401 Water Quality Certification (WQC) pursuant to the proposed turbine replacement. The NHDES placed conditions on the existing Vernon WQC relevant to the 1992 license amendment. In addition, the licensee entered into a Settlement Agreement with the state of Vermont, dated November 18, 1991, in which certain conditions were agreed to (and that were incorporated into the FERC license order, Article 401), and the state of Vermont agreed to waive 401 Certification, to the extent that it may have been required by Vermont.

B. Summary of Actions Conducted under the 1992 License Amendment

The 1992 license amendment included several requirements related to the turbine replacement. Table 1 summarizes the status of these requirements.

1. Fish Passage Facilities and Studies

Articles 402 and 403 of the 1992 license amendment required that the Licensee, prior to commencing project-related construction activities, file with the FERC a plan on how to provide continual safe upstream fish passage to ensure the safe and efficient upstream passage of Atlantic salmon, American shad, and other anadromous fishes during the construction and operation of the new units, and a plan to provide safe and efficient downstream passage for Atlantic salmon smolts, American shad, and blueback herring during the construction and operation of the new units. Subsequently, a Fish Passage Plan (Action Plan) was filed with the Commission on November 27, 1992, and approved by FERC Order dated February 12, 1993 [62 FERC ¶ 62,097] .

Table 1. Status of the 1992 License Amendment Requirements

License Article No.	Requirement	Time Requirement per License Article	Consultation Requirement	Current Status
30	Annual charge - based on authorized installed capacity of 59,200 horsepower	Effective first day of month of the date Order is issued (6/92)	NA	NA
32	Agreement with US Army Corps of Engineers (USACE) for coordinated project operation	Within 1 year of issuance of amendment Order (6/12/93)	USACE	An agreement is in place with the USACE based upon the 6/25/79 license requirement; latest revision dated September 1987 (*see* Attachment 2).
301	Requirement for implementation of construction	Complete upgrade within 4 years of Order issuance (6/11/96)	NA	Extensions granted by Commission Orders issued on June 8, 1994; May 15, 1996; March 25, 1998; June 23, 2000; May 8 2002; and July 6, 2004
302	Final contract drawings and specifications	At least 60 days prior to start of construction	Copy to Division of Dam Safety	NA. The two 14-MW units were not installed
303	Revised exhibits A, F, and G - as built	Within 90 days after construction	NA	NA. The two 14-MW units were not installed; revised Exhibit F as-built drawings of fish passage facilities were submitted on 9/1/95, and approved by FERC by Order issued on 11/7/95.
304	Coordinate project operation via NEPEX with Northfield Mt and Turners Falls Projects	Continue to coordinate	IF NEPEX no longer coordinates, must enter into an agreement with NUSCO and submit to Commission	Executed an agreement with Northeast Generating Services (Northfield Mountain and Turners Falls) based upon the termination of NEPEX role in river coordination, submitted to FERC on June 20, 2003 (*see* Attachment 2).

Table 1. Status of the 1992 License Amendment Requirements (cont.)

License Article No.	Requirement	Time Requirement per License Article	Consultation Requirement	Current Status
401	Soil erosion and sediment control plan	Within 90 days prior to commencing ground-disturbing activities	NH and VANR	NA. The two 14-MW units were not installed
402	Upstream fish passage plan (for during construction and operation of new units)	Within 90 days prior to commencing project-related construction activities	CRASC, FWS, VDFW, NHFG	Action Plan filed on 11/27/92, and approved by FERC on 2/12/93; on 2/29/96 the licensee filed request for extension for USFP study, and FERC granted extension on 9/19/96. FERC 2/27/98 letter waived remaining fish passage studies but stated that, should redevelopment of project begin, the studies under the 2/12/93 Order would still be required.

Table 1. Status of the 1992 License Amendment Requirements (cont.)

License Article No.	Requirement	Time Requirement per License Article	Consultation Requirement	Current Status
403	Downstream fish passage plan (for during construction and operation of new units)	Within 90 days prior to commencing project-related construction activities	CRASC and "other fishery agencies"	Action Plan filed on 11/27/92; and approved by FERC on 2/12/93. Action plan related to providing interim passage. Functional design drawings for permanent downstream fish passage facilities filed on 4/2/92, and approved by FERC 5/14/93; as-built drawings of the downstream passage facilities filed on 9/1/95; and approved by FERC on 11/7/95. Effectiveness studies filed on 9/12/96 and 6/23/97. On 4/1/97 FWS and CRASC agreed with licensee's proposal that further passage studies and facility modifications are not needed at this time. On 6/23/97 the licensee filed request to FERC that remaining fish passage studies be waived. FERC 2/27/98 letter granted request but stated that, should redevelopment of project begin, the studies under the 2/12/93 Order would still be required.
404	NRHP nomination/HAER documentation	Prior to commencing project-related construction activities	VT and NH SHPO	Conducted a comprehensive system-wide Cultural Resources modified HAER documentation package for all hydroelectric facilities, including the Vernon Project.

Upstream Fish Passage

Article 402 requires that the Licensee prior to commencing project-related construction activities, file an upstream fish passage plan that includes the following: (1) provisions for constructing the new units to avoid the driving of sheet pilings in the tailrace during the upstream migration of anadromous fishes at the project; (2) 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; (3) recommendations, based on the results of the modeling study, for any changes to the project's structures or operation needed to ensure the safe and efficient upstream passage of anadromous fishes; (4) a proposed plan and schedule for monitoring the effectiveness of the fish ladder during operation of the new units; and (5) a schedule for filing with the Commission the results of the monitoring and, for approval, any additional recommended changes to the project's structures or operation, based on the monitoring results, to ensure the safe and efficient upstream passage of anadromous fishes.

Upstream Fish Passage Facilities

Upstream passage at the project is provided by a 984-foot-long concrete combination fish ladder (Ice Harbor and vertical slot designs) that was constructed in 1981 on the Vermont shoreline. The fishway includes one main entrance weir and a collection gallery with multiple entrances in the tailrace. The collection gallery entrances, however, were found to be ineffective for attracting fish into the fishway, so the collection gallery is no longer used. The fishway was designed to pass 40,000 adult Atlantic salmon and 750,000 adult American shad annually, although actual passage to date has been significantly less (*see* Exhibit E). TransCanada operates the fish ladder in the spring and fall of each year. The spring season for salmon, shad, and river herring runs from May 15 through July 15, 24 hours per day. The fall season for salmon runs from September 15 through November 15, 24 hours per day. Both the spring and fall operational periods are specified annually by the Connecticut River Atlantic Salmon Commission (CRASC), but more specific start-up and shut down dates are requested by agency field staff based upon known presence and location of migratory adults through radio telemetry tracking.

Upstream Fish Passage Studies

As part of the 1992 amendment application, the licensee contracted with Alden Research Laboratory (ARL) to conduct a hydraulic modeling assessment to determine the potential effects of the proposed 14-MW units on fishway guidance and attraction flows.[10] The results of the modeling indicated that there would be no changes in

[10] Hydraulic Flow Study of Flow Pattern Changes in the Vernon Station Tailrace from Increased Turbine Discharge, by John Noreika and Johannes Larson, ARL, July 1992.

tailrace hydraulic conditions at flows at or above 12,000 cfs. At lower flows, however, the model indicated that a back eddy would occur near the fish ladder entrance when only the two proposed 14-MW units were running. The model also indicated that the condition could be corrected by dividing the load between the new units and existing Units 9 or 10, which are the two units in closest proximity to the fishway entrance. Accordingly, in the 1992 Action Plan, the licensee proposed to operate either Unit 9 or Unit 10 as a first-on, last-off at flows below about 12,000 cfs during the spring upstream fish migration season to address the back eddy concern. Currently, Units 9 or 10 operate as first-on and last-off, in part due to their proximity to the fish ladder entrance in comparison to the remaining Units 1 through 4 and because they are presently the preferred minimum flow units.

Further upstream fish passage studies were postponed because the construction and operation of the new units was delayed and ultimately not implemented (for the reasons explained under Section II.A.).

Downstream Fish Passage

Article 403 requires that the Licensee prior to commencing project-related construction activities, file a downstream passage plan that includes the following: (1) provisions for alternate interim downstream fish passage, in the event that construction activities interfere with the operation or effectiveness of the existing interim downstream passage facility; (2) functional design drawings of permanent downstream passage facilities and a schedule for constructing these facilities so that the facilities are operational prior to the start of operation of the new units; (3) provisions to monitor the effectiveness of the downstream passage facilities in minimizing the entrainment of anadromous fishes; and (4) provisions to operate the downstream fish passage system in accordance with the annual notification letter issued by the CRASC.

Downstream Fish Passage Facilities

Subsequent to the 1992 Amendment, there are now several permanent downstream passage facilities and structures at the Vernon Project. On April 2, 1992, functional design drawings for permanent downstream fish passage facilities were filed with the Commission, and they were approved by FERC Order dated May 14, 1993 [62 FERC ¶ 62,157]. On September 1, 1995, as-built drawings of the downstream passage facilities were filed, and these were approved by FERC Order dated November 7, 1995 [73 FERC ¶ 62,085].

Existing downstream fish passage facilities at the project include: a "fishpipe" that discharges through one of the two old exciter turbine waterways located between Units 4 and 5, approximately midway through the powerhouse (350-cfs capacity); a second smaller "fishtube" at the Vermont end of the powerhouse (40-cfs capacity); and

a 156-foot-long louver array that extends from log boom pier number 1 (which is the third log boom pier from the Vermont shoreline) to the entrance of the fishpipe.

The louver array consists of stainless steel louver panels (louver vanes are spaced 3 inches apart) that extend to a depth of 15 feet at normal pond elevation. The purpose of the louver is to intercept and direct downstream-migrating fish that enter the forebay from mid-river and from the east (New Hampshire) shoreline into the fishpipe. Radiotelemetry studies had shown that most of the fish approach the project from mid-river and from the New Hampshire shoreline. The louver was designed in consideration of the two 14-MW units approved by the 1992 license amendment (the louver is to the east of the location for the new units and would intercept fish before entering the units), and it is expected to function in the same manner with the proposed four 4-MW units. The smaller fishtube on the Vermont end of the powerhouse functions as a secondary passage route for fish that are not intercepted by the louver array and that enter the western end of the forebay.

Downstream Fish Passage Effectiveness Studies

The licensee conducted several studies on the effectiveness of downstream fish passage at the project,[11] including assessment of the passage efficiency of the louver array, fishpipe, and fishtube for emigrating Atlantic salmon smolts. The passage efficiency studies found that, for the smolts that passed downstream through the project, 24 percent passed through the fishpipe, 39 percent passed through the fishtube (west end of the forebay), and 24 percent passed through Units 9 and 10 (inside the louver array) and 10 percent through Units 1 through 4 (outside louver array). Because about one-third of the fish appeared to be passing through the turbines, the licensee also conducted turbine and fishway survival studies for salmon smolt passage,[12] and estimated total project survival under conditions that existed in 1996. Estimated survival through Unit 10 was 95 percent and through Unit 4 (a smaller unit) was 85 percent. Based on the migration routes that smolts used in 1996, the total estimated project survival was 95 percent. Exhibit E contains additional details of these studies.

The licensee consulted with the relevant agencies regarding the results of the effectiveness studies and based on the improved bypass efficiency the licensee's acceptance of certain conditions, the agencies stated that further passage studies and

[11] Final Report on the Efficiency of the Louver System to Facilitate Passage of Emigrating Atlantic Salmon Smolts at Vernon Hydroelectric Station, Normandeau Associates, May 1996, filed with the Commission on September 12, 1996; and Report on the Efficiency of the Louver System to Facilitate Passage of Emigrating Atlantic Salmon Smolts at Vernon Hydroelectric Station, Spring, 1996, Normandeau Associates, September 1996, filed with the Commission on May 27, 1997.

[12] Estimation of Survival and Injuries of Atlantic Salmon Smolts in Passage of Two Francis Turbines at the Vernon Hydroelectric Station, Connecticut River, Vermont, Normandeau Associated, October 1996, filed with the Commission on May 23, 1997; and the Vernon Bypass Fishtube: Evaluation of Survival and Injuries of Atlantic Salmon Smolts, Normandeau Associates May 1996, filed with the Commission on September 12, 1996.

facility modification were not needed at that time. These conditions included the following: operation of both the fishpipe and fishtube at full design capacity, diligent maintenance of the fishpipe and fishtube to keep the entrance areas free of trash and other debris, operation of Units 9 or 10 as first on and last off, and operation of the units at their most efficient gate setting possible. On May 23, 1997, the licensee filed a request with the FERC for a waiver of the remaining downstream fish passage effectiveness studies required pursuant to the February 12, 1993, Order approving the Fish Passage Action Plan. On February 27, 1998[13], the FERC waived the requirement for the remaining studies stating that the existing downstream passage facilities and the low rate of turbine mortality adequately protected downstream migrating anadromous fishes at the current time. The FERC letter also stated that, should redevelopment of project begin, the studies under the February 12, 1993, Order would still be required.

Coordination with CRASC

As stated in the 1992 Action Plan, the licensee agreed to cooperate in the operation of the permanent downstream fish passage facilities at the Vernon Station in accordance with the CRASC Annual Schedule of Downstream Passage Operations, as described in Article VI of the Memorandum of Agreement, dated July 26, 1990. The licensee also reserved the right to petition the CRASC in writing for changes to the operations schedule based on operation experience or other related data. This coordination with the CRASC has been implemented and is ongoing (*see* Attachment 2).

2. Cultural Resources Studies

The previous licensees conducted a comprehensive system-wide Cultural Resources modified Historic American Engineering Record (HAER) documentation package for all hydroelectric facilities, including the Vernon Project (*Systemwide Documentation of Hydroelectric Facilities on the Deerfield and Connecticut Rivers prepared by The Public Archaeology Laboratory, Inc. (PAL) in 1999–2000*). In part, this was performed in conjunction with requirements set forth in the Deerfield River Project's (FERC No. 2323) Cultural Resources Management Plan (CRMP), specific to eligible facilities within that project. At that time, TransCanada understands that the prior licensees, USGenNE and NEP, felt it appropriate to develop such a package for all their hydroelectric projects since it was assumed that many of their other projects, including the Vernon Project, included numerous facilities eligible for the National Register of Historic Places. This eligibility status in itself requires consultation with State Historic Preservation Offices (per Article 35 of the Vernon License issued on June 25, 1979) should changes in the facilities affect the project's historic resources. TransCanada understands that this documentation was an attempt to ensure these facilities were recorded appropriately. For the Vernon Project, the documentation

[13] Letter from Carol I. Sampson, Director Office of Hydropower Licensing to Mr. Lawrence Bailey, New England Power Service Company, dated February 27, 1998.]

package was provided to the New Hampshire and Vermont State Historic Preservation Offices, as well as to local public libraries. Only the portions required by the Deerfield River Project's CRMP have been filed with the Commission.

III. COFFERDAM INSTALLATION

TransCanada is initiating disassembly of Units 5 and 8 that are out-of-service and 6 and 7 that are to be placed out-of-service. In addition to the mechanical problems with the units, there is also a confined space issue which results in a potentially unsafe environment for maintenance activities. To commence dismantling of the units, TransCanada is installing a cofferdam at both the upstream and downstream faces of the Vernon Station to isolate and de-water those portions of the plant associated with Units 5 through 8. Based on discussions with the FERC, OEP, Division of Hydropower Administration and Compliance (DHAC), and FERC Dam Safety New York Regional Office (NYRO), TransCanada was advised that it is authorized to install the cofferdams under the existing license. The intent is to complete the installation of the cofferdam in spring 2006 in accordance with the Fish Passage Action Plan filed with the Commission on November 27, 1992, and approved by FERC Order dated February 12, 1993, and subsequent consultation with CRASC agency representatives on January 25, 2006. The cofferdams would then remain in place and function as the perimeter control measures for the proposed installation of the new 4-MW units, as described under the proposed action (*see* Section IV), subsequent to FERC approval of this non-capacity amendment application.

The bulkhead design at each location (upstream and downstream) will be vertical steel sheet piles supported by horizontal steel wales and vertical struts. The cofferdam will be anchored to the existing toe of powerhouse, and there will be no driven piles. The cofferdams will not block the upstream or downstream fish passage entrances and will be located inside the louver array. The top of bulkheads upstream of the dam have been designed at elevation 226.4 feet mean sea level (msl), above the 50-year flood level based on data from the available Federal Emergency Management Agency flood study for the Vernon area. This is the level of the generator room floor, and provides about 1.4 feet freeboard above the estimated 50-year flood level (elevation 225 feet msl); and 2.4 feet freeboard above the estimated 25-year flood level (elevation 224 feet msl). Downstream of the dam, the bulkheads have been designed with a top elevation of 212.2 feet msl. This is the 50-year flood level and provides about 2.2 feet freeboard above the estimated 25-year flood level (elevation 210 feet msl).

A sediment control basin will be provided during construction on the downstream side of the powerhouse, above the existing fishway collection gallery, which is no longer used. Any inflow of water into the work area will be pumped to this settling basin prior to discharge back to the river. The basin will serve as a temporary settling pond for water pumped out from the work area, and as a temporary storage area

for the associated sediments and construction debris. Clean filtered water from the settling basin containing filter fabric will seep back to the river. The sediments and construction debris that are deposited in the settling basin will be transported off-site to an approved landfill.

TransCanada filed for a standard dredge and fill permit with the NHDES on December 23, 2005, amended the permit application on February 1, 2006, and subsequently received a permit from NHDES on February 10, 2006 (*see* Attachment 3). In accordance with the November 27, 1992, Fish Passage Action Plan and the January 25, 2006 consultation with CRASC agency representatives, the downstream cofferdam will be installed prior to the upstream fish migration season and the upstream cofferdam will be installed behind the fish guidance system. To the extent possible, these actions will be completed as early in the passage season as possible. In addition, as stated previously, there would be no driven piles and therefore, there would be no associated adverse effects of noise transmissions going through the water column. Based upon consultation with the New Hampshire Fish and Game Department (NHFG), Vermont Department of Fish and Wildlife (VDFW) and U.S. Fish and Wildlife Service (FWS),[14] this proposed installation is satisfactory and should not affect passage for either up- or downstream migrating fish (*see* Attachment 3).

[14] Consultation meeting conducted on January 25, 2006, and memo to NHDES wetlands bureau from NHFG dated January 31, 2006; see Attachment 3.

IV. DESCRIPTION OF THE PROPOSED ACTION

A. Proposed Turbine Replacement

TransCanada proposes to replace four existing 2.0-MW turbine/generator units (Units No. 5 through 8) with four new 4-MW units, instead of the two 14-MW turbine/generator units that were approved by the 1992 amendment. The new units would be more efficient and thus would produce more energy per unit of flow, and would have fewer construction and operational effects than the two larger replacement units that were originally proposed.

The proposed replacement turbines would be vertical axial flow Kaplan turbines with a 3.1-meter diameter runner. The nominal capacity per unit would be 4-MW at a net head of 32 feet for a total output of 16.0 MW. The maximum hydraulic capacity per unit would be 1,800 cfs or a total of 7,200 cfs for the four proposed units under ideal conditions. The proposed change would decrease the project's total installed capacity from the authorized 44.4 MW (as authorized by the 1992 amendment) to about 32.4 MW. The maximum hydraulic capacity (calculated as the sum of each individual unit's maximum discharge capacity) of the total project would decrease about 22 percent from about 20,930 cfs (as authorized by the 1992 amendment) to 17,130 cfs. Total project nominal discharge capacity would be approximately 15, 068 cfs, calculated based upon normal headwater and tailwaters elevations and all units operating.

The generator will be of the hydraulic turbine drive, alternating current, synchronous type with vertical shaft. The generator will be complete with supervisory devices and brushless excitation system with automatic voltage regulation as required for a complete installation. TransCanada expects to accomplish generator cooling through air cooling with an envelope. Auxiliary equipment in the Vernon station will include a new powerhouse bridge crane, upgraded transmission cables between the 13.4kV bus in the plant to the yard transformers, station service upgrades including new breakers, and replacement of the 2.4kV switchgear for Units 1 through 4.

The proposed four units would be installed within the existing intake bays. To facilitate the new turbines, a small amount of bedrock will need to be excavated within the powerhouse to accommodate the draft tubes associated with the new units. Existing concrete associated with wheel pit and draft tubes for Units 5 through 8 will be removed, and the downstream bulkheads will be replaced to accommodate the new draft tubes. It is estimated that a total of 400 cubic yards of bedrock will be excavated at the base of the existing wheel pits. This excavated material will be removed offsite for disposal. This bedrock removal is far less than the bedrock removal required for the two 14-MW units which essentially removed bedrock to a depth of 10 feet beneath the existing units, draft tube and below the upstream fish passage collection bay as the draft tube extension required.

The proposed replacement project also necessitates replacing the trash rack and replacing the bottom-hinged head gates removal with vertical single leaf wheel gates and hoists. Initially, TransCanada proposed replacement racks with 4 inch on center (O.C) spacing based upon initial turbine manufacturer recommendations and to address anticipated debris loading increases. This proposal raised entrainment concerns from fishery agency representatives at the January 25, 2006 consultation meeting. Since that meeting TransCanada re-evaluated the rack spacing proposal and revised the proposal to follow agency recommendations that the spacing continue to be the current 2 inch O.C. spacing (*see* January 25, 2006 consultation meeting summary in Attachment 3).

The existing head gates will be replaced with new self-closing, vertical, single leaf, wheel gates, replacing the maintenance bottom-hinged flag gates now in service. This will provide a secondary means of discharge closure in the event of a turbine failure. Draft tube extensions will be extended 2 feet further downstream and maintain the same exit elevation. The draft tube extension ceiling will be shorter than existing, with an exit height of 12 feet. The ceiling will be extended to the exit and the existing stop log slots will be refurbished. A new maintenance bulkhead arrangement will be designed and installed to facilitate de-watering of the draft tube for runner maintenance. New stop log slots will be built into the draft extension walls, and a single gantry hoist system provided to accommodate all four units.

B. Perimeter and Soil Erosion Control Measures

TransCanada proposes to implement an Erosion and Sedimentation Control Plan (ESCP) that would, provide measures for the 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. The draft ESCP is being submitted for review and comment with the NHDES and VANR at the time of submitting this draft amendment application. The final ESCP, including documentation and response, as appropriate, to agency consultation, will be filed for Commission approval in advance of any land clearing or land disturbance activities as required by Article 401 of the June 12, 1992, FERC Order Amending License. The ESCP will include a design and schedule to control erosion, slope stability, and fugitive dust and to minimize the quantity of sediment resulting from project construction and operation.

C. Fish Passage Studies

1. Upstream Fish Passage Studies

TransCanada is not proposing any modifications to the existing fish passage facilities at the project. However, TransCanada has contracted with ARL to conduct a computational fluid dynamic (CFD) model to assess the tailrace flow patterns

associated with the proposed four 4-MW units, and how those patterns may affect attraction flows from the fish ladder. As stated in section II.B.1, in 1992 ARL conducted a study of the discharge associated with the proposed two 14-MW units using a physical model to determine the effect on the upstream fish ladder. The 1992 study identified that an eddy would likely form in front of the ladder entrance when station flows were below 12,000 cfs and the proposed Units 11 and/or12 were in operation without either Units 9 or 10 operating. As a result, the November 24, 1992 Action Plan for Fish Passage filed with the Commission proposed operating either Units 9 or 10 as first-on, last-off when the upstream ladder is operating to maintain a linear flow across the entrance. The results of the 2006 CFD model of the four 4-MW units are expected to be available in March 2006, and TransCanada expects to file a report on the results as a supplement to this application by April 1, 2006.

In advance of the results from the ARL CFD modeling, TransCanada is prepared to continue prescribed first-on, last –off operation of either Units 9 or 10 during the upstream fish ladder operation when flows would be below about 12,000 cfs, if the modeling indicates that an eddy would continue to form in the vicinity of the fishway entrance, as predicted in 1992 ARL study. If the study indicates that an eddy would not form with the new turbine units, TransCanada may revise this proposed Unit 9 or 10 first-on, last-off operation and will include this revision in the April report. The result of the ARL CFD study and TransCanada's proposed operations to maintain efficient fish ladder operation will be provided to CRASC agency representatives for comment prior to filing the supplemental report with the Commission. Agency comments and TransCanada's response to such will be included with the report filing.

As stated in the November 24, 1992, Action Plan [for upstream passage], TransCanada will develop a study plan in coordination with CRASC agency representatives to evaluate the effectiveness of the fish ladder under the re-powered station flow regimes. The study would evaluate the effectiveness of the proposed operations, to be specified following the result of the ARL CFD modeling study, in a supplement to this application. The proposed fish behavior studies in the tailrace will be conducted during the first two years of commercial operation of the new units.

2. Downstream Fish Passage Studies

TransCanada conducted a desktop evaluation of predicted downstream fish passage turbine survival through the proposed new 4-MW turbine units, including consideration of survival of fish of sizes similar to juvenile and adult American shad, as requested by various fisheries agency representatives during the January 25, 2006, consultation meeting (*see* Attachment 3). The fish sizes selected for this evaluation correspond approximately to fish sizes for American shad juveniles (4 inch) and adults (12 and 18 inch) and Atlantic salmon smolts (6, 8, and 10 inch). The assessment showed that predicted survival for 4-inch fish ranged from 92 to 98 percent; for smolt

size fish (6 – 10 inch) ranged from 79 to 97 percent; and for 18-inch fish ranged from 63 to 94 percent (*see* Exhibit E for more detail).

D. Cultural Resources Measures

TransCanada proposes an alternative to the requirement specified in Article 404 in the 1992 Order Amending the License that is more consistent with prescribed requirements found in recent license renewals. TransCanada initiated consultation with the New Hampshire State Historic Preservation Officer (SHPO) (letter dated November 16, 2005) and the Vermont SHPO (letter dated December 20, 2005) (*see* Attachment 3). The goal of this consultation is to reach agreement and sign a Memorandum of Agreement (MOA) with the SHPOs stipulating as to what mitigation and documentations measures are required to adequately protect the historic resources potentially affected by the proposed changes to the existing station. Attachment 3 includes the draft MOA. Once an MOA is signed with the SHPOs specifying documentation and mitigation requirements, TransCanada will submit the MOA to the FERC as an addendum to the application.

Under an executed MOA, TransCanada proposes to:

- Conduct photographic documentation of the Vernon powerhouse, and ensure that all documentation is completed and accepted by the SHPOs before commencing any demolition or construction activities for the proposed project.
- Conduct digital video documentation at key stages of the project to record the removal of the original equipment and the installation of new equipment.
- Conduct archaeological investigations to identify known archaeological sites and areas within the Vernon Project boundaries that have a likelihood of containing archaeological deposits.
- Prepare a Historic Properties Management Plan (HPMP) for the project.
- Offer and, if accepted, donate generating and electrical equipment removed from the Vernon powerhouse to museums and educational organizations.

The photographic documentation of the Vernon powerhouse would be completed by a qualified architectural historian in accordance with the standards and regulations outlined in the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation [48 FR 190 (1983)]. Photographic documentation would consist of recordation of the affected areas of the powerhouse that are not adequately covered in the Systemwide Documentation of Hydroelectric Facilities on the Deerfield and Connecticut Rivers prepared by The Public Archaeology Laboratory, Inc. in 1999–2000. Views would include the existing generators, electrical equipment, crane, and

windows that would be removed as part of the project. Supplemental documentation would consist of photographs and/or photocopies of historical plans and/or specifications that show affected equipment, if such are found to exist in the archives maintained by TransCanada. TransCanada would ensure that all documentation is completed, and accepted by the SHPOs before commencing any demolition or construction activities for the project.

Digital video documentation would be conducted at key stages of the project to record the removal of the original equipment and the installation of new equipment. The video would capture the following key events:

a. Overall documentation of the interior and exterior of the powerhouse, including but not limited to, its setting, general appearance, location of key components and features in relation to one another;

b. At least one of the original units in actual or simulated operation to the extent possible, before its removal showing the steps and processes involved in starting, running, and shutting down the generator;

c. Preparatory work involved in the setup and staging for the removal of the generators, including, but not limited to, the installation of temporary coffer dams, set up of construction machinery, disconnecting of equipment, and installation of overhead crane;

d. Removal of generators and associated historical equipment, including the lifting and transporting of equipment from their existing locations and the recordation of unique features of the equipment that were not visible while in place;

e. Preparatory work involved in altering the existing generator pits for the acceptance of the new equipment; and

f. Installation of new generators, including the insertion of the equipment and footage showing them in operation.

The video documentation would be supplied to each of the SHPOs within twelve months of the completion of the project for inclusion in the respective state archives and designated local repositories.

TransCanada proposes to prepare a HPMP in accordance with the Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects issued by the FERC and Advisory Council on Historic Preservation (ACHP) on May 20, 2002 (effective January 11, 2001). The HPMP would govern future actions

as they relate to historic properties, including standing structures and archaeological sites, within the property boundaries of the Vernon Hydroelectric Project. The HPMP would identify the nature and significance of historic properties within the project boundaries that may be affected by project maintenance and operation, proposed improvements to the project facilities, and public access. The HPMP would identify goals for the preservation of historic properties; establish guidelines for routine maintenance and operation; and establish procedures for consulting with the SHPOs, Tribal Historic Preservation Officers (THPO), Indian tribes, historic preservation experts, and the interested public concerning effects on historic properties. The HPMP would identify the responsible TransCanada officer in charge of executing the plan and establish procedures for training plant operators, maintenance staff, and other employees in its implementation. The HPMP would also be integrated with existing management plans, as appropriate. TransCanada proposes to submit an approved final HPMP within one year of the issuance of the revised amended license.

In preparation for completing the HPMP, TransCanada proposes to hire a qualified archaeologist to conduct investigations to identify known archaeological sites and areas within the Vernon Hydroelectric Project boundaries that have a likelihood of containing archaeological deposits. The investigations would be carried out in accordance with the methodology established by the SHPOs in the state in which the lands are located. The information from these investigations would be incorporated into the HPMP and used to establish procedures in the HPMP that would be followed when project operations, construction, or other activities have the potential to disturb those areas.

TransCanada proposes to donate the generating and electrical equipment removed from the Vernon powerhouse to identified museums, historical societies, educational facilities, industrial history organizations, or other institutions willing and capable of displaying and interpreting the historic values of the equipment.

V. CONSULTATION SUMMARY

TransCanada initiated consultation with the New Hampshire SHPO (letter dated November 16, 2005) and the Vermont SHPO (letter dated December 20, 2005) and held separate consultation meetings on November 23, 2005 and February 13, 2006 respectively to discuss the proposed action, the proposed MOA and receive comments (*see* Attachment 3). TransCanada filed for a standard dredge and fill permit with the NHDES on December 23, 2005, amended the permit application on February 1, 2006, and subsequently received a permit from NHDES on February 10, 2006. Attachment 3 provides the NHDES issued permit. TransCanada conducted an initial consultation meeting on January 25, 2006, with representatives from the FWS, NHFG, NHDES, CRASC, VDFW, and VANR to discuss the proposed actions related to this non-capacity application and potential concerns or issues that the agencies may have. The

issues discussed at this meeting and potential resolutions were considered in the development of the proposed action and the preparation of this application. Attachment 3 includes a summary of this meeting.

This non-capacity amendment application is being distributed to the FWS, NHDES, NHFG, VANR, VDFW, CRASC, NHSHPO, VTSHPO, NYRO, and the US Corps of Engineers (USACE) at the time of filing the application with the FERC. Following a 30 day agency review period, TransCanada will provide the FERC with copies of comments received along with TransCanada's response to comments and any resulting modifications to the application.

VI. EXHIBIT A - PROJECT DESCRIPTION

A. Dam

The dam is a composite overflow and non-overflow gravity structure originally constructed in 1909 and extending across the Connecticut River between Hinsdale, New Hampshire and Vernon, Vermont. The dam consists of a powerhouse and sluice gate block section 383 feet long and a concrete overflow spillway section 600 feet long. The maximum dam height is 58 feet.

B. Spillway

The overflow spillway crest is at elevation 212.13 (NGVD) for a nominal distance of 500 feet and the remaining 100 feet is a gated sill block with two 20 foot by 50 foot tainter gates for closure. The spillway ogee section includes one 13 foot by 13 foot trash sluice gate (sill elevation 207.13); four 10 foot by 50 foot tainter gates (sill elevation of 212.13); ten 10 foot by 10 foot hydraulically operated flashboards (sill elevation 212.13); two 50 foot bays and one 46 foot bay of steel pin supported wooden flashboards (sill elevation 212.13); and two 20 foot by 50 foot tainter gates (sill elevation 202.13). All bays are separated by 5 foot wide crest piers. In addition to the crest gates and flashboard panels, there are eight 7-foot by 9-foot submerged sluice gates (sill elevation of 173.131, through the spillway.

C. Powerhouse and Associated Facilities

The non-overflow section of the dam contains the powerhouse which is approximately 336 feet long by 55 feet wide by 45 feet high, and is a reinforced concrete substructure with a structural steel and brick superstructure. The Vernon powerhouse currently contains ten vertical Francis type turbine/generators, three three-phase 2.3 kV to 13.8 kV step up transformers, turbine bearing cooling water systems, turbine wicket gate governor systems, and other ancillary equipment. Units No. 1 through 4 are single runner, vertical Francis turbines rated at 4,190 HP at 35 feet of head and 133.3 rpm with a maximum hydraulic capacity of 1,465 cfs. These turbines are directly connected to three-phase, 60 cycle, 2,300 volt generators, with a rating of 2,000 kW each at a 0.8 power factor. The new Units No. 5 through 8 are vertical axial flow Kaplan turbines with a 3.1-meter diameter runner rated at 5898 HP at 32 feet of head, and 144 rpm with a maximum hydraulic capacity of 1,800 cfs. These turbines are directly connected to three-phase, 60 cycle, 13.8 kV generators rated at 5,000 kW with a 0.9 power factor. Units No. 9 and 10 are vertical single runner Francis turbines rated at 6,000 HP at 34 feet of head with a maximum hydraulic capacity of 2,035 cfs. Each of these turbines is directly connected to a three-phase, 60 cycle, 13.8 kV 75 rpm generator rated at 4,200 kW with a 0.7 power factor. Units No. 9 and 10 also are directly connected t o 228 kW, 125 volt exciters. The turbine intake trashracks are 2

inch on center for Units 1 through 8, and 4 inch on center for Units 9 and 10. The powerhouse also contains two motor driven generator exciter sets, each rated at 300 kW and 125 volts which will be removed as part of the project. The three step-up transformers located within the powerhouse have the following criteria: four are rated at 6,000 kVA and 13.8/2.3 kV. Bus structures, switching equipment, switchboards and miscellaneous electrical equipment are also contained in the powerhouse. Transmission cables are run underground from the internal dual 13.8 kV Bus to the existing two 40 MVA step up transformers (13.8/69 kV) in the Switchyard. These transmission lines will be upgraded to carry full station load (32.4 MVA) on either bus, and thus make the switchyard transformers fully redundant.

D. Fish Passage Facilities

Adjacent to the powerhouse on the west and south is a fish ladder completed in 1981. The ladder has a fish collection gallery along the powerhouse tailrace (south face) and 51 climbing pools along the west face. The fish ladder exits into the Station's forebay adjacent to Unit No. 10. The fish ladder is 984 feet long and provides fish passage from tailwater to head pond (approximately 35 feet vertical). The previously used trash sluice at the western end of the powerhouse structure now functions as an attraction water intake for the Station's fish ladder.

The fish pipe, installed in 1991, is surface fed and allows downstream passage of fish from the forebay to the tailrace. The fishpipe measures about 82.5 feet in length, is 4 feet high throughout it length and measures 7.6 feet wide at the entrance, tapering to about 2.6 feet at the discharge end. At normal pond elevation the sill of the fishpipe is 10 feet below the water surface and flow through the pipe is 350 cfs.

A 156-foot-long louver system, installed in the inner forebay in 1994, extends from the log boom pier number 1 to the entrance of the fishpipe. The louver system consists of eleven 12-foot-wide by 10-feet-high removable louver panels spaced 3 feet apart that are housed in the system. Each individual stainless steel louver measures 2 inch wide, 3/8 inch thick and 10 feet long, and are angled 60 degrees.

The second fish passage facility, installed in 1994, includes a surface fed entrance in the western forebay wall of the Station, about 25 feet upstream of the Unit 10 trashrack. The entrance measures 8 feet high by about 3 feet wide and at normal pond elevation the bottom sill is about 6 feet underwater. At about 4 feet from the lower sill of the entrance, the passage tapers from 4 feet in diameter to 2 feet in diameter, and extends through the powerhouse, discharging near the fish ladder collection channel in the tailrace. In 1995, a debris diversion/flow modification board, about 4 feet by 8 feet in size, was mounted at an approximate 30 degree angle to the entrance of the west fishtube.

E. Reservoir

The normal pond elevation is 220.13 (NGVD) and has a surface area of 2,550 acres. The usable storage is 18,289 acre-feet between elevations 220.13 and 212.13.

VII. EXHIBIT B – PROJECT OPERATIONS

A. Existing Station

The Vernon Station is operated in a coordinated manner employing a set of operational guidelines that take into consideration variations in demand for electricity and the natural seasonal variation of flow in the Connecticut River system. The Vernon Project operates on a daily cycle, receiving un-regulated inflow and inflow from upstream hydroelectric storage. It is remotely operated from TransCanada's Connecticut River Operations Control Center located at the Wilder Hydroelectric Project (FERC No. 1892). Personnel who staff Vernon do so primarily as weekday, first-shift maintenance crews, but will staff the station on weekends if high flows demand constant attention to insure trash racks are cleaned and units are running.

B. Vernon Development Hydrology

The Station flow averaged 5800 cfs during the period of record February 1999 through February 2006. Fifty percent exceedance flow value is 7,800 cfs as shown on Figure B-1 for the period from 1972 to 2000. Annual Natural Inflows sequences are depicted in Figure B-2 using distinct colors for separate years. It shows the pattern of flows that naturally occur in the Connecticut River basin above Vernon.

The Vernon Project, with a reservoir storage area of 2,550 acres has limited storage capability; therefore, the Station daily discharge matches daily inflow. The drainage area (DA) above the Vernon Project is 6,266 square miles and the reservoir has a total volume of 40,000 acre-feet at full reservoir (top of flashboards-El. 220.13). Usable storage amounts to about 18,300 acre-feet in eight feet of drawdown. The reservoir area/capacity curve is shown in Figure B-3 and the reservoir storage above the crest is shown in Figure B-4.

TransCanada owns and operates power storage capacity above Vernon of about 255,900 acre-feet. TransCanada also utilizes 99,300 acre-feet of storage from the State of New Hampshire's Lake Francis, and also benefits from the stream flow regulation provided by other reservoirs with a combined usable capacity of about 310,000 acre-feet.

The maximum flow past the Station was 185,000 cfs recorded in March 1936. Since the 1936 occurrence, the USACE has constructed several flood control projects on the river tributaries above Vernon, which substantially reduce the probability of a flood of such magnitude. Three tributaries, the West River (DA 308 sq. mi.), Cold River (DA 83 sq. mi.), and the Saxtons River (DA 72 sq. mi.) enter the Connecticut River between Bellows Falls and Vernon Dam. The West River has two USACE flood control dams controlling a total drainage area 278 sq. mi.; one at Townsend, Vermont,

the other at Jamaica, Vermont. These projects, in conjunction with three other USACE Vermont flood control dams, significantly control flood flows into the Connecticut River and the Vernon Reservoir.

C. Vernon Development Hydraulics and Generation

The nominal hydraulic capacity of the existing Station is 15,068 cfs however a maximum of over 17,000 cfs can be achieved with all units operating at maximum gate and optimal gross head conditions. Station discharge capacity and maximum output is limited by Station head and the tailrace elevation is controlled by the backwater from Northeast Generation Service's Turners Falls Project (Commission Licensed Project No. 1889). Figure B-5 is a tailwater plot versus maximum daily discharge flow derived from Station log data. The data exhibits an elevation band width caused by reservoir operating level variations of the Turners Falls Project downstream.

Vernon Station, with the re-powered Units 5 through 8 is currently rated at 32.4 MW capacity. The Station's 10-yr average annual generation for the period of 1996 to 2005 is 123,276 MWh. The maximum and minimum annual generation during the period is 141,716 MWh and 90,923 MWh, respectively.

Vernon Station's annual plant capacity factor is approximately 0.57. Generating units are dispatched based on available water which reaches the Station from upstream generating facilities and natural inflow from intermediate tributaries. River flows less than Station capacity are normally used for generation during peak hours. When units are not dispatched for generation, a 1,250 cfs minimum flow (or inflow if less) is maintained through the project for the benefit of downstream fisheries and water quality. On an annual basis, the station operates at minimum about 32 percent of the time. Additional water used for upstream and downstream fish passage devices is also released based upon seasonal schedules.

D. Vernon Development Reservoir Operations

Two-hour headpond elevations versus frequency of occurrence for the period September 24, 1997 to December 31, 2005 is provided as Figure B-6. This figure shows pond fluctuations greater than two (2) feet occur infrequently. The need to utilize more than two feet of Vernon's storage arises when regional energy demand is high and when electric system stability is threatened by the unexpected loss of other generating units or transmission lines.

The reservoir extends approximately 26 miles upstream and backwater effects raise the river to about elevation 227 feet at the base of the Bellows Falls Dam approximately 31 miles upstream. *See* Figure B-7. Existing Station units, gate and spillway capacity allow elevation control to flows of approximately 90,000 cfs. When flows exceed 45,000 cfs up to the control limit above Vernon is operated such that the

reservoir does not exceed 218.6 in order to maintain flow within its upstream project boundary.

E. Vernon Project Coordinated High Water and Flood Reduction Operations with USACE

An agreement between the New England Power Company (then the licensee for Vernon) and the USACE, signed in 1980 and later revised in 1987 following the installation of additional tainter gates provides for coordinated operation of the project in the interest of flood control and navigation on the Connecticut River. Its purpose is to direct the operation of the Vernon Project such that it does not increase flood flows on the Lower Connecticut River through a set of Operating Procedures that remain in effect today. Although the re-powering of Units 5 through 8 will alter the flow capacity through the station itself, in terms of overall capacity for controlling flow, the change is modest and therefore the terms of this agreement and the referenced operating procedure remain effective and unchanged. The Agreement and Operating Procedures are included in Attachment 2 of the application.

F. Vernon Project Coordinated Operations with Northeast Generating Service's Turners Falls Project

Because NEPOOL no longer operates its regional central dispatching system (NEPEX) to coordinate the operation of the Vernon Project with the Northfield Mountain Project (FERC No. 2485) and Turners Falls Project (FERC No. 1889) for generation output, owners of these facilities entered into a letter agreement in which various procedures were specified to be implemented in order to share certain information and better coordinate our respective hydro operations on the Connecticut River. This agreement remains in force and suitable for the continued coordinated operation of the facilities while respecting the regional competitive energy market within which both parties operate. The agreement is included as Attachment 2 of the application.

Also, in 1993 Owners of these respective projects, Northfield Mountain Project (FERC No. 2485) and Turners Falls Project (FERC No. 1889) and Vernon Project (FERC No. 1904), Northeast Utilities and New England Power entered into an agreement to address the effect on generating output at Vernon due to the development of the Northfield Mountain Project. The development of Northfield involved the removal of the flashboards and the raising of the dam at Turner's Falls by 5.4 feet. The parties agreed that the impact of having removed the flashboards and raised the dam at Turner Falls is complex and, after reviewing several analyses, have agreed that an estimate of nine-tenths of one percent (-009) of Vernon's net electric output is a reasonable estimate of the impact of lost energy production at the Vernon hydroelectric station before and after the contemplated expansion. As such this agreement remains in

effect following the re-powering of Units 5 through 8. The agreement is included in Attachment 2 of the application.

G. Use of Project Power

TransCanada is a member of the New England Power Pool (NEPOOL) and the Vernon Project is part of the NEPOOL interconnected power system for the New England region. NEPOOL, a voluntary organization of nearly 100 individual electric utilities and generators located throughout the six state New England region, accounts for essentially all of the region's electric power production. As of 2006, TransCanada is expected to bid the Vernon Station output into a competitive electricity market under the supervision of the Independent System Operator (ISO) New England. The use of Vernon Project generated power will be within the context of this market.

H. Plans for Future Development

At this time, there are no plans to develop Vernon Project further than that which encompassed the re-powering of the original Units 5 through 8.

Figure B-1. Flow Duration Curve Vernon – Water Years 1972 to 2000

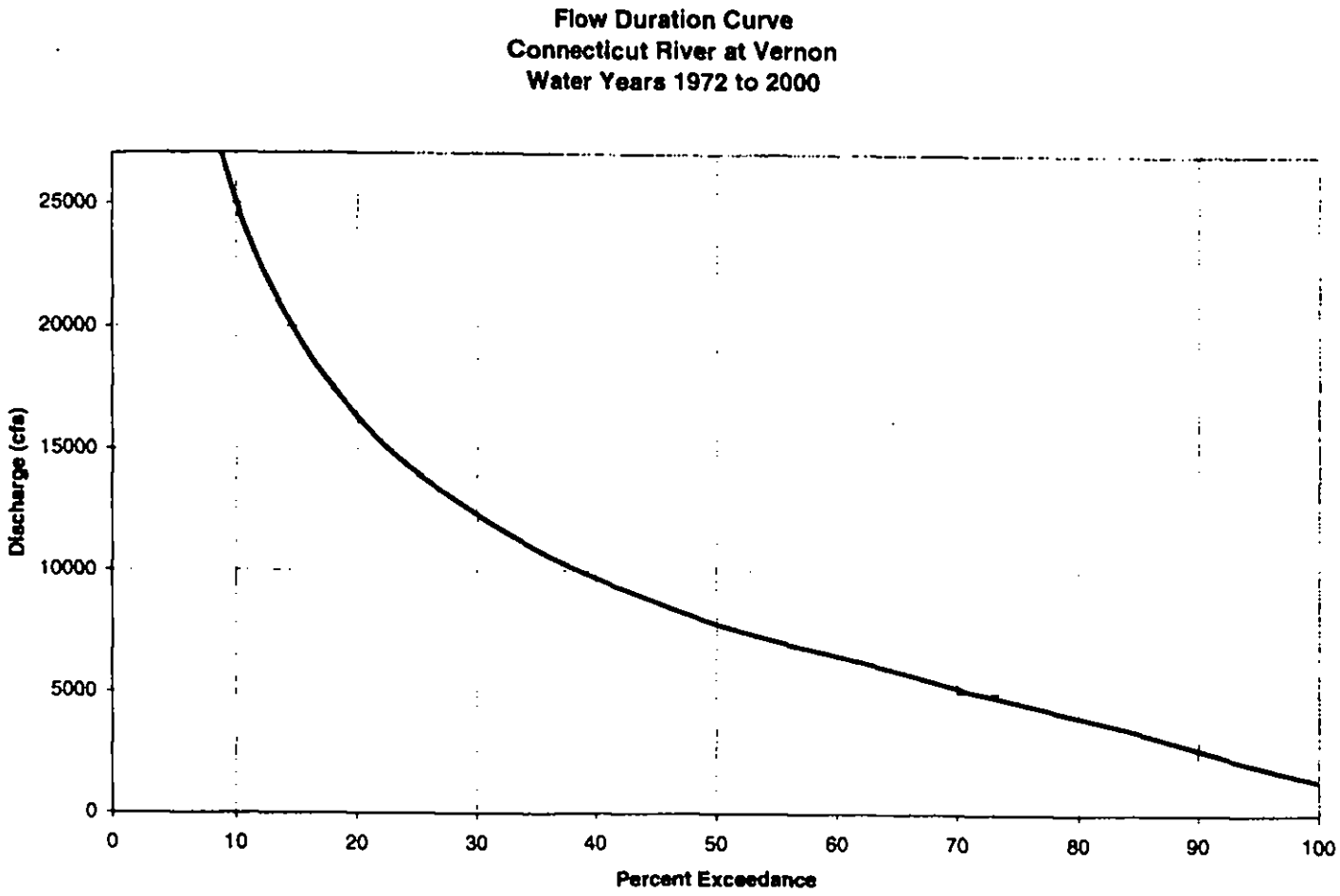


Figure B-2. Historic Natural Local Inflow to Vernon - Sequences 1976 to 1994

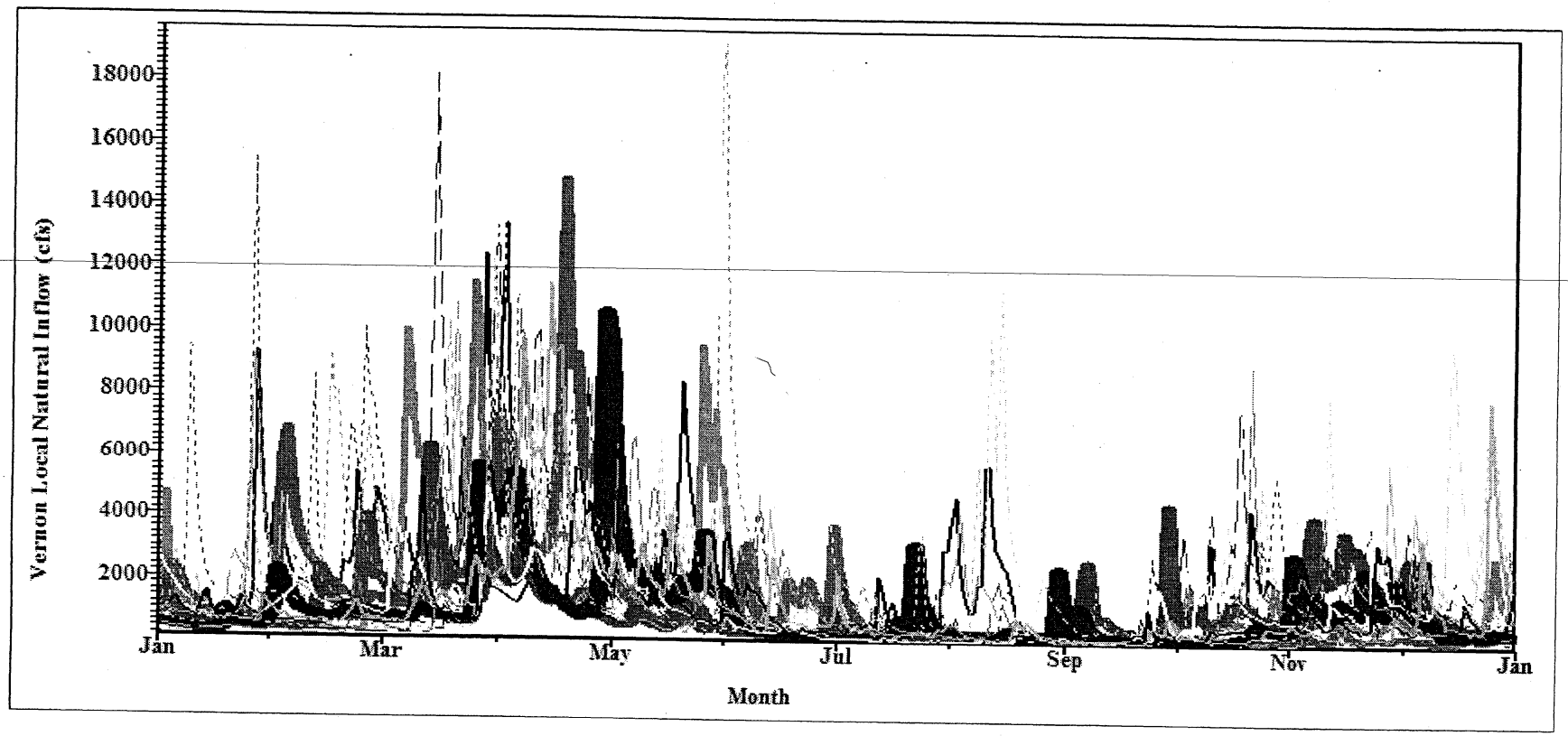


Figure B-3. Vernon Reservoir Area and Capacity Curve

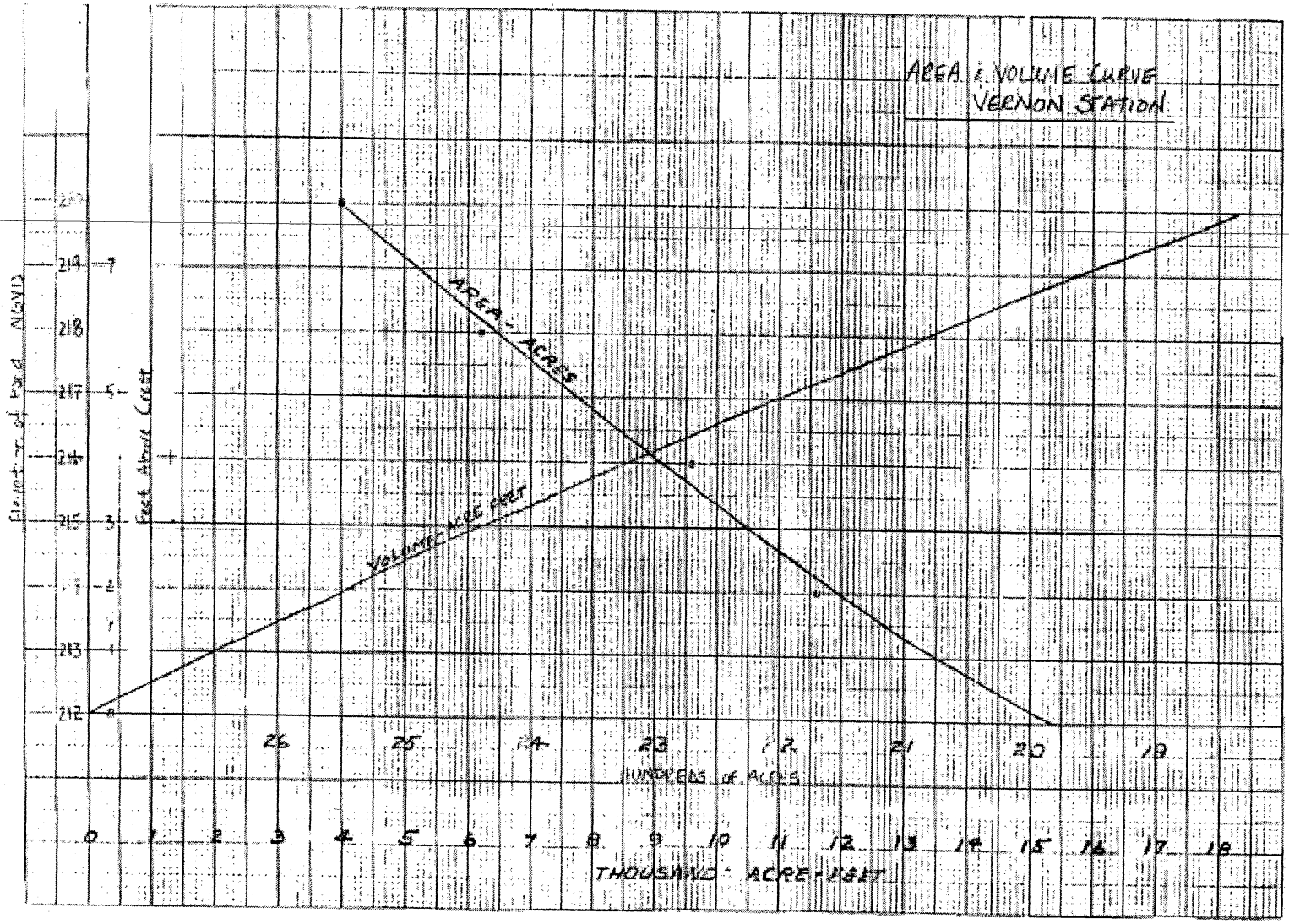


Figure B-4. Vernon Reservoir Storage Above Crest

FIGURE 4

VERNON STATION

Storage Above Crest
Crest of Dam = 212.1 NGVD
Drainage Area = 6266 Sq.Mi.

kWh reflects head change and assumes operation at best efficiency

Elev. (NGVD)	CFSH	kWh	Elev. (NGVD)	CFSH	kWh	Elev. (NGVD)	CFSH	kWh
			216.0	101,185	196,880	220.0	218,230	459,200
212.1	0	0	.1	103,940	202,600	.1	221,295	466,500
.2	2,420	4,380	.2	106,735	208,520	.2	224,400	474,000
.3	4,840	8,760	.3	109,530	214,440	.3	227,505	481,500
.4	7,255	13,140	.4	112,330	220,360	.4	230,605	489,000
.5	9,675	17,520	.5	115,126	226,280	.5	233,710	496,500
.6	12,095	21,900	.6	117,920	232,200	.6	236,815	504,000
.7	14,575	26,500	.7	120,755	238,300	.7	239,955	511,700
.8	17,060	31,100	.8	123,595	244,400	.8	243,095	519,400
.9	19,540	35,700	.9	126,430	250,500	.9	246,230	527,100
213.0	22,020	40,300	217.0	129,270	256,600	221.0	249,370	534,800
.1	24,505	44,900	.1	132,105	262,700	.1	252,510	542,500
.2	27,040	49,680	.2	134,980	269,000	.2	255,686	550,400
.3	29,575	54,460	.3	137,860	275,300	.3	258,860	558,300
.4	32,115	59,240	.4	140,735	281,600	.4	262,035	566,200
.5	34,650	64,020	.5	143,615	287,900	.5	265,210	574,100
.6	37,185	68,800	.6	146,490	294,200	.6	268,385	582,000
.7	39,770	73,780	.7	149,405	300,700	.7	271,595	590,120
.8	42,350	78,760	.8	152,320	307,200	.8	274,805	598,240
.9	44,935	83,740	.9	155,240	313,700	.9	278,010	606,360
214.0	47,515	88,720	218.0	158,155	320,200	222.0	281,220	614,480
.1	50,100	93,700	.1	161,070	326,700	.1	284,430	622,600
.2	52,730	98,880	.2	164,025	333,400			
.3	55,355	104,060	.3	166,980	340,100			
.4	57,985	109,240	.4	169,935	346,800			
.5	60,610	114,420	.5	172,890	353,500			
.6	63,240	119,600	.6	175,845	360,200			
.7	65,910	124,940	.7	178,840	367,080			
.8	68,580	130,280	.8	181,830	373,960			
.9	71,255	135,620	.9	184,825	380,840			
215.0	73,925	140,960	219.0	187,815	387,720			
.1	76,595	146,300	.1	190,810	394,600			
.2	79,310	151,840	.2	193,840	401,680			
.3	82,025	157,380	.3	196,870	408,760			
.4	84,735	162,920	.4	199,900	415,840			
.5	87,450	168,460	.5	202,930	422,920			
.6	90,165	174,000	.6	205,960	430,000			
.7	92,920	179,720	.7	209,025	437,300			
.8	95,675	185,440	.8	212,095	444,600			
.9	98,430	191,160	.9	215,160	451,900			
216.0	101,185	196,880	220.0	218,230	459,200			

Figure B-5. Vernon Tailwater Rating Curve

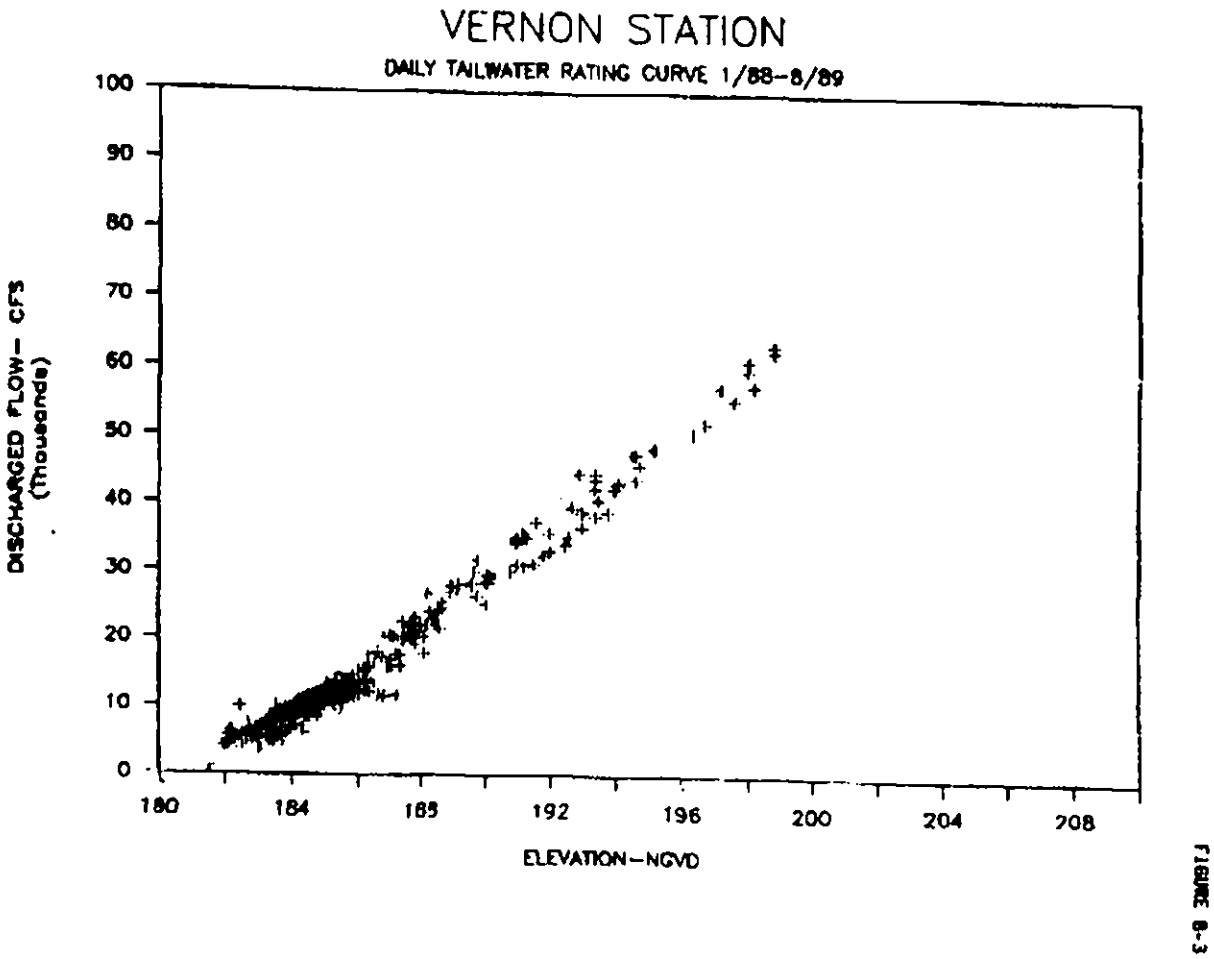


Figure B-6. Vernon Elevation versus Exceedance Percentage

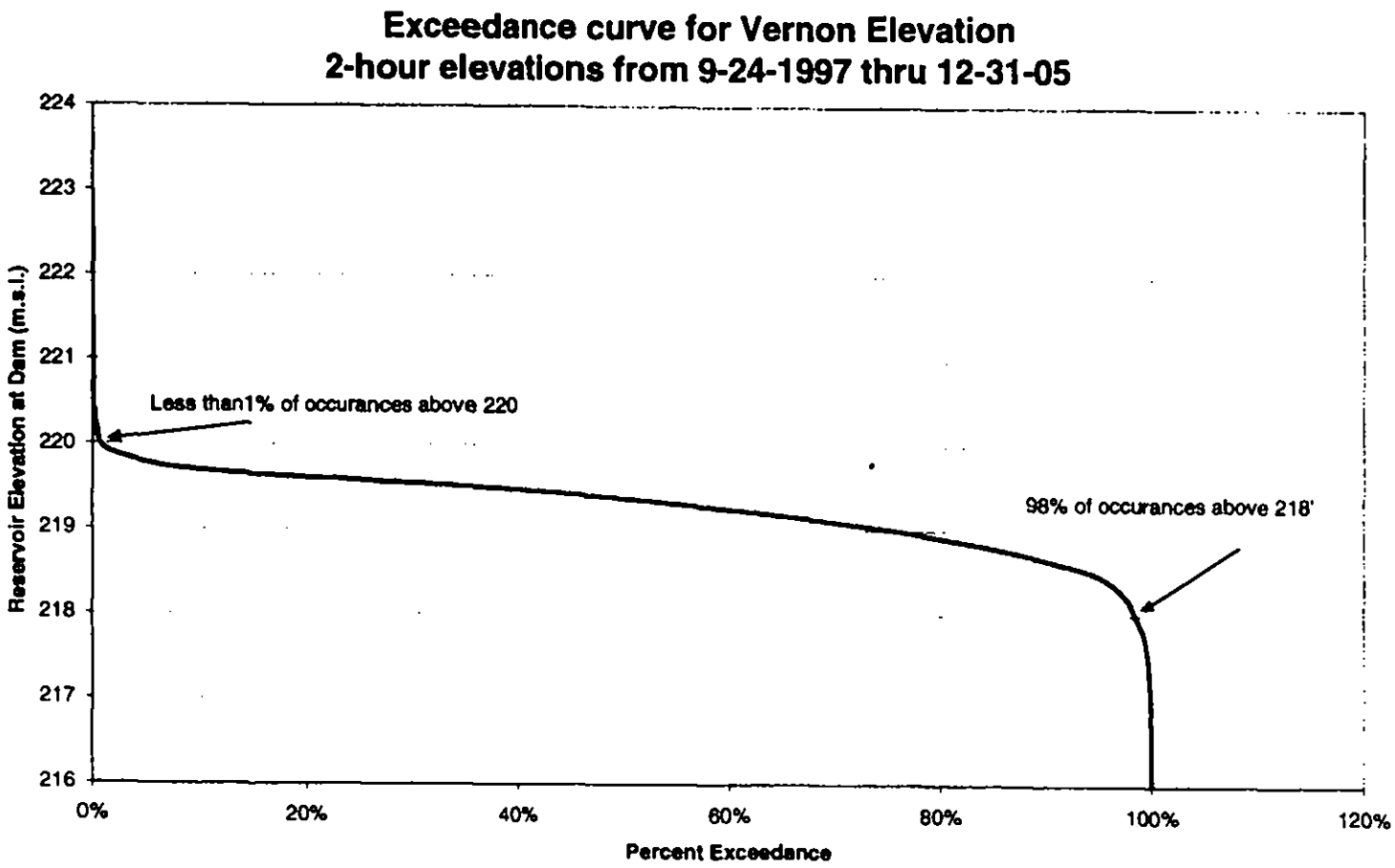
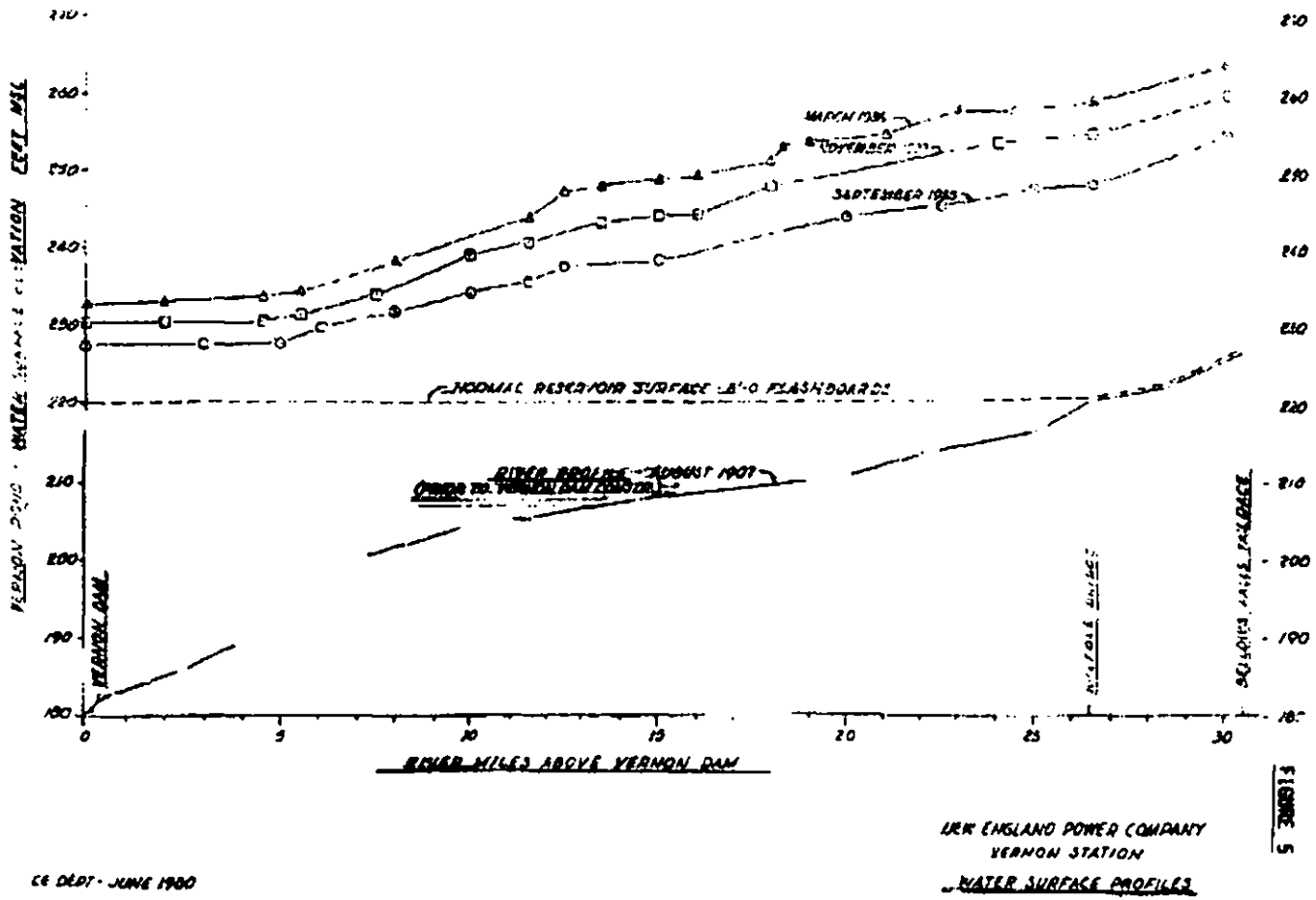


Figure B-7. Vernon River Profile



VIII. EXHIBIT C – CONSTRUCTION HISTORY AND PROPOSED SCHEDULE

A. Construction History

The Vernon Project was constructed between 1907 and 1910. The original construction resulted in the dam and a powerhouse containing eight generating units on the Connecticut River between Vernon, Vermont and Hinsdale, New Hampshire. Five units were completed and placed in operation in 1909 and the remaining three units began operation in 1910.

In 1918, an addition to the powerhouse was started to accommodate two additional units (Units 9 and 10). The addition was completed and Units 9 and 10 began operation in 1921. In 1924 and 1925, the three-runner turbines in four of the original units were replaced by single runner turbines. The present fish ladder was built between 1979 and 1981. Modifications to the crest of the ogee spillway commenced and were made over 1985 and 1986.

A study for replacing Units 5 through 8 was performed in 1988, resulting in a recommendation to demolish the existing units and replace them with two new 14-MW mixed flow turbines in the same location. Detailed engineering was completed on this option, and a FERC amendment (1992 license amendment) was granted, which is still in place today. However, the installation of the two 14-MW units has not moved forward due to poor market conditions, changes in project ownership, and concerns about the risk of deep excavations to the existing powerhouse.

Following the acquisition of the Vernon Project by TransCanada, another feasibility study was performed in the fall of 2005, to revisit all of the replacement options available for Units 5 through 8. The results of this recent study indicated that replacing the four retired units with four new 3- to 4.5-MW units was the most economical option. A competitive bid process was utilized to determine the best unit configuration, which resulted in the selection of installation of four identical new 4-MW axial flow Kaplan units, which is proposed under this non-capacity license amendment.

B. Proposed New Development Construction Schedule

Construction of temporary upstream and downstream bulkheads is presently underway, to allow completion prior to critical fish passage periods and high water conditions. It is anticipated that bulkheads (cofferdam) construction will be complete no later than June 15, 2006. Once completed, the area will then

be de-watered. After an approved Memorandum of Agreement regarding treatment of historic resources is signed by New Hampshire and Vermont State SHPO's, FERC and TransCanada, and the specified on-site documentation is complete, the existing Units 5 through 8 will be dismantled.

Upon receipt of a license amendment, the general construction contract to complete the civil demolition and installation of the new turbine generators will be let. Construction will commence with the demolition of the existing concrete work within bays 5 through 8. New concrete placement will begin with the new draft tube liners, and proceed upwards through the inlet elbows, and embedded portions of the turbines and generators. Following concrete placement, the new Units 5 through 8 will be erected, cofferdams will be removed, and the commissioning and testing program will begin.

Work associated with the unit replacements includes the supply and installation of new intake gates and draft tube bulkheads, upgrading of the existing 2.4kV service for Units 1 through 4, upgrading of the station service, replacement of the high voltage cables to the switchyard transformers, and installation of a new station bridge crane. Static exciters will be installed with the new units, and lubrication, cooling water, ventilation, control and protection systems will be upgraded as part of the project. Construction is anticipated to take about 18 months following receipt of a license amendment. Table C-1 shows the proposed construction schedule for the work associated with the unit replacement.

Table C-1. Approximate Construction Schedule for Unit Implementation

Task	**Begin**[1]	**End**
Civil Construction	June 2006	July 2007
Water Passage Demolition and Concrete	June 2006	November 2006
Install Intake and Draft Tube Gate Guides	November 2006	February 2007
Install Turbine Embedded Parts	October 2006	June 2007
Generator Foundation	May 2007	July 2007
Mechanical Installation	January 2007	October 2007
Install Gates & Hoists	January 2007	March 2007
Install Remainder of Turbines	October 2006	June 2007
Install 2.4 kV Switchgear	August 2006	March 2007
Install Generators	June 2007	September 2007
Install Electrical Systems	July 2007	October 2007
Remove Cofferdam	September 2007	October 2007
Commissioning	January 2007	October 2007
Demobilization	October 2007	October 2007

[1] Approximate schedule assuming FERC approval of proposed amendment in late May 2006.

IX. EXHIBIT D – STATEMENT OF COSTS AND FINANCING

A. Estimated Construction Costs

The following construction cost estimate is based on conceptual design and preliminary drawings available at this time. Estimated costs are based on discussions with contractors and vendors, and previous experience of the Owner's Engineer. It is anticipated that firm construction bids may result in differing component costs. However, TransCanada offers the following estimate based on information available at this time.

i. The Company currently holds all land and water rights necessary to accommodate the Unit Replacement

ii. Estimated Unit Replacement Costs:

Description	**Cost**[1]
General Requirements	$5,144,570
Site Work	$1,326,050
Concrete	$2,578,820
Metals	$70,000
Special Construction	$15,945,000
Mechanical Systems	$160,000
Electrical Systems	$1,818,000
Indirects - Eng & Admin	$2,758,320
Subtotal	$29,800,760
Contingency (@20%)	$5,960,152
Subtotal - Feasibility Estimate	$35,760,912
Owners Adjustment[2] (30%)	$10,728,274
Total	**$46,489,186**

[1] (2005 $USD)
[2] Owner's adjustment represents equipment and contract price increases to reflect current market conditions, and project and construction management costs.

B. Estimated Costs of O&M and Environmental Measures for the New Units

Description	Capital Cost[1]	Annual Cost[1]
Operation and maintenance of units	$0	$250,000
Continue to operate Units 9 or 10 as first-on, last-off units during operation of the upstream fish ladder when flows are below about 12,000 cfs	$0	Negligible
Develop an erosion and sedimentation control plan	Negligible	$0
Perform computational fluid dynamic (CFD) modeling to evaluate tailrace flow patterns and effects to attraction flows for upstream fish passage	$50,000	$0
Conduct study to evaluate the effectiveness of the fish ladder for upstream fish passage during the first two years of commercial operation of the new units	$60,000	$0
Prepare an HPMP for the project	$100,000	$0

[1] (2005 $USD)

C. Estimated Annual Value of Power

The four new 4-MW units are estimated to produce about 53,092 MWh annually. The dependable capacity of these units is assumed to be the same as the installed capacity of 16 MW. With an estimated energy rate of $58.41/MWh and an estimated capacity rate of $40/kW-year, the power value of the four new 4-MW units is estimated to be approximately $3,741,100 per year (2005 $USD). This would result in a total project estimated 188,544 MWh annually with the installation of the four 4-MW units.

D. Sources and Extent of Financing

The Company plans to finance the unit replacement from internal sources as part of its normal capital upgrade financing program.

X. EXHIBIT E – ENVIRONMENTAL REPORT

As part of this non-capacity amendment application for the proposed turbine replacement at the Vernon Project, TransCanada is providing an Applicant Prepared Environmental Assessment (APEA) (*see* Attachment 4). This APEA provides a discussion of the potential environmental effects of the proposed actions associated with the turbine replacement on affected environmental resources within the project area and serves as the Environmental Report for this amendment application.

XI. EXHIBIT F – PROJECT DRAWINGS

Exhibit F contains project drawings detailing the Vernon Project facilities and is considered Critical Energy Infrastructure Information (CEII). Therefore, the revised Exhibit F drawings are not provided to the public and are provided under separate cover. Requests for access to CEII materials should be made to the Commission's CEII Officer.

ATTACHMENT 1

FIGURES REFERENCED IN THE AMENDMENT APPLICATION AND ATTACHMENTS

Attachment 1 contains project drawings detailing the Vernon Project facilities and is considered Critical Energy Infrastructure Information (CEII). Therefore, Attachment 1 is not provided to the public and is provided under separate cover. Requests for access to CEII materials should be made to the Commission's CEII Officer.

ATTACHMENT 2

1992 AMENDMENT ORDER AND OPERATIONAL AGREEMENTS

- **Vernon Project 1992 License Amendment Order and EA**
- **2005 CRASC Coordination Letter**
- **USACE Operational Agreement**
- **Northeast Generating Operational Agreement**
- **Northeast Generating Vernon Backwater Agreement**

UNITED STATES OF AMERICA 59 FERC 62,267
FEDERAL ENERGY REGULATORY COMMISSION

New England Power Company

Project No. 1904-008
Vermont

ORDER AMENDING LICENSE
AND REVISING ANNUAL CHARGES
(ISSUED JUNE 12, 1992)

On February 22, 1991, New England Power Company (NEP), licensee for the Vernon Project, filed an application for an amendment of license under Part I of the Federal Power Act (Act).

The licensee proposes to replace four existing 2-MW turbine/generator units (Units Nos. 5 through 8) with two 14-MW turbine/generator units (Unit Nos. 11 and 12). The proposed change would increase the project's total installed capacity from 24.4 MW to 44.4 MW and increase the total hydraulic capacity from 15,530 cubic feet per second (cfs) to 20,930 cfs. In addition, the licensee also proposes the following additional modifications to the project: (1) install two new outdoor 13.8-kV to 69-kV step-up transformers; (2) replace the existing interior 69-kV bare conductor overhead busses with an underground 13.8-kV interconnection to the new step-up transformers; (3) install two new draft tube extensions for the two 14 MW units; and (4) replace all interior electrical equipment for the turbine/generator units with a modern control system and a new control room.

The modifications would not greatly alter the operation of the project from its present condition since the amount of water available for daily generation would still be dependent on project inflow. The project would still operate to meet periods of high power demand and also operate in a more continuous base load mode when river flows are high enough to support continuous generation.

The Commission issued a public notice of the application. Comments received from the agencies have been fully considered in determining whether to issue this order. No agency objected to the issuance of this order.

The State of Vermont (Vermont) filed a motion to intervene, a Protest, and a Stay Request on June 26, 1991. Vermont withdrew its Protest and Stay Request by a settlement agreement filed on November 20, 1991. However, Vermont did not withdraw its motion to intervene to continue to be a party to this proceeding.

On June 27, 1991, Northeast Utilities Service Corporation (NUSCO) also filed a motion to intervene. NUSCO's concerns were that the proposed increased capacity at the Vernon Project would have negative effects on the operation of the downstream Turners Falls Project (FERC No. 1889) and Northfield Mountain Project (FERC No. 2485). Both projects are licensed to subsidiaries of NUSCO.

In response to NUSCO's comments, NEP stated that the proposed development could have the potential to beneficially affect the downstream projects by reducing fluctuations in the Turners Falls reservoir. Also, NEP stated that the operation of all three projects is coordinated through the New England Power Pool's regional central dispatching system (NEPEX). The present goal of NEPEX is to optimize generation from all the Connecticut Basin projects. NEP stated that if, at some time in the future, NEPEX stopped providing project coordination, NEP and NUSCO could enter into a coordination agreement. Article 304 has been added to the license to ensure continued coordinated operations of the affected projects.

On June 28, 1991, the Army Corps of Engineers (Corps), filed a letter with Commission concerning the application. The letter requested NEP to enter into an agreement with the Corps in order to coordinate flow releases from the Vernon Project with the upstream Corps flood control projects. The Commission will revise Article 32 of the license to specify that NEP and the Corps enter into a new agreement for the coordinated operation of the Vernon Project in the interests of flood control and navigation.

The staff considered the agency and public comments in its preparation of the Environmental Assessment (EA)1. The attached EA also identifies environmental issues in relation to construction impacts on water quality and fish passage. Therefore, the Commission will include Articles 401 through 403 to address these issues.

Subsequent to preparation of the EA, the Vermont State Historic Preservation Officer (SHPO) raised concerns regarding impacts of the proposal on the eligibility of the Vernon Station for the National Registration of Historic Places. The proposed modifications would replace some of the original turbines, and mechanical and electric components, some of which date to 1909.

1 Environmental Assessment, Unit Replacement Project at Vernon Station, FERC Project No. 1904-008, New Hampshire and Vermont, Federal Energy Regulatory Commission, dated April 13, 1991. This document is available in the Commission's public files associated with this proceeding and is attached to this order.

In their letter dated May 15, 1992, the SHPO stated that the proposal would have an adverse effect on properties that are eligible for the National Register of Historic Places. The SHPO also stated that the effects of the modifications could be mitigated by preparing the registration form for the National Register of Historic Places for the Vernon Station, and documenting the components proposed for replacement to Historic American Engineering Records (HAER) standards.

The proposal's effects to the historic characteristics of the Vernon Station will be adequately mitigated by complying with Article 404. This article will require the licensee to prepare the registration form for the National Register of Historic Places and documentation of the components proposed for replacement to HAER standards.

Comprehensive Development

Section 4(e) of the Act states that in deciding whether to issue a license, the Commission, in addition to considering the power and development purposes of the project, shall give equal consideration to the purpose of energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife, the protection of recreational opportunities, and the preservation of other aspects of environmental quality. These purposes are considered in the EA prepared for this project.

Section 10(a)(2)(A) of the Act, 16 U.S.C. 803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under section 10(a)(2), federal and state agencies have filed with the Commission eight comprehensive plans that address various resources in New Hampshire and seven comprehensive plans that address various resources in Vermont. Of these, the staff identified and reviewed five New Hampshire plans2, four Vermont plans3, and one federal plan4 relevant to

2 Wild, Scenic, and Recreational Rivers for New Hampshire, 1977, New Hampshire Office of State Planning; Connecticut River Basin Fish Passage, Flow, and Habitat Alteration Considerations in Relation to Anadromous Fish Restoration, 1981, Technical Committee for Fisheries Management of the Connecticut River; A Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River Basin, 1982, Policy Committee for Fisheries Management of the Connecticut River; New Hampshire Rivers Management and Protection Program, 1988, State of New Hampshire; New Hampshire Wetlands Priority Conservation Plan, 1989, New Hampshire Office of State Planning.

this project. No conflicts were found.

Based upon a review of the agency and public comments filed on this project, and on the staff's independent analysis, the staff finds that the Vernon redevelopment is best adapted to a comprehensive plan for the proper use, conservation, and development of the Connecticut River and other project-related resources.

Recommendations of Federal and State Fish and Wildlife Agencies

Section 10 (j) of the Act, 16 U.S.C. 803(j), requires the Commission to include license conditions, based on recommendations submitted by federal and state fish and wildlife agencies pursuant to the Fish and Wildlife Coordination Act, for protection, mitigation, and enhancement of fish and wildlife. The attached EA for the amendment proposal addresses the concerns of the federal and state fish and wildlife agencies and makes recommendations consistent with those of the agencies.

Summary of Findings

After considering the environmental information in the application for amendment of license, the staff's independent environmental assessment, and other agency and public comments, the staff finds that issuance of this amendment is not a major federal action significantly affecting the quality of the human environment. The EA contains background information, analysis of impacts, support for related license articles, and the basis for a finding of no significant impact on the environment.

The Vernon Project, as amended by this order, is best adapted to the comprehensive development of the waterway for beneficial public uses. The increase in the authorized generating capacity from 24.4 MW to 44.4 MW (59,200 horsepower equivalent) is in the interest of maximizing the project's

3 Connecticut River Basin Fish Passage, Flow, and Habitat Alteration Considerations in Relation to Anadromous Fish Restoration, 1981, Technical Committee for Fisheries Management of the Connecticut River; A Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River Basin, 1982, Policy Committee for Fisheries Management of the Connecticut River; Vermont State Comprehensive Outdoor Recreation Plan, 1983-1988, 1983, Vermont Agency of Environmental Conservation; Vermont Rivers Study, 1986, Vermont Agency of Environmental Conservation.

4 Restoration of Atlantic Salmon to New England Rivers: Final Environmental Impact Statement, 1989, U.S. Fish and Wildlife Service.

electrical generating potential. The licensee will pay the United States the revised annual charges effective the first day of the month in which this order is issued.

The Director orders:

(A) The license for the Vernon Project, FERC No. 1904, is amended as proposed in the application filed on February 22, 1991, effective the first day of the month in which this order is issued.

(B) The following exhibits conform to the Commission's rules and regulations. They are approved and made part of the license, superseding the existing exhibits:

Exhibit A - Pages A-1 through A-4 of the exhibit A entitled "Exhibit A - Project Description", filed on February 22, 1991.

Exhibit	FERC No.	Title	Superseding
F-1	1904-93	General Layout of Plant	1904-87
F-2	1904-94	Details of Spillway	1904-88
F-3	1904-95	Powerhouse & Switchyard	1904-89
F-4	1904-96	Section of Powerhouse, Unit Nos. 1-4	1904-90
F-5	1904-97	Section of Powerhouse, Unit Nos. 11-12	1904-91
F-6	1904-98	Section of Powerhouse, Unit Nos. 9-10	1904-92

(C) The superseded exhibit F drawings are eliminated from the license.

(D) The exhibit M of the license, filed on June 23, 1969, is superseded and eliminated from the license.

(E) The project description in ordering paragraph (B)(2) of the license is revised to read as follows:

(2) Project works consisting of: (a) a concrete gravity dam comprising of a 500-foot-long overflow spillway with 8-foot-high flashboards, a 100-foot-long gated sill block with two

75 foot-high by 50-foot-long tainter gates, and a 353-foot-long non-overflow section; (b) Vernon Reservoir with a water surface area of 2,550 acres at normal pool elevation 726.1 (NGVD) extending about 2½ miles upstream; (c) a powerhouse

containing four 5,000-kW, two 14,900-kW, and two 4,200-kW generating units for a total installed capacity of 44,400-kW; (d) transmission facilities consisting of: (i) generating leads; (ii) four 66/2.3 kV and two 2?2.?-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.

(F) Article 30 of the license is revised to read as follows:

Article 30. The licensee shall pay the United States the following annual charge, effective the first day of the month in which this order is issued:

a 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 59,200 horsepower.

(G) Article 32 of the license is revised to read as follows:

Article 32. The licensee shall enter into an agreement with the Department of Army, Corps of Engineers (Corps), providing for the coordinated operation of the project, in the interest of flood control and navigation, on the Connecticut River in accordance with the rules and regulations prescribed by the Secretary of the Army. A copy of the agreement shall be filed with the Commission within one year of the date of this order. If the licensee and the Corps fail to reach an agreement, then the licensee shall file its proposals for coordinated operation of the project with other water resource projects on the Connecticut River, together with a copy of the Corp's objections to the licensee's proposals. The Commission reserves the right to impose conditions on the licensee for coordinated operation of the project.

(H) The following articles are added to and made part of the license for the Vernon Project:

Article 301. The licensee shall commence construction of the revised project works within two years from the issuance date of this order and shall complete construction of the project within four years from the issuance date of this order.

Article 402. The licensee shall, at least 60 days prior to the start of construction, submit one copy to the Commission's Regional Director and two copies to the Commission (one of these shall be a courtesy copy to the Director, Division of Dam Safety and Inspections), of the final contract drawings and specifications for pertinent features of the revised project works, such as water retention structures, powerhouse, and water conveyance structures. 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 water retention structures, powerhouse, or water conveyance structures, the plans and specifications must be accompanied by revised Exhibit F and G drawings, as necessary.

Article 403. Within 90 days after constructing the revised project works, the licensee must file for Commission approval revised exhibits A, F, and G to describe and show the project as built.

Article 404. The licensee shall continue to allow the New England Power Pool's regional central dispatching system (NEPEX) to coordinate the operation of the Vernon Project with the Northfield Mountain Project (FERC No. 2485) and Turners Falls Project (FERC No. 1889) for generation output. Both the Northfield Mountain and Turners Falls Projects are immediately downstream of the Vernon Project and owned by subsidiaries of Northeast Utilities Service Company (NUSCO). In the event that NEPEX will no longer continue to adequately coordinate the projects' operation, the licensee shall enter into a reasonable agreement with NUSCO to coordinate the operation of the three projects. If the licensee must enter into an agreement with NUSCO, then the licensee shall submit a copy of this agreement to the Commission. The Commission reserves the right to impose conditions on the licensee for coordinated operation of the project.

Article 401. The licensee shall, in consultation with the New Hampshire Water Supply and Pollution Control Division (NHWSPC) and the Vermont Agency of Natural Resources (VANR), and at least 90 days before commencing any project-related land clearing or land disturbing activities, 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 erosion control plan shall be based on the actual geological, soil, and groundwater conditions and final project design. The erosion control plan shall contain, as a minimum, the following measures: 1) cofferdams, perimeter control measures, measures to divert runoff around disturbed land surfaces and to collect and filter runoff, provisions for energy dissipation, rip-rap, and permanent drainage where necessary; 2)

a revegetation plan; and 3) disposal of excavated materials above the high water mark and storage of fuel and chemicals used in construction in a manner to prevent releases to water bodies. In addition, the licensee shall take every reasonable precaution during construction to prevent the discharge of petrochemicals, wet concrete, or other materials and debris into the river. Debris generated shall be disposed of properly and in a non-wetland location.

The licensee shall also include in the plan documentation of consultation with, and recommendations of, the NHWSPC and the VANR. Specific descriptions of how all of the agency comments and recommendations are accommodated by the plan should be included in the filing. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons for rejection, based on project-specific information. The licensee shall allow a minimum of 30 days for the agencies to comment on the plan prior to filing the plan with the Commission. The licensee shall not commence any land clearing or land disturbing activities until the licensee is notified in writing that the Commission approves the plan. The licensee shall give prior written notice to the NHWSPC and the VANR at least 48 hours prior to the commencement of land clearing or land disturbing activities.

The Commission reserves the right to require changes to the plan. Upon notification of Commission approval, the licensee shall begin implementing the erosion control plan, including any changes required by the Commission.

Article 402. At least 90 days before commencing any project-related construction activities, the licensee shall file a plan for Commission approval to ensure the safe and efficient upstream passage of Atlantic salmon, American shad, and other anadromous fishes during the construction and operation of the new units. The upstream passage plan shall include, but not be limited to, the following: 1) provisions for constructing the new units to avoid the driving of sheet pilings in the tailrace during the upstream migration of anadromous fishes at the project; 2) the results of the licensee's hydraulic modelling study showing the effects of the new units' discharges on the hydraulic conditions in the project tailrace; 3) recommendations, based on the results of the modelling study, for any changes to the project's structures or operation needed to ensure the safe and efficient upstream passage of anadromous fishes; 4) a proposed plan and schedule for monitoring the effectiveness of the fish ladder during operation of the new units; and 5) a schedule for filing with the Commission the results of the monitoring and, for approval, any additional recommended changes to the project's structures or operation, based on the monitoring results, to ensure the safe and efficient upstream passage of anadromous fishes.

The licensee shall prepare the plan following consultation with the Connecticut River Atlantic Salmon Commission (CRASC), the U.S. Fish and Wildlife Service (FWS), the Vermont Department of Fish and Wildlife (VDFW), and the New Hampshire Fish and Game Department (NHFGD). 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 comments of the agencies are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations prior to filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing should include the licensee's reasons for not doing so, based on project specific information.

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 to with the Commission for approval. The licensee shall consult with CRASC and the other fishery agencies on the study results and on the proposed modifications. The Commission reserves the right to require any changes to the plan to improve the effectiveness of upstream passage of anadromous fishes at the project.

Article 403. At least 90 days before commencing any project-related construction activities, the licensee shall file with the Commission for approval a plan to provide safe and efficient downstream passage for Atlantic salmon smolts, American shad, and blueback herring during the construction and operation of the new units. The downstream passage plan shall include, but not be limited to, the following: 1) provisions for alternate interim downstream fish passage, in the event that construction activities interfere with the operation or effectiveness of the existing interim downstream passage facility; 2) functional design drawings of permanent downstream passage facilities and a schedule for constructing these facilities so that the facilities are operational prior to the start of operation of the new units; 3) provisions to monitor the effectiveness of the downstream passage facilities in minimizing the entrainment of anadromous fishes; and 4) provisions to operate the downstream fish passage system in accordance with the annual notification letter issued by the CRASC.

The licensee shall prepare the plan following consultation with the CRASC and the other fishery agencies. 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 comments of the agencies are accommodated by the plan. The licensee shall allow a minimum of

60 days for the agencies to comment and to make recommendations, prior to filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing should include the licensee's reasons for not doing so, based on project-specific information.

The Commission reserves the right to require changes to the plan. Operation of the new units shall not begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 404. The licensee shall, prior to commencing any project-related construction activities, that will affect the characteristics of the Vernon Station that make it eligible for the National Register of Historic Places, (1) prepare the National Register of Historic Places registration form consistent with the Secretary of the Interior's Standards and Guidelines for Historic Preservation for the Vernon Station, and (2) document the components proposed for replacement according to the standards of the Historic American Engineering Record (HAER) of the National Park Service (NPS). The HAER documentation shall be based on the recommendations of the Vermont and New Hampshire State Historic Preservation Officers (SHPO) and the HAER staff of the NPS. The licensee shall file with the Commission copies of letters from the Vermont and New Hampshire SHPO's commenting on the registration form for the Vernon Station for the National Register of Historic Places. The licensee shall also file a copy of a letter from the NPS accepting the HAER documentation. The Commission may require changes to the documentation based on this filing. No construction activities that will affect the characteristics of the Vernon Station that make it eligible for the National Register of Historic Places shall begin until the licensee is notified by the Commission that the documentation complies with requirements of the article.

(I) Within 90 days of the date of issuance of this order, the licensee shall file an original of the approved exhibit F drawings reproduced on silver or gelatin 35 mm microfilm mounted on Type D (3 1/4" x 7 3/8") aperture cards for each drawing. In addition, the licensee shall file two Diazo-type duplicate aperture cards. The original set and one duplicate set of aperture cards should be filed with the Secretary of the Commission. The remaining duplicate set of aperture cards should be filed with the Commission's New York Regional Office. The FERC drawing number (1904-93 through 1904-98) shall be shown in the margin below the title block of the microfilmed drawing and also in the upper right corner of each aperture card. The top line of the aperture card shall show the FERC exhibit (i.e., F-1 through F-6), Project Number, Drawing Title, and date of this order.

(J) This order constitutes final agency action. Requests for 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.

J. Mark Robinson
Director, Division of Project
Compliance and Administration

ENVIRONMENTAL ASSESSMENT
FOR HYDROPOWER LICENSE AMENDMENT

Unit Replacement Project at Vernon Station

FERC Project No. 1904-075

New Hampshire and Vermont

Federal Energy Regulatory Commission
Office of Hydropower Licensing
Division of Project Compliance and Administration
825 N. Capitol Street, NE
Washington, D.C. 20426

April 13, 1992

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ENVIRONMENTAL ASSESSMENT

FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF HYDROPOWER LICENSING
DIVISION OF PROJECT COMPLIANCE AND ADMINISTRATION

Date: April 13, 1992

Project Name: Vernon FERC Project No. 1904-009

A. APPLICATION

1. Application type: Amendment of License

2. Date filed with the Commission: February 22, 1991

3. Applicant: New England Power Company (NEP)

4. Water body: Connecticut River

5. Nearest city or town: Hinsdale, NH

6. County: Cheshire, NH; Windham, VT State: NH/VT

B. PURPOSE AND NEED FOR ACTION

NEP proposes to redevelop the Vernon Project by replacing four existing 2.0 megawatt (MW) turbine/generator units (Units No. 5 through 8) with two new 14-MW units and replacing all electrical equipment and controls. The proposed change would increase the project's total installed capacity from the authorized 24.4 MW to 44.4 MW.

The proposed redevelopment of the Vernon Project would result in more efficient use of water passing through the project and increase average annual generation from 124,470 megawatt hours (MWh) to about 180,500 MWh.

C. PROPOSED PROJECT AND ALTERNATIVES

1. Description of the proposed action.

NEP proposes to replace four eighty-year-old existing 2.0-MW turbine/generator units (Units No. 5 through 8) with two new 14-MW units. The proposed changes would increase the maximum hydraulic capacity of the project from 15,530 cubic feet per second (cfs) to 20,930 cfs. All interior electrical equipment connecting the remaining generating units (Units No. 1 through 4, 9 and 10) will be replaced with new modern control systems and a

new control room.

NEP also proposes to install two new outdoor 13.8 to 69-kilovolt (kV) step up transformers located at the south end of the 69-kV switchyard, replace the existing interior 69-kV bare conductor overhead busses with an underground 13.8-kV interconnection to the new step-up transformers, and install two new draft tube extensions for the two new 14-MW units. These extensions would project downstream of the fish ladder's collection channel.

The operation of the Vernon Project following the proposed unit replacements would not be greatly altered from the present condition, since the amount of water available for daily generation would still be dependent on project inflow. The Vernon Station would still operate to meet periods of high power demand during periods of low river flows, and it would operate in a more continuous base load mode when river flows are high enough to support continuous generation, primarily during high runoff periods (e.g., spring freshets, storm events).

NEP estimates that, as a result of the larger Station discharge capacity, gate spillage would be reduced from about 14 percent to about 10.5 percent on a yearly basis. The time that the Station would be at the minimum flow discharge of 1,250 cfs would increase from about 32 percent to about 76 percent on a yearly basis.

The current minimum flow release of 1,250 cfs would be maintained during and following construction.

2. Alternatives to the proposed action.

Alternatives to the proposed action include the no-action alternative and the installation of a greater or lesser amount of capacity at the project.

The no action alternative would not result in the development of the unused hydraulic capacity at the site and not result in the more efficient use of the water that now passes through the project. Further, because of the deteriorating condition of the four eighty-year old 2.0 MW units, NEP has estimated that approximately $8.5 million worth of repairs would be needed to restore the existing units.

Other alternatives exist with respect to the number and sizes of new units to install as replacements for the old units. NEP considered the installation of one or two new units, and based on physical constraints, commercial availability, available river flows, and a cost/benefit analysis, decided that the two proposed 14-MW units represented the best choice under the existing alternatives.

3. Applicant's proposed mitigative measures.

a. Construction.

The proposed unit replacements would not disturb areas outside of the existing powerhouse and adjacent switchyard. The powerhouse area would be isolated from the Connecticut River through the use of upstream and downstream structurally supported sheet pile cofferdams. To avoid sedimentation problems, all work would take place within the area behind the cofferdams. Dewatering discharge would be clarified to meet downstream water quality standards prior to being returned to the river.

Further, to avoid potential disruptive effects on usage of the adjacent fish ladder, NEP has agreed not to drive sheet piling into the tailrace while the fish ladder is being operated for upstream fish passage.

b. Operation.

NEP proposes to conduct fish behavior studies in the forebay and tailrace of the project following operation of the new units to determine whether the proposed changes adversely affect upstream or downstream fish passage at the project. NEP proposes to make changes to project structures or operation if the studies show that fish passage has been adversely affected.

D. CONSULTATION AND COMPLIANCE

1. Fish and wildlife agency consultation (Fish & Wildlife Coordination Act).

a. U.S. Fish & Wildlife Service (FWS): XX Yes. No.
b. State(s): XX Yes. No.
c. National Marine Fisheries Service (NMFS): Yes. XX No.

2. Section 7 consultation (Endangered Species Act).

a. Listed species: XX None. Present:

b. Consultation: XX Not required.
Required; completed: / / .

3. Section 401 certification (Clean Water Act).

Not required.

XX Required; applicant requested certification on 02/22/91.

Status : XX Granted by the certifying agency1 on 12/09/91.

XX Waived by the certifying agency2 on 11/18/913.

E. COMMENTS

1. The following agencies and entities provided comments on the application or filed a motion to intervene in response to the public notice dated 05/10/91.

Commenting agencies and other entities	Date of letter
U.S. Fish and Wildlife Service	07/11/91
Vermont Agency of Natural Resources	06/26/914
New Hampshire Fish and Game Department	09/13/91
U.S. Army Corps of Engineers	05/24/91
Connecticut River Atlantic Salmon Commission	11/04/91

Motions to intervene	Date of motion
State of Vermont	06/25/915
Northeast Utilities Service Company	06/26/91

2. XX The applicant responded to the comments or motion(s) to intervene by letter(s) dated 06/11/91 and 06/12/91.

1New Hampshire

2Vermont

3Vermont had originally claimed jurisdiction under 401, which NEP disputed. In a Settlement Agreement entered into with NEP, dated November 18, 1991, the State of Vermont waived 401 Certification, to the extent that it may have been required.

4This comment letter was withdrawn in a Settlement Agreement between the State of Vermont and NEP dated November 18, 1991.

5On June 26, 1991, The State of Vermont also filed a Protest and Stay Request with the Commission. The Protest and Stay Request was withdrawn by the Settlement Agreement dated November 18, 1991. The motion to intervene, however, was not withdrawn..

F. AFFECTED ENVIRONMENT

The mainstem Connecticut River in the area of the Vernon Project is a critical component of the Connecticut River Anadromous Fish Restoration Program. As an example, over 760,000 Atlantic salmon fry and 24,000 smolts were stocked into tributaries upstream of the Vernon Project in 1991, and fry stockings are slated to be increased substantially in the next few years. In addition, one out of every ten returning adult salmon is not captured at downstream fishways, but allowed to continue upstream to spawn naturally. These fish should provide additional smolt production upstream from Vernon.

Because of the use of the mainstem Connecticut River and upstream tributaries by salmon, shad, and herring, both upstream and downstream fish passage are critical issues at the Vernon Project.

Upstream passage for anadromous fishes at the Vernon Project is provided by a combination modified Ice Harbor and vertical slot design fish ladder located on the Vermont shore. The fish ladder was constructed and became operational in 1981. A fish collection gallery with a series of entrance weirs lies over the project's draft tubes. The Vernon ladder is designed to pass 40,000 adult Atlantic salmon and 750,000 adult American shad annually. Usage of the fish ladder by these species has generally increased since its completion. During 1991, five salmon and over 5',000 American shad passed upstream of the project via the fish ladder, testimony to the fact that while successes have been achieved, restoration is far from complete.

No permanent facilities currently exist for the downstream passage of anadromous fishes at the Vernon Project. Downstream fish passage is needed during the spring (Atlantic salmon smolts), summer (adult shad), and fall (juvenile shad). Prior to 1991, the log and ice sluice at Vernon was operated during the spring to provide downstream passage for salmon smolts. Studies conducted during 1988 (Saunders and Mudre 1988) indicated that the sluice was not effective for passing Atlantic salmon smolts when operated at a gate opening of 1-2 feet. The sluice was more effective in tests conducted during 1990, passing up to 36 percent (mean 21%) of the smolts when the gate opening was 3.5 feet (Royer et al. 1991).

By order dated July 26, 1990, the Director, Division of Project Compliance and Administration (in FERC's Office of Hydropower Licensing), issued an order approving an interim downstream fish passage facility at the project. This interim facility consists of a bypass conduit that was constructed inside an unused exciter bay in the powerhouse. This facility became

operational on April 1, 1991. Testing of the effectiveness of the interim facility was conducted during 1991, however the results of the studies are not currently complete. It is anticipated that the fish bypass conduit will be a component of the permanent downstream fish passage system implemented at the project.

Downstream passage for anadromous fishes at Vernon is also provided by spillage over the dam. Spillage typically occurs only in the spring, during high flows. Consequently, spillage would typically be expected to benefit only smolt migrations, and would not be significant for the downstream passage of juvenile or adult clupeids.

6. ENVIRONMENTAL IMPACTS AND RECOMMENDATIONS

Redevelopment of the Vernon Project has the potential for minor short-term impacts on downstream water quality during construction. Short and/or long-term impacts are possible on fisheries resources through an increase in entrainment or a reduction in fish passage efficiency. Long-term impacts are possible on the river flow regime, due to the increase in the hydraulic capacity of the project. There would be no adverse impacts on vegetation, wildlife resources, aesthetics, cultural resources, land use, or recreation associated with the implementation of the amendment proposal.

The following four environmental impact issues have been identified in relation to the proposed license amendment: 1) construction impacts on water quality and fish passage; 2) upstream fish passage; 3) downstream fish passage; and 4) changes in water flow regime.

1. Construction Impacts on Water Quality and Fish Passage

The proposed construction has the potential to cause short-term impacts on water quality, including turbidity, sedimentation, and discharge of construction pollutants (e.g., fuel, lubricating oil, or debris). However, standard construction precautions should minimize the probability that these impacts will occur. The licensee proposes to isolate the work area from the river by sheet-pile cofferdams, and to use settling basins to clarify water before it is returned to the river.

Minimal disturbance of land would occur during the proposed redevelopment. Nonetheless, the licensee should ensure that appropriate erosion and sediment controls are employed to prevent suspended sediments from entering the Connecticut River. The licensee should also ensure that construction-related pollutants and debris do not enter the Connecticut River. Consequently, the

licensee should prepare an erosion, sediment, and construction debris control plan prior to beginning any land-disturbing activities. The plan should be developed in consultation with the New Hampshire Fish and Game Department (NHFGD) and the Vermont Agency of Natural Resources (VANR) and filed for Commission approval at least one month prior to the start of any land disturbing activities.

The resource agencies raised the concern that construction activities might also disrupt fish passage at the project. The agencies stated that the driving of sheet-pile cofferdams in the tailrace may frighten upstream migrant fish away from the fish ladder entrance. To avoid this potentiality, NEP has agreed to not drive sheet piling into the tailrace while the fish ladder is being operated for upstream fish passage. Staff finds that this proposal is satisfactory, and the licensee should refrain from driving sheet piling into the tailrace during the upstream migration of anadromous fishes.

The agencies also stated that cofferdams or construction activities on the upstream face of the powerhouse might, depending on time of year, interfere with the operation of the interim downstream passage facility. Because of the potential impact on downstream migrant fishes, in the event that activities associated with the construction of the new units interfere with the operation or effectiveness of the interim downstream passage facilities, the licensee should, following consultation with the Connecticut River Atlantic Salmon Commission (CRASC) and the other fishery agencies, file for Commission approval, a plan to provide an alternate interim downstream passage system.

2. Upstream Fish Passage

The proposed new turbine/generator units will discharge a greater flow volume than the present units and at an upturned angle. This new configuration may create a boil at the head of the tailrace below the powerhouse, and near the upstream fishway entrance gallery. This boil may interfere with the effectiveness of the existing fish ladder for upstream fish passage.

NEP has developed a scale physical model of the facility to model plant outflows in order to determine the potential effects of the new units on fishway guidance and attraction flows. Preliminary results of the modelling indicate that there would be no changes in tailrace hydraulic conditions at flows exceeding 10,290 cfs. However, the model showed that, at lower flows, a slight back eddy would be present near the fish ladder entrance when only the two new units (Units 11 and 12) were running. The condition was found to be corrected by dividing the load between the new units and existing Units 9 and 10. Based on these preliminary results, NEP proposes to run a portion of the load through either or both Units 9 or 10 to eliminate the eddy at

flows below about 10,000 cfs.

The licensee should complete the modelling analyses and consult with CRASC and the other fishery agencies regarding the modelling results, and any proposed measures to correct problems identified. The licensee should file the modelling results showing the effects of the new unit discharges on the operation of the existing fish ladder and recommendations, based on the results of the modelling study, for any changes to the project's structures or operation needed to ensure the safe and efficient upstream passage of anadromous fishes. This filing should be part of an upstream fish passage plan that the licensee should develop and file with the Commission for approval.

To gain additional insight into the effects, if any, of the proposed redevelopment on fish passage, NEP proposes to conduct fish behavior studies in the tailrace after the new units begin operation, in order to determine if the back eddy predicted by the model tests, or other flow changes, would actually deter fish from using the main entrance of the fish ladder. The results of these studies would indicate whether any changes in project structures or operation are warranted.

Staff further finds that these proposed behavioral studies should be conducted. Consequently, following operation of the new units with any proposed modifications, the licensee should consult with CRASC and the other fishery agencies to develop a study plan and conduct a study to evaluate the effectiveness of the fish ladder under the new hydraulic regime. The licensee shall file with the Commission a post-operational report describing the passage system effectiveness, and, for approval, any proposed measures or further studies.

3. Downstream Fish Passage

Because the proposed redevelopment at the Vernon Project would increase the total hydraulic capacity of the plant, the potential exists for a reduction in the frequency and magnitude of spillage at the project. Under normal efficient maximum operation, the project currently uses about 11,000 cfs of river flow. Following the proposed unit replacements, normal efficient maximum discharge would increase to about 17,800 cfs.

The reduction of spill would increase the likelihood of fish entrainment at the project, and thus the potential for turbine-related mortality. A study conducted at Vernon during 1990 showed that 44 to 86 percent of salmon smolts passed downstream via spillage during those times when spill was occurring (Royer et al. 1991).

NEP estimates that the proposed redevelopment would decrease spillage about 4 percent on an annual basis, from about 14

percent to about 10 percent. However, it is more appropriate to consider spill reductions as they relate to specific downstream migrations. Under existing conditions, spillage is important only for the Atlantic salmon smolt outmigration, since river flows during summer and fall (when adult shad and juvenile clupeids outmigrate) are typically insufficient to allow spillage.

Staff studied flow data for the Connecticut River at the Vernon Project to determine the expected magnitude of spill reduction during the period of time when Atlantic salmon smolts outmigrate. For purposes of this analysis, the smolt migration was considered to occur during the month of May. Based on 19 years of water temperature data, Saunders (1987) determined that the likely period of smolt migration at the Bellows Falls Project (FERC No. 1855), approximately 33 miles upstream from Vernon, was from April 27 to June 14, annually, with the great majority of the migration occurring during the month of May.

Analysis of the flow duration curve for the month of May (based on data from 1915 to 1987) indicates that the proposed change in maximum normal efficient discharge from 1,000 cfs to 17,800 cfs would reduce the percent of time that spillage occurred during May from about 30 percent of the time to about 17 percent of the time, a reduction in spillage of about 45 percent.

Staff also analyzed the average daily flow at the Vernon Project over the period 1981 to 1990 (Figure 1). Over this period, flow in excess of 11,000 cfs occurred an average of 22 days (range 7 to 51 days) during the month of May. Over the same period, flows in excess of 17,800 cfs occurred an average of 12 days (range 0 to 26 days). This corresponds to a reduction in the average number of days that spillage would have occurred of about 46 percent. Based on the average daily flow data, the proposed redevelopment would tend to restrict spillage to the first half of May.

The reduction in spillage during the latter half of May could differentially impact wild, as opposed to hatchery smolts. Saunders and Madre (1988) studied smolt passage at the Bellows Falls Project and found that peak migration of hatchery smolts occurred about 10 days prior to the peak migration for wild smolts in 1987 (i.e., May 10 versus May 20). If this finding represents a general trend, the proposed redevelopment could have a more serious impact on wild smolts.

Because of the potential for increased adverse impacts on Atlantic salmon smolts resulting from operation of the proposed new units, it is imperative that effective downstream passage facilities are installed and operated at the Vernon Project.

Downstream fish passage at Vernon is the subject of a

Figure 1. Average River Flows at the Vernon Project: May 1981 1990. Horizontal Lines Indicate Current and Proposed Normal Efficient Maximum Discharge (B.C.).

July 26, 1990 Memorandum of Agreement (MOA) between NEP and the resource agencies. This agreement establishes a mechanism and a schedule to provide downstream passage systems at NEP projects on the Connecticut River. Under this agreement, NEP has agreed to the installation of permanent downstream fish passage facilities at the Vernon Project by 1994. The licensee should continue to cooperate with the fishery agencies on downstream fish passage issues, and remedy any adverse impacts associated with the proposed redevelopment.

The licensee should install downstream fish passage facilities or implement other measures to provide safe and efficient downstream passage for Atlantic salmon, American shad, and herring, concurrent with the planning and construction of the new units. These facilities should be operational prior to the start of operation of the new units. The design of permanent downstream fishways should be developed in consultation with CRASC and other fishery agencies and should be filed for Commission approval at least 30 days prior to their proposed construction.

Downstream fish passage facilities should be operated in accordance with the annual notification letter issued by the

CRASC, in conjunction with the U.S. Fish and Wildlife Service (FWS), the Vermont Department of Fish and Wildlife (VDFW), and the New Hampshire Fish and Game Department (NHFGD).

Once operational, the approved downstream fish passage system should be monitored to determine the effectiveness of the system in minimizing the entrainment or anadromous fishes. Study plans, including schedules for conducting the monitoring and submitting reports, should be developed in consultation with the CRASC and the other fishery agencies and filed for Commission approval along with the downstream fish passage designs.

The results of the monitoring should be filed with the Commission according to the approved schedule. If the results indicate that modifications to the downstream passage measures are needed, the licensee should also file recommendations for these changes with the Commission for approval. The licensee should consult with CRASC and the other fishery agencies on the monitoring results and on the proposed modifications.

4. Changes in Water Flow Regime

In their Motion to Intervene and Comments, Northeast Utilities (NU) expressed concern that the increased hydraulic capacity resulting from the redevelopment of the Vernon Project may negatively affect the operation of two NU projects located downstream from Vernon: Northfield Mountain (FERC No. 2485) and Turners Falls (FERC No. 1889). NU states that because Vernon would have a hydraulic capacity greater than Turners Falls, it could be operated in a manner that would decrease generation from the Turners Falls Project, the next hydroelectric station downstream from the Vernon Project. With respect to Northfield Mountain, a pumped storage project that utilizes the Connecticut River between the Vernon Project and the Turners Falls Project as its lower reservoir, NU claims that the Vernon redevelopment could adversely affect that project's generation and operating and reserve capacity.

NEP's response to NU's Motion to Intervene and Comments was that they already have the potential to adversely affect both projects, and that the proposed development could potentially beneficially affect the two projects, since they would be able to regulate project discharge over a wider range of flows.

From a practical standpoint, the key factor that would determine whether affects were adverse, beneficial, or benign, is coordination of operation among the projects. At present, and for the foreseeable future, the operation of all three projects is coordinated through the New England Power Pool's regional central dispatching system ("NEPEX"). The present goal of NEPEX is to optimize generation from all the Connecticut Basin projects. NEP stated that it, at some time in the future, NEPEX

stopped providing project coordination, then NEP and NU could enter into a coordination agreement.

NU also claimed that the proposed redevelopment would allow NEP to cause greater fluctuations in the elevation of the Turners Falls' pool, hence exacerbating shoreline erosion, or negatively affecting fish passage at the Turners Falls Project.

NEP responded that their ability to regulate a wider range of river flows could actually reduce pool level fluctuations. They further responded that their ability to fluctuate the pond would be small, on the order of one foot, and that any fluctuations would be gradual, as opposed to those caused by the operation of the Northfield Mountain Project, which can cause pond elevation changes of six feet. NEP further states that the redevelopment may actually result in decreased shoreline erosion, since water surface elevation could be better regulated.

With respect to NU's statement that the proposed redevelopment could negatively affect fish passage at the Turners Falls Project, NEP stated that NU produced no evidence to support this claim, and pointed out that none of the resource agencies voiced this concern.

The erosion issue was considered when the Vernon Project was relicensed in 1979. At that time, the Commission concluded that standard article 19 of the Vernon Project's license provides that the operation of the Vernon Project shall not result in shoreline erosion, and provides remedies for any erosion problems that may arise. Since relicensing, no evidence has arisen that demonstrates that operation of the Vernon Project has resulted in shoreline erosion. Further, NU has presented no evidence that the proposed amendment would result in water level fluctuations greater than those that currently occur, or other evidence that the proposed amendment would cause shoreline erosion. Because standard article 19 provides a mechanism for the correction of erosion problems, should they be demonstrated to occur, no additional safeguards are needed at this time.

Staff concludes that NU has not demonstrated that the redevelopment of the Vernon Project would affect the operation of fish passage facilities at the Turners Falls Project. Further, staff finds that adequate measures are already in place, or provided for, to ensure the development and operation of effective fish passage facilities at the Turners Falls Project.

H. CONCLUSION

NEP should be authorized to proceed with the redevelopment of the Vernon Project, under the conditions delineated above. Approval of the proposed amendment would not constitute a major

federal action significantly affecting the quality of the human environment; therefore, an environmental impact statement (EIS) will not be prepared.

I. LITERATURE CITED

Alden Research Laboratory, Inc. 1991. Preliminary Vernon Model Study Results - Powerhouse Flows. Preliminary report prepared for New England Power.

Boyer, D.D., B.N. Hansen, and M.R. Anderson. 1991. Atlantic salmon smolt movement and behavior at Vernon Hydroelectric Station. Pages 366-375 in D.D. Darling, ed. Waterpower '91: A New View of Hydro Resources. Proceedings of the International Conference on Hydropower, July 24-26, 1991, Denver, Colorado.

Saunders, W.P. 1987. Assessment of the frequency of worst-case flow conditions during downstream migration of salmon smolts at Bellows Falls Dam. International Science & Technology, Inc., Reston, Virginia. Final Task 2 Report prepared for New England Power Service Company.

Saunders, W.P. and J.M. Madre. 1988. An evaluation of the effectiveness of fish bypass modifications at the log and ice sluiceway at Bellows Falls Station. International Science & Technology, Inc., Reston, Virginia. Report prepared for New England Power Service Company.

J. LIST OF PREPARERS

Name	Position title
John M. Madre, Ph.D.	Fisheries Biologist (Coordinator)

400-SERIES ARTICLES

Article 401. The licensee shall, in consultation with the New Hampshire Water Supply and Pollution Control Division (NHWSPC) and the Vermont Agency of Natural Resources (VANR), and at least 30 days before commencing any project-related land clearing or land disturbing activities, 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 erosion control plan shall be based on the actual geological, soil, and groundwater conditions and final project design. The erosion control plan shall contain, as a minimum, the following measures: 1) cofferdams, perimeter control measures, measures to divert runoff around disturbed land surfaces and to collect and filter runoff, provisions for energy dissipation, rip-rap, and permanent drainage where necessary; 2) a revegetation plan; and 3) disposal of excavated materials above the high water mark and storage of fuel and chemicals used in construction in a manner to prevent releases to water bodies. In addition, the licensee shall take every reasonable precaution during construction to prevent the discharge of petrochemicals, wet concrete, or other materials and debris into the river. Debris generated shall be disposed of properly and in a non wetland location.

The licensee shall also include in the plan documentation of consultation with, and recommendations of, the NHWSPC and the VANR. Specific descriptions of how all of the agency comments and recommendations are accommodated by the plan should be included in the filing. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons for rejection, based on project-specific information. The licensee shall allow a minimum of 30 days for the agencies to comment on the plan prior to filing the plan with the Commission. The licensee shall not commence any land clearing or land disturbing activities until the licensee is notified in writing that the Commission approves the plan. The licensee shall give prior written notice to the NHWSPC and the VANR at least 48 hours prior to the commencement of land clearing or land disturbing activities.

The Commission reserves the right to require changes to the plan. Upon notification of Commission approval, the licensee shall begin implementing the erosion control plan, including any changes required by the Commission.

Article 402. At least 30 days prior to the start of installation of the new units, the licensee shall file Commission approval a plan to ensure the safe and efficient upstream passage of Atlantic salmon, American shad, and other anadromous fishes during the construction and operation of the new units. The upstream passage plan shall include, but not be limited to, the following: 1) provisions for constructing the new units to avoid the driving of sheet pilings in the tailrace during the upstream migration of anadromous fishes at the project; 2) the results of the licensee's hydraulic modelling study showing the effects of the new units' discharges on the hydraulic conditions in the project tailrace; 3) recommendations, based on the results of the modeling study, for any changes to the project's structures or operation needed to ensure the safe and efficient upstream passage of anadromous fishes; 4) a proposed plan and schedule for monitoring the effectiveness of the fish ladder during operation of the new units; and 5) a schedule for filing with the Commission the results of the monitoring and, for approval, any additional recommended changes to the project's structures or operation, based on the monitoring results, to ensure the safe and efficient upstream passage of anadromous fishes.

The licensee shall prepare the plan following consultation with the Connecticut River Atlantic Salmon Commission (CRASC), the U.S. Fish and Wildlife Service (FWS), the Vermont Department of Fish and Wildlife (VDFW), and the New Hampshire Fish and Game Department (NHFGD). 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 comments of the agencies are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations prior to filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing should include the licensee's reasons for not doing so, based on project-specific information.

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 to with the Commission for approval. The licensee shall consult with CRASC and the other fishery agencies on the study results and on the proposed modifications. The Commission reserves the right to require any changes to the plan to improve the effectiveness of upstream passage of anadromous fishes at the project.

Article 403. At least 90 days before the start of installation of the new units, the licensee shall file with the Commission for approval a plan to provide safe and efficient downstream passage for Atlantic salmon smolts, American shad, and blueback herring during the construction and operation of the new units. The downstream passage plan shall include, but not be limited to, the following: 1) provisions for alternate interim downstream fish passage, in the event that construction activities interfere with the operation or effectiveness of the existing interim downstream passage facility; 2) functional design drawings of permanent downstream passage facilities and a schedule for constructing these facilities so that the facilities are operational prior to the start of operation of the new units; 3) provisions to monitor the effectiveness of the downstream passage facilities in minimizing the entrainment of anadromous fishes; and 4) provisions to operate the downstream fish passage system in accordance with the annual notification letter issued by the CBASC.

The licensee shall prepare the plan following consultation with the CBASC and the other fishery agencies. 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 comments of the agencies are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations, prior to filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing should include the licensee's reasons for not doing so, based on project-specific information.

The Commission reserves the right to require changes to the plan. Operation of the new units shall not begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Comprehensive Development

Section 4(e) of the Act states that in deciding whether to issue a license, the Commission, in addition to considering the power and development purposes of the project, shall give equal consideration to the purpose of energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife, the protection of recreational opportunities, and the preservation of other aspects of environmental quality. These purposes are considered in the environmental assessment prepared for this project.

Section 10(a)(2)(A) of the Federal Power Act (FPA), 16 U.S.C. §803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under section 10(a)(2), federal and state agencies have filed with the Commission eight comprehensive plans that address various resources in New Hampshire and seven comprehensive plans that address various resources in Vermont. Of these, the staff identified and reviewed five New Hampshire plans[6], four Vermont plans[7], and one federal plan[8] relevant to this project. No conflicts were found.

[6]Wild, Scenic, and Recreational Rivers for New Hampshire, 1977, New Hampshire Office of State Planning; Connecticut River Basin Fish Passage, Flow, and Habitat Alteration Considerations in Relation to Anadromous Fish Restoration, 1981, Technical Committee for Fisheries Management of the Connecticut River; A Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River Basin, 1982, Policy Committee for Fisheries Management of the Connecticut River; New Hampshire Rivers Management and Protection Program, 1986, State of New Hampshire; New Hampshire Wetlands Priority Conservation Plan, 1989, New Hampshire Office of State Planning.

[7]Connecticut River Basin Fish Passage, Flow, and Habitat Alteration Considerations in Relation to Anadromous Fish Restoration, 1981, Technical Committee for Fisheries Management of the Connecticut River; A Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River Basin, 1982, Policy Committee for Fisheries Management of the Connecticut River; Vermont State Comprehensive Outdoor Recreation Plan, 1983-1988, 1983, Vermont Agency of Environmental Conservation; Vermont Rivers Study, 1986, Vermont Agency of Environmental Conservation.

[8]Restoration of Atlantic Salmon to New England Rivers: Final Environmental Impact Statement, 1989, U.S. Fish and Wildlife Service.

Based upon a review of the agency and public comments filed on this project, and on the staff's independent analysis, the staff finds that the Vernon redevelopment is best adapted to a comprehensive plan for the proper use, conservation, and development of the Connecticut River and other project-related resources.

CONNECTICUT
MASSACHUSETTS
NATIONAL MARINE FISHERIES SERVICE
103 East Plum Tree Road
Telephone: 413/548-9138

CONNECTICUT RIVER ATLANTIC SALMON COMMISSION

VERMONT
NEW HAMPSHIRE
U.S. FISH AND WILDLIFE SERVICE
Sunderland, Massachusetts 01375

Re: CRASC's 2005 Up and Downstream Fish Passage Operations Schedule
FERC project Nos.: 1855, 1892, 1904, 2077

John Ragonese, FERC License Coordinator
USGen, New England, Inc.
4 Park Street, Suite 402
Concord, New Hampshire 03301

March 14, 2005

Dear Mr. Ragonese,

Enclosed is the 2005 Schedule of Operations that the Connecticut River Atlantic Salmon Commission (CRASC) believes is necessary for both up and downstream passage under current conditions at eight projects on the mainstem Connecticut River. Full implementation of this schedule provides juvenile and adult anadromous fish alternatives to turbine passage and river obstacles essential to the restoration of Atlantic salmon, American shad and river herring populations in the Connecticut River.

The proposed 2005 schedule for mainstem facilities is essentially the same as the schedule followed in 2004. Any changes to the operation schedule will be addressed cooperatively as the need arises. To enable us to work with you in a timely manner when considering such adjustments, the suggested protocol is for you to contact John Warner of the U.S. Fish and Wildlife Service's New England Field Office at 603-223-2541 ext. 15.

The Commission appreciates the cooperation we have experienced with USGen under last year's passage schedules. We look forward to continued cooperation with USGen, New England, Inc.

Sincerely,

Janice N. Rowan

Enclosures(2)

cc: CRASC Commissioners
CRASC Technical Committee
CRASC Fish Passage Subcommittee
FERC-DLC

2005 CT RIVER SCHEDULE OF DOWNSTREAM FISH PASSAGE OPERATIONS

Location (Project)	Downstream Fish Passage Exit	Species	Life Stage	Date of Operation	Hours of Operation
McIndoes	Log Sluice[3]	salmon	smolt	April 1 - June 15	24 hrs/day
Ryegate (Dodge Falls)	Fish Bypass Facility	salmon	smolt	April 1 - June 15	24 hrs/day
Wilder	Log Sluice[2]	salmon salmon	smolt adult	April 1 - June 15 October 15 - December 31[5]	24 hrs/day 24 hrs/day
Bellows Falls	Angled Fish Guide Wall and Log Sluice[2]	salmon salmon	smolt adult	April 1 - June 15 October 15 - December 31[5]	24 hrs/day 24 hrs/day
Vernon	Fish Bypass at Unit 10 Louvers and Fish Pipe at Unit 4	salmon salmon shad shad salmon salmon shad shad	smolt adult adult juvenile smolt adult adult juvenile	April 1 - June 15 October 15 - December 31[5] June 1 - July 31 September 1 - November 15 April 1 - June 15 October 15 - December 31[5] June 1 - July 31 September 1 - November 15	24 hrs/day 24 hrs/day 24 hrs/day 24 hrs/day 24 hrs/day 24 hrs/day 24 hrs/day 24 hrs/day
Northfield	Barrier Net	salmon	smolt	April 1 - June 15[1]	24 hrs/day
Turners Falls	Log Sluice and Trash Sluice	salmon salmon shad shad	smolt adult adult juvenile	April 7 - June 15 October 15 - December 31[5] June 1 - July 31 September 1 - November 15	24 hrs/day 24 hrs/day 24 hrs/day 24 hrs/day
Holyoke[6]	Canal Louver Bypass Bascule Gate[4]	salmon salmon shad shad salmon salmon shad shad	smolt adult adult juvenile smolt adult adult juvenile	April 7 - June 15 October 1 - December 31[5] June 15 - July 31 September 1 - November 15 April 7 - June 15 October 15 - December 31[5] June 1 - July 31 September 1 - November 15	24 hrs/day 24 hrs/day 24 hrs/day 24 hrs/day 24 hrs/day 24 hrs/day 24 hrs/day 24 hrs/day

1/Date of initiating operation April 1 or as soon as possible after high spring flows subside. Net can be removed after smolt emigration ceases at the Cabot sampler upon consultation with the Coordinator.

2/Minimum log sluice gate opening of 3.5 feet at Bellows Falls and 5 feet at Wilder.

3/The McIndoes log sluice gate will be lowered to 3.5 feet below normal pool level. This will provide a continuous spill when river flow exceeds turbin capacity (app. 7600 cfs) which normally occurs during April and early May. During non-spill periods, the McIndoes headpond fluctuates 8-12 feet daily. Spill at the log sluice will occur for 8-12 hours per day, whenever the head pond is above the fixed crest of the opened sluice. The gate shall be opened if smolts are observed in the head pond during periods when the pond is below the log sluice crest.

4/Bascule gate may be closed periodically in order to facilitate upstream passage at spillway fishlift, as directed by Massachusetts Division of Fisheries and Wildlife fishway personnel.

5/Downstream passage operation, or monitoring with operation as needed, is required for salmon when salmon are upstream of a location.

6/Holyoke passage operation dates may be adjusted to facilitate fish passage facility improvements if approved by the Massachusetts Division of Fisheries and Wildlife and U.S. Fish and Wildlife Service.

2005 CT RIVER SCHEDULE OF UPSTREAM FISH PASSAGE OPERATIONS

Location (Project)	Upstream Fish Passage	Species	Life Stage	Date of Operation[1]	Hours of Operation
Wilder	Ladder	salmon salmon	adult adult	May 15 - July 15 September 15 - Nov 15	24 hrs/day 24 hrs/day
Bellows Falls	Ladder	salmon salmon	adult adult	May 15 - July 15 September 15 - Nov 15	24 hrs/day 24 hrs/day
Vernon	Ladder	salmon salmon shad & herring	adult adult adult	May 15 - July 15 September 15 - Nov 15 May 15 - July 15	24 hrs/day 24 hrs/day 24 hrs/day
Turners Falls	Cabot Ladder, Gatehouse Ladder, and Spillway Ladder	salmon salmon shad & herring	adult adult adult	April 1 - July 15 September 15 - Nov 15 April 1 - July 15	24 hrs/day 24 hrs/day 24 hrs/day
Holyoke	Zone-of-Passage Flows[2] Tailrace Lift, and Spillway Lift	salmon, shad, herring and sturgeon salmon shad & herring	adult adult adults	April 1 - July 15[3] April 1 - July 15 April 1 - July 15	24 hrs/day up to 12 hrs/day[4] up to 12 hrs/day[4]

1/Actual dates of operation are based on passage of fish at the next lowest downstream fishway and/or monitoring of radio-tagged adult salmon locations.

2/Zone -of-passage flow of 1,300 cfs or more to the bypass reach below the dam

3/Zone-of-passage flows for shortnose sturgeon passage in summer (July 16 through September 14) are not currently required until downstream passage measures are in place to protect down-running sturgeon.

4/Actual hours of operation on a day-to-day basis are to be determined by the Massachusetts Division of Fisheries and Wildlife in consultation with the project owner.

AGREEMENT

Re: Operation of Vernon Project
(FERC No. 1904

This agreement, entered into this 25th day of June 1980, between the United States of America, acting by and through the Department of the Army, Corps of Engineers, and New England Power Company ("NEP"), a corporation organized and existing under the laws of the Commonwealth of Massachusetts, and having a principal office at Westborough, Massachusetts;

WITNESSETH THAT:

Whereas NEP is the Licensee of a Hydroelectric development located on the Connecticut River in Windham County, Vermont and Cheshire County, New Hampshire, known as the Vernon Project, Federal Energy Regulatory Commission ("FERC") Licensed Project No. 1904 (the "Vernon Project"); and

Whereas pursuant to an Opinion Issuing New License issued by the Federal Energy Regulatory Commission on June 25, 1979 (the "FERC Order"), NEP was permitted to continue the operation and maintenance of the aforesaid Vernon Project; and

Whereas pursuant to Article 32 of the FERC license for the Vernon Project contained in the FERC Order, NEP is required to enter into an agreement with the Department of the Army, Corps of Engineers providing for the coordinated operation of the project in the interests of flood control and navigation on the Connecticut River in accordance with rules and regulations prescribed by the Secretary of the Army; and

Whereas the parties desire to record their agreement as to such coordinated operation;

NOW THEREFORE, the parties do agree to the operation of the Vernon Project as follows:

1. The Vernon Project will be operated so as not to significantly increase flood flows in the lower Connecticut River. More particularly, it shall be operated in accordance with the manual entitled Operating Procedures, Vernon Project (the "Manual"), dated June 1980, attached hereto and incorporated herein by reference, as said Manual may be amended from time to time as hereinafter provided. Revised in Amend. No. 2

2. The Manual may be amended at any time upon mutual consent of the parties hereto.

3. This agreement shall continue in full force and effect during the initial term of the License issued to NEP for the Vernon Project unless earlier terminated by mutual agreement; provided, however, that this agreement shall be cancelled or amended to the extent and from the time that performance hereunder may conflict with any rule, regulation or order of the FERC adopted before or after the execution hereof under the provisions of the Federal Power Act.

4. This Agreement shall inure to the benefit of and bind the successors and assigns of the parties hereto, including any successor licensee or or owner of the Vernon Project.

5. This Agreement may be amended at any time with the written consent of all the parties hereto; provided, however, that no such amendment shall become effective until any approval necessary is secured from the FERC after such notice and hearing, if any, as may be required.

IN WITNESS WHEREOF, the parties hereto have executed this agreement as of the day and year first above written.

THE UNITED STATES OF AMERICA

By _____
MAX. B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

NEW ENGLAND POWER COMPANY

By _____

Title President

CERTIFICATE

New England Power Company

I, Robert King Wulff, certify that I am the Clerk of the New England Power Company; that J. F. Kaslow who signed this agreement on behalf of the New England Power Company was then President of said corporation; that said agreement was duly signed for and in behalf of said corporation and is within the scope of its corporate powers.

AFFIX CORPORATE SEAL

(Signature)

Clerk

(Title)

New England Power Service

New England Power Service Company
25 Research Drive
Westborough, Massachusetts 01582-0099
Tel. (617) 366-9011

23 December 1987

Federal Energy Regulatory Commission
New York Regional Office
201 Varick Street, Room #664
New York, NY 10014

Attention: Mr. Martin W. Inwald, P.E. - Regional Director

New England Power Company
Vernon Project - FERC LP No. 1904-NH/VT
Licensed Project Operating Procedures

Gentlemen:

Enclosed are two (2) copies of the revised (September 1987) Operating Procedures for the Vernon Project. This revision was completed under a December 1987 Corps of Engineers agreement, which is also enclosed.

This revision was necessitated by the recent installation and completion of water handling mechanisms on the spillway crest.

If you have any questions, kindly contact us.

Very truly yours,

Denton E. Nichols

Denton E. Nichols
Manager - Civil Engineering

DEN/taw
Enclosure
Copies Without Enclosure: H.W. McLaren
M.E. Rook
H.W. Sullivan
R.K. Wulff

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF

December 10, 1987

Engineering-Water Control

Mr. Denton E. Nichols
Manager - Civil Engineering
New England Power Service Company
25 Research Drive
Westboro, Massachusetts 01582-0099

Dear Mr. Nichols:

This letter acknowledges receipt and acceptance of the Revised Operating Procedures for the Vernon Project FERC #1904, dated September 1987.

Sincerely,

Richard D. Reardon
Chief, Engineering Division

New England Power Service

New England Power Service Company
25 Research Drive
Westborough, Massachusetts 01582-0099
Tel. (617) 366-9011

2 December 987

DEPARTMENT OF THE ARMY
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254-9149

Attention: Office of Counsel
Mr. Theodore F. Smollen

New England Power Company
VERNON PROJECT -- FERC LP NO. 1904
Revised Operating Procedure Agreement

Dear Mr. Smollen:

Enclosed is an executed copy of the Memorandum of Agreement for New England Power Company's Vermont Project.

We shall file a copy of this revised Agreement with the FERC Regional Director in New York.

We appreciate your cooperation in this matter.

Very truly yours,
NEW ENGLAND POWER SERVICE COMPANY

Denton E. Nichols,

Denton E. Nichols
Manager - Civil Engineering

DEN/kaa
Enclosure

Copies with Enclosure/R. E. Charpentier
H. W. McLaren
M. E. Rook
H. W. Sullivan
R. K. Wulff

therefore:

"More particularly, the project shall be operated in accordance with the most current manual (the "Manual" entitled OPERATING PROCEDURES, VERNON PROJECT and bearing the most current revision number as agreed to in the current amendment to this MOA."

IN WITNESS WHEREOF, the parties hereto have executed this agreement as of the date first written below.

NEW ENGLAND POWER COMPANY

1 Dec 87
Date

BY John F. Kaslow
John F. Kaslow

Title President

THE UNITED STATES OF AMERICA

19 Nov 87
Date

BY
THOMAS A. RHEN
Colonel, Corps of Engineers
Division Engineer

Amendment No. 2
to
A Memorandum of Agreement
Between
The United States of America
And
The New England Power Company
Pertaining To
The Operation of the Vernon Project

(FERC Number 1904)

WITNESSETH THAT

Whereas the above captioned Memorandum of Agreement (MOA) was entered into on June 25, 1980.

Now Therefore, in accordance with paragraph 2 of the MOA the parties agree that the said MOA shall be amended as follows:

The document entitled

New England Power Company
OPERATING PROCEDURES
VERNON PROJECT
Vernon, Vermont
FERC - LP NO. 1904 NH/VT
June 1980
(Revised) September 1985

is hereby cancelled and superceded

2 The document entitled

New England Power Company
OPERATING PROCEDURES
VERNON PROJECT
Vernon, Vermont
FERC - LP NO. 1904 NH/VT
June 1980
Revision 1 : September 1985
Revision 2 : September 1987

and attached to this Amendment No. 2 is hereby incorporated by reference into the MOA dated June 25, 1980.

3. The last sentence of paragraph 1 of the MOA is hereby stricken and the following language substituted

New England Power Company

OPERATING PROCEDURES

VERNON PROJECT
Vernon, Vermont

FERC - LP NO. 1904 NH/VT

June 1980

Revision 1: September 1985
Revision 2: September 1987

NEW ENGLAND POWER SERVICE COMPANY - ENGINEERS
25 Research Drive - Westborough, Massachusetts 01582

OPERATING PROCEDURES

VERNON PROJECT
Vernon, Vermont

FERC - LP NO. 1904 NH/VT

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OPERATING PROCEDURES

VERNON PROJECT
Vernon, Vermont

FERC - LP NO. 1904 NH/VT

1.0 INTRODUCTION

On 25 June 1979 the Federal Energy Regulatory Commission (FERC) issued to New England Power Company (NEP) a long term license authorizing the continued operation and maintenance of the Vernon Project - FERC - LP No. 1904. The Vernon Project license terminates on 30 April 2018.

Two major construction projects have been completed since the 1979 license was issued. The first was a fishway installation completed in 1981; and the second, was a major reconstruction of the spillway crest water control mechanisms completed in 1986 which included the addition of a trash sluice (skimmer) gate, six (6) tainter gates and two (2) 50' bays of hydraulic panels to the spillway section. A new rack raking system was constructed along the powerhouse forebay.

These changes have resulted in improved generator efficiency and a smoother flow release during flood periods. These procedures have been revised to reflect the operating characteristics of the new water handling mechanisms.

Article 32 of the License required NEP to enter into agreement with the Department of Army, Corps of Engineers, "providing for the coordinated operation of the Project in the interest of flood control and navigation, on the Connecticut River in accordance with the rules and regulations prescribed by the Secretary of the Army". There is no navigation at the Project and therefore no requirements.

This procedure is a general guide for the operation of that portion of the Connecticut River within the Vernon Hydroelectric Project

located at Vernon, Vermont. The facility is a run-of-the-river generating station with the reservoir extending upstream 26.5 miles to the Walpole Bridge at Westminster Station about 4.0 miles below Bellows Falls Hydroelectric Project (FERC LP No. 1855).

Measured flows from upstream hydroelectric facilities and gaging stations on the Connecticut River and tributary streams are used to estimate the flow expected at the Vernon Project. This flow information determines station operation and spillway gate operations at Vernon Dam. The methods of estimating the natural average inflow and anticipated station inflow at Vernon Dam are described in Appendix A.

Other pertinent information regarding the operating procedures for the Vernon Project can be found in the Appendix and Figure sections.

2.0 GENERAL INFORMATION

The Vernon Hydroelectric Project is located on the Connecticut River in the Towns of Vernon, Vermont and Hinsdale, New Hampshire. See Figure 1 for Location Map. The Project is a run-of-the-river generating facility with limited storage and includes a concrete gravity dam, a reservoir with a surface area of 2,550 acres, and an installed generating capacity of 24,400 kW. The dam's flow passage facilities include a 13'x13' trash sluice gate, eight 7'x9' flood gates, four 10'x50' tainter gates, two 20'x50' tainter gates, two 50 foot long bays of 10'x10' hydraulic flashboard panels, and three bays (2 @ 50' and one @ 42.5') of 8 foot wood flashboards. Refer to Figure 2 for a general arrangement of facilities. Additional station data is given in Appendix B, Station Data Sheet. A reinforced concrete fishway between the tailrace and forebay allows passage of anadromous fish.

The drainage area (DA) above the Vernon Project is 6,266 square miles and the reservoir has a total volume of 40,000 acre-feet at full reservoir (top of flashboards - El. 220.13). Usable storage amounts to about 18,300 acre-feet in eight feet of drawdown. The

reservoir area/capacity curve is shown in Figure 3 and the reservoir storage above the crest is shown in Figure 4.

Three tributaries, the West River (DA 308 sq. mi.), Cold River (DA 83 sq. mi.), and the Saxtons River (DA 72 sq. mi.) enter the Connecticut River between Bellows Falls and Vernon Dam. The West River has two Corps of Engineers flood control dams controlling a total drainage area 278 sq. mi.; one at Townsend, Vermont, the other at Jamaica, Vermont. These projects, in conjunction with three other Corps Vermont flood control dams, significantly control flood flows into the Connecticut River and the Vernon Reservoir.

In 1970 the FERC set a flow release requirement of 1,200 CFS through the Vernon Project to prevent heat build-up in the reservoir from cooling system discharges of the Vermont Yankee Nuclear power plant 0.5 mile upstream of Vernon Dam. During the relicensing process of the Vernon Project, several agencies requested a minimum flow release be established at 0.2 cubic feet per second per sq. mi. (CFSM) of drainage area. Article 34 of the new license requires a minimum flow release of 1,250 CFS, (0.2 CFSM), or a flow equal to the inflow of the reservoir,'whichever is less, from the Project.

The typical water surface profile between Vernon Dam and Bellows Falls is shown on Figure 5, and included are the 1927, 1936, and 1938 major flood profiles through the Vernon Pond. The August 1907 plot shows the river profile prior to the construction of Vernon Dam.

The operating procedure includes the computed "natural average inflow" calculated twice daily and "anticipated inflows" figured to determine expected station flows at 4 and 12 hours in advance. Calculations are based on using the Wilder Station and Bellows Falls Station discharges, the USGS gage at West Hartford (White River), the USGS gage at Newfane (West River), and contact with the Corps' flood control personnel at Townsend. Refer to Appendix C for additional USGS Gaging Station information. With the natural

and anticipated flows calculated, operating limits then can be set for the reservoir before committing any spillway gate operations. By pre-drawing the Vernon Reservoir as shown in Table 1, Page 11, to provide limited storage during normal daily operation, flows in excess of station capacity (12,000 CFS) can be passed without using the spillway gates.

These procedures are intended to allow for operation of the Vernon Project in accordance with the license requirements and have been prepared after consultation with representatives of the New England Division, Corps of Engineers. Every attempt has been made to develop this operating procedure to cover general categories; however, it may be necessary to temporarily depart from these procedures for the safe operation of the Project during unusual flood conditions.

The intent of these procedures is to provide a reliable source of electricity and to secure the most economical use of a natural resource.

A joint review of these procedures between the Corps of Engineers and NEP may be required from time to time to clarify or improve the Project's operation resulting from certain unusual flow conditions or Project improvements.

3.0 OPERATING PROCEDURES

The procedures for operating the Vernon Project are summarized in Table 1, Page 11. Five categories of river flow conditions have been developed for plant operation:

Vernon Natural Inflow	Project Status
a. 12,000 CFS or less	plant capacity
b. 12,000 to 45,000 CFS (No Ice)	plant capacity, gates and pond limit
c. 12,000 to 45,000 CFS (With Ice)	plant capacity, selected gates and pond limit

Vernon Natural Inflow	Project Status
d. Expected to exceed 45,000 CFS (No Ice)	plant capacity, gates as needed to draw pond with eventual flashboard failure occurring
e. Expected to exceed 45,000 CFS (With Ice)	plant capacity, selected gate use to draw pond with all gates and panels committed and flashboard failure occurring.

The natural average inflow calculation for Vernon during periods of **no spill** is computed twice daily at 6 AM and 12 midnight to determine in which of the five flow categories the station will be operating. The 6 AM figure is the average inflow between 12 midnight and 6 AM. The 12 midnight inflow is the average inflow for the previous 24 hour period.

When any spill is expected at Vernon, the inflow is calculated hourly and entered on the Vernon Flow Sheet (Figure 6).

Anticipated station inflow is calculated to determine the magnitude of flows expected in 4 or 12 hours and again determines which of the five flow categories for station operation. This computation is used also to set pond limits prior to committing any spillway floodgate operation. The method for this calculation is shown in Appendix D.

3.01 Flows Less Than 12,000 CFS

Flows in this range can be passed through the station using the 10 hydro-turbines or less depending upon the schedule for load requirements. The inflow calculations are computed twice daily at 6 AM and 12 midnight.

The maximum pond limit is El. 220.1 for year round operation.

If there is no power generation scheduled, the FERC license requires a minimum flow release of 1,250 CFS and either Unit 9 or 10 is used to provide 1,100 CFS, while the

remaining 150 to 200 CFS is obtained from leakage through the other generating units.

3.02 Flows 12,000 - 45,000 CFS (No Ice)

When flows are in excess of station capacity (12,000 CFS) it is necessary to operate selected spillway gates to pass excess flows. The first gate used is the trash sluice gate located in the spillway to keep debris away from the intake area. Trash sluice gate discharge capacities are found on Figure 7.

Station inflow is calculated hourly and the anticipated inflow is calculated as deemed necessary by local supervision. An operating limit at El. 219.6 is placed on the pond. No. 1 and 2 tainter gates (20'x50') are used as needed up to a maximum opening of 7 feet on each gate (refer to Figure 8 for discharge capacities). If additional gate capacity is needed, No. 1 tainter gate is taken out of water and No. 2 tainter gate is used to control the pond at El. 219.6. The submerged hydraulic floodgates should be used next to pass flow.

When using gates to lower the pond to a new pond limit, the rate of draw is normally 0.1 to 0.2 feet/hour; however, **under all circumstances, the rate is not to exceed 0.3 feet/hour**, which is approximately 9,000 CFS.

Pre-drawing the pond is in anticipation of higher expected flows to mitigate the peak flow.

3.03 Flows 12,000 - 45,000 CFS (With Ice)

When flows are in excess of station capacity (12,000 CFS) with ice in the pond, it is necessary to operate the appropriate tainter gates to avoid flashboard damage from floating ice.

Station inflow is calculated hourly and anticipated inflows are calculated as necessary by local supervision. An operating limit of EL. 219.6 is placed on the pond. No. 1 tainter gate is used to control pond elevation up to a maximum of 7 feet open. When additional gate capacity is required, use No. 4 and No. 5 (10'x50') tainter gates (refer to Figure 9 for discharge capacities). Experience has shown these gates provide a smoother more direct passage for ice flows. See Figure 2 for the spillway gate arrangement. The submerged hydraulic floodgates would be the next gates used, if needed.

3.04 Flows Over 45,000 CFS Anticipated (No Ice)

When flows above 45,000 CFS are expected, an operating limit at El. 218.6 is placed on the pond.

Station inflow is calculated hourly and anticipated inflow is calculated as necessary by local supervision.

No. 1 or No. 2 tainter gates are used to lower the pond to the new operating limit at a 0.1 to 0.2 feet/hour. Pre-drawing the pond is in anticipation of higher expected flows to mitigate the peak flow.

When both No. 1 and No. 2 tainter gates have reached a gate opening of 7 feet, No. 1 gate is raised clear of the flow. No. 2 gate is then closed as needed to compensate for the increased flow.

The submerged hydraulic floodgates are used next to pass increased flows (refer to Figure 10 for discharge capacities). All hydraulic floodgates should be committed before the tailwater elevation reaches El. 196.0. At this elevation the tailwater enters the floodgate gallery and makes floodgate operation impossible.

As the flow continues to increase, tainter gates No. 6 through No. 3 should be used with No. 3 being the last one committed. These gates are locally operated and should be either wide open or closed as needed. Controlling the pond elevation should be done with the larger remotely operated No. 1 or No. 2 tainter gates.

The ten (10'x10') hydraulic panels can be lowered to the spillway crest (EL.212.1) to pass additional flow. Before these panels are committed, consideration should be given towards removing braces from the flashboard pins. Pond elevation should be lowered to 218.1 when brace removal is required. Discharge rates for flashboards in-place and clear of crest for both 42.5 and 50 foot bays are given in Figures 11 and 12, respectively.

3.05 Flows Over 45,000 CFS Anticipated (With Ice)

When flows above 45,000 CFS are expected with ice on the pond, an operational limit of El. 218.6 is placed on the pond and selective gate operation is required to prevent damage or premature flashboard failure.

Use No. 1 tainter gate to a maximum opening of 7 feet to maintain the pond below El. 218.6. If additional gate capacity is needed, No. 4 and No. 5 tainter gates are opened. These gates will pass ice safely and not cause damage to flashboards and pins.

The submerged hydraulic floodgates should be used next, then followed by tainter gates Nos. 6, 3, 1, and 2 in that sequence.

Past experience has shown ice passage over Vernon Dam usually occurs at flows between 25,000 to 45,000 CFS. The hydraulic panels and consideration for the flashboard pin brace removal would be the same as under the Section 3.04 procedure with no ice

- **The 3" Ø extra heavy pins unbraced fail at approximately 219.3.**

- **The 3" Ø extra heavy pins braced fail at approximately 222.5.**

It is estimated with the new spillway crest gates in operation, failure of the three flashboard sections will occur approximately once every 10 years.

3.06 Fish Ladder Operation

Upstream migrating fish are attracted to the ladder by attraction water released through the main entrance weir and the collection channel weirs. Fish ladder operation usually lasts six to eight weeks starting late in May for upstream migrating fish. Again during the month of October it may be put back in operation at the request of the Vermont Fish & Game Department for downstream migrating fish.

4.0 OPERATING SUMMARY

As discussed the Vernon Project is operated within five general ranges of river flows. Due to limited specific experience with the new tainter gate installation, it is difficult to state with certainty the exact operation sequence necessary for all river conditions. However, NEP has similar experience with tainter gates at upstream locations.

All previously issued high water rules for extra precautions required, as outlined in Vernon Station Flood Data Operating Reminders, remain in effect. Copies of these are posted in the Superintendent's Office.

Once the river flow exceeds 85,000 CFS, the combined capacity of station units and spillway gates has been surpassed; therefore, the flow no longer can be controlled.

If the flow continues to rise, proceed with precautions to protect the station as outlined in the Flood Data Operating Reminders posted in the Superintendent's office.

If it appears the river will reach an extremely high flood stage of El. 224.1 or more over Vernon Dam, personnel shall be posted round the clock at the east end of the dam. They shall patrol the east abutment, Vernon Neck, and No. 1 and 2 line tower footings and inspect for evidence of gullying and slope erosion; and, if required, they shall place sandbags to stop the erosion. At all times they shall keep in close contact with the station.

As stated in **GENERAL INFORMATION**, it may be necessary to temporarily depart from these general procedures to insure the safe operation of the Project during unusual flood conditions.

A summary of Operation Procedures for the Vernon Project is shown in Table 1, Page 11.

TABLE 1

SUMMARY OF OPERATING PROCEDURES FOR VERNON STATION

Vernon Inflow CFS	Station Inflow Calculations	Pond Limit and Rate of Draw	Water Released from Vernon Pond as Follows:	Dam Status Spillway Length 542'-0"
Less than 12,000	Twice daily 6AM & 12 Mid	220.1	By generation as required from NEPEX load schedule.	Skimmer Gate (1) - 13'x13' - El. 209.13 Tainter Gates (2) - 20'x50' - El. 202.13 Tainter Gates (4) - 10'x50' - El. 212.13 Hydraulic Panels (10) - 10'x10' - El. 212.13 Flashboards - 142.5' x 8' - El. 212.13 Pins - 3" diameter extra heavy with braces - 2.0' spacing Pin Failure: - With braces El. 222.53 - 222.73 - Without braces El. 219.53 Pond Limit Maximum El. 220.13 - Year around Minimum Flow - 1,250 CFS at all times as required by FERC License No. 1904.
12,000 - 45,000 (No Ice)	Station inflow calculated hourly. Anticipated inflow as required by local supervision.	219.6 As required to regulate pond elevation. Rate of draw not to exceed 0.3 feet/hour.	All generators wide open. Skimmer gate, No. 1 & No. 2 tainter gates, submerged hydraulic floodgates as needed.	
12,000 - 45,000 (With Ice)	Station inflow calculated hourly. Anticipated inflow as required by local supervision.	219.6 As required to regulate pond elevation. Rate of draw not to exceed 0.3 feet/hour.	All generators wide open. Skimmer gate, No. 1 tainter gate to 7.0 feet open, No. 4 & No. 5 tainter gates, submerged hydraulic floodgates as needed.	
Flows expected to exceed 45,000 (No Ice)	Station inflow calculated hourly. Anticipated inflow as required by local supervision.	218.6 As required to regulate pond elevation. Rate of draw not to exceed 0.3 feet/hour.	All generators wide open. Gate operation as follows: Skimmer gate, No. 1 & No. 2 tainter gates, submerged hydraulic floodgates, No. 3 thru No. 6 tainter gates, hydraulic panels. Expected flashboard failure.	
Flows expected to exceed 45,000 (With Ice)	Station inflow calculated hourly. Anticipated inflow as required by local supervision.	218.6 As required to regulate pond elevation. Rate of draw not to exceed 0.3 feet/hour.	All generators wide open. Gate operation as follows: Skimmer gate, No. 1 tainter gate to 7.0 open, No. 4 & No. 5 tainter gates, submerged hydraulic floodgates, No. 3 thru No. 6 tainter gates, No. 1 and No. 2 tainter gates, hydraulic panels. Expected flashboard failure.	

APPENDICES

OPERATING PROCEDURES

VERNON PROJECT
Vernon, Vermont

FERC - LP NO. 1904 NH/VT

NATURAL AVERAGE INFLOW DETERMINATION

As outlined in the "Operating Procedures", the natural average inflow calculation during no spill is figured twice daily at 6 AM and 12 midnight.

When any spill is expected, the inflow is figured hourly and recorded on the Station Flow Sheet (Figure 6). For a particular hour the pondage is added or subtracted to/from the Station discharge in that time period. Figure 4, gives reservoir contents in CFS-Hours. This data is entered onto the Morning Report Form, see Figure 13. As a matter of record the Newfane USGS gage is checked periodically to determine whether the Corps' flood control dam at Townsend is discharging.

Example:

11 AM - Pond Elevation 217.5 = 143,615 cfsh (pondage contents)
10 AM - Pond Elevation 217.3 = 137,860 cfsh
Difference = 5,755 cfsh (plus pondage from 10 AM)

If there was less water in the pond, then there would be a minus pondage for that hour.

To the Station discharge for 11 AM add the plus pondage

11 AM - Station Discharge = 11,065 cfsh
plus Pondage = 5,755 cfsh
Total Station Average Inflow = 16,800 cfsh

ANTICIPATED STATION INFLOW

Four hours after a Bellows Falls reading - Subtract from the present Vernon Station hourly inflow the Bellows Falls Station total discharge 4 hours previously. The difference is the natural local inflow. Add the natural inflow to the present Bellows Falls discharge and this figure is the approximate inflow at Vernon 4 hours later.

Twelve hours after a Wilder Station reading - Under rising river conditions take the present Wilder Station discharge plus 3 times the present West Hartford (White River) gage reading. This should be the Bellows Falls inflow in 6 to 8 hours, then add the present Vernon natural average inflow and that total will be the flow at Vernon 12 hours later.

OPERATING PROCEDURES

VERNON PROJECT
Vernon, Vermont

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STATION DATA SHEET

RESERVOIR DATA

Location. . . . . Connecticut River, 26.5 miles in length between Vernon Dam and Walpole Bridge (NH Route 123) about 4 miles downstream of Bellows Falls Station.

Drainage Area . . . . . 6,266 Square Miles
Storage Above Crest to 220.13 . . 18,289 Acre-Feet
Maximum Pool Level. . . . . Elevation 220.13 Feet
Minimum Pool Level. . . . . Elevation 212.13 Feet

PLANT DATA

Station Capacity. . . . . 10 turbines, 24.4 mW total capacity

Spillway Arrangement. . . . . 1 trash sluice 13'x13' @ El. 209.13
2 tainter gates 20'x50' @ El. 202.13
4 tainter gates 10'x50' @ El. 212.13
10 hydraulic panels 10'x10' @ El. 212.13
8 hydraulic floodgates 7'x 9' invert @ El. 173.

Flashboards . . . . . 142.5' @ 212.13' with 3" Ø extra heavy pins, braces, 2'-0" pin socket spacing

Spillway Length . . . . . 542.50 Feet

CFS CAPACITY - (Approximate)

	Project Discharge Capacity (CFS)			
	No Spill	Reservoir El. 212.1	Reservoir El.220.1	Reservoir El.228.1
10 Generators	12,000	6,500- 7,000	11,000	0
1 Trash Sluice (13'x13')	0	220	1,570	2,770
2 Tainter Gates (20'x50')	0	4,300	23,590	40,950
4 Tainter Gates (10'x50')	0	0	16,960	48,000
8 Hydraulic Floodgates (7'x9')	0	14,800	18,000	1,680+
10 Hydraulic Panels (10'x10')	0	0	8,480	24,000
Flashboards (8'x142.5')	0	0	2,610	10,200
Total Capacity	**12,000**	**25,820-26,320**	**83,230**	**127,600**

+Gates submerged by tailwater (estimated)

OPERATING PROCEDURES

VERNON PROJECT
Vernon, Vermont

FERC - LP NO. 1904 NH/VT

USGS GAGING STATIONS

USGS Station*	Drainage Area (Sq. Mi.)	Years of Record	Discharge (CFS) Maximum	Discharge (CFS) Minimum	Gage Datum (NGVD)
01144000 White River @ West Hartford, Vermont	690	1915 to present	120,000 (1927)	35 1918)	374.53
01154500 Connecticut River @ North Walpole, New Hampshire	5,493	1942 to present	97,000 (1953)	115 (1952)	218.63
01156000 West River @ Newfane, Vermont	308	1919 to 1923 and 1928 to present	52,300 (1938)	7.6 1962)	384.21

NOTE:

*All stations use a water stage recorder for measurements.

OPERATING PROCEDURES

VERNON PROJECT
Vernon, Vermont

FERC - LP NO. 1904 NH/VT

SPILLWAY GATES AND HYDRAULIC PANEL OPERATION

The spillway crest has been modified with the addition of six (6) tainter gates, two (2) fifty-foot bays of hydraulic panels, and one (1) trash sluice gate. The Station Operation can now control flows to 85,000 CFS. Previous flow control was limited to 30,000 CFS.

The tainter gate additions provide better control during periods of ice passage and flood flows and maintains a higher operating head, increasing Station generation.

Pre-draw of the reservoir will be controlled within the same limits of the previous procedures. Normal pre-draw is limited to 0.1 to 0.2 feet/hour and in no case will it exceed 0.3 feet/hour.

The plant operating procedures have been divided into five categories, with basically two modes of spillway operation including ice and without ice. See Figure 2 for the spillway arrangement and numbering sequence.

TRASH SLUICE

A trash sluice gate (13'x13') has been placed in the existing log sluiceway. This gate will be the first to be opened, if spill is required. It keeps trash or debris from building up against the forebay booms and entering the intake area.

REMOTE OPERATED TAINTER GATES

Two remotely operated tainter gates (20'x50') located on the east end of the spillway (NH side) are recessed 10 feet into the former spillway

crest. The spill capacity of these gates provide additional capacity which was lost by the 12 piers added to the spillway crest. These gates are used to draw or control the pond elevation.

Experience shows with pond ice movement, operation of No. 2 tainter gate tends to pull ice in front of the No. 3 and No. 4 flashboard bays. To eliminate or minimize potential flashboard damage, No. 5 and No. 4 10'x50' tainter gates must be opened to pull the ice away from the flashboard sections.

LOCALLY OPERATED TAINTER GATES

Four tainter gates (10'x50') located in bays No. 8 through No. 11 must be operated from the dam. These gates must be operated to their full open position, never partially open.

HYDRAULIC PANELS

Ten hydraulic panels (10'x10') located in bays No. 6 and No. 7 can be lowered to crest elevation or raised to an upright position as needed. It is intended these panels will be operated last. Each panel has a retaining brace which holds the panel in an upright position and must be uncoupled prior to panel lowering.

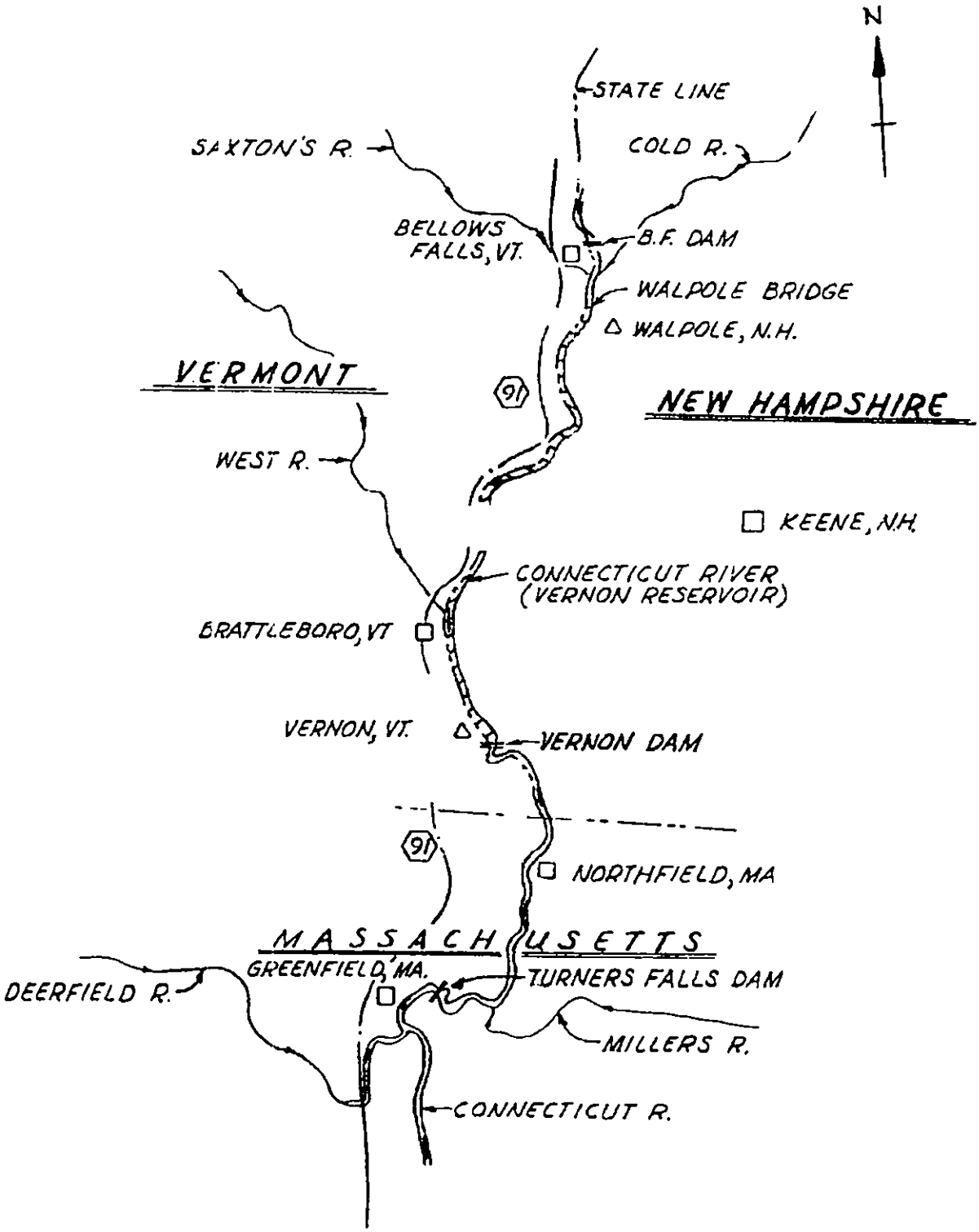
HYDRAULIC FLOOD GATES

Eight submerged hydraulic floodgates (7'x9') have been retained and are operated in the full open position, never throttled. These gates must be opened before the tailwater reaches elevation 196.0 because the tailwater starts to enter the floodgate gallery and gate operation is not possible. See Figure 10 for the rating curve of one floodgate wide open.

EMERGENCY GENERATOR

A 125 kW emergency generator has been installed in the powerhouse to operate No. 1 or No. 2 tainter gates and provide a back-up to station service. The emergency generator is exercised weekly and load tested annually.

FIGURE 1



NEW ENGLAND POWER COMPANY
VERNON PROJECT - FERC LP NO. 1904
VERNON, VERMONT

LOCATION MAP

SCALE: 1" = 8 MI. CE DEPT: JUNE 1980

FIGURE 3

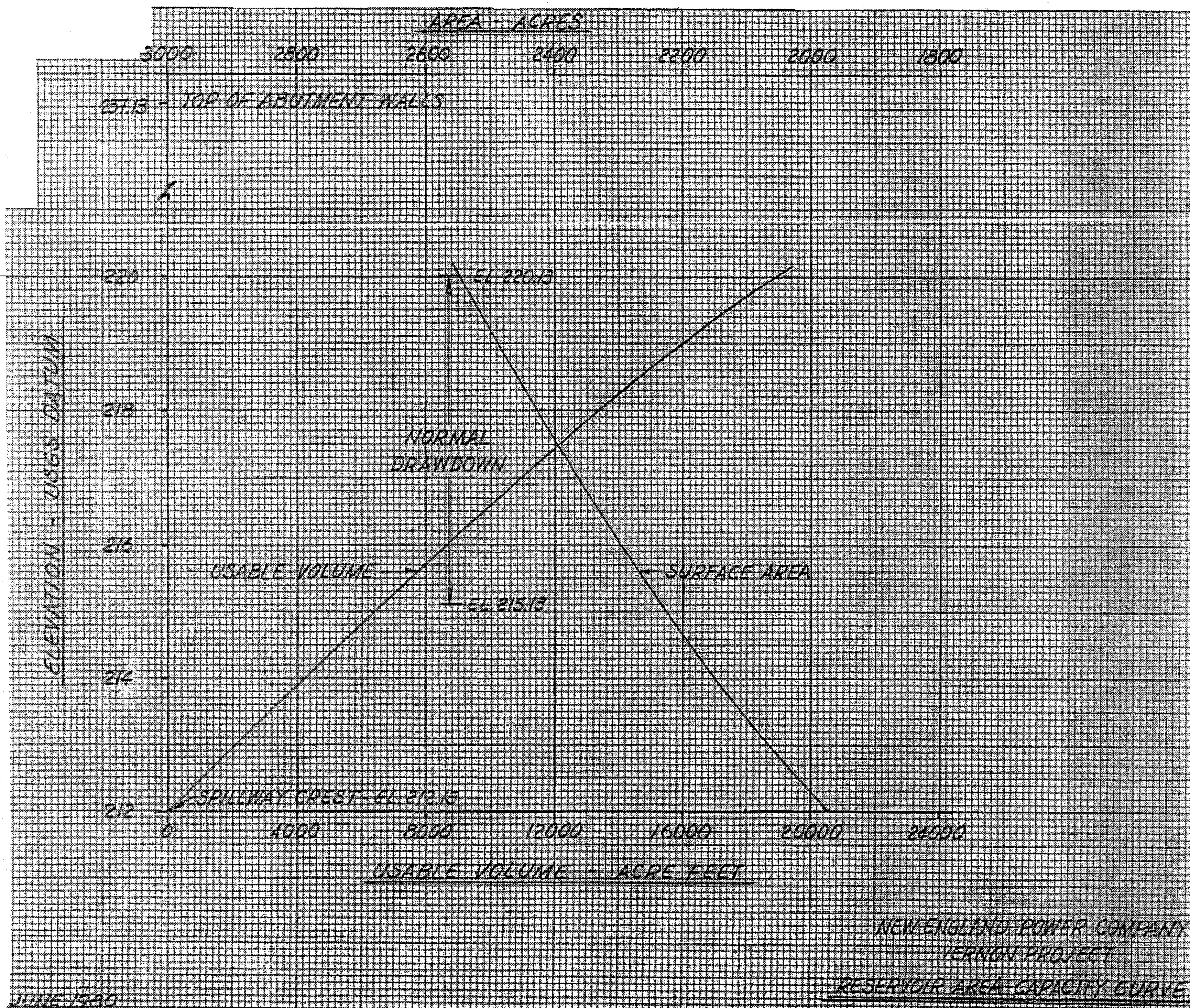


FIGURE 4

VERNON STATION

Storage Above Crest
Crest of Dam = 212.1 NGVD
Drainage Area = 6266 Sq.Mi.

kWh reflects head change and assumes operation at best efficiency

Elev. (NGVD)	CFSH	kWh	Elev. (NGVD)	CFSH	kWh	Elev. (NGVD)	CFSH	kWh
			216.0	101,185	196,880	220.0	218,230	459,200
212.1	0	0	.1	103,940	202,600	.1	221,295	466,500
.2	2,420	4,380	.2	106,735	208,520	.2	224,400	474,000
.3	4,840	8,760	.3	109,530	214,440	.3	227,505	481,500
.4	7,255	13,140	.4	112,330	220,360	.4	230,605	489,000
.5	9,675	17,520	.5	115,125	226,280	.5	233,710	496,500
.6	12,095	21,900	.6	117,920	232,200	.6	236,815	504,000
.7	14,575	26,500	.7	120,755	238,300	.7	239,955	511,700
.8	17,060	31,100	.8	123,595	244,400	.8	243,095	519,400
.9	19,540	35,700	.9	126,430	250,500	.9	246,230	527,100
213.0	22,020	40,300	217.0	129,270	256,600	221.0	249,370	534,800
.1	24,505	44,900	.1	132,105	262,700	.1	252,510	542,500
.2	27,040	49,680	.2	134,980	269,000	.2	255,685	550,400
.3	29,575	54,460	.3	137,860	275,300	.3	258,860	558,300
.4	32,115	59,240	.4	140,735	281,600	.4	262,035	566,200
.5	34,650	64,020	.5	143,615	287,900	.5	265,210	574,100
.6	37,185	68,800	.6	146,490	294,200	.6	268,385	582,000
.7	39,770	73,780	.7	149,405	300,700	.7	271,595	590,120
.8	42,350	78,760	.8	152,320	307,200	.8	274,805	598,240
.9	44,935	83,740	.9	155,240	313,700	.9	278,010	606,360
214.0	47,515	88,720	218.0	158,155	320,200	222.0	281,220	614,480
.1	50,100	93,700	.1	161,070	326,700	.1	284,430	622,600
.2	52,730	98,880	.2	164,025	333,400			
.3	55,355	104,060	.3	166,980	340,100			
.4	57,985	109,240	.4	169,935	346,800			
.5	60,610	114,420	.5	172,890	353,500			
.6	63,240	119,600	.6	175,845	360,200			
.7	65,910	124,940	.7	178,840	367,080			
.8	68,580	130,280	.8	181,830	373,960			
.9	71,255	135,620	.9	184,825	380,840			
215.0	73,925	140,960	219.0	187,815	387,720			
.1	76,595	146,300	.1	190,810	394,600			
.2	79,310	151,840	.2	193,840	401,680			
.3	82,025	157,380	.3	196,870	408,760			
.4	84,735	162,920	.4	199,900	415,840			
.5	87,450	168,460	.5	202,930	422,920			
.6	90,165	174,000	.6	205,960	430,000			
.7	92,920	179,720	.7	209,025	437,300			
.8	95,675	185,440	.8	212,095	444,600			
.9	98,430	191,160	.9	215,160	451,900			
216.0	101,185	196,880	220.0	218,230	459,200			

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24 September 1982-DEN

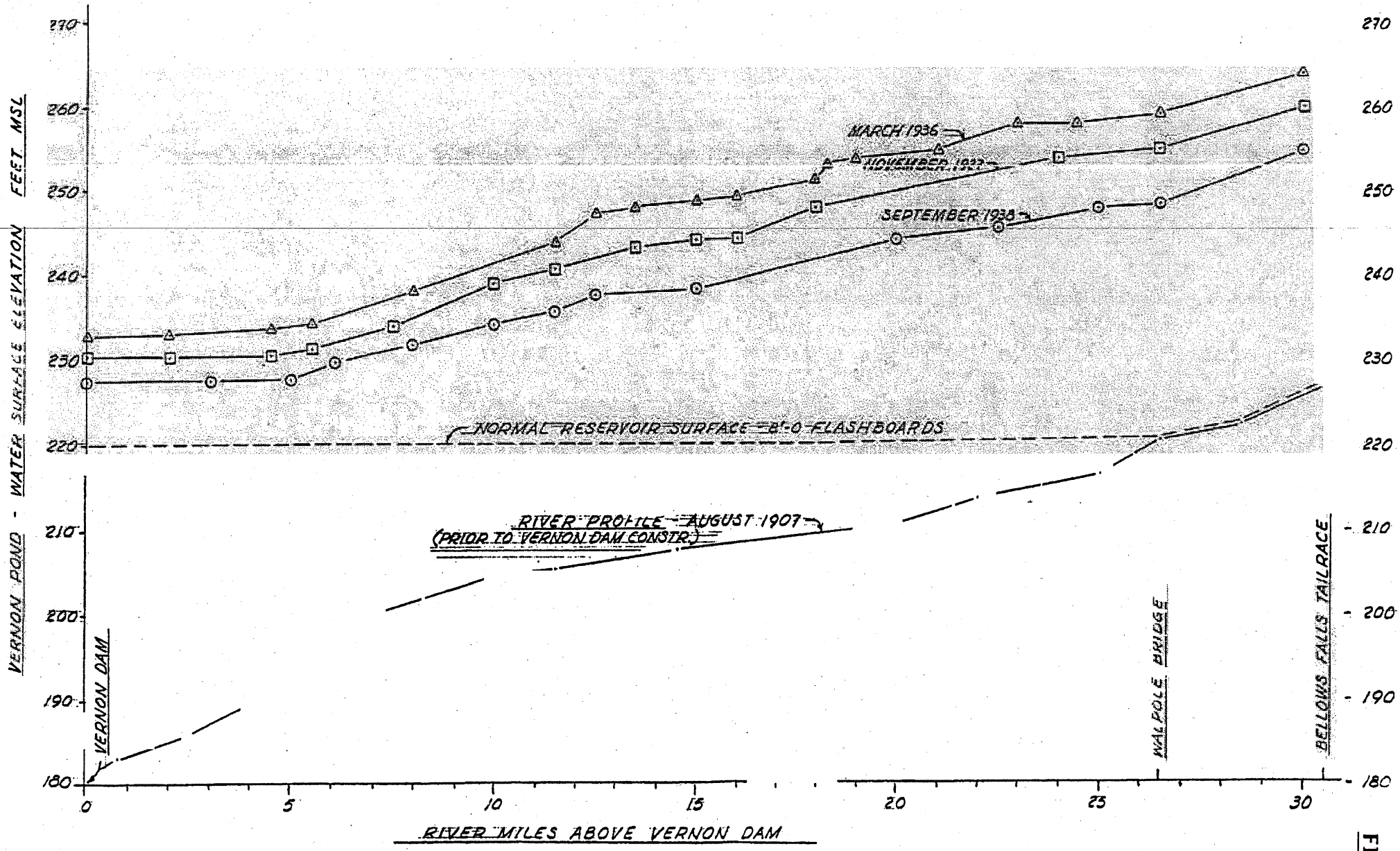

FIGURE 5

NEW ENGLAND POWER COMPANY
VERNON STATION
WATER SURFACE PROFILES

CE DEPT - JUNE 1980

FLOW SHEET VERNON STATION

DAY _____ DATE _____

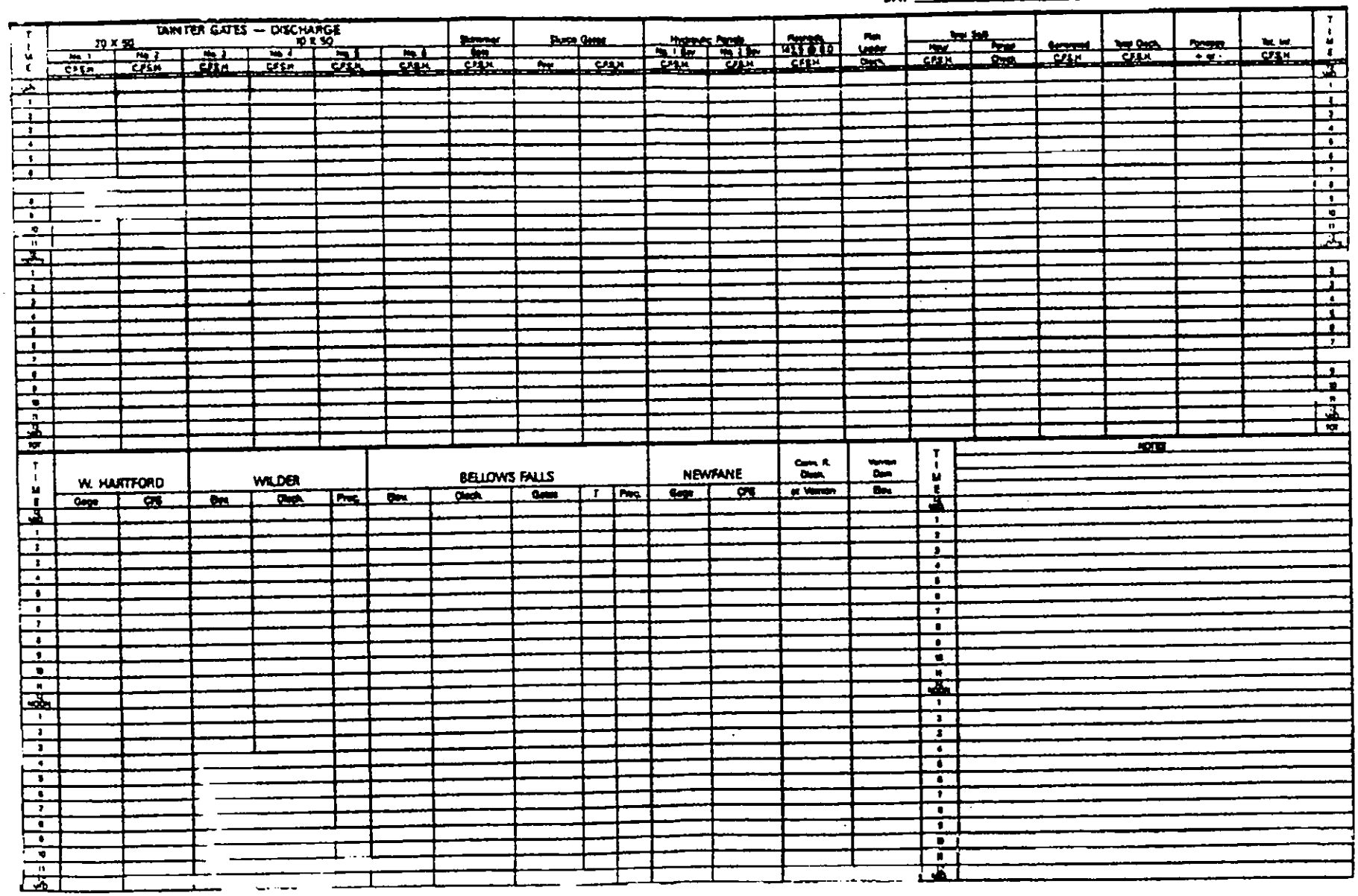

FIGURE 6

FIGURE 7

OPERATING PROCEDURES

VERNON PROJECT
Vernon, Vermont

FERC - LP NO. 1904 NH/VT

TRASH SLUICE GATE DISCHARGE CAPACITY(1)

Discharge Equation (CFS) = 13 $[0.4133\ (2g)^{1/2}\ H^{2/3}]$

Reservoir Head on Sluice Gate(2) (Ft)	Discharge Capacity (CFS)
0.0	0.0
0.5	15.2
1.0	43.1
1.5	79.2
2.0	122.0
2.5	170.4
3.0	224.0
3.5	282.3
4.0	344.9
4.5	411.6
5.0	482.0
5.5	556.2
6.0	633.7
6.5	714.5
7.0	798.5
7.5	885.6
8.0	975.6
8.5	1,068.5
9.0	1,164.2
9.5	1,262.5
10.0	1,363.5
10.5	1,467.0
11.0	1,573.0
11.5	1,681.5
12.0	1,792.4
12.5	1,905.5
13.0	2,021.0
13.5	2,138.7
14.0	2,258.6
14.5	2,380.7
15.0	2,504.9

NOTES:

(1) The sluice gate discharge is created by lowering the gate and passing flow over the gate's crest.

(2) Difference in feet between pond elevation and top of gate.

OPERATING PROCEDURES

VERNON PROJECT
VERNON, VERMONT

FERC - I.P NO. 1904 NH/VT

20'X50' TAINTER GATE DISCHARGE CAPACITY(1)
(CFS)

Reservoir Elevation (NGVD)	GATE OPENING IN FEET(2)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
212.1	775	1,540	2,286	3,030	3,749										
213.1	1,064	2,055	2,985	3,864	4,883										
214.1	1,114	2,156	3,138	4,069	4,955	5,803	6,419								
215.1	1,161	2,253	3,284	4,264	5,200	6,097	6,959	7,239							
216.1	1,207	2,345	3,424	4,452	5,435	6,379	7,288	8,090	8,090						
217.1	1,252	2,435	3,559	4,633	5,661	6,550	7,605	8,529	8,972	8,972					
218.1	1,295	2,521	3,689	4,806	5,880	6,913	7,911	8,878	9,817	9,884					
219.1	1,336	2,605	3,815	4,975	6,091	7,167	8,207	9,217	10,198	10,825	10,825				
220.1	1,376	2,686	3,937	5,138	6,295	7,412	8,494	9,545	10,567	11,563	11,794				
221.1	1,415	2,764	4,056	5,297	6,494	7,651	8,773	9,863	10,925	11,961	12,790	12,790			
222.1	1,453	2,840	4,171	5,451	6,687	7,883	9,043	10,173	11,273	12,348	13,399	13,831	13,831		
223.1	1,490	2,915	4,283	5,601	6,874	8,108	9,307	10,474	11,612	12,725	13,814	14,862	14,862		
224.1	1,526	2,988	4,393	5,747	7,058	8,328	9,564	10,768	11,943	13,092	14,218	15,323	15,940	15,940	
225.1	1,562	3,059	4,499	5,890	7,236	8,543	9,815	11,055	12,266	13,451	14,613	15,753	16,875	17,035	17,035

NOTES:

(1) Table is preliminary and will be adjusted based on experience.

(2) Flows for gate openings greater than those indicated equal the last posted flow rate.

FIGURE 8

OPERATING PROCEDURES

VERNON PROJECT
VERNON, VERMONT

FERC - LP NO. 1904 NH/VT

10'x50' TAINTER GATE DISCHARGE CAPACITY(1)
(CFS)

Reservoir Elevation (NGVD)	GATE OPENING IN FEET								
	1	2	3	4	5	6	7	8	9
212.1	0	0	0	0	0	0	0	0	0
213.1	160	160	160	160	160	160	160	160	160
214.1	467	467	467	467	467	467	467	467	467
215.1	566	883	883	883	883	883	883	883	883
216.1	645	1,143	1,400	1,400	1,400	1,400	1,400	1,400	1,400
217.1	715	1,277	1,688	2,009	2,009	2,009	2,009	2,009	2,009
218.1	780	1,399	1,856	2,595	2,717	2,717	2,717	2,717	2,717
219.1	839	1,511	2,010	2,823	3,455	3,467	3,467	3,467	3,467
220.1	895	1,616	2,155	3,036	3,725	4,241	4,241	4,241	4,241
221.1	947	1,715	2,290	3,236	3,979	4,469	5,050	5,050	5,050
222.1	997	1,783	2,385	3,378	4,160	4,935	5,689	5,950	5,950
223.1	1,044	1,898	2,541	3,606	4,448	5,284	6,099	6,850	6,850
224.1	1,089	1,984	2,659	3,780	4,668	5,552	6,416	7,260	7,800
225.1	1,133	2,065	2,770	3,944	4,875	5,807	6,717	7,608	8,800
226.1	1,174	2,143	2,878	4,123	5,078	6,053	7,008	7,945	9,800

NOTE:

(1)Gate discharge capacity is limited by ogee spillway capabilities
For gate openings of 10 to 15 feet use 9 foot opening flow rate.

FIGURE 9

FIGURE

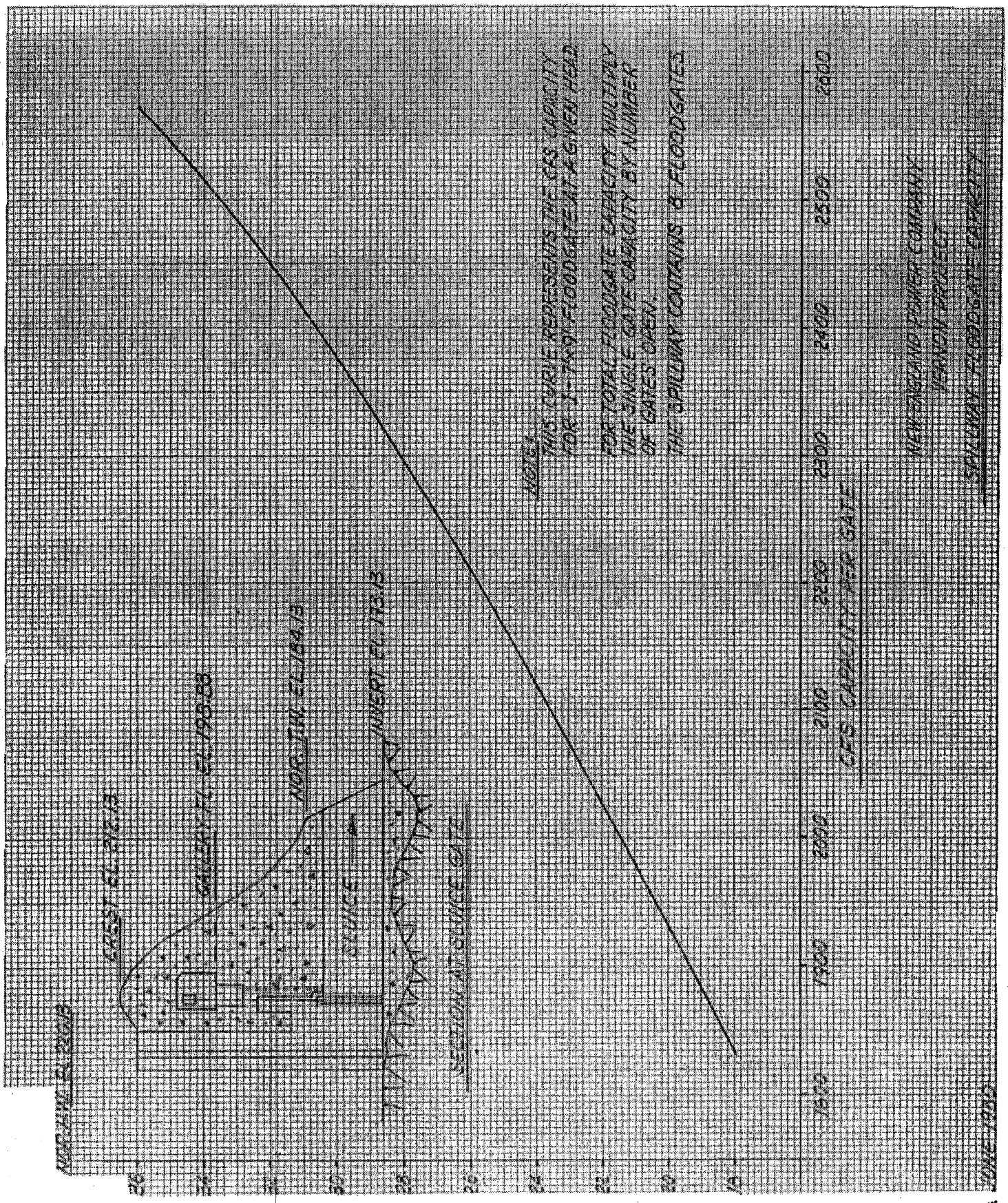

FIGURE 11

OPERATING PROCEDURES

VERNON PROJECT
Vernon, Vermont

FERC - LP NO. 1904 NH/VT

FLASHBOARD BAY FLOW WITH 8' BOARDS IN-PLACE

Reservoir Elevation (NGVD)	Discharge (CFS)	
	42.5 Foot Bay	50 Foot Bay
220.1	0	1,000
220.6	54	62
221.1	142	167
221.6	265	310
222.1	400	471
222.6	559	658

FIGURE 12

OPERATING PROCEDURES

VERNON PROJECT
Vernon, Vermont

FERC - LP NO. 1904 NH/VT

FLASHBOARD BAY FLOW WITHOUT BOARDS

Reservoir Elevation (NGVD)	Discharge (CFS)	
	42.5 Foot Bay	50 Foot Bay
212.1	0	0
212.6	49	58
213.1	136	160
213.6	208	304
214.1	397	467
214.6	567	667
215.1	751	883
215.6	963	1,133
216.1	1,190	1,400
216.6	1,438	1,692
217.1	1,707	2,008
217.6	1,998	2,350
218.1	2,309	2,717
218.6	2,628	3,092
219.1	2,947	3,467
219.6	3,273	3,850
220.1	3,606	4,242
220.6	3,946	4,642
221.1	4,293	5,050
221.6	4,675	5,500
222.1	5,058	5,950
222.6	5,440	6,400
223.1	5,823	6,850
223.6	6,219	7,317
224.1	6,630	7,800
224.6	7,055	8,300
225.1	7,480	8,800
225.6	7,863	9,250
226.1	8,330	9,800
226.6	8,798	10,350
227.1	9,265	10,900
227.6	9,733	11,450
228.1	10,200	12,000

MORNING REPORT
VERNON STATION

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
DATE							
Dam Elev.							
Avg. Disch. CFS							
Avg. Inf. CFS 6 hr.							
Gross Gen. Day							
Gross Gen. Mo.							
Temp. 8 A.M.							
Weather							
Precip. Day & Mo.							
Board Elev.							
Gates Ft.							
Newfane Elev. & CFS							
Accidents							
Sickness							
Vacations							
Operations							
Activities							

EXHIBIT 13

TIME	TAINTER GATES — DISCHARGE 20 X 50 No. 1 C.F.S.H.	20 X 50 No. 2 C.F.S.H.	10 X 50 No. 3 C.F.S.H.	10 X 50 No. 4 C.F.S.H.	10 X 50 No. 5 C.F.S.H.	10 X 50 No. 6 C.F.S.H.	Skimmer Gate C.F.S.H.	Sluice Gates Feet	Sluice Gates C.F.S.H.
12 MID.									
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12 NOON									
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2									
3									
4									
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7									
8									
9									
10									
11									
12 MID.									
TOT.									

TIME	W. HARTFORD Gage	W. HARTFORD CFS	WILDER Elev.	WILDER Disch.	WILDER Prec.	BELLOWS FALLS Elev.	BELLOWS FALLS Disch.	BELLOWS FALLS Gates	BELLOWS FALLS T	BELLOWS FALLS Prec
12 MID.										
1										
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10										
11										
12 MID.										

DAY _____ DATE _____

ulic Panels No. 2 Bay C.F.S.H.	Flashbds. 142.5 @ 8.0 C.F.S.H.	Fish Ladder Disch.	Total Spill Hour C.F.S.H.	Total Spill Period Check	Generated C.F.S.H.	Total Disch. C.F.S.H.	Pondage + or -	Tot. Inf. C.F.S.H.	TIME
									12 MID.
									1
									2
									3
									4
									5
									6
									7
									8
									9
									10
									11
									12 NOON
									1
									2
									3
									4
									5
									6
									7
									8
									9
									10
									11
									12 MID.
									TOT.

VFANE CFS	Conn. R. Diach. at Vernon	Vernon Dam Elev.	TIME
			12 MID.
			1
			2
			3
			4
			5
			6
			7
			8
			9
			10
			11
			12 NOON
			1
			2
			3
			4
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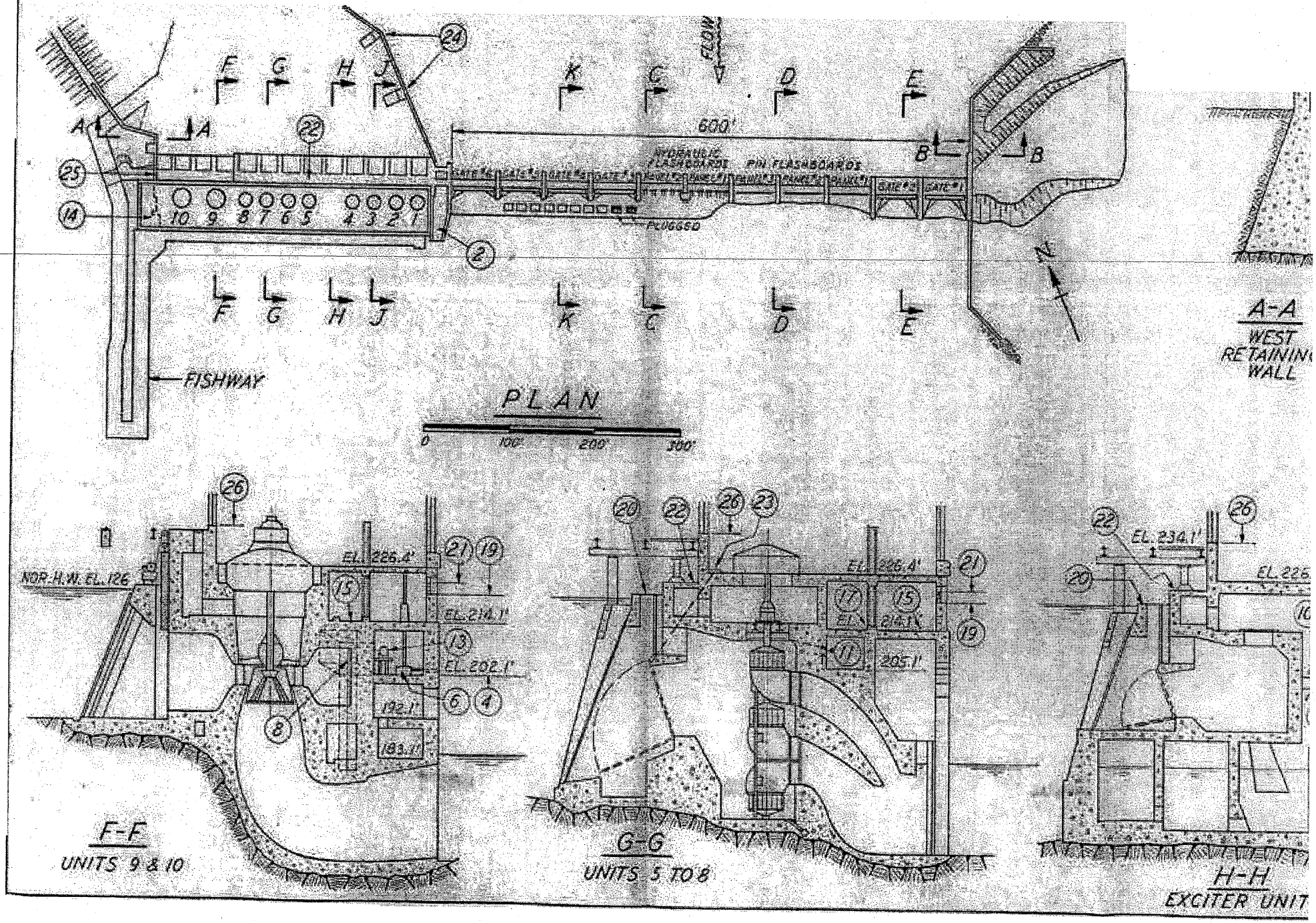
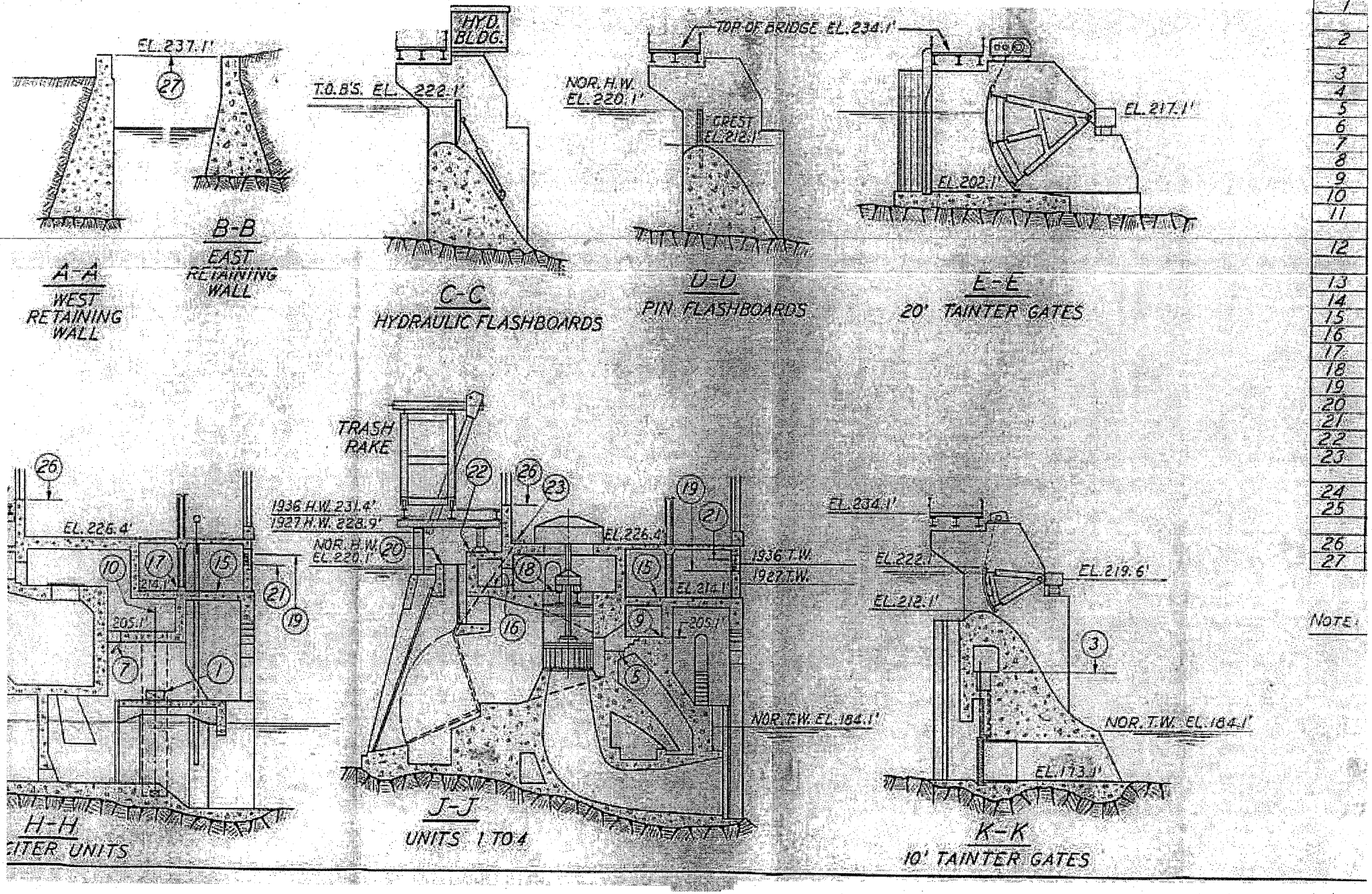
			7
			8
			9
			10
			11
			12 MID.

NOTES





ITEM
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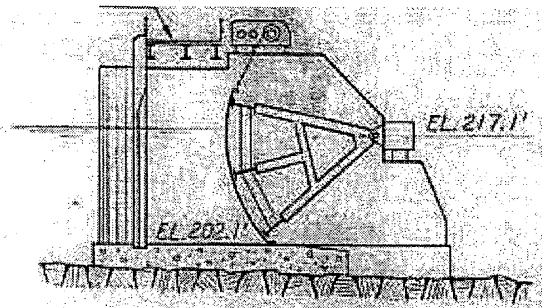
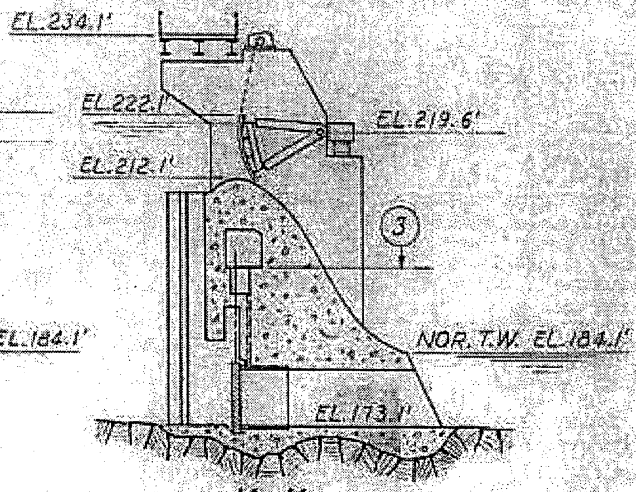
NOTE:



E-E

20' TAINTER GATES



K-K

10' TAINTER GATES

1			[illegible] BUS [illegible] AD [illegible] PE [illegible] AT [illegible] OF [illegible] TE [illegible] TS (EAST SIDE OPENING PERMANENTLY BLOCKED).
2		194.1	REMOVE CHAIN RAILING FROM STAIR LANDING AT EL. 103.0' ON EAST FACE OF BUILDING.
3		196.0	WATER ENTERS SLUICE GATE OPERATING GALLERY.
4		202.1	CHECK CLOSURE OF FLOOR DRAIN VALVE AT FLOOD PUMPS.
5		202.1	CLOSE BREATHER VALVES AT UNITS NO.1 TO NO.4.
6		203.1	USE WEST END FLOOD PROTECTION PUMPS.
7		203.1	CLOSE TRAP DOOR IN FLOOR OPENING AT EXCITER UNITS.
8		204.1	WEST END SUMP PUMP MOTOR FLOODED.
9		205.1	CHECK CLOSURE OF FLOOR DRAIN VALVE AT EAST END OF 111.0 GALLERY.
10		205.1	SUMP PUMP AT EXCITER UNITS FLOODED.
11		205.1	CLOSE LOWER WHEEL PIT DRAIN VALVE LOCATED IN 111.0 GALLERY ON UNITS NO. 5 TO NO. 8 AND OPEN UPPER VALVE.
12		205.1	CHECK CLOSURE OF VACUUM BREAKERS AND DRAIN VALVES IN WHEEL PITS AT UNITS NO. 1 TO NO. 4 ALSO NO. 2 AND NO. 10.
13		207.1	WEST END OPERATING WATCH PUMPS FLOODED; USE AUXILIARY PUMPS.
14		209.1	MACHINE SHOP FLOOR AT WEST END OF POWERHOUSE.
15		214.1	2300 V. BUS ROOM FLOOR.
16		214.1	PLUG 6" DRAIN AT EAST END OF BLIND ALLEY.
17		214.8	TOP OF BUSS ROOM FLOOR CURB.
18		214.9	SILL OF STEEL DOOR AT EAST END OF POWERHOUSE.
19		220.4	WINDOW SILL IN DOWN STREAM FACE OF POWERHOUSE; PLACE STOP LOGS.
20	222.1		LIMIT OF TRASH RAKE USE FROM UNITS NO.1 TO NO. 8.
21		223.1	TOP OF STOP LOGS IN DOWN STREAM WINDOW OPENINGS.
22	224.1		TOP OF INTAKE FROM UNIT NO. 8 TO DAM.
23	226.4		TOP OF GENERATOR FLOOR. CHECK FLOOR PLATES OVER GATE LIFT OPENINGS UNITS NO.1 TO NO. 6.
24	231.1		TOP OF ICE BOOM PIERS.
25	232.1		PLACE STOP LOGS IN PASSAGE WAY BETWEEN WEST RETAINING WALL AND POWERHOUSE.
26	235.1		TOP OF WINDOW SILLS IN UPSTREAM WALL OF POWERHOUSE.
27	237.1		TOP OF EAST AND WEST RETAINING WALLS.

NOTE: ALL ELEVATIONS ARE REFERENCED TO N.G.V.D.

NEW ENGLAND POWER COMPANY

VERNON STATION

FLOOD DATA

OPERATING REMINDERS

SCALE: 1"=20' UNLESS NOTED APR. 1988

R-1606-3

USGen New England, Inc

Michael G. Kline, P.E.
General Manager, Hydro Generation
275 Wilder Dam Rd.
P.O Box 1898
Wilder, VT 05088
Phone: (802) 291 8108
Fax : (802) 291-8092
Mike.Kline@neg.pge.com

May 28 , 2003

Mr. John Howard, Station Manager
Northfield Mountain
99 Millers Falls Road
Northfield, MA 01360

Re: Connecticut River Hydro Coordination - Project Nos 1904, 2485, and 1889

Dear Mr. Howard:

The purpose of this letter is to set forth our understanding as to the procedures and measures we, USGen New England, Inc. (USGenNE) and Northeast Generating Company (NGC) have agreed to implement in order to share certain information and better coordinate our respective hydro operations on the Connecticut River. This letter restates the agreements reflected in our earlier letter agreement of April 19, 2001 and reflects the suggestions you made in your letter of February 13, 2003. If you concur with this summary, please sign a copy of this letter on behalf of NGC and return a copy to:

John Ragonese
FERC License Manager
PG&E National Energy Group
4 Park Street; Suite 402
Concord, NH 03301

We will then have copies of this letter agreement filed with FERC consistent with Article 304 of our license for the Vernon Project.

1. We will each day by 10:00 AM starting on April 20, 2001 provide you by fax* at 413-659-4423 (Northfield) our estimate of the total discharge (cfsh) expected the next day at our Vernon Project.
2. When we receive the hourly dispatch schedule for the next day from the New England ISO, we will have the schedule for Vernon faxed* to Northfield. We generally receive that report between 4:00 PM and 6:00 PM.
3. If any subsequent dispatch schedules are received during the day showing changes in the projected hourly flow schedules, the schedule for Vernon will be sent by fax to Northfield.
4. We will cooperate with and provide reasonable assistance to you in securing current gage readings from the principal USGS stations in the Connecticut River basin.

5 We will arrange for the transmission to your control room of the instantaneous total discharge and tailwater elevation data at Vernon. If new equipment is necessary within USGenNE facilities, we would expect NGC to compensate us for that one time expense. We would not replace and bill you for any equipment necessary for this transmission without prior NGC approval. Ongoing equipment upkeep and maintenance installed at each facility will be the responsibility of each respective company. NGC will be allowed to continue to maintain the current method of monitoring and maintaining the Vernon tailwater gage as a back-up.

6. NGC will take appropriate steps to insure that the flow discharge information we provide will not be communicated to individuals involved in marketing operations on behalf of NGC or any of its affiliates.

7 We will file copies of this executed letter agreement with FERC pursuant to our Vernon license and the 1993 Headwater Benefits Agreement.

8. In view of the fact that there has been a change in ownership of certain of the hydroelectric projects in the Connecticut River basin, we will enter into separate headwater benefit agreements with the new owners, on the same terms and conditions as the 1993 Headwater Benefits Agreement, to reflect those ownership changes. Until such time as the new agreements have been executed, we will make any necessary adjustments to the monthly billing under the existing 1993 Headwater Benefits Agreement to reflect those ownership changes.

9. **This agreement shall be binding on our respective successors and assigns and shall continue until terminated by either party giving the other party twelve (12) months written notice specifying the date of such termination, such date not to be earlier than December 31, 2009.**

* Fax or delivered by other available electronic means if so requested by Northfield.

If you agree with the foregoing summary of our understandings and commitments, please so indicate by signing and returning to me a copy of this letter.

Very truly yours,

Michael G. Kline

Michael G. Kline
General Manager, Hydro Generation

Name: [signature]
Title: Station Manager
Date: 6/2/03

VERNON HYDROELECTRIC STATION

BACKWATER AGREEMENT

NEW ENGLAND POWER COMPANY

AND

NORTHEAST UTILITIES SERVICE COMPANY

1993

VERNON HYDROELECTRIC STATION BACKWATER AGREEMENT

Agreement dated as of _____, 1993 by and between NEW ENGLAND POWER COMPANY (NEP), a Massachusetts corporation and NORTHEAST UTILITIES SERVICE COMPANY (NUSCO), a Connecticut corporation, as agent for WESTERN MASSACHUSETTS ELECTRIC COMPANY (WMECO) and THE CONNECTICUT LIGHT AND POWER COMPANY (CL&P).

WHEREAS, NEP owns and operates the Vernon hydroelectric station (L.P. No. 1904) on the Connecticut River; and

WHEREAS, WMECO and CL&P are the licensees for the Northfield Mountain pumped storage hydroelectric station (L.P. No. 2485) and WEMCO is the licensee for the Turner Falls hydroelectric station (L.P. No. 1889), both located on the Connecticut River downstream from the Vernon hydroelectric station; and

WHEREAS, the development of the Northfield Mountain project involved removing the flashboards and raising the dam at Turner Fall by 5.4 feet which affected the generation output of the Vernon station; and

WHEREAS, NEP is contemplating an expansion of the Vernon hydroelectric project to increase its generating capability from its current level of approximately 24 MW to approximately 44 MW after expansion: and

WHEREAS, the parties acknowledge that the precise determination of the impact of having removed the flashboards and raised the dam at Turner Falls is complex and, after reviewing several analyses, have agreed that an estimate of nine-tenths of one percent (.009) of Vernon's net electric output is a reasonable estimate of the impact of lost energy production at the Vernon hydroelectric station before and after the contemplated expansion; and

WHEREAS, the parties wish to ensure that all hydroelectric stations continue to be operated in a manner to maximize the utilization of the hydropower resources; and

WHEREAS, the parties wish to resolve all issues of lost capacity and energy at the Vernon hydroelectric station related to removing the flashboards and raising the dam at Turner Falls;

NOW, THEREFORE, the parties agree as follows:

ARTICLE I. Effective Date and Term

This agreement shall become effective on April 1, 1993 and shall remain in effect until the Vernon hydroelectric station license expires on April 30, 2018 or upon the mutual agreement of the parties.

ARTICLE II. Definitions

"Avoided Cost" shall mean the average short term avoided energy cost for the month (in cents per kilowatthour), exclusive of capacity value, as filed by NEP's affiliate, Massachusetts Electric Company (MECO), in accordance with Massachusetts Department of Public Utilities regulations. The average short term avoided energy cost for the month shall include weighting of on-peak hours and off-peak hours in a week. Currently, the weighting is 38.7% on-peak (8 a.m. to 9 p.m. weekdays) and 61.3% off-peak (all other hours). NEP may modify these weighting percentages accordingly should the definition of on-peak and off-peak hours change in MECO's avoided cost filings.

"Net Electric Output" shall mean the total metered amount of electricity (in kilowatthours) generated by the Vernon station less metered kilowatthours consumed for station use.

"Prime Rate" shall mean the prime (or comparable) rate announced from time to time as its prime rate by the Bank of Boston, which rate may differ from the rate offered to its most substantial and credit-worthy customers.

ARTICLE III. Price and Billing

A. NEP agrees to waive any claim for lost capacity and energy occurring prior to April 1, 1993 which relates to having removed the flashboards and raised the dam at Turner Falls.

B. Commencing April 1, 1993, NUSCO shall pay NEP an amount equal to nine-tenths of one percent (.009) multiplied by the Net Electric Output for the month multiplied by the Avoided Cost for the month.

C. Bills for all amounts due under this ARTICLE III shall be rendered to NUSCO monthly. All such bills, including bills disputed by NUSCO, shall be due and payable by NUSCO when rendered. If all or any part of any bill shall remain unpaid for more than thirty (30) days after receipt by NUSCO, interest at a rate per annum equal to the Prime Rate shall thereafter accrue and be payable to NEP on such unpaid amount.

ARTICLE IV. Changed Operating Conditions

The intent of the parties in this Agreement is to reach a reasonable level of payment to NEP for the impact of removing the flashboards and raising the dam at Turner Falls, both before and after the contemplated expansion of the Vernon station. The

parties acknowledge that over the term of this Agreement, changes other than the expansion of the Vernon station may occur that could increase or decrease the backwater levels at the Vernon station. In the event that other substantial changes to the operation of the Vernon, Northfield Mountain or Turner Falls hydroelectric stations occur during the term of this Agreement, the parties may mutually agree on a modification of the terms of this Agreement.

ARTICLE V. Notices

Any notice, demand or request required or authorized by this Agreement to be given by one party to the other party shall be in writing. It shall either be personally delivered or mailed, postage prepaid, to the representative of said other party designated in this ARTICLE. Any such notice, demand or request so delivered or mailed shall be deemed to be given when so delivered or mailed.

Notices and other communications by NUSCO to NEP shall be addressed to:

Director, Planning & Power Supply
New England Power Company
25 Research Drive
Westborough, MA 01581

Notices and other communications by NEP to NUSCO shall be addressed to:

Vice President, Fossil-Hydro Engineering and Operations
Northeast Utilities Service Company
P.O. Box 270
Hartford, Connecticut 06141

Either party may change its representative by written notice to the other.

ARTICLE VI. Modifications

No modification to this Agreement shall be binding on either party unless it shall be in writing and signed by both parties.

ARTICLE VII. Waivers

The failure of either party to insist in any one or more instance upon strict performance of any of the provisions of this Agreement or to take advantage of any of its rights under this Agreement shall not be construed as a general waiver of any such provision or the relinquishment of any such right, but the same

shall continue and remain in full force and effect, except with respect to the particular instance or instances.

ARTICLE VIII. Regulation

This Agreement and all rights, obligations, and performances of the parties hereunder, are subject to all applicable state and Federal laws, and to all duly promulgated orders and other duly authorized action of governmental authority having jurisdiction.

ARTICLE IX. Interpretation, Dispute Resolution

The interpretation and performance of this Agreement shall be in accordance with and controlled by the law of The Commonwealth of Massachusetts, the state or Federal Courts in which shall have exclusive jurisdiction over cases and controversies arising hereunder.

Headings are for the convenience of the parties only and shall not be construed as a part of this Agreement.

ARTICLE X. Severability

If any provision or provisions of this Agreement shall be held invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions shall in no way be affected or impaired thereby.

ARTICLE XI. Assignment

This Agreement shall bind and inure to the benefit of the parties hereto and of their respective successors and assigns.

ARTICLE XII. Prior Agreement Superseded

This Agreement constitutes the entire agreement between the parties hereto relating to the subject matter hereof and its execution supersedes all previous agreements, discussions, communications and correspondence with respect to the subject matter hereof.

ARTICLE XIII. Counterparts

This Agreement may be executed in any number of counterparts, and each executed counterpart shall have the same force and effect as an original instrument.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

NEW ENGLAND POWER COMPANY

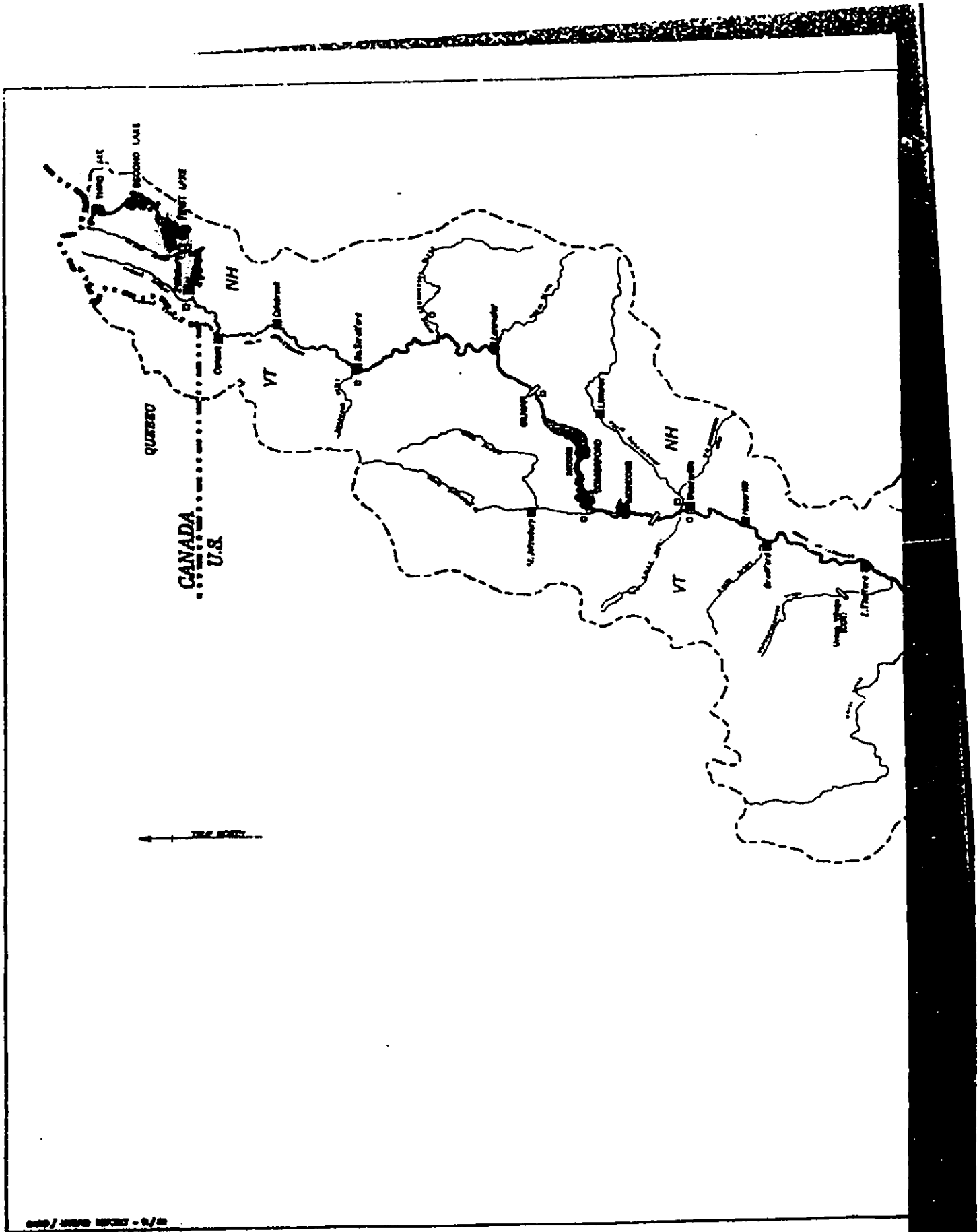
By Donald H. Turmin

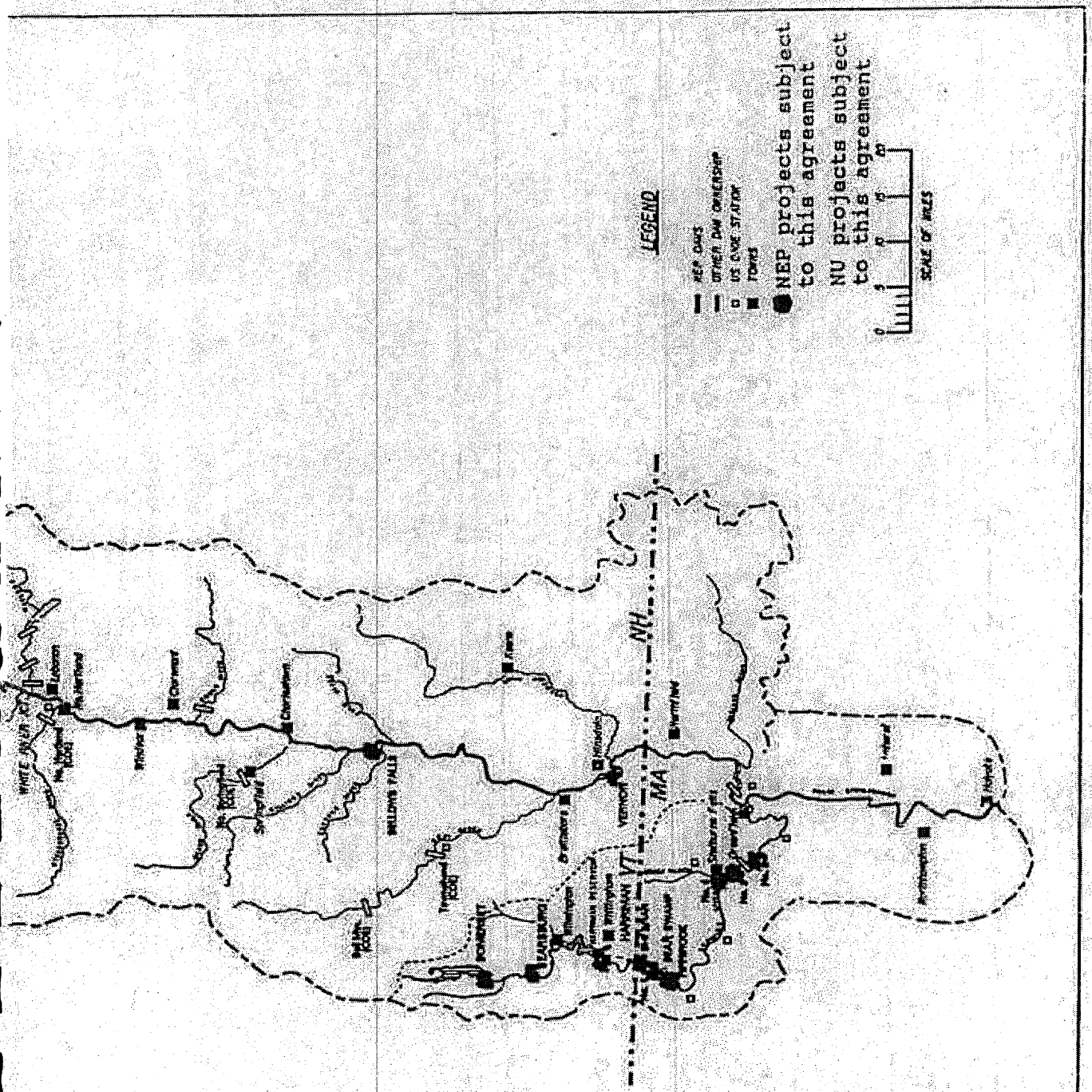
Title: Vice President

NORTHEAST UTILITIES SERVICE COMPANY

By Ronald G. Robinson

Title: VICE PRESIDENT





ORIG

New England Power Service
A New England Electric System company

Mark E. Slade
Senior Attorney

9:58

P-2077 ETC

April 6, 1993

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E., Room 3110
Washington, DC 20426

Dear Secretary Cashell:

Enclosed for filing are an original and seven copies of a Headwaters Settlement Agreement being filed pursuant to the Commission's Regulations at 18 C.F.R. 11.14. This Agreement resolves the issue of compensation for headwater benefits received by projects owned by Northeast Utilities (NU) and its subsidiaries from projects owned by New England Power Company (NEP). The projects are on the Connecticut River in New Hampshire, Vermont, and Massachusetts, and on the Deerfield River in Vermont and Massachusetts. The projects involved in this Agreement, their ownership, and FERC license numbers are identified on the attached map, and Table I.

The Agreement and its exhibits detail the methodology and information to be used in determining the headwater benefits received by NU. The benefits will be determined through use of an USACOE HEC-5 model, [redacted] used in determining the benefits provided to NU by NEP's upstream licensed facilities on the Connecticut River.

Also enclosed is an original and seven copies of a "Backwater Settlement Agreement" also between NU and NEP. This Agreement provides compensation to NEP for the reduction in capacity and energy produced at NEP's Vernon Station (L.P. No. 1904) which resulted from the raising of the Turners Falls impoundment (L.P. No. 1889). This change was required by the construction of the Northfield Mountain Pumped Storage Station (L.P. No. 2485, owned by NU). As such, this Agreement compensates NEP for an encroachment upon its project as it existed prior to the construction of the Northfield Mountain project.

FERC DOCKETED

APR 7 1993

9304140012

[redacted]

NEP and NU have concluded that precise determination of this impact is extremely complex. After reviewing several analyses NEP and NU have agreed that a simple approximation, mutually agreed to by the parties, is the most reasonable solution. The Backwater Agreement implements this conclusion and avoids further delay and expense associated with attempting to find a mutually acceptable analytic solution.

From previous Commission decisions, we believe that the Backwater Agreement is not subject to FERC jurisdiction, and are providing it as an informational filing. See Enerco Corp., 48 FERC ¶ 61,009, n. 10 (1989). However, if this Agreement is deemed jurisdictional then we respectfully request that it be treated as hereby filed.

Sincerely,

ATTACHMENT 3

AGENCY CONSULTATION DOCUMENTATION

- **NHSHPO Consultation**
- **VTSHPO Consultation**
- **Draft Memorandum of Agreement Pursuant to 36 CFR 800.6(c)**
- **Summary of Initial Consultation Meeting on January 25, 2006**
- **NHDES Issued Permit**
- **401 WQC Application to NHDES**

US Northeast Hydro Region
Concord Hydro Office
4 Park Street, Suite 402
Concord NH 03301-6373

tel 603 225 5528
fax 603 225 3260
web www.transcanada.com

November 16, 2005

James McConaha, SHPO & Director
New Hampshire Division of Historical Resources
19 Pillsbury Street
2nd Floor
Concord, NH 03301-3570

Re: TransCanada Vernon Hydroelectric Project; License Amendment SHPO Consultation

Dear Mr. McConaha:

TransCanada Hydro Northeast Inc. ("TransCanada"), current owner and licensee for the Vernon Hydroelectric Project, intends to submit an application to the Federal Energy Regulatory Commission (FERC) to modify its current license as amended on June 12, 1992. The 1992 amendment Order (copy enclosed) was issued by the FERC in response to an application by the New England Power Company (NEP). The original plan included the replacement of four existing 2 megawatt turbine/generator units (Units Nos. 5 through 8) with two 14 megawatt units and the replacement of all interior electrical equipment for the turbine/generator units with a modern control system and a new control room. Most of this equipment was installed when the station was constructed in 1909.

In accordance with Section 106 of the National Historic Preservation Act, NEP consulted with the New Hampshire and Vermont State Historic Preservation Officers regarding the impacts of the proposed project on historic properties (see attached correspondence). The consultation initially resulted in a finding "no effect" by the NHSHPO. The VTSHPO, however, found that Vernon Station was eligible for listing in the National Register of Historic Places and that the proposed modifications would have had an "adverse effect" on historic qualities of the station. As mitigation for the impacts, the VTSHPO recommended that a National Register nomination be prepared for Vernon Station and that the components scheduled for removal be documented according to Historic American Engineering Record (HAER) standards. These mitigation activities were written into the Order with the requirement that they be completed before the commencement of the project.

The proposed project was put on hold by NEP and was not undertaken by its successor, USGen New England Inc.; thus the mitigation activities were never completed. TransCanada, as the current owner, wishes to move forward with the upgrade but in a different configuration from the original upgrade (2-14 mw generators). The new configuration more appropriately matches the station hydrology with today's market conditions. The current proposal will replace the existing four 2-mw units with four units in the same existing bays. The final design is still in progress but the output from these units will be in the 3.2 – 4.5 mw range each. New head gates and trash racks would be installed for each of these units. We may need draft tube gates as well depending on the final turbine arrangement, but at the least we will build a new set of stop logs for dewatering. This area at the downstream base of the station has been significantly modified already due to the fish ladders constructed for Atlantic salmon migration.

The new generating units will require air cooling that shall require the discharge to be ducted through the downstream wall of the powerhouse. The new concept, using (4) smaller units versus the original concept of (2) large units, will require less air flow and so the impact on the exterior façade of the building will be less than previously anticipated. Our initial feasibility study indicates that the cross sectional area of the windows at elevation 214 on the downstream wall will be sufficient to discharge the air needed to cool the new generators. Therefore we propose to keep the same wooden sills and sashes of the windows and remove the glass panes and grids. Duct work will have to be added up to the window frames, and new louvers will be required to control the air flow. The location of the proposed window modifications can be discussed with you or your staff.

The proposed plans constitute an alteration to the original application that your office reviewed. Therefore, TransCanada requests the opportunity to reinitiate consultation with your office in order to devise a mutually acceptable plan to mitigate the anticipated impacts that reflects current and more relevant mitigation approaches. Since the preparation of National Register nominations for properties that are already considered eligible for the listing in the National Register is no longer a common element of mitigation, TransCanada proposes instead to develop a Cultural Resource Management Plan, similar to those it currently has for the Deerfield River and Fifteen Mile Falls Projects, that would govern future activities at the Vernon Project. Also, Vernon Station was previously documented according to modified HAER standards as part of the Systemwide Documentation of the Connecticut and Deerfield River Hydroelectric Projects prepared by PAL in 1999-2000. TransCanada therefore requests your concurrence in removing the language in the original order that states that the equipment to be removed will be documented to HAER standards in favor of amending the existing Systemwide Documentation.

TransCanada hopes to schedule a meeting in the near future to discuss these suggested changes in its approach toward mitigating the impacts to Vernon Station during the proposed project. We appreciate you attention to this matter and look forward to hearing from you. Please contact me at 603-225-5528 to set up a time for us to meet with you.

Sincerely,

John L. Ragonese
FERC License Manager

TransCanada
In business to deliver

US Northeast Hydro Region
Concord Hydro Office
4 Park Street, Suite 402
Concord NH 03301-6373

tel 603 225 5528
fax 603 225 3260
web www.transcanada.com

December 20, 2005

Jane Lendway, SHPO
Vermont Division for Historic Preservation
National Life Building
Drawer 20
Montpelier, Vermont
05620-0501

Re: TransCanada Vernon Hydroelectric Project; License Amendment SHPO Consultation

Dear Ms. Lendway:

TransCanada Hydro Northeast Inc. ("TransCanada"), current owner and licensee for the Vernon Hydroelectric Project, intends to submit an application to the Federal Energy Regulatory Commission (FERC) to modify its current license as amended on June 12, 1992. The 1992 amendment Order (copy enclosed) was issued by the FERC in response to an application by the New England Power Company (NEP). The original plan included the replacement of four existing 2 megawatt turbine/generator units (Units Nos. 5 through 8) with two 14 megawatt units and the replacement of all interior electrical equipment for the turbine/generator units with a modern control system and a new control room. Most of this equipment was installed when the station was constructed in 1909.

In accordance with Section 106 of the National Historic Preservation Act, NEP consulted with the New Hampshire and Vermont State Historic Preservation Officers regarding the impacts of the proposed project on historic properties (see attached correspondence). The consultation initially resulted in a finding "no effect" by the NHSHPO. The VTSHPO, however, found that Vernon Station was eligible for listing in the National Register of Historic Places and that the proposed modifications would have had an "adverse effect" on historic qualities of the station. As mitigation for the impacts, the VTSHPO recommended that a National Register nomination be prepared for Vernon Station and that the components scheduled for removal be documented according to Historic American Engineering Record (HAER) standards. These mitigation

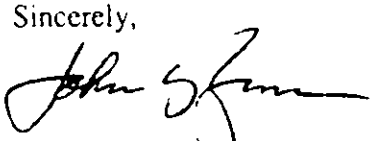
activities were written into the Order with the requirement that they be completed before the commencement of the project.

The proposed project was put on hold by NEP and was not undertaken by its successor, USGen New England Inc.; thus the mitigation activities were never completed. TransCanada, as the current owner, wishes to move forward with the upgrade but in a different configuration from the original upgrade (2-14 mw generators). The new configuration more appropriately matches the station hydrology with today's market conditions. The current proposal will replace the existing four 2-mw units with four units in the same existing bays. The final design is still in progress but the output from these units will be in the 3.2 – 4.5 mw range each. New head gates and trash racks would be installed for each of these units. We may need draft tube gates as well depending on the final turbine arrangement, but at the least we will build a new set of stop logs for dewatering. This area at the downstream base of the station has been significantly modified already due to the fish ladders constructed for Atlantic salmon migration.

The proposed plans constitute an alteration to the original application that your office reviewed. Therefore, TransCanada requests the opportunity to reinitiate consultation with your office in order to devise a mutually acceptable plan to mitigate the anticipated impacts that reflects current and more relevant mitigation approaches. Since the preparation of National Register nominations for properties that are already considered eligible for the listing in the National Register is no longer a common element of mitigation, TransCanada proposes instead to develop a Historic Properties Management Plan, similar to those it currently has for the Deerfield River and Fifteen Mile Falls Projects, that would govern future activities at the Vernon Project. Also, Vernon Station was previously documented according to modified HAER standards as part of the Systemwide Documentation of the Connecticut and Deerfield River Hydroelectric Projects prepared by PAL in 1999-2000. TransCanada therefore requests your concurrence in removing the language in the original order that states that the equipment to be removed will be documented to HAER standards in favor of amending the existing Systemwide Documentation.

TransCanada has met with the NHSHPO regarding these proposed changes in its approach toward mitigating the impacts to Vernon Station during the proposed project and hopes to schedule a meeting with your office in the near future. We appreciate your attention to this matter and look forward to hearing from you. Please contact me at 603-225-5528 to set up a time for us to meet with you.

Sincerely,



John L. Ragonese
FERC License Manager

From: McConaha, James [mailto:James.McConaha@dcr.nh.gov]
Sent: Fri 1/6/2006 11:34 AM
To: Cleveland Kapala
Cc: Feighner, Edna; Wilson, Linda
Subject: Vernon Hydroelectric Project MOA

Cleve,

Just to let you know that our staff have reviewed the draft MOA for the Proposed Amendment to the License of the Vernon Hydroelectric Project and find that it meets all our requirements and expectations. We appreciate, particularly, the company's willingness to try to salvage the historic generating and electrical equipment.

Please let us know when the final document is ready for our signature.

James McConaha, Director
State Historic Preservation Officer
N.H. Division of Historical Resources
19 Pillsbury Street, 2nd Floor
Concord, NH 03301-3570
603-271-6435
james.mcconaha@dcr.nh.gov

From: Peebles, Giovanna [Giovanna.Peebles@state.vt.us]
Sent: Tuesday, February 07, 2006 5:21 PM
To: John Ragonese
Cc: Peebles, Giovanna
Subject: Comments on Vernon MOA

Dear John,

The Division for Historic Preservation (DHP) has reviewed the MOA submitted by Transcanada for VTSHPO review. We are not able to concur with the MOA as currently drafted. We also need to better understand the proposed project so we can most meaningfully participate in this consultation process, especially in light of Transcanada's intent to draft an Historic Properties Management Plan and conduct archeological investigations as part of this MOA.

We offer the following preliminary comments:

1) The DHP would like a more detailed description of all the proposed project modifications, that is,
(a) what's being replaced, changed, etc., with
(b) a cross-reference to the documentation photos and
(c) information whether or not that particular component of the station is historic. Perhaps a table would be an appropriate format for presenting this information. This table would be a useful attachment to the MOA.

2) The DHP would like a copy of any available proposed project plans, drawings, etc. It would be helpful if you could mail those up as soon as convenient.

3) Paragraph 7 of the MOA states that Transcanada "has explored alternatives...." Could you please send us any copies of such alternative assessments.

4) We would like a copy of the draft license amendment at your earliest convenience so we have the full context for this MOA.

5) 36 C.F.R. 800 requires considerable public consultation in the Section 106 process. Have you had a chance to seek any public input to the proposed changes at the station and the proposed mitigation? Perhaps a public meeting advertized in both states would be useful in obtaining public comments.

6) As you know, the Vernon project area, near the falls of the river, is highly archeologically sensitive for pre-contact and contact period Native American sites. We would like more information about
(a) the proposed construction methods for this specific undertaking and how this work may impact as yet undiscovered sites, and
(b) Transcanada's proposal for identifying/evaluating/treating archeological resources prior to construction. We think this aspect of the archeology should be specifically addressed in the MOA.

7) The MOA does not mention a project implementation schedule, or how the project implementation coordinates with the HPMP schedule and archeological investigation

schedule. It would be useful to include a Table with an "estimated schedule" as an attachment to the MOA.

8) We like the idea of getting a jumpstart on the Vernon relicensing by preparing an HPMP and completing archeological investigations. However, we would like to see more details in both sections "B" and "C" of the MOA.
(a) Re Section B: For example, it would be helpful if the MOA included details about the process for arriving at a an HPMP, given that there are 2 states involved.
(b) Re Section C: Given that the project extends for 27 miles up river and for unknown (to us) extent downriver, it would be useful if the MOA set forth more details about the process for conducting the archeological investigations, who will conduct, and some scheduling information about when the archeological studies would commence, etc. For example, if preparation of the HPMP does not start until the archeological investigations are completed, how do the 2 SHPOs get involved in the archeological conversation (in discussing the parameters of the studies? in reviewing scopes of work? etc.). Will there be comprehensive archeological investigations of the 27 miles before the HPMP? How does Transcanada's archeology consultants treat investigations along the river on private land? More details would be good.

Many thanks for the opportunity to provide you with our comments. I'm around all week if you want to discuss via phone. We will work with you to the greatest extent possible to help you include the signed MOA with the license amendment application..
With best regards,
Giovanna

From: John Ragonese [mailto:john_ragonese@transcanada.com]
Sent: Monday, February 06, 2006 1:03 PM
To: Peebles, Giovanna
Subject: Any comments on the MOA?

Looking for specific comments or some sense that the MOA will work. Would like to include a signed copy in the amendment application.

John L. Ragonese, FERC License Manager
TransCanada; Northeast Hydro Region
4 Park Street; Concord NH 03301
603.225.5528; FAX 603.225.3260
CELL: 603.498.2851 (*best phone, voice, text or pager contact*)
Email: john_ragonese@transcanada.com

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web www.transcanada.com

February 28, 2006

James McConaha, SHPO & Director
New Hampshire Division of Historical Resources
19 Pillsbury Street
2nd Floor
Concord, NH 03301-3570

Re: TransCanada Hydro Northeast Inc.; Vernon Project,
Final Draft of MOA for review and approval

Dear Jim:

Based upon comments received by email from the VT Division for Historic Preservation (VDHP) dated 2-7-06 and our recent consultation discussion with the VDHP at their office on 2-13-06, we have made a number of revisions and additions to the draft MOA previously approved by the NH Division of Historic Resources (NHDHR) by email correspondence on 1-6-06.

The changes fall into the categories of additional specifics including a table of changes accompanied by photo and drawing references and the additional video recording (recordation) the dismantling and possible operation (simulated) of the units and auxiliary equipment we are proposing to remove, alter or replace. The video would then be compiled into a 30+ minute record of these units and how they were operated. Please refer to the draft MOA for more specific changes.

We trust that the draft MOA addresses the concerns expressed by the VTDHP and continues to meet with the approval of the NHDHR. If you would respond by email that the document is ready for signature, we can then forward your responses to the FERC as a supplement to our application which is expected to be filed on Tuesday February 28, 2006.

Please contact John Ragonese at 603-498-2851 or john_ragonese@transcanada.com if you have any questions regarding this filing.

Sincerely,

John Ragonese
FERC License Manager
TransCanada Hydro Northeast, Inc.

Enclosures
cc: Vermont Division for Historic Preservation

TransCanada
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US Northeast Hydro Region
Concord Hydro Office
4 Park Street, Suite 402
Concord NH 03301-6373

tel 603.225.5528
fax 603 225 3260
web www.transcanada.com

February 28, 2006

Jane Lendway, SHPO
Vermont Division for Historic Preservation
National Life Building; Drawer 20
Montpelier, Vermont 05620-0501

Re: TransCanada Hydro Northeast Inc.; Vernon Project,
Final Draft of MOA for review and approval

Dear Jane:

Based upon comments received by email from the VT Division for Historic Preservation (VDHP) dated 2-7-06 and our recent consultation discussion with the VDHP at their office on 2-13-06, we have made a number of revisions and additions to the draft MOA previously approved by the NH Division of Historic Resources (NHDHR) by email correspondence on 1-6-06.

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We trust that the draft MOA addresses the concerns expressed by the VTDHP and continues to meet with the approval of the NHDHR. If you would respond by email that the document is ready for signature, we can then forward your responses to the FERC as a supplement to our application which is expected to be filed on Tuesday February 28, 2006.

Please contact John Ragonese at 603-498-2851 or john_ragonese@transcanada.com if you have any questions regarding this filing.

Sincerely,

John Ragonese
FERC License Manager
TransCanada Hydro Northeast, Inc.

Enclosures
cc: New Hampshire Division of Historical Resources

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

WHEREAS, TransCanada Hydro Northeast, Inc. (TransCanada), licensee for the Vernon Hydroelectric Project (FERC Project 1904) is proposing to replace and upgrade generation within the powerhouse by removing four (4) 2 megawatt (mw) generating units (units 5-8), which are original but out-of-service, and replacing them with four (4) 4.0 mw units, and,

WHEREAS, the proposed project will require ancillary modifications as specified in Attachment A to this MOA; and,

WHEREAS, the project requires the revision of an approved Amendment to the License of the Vernon Hydroelectric Project granted by the Federal Energy Regulatory Commission (FERC) to the New England Power Company (predecessor owner) in 1992 and which authorized the installation of two larger 14-mw generator units in place of four existing units (Units 5-8), and,

WHEREAS, the FERC has determined that the current proposed undertaking will have an effect upon the Vernon Hydroelectric Powerhouse, a property that has been evaluated as eligible for listing in the National Register of Historic Places; and,

WHEREAS, the FERC, has consulted with the New Hampshire and Vermont State Historic Preservation Officers (SHPOs) pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act of 1966, as amended [16 U.S.C. Part 470(f)]; and,

WHEREAS, TransCanada has participated in the consultation and has been invited to be a signatory to the Memorandum of Agreement (MOA); and,

WHERAS, TransCanada has explored alternatives that seek to avoid or minimize effects on the historic qualities of the Vernon Powerhouse, and;

WHERAS, the proposed project is the preferred alternative because it meets the operational goals for the Project and is less invasive and will have fewer impacts on the historic qualities of the Vernon Powerhouse than the original project approved under the 1992 Amendment, and,

WHEREAS, the FERC and SHPOs agree that the mitigation for the project's effects named in the 1992 Amendment to the License of the Vernon Hydroelectric Project is outdated and that a more current and meaningful program of mitigation that incorporates present standards for historic properties management is desirable;

NOW, THEREFORE, the FERC, SHPOs and TransCanada agree that the proposed project will be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

STIPULATIONS

The FERC will ensure that the following measures are carried out in consultation with the SHPOs:

A. PHOTOGRAHIC DOCUMENTATION OF THE VERNON POWERHOUSE

1. Photographic documentation of the affected areas of the Vernon Powerhouse will be completed by a qualified architectural historian in accordance with the standards and regulations outlined in the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation [48 FR 190 (1983)].

    a. Photographic documentation will consist of recordation of the affected areas of the Powerhouse defined in Attachment A that are not adequately covered in the Systemwide Documentation of Hydroelectric Facilities on the Deerfield and Connecticut Rivers prepared by The Public Archaeology Laboratory, Inc. in 1999 2000. Views will include the existing generators, electrical equipment, crane, and windows that will be removed as part of the project. The photographs will be taken with black-and-white, large format (4-x-5 inch) negative film. The photographs will be keyed by number to a sketch plan that shows the view vantage points and an inventory that provides a description of the views.

    b. Supplemental documentation will consist of photographs and/or photocopies of historical plans and/or specifications that show affected equipment, if such are found to exist in the archives maintained by TransCanada.

2. TransCanada will ensure that the photographic documentation is completed, and accepted by the SHPOs before commencing any demolition or construction activities for the project. One (1) original archival-quality set of the documentation, including black-and-white photographic contact prints, large format negatives, and supplemental materials, will be forwarded to each SHPO for appending to the existing Systemwide Documentation packages on file at the state archives in the respective states. One (1) additional set with archival black and white photographs will be forwarded to the Brooks Memorial Library in Brattleboro, Vermont for appending to its copy of the Systemwide Documentation Package including the Vernon Hydroelectric Project. One (1) copy of the original Systemwide Documentation Package for the Vernon Hydroelectric Project with the appended documentation photographs will be prepared for transmittal to an appropriate repository in Hinsdale, New Hampshire as identified by the NHSHPO. In order to meet the requirements for permanence and quality, the original documentation sets will be prepared as follows:

    a. Large format photographic negatives and contact prints will be processed using archival-quality materials. Negatives will be double-washed to ensure the removal of all developing solutions and photographs will be printed on fiber-based archivally stable paper. All photographs will be identified on the back in pencil, with no affixed labels. The photographs and negatives will be unmounted, but sleeved in archival-quality buffered envelopes labeled in pencil with the appropriate photo number.

    b. Supplemental paper materials, including the Inventory to Photographs, Photograph Key, and any photocopied materials will be printed on alkaline buffered paper with at least 25 percent rag content.

B. DIGITAL VIDEO DOCUMENTATION OF EQUIPMENT REMOVAL

1. Digital video documentation will be conducted at key stages of the project to record the removal of the original equipment and the installation of new equipment. The video will be compiled using a high-quality digital video recording device with the capability of shooting video at multiple focal lengths. The video will capture the following key events:

   a. Overall documentation of the interior and exterior of the powerhouse, including but not limited to, its setting, general appearance, location of key components and features in relation to one another;

   b. At least one of the original units in actual or simulated operation to the extent possible, before its removal showing the steps and processes involved in starting, running, and shutting down the generator.

   c. Preparatory work involved in the setup and staging for the removal of the generators, including, but not limited to, the installation of temporary coffer dams, set up of construction machinery, disconnecting of equipment, and installation of overhead crane;

   d. Removal of generators and associated historical equipment, including the lifting and transporting of equipment from their existing locations and the recordation of unique features of the equipment that were not visible while in place.

   e. Preparatory work involved in altering the existing generator pits for the acceptance of the new equipment.

   d. Installation of new generators, including the insertion of the equipment and footage showing them in operation.

2. The raw video footage will be edited to produce a 30 to 45 minute presentation that documents the most significant aspects of the equipment replacement project. Five (5) copies of the video in DVD format will be supplied to each of the SHPOs within twelve (12) months of the completion of the project for inclusion in the respective state archives and designated local repositories.

C. HISTORIC PROPERTIES MANAGEMENT PLAN

1. TransCanada will prepare a Historic Properties Management Plan (HPMP) in accordance with the *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects* issued by the FERC and Advisory Council on Historic Preservation (ACHP) on May 20, 2002 (effective January 11, 2001). The HPMP will govern future actions as they relate to historic properties, including standing structures and archaeological sites, within the boundaries of the Vernon Hydroelectric Project. The HPMP will identify the nature and significance of historic properties within the Project boundaries that may be affected by Project maintenance and operation, proposed improvements to the Project facilities, and public access. The HPMP will identify goals for the preservation of historic properties; establish guidelines for routine maintenance and operation; and establish procedures for consulting with the SHPOs, Tribal Historic Preservation Officers (THPO), Indian tribes, historic preservation experts, and the

interested public concerning effects on historic properties. The HPMP will identify the responsible TransCanada officer in charge of executing the plan and establish procedures for training plant operators, maintenance staff, and other employees in its implementation. The HPMP will be integrated with existing management plans, as appropriate.

2. A detailed outline of the proposed content of the HPMP will be submitted for review and approval of the FERC and SHPOs within three (3) months of the issuance of the revised License Amendment. A draft HPMP will be submitted to the FERC and SHPOs for review within twelve (12) months. An approved final HPMP will be in place within eighteen (18) months of the issuance of the revised Amended License.

D. ARCHAEOLOGICAL INVESTIGATIONS

1. In preparation for completing the HPMP, TransCanada will hire a qualified archaeologist to conduct investigations to identify known archaeological sites and areas within the Vernon Hydroelectric Project boundaries that have a likelihood of containing archaeological deposits. The investigations will be carried out in accordance with the guidelines and methodology for assessment-level archaeological surveys established by the SHPOs in the states in which the lands are located. The results of these investigations will be incorporated into the HPMP and used to establish procedures that must be followed when Project operations, construction, or other activities have the potential to disturb known archaeological sites or areas that are identified as sensitive for containing archaeological deposits.

2. All archaeological investigations will be carried out by qualified archaeologists with experience in conducting projects in the Connecticut River Valley and who meet the standards and regulations outlined in the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation [48 FR 190 (1983)]. The investigations will be completed during the summer of 2006. The SHPOs will be afforded the opportunity to review and comment on the proposed scope of work for the investigations before they commence. Draft copies of the resulting archaeological reports will be submitted to the respective SHPOs by December 1, 2006 for review and comment. Final reports will incorporate appropriate comments and will be submitted at the same time the final HPMP is submitted.

3. A schedule for completing any additional investigations, protection measures, monitoring, or public interpretation of archaeological sites identified as a result of the assessment surveys will be included in the HPMP.

E. SALVAGE OF HISTORIC GENERATING AND ELECTRICAL EQUIPMENT

TransCanada will make an effort to identify museums, historical societies, educational facilities, industrial history organizations, or other institutions willing and capable of displaying and interpreting the historic values of the generating and electrical equipment removed from the Vernon Powerhouse. A list of these organizations will be circulated to the SHPOs for review and suggestions for other potentially interested institutions. All organizations on the final list will be contacted by mail. The letter will include a description of the equipment, timetable for its availability, and provisions for the transfer

of ownership. Equipment not accepted by any party within ninety (90) days of the postmarked date of the letter will be disposed of at the discretion of TransCanada.

F. DISPUTE RESOLUTION

1. Should either SHPO object within thirty (30) days to any actions proposed or carried out pursuant to this agreement, the FERC shall consult with the SHPO to resolve the objection. If the FERC determines that the objection cannot be resolved, the FERC shall forward all documentation relevant to the dispute to the ACHP. Within thirty (30) days after the receipt of all pertinent documentation, the ACHP will either:

   a. provide the FERC with recommendations which they will take into account in reaching a final decision regarding the dispute, or

   b. notify the FERC that it will comment pursuant to 36 CFR 800.6(b), and proceed to comment. Any recommendations or comment provided by the ACHP will be understood to pertain only to the subject of the dispute; the FERC responsibility to carry out all actions under the MOA that are not subjects of the dispute will remain unchanged.

2. At any time during the implementation of the measures stipulated in this agreement, should any objection regarding the subject matter of this agreement be raised by a member of the public, the FERC shall take the objection into account and consult as needed with the objecting party, the SHPOs, or the ACHP to resolve the objection.

G. AMENDMENTS

The parties of this MOA may amend its terms and provisions herein, and execution of such an amendment shall be governed by 36 CFR 800.6.

Execution of the MOA by the FERC and SHPOs, its subsequent filing with the ACHP, and the implementation of its terms, shall establish that the FERC has taken into account the effects of the undertaking on historic properties.

FEDERAL ENERGY REGULATORY COMMISSION

By _____ Date _____

NEW HAMPSHIRE STATE HISTORIC PRESERVATION OFFICER

By _____ Date:
James McConaha

VERMONT STATE HISTORIC PRESERVATION OFFICER

By: Date:
Jane Lendway

TRANSCANADA US NORTHEAST HYDRO REGION

By: _____ Date: _____

ATTACHMENT A

2006 VERNON RE-POWERING PROJECT
MEMORANDUM OF AGREEMENT

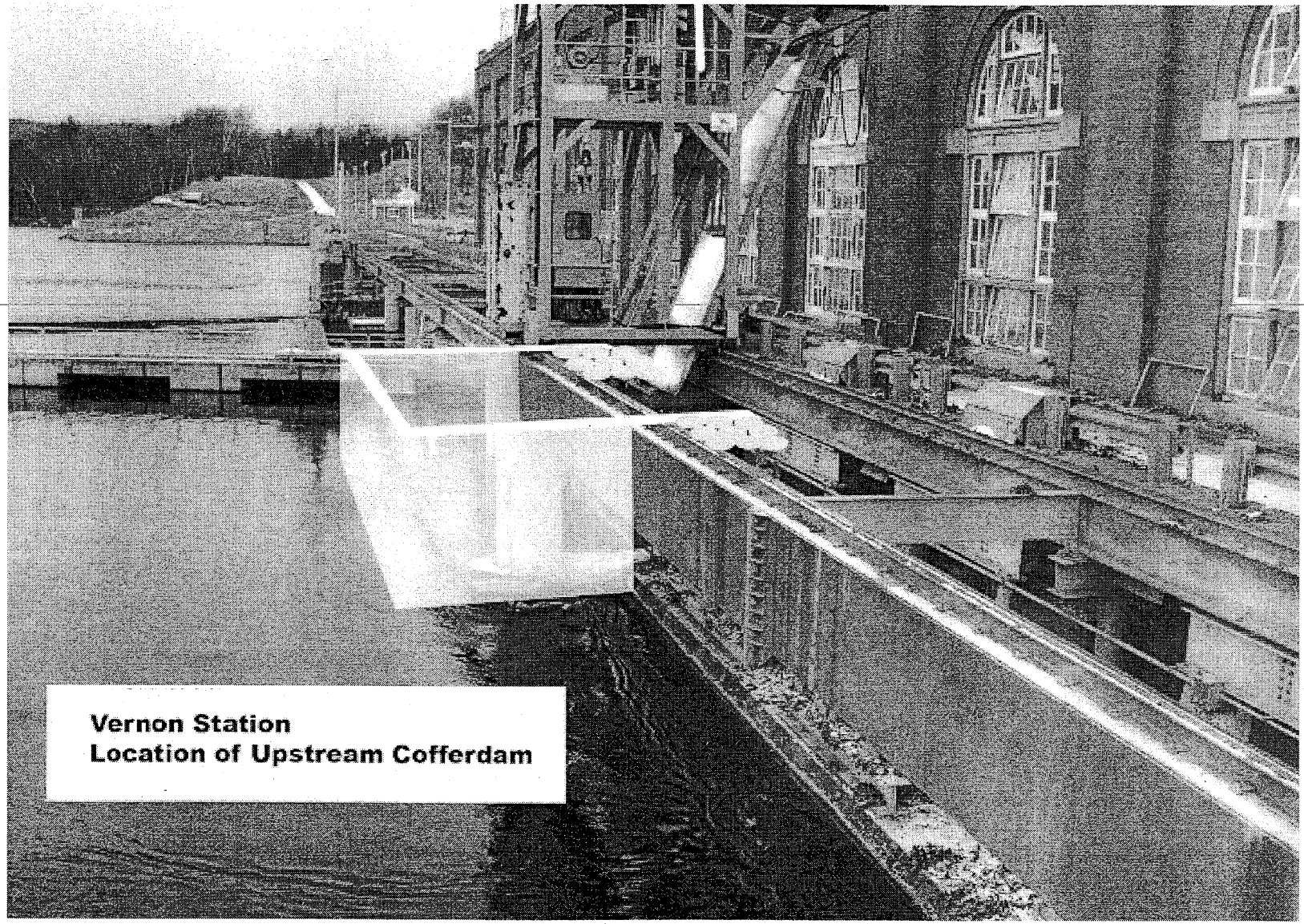
Proposed Modifications Associated with the Project

Proposed Project Modification	Impact to Historically Significant Feature	Photo/Drawing Reference	Alternative Considered
Installation of temporary cofferdam	No effect – temporary and will be removed in full. No ground disturbance.	Picture 1 Picture 2 Picture 3 Picture 4	Other alternative cofferdam designs were considered – chose least impact alternative in terms of footprint and impact to riverbed.
Removal of electrical tie brackets on downstream end of building.	Adverse effect on visible historic feature on the downstream face of the Powerhouse.	Picture 4 Picture 5	Structure has no purpose and could impede access to draft tube sections of powerhouse with crane. If possible little if any alteration or removal will be done to facilitate crane access to construction site.
Dismantling and removal of Units 5-8 turbine generators and associated governors	Adverse effect on significant original historic generating equipment.	Picture 6 Picture 7 Picture 8 Picture 9 Picture 10	Alternatives were associated with economic study to re-power units now OOS or in dis repair. Repair impractical. 1992 Amendment version less desirable greater resource impacts.

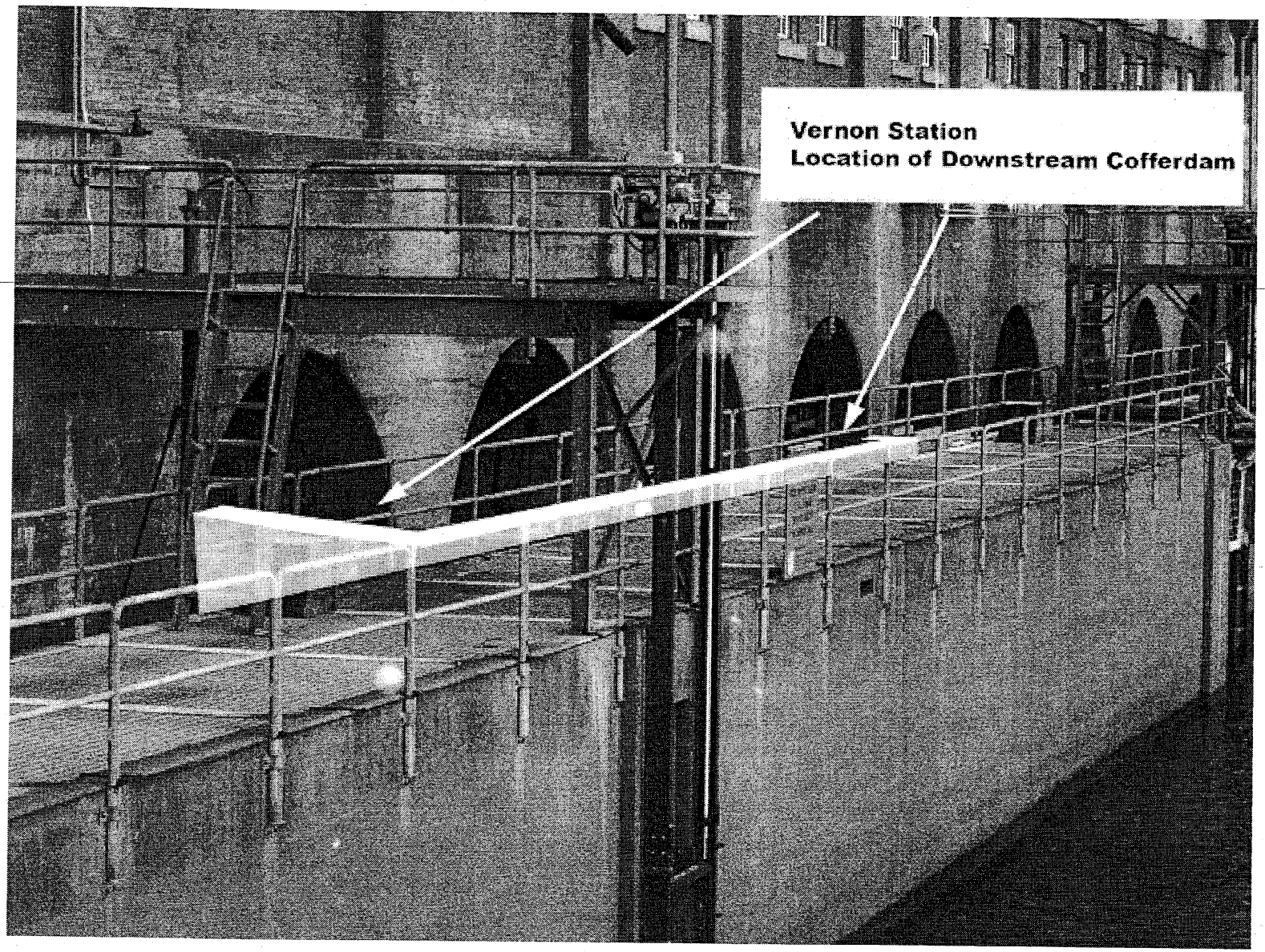
Proposed Project Modification	Impact to Historically Significant Feature	Photo/Drawing Reference	Alternative Considered
Dismantling and removal of motor generator exciters	Adverse effect on significant original historic generating equipment.	Picture 7 Picture 11	None – devices are inoperable and need to be removed for unit replacement.
Demolition of concrete associated with wheel pit and draft tubes for Units 5-8	Adverse effect associated with removal of the historic generating equipment	Drawing 1	None - except 1992 amendment version results in greater demolition and reconfiguration of powerhouse.
Excavation of 400 yd.^{3} bedrock beneath existing Unit 5-8 wheel pits	No effect – bedrock previously excavated	Drawing 1	None - except 1992 amendment version results in greater demolition and reconfiguration of powerhouse.
Replace existing and install new powerhouse bridge crane to replace existing crane that is limited by lift capacity.	No effect - crane was heavily modified in 1978 from original 30-ton capacity to current 46-ton capacity.	Picture 12	None
Bottom-hinged flap [head]gate and hoist removal and replacement with vertical double-leaf wheel gates – Units 5-8	Adverse effect on historic mechanical features of the power generating system.	Drawing 1 Picture 13	None - Useful life exceeded and need to be replaced for integrity and safety purposes. Design not considered as safe to work behind as alternative.

Proposed Project Modification	Impact to Historically Significant Feature	Photo/Drawing Reference	Alternative Considered
2 "Trashrack removal and replacement with 4" – Units 5-8 only	Adverse effect on historic mechanical features of the power generating system.	Drawing 1 Picture 13 Picture 14	None – wider spacing necessary due to increase flows through the unit and debris loading. Not visible component and these may have been replaced and repaired many times before.
Modify draft tube – extend it beyond present powerhouse. Will not modify visible portions of draft tube including archways.	No effect – not visible and already modified as part of fish ladder installation.	Drawing 2	None – except 1992 amendment version results in greater demolition and reconfiguration of draft tube and downstream end of the powerhouse.
Upgrade transmission cables between the 13.8kV Bus in the station to the yard transformers via underground cable.	Area affected should not be sensitive as area has already been developed with fish ladder, other underground cables, foundations and pavement.	Picture 5	Overhead connection considered and would require modifying powerhouse to pass cables through wall and connect to exterior mounted apparatus for overhead connection to exterior transformers. Underground conduit has fewer impacts to structure and does not affect sensitive areas.

Proposed Project Modification	Impact to Historically Significant Feature	Photo/Drawing Reference	Alternative Considered
Station Service upgrades including new breakers, and replacement of the 2.4kV switchgear for Units 1 through 4	Adverse effect on historic electrical equipment associated with operation of powerhouse	Picture 15 Picture 16 Picture 17	None considered. Useful life exceeded and need to be replaced for integrity and safety purposes.
Install air cooling – requires venting out back of station – window modification	Potential adverse effect due to appearance of ventilation on the downstream face of the powerhouse.	Picture 3 Picture 18	Water cooling with heat exchanger. Dismissed due to cost and impacts associated with discharge of heated water into river.
Removal of fish ladder #2 dissipation chamber	No effect – feature is 20 years old and is not historic	Picture 19	n/a
New downstream bulkheads replacing current bulkheads – less than 20 years old.	No effect – non-historic 20 yr old feature	Picture 19	None -Existing bulkheads will not accommodate new draft tube design.



Picture 1



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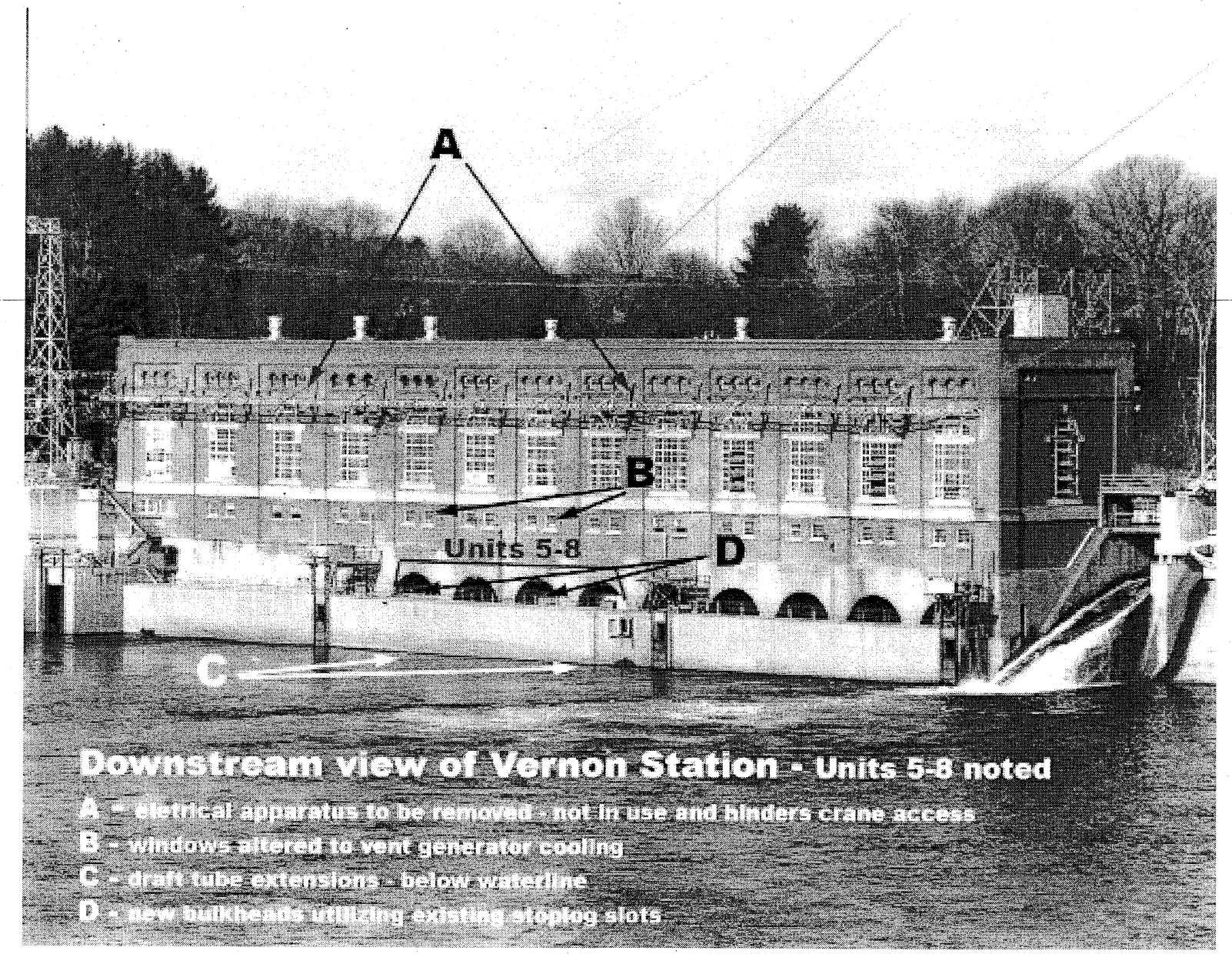

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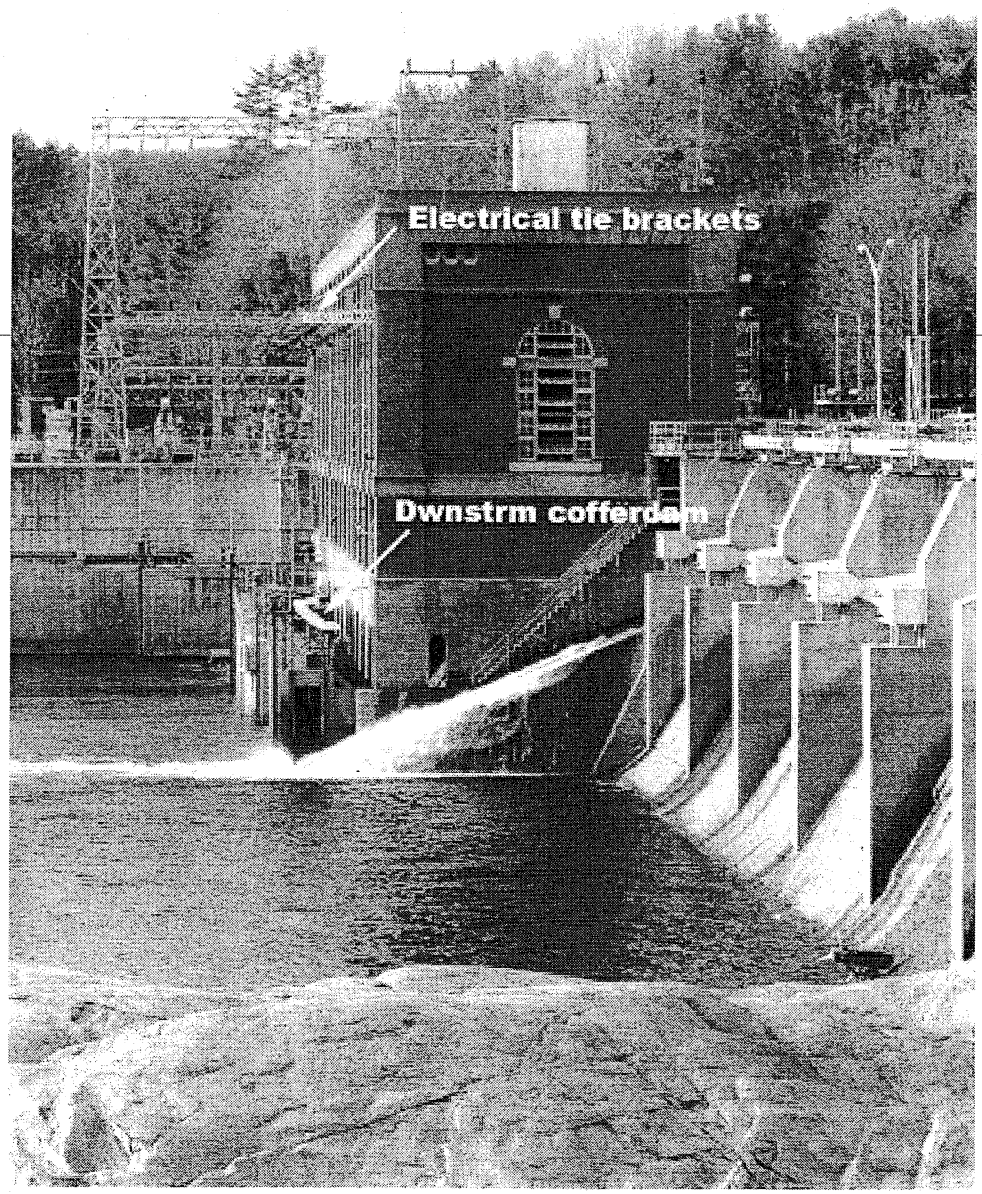

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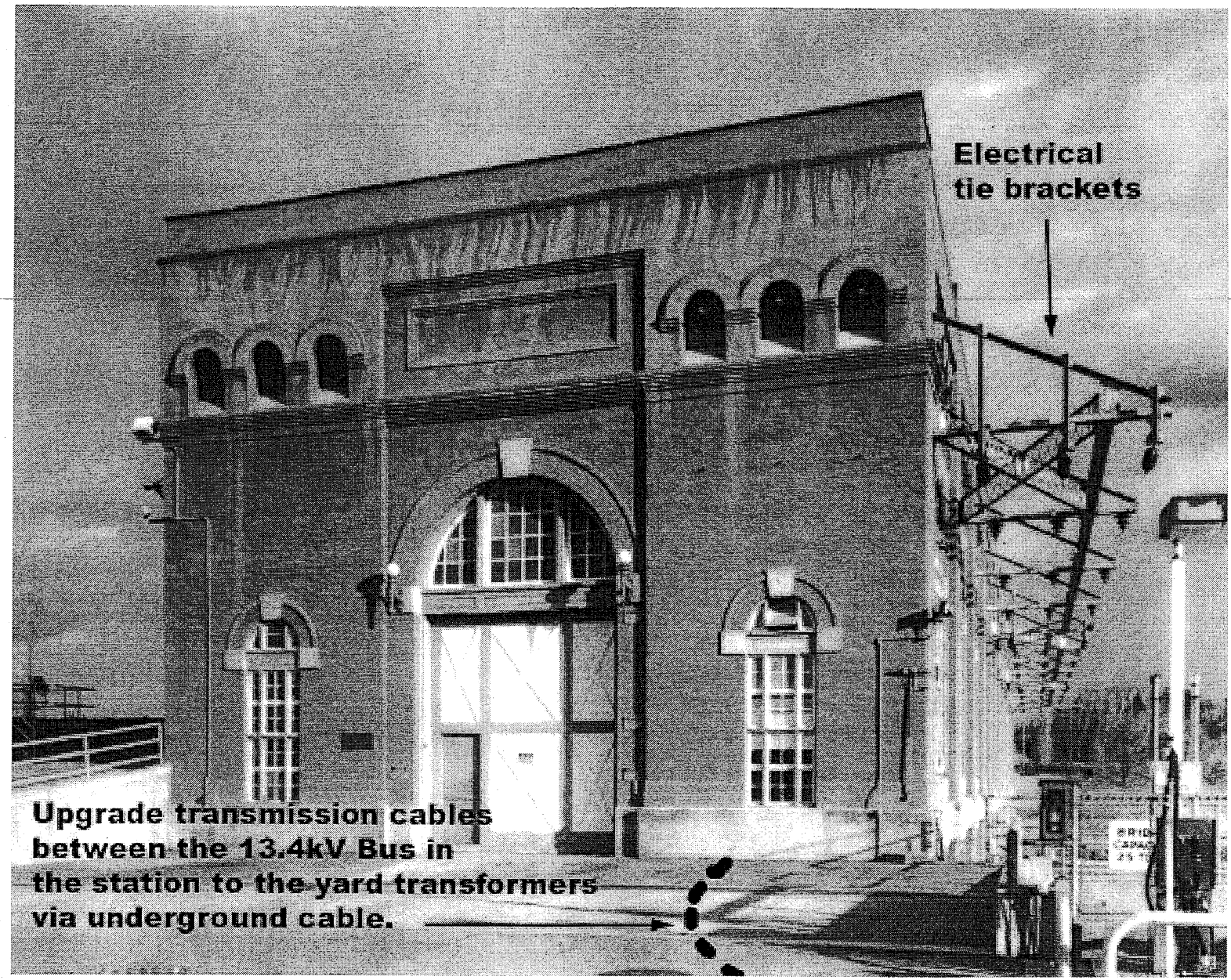

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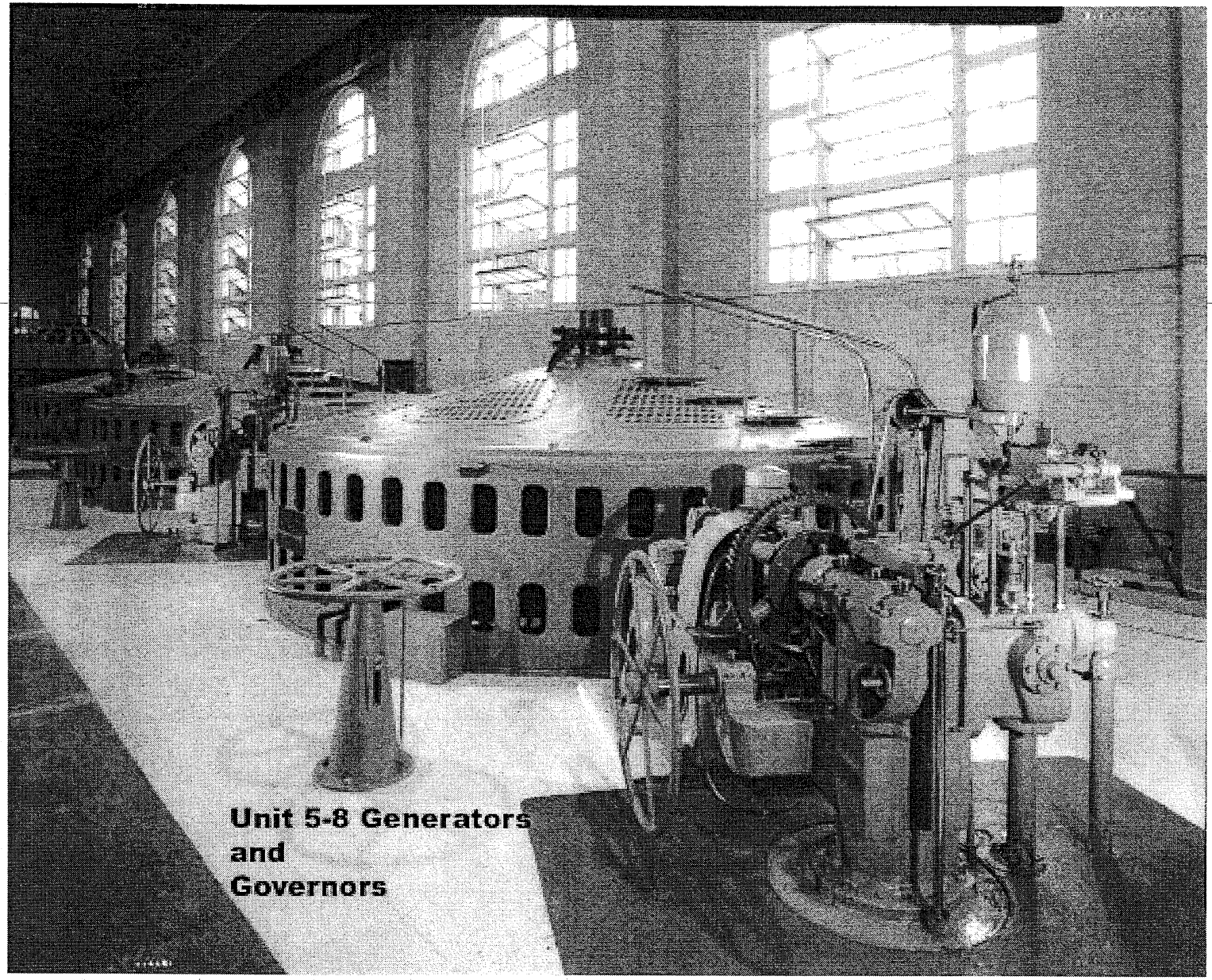

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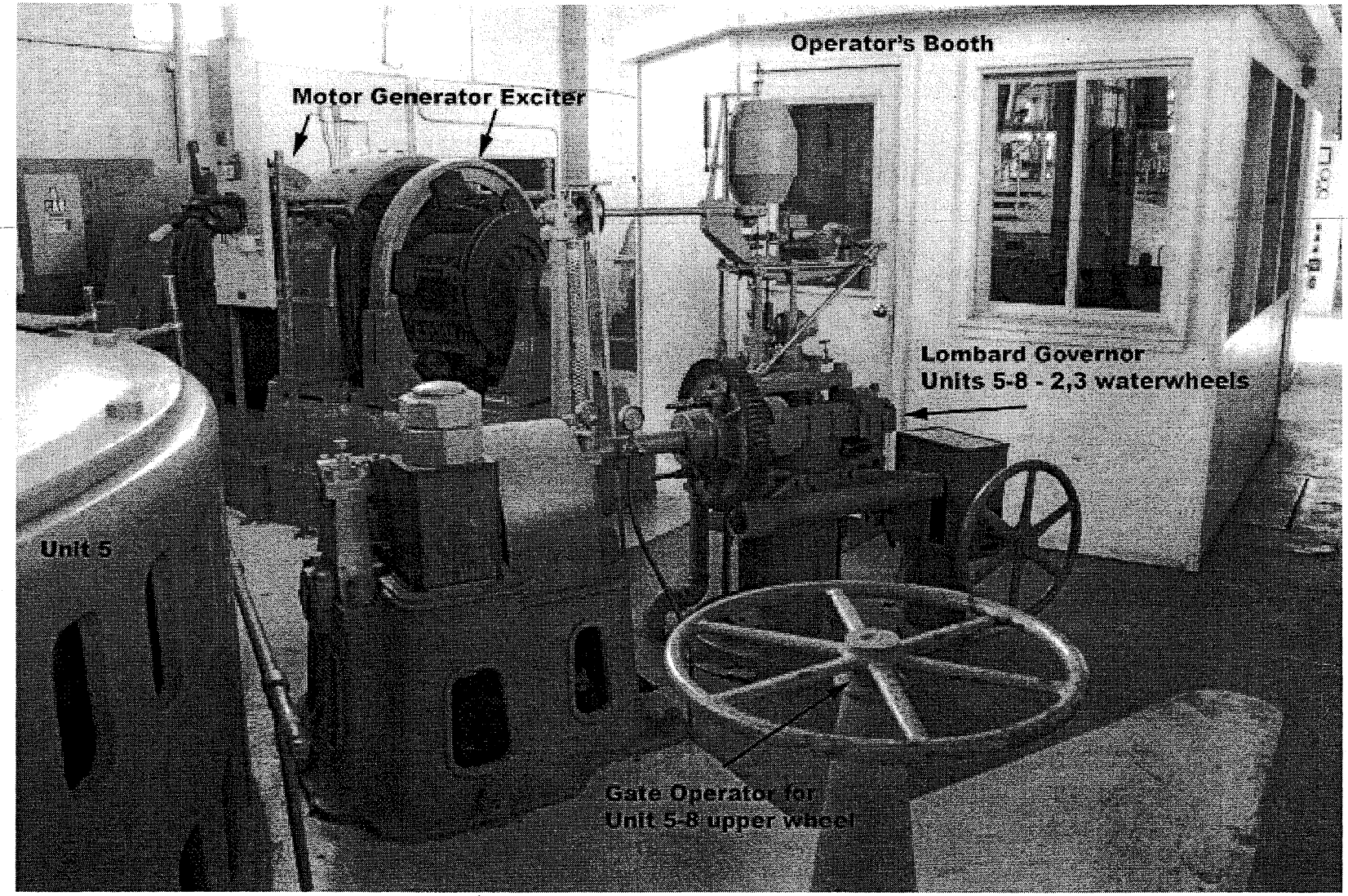

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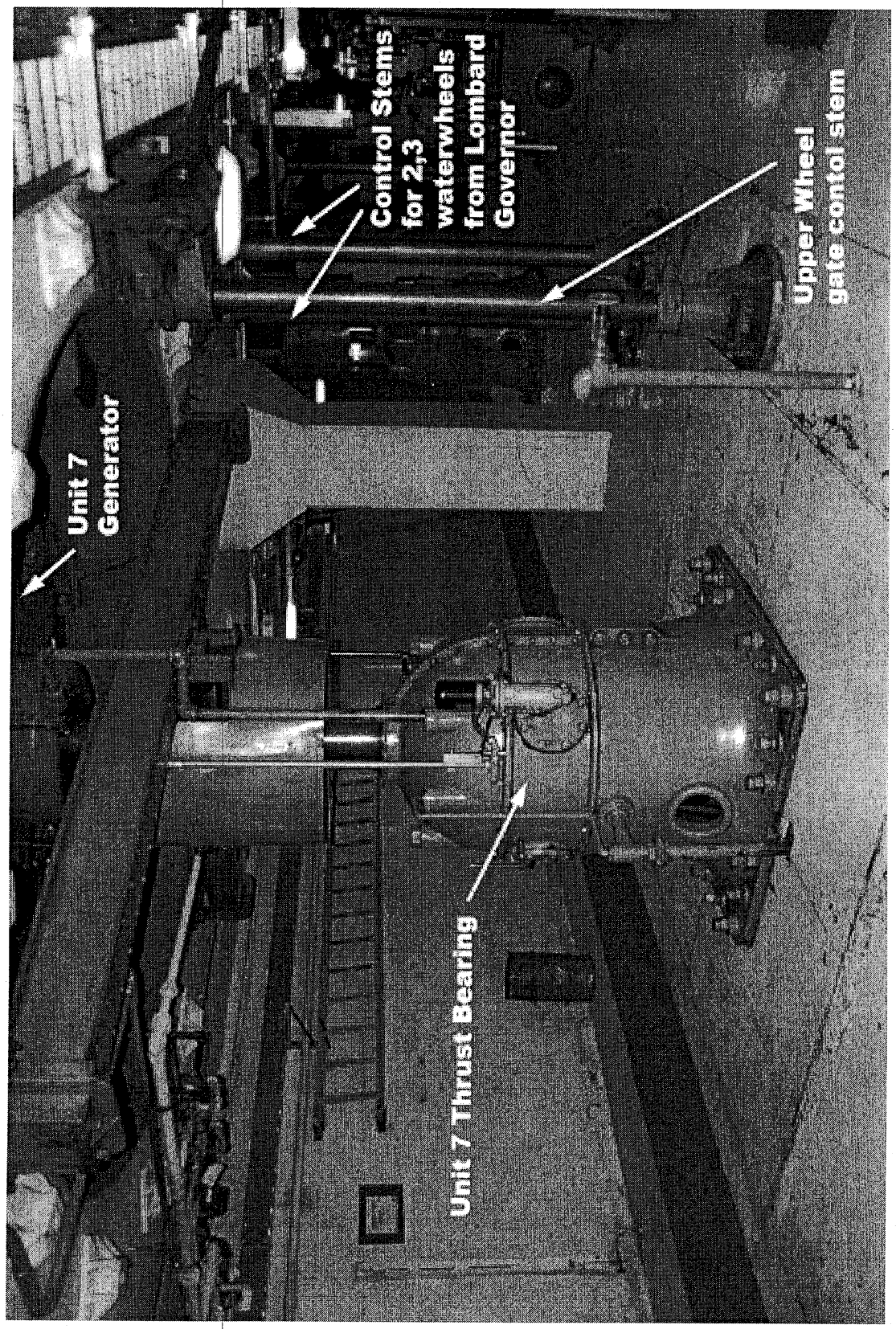

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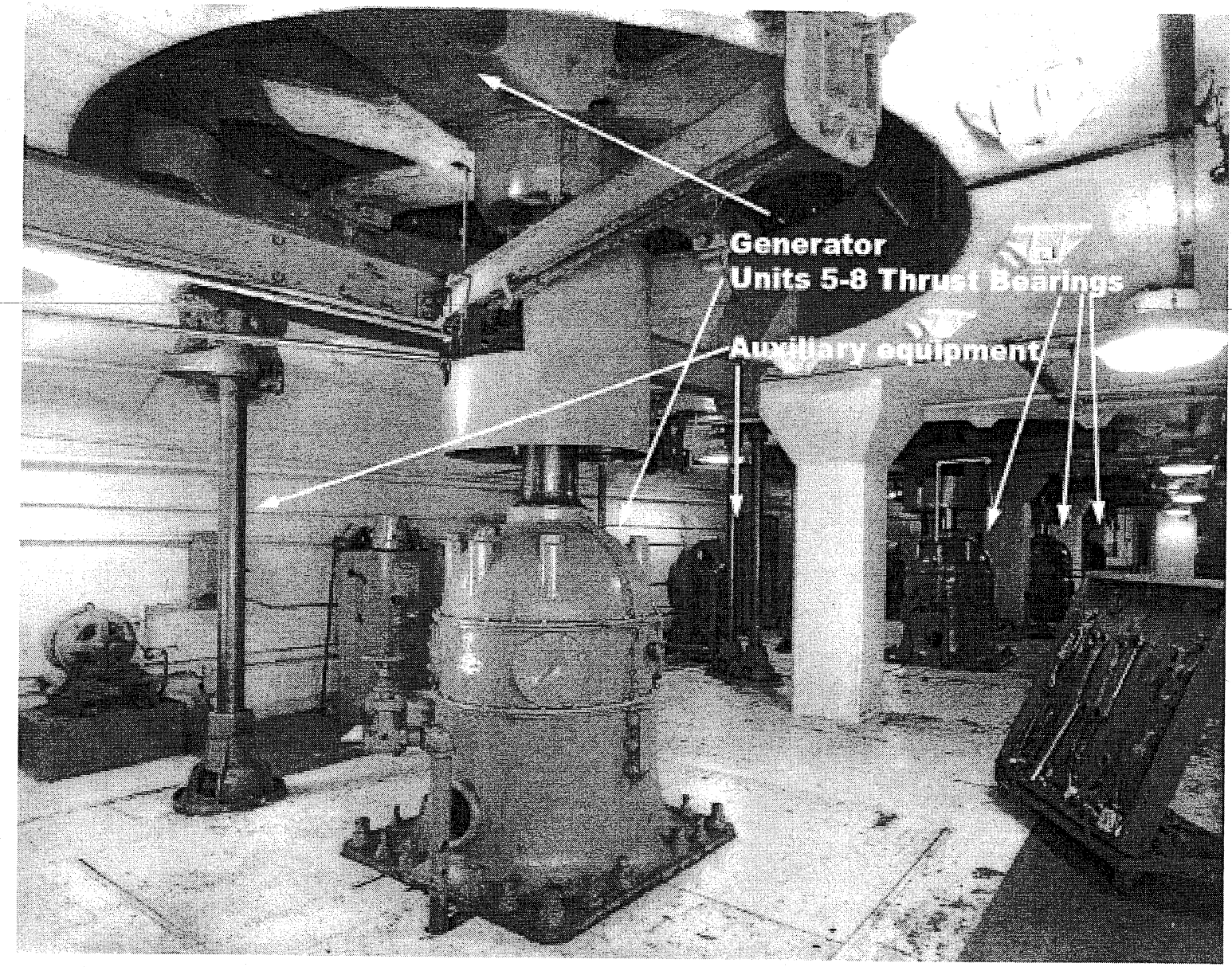

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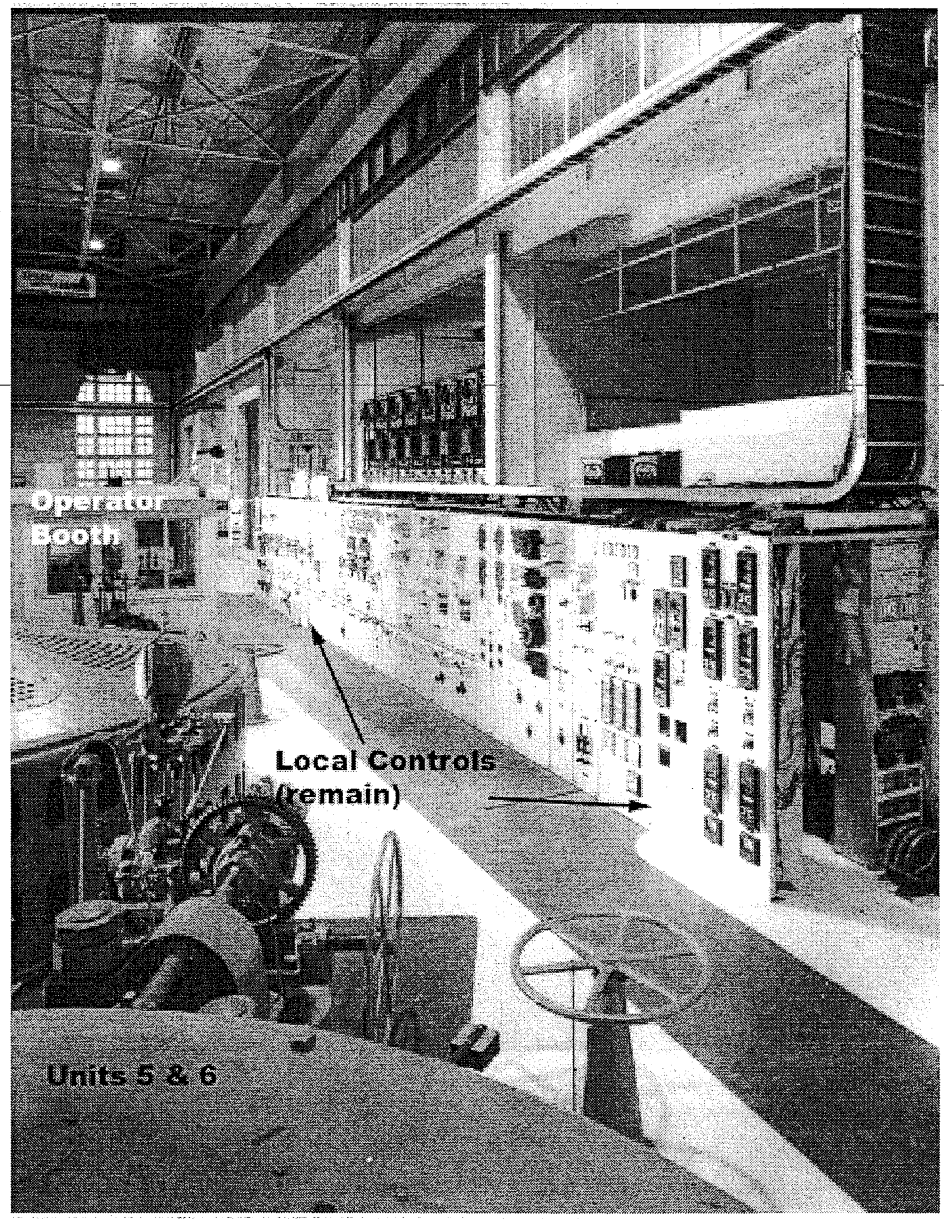

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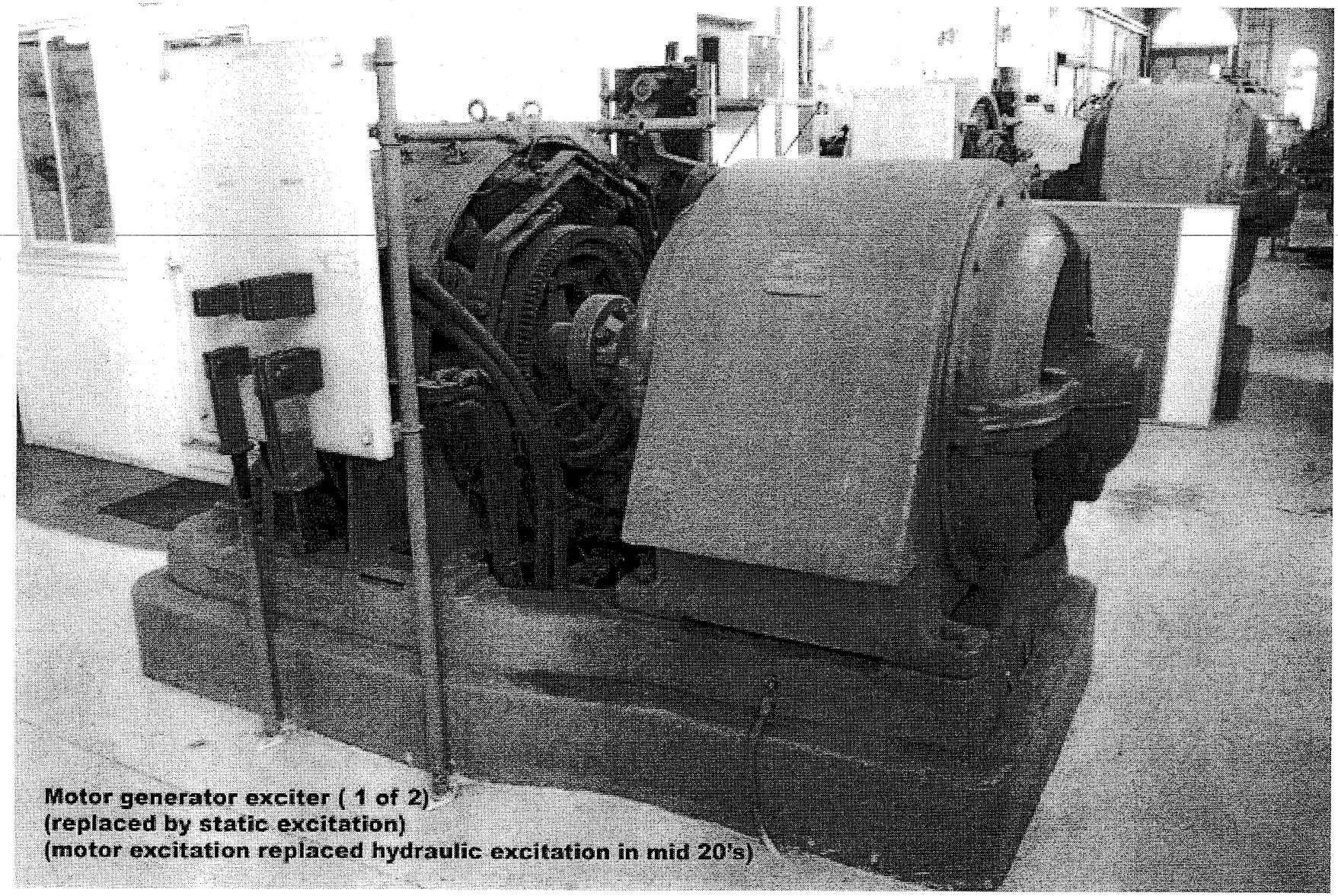

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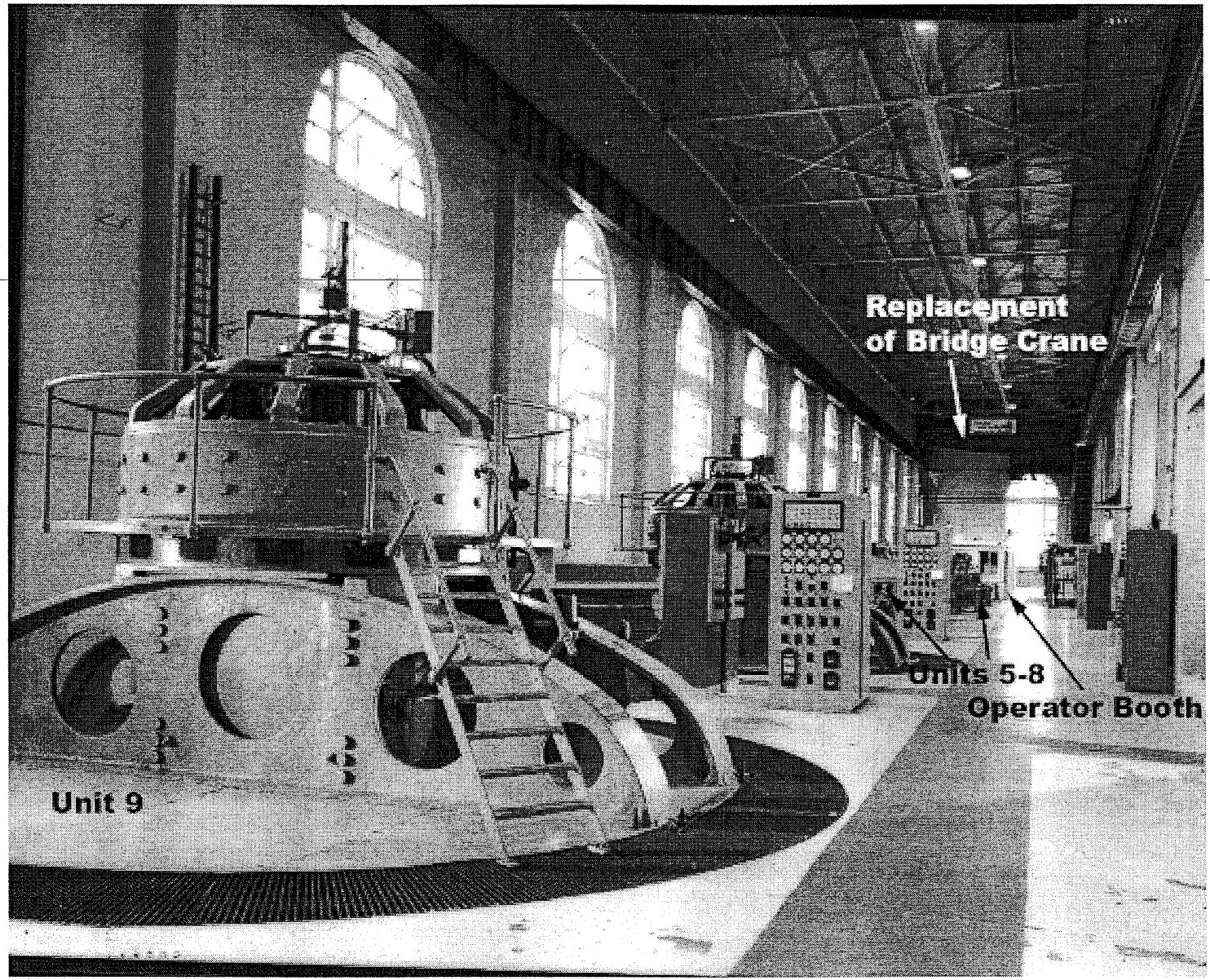
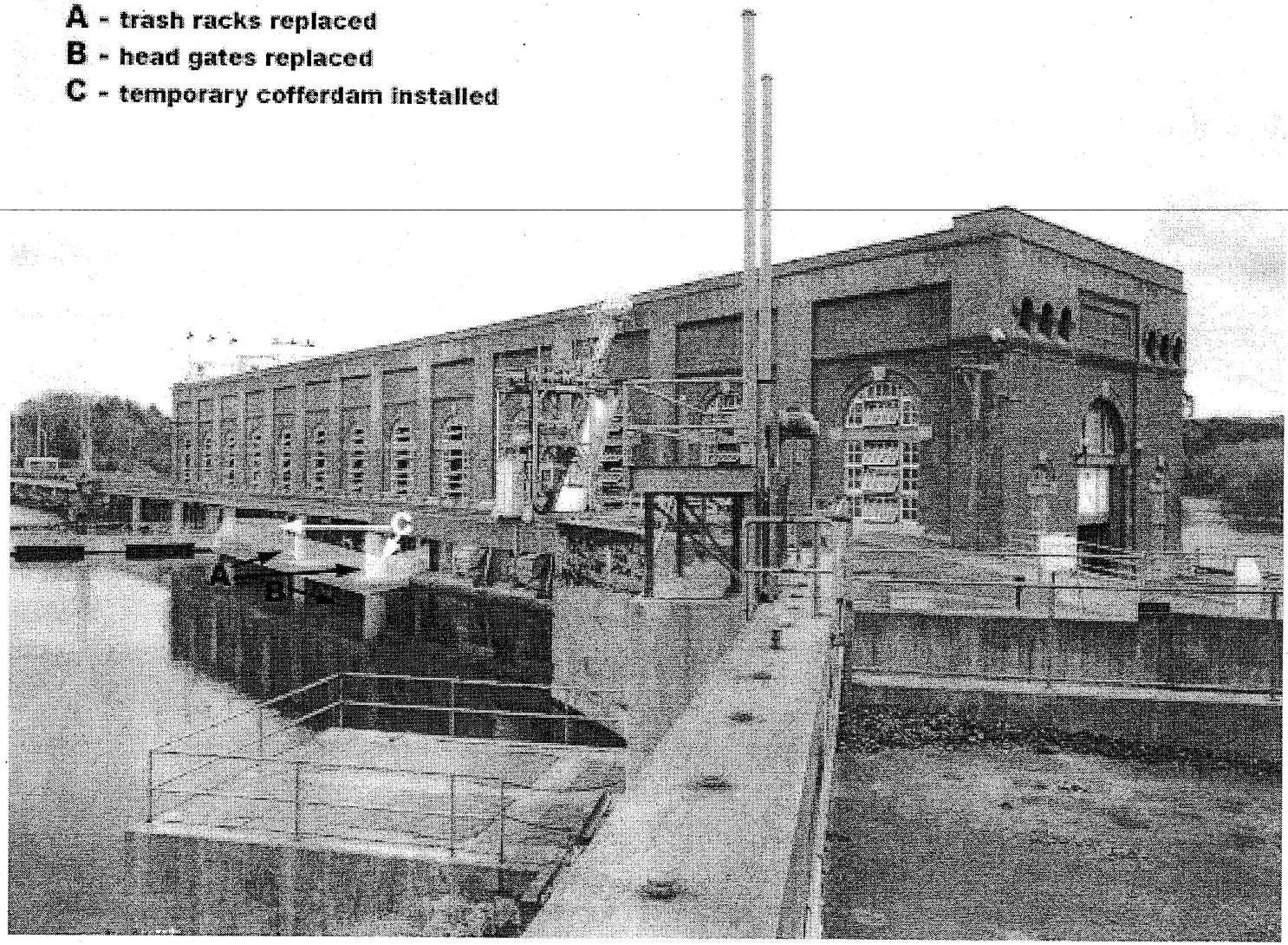


Picture 12

Upstream Face of Vernon Station

A - trash racks replaced
B - head gates replaced
C - temporary cofferdam installed



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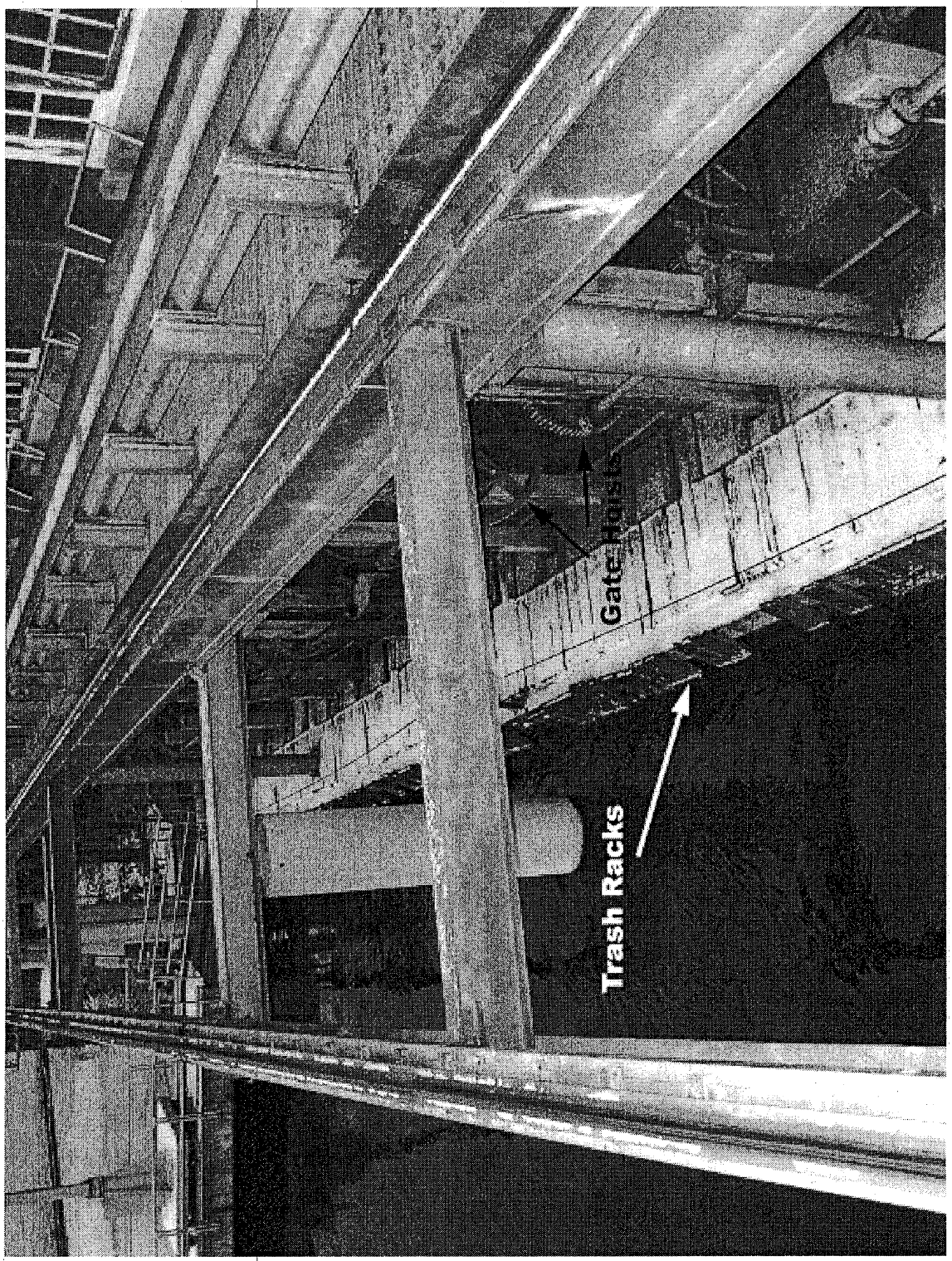

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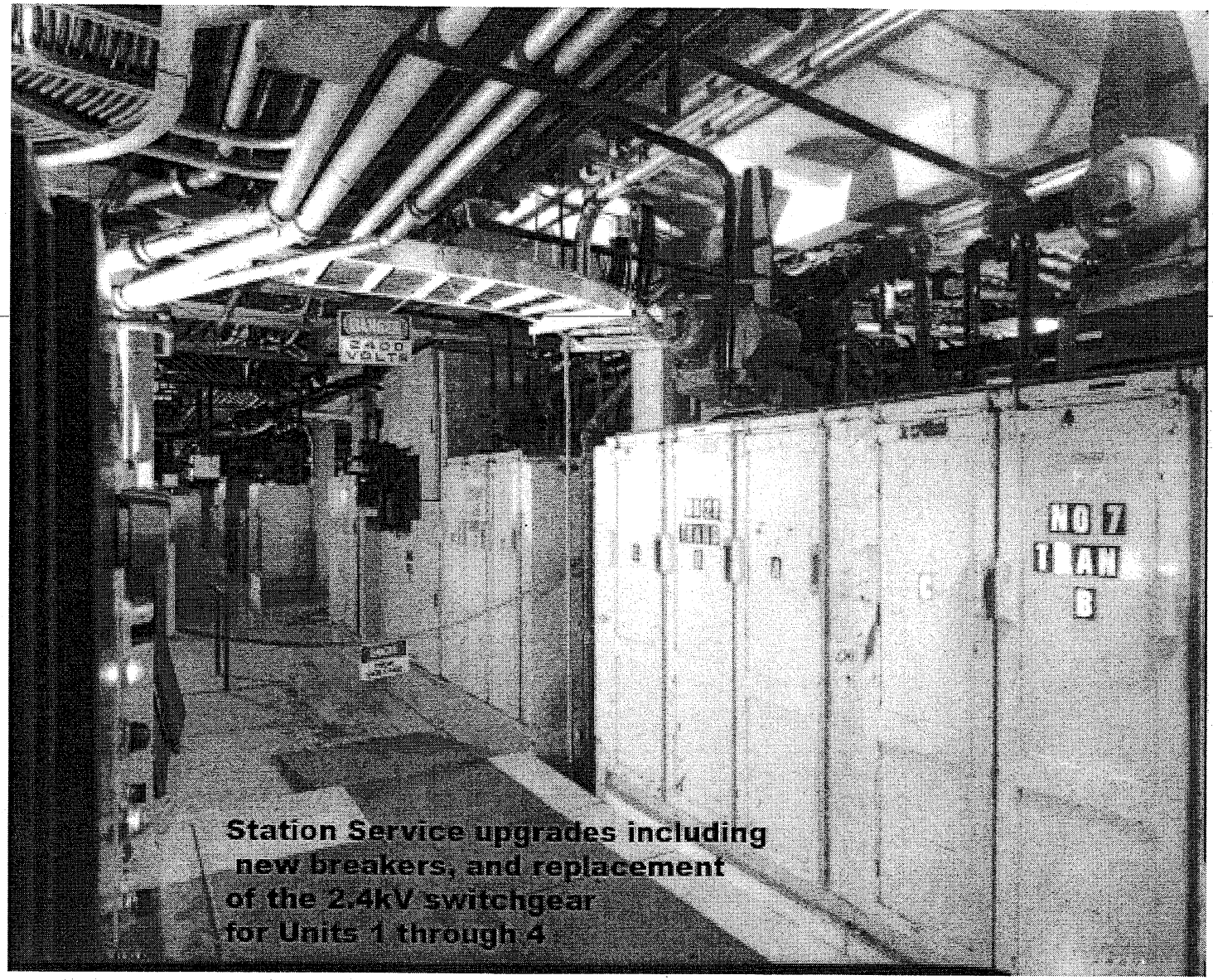

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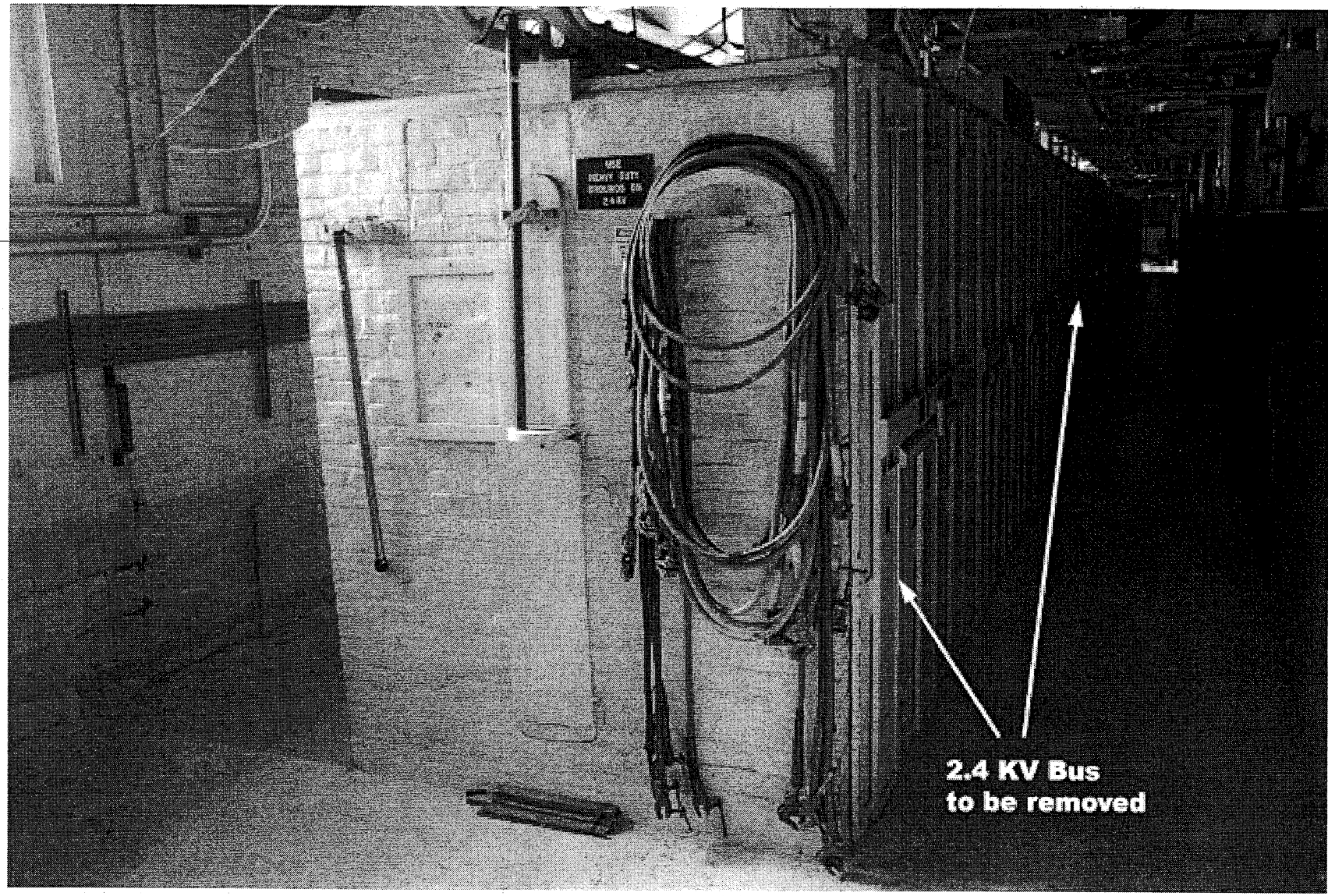

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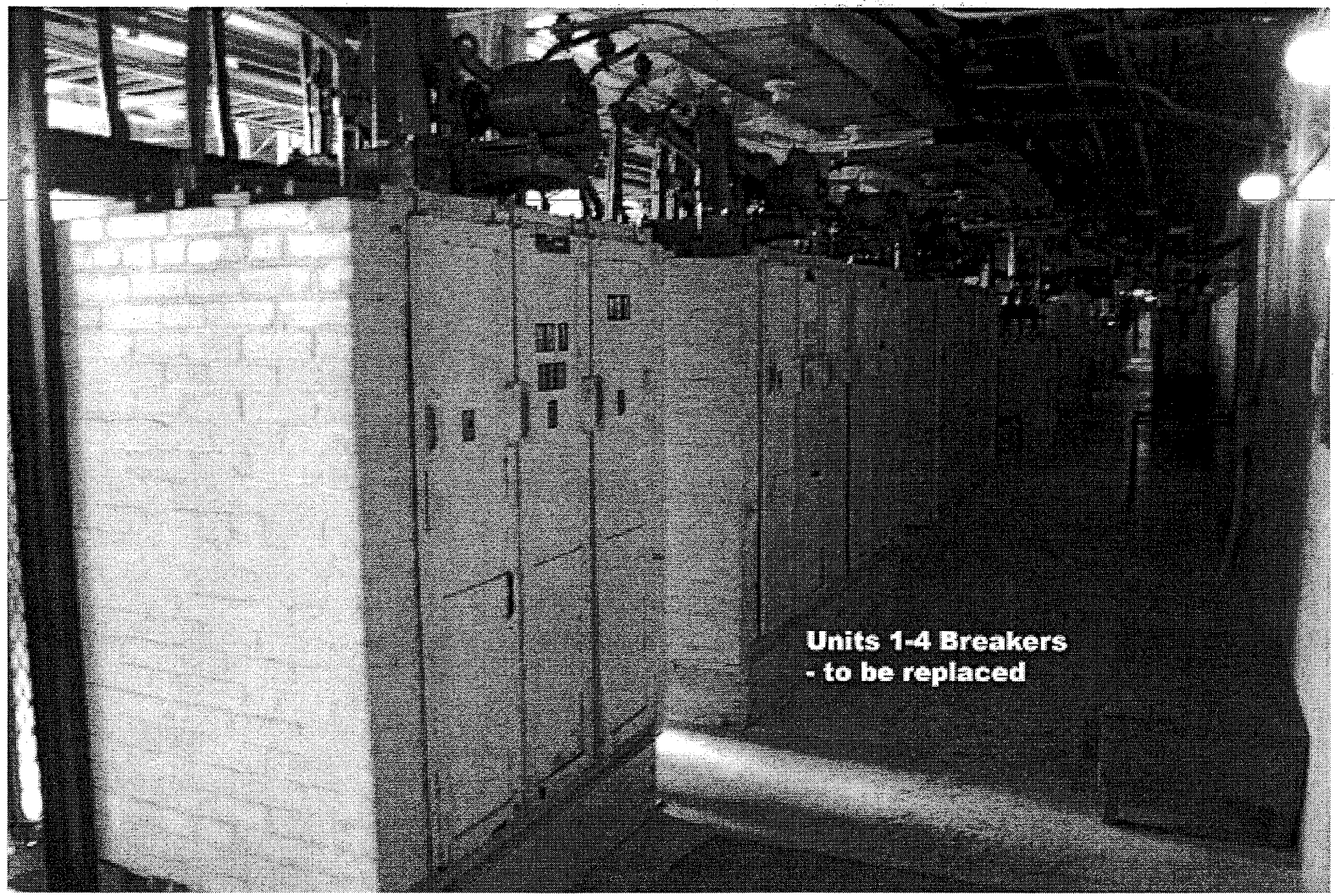

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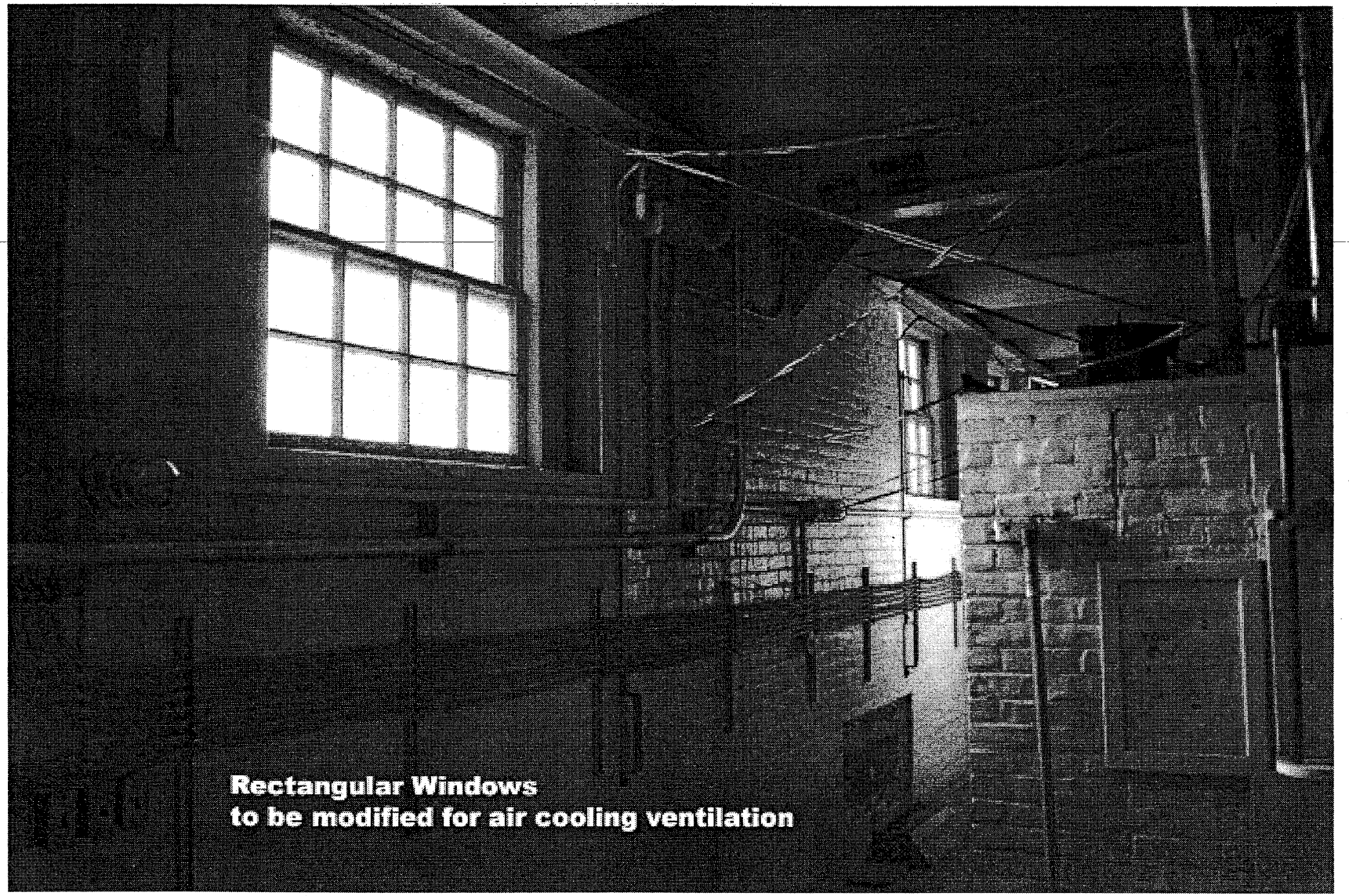

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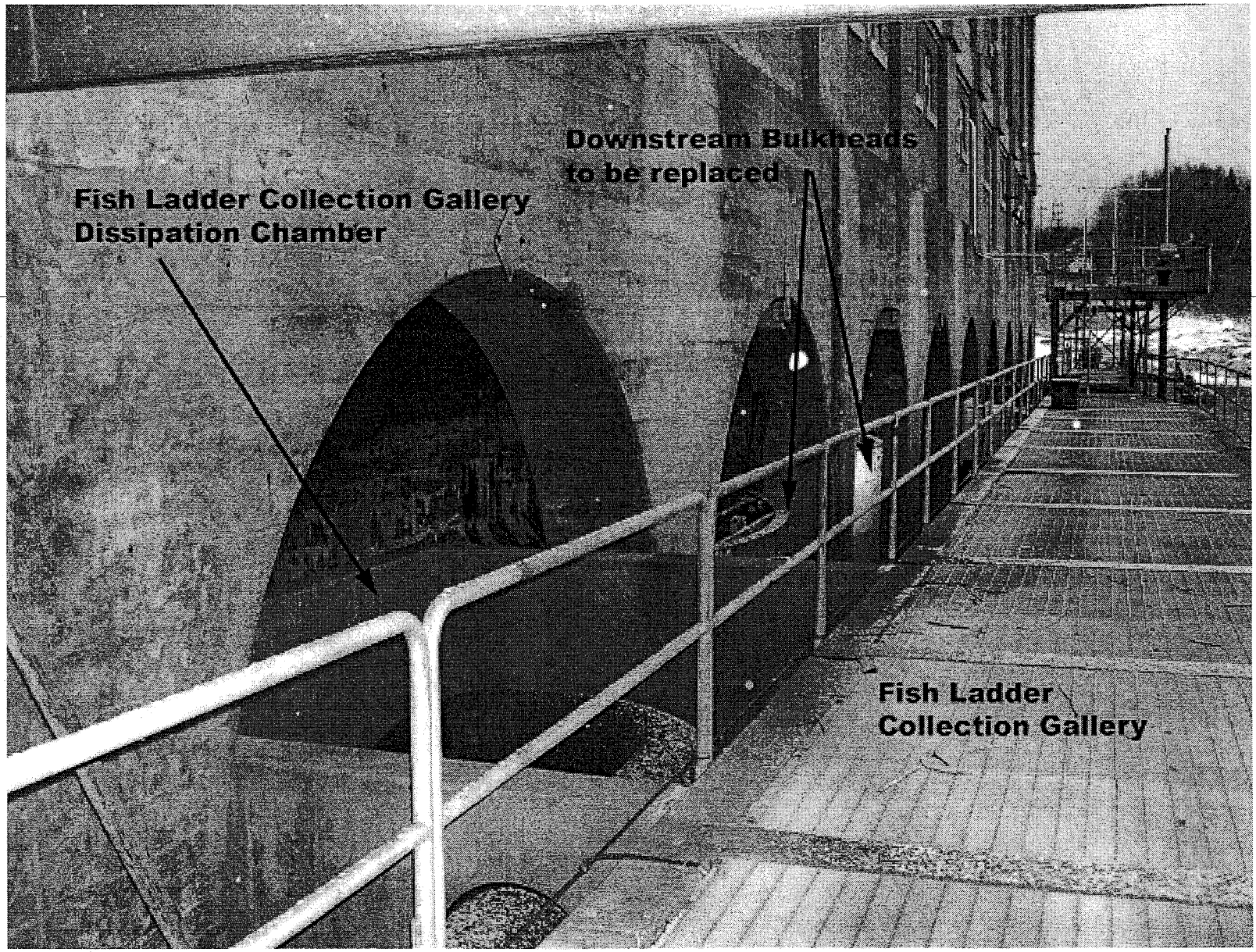

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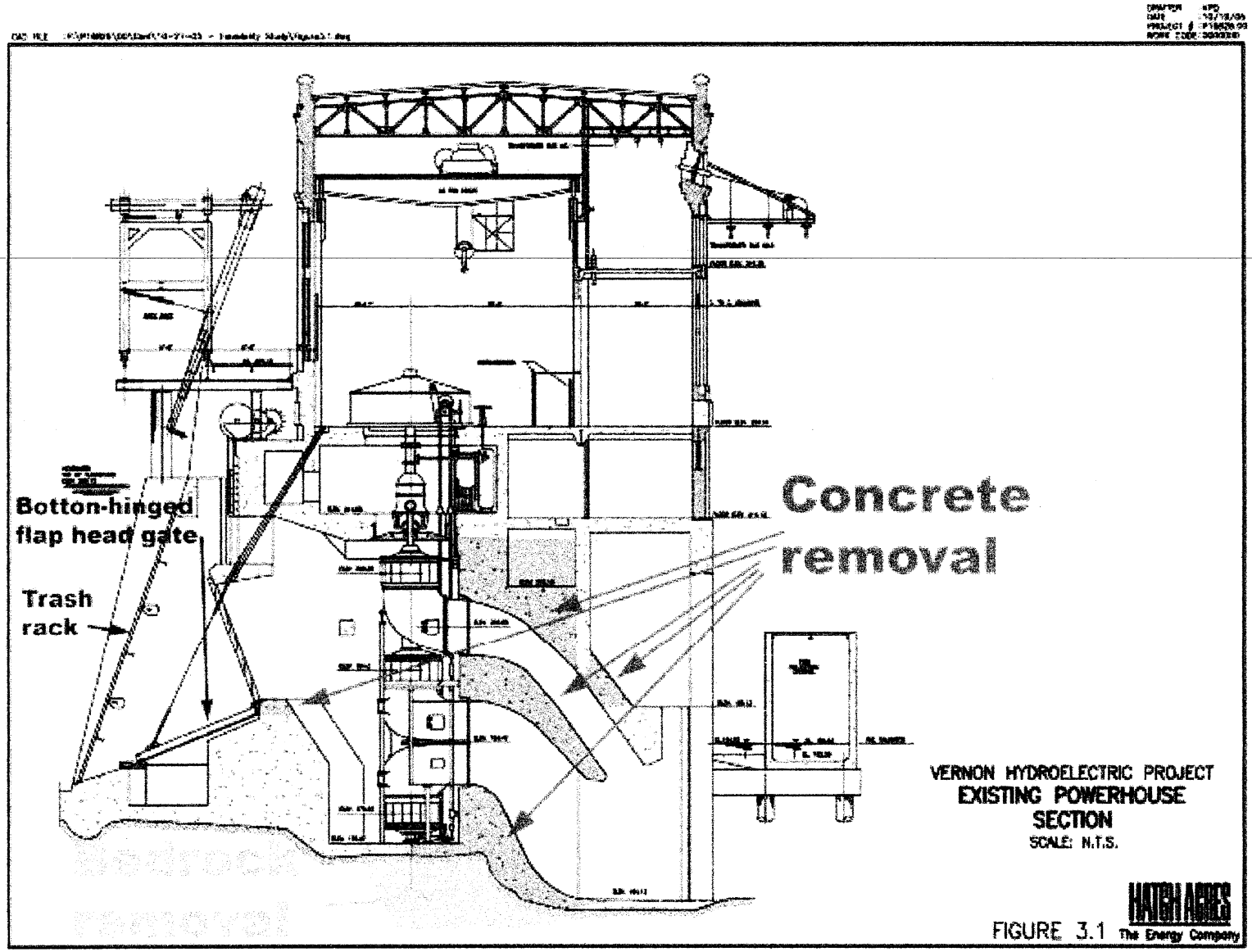
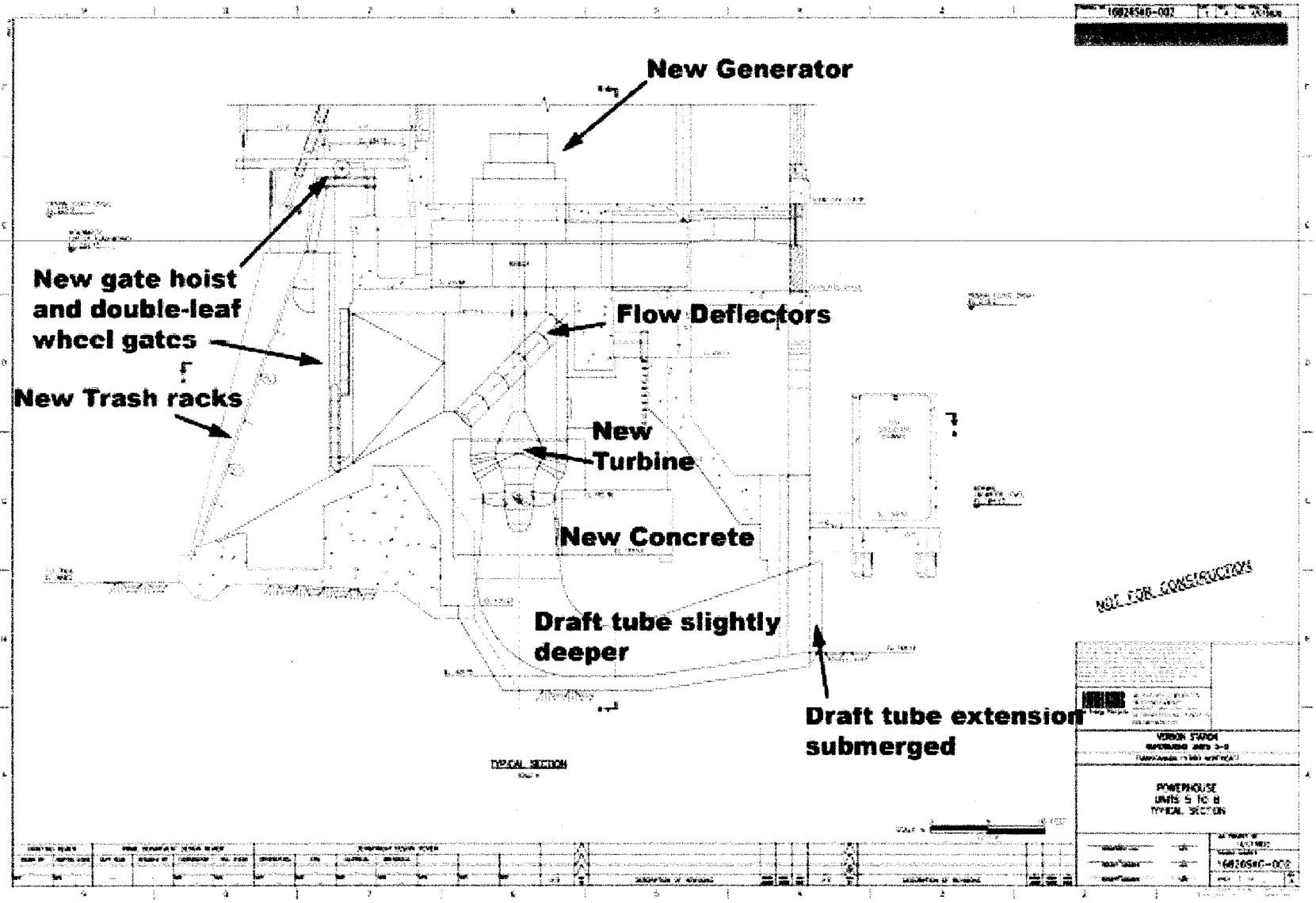


Drawing 1



Drawing 2

Agency Consultation Meeting
January 25, 2006

RE: Vernon Project (FERC No. 1904) Non-Capacity Amendment Application
Fifteen Mile Falls Project (FERC No. 2077) (Comerford Development) Non-Capacity Amendment Application

Participants:
John Warner -- US Fish and Wildlife Service (FWS)
Ben Rizzo - FWS
Jeff Cueto – Vermont Agency of Natural Resources (VANR) -- Water Quality
Jay McMenemy – VANR – Fish and Wildlife
Paul Piszczek - NH Department of Environmental Services (NHDES) – Watershed Bureau - water quality
Bill Ingham – New Hampshire Fish and Game (NHFG)
Diane Emerson - NHFG
Andy Schafermeyer – NHFG
Tim Brush – Normandeau Associates (consultant)
Jennifer Griffin – Normandeau Associates (consultant)
Brian Hanson -- Normandeau Associates (consultant)
Karen Klosowski – Louis Berger Group (consultant) - conference call participant
John Ragonese – TransCanada
John Huysentruyt - TransCanada
Justin Donaghy – TransCanada

Vernon Non-Capacity Amendment Application

The following provides a summary of the key items discussed at the meeting relative to each of the topics indicated.

Review of 1992 Amendment and Current Project Facilities

John R. reviewed the history of the turbine units at the Vernon Station. Currently units 5 through 8 are not operated, two of these units are officially out-of-service. There are many mechanical problems with the existing units 5 through 8, and there are also confined space issues that result in safety issues for any maintenance related activities at these units. Currently the station is only producing 16.4 megawatts (MW).

John R. reviewed the components of the 1992 Amendment in which FERC authorized the installation of two 14 MW units to replace units 5 through 8.

This resulted in a total project authorized capacity of 44.4 MW and 20,930 cubic feet per second (cfs) hydraulic flow capacity. He stated the amendment was still active and that various extensions were requested and granted. He stated that the units were not installed due to various reasons, including the changes in the energy market, and the separation of assets and the bankruptcy status of the previous owners. He reviewed some changes that have occurred at the project since the 1992 Amendment. This included during 1991-1996 installation and testing of downstream fish passage devices including a louvered barrier and fish tubes and study of unit fish passage survival. He also stated that the station was automated in 1998, and is now remotely controlled from the Connecticut River Control Center in Wilder, Vermont.

Review of Proposed Turbine Re-Powering Option

John R. stated that TransCanada conducted a reassessment of turbine assessment options and that key constraints of the analysis were hydrology and to limit structural modifications to the powerhouse, such as the more major structural modifications that would have to occur under the two 14 MW unit installation. He stated that Hatch Acres consulting was hired and that a detailed technical analysis was completed, assessing 12 different options. He stated that TransCanada is evaluating options and what is being discussed at this meeting is currently the preferred option. If the preferred option changes, the application would be modified.

John R. reviewed the preferred option which is replacing units 5 through 8 with four new 4 MW vertical axial Kaplan turbine units with a 3.1 meter diameter runner. The nominal capacity per unit would be about 4 MW, which would result in a decrease from the 44.4 MW authorized under the 1992 Amendment to approximately 32.5 MW under this proposed option. John stated that there would be a need for some excavation of the concrete and bedrock in order to install the new 4 MW units, but not near the extent that would have to occur with the two 14 MW units.

John also reviewed the hydraulic capacity of the proposed units which would be a nominal hydraulic capacity of 1,600 cfs per unit and a maximum hydraulic capacity of 1,800 cfs per unit. John stated that the total station hydraulic capacity numbers included in the 1992 Amendment order were not correct and he reviewed the hydraulic capacity of the existing turbine units. Units 1-4 have a hydraulic capacity of 1,250 cfs; units 5-8, now not functional, had a hydraulic capacity of about 1000 cfs; and units 9-10 have a maximum hydraulic capacity of 1,834 cfs. Under current conditions, the project passes about 8,600 cfs and under the 1992 amendment the two authorized 14 MW units replacing the original Units 5-8 would pass an additional 6,000 cfs each.

Cofferdam Installation

John R. reviewed the schedule and components of the cofferdam installation. He stated that TransCanada is initiating the dismantling the existing units and that the cofferdams will be installed at both the upstream and downstream sides of the powerhouse. He stated that the purpose is to isolate and de-water units 5-8 portions of the powerhouse and that the cofferdams will be placed in the water and tied to the base of the station, would not be placed in the river bed, and there will be no driven piles. A sedimentation basin will treat all dewatered and leakage discharge.

John R. reviewed components of the Action Plan (11/24/92) submitted under Article 402 and 403 of the 1992 license amendment that related to cofferdam installation. The Action Plan specified that the cofferdam installation would avoid upstream ladder operating season and downstream adult shad season; no driven piles, if possible; provisions pertaining to downstream fish passage devices; and post construction effectiveness evaluations. He stated that some of these measures have already been implemented, such as downstream fish passage devices that have been installed and numerous effectiveness studies that have been conducted since the submittal of the Action Plan in 1992.

John R. stated that TransCanada is looking at moving ahead with the installation of the downstream cofferdam in order to install the cofferdam in advance of upstream fish passage. TransCanada is looking to install the downstream bulkhead prior to May 15, 2006 (targeting April 1) and looking at installing the upstream bulkhead prior to June 1, 2006 (targeting May 1). TransCanada filed for a standard dredge and fill permit with the New Hampshire Department of Environmental Services (NHDES) on December 23, 2005, and TransCanada anticipates the issuance of the dredge and fill permit in mid February. Agencies questioned whether the cofferdam construction would be using sheet piles, or how the cofferdams would be attached. John H. and Jud D. explained that the cofferdam would connect to the outside face base of the powerhouse footings with a connection flange. There would be no need to hammer any pilings into the riverbed. John H. also stated that once mobilized it would take about 2 weeks to install the cofferdam. The Agencies stated that their concern was percussion going through the water column in particular during shad downstream migration periods. John H stated that there would be some vibration during the sheet-to-sheet assembly, but noise transmission would be minimized by the use of new coated steel and the sealant applied to the connection would also facilitate smother assembly. Agencies personnel seemed satisfied that TC plan for installing the cofferdams was utilizing sufficient measures, schedules and

techniques to limit the affect on fish passage and they did not see it would be an issue.

Agencies raised the question whether the cofferdam installation was being conducted under the 1992 amendment or the new proposed re-powering project, and whether TransCanada has been dealing with the New York Regional Office (NYRO). John R. stated that TransCanada has consulted with both the Division of Hydropower Administration and Compliance (DHAC), located in Washington, DC, and the NYRO, and that TransCanada will be providing the NYRO with the plans for the cofferdam installation and that it was being installed to initiate dismantling of existing units at this time.

Erosion Control Plan

John R stated that a sediment control filter basin will be installed prior to any dewatering and that areas behind the cofferdams would be dewatered prior to dismantling the units. He stated that these areas will remain dewatered and the sediment control basin will stay in place through the end of the construction and installation of the new units. John stated that TransCanada will be submitting erosion control plan for the re-powering activities consistent with the 1992 amendment Article 401 requirements. He added that the plan will, in addition to the cofferdam and sedimentation basin components to maintain a de-watered portion of the powerhouse during the re-powering project, include measures for soil erosion control for any potential land-disturbing activities. It would be filed to NHDES and VTDEC for comment and review prior to FERC submission, separate from the NHDES wetlands permit process. Jeff Cueto, VANR, questioned if the area of land disturbance would be less than 1 acre. John R. stated that TransCanada is still preparing the erosion control plan, but that most if not all areas intended for use would be the primary staging areas and were already disturbed or used for project purposes, such as parking areas, etc., so that the least amount of land areas would be disturbed.

Review of FERC Procedural Process

John R. reviewed the FERC procedural process and stated that TransCanada will be filing for a non-capacity amendment and hopes to have FERC approval by early summer. John stated that a non-capacity Amendment means that 3-stage consultation is not required, but that 30-day agency consultation and review is required. He stated that the application will request a reduction in the current 44.4 MW authorized capacity of the Vernon Station. TransCanada conducted initial pre-consultation with FERC DHAC, located in Washington, DC, and the NYRO to verify that a non-capacity amendment would be appropriate and to identify the Exhibit and application components that would

be required with the filing. John R. stated that a draft Environmental Assessment was being prepared as part of the application and that this meeting was important to identify issues and concerns that the agencies may have so that TransCanada can address them in the application or draft EA. He stated that the anticipated filing of the application to the agencies and to FERC is early February 2006, and that TransCanada anticipates filing an additional addendum to the application, including the response to agency comments by March 15, 2006.

Upstream Fish Passage

John R. reviewed the hydraulic modeling results conducted by Alden Labs as part of the 1992 Amendment process. He stated the study found that with the two 14 MW units, an eddy would result in front of the fish ladder when the two new units would be run without units 9 or 10 running. The study found that running unit 10 with the new units would eliminate the eddy and accordingly in the 1992 Action Plan, the plan proposes to operate unit 9 or unit 10 as a first-on, last off during the fish passage period. John stated that Alden is currently conducting a computational fluid dynamic (CFD) modeling studies to look at the new turbine flows under the four 4 MW units, but that the study results will not be available until the end of February. John stated that the initial feedback is that Alden feels the eddy would still exist, so TransCanada is prepared to operate as proposed in 1992 amendment of unit 9 or unit 10 as first on, last off during the fish passage season. He stated that if the study found that the eddy would not exist with the new turbine units, TransCanada would then alter the proposal and amend the application.

John R. stated that per the 1992 Action Plan, post re-powering upstream passage effectiveness studies could utilize the present day adult radio tagged salmon tracking studies associated with the Deerfield River Project if it were to continue at that point. If not it would likely be done using the same methodology. Agencies raised the question as to whether that study should be for shad rather than salmon as the primary concern is for shad not salmon. John R. said that TransCanada was unaware that agencies were concerned for the upstream ladder effectiveness by shad not salmon and would consider this further when it develops a study plan. There was discussion that previously New England Power had conducted a radio tag tracking study of shad, but that many of the tags were faulty. Agency officials all agreed shad were much more sensitive to handling and thus studies are at risk of being successful

Downstream Fish Passage

John stated that the 1992 Action Plan pre-dates many modifications for downstream and the related effectiveness and entrainment studies conducted at the

project. Effectiveness studies initially showed many fish choosing passage through the units versus the fish tube initially installed. This was followed by the construction of the louver barrier guidance structure toward the fish tube between Units 4 and 5 and the additional west end fish pipe to provide passage to those fish inside the barrier. Another effectiveness study was performed after the installation of the barrier and although the fish tube was much more successful there still continued to be a significant number of fish passing via turbines. An entrainment study conducted in 1995 indicated a high survival rate through units 9 and 10, where the majority of the fish opting to not use either fish tube or fish pipe utilize for passage showed overall survival rates were 95 percent or better. John also stated that provisions to operate the downstream fish passage system in accordance with the annual notification letter issued by the CRASC was implemented and is still being conducted.

John R. stated that TransCanada did not see that any further need for effectiveness studies of downstream fish passage due to the fact that two fish passage routes were installed along with the louvered guidance wall and the entrainment studies indicated high survival through units; therefore why study this further? The barrier was designed for Units 11 and 12 operating flows and the lack of optimal performance could be due to the fact that the units were never installed. Thus with re-powering units 5-8, it could become more effective and result in increasing passage though the primary fish tube. But John R questioned why it made sense to study this further when all other routes appear to pass fish with relatively high success.

Agency personnel raised the question if the initial effectiveness study was done on the louver system. John stated that it was initially conducted on the fish tube only and then again after the guidance system was added. Agency personnel questioned if the flows were doubled and the hydrology changed that additional effectiveness studies may be needed. John R. stated that TransCanada's position was that there have been sufficient effectiveness studies for downstream fish passage devices and that the agencies had signed off on the louver system. He also reiterated that the louver system would likely improve since it was designed with the 2-14 MW re-powering option running and that passage via units also resulted in high survival. He stated that if a test was to be done it should be the survivability study of downstream passage through the new 4 MW units, rather than effectiveness studies.

Historic Properties Documentation

John R. reviewed the requirements of Article 404 of the 1992 Amendment which required preparation of the National Register of Historic Places nomination, including Historic American Engineering Records (HAER) documentation of the

station. John R. stated that the station has extensive documentation, but that based on more recent discussions with the State Historic Preservation Office (SHPO) that a different approach is being pursued. TransCanada developed a Memorandum of Agreement (MOA) which the New Hampshire SHPO is in support of and the Vermont SHPO is currently reviewing. TransCanada is hoping to include a signed MOA in the amendment application or submitting it with the addendum. John R. stated that the MOA includes measures for TransCanada to develop a Historic Resources Management Plan for the Vernon Project, measures to supplement documentation that is already assembled, and measures to investigate repository options for mechanical equipment.

401 Water Quality Certification

John R. reviewed that under the 1992 Amendment, a single 401 Water Quality Certificate (WQC) was issued by New Hampshire, and Vermont, pursuant to an MOA with the licensee, waived its right to issue a WQC. TransCanada presumes that application for a new WQC will be required by NH as the 1992 WQC has language to the effect that substantial design changes would require another WQC. TransCanada would like to approach the WQC similar to what was conducted for the Fifteen Mile Falls Project, in that the WQC would be issued by New Hampshire where the existing and re-powered Units 5-8 are located, but that a collaborative effort between New Hampshire and Vermont would be conducted. Jeff Cueto, VANR, stated that his opinion is that it could be done with approach of the execution of a MOA to make it clear that Vermont is waiving its 401 WQC, and to have New Hampshire consult with Vermont on the WQC. He stated that Vermont has several issues associated with the overall Vernon Project (not just associated with this proposed action), including flow, water level management and dissolved oxygen, but that he assumed that these issues, other than perhaps the DO issue, would be put off until relicensing. Jeff stated that he would consult and give TransCanada feedback about Vermont's position on the WQC approach.

Headpond Fluctuations

Agency personnel raised issues about the water level fluctuations, specifically how the proposed turbine upgrade may change the drawdown on the headpond and if the cycling would change. John R stated that the larger capacity units associated with the 1992 Amendment could have had a greater impact on drawdown that the smaller 4 MW units due to inherent capacity to pass more flow. He added that currently the Vernon Project flows were pretty riverine and that although the license operating range is as much as 8 foot drawdown; typically the project operates within the upper two feet on a daily cycling run-of-river basis. A Vermont agency official raised the question in terms of any anticipated shift in the timing of draw downs or cycling, stating concerns about the exposure of mudflats

and dewatering of wetlands. John R stated that there are certain flood flows reservoir [profile] operating procedures that require drawdown to specific elevations would be remain. John R. also stated that the EA would discuss headpond fluctuations.

Corps Agreement

An agency representative questioned if there was any agreement with the Corps regarding flow management. John R. stated that downstream flow coordination occurs and that there is an agreement in place with the Corps. Agency questioned what the agreement with the Corps entailed. John R stated that it was really an agreement to ensure that the operation of Vernon did not cause further flooding; describes how the station responds to high water and explains how operation will address reservoir profile.

Trash Rack Replacement

John R. stated that currently units 5-8 have trash racks with 2 inch on center ¼ wide and 1 ½ inch deep, full length bars, and that TransCanada would like to consider wider spacing of 4 inch per the manufacturer specifications. TransCanada was still evaluating what less than 4 inch spacing mean in terms of head loss and efficiency and increased maintenance of smaller spacing. John H. stated that the key concern would be the high costs of maintenance associated with cleaning of the 2 inch trash racks. There was general agency concern for increasing trash rack spacing from the existing 2 inch spacing. A Vermont agency official questioned whether TransCanada could put in an automated cleaner. John R. stated that TransCanada is not looking at that or proposing it. TransCanada provided some initial estimated turbine mortality rates based on the new 4 MW units which ranged from about 80 percent to 97 percent survivability. Vermont agency personnel questioned if that was for adult or juveniles and stated that the estimated turbine mortality should be based on adult shad. Tim Brush from Normandeau Associates stated that those figures would drop slightly for adult shad. John R. stated that if the 4 inch trash racks appear to be warranted that TransCanada would propose turbine entrainment survival study of the new units and provide the results to the agencies.

Comerford Non-Capacity Amendment Application

John R. reviewed the scope of the proposed re-powering of the Comerford Development at the Fifteen Mile Falls Project. TransCanada is looking at replacing unit number 1 turbine with a new water wheel that will provide the required minimum flows at improved generation efficiency. TransCanada is not looking at changing capacity in the event that TransCanada would like to return the larger unit if economics dictate or if performance of the new unit is less than expected. The new wheel will be placed where the existing wheel presently sits and all construction activities would occur within the existing powerhouse, isolated from the river and there is no need for cofferdam construction.

John explained that the hydraulic capacity of the replacement turbine will be decreased by about 50 percent, from 3,300 cfs to 1,635 cfs, and that the existing generators will remain in place. The electric generating capacity will be reduced from 40,500kW at rated head, down to 22,000 kW. Because of the increased efficiency of the turbine, an approximate increase of about 3,900 megawatt hours (MWh) annually is expected, with the same amount of water.

He stated that TransCanada is looking at a turbine design that would maintain or enhance the dissolved oxygen (DO) downstream of the station. John discussed that the current issues with DO are during mid August and mid September and during short time periods. TransCanada is still monitoring DO both at Comerford and Moore and actually Moore is more of the issue. Two methods of aeration with the turbine units are being considered: (1) aeration through the thrust relief holes; or (2) aeration through the aeration through the center of the runner cone. Computational fluid dynamic modeling will be conducted to calculate the pressures in the runner passage and the appropriate location for maximizing airflow into the water passageway. TransCanada will select the most effective option. John H. stated that he was just at a meeting with the Vendor and that the results of the modeling are anticipated to be completed shortly.

John R. stated that TransCanada is not of the opinion that a 401 WQC is needed and that TransCanada will submit an application and request consideration that a 401 WQC modification is not required, particularly since the existing WQC has flexibility for the monitoring period. John R. stated that TransCanada will be filing for a non-capacity amendment with FERC and that TransCanada conducted initial pre-consultation with FERC DHAC and NYRO. He stated that TransCanada anticipates filing the application to agencies and FERC in early February 2006, and that the application would include an Exhibit E. There would be a 30 day review and comment period, and TransCanada anticipates filing an addendum to the application including the response to agency comments.

The State of New Hampshire
Department of Environmental Services

Michael P. Nolin
Commissioner

February 13, 2006

Transcanada Hydro Northeast Inc
4 Park St
Concord, NH 03301

RE: Transcanada Hydro Northeast Inc - File # 2005-03035 – Hinsdale Tax Map/Lot #8/2

Dear Mr. Ragonese:

Attached please find Wetlands Permit # 2005-03035 to maintenance dredge silt and woody debris from the trash racks and draft tubes of a hydroelectric dam and construct temporary sheet-pile cofferdams, temporarily impacting approximately 2,930 square feet of the bed of the Connecticut River, in preparation for the future replacement of four turbine generating units.

The decision to approve this application was based on the following findings:

1. This is a minimum impact project per Administrative Rule Wt 303.04(l), temporary cofferdams and other water control devices constructed in flowing water or adjacent to dams in conjunction with the repair or maintenance of existing structures. Temporary cofferdams means temporary watertight enclosures built in the water and pumped dry to expose the bottom so that construction may be undertaken. All such work shall be designed and supervised by a professional engineer and shall be removed upon completion of repair and/or maintenance.
2. The need for the proposed impacts has been demonstrated by the applicant per Wt 302.01. For approximately 13 years, four turbine generating units in the hydroelectric dam have been either retired or been in disrepair due to their age and outdated design. Maintenance dredging of silt and woody debris from the trash racks and draft tubes of the dam and construction of temporary sheet-pile cofferdams is being conducted in preparation for replacement of the four turbine generating units.
3. Future impacts associated with the turbine generating unit replacement project will be addressed in a separate application to the DES Wetlands Bureau.
4. The applicant has provided evidence which demonstrates that this proposal is the alternative with the least adverse impact to areas and environments under the DES Wetlands Bureau's jurisdiction per Wt 302.03.
5. The applicant has demonstrated by plan and example that each factor listed in Wt 302.04(b) Requirements for Application Evaluation, has been considered in the design of the project.
6. Silt and woody debris have accumulated in front of the trash racks and in the draft tubes of the dam and must be removed before cofferdams can be installed. Typically, the woody debris is removed by a trash rake; however, the debris is encased in silt due to four of the turbine generating units being out of service for approximately 13 years.
7. On the upstream side of the dam, the silt will be removed using a barge and crane-mounted clam shell bucket. The clam shell will be used to remove the silt and woody debris and deposit the material into dumpsters on the barge. Adjacent generating units will be shut down to eliminate flow reducing the opportunity for silt to drift. This process will only remove material down to the base of the dam. Divers will be directing the operation to ensure that the clam shell removes only the debris in front of the trash racks and does not dredge the river bed. The dewatered material will be transported to an approved landfill.
8. On the downstream side of the dam, the silt will removed from the draft tubes using a dredging pump. The silt will be deposited into a settling basin and the dewatered material will be transported to an approved landfill.

P.O. Box 95, 29 Hazen Drive, Concord, New Hampshire 03302-0095
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9. Temporary cofferdams will be installed to maintain the work site in a dewatered condition for future replacement of the four turbine generating units. The cofferdams will be removed following construction completion.
10. The applicant intends to install the cofferdams no later than June 1, 2006 to avoid migratory fish passage periods.
11. The proposed cofferdams will be installed on the concrete footing at the base of the dam and attached to concrete piers and not the river bed.
12. The cofferdam design will be vertical steel sheet piles supported by horizontal steel wales and vertical struts. The upper sections of the structures at the head water side will be supplemented with sand bags as required. Sealing of the cofferdams at the toe of the sheet piles will be achieved with grout bags and tremie concrete. Sealing of the sheet piles against existing concrete walls will be achieved by timber lath and PVC sheeting.
13. Any inflow into the work area will be pumped to a settling basin constructed at the downstream side of the dam above the existing fishway. The basin will serve as a temporary settling pond for water pumped out from the work area and as a temporary storage area for associated sediments and construction debris. Water will seep from the settling basin, through a containing filter fabric, through secondary hay bales installed in the fishway, and back to the river. Material deposited in the settling basin will be periodically transported to an approved landfill.
14. Upon removal of the settling basin, hay bales will remain in place so that any material that may escape is contained. Hay bales will be removed when all material is contained.
15. The Connecticut River Joint Commissions has no objections to the applicant's proposal.
16. The Nongame and Endangered Wildlife Program of the NH Fish and Game Department (NHFGD) identified that the proposed project has the potential to impact anadromous fish that use the Connecticut River and an active bald eagle nest approximately 1,125 feet downstream of the dam. To minimize impacts to these species, NHFGD originally requested that active construction occur within the river between November 1 and April 1. On January 25, 2006, the applicant met with the US Fish and Wildlife Service (USFWS) and NHFGD to address potential wildlife impacts. The parties concluded that disturbance and excessive noise from construction activities should be minimal and the original date restrictions were removed.
17. The applicant has consulted with the USFWS and the NHFGD to determine a satisfactory construction schedule that should not affect passage for both up and downstream migratory fish.

Any party may apply for reconsideration with respect to any matter determined in this action within 20 days from the date of this letter. A motion for reconsideration must specify all grounds upon which future appeals may be based, and should include information not available to the Department when the decision was made. The department may grant reconsideration if, in its opinion, good reason is provided in the motion.

Your permit must be signed, and a copy must be posted in a prominent location on site during construction. If you have any questions please contact our office at (603) 271-2147.

Sincerely,

Christine Bowman
Wetlands Inspector
DES Wetlands Bureau

cc: Hinsdale Conservation Commission
Hinsdale Board of Selectmen

The State of New Hampshire

Department of Environmental Services

Michael P. Nolin
Commissioner

WETLANDS AND NON-SITE SPECIFIC PERMIT 2005-03035

Permittee: **Transcanada Hydro Northeast Inc, 4 Park St, Concord, NH 03301**
Project Location: **Governor Hunt Rd, Hinsdale**
Hinsdale Tax Map/Lot No. 8 / 2
Waterbody: **Connecticut River**

NOTE - - CONDITIONS

APPROVAL DATE: 02/10/2006 **EXPIRATION DATE: 02/10/2011**

Based upon review of the above referenced application, in accordance with RSA 482-A and RSA 485-A:17, a Wetlands Permit and Non-Site Specific Permit was issued. This permit shall not be considered valid unless signed as specified below.

PERMIT DESCRIPTION: Maintenance dredge silt and woody debris from the trash racks and draft tubes of a hydroelectric dam and construct temporary sheet-pile cofferdams, temporarily impacting approximately 2,930 square feet of the bed of the Connecticut River, in preparation for the future replacement of four turbine generating units.

THIS APPROVAL IS SUBJECT TO THE FOLLOWING PROJECT SPECIFIC CONDITIONS:

1. All work shall be in accordance with plans by Hatch Acres Corporation dated December 8, 2005, as received by the DES Wetlands Bureau on December 23, 2005 and the narrative entitled "Vernon Hydroelectric Station Project Description" by TransCanada and The Louis Berger Group, Inc., as received by the DES Wetlands Bureau on February 6, 2006.
2. Any future work on this property that is within the jurisdiction of the DES Wetlands Bureau as specified in RSA 482-A will require a new application and approval by the Bureau.
3. Appropriate turbidity controls shall be installed prior to construction, shall be maintained during construction such that no turbidity escapes the immediate dredge area, and shall remain until suspended particles have settled and the water at the work site has returned to normal clarity.
4. Dredging shall remove only material down to the base of the dam and not impact the river bed.
5. Extreme caution should be taken to avoid releases of turbidity to the river during dredging.
6. Dredged material shall be dewatered in settling basins that are located outside of the jurisdiction of the DES Wetlands Bureau and lined with acceptable sediment trapping liners.
7. Prior to commencing work on the dam, cofferdams shall be constructed to isolate the work area from the river. Once a cofferdam is fully effective, confined work can proceed without restriction.
8. Dredging and cofferdam construction shall be done so as not to impede fish migrations or interfere with fish spawning areas.
9. Discharge from dewatering of work areas shall be to settling basins that are located outside of the jurisdiction of the DES Wetlands Bureau and lined with acceptable sediment trapping liners.
10. Temporary cofferdams, sandbags, and hay bales shall be entirely removed immediately following construction completion.

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2005-3035
Conditions Cont'd

11. Construction equipment shall be inspected daily for leaking fuel, oil and hydraulic fluid prior to entering surface waters or wetlands.
12. Faulty equipment shall be repaired prior to entering jurisdictional areas.
13. The contractor shall have appropriate oil spill kits on site and readily accessible at all times during construction and each operator shall be trained in its use.
14. All refueling of equipment shall occur outside of surface waters or wetlands during construction.

GENERAL CONDITIONS WHICH APPLY TO ALL DES WETLANDS PERMITS:

1. A copy of this permit shall be posted on site during construction in a prominent location visible to inspecting personnel;
2. This permit does not convey a property right, nor authorize any injury to property of others, nor invasion of rights of others;
3. The Wetlands Bureau shall be notified upon completion of work;
4. This permit does not relieve the applicant from the obligation to obtain other local, state or federal permits that may be required (see attached form for status of federal wetlands permit);
5. Transfer of this permit to a new owner shall require notification to and approval by the Department;
6. This permit shall not be extended beyond the current expiration date.
7. This project has been screened for potential impacts to **known** occurrences of rare species and exemplary natural communities in the immediate area. Since many areas have never been surveyed, or have received only cursory inventories, unidentified sensitive species or communities may be present. This permit does not absolve the permittee from due diligence in regard to state, local or federal laws regarding such communities or species.
8. The permittee shall coordinate with the NH Division of Historic Resources to assess and mitigate the project's effect on historic resources.

APPROVED: _____
DES Wetlands Bureau

BY SIGNING BELOW I HEREBY CERTIFY THAT I HAVE FULLY READ THIS PERMIT AND AGREE TO ABIDE BY ALL PERMIT CONDITIONS.

OWNER'S SIGNATURE (required)

CONTRACTOR'S SIGNATURE (required)

TransCanada
In business to deliver

US Northeast Hydro Region
Concord Hydro Office
4 Park Street, Suite 402
Concord NH 03301-6373

tel 603 225 5578
fax 603 225 3760
web www.transcanada.com

February 27, 2006

New Hampshire Department of Environmental Services
Watershed Management Bureau
Paul Piszczek
6 Hazen Drive; PO Box 95
Concord, NH 03302-0095

Re: TransCanada Hydro Northeast Inc.; Vernon Project, P-1904; Application for Review of Existing Water Quality Certification

Dear Mr. Piszczek:

TransCanada Hydro Northeast, Inc. (TransCanada) is submitting this application to the New Hampshire Department of Environmental Services (NHDES) for the review of the existing 401 Water Quality Certification (WQC) associated with the Vernon Hydroelectric Project (FERC No. 1904). TransCanada is submitting a Non-Capacity Amendment Application to the Federal Energy Regulatory Commission (FERC) to amend its existing license for the Vernon Project to revise the number, generating capacity, and design of replacement turbine units that were authorized under the 1992 license amendment[1] approving turbine replacement. The 1992 license amendment authorized replacement of four existing 2.0-megawatt (MW) turbine/generator units (Units No. 5 through 8) with two 14-MW turbine/generator units. TransCanada wishes to amend the current license as amended in 1992 by instead replacing the four units with four new 4-MW units.

The two 14-MW unit installation has not moved forward due to economic factors, wholesale power restructuring in the New England market, changes in the marketplace, and changes in project ownership. With the improved conditions in the generating market, TransCanada re-evaluated the turbine replacement at the Vernon Project and is looking instead at replacing the units with four 4-MW units. The four 4-MW units would fit in the same station footprint as the existing units, and TransCanada would not need to conduct some of the more significant modifications that would be associated with installation of two 14-MW units.

With the turbine replacement, TransCanada will continue to operate the Vernon Project under the existing FERC license requirements and would continue to meet the conditions specified in the existing New Hampshire 401 Water Quality Certification (WQC) and all applicable water quality standards. Under the 1992 license amendment process, the New

[1] Application filed by New England Power Company on February 22, 1991, to amend the Vernon Project and approved by Commission Order issued on June 12, 1992 (59 FERC ¶62,267).

Hampshire Department of Environmental Services (NHDES) placed conditions on the Vernon Project WQC relevant to the 1992 license amendment, and the state of Vermont, pursuant to a Settlement Agreement with the Licensee filed with the Commission November 20, 1991,[2] agreed to waive 401 Certification, to the extent that it may have been required by Vermont.

Similar to the Licensee position in 1991, TransCanada is filing for an amended 401 WQC (concurrent with the filing of this application with the Commission) from the NHDES based upon the proposed change in re-powering Units 5 through 8. The intent is that any potential revised conditions placed on the NH 401 WQC as a result of the revised scope of unit replacement would be conducted through a cooperative consultation process between the NHDES and Vermont Agency of Natural Resources, Department of Environmental Conservation (VANR). TransCanada suggests that through a cooperative effort the NHDES-issued WQC would satisfy the state of Vermont's interests, and VANR would continue to waive a requirement for Vermont 401 Certification associated with this amendment. TransCanada further believes that the Settlement Agreement regarding the 401 WQC, pursuant to the proposed turbine replacement entered into between New England Power Company and the VANR and filed with the Commission on November 18, 1992, remains binding upon the VANR and TransCanada through the transfer of the License as amended by the FERC. The 1992 Order approving the increase in authorized capacity for the Vernon Project incorporated the terms of the 1991 Settlement Agreement; as such the Settlement Agreement should be considered as remaining in effect.

In support of this WQC application, TransCanada is submitting the Non-Capacity Amendment Application, which provides a description of the proposed actions and anticipated environmental effects, including an environmental report (Applicant Prepared Environmental Assessment). Please note that Attachment 1 and Exhibit F of the amendment application is being filed under separate cover as it contains Critical Energy Infrastructure Information detailing the Vernon Project Facilities.

Please contact John Ragonese at 603-498-2851 or john_ragonese@transcanada.com if you have any questions regarding this filing.

Sincerely,

John Ragonese
FERC License Manager
TransCanada Hydro Northeast, Inc.

Enclosures
cc: Mr. Jeff Cueto, VT Dept. of Environmental Conservation, Vermont Agency of Natural Resources

[2] Offer of Settlement submitted by Mark Slade, attorney for New England Power Company, and William Brierly, Chief of Operations, Vermont Department of Environmental Conservation, to the Commission on November 20, 1991.

NHDES

State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES
29 Hazen Drive, PO Box 95, Concord, New Hampshire 03302-0095
Phone (603) 271-2457 Fax (603) 271-7894

APPLICATION FOR 401 WATER QUALITY CERTIFICATION

1. APPLICANT INFORMATION:

Name of Applicant TransCanada Hydro Northeast, Inc

Address 4 Park Street

City/Town Concord, NH Zip 03301 Phone # Telephone: (603) 225-5528
Fax: (603) 225-3260

Principal Place of Business _____

2. PROJECT INFORMATION

Name of Project Vernon Hydroelectric Project (FERC No. 1904) _____

Address _____

City/Town _____ County _____

Receiving Stream Connecticut River

Drainage Basin Connecticut River

Description of Project Turbine Unit Upgrade/ FERC Non-Capacity License Amendment.
Please refer to Vernon Project Non-Capacity Amendment Application for supporting information.

Project Schedule:

Beginning of Construction _____

End of Construction _____

Operation Period _____

Name of Person Responsible for Project _____ Phone # _____

3. DISCHARGE INFORMATION

Is the discharge occurring or proposed? _____

Latitude/Longitude of discharge _____

Name of Receiving Water _____

County _____

Drainage Basin _____

4. ADDITIONAL SUBMITTAL INFORMATION

- An original of a United States Geological Survey Quadrangle Map with the location of the project and its discharge;
- Copy of the complete federal permit application, including federal permit number;
- Copy of the wetlands permit;
- Copy of the alteration of terrain permit (RSA 485-A:17);
- Copy of any other state and local permits and application required by law;
- Name and addresses of adjoining riparian or littoral owners;
- Plan showing the proposed project to scale including:
  - Project Boundaries;
  - Location, dimensions and types of any existing and/or proposed structures; and
  - Location and extent of water bodies, including wetlands.

Signature – <u>MUST</u> BE SIGNED AND DATED BY APPLICANT

To the best of my knowledge, the data and information, which, I have submitted to the New Hampshire Department of Environmental Services, is true and correct. I understand that an approval based upon incorrect data may be subject to revocation. I have complied with all local regulations or ordinances relative to this project and have obtained or will obtain, prior to the commencement of any work, all other approvals that may be required.

Date: 02-27-06 **Signed:** John G Jr

ATTACHMENT 4

EXHIBIT E – APPLICANT PREPARED ENVIRONMENTAL ASSESSMENT

ENVIRONMENTAL ASSESSMENT

NON-CAPACITY AMENDMENT

VERNON HYDROELECTRIC PROJECT

Project No. 1904

Submitted by:
TransCanada Hydro Northeast, Inc.
4 Park Street
Concord NH 03301

February 2006

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LIST OF FIGURES

LIST OF TABLES

ACRONYMS

ACHP	Advisory Council on Historic Preservation
cfs	cubic feet per second
Commission/FERC	Federal Energy Regulatory Commission
CFD	computational fluid dynamic
CRASC	Connecticut River Atlantic Salmon Restoration Commission
DO	dissolved oxygen
EA	environmental assessment
ESCP	Erosion and Sedimentation Control Plan
FERC/Commission	Federal Energy Regulatory Commission
FPA	Federal Power Act
FWS	U.S. Fish and Wildlife Service
HAER	Historic American Engineering Records
HPMP	Historic Properties Management Plan
kV	kilovolt
MOA	Memorandum of Agreement
MW	megawatts
MWh	megawatt-hours
National Register	National Register of Historic Places
NEP	New England Power Company
NHDES	New Hampshire Department of Environmental Services
NHFG	New Hampshire Fish and Game Department
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
O.C.	on center
SHPO	State Historic Preservation Officer
USGenNE	USGen New England
USGS	U.S. Geological Survey
VANR	Vermont Agency of Natural Resources
VDFW	Vermont Department of Fish and Wildlife
WQC	water quality certification

EXECUTIVE SUMMARY

TransCanada Hydro Northeast, Inc. (TransCanada or Licensee) proposes to amend its existing license for the Vernon Project (FERC No. 1904) to revise the number, generating capacity, and design of replacement turbine/generator units that were authorized under the 1992 license amendment[1] approving turbine replacement. The 1992 license amendment authorized replacement of four existing 2.0-megawatt (MW) turbine/generator units (Unit Nos. 5 through 8) with two14-MW turbine/generator units. TransCanada seeks to amend the current license, as amended in 1992, by replacing the four units with four new 4-MW units instead of two 14-MW units as provided in the amended license.

The two 14-MW unit installation has not moved forward due to economic factors, 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 (the previous owner of the Vernon Project). With the improved conditions in the generating market, TransCanada re-evaluated the turbine replacement at the Vernon Project and intends instead to replacing the units with four 4-MW units. The four 4-MW units would fit in the same station footprint as the existing units, and TransCanada would not need to conduct some of the more significant modifications that would be associated with installation of two 14-MW units. The proposed change would decrease the project's total installed capacity from 44.4 MW (as authorized by the 1992 amendment) to 32.4 MW and would produce about 188,544 megawatt-hours (MWh) per year.

This environmental assessment (EA) assesses the effects of the proposed action and the no action alternative. Under the proposed action, TransCanada would implement an Erosion and Sedimentation Control Plan that would provide measures for the 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. Major construction activities would occur in the dry behind the cofferdams, so there would be no disturbance of resident fishes during that period. Any discharges of water from the construction area would be cycled through the sediment control basin, so there would be no discharge of turbid waters, and associated sedimentation, downstream of the dam.

TransCanada proposes no change in project operations and the project would continue to operate in its current mode. The proposed unit installation would result in a reduction in the maximum station hydraulic capacity by about 3,800 cubic feet per second (cfs) (from the authorized 20,930 to 17,130 cfs) that would result in some increase in the amount and duration of spillage over Vernon dam during high flow events.

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[1] Application filed by New England Power Company on February 22, 1991, to amend the Vernon Project and approved by Commission Order issued on June 12, 1992 (59 FERC ¶62,267).

compared to what would occur if the two 14-MW units authorized by the 1992 amendment are installed.

TransCanada is also conducting a computational fluid dynamic (CFD) model to assess the tailrace flow patterns associated with the proposed four 4-MW units, and how those patterns may affect attraction flows from the fish ladder. Based on the preliminary results of the CFD modeling, at flows less than or equal to 12,000 cfs (final modeling results will be available by April 1, 2006), it appears that a back eddy would develop in the vicinity of the fish ladder tailrace entrance, if the four new units are in operation, and Units 9 and 10 (closest to the fish ladder entrance) are shut down. Thus, TransCanada is prepared to operate Unit 9 or Unit 10 as first-on, last-off during the operation of the fish ladder when flows are at or below about 12,000 cfs, unless the final results of the CFD modeling indicate that an alternative operation would eliminate the potential back eddy. TransCanada will also develop a study plan in consultation with Connecticut River Atlantic Salmon Restoration Commission agency representatives to evaluate the effectiveness of the fish ladder under the re-powered station flow regimes during the first 2 years of commercial operation of the new units.

Based on a desktop evaluation of potential fish passage survival through the proposed new 4-MW units, there is no indication that, with installation of the new units, fish survival during downstream passage, which has been shown to be high at the project, would markedly change from existing conditions. During operation of the proposed units, there should be little effect on downstream fish migration, because there are multiple options available for downstream passage (fishpipe, fishtube) and because the intakes to the new units would be located behind the louver array. With the installation of the new units, the louver array should continue to intercept and guide fish to the fish tube.

TransCanada proposes to execute a Memorandum of Agreement (MOA) among TransCanada, the New Hampshire State Historic Preservation Officer (SHPO), the Vermont SHPO and FERC that stipulates measures for the documentation and protection of historic properties within the Vernon Project. The executed MOA would ensure that provisions for cultural resource protection at the project are implemented and that the effects of the proposed action on historic properties of the Vernon Project would be appropriately mitigated and protected, resulting in a no adverse effect on the historic properties associated with the Vernon powerhouse.

The no-action alternative would result in the implementation of the 1992 license amendment with the approved two 14-MW units. Approval of the proposed installation of the four 4-MW units and associated actions would result in greater efficiency in the total operation of the project and operations that are better suited to the current market demands. The proposed action would result in less demolition and modification of the powerhouse and equipment than what would be required under the installation of the authorized 14-MW units. Compared to the authorized two 14-MW units, the proposed

installation of four-4-MW units would have a capital cost reduction of 43 percent yet the resulting energy production would be only 16 percent less. In addition, the combined maximum hydraulic capacity of the proposed 4-MW units would be 35 percent less than the authorized 14 MW units. The proposed action would, therefore, result in a substantially more efficient development of the unused hydraulic capacity both in terms of hydraulic efficiency and capital cost, including structural modifications to the powerhouse, while producing almost an equivalent amount of annual energy.

On the basis of the record and this EA, we conclude that replacement of the existing units at Vernon Project, along with implementation of the Licensee's proposed environmental protection measures, would not constitute a major federal action significantly affecting the quality of the human environment.

ENVIRONMENTAL ASSESSMENT
NON-CAPACITY AMENDMENT

VERNON HYDROELECTRIC PROJECT
FERC NO. 1904 — NEW HAMPSHIRE/VERMONT

I. APPLICATION

TransCanada Hydro Northeast, Inc. (TransCanada or Licensee) proposes to amend its existing license for the Vernon Project to revise the number, generating capacity, and design of replacement turbine/generator units that were authorized under the 1992 license amendment[2] approving turbine replacement. The 1992 license amendment authorized replacement of four existing 2.0-megawatt (MW) turbine/generator units (Unit Nos. 5 through 8) with the two 14-MW turbine/generator units. TransCanada seeks to amend the current license, as amended in 1992, by replacing the four units with four new 4-MW units instead of two 14-MW units as provided in the amended license.

The Federal Energy Regulatory Commission (FERC or Commission) issued a new license for a major project for the existing Vernon Hydroelectric Project (FERC No. 1904) on June 25, 1979. The license expires on April 30, 2018. 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 (*see* project figure in Attachment 1 of the non-capacity amendment application). The project has a total authorized installed capacity of 44.4 MW. There are no federal lands within the project boundary.

The two 14-MW unit installation has not moved forward due to economic factors, 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 (USGenNE) (the previous owner of the Vernon Project). With the improved conditions in the generating market, TransCanada re-evaluated the turbine replacement at the Vernon Project and intends instead to replace the units with four 4-MW units. The four 4-MW units would fit in the same station footprint as the existing units, and TransCanada would not need to conduct some of the more significant modifications that would be associated with installation of two 14-MW units. The proposed change would decrease the project's total installed capacity from 44.4 MW (as authorized by the 1992 amendment) to 32.4 MW with the installation of the four proposed 4-MW units.

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[2] Application filed by New England Power Company on February 22, 1991, to amend the Vernon Project and approved by Commission Order issued on June 12, 1992 (59 FERC ¶62,267).

II. BACKGROUND

A. PURPOSE OF ACTION

On February 22, 1991, New England Power Company (NEP), the licensee at the time for the Vernon Project,[3] filed an application for an amendment of license to replace four existing 2-MW turbine/generator units (Unit Nos. 5 through 8) with two 14-MW turbine/generator units (Unit Nos. 11 and 12). The proposed change would have increased the project's total installed capacity from 24.4 to 44.4 MW and increased the total hydraulic capacity from 15,530 to 20,930 cubic feet per second (cfs). In addition, under the 1992 amendment, the licensee also proposed the following additional modifications to the project: (1) install two new outdoor 13.8- to 69-kilovolt (kV) step-up transformers; (2) replace the existing interior 69-kV bare conductor overhead busses with an underground 13.8-kV interconnection to the new step-up transformers; (3) install two new draft tube extensions for the two 14-MW units; and (4) replace all interior electrical equipment for the turbine/generator units with a modern control system and a new control room.

On June 12, 1992, the Commission approved the proposed license amendment authorizing the replacement of four 2-MW units with two new 14-MW units (59 FERC ¶62,267). This amendment required commencing construction within 2 years of amendment being granted and completion within 4 years. Former licensees for Vernon, NEP and USGenNE, requested several subsequent extensions to this deadline citing changes in capacity market, wholesale generation de-regulation in New England, asset ownership transfer and bankruptcy issues. The Commission granted these extensions.[4] Currently, the 1992 amendment requires TransCanada to commence construction of these units by June 11, 2006 and complete the installation by June 11, 2008. With the improved conditions in the generating market, TransCanada re-evaluated turbine replacement at the Vernon Project and is proposing instead to replace the units with four 4-MW units. The four 4-MW units would basically fit in the same station footprint as the existing units and TransCanada would not need to conduct some of the more significant modifications that would be associated with installation of two 14-MW units that were approved under the 1992 license amendment.

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[3] On October 17, 1997, NEP applied for Commission approval to transfer the licenses for all of its hydroelectric assets, including the Vernon Project (Project No. 1904) from NEP to USGen New England, Inc. On February 27, 1998, the Commission approved the transfer of the licenses, and transfer of the assets for these hydroelectric projects from NEP to USGenNE was finalized on September 1, 1998. The license transfer was completed on November 20, 1998. On October 29, 2004, and supplemented on November 2, 2004, USGen New England, Inc. and TransCanada Hydro Northeast, Inc. applied for the transfer of the Vernon Project license. On January 24, 2005, the FERC approved the transfer of the Vernon Project license from USGen New England, Inc. to TransCanada Hydro Northeast, Inc.

[4] Commission Orders granting extension of time issued on June 8, 1994; May 15, 1996; March 25, 1998; June 23, 2000; May 8 2002; and July 6, 2004.

B. NEED FOR POWER

If approved, the power from the proposed increase in turbine capacity at the Vernon Project would help to meet the local and regional need for power. The project provides low-cost renewable energy that displaces non-renewable, fossil-fired generation and contributes to a diversified generation mix. Displacing the operation of fossil-fueled facilities avoids some power plant emissions and creates an environmental benefit. The additional output resulting from the upgraded turbines, if produced by fossil-fueled generation, would result in an increase in greenhouse gases of about 37,700 metric tons of carbon per year.

III. PROPOSED ACTION AND ALTERNATIVES

A. PROJECT LOCATION AND DESCRIPTION

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 (*see* project figure in Attachment 1 of the non-capacity amendment application). The project's 58-foot-high concrete gravity dam is composed of a 356-foot-long powerhouse and a 600-foot-long spillway with six taintor gates, eight underwater sluice gates, hinged hydraulic flashboards, stanchion flashboards, and a trash log sluice to discharge flows in excess of powerhouse capacity. The project reservoir has a water surface area of 2,550 acres at normal pool elevation 220.13 (National Geodetic Vertical Datum), and it extends about 26 miles upstream for a maximum of 54,000 acre-feet of storage.

The Vernon Project was constructed in 1909 with eight turbine generator units: Units 1-4 each with a capacity of 1.5 MW and Units 5 through 8 with a capacity of 2.0 MW. The original turbines had three runners on a common shaft in a vertical configuration. In 1917, an additional two units (Units 9 and 10), which are Francis-type turbines, were added. These units had a capacity of 4.2 MW each. In the 1920s, Units 1 through 4 were upgraded to single Francis runners with a unit capacity of 2 MW each. The Commission was notified that Units 8 and 5 were declared out-of-service in 1992[5] and 1994,[6] respectively. In 2004, Units 6 and 7 ceased to operate, and the status of these units was awaiting the decision to repair or replace these units, when the planning began for the current re-powering project. Concerns over confined-space issues also led to the decision to discontinue service. In 2006, these last two units will be officially retired and the New York Regional Office of the FERC notified.

As approved by the 1992 license amendment, the project facilities would include: a powerhouse containing four 2-MW, two 14-MW, and two 4.2-MW generating units for

[5] Letter from H.W. Sullivan, New England Power Company, to Anton Sidoti, FERC, New York Regional Office, dated March 6, 1992, stating that Unit 8 was permanently out-of-service.

[6] Letter from Ernest Griggs, New England Power Company, to Anton Sidoti, FERC, New York Regional Office, dated December 1, 1994, stating that Unit 5 was permanently out-of-service.

a total installed capacity of 44.4 MW. Also included are transmission facilities consisting of generating leads, four 66/2.3-kV and two 72/2.3-kV step-up transformers located within the powerhouse, an underground 13.8-kV interconnection to two outdoor 13.8- to 69-kV step-up transformers, and appurtenant facilities. The approved 1992 unit upgrade resulted in a change in the project's total authorized capacity from 24.4 MW (as authorized under the project license issued on June 25, 1979) to 44.4 MW (as authorized by the 1992 order to amend the license).

B. PROPOSED ACTION

TransCanada proposes the following measures associated with the proposed turbine replacement:

- Install four vertical axial flow semi-Kaplan turbine/generator units and auxiliary equipment, in place of the two 14-MW units approved in the 1992 license amendment. The nominal capacity per unit would be 4.0 MW, and the maximum hydraulic capacity per unit would be 1,800 cfs for a total output of 16 MW and 7,200 cfs for the four proposed units. The proposed change would decrease the project's total installed capacity from 44.4 MW (as authorized by the 1992 amendment) to 32.4 MW with the installation of the proposed four 4-MW units.

- Excavate a minor portion of the underlying bedrock within the confines of the station to accommodate the draft tubes associated with the new units in place of significant bedrock excavation and deepening the draft tube as much as 10 feet as approved in the 1992 amendment.

- Replace the existing trashracks and continue the existing bar spacing of 2 inches on center.

- Replace bottom-hinged head gate and hoist removal with vertical single-leaf wheel gates and new hoist.

- Upgrade the auxiliary equipment at the powerhouse including: replacement of the powerhouse crane; upgrade of the 13.4-kV cables to the main transformers; station service upgrades including new breakers; and replacement of the 2.4-kV switchgear for Units 1 through 4.

- Implement an Erosion and Sedimentation Control Plan (ESCP) 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 proposed turbine units.

- Continue prescribed first-on, last-off operation of either Units 9 or 10 during the 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 four 4-MW units, and how those patterns may affect attraction flows from the fish ladder using computational fluid dynamic (CFD) models. Provide agencies with a copy for comment prior to submitting it to the FERC as a supplement to this application.

- Develop a study plan in consultation with Connecticut River Atlantic Salmon Restoration Commission (CRASC) agency representatives to evaluate the effectiveness of the fish ladder under the re-powered station flow regimes during the first 2 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 FERC that stipulates measures for the documentation and protection of historic properties within the Vernon Project.

C. NO-ACTION ALTERNATIVE

The no-action alternative would result in the implementation of the 1992 approved license amendment for the installation of the two 14-MW units, to replace four existing, shut down units. Other alternatives exist with respect to the number and sizes of new units to install as replacements for the old units; however, based on physical constraints, commercial availability, available river flows, and a cost/benefit analysis, TransCanada found that the proposed four 4-MW units represented the best choice. Alternatively, in the event that neither the four 4-MW or the two 14-MW units are installed, or any other future option to utilize the available energy, TransCanada would be required to apply for a license amendment for a reduction in authorized capacity, resulting in significantly decreased capacity at the project of about half of what would occur under the proposed action.

IV. CONSULTATION AND COMPLIANCE

A. CONSULTATION

TransCanada initiated consultation with the New Hampshire SHPO (letter dated November 16, 2005) and the Vermont SHPO (letter dated December 20, 2005) and held separate consultation meetings to discuss the proposed action, the proposed MOA and receive comments on December 22, 2005 and February 13, 2006 respectively. TransCanada conducted an initial consultation meeting on January 25, 2006, with representatives from the U.S. Fish and Wildlife Service (FWS), New Hampshire Department of Environmental Services (NHDES), New Hampshire Fish and Game Department (NHFG), Vermont Department of Fish and Wildlife (VDFW), Vermont Agency of Natural Resources (VANR), and CRASC to discuss the proposed actions related to this non-capacity application and potential concerns or issues that the agencies

may have. In addition, the proposal has been reviewed with the Town of Hinsdale Conservation Commission as well as the Connecticut River Local Advisory Committee to the Connecticut River Joint Commissions. The non-capacity amendment application was distributed to the FWS, NHDES, NHFG, VANR, VDFW, CRASC, NHSHPO, VTSHPO, New York Regional Office of FERC, and the U.S. Army Corps of Engineers at the time of filing the application with the FERC.

B. COMPLIANCE

1. Section 18 Fishway Prescriptions

Section 18 of the Federal Power Act (FPA) states that the Commission will require the construction, maintenance, and operation by a Licensee of such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce, as appropriate. For the Vernon Project, upstream and downstream fish passage facilities have been constructed at the project, so further fishway prescriptions are not anticipated. Section V.C.2 of this environmental assessment (EA) includes a description of the existing fish facilities.

2. Water Quality Certification

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 the navigable waters of the United States must provide the licensing or permitting agency with water quality certification (WQC) 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 western historic low waterline of the Connecticut River forms the boundary between the states of Vermont and New Hampshire. It lies such that Units 5 through 8 are wholly within the State of New Hampshire. However, TransCanada understands that the river is a shared resource that lends itself to a coordinated approach by the two states with regard to compliance with state water quality standards. Under the 1992 license amendment process, the NHDES placed conditions on the Vernon Project WQC relevant to the 1992 license amendment, and the VANR, pursuant to a Settlement Agreement with the licensee filed with the Commission November 18, 1991, agreed to waive 401 WQC to the extent that it may have been required by Vermont.

TransCanada filed for an amended 401 WQC (concurrent with the filing of the application with the FERC) from the NHDES based upon the proposed change in re-powering Units 5 through 8. The intent is that any potential revised conditions placed on the New Hampshire 401 WQC as a result of the revised scope of unit replacement would be conducted through a cooperative consultation process between the NHDES and VANR such that the NHDES issued WQC would satisfy the State of Vermont's interests

and VANR would continue to waive a requirement for Vermont 401 WQC associated with this amendment. TransCanada believes that the Settlement Agreement regarding the 401 WQC, pursuant to the proposed turbine replacement entered into between NEP and the VANR, filed with the Commission on November 20, 1991[7] and incorporated into the 1992 Order, remains binding upon the VANR and TransCanada through the transfer of the license as amended by the FERC.

3. Coastal Zone Management Act

Section 307(c)(3) of the Coastal Zone Management Act requires that all federally licensed and permitted activities be consistent with approved state coastal zone management programs. If a project is located within a coastal zone boundary, or if a project affects a resource located in the boundaries of the designated coastal zone, the applicant must certify that the project is consistent with the state's coastal zone management program.

The Vernon Project is not located in a state-designated coastal zone management area and therefore is not subject to the New Hampshire coastal zone management program review. Vermont does not have a coastal zone management program. Accordingly, no coastal zone consistency certification is needed for this project.

4. Endangered Species Act

Section 7 of the Endangered Species Act 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 the critical habitat of such species. The only federally listed wildlife species that occurs in the vicinity of the project is the threatened bald eagle *(Haliaeetus leucocephalus)*, which has an active nest about 700 meters (2,300 feet) downstream of the project. The federally listed endangered shortnose sturgeon occurs in the Connecticut River, but the population is found downstream of the Turners Falls Project (FERC No. 1889), which is located 20 miles downstream of Vernon. There are no federally listed plant species within the project vicinity.

5. National Historic Preservation Act

The National Historic Preservation Act of 1966 (NHPA) (16 U.S.C. 470 *et seq.*) (as amended) 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 and its implementing regulation (36 CFR Part 800) require federal agencies to take into account the effect of any proposed undertaking on properties listed or eligible for listing in the National

[7] Offer of Settlement submitted by Mark Slade, attorney for New England Power Company, and William Brierly, Chief of Operations, Vermont Department of Environmental Conservation, to the Commission on November 20, 1991.

Register. If an agency official determines that an undertaking may have adverse effects on properties listed or eligible for listing in the National Register, the agency official must afford an opportunity for the Advisory Council on Historic Preservation (ACHP) to comment on the undertaking.

TransCanada initiated consultation with the respective SHPOs in New Hampshire (letter dated November 16, 2005) and Vermont (letter dated December 20, 2005) regarding the proposed license amendment. The goal of this consultation is to reach agreement and sign an MOA with the SHPOs stipulating what mitigation and documentations measures are required to adequately protect the historic resources potentially affected by the proposed changes to the existing station. Once an MOA is signed with the SHPOs specifying documentation and mitigation requirements, TransCanada will submit the MOA to the FERC for signature and execution.

V. ENVIRONMENTAL ANALYSIS

A. GENERAL DESCRIPTION OF THE LOCALE

The Vernon Project is located at about river mile 142 on the Connecticut River. 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. Together with its major tributaries, the Connecticut River drains a watershed of roughly 11,265 square miles in four states: Connecticut, Massachusetts, New Hampshire, and Vermont. Thirty-six major tributaries join the Connecticut River; the principals are the Passumpsic, White, West, Ottaquechee, and Black rivers in Vermont; the Ammonoosuc, Mascoma, Sugar, and Ashuelot rivers in New Hampshire; the Millers, Deerfield, Chicopee, and Westfield rivers in Massachusetts; and the Farmington River in Connecticut. 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 main stem 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 rolling hills and along alluvial floodplains and terraces; and mixed residential, commercial, and industrial uses in population centers and along transportation corridors.

B. SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act of 1969, a cumulative effect is the effect on the environment that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time to include hydropower and other land and water development activities.

The proposed action would occur primarily inside the existing powerhouse and would not significantly alter the existing project flows, and would, therefore, not result in cumulative effects on environmental resources.

C. PROPOSED ACTION AND ACTION ALTERNATIVES

Construction activities associated with the proposed action would occur primarily inside the existing powerhouse, isolated from the river. Sheet-pile cofferdams would be installed to isolate the construction area from the river, but would be attached to the upstream and downstream faces of the powerhouse. There would be no major in-river work or placement of the sheet-pile into the river bottom, but there could be some minor disturbance of the river bottom during installation and removal of the cofferdams. There would be no major changes in project operations after installation of the new units, although there would be a decrease in the volume of river flow (decrease of 3,800 cfs or 22 percent) passing through the powerhouse during periods of maximum generation, compared to the maximum hydraulic capacity authorized under the 1992 amendment. Thus, there would be no effects on geology and soils, terrestrial resources, recreational resources, and land use and aesthetic resources. The only resources that could be affected by the proposed amendment would be water resources, fisheries and aquatic resources, and cultural resources (due to the historic significance of the powerhouse). The effects of the proposed action on these resources are described below. In addition, included is a discussion of the effects of the proposed action on the threatened bald eagle, the only federally listed wildlife species that occurs within the vicinity of the project.

1. Water Resources

a. Affected Environment:

Water Quantity

The Connecticut River Basin, with a drainage area of about 11,265 square miles, is one of the largest rivers in New England. The closest U.S. Geological Survey (USGS) gage to the Vernon Project is at North Walpole, New Hampshire on the main stem of the Connecticut River about 30 miles upstream of the Vernon dam. This gage is located just downstream of the Bellows Falls Hydroelectric Project and essentially measures the inflow to the upper end of the Vernon Project reservoir, which is about 26 miles long, covering 2,550 acres at normal pool elevation of 220.13 feet. The drainage area at the North Walpole gage is 5,493 square miles, while the drainage area at the Vernon Project is 6,266 square miles, or 773 square miles (14 percent) greater than at the gage. Based on average monthly flows from the North Walpole gage (*see* table 1), highest flows typically occur during the spring freshet (March, April, and May), and lowest flows occur during the late summer months of July, August, and September. High flows, however, may occur during any month of the year due to storm events. The Vernon spillway has the capacity to pass 90,000 cfs through its gates.

Table 1. Mean monthly flows at USGS gage number 01154500, Connecticut River at North Walpole, NH, 1970-2004. (Source: USGS, 2006a)

Mean Monthly Streamflow in cfs flows											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7,877	7,971	14,537	26,476	16,289	8,243	5,230	4,487	4,238	7,374	9,327	9,490

The Vernon dam is located at about river mile 142, with the Bellows Falls Hydroelectric Project located approximately 32 miles upstream and the Turners Falls Hydroelectric Project approximately 20 miles downstream in Massachusetts. Flows in this reach of the river are highly regulated by upstream hydroelectric projects, except under high-flow conditions. Other reservoirs in the upper Connecticut River Basin provide a usable storage capacity of about 310,000 acre-feet. Typically, when flows are less than its hydraulic capacity, the Vernon Project operates in a daily-cycle run of river mode, where the daily inflow matches the 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 Vernon Project is 1,250 cfs or inflow if less (0.20 cfs per square mile of drainage area), which was established in 1979 when the project was relicensed. The 540-MW Vermont Yankee Nuclear Power Station is located on the Vermont shore just upstream from Vernon dam, and withdraws a small amount of water for cooling.

Typically, pond fluctuations greater than two (2) feet occur infrequently. The need to utilize more than the upper two feet of Vernon's storage arises when regional energy demand is very high and when electric system stability is threatened by the unexpected loss of other generating units or transmission lines. Statistically based on the past eight years of hourly operating data, the pond is below 220.13 feet msl more than 99 percent of the time and above 218.13 feet msl 98 percent of the time. When flows exceed 45,000 cfs up to the maximum flow where the project still has control of reservoir levels, Vernon is operated such that the reservoir does not exceed elevation 218.6 feet msl in order to maintain flow within its upstream project boundary.

Water Quality

The Connecticut River in the vicinity of the project is classified as a Class B water. Pursuant to NHDES water quality criteria, Class B waters must have instantaneous dissolved oxygen (DO) levels 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 bacteria (*E. coli*) levels 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 (Connecticut River Joint Commissions and NHDES, 2004). Based on a 2004 water quality assessment by NHDES (Connecticut River Joint Commissions and NHDES, 2004), the Connecticut River upstream and downstream of the Vernon Project (to a point in Massachusetts about 8 miles downstream) fully met the criteria for Class B waters. Water quality data are also available from the USGS gage at North Walpole, about 30 miles upstream of the Vernon dam. These data are somewhat sporadic and are reported as single values collected once or more frequently per month on some but not all months, dating back to 1954. Table 2 contains data reported since 2002 for some parameters. These data illustrate the seasonal variability in water temperature, river flow, DO, and pH, and do not show any violations of water quality standards (for DO and pH).

Provisions under the 1992 License Amendment

Under the existing 1992 license amendment, Article 401 requires the Licensee to prepare a soil erosion control plan prior to commencing any land clearing or land disturbing activities associated with the turbine replacement. Article 401 stipulates that the erosion control plan contain, at a minimum, the following measures: (1) cofferdams, perimeter control measures, measures to divert runoff around disturbed land surfaces and to collect and filter runoff, provisions for energy dissipation, rip-rap, and permanent drainage where necessary; (2) a revegetation plan; and (3) disposal of excavated materials above the high water mark and storage of fuel and chemicals used in construction in a manner to prevent releases to water bodies. The article also requires the Licensee to take every reasonable precaution during construction to prevent the discharge of petrochemicals, wet concrete, or other materials and debris into the river, and to dispose of debris properly and in a non- wetland location. In addition, the Licensee was required to consult with and include in the plan documentation of consultation with, and recommendations of, the New Hampshire Water Supply and Pollution Control Division and VANR.

Table 2. Water quality data from USGS gage number 01154500, Connecticut River at North Walpole, NH, December 2002 to September 2004. (Source: USGS, 2006b)

Date	Water Temp. (C)	River Flow (cfs)	Dissolved Oxygen (mg/l)	pH (standard units in field)
12/11/2002	1.1	1,290	--	7.2
1/6/2003	.2	4,200	13.1	7.0
2/3/2003	.1	5,350	14.0	7.4
3/17/2003	.5	1,560	13.9	7.5
3/27/2003	--	41,600	--	6.8
4/2/2003	2.0	40,000	13.5	7.3
4/9/2003	2.0	10,300	12.9	7.0
4/15/2003	6.2	23,200	12.3	7.3
4/29/2003	9.0	19,800	10.9	7.5
5/12/2003	11.5	12,800	9.9	7.5
6/17/2003	18.5	11,500	9.1	7.6
7/15/2003	23.9	5,360	7.3	7.6
8/19/2003	25.0	6,520	7.7	7.5
9/8/2003	20.4	1,800	8.5	7.7
10/8/2003	12.1	5,300	9.7	7.6
11/3/2003	10.0	14,700	10.9	7.2
12/10/2003	.2	10,400	13.6	7.2
1/13/2004	0	9,000	13.9	7.0
2/2/2004	0	6,220	14.3	6.9
3/1/2004	.5	7,600	14.8	6.8
3/31/2004	--	26,000	--	7.0
4/5/2004	--	34,000	--	6.6
4/13/2004	5.4	12,100	12.2	7.1
5/3/2004	13.2	9,570	10.3	7.5
6/8/2004	16.7	7,310	9.5	7.7
7/20/04	22.4	6,080	7.7	7.6
8/10/2004	23.0	1,610	7.5	7.7
9/7/2004	20.5	5,680	7.9	7.4

TransCanada is initiating disassembly of Units 5 and 8 that are out-of-service and 6 and 7 will also be placed out of service. In addition to the mechanical problems with the units, there is a confined space issue which results in a potentially unsafe environment for maintenance activities. To commence dismantling of the units, TransCanada is installing a cofferdam at both the upstream and downstream faces of the Vernon Station

to isolate and de-water those portions of the plant associated with Units 5 through 8. The bulkhead design at each location (upstream and downstream) will be vertical steel sheet piles supported by horizontal steel wales and vertical struts. The bulkheads will be anchored to the existing toe of powerhouse, and there will be no driven piles. The cofferdams will not block the upstream or downstream fish passage entrances and will be located inside the louver array.

A sediment control basin will be provided during construction on the downstream side of the powerhouse, above the existing fishway collection gallery, which is no longer used. Any inflow of water into the work area will be pumped to this sediment control basin prior to discharge back to the river. The basin will serve as a temporary settling pond for water pumped out from the work area and as a temporary storage area for the associated sediments and construction debris. Clean filtered water from the basin containing filter fabric will seep back to the river. The sediments and construction debris that are deposited in the sediment control basin will be transported off-site to an approved landfill.

Until the current non-capacity amendment application was submitted, the Licensee did not proceed with the development of the erosion control plan because the authorized installation of the two 14-MW units had not moved forward. TransCanada developed and is proposing to implement an ESCP that would follow the requirements of Article 401 of the 1992 amendment (see description below).

The following conditions were included in the NH 401 WQC issued on December 9, 1991. Although TransCanada intends to file for a new WQC, until a new or revised WQC is issued, TransCanada expects to meet the following requirements:

The following water quality monitoring program must be enacted following the start of construction associated with the unit replacement at the Vernon Site.

(a) *Dissolved oxygen and water temperature must be monitored at three stations in the Connecticut River; upstream of the Vernon impoundment, in the impoundment (surface, bottom and mid-depth), and downstream of the dam, all stations as specified by NHDES.*

(b) *Monitoring must occur once each month for a three day period during the following months: June, July, August, and September. Sampling will be conducted between 6 am and 8 am.*

(c) *Equipment calibration and quality control measures must be followed to assure accurate reporting.*

(d) *Monitoring events will be conducted under as close to limiting water quality*

conditions as possible (i.e., river water temperatures of 20°C or greater and river flows less than 3,000 cfs). Sampling flows will be documented including inflow, reservoir level, generation and spillage and outflow.

(c) *Water quality monitoring data, analysis of the data and QA/QC results must be reported on an annual basis and a summary report must be submitted to NHDES.*

b. Environmental Effects:

Water Quantity

Proposed Action

TransCanada proposes to replace the existing 2-MW turbine/generators (Units 5 through 8) with four 4-MW turbine/generator units, instead of the two 14-MW units authorized under the 1992 amendment. The new units would be installed in the existing turbine bays. The proposed four units would be installed within the existing intake bays. In order to facilitate the new turbines, a small amount of bedrock would need to be excavated within the powerhouse. It is estimated that a total of 400 cubic yards of bedrock would be excavated at the base of the existing wheel pits to accommodate the draft tubes associated with the new units. This excavated material would be removed off-site for disposal. Therefore, the overall plant configuration would remain virtually the same. There may be some minor modifications to the existing plant structure required to allow installation of the new units, but no changes in project operations are proposed during the construction period. No operational changes are proposed.

TransCanada proposes to implement an ESCP that would provide measures for the 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. The ESCP would be developed in consultation with the NHDES and VANR and filed for Commission approval in advance of any land clearing or land disturbance activities as required by Article 401 of the June 12, 1992, FERC Order Amending License. The ESCP would include a design and schedule to control erosion, slope stability, and fugitive dust and to minimize the quantity of sediment resulting from project construction and operation.

The nominal hydraulic capacity of the four new units would be 6,400 cfs (1,600 cfs each), while the maximum capacity would be 7,200 cfs (1,800 cfs each). This would result in an overall plant hydraulic capacity of 15,068 cfs (nominal) and 17,130 cfs (maximum), which would reduce the station total hydraulic capacity from 19,668 cfs (nominal) and 20,930 cfs (maximum), as approved by the 1992 amendment. Although the authorized maximum capacity of the station has been 20,930 cfs (since the 1992 amendment), since the shutdown of Units 5 through 8 the total maximum station

hydraulic capacity has been about 9,930 cfs. Though the authorized hydraulic capacity of the station would be reduced, TransCanada is not proposing any changes in how the project operates. The minimum flow requirement of 1,250 cfs or inflow if less would continue to be met, and other operating procedures for either normal or for emergency conditions such as flood flow conditions would remain the same as current operations.

Our Analysis

A reduction in the maximum station hydraulic capacity by about 3,800 cfs (from the authorized 20,930 to 17,130 cfs) would result in some increase in the amount and duration of spillage over Vernon dam during high-flow events, compared to what would occur if the two 14-MW units authorized by the 1992 amendment are installed.[8] Based upon a 28-year period of record from 1972 to 2000, flows exceeding 20,930 cfs and 17,130 cfs occur 14 percent and 18 percent of the time respectively. A maximum hydraulic capacity of 17,130 cfs, however, would only be slightly higher than the long-term maximum station capacity of about 15,330 cfs, at which the project operated for decades, until the recent retirement of Units 5 through 8. Compared to operations in recent years (since the retirement of Units 5 though 8), the maximum station hydraulic capacity would increase by about 73 percent and result in a significant reduction in spillage from what has been experienced in recent years. Based upon the same 28-year period of record from 1972 to 2000, flows exceeding 15,330 cfs and 9,930 cfs occur 22 percent and 38 percent of the time, respectively.

Although spillage may occur in any month of the year, it typically occurs in the months of March, April, and May. Using the long-term monthly average flows, table 3 provides an illustration of the changes in average spillage that could occur with the different operational scenarios. Although spillage is highly variable and table 3 does not allow estimation of the changes in the duration of spillage, this comparison indicates that the proposed installation of the four new units would not result in large changes in the average level of spillage from long-term past operations, but would likely result in higher amounts of spill in April, compared to the current authorized capacity.

[8] This assumes that spillage would not occur until the maximum capacity of all the units in the station has been reached.

Table 3. Approximate average monthly spillage (in cfs) that would occur under different operational scenarios for the Vernon Project.

Operational Scenario	March (14,537 cfs mean monthly flow)	April (26,476 cfs mean monthly flow)	May (16,289 cfs mean monthly flow)
Current authorized (20,930 cfs)	0	5,546	0
Proposed (17,130 cfs)	0	9,346	0
Long-term past (15,330 cfs)	0	11,146	959
Recent past (9,930 cfs)	4,607	16,546	6,359

The proposed action would result in the four 4-MW units operating with a maximum discharge of 1,800 cfs each as compared to the authorized 14-MW units which would have a maximum discharge capacity of 5,500 cfs each. As such, despite the intent to maintain current operating procedures and the existing minimum flows, operating a 14-MW unit would result in more rapid drawdown (even within the two-foot normal range) and increases in discharge, compared to the 4-MW units operating sequentially to maintain maximum head.

The proposed action would likely result in fewer hours of operation using existing Units 1-4 and 9 and 10, and the "transfer" of these operating hours to the more energy efficient new Units 5 through 8. However, this expected shift in operation would not result in a change in the normal reservoir operating range of 2 feet, or the rate of drawdown or discharge, because the new units and the existing older units would have similar discharge capacities.

Water Quality

Construction Effects

As required by Article 401 of the 1992 License Amendment, TransCanada would implement the ESCP prior to any construction that would result in discharges to the Connecticut River. The plan will be developed in consultation with the NHDES and the VANR, and will include methods to reduce, prevent or divert construction run off, revegetation (if required) and material disposal. The plan will also be filed with the Commission for approval prior to any ground-disturbing or instream work. Based upon the plan, the upstream and downstream cofferdams and sediment control basin

(immediately below the powerhouse), and the installation of sediment barriers and containment structures would prevent discharge of materials into the river. Maintaining these measures throughout the construction period for the four 4-MW units would reduce the effects on water quality during construction.

Our Analysis

The installation of cofferdams (upstream and downstream) together with the sediment control basin (described below) should adequately isolate the work area associated with this project from the Connecticut River. The sheet piles were not driven into the river bottom; therefore, removal from the area following construction is not expected to result in any significant turbidity other than in the immediate locale, which is expected to re-settle locally due to operational restrictions on adjacent units. The proposed bedrock removal for the installation of the four 4-MW units is far less than the bedrock removal required for the two 14-MW units. The bedrock removal for the two 14-MW units required essentially the removal of bedrock to a depth of 10 feet beneath the existing units, draft tube and below the upstream fish passage collection channel in order to accommodate the draft tube extension. Under the proposed action, the bedrock removal only requires the removal of approximately 400 cubic yards, generally limited to the area immediately below the units. The depth of the draft tube would continue to exit the powerhouse at the same general elevation as present. All bedrock removal would be done in the dry after installation of the cofferdams and dewatering of the work area.

The sediment control basin to be placed on the downstream side of the powerhouse, above the existing fishway collection channel, would serve to collect any outflow of water from the work area. Any leakage into the work area would be pumped into the sediment control basin where it would be allowed to settle and clarify before being discharged into the Connecticut River. The sediment control basin would also serve to provide a temporary storage area for any associated sediments and debris from construction. Secondary hay bales would be installed in the fishway collection channel to assist with trapping any extraneous material. All solid material would be disposed of off-site and on land. Any short-term effects on water quality would be minimized by TransCanada's proposed construction measures, which would ensure that all unit replacement activities do not disturb areas outside of the existing powerhouse and adjacent switchyard.

Operational Effects

The project would continue to operate in its current mode, with no changes in the project minimum flow or other project operating procedures for either normal or for emergency conditions such as flood flow conditions. As described in table 3, there would be some changes in the level of spillage under high flow conditions, but this would likely have no significant effect on water temperature, DO, or other parameters. As indicated in

table 2 and from recent water quality studies (Connecticut River Joint Commissions and NHDES, 2004), water quality in the Connecticut River in the vicinity of the project continues to meet state standards, and water quality monitoring is expected to be performed pursuant to the NH 401 WQC issued in 1992, unless further requirements are stipulated in a new or revised 401 WQC.

Our Analysis

The primary operational changes that may result from installation of the four proposed units would be changes in the volume and duration of spillage over the dam (see table 3). These changes, however, would not be significant and should not result in any changes in water quality. There are no indication of water quality problems in this reach of the Connecticut River that could be associated with project operations (such as changes in water temperature or DO), and any changes in the spillage at the project would occur during higher flow periods when DO is typically at saturation and temperatures are cool. The potential changes in the duration of spillage have not been estimated, but any changes in duration should not affect water quality because these changes would be occurring during higher-flow periods.

Based upon maximum discharge capacity, the proposed action would essentially continue the current operational mode, including reservoir drawdown rates and discharge rates of change; operating the authorized 14-MW units would have increased the rates of drawdown and discharges from the project. Thus, there would have been a greater potential for effects on water quality with operation of the 14-MW units than with the proposed 4-MW units, which would continue operations as they have occurred since issuance of the license in 1979

As described above, the proposed action would likely result in fewer hours of operation using Units 1-4 and 9 and 10, and "transfer" of these operating hours to the more energy efficient new Units 5 through 8. This shift in operations to the new units would have no effect on water quality, because other operating parameters (rate of drawdown or discharge) would not change due to the similar discharge capacities among the units.

A potential secondary effect of installing the four proposed units in comparison to the two 14-MW units would be a reduction in the length of time when the station would be passing the minimum flow of 1,250 cfs. We are unable to predict with certainty the extent of that time, but based on the discharge capacity of the two 14-MW units, under certain inflow conditions they could cycle on and off between the minimum flow and higher discharge levels, while the smaller 4-MW units could operate more continuously on the same volume of water, probably at discharges above the required minimum flow. This would act to reduce flow fluctuations, and associated water quality effects (such as erosion), downstream of Vernon dam, compared to operations with the two 14-MW units.

c. Unavoidable Adverse Effects:

None.

2. Fisheries and Aquatic Resources

a. Affected Environment:

The mainstem Connecticut River in the project area contains a diversified fishery, with a mix of 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 project tailrace is known to support an important fishery for both smallmouth bass and walleye during the spring months. The Connecticut River anadromous fishery is of national and regional significance. There are numerous fishways on the river that help to facilitate Atlantic salmon, American shad, blueback herring, lamprey, and striped bass migrations both upstream and downstream. Vernon dam is the third dam upstream from the mouth of the Connecticut River; the lowermost dam is at the Holyoke Hydroelectric Project (river mile 86), while Turners Falls dam is about 20 miles downstream of Vernon. The fish passage facilities at Holyoke and Turners Falls annually pass upstream adult shad and herring typically numbering up to the hundreds of thousands of fish, and smaller numbers of Atlantic salmon. Table 4 provides a summary of the fish counts for the Connecticut River dams since 2000.

Table 4. Summary of the fish counts at the Connecticut River hydroelectric projects, 2000 to 2005. (Source: FWS, 2006)

Projects	American shad	Blueback herring	Atlantic salmon	Sea lamprey	Shortnose sturgeon	Striped bass
2005						
Holyoke	116,511	534	132[a]	28,134	1	226
Turners Falls	1,500	2	5	15,798	0	2
Vernon	167	0	5	3,586	0	0
Bellows Falls	3	0	3	229	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
Bellows Falls	3	0	1	229	0	0
Wilder	0	0	1	0	0	0

Projects	American shad	Blueback herring	Atlantic salmon	Sea lamprey	Shortnose sturgeon	Striped bass
2003						
Holyoke	286,814	1,392	28	53,030	0	883
Turners Falls	NR[b]	NR	NR	NR	NR	NR
Vernon	267	0	0	8,048	0	0
Bellows Falls	0	0	0	0	0	0
2002						
Holyoke	374,548	1,939	34	73,491	0	1,104
Turners Falls	2,870	0	4	10,160	0	0
Vernon	336	0	4	2,201	0	0
Bellows Falls	0	0	0	0	0	0
2001						
Holyoke	273,220	10,604	24	49,277	4	1,217
Turners Falls	1,540	0	1	2,144	0	0
Vernon	1,666	0	1	3,394	0	1
Bellows Falls	0	0	0	0	0	0
2000						
Holyoke	225,042	10,587	52	21,036	0	489
Turners Falls	2,590	0	5	1,350	0	0
Vernon	1,536	3	5	729	0	0
Bellows Falls	0	0	2	0	0	0

[a] Only about 10 percent of the Atlantic salmon captured at Holyoke are released to continue upriver migrations. Most are collected for hatchery brood stock.
[b] Fish counts for Turners Falls were not reported.

Upstream passage at the Vernon Project is provided by a 984-foot-long concrete combination fish ladder (Ice Harbor and vertical slot designs) with 51 pools and a total rise of 35 feet from tailrace to headpond, two viewing windows for fish counting and public viewing, and a fish trap. The fishway also includes one main entrance weir and a collection gallery with multiple entrances in the tailrace. The collection gallery entrances, however, were found to be ineffective for attracting fish into the fishway, so the collection gallery is no longer used. The fishway was constructed in 1981 and was designed to pass 40,000 adult Atlantic salmon and 750,000 adult American shad annually, although actual passage to date has been significantly less (see table 4). TransCanada operates the fish

ladder in the spring and fall of each year. The spring season for salmon, shad, and river herring runs from May 15 through July 15, 24 hours per day. The fall season for salmon runs from September 15 through November 15, 24 hours per day. The 1992 Action Plan requires the first-on last-off operation of either Unit 9 or 10 (on the Vermont end of the powerhouse, closest to the fishway entrance) during fish ladder operation in the spring, to address a potential back eddy concern that was indicated through modeling of discharge flows from the two new 14-MW units that were approved in the 1992 amendment.

Existing downstream fish passage facilities at the project include a "fishpipe" that discharges through one of the two old exciter turbine waterways located between Units 4 and 5, approximately midway through the powerhouse (350-cfs capacity); a second smaller "fishtube" at the Vermont end of the powerhouse (40-cfs capacity); and a 156-foot-long louver array that extends from log boom pier number 1 (which is the third log boom pier from the Vermont shoreline) to the entrance of the fishpipe. The permanent fish passage facilities were completed at the project in 1995.

The louver array consists of stainless steel louver panels (louver vanes are spaced 3 inches apart) that extend to a depth of 15 feet at normal pond elevation. The purpose of the louver is to intercept and direct downstream-migrating fish that enter the forebay from mid-river and from the east (New Hampshire) shoreline into the fishpipe. Radiotelemetry studies had shown that most of the fish approach the project from mid-river and from the New Hampshire shoreline. The louver was designed in consideration of the two 14-MW units approved by the 1992 license amendment (the louver is to the east of the location for the new units and would intercept fish before entering the units), and it is expected to function in the same manner with the proposed four 4-MW units. The smaller fishtube on the Vermont end of the powerhouse functions as a secondary passage route for fish that are not intercepted by the louver array and that enter the western end of the forebay.

Provisions under the 1992 License Amendment

Articles 402 and 403 of the 1992 license amendment required that the Licensee, prior to commencing project-related construction activities, file with the FERC a plan on how to provide continual safe upstream fish passage to ensure the safe and efficient upstream passage of Atlantic salmon, American shad, and other anadromous fishes during the construction and operation of the new units. The Licensee is also required to file a plan to provide safe and efficient downstream passage for Atlantic salmon smolts, American shad, and blueback herring during the construction and operation of the new units.

Specifically, Article 402 requires that the fish passage plan include the following: (1) provisions for constructing the new units to avoid the driving of sheet pilings in the tailrace during the upstream migration of anadromous fishes at the project; (2) 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; (3) recommendations, based on the results of the modeling study, for any changes to the project's structures or operation needed to ensure the safe and efficient upstream passage of anadromous fishes; (4) a proposed plan and schedule for monitoring the effectiveness of the fish ladder during operation of the new units; and (5) a schedule for filing with the Commission the results of the monitoring and, for approval, any additional recommended changes to the project's structures or operation, based on the monitoring results, to ensure the safe and efficient upstream passage of anadromous fishes.

Article 403 requires that the Licensee file a downstream passage plan that includes the following: (1) provisions for alternate interim downstream fish passage, in the event that construction activities interfere with the operation or effectiveness of the existing interim downstream passage facility; (2) functional design drawings of permanent downstream passage facilities and a schedule for constructing these facilities so that the facilities are operational prior to the start of operation of the new units; (3) provisions to monitor the effectiveness of the downstream passage facilities in minimizing the entrainment of anadromous fishes; and (4) provisions to operate the downstream fish passage system in accordance with the annual notification letter issued by the CRASC.

Subsequently, a Fish Passage Plan (Action Plan) was filed with the Commission on November 27, 1992, and approved by FERC Order dated February 12, 1993 (62 FERC ¶ 62,097). Also, subsequent to the 1992 Amendment, the licensee constructed the permanent downstream fish passage facilities described above. On April 2, 1992, functional design drawings for permanent downstream fish passage facilities were filed with the Commission, and they were approved by FERC Order dated May 14, 1993 (62 FERC ¶ 62,157). On September 1, 1995, as-built drawings of the downstream passage facilities were filed, and these were approved by FERC Order dated November 7, 1995 (73 FERC ¶ 62,085).

Upstream Fish Passage Studies

As part of the 1992 amendment application, the licensee contracted with Alden Research Laboratory (ARL) to conduct a hydraulic modeling assessment to determine the potential effects of the proposed 14-MW units on fishway guidance and attraction flows (ARL, 1992). The results of the modeling indicated that there would be no changes in tailrace hydraulic conditions at flows at or above 12,000 cfs. At lower flows, however, the model indicated that a back eddy would occur near the fish ladder entrance when only the two proposed 14-MW units were running. The model also indicated that the condition could be corrected by dividing the load between the new units and existing Units 9 or 10, which are the two units in closest proximity to the fishway entrance. Accordingly in the 1992 Action Plan, the licensee proposed to operate either Unit 9 or Unit 10 as a first-on, last-off at flows below about 12,000 cfs during the upstream fish

ladder operation to address the back eddy concern. Currently Units 9 or 10 operate as first-on and last-off, in part, due to their proximity to the fish ladder entrance (thus attracting fish to that side of the tailrace), in comparison to the remaining Units 1 through 4, which are located on the opposite side of the tailrace. Units 9 and 10 are also currently the preferred minimum flow units.

Additional upstream fish passage studies were postponed because the construction and operation of the new units were delayed and not implemented (for the reasons explained previously). As stated in the July 5, 1994, FERC Order Amending the Fish Passage Studies, the timing of fish passage studies, both upstream and downstream, should be coincident with the construction and operation of the new units, to ensure that the effects of the construction and operation of the new units at the Vernon Project are properly evaluated. Upstream fish passage counts, however, continue to be made on an annual basis at the counting station on the upstream end of the fish ladder, to provide long-term passage data for the project. Table 4 includes the last 6 years of upstream fish passage data for Vernon and the other mainstem Connecticut River dams.

Downstream Fish Passage Effectiveness Studies

The licensee conducted studies on the effectiveness of downstream fish passage facilities at the project in 1995 and 1996 (NA, 1996a, 1996b, 1996d), including assessment of the passage efficiency of the louver array, fishpipe, and fishtube for emigrating Atlantic salmon smolts, based on radio tagging of actively-migrating smolts. Atlantic salmon smolts are the species of primary interest for downstream passage, because all smolts passing downstream from several upriver tributaries in Vermont and New Hampshire, which are heavily stocked with salmon fry, must pass through the Vernon Project. Other anadromous species, such as American shad, also require safe downstream passage, but the numbers of shad reaching spawning grounds upstream of the Vernon Project have been limited in recent years (table 4). Table 5 presents the results of the 1995 and 1996 effectiveness studies. These studies found that the guidance efficiency of the louver system (the number of emigrating smolts from mid-river and from the New Hampshire shoreline that were intercepted and prevented from entering the west end of the forebay) improved from 42.1 percent in 1995 to 62.9 percent in 1996. The percentage of fish passing through the fishpipe showed a corresponding increase, from 23.7 to 41.2 percent, while the percentage through the west fishtube decreased from 34.7 to 15.3 percent. The percentage of fish passing through the turbines also decreased from 34.7 to 19.8 percent, from 1995 to 1996. In 1996, more fish passed via the spillway, because river flows were higher, yet the louver guidance efficiency was higher.

The licensee also conducted turbine and fishway survival studies for salmon smolt passage (NA, 1996b; 1996c), and estimated total project survival under conditions that existed in 1996. Estimated survival through the west fishtube was 93.3 percent in 1995, while Unit 10 survival was 94.9 percent, and Unit 4 survival (a smaller unit) was 81.0

percent. Based on the migration routes that smolts used in 1996, the total estimated project survival was 95.5 percent.

Table 5. Summary of the downstream fish passage efficiency studies conducted at the Vernon Hydroelectric Project, 1995 and 1996. (Source: NA, 1996a, 1996b; 1996c, 1996d)

Measure of Effectiveness	1995	1996
Louver guidance efficiency (percent)	42.1	62.9
Percent through fishpipe	23.7	41.2
Percent through west fishtube	34.7	15.3
Percent through Units 9-10	24.3	15.3
Percent through Units 1-4	10.4	3.5
Percent through spillway	0	23.5
Percent passage via unknown route	6.0	1.2

Following the efficiency and survival studies, the licensee consulted with the state and federal fisheries agencies regarding the results of the studies, and based on the improved bypass efficiency that was shown, on the overall high project survival, and on the licensee's acceptance of certain conditions, the agencies stated that further passage studies and facility modification were not needed at that time. The conditions that the licensee agreed to included the following: operation of both the fish pipe and fish tube at full design capacity, diligent maintenance of the fish pipe and fish tube to keep the entrance areas free of trash and other debris, operation of Units 9 or 10 as first on and last off, and operation of the units at their most efficient gate setting possible. On May 23, 1997, the licensee filed a request with FERC for a waiver of the remaining downstream fish passage effectiveness studies required pursuant to the February 12, 1993 Order approving the Fish Passage Action Plan. On February 27, 1998, FERC waived the requirement for the remaining studies stating that the existing downstream passage facilities and the low rate of turbine mortality adequately protected downstream migrating anadromous fishes at the current time. The FERC letter also stated that should redevelopment of the project be initiated in the future, the studies under the February 12, 1993 Order would still be required.

Coordination with CRASC

As stated in the 1992 Action Plan, the licensee agreed to cooperate in the operation of the permanent downstream fish passage facilities at the Vernon Station in accordance with the CRASC Annual Schedule of Downstream Passage Operations, as described in Article VI of the MOA, dated July 26, 1990. The licensee also reserved the right to petition the CRASC in writing for changes to the operations schedule based on operation experience or other related data. This coordination with the CRASC has been implemented and is ongoing.

b. Environmental Effects:

Effects on Resident Fish Species

Major construction activities would occur in the dry behind the cofferdams, so there would be no disturbance of resident fishes during that period. Any discharges of water from the construction area would be cycled through the sediment control basin, so there would be no discharge of turbid waters and associated sedimentation downstream of the dam.

Operational effects would be minor. The Licensee is not proposing any changes in project operations from current operations. The project would continue to be operated in a cycling mode between the minimum flow and full powerhouse capacity (if flows are available). Compared to the current authorized maximum capacity (20,930 cfs), there would be a reduction in maximum hydraulic capacity to about 17,130 cfs. This would result in a reduction in the potential for fish entrainment and mortality, although there has been no indication that resident fish entrainment and mortality has been an issue at the Vernon Project. As discussed above, estimated survival for salmon smolts passing the project has been greater than 95 percent. Additional discussion on potential entrainment mortality is discussed below.

Effects on Anadromous Species

The primary fisheries concern associated with installation of the proposed units is the effects on upstream and downstream passage of anadromous species. Upstream passage could be affected during both project construction and operation. During construction, any in-water construction and disturbance (cofferdam removal) during the upstream migration period could affect anadromous fish entry into the fish ladder and possibly delay migration. The Licensee, however, is not proposing any in-water construction during the spring upstream migration period. During operation, any changes in the flow patterns in the tailrace could also affect the ability of anadromous species to find the fish ladder entrance.

To address the issue of operational effects on upstream fish passage, TransCanada contracted with ARL to conduct a CFD model to assess the tailrace flow patterns associated with the proposed four 4-MW units and how those patterns may affect attraction flows from the fish ladder. Based on the preliminary results of the CFD modeling at flows less than or equal to 12,000 cfs (final modeling results will be available by April 1, 2006), it appears that a back eddy would develop in the vicinity of the fish ladder tailrace entrance, if the four new units are in operation, but Units 9 and 10 (closest to the fish ladder entrance) are shut down. Thus, TransCanada is prepared to operate Unit 9 or Unit 10 as first-on, last-off during the spring upstream fish passage

season when flows are at or below about 12,000 cfs, so that fish are attracted to the west side of the tailrace, toward the ladder entrance. If the final modeling results (which will be filed with the Commission as a supplemental report by April 1, 2006) indicates that alternative operations would eliminate the back eddy, TransCanada may revise this proposed Unit 9 or 10 first-on, last-off operation.

The results of the ARL CFD study and TransCanada's proposed operations to maintain efficient fish ladder operation will be provided to CRASC agency representatives for comment prior to filing the supplemental report with the Commission. Agency comments and TransCanada's response to such will be included with the report filing.

TransCanada would also develop a study plan in coordination with CRASC agency representatives, similar to that stated in the November 24, 1992, Action Plan (for upstream passage), to evaluate the effectiveness of the fish ladder during operation of the Vernon Station after installation of the four 4-MW units. The study would evaluate the effectiveness of the proposed operations. The study plan would be developed following the receipt of results of the ARL CFD modeling study, and would be filed with the Commission by January 1 of the year in which the units are expected to commence operation. It is expected that the study would involve fish behavior studies in the tailrace (radio tagging of adult fish approaching the fish ladder), which would be conducted during the first 2 years of commercial operation of the new units.

For downstream passage, if cofferdam removal was to occur during the downstream migration period, there could be some avoidance of the area by out-migrating fish, but this would be less critical than with upstream migration because there are multiple options available for downstream passage (fishpipe, fishtube). During operation of the proposed units, there should be little effect on downstream migration, 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 proposed 4-MW turbine replacement project would also necessitate the replacement of the trashracks in front of those units. Initially, TransCanada proposed replacement racks with 4 inch on center (O.C) spacing based upon initial turbine manufacturer recommendations and to address anticipated debris loading increases. This proposal raised entrainment concerns from fishery agency representatives at the January 25, 2006 consultation meeting. Since that meeting TransCanada re-evaluated the rack spacing proposal and revised the proposal to follow agency recommendations that the spacing continue to be the current 2 inch O.C. bar spacing. The proposed trashrack replacement, therefore, would maintain the bar spacing at the current 2 O.C. The average approach velocity at the upstream face of the racks would be 2.4 feet per second (fps). Thus, the potential for fish entrainment should remain essentially the same as compared

to the current 2-inch racks.

Our Analysis

TransCanada is not proposing any modifications to the existing fish passage facilities at the project because construction and operation of the proposed units is not generally anticipated to affect fish passage. Operations could affect flow patterns in the tailrace, which TransCanada is proposing to address through completion of the CFD modeling and preferential operation of Units 9 or 10. The potential for fish entrainment through the new units, for fish that are not guided by the louver array and enter the vicinity of the intakes, should remain essentially the same as under current operations. Although TransCanada does not have data on the approach velocities for the retired units, the estimated approach velocity of 2.4 fps for the proposed units is close to the agency-recommended maximum intake approach velocity of 2 fps. Velocities in this range should allow most migratory fish to avoid the intakes and entrainment. Recent downstream passage studies have also shown that the existing downstream fish passage facilities are effective in safely passing fish downstream, that turbine passage survival is high, and that overall project survival is high, for salmon smolts.

To further address the issue of fish entrainment, TransCanada conducted a desktop evaluation of potential fish passage survival through the proposed new 4-MW units, using the model developed by Franke et al. (1997) for a range of fish sizes from 4 inches to 18 inches (NA, 2006). This represents fish sizes for juvenile and adult shad (as requested by the fisheries agency representatives during the January 25, 2006, consultation meeting[9]) and salmon smolts, although fish in the larger size groups modeled would likely be physically excluded from passage through the units by the 2-inch-spaced trashracks. Other variables considered, besides fish size, included turbine operating efficiency (85 and 90 percent), fish entry point along the runner blade (10, 50, and 90 percent of the runner length), and correlation factor (to adjust the predicted blade strike on fish, based on empirical data from field studies; factors used were 0.1 and 0.15). This assessment predicted survival for 4-inch fish (to represent juvenile shad) from 92 to 98 percent; for smolt size fish (6 – 10 inches) from 79 to 97 percent; and for 12 to 18-inch fish (to represent adult shad) from 63 percent to 94 percent. These predicted survival rates fall within the range of empirical values observed in several field studies cited by NA (2006), and show that survival decreases with increasing fish length, and that survival is generally higher at higher turbine efficiency.

These predicted values also are within the range of survivals observed at the Vernon Station in past survival studies using salmon smolts. Thus, there is no indication that with installation of the new units that fish survival during downstream passage would

[9] Initial consultation meeting conducted on January 25, 2006, with representatives from the FWS, NHFG, NHDES, CRASC, VDFW, and VANR.

markedly change from existing conditions. Because overall station survival (for salmon smolts) was estimated to be higher than 95 percent (in 1996), we expect that overall station survival would remain high after installation of the new units.

Section C.1.b. describes the change in the volume of spillage at the project due to the change in hydraulic capacity of the powerhouse. Changes in the volume of spillage, which typically occurs in the spring months during at least a portion of the outmigration period for salmon smolts, could also affect fish survival, depending on the portion of the run that may use the spillway for passage. With spillway passage, fish survival would typically be higher than turbine passage, particularly for larger fish that tend to experience the highest mortality during turbine passage. The maximum authorized capacity of the station is now 20,930 cfs, although that capacity has never been realized because the two 14-MW units were not installed. With the proposed four 4-MW units, the total station capacity would be 17,130 cfs. Thus, with the proposed action, the amount of spillage would likely increase over the current authorized capacity (see table 3), which could benefit downstream fish passage if more fish utilize spillage for passage. Because the current authorized capacity was never realized, we also estimated the long-term past hydraulic capacity at which the station operated for decades, prior to the retirement of Units 5 through 8. That capacity was 15,330 cfs, only 1,800 cfs less than the proposed capacity. Thus, there may be the potential for a small decrease in spillage with the proposed new units, compared to long-term past operations, but such a small decrease in spillage would be unlikely have a measurable effect on fish passage and survival.

c. Unavoidable Adverse Effects:

None.

3. Threatened and Endangered Species

a. 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 (2,296 feet) downstream of the Vernon dam on the southern tip of an unnamed island. The Audubon Society of New Hampshire and NHFG coordinate a statewide survey of bald eagle counts during a two-week period during the winter months to provide an index of bald eagle presence in the state of New Hampshire. Records are taken on the number of eagles seen during this two-week interval, combining survey day data with any additional individuals that are distinguishably different and are seen during the week before and after the survey day, to get an overall count period total. The count records indicate an increase in bald eagles in the state. During the count period in 1982, a total of 5 bald eagles (2 adults, 3 immatures) were sighted statewide. During the count period in 1995, 30 bald eagles (21 adults, 9 immatures) were located. During 2005, these

numbers rose to 55 bald eagles (37 adults, 18 immatures) being sighted, and during the 2006 count period, 55 bald eagles (31 adults, 24 immatures) were identified. For the Connecticut River, a total of 12 bald eagles were seen, including 8 individuals (7 adults, 1 immatures) seen on the survey day, plus 4 additional eagles (3 adults, 1 immature) confirmed during the two-week count period (NHFG, 2006).

Several rare plants have been found at two sites near the vicinity of the project along the Vermont shoreline. None of these rare plants are federally listed as threatened or endangered and only one is listed as state (Vermont) threatened (see table 6). One site, which is located above the Vernon dam, contains rare plants in the shallow water near the edge of a pool, on a sandy flat adjacent to the pool and in a marsh landward from the sandy flat. The rare plant species at this site are: Great St. Johnswort *(Hypericum pvramidatum),* Frank's lovegrass *(Eraqnostis frankii),* horned pondweed *(Zannichelia oalustris),* small waterwort *(Elatine minima),* and pygmyweed *(Tillaea aquatic).* The other site is located below Vernon dam where two species are found growing in a sandy wash below the tail race. The rare plant species at this site are: Smith's bulrush *(Scirpus smithii)* and muskflower *(Mimulus moschatus).* The presence of some of these rare plant species is due in part to operation of the Vernon Project. In October 1988, NEP (the previous project licensee) and the Nature Conservancy entered into a "Special Habitats" Cooperative Agreement to protect the two ecologically significant sites at the Vernon Project and similar sites at other NEP projects on the Connecticut River. This agreement was assigned to the current licensee, TransCanada, at the time of license transfer and remains in place.

Table 6. Summary of Rare Plant Species within the Project Vicinity (Source: VDFW, 2006)

Site	Scientific Name	Common Name	Rank		Listing	
			Global[1]	State[2]	Federal	State[3]
Site 1	*Elatine minima*	small waterwort	G5	S1	-	-
	Eraqnostis frankii	Frank's lovegrass	G5	S2,S3	-	-
	Hypericum ascyron	Great St. Johnswort	G4	S2	-	T
	Tillaea aquatic	pygmyweed	G5	S2	-	-
	Zannichelia oalustris	horned pondweed	G5	S1	-	-
Site 2	*Mimulus moschatus*	muskflower	G4,G5	S2,S3	-	-
	Scirpus smithii	Smith's bulrush	G4,G5	S2,S3	-	-

[1]Global Ranks are assigned by the international network of Natural Heritage Data Centers. The ranks are tracked by NatureServe and by the Natural Heritage programs. They reflect the rarity of species

worldwide.
G1: Critically imperiled globally (on the order of 1-5 occurrences worldwide)
G2: Endangered globally (ca. 6-20 occurrences worldwide)
G3: Threatened globally: rare and/or local
G4: Apparently secure globally, though perhaps locally rare
G5: Demonstrably secure globally

[2]State ranks are assigned by the Nongame & Natural Heritage Program based on the best available information and reflect the rarity of the species in Vermont.
S1: Very rare, generally 1 to 5 occurrences believed to be extant and/or some factor(s) making it especially vulnerable to extirpation from the state
S2: Rare, generally 6 to 20 occurrences believed to be extant and/or some factor(s) making it vulnerable to extirpation in the state
S3: Uncommon, believed to be more than 20 occurrences and/or there is some threat to it in the state
S4: Apparently secure in state, often with more than 100 occurrences
S5: Demonstrably secure in state

[3]State Status as per the Vermont Endangered Species Law (10 V.S.A. Chap. 123)
E: Endangered: in immediate danger of becoming extirpated in the state
T: Threatened: with high possibility of becoming endangered in the near future

b. Environmental Effects:

Construction Effects

In order to facilitate installation of the new turbines, a small amount of bedrock would need to be excavated within the powerhouse. It is estimated that a total of about 400 cubic yards of bedrock would be excavated at the base of the existing wheel pits. The methods for removing the bedrock would be limited to using small ram-hoes and jack hammers to the extent possible, using expansion materials inserted into borings to fracture the rock. The excavated material would be removed offsite for disposal.

TransCanada conducted an assessment of the anticipated construction noise levels associated with the proposed action in order to assess any potential construction-related noise effects on the bald eagle nesting site. Construction noise levels were calculated using the decibel system (dB) referenced to the human audio range (method A) and assumed maximum operating noise in the powerhouse during excavation of the bedrock (see table 7). The loudest construction equipment that would be used during rock excavation would be the jackhammers. Noise level calculations assumed that as many as four jack hammers could be operating at a time (one in each bay). The other equipment, such as the powerhouse crane (82 dBA) or a construction vehicle (90 dBA), would produce significantly less noise. Ambient noise at the nest was measured as 46.1 dBA, based on measurements taken during daylight hours on February 23, 2006.

Table 7. Summary of Noise Attenuation Associated with the Proposed Action (Source: TransCanada)

Source of Noise	Source Noise Level dBA	Predicted Attenuation of Noise at Location: Building Distance (m)	Building Noise dBA	Eagles' Nest Distance (m)	Eagles' Nest Noise dBA
Crane	82.0			700.0	9.0[1]
One Jackhammer	100.0			700.0	27.0[1]
Four Jackhammers[2]	106.0			700.0	33.0[1]
Turbine 9	90.7	15.0	71.9	700.0	ND[3]
Four Jackhammers[2]	106.0	15.0	87.2	700.0	15.0[4]
Ambient Noise Level Measured at the Nest	46.1			700.0	46.1

[1] Noise assumed transmitted through air from the source, with no attenuation for building containment.
[2] Four jackhammers (one in each bay) would provide the maximum noise level during construction.
[3] ND = Not detectable for both predicted and actual measurements.
[4] Noise assumed attenuated by the building containment.

Our Analysis

Based upon noise calculations, the bedrock excavation is not expected to disturb the eagle nest because the ambient noise at the nest is higher than predicted construction noise. The loudest construction equipment that would be used during rock excavation are the jackhammers, and assuming no noise attenuation from building containment, the predicted maximum noise levels at the nest would be between 27 and 33 dBA for the noise associated with the use of the jackhammers. If building containment of noise (as would be the case during actual construction) is considered, the maximum noise level from excavation would be 15 dBA, as measured at the nest. Ambient noise at the nest was measured as 46.1 dBA. This did not include any intermittent noise associated with the railroad, state highway, and postal facility that are located nearby the nest, which would produce intermittent higher human noise levels at the nest. Excavation noise would be masked at the bald eagle nest because the predicted ambient noise levels at the nest are significantly higher, almost three times the anticipated maximum noise levels from excavation, as dampened by the powerhouse structure. As a result, there would be no noise disturbance to the bald eagle nest as a result of the proposed construction activities.

The proposed action would occur within the project powerhouse and adjacent areas (switchyard and powerhouse parking area), and the construction related activities would not occur within the vicinity of the rare plant species. Therefore, the proposed action would have no adverse effect on rare plant species located within the vicinity of the project.

Operational Effects

Operation of the proposed four 4-MW units would not result in changes in the current operational mode of the project. The existing reservoir levels (which includes a typical 2-foot drawdown) would be maintained, the current minimum flow of 1,250 cfs (or inflow, if less) would continue, and the project would continue to operate in a daily-cycle run of river mode, passing whatever inflows are received on a daily basis.

Our Analysis

Continued project operations, with the new units, would likely have no effect on the bald eagle nest or on the rare plant species found both upstream and downstream of the dam. Any noise that may emanate from the powerhouse during operations would likely be similar to existing noise levels, which have had no effect on eagles nesting at the current nest location 700 meters downstream of the dam. Flow releases from the project would also remain essentially unchanged,[10] so there should be no effects on eagle feeding activities downstream of the dam. Similarly, the rare plant species that currently occur upstream and downstream of the dam under existing operational patterns would be unaffected, because existing operational patterns would remain the same.

4. Cultural Resources

a. Affected Environment:

As part of the 1992 license amendment process, the New Hampshire SHPO determined that the proposed installation of the two 14 MW units as proposed under the 1992 license amendment would have no effect on properties of known or potential architectural, historic, archeological, engineering, or cultural significance (letter from R. Stuart Wallace, SHPO, to Leo Sicuranza, Supervisor, New England Power Company, dated June 13, 1989). The Vermont SHPO also determined initially that the proposed installation would have no effect (letter from Eric Gilbertson, SHPO, to Leo Sicuranza, Supervisor, New England Power Company, dated October 18, 1989). In May 1991, as part of further review associated with the 1992 license amendment proposal, the Vermont SHPO conducted a site visit of the Vernon Project. The Vermont SHPO determined the Vernon Station to be eligible for inclusion in the National Register based on several factors: the Vernon Station was the first facility in the country that shipped its power out; the station was unique for its state-of-the-art technology and the expertise of the electrical engineers involved in the project; and the Vernon Station is architecturally significant in both design and scale and that it is virtually intact from when it was built in 1909. The

[10] There may be some shifting of flows from the old units to the more-efficient new units, so flow patterns in the immediate tailrace may change, but the flow patterns at the eagle nest 700 meters downstream would not change.

SHPO also stated that the turbines, electrical and mechanical systems, and other project components, such as the crane, are contributing elements to the historic properties of the Vernon Station (letter from Eric Gilbertson, Deputy SHPO, State of Vermont, Division for Historic Preservation, to Lois Cashell, Secretary, FERC, dated May 15, 1992).

Provisions under the 1992 License Amendment

The 1992 license amendment, Article 404, includes provisions for documentation of the historic properties of the Vernon Station. Specifically, Article 404 requires the Licensee prior to commencing any project-related construction activities, that would affect the characteristics of the Vernon Station that make it eligible for the National Register: (1) prepare the National Register registration form consistent with the Secretary of the Interior's Standards and Guidelines for Historic Preservation for the Vernon Station, and (2) document the components proposed for replacement according to the standards of the Historic American Engineering Records (HAER) of the National Park Service (NPS). Article 404 requires that the HAER documentation be based on the recommendations of the Vermont and New Hampshire SHPOs and the HAER staff of the NPS. In addition, Article 404 requires that the Licensee file with the Commission copies of letters from the Vermont and New Hampshire SHPOs commenting on the registration form for the Vernon Station for the National Register, and also file a copy of a letter from the NPS accepting the HAER documentation.

The previous licensees conducted a comprehensive system-wide cultural resources modified HAER documentation package for all hydroelectric facilities, including the Vernon Project (PAL, 2000). In part, this was performed in conjunction with requirements set forth in the Deerfield River Project's (FERC No. 2323) Cultural Resources Management Plan, specific to eligible facilities within that project. At that time, the prior licensees, USGenNE and NEP, felt it appropriate to develop such a package for all its hydroelectric projects since it was assumed that many of their other projects, including the Vernon Project, included numerous facilities eligible for the National Register. This eligibility status in itself requires consultation with State Historic Preservation offices (per Article 35 of the Vernon License issued on June 25, 1979) should changes in the facilities impact the project's historic resources. This documentation was an attempt to insure these facilities were recorded appropriately. In the case of the Vernon Project, the documentation package was provided to both the New Hampshire and Vermont State Historic Preservation Offices, as well as local public libraries

b. Environmental Effects:

Proposed Action

TransCanada proposes to execute an MOA between TransCanada, the New Hampshire SHPO, the Vermont SHPO and FERC that stipulates measures for the documentation and protection of historic properties within the Vernon Project. TransCanada initiated consultation with the New Hampshire SHPO (letter dated November 16, 2005) and the Vermont SHPO (letter dated December 20, 2005) regarding the proposed installation of the four 4-MW turbine units and the proposed MOA.

Under an executed MOA, TransCanada proposes to:

- Conduct photographic documentation of the Vernon powerhouse, and ensure that all documentation is completed and accepted by the SHPOs before commencing any demolition or construction activities for the proposed project.
- Conduct digital video documentation at key stages of the project to record the removal of the original equipment and the installation of new equipment.
- Conduct archaeological investigations to identify known archaeological sites and areas within the Vernon project boundaries that have a likelihood of containing archaeological deposits.
- Prepare a Historic Properties Management Plan (HPMP) for the project.
- Offer and, if accepted, donate generating and electrical equipment removed from the Vernon powerhouse to museums and educational organizations.

The photographic documentation of the Vernon powerhouse would be completed by a qualified architectural historian in accordance with the standards and regulations outlined in the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation [48 FR 190 (1983]. Photographic documentation would consist of recordation of the affected areas of the powerhouse that are not adequately covered in the Systemwide Documentation of Hydroelectric Facilities on the Deerfield and Connecticut Rivers prepared by The Public Archaeology Laboratory, Inc. in 1999–2000. Views would include the existing generators, electrical equipment, crane, and windows that would be removed as part of the project. Supplemental documentation would consist of photographs and/or photocopies of historical plans and/or specifications that show affected equipment, if such are found to exist in the archives maintained by TransCanada. TransCanada would ensure that all documentation is completed, and accepted by the SHPOs before commencing any demolition or construction activities for the project.

Digital video documentation would be conducted at key stages of the project to record the removal of the original equipment and the installation of new equipment. The video would capture the following key events:

a. Overall documentation of the interior and exterior of the powerhouse, including but not limited to, its setting, general appearance, location of key components and features in relation to one another;

b. At least one of the original units in actual or simulated operation to the extent possible, before its removal showing the steps and processes involved in starting, running, and shutting down the generator.

c. Preparatory work involved in the setup and staging for the removal of the generators, including, but not limited to, the installation of temporary coffer dams, set up of construction machinery, disconnecting of equipment, and installation of overhead crane;

d. Removal of generators and associated historical equipment, including the lifting and transporting of equipment from their existing locations and the recordation of unique features of the equipment that were not visible while in place.

e. Preparatory work involved in altering the existing generator pits for the acceptance of the new equipment.

f. Installation of new generators, including the insertion of the equipment and footage showing them in operation.

The video documentation would be supplied to each of the SHPOs within twelve months of the completion of the project for inclusion in the respective state archives and designated local repositories.

TransCanada proposes to prepare a HPMP in accordance with *the Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects* issued by the FERC and the ACHP on May 20, 2002 (effective January 11, 2001). The HPMP would govern future actions as they relate to historic properties, including standing structures and archaeological sites, within the property boundaries of the Vernon Hydroelectric Project. The HPMP would identify the nature and significance of historic properties within the project boundaries that may be affected by project maintenance and operation, proposed improvements to the project facilities, and public access. The HPMP would identify goals for the preservation of historic properties; establish guidelines for routine maintenance and operation; and establish procedures for consulting with the SHPOs, Tribal Historic Preservation Officers, Indian tribes, historic

preservation experts, and the interested public concerning effects on historic properties. The HPMP would identify the responsible TransCanada officer in charge of executing the plan and establish procedures for training plant operators, maintenance staff, and other employees in its implementation. The HPMP would also be integrated with existing management plans, as appropriate. TransCanada proposes to submit an approved final HPMP within 1 year of the issuance of the revised amended license.

TransCanada proposes to hire a qualified archaeologist to conduct investigations to identify known archaeological sites and areas within the Vernon Hydroelectric Project boundaries that have a likelihood of containing archaeological deposits. The investigations would be carried out in accordance with the methodology established by the SHPOs in the state in which the lands are located. The information from these investigations would be incorporated into the HPMP and used to establish procedures in the HPMP that would be followed when Project operations, construction, or other activities have the potential to disturb those areas.

TransCanada proposes to donate the generating and electrical equipment removed from the Vernon powerhouse to identified museums, historical societies, educational facilities, industrial history organizations, or other institutions willing and capable of displaying and interpreting the historic values of the equipment.

Our Analysis

The short-term effects of project-related construction, such as placement of temporary cofferdam structures at the station, would not be permanently attached to the power house structure and would be removed following completion of the installation of the new turbine units. Also, the bedrock removal would occur within the confines of the existing powerhouse. Bedrock within the powerhouse was excavated to the present level during the construction of Vernon Station in about 1907. No archaeological resources are present. Therefore, the proposed construction-related activities would not lead to an adverse effect on the archeological resources and historic properties of the Vernon Station.

The removal of the historic equipment that are contributing elements of the historic properties of the Vernon Station would be mitigated through the existing and proposed recordation of this equipment and completion and acceptance of the documentation by the SHPOs prior to the commencement of any demolition or construction activities for the project. Furthermore, there would be the added benefits of donation of this equipment to local museums, allowing a greater number of people to see the equipment.

Under the proposed action, there would be the additional benefits from the development and implementation of a HPMP for the project and associated archaeological investigations. This would include measures not only for the protection and mitigation of effects to the historic properties of the station, but would also include measures for the long-term protection of historic properties within the entire project area, including areas outside of the station and beyond those that would be affected by any of the actions associated with the proposed turbine replacement. The HPMP would help ensure long-term protection of the historic properties associated with the Vernon project, including both the Vernon Station and other cultural resources that may be identified within the project boundary. Finally, the executed MOA would ensure that provisions for cultural resource protection at the project are implemented and that the effects of the proposed action on historic properties of the Vernon Project would be appropriately mitigated and protected. Therefore, the proposed action would result in no adverse effect on the historic properties associated with the project.

c. Unavoidable Adverse Effects:

None.

D. NO-ACTION ALTERNATIVE

The no-action alternative would result in the implementation of the 1992 license amendment that approved new two 14-MW units. Installation of the two 14-MW units, as compared to the four 4-MW now proposed, would result in greater demolition and modification of the powerhouse and equipment to accommodate the two 14-MW units. The no-action alternative would also result in greater inefficiency in the total operation of the project and operations that are not suited to the current market demands. In addition, the measures proposed under the four 4-MW unit installation, including the implementation of the ESCP, the MOA, and associated elements (such as the HPMP for the project and archaeological investigations) would not occur.

Other alternatives exist with respect to the number and sizes of new units that could be installed as replacements for the old units. Based on physical constraints, commercial availability, available river flows, and a cost/benefit analysis, TransCanada found that the proposed four 4-MW units represented the best choice under the existing alternatives. Alternatively, in the event that neither the four 4-MW nor the two 14-MW units were installed, TransCanada would be required to apply for a license amendment for retirement of the units. Retirement with no replacement of the units would result in significantly decreased generating capacity for a total capacity at the project of about 16 MW. The development of the unused hydraulic capacity at the site and the more efficient use of the water that passes through the project would not occur.

VI. SUMMARY AND CONCLUSIONS

A. SUMMARY OF THE ENVIRONMENTAL EFFECTS

1. Proposed Action

Water Resources

A reduction in the maximum station hydraulic capacity by about 3,800 cfs (from the authorized 20,930 to 17,130 cfs) would result in some increase in the amount and duration of spillage over Vernon dam during high-flow events, compared to what would occur if the two 14-MW units authorized by the 1992 amendment are installed. A maximum hydraulic capacity of 17,130 cfs, however, would only be slightly higher than the long-term maximum station capacity of about 15,330 cfs, at which the project operated for decades, until the recent retirement of Units 5 through 8. Therefore, compared to the longer term operations at the project, increasing the maximum hydraulic capacity to 17,130 cfs would result in a small reduction in the amount and duration of spillage at the project.

The project would continue to operate in its current mode, with no changes in the project minimum flow or other project operating procedures for either normal or for emergency conditions such as flood flow conditions. Based upon maximum discharge capacity, the proposed action would essentially continue the current operational mode, including reservoir drawdown rates and discharge rates of change, compared to operation of the authorized 14-MW units. The proposed action would likely result in fewer hours of operation using Units 1through 4 and 9 and 10, and "would result in transfer" of these operating hours to the more energy efficient new Units 5 through 8. However, this is not expected to result in a change in the normal reservoir operating range of 2 feet, or the rate of drawdown or discharge, because the new units and the existing older units have similar discharge capacities. There would be some changes in the level of spillage under high flow conditions, but this would likely have no effect on water temperature, DO, or other parameters.

The construction activities would be contained within the confines of the cofferdams installed as part of the prior unit dismantling activity. The sediment control basin would serve to collect any outflow of water from the work area and any leakage into the work area would be pumped into the sediment control basin where it would be allowed to settle and clarify before being discharged into the Connecticut River. The sediment control basin would also serve to provide a temporary storage area for any associated sediments and debris from construction. All solid material would be disposed of off-site and on land.

Any potential effects on water quality would be minimized by TransCanada's Erosion Control Plan developed in consultation with NH and VT water quality agencies

and filed with the Commission. Also, the proposed bedrock removal for the installation of the four 4-MW units, which would occur in the dry, is far less than the bedrock removal required for the two 14-MW units.

Fisheries and Aquatic Resources

Any effects on resident species would primarily occur during the construction phase, during the demobilization phase including the removal of the sheet pile cofferdams. Major construction activities would occur in the dry behind the cofferdams, so there would be no disturbance of resident fishes during that period. Any discharges of water from the construction area would be cycled through the sediment control basin, so there would be no discharge of turbid waters, and associated sedimentation, downstream of the dam.

Operational effects on resident species would be minor. The Licensee is not proposing any changes in project operations from current operations. The project would continue to be operated in a cycling mode between the minimum flow and full powerhouse capacity (if flows are available).

The primary concern for anadromous species is the effect of the proposed units on upstream and downstream passage. Upstream passage could be affected during both project construction and operation. During construction, any in-water construction and disturbance (cofferdam removal) during the upstream migration period could affect anadromous fish entry into the fish ladder and possibly delay migration. The Licensee, however, is not proposing any in-water construction during the spring upstream migration period. During operation, any changes in the flow patterns in the tailrace could also affect the ability of anadromous species to find the fish ladder entrance. To address this issue, TransCanada contracted with ARL to conduct a CFD model to assess the tailrace flow patterns associated with the proposed four 4-MW units, and how those patterns may affect attraction flows from the fish ladder. Based on the preliminary results of the CFD modeling at flows less than or equal to 12,000 cfs (final modeling results will be available by April 1, 2006), it appears that a back eddy would develop in the vicinity of the fish ladder tailrace entrance, if the four new units are in operation, but Units 9 and 10 (closest to the fish ladder entrance) are shut down. Thus, TransCanada is prepared to operate Unit 9 or Unit 10 as first-on, last-off during the spring upstream fish passage season when flows are at or below about 12,000 cfs.

For downstream passage, if cofferdam installation and removal was to occur during the downstream migration period, there could be some avoidance of the area by out-migrating fish, but this would be less critical than with upstream migration, because there are multiple options available for downstream passage (fishpipe, fishtube). During operation of the proposed units, there should be little effect on downstream migration, 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.

To address the issue of fish entrainment through the new units, TransCanada conducted a desktop evaluation of potential fish passage survival through the proposed new 4-MW units, using the model developed by Franke et al. (1997) for a range of fish sizes from 4 to 18 inches (NA, 2006a). This assessment predicted survival for 4-inch fish (to represent juvenile shad) of from 92 to 98 percent; for smolt size fish (6 - 10 inches) from 79 to 97 percent; and for 12- to 18-inch fish (to represent adult shad) from 63 to 94 percent. These predicted survival rates fall within the range of empirical values observed in several field studies cited by NA (2006a), and also are within the range of survivals observed at the Vernon Station in past survival studies using salmon smolts. Thus, there is no indication that with installation of the new units, that fish survival during downstream passage, which has been shown to be high at the project, would markedly change from existing conditions.

We also assessed the effects on downstream fish passage from the changes in spillage that would occur. There would be the potential for a small increase in spillage with the proposed new units, compared to operations with the authorized 14-MW units, but a small increase in spillage would unlikely have a measurable effect on fish passage and survival.

Cultural Resources

The removal of the historic equipment that is a contributing element of the historic properties of the Vernon Station would be mitigated through the existing and proposed recordation of this equipment and completion and acceptance of the documentation by the SHPOs prior to the commencement of any demolition or construction activities for the project. Furthermore, there would be the added benefits of donation of this equipment to local museums. The proposed HPMP would help ensure long-term protection of the historic properties associated with the Vernon Project, including both the Vernon Station and other cultural resources that may be identified within the project boundary. Finally, the executed MOA would ensure that provisions for cultural resource protection at the project are implemented and that the effects of the proposed action on historic properties of the Vernon Project would be appropriately mitigated and protected. Therefore, the proposed action would result in no adverse effect on the historic properties associated with the project.

2. No Action

The no-action alternative would result in the implementation of the 1992 license amendment. Implementation of the two 14-MW units as compared to the four 4-MW units would result in greater demolition and modification of the powerhouse and equipment to accommodate the two 14-MW units. The no-action alternative would also

result in greater inefficiency in the total operation of the project and operations that are not suited to the current market demands. Also, the provisions in the MOA, specifically, the proposed HPMP, would not be implemented and the beneficial effects for the long-term protection of historic properties within the entire project area, including areas outside of the station, would not occur at this time.

Alternatively, in the event that neither the four 4-MW nor the two 14-MW units were installed, TransCanada would be required to apply for a license amendment for retirement of the units. Retirement and no replacement of the units would result in significantly decreased capacity for a total capacity at the project of about 16 MW, and the development of the unused hydraulic capacity at the site and the more efficient use of the water that passes through the project would not occur.

B. COMPARATIVE ECONOMIC BENEFITS OF ALTERNATIVES

In this section, we analyze the project's use of the Vernon Project's water resources to generate power, estimate the economic benefits of the proposed modification of the Vernon Project, and estimate the cost of various environmental protection and enhancement measures and the effects of these measures on project operations.

Under its approach to evaluating the economics of hydropower projects, as articulated in *Mead Corporation, Publishing Paper Division* (72 FERC ¶61,027, July 13, 1995), the Commission employs an analysis that uses current costs to compare the costs of the project and likely alternative power with no consideration for potential future inflation, escalation, or deflation beyond the license issuance date. The Commission's economic analysis provides a general estimate of the potential power benefits and costs of a project and reasonable alternatives to project-generated power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

For our economic analysis of alternatives, we used the assumptions, values, and sources shown in table 8.

Table 8. Assumptions for economic analysis of the Vernon Project. (Source: TransCanada)

Assumption	Value
Energy value (2005$)	58.61 mills/kWh (two 14-MW units) 58.41 mills/kWh (four 4-MW units)
Capacity value (2005$)	$40/kW-yr
Discount rate	8 percent
State and federal income tax rate	35 percent
Local tax rate	3 percent
Term of financing	20 years
Period of analysis	50 years
Escalation rate after 2005	0 percent

1. Power and Economic Benefits of the Project under the Authorized 14-MW Unit Replacement

The Commission's Order Amending License issued June 12, 1992 (59 FERC ¶ 62,267), authorized the replacement of four existing, 2-MW, triple-runner Francis units (Units 5 through 8) with two 14-MW, mixed-flow units. The four existing units have been out of service since at least 2004. The four old units have not been removed, nor have the two new 14-MW units been installed, due to economic factors, wholesale power restructuring in the New England market, changes in the market place, and changes in project ownership.

As currently licensed, the Vernon Project would have a total authorized capacity of 44.4 MW, which includes four 2-MW units (Units 1-4), two 4.2-MW units (Units 9 and 10), and the authorized two 14-MW units (Units 11-12). Under the authorized installation of the two 14-MW units, TransCanada would implement several environmental measures, including: (1) develop and implement a soil erosion control plan; (2) conduct CFD modeling of upstream fish passage operational effects; (3) conduct upstream fish passage effectiveness studies for 2 years following installation of the units; (4) operate Units 9 and 10 as first-on, last-off units during the operation of the upstream

fish ladder when flows are below about 12,000 cfs; and (5) prepare documentation for the National Register for historic properties at the Vernon Station.

The authorized two 14-MW units would generate an average of 63,504 MWh of electricity annually, have an annual power value of $4,841,970 (76.25 mills/kWh) and total annual costs of $10,637,110 (167.50 mills/kWh), resulting in a net annual benefit of -$5,795,140 (-91.25 mills/kWh). The total project would produce about 198,956 MWh of electricity annually with the installation of the two 14-MW units at a cost of about $81,904,000.

2. Power and Economic Benefits of the Proposed Action

TransCanada requests a non-capacity amendment of license to allow the removal of the four existing Units 5 through 8 to be replaced with four 4-MW, vertical axial-flow Kaplan units. The new total capacity will be 32.4 MW. Under the proposed installation of the four 4-MW units, TransCanada would implement the above measures associated with the two 14-MW unit installation with the exception of preparing documentation for the National Register and instead proposes to prepare and implement an HPMP for the project covering architectural and operational documentation and archaeological resource assessments.

As now proposed, the four new 4-MWunits would generate an average of 53,092 MWh of electricity annually, have an annual power value of $3,741,100 (70.46 mills/kWh) and total annual costs of $6,162,650 (116.07 mills/kWh), resulting in a net annual benefit of -$2,421,550 (-45.61 mills/kWh). With the installation of the four 4-MW units, the total project would produce about 188,544 MWh of electricity annually at a cost of about $46,489,000 based on feasibility study estimates. This would result in a somewhat lower amount of energy, about a reduction of 10,412 MWh, a reduced annual cost of about $4,474,460, and an increased net annual benefit of $3,373,590, as compared to the total project with the installation of the two 14-MW units.

Table 9 compares the power value, annual costs, and net benefits for the original proposal and the revised proposal for the Vernon Project. Table 10 shows the effect on costs and power values of individual measures proposed by TransCanada.

Table 9. Summary of the annual net benefits for the original proposal and the revised proposal for the Vernon Project. (Source: TransCanada)

	Original Proposal Two 14-MW units (as currently licensed)	**Revised Proposal Four 4-MW Units**
Installed capacity (MW)	28	16
Annual generation (MWh)	63,504	53,092
Annual power value	$4,841,970	$3,741,100
(mills/kWh)	76.25	70.46
Annual cost	$ 10,637,110	$6,162,650
(mills/kWh)	167.50	116.07
Annual net benefit	-$5,795,140	-$2,421,550
(mills/kWh)	-91.25	-45.61

Table 10. Summary of capital costs, annual costs, annual energy costs, and total annualized costs of environmental measures for the Vernon Project. (Source: TransCanada)

Environmental Measures	**Capital Costs (2005$)**	**Annual Costs (2005$)**	**Annual Energy Costs (2005$)**	**Total Annualized Cost (2005$)**
1. Install two 14-MW, mixed flow units as authorized under the 1992 amendment.	$81,904,000	$250,000	$4,841,970 (gain)	$5,778,050
2. Install four 4-MW, vertical axis, semi-Kaplan units.	$46,489,000	$250,000	$3,741,100 (gain)	$2,394,960
3. Continue to operate Units 9 or 10 as first-on, last-off units during operation of the upstream fish ladder when flows are below about 12,000 cfs.	$0	Negligible	$0	$0
4. Develop and implement an ESCP for the project.	Negligible	$0	$0	$0
5. Perform CFD modeling to evaluate tailrace flow patterns	$50,000	$0	$0	$6,330

Environmental Measures	Capital Costs (2005$)	Annual Costs (2005$)	Annual Energy Costs (2005$)	Total Annualized Cost (2005$)
and effects on attraction flows for upstream fish passage.				
6. Conduct study to evaluate the effectiveness of the fish ladder for upstream fish passage during the first 2 years of commercial operation of the new units.	$60,000	$0	$0	$7,600
7. Prepare an HPMP for the project (only applies under the installation of the four 4-MW units).	$100,000	$0	$0	$12,660
8. Prepare documentation for the National Register (only applies under the installation of the two 14-MW units).	$25,000	$0	$0	$3,170

C. CONCLUSIONS

Approval of the proposed installation of the four 4-MW units and associated actions would result in greater efficiency in the total operation of the project and operations that are better suited to the current market demands. 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 authorized 14-MW units. Compared to the authorized two 14-MW units, the proposed installation of four 4-MW units would yield a capital cost reduction of 43 percent, yet the resulting energy production would be only 16 percent less. In addition, the combined maximum hydraulic capacity of the proposed 4-MW units would be 35 percent less than the authorized 14 MW units. Therefore, the proposed action would result in a substantially more efficient development of the unused hydraulic capacity both in terms of hydraulic efficiency and capital cost, including structural modifications to the powerhouse, while producing a somewhat lower equivalent amount of annual energy.

VII. CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with comprehensive plans for improving, developing, or conserving a waterway or waterways affected by a project. A total of 33 comprehensive plans that address various resources of the state are currently on the Commission's list for the states of New Hampshire and Vermont, 18 plans[11] are applicable to the project area. The proposed action is consistent with the applicable plans.

VIII. FINDING OF NO SIGNIFICANT IMPACT

On the basis of the record and this EA, we conclude that replacement of the existing units at Vernon Project, along with implementation of the Licensee's proposed environmental protection measures, would not constitute a major federal action significantly affecting the quality of the human environment.

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