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August 31, 2016

**VIA ELECTRONIC FILING**

Kimberly D. Bose, Secretary  
Federal Energy Regulatory Commission  
888 First Street, N.E.  
Washington, DC 20426

**Re: TransCanada Hydro Northeast Inc.'s July 15, 2016 Updated Study Results Meeting  
Summary  
Project Nos. 1892-026, 1855-045, and 1904-073**

Dear Secretary Bose:

TransCanada Hydro Northeast Inc. ("TransCanada") is the owner and licensee of the Wilder Hydroelectric Project (FERC No. 1892), the Bellows Falls Hydroelectric Project (FERC No. 1855), and the Vernon Hydroelectric Project (FERC No. 1904). The current licenses for these projects each expire on April 30, 2019. On October 31, 2012, TransCanada initiated the Integrated Licensing Process by filing with the Federal Energy Regulatory Commission ("FERC" or "Commission") its Notice of Intent to seek new licenses for each project, along with a separate Pre-Application Document for each project.

With this filing, TransCanada submits its August 25, 2016 Updated Study Results Meeting Summary for the three projects, as required by 18 C.F.R. §5.15(c)(3) and the Commission's current Process Plan and Schedule (dated May 5, 2016). The Meeting for the Updated Study Report filed August 1, 2016 was held at the Fairfield Inn in White River Junction, Vermont, with WebEx and call-in capability for participants who could not attend in person.

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The attached meeting summary includes meeting notes, points of discussion, the list of meeting attendees, and a copy of the presentation slides used during the meeting. According to the current Process Plan and Schedule, the comment period for these studies and studies filed June 17, 2016 will end on September 30, 2016.

If there are any questions regarding the information provided in this filing or the process, please contact John Ragonese at 603-498-2851 or by emailing [john\\_ragonese@transcanada.com](mailto:john_ragonese@transcanada.com).

Sincerely,



John L. Ragonese  
FERC License Manager

Attachment: August 25, 2016 Updated Study Results Meeting Summary

cc: Interested Parties List (distribution through email notification of availability and download from TransCanada's relicensing web site [www.transcanada-relicensing.com](http://www.transcanada-relicensing.com)).

UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION

**TRANSCANADA HYDRO NORTHEAST INC.**

**Wilder Hydroelectric Project (FERC Project No. 1892-026)**  
**Bellows Falls Hydroelectric Project (FERC Project No. 1855-045)**  
**Vernon Hydroelectric Project (FERC Project No. 1904-073)**

**August 25, 2016 Updated Study Results Meeting Summary**

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**AUGUST 25, 2016**

The Updated Study Results meeting for study reports filed August 1, 2016 was held on August 25, 2016 at the Fairfield Inn and Suites in White River Junction, VT. Presentation slides follow these notes.

Meeting attendees in person or identified on the telephone:

<b>Name</b>	<b>Affiliation</b>	<b>Name</b>	<b>Affiliation</b>
Bill Connelly	FERC		
Brandon Cherry	FERC	Jeff Crocker	VDEC
John Baummer	FERC	Eric Davis	VDEC
Steve Kartalia	FERC	Lael Will	VFWD
Nick Palso	FERC	Julienne Rosset	FWS
Patrick Crile	FERC	Ken Sprankle	FWS
Michael Watts	FERC	John Warner	FWS
Gregg Comstock	NHDES	Mark Wamser	Gomez & Sullivan
Andrea Donelon	CRWC	Chris Tomichek	Kleinschmidt
Tom Christopher	NE FLOW	Semiu Lawal	Hatch
Amy Chang	FERC	Stu Bridgeman	Hatch
David Deen	CRWC	Ben Ellis	LBG
John Bruno	Landowner	John Ragonese	TransCanada
Jim McClammer	CRJC	Jen Griffin	TransCanada
Adair Mulligan	Hanover Conservancy	Rick Simmons	Normandeau
Richard Walling	CRJC	Steve Leach	Normandeau
John Mudge	Landowner	Doug Royer	Normandeau
David Hewitt	Landowner/ CRJC	Adam Slowik	Normandeau
Jim Kennedy	CRJC	Mark Allen	Normandeau
O. Ross McIntyre		Sarah Allen	Normandeau
Tara Bamford	CRJC	Jen Bryant	Normandeau
Don Pugh		Maryalice Fischer	Normandeau

**Study 5 – Operations Modeling Study:**

Semiu Lawal and Stu Bridgeman summarized the study and the operations model.

Question (Q): How did the model development process and adjustments to it progress? Were there standard modeling approaches used to reach the point where the model simulated actual operations?

Answer (A): First, we looked at whether the model produced the same amount of energy production as we had. Similarly with hydrologies, we looked at ones over the historic record that represented a range of flows and looked to see how those matched up on an energy basis, water basis, etc. to historical operations, and then we adjusted them for changes that have occurred in the upstream projects and

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these projects over those 30 years of historical hydrologies. The model base case is based on what the projects are doing now. We looked at whether the model was over-reacting by trying to maximize energy, and we added some constraints (band widths) to force the model on the storage side (from Second Connecticut Lake on down) not the discharge side, to make sure that the model reflects reality.

Q: The model was calibrated to reflect current operations, so when we apply this model to individual studies, the model results are for current operations?

A: Yes. Different studies used model output differently (range of water fluctuations, modeled water surface elevations, etc. during certain time periods of interest).

Q: How would you define the current operations in a future sense if a new owner chooses to operate differently or the market changes, for instance? The licenses allow broader ranges than TC's normal operations.

A: The reason we do not use the full licensed range is because it does not optimize energy. The licenses reflect conditions at the time of those licenses (e.g., Vernon used to have flashboards where we now have gates, new generating units, etc.) and the conditions necessary for high water management. For alternative scenarios we would apply those alternative constraints and compare output from the base case and the alternative.

Q: Will stakeholders have access to the data that came out of this model that fed directly into the other resource studies?

A: We could give you the actual hourly data, but it is a lot of data. The resource studies included their own analysis of model output based on the needs of each study. That information is included graphically or in tabular format for applicable studies.

Q: Can we ask the model "what if" questions across a range of locations?

A: We want stakeholders to tell us what the proposed operational alternatives are based on a resource concern. Stakeholders should frame the questions in terms of hourly changes in discharge, ramping, water surface elevation, and/or fluctuation. But we cannot change from the 5 hydrologies in the model, we can only constrain the model in different ways. We don't think you want to give us proposed operational alternatives though, until you see the study 9 habitat data.

Q: Was model calibration reported?

A: Yes, in the study plan. Our base case is the current operations and installed equipment not what we had in 1992 for instance.

**Study 21 – American Shad Telemetry Study:**

Doug Royer summarized the study.

Upstream Passage Discussion

Q: In Table 5.3-3 the travel time values vary a lot, for instance in some cases the average travel time between points is much different from the median value. Does that mean that one fish or a couple might have skewed the average data?

Y: Yes.

Q: Figures 5.3-3 and 5.3-4 include 75 fish and the report talks about 104 fish, what happened to the other 29 fish?

A: The difference is the 29 PIT-tagged fish that were not detected at the fishway entrance due to the lower sensitivity of the dual antenna there. This is discussed in Section 4.3.3 of the report.

Q: I don't understand the definition of forays on p. 26 of the report. Is that forays into the fishway and any detection at the entrance or the first bend? I regard a foray as each detection, not all detections over 4 hours. If a fish enters the fishway and goes up to the first bend three different times, is that one foray or more than one?

A: If it was only detected at the entrance not at the first bend, no matter how many times it was detected there without falling back to the tailrace, it was considered the same foray. *[Post-meeting clarification: The report definition will be expanded or modified for clarity in the revised report. Once in the fishway, the report did not quantify movements between points other than in the travel time tables 5.3-3 and 5.3-4, and to compare those travel times between the lower and upper sections of the fishway; however, we can look more closely at that data in revising the report.]*

Q: What was the detection zone around the fish entrance?

A: The range of detection was in the range of the attraction flow and fish entrance.

Q [comment]: Fish attraction is one issue, the second separate issue is whether fish can get into and stay in the fishway, and the third issue is whether they can pass into the forebay.

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Q: When is the start time to measure duration from fishway entrance?

A: From the first detection at that point (fish entrance), for the number of fish detected there.

Q: For fishway efficiency, it may have been in the study plan but what is the value in calculating that statistic? How do you explain that fish get to the counting window and then some do not exit into the forebay? When do fish seem to exit the fishway and what are the operations at that time (flow, head pond, etc.)?

A: We were only trying to evaluate the differences between the lower and upper sections of the fishway, and will look at additional data we have within the fishway along with operations data at the time of exit. Overall, there was not a difference in median passage times through each section.

Q: We do not believe that proportional approach is an appropriate analytical method to evaluate project effects. We don't know what each fish was doing over the time period prior to fishway entrance and passage. You have the telemetry and operations data and we had recommended the time- to-event analysis in prior comments [filed May 2, 2016 on the March 17-18 study meeting].

A: The study was not set up to do the time-to-event type of analysis. Telemetry arrays were set up to have overlapping detection areas. The upstream passage study objectives were to assess near-field attraction, entrance efficiency, and internal efficiency of the fish ladder rather than try to understand behaviors of individual within the tailrace and how fish moved back and forth within that area. The report stated that in general, there do not seem to be operational issues related to fish getting to the fishway entrance based on tailrace residency times but we will look more closely at the data we do have and include that in the revised report.

Q: The study results do not allow us to understand project effects. Only ranges of operations are presented in the report. We need to know when these fish were available and what was happening operationally at that time.

A: We will reevaluate how project effects were assessed and revise the report as needed [see [Attachment 1](#) to these meeting notes describing additional analysis and/or data presentation to be included in the revised report].

Q: The report identified night time forays when the attraction water was not operating. It is important to have information on detections and entrance operational conditions to tease out night time periods.

A: That is one area where we can look more closely at the data for the revised report.

Q: Can you provide the operations data?

A: Yes, we can provide that data over the study period.

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Downstream Passage Discussion

Q: It is important to put into context the conditions observed in 2015. Almost half the fish experienced the facility during spill conditions. June was substantially different than normal. Also there was no discussion at all about survival for each fish.

A: Is it your belief that the conditions were not normal for downstream passage? Because we did have periods that were normal operating (non-spill) in 2015 as well.

Q: Yes, there is a limited sample size of fish that passed in non-spill.

A: We can identify whether non-spill conditions were representative of normal, non-spill conditions. However, if you want us to do a hydrological analysis of 2015 then that is a different question. At all projects we have observed more periods of spill lately. With regard to survival of downstream passing fish, the study was not a survival study and the only information available would be based on motion detecting tags. For fish that did not pass, that information is included in the report; however we can look more closely at the potential for passed fish to have been tracked below Vernon as part of the spawning study.

Q: With regard to upstream movement assessment, what happened to the 11 fish that didn't come back down to Vernon?

A: After the spawning surveys were completed we did not do extensive manual tracking in that area, so we don't know, and they may have died either before or after spawning above Vernon.

Spawning Discussion

Q: For the spawning portion, you did not see splashing, but you still assumed the fish was spawning?

A: No, we didn't assume that, we assumed spawning had occurred based on egg/larval collections.

Q: There is very little data presented in the report for spawning. Since you found eggs in enough places, you concluded that spawning occurs throughout the project area, and since you collected eggs at some point in some place under different conditions, that there aren't any project effects? There is no data on what was happening on each of the locations/occasions when you sampled. You don't know if fish actually were spawning. There wasn't any evaluation of what the project effects were.

A: There was very little splashing, so we started looking for spawning locations via radio tracking, habitat type, etc. We were not able to actually see spawning locations so we cannot look specifically at operations at those locations/times. We could only relate operations and flows at the locations/times when we collected eggs. However, we will look more closely at the available data to see if any inferences can be made (see [Attachment 1](#)).



Q: The report has descriptive observations of spawning, but the expectation was that analysis would be conducted. Variables like depth, when the river was under operational control or not at the different spawning sampling sites, etc.

A: That data, except for project operations is in Appendix C of the report, with water quality data collected at the trawl sites in Appendix D. Environmental condition data were taken at the start of the trawl. Additional data presentation and/or analyses to be included in the revised report are described in [Attachment 1](#).

Q: Why could you not use the models to look at flows/velocity at the trawl sites?

A: The operations model uses the 5 modeled hydrologies, not 2015 actual flow data. We can clarify in the report that because we didn't see spawning we couldn't do that analysis. We will explain better why we did what we did. All we stated in the report is that we found eggs under lots of different conditions and locations, and as a result, we believe spawning occurred and project operations did not seem to affect that. We will review the collection data, operational data and the report itself in an effort to provide a more robust analysis in the revised report.

### **Study 27 - Floodplain, Wetland, Riparian and Littoral Vegetative Habitats Study:**

Sarah Allen summarized the study and project effects analysis based on model data.

Q: Are the transects shown in the presentation figures from the hydraulic model?

A: Yes.

Q: Did you find any exemplary natural communities that would be affected?

A: The only one we documented in this study (prior 2012 study did that) was a black maple forest, and it is very low quality now due to agricultural disturbance, but we did not find any black maple forests associated with riverine activities. My sense is that the river condition has been stable enough that vegetation communities have adapted and do not seem to be affected by water level fluctuations. However, they have other issues like invasive species disturbance.

Q: Do you sense that changes in the hydrology or operations would change distribution of invasives like Japanese knotweed?

A: Mostly we found Japanese knotweed at the tops of banks, more associated with agriculture, and under the forested canopy. Invasives are prevalent and aggressive by definition, but I do not think it is responding necessarily to the hydrology, but more to land disturbances.

Q: So are you saying that there are not hydrology effects or any way to lessen the impacts?

A: The presence and distribution is due to the hydrology as it exists now. If you were able to significantly change the condition, you might change the vegetation

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communities. In the Jesup's milkvetch study conducted in 2012 we also found that species not affected by normal project operations.

Q: This report could be used in two directions. If you looked only at wetlands, you could adjust water levels and look at what the changes might be. The submerged aquatic vegetation may change, but if we change elevations for fish spawning for instance, you could look at what those changes might mean for wetlands.

A: We could get at that in a qualitative sense, and yes if you change water levels some community types will increase and some will decrease at the locations where they currently are found.

**Study 32 - Bellows Falls Aesthetic Flow Study:**

Ben Ellis summarized the study and the 2016 additional low flow analysis.

Q: The filing indicated the video was filed with FERC, can VANR get a copy of that?

A: Yes. [copy provided at the meeting to VANR staff].

Q: There is talk about rebuilding the Vilas bridge. If that happens it would change the traffic pattern at KOP3. Did you evaluate the scenario of whether there might be alternate viewing locations in the future and whether that would significantly change the aesthetic values?

A: The second study evaluation in 2016 was not part of a focus group, and was only intended to characterize aesthetic changes at lower flows than were part of the focus group evaluation in 2015. It was not part of the study to evaluate different scenarios, other than in the original focus group, in which participants indicated that with additional viewing and accessibility for pedestrians, there might be some additional value. The conclusion we reached was that the leakage flow or a little more provides the aesthetic value based on current viewing opportunities.

**Study 14/15 – Resident Fish Spawning Studies:**

Mark Allen summarized the final study results related to operations modeling.

No questions.

**Study 16 – Sea Lamprey Spawning Assessment:**

Steve Leach summarized the final study results related to operations modeling.

Q: Since many of the exposed nest sites were in the riverine reaches, is there discharge data from the models that could be used to see changes in exposure if, say, minimum flows were increased?

A: We do have the hydrographs for modeled years, and the model can output variations based on alternative operating scenarios.

Q: The larger question becomes how many nests do you really need to optimize the abundance of the species in the river?

A: There are management plans or targets for some species but that is an agency issue.

Q: How were sites with suitable habitat treated in this report revision?

A: Those sites were relabeled as “no evidence of spawning in 2015” rather than “no project effect” as they were labeled in the interim study report.

**Studies 2/3 – Riverbank Transect and Riverbank Erosion Studies:**

John Field summarized the consolidated studies and results.

Q: Is notching/overhangs considered not eroding? It would likely continue to erode.

A: Of all the notching we saw, about half was mapped as stable and the other half was otherwise eroding. The process with notching could go either way, either continue to erode or remain stable.

Q: What was the timeframe over which you looked at water fluctuation in the model exceedance curves?

A: We used daily water level fluctuation.

Q: Water-level logger data was in 15-minute intervals, does the notching occur at the monitoring sites where the water levels were fluctuating the most? I would like to see each logger’s water surface elevation (WSE) data and look at frequency of occurrence.

A: What we show in Appendix A of the report for each monitoring site is the minimum and maximum stage based on the logger data. The notching would be within that range. The median range is shown in the Appendix A site figures within the gray zone. You would see a higher density of logger points within that range than outside of it, so we believe we adequately presented that information.

Q: Is there generally more fluctuation closer to the dam than upstream?

A: No, there is generally greater fluctuation farther upstream in the impoundments. Project operations at the dam affect fluctuation far upstream the least, but overall fluctuation at the upstream end is higher than it is closer to the dam, due to inflow rather than caused by project operations at the dam.

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Q: Is the method of using the erosion ratio a standard practice in your field? If not, geotechnical and hydrogeological studies would be needed to evaluate WSE fluctuation.

A: It is a methodology I created and used in the Turners Falls impoundment many years ago. There are multiple causes of erosion at any given site and a single cause cannot be ascribed. The study was looking at the entire study area, not at local factors and causes which likely differ from site to site. To do those types of studies (geotechnical and hydrogeological) over 250 miles of river bank is just not practical.

Q: But you cannot then draw the conclusion that project operations have a minimal or no effect.

A: Project operations are included as a potential cause in the study conclusions, with other causes that are also important and likely.

Q: Can you separate out erosion over the last 10-15 years vs. the last 50 years?

A: The results are based on the available data (1950's and 1970's historical data sets and 2014 field effort for this study). For instance at the Mudge site, there were multiple surveys, so we have those data points but not necessarily at the breakpoints you suggest and not over the entire study area.

Q: I think we have a problem in dealing with this report from the standpoint of the litigation that may come out based on what is happening on River Road in Lyme.

A: We only have the available historical data from there, and in 2014 we mapped it as armored. When we compare 1958 and 1978, we lumped all armoring in the broader stable category for purposes of comparison over time. It obviously had been eroding but we only have the distinct points in time to look at. Can we conclude that everywhere the bank was armored means it was eroding? No, in some places armoring was done preventatively, for instance along the railway.

Q: The public should know from this report that erosion has caused significant problems in some locations like Lyme. The report shows two places mapped as stable in the appendix where the road is undermined.

A: While we understand the problem and the concern in Lyme, that specific site and causal investigation was not part of the study (e.g., to evaluate hazards to infrastructure) and that area is unusual in terms of erosion with likely causes more difficult to identify. *[Post-meeting note: Our transfer of the historical data into digital form was made from paper maps so the precision is not ideal and not at the scale needed to answer this question. Additionally, the historical maps were likely to have called our vegetated-eroding category "stable" as described in the report and at the meeting. Once we know the exact locations of road undermining via GPS, we will look at the 2014 mapping data and relevant photos more closely to determine if there may be a discrepancy.]*

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Q: In riverine sections with greater velocity you would expect larger erosion, how do you reconcile that the analysis does not reflect that?

A: When you realize how complex the river is and how it changes (e.g., ledges in some riverine reaches), there are all sorts of possible explanations. It isn't just the forces of water in the impoundment reaches, there is also WSE fluctuation, seepage, groundwater, etc. *[Post-meeting clarification: modeling data will be reviewed further to assess whether impacts of velocity and shear stress can be determined on riverbanks in the study area, and that information included in the revised study report.]*

Q: In the executive summary of report, there is a statement that notching can occur due to various causes "or" due to WSE fluctuation. Shouldn't that be "and WSE" fluctuation?

A: The intent was to distinguish between non-project controlled (e.g., natural) causes and the WSE fluctuations due to normal project operations; it may be more accurate to state the various causes "including" WSE fluctuation.

Q: Did you say that if you were willing to spend the time and money you could determine the cause or primary cause of erosion?

A: I think there are multiple causes at every spot, but yes that would be possible at a specific location. But that was not what the study was intended to do. In this study we were trying to tease out if project operations are a primary cause. Notching occurs at the water surface elevation and we did find that some notching occurs within that project operations range and some does not, but notching is only a part of the erosion cycle.

Q: What has not been answered is what the project fluctuation effect is on creating notching which happens 24/7 all year around, as opposed to say boat wakes that only happen in summer and not very much. The report does not say what the effect of WSE fluctuation is on erosion.

A: The report does say that notching is part of the erosion process and notching has multiple causes. The report shows that much of the erosion occurs far upstream in the impoundments where project dam WSE fluctuations have little to no effect. Project operations do not change WSE in those locations as much as it does closer to the dam or just downstream of the dam. But rates of erosion are higher farther upstream. The study does not pinpoint locations, but characterizes project related effects in the data that we could find and develop. We are not saying the projects do not cause any erosion, but that the continuation of the cycle of erosion is dependent on flood flows that remove the base of bank material.

Q [comment]: I just see what I see at my property that the notching continues and is within the normal fluctuation range.

Q: Have you considered the possible correlation with varve layers to infiltration and erosion?

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A: We had intended to look at heterogeneity in sediments/substrate that lead to horizontal seepage, but the problem with that in terms of this study was that only three of the 21 sites had bank recession during the 2-year monitoring period. The other issue was that a lot of native bank sediment was covered and we could not get down into it to look closely at the detailed bank make up. I will note that you are talking about precipitation that infiltrates. I will also say that there are some unusual things in Lyme and it might be something related to soils.

Q: Page 110 of the report, you say sink holes happen in the winter but the new one in Hanover happened in the summer.

A: The statement in the report was based on the 21 monitoring sites where three showed bank recession (the term sink holes was not used to describe these instances; see page 61 of the report for sink hole discussion) and all of those occurrences were between November and May.

Q: The last paragraph of report says project operations haven't changed over decades but there is no data or history of operations provided.

A: We can qualify that concept more clearly. All we have done is increase minimum flows from the upstream project (Fifteen Mile Falls) as part of that project relicensing, and we have minimized fluctuation in the impoundments under normal operations, for instance at the Vernon project due to spillway crest control added in the 1980's.

Q: Could you do some correlation between soil types and erosion?

A: We have done that within the context of the bank height and in relation to geomorphic surfaces, which in turn relate to soils. Soil maps are often based only on the upper foot of soils so would not be helpful.

Q: We are asking you to tease out what proportion of erosion is caused by project operations.

A: The USASE 1978 (published in 1979) study did do that. They rank-ordered several causes observed. A concern with ranking is that it leads to defining an area of erosion by a particular cause based on rank, when in reality it is the effect of a combination of the ranked causes. This current study was not intended to attempt to quantify proportional causes of erosion at any given location.

**Attachment 1**

**Study 21 additional data presentation and/or analyses  
to be included in the revised study report**

1. Upstream Passage Assessment

- a. Clarify or modify the definition of “foray”. Prepare a table which provides the fish ID, date and time for each unique “foray” observed during the study. The table will include columns for generation at Units 1 through 10, non-unit spill, attraction and bypass flows, temperature, and whether or not that foray was ultimately successful. Provide the same information graphically to potentially identify particular operations that led to more or fewer successful “forays”. Review data on forays and present information on day vs. night forays when attraction flow was not operating.
- b. Clarify the term “residency time” in the tailrace and simplify or combine Tables 5.3-3 and 5.3-4 on travel times between points at detection points for both types of tagged fish. Provide a table (as in bullet 1.a above) of residency times for each dual- tagged fish within the study area and, in lieu of a time-to-event analysis which cannot be reasonably conducted for this study, include total project discharge data at the end of residency (e.g., successful foray into fishway) and min/max/mean discharge during residency.
- c. Review detection data within the fish ladder to compare the amount of time fish were in the ladder for fish that exited vs. fish that fell back below the counting window, and evaluate operations data (head pond, flow) at the time of fishway exit.
- d. Provide operations data for the study period as requested.

2. Downstream Passage Assessment

- a. Provide an expanded table for downstream passing fish showing ID, date/time and route of passage along with unit discharges, fish tube and pipe discharge, spill discharge and locations of spill discharges. Plot conditions graphically and at present observed patterns, if they can be discerned.
- b. Include data on PIT-tagged fish detected passing via the fishpipe (as requested via email prior to the study meeting).

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- c. Expand upon conditions during residency time prior to downstream passage and provide a table as in bullet 2.a above.
  - d. Expand upon downstream passage survival given the limitations of motion-detecting tags, and review manual tracking data below Vernon to determine which downstream passed fish were tracked.
3. Spawning
- a. Since little splashing was observed during spawning surveys, the available data on spawning locations is limited. We will evaluate the usefulness of various approaches to identifying spawning locations, including: reviewing operations and river flows, modeled velocities, and bathymetry data; and/or conducting additional lab analysis of egg stage which may give an indication of egg age at collection to potentially allow inferences of the distance upstream where eggs were spawned. If any of this information proves informative it will be included in the revised report.