

TO: Federal Energy Regulatory Commission
Office of Energy Projects
888 First Street, N. E.
Washington D. C. 20426

By electronic filing

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RE: **Wilder Project, FERC No. 1892-026**
Bellows Falls Project, FERC No. 1855-045
Vernon Hydroelectirc, Project No. 1904-073

Preliminary License Proposal dated December 1, 2016
&
ILP Study 2 & Study 3, Riverbank Transect and Riverbank
Erosion Studies dated February 4, 2017

DATE: February 24, 2017

CONTENTS: Landowner's comments re the two above referenced documents submitted by TransCanada on December 1, 2016 and February 4, 2017.

To the reader:

My comments include pictures and references to land along the Connecticut River that my family has owned since 1962. Anyone wishing to visit these fields should contact me at the above address and phone. As I write this, they are snow-covered but that will be melting in the coming weeks and the erosion will be very visible before there is foliage. —

John Mudge

Introduction

Since 2013 I have submitted a number of documents to FERC regarding the proposed re-licensing of three dams on the Connecticut River, including the Wilder Dam, which impact land owned by my family. Four years ago, on February 13, 2013, I submitted a Study Request to study the erosion on the riverbank. In responses to different studies completed since then I have submitted a number comments and today, four years after my first Study Request, I am responding to TransCanada's Preliminary License Proposal and their revised ILP Study 2 & 3, the erosion study.

It was on January 28, 2013, at a FERC Scoping Meeting in West Lebanon, New Hampshire, that a spokesperson for TransCanada dismissed the need for any erosion & geology-soil resources studies since, in 2012, a group of TransCanada employees had taken a boat trip up the entire Wilder pool, and they had seen no evidence of erosion.

With just the photographs that have been presented to FERC in different study requests, studies, and responses to studies, I think that it can be concluded that there is a tremendous amount of erosion on the impacted riverbanks. One might be left wondering about the veracity and motives of the spokesperson who denied that there was any erosion and therefore no need for any such studies on the Connecticut River.

My home is in this valley. My family has owned a farm on the Connecticut River since 1962. I attended school and college in Massachusetts on the banks of the river. I have boated and visited other landowners on the river.

The Connecticut River and the riverbanks have been greatly impacted by the dams operating there. The re-licensing of these dams is now the opportunity to recognize the impact that the dam, "project," operations have had and to modify the operations of those dams for the future.

Re: Preliminary License Proposal dated December 1, 2016

The cover letter to the Preliminary License Proposal lists ten (10) studies that have not been completed as of December 1, 2016, the date of the proposal. Several very important studies, including two on erosion were not completed until February 2017, more than two months after submitting the license proposal. Rather than call this a “Preliminary” proposal, it should be called a very pre-mature proposal.

The cover letter and the entire proposal clearly state that TransCanada is “not proposing any changes” in the operations of these three dams.

I believe that there are many problems with the river that are attributable to the current operations of the dams and that no proposal should be considered by FERC until TransCanada addresses those problems and makes suggestions for how project operations will be modified.

I believe that the proposal should include:

1. A description of how project operations will be modified to minimize water level fluctuations that cause erosion. This may have to include a change in, and/or lowering of, the maximum water elevation.
2. An economic impact study that addresses the loss of agricultural land due to erosion caused by project operations.
3. Mitigation funds that will:
 - a. Compensate landowners for land lost due to the erosion caused by project operations.
 - b. Compensate towns and municipalities for expenses related to reconstructing and repairing roads and infrastructure damaged by project operations.
 - c. Fund a study that will determine the most environmentally sound way of restoring and protecting the riverbank from erosion caused by project operations.
 - d. Reimburse the U. S. Treasury for funds spent by the U. S. Department of Agriculture and landowners when they have tried to minimize and correct the erosion caused by project operations.
4. TransCanada writes: “TransCanada is proposing to maintain current voluntary limits on impoundment drawdown rates.” (P. 3-60). As both the level of the water and the drawdown rates contribute to the erosion, drawdown rates should be regulated rather than voluntary. TransCanada repeatedly talks about “high natural flows” and asserts that these can not be managed or controlled. High natural flows are

primarily the result of 1) the snowpack that melts each spring and 2) heavy rainstorms including hurricanes. When these dams were built, we did not have the satellite and computer forecasting methods that exist today. Therefore, as “high natural flows” are now much more predictable, the future operation of the dams should take into account these resources. If properly done, erosion may be minimized.

5. My family owns land that has been identified for inclusion on the National Register as the result of archeological findings on this property. TransCanada should clearly describe how it will work to protect this and other similar sites. There is no specificity in TransCanada’s proposal about this. Page 3-496 of the December proposal reads: “On the New Hampshire side of the Connecticut River, active erosion was identified in 33 archaeologically sensitive areas (17 at the Wilder Project, 11 at the Bellows Falls Project, and 5 at the Vernon Project).” Then page 3-500 of the same proposal reads: “The Phase IA survey also identified approximately 86 miles of the Wilder Project shoreline (on both sides of the river) as archaeologically sensitive, including the locations of recorded and documented sites, of which approximately 7 miles (35 areas) were identified as being in active erosion areas.” Page 141 of the January erosion study reads: “Six of the seven Phase 2 sites (18 percent of all tested sites) were recommended for listing in the National Register and periodic monitoring, and to the extent necessary, management measures to protect them will be identified and implemented. The specific steps recommended to avoid, minimize, or mitigate any impacts will be forthcoming in the Project-specific Historic Properties Management Plans.”

FERC must require that TransCanada be much more specific about its proposals to protect these sites from further “active erosion.” Again this is an example of how premature this proposal is.

Re: ILP Study 2 & Study 3, Riverbank Transect and Riverbank Erosion Studies dated February 4, 2017

The ILP study released on February 4, 2017, is the SECOND Riverbank Transect and Riverbank Erosion Study. The first was released on August 1, 2016, and I responded to that on September 25, 2016. In its response of November 29, 2016, to TransCanada, FERC wrote in a footnote: "We recommend that TransCanada review and response to Mr. Mudge's letter in an appendix to its revised study report that will be filed in January 2017."

There is no such appendix in TransCanada's Study Report of February 4, 2017. Therefore, I must repeat some of the questions that I raised in my letter of September 25, 2016.

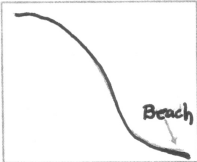
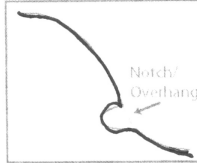

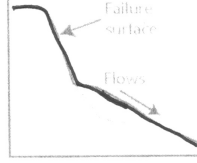
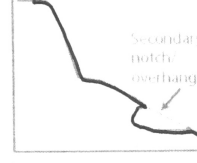
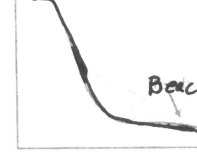
The Cycle of Erosion

I have previously responded to this issue. Both the August 2016 study and the February 2017 study discuss the "Cycle of Erosion." Page 70 of the February 4 report includes TransCanada's diagram of the "Cycle of Erosion." The sketches are very interesting, but those sketches should be compared to the sketches that I included in my original Study Request of February 25, 2013. Carefully examine pages 13, 14, 17, 18 & 19 of my Study Request.

They are basically the same diagrams, but with a very important thing missing from the TransCanada drawings. TransCanada draws a "Stable" bank and I have a sketch with a "Buffer." TransCanada has a "Notch Overhang" and I have a "Cavity." TransCanada has a "Slide Mass" and a "Flow" that I call "Earth collapses." TransCanada writes, "Secondary Notch Overhang" and on page 18 & 19 of my Study Request I again show the "Cavity" and more "Unstable Bank."

What is the difference between these two sets of sketches? It is very simple: *TransCanada does NOT illustrate the river and the fluctuations in the water level. My sketches DO illustrate the fluctuations in the water level!* Below I have reproduced both the TransCanada sketches, left, and the sketches in my Study Request, right. *You can not address the issue of erosion on the Connecticut River without taking into consideration the operations of the dams.*

Trans Canada
Study 2/3

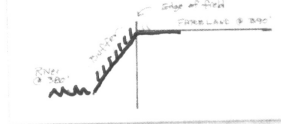
| Stage | Profile |
|--------------------------------|---|
| a) Stable bank |  |
| b) Notch or overhang |  |
| c) Slide or topple |  |
| d) Flows |  |
| e) Secondary notch or overhang |  |
| f) Bare bank |  |

TransCanada study, page 70
"Cycle of Erosion" August 2016

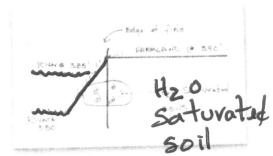
Beach = River-level never changed

Mudge
study Request

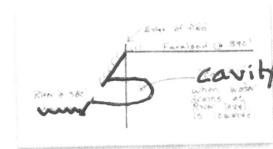
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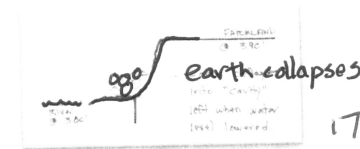
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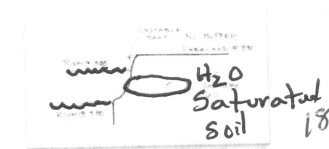
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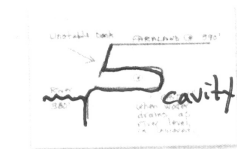
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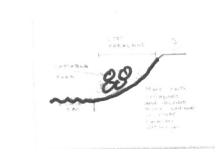
17



18



18



19

Mudge Study Request
February 25, 2015

w = changing river level

If you exclude the river from your sketches, as it is excluded in the TransCanada sketches, then you must wonder what causes the erosion. In all of its sketches TransCanada leaves the water at the "beach." Visit the river and you will see that the water is not at "the beach" at all times. TransCanada raises and lowers the water in order to generate electricity for the spot market and this sudden raising and lowering of the water has an adverse affect on the saturated and highly permeable soils that are the riverbank.

To have excluded the raising and lowering of the river from the “cycle of erosion” diagrams totally discredits that work.

At different hearings, spokespersons for TransCanada have repeatedly stated that they do not raise and lower the water very much. However, the February 4th report includes many pictures of the river when it has been lowered. Similarly, my Study Request of February 25, 2013, includes pictures of the river when the water level has been lowered. Does TransCanada truly believe that it is possible to include pictures of a lowered water level in a study report and then state that it does not lower the water level? *It is an undeniable fact that the impoundment level changes. The water level goes up and down and something that obvious, that is so apparent in photographs, can not be denied. Photographs do not lie.*

There is a cycle of erosion along the riverbank and all activity on the river, including the raising and lowering of the water level should be taken into account. TransCanada does not acknowledge that.

The undercutting of the riverbank begins with the raising and lowering of the water level. In the below two pictures, taken February 2016, a measuring stick has been put into holes at the base of the riverbank, four (4) feet and three (3) feet. When the water level is high, the highly permeable soil becomes saturated. At all times there is a current in the river. Particles of the saturated soil become suspended in the water and are carried away. The cavities form as the suspended particles of soil are carried away. Then, when the cavity is large enough the bank becomes unstable, the earth collapses, the sinkholes are formed, and then there is more erosion.



I am unaware of any pictures in any of TransCanada’s reports that illustrate this erosion process— the saturation of the soil, the undercutting of the bank and the sinkholes and erosion that result from it.



Undercut bank, Lyme, NH.



The above sinkhole, perhaps 12-15 feet deep, formed near Route 10 in Hanover, New Hampshire, in July 2016. I took pictures and distributed them to interested parties. This sinkhole is referred to on page 125 of the February 4, 2017, TransCanada study but without a picture. In future years, there will be continued erosion between this sinkhole and the river, a distance of perhaps 15 feet. In other words, with repeated raising and lowering of the river, the water saturated 15 feet into the riverbank and today there is tremendous instability and erosion here just as there is tremendous instability and erosion along much of the riverbank. This is all a result of the operations of the Wilder Dam.

Isn't this basically what TransCanada described on pages 11 & 12 of the February 4, 2017, study: "During floods when the river stage is high on the bank, water moves into the bank and then flows back out of the bank after the river level recedes (Hagerty, 1991a). In the case of a rapid drawdown in impoundment or river level, the internal porewater pressures of the bank sediments continue to reflect the original water level for some time after drawdown, increasing the hydrostatic pressure on the bank face (Lane and Griffiths, 2000). Bank instability results from the increasing pore-water pressures that cause a loss

in the cohesion that holds soil particles together (Rinaldi et al., 2004). Bank erosion quite commonly will be greatest during the recession of high water flows rather than during the high flow event itself (Twidale, 1964; Thorne, 1982; Rinaldi et al., 2004), because the pore pressure of the saturated bank sediments exceeds the confining pressure exerted on the bank once the flow level drops (Fox and Wilson, 2010)."

Let's rephrase TransCanada's own words: *The raising and lowering of the water in the Connecticut River as a result of the operation of the dams is a daily flood. On a daily basis water moves into the riverbank and then flows back out, bank instability results, and there is a loss in the cohesion that holds soil particles together and bank erosion is quite common.*

TransCanada writes in the Introduction (page 2) of the January erosion study: "FERC contends (in its March 1, 2013 Pre-Application Document (PAD) Deficiencies, Additional Information Requests, and Comments letter) that although erosion, in and of itself, is not necessarily an adverse effect, areas of excessive erosion that are a direct result of project operations or that may be having an adverse effect on another resource are of concern."

Yes, FERC should be concerned with this erosion that is a direct result of project operations.

TransCanada is not concerned, and landowners are being very adversely affected.

Nathaniel Tripp recognized this in his book about the Connecticut River, *Confluence— A River, The Environment, Politics, & The Fate of All Humanity* (Steerforth Press, 2005). Tripp wrote: "When that flow is manipulated — when the magnitude, frequency, duration, and timing of flows are changed by the many uses of humankind such as dams for power generation or recreation, or water withdrawals for industrial uses, irrigation, or snow-making — there are ripple effects throughout the ecosystem that are only now beginning to be understood."

How much erosion is there?

As noted earlier, a spokesperson for TransCanada has told a FERC hearing that there is no erosion on the Connecticut River. The erosion reports state that "Nearly 40 percent of the riverbank in the study area were mapped as unstable." I will not try to reconcile the difference between *no erosion* and *40% erosion* as that is for TransCanada to do. However, I again question the figure that only 40% of the riverbank is unstable and eroding. This can be found in TransCanada's own figures.

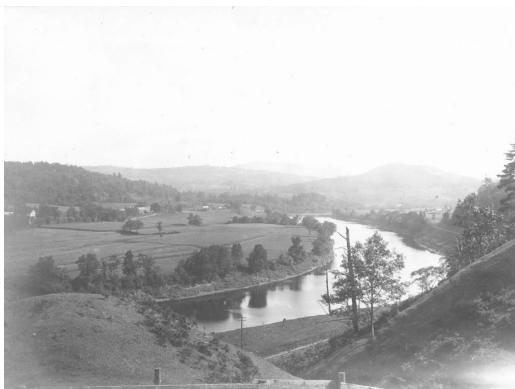
| Erosion category | August 2016 study, p. 79 | February 2017 study, p. 80 |
|-------------------|--------------------------|----------------------------|
| Eroding | 11% | 11% |
| Vegetated eroding | 22% | 22% |
| Failing armor | 6% | 6% |
| Sub-total | 39% = (Approx 40%) | 39% = (Approx 40%) |
| Armored | 15% | 15% |
| No longer eroding | 4% | 4% |
| Total | 58% | 58% |

(At least TransCanada did not change the percentages between August 2016 and February 2017.)

However, any section of the riverbank that is today “armored,” was once eroding, and any section that is “no longer eroding,” was once eroding. Therefore, it is 58% of the riverbank that is unstable and eroding and that is 45% more than TransCanada wants to acknowledge.

TransCanada repeatedly asserts that the erosion is not the result of project operations. However, TransCanada *never* describes, defines, or characterizes the nature of any erosion that it *would* attribute to project operations. TransCanada never says, “This is what we would call erosion caused by the operations of the dams.” They simply assert that none of the 58% of the riverbank that is eroding has any connection with project operations. Doubtful. Very Doubtful.

As the below two pictures show, there was no erosion on the Mudge farmland in the picture taken prior to 1896 and the other about 1940. As has been shown elsewhere, today there is tremendous erosion and the farmland shown in these pictures has lost forty (40) feet at the riverbank / farmland. The land is not disappearing beside the River Road. The land is disappearing at the banks of the Connecticut River! Acres of farmland have been lost.



Mudge fields, Lyme, New Hampshire, left, pre-1896 and right, about 1940. *Both show a strong and healthy riparian buffer with vegetation and a gentle slope to the river. No erosion.*



Stumps of the old trees are to the left.
 Forty feet of riverbank lost.
 No erosion?

A well surveyed line

In both my original study request of February 25, 2013, and in my response of September 25, 2016, I have described one line on my property that has been surveyed *three* times by licensed New Hampshire surveyors. The three surveys are summarized below and a letter from the 2015 surveyor is on the next page.

| Survey | Length of line |
|---------------------------------|----------------|
| July 10, 1961 K. A Leclair | 943.0 |
| April, 19, 1989, K. A Leclair | 918.6 |
| December 8, 2015, H. J. Burgess | 903.1 |

Forty (40) feet of riverbank had been eroded since 1961. There is no new impoundment level. There is a fluctuating river level and with every change in the river level particles of soil become suspended in the water and are washed away. Where the riverbank had a riparian buffer and vegetation in the past, that has been destroyed today and there is ongoing erosion that is always denied by TransCanada. There is no vegetation on the riverbank with the accompanying root system that will create riverbank stability. TransCanada writes on page 133 of the February study: “Absent changes other than a permanent rise in WSE, however, the banks will eventually re-stabilize when an equilibrium condition is reached with the new impoundment level.” There is no new impoundment level, there is an ever-changing impoundment level that is causing the erosion of the riverbank. The maximum impoundment level should be lowered and the maximum allowable change in the water level should be reduced and not allowed to be voluntary.

Harry J. Burgess

Registered Land Surveyor/Consulting Forester
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Bath, New Hampshire

NH & VT

Phone: (603) 838-5260
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Date: March 15, 2016

John Mudge
Lamphere Hill Road
Lyme, NH 03768

Dear John,

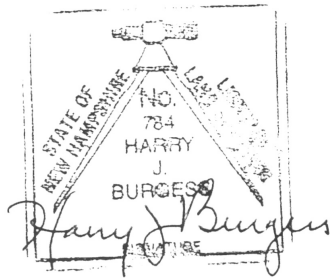
At your request, we measured a line between fields on your land on the River Road in Lyme, NH (Map 403 Lot 27) from the River Road to the Connecticut River then compared the distance to two former surveys you provided. The results are as follows

- | | |
|--|------------|
| 1) July 10, 1961 K.A. Leclair "Survey for Luke Eaton property" | 943.0 feet |
| 2) April 19, 1989 K.A. Leclair "Survey for Gilbert and Eleanor Mudge" | 918.6 feet |
| 3) December 18, 2015 H.J. Burgess measured line between 2 found boundary pins on the same line | 903.1 feet |

In conclusion, it appears that the boundary line has shorted by 40 feet since 1961. The explanation for this must be you are losing land because of erosion or reliction along the boundary with the Connecticut River.

I hope this answers any questions you had

HJB/jhb



Harry

Harry J. Burgess

There is a cycle of erosion and it was illustrated in the sketches that I included in my original Study Request. As a result of this erosion, landowners throughout the valley have lost land and towns have incurred large expenses repairing roads near the river. It is just plain deceitful and dishonest to schematically describe a “cycle of erosion” that ignores the fluctuations in the level of the water. That is the Connecticut River today— a river controlled by many dams where the riverbanks are of highly permeable soil and the fluctuations in the water level cause tremendous damage to private and public property.

The “Erosion Ratio”

As I have previously written: “It has been acknowledged that the “erosion ratio” is not an accepted methodology as it has not been peer reviewed and accepted by the geology profession as a whole.” In the Study of February 4, 2017, the citation is for “Field, 2007a.” That citation reads: “Fluvial Geomorphology Study of the Turners Falls Pool on the Connecticut River between Turners Falls, MA and Vernon, VT: Unpublished report prepared for Northfield Mountain Pumped Storage Project, 131 p.” That work appears to have been done for TransCanada. Therefore, a “ratio” may have been created to support TransCanada’s position about erosion.

Furthermore, in the February 4, 2017, study Field writes: “The Field (2007a) report was accepted by FERC with no substantive stakeholder comments regarding the erosion ratio, so the approach should be considered valid and accepted for the study area given the proximity and similarity in setting to the Turners Falls impoundment.”

For the “Erosion Ratio” to have any merit, it should be independently tested and reviewed on a river with similar riverbanks, with similar soils, and with dams that are raising and lowering the water level on a daily basis. There is no evidence of any such testing of this hypothesis. To blatantly declare that the untested “erosion ratio” “should be considered valid and accepted” is little more than very self-serving nonsense. We are basically told that the “erosion ratio” is a “truth” — the Field Theorem of Erosion.

Any scientist who believes that their hypothesis has merit, welcomes questions and criticisms and seeks out professional colleagues to test it. That has not been done.

Both Field Geology and TransCanada find it convenient to use a totally unproven “ratio” as their basis for stating that there is no dam related erosion on the Connecticut River.

As I have previously stated, FERC should proceed with great caution before giving too much credence to this work. Accepting this very simplistic and unproven hypothesis may fail to determine the causes of erosion in a river that is so controlled by dams.

The erosion ratio does not even fall into the category of alternative facts. The “erosion ratio” used in this study and in this project is little more than junk science.

Once you start to use junk science as the basis for your statistics, then one must question the validity of other statistics in the Study. The book, *How to Lie with Statistics* by Darrell Huff was published in 1954 and as of today has sold over one million copies. That book reads: "Misinforming people by the use of statistical material might be called statistical manipulation; in a word (though not a very good one), statistication." In a chapter titled, "How to talk back to a statistic," the author writes: "About the first thing to look for is bias—the laboratory with something to prove for the sake of a theory, a reputation or a fee." In the use of the "erosion ratio," Field Geology is the laboratory looking to prove its theory, the "erosion ratio," and I imagine that TransCanada has paid a fee. Are these the statistics and is this the science that will be accepted by FERC?

Conclusion:

1. I believe that the "Preliminary Licensing Proposal" of December 1, 2016, is both very premature and very incomplete.
2. I believe that in the revised erosion studies Field Geology and TransCanada have used very unreliable statistics to try and prove that there is no erosion. In fact, photographs, field observations, and three surveys since 1961 all tell us that there is a tremendous amount of erosion. Photographs do not lie, but there is a book about how to lie with statistics. The photographs of the riverbank before the construction of the dams show no erosion. Photographs taken today show a great deal of erosion and a careful reading of the study will show you that at least 58% of the riverbank has erosion. This is a problem that must be addressed now.

Life is series of conversations with the environment. In this conversation with this small part of our environment, let the Connecticut River and its riverbank be observed, listened to, restored, and healed.