124 FERC ¶ 62,199
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

TransCanada Hydro Northeast, Inc. Project No. 1904-061

ORDER APPROVING FLOW OPERATIONS AND MONITORING PLAN

(Issued September 12, 2008)

On April 18, 2008, TransCanada Hydro Northeast, Inc. (TransCanada), licensee for the Vernon Hydroelectric Project, FERC No. 1904, filed a Flow Operations and Monitoring Plan (Plan) pursuant to ordering paragraph (O) of the Order Amending License and Revising Annual Charges, issued on July 28, 2006.[1] The project is located on the Connecticut River, in Cheshire County, New Hampshire and Windham County, Vermont.

REQUIREMENTS

The ordering paragraph (O) includes Conditions E-3 and E-4 of the New Hampshire Clean Water Act Section 401 Water Quality Certificate issued on July 3, 2006.

Condition E-3 of the 401 Certificate, in part, states:

> The licensee shall develop and file with the New Hampshire Department of Environmental Services (NHES) an operations plan detailing impoundment water level fluctuations and the approach to complying with the minimum flow release described in the 401 Certification. The plan shall include information on minimization, avoidance, and control of lag times and must describe contingencies for periods of non-compliance with the minimum flow requirements.

Condition E-4 of the 401 Certificate, in part, states:

> The licensee shall develop a plan for continuous monitoring and reporting of flow releases through spillage and turbine discharge, impoundment levels, and inflows. The plan shall include procedures for reporting deviations from prescribed operating conditions.

[1] 116 FERC ¶ 62,078

LICENSEE'S PLAN

In compliance with Conditions E-3 and E-4 of the New Hampshire Water Quality Certificate for the Vernon Project license, TransCanada submitted a Flow Operations and Monitoring Plan that includes:

A. Vernon Station Operations

1. Normal Operations

Minimum flows are maintained continually through generation flows. Under normal operations, continual operation of one of the new units 5-8 will provide the required discharge except during periods when the fish ladder is in operation. During such periods, Unit 10 will serve as the primary unit to provide the minimum flow. With the new units in operation, pond fluctuations greater than two feet, between 220.13 ft msl and 218.13 ft msl, occur infrequently. This will not change with the repowering of units 5-8. The need to utilize a wider range beyond 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; or when inflows are anticipated to exceed station capacity as explained below. Normal operations follow detailed procedures based on the computed estimates of inflows.

When anticipated inflows exceed station capacity, the reservoir can be drawn down as low as elevation 216.13 ft in order to prevent unnecessary spill. When flows exceed 45,000 cfs, Vernon is operated using generation flow, sluice gates and tainter gates to maintain the reservoir at elevation 218.6 ft at the dam in order to maintain flow within its upstream project boundary. As flows increase, additional gates are opened, hydraulic flashboards are lowered and a crane removes panelized boards in the upper portion of the stanchion bays. The reservoir is allowed to surcharge up to a maximum elevation of 222.13 ft before a decision is made to drop the stanchion beams, eliminating the lower portion of the panels not previously pulled. The value of surcharge is to prevent dropping stanchion beams prematurely and to preserve the reservoir elevation so the pond does not have to drop to elevation 212.13 ft, necessary to rebuild the stanchion bays.

2. Emergency Conditions

Emergency or extraordinary conditions, which cause unforeseen interruptions or deviations in minimum flow, are detected at the Connecticut River Operations Control Center (Control Center) where one of several alarms will indicate the flow is either

deficient or a unit or station trip has occurred. The control center is staffed 24 hours, 7 days per week. An immediate response to such an event would be one of the following actions listed in sequential order: (1) re-start the unit from Control Center and return to providing minimum flow; and (2) start up another unit (all 10 units can potentially provide required minimum flow) from Control Center. These actions are typically within few minutes of the alarm alerting the operators.

If unit re-start or start-up is not possible due to transmission related issues, which trip the entire station, and take it "off-the transmission grid" and terminate station service, within a few seconds an emergency generator is automatically started to ensure continued power for lighting, instrumentation and control and pumps. During off-hours, personnel are immediately called and dispatched to the station to assess the situation. The Control Center would be contacted to immediately open either Tainter Gates #1 or #2 remotely from the Control Center using the emergency generator as the power source. This is done before attempting to restart the station and generators. Either of these tainter gates would be opened to pass a minimum of 1250 cfs. In the event that an emergency condition occurs, TransCanada will notify NHDES and Vermont Department of Environmental Conservation (VTDEC) within 24 hours of a substantial deviation, and will provide a written report within 10 days.

B. Operations Monitoring and Verification

Inflows and reservoir operations are continuously monitored in real time through a SCADA system. Data is transmitted to the Control Center where it is available onscreen to the control room operators. If reservoir elevation deviates from prescribed operating limits, the operator is notified via an alarm on a console, and an on-call maintenance person is dispatched to manually read the staff gage at Vernon Station to verify reservoir elevation.

Minimum flow is provided primarily through turbine generation. Minimum flow is calculated using turbine discharge flows in conjunction with impoundment and tail-level elevations. When upstream or downstream fish passages are in operation, those flows can also be factored in to the minimum flow calculation. Instantaneous flows are calculated through all turbines, gates and fish passages; and the total discharge flow is compiled on an hourly basis. This data is electronically compared to the required minimum flow and compliance status is immediately available to the control room operators, who can remotely operate turbines and/or gates if needed to increase discharge flows.

C. Record Keeping/Reporting and Real Time Flow Monitoring

Operating records documenting reservoir levels, inflows, gate settings, and discharges from turbines and spill at Vernon Station are maintained electronically and utilized for compliance tracking. This documentation will be supplied if requested, to NHDES and VTDEC. In addition, a log of all deviations for the year will be maintained and submitted to the agencies by January 31 of each year.

Flow data is provided on a near real-time basis through a web site and flow information telephone. Waterline Inc. currently provides this information for TransCanada hydroelectric generating facilities. Agencies and the interested public have access to this information twenty-four hours per day. The telephone numbers for this service are 1-800-452-1737 or 1-800-452-1742. The site code number 505123 is necessary to access Vernon Dam discharge data via telephone. Similar information is available on Waterline's web page at http://www.h2oline.com/TRC.asp by selecting Vernon Dam from the facility list on the web page. The near real-time flow data is updated through direct links to the Control Center on 15-minute intervals.

D. Implementation Schedule

The installation of Vernon's four new generating turbines will not significantly affect the existing operating procedures, or data collection methodology. As part of unit commissioning, electronic monitoring devices that capture generation data will be installed, programmed and calibrated. Operating records for these units will then be incorporated directly into the pre-existing Vernon operations dataset maintained by the Control Center as described in Section "C" above. Therefore, implementation of this Plan can begin as soon as the new turbines have completed commissioning, become operational and data instrumentation ties are complete. The schedule of ongoing plan requirements is detailed below.

Implementation Schedule

Implementation Task	**Targeted Date**
Add new turbine operations data to facility operations dataset	Immediately following commissioning of all four units
Substantial deviation from operating parameters	Notify NHDES within 24 hours of substantial deviation
Annual log of deviations	Submit to NHDES and VTDEC by January 31
Provide continuous monitoring data	If requested by NHDES or VTDEC

CONSULTATION

The plan was submitted by TransCanada to the NHDES, VTDEC, NH Fish and Games Department, and US Fish and Wildlife Service for review; and to NHDES for approval. TransCanada incorporated all the agencies' comments in the plan. NHDES, in its letter dated April 18, 2008, approved the plan and acknowledged its fulfillment of Conditions E-3 and E-4 of 401 Water Quality Certificate.

REVIEW

The plan was developed, in consultation with resource agencies, and approved by NHDES. The plan is in compliance with Conditions E-3 and E-4 of the New Hampshire Water Quality Certificate for the Vernon Project license, and is approved in this order.

The Director orders:

(A) The TransCanada's Flow Operations and Monitoring Plan, required by New Hampshire Clean Water Act Section 401 Water Quality Certificate issued on July 3, 2006, is approved as provided in this order.

(B) If project operations deviate from the minimum flow and impoundment water level fluctuations by the New Hampshire 401 Water Quality Certificate for the Vernon Project, the licensee shall file a report with the Commission within 30 days of the incident. The report shall, to the extent possible, identify the cause, severity, and duration of the incident, and any observed or reported adverse environmental impacts resulting from the incident. The report shall also include: (1) operational data necessary to determine compliance with this article; (2) a description of any corrective measures implemented at the time of the occurrence and the measures implemented or proposed to ensure that similar incidents do not recur; and (3) comments or correspondence, if any, received from resource agencies, regarding the incident. Based on the report and the Commission's evaluation of the incident, the Commission reserves the right to require modifications to project facilities and operations to ensure future compliance.

(C) 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 CFR § 385.713.

Mohamad Fayyad
Engineering Team Lead
Division of Hydropower Administration
and Compliance

Reservoir and Minimum Flow Operations and Monitoring Plan

Vernon Hydroelectric Project
FERC Project No. 1904

April 2008

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

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1.0 INTRODUCTION

This Reservoir and Minimum Flow Operations and Monitoring Plan (the Plan) is being submitted by TransCanada Hydro Northeast Inc. (TransCanada) to the New Hampshire Department of Environmental Services (NHDES, or DES), Vermont Department of Environmental Conservation (VTDEC), New Hampshire Fish and Game Department, and US Fish and Wildlife Service for review; and to NHDES for approval, in accordance with:

- Conditions E-3 and E-4 of the New Hampshire Clean Water Act Section 401 Water Quality Certificate issued on July 3, 2006; and

- Article 405 of the Federal Energy Regulatory Commission (FERC) Order amending the FERC License for the Vernon Hydroelectric Project, FERC No. 1904 (the Project) issued on July 28, 2006.

Condition E-3 of the New Hampshire Water Quality Certificate states:

> *The Applicant shall develop and file with DES* ***an operations plan detailing impoundment water level fluctuations and the approach to complying with the minimum flow release described in D-16 of this 401 Certification. The plan shall include information on minimization, avoidance, and control of lag times and shall describe contingencies for periods of non-compliance with the minimum flow requirements.*** *The plan shall also include procedures for reporting deviations from prescribed operating conditions. The plan shall be developed in consultation with DES, VTDEC, New Hampshire Fish and Game Department (NH F&G), and U.S. Fish and Wildlife Service (USFWS), with final approval by DES. DES reserves the right of review and approval of any material changes made to the plan. Proposed modifications shall not be implemented until after approval by DES…The Applicant shall notify DES not more than 24 hours after any substantial deviation from the approved operations plan and shall maintain a log of deviations, which shall be submitted annually to DES and VTDEC not later than January 31 of each year. Exceptions to the plan may be granted by DES, as necessary, in consultation with the Applicant, VTDEC, USFWS, and NH F&G.*

Condition E-4 of the New Hampshire Water Quality Certificate states:

> *The Applicant shall develop a plan for* ***continuous monitoring and reporting of flow releases through spillage and turbine discharge, impoundment levels, and inflows. The plan shall include procedures for reporting deviations from prescribed operating conditions.*** *The Applicant shall maintain continuous records of flows and impoundment levels and provide such records on a regular basis, if requested by DES or VTDEC. The plan shall be developed in consultation with DES, VTDEC, USFWS, and NH F&G, with final approval resting with DES. The Applicant shall consult DES regarding any proposed material changes made to the plan.*

2.0 SCOPE OF THE PLAN

This Plan includes an operating plan that details reservoir management and provisions for providing minimum flow; and a plan for providing continuous reservoir and flow data for the Vernon Project. The operating plan will address applicable reservoir elevation requirements, guaranteed minimum flows and a schedule of implementation. The monitoring section will include a schedule of implementation and provisions for providing near real-time flow data to the NHDES and the Vermont Department of Environmental Conservation (VTDEC). Additionally, the plan will address annual data reporting and analysis requirements to DES and FERC.

3.0 VERNON STATION OPERATIONS

3.1 Overview

The Vernon Project consists of a concrete gravity dam, a reservoir with a surface area of 2,550 acres, and an installed generating capacity, after installation of four new turbines in 2007, of 32.4 MW. The dam's flow passage facilities include a 13' x 13' trash sluice gate, eight 7' x 9' flood gates, four 10' x 50' tainter gates, two 20' x 50' tainter gates, two 50' long bays of 10' x 10' hydraulic flashboard panels, and three stanchion bays (2 at 50' and one at 42.5') of 10' stanchion panels. A reinforced concrete fishway between the tailrace and forebay allows both up and downstream passage of anadromous fish.

Units No. 1 through 4 are single runner, vertical Francis turbines with a maximum hydraulic capacity of 1,465 cubic feet per second (cfs). The new Units No. 5 through 8 are vertical axial flow Kaplan turbines with a 3.1-meter diameter runner and a maximum hydraulic capacity of 1,800 cfs. Units No. 9 and 10 are vertical single runner Francis turbines with a maximum hydraulic capacity of 2,035 cfs.

The Vernon impoundment extends from Vernon Dam to an area approximately 26.5 miles upstream from the dam to the Walpole Bridge at Westminster Station, Vermont, about 4 miles downstream of the Bellows Falls Project (FERC Project No. 1885). The drainage area above the Vernon Project is 6,266 square miles. 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. The reservoir has a total volume of 40,000 acre-feet at full reservoir.

Three tributaries – the West River, Cold River and Saxtons River – enter the Connecticut River between Bellows Falls and Vernon Dam. The West River has two Army Corps of Engineers' (USACE) flood control dams – one at Townshend and one at Jamaica. These projects, in conjunction with three other Army Corps' flood control dams in Vermont, significantly control flood flows into the Connecticut River and the Vernon impoundment. Vernon Station is operated in conjunction with other hydroelectric generating facilities on the Connecticut River, in a coordinated manner that takes into consideration variations in demand for electricity as well as natural seasonal flow variations in the Connecticut River system. Flows in this reach of river

are highly regulated by the upstream hydroelectric projects under normal flow conditions. Article 32 of the Vernon License requires a coordination agreement with the USACE, prescribed by the document, *Operating Procedures - Vernon Project*. A copy of the draft current operating procedures reflecting the new Unit 5-8 is included with this Plan in Appendix A. This draft has neither been finalized or sent to the USACE at this time and as such cannot be considered final.

Powerhouse discharge capacity and maximum output is a combined function of gross head and the tailwater, which is controlled by the reservoir associated with First Light Power's Turners Falls Project (FERC Project No. 1889). Generation can vary during the course of any day between the required minimum flow and full capacity, if higher flows are available. Additional water is released for upstream and downstream fish passage devices in accordance with seasonal fish migration schedules.

3.2 Reservoir Elevations and Minimum Flow Requirements

The facility is a daily fluctuating run-of-river facility with a normal reservoir operating range between 218.6 and 220.1 feet msl. 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 during the day between the required minimum flow and full capacity if flows are available. The maximum usable storage is 18,289 acre-feet between the reservoir operating limits of 220.13 and 212.13 msl, but as stated above, the typical fluctuation is within the upper 2 feet. The elevation at the dam crest is 212.13 feet.

As described in Finding D-15 of the NH Water Quality Certificate, Article 34 of the 1979 FERC license for the Vernon Project mandates a year-round minimum flow of 1,250 cubic feet per second (cfs) or inflow if less, through Vernon for the protection of aquatic life immediately downstream from the powerhouse. Measured flows from upstream hydroelectric facilities and gaging stations on the Connecticut River and on tributary streams are used to estimate the flow expected at the Project. This flow information determines station and spillway gate operations at Vernon Dam.

Minimum flows are typically provided through generation flows. Any of the Units 5-10 can provide the required flow on their own. In some cases depending upon generation loads and head more than one of the Units 1-4 would be required to run in order to provide the required flow. If for some hypothetical reason the inflow were to be lower than a reasonable operating range for any of these units, we would open the surface gate immediately to the east of the power station and pass the required flow. As a surface gate has a flow capacity between 0 cfs and 2500 cfs. If during downstream passage season, the required passage flows could also serve to meet the required flow if the inflows were below 500 cfs. This would be a very uncommon instance; one that has not occurred to our [TransCanada's] knowledge. All other circumstances in which a unit could not pass the required minimum flow would be a result of a station interruption and such circumstances are covered under 3.4 Emergency Conditions. Gate capacity tables and curves are provided in Appendix C.

Per Condition E-5 of the NH 401 Water Quality Certificate and Article 405 of the License Amendment, TransCanada will monitor dissolved oxygen and water temperature in the Connecticut River to ensure the discharge from Vernon Dam complies with New Hampshire and Vermont Class B surface water quality standards. If violations of Class B surface water quality standards occur or persist, the Applicant shall revise this operations plan to include additional measures to meet dissolved oxygen standards. Any revised plan shall be submitted to DES and VTDEC, for review and approval, prior to implementation.

3.3 Normal Operations

Minimum flows are maintained continually through generation flows. Under normal operation, continual operation of one of the new units 5-8 will provide the required discharge except during periods when the fish ladder is in operation. During such periods, Unit 10 will serve as the primary unit to provide the minimum flow, pending further review as specified in the Upstream Passage Monitoring Plan, filed with State and Federal Agencies and the FERC as required by Ordering Paragraph M of the July 28, 2006 License Amendment.

Historically and going forward with the new units in operation, pond fluctuations greater than two feet occur infrequently. 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. This will not change with the re-powering of units 5-8. The need to utilize a wider range beyond 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; or when inflows are anticipated to exceed station capacity as explained below. Normal operations follow detailed procedures based on the computed estimates of inflows.

Expected station inflow is predicted four to twelve hours in advance, thus allowing operating limits to be set for the Vernon reservoir before any spillway gate operations are conducted. On occasion, when anticipated inflows exceed station capacity the reservoir can be drawn down as low as elevation 216.13 in order to prevent unnecessary spill. This results in a beneficial smoothing effect on downstream flow.

When flows exceed 45,000 cfs Vernon is operated using generated flow, sluice gates and tainter gates to maintain the reservoir at elevation 218.6 feet msl at the dam in order to maintain flow within its upstream project boundary. Discrete changes in reservoir elevation and operation of the various gates depend upon the volume of anticipated inflow and whether or not ice is present in the river. As flows increase, additional gates are opened, hydraulic flashboards are lowered and a crane removes panelized boards in the upper portion of the stanchion bays. The reservoir is allowed to surcharge up to a maximum elevation of 222.13 before a decision is made to drop the stanchion beams eliminating the lower portion of the panels not previously pulled. The value of

surcharge is to prevent dropping stanchion beams prematurely and to preserve the reservoir elevation so the pond does not have to drop to elevation 212.13, necessary to rebuild the stanchion bays. Elevation 222.13 corresponds with the top of the stanchion bay boards, the hydraulic flashboards and the tainter gates, and is the height that the reservoir used to attain before failing the original wood and pin flashboards that ran the entire length of the spillway

3.4 Emergency Conditions

Article 34 of the 1979 Vernon Project FERC License allows for minimum flows to be temporarily modified if required by operating emergencies beyond the control of the licensee. In addition, for short periods of time in the interest of recreation and protection of the fisheries resources upon mutual agreement with the New Hampshire Fish and Game Department (NHFG) and the Vermont Agency of Natural Resources Fish and Wildlife Department VTFW).

Emergency or extraordinary conditions, which cause unforeseen interruptions of deficiencies in minimum flow, are detected at the Connecticut River Operations Control Center (Control Center) where one of several alarms will indicate the flow is either deficient or a unit or station trip has occurred. The control center is staffed 24 hours, 7 days per week. Our immediate response to such an event would be one of the following actions listed in sequential order: 1.) Re-start the unit from Control Center and return to providing minimum flow; 2.) Start up another unit (all 10 units can potentially provide required minimum flow) from Control Center. These actions are typically within a few minutes of the alarm alerting the operators.

If unit re-start or start-up is not possible due to transmission related issues, which trip the entire station, and take it “off-the transmission grid” and terminate station service, within a few seconds an emergency generator is automatically started to ensure continued power for lighting, instrumentation and control and pumps. During off-hours, as opposed to normal working hours when plant is occupied, personnel are immediately called and dispatched to the station to assess the situation. Several personnel currently live within a few minutes of the plant. They would initially assess if there is any danger of fire in the station and lacking any evidence of fire, they would immediately check to see if the spillway was clear of people, boaters or other potential public safety concerns. Seeing no persons or after alerting public to leave the spillway area of concern, the Control Center would be contacted to immediately open either Tainter Gates #1 or #2 remotely from the Control Center using the emergency generator as the power source. This is done before attempting to restart the station and generators. Either of these tainter gates would be opened to pass a minimum of 1250 cfs. These response procedures should restore the minimum flow as quickly as is feasibly possible. Due to the tailwater of the Vernon Dam being within the impoundment associated with the downstream Turner’s Falls Project, there would not be periods when the river would become dry during such an emergency.

In the event that an emergency condition occurs, TransCanada will notify DES and VTDEC within 24 hours if a substantial deviation, and will provide a written report within 10 days. The NHDES, for good cause, may grant an extension of the 10-day filing deadline in writing. The written report will include the following event-related details:

- Description of the emergency event and its duration;
- Reason for the occurrence; and
- Proposals to avoid future occurrences and mitigation planned or implemented.

In accordance with Condition E-3 of the Water Quality Certification, TransCanada will also keep a log of all deviations from normal operating conditions that may occur during the course of a year. This log will be submitted annually to DES and VTDEC by January 31 of each following year.

4.0 OPERATIONS MONITORING AND VERIFICATION

Inflows and reservoir operations are continuously monitored in real time through a SCADA system. Data is transmitted to the Connecticut River Control Center where it is available onscreen to the control room operators. If reservoir elevation deviates from prescribed operating limits, the operator is notified via an alarm on their console, and an on-call maintenance person is dispatched to manually read the staff gage at Vernon Station to verify reservoir elevation.

Minimum flow is provided primarily through turbine generation. Minimum flow is calculated using turbine discharge flows in conjunction with impoundment and tail-level elevations. When upstream or downstream fish passages are in operation, those flows can also be factored in to the minimum flow calculation. Instantaneous flows are calculated through all turbines, gates and fish passages; and the total discharge flow is compiled on an hourly basis. This data is electronically compared to the required minimum flow and compliance status is immediately available to the control room operators who can remotely operate turbines and/or gates if needed to increase discharge flows.

5.0 RECORD KEEPING / REPORTING AND REAL TIME FLOW MONITORING

Operating records documenting reservoir levels, inflows, gate settings, and discharges from turbines and spill at Vernon Station are maintained electronically and utilized for compliance tracking. This documentation will be supplied if requested, to DES and VTDEC. In addition, a log of all deficiencies for the year will be maintained and submitted to the agencies by January 31 of each year.

Flow data is provided on a near real-time basis through a web site and flow information telephone. Waterline Inc. currently provides this information for TransCanada hydroelectric generating facilities. Agencies and the interested public have access to this information twenty-four hours per day. The telephone numbers for this service are 1-800-452-1737 or 1-800-452-1742. The site code number 505123, is necessary to access Vernon Dam discharge data via telephone. Similar information is available on Waterline's web page at http://www.h2oline.com/TRC.asp by selecting Vernon Dam from the facility list on the web page. The near real-time flow data is updated through direct links to our Connecticut River Control Center on approximately 15-minute intervals.

6.0 IMPLEMENTATION SCHEDULE

The installation of Vernon's four new generating turbines will not significantly affect the existing operating procedures, or data collection methodology. As part of unit commissioning, electronic monitoring devices that capture generation data will be installed, programmed and calibrated. Operating records for these units will then be incorporated directly into the pre-existing Vernon operations dataset maintained by the River Control Center as described in Section 5.0 above. Therefore, implementation of this Plan can begin as soon as the new turbines have completed commissioning, become operational and data instrumentation ties are complete. The schedule of ongoing Plan requirements is detailed below.

Table 1
Implementation Schedule

Implementation Task	Targeted Date
Add new turbine operations data to facility operations dataset	Immediately following commissioning of all four units
Substantial deviation from operating parameters	Notify DES within 24 hours of substantial deviation
Annual log of deficiencies (deviations)	Submit to DES and VTDEC by January 31
Provide continuous monitoring data	If requested by DES or VTDEC

APPENDIX A

OPERATING PROCEDURES - VERNON PROJECT
Associated with Article 32 Vernon License

OPERATING PROCEDURES

VERNON PROJECT

Vernon, Vermont

FERC - LP NO. 1904 NH/VT

04/07/08 – Draft

OPERATING PROCEDURES

VERNON PROJECT

Vernon, Vermont

FERC - LP NO. 1904 NH/VT

APPENDICES

OPERATING PROCEDURES

VERNON PROJECT

Vernon, Vermont

FERC - LP NO. 1904 NH/VT

1.0 INTRODUCTION

One 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.

A number of 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. A downstream passage guidance boom was constructed along with the implementation of two downstream passage routes through the station. Finally in 2007, a major re-powering of Units 5-8 was completed in which new 4-MW turbine generators were installed to replace the aging and retired triple runner units.

These changes have resulted in improved generator efficiency, slightly greater maximum discharge capacity and a smoother flow release during flood periods. These procedures have been revised to reflect the operating characteristics of the new water handling mechanisms and the re-powerd units 5-8.

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 daily average 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.

2.0 GENERAL INFORMATION

The Vernon Hydroelectric Project is located on the Connecticut River in the Towns of Vernon, Vermont and Hinsdale, New Hampshire. The Project is a daily average 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 authorized installed generating capacity of 32.400 KW. The dam's flow passage facilities include a 13' x 13' trash sluice gate, eight 7' x 9' flood gates, four 10' x 50' tainter gates, two 20' x 50' tainter gates, two 50' long bays of 10' x 10' hydraulic flashboard panels, and three stanchion bays (2 @ 50' and one @ 42.5') of 10' stanchion panels. 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 10'stanchion panels - Elevation 222.13). Usable storage amounts to about 18,300 acre-feet in eight feet of drawdown.
Three tributaries, the West River (DA 308 square miles), Cold River (DA 83 square feet), and the Saxtons River (DA 72 square miles) enter the Connecticut River between Bellows Falls and Vernon Dam. The West River has two US Army Corps of Engineers (USACE) flood control dams controlling a total drainage area 278 square miles; 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.

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 miles upstream of Vernon Dam. During the relicensing process of the Vernon Project, several agencies requested a minimum flow release by established at 0.2 cubic feet per second per square mile (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 operating procedure includes the computed "natural average inflow" 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 USACE 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 to provide limited storage during normal daily operation, flows in excess of station capacity 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, USACE. 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 TransCanada 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

Listed below are the procedures for operating the Vernon Project. Six categories of river flow conditions have been developed for plant operation:

	VERNON NATURAL INFLOW	PROJECT STATUS
a.	17,100 CFS or less	plant capacity
b.	17,100 to 55,000 CFS (No Ice)	plant capacity, gates and pond limit
c.	17,100 to 55,000 CFS (With Ice)	plant capacity, selected gates and pond limit
d.	Greater than 55,000 CFS (No Ice)	plant capacity, gates as needed to draw pond
e.	Greater than 55,000 CFS (with Ice)	plant capacity, selected gate use to draw pond
f.	Greater than 60,000	plant capacity, all gates, panels begin stanchion bay board removal

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 17,100 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 maximum pond limit is Elevation 220.1 for year round operation. The FERC license requires a minimum flow release of 1,250 CFS or inflow if less and any of the Units 5 through 10 can be used to provide this flow. Typically, Units 5 thru 8 would be used first but during the upstream fish passage season Unit 10 would be the priority unit to ensure linear flow across the entrance to the fish ladder.

3.02 FLOWS 17,100 - 55,000 CFS (NO ICE)

When flows are in excess of station capacity (17,100 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.

An operating limit at Elevation 219.6 is placed on the pond. No. 1 and 2 tainter gates (20' x 50') are used as needed up to a maximum opening of 7 feet on each gate. 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 Elevation 219.6.
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 17,100 - 55,000 CFS (WITH ICE)

When flows are in excess of station capacity (17,100 CFS) with ice in the pond, it is necessary to operate the appropriate tainter gates to avoid stanchion panel damage from floating ice.

An operating limit of Elevation 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 5 (10' x 50') tainter gates (refer to Figure 9 for discharge capacities). Experience has shown these gates provide a smooth more direct passage for ice flows. The submerged hydraulic floodgates would be the next gates used, if needed. Depending on the amount of ice flow or the time of day.

3.04 FLOWS OVER 55,000 CFS ANTICIPATED (NO ICE)

When flows above 55,000 CFS are expected, an operating limit at Elevation 218.6 is placed on the pond. No. 1, 2, 3, 4, 5, and 6 tainter gates are used to lower the pond to the new operating limit at a rate of 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 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. All hydraulic floodgates should be committed before the tailwater elevation reaches Elevation 196.0 as tailwater elevation above such point can restrict safe access to submerged gates. The ten (10' x 10') hydraulic panels can be lowered to the spillway crest (Elevation 212.1) to pass additional flow and the pond is then controlled by adjusting #1 and #2 tainter gates.

3.05 FLOWS OVER 55,000 CFS ANTICIPATED (WITH ICE)

When flows above 55,000 CFS are expected with ice on the pond, an operational limit of Elevation 218.6 is placed on the pond and selective gate operation is required to prevent damage to stanchion board sections. Use No. 1 tainter gate a

maximum opening of 7 feet to maintain the pond below Elevation 218.6. If additional gate capacity is needed, No. 4, 5, 6 and 3 tainter gates are opened. These gates will pass ice safely and not cause damage to stanchion sections. The submerged hydraulic floodgates should be used next. Past experience has shown ice passage through Vernon Dam usually occurs at flows between 25,000 to 45,000 CFS.

3.06 FLOWS EXPECTED TO EXCEED 70,000 CFS

Control pond at or below 218.6 using No. 1 or 2 tainter gate. Move station crane into position to pull stanchion bay boards and/or stanchion beams. At a flow of approximately 70,000 CFS, pull top sections of stanchion bay boards and continue to regulate to Elevation 218.6 using No. 1 or 2 tainter gate.
Once all gates and hydraulic panels are fully opened, allow elevation to rise to 220.1. If river continues to rise have crane operator to remain onsite if not presently so or immediately call in operator to do so. Once at Elevation 222.1 and river flows continuing to rise, remove stanchion beams from bays as required to maintain Elevation 222.1. (Approximate river flow 105,000 CFS).

If it appears the river will reach an extremely high flood stage of Elevation 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 Connecticut River Operator.

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.

3.07 FISH PASSAGE 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 mid-May for upstream migrating fish and remain pretty much in operation through the fall for downstream migrating fish.

Comment [jlr1]: This needs to be re-written to reflect both Up and downstream passage for salmon and shad and reflect operational priorities associated with new units.

APPENDIX A

OPERATING PROCEDURES

VERNON PROJECT

FERC - LP No. 1904 NH/VT

NATURAL AVERAGE INFLOW DETERMINATION

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 Hartord (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.

APPENDIX B

OPERATING PROCEDURES

VERNON PROJECT

FERC - LP No. 1904 NH/VT

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, 32.4 MW total capacity

Spillway Arrangement - 1 trash sluice - 13' x 13' @ Elevation 209.13

2 tainter gates - 20' x 50' @ Elevation 202.13

4 tainter gates - 10' x 50' @ Elevation 212.13

10 hydraulic panels - 10' x 10' @ Elevation 212.13

8 hydraulic floodgates - 7' x 9' invert @ Elevation 173.13

3 Stanchion Bay Sections (two 50’ and one 42.5’)

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	17,100	16,500	21,000	0
1 Trash Sluice (13' x 13')	0	220	1,570	2,770
2 Tainter Gates (20' x 50')	0	4,300	23,590	40,950
4 Tainter Gates (10' x 50')	0	0	16,960	48,000
8 Hydraulic Floodgates (7' x 9')	0	14,800	18,000	1,680+
10 Hydraulic Panels (10' x 10')	0	0	8,480	24,000
Stanchion Bays (10' x 142.5')	0	0	2,610	10,200
TOTAL CAPACITY	17,100	26,320	83,230	127,600

+ Gates submerged by tailwater (estimated)

APPENDIX C

OPERATING PROCEDURES

VERNON PROJECT

FERC - LP No. 1904 NH/VT

USGS GAGING STATIONS

USGS Station *	Drainage Area (sq. mi.)	Years of Record	Max Discharge (CFS)	Min Discharge (CFS)	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 – 1923 & 1928 to present	52,300 (1938)	7.6 (1962)	384.21
NOTE: * All stations use a water stage recorder for measurements					

APPENDIX D

OPERATING PROCEDURES

VERNON PROJECT

FERC - LP No. 1904 NH/VT

SPILLWAY GATES AND HYDRAULIC PANEL OPERATION

The spillway crest has six (6) tainter gates, two (2) fifty-foot bays of hydraulic panels, and one (1) trash sluice gate. The Station operation controls flow to 85,000 CFS.

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

Rates for “predrawing” (lowering reservoir in advance of significantly greater anticipated inflow) of the reservoir will be 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' x 13') 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' x 50') located on the east end of the spillway (NH side) have a sill elevation 10 feet into the overall 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. These gates can be operated in remote using the emergency generator if necessary. They are the only gates which can be operated if the station is dead and cannot be re-started.

Experience shows with pond ice movement, operation of No. 2 tainter gate tends to pull ice in front of the No. 3 and 4 stanchion bays. To eliminate or minimize potential flashboard damage, No. 5 and 4 10' x 50' tainter gates must be opened to pull the ice away from the stanchion bay sections.

LOCALLY OPERATED TAINTER GATES

Four tainter gates (10' x 50') located in bays No. 8 thru 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' x 10') located in bays No. 6 and 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

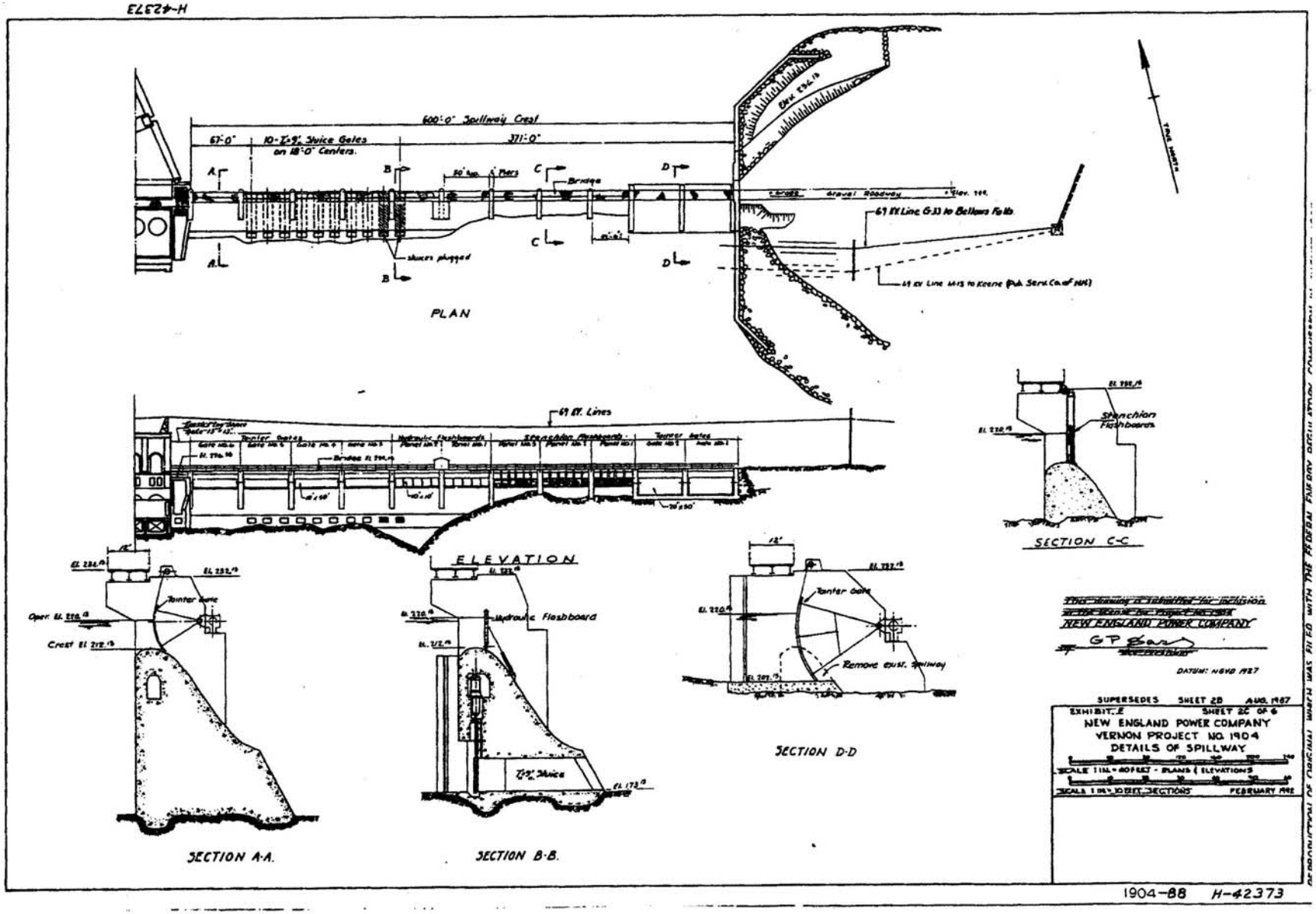
Eight submerged hydraulic floodgates (7' x 9') have been retained and are operated in the full open position, never throttled. These gates must be opened before the tailwater reaches elevation 196.0 because the tailwater could start to enter the floodgate gallery and potentially make gate operation impossible.

EMERGENCY GENERATOR

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

APPENDIX B

VERNON DAM GATE LOCATIONS DIAGRAM


H-42373
600'-0" Spillway Crest
67'-0"
10-7'-9" Sluice Gates on 18'-0" Centers.
371'-0"
Bridge
Gravel Roadway
61 FT. Line G.S.S. to Bellows Falls
69 FT. Line M.S.& to Keene (Pub. Serv. Co. of NH)
Sluices plugged
PLAN
69 FT. Lines
Tainter Gates
Hydraulic Flashboards
Stanchion Flashboards
ELEVATION
Stanchion Flashboard
Tainter Gate
Hydraulic Flashboard
7'-9" Sluice
Remove exist. Spillway
SECTION C-C
SECTION D-D
SECTION A-A.
SECTION B-B.
This drawing is submitted for inclusion in the Report of the Project Manager
NEW ENGLAND POWER COMPANY
DATUM: NGVD 1927
SUPERSEDES SHEET 2B AUG. 1967
EXHIBIT E SHEET 2C OF 6
NEW ENGLAND POWER COMPANY
VERNON PROJECT NO. 1904
DETAILS OF SPILLWAY
SCALE 1 IN. = 40 FEET - PLANS & ELEVATIONS
SCALE 1 IN. = 10 FEET - SECTIONS
FEBRUARY 1968
1904-88 H-42373

APPENDIX C

GATE CAPACITY TABLES & CURVES

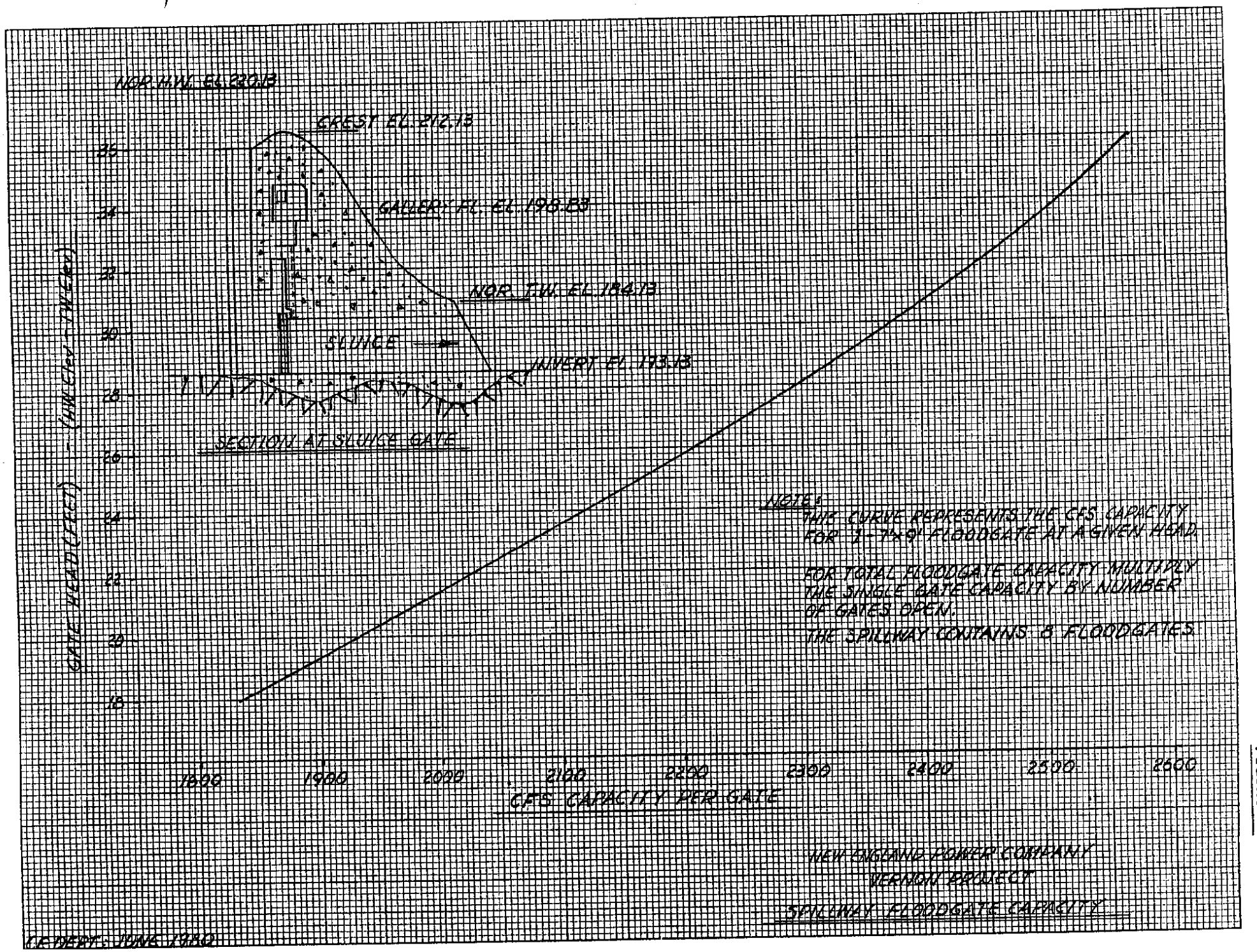

NOR. H.W. EL. 220.18
CREST EL. 212.13
GALLERY FL. EL. 198.83
NOR. T.W. EL. 184.13
SLUICE
INVERT EL. 193.13
SECTION AT SLUICE GATE
GATE HEAD (FEET) - (NOR. H.W. - INVERT)
25
24
22
20
18
26
28
30
1800
1900
2000
2100
2200
2300
2400
2500
2600
C.F.S. CAPACITY PER GATE
NOTE:
THIS CURVE REPRESENTS THE C.F.S. CAPACITY FOR 1-7'x9' FLOODGATE AT AGAWAM ROAD
FOR TOTAL FLOODGATE CAPACITY MULTIPLY THE SINGLE GATE CAPACITY BY NUMBER OF GATES OPEN.
THE SPILLWAY CONTAINS 8 FLOODGATES
NEW ENGLAND POWER COMPANY
VERNON PROJECT
SPILLWAY FLOODGATE CAPACITY
DECEMBER, JUNE 1960

FIGURE 10

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 - 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

OPERATING PROCEDURES

VERNON PROJECT
VERNON, VERMONT

FERC - LP 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

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 (Typo.)
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

APPENDIX D

AGENCY COMMENTS

John Ragonese

From: Piszczek, Paul [Paul.Piszczek@des.nh.gov]
Sent: Thursday, April 17, 2008 3:21 PM
To: John Ragonese; jeff.cueto@state.vt.us
Cc: Brandi.Sangunett@ferc.gov
Subject: 20080417_PPiszczek_Vernon_Operations_Plan_Comment2

John,
That will work. Thank you. Go ahead and put that language in the plan and send it to me. I will finish up the letter and send it tomorrow morning.
Paul

++++++++++++++++++++++++++++++++
Paul Piszczek
NHDES-Watershed Management Bureau
P.O. Box 95
Concord, NH 03302
v (603) 271-2471
f (603) 271-7894
paul.piszczek@des.nh.gov

-----Original Message-----
From: John Ragonese [mailto:john_ragonese@transcanada.com]
Sent: Thursday, April 17, 2008 2:38 PM
To: Piszczek, Paul; jeff.cueto@state.vt.us
Cc: Brandi.Sangunett@ferc.gov
Subject: RE: 20080417_PPiszczek_FERC_Vernon_Operations_Plan_Comment
Importance: High

Paul,

Ok, I see what you are speaking of and I agree [even strangely-er…]

I will replace the highlighted sentences below with if you agree:

Our immediate response to such an event would be one of the following actions listed in sequential order: 1.) Re-start the unit from Control Center and return to providing minimum flow; 2.) Start up another unit (all 10 units can potentially provide required minimum flow) from Control Center. These actions are typically within a few minutes of the alarm alerting the operators. If unit re-start or start-up is not possible due to transmission related issues, which trip the entire station, and take it “off-the transmission grid” and terminate station service, within a few seconds an emergency generator is automatically started to ensure continued power for lighting, instrumentation and control and pumps. During off-hours, as opposed to normal working hours when plant is occupied, personnel are immediately called and dispatched to the station to assess the situation. Several personnel currently live within a few minutes of the plant. They would initially assess if there is any danger of fire in the station and lacking any evidence of fire, they would immediately check to see if the spillway was clear of people, boaters or other potential public safety

concerns. Seeing no persons or after alerting public to leave the spillway area of concern, the Control Center would be contacted to immediately open either Tainter Gates #1 or #2 remotely from the Control Center using the emergency generator as the power source. This is done before attempting to restart the station and generators. Either of these tainter gates would be opened to pass a minimum of 1250 cfs. These response procedures should restore the minimum flow as quickly as is feasibly possible. Due to the tailwater of the Vernon Dam being within the impoundment associated with the downstream Turner's Falls Project, there would not be periods when the river would become dry during such an emergency.

Anything else?

John

From: Piszczek, Paul [mailto:Paul.Piszczek@des.nh.gov]
Sent: Thursday, April 17, 2008 1:39 PM
To: John Ragonese; jeff.cueto@state.vt.us
Cc: Brandi.Sangunett@ferc.gov
Subject: 20080417_PPiszczek_FERC_Vernon_Operations_Plan_Comment

John,
Strangely, I think the phrase "we immediately respond, typically within a few minutes" is much less ambiguous than "as soon as possible". "Within a few minutes" gives any reader some idea of the duration of an outage. So, just add that phrase to the first highlighted sentence.
Paul

++++++++++++++++++++++++++++++++

Paul Piszczek
NHDES-Watershed Management Bureau
P.O. Box 95
Concord, NH 03302
v (603) 271-2471
f (603) 271-7894
paul.piszczek@des.nh.gov

-----Original Message-----
From: John Ragonese [mailto:john_ragonese@transcanada.com]
Sent: Thursday, April 17, 2008 12:24 PM
To: Piszczek, Paul; jeff.cueto@state.vt.us
Cc: Brandi.Sangunett@ferc.gov
Subject: RE: 20080417_PPiszczek_FERC_Vernon_Operations_Plan
Importance: High

Paul, Jeff:

As I am now reviewing the current revised version, I am now unclear as to what exactly you would like me to add to the Ops Plan (that is not already there). Please review the info below and get back to me as soon as possible so I can address this with any changes that are necessary

This is what is presently under Section 3.4 in the revised version of the plan sent to you on April

8th in response to your comments.

> Emergency or extraordinary conditions, which cause unforeseen interruptions of deficiencies in minimum flow, are detected at the Connecticut River Operations Control Center (Control Center) where one of several alarms will indicate the flow is either deficient or a unit or station trip has occurred. The control center is staffed 24 hours, 7 days per week. As quickly as possible, response to such an event would include one of the following actions listed in priority: 1.) Re-start the unit from Control Center and return to providing minimum flow; 2.) Start up another unit (all 10 units can potentially provide required minimum flow) from Control Center. If unit re-start or start-up is not possible due to transmission related issues, which trip the station and take it "off-line" from the transmission grid, personnel would be dispatched as quickly as possible to the station to assess the situation. They would initially assess if there is any danger of fire in the station and lacking any evidence of fire, they would immediately check to see if the spillway was clear of people, boaters or other potential public safety concerns. Seeing no persons or after alerting public to leave the spillway area of concern, the Control Center would be contacted to immediately open either Tainter Gates #1 or #2 remotely from the Control Center before attempting to restart the station and generators. One of these tainter gates would be opened to pass a minimum of 1250 cfs. These response options should restore the minimum flow as quickly as is feasibly possible. Due to the tailwater of the Vernon Dam being within the impoundment associated with the downstream Turner's Falls Project, there would not be periods when the river would become dry.

In response to the inflow comment never dropping below 1250 – it is because we manage Vernon's inflow from Bellows Falls, Wilder and upstream storage. Do you want that clarified?

In response to the comment regarding operating a slide rule to calculate inflow. We wouldn"t do that but you asked how we would do it if inflow was less than 1250 and we chose to pass inflow only how would we calculate it If you do not want that language because it implies that is the normal protocol, I can stike it. We tried to characterize it in Section 3.2 as a "very uncommon instance; one that has not occurred to our knowledge".

We do not immediately start up the emergency generator open a tainter gate remotely without first checking the tailrace below the gates to see if there are any fishermen or boaters below the gates. But we do dispatch personnel to check and immediately inform the operations center to start-up the generator and open a gate. I think that is spelled out above.

The reach immediately below Vernon is Turners Falls impoundment and thus does not go dry.

Please advise as to what additional information you would like me to add as this appears to be addressing the issue mentioned in Jeff's email response below. I can add some sort of language relative to a planned outage that would effectively shut down the station which I am not aware of ever occurring, but that we would prepare the gates to pass the flow before station shutdown.

Thanks, John

From: Piszczek, Paul [mailto:Paul.Piszczek@des.nh.gov]
Sent: Thursday, April 17, 2008 7:47 AM
To: John Ragonese; jeff.cueto@state.vt.us
Cc: Brandi.Sangunett@ferc.gov
Subject: 20080417_PPiszczek_FERC_Vernon_Operations_Plan

John,
It would be very helpful if this was clarified in the Ops plan. Would you do that and then send it over?
Paul

++++++++++++++++++++++++++++++++
Paul Piszczek
NHDES-Watershed Management Bureau
P.O. Box 95
Concord, NH 03302
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f (603) 271-7894
paul.piszczek@des.nh.gov

-----Original Message-----
From: John Ragonese [mailto:john_ragonese@transcanada.com]
Sent: Wednesday, April 16, 2008 4:39 PM
To: jeff.cueto@state.vt.us; Piszczek, Paul
Cc: Brandi.Sangunett@ferc.gov
Subject: Re: 20080410_PPiszczek_FERC_Vernon_Operations_Plan

Jeff,
We do immediately respond - typically within a few minutes (which is as soon as possible), but you are correct, there in no de-watered reach due to Turners Falls Project. Would you like me to clarify this further in the Ops plan?

John

----- Original Message -----
From: Cueto, Jeff <Jeff.Cueto@state.vt.us>
To: John Ragonese; Paul.Piszczek@des.nh.gov <Paul.Piszczek@des.nh.gov>
Cc: Brandi.Sangunett@ferc.gov <Brandi.Sangunett@ferc.gov>
Sent: Wed Apr 16 13:07:57 2008
Subject: RE: 20080410_PPiszczek_FERC_Vernon_Operations_Plan

I understand, John. It's just when I hear an explanation like that, what comes into my mind is how long does it take to reestablish downstream flows and avoid damage to the aquatic community. You don't answer that particular question, but you had previously noted that Turner Falls backwaters to Vernon Dam.
Jeff

><{{{˜> Jeffrey R. Cueto, P.E., Chief Hydrologist

><{{{˜> VT Department of Environmental Conservation
><{{{˜> Dam Safety and Hydrology Section
><{{{˜> Facilities Engineering Division, Laundry Bldg.
><{{{˜> 103 South Main Street, Waterbury, VT 05671-0511
><{{{˜> (802) 241-3758
><{{{˜> jeff.cueto@state.vt.us

From: John Ragonese [mailto:john_ragonese@transcanada.com]
Sent: Wednesday, April 16, 2008 3:00 PM
To: Cueto, Jeff; Paul.Piszczek@des.nh.gov
Cc: Brandi.Sangunett@ferc.gov
Subject: Re: 20080410_PPiszczek_FERC_Vernon_Operations_Plan

Thanks jeff. We do not go below 1250 min flow but the pond might fluctuate with the normal 2 foot operating range.

I keep trying to make it clear, if a unit trips we either immediately re-start or start another as necessary. If we cannot re-start (we have 10 to attempt) we can immediately and remotely operate a tainter gate to pass 1250 or more.

If station is down we immediately dispatch a crew who starts up emergency generator and opens a gate. I can check (Earl???)but am pretty sure we cannot start emergency generator remotely.

----- Original Message -----
From: Cueto, Jeff <Jeff.Cueto@state.vt.us>
To: John Ragonese; Piszczek, Paul <Paul.Piszczek@des.nh.gov>
Cc: brandi.sangunett@ferc.gov <brandi.sangunett@ferc.gov>
Sent: Wed Apr 16 12:48:06 2008
Subject: RE: 20080410_PPiszczek_FERC_Vernon_Operations_Plan

John and Paul -- Sorry that I haven't been able to get back to you earlier. The explanation of how instantaneous run-of-river conditions are maintained during low flow periods makes sense. The flow duration curve is a bit hard to read on the low end. It almost appears that inflows never decline to 0.2 csm. (Clearly, the conservation flow wasn't set high enough!) So, as long as the station is operational, the flows can be covered through operation of one or more units, and, IF the inflow is less than 0.2 csm, the headpond is held constant. If the station goes off line for whatever reason, the inflow is estimated and sluicegate is dropped in accordance with the head/flow relationship in the table you provided, or a Tainter gate is cracked open. I guess the only caution is 1) if a shutdown is planned, the operator should be prepared to make a "seamless" transition, so that there is no interruption of flow, or 2) if the shutdown is unanticipated, the protocol should provide for a rapid response (e.g., not spending half an hour estimating inflow with a slide rule). My understanding is that the immediate downstream reach is backwatered. Otherwise, we might look for gate automation to avoid dewatering of habitat.

You might want to note in the review of future compliance records whether the above low-flow scenarios ever occur and whether the operating procotol does in fact assure instantaneous r-o-r operation.

Thanks.
Jeff

><{{{˜> Jeffrey R. Cueto, P.E., Chief Hydrologist

><{{{˜> VT Department of Environmental Conservation
><{{{˜> Dam Safety and Hydrology Section
><{{{˜> Facilities Engineering Division, Laundry Bldg.
><{{{˜> 103 South Main Street, Waterbury, VT 05671-0511
><{{{˜> (802) 241-3758
><{{{˜> jeff.cueto@state.vt.us

From: John Ragonese [mailto:john_ragonese@transcanada.com]
Sent: Thursday, April 10, 2008 10:13 AM
To: Piszczek, Paul
Cc: Cueto, Jeff; brandi.sangunett@ferc.gov
Subject: RE: 20080410_PPiszczek_FERC_Vernon_Operations_Plan

Paul:

If I understand your question…

Your question relates to when inflows would be less than any of the 10 unit minimum flow capacities, which is almost impossible as we try to maintain 1250 cfs regardless of inflow in reality. But let's say the lowest limit we would want to run any of our now 10 unit down to passes 500 cfs and the inflow drops below that amount what would we do? And how would we do it?

We would estimate what the inflow is based on calculated discharge from the unit and then a calculated inflow based upon our procedure which involves knowing what is coming in from upstream through gages and Bellows Falls discharge together with an estimate of intermediate inflow based pond the storage tables for Vernon. Based on the table you reference below (and attached), we would then open the sluice gate (which is a surface gate and can pass as little as 15cfs if opened .5 feet down from pond elevation). If our estimate of inflow is too low the pond would still continue to drop, if it was too high the pond would rise and we would continue to drop the gate in order to find the balance and cause the pond to stabilize. We read pond elevation instantaneously and could call down to the plant for gate adjustments.

Likewise we could do the same with our tainter gates and might choose to as we can operate gates 1 and 2 remotely from the same control center we monitor inflows and station discharge from. In our example above, we could open a single tainter gate less than a half a foot to pass this flow.

However, all that said we rarely IF EVER pass less than 1250 cfs as I believe the Figure B-1 flow duration curve from our license amendment application points out. See attached pdf. Part of this is due to the fact that Vermont Yankee requires a certain amount of flow in the river and we cooperatively maintain that flow.

Does this address your question satisfactorily?

John

From: Piszczek, Paul [mailto:Paul.Piszczek@des.nh.gov]

Sent: Thursday, April 10, 2008 8:40 AM
To: John Ragonese
Cc: Cueto, Jeff; brandi.sangunett@ferc.gov
Subject: 20080410_PPiszczek_FERC_Vernon_Operations_Plan

John,

In the revised plan, the text states that the gate just east of the power station will be opened to pass the flows. Is this gate the trash sluice gate described in Appendix C, Figure 7? How are adjustments made to maintain a stable headpond, especially with declining inflows?

Paul

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Paul Piszczek

NHDES-Watershed Management Bureau

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paul.piszczek@des.nh.gov <mailto:paul.piszczek@des.nh.gov>

-----Original Message-----
From: John Ragonese [mailto:john_ragonese@transcanada.com]
Sent: Monday, April 07, 2008 4:49 PM
To: Piszczek, Paul
Cc: Cueto, Jeff; brandi.sangunett@ferc.gov
Subject: RE: 20080407_PPiszczek_FERC_Vernon_Plans_Comments

Paul:

I have attached a revised Operations Plan (WQC Conditions E-3 and E-4) for your review, in redlined strikeout so you can see where I made the changes. Please review the changes before I finalize and submit a clean version.

Regarding Operations - 1 below: The Appendix A -Operating Procedures is under revision currently. I have changed the wording in the WQC Operations Plan to reflect the fact that it is under revision and that the Appendix A version is a draft revised copy only and has not been reviewed or been approved by the USACE for which its purpose is to meet our requirement under Article 32 as a coordinated operations agreement. This document has been revised several times with the USACE in the past when we constructed the fish ladder and when we installed spillway control structures.

Regarding Operations – 2 below: I have made changes in the document to Section 3.2 and 3.4 to address these comments and added an new Appendix C Gate Capacity Tables & Curves (former Appendix C and D renamed).

Debris Disposal Plan: I have already sent you the revised Plan addressing the agency jurisdictional comment.

Rating Curves: This is not referenced in the FERC License but I have acquired Discharge tables for Units 1-4 and 9-10 and hope to get curves tomorrow, which are used in our SCADA system for remote operation and control. I hope to send them off to you tomorrow in a revised Rating Curve Document.

Please let me know if these changes are sufficient

John

From: Piszczek, Paul [mailto:Paul.Piszczek@des.nh.gov]
Sent: Monday, April 07, 2008 9:11 AM
To: John Ragonese
Cc: Cueto, Jeff
Subject: 20080407_PPiszczek_FERC_Vernon_Plans_Comments

John,

Thanks for the email a little while ago regarding the name change in the Debris Disposal Plan. See my reply, along with other comments, below. Please address the comments and make the necessary changes to the plans.

Operations:

1. Need to clarify Appendix A, Operating Procedure, Section 3.01. If min flow release is 1,250 cfs, and the “remaining 150-200 cfs” would come from other units, shouldn’t the 1,750 cfs be

1,100 cfs or so? The FERC application notes Units 9 and 10 have a max hydraulic capacity of 2,035 cfs. Is that Unit 9 and 10 combined, for ~1,017.5 each?

2. If flows are declining below the minimum station capacity (e.g., the drought is coming), what action is taken to institute a run-of-river condition? Does the station capacity extend below the natural low flows for the Connecticut River? Note in Section 3.2, the project goes to a daily cycle operation when inflows decline below the station capacity. 0.2 csm must be passed during the headpond refill part of the cycle. This is not described in the plan. Further, if daily inflow falls below 0.2 csm, can we assume no operations? If a gate opening is used to provide conservation flows during these conditions, please provide the information on the setting and the gate rating curve.

Rating Curves: Please provide the curves for all units, as required by the 401 WQC. The curves you sent over are only for Units 5-8.

Debris disposal: In Section 6.0 on dredging, permitting in Vermont would be handled by the "Department of Environmental Conservation,"not the "Vermont Water Resources Panel." Please revise accordingly.

I have an approval letter for WQ, Erosion, D/S Fish Passage, and Debris Disposal ready to go, once you send me the revised Debris Disposal Plan. Brandi will be on the cc list on the letter.

Paul

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Paul Piszczek

NHDES-Watershed Management Bureau

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Concord, NH 03302

v (603) 271-2471

f (603) 271-7894

paul.piszczek@des.nh.gov <mailto:paul.piszczek@des.nh.gov>

-----Original Message-----
From: John Ragonese [mailto:john_ragonese@transcanada.com]
Sent: Monday, April 07, 2008 8:59 AM
To: Piszczek, Paul
Subject: RE: 20080404_PPiszczek_FERC_Vernon_Letter

Yes, I was trying to get that to you on Friday but wanted to be sure I have the correct change. Where was it specifically? And was it, “replace Water Resource Panel” with what again? VANR? I can make the change immediately after hearing from you and send it by email.

_____

From: Piszczek, Paul [mailto:Paul.Piszczek@des.nh.gov]
Sent: Monday, April 07, 2008 8:56 AM
To: John Ragonese
Subject: RE: 20080404_PPiszczek_FERC_Vernon_Letter

John,

The letter is all set. Should I wait for the debris disposal plan?

Paul

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Paul Piszczek

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f (603) 271-7894

paul.piszczek@des.nh.gov <mailto:paul.piszczek@des.nh.gov>

-----Original Message-----

From: John Ragonese [mailto:john_ragonese@transcanada.com]
Sent: Friday, April 04, 2008 4:28 PM
To: Piszczek, Paul; brandi.sangunett@ferc.gov
Cc: Cueto, Jeff
Subject: RE: 20080404_PPiszczek_FERC_Vernon_Letter

Thank you Paul. I may try to file the revised Debris Plan with the referenced name change tonight.

Brandi: Once I receive the letter on Monday I should be able to re-file to eLibrary, the Water Quality Monitoring, the Erosion and Fish Passage plans. We will respond to the comments asap and re-file the further revised plans with the State 401 agencies for final review and approval.

John

From: Piszczek, Paul [mailto:Paul.Piszczek@des.nh.gov]
Sent: Friday, April 04, 2008 4:20 PM
To: John Ragonese; Cueto, Jeff
Cc: brandi.sangunett@ferc.gov
Subject: 20080404_PPiszczek_FERC_Vernon_Letter

John,

I received the letter in today's postal mail. I know two months have passed since my last update on the review and approval process. I apologize for the delay.

Nonetheless, I consulted Jeff and he had a few comments on the operations plan, debris disposal, and rating curves. I will send along those comments on Monday (4/7), but wanted to let you know we are all set with the water quality and erosion plans. In addition, the fish passage information you provided is sufficient for the purposes of the 401 Certification. I will send an approval letter on Monday 4/7 for water quality, erosion, and fish passage.

Before sending an approval letter for rating curves, operations, and debris disposal, I will need rating curves and revised plans for operations and debris disposal. Please note the only revision to the debris disposal plan is a simple name change.

You will see more correspondence from me on Monday.

Paul

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Paul Piszczek

NHDES-Watershed Management Bureau

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Concord, NH 03302

v (603) 271-2471

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paul.piszczek@des.nh.gov <mailto:paul.piszczek@des.nh.gov>

-----Original Message-----
From: John Ragonese [mailto:john_ragonese@transcanada.com]
Sent: Friday, April 04, 2008 3:55 PM
To: Piszczek, Paul; Cueto, Jeff
Cc: brandi.sangunett@ferc.gov
Subject: 04-01-08-FERC-ltr-VERN-WQC plans overdue.pdf - Adobe Acrobat Standard
Importance: High

Paul:

I just received this correspondence from the FERC regarding the various plans required under the NH 401 WQC. As you recall, we discussed getting additional and final review including a statement that the Conditions in the 401 have been met through these plans. In you email of 2/5/08, you felt that we would be able to receive these comments and possibly approval of the various plans we filed within a couple weeks.

Is there any possibility for you to complete this review / approval in the near future? Although it is TransCanada's position that we did file plans we do acknowledge mis-reading the requirement to have an Approval rather than typical, review-comment-response from State agencies. FERC is considering this as a compliance action, has interpreted our previous filings as withdrawn and is not prepared to accept an extension on filing deadlines.

Anything you can do to expedite this would be greatly appreciated.

John

The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

December 19, 2007

Mr. John Ragonese
TransCanada Northeast Hydro Region
4 Park Street
Concord, NH 03301

Re: Vernon Hydroelectric Project: FERC No. 1904

Dear Mr. Ragonese:

New Hampshire Department of Environmental Services (DES) Watershed Management Bureau (WMB) has reviewed the draft Water Quality Monitoring Plan, draft Debris Disposal Plan, draft Erosion Monitoring Plan, draft Reservoir and Minimum Flow Operations and Monitoring Plan, and draft Downstream Fish Passage Monitoring Plan. The plans were received via electronic mail between November 20, 2007 and December 3, 2007. With the exception of the draft Downstream Fish Passage Monitoring Plan, all plans required review and approval by DES pursuant to DES 401 Water Quality Certification (401 Certification) 2006-008 issued on July 3, 2006 for the Project.

Please address the following comments and submit the revised plans to WMB for further review and final approval consistent with the requirements of 401 Certification 2006-008.

Water Quality

1. Section 5.1 describes monitoring stations. Station A may represent the deepest area of the river associated with the Project, based on data from the Vermont Yankee Generic Environmental Impact Statement (EIS) dated December 2006. The water depth near the west bank approximately 0.25 mile upstream from Station A is 39.1 feet. Please include water temperature/dissolved oxygen profiles for each sampling event at Station A, as only water temperature data are available in the EIS.

2. Section 5.3 describes QC checks for dissolved oxygen. Please include provisions for a field replicate measurement after every 10^{th} sample. Take the replicate measurement exactly as the original sample (i.e., raise the water quality meter back to the surface, then re-immerse the meter to the depth of the original sample).

Debris disposal

1. The document notes that solid waste and hazardous waste will be managed and disposed of according to federal and state regulations. Please provide references for those regulations.

2. Section 5.0 describes the use of erosion and runoff controls to prevent discharges to the environment. Please provide examples of potential erosion and runoff controls and secondary containment structures.

3. Section 6.0 notes "New Hampshire...wetland authorities." Please revise as New Hampshire Department of Environmental Services Wetlands Bureau. Further, the text states that sediment sampling will occur if sediment contamination is suspected. Please revise the text to state that sampling will be conducted for all sediments dredged, particularly if the sediments are to be used on dry land as fill.

Erosion

Section 4.0 notes that the proposed monitoring program will remain consistent with the methods used in prior surveys. Please provide additional details on those methods.

Operations

1. The document does not describe specific statements relative to the avoidance, minimization, or control of lag times, nor were any contingency plans discussed relative to non-compliance with minimum flows. Please include a discussion of contingency plans and avoidance, minimization, and control of lag times, as required pursuant to 401 Certification 2006-008.

2. Please include provisions for changes to operations should violations of water quality standards for dissolved oxygen occur at the Project. This is required pursuant to Condition E-5 of 401 Certification 2006-008.

3. Page 3, Section 3.3 describes reservoir WSEL relative to the past eight years. Please discuss the representativeness of the eight years relative to future operations.

4. Please address the comments by the Vermont Department of Environmental Conservation via electronic mail dated December 19, 2007.

Thank you for providing the draft plans for WMB review. Please feel free to contact me if you have questions or wish to further discuss these comments. Thank you.

Very truly yours,

Paul Piszczek

Paul Piszczek
Watershed Management Bureau

cc: Jeff Cueto, VANR (via electronic mail)
Gabe Gries, NH F&G (via electronic mail)
John Warner, USFWS (via electronic mail)

John Ragonese

From: Cueto, Jeff [Jeff.Cueto@state.vt.us]
Sent: Wednesday, December 19, 2007 12:09 PM
To: John Ragonese
Cc: Piszczek, Paul; John Warner; USFWS
Subject: RE: Reservoir and Minimum Flow Operations and Monitoring Plan

ignore the comment. dyslexia is getting the best of me. i thought the storage value was for 220.13 to 222.13, but now i see its for 220.13 down to 212.13.

><{{{˜> ***Jeffrey R. Cueto, P.E., Chief Hydrologist***
><{{{˜> VT Department of Environmental Conservation
><{{{˜> Dam Safety and Hydrology Section
><{{{˜> Facilities Engineering Division, Laundry Bldg.
><{{{˜> 103 South Main Street, Waterbury, VT 05671-0511
><{{{˜> (802) 241-3758
><{{{˜> jeff.cueto@state.vt.us

From: John Ragonese [mailto:john_ragonese@transcanada.com]
Sent: Wednesday, December 19, 2007 12:01 PM
To: Cueto, Jeff
Cc: Paul Piszczek (NHDES); ggries@nhfgd.org; John Warner; USFWS; Wentworth, Rod; McMenemy, Jay
Subject: RE: Reservoir and Minimum Flow Operations and Monitoring Plan

Thanks Jeff,

Briefly,
1.) We are happy to provide a copy of the flood control plan once we revise it and submit a copy to the USACE and FERC but at this time we only have our current, soon to be out-dated version. Also it is not specifically required by the Condition and thus we do not believe it is absolutely necessary to meet the requirements specified in the NH401. It has no potential for affecting conservation flows and normal reservoir management because by nature it is about high flow management and the need to operate the reservoir in a manner as to keep it within its banks to the extent possible.
2.) I will review Section 3.4 to make sure it makes sense to even enumerate possible emergency conditions. I agree on the surface the point made in your last sentence does not make sense. What we are saying here is, in an unanticipated emergency which forces an interruption. If we have a planned activity (not considered an emergency in the context of this section) that would potentially curtail MF , we would obviously check with our State agencies first.
3.) Where do you see “but it looks like…”

From: Cueto, Jeff [mailto:Jeff.Cueto@state.vt.us]
Sent: Wednesday, December 19, 2007 11:38 AM
To: John Ragonese
Cc: Paul Piszczek (NHDES); ggries@nhfgd.org; John Warner; USFWS; Wentworth, Rod; McMenemy, Jay
Subject: RE: Reservoir and Minimum Flow Operations and Monitoring Plan

John -- The plan will need approval under the NH 401, and Paul Piszczek and I are doing a coordinated review. Paul shared NHDES's draft response with me earlier, and I concur with NH's comments and requests for information. Additionally:

1) The Corps of Engineers flood control coordination agreement should be included in the plan prior to seeking final approval from NHDES. The plan should indicate whether implementation of the plan has the potential for affecting compliance with the conservation flow and normal reservoir management.

2) As related to emergency operations and temporary suspension of the conservation flow, the draft plan enumerates (Section 3.4) several different scenarios relative to when the minimum flows would be "temporarily modified." The plan does not indicate the extent of modification that might be necessary. Curtailing flow at any project is a major concern as it has the potential to reverse the gains made from restoring conservation flows. In some cases, fish kills can result. TransCanada should, based on its operating experience, justify each scenario and address how flows would be managed so as to minimize the deviation. It is not clear, for example, why "low natural precipitation" would necessitate modifying the conservation flow release, since it is 1,250 cfs or inflow if less.

3) In Section 3.2, the first paragraph was a bit confusing since it says that the typical fluctuation is within the upper 2 feet, but it looks like it's managed between -2 and -4 ft. from the crest.

><{{{˜> ***Jeffrey R. Cueto, P.E., Chief Hydrologist***
><{{{˜> VT Department of Environmental Conservation
><{{{˜> Dam Safety and Hydrology Section
><{{{˜> Facilities Engineering Division, Laundry Bldg.
><{{{˜> 103 South Main Street, Waterbury, VT 05671-0511
><{{{˜> (802) 241-3758
><{{{˜> jeff.cueto@state.vt.us

From: John Ragonese [mailto:john_ragonese@transcanada.com]
Sent: Wednesday, November 21, 2007 6:12 PM
To: Paul Piszczek (NHDES); Cueto, Jeff; ggries@nhfgd.org; John Warner; USFWS
Subject: Reservoir and Minimum Flow Operations and Monitoring Plan

Greetings: Per Conditions E-3 and E-4 and Article 405 of the NH WQC and Vernon Amendment I am please to provide you with this Agency Draft of the Reservoir and Minimum Flow Operations and Monitoring Plan for the Vernon Project. Please review this and if you have any comments, please get them to me within 30 days. Thanks you in advance for your cooperation.

I had intended to include as Appendix A is a copy of the Operations Procedure for Vernon which serves as an internal guidance document and a document required for coordination of flows during flood conditions with the US Army Corp of Engineers. That document however, has not been finalized to reflect the re-powering operation at this time but will be shortly. As this is not a required portion of this plan I chose to send you this now and will supplement the email with a revised Operations Plan.

Thank you and have a great Thanksgiving.

***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***
Email: john_ragonese@transcanada.com

APPENDIX E

RESPONSE TO AGENCY COMMENTS

Vernon Hydroelectric Project
Reservoir and Minimum Flow Operations and Monitoring Plan

Summary of Responses to Agency Comments

Agency Comment	Response
NHDES_1: The document does not describe specific statements relative to the avoidance, minimization, or control of lag times, nor were any contingency plans discussed relative to non-compliance with minimum flows. Please include a discussion of contingency plans and avoidance, minimization and control of lag times as required pursuant to 401 Certification 2006-008.	Revisions have been made to Section 3.4 in the final Plan.
NHDES_2: Please include provisions for changes to operations should violations of water quality standards for dissolved oxygen occur at the Project. This is required pursuant to Condition E-5 of401 Certification 2006-008.	Revisions have been made to Section 3.2 in the final Plan
NHDES_3: Page 3. Section 3.3 describes reservoir WSEL relative to the past eight years. Please discuss the representativeness of the eight years relative to future operations.	Revisions have been made to Paragraph 2 of Section 3.3
NHDES_4: Please address the comments by the Vermont Department of Environmental Conservation via electronic mail dated December 19. 2007.	The VTDEC comments are addressed as described below.
VTDEC_1: The Corps of Engineers flood control coordination agreement should be included in the plan prior to seeking final approval from NHDES. The plan should indicate whether implementation of the plan has the potential for affecting compliance with the conservation flow and normal reservoir management.	We have included a copy of the existing Operating Procedures associated with the USACE Agreement in Appendix A for informational purposes only. Their primary focus is coordination of high flows and thus the existing procedures and any changes made will not affect conservation flow and normal reservoir operation.
VTDEC_2: As related to emergency operations and temporary suspension of the conservation flow, the draft plan enumerates (Section 3.4) several different	TransCanada has revised Section 3.4 to clarify what it does in response to unforeseen minimum flow interruptions or

scenarios relative to when the minimum flows would be "temporarily modified." The plan does not indicate the extent of modification that might be necessary. Curtailing flow at any project is a major concern as it has the potential to reverse the gains made from restoring conservation flows. In some cases, fish kills can result. TransCanada should, based on its operating experience, justify each scenario and address how flows would be managed so as to minimize the deviation. It is not clear, for example, why "low natural precipitation" would necessitate modifying the conservation flow release, since it is 1,250 cfs or inflow if less.	deficiencies or how it would consult with State Agencies prior to anticipated conditions would affect our ability to provide minimum flow. We removed references to general examples of emergency conditions, as we agree; many did not appear to make sense upon additional review.
VTDEC_3: In Section 3.2, the first paragraph was a bit confusing since it says that the typical fluctuation is within the upper 2 feet, but it looks like it's managed between -2 and -4 ft. from the crest.	TransCanada requested clarification on this comment in a December 19, 2007 reply email. VTDEC withdrew the comment citing confusion.