FEDERAL ENERGY REGULATORY COMMISSION
Washington, DC 20426
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OFFICE OF ENERGY PROJECTS

Project No. 1892-026 – New Hampshire / Vermont
Project No. 1855-045 – New Hampshire / Vermont
Project No. 1904-073 – New Hampshire / Vermont
TransCanada Hydro Northeast Inc.

Mr. John Ragonese
Relicensing Project Manager
TransCanada Hydro Northeast, Inc.
4 Park Street, Suite 402
Concord NH 03301
Telephone: (603) 498-2851

Subject: Identification of PAD Deficiencies, Additional Information Requests, and Study Requests

Dear Mr. Ragonese:

After reviewing the Wilder, Bellows Falls, and Vernon Hydroelectric projects Pre-Application Documents (PADs) and the transcripts of our scoping meetings held between Monday, January 28 and Thursday, January 31, 2013, we determined that there are some deficiencies in the PADs. We also determined that there is a need for additional information and study requests in order to gain information necessary for our preparation of environmental documents.

We identify the PAD deficiencies and existing additional information needs in the attached Schedule A, and we provide our study requests in the attached Schedule B. Please provide the deficiencies and additional information requested in Schedule A when you file your proposed study plans, on or before April 15, 2013. The last part of Schedule A includes comments on the PAD which should be used during the preparation of the Preliminary License Proposal (PLP) and/or the License Application. Please note that if you propose any plans for measures to mitigate project impacts, drafts of those plans should be filed with the PLP or draft license application and finalized and filed with the final license application.

Finally, please note that we may determine a need for additional studies or information upon receipt and review of scoping comments/study requests and study plans proposed by TransCanada Hydro Northeast, Inc. (TransCanada).

The Commission strongly encourages electronic filings via the Internet in lieu of paper. See 18 CFR § 385.2001(a)(1)(iii) and the instructions on the Commission's website (http://www.ferc.gov) under the "e-Filing" link.

Commission staff will participate in your study plan meeting(s), when scheduled. The meeting(s) will be held to discuss your proposed study plans and study requests filed by the Commission, agencies, and other parties. Interested individuals are encouraged to attend and should contact you at (603) 498-2851, or via email at john_ragonese@transcanada.com for the logistics.

If you have any questions, please contact Kenneth Hogan at (202) 502-8434 or via email at: kenneth.hogan@ferc.gov.

Sincerely,

Timothy J. Welch, Chief
West Branch
Division of Hydropower Licensing

Enclosures: Schedule A
Schedule B

cc: Mailing List
Public Files

PRE-APPLICATION DOCUMENT DEFICIENCIES, ADDITIONAL INFORMATION REQUESTS, AND COMMENTS

Based on our review of the Pre-Application Documents (PADs) submitted for the Wilder, Bellows Falls, and Vernon Hydroelectric projects, we identified: (a) some deficiencies in the PADs and; (b) additional information that we require for continuing to process the relicensing of the project. Please file the requested supplemental information to resolve the deficiencies and responses to the additional information requests (AIRs) by April 15, 2013.

A. Deficiencies

Our review of the PADs for the Wilder, Bellows Falls, and Vernon Projects found deficiencies common to each project. Therefore, **for each project**, please correct the PAD deficiencies outlined below.

Wilder, Bellows Falls, and Vernon Hydroelectric Projects

1) Project Facilities and Operations

Please provide land use maps which include key features such as the Wilder project boundary and TransCanada facilities within or adjacent to the impoundment as required per § 5.6(d)(2)(ii) of the regulations.

Please provide the dependable capacity of the Wilder project and the basis for the determination of the dependable capacity as required per § 5.6(d)(2)(iii)(E) of the regulations.

2) Geology, Topography & Soils

The PAD provides general information about soil types along the reservoir; however it does not provide maps. Therefore, please provide mapping at a usable scale showing the existing geology, topography, and soils along the reservoir as required by § 5.6(d)(3)(ii) of the regulations.

The PAD provides general information about erosion along the reservoir, however it does not provide descriptions and maps. Therefore, please provide a description of the reservoir shoreline erosion sites as required by § 5.6(d)(3)(ii)(C) of the regulations,

including steepness, composition, cover, and a description of existing instability including a description of project operations that are known to, or may cause, these instabilities. In particular, we note the presence of a brownfield site at the Westboro Railyard, in West Lebanon, NH just below the confluence of the White River. The issues raised in the public meetings highlighted the potential for mobilization of contaminated materials or groundwater into the Connecticut River, exacerbated by the operation of the project. Therefore, when correcting the deficiency, please also include any additional information associated with this brownfield site and as it may pertain to this concern.

3) Recreation and Land Use

For each recreation facility within or adjacent to the project boundary, please provide a description of the facility, uses, location, ownership, capacity, and management, as specified in § 5.6(d)(3)(viii) of the regulations.

B. Additional Information Requests

Wilder Hydroelectric Project

1) Recreation and Land Use

Your PAD identifies several recreation sites and facilities that are in close proximity to one another and near project boundaries, particularly the area around Wilder Dam. Although Figure 3.10-1 provides a map of the Wilder project boundary and recreation sites, it is difficult to discern the exact location of these sites with respect to one another and whether each site is located within the project boundary. Please map this area in greater detail (i.e., larger scale) including the project boundary and recreation facilities as displayed in Figure 3.10-1.

When detailing recreation use estimates, the PAD references a TransCanada 2009 document in Section 3.10.3 that is not listed in the references. Recreation use estimates are critical for us to evaluate the current use, overall demand, and possible future use. Therefore, it is important for us to understand the methods and study design used to estimate these results. Please provide the reference for the document, methods of data collection, and an explanation of how use estimates were derived.

Throughout the scoping meetings, some stakeholders identified a concern with a lack of vegetative buffers between the reservoir shoreline and upland land management practices. So that we may fully understand the land use adjacent to the project reservoir

and how project operations and maintenance may influence these adjacent uses, please provide any existing information and maps on land use and land classification for all lands within the project boundary, associated buffers, the authorized non-project use of project lands, and to the extent known, any lands immediately adjacent to the project boundary and within the floodplain. In addition to a general description, this information should include aerial photographs and local or regional planning agency land use classifications.

At the scoping meetings and during the site visit held on October 1, 2012, we learned that there are a number of shoreline activities that occur along the reservoir including shoreline development, docks, and farming. However, the PAD provides little information on shoreline management. The PAD states that the demand for docks has not required a formal permitting process or management. The PAD was also unclear about other TransCanada shoreline management practices. Please provide further explanation of TransCanada's shoreline management practices including the number of permits issued, standard permit conditions, clarification of New Hampshire state requirements for minimum shoreline buffer, and any other pertinent information related to shoreline management.

2) Cultural Resources

In section 3.12 of the PAD, you state that you conducted a Phase IA Archaeological Reconnaissance Survey to identify known archaeological sites within the project's area of potential effects (APE) and to identify areas of archaeological sensitivity where documented and previously recorded archaeological sites are likely to exist. You also state that you have completed a study to identify historic standing structures within the Deerfield and Connecticut River hydroelectric systems to establish a baseline archival record and that documentation was completed to Historic American Engineering Record (HAER) standards. In section 4.10.2, you propose to conduct a cultural resources study that may include Phase IB Intensive Archaeological Investigations. You also propose to formally evaluate the National Register of Historic Places (National Register)-eligibility of the project facilities. However, you have not provided a map specifically defining the APE, and we are unclear on how you would specifically carry out the various tasks involving your proposed study.

As a result, we ask you to include the following in your study proposal for cultural resources:[1]

a) In section 3.12 of the PAD, you state that an APE for the project was defined in consultation with the Vermont and New Hampshire SHPOs. We ask that you provide documentation in your study proposal for cultural resources that the APE defined for the project would include all lands enclosed by the project boundary including both in-water and on-shore project lands and facilities, and lands or properties outside the project boundary where project operations or other project-related activities may directly or indirectly cause changes in the character or use of historic properties, if any historic properties exist. Your study proposal should also include a record of consultation with the Vermont and New Hampshire SHPOs and other interested parties regarding the APE or a proposal to complete such consultation as a component of the study.[2] Include a detailed map showing all aspects of the APE, including designations of land ownership**.**

b) Include the techniques on how you would carry out the Phase IB investigation, in addition to any other methods (if needed) by which other cultural resources that may be directly or indirectly affected by the project will be inventoried. Your proposal should include methods for inventorying all archaeological and historic resources that may lie within the APE, including project facilities, non-project architectural resources, and properties of traditional religious or cultural significance.

c) Develop and include in your study proposal a process for evaluating the National Register eligibility of all cultural resources during the field inventory stage, and afterwards, through additional second season field investigations (if necessary),[3] including a strategy for examining, testing, or

[1] Include in your study proposal that you would also consult with the Vermont State Historic Preservation Officer (SHPO), the New Hampshire SHPO, and any involved Indian tribe or other interested parties in formulating each of the tasks listed below. Although there are no federally recognized Tribes in New Hampshire or Vermont, there are Native American organizations that may attach religious and cultural significance to historic properties in the APE.

[2] Once you have defined your APE, send your APE definition and APE map to the Vermont and New Hampshire SHPOs and seek their concurrence. The APE definition and map should be included in your study proposal, along with a record of consultation.

[3] If all National Register eligibility determinations cannot be done in either the first or

excavating cultural resources. This process should take into account applicable guidelines and standards promulgated by the Vermont and New Hampshire SHPOs.

d) Elaborate on what methods you would use to identify any existing project-related effects (both direct and indirect) on historic properties recorded during the field inventory, and determine how project operations may affect or potentially affect them.

e) Include in any study report: (1) a background section on previous work in and around the APE; (2) a culture history of the research area; (3) definition and map of the APE; (4) methods used for the archival research and field pedestrian survey and how the APE was systematically inventoried; (5) the results of the survey and detailed descriptions of the cultural resources found (including a table depicting type of cultural resources, age, property location and ownership, associated artifacts, existing and potential effects, and National Register eligibility status);[4] (6) results of National Register evaluations for all cultural resources located within the APE;[5] and (7) site or resource specific descriptions of existing and potential project-related effects on cultural resources considered to be eligible for inclusion in the National Register.

f) Put a statement in your study proposal you will also prepare a HPMP in consultation with the involved parties and will file a draft HPMP along with your preliminary licensing proposal, and a final HPMP with your final license application.[6] Among other things, the HPMP should provide site-

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second season of field investigations, a program to follow-up on completing all National Register eligibility determinations of properties located within the APE could be developed and included in the Historic Properties Management Plan (HPMP).

[4] Also integrate all of the existing cultural resources information you have already compiled and completed, as expressed in section 3.12.

[5] In consultation with the involved parties, once you have determined which cultural resources may, or may not be eligible for the National Register, submit your evaluations to the Vermont and New Hampshire SHPOs (as applicable) for concurrence.

[6] Note that once the Commission finds the HPMP to be final, we would attach it to a programmatic agreement and after noticing the Advisory Council on Historic Preservation, we would execute the programmatic agreement with the Vermont and New Hampshire SHPOs, if the Advisory Council on Historic Preservation declines to participate. Execution of the programmatic agreement would evidence that the Commission has resolved any potential adverse effects to historic properties involved with the proposed project.

specific measures to resolve any potential project-related adverse effect to historic properties located within the project's APE.[7]

g) Provide a schedule for carrying out all of the various tasks involving your study, including the filing of draft and final reports and HPMPs.

h) Provide estimated costs associated with the various tasks in your study, along with the costs of report production and crafting the HPMP.

Bellows Falls Hydroelectric Project

1) Project Facilities and Operations

On page 3-128 the PAD states the shoreline of the reservoir is 72 miles; however, on pages 2-24 and 3-18 it states it is 74 miles long. Therefore, so that we may fully understand and evaluate your proposal and determine the appropriate studies needed, please provide clarification regarding the length of the reservoir shoreline.

2) Recreation and Land Use

Your PAD identifies several recreation sites and facilities that are in close proximity to one another and near project boundaries, particularly the area around Bellows Falls Dam. Although Figure 3.10-1 provides a map of the Bellow Falls project boundary and recreation sites, it is difficult to discern the exact location of these sites with respect to one another and whether each site is located within the project boundary. Please map this area in greater detail (i.e., larger scale) including the project boundary and recreation facilities as displayed in Figure 3.10-1 and provide the same level of information for the Bellows Falls Project as outlined above for recreation, land use, and shoreline management for the Wilder Project under B 1).

3) Cultural Resources

In section 3.12 of the PAD, you state that you conducted a Phase IA Archaeological Reconnaissance Survey to identify known archaeological sites within the project's APE and to identify areas of archaeological sensitivity where documented and previously recorded archaeological sites are likely to exist. You also state that you've

[7] You should use the Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects, developed by the Advisory Council on Historic Preservation and Commission in May 2002.

completed a study to identify historic standing structures within the Deerfield and Connecticut River hydroelectric systems to establish a baseline archival record and that documentation was completed to HAER standards. In section 4.10.2 you propose to conduct a cultural resources study that may include Phase IB Intensive Archaeological Investigations. You also propose to formally evaluate the National Register-eligibility of the project's facilities. However, you have not provided a map specifically defining the APE, and we are unclear on how you would specifically carry out the various tasks involving your proposed study.

As a result, we ask you to include information in your study proposal for Bellows Falls cultural resources as outlined above for the Wilder Project under B 2).[8]

Vernon Hydroelectric Project

1) Recreation and Land Use

Your PAD identifies several recreation sites and facilities that are in close proximity to one another and near project boundaries, particularly the area around Vernon Dam. Although Figure 3.10-1 provides a map of the Vernon project boundary and recreation sites, it is difficult to discern the exact location of these sites with respect to one another and whether each site is located within the project boundary. Please map this area in greater detail (i.e., larger scale) including the project boundary and recreation facilities as displayed in Figure 3.10-1 and provide the same level of information for the Vernon Project as outlined above for recreation, land use, and shoreline management for the Wilder Project under B 1 above) .

C. Study Reports

Throughout each of the PADs, TransCanada refers to information from numerous studies it conducted prior to submittal of the PADs. These study reports were not yet available when the PADs were filed with the Commission on October 31, 2012. Additionally, the PADs reference several other documents that are not readily available

[8] Include in your study proposal that you would also consult with the Vermont State SHPO, the New Hampshire SHPO, and any involved Indian tribe or other interested parties in formulating each of the tasks listed below. Although there are no federally recognized Tribes in New Hampshire or Vermont, there are Native American organizations that may attach religious and cultural significance to historic properties in the APE.

to the Commission or the public. As such, we request that you file the following study reports and reference documents with the Commission:

Cherau, S. and B. O'Donnchadha. 2008. Phase IA archaeological Reconnaissance Survey, Vernon Hydroelectric Project (FERC No. 1904, Windham County, Vermont and Cheshire County, New Hampshire. Public Archaeology Laboratory, Pawtucket, RI. Submitted to TransCanada Northeast Hydro, Concord, NH.

Holmes, R.D., M.T. Mulhollard, and C.D. Hertiz. 1991. Archaeological Reconnaissance Survey for the Proposed Riverbank Erosion Control Study, Massachusetts, Vermont, and New Hampshire. University of Massachusetts, Archaeological Services Report. Submitted to Northeast Utilities, Hartford, CT.

Hubbard, Michael, Suzanne Cherau, Jenifer Elam, John Daly, and Ora Elquist. 2012. Phase IA Archaeological Reconnaissance Survey, Wilder Hydroelectric Project (FERC No. 1892), Windsor and Orange Counties, Vermont, and Grafton County, New Hampshire. Public Archaeology Laboratory, Pawtucket,RI.. Submitted to TransCanada Hydro Northeast, Inc. Concord, NH.

TransCanada and Normandeau Associates Inc. (Normandeau) water quality sampling data and reports.

TransCanada and Normandeau Associates Inc. (Normandeau) Jesup's milk vetch/Wilder flow and the RTE study reports.

In addition, during the January 29, 2013 scoping meeting, TransCanada noted that the geologic, geotechnical, seepage and stability study along the Vernon Neck had recently been completed. Please file the results of the geologic, geotechnical, seepage and stability study along the Vernon Neck study.

D. Additional Comments for Preliminary Licensing Proposal (PLP) and License Application

Based on our review of each PAD we have the following additional comments which can be used during your future preparation of the PLP and/or License Application.

<u>Wilder, Bellows Falls and Vernon Hydroelectric Projects</u>

While each PAD did provide descriptions of aesthetic and visual characteristics of

the respective project dam and adjacent facilities as required by § 5.6(d)(3)(ix), there were few accompanying photos. So we may perform an analysis of project effects on aesthetic resources, when submitting your PLP for each project please provide additional photograph evidence from public areas such as recreation facilities, public roadways, and designated trails of project features including the dam, appurtenant facilities, and facilities in towns and villages.

STUDY REQUESTS

After reviewing the information in the Pre-Application Document (PAD), we identified a gap between the information in the PAD and the information needed to assess project effects. The intent of the following studies is to fill the gap between existing and needed information. We recognize that there may be additional existing information that currently has not been identified and may be sufficient to address our information needs. As such, please note that we can further discuss the extent of the information gap, any additional existing information, and the relative scope of the requested studies at the study plan meeting(s). As required in section 5.9 of the Commission's regulations, we address the seven study request criteria for the following requested studies.

Study Request #1 - Water Level Fluctuation Study

Projects: Wilder, Bellows Falls, Vernon

Goals and Objectives

§5.9(b)(1) – *Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal is to identify hourly reservoir elevations throughout the upstream and downstream reaches affected by the project in order to assess project effects on aquatic and terrestrial resources under current and proposed operation. Specifically the study should identify hourly water levels and flows within the upstream and downstream reaches under project operation conditions for the full range of inflows to inform an analysis of potential operational effects on geologic and soil resources, and an analysis of project related effects on aquatic resources and terrestrial resources.

§5.9(b)(2) – *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.*

Not applicable.

§5.9(b)(3) – *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

The Federal Energy Regulatory Commission must decide whether to issue a new license to TransCanada for the projects. Sections 4(e) and 10(a) of the Federal Power Act

require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. In making its license decision, the Commission must equally consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. Any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

Project operations affect reservoir and tailrace water levels on an hourly basis (or finer increment), which may affect several environmental resources. Understanding the projects' influence on hourly water levels and flows within the Connecticut River is essential to understand the effect of project operations on these environmental resources; and therefore, is relevant to the Commission's public interest determination.

Background and Existing Information

§5.9(b)(4) – *Describe existing information concerning the subject of the study proposal, and the need for additional information*

The PAD provided general information about the magnitude of the licensed limits for water level fluctuation in the project reservoirs and referenced information on the hydrology, hydraulics, and erosion conditions along the river reach below the Vernon Project and above Turners Falls,. For instance, TransCanada cited an Army Corps of Engineers (USACE) *Report on Connecticut River Streambank Erosion Study, Massachusetts, New Hampshire and Vermont.*[9] This report looked at hydraulics and erosion along a 141 mile reach of the River from the Turners Falls dam to the headwaters of the Wilder Project.[10] TransCanada has recently conducted a river reconnaissance study[11] to document existing bank conditions within project impoundments. TransCanada proposes no further studies.

[9] Simons, D.B., Andrew, J.W., Li, R.M., & Alawady, M.A. (1979). Connecticut River Streambank Erosion Study: Massachusetts, New Hampshire, and Vermont. Waltham, MA: US Army Corps of Engineers (USACE).

[10] We note that the USACE's report quantified multiple contributing factors to bank erosion, and summarized that the erosional forces on river banks due to the project operation fluctuation of water levels was 15 to 18 percent of the shear stress forces caused by the flowing water.

[11] Kleinschmidt, 2010, Lower Connecticut River Shoreline Survey Report, Prepared for TransCanada Hydro Northeast

While this information is available, it is insufficient to fully inform an analysis of the contributing factors for erosion along the projects' reservoirs and tailraces. For example, the USACE's study and corresponding report was completed in 1979 and while it considered the hydraulics of the Connecticut River at that time, the hydraulics have changed with alterations to the three projects' operations since 1979[12] and operational changes to upstream storage projects. Additionally, TransCanada's recent river reconnaissance study does not take river hydraulics and project operation into consideration and only reviewed and assessed the conditions of the streambanks along the impoundments.

TransCanada noted during the scoping meetings that normal fluctuations are generally lower than the licensed limits. However, the PAD did not provide information on the variability, rate of change or the frequency of fluctuation within the reservoirs or tailraces. The data from this study, and the other study requests herein, coupled with information in the PAD provide information to understand the effect of project operations on multiple environmental resources (e.g. geology and soils, aquatic resources, and terrestrial resources).

Project Nexus

§5.9(b)(5) – *Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.*

The applicant notes the project-related effects of water level fluctuations upon soils and geology resources in the PAD, as well the potential related impact to terrestrial and aquatic resources. Operation of projects in the "average daily" run of river mode results in the storage and release of water within the day, producing water level fluctuations throughout the reservoirs and tailraces. The fluctuation in water levels affects the soils along the reservoir through saturation and dewatering of the embankment materials, potentially increasing their susceptibility to erosion. It is understood from information in the PAD and information presented at the scoping meetings that the

[12] *See* Transcripts of Wilder Hydroelectric Project evening scoping meeting filed on January 28, 2013, and transcripts of the Vernon Hydroelectric Project morning scoping meeting filed on January 30, 2013.

fluctuations are at a maximum during low flow periods and lessen with increasing river flows up to station hydraulic capacity.

The information from this proposed study should provide the variations in water elevations and fluctuation rates for various project operations during a variety of inflow conditions, identifying the ranges of water level fluctuations rates and variability with inflow and location along the reservoir. The results of this study will be used along with information within the PAD, and the next three study requests to identify operation related effects on erosion. Additionally, this information would help inform an analysis of project related effects on aquatic resources and terrestrial resources.

Proposed Methodology

§5.8(b)(6) – *Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.*

Conduct the fluctuation study using an unsteady one-dimensional hydraulic model such as HEC-RAS, using level loggers to verify in-situ measurements at multiple sites within each reservoir and tailrace. Collect cross sectional input data at locations along the reservoirs and tailraces, utilizing survey data scope from the study request #2.

Quantify water level fluctuations at reservoir erosion sites under various inflow conditions, including rates of elevation change, and changes to mean velocity in the reservoir.

Level of Effort and Cost

§5.9(b)(7) – *Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

The estimated cost of the study is approximately $90,000. An alternative study using just the level loggers might capture the water level fluctuation data, but would not have the ability to identify the dynamic river flows or isolate the effects of upstream discharges to fluctuations at the upper limit of reservoir influences.

Study Request #2 – River Bank Transect Study

Projects: Wilder, Bellows Falls, Vernon

Goals and Objectives

§5.9(b)(1) – *Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal of this study is to provide river bank survey data to monitor riverbank erosion at specific locations along each reservoir and tailrace. The survey sites should be selected at representative erosion sites along the tailwater and reservoir reaches with varying types of erosion to capture different soils, water level influences, and morphology. This survey data will also be useful as hydraulic model input data required as part of study request # 1. The survey will be performed at all river bank locations four times per year for two years, and may lead into longer term monitoring and reporting. The timing for the surveys will be immediately after high spring flows, early and late summer, and then in late fall.

§5.9(b)(2) – *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.*

Not applicable.

§5.9(b)(3) – *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

The Federal Energy Regulatory Commission must decide whether to issue a new license to TransCanada for the Wilder, Bellows Falls, and Vernon projects in the Connecticut River. Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. In making its license decision, the Commission must equally consider the environmental, recreational, fish and wildlife, and other non-developmental values of the projects, as well as power and developmental values. Any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

Public comments during the January 28 -30, 2013 scoping meetings indicate a strong public interest in erosion and a belief that the rates of erosion have increased recently and since deregulation of the energy markets. The riverbank surveys should capture existing conditions at representative locations and support a quantitative comparison. This would ensure that the effect of project operations pertaining to this resource is considered in a reasoned way and is relevant to the Commission's public interest determination.

Background and Existing Information

§5.9(b)(4) – *Describe existing information concerning the subject of the study proposal, and the need for additional information*

TransCanada commissioned an erosion monitoring study in 2010 to document riverbank erosion along the project reservoirs and tailraces. No riverbank geometry is available for the erosion sites, nor an understanding of the trends or rates of erosion at each project. This study request should provide baseline information on the erosion and erosional changes throughout the study period.

Project Nexus

§5.9(b)(5) – *Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.*

Erosion is likely to occur whenever moving water intersect with lands, and is a natural process with potentially both beneficial and adverse affects. The PADs describes a daily run-of-river mode of operation that results in headwater and tailwater flow fluctuations, resulting in a fluctuation of water levels. As referenced in the PAD, the 1979 Simons report attributes water fluctuations to be a factor in erosion. However, erosion, in and of itself, is not necessarily an adverse impact; but areas of excessive erosion that are a direct result of project operations or that may be having an adverse effect on another resource is of concern. The potential resources that may be affected are aquatic, terrestrial, cultural, recreation, or socioeconomic.

This study would help identify riverbank geology and rates of erosional changes. Coupled with information from the other requested studies, this data would provide an understanding of project effects on erosion and would inform the need for and appropriateness of potential erosion control measures to be included in a new license.

Proposed Methodology

§5.8(b)(6) – *Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.*

The survey should be performed at all locations four times per year for two years. Conduct surveys immediately after high spring flows, early and late summer, and then in late fall as follows:

1. Collect field survey data at each project along 10 sites (30 total) four times per year, for a two year period. Reference the survey location to project datum, both vertically and horizontally, and have permanent, recoverable control points. Extend survey locations from a point 50-feet upland from the top of bank to a wadeable depth into the water, and collect data at a sufficient density to accurately describe the slope geometry. This survey could be coupled with the input data requirements for study request #1, where the first survey collection might extend the survey transection completely across the river including the opposite bank as required for the hydraulic model input. Further field survey data collection can be confined to the upland area, riverbank and wadeable depths.

2. Collect additional survey data at the survey locations sites within 15 days of a significant high water event that exceeds the hydraulic capacity of the project(s) affected.

3. Provide a summary of the work scope, section morphology and changes, weather patterns, riverflows and levels, and quarterly comparisons of morphology changes and patterns in the study report.

Level of Effort and Cost

§5.9(b)(7) – *Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

The study is expected to cost $91,000 for the two year study. This estimated cost includes approximately 60 hours of engineering support, 670 hours of survey and technician support, 30 hours of CAD/GIS support, 20 hours of office support, and $11,000 in expenses.

Study Request #3– Historical River Bank Position and Erosion

Projects: Wilder, Bellows Falls, Vernon

Goals and Objectives

§5.9(b)(1) – *Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal of this study is to assess the historic erosion and river bank movement within the projects' boundary.

§5.9(b)(2) – *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.*

Not applicable.

§5.9(b)(3) – *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

The Federal Energy Regulatory Commission must decide whether to issue a new license to TransCanada for the Wilder, Bellows Falls, and Vernon projects in the Connecticut River. Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. In making its license decision, the Commission must equally consider the environmental, recreational, fish and wildlife, and other non-developmental values of the projects, as well as power and developmental values. Any license issued shall be best adapted to a

comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

Public comments during the January 28 -30, 2013 scoping meetings indicate a strong public interest in erosion and a belief that the rates of erosion have increased recently and since deregulation of the energy markets. Documentation of historic riverbank information, surveys and photos would provide an opportunity to quantify or compare changes over an extended time period. This would ensure that the effect of project operations pertaining to this resource is considered in a reasoned way and is relevant to the Commission's public interest determination.

Background and Existing Information

§5.9(b)(4) – *Describe existing information concerning the subject of the study proposal, and the need for additional information*

Public comments indicate that erosion has resulted in the loss of land along the project boundaries; however, no qualitative or quantitative information describing the amounts of lost lands has yet been made available. A thorough review of the information listed below, or from other sources, may provide detailed insight into riverbank changes and location over time.

Project Nexus

§5.9(b)(5) – *Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.*

Erosion is likely to occur whenever moving water intersect with lands, and is a natural process with potentially both beneficial and adverse affects. The PADs describes a daily run-of-river mode of operation that results in impoundment and tailwater flow fluctuations, resulting in a fluctuation of water levels. As referenced in the PAD, the 1979 Simons report attributes water fluctuations to be a factor in erosion. However, erosion, in and of itself, is not necessarily an adverse impact; but areas of excessive erosion that are a direct result of project operations or that may be having an adverse effect on another resource is of concern. The potential resources that may be affected are aquatic, terrestrial, cultural, recreation, or socioeconomic.

This study would help identify riverbank erosion conditions observed over a longer time period, allowing a comparison of historic and present conditions. Coupled with information from the other requested studies, this data would provide an understanding of project effects on erosion and would inform the need for and appropriateness of potential erosion control measures to be included in a new license.

Proposed Methodology

§5.8(b)(6) – *Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.*

1. Conduct a literature and document search at local towns and Registry of Deeds to identify historical information on river bank mapping and boundary surveys locating the edge of river.

2. Conduct research into available FEMA flood insurance studies for the project areas, where field surveys may have been conducted at key locations along the reservoir.

3. Conduct research into available aerial photographic records, such as available from the National Agriculture Imagery Program (NAIP) and NRCS (formerly Soil Conservation Service), which has aerial imagery dating back to the 1930's.

4. Conduct research on land purchases, easement agreements, and flowage agreements for the projects, where surveys or descriptions of the river bank positions may be detailed.

5. Conduct research on project records for original survey data or real estate data collected to define the reservoir rim and project boundaries.

6. Prepare a report, summarizing data sources and information acquired from the previous steps, qualify and quantify historic bank movement and erosion, and compare results to new survey data from study request #2.

Level of Effort and Cost

§5.9(b)(7) – *Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

This study effort is estimated to be a $30,000 effort, estimated to require approximately 325 hours of total labor.

Study Request #4 – Riverbank Erosion Study

Projects: Wilder, Bellows Falls, Vernon

Goals and Objectives

§5.9(b)(1) – *Describe the goals and objectives of each study proposal and the information to be obtained.*

Perform bank shear assessments using methodology such as the tractive force method to assess erosion potential from natural and project operational effects at representative erosion sites along the projects' reservoirs and tailwater, specifically at river bank survey sites within study request #2 or other significant locations identified within the Study Plan meetings.

§5.9(b)(2) – *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.*

None.

§5.9(b)(3) – *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

The Federal Energy Regulatory Commission must decide whether to issue a new license to TransCanada for the Wilder, Bellows Falls, and Vernon projects in the Connecticut River. Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. In making its license decision, the Commission must equally consider the environmental, recreational, fish and wildlife, and other non-developmental values of the projects, as

well as power and developmental values. Any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

Public comments during the January 28 -30, 2013 scoping meetings indicate a strong public interest in erosion and a belief that the rates of erosion have increased recently and since deregulation of the energy markets. Computation of erosional forces at select locations along the river from natural flows and water levels influenced by project operations will help identify the influences of project operation on riverbank erosion. This would ensure that the effect of project operations on erosional forces from river flows and water level fluctuations is considered in a reasoned way and is relevant to the Commission's public interest determination.

Background and Existing Information

§5.9(b)(4) – *Describe existing information concerning the subject of the study proposal, and the need for additional information*

The PAD describes erosional processes and summarizes findings from the 2010 shoreline survey and the USACE's 1979 report that concluded project operations are not likely to be a significant contributor to erosion within the reservoir.[13] This report looked at hydraulics and erosion along a 141 mile reach of the River from the Turners Falls dam to the headwaters of the Wilder Project.[14] Additionally, TransCanada has recently conducted a river reconnaissance study to document existing bank conditions within project impoundments. [15] TransCanada proposes no further studies.

While this information is available, it is insufficient to fully inform an analysis of the contributing factors for erosion along the projects' reservoirs and tailraces. For example, the USACE's study and corresponding report was completed in 1979 and while

[13] Simons, D.B., Andrews, J.W., Li, R.M., and Alawady, M.A. 1979. Connecticut River Streambank Erosion Study Massachusetts, New Hampshire, and Vermont. Prepared for USACE, New England Division.

[14] We note that the USACE's report quantified multiple contributing factors to bank erosion, and summarized that the erosional forces on river banks due to the project operation fluctuation of water levels was 15 to 18 percent of the shear stress forces caused by the flowing water.

[15] Kleinschmidt, 2010, Lower Connecticut River Shoreline Survey Report, Prepared for TransCanada Hydro Northeast.

it considered the hydraulics of the Connecticut River at that time, the hydraulics have changed with alterations to the three projects' operations since 1979[16] and operational changes to upstream storage projects. Additionally, TransCanada's recent river reconnaissance study does not river hydraulics, morphology, or project operation, into consideration and only reviewed and assessed the erosional conditions of the streambank along the impoundments.

TransCanada noted during the scoping meetings that normal fluctuations are generally lower than the licensed limits. However, the PAD did not provide information on the variability, rate of change or the frequency of fluctuation within the reservoirs or tailraces. The data from this study, and the other study requests herein, coupled with information in the PAD provide information to understand the effect of project operations on multiple environmental resources (e.g. geology and soils, aquatic resources, and terrestrial resources).

Project Nexus

§5.9(b)(5) – *Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.*

Erosion is likely to occur whenever moving water intersect with lands, and is a natural process with potentially both beneficial and adverse affects. The PADs describe a daily run-of-river mode of operation that results in headwater and tailwater flow fluctuations, resulting in a fluctuation of water levels. As referenced in the PAD, the 1979 Simons report attributes water fluctuations to be a factor in erosion. However, erosion, in and of itself, is not necessarily an adverse impact; but areas of excessive erosion that are a direct result of project operations or that may be having an adverse effect on another resource is of concern. The potential resources that may be affected are aquatic, terrestrial, cultural, recreation, or socioeconomic.

This study would quantify the forces and riverflows expected to cause erosion of the riverbanks at select locations under both flood conditions and normal project

[16] *See* Transcripts of Wilder Hydroelectric Project evening scoping meeting filed on January 28, 2013, and transcripts of the Vernon Hydroelectric Project morning scoping meeting filed on January 30, 2013.

operational conditions. Coupled with information from the other requested studies, this data would provide an understanding of project effects on erosion and would inform the need for and appropriateness of potential erosion control measures to be included in a new license.

Proposed Methodology

§5.8(b)(6) – *Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.*

Using generally accepted methods:

1. Gather soils information for the riverbank transect, referenced in study request #2.

2. Compute river depth and velocity at river bank locations using HEC-RAS software or acceptable substitute, referenced in study request #1.

3. Perform tractive force or shear stress analyses to identify the incipient motion for dominant particle sizes.

4. Assess soils stability during drawdown, considering excess pore pressures.

5. Correlate river flow, shear stress, and drawdown to establish a flow/shear stress relationship to quantify project influence on erosion potential. Prepare a report that summarizes the input data (soils, morphology, flows, fluctuations), methods of computations, and results, describing the contributing causes of erosion at the study sites.

Level of Effort and Cost

§5.9(b)(7) – *Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

The estimated cost of this work is approximately $66,000, would rely on data generated in other study requests and may be completed within one year.

It is anticipated that two technicians and an engineer would spend approximately 570 hours to conduct the study and prepare the report.

Study Request #5 – Aquatic Habitat Mapping

Projects: Wilder, Bellows Falls, Vernon

Goals and Objectives

§5.9(b)(1) – *Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal of this study is to map the aquatic habitat at the Wilder, Bellows Falls, and Vernon projects in the Connecticut River, to evaluate the types of aquatic habitats that occur throughout the project areas (and downstream riverine corridors), and identify any potential project effects under current operations. Specifically, the objectives of the study are to:

1. Survey and map the aquatic habitat types distributed within the project impoundments, tailwaters, and downstream riverine corridors outside of the project areas in the Connecticut River from the upper extent of the Wilder impoundment and downstream to the upper extent of the Turners Falls Project's impoundment, including the Bellows Falls bypassed reach.

2. Describe the potential influences of the project reservoirs, water quality conditions, and project operations on the distribution of aquatic habitat within the reaches of the river evaluated.

§5.9(b)(2) – *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.*

Not applicable.

§5.9(b)(3) – *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

The Federal Energy Regulatory Commission must decide whether to issue a new license to TransCanada for the Wilder, Bellows Falls, and Vernon projects in the Connecticut River. Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. In making its license decision, the Commission must equally consider the environmental, recreational, fish and wildlife, and other non-developmental values of the projects, as well as power and developmental values. Any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

Aquatic habitats in the Connecticut River support a sustainable riverine ecosystem that provides public opportunities, including a sport fishery. Ensuring that the effect of project operations pertaining to this resource is considered in a reasoned way is relevant to the Commission's public interest determination.

Background and Existing Information

§5.9(b)(4) – *Describe existing information concerning the subject of the study proposal, and the need for additional information.*

Review of TransCanada's PADs, as well as a preliminary review of scientific literature revealed minimal information pertaining to aquatic habitat resources within the projects reaches in the Connecticut River. Sparse site-specific data are provided in the PAD. Additional aquatic habitat information, including the mapped locations of aquatic habitats is needed to evaluate the projects effects on this resource.

Project Nexus

§5.9(b)(5) – *Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.*

Currently, water levels in the impoundments, tailwaters, and downstream riverine areas fluctuate due to the current peaking operations of all three projects. In addition, there is no minimum flow requirement in the bypassed reach at the Bellows Falls project. As a result, any aquatic habitat exposed under low flow conditions may be adversely effected and/or inhibit the utilization of aquatic habitats by aquatic species during various life stages. These events may also cause fish or other aquatic species (e.g., mussels and macroinvertebrates) stranding and associated mortality.

This requested study would help establish a baseline condition and the health of the aquatic habitat and aquatic species of the Connecticut River from the head of the Wilder impoundment to the head of the Turners Falls impoundment under current operations. These data would also assist in forming the basis for inclusion of potential license articles to protect aquatic resources in the Connecticut River.

Proposed Methodology

§5.8(b)(6) – *Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.*

Using generally accepted practices in the scientific community:

1. Conduct field surveys during the low flow season (i.e. summer months) from the head of the Wilder project impoundment to the head of the Turners Falls Project impoundment, including within the Bellows Falls bypassed reach. Include all three project impoundments, tailwaters, and downstream riverine corridors.

2. Categorize the habitat survey information per accepted practices in the scientific community (e.g., riverine habitat type, substrate type, depths, etc.)

and plot on aerial maps. Record in-situ water quality conditions (temperature, DO, pH, conductivity).

3. Prepare a report that includes a summary of the data collected. The report should include aerial habitat maps, habitat descriptions, project operations and flow conditions during the survey, and in-situ water quality data. Include all data used to develop the report within an appendix to the report.

Level of Effort and Cost

§5.9(b)(7) – *Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

The estimated cost of this work is approximately between $115,000, and may be completed within one study season.

It is anticipated that two technicians and a biologist would spend about 120 hours to conduct field work. Report preparation would require about 3 weeks by a biologist, and by GIS specialist.

Study Request #6 – Aquatic Habitat Instream Flow Study

Projects: Wilder, Bellows Falls, Vernon

Goals and Objectives

§5.9(b)(1) – *Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal of this study is to evaluate the condition of aquatic habitat downstream of the Wilder, Bellows Falls, and Vernon dams (including the Bellows Falls bypassed reach) in the Connecticut River under flow conditions affected by project operations. Specifically, the objective of the study is to assess various stream flow conditions and resultant habitat for the production and survival of aquatic species downstream of the Wilder, Bellows Falls, and Vernon dams (including the Bellows Falls bypassed reach).

§5.9(b)(2) – *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resources to be studied.*

Not applicable.

§5.9(b)(3) – *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study*.

The Federal Energy Regulatory Commission must decide whether to issue a new license to TransCanada for the Wilder, Bellows Falls, and Vernon projects. Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. In making its license decision, the Commission must equally consider the environmental, recreational, fish and wildlife, and other non-developmental values of the projects, as well as power and developmental values. Any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

Aquatic habitats and the species that utilize these habitats in the Connecticut River support a sustainable riverine ecosystem that is critical in providing public opportunities, such as the sport fishery. Ensuring that the effect of project operations pertaining to this resource is considered in a reasoned way is relevant to the Commission's public interest determination.

Background and Existing Information

§5.9(b)(4) – *Describe existing information concerning the subject of the study proposal and the need for additional information.*

Review of TransCanada's PADs, as well as a preliminary review of scientific literature revealed minimal information pertaining to the adequacy and/or availability of flow dependent aquatic habitats downstream of the projects. Additional information on in stream flow downstream of the three dams and bypassed reach at Bellows Falls is needed to evaluate the projects effects on fish and aquatic resources.

Project Nexus

§5.9(b)(5) – *Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.*

The Wilder, Bellows Falls, and Vernon projects operate as peaking hydroelectric projects. These peaking operations result in stream flow fluctuations of varying degrees based on total river flows and electricity demands. Because the projects reduce downstream flows when holding water in the project's reservoirs, there is a direct effect on the quantity and quality of the aquatic habitats downstream of the project dams. These effects could affect spawning, rearing, feeding, migration, and overwintering of aquatic species and may even cause stranding and mortality of aquatic species.

This requested study would help establish appropriate data of the effects of various flows on supporting aquatic habitat and species under current operations. These data would also assist in forming the basis for inclusion of potential license requirements (e.g. minimum instream flow) to protect aquatic resources in the Connecticut River.

Proposed Methodology

§5.9(b)(6) – *Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge*.

Using generally accepted practices in the scientific community:

1. Use habitat mapping information of the Connecticut River downstream of the Wilder, Bellows Falls, and Vernon dams (including the Bellows Falls bypassed reach) as baseline habitat information in this study;

2. Conduct a substrate embeddedness evaluation in the study areas;

3. Consult with stakeholders to develop a specific methodology for evaluating instream flows within the project's hydraulic control at the three projects;

4. Establish a protocol for identifying or developing Habitat Suitability Curves for target species (if appropriate); and

5. Prepare a report that includes a summary of the data collected. The report should include aerial habitat maps, habitat descriptions, project operations and flow conditions during the study, and all other results from the study.

Level of Effort and Cost

§5.9(b)(7) – *Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

The estimated cost of this work is approximately $200,000 and may be completed within one study season.

It is anticipated that two technicians and a biologist would spend about 130 hours to conduct field work for each project. Report preparation would require about 2 weeks by a biologist and technician for each project.

Study Request #7 – Baseline Fisheries Population Study

Projects: Wilder, Bellows Falls, Vernon

Goals and Objectives

§5.9(b)(1) – *Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal of this study is to gather baseline fisheries data upstream and downstream of the Wilder, Bellows Falls, and Vernon projects in the Connecticut River. These data are needed to identify the fish species that occur in the projects' impoundments, tailwaters, the downstream riverine corridors, and the Bellows Falls bypassed reach and to evaluate any potential project effects. Specifically, the objectives of the study are to:

1. Determine the relative abundance and distribution of resident/riverine and diadromous fish species within the project impoundments, tailwaters, and downstream riverine corridors outside of the project areas in the

Connecticut River from the upper extent of the Wilder impoundment and downstream to the upper extent of the Turners Falls Project impoundment, including the Bellows Falls bypassed reach.

2. Describe the distribution of resident/riverine and diadromous fish species within the reaches of the river and in relationship to data gathered by the Aquatic Mapping Study.

§5.9(b)(2) – *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.*

Not applicable.

§5.9(b)(3) – *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

The Federal Energy Regulatory Commission must decide whether to issue a new license to TransCanada for the Wilder, Bellows Falls, and Vernon projects. Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. In making its license decision, the Commission must equally consider the environmental, recreational, fish and wildlife, and other non-developmental values of the projects, as well as power and developmental values. Any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

Fish populations in the Connecticut River support a sport fishery. The effect of project operation on this resource is relevant to the Commission's public interest determination.

Background and Existing Information

§5.9(b)(4) – *Describe existing information concerning the subject of the study proposal, and the need for additional information.*

Review of TransCanada's PADs, as well as a preliminary review of scientific literature revealed minimal information on fisheries resources in the Connecticut River potentially affected by the project. While sparse site-specific data on general species

presence and absence are provided in the PAD, additional fisheries population data are needed to evaluate the projects effects on this resource.

Project Nexus

§5.9(b)(5) – *Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.*

Potential project effects on fishery resources may include fish entrainment through the generating units, minimum instream flows, and peaking flow operations. Information on the abundance and distribution of the existing fish community would help to identify whether adverse effects are occurring.

The applicant is proposing to continue providing the existing minimum flows. Flow releases from the projects have the potential to affect the suitability of aquatic habitat in these reaches, and in turn fishery resources. This requested study would help establish a baseline condition on the health of the fishery of the Connecticut River in the projects' vicinity under current operations. These data would also assist in informing potential license articles to protect fishery resources in the Connecticut River.

Proposed Methodology

§5.8(b)(6) – *Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.*

Using generally accepted practices in the scientific community:

1. Conduct electrofishing surveys in each of the project impoundments, tailwaters, and downstream riverine corridors, including boat or backpack electrofishing within the Bellows Falls bypassed reach. Conduct sampling during late-summer or fall in order to observe annual juvenile production (juvenile fish would be large enough to collect). Establish sampling locations that represent the full extent and types of habitat in the study area.

2. Separately target upstream and downstream migrating American eels for sampling using generally accepted methods, such as electrofishing, trap/fyke netting, eel pots, etc. to provide data on the abundance of American eels at various life stages, and where they tend to congregate at each of the projects. Conduct the study in late spring/early summer to target upstream migration juvenile eels (i.e., elvers and yellow eels), and during the fall to target downstream migrating adults eels (i.e. silver eels).

3. Identify to species and count all collected fish while weighing and measuring only a subsample. Measure eye diameters of captured American eels for use in the evaluating silver eels phase. Identify and record the habitat type and substrate of each sampling location , and record in-situ water quality conditions (temperature, DO, pH, conductivity).

4. Prepare a report that includes a summary of the data from the above studies. Include tabular summaries of fish species collected by station, plus data on lengths, weights, condition factors, and in-situ habitat conditions. Also include specific information relating to American eel populations characteristics , such as areas at the base of the dams where elvers congregate, and the abundance of potentially downstream migrating silver eels. Include all data used to develop the report (including date and time of collection) within an appendix to the report.

Level of Effort and Cost

§5.9(b)(7) – *Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

The estimated cost of this work is approximately $100,000 and may be completed within one study season.

It is anticipated that three technicians and a biologist would spend about 165 hours to conduct field work for each project. Report preparation would require about 4 weeks by a biologist.

Study Request #8 – Assessment of Fish Impingement, Entrainment, and Survival Study

Projects: Wilder, Bellows Falls, Vernon

Goals and Objectives

§5.9(b)(1) – *Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal of this study is to use the data gathered from the baseline fisheries population study to assess fish trashrack impingement, turbine entrainment, and survival at the Wilder, Bellows Falls, and Vernon projects in the Connecticut River. This information would be used to evaluate the effects from passage through project turbines and other passage routes on fish populations that occur throughout the project areas. Specifically, the objectives of the study are to:

1. Describe the physical characteristics of the Wilder, Bellows Falls, and Vernon projects that may influence fish impingement and entrainment rates, including intake location and dimensions, the velocity distribution in front of the intake structure, and the clear spacing between the trashrack bars;

2. Identify current and any future routes for fish movement past the three dams, and the risks of injury or mortality for each, taking into consideration seasonality of movement, flow direction and velocity, and current and future flow management regimes;

3. Analyze target species (i.e., individual species and guilds/groups) for factors that may influence their vulnerability to entrainment and mortality;

4. Assess the potential for target fish species impingement;

5. Estimate entrainment rates and numbers for target fish species;

6. Estimate turbine passage survival rates and numbers for target fish species;

7. Estimate total project survival considering all passage routes for American shad and river herring at the Vernon project; and

8. Estimate total project survival considering all passage routes for American eel, Atlantic salmon, and sea lamprey at the Wilder, Bellows Falls, and Vernon projects.

§5.9(b)(2) – *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.*

Not applicable.

§5.9(b)(3) – *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

The Federal Energy Regulatory Commission must decide whether to issue a new license to TransCanada for the Wilder, Bellows Falls, and Vernon projects in the Connecticut River. Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. In making its license decision, the Commission must equally consider the environmental, recreational, fish and wildlife, and other non-developmental values of the projects, as well as power and developmental values. Any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

Fish populations in the Connecticut River support a sustainable riverine ecosystem that is critical in providing public opportunities, such as the important sport fishery. Ensuring that the effect of project operations pertaining to this resource is considered in a reasoned way is relevant to the Commission's public interest determination.

Background and Existing Information

§5.9(b)(4) – *Describe existing information concerning the subject of the study proposal, and the need for additional information.*

Review of TransCanada's PADs, as well as a preliminary review of scientific literature revealed no information pertaining to fish impingement, entrainment, and survival at the Wilder, Bellows Falls, and Vernon projects on the Connecticut River. Additional up-to-date information on fish impingement, entrainment, and survival is needed to evaluate the projects effects on this resource.

Project Nexus

§5.9(b)(5) – *Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.*

Potential t effects of project operations and facilities include fish impingement on the trashracks and entrainment through the generating units. Any fish moving downstream as a part of their life cycle would encounter a series of dams and intakes at hydroelectric projects in the Connecticut River, potentially resulting in exposure of these fish to multiple sources of mortality. Information pertaining to these effects would help identify any adverse effects from the projects.

This requested study would help establish a baseline condition and be considered when evaluating the health of the fishery of the Connecticut River in the project reach. These data would also assist in forming the basis for inclusion of potential license conditions to protect fishery resources in the Connecticut River.

Proposed Methodology

§5.8(b)(6) – *Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.*

Using generally accepted practices in the scientific community:

1. Utilize the fish population data to develop a target species list that represents species of conservation interest and all fish guilds/groups in consultation with the state fishery resource agencies.

2. Conduct an assessment on the probability of trashrack impingement a the three projects considering the site-specific variables at each project, such as clear spacing, intake configurations, flow velocities, fish size, fish swim speeds, and life histories.

3. Conduct a literature review of entrainment studies conducted at other hydroelectric facilities, including the EPRI (1997)[17] database to derive entrainment rates for the target species at the Wilder, Bellows Falls, and Vernon projects. Correlate entrainment rates with flow through the units of each project and the relative abundance of each target species to estimate the levels of entrainment for each target species.

4. Using the site-specific specifications from each of the projects, conduct a blade strike assessment to derive survival rates of each target species. Correlate these survival rates with the entrainment estimates to estimate fish survival through the turbines of each of the two projects.

5. Use flow distributions through the projects turbines and other passage routes, as well as survival rates through alternative passage routes to estimate total project survival of migratory species at each of the project.

6. Prepare a report that includes a summary of the results from the assessments described above. Include all data used to develop the report in an appendix.

Level of Effort and Cost

§5.9(b)(7) – *Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

The estimated cost of this work is approximately $65,000. It is anticipated that a biologist and a hydrologist would spend approximately 500 hours total to conduct the impingement, entrainment, and survival assessments and prepare a report.

[17] Electric Power Research Institute (EPRI). 1997. Turbine survival and entrainment database – Field tests. EPRI Report No. TR-108630. Prepared by Alden Research Laboratory, Inc. Holden, MA.

Study Request #9 – American Shad Upstream Migration and Behavioral Study

Projects: Bellows Falls & Vernon

Goals and Objectives

§5.9(b)(1) – *Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal of this study is to track adult American shad within the Connecticut River, through inter-project riverine reaches, project reservoirs, and project facilities located within the species' historic range. These migration data would be correlated to project operations (e.g. flow), water quality, and any other parameters believed to influence migration behavior. This data would be used to evaluate the effects the hydroelectric projects operations and facilities on upstream American shad passage in the Connecticut River. Specifically, the objectives of the study are to:

1. Collect and tag upstream migrating adult American shad downstream of the projects to track their migration and behavior.

2. Identify any project operations and facilities contributing to migration delay, mortality, increased predation, upstream passage avoidance, or any other project related factors contributing to alterations in natural upstream migration and behavior.

§5.9(b)(2) – *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.*

Not applicable.

§5.9(b)(3) – *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

The Federal Energy Regulatory Commission must decide whether to issue a new license to TransCanada for the Wilder, Bellows Falls, and Vernon projects in the Connecticut River. Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. In making its license decision, the Commission must equally consider the environmental,

recreational, fish and wildlife, and other non-developmental values of the projects, as well as power and developmental values. Any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

American shad populations in the Connecticut River represent a valuable aquatic resource to the region, as well as a recreational and cultural resource. Identifying effects of project operations pertaining to this resource is relevant to the Commission's public interest determination.

Background and Existing Information

§5.9(b)(4) – *Describe existing information concerning the subject of the study proposal, and the need for additional information*

Review of FirstLight's PADs, as well as a preliminary review of scientific literature revealed sparse and dated information pertaining to upstream American shad migration and behavior on the Connecticut River. Although fish passage efficiency studies have been conducted within the passage facilities themselves, we are not aware of any studies on the potential effects of project operations on the migration efficiency of shad in the general project vicinity. Therefore, additional information on adult American shad migration and behavior is needed to evaluate the projects effects on this resource.

Project Nexus

§5.9(b)(5) – *Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.*

Potential effects of project operations at the Vernon and Bellows Falls projects may influence adult American shad migration and behavior in the Connecticut River. Any adult shad moving upstream would be exposed to a series of dams and unnatural flow conditions, potentially resulting in migration delay, increased predation, and other project related effects. Information pertaining to these effects would help identify if adverse effects from the projects are occurring.

This requested study would help identify any project-specific conditions adversely affecting upstream American shad passage conditions in the Connecticut River. These

data would also assist in forming the basis for inclusion of potential license articles to protect adult American shad.

Proposed Methodology

§5.8(b)(6) – *Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.*

Using generally accepted practices in the scientific community:

1. Capture upstream migrating adult American shad downstream of the projects during their upstream migration season. Insert telemetry tags into the captured American shad and record biological data before release and track their upstream migration and behavior, especially as these fish approach hydroelectric facilities. Closely monitor behavior of these shad as they approach and ascend fishways, as well as behavior within the projects impoundments.

2. Prepare a report that includes a summary of the results of the collected telemetry data. Include statistically justifiable analyses of American shad migration and behavior throughout the study area in the Connecticut River, and consider collected biological information, water quality data, river conditions, project operations and flow conditions, and the condition of project facilities during the time of the study. Also include graphics displaying the tagged-shad movements during the study. Include all data used to develop the report in an appendix.

Level of Effort and Cost

§5.9(b)(7) – *Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

The estimated cost of this work is approximately $200,000. It is anticipated that a few technicians and a biologist would spend approximately 200 hours to conduct the field work and report. This study should be conducted over two seasons.

Study Request #10 – Recreation Facility Inventory and Use & Needs Assessment

Projects: Wilder, Bellows Falls, Vernon

Goals and Objectives

§5.9(b)(1) – *Describe the goals and objectives of each study proposal and the information to be obtained.*

The goals of the Recreation Facility Inventory and Use & Needs Assessment Study are to: (1) obtain information about the condition of existing recreation facilities and access sites at the projects; and existing recreation use, access, and demand at the projects; (2) conduct an assessment of the need to enhance recreation opportunities and access at the project; and (3) develop a Recreation Management Plan for the implementation of any enhancement measures and long-term monitoring of recreation demand and adequacy of facilities at the project over the term of a new license.

§5.9(b)(2) – *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.*

Not applicable.

§5.9(b)(3) – *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

The Federal Energy Regulatory Commission must decide whether to issue a license to TransCanada for the Wilder, Bellows Falls, and Vernon Hydroelectric projects. Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what

conditions should be placed on any license that may be issued. In making its license decision, the Commission must equally consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. Any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

Recreation has been identified as a legitimate project purpose by the Commission. Applicants are encouraged to develop recreation resources in such a matter that is "consistent with the needs of the area to the extent that such development is not inconsistent with the primary purpose of the project" (18 C.F.R. §2.7). Identifying effects of project operations pertaining to this resource is relevant to the Commission's public interest determination.

Background and Existing Information

§5.9(b)(4) – *Describe existing information concerning the subject of the study proposal, and the need for additional information.*

Section 3.10.3 of the PADs for each project provides a summary of FERC Form 80 Recreation Use Report annual visitation estimates for 2008. Section 3.10.2 provides a general description of public recreation facilities, activities, and demand at the projects. However, the PADs provide no detailed information regarding the condition of existing facilities or type or location of various uses. The PAD provides no project-specific information regarding visitor perceptions and identified needs at the projects. Information on current use and whether existing access facilities in the area are meeting recreation demand would inform a decision on whether additional, designated public access at the projects is necessary to meet existing and future recreation demand at the projects.

Project Nexus

§5.9(b)(5) – *Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.*

The projects include reservoirs, tailwater areas, and a bypassed reach at Bellows Falls, that are inherently attractive recreation features. An analysis of existing recreation use and access at the projects would help form the basis for determining the project's ability to enhance public recreation access opportunities. Also, an assessment of the

current level of recreation use would provide information necessary to develop a Recreation Management Plan for efficient management of the recreational components of the project over the term of a new license.

Proposed Methodology

§5.8(b)(6) – *Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.*

1. An assessment of the condition of existing developed recreation facilities should be conducted throughout the project using physical and visual inspections.

2. At Bellows Falls, the facility inventory should include characterization of the suitability of the bypassed reach for whitewater boating (e.g., gradient, length, character of potential flows) and the feasibility of incorporating a shorter and safer (i.e., a path that reduces boaters proximity and time near a highway) around Bellow Falls dam.

3. The use and needs assessment will include all recreation activity types known to occur or potentially occurring at the project. Methods should include visitor observations; on-site visitor intercept surveys at formal and informal public recreation areas at the project reservoirs, tailraces, and riverine areas, including the Bellow Falls bypassed reach; and mail and/or internet surveys targeting unique stakeholder groups that may not be practically accessed through on-site surveys (e.g., adjacent residential land owners, residents of the counties in which the projects are located, rock climbers, whitewater boaters).

4. Specific methods for each sampling approach in the use and needs assessment include: (1) the visitor observations should capture information such as location, date, time, weather, number of vehicles, watercraft (if any), number of recreation users or party size, and recreation activity engaged in; (2) the methodology for the visitor survey sampling will be based on a stratified random sample that includes all seasons, various locations, and various times of week and day to enable representative

responses from the visitors, while ensuring interview coverage during key times (e.g., holiday and weekend days, shoulder seasons, hunting seasons) (Note: surveys of fisherman and hunters should include additional pertinent information related to game and harvest); (3) the mail back survey will follow the Dillman Method or modified Dillman method, and include items such as frequency and duration of visits to the projects, qualitative ratings of existing public access and recreation facilities of the project area, and reasons for visiting or not visiting the projects for recreation

5. The needs assessment will include the demand for whitewater boating in the bypassed reach of Bellow Falls, existing boating opportunities within the project region (including at the project impoundments and immediately downstream of the project), feasibility of providing additional public access at the project reservoir and riverine reaches (potential locations, type of facilities and access, and any associated costs), identifying visitor perceptions regarding the adequacy of recreation facilities, and access in the project area, and assessing future recreation demand and facility needs at the project.

6. Quantify annual recreation use by activity type and season, to include, at a minimum, the project tailraces and Connecticut River Water Trail campsites, and the following locations:

    a. At the Wilder Project: Norwich Landing; East Wilder Boat Launch; Hartford (Wilder) Picnic Area at Kilowatt Park; Wilder Dam (Olcott Falls) Boat Launch; Fishladder and Angler Parking; Lebanon (Wilder Dam) Picnic Area, Vista, and hiking trails; Wilder Dam Portage and downstream natural areas.

    b. At the Bellows Falls Project: Charlestown Boat Launch and Picnic Area, Herrick's Cove Boat Launch and Picnic Area, Pine Street Boat Launch and Portage Trail Take-Out, Bellow Falls Fish Ladder Visitor Center, Bellows Falls Dam Portage Put-In, and the bypassed reach.

    c. At the Vernon Project: Fisherman Access Area; Vernon Canoe Portage, Vernon (Governor Hunt) Recreation Area & Boat Launch, and Vernon Neck Open Space.

7. Assess visitor perceptions of the effects of project operations and management on recreation and recreation opportunities at the project including fluctuating reservoir levels, minimum flow releases, and anticipated changes over a new license term. Identify potential measures to alleviate any negative effects as well as to enhance existing recreation opportunities and access.

8. A Recreation Management Plan for the projects should be included in the license application and should include, at a minimum: (1) description of any proposed protection, mitigation, and enhancement measures, including: location of any proposed facilities and/or access areas (including description and figure depicting the relationship of any proposed facilities to the existing project boundaries), proposed ownership and management of any proposed facilities, associated capital, and operation and maintenance costs; and a timeline for implementation; (2) description of operation and management measures associated with project-related recreation access and facilities; and (3) description of measures for future monitoring of recreation demand and adequacy of project-related facilities to meet this demand over the term of new licenses.

Level of Effort and Cost

§5.9(b)(7) – *Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

The estimated cost of the Recreation Facility Inventory and Use & Needs Assessment Study for all three projects is about $150,000, including field studies, study report development, and drafting of a Recreation Management Plan. One field season should be sufficient to collect the required data and prepare the report.

Study Request #11 – Whitewater Boating Flow Assessment

Projects: Bellows Falls

Goals and Objectives

§5.9(b)(1) – *Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal of this study is to assess the effects of a range of bypassed reach flows on whitewater recreational opportunities. The objectives of the study are to:

1. Determine what whitewater boat-types (e.g., rafts, canoes, and kayaks) would be appropriate to whitewater flows potentially provided in the bypassed reach.

2. Determine the range of flows (minimum through optimal) needed to support various whitewater boating opportunities (by watercraft type) in the project bypassed reach of the Connecticut River.

3. Determine whether current or future demand exists for whitewater boating in the bypassed reach.

4. Determine the number of days per month the minimum and optimum flows for whitewater boating are available under the project's current and any proposed mode of operation.

5. Determine any competing recreational uses (e.g., climbing or fishing) or other resource needs (e.g., aquatic habitat) that would be adversely affected by scheduled releases.

6. Identify any significant or unique hazards.

§5.9(b)(2) – *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.*

Not applicable.

§5.9(b)(3) – *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

The Federal Energy Regulatory Commission must decide whether to issue a license to TransCanada for the Bellows Falls Hydroelectric Project. Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. In making its license decision, the Commission must equally consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. Any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

Comments provided during scoping indicate an interest in studying flows for boating opportunities on the 1-mile-long segment of the Connecticut River from Bellows Falls dam to the powerhouse. There is currently no requirement for flow releases into the bypassed reach. Comments received stated that releasing an appropriate amount of water into the bypassed reach could potentially provide whitewater park boating opportunities for public use, especially if combined with design and construction of whitewater park obstacles in this stretch of the river.

Background and Existing Information

§5.9(b)(4) – *Describe existing information concerning the subject of the study proposal, and the need for additional information.*

The PAD does not include information on the bypassed reach. After reviewing the comments provided during the January 29, 2013 scoping meetings, we have identified a gap between existing information and the information needed to analyze whether flows could be provided to enhance whitewater boating opportunities and whether there is demand for whitewater boating in the bypassed reach. We are unaware of any information on the characteristics or boatability of the Bellows Falls bypassed reach, or the range of boatable flows.

Project Nexus

§5.9(b)(5) – *Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.*

Project operation diverts flows from a 1-mile-long bypassed reach of the Connecticut River that could provide whitewater boating opportunities. Specifically, instream flows for the Connecticut River divert11,000 cfs from the bypass reach from Bellows Falls dam to the powerhouse. Thus, flows into the bypassed reach currently only happen if flows into Bellows Falls reservoir exceed approximately 11,000 cfs. An analysis of project operation relative to a range of boatable flows would help form the basis for informing potential license articles pertaining to whitewater boating opportunities.

Proposed Methodology

§5.8(b)(6) – *Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.*

1. Use accepted practices for a controlled flow study as described in Whittaker et al. (2005) to visually assess whitewater boating flows in coordination with flows scheduled for the requested Instream Flow Aquatic Habitat Study, and any opportunities that may be provided by river flows in excess of 11,000 cfs at the Bellows Falls dam; and to the extent practicable based on these visual observations, determine the acceptable minimum and optimal instream flow needed for whitewater boating in the bypassed reach.

2. Prepare a study report that (1) describe the whitewater boating attributes of the range of flows examined, including level of difficulty, play spots, portage requirements, etc; (2) identifies the acceptable and optimal flows for the reach and the frequency of availability of the identified flows under current and any proposed project operation, and (3) incorporate relevant results from the Recreation Facility Inventory and Use & Needs Assessment including characterization of the suitability of the bypassed reach for whitewater boating (e.g., gradient, length, character of potential

flows), annual recreation use by activity type and season of the bypassed reach, and (4) assesses whether or not there is demand for whitewater boating in the bypassed reach.

3. The report should also describe any competing recreation uses or other resources (e.g., fishing, rock climbing) in the bypassed reach that could be adversely affected by providing scheduled releases of minimum and optimum flows for whitewater boating.

Level of Effort and Cost

§5.9(b)(7) – *Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

This study could be conducted in coordination with the requested Instream Flow Aquatic Habitat Study; and as such. The estimated cost of the whitewater boating flow assessment is approximately $30,000.

Study Request #12 – Vernon Project Cultural Resources Study

Goals and Objectives

§5.9(b)(1) – *Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal of this study is to determine the potential effects of the Vernon Project on archaeological and historic resources that are listed in or eligible for inclusion in the National Register of Historic Places (National Register).[18] The Cultural Resources Study, including identification of the area of potential effects (APE),[19] should be

[18] In structure and appearance, the Vernon Cultural Resource Study should resemble the two other cultural resource studies associated with the Wilder and Bellows Falls projects for this relicensing.

[19] The APE should, at a minimum, include the lands enclosed by the project boundary including both in-water and on-shore project lands and facilities, and lands or properties outside the project boundary where project operations or other project-related activities may directly or indirectly cause changes in the character or use of historic properties, if any historic properties exist.

developed in consultation with the Vermont and New Hampshire State Historic Preservation Officers (SHPO), and other interested parties.[20] The study area should encompass the APE.

The Cultural Resources Study should satisfy these specific study objectives:

a) Identify the Project's APE and seek the concurrence on the APE from the New Hampshire SHPO and the Vermont SHPO.

b) Identify, and complete an inventory of cultural resources that may be directly or indirectly affected by the project.

c) Evaluate the National Register eligibility of all cultural resources within the APE.

d) Identify any existing project-related effects (both direct and indirect) on historic properties, and determine how project operations or other project-related activities may affect or potentially affect them.

e) Prepare a study report or reports that include: (1) a background section on previous work in and around the APE; (2) a culture history of the research area; (3) definition and map of the APE; (4) methods used for the archival research and field pedestrian survey and how the APE was systematically inventoried; (5) the results of the survey and detailed descriptions of the cultural resources found (including a table depicting type of cultural resources, age, property ownership location, associated artifacts, existing and potential effects, and National Register eligibility status) ; (6) results of National Register evaluations for cultural resources located within the APE; and (7) site- specific descriptions of existing and potential project-related effects on cultural resources considered to be eligible for inclusion in the National Register.

f) Consult with the Vermont and New Hampshire SHPOs and other interested parties to resolve adverse effects on historic properties within the APE. If historic properties are or may be adversely affected by operation of the project or from project-related activities, you should revise the existing

[20] Although there are no federally recognized Tribes in New Hampshire or Vermont, there are Native American organizations that may attach religious and cultural significance to historic properties in the APE.

Historic Properties Management Plan (HPMP)[21] to address identified project effects.

g) File a draft revised HPMP along with your preliminary licensing proposal, and a final revised HPMP with your final license application.[22] Among other things, the revised HPMP should provide site-specific measures to resolve any potential project-related adverse effect to historic properties located within the project's APE.

§5.9(b)(2) – *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resources to be studied.*

Not applicable.

§5.9(b)(3) – *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

The Federal Energy Regulatory Commission must decide whether to issue a license to TransCanada for the Vernon Project. Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. In making its license decision, the Commission must equally consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. Any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

[21] A HPMP was prepared for the Vernon Project in accordance with the requirements of a 2006 Memorandum of Agreement (MOA) to address adverse effects associated with a license amendment as well as future operation of the hydro project in general. The HPMP (dated October 2008) was approved by the Commission in January 2010.
[22] Note that once the Commission finds the HPMP to be final, we would attach it to a programmatic agreement and after noticing the Advisory Council on Historic Preservation, we would execute the programmatic agreement with the Vermont and New Hampshire SHPOs, if the Advisory Council on Historic Preservation declines to participate. Execution of the programmatic agreement would evidence that the Commission has resolved any potential adverse effects to historic properties involved with the proposed project.

Historic properties [23] are of concern because of their importance in prehistory and history, representing major patterns of our shared local, state, and national experience. Ensuring that measures pertaining to these resources are considered in a reasoned way is relevant to the Commission's public interest determination. Additionally, this information is needed to ensure compliance with section 106 of the National Historic Preservation Act and its implementing regulations at 36 C.F.R. Part 800.

Background and Existing Information

§5.9(b)(4) – *Describe existing information concerning the subject of the study proposal and the need for additional information.*

In Section 3.12 of the PAD, you state that you conducted a Phase IA Archaeological Reconnaissance Survey to identify known archaeological sites within the project's APE and to identify areas of archaeological sensitivity where documented and previously recorded archaeological sites are likely to exist. You also state that you've completed a study to identify historic standing structures within the Deerfield and Connecticut River hydroelectric systems to establish a baseline archival record and that documentation was completed to Historic American Engineering Record (HAER) standards. A HPMP was prepared for the Vernon Project in accordance with the requirements of a 2006 memorandum of agreement to address adverse effects associated with a license amendment as well as future operation of the hydro project in general. In Section 4.10 of the PAD you state that the SHPOs approved a full assessment of specific project effects resulting from operation, maintenance and recreation use on cultural resources within the project's APE, including historic hydroelectric system features, consistent with the provisions of the executed MOA. As a result, TransCanada does not propose to conduct any additional cultural resources studies in association with the relicensing of the project.

Although we note the referenced HPMP provides a general definition and associated map of the APE, it does not have the detail we would need for our analysis involving this relicensing. Although you state in your HPMP that you conducted a Phase IA reconnaissance survey within the APE to identify previously reported archaeological sites and archaeological sensitivity areas, we must take into account the effects of issuing a new license for the Vernon Project on all historic properties listed in or eligible for inclusion in the National Register, not just those resources identified through previous

[23] Historic properties are prehistoric or historic districts, sites, buildings, structures or objects listed in or eligible for inclusion in the National Register.

studies. Therefore, in order to assess the effects of project operations and related activities on historic properties, we require an inventory of cultural resources within the project's APE and an evaluation of all inventoried resources to determine their eligibility for inclusion in the National Register.

Project Nexus

§5.9(b)(5) – *Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study would inform the development of license requirements.*

Continued operation and maintenance of the Vernon Project has the potential to affect previously identified or unknown historic properties within the APE. Such effects would include modification and repair of existing hydropower facilities, shoreline erosion to archaeological sites due to changes of elevation of the flood pool due to power generation, recreational causes on archeological sites including unauthorized collecting of artifacts and vandalism.

The study would identify and evaluate all archaeological and historic resources within the project's APE. If there would be an adverse effect on historic properties, an HPMP, developed in consultation with the Commission, the SHPOs, and other interested parties, may be required in a new license to avoid, lessen, or mitigate for adverse effects.

Proposed Methodology

§5.9(b)(6) – *Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field seasons(s) and the duration) is consistent with generally accepted practice in the professional design community or, as appropriate, considers any known tribal values or knowledge.*

The generally accepted practice is to conduct a literature review and field reconnaissance to identify previously reported archaeological sites, historic resources, and areas of cultural resource sensitivity in the APE. The APE definition needs to include all lands enclosed by the project boundary including both in-water and on-shore project lands and facilities, and lands or properties outside the project boundary where project operations or other project-related activities may directly or indirectly cause changes in the character or use of historic properties, if any historic properties exist.

This background and literature review is generally followed by intensive investigation (usually accomplished by a systematic pedestrian survey within the APE), an evaluation of the National Register-eligibility of inventoried resources, an assessment of project effects on properties listed in or determined to be eligible for inclusion in the National register, and consultation with the SHPO, interested Indian tribes, and other interested parties (including the public or any other group interested in cultural resources that may be affected by the project) to resolve adverse effects on historic properties.

As noted in the PAD, a Phase IA literature review and archaeological sensitivity has already been completed. In accordance with any applicable the guidelines and standards promulgated by the Vermont and New Hampshire SHPOs, the Vernon Project Cultural Resources Study should use generally accepted practices in the scientific community to:

a) Document that the APE conforms to the definition noted above. Develop include a record of consultation with the Vermont and New Hampshire SHPOs and other interested parties regarding the APE or a proposal to complete such consultation as a component of the study.[24] Create a detailed map showing all aspects of the APE, including designations of land ownership.

b) Conduct an inventory of all archaeological and historic resources that may lie within the APE, including project facilities, non-project architectural resources, and properties of traditional religious or cultural significance. Your inventory should include intensive archaeological testing in addition to any other methods (if needed) by which other cultural resources that may be directly or indirectly affected by the project will be inventoried.[25]

[24] Once you have defined your APE, send your APE definition and APE map to the Vermont and New Hampshire SHPOs and seek their concurrence. The APE definition and map should be included in your study proposal, along with a record of consultation with the two SHPOs regarding the APE.

[25] Your study proposal should clearly define the methods and applicable standards for conducting Phase IB or other intensive testing within the APE and for completing an inventory of historic buildings, structures, objects, and districts (including non-project architectural resources).

c) Evaluate the National Register eligibility of all cultural resources within the APE[26] through examination, testing and/or excavation of cultural resources.[27]

d) Identify, in consultation with the SHPOs and other interested parties, any existing project-related effects (both direct and indirect) on historic properties recorded during the field inventory, and determine how project operations may affect or potentially affect them.

e) Prepare a study report or report(s) that include: (1) a background section on previous work in and around the APE; (2) a culture history of the research area; (3) definition and map of the APE; (4) methods used for the archival research and field pedestrian survey and how the APE was systematically inventoried; (5) the results of the survey and detailed descriptions of the cultural resources found (including a table depicting type of cultural resources, age, property location and ownership, associated artifacts, existing and potential effects, and National Register eligibility status); (6) results of National Register evaluations for all cultural resources located within the APE; and (7) site or resource specific descriptions of existing and potential project-related effects on cultural resources considered to be eligible for inclusion in the National Register. Also integrate all existing cultural resources information you have already compiled and completed, as expressed in section 3.12, and in your 2008 HPMP and associated documentation and attachments.

f) Provide a record of consultation documenting that you have consulted with the Vermont and New Hampshire SHPOs and other interested parties regarding the applicability of the existing HPMP to resolve any potential adverse effects to historic properties within the project's APE. Include in this record of consultation any proposals to modify or amend the existing HPMP approved by the Commission in January 2010. Your record of consultation should also describe how you have addressed any comments

[26] If all National Register eligibility determinations cannot be done in either the first or second season of field investigations, a program to follow-up on completing all National Register eligibility determinations of properties located within the APE could be developed and included in the HPMP.

[27] Your study proposal should describe the methods for evaluating the National Register eligibility of archaeological and historic resources within the APE.

on or requests to modify the HPMP. You should file a draft revised HPMP along with your preliminary licensing proposal, and a final revised HPMP with your final license application.[28] Among other things, the revised HPMP should provide site-specific measures to resolve any potential project-related adverse effect to historic properties located within the project's APE.

Level of Effort and Cost

§5.9(b)(7) – *Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

The cost of the study and associated report(s) is estimated to be between $140,000 and $150,000, depending on the scope and intensity of the investigations and the number of resources identified. The survey and report(s) would likely take one study season to complete.

[28] You should use the Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects, developed by the Advisory Council on Historic Preservation and the Commission in May 2002.