REVIEW OF APPLICATION FOR RE-CERTIFICATION BY THE LOW IMPACT HYDROPOWER INSTITUTE OF THE VERNON PROJECT

Prepared by:
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I. INTRODUCTION AND OVERVIEW

This report reviews the application for re-certification initially submitted by TransCanada Hydro Northeast, Inc. (Applicant or TransCanada) on December 5, 2013, to the Low Impact Hydropower Institute (LIHI) for re-certification for the Vernon Hydroelectric Project (P-1904) (the Project). The Vernon Project is located on the Connecticut River in Hinsdale, Cheshire County, New Hampshire, and Vernon, Windham County, Vermont. Initial certification became effective date December 15, 2008, with an expiration date of December 15, 2013. The reviewer at that time was Gabriela Goldfarb who completed her report in June 2009. Both this reviewer's report and a LIH staff report can be found here: http://lowimpacthydro.org/lihi-certificate-40-vernon-project-vermont-ferc-1904/. It was agreed between LIHI and TransCanada that an updated application could be delayed until LIHI's completion of its review of TransCanada's Fifteen Mile Project, which occurred in July 2015. An updated application was submitted by TransCanada on December 30, 2015, with additional supporting materials not available until May 2016. This delay in part was because some data (e.g. 2015 fish passage testing) was completed coincident with studies required for Project re-licensing. The primary LIHI reviewer was Patricia McIlvaine, with support from Michael J. Sale on key controversial issues.

LIHI's recertification process asks two questions:

- Have LIHI's certification criteria been revised since the previous certification was issued by LIHI in 2007?
- Have there been "material changes" at the facility that would affect the certification?

Criteria Changes

LIHI is in the process of revising its certification criteria and publishing a new Handbook, with the transition to the new certification processes staring April 2016. Facilities that have applied for recertification on or before December 31, 2015, are to be evaluated using the April 2014 version of LIHI's Certification Handbook.

Neither the LIHI's April 2014 criteria being applied to this recertification, or the Board's interpretation of one or more criteria, that are applicable to the circumstances of the Vernon Project, have changed in meaningful ways since the date of the original certification.

Material Changes

In accordance with the Recertification Standards, "material changes" mean non-compliance and/or new or renewed issues of concern that are relevant to LIHI's criteria. A preliminary review of the application indicated that "material changes" have occurred at the Project, primarily associated with:

- Performance of various downstream fish passage effectiveness and turbine mortality studies,
- Recent identification of state protected species onsite as a result of the ongoing re-licensing activities, and
- Performance of new water quality assessments, also as a result of the ongoing re-licensing activities.

The LIHI process requires that projects applying for re-certification that have "material changes" must undergo a full Intake Review and full review confirming criteria compliance using the standard "certification" report format. The Applicant was required to provide supplemental information for review in response. As previously noted, the final materials were not provided until mid-May 2016. Agency comments were not received until May 26 and May 31, 2016.

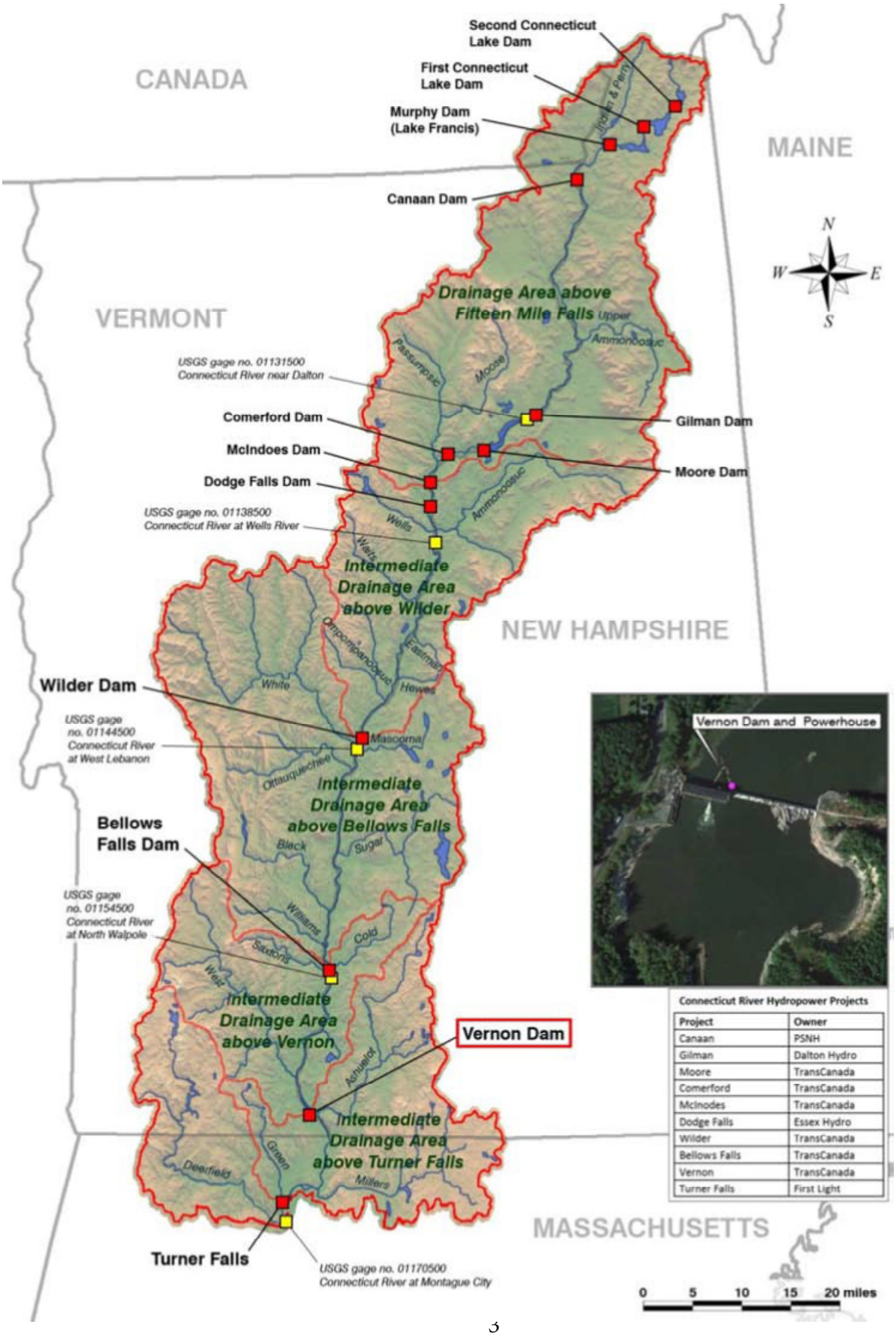
Abbreviated description information, much of which has been excerpted from the original reviewer's report, is contained in this report, as this is a recommended recertification of the project. Additional information can be found in the original certification report from June 2009.

II. PROJECT'S GEOGRAPHIC LOCATION

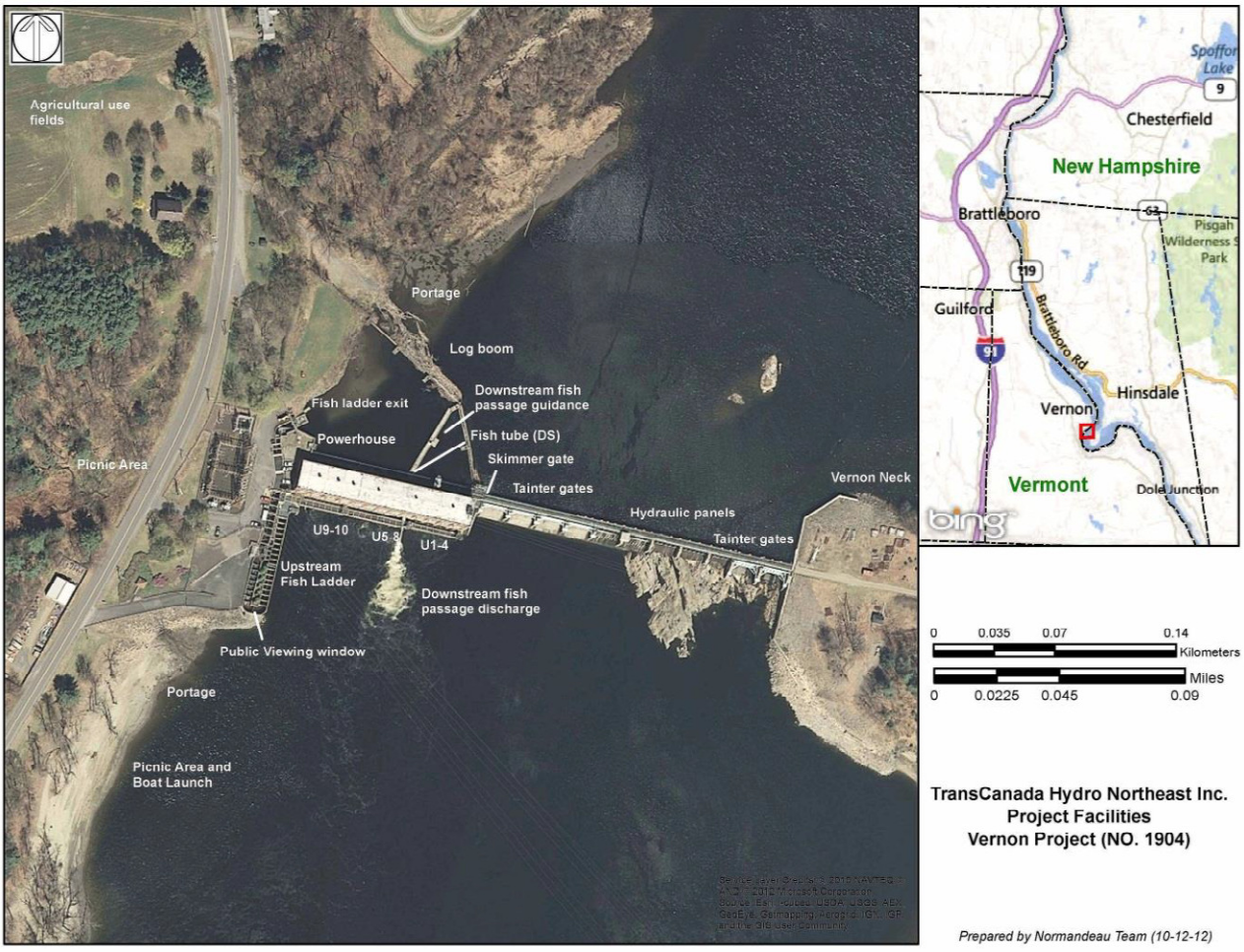
The Project is located on the Connecticut River in Cheshire County, New Hampshire, and Windham County, Vermont. The map on the next page illustrates the Project's location relative to nearby upstream dams and the closest downstream dam, Turner's Falls dam, which is owned by FirstLight Power Resources. The 20-mile stretch of the Connecticut River, extending from the dam at Turner's Falls north to the Vernon Dam in Vermont, forms the Turner's Falls impoundment, as well as the lower reservoir for the Northfield Mountain Project, a pumped storage project, also owned by FirstLight Power Resources. Since 1972, Vermont Yankee, which was recently decommissioned, withdrew cooling water from the Vernon Project reservoir and discharged this water back to the Vernon reservoir. The most downstream dam on the main stem of the Connecticut River is the Holyoke Dam, located at river mile 87 or about 35 miles downstream of Turner's Falls dam. Both Holyoke and Turner's Falls dams provide for upstream and downstream fish passage.

III. PROJECT AND IMMEDIATE SITE CHARACTERISTICS

The project, located at river mile 142 on the Connecticut River, consists of a concrete gravity dam and a single powerhouse. The Vernon reservoir extends 26 miles upstream and has a surface area of 2,550 acres at full pool elevation 220.13 msl. The powerhouse contains four 2,000-k W, four 4,000-kW, and two 4,200-kW generating units, for a total installed capacity of 32,400 kW; The project operates as a daily cycling generating facility with limited storage and has a minimum flow requirement, set in the 1979 relicensing, of 1250 cfs. (See discussion under the Criterion A - Flows regarding this minimum flow.) Photographs of the project are located on page 4 of this report.


Second Connecticut Lake Dam
First Connecticut Lake Dam
Murphy Dam (Lake Francis)
Canaan Dam
CANADA
MAINE
VERMONT
NEW HAMPSHIRE
MASSACHUSETTS
N
W
E
S
Drainage Area above Fifteen Mile Falls
USGS gage no. 01131500 Connecticut River near Dalton
Comerford Dam
McIndoes Dam
Dodge Falls Dam
Gilman Dam
Moore Dam
USGS gage no. 01138500 Connecticut River at Wells River
Intermediate Drainage Area above Wilder
Wilder Dam
USGS gage no. 01144500 Connecticut River at West Lebanon
Intermediate Drainage Area above Bellows Falls
Bellows Falls Dam
USGS gage no. 01154500 Connecticut River at North Walpole
Intermediate Drainage Area above Vernon
Vernon Dam
Intermediate Drainage Area above Turner Falls
Turner Falls
USGS gage no. 01170500 Connecticut River at Montague City
Vernon Dam and Powerhouse
Connecticut River Hydropower Projects
Project | Owner
Canaan | PSNH
Gilman | Dalton Hydro
Moore | TransCanada
Comerford | TransCanada
McIndoes | TransCanada
Dodge Falls | Essex Hydro
Wilder | TransCanada
Bellows Falls | TransCanada
Vernon | TransCanada
Turner Falls | First Light
0 5 10 15 20 miles

Aerial photograph of the Project



Vernon Station looking upstream

Upstream fish passage
(Ice Harbor and vertical slot design)

IV. REGULATORY AND COMPLIANCE STATUS

FERC License

The Federal Energy Regulatory Commission (FERC) issued the project license on June 25, 1979 to expire on April 30, 2018. The license was amended in 1992 to allow for the installation of additional units that would have increased the generating capacity of the project from 24.4 megawatts (MW) to 44.4 MW. Instead of installing two 14.0-MW units, as authorized in the 1992 amendment, the applicant instead sought and received authorization to replace the four existing inoperable 2.0-MW turbines with four new 4.0-MW units. FERC issued a license amendment approving the change in 2006. The change decreased the project's total authorized generation capacity from 44.4 MW to about 32.4 MW. The added generation first generated electricity in 2008, and did not change the facility's mode of operation. This increase in generation occurred prior to initial certification by LIHI. As noted in the 2009 LIHI reviewer's Report, it appears that the assessments conducted for these amendments were not as comprehensive as the studies that are conducted for full re-licensing.

Set to expire in 2018, TransCanada initiated re-licensing activities in December 2012 with submission of its Notice of intent to file license application, filing of pre-application document. On August 27, 2013, Entergy announced its plans to decommission Vermont Yankee during the fourth quarter of 2014. Vermont Yankee withdrew cooling water from the Vernon reservoir for and discharged this water back to the Vernon reservoir. The discharge of warm water from Vermont Yankee has influenced water temperatures in the Vernon reservoir and downstream of the Vernon Project since 1972.

Recognizing the potential influence of the closure of Vermont Yankee on the baseline environmental conditions in the Vernon reservoir and downstream of the Vernon Project, the FERC tiered its study plan determination to account for the anticipated closure of Vermont Yankee. Following a technical conference held on November 26, 2013, FERC adjusted the schedule for aquatic studies to provide that the studies would be initiated in the 2015 field season due to the timing of the closure of Vermont Yankee. As a result, on January 16, 2015, TransCanada requested that the term of the license for the Project be extended for one year to maintain the integrity of the ILP pre-filing process in light of the delay in conducting necessary studies caused by the closure of Vermont Yankee, and the statutory deadline for submitting new license applications two years before a license expires. All resource agencies supported the license extension, although caution was noted to FERC that it was critical to maintain a coordinated and simultaneous re-licensing review of TransCanada's and FirstLight Power Resources Connecticut River projects (Turner's Falls and Northfield Mountain). FERC granted a one year extension of the Vernon license (to April 30, 2019) on July 22, 2015. Thus, the existing license will not expire until after a new LIHI certification five-year period, which would be from December 2013 to December 2018.

Water Quality Certification (WQC)

NHDES issued the project a Clean Water Act Section 401 Certification (401 Certification) in July 2006 on behalf of the States of New Hampshire and Vermont in conjunction with the 2006

license amendment. The 401 Certification explicitly acknowledged that the activity would "cause hydrologic modifications to the Connecticut River, including changes in flow regime upstream and downstream from the Vernon Dam beyond that which occurs under un-regulated conditions." A requirement of the WQC included preparation and implementation of a plan to monitor dissolved oxygen and water temperature in the river to ensure compliance with New Hampshire and Vermont Class B surface water quality standards. These results are discussed under Criterion B - Water Quality.

V. PUBLIC COMMENT RECEIVED BY LIHI

The period for submission of comments on the re-certification application was from January 27, 2014 through March 28, 2014. No comments were received. Out-reach was made to key federal and state resource agency personnel by the LIHI reviewer in April 2016. It is important to note that the outreach to the agencies identified that comments being sought are requested to be limited to compliance issues or concerns associated with existing license and WQC requirements. Due to the planned mid-May release of key study plans such as fish passage, a number of agencies identified that they could not provide comment in response to LIHI inquiries until mid-May. Comment letters were received on May 26th from the New Hampshire Department of Environmental Services (NHDES) and the Vermont Agency of Natural Resources, Department of Environmental Conservation (VTANR). An email was also received from NH Fish and Game. All three recommended against recertification at this time. These comments, along with those provided by other agencies, are included in Appendix A. Specific comments are discussed in the specific criterion sections.

VI. SUMMARY OF COMPLIANCE WITH CRITERIA AND ISSUES IDENTIFIED

The relicensing efforts resulted in the accessibility of study data for many criteria that is not typically available for LIHI recertification reviews. However, this data was reviewed only from the perspective of compliance with current requirements, and does not examine possible opportunities for improvements within any of the areas that may be sought by resource agencies and/or FERC as part of the relicensing of the project. It is also important to note that the study results were taken "at face value", meaning it was assumed that they were performed using sound scientific methodologies approved by the resource agencies as part of the study development phase of the re-licensing activities. A number of agencies submitted comments regarding these various re-licensing studies, some of which proposed that some study approaches were not complete. As the intent of these studies is to determine possible enhanced environmental protection requirements for future operations in a new license, this recertification review did not attempt to evaluate such agency positions. Also, not all studies have been finalized. Rather, an attempt was only made to use data, such as new water quality testing results, which such efforts provided. This approach is similar to use of newly acquired water quality data requested by a state resource agency in order for them to comment on compliance of a facility with existing water quality standards for which a water quality certification predates 1986.

Criterion A - Flows – The 1979 FERC license incorporates a minimum flow requirement of 1,250 cfs, primarily for water quality management. Neither the 1992 nor 2006 FERC license amendments, nor the 2006 WQC, modified this requirement. This flow value concerned many

resource agencies in the past and continues to be problematic for them, as noted in the 2009 Reviewers Report, evidenced by various filings made in regard to the re-licensing efforts, and recently received comments. (See further discussion under Criterion A – Flows). Nonetheless it still stands as the current requirement and non-compliance with it has not been identified by the resource agencies. Only one deviation in the release of this minimum flow occurred since being certified in December 2008. FERC did not view the deviation as a license violation.

Criterion B - Water Quality – The Project appears to be in compliance with the requirements of the NHDES WQC issued to the Project on behalf of NH and VT, and adopted into the FERC License. Review of water quality data collected in 2011-2012 as required by the WQC and the FERC License, and data collected in 2015 during re-licensing efforts, indicated compliance with the numerical standards of both states as reported by TransCanada. Resource agencies however expressed concern that it is uncertain that the WQC requirement to provide water quality "adequate to support aquatic life" is being achieved in large part due to the minimum flow of 1250 cfs.

Criterion C - Fish Passage and Protection. The Project appears to remain in compliance with this criterion, although final agency assessment of the effectiveness of downstream passage of juvenile American shad remains outstanding. A condition has been issued in regard to this final agency review. A condition has also been recommended regarding proactive consultation with the resource agencies on passage for riverine species and American eel, neither of which is required by the current license and WQC.

Criterion D - Watershed Protection – The project is not required to have a dedicated buffer zone, watershed enhancement fund, a shoreland buffer or equivalent watershed land protection plan, nor a shoreland management plan.

Criterion E - Threatened and Endangered Species Protection – No federally protected species were found in the project area during 2015 studies. However, Fowler's toad, a VT state endangered species was found below the Vernon dam, and Pygmy-weed (Crassula aquatica), which is listed as endangered by both VT and NH, was observed growing at the Vernon impoundment. Final assessment of potential impacts to these species is still ongoing.

Criterion F - Cultural Resources –All measures required by the FERC license and Historic Properties Management Plan to protect the cultural resources on Project lands have been implemented and agency comments support this finding. The project continues to be in compliance with this criterion.

Criterion G - Recreation – No new recreationally based activities were required since LIHI certification in December 2008. Several observations were made by respondents to a survey conducted for re-licensing activities. As some of these observations were associated with maintenance of facilities required by the current license, a Condition has been recommended to ensure that such facilities are being properly maintained.

Criterion G - Facilities Recommended for Removal - No resource agencies have recommended dam removal.

VII. GENERAL CONCLUSIONS AND REVIEWER RECOMMENDATION

Based on review of information submitted by the applicant, the additional documentation noted herein, many of which were studies performed for the re-licensing efforts, and comments obtained through consultations with various resource agencies, it appears that this project continues to be in compliance with all LIHI criteria and therefore should be re-certified at this time. Recertification of the Project for a term of five years with the conditions noted below is recommended:

Condition 1. The facility must provide effective upstream and downstream fish passage and protection for migratory fish species. Therefore, the Owner shall continue consultation with the USFWS, VTANR, VFWD and NHF&G to identify appropriate measures to pass juvenile shad downstream, as well as for any other migratory species that the agencies deem appropriate. If any agency recommends that improvements are needed to achieve satisfactory downstream passage, the Owner shall provide to LIHI a copy of those recommendations, along with the Owner's position on those improvements as soon as is practicable. No later than December 31, 2016, and annually after that date, the Owner shall report to LIHI on the status of fish passage improvements and associated agency consultations.

Condition 2. The Owner shall proactively consult with the resource agencies regarding possible interim opportunities to enhance fish passage for American eel and riverine species while the FERC relicensing activities are underway. Such opportunities may involve study and design of fish passage mitigation measures for these species so that they can be implemented more quickly once a new license is issued. During the term of this new LIHI certification, should a resource agency request implementation of upstream or downstream passage measures for anadromous, catadromous, or riverine fish as part of their recommendations/mandates under the new licensing proceedings, the Owner shall notify LIHI within 30 days, provide LIHI with a copy of the request, and describe the Owner's plan to address these requests.

Condition 3. The Owner shall develop a plan and schedule for repair and maintenance of the recreational facilities at the Governor Hunt Picnic Area, including the boat launch, trash collection, and sanitary facilities. The Owner shall make best efforts to ensure these recreational facilities are well maintained. The recreation plan and schedule for its implementation shall be submitted to LIHI as soon as practicable, but no later than June 30, 2017.

Condition 4. The Owner will provide a concise letter report to LIHI annually, providing a status report on FERC licensing progress, listing significant agency interactions that have occurred in the past year that are relevant to LIHI's certification criteria, and highlighting major topics of agreement or disagreement. This report will be provided to LIHI as part of the owner's annual compliance statement. LIHI reserves the right to request additional details if necessary, if highlighted topics are relevant to LIHI's certification criteria and their associated goals.

Condition 5. – If the on-going FERC relicensing proceeding is concluded and a new Commission Order is issued for the facility during the term of the new LIHI certification, the Owner shall notify LIHI within 30 days of that action. Within 60 days of a new FERC license being issued, the owner shall provide LIHI with a report that identifies all material differences

between the requirements of the new FERC license and the standards used to satisfy LIHI's criteria or conditions on the new LIHI certificate. LIHI reserves the right to adjust any and all conditions on the LIHI certificate, pending the outcome of the FERC relicensing, to ensure consistency between the LIHI certificate and the new FERC license. If the on-going relicensing proceeding is not concluded prior to the expiration of the term of the new LIHI certification, no action is required on this condition.

Condition 6. The Connecticut River basin is highly developed for water resources and the operation of multiple hydropower facilities and other water uses in the basin are interconnected to a degree that requires a systematic approach for future water management. Solutions for individual facilities are insufficient to achieve the environmental protection and restoration needed for long-term, sustainable water uses. Therefore, the owner of the Vernon facility shall continue to play a constructive, supportive role in promoting integrative water management in the basin, both in the ongoing FERC relicensing and in other regulatory proceedings that may develop in the basin. The owner shall report to LIHI on its activities relative to this condition each year in its annual compliance report. LIHI reserves the right to modify the certificate conditions again if needed.

THE VERNON PROJECT CONTINUES TO CONDITIONALLY MEET THE LIHI CRITERIA FOR RE-CERTIFICATION

VIII. DETAILED CRITERIA REVIEW

A. FLOWS

Goal: The Flows Criterion is designed to ensure that the river has healthy flows for fish, wildlife and water quality, including seasonal flow fluctuations where appropriate.

Standard: For in=stream flows, a certified facility must comply with recent resource agency recommendations for flows. If there were no qualifying resource agency recommendations, the applicant can meet one of two alternative standards: (1) meet the flow levels required using the Aquatic Base Flow methodology or the "good" habitat flow level under the Montana-Tennant methodology; or (2) present a letter from a resource agency prepared for the application confirming the flows at the facility are adequately protective of fish, wildlife, and water quality.

Criterion:

1) **Is the facility in Compliance with Resource Agency Recommendations issued after December 31, 1986 regarding flow conditions for fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking conditions, and**

seasonal and episodic instream flow variations) for both the reach below the tailrace and all bypassed reaches?

YES.

In addition to application materials submitted by TransCanada, the following was also reviewed:

- Applicant-prepared EA submitted with application for License Amendment on 2/27/06
- Turners Falls relicensing documentation (see TF website at: http://www.northfieldrelicensing.com/Pages/Turners.aspx)

This review showed:

- Vernon pool: WSEL.min=212.13, WSEL.max=220.13; DamHeight.max=58 ft.; tailrace elev. ~220-58=162 ft? Or 212-58=154 ft??
- Turners Falls pool: Emin=176.0, Emax=185.0, 9 ft variation at dam but significant backwater effects up to Vernon that increase with discharge
- The tailwater of Vernon Dam is therefore an impounded reach, not a free-flowing river, with minimum depth in tailrace of Vernon between 14 and 22 ft

Minimum flow requirement at Vernon was originally set in the FERC 1979 License at 1250 cfs primarily for water quality management – this has not been changed in the 1992 nor 2006 FERC license amendments. During the 2009 LIHI certification review, some agencies reported that the discussion of flows was considered "off the table" for discussion. Others indicated that they agreed to not raise the issue of adequacy of the minimum flows, in part, because of the hydraulic interaction between flows from projects upstream and downstream of the Vernon Project, some of which are not owned by TransCanada. Those agencies agreed that modifications of the flow regime would be better handled through the current re-licensing efforts, since projects influencing this section of the river owned by TransCanada and FirstLight Power Resources are simultaneously undergoing re-licensing.

Most important however is that it was effectively reaffirmed in the most recent Clean Water Act Section 401 Water Quality Certificate issued in July 2006 by the NHDES on behalf of the States of New Hampshire and Vermont. (NOTE: all agencies had a chance to comment and have input into this, and it was a joint issuance by the two states, saying continued facility operations "will not violate surface water quality standards, or cause additional degradation in surface waters not presently meeting water quality standards.") The 401 Certification explicitly acknowledged that the activity would "cause hydrologic modifications to the Connecticut River, including changes in flow regime upstream and downstream from the Vernon Dam beyond that which occurs under un-regulated conditions." The 2006 401 Certification also acknowledged the 1,250 cfs flow requirement, and included a condition that required the filing of an operations plan, addressing the approach to be used to comply with this minimum flow release, developed in consultation with, and approved by, applicable federal and state resource agencies. FERC issued its "Order Approving Flow Operations and Monitoring Plan" in September 2008. Thus, while the alteration of natural flows was recognized, the WQC instead of modifying the minimum flow, established requirements to monitor compliance with the 1,250 cfs requirement from 1979.

The flow of 1250 cfs does not meet current conservation, Aquatic Base Flow, or Montana-Tennant standards, as identified during the initial LIHI certification review, and again in the May 26, 2016 letter received from the VT ANR. However, neither the Tennant/Montana nor the NE Aquatic Base Flow standards would be appropriate for setting minimum flows here, because the tailwater is not a free-flowing river.

Company review of actual discharges in 2015 showed they were at or above 1600 cfs 100% of the time. Only one deviation from the minimum flow requirement has occurred since being certified in December 2008. The deviation occurred on November 26, 2014 due to a winter storm which caused numerous transmission line faults in the area, causing the Vernon Station to trip. The total duration of the Vernon minimum flow interruption was 37 minutes. All required State and Federal agencies were notified by copy of the deviation letter report to FERC. On January 9, 2015, FERC elected to not consider the deviation that occurred as a violation of Article 34 of the Vernon Project license.

As discussed further below under the Water Quality Criterion, extensive water quality monitoring below Vernon have shown no water quality problems, therefore the minimum flow must be adequate for water quality purposes. The 2006 WQC found that the year-round minimum flow release of 1,250 cfs through the Vernon powerhouse was adequate "for the protection of aquatic life Immediately downstream from the powerhouse."

Thus, the position taken in the LIHI 2009 certification review appears to still be appropriate. It appears that while detailed flow studies were not undertaken, this requirement was recognized and allowed to continue by many of the resource agencies. Simultaneously re-licensing of the Vernon Project along with other dams up and downstream of this Project will allow for such detailed assessments. Thus, while minimum flow requirements may change with issuance of a new license, the Project appears to be operated in compliance with current license and WQC requirements.

This Project Passes Criterion A - Flows- Go to B

B. WATER QUALITY

Goal: The Water Quality Criterion is designed to ensure that water quality in the river is protected.

Standard*:* The Water Quality Criterion has two parts. First, an Applicant must demonstrate that the facility is in compliance with state water quality standards, either through producing a recent Clean Water Act Section 401 certification or providing other demonstration of compliance. Second, an applicant must demonstrate that the facility has not contributed to a state finding that the river has impaired water quality under Clean Water Act Section 303(d).
Criterion:

1) Is the Facility either:

a) In compliance with all conditions issued pursuant to a Clean Water Act Section 401 water quality certification issued for the facility after December 31, 1986? Or in compliance with the quantitative water quality standards established by the state that support designated uses pursuant to the federal Clean Water Act in the Facility area and in the downstream reach?

YES. Water quality studies were performed by TransCanada upstream and downstream of the Vernon Project in 2011 and more so in 2012. These studies were required by the Article 405 of the FERC license. The monitoring plan was reviewed and commented on (and modified) in response to comments received from the NHDES. The VTDEC did not comment on the plan. According to the summary provided in the Pre-application Document (PAD) issued in October 30, 2012 for the re-licensing activities, 2012 water quality data were found to be within a range that is typical of large, good quality riverine systems in northern New England. All DO/oxygen saturation and pH levels measured met state standards for Vermont and New Hampshire. The report also states that there are no specified state standards for temperature and specific conductivity, but both parameters reflect natural variations and seasonality as expected. Composite water sample data does not exceed nutrient criteria for either state, although at this time Vermont is the only state with numeric criteria, while New Hampshire only notes phosphorus or nitrogen levels should not impair any existing or designated uses, unless naturally occurring.

This document also denotes that the Project was issued an NPDES permit in the mid-1990s and has held a valid discharge permit ever since. This permit allows the Project to discharge minor, nongeneration related wastewaters, including non-contact cooling water from turbine bearings and air compressors and internal leakage in wheelpits and sumps. The Project is required to sample its wastewaters quarterly and report the results of the sampling to Vermont DEC. The permit includes limits for temperature (<90° F), pH (6.5-8.5); and oil/grease (<20 mg/l). TransCanada reported they have never measured a permit exceedence at the Project.

The PAD concludes that "the Vernon dam modifies the physical environment of this section of the Connecticut River by increasing depth, time-of-travel (flushing rate), and in the lower portion of the impoundment, width. However, existing and newly collected water quality data indicate that the Project has, and will continue to have, no significant impact on the primary water quality of concern, DO, or on other physical or chemical parameters."

Additional studies were conducted in 2015, as presented in a March 1 2016 report. In this report, evaluation of project effects on water quality within the study area was investigated by deploying continuous temperature loggers, continuous water quality multiparameter sondes, collecting instantaneous vertical profiles and nutrient and chlorophyll-*a* water column composite samples. Water quality parameters were monitored on a continuous and discrete basis. From April through November 15, 2015 water temperature was continuously monitored throughout the study area. From June through September, water temperature, DO, pH, specific conductivity, and turbidity were continuously monitored at the project forebay, tailrace. Also from June through September, water quality vertical profiles were collected for these parameters. Within the project forebay, nutrient and chlorophyll-*a* data were collected from June through September. Over a 10-day high temperature low-flow period from August 30 through September 8, specific conductivity,

DO, pH, and turbidity were continuously monitored at the station as well as water temperature along transects at various depths.

The 2015 studies assessed the monitoring results against NH and VT state water quality standards separately. Regarding **NH standards**, the report states that temperature, DO, and turbidity varied both temporally and spatially, but no observations were made of either parameter that would interfere with the specified designated uses of the Connecticut River, or were in noncompliance with applicable surface water quality standards. The only water quality parameter that exceeded NH surface water quality standards was pH, which was exceeded on only two observations at the Vernon forebay (06-V-01) station.

Regarding **VT standards**, dissolved oxygen and turbidity varied both temporally and spatially, but no observations were made of either parameter that would interfere with the specified designated uses of the Connecticut River or were in noncompliance with applicable surface water quality standards. Turbidity did exceed 10 NTU, but the measurements of turbidity greater than 10 NTU were only made during high-flow periods following heavy rains.

The VT surface water quality standard for water temperature states the change or rate of change either upward or downward shall not exceed 1.0°F (0.56°C) from ambient temperatures. For this analysis, ambient temperatures were considered those measurements collected at the upstream stations to assess the effect and degree of temperature change as water flows through the impoundment and powerhouse, and discharged at the tailrace. As water flows from the upstream area and through the impoundment, weekly mean temperatures on average warm by 0.5°C at the Vernon Station, thus staying within the state standard.

pH, as recorded by the continuous sonde deployed in the Vernon forebay (06-V-01), did not fall below VT or NH standards, nor exceed VT surface water quality standards. pH ranged from 7.36 to 7.86, with an overall mean of 7.55.

Dissolved oxygen and turbidity varied both temporally and spatially, but no observations were made of either parameter that would interfere with the specified designated uses of the Connecticut River or were in noncompliance with applicable VT surface water quality standards. The 2016 report summarized that although the presence and operation of the project appears to have some minor effects on temperature and DO, and negligible to no effect on pH, specific conductivity, or turbidity, all water quality parameters were generally within VT and NH state water quality standards. Therefore, there is no indication that operation of the Vernon project affects adherence to VT or NH state surface water quality standards.

Based on these studies, it appears that the Project continues to be in compliance with this criterion in terms of compliance with numerical standards. The NHDES in their May 26th letter stated that as all studies have not yet been completed, they could not state whether or not the Project meets state standards and that "areas of concern include, but are not limited to, if the minimum flow of 1250 cfs established in 1979 is adequate to support aquatic life, downstream fish passage (i.e., American Eel, anadromous species, and riverine fish), and the potential impacts of daily impoundment level fluctuations on aquatic life and habitat." Discussion of fish passage issues are discussed below.

Go to B2

2) Is the Facility area or the downstream reach currently identified by the state as not meeting water quality standards (including narrative and numeric criteria and designated uses) pursuant to Section 303(d) of the Clean Water Act?

YES. In recent history, all surface waters in Vermont and New Hampshire have been listed as non-compliant for mercury due to higher than desired mercury levels in fish. The primary source of mercury contamination is atmospheric deposition.

The section of the Connecticut River in Hinsdale NH, is listed on the draft NHDES 2014 303(d) list as impaired for aluminum and copper. In Vermont, this river section is listed as "altered" under Part F of the Vermont Priority Waters List. This list includes waters which represent priority management situations where aquatic habitat and/or other designated uses have been altered by flow regulation. These waters correspond to Category 4c of EPA's Consolidated Assessment Listing Methodology and not on the 303(d) list. The report issued by VT ANR states that 2018 is expected to be the "WQS compliance year" with the issuance of a new FERC license in 2018 as the "Control Activity". Thus, VT ANR anticipates changes to occur upon relicensing which would remove it from this listing.

Go to B3

3) If the answer to question B.2. is yes, has there been a determination that the Facility is not a cause of that violation?

YES. The NHDES 303(d) list identifies the source of aluminum and copper as "unknown".

This Project Passes Criterion B - Water Quality - Go to C

C. FISH PASSAGE AND PROTECTION

Goal: The Fish Passage and Protection Criterion is designed to ensure that, where necessary, the facility provides effective fish passage for riverine, anadromous and catadromous fish, and protects fish from entrainment.

Standard: For riverine, anadromous and catadromous fish, a certified facility must be in compliance with both recent mandatory prescriptions regarding fish passage and recent resource agency recommendations regarding fish protection. If anadromous or catadromous fish historically passed through the facility area but are no longer present, the facility will pass this criterion if the Applicant can show both that the fish are not extirpated or extinct in the area due in part to the facility and that the facility has made a legally binding commitment to provide any future fish passage recommended by a resource agency. When no recent fish passage prescription exists for anadromous or catadromous fish, and the fish are still present in the area, the facility must demonstrate either that there was a recent decision that fish passage is not necessary for a valid environmental reason, that existing fish passage survival rates at the facility are greater than 95% over 80% of the run, or provide a letter prepared for the application from

the U.S. Fish and Wildlife Service or the National Marine Fisheries Service confirming the existing passage is appropriately protective.

Criterion:

1) Is the facility in compliance with Mandatory Fish Passage Prescriptions for upstream and downstream passage of anadromous and catadromous fish issued by Resource Agencies after December 31, 1986?

CONDITIONALLY, YES.

In addition to application materials submitted by TransCanada, the following was also reviewed:

- FERC Order dated 10/5/78 which incorporated a Settlement Agreement signed by the then owner of the Vernon Project as well as the USFWS, States of Connecticut, Massachusetts, Vermont and New Hampshire fishery agencies and several other non-governmental stakeholders which established fish passage measures to be developed at Vernon as part of a basin-wide restoration effort for anadromous species;
- FERC license issued on 6/25/79 which adopted the Settlement Agreement;
- The Connecticut River Basin – Anadromous Fish Restoration Coordination and Technical Assistance annual report Oct 1, 2014 to Sept 30, 2015 issued by USFWS, and
- The Connecticut River Atlantic Salmon Commission (CRASC) website (part of USFWS) and their June 2015 Species Status Report for American Shad.

The review indicated that the fish passage requirements for this Project were based on the Settlement Agreement and not a FPA Section 18 prescription or 10(J) recommendation. Also, while the initial requirement to install fish passage precedes LIHI's C.2 criterion deadline of Dec. 31, 1986, the effectiveness testing requirement was issued post 1986 via the 2006 License Amendment which was issued to approve installation of the new units. The WQC references compliance with the CRASC'S *Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River.* There no longer appears to be such a Plan as the restoration efforts are now focused on other species such as American Shad and river herring.

Upstream Passage

Upstream fish passage of anadromous species at Vernon dam depends on fish first ascending the Connecticut River and successfully passing the two downstream dams, Holyoke and Turners Falls. Upstream passage via the Vernon fish ladder has been monitored by Vermont Fish & Wildlife since 1981.

Article 402 of FERC Order dated 6/12/92, as amended on 7/28/06, required TransCanada to file a monitoring plan to ensure the safe upstream passage of Atlantic salmon, American shad and other anadromous fish during operation of the new units authorized by the 2006 amendment. The Upstream Fish Passage Monitoring Plan was filed 1/18/08 and approved on 6/8/08. A spring 2009 field verification study was conducted with US Fish and Wildlife Service (USFWS) and Vermont Fish and Wildlife Department (VFWD) and as a result, a unit operating protocol was enacted to support fish ladder effectiveness. This protocol addressed the sequence to be followed

for unit operation (last on – first off) to minimize changes in flow at the fish ladder. TransCanada reported they have been following this protocol since its development.

In spring 2011, TransCanada and fishery agencies became concerned about a decrease in the Vernon shad passage ratio relative to passage numbers at the Turners Falls fish ladder. The Vernon fish ladder was inspected and an evaluation resulted in a number of items that were addressed: silt was removed from the entrance section of the ladder (caused by T.S. Irene high water), orifice boards were repaired and replaced, weir gages were installed, and the entrance weir gate control was connected to a more accurate tailwater gage, which resulted in a more accurate and responsive entranced weir height relative to tailwater height. The result of this improvement work resulted in a markedly improved performance.

None of the recent agency comment letters identified concerns regarding upstream passage for anadromous species. However, the lack of focused upstream passage for American eel was identified by all three agencies in their recent comments. American eel studies conducted in 2015 for relicensing found American eel were using the upstream fish ladder for access over the dam. The Vernon fish ladder had a total of 1,545 eels observed to be passing upstream via the ladder. It should be noted that the current license and WQC do not address passage of American eel.

Downstream Passage

Article 403 of FERC's 1992 Order, as amended 7/28/06, required TransCanada to file a monitoring plan to ensure the safe downstream passage of Atlantic salmon and American shad during operation of the new units. Downstream passage studies for salmon, including turbine survival and route selection were completed in 2009. A February 19, 2010 letter from FERC (in Appendix A) concluded the following on these salmon studies:

- downstream fish passage is efficient since forebay residence time is low,
- a relationship between passage route selection and unit discharge could not be determined,
- overall passage survival for the 2009 evaluation was estimated to be greater than 92%.
- the addition of the high capacity units 5-8 resulted in no decrease in bypass effectiveness and passage through combined units 5-10 did not increase from previous studies.
- combined turbine passage increased from 20.7 percent (1990's studies) to 37.7 percent (2009).

FERC's findings were at least in part, based on a meeting held on September 28, 2009 between TransCanada and John Warner and Ben Rizzo of USFWS, Jay McMenemy of VDFW and Mathew Carpenter of NHFG, and Caleb Slater of MassWildlife. These notes showed:

- "Bypass efficiency was 58.3 %; 34.1% of all smolts that passed (46 of 135) passed through the fishpipe and 25.9% (35 of 135) passed through the west fishtube;
- Of smolts passing via turbines (n=49), 17 (12.6% of all smolts that passed the Project) used turbines 1-4, 16 (11.9%) used turbines 5-8, and 16 (11.9%) used turbines 9 and 10"

In summary the notes indicated "All agreed that there were few operational changes that could be made to improve passage efficiency. There was some concern that passage was lower this year than in previous years, but probably not significantly different." Based on this documentation, it appears that downstream passage of salmon smolts was found satisfactory."

Downstream passage of shad was conducted over several years with inconclusive results, due to study technology limitations and low adult shad return numbers, which led to a hiatus in further evaluation until 2015, to be incorporated into the relicensing studies. The technology challenges appear to have been remedied in the new studies completed by TransCanada in 2015. In summary, the May 2016 report stated the following:

- Regarding route selection:
  - 75% through the turbines
  - 8.7 % through the fish pipe
  - 1.2 % via the attraction flow pipe
  - 2.1 % used the small fish tube, and
  - 0.4 % used the fishway exit
- Regarding turbine survival at 1 hr:
  - 91.7 % for the Francis unit
  - 95.2 % for the Kaplan unit
- The estimated 48 hr survival data was deemed unreliable due to the high mortality of control fish during the delayed assessment period.

As the report was only issued on May 15, 2016, the resource agencies have not yet issued comments on the report. The three agencies who responded to the 2016 recertification outreach efforts commented that until all studies have been completed and evaluated, they could not comment on whether downstream passage for juvenile shad is effective. To address this delay in agency review, a condition has been recommended to address American shad passage. A second condition is recommended regarding eel passage.

Go to C5

5) Is the Facility in Compliance with Mandatory Fish Passage Prescriptions for upstream or downstream passage of riverine fish?

Not Applicable. Passage for riverine fish is not required by the current license or WQC. Such passage will likely be recommended/mandated by the resource agencies for inclusion in the new license, as such passage was identified as important in the various agency comment letters. As noted by VT ANR in their May 26th letter, "studies addressing passage of riverine fish have not been fully evaluated, and collection of more field data may be necessary to determine the optimal means of passing migratory and resident species over the course of the upcoming licensing." A condition is recommended to keep LIHI informed on the status of agency recommendations regarding riverine species passage.

Go to C6

6) Is the facility in Compliance with Resource Agency Recommendations for Riverine, anadromous and catadromous fish entrainment protection, such as tailrace barriers?

YES. As no changes in entrainment protection have occurred since LIHI certification in 2009, the position stated in the original certification report is still applicable. That finding stated that entrainment is addressed by the downstream passage measures.

The Project Conditionally Passes Criterion C - Fish Passage and Protection - Go to D

D. WATERSHED PROTECTION

Goal: The Watershed Protection criterion is designed to ensure that sufficient action has been taken to protect, mitigate and enhance environmental conditions in the watershed.

Standard: A certified facility must be in compliance with resource agency and Federal Energy Regulatory Commission ("FERC") recommendations regarding watershed protection, mitigation or enhancement. In addition, the criterion rewards projects with an extra three years of certification that have a buffer zone extending 200 feet from the high water mark or an approved watershed enhancement fund that could achieve within the project's watershed the ecological and recreational equivalent to the buffer zone and has the agreement of appropriate stakeholders and state and federal resource agencies. A Facility can pass this criterion, but not receive extra years of certification, if it is in compliance with both state and federal resource agencies recommendations in a license-approved shoreland management plan regarding protection, mitigation or enhancement of shorelands surrounding the project.

Criterion:

1) Is there a buffer zone dedicated for conservation purposes (to protect fish and wildlife habitat, water quality, aesthetics and/or low-impact recreation) extending 200 feet from the average annual high water line for at least 50% of the shoreline, including all of the undeveloped shoreline?

NO. A dedicated buffer zone is not established for the project.

If NO, go to D2

2) Has the facility owner/operator established an approved watershed enhancement fund that: 1) could achieve within the project's watershed the ecological and recreational equivalent of land protection in D.1), and 2) has the agreement of appropriate stakeholders and state and federal resource agencies?

No. A watershed enhancement fund is not established for the project.

If NO, go to D3

3) Has the facility owner/operator established through a settlement agreement with appropriate stakeholders and that has state and federal resource agencies agreement an appropriate shoreland buffer or equivalent watershed land protection plan for

conservation purposes (to protect fish and wildlife habitat, water quality, aesthetics and/or low impact recreation)

No. Neither a shoreland buffer or equivalent watershed land protection plan for conservation purposes has been developed for the project.

If NO, go to D4

4) Is the facility in compliance with both state and federal resource agencies recommendations in a license approved shoreland management plan regarding protection, mitigation or enhancement of shorelands surrounding the project?

No. A shoreland management plan is not established for the project.

The Project Passes Criterion D - Watershed Protection - Go to E

E. THREATENED AND ENDANGERED SPECIES PROTECTION

Goal: The Threatened and Endangered Species Protection Criterion is designed to ensure that the facility does not negatively impact state or federal threatened or endangered species.

Standard: For threatened and endangered species present in the facility area, the Applicant must either demonstrate that the facility does not negatively affect the species, or demonstrate compliance with the species recovery plan and receive long term authority for a "take" (damage) of the species under federal or state laws.

Criterion:

1) **Are threatened or endangered species listed under state or federal Endangered Species Acts present in the Facility area and/or downstream reach?**

YES. Based on 2015 studies performed for the relicensing activities, there are no federal endangered or threatened species in the project area. Past studies listed the Bald Eagle, which is no longer federally listed. Jesup's Milk Vetch, a federally endangered plant was only found upstream of the Vernon project, near the Wilder Project.

Fowler's toad, a VT state endangered species was found below the Vernon dam. According to TranCanada's 2015 report, water elevation in this area below the dam is influenced by the Northfield Mountain Pump Storage project more so than the Vernon Project. Pygmy-weed (Crassula aquatica), which is listed as endangered by both VT and NH was one of the rare plants observed growing at the Vernon impoundment.

Go to E2

2) **If a recovery plan has been adopted for the threatened or endangered species pursuant to Section 4(f) of the Endangered Species Act or similar state provision, is the Facility in Compliance with all recommendations in the plan relevant to the Facility?**

NA. Recovery plans for these species have not been developed.
Go to E3

3) If the Facility has received authority to Incidentally Take a listed species through: (i) Having a relevant agency complete consultation pursuant to ESA Section 7 resulting in a biological opinion, a habitat recovery plan, and/or (if needed) an incidental take statement; (ii) Obtaining an incidental take permit pursuant to ESA Section 10; or (iii) For species listed by a state and not by the federal government, obtaining authority pursuant to similar state procedures; is the Facility in Compliance with conditions pursuant to that authorization?

No. Only survey studies for protected species have been completed to date. Agency decision on impacts to these species and the need for protective measures has not yet been undertaken.
Go to E4

4) If E2 and E3 are not applicable, has the Applicant demonstrated that the Facility and Facility operations do not negatively affect listed species?

TransCanada's response to an inquiry regarding endangered and threatened species stated that impacts to these species are still under assessment as part of the relicensing efforts. None of the agency comments received in May 2016 addressed protected species.

The Project Passes Criterion E - Threatened and Endangered Species Protection - Go to F

F. CULTURAL RESOURCE PROTECTION

Goal: The Cultural Resource Protection Criterion is designed to ensure that the facility does not inappropriately impact cultural resources.

Standard: Cultural resources must be protected either through compliance with FERC license provisions, or through development of a plan approved by the relevant state or federal agency.

***Criterion*:**

1) If FERC-regulated, is the Facility in compliance with all requirements regarding Cultural Resource protection, mitigation or enhancement included in the FERC license or exemption?

YES.
The buildings and structures that comprise the Vernon Project have been determined eligible for listing in the National Register as a Historic District through past consultation with the Vermont and New Hampshire State Historic Preservation Offices (SHPOs). The district is comprised of two primary resources, the Vernon Powerhouse and Dam, and five ancillary facilities. To manage possible adverse effects on these structures, an MOA was executed among the Commission, licensee, and SHPOs which includes preparation of a Historic Properties Management Plan (HPMP) for mitigating the project's effects on Historic Properties. The HPMP

governs future project activities as they relate to cultural resources, within the Area of Potential Effect (APE). The APE for the project conforms to the project boundaries, which encompass all lands owned, the impoundment, and areas along the banks of the Vermont and New Hampshire shoreline from Vernon Dam north to Walpole Bridge where flowage rights are maintained. The HPMP provides for an archaeological monitoring program designed to ensure adequate and long-term site protection and preservation, and, if necessary, mitigation measures. As noted in FERC's January 2010 approval of the HPMP, the New Hampshire SHPO stated that the draft HPMP was "thorough and informative," and fulfills the stipulation set forth in the MOA. The Vermont SHPO did not submit any comments on the plan.

The monitoring program was to begin in 2013 to include the inspection of all recorded and potential archaeological sites identified in the 2007 Phase 1A Archaeological Reconnaissance Survey, and every ten years thereafter. Due to an unfortunate loss of the lead archaeologist of the contractor to TransCanada, this survey was re-scheduled (and approved by FERC) to be completed coincident with other cultural resources planned for nearby sites in 2014.

The required archaeological monitoring survey (Vernon Phase 1A Report) was completed and submitted to FERC on December 23, 2014. This report also served as the basis for TransCanada's Phase 1B scope of work for the re-licensing efforts. As evidenced by review of numerous correspondences between TransCanada and VT and NH SHPO's, it appears that TransCanada is complying with the requirements of the HPMP and its license.
Both the VT and NH SHPOs were contacted initially by email on March 4, 2016 and follow-up calls on April 26, 2016. Both indicated TransCanada is in compliance with the cultural resource protection requirements established for the Project under their existing MOA incorporated into the FERC license.

The Project Passes Criterion F - Cultural Resource Protection - Go to G

G. RECREATION

Goal: The Recreation Criterion is designed to ensure that the facility provides access to the water without fee or charge, and accommodates recreational activities on the public's river.

Standard. A certified facility must be in compliance with terms of its FERC license or exemption related to recreational access, accommodation and facilities. If not FERC-regulated, a certified facility must be in compliance with similar requirements as recommended by resource agencies. A certified facility must also provide the public access to water without fee or charge.

Criterion:

1) If FERC-regulated, is the Facility in Compliance with the recreational access, accommodation (including recreational flow releases) and facilities conditions in its FERC license or exemption?

Conditionally, YES. The recreational facilities required by the June 25, 1979 FERC license were implemented prior to initial LIHI certification. Public use of the site is provided at state

and applicant-owned boat launch, picnic, and recreation areas. Review of the most recent FERC Environmental Inspection report from 2012 suggested that some improvements were being considered for the Governor Hunt Site. However, based on a February 29, 2016 conference call with several TransCanada representatives, such improvements were not made as they were not necessary. In a March 1.2016 report on recreational needs for the three TransCanada's sites undergoing re-licensing, respondents to a survey indicated a need for repairing the boat launch, improving road conditions, adding trash facilities, cleaning up broken glass around the site, maintaining cleaner bathroom, and providing better hours for fish ladder viewing. These observations appear to relate to existing recreational features and maintenance of such facilities are part of the current license. As such, a condition has been recommended to remedy all of these items with the exception of the change in hours for fish ladder viewing and road improvements, as these could be considered beyond the existing license requirements.

No comments associated with recreational issues were received from the resource agencies contacted.

2) Does the Facility allow access to the reservoir and downstream reaches without fees or charges?

YES. The Project continues to provide free access to project waters.

The Project Passes Criterion G - Recreation - Go to H

H. FACILITIES RECOMMENDED FOR REMOVAL

Goal: The Facilities Recommended for Removal Criterion is designed to ensure that a facility is not certified if a natural resource agency concludes it should be removed.

Standard: If a resource agency has recommended removal of a dam associated with the facility, the facility will not be certified.

Criterion:

1) Is there a Resource Agency recommendation for removal of the dam associated with the Facility?

NO. No resource agency has recommended removal of this dam.

The Project Passes Criterion H -Facilities Recommended for Removal

APPENDIX A

RESULTS OF REVIEWER COMMUNICATIONS WITH THE RESOUCE AGENCIES

The following lists all of the agency representatives contacted by the Reviewer to obtain input on this review. Agencies who did not respond to the initial email were called on April 26, 2016.

LIHI CRITERION	PRIMARY CONTACT INFORMATION
Flows	USFWS: John Warner, john_warner@fws.gov, (603) 223-2541 , Ext 15 VT Agency of Natural Resources: Jeff Crocker, jeff.crocker@state.vt.us, (802) 490-6151 NH Dept. of Env. Services: Owen David, Owen.David@des.nh.gov, (603) 271-0699
Water Quality	VT Agency of Natural Resources: Jeff Crocker NH Dept. of Env. Services: Owen David
Fish Passage & Protection	USFWS: John Warner VT Fish and Wildlife Dept.: Lael Will, Lael.Will@state.vt.us, (802) 885-8829 NH Fish and Game Dept.: Gabe Gries, Gabriel.Gries@wildlife.nh.gov, (603) 352-9669
Watershed Protection	VT Agency of Natural Resources: Jeff Crocker, jeff.crocker@state.vt.us, (802) 490-6151 NH Dept. of Env. Services: Owen David, Owen.David@des.nh.gov, (603) 271-0699
Threatened & Endangered Species	USFWS : Susi von Oettingen, Susi_vonOettingen@fws.gov, 603-227-6418 VT Fish and Wildlife Dept.: Lael Will NH Fish and Game Dept.: Gabe Gries VTDFW Natural Heritage Inventory: Bob Popp, Bob.Popp@state.vt.us, (802) 476-0127 NH Natural Heritage Bureau: Sara Cairns, sara.cairns@dred.state.nh.us, (603) 271-2215
Cultural Resources Protection	VT SHPO: Scott Dillon, scott.dillon@vermont.gov, (802) 272-7358 NH SHPO: Edna Feighner, edna.feighner@dcr.nh.gov , (603) 271-2813
Recreation	VT Agency of Natural Resources: Jeff Crocker NH Dept. of Env. Services: Owen David
Facilities Recommended for Removal	None required

Information gathered by telephone or brief email communication between Pat McIlvaine and four agency representatives are summarized on the following page. All other agency written comments are at the end of this Appendix.

RECORD OF CONTACTS

Date: 4/26/16
Contact Person: Scott Dillon, VT SHPO
Area of Expertise: Cultural resources

In a telephone discussion, Mr. Dillon reported that in his opinion, TransCanada has been incompliance with the HPMP and cultural resource protection requirements in the Vernon license.

Date: 4/26/16
Contact Person: Edna Feighner, NH SHPO
Area of Expertise: Cultural Resources

On April 26, 2016, a brief email was received from Ms. Feighner stating: "We have no issues with the recertification of the Vernon Hydropower Project. "

Date: 4/27/16
Contact Person: Susi Oettingen, USFWS
Area of Expertise: Endangered and Threatened Species

While comment was initialed sought from Ms. Oettingen, detailed review of newer data provided by TransCanada indicated that no federally protected species were found during the 2015 field studies. This finding was shared with Ms. Oettingen by email who agreed that she had she same understanding. Therefore she offered no comment.

Date: 5/4/16
Contact Person: Bob Popp, VTDFW Natural Heritage Inventory
Area of Expertise: Endangered and Threatened Species

A telephone message was received from Mr. Popp in response to the initial email and follow-up call. In his message, he stated that the only comment he had was that he had suggested to TransCanada that the study plan area for studies performed pursuant to the re-licensing efforts should have included an area downstream of the Vernon dam. This suggestion however was not agreed to by TransCanada as they believed such an area would not be subject to effects from plan operation on protected species.

VERMONT

Vermont Department of Environmental Conservation *Agency of Natural Resources*
Watershed Management Division
1 National Life Drive, Main 2 [phone] 802-490-6180
Montpelier, VT 05620-3522 [fax] 802-828-1544
http://www.watershedmanagement.vt.gov

DISTRIBUTED ELECTRONICALLY

May 26, 2016

Pat McIlvaine
Low Impact Hydropower Institute
PO Box 194
Harrington Park, New Jersey

RE: Vernon Hydroelectric Project (FERC No. 1904)
Comments on Low Impact Hydropower Certification

Dear Ms. McIlvaine,

On March 31, 2016, the Low Impact Hydropower Institute (LIHI) contacted Vermont Agency of Natural Resources (Agency) staff to seek comment on low impact certification of the Vernon Project, located on the Connecticut River in Vermont and New Hampshire. Based on our review, the Agency has substantial concerns regarding compliance of the Vernon project with LIHI's low impact criteria. The Agency provides comments, herein.

Background

The Vernon hydroelectric project was originally licensed in 1979 and significant aspects of project operation remain governed by the original license. Subsequent amendments to modify project capacity have not involved a comprehensive evaluation of project operations due to the Federal Energy Regulatory Commission (FERC) rules governing the processes, as well as the practical challenge of addressing certain aspects of operation at the Vernon project without involvement of the upstream and downstream facilities.

For example, the most recent amendment in 2006 was a non-capacity amendment. In general, non-capacity amendments do not require three stage agency consultation typical of the licensing process. As a result, issues were limited in scope to the effects of the change and did not include other issues within the scope of review. Issues analyzed at the time of the 2006 license amendment and associated water quality certification were limited to water chemistry, fish passage, erosion, and administration (flow monitoring and operations compliance plans). As you are aware the Vernon Project currently is in the FERC relicensing process, with its current license set to expire in April 2019.

The State of Vermont's 2014 List of Priority Surface Waters Outside of the Scope of Clean Water Act Section 303(d) lists the Vernon impoundment and the downstream 5.5-mile segment of the Connecticut River on Part F as waters altered by flow regulation, in this case primarily related to hydropeaking and deficient minimum flow resulting from operations at the Vernon hydroelectric

project.[1] The project waters are considered by the Agency to not fully support the designated use of aquatic biota, wildlife, and aquatic habitat.

Flows

Project operations are not in compliance with LIHI's flow criterion. LIHI's flow criteria applicable to this application are:

> *"Compliance with Resource Agency Recommendations issued after December 31, 1986 regarding flow conditions for fish and wildlife protection, mitigation and enhancement" or meet one of two alternative standards: (1) meet the flow levels required using the Aquatic Base Flow methodology or the "good" habitat flow level under the Montana-Tennant methodology; or (2) present a letter from a resource agency prepared for the application confirming the flows at the facility are adequately protective of fish, wildlife, and water quality.*

The current 1250 cubic feet per second (cfs) minimum flow was established by the 1979 project license. It would be incorrect to use the amended license and associated certification as a foundation for flow compliance. Due to FERC process for non-capacity amendments in which a change in mode of operation is not proposed, the project flow regime was not reviewed as part of the amendment process. The FERC Environmental Assessment conducted in support of the amendment specifically stated, "The licensee will continue to operate the project as it has in the past, therefore minimum flows will remain unchanged". As a result of the limited scope, quantitative in-stream flow studies were not conducted and neither the license amendment, nor water quality certification, contained conditions related to in-stream flows, ramping and peaking rate conditions, or seasonal and episodic instream flow variations. Therefore, the project is not in compliance with "Resource Agency Recommendations issued after December 31, 1986 regarding flow conditions for fish and wildlife protection, mitigation and enhancement."

Given that the project does not conform with a resource agency flow recommendation made after 1986, the next test (A.2) is whether the flows meet Aquatic Base Flow (ABF) standards or the good habitat flow level under the Montana-Tennant methodology. The facility maintains a minimum flow equivalent to 0.2 cubic feet per second per square mile (csm) or 1250 cfs. Summer ABF (0.5 csm) for the 6,266 square mile drainage area would be 3,133 cfs. Montana-Tennant's methodology would require a minimum flow of approximately 2,700 cfs (20% Average Daily Flow (ADF)) from October through March and 5,400 cfs (40% ADF) from April through September for "good" habitat conditions. The existing minimum flows required by the 1979 license do not meet the flow levels required using the Aquatic Base Flow methodology or the "good" habitat flow level under the Montana-Tennant methodology.

The last test (A.3) is whether the application has documentation from a resource agency that it has demonstrated the flow regime as "appropriately protective of fish, wildlife, and water quality". Given the listing of waters affected by the project on the State of Vermont's List of Priority Surface Waters, as discussed above and specifically due to project operations, the State has in fact made a determination that the flow regime is *not* appropriately protective of fish and does not fully support the designated use of aquatic biota, wildlife, and aquatic habitat.

[1] State of Vermont (2014). List of Priority Surface Waters. Part F. Surface Waters Altered by Flow Regulation.

Fish Passage

Anadromous and catadromous fish are present in the area of the project. Mandatory fish passage prescriptions have historically focused on passage for anadromous fish, but the need for measures to pass American Eel, a catadromous species and a species of greatest conservation need in Vermont, has been identified as least as far back as the 2009 LIHI certification. The Applicant has not implemented any downstream passage measures for American Eel to date.

Since the certification in 2009, there have been material changes in regards to what is known about the technical feasibility of passing many species of interest at the project. Studies associated with the relicensing have been conducted to assess the feasibility of passing American Eel, anadromous species, as well as riverine fish. While the collection of more field data may be necessary to determine the optimal means of passing migratory and resident species over the course of the upcoming license, results to date indicate that it may be possible to greatly improve passage effectiveness by utilizing existing infrastructure with only minor modifications to the operation of the existing infrastructure.

Once the data collection for the relicensing is complete, if it is possible for the Applicant to reduce the impacts of the dam on fish movement by facilitating more effective passage through modified ladder operation, the Agency is confident that the Applicant, given their interest in low impact certification, would proactively undertake these measures on an interim basis before the new license is issued. However, the Agency also hopes that LIHI will encourage the Applicant to make reasonable interim modifications to fishway operation, in consultation with resource agencies, if such modifications would reduce the impacts of the facility. Accordingly, the Agency includes a recommended condition below.

Recommendation

As a result of this review, the Agency's does not believe the Vernon hydroelectric project complies with LIHI's criteria, particularly in regards to the criteria for flows and fish passage. As such, the Agency would recommend against certification of this project as "low impact". If LIHI does certify the project, the Agency would recommend the following condition be included in any certification issued for the project.

> "During the term of this certification, should a resource agency request implementation of passage measures for catadromous or riverine fish, the applicant shall notify LIHI within 14 days, provide LIHI with a copy of the request, and the applicant's response."

Thank you for the opportunity to comment.

Sincerely yours,

Eric Davis
River Ecologist

c: Jeff Crocker, VTDEC
Lael Will, VTDFW
Owen David, NHDES
Gregg Comstock, NHDES

Gabe Gries, NHFG
John Warner, USFWS
Melissa Grader, USFWS
Julianne Rosset, USFWS
John Ragonese, TransCanada
Mike Sale, LIHI
Dana Hall, LIHI

The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

May 26, 2016

Pat McIlvaine
Low Impact Hydropower Institute
P.O. Box 194
Harrington Park, New Jersey

RE: Vernon Hydroelectric Project (FERC No. 1904)
Comments on Low Impact Hydropower Certification

Dear Ms. McIlvaine:

Thank you for your email of March 31, 2016 wherein you requested comments regarding the potential recertification of the TransCanada's Vernon Hydroelectric Project on the Connecticut River (FERC No. 1904) under the Low Impact Hydropower Institute (LIHI) program. Our comments regarding compliance with state surface water quality standards are provided below.

As you know, the Vernon Hydroelectric Project is in the FERC relicensing process as its current license is set to expire in April 2019. As a result, TransCanada is conducting many studies, the purpose of which (in many cases), is to determine if existing operation of the dam is causing or contributing to violations of New Hampshire and Vermont surface water quality standards. Although some studies are complete, many are not. Until the studies are completed and the New Hampshire Department of Environmental Services (NHDES) has had adequate time to review them, it is not known, at this time, if existing operation of the Vernon Hydroelectric Project is meeting New Hampshire surface water quality standards. Areas of concern include, but are not limited to, if the minimum flow of 1250 cfs established in 1979 is adequate to support aquatic life, downstream fish passage (i.e., American Eel, anadromous species, and riverine fish), and the potential impacts of daily impoundment level fluctuations on aquatic life and habitat.

Since there is insufficient information to determine, at this time, if operation of the Vernon Hydroelectric Project is meeting state surface water quality standards, NHDES recommends that LIHI defer a decision to recertify the Project as "low impact" until the FERC relicensing process is complete.

Thank you for the opportunity to comment should you have any questions on this matter, please do not hesitate to contact either myself (603-271-0699) or Gregg Comstock (602-271-2983)

Sincerely,

Owen David
Water Quality Certification Coordinator
Watershed Management Bureau
New Hampshire Department of Environmental Services

Cc. Jeff Crocker, VTDEC
Lael Will, VTDFW
Eric Davis, VTDEC
Gabe Gries, NHFG
Carol Henderson, NHFG
John Warner, USFWS
Melissa Grader, USFWS
John Ragonese, TransCanada
Ted Diers, NHDES
Gregg Comstock, NHDES

Print

Date: Tuesday, May 31, 2016 11:26 AM

From: Henderson, Carol <Carol.Henderson@wildlife.nh.gov>

To: 'pbmwork@maine.rr.com' <pbmwork@maine.rr.com>

Cc: Gries, Gabriel <Gabriel.Gries@wildlife.nh.gov>

Subject: LIHI Re-certification Application for TransCanada's Vernon Project

Hello Mr. Nolan:

The NH Fish and Game Department agrees with the observations discussed in the Vt. Dept. Of Environmental Conservation's letter (attached) regarding the LIHI re-certification of the Vernon project. More specifically, we also support the VTANR recommendation noted below; if the project is certified regardless of the comments received to date:

"As a result of this review, the Agency's does not believe the Vernon hydroelectric project complies with LIHI's criteria, particularly in regards to the criteria for flows and fish passage. As such, the Agency would recommend against certification of this project as "low impact". If LIHI does certify the project, the Agency would recommend the following condition be included in any certification issued for the project. "

"During the term of this certification, should a resource agency request implementation of passage measures for catadromous or riverine fish, the applicant shall notify LIHI within 14 days, provide LIHI with a copy of the request, and the applicant's response."

If you have any comments or questions about this information, please do not hesitate to contact ma via email or by phone at 603-271-3511. Thank you, Carol henderson, NH Fish and Game Department, Environmental Review Coordinator

VTANR_Vernon Project LIHI Comments.pdf

FEDERAL ENERGY REGULATORY COMMISSION
Washington, D. C. 20426

OFFICE OF ENERGY PROJECTS

P-1904-072–New Hampshire/Vermont
Vernon Project
TransCanada Hydro Northeast Inc.

FEB 19 2010

Mr. John L. Ragonese
TransCanada Hydro Northeast
4 Park St, Suite 402
Concord Hydro Office
Concord, NH 03301-6373

Subject: 2009 Radio tagged salmon smolt passage study final report

Dear Mr. Ragonese:

This acknowledges the receipt of your December 3, 2009 filing of the final report of the Atlantic salmon smolt radio tagged study at the Vernon project during 2009. The report was required by the Order Approving Plan to Monitor Effectiveness of Downstream Fish Passage Pursuant to Article 403, issued on May 27, 2009.[1] The approved plan was designed to determine route selection, louver guidance efficiency and bypass passage effectiveness for emigrating Atlantic salmon smolts in accordance with the requirements of article 403 and with the new units active. A draft report summarizing the results of the study was to be provided to the U.S. Fish and Wildlife Service (FWS), New Hampshire Fish and Game Department (NHF&G) and the Vermont Department of Fish and Wildlife (VTF&W) for review and the final report filed with the Commission by December 31, 2009.

Your report noted that following the distribution of the agency draft of the report, a Comprehensive Fishery Agency Consultation meeting was held on September 28, 2009, at the FWS office in Concord, NH. The report was revised based upon the comments received at that meeting and no further comments have been received subsequent to the filing of the final report. The report noted that the study was successful in addressing points of concern by the resource agencies. It also reached several other conclusions including that the replacement of the four units did not negatively affect forebay residence time, that downstream fish passage is efficient since forebay residence time is low, that a relationship between passage route selection and unit discharge could not be determined, and that overall passage survival for the 2009 evaluation was estimated to be greater than 92 percent. Comparison of the 2009 study with previous studies (1990's) indicate that passage route selection was similar, residency time was

[1] 127 FERC ¶ 62,158 (2009)

less than previous evaluations, the addition of the high capacity units 5-8 resulted in no decrease in bypass effectiveness, passage through combined units 5-10 did not increase from previous studies, and combined turbine passage increased from 20.7 percent (1990's studies) to 37.7 percent (2009).

The final report for the 2009 radio tagged smolt passage study is acceptable. Thank you for your cooperation and if you have any questions regarding this letter, please contact Mr. Joseph Enrico at (212) 273-5917.

Sincerely,

Robert H. Gr

for Heather Campbell
Acting Director
Division of Hydropower Administration
and Compliance