PUBLIC SERVICE COMMISSION
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April 25, 2014

Patrick Corcoran
NorthWestern Energy
40 E. Broadway St.
Butte MT 59701

RE: Docket No. D2013.12.85
PPLM Hydro Assets Purchase
PSC Consultant Responses to NWE's Data Requests 011-012

Dear Mr. Corcoran:

Enclosed is a copy of the responses of the PSC's consultant, The Essex Partnership, to NorthWestern Energy data requests 011-012. PSC staff responded to the DR 012 request for email communications between the PSC and Essex. The twelve attachments referred to in the data responses are provided on the enclosed CD, except that protected Attachments 6 and 10 are enclosed herein in a separate sealed envelope.

If you have any questions, contact me at 406-444-7627.

Sincerely,

Bob Decker
Public Policy Bureau Chief
Montana PSC

Docket D2013.12.85
PPLM Hydro Assets Purchase

NorthWestern Energy
NWE-011 and NWE-012

Data Requests served April 11, 2014

NWE-011

Regarding: Memorandum
Respondent: Myron Petrovsky of The Essex Partnership (Parts a-d); Fred Szufnarowski of The Essex Partnership (Part e)

a. In the Memorandum from The Essex Partnership to the Montana Public Service Comnission dated April 2, 2014 ("Essex Memorandum"), on page I, 3rd paragraph, the authors refer to replacement of certain components as "industry practice." Describe the basis for this assertion.

b. Provide every document in the possession, custody, or control of The Essex Partnership that supports the assertion that the referred to replacement is "industry practice."

c. In the Essex Memorandum on page 1, 4th paragraph, the authors refer to "Current practice, as accepted by FERC" with respect to a described installation. Provide every document in the possession, custody, or control of The Essex Partnership that supports the assertion that the "current practice" is required or accepted by FERC.

d. In the Essex Memorandum on page I, 4th paragraph, the authors refer to "Current practice," as related to recommendations of a named institute. Provide a copy of the recommendations.

e. In the attachment to the Essex Memorandum titled *Historic and Projected Capital Expenditures ($1,000s)*, base capital expenditures were projected for four developments for 2021. Please provide The Essex Partnership's projections of base capital expenditures for every development for each year from 20lS through 2022, explain, and document the projections.

RESPONSE:

a. The "certain components" referred to in the data request are flashboard-stanchion systems on the majority of PPLM hydroelectric dams. Most of these systems were installed at the beginning of the twentieth century when materials and labor were relatively inexpensive. Essex states that current industry practice is to replace flashboard-stanchion systems with more reliable equipment such as radial gates, crest gates, and inflatable dams. These gates have quick response time, large openings to pass flow and debris, can be operated remotely, and are sufficiently watertight to permit inspection and monitoring of the downstream dam features.
The basis for this statement is as follows:

- Worldwide, over 2,000 inflatable dams/gates have been installed. In the United States, hundreds of inflatable dams/gates have been installed, many of which replaced existing flashboard systems (see Attachment 1).

- The State of New York does not allow the installation of flashboard systems on new dams. For existing dams, the installation or continued use of flashboard systems is considered on a case-by-case basis (see Attachment 1).

- FERC orders for new licenses have stipulated that existing flashboard systems be replaced with some type of automated spillway gate system (see Attachment 2).

- In instances where flooding resulted because dam operators were unable to safely remove flashboards in time, the FERC required that the existing flashboard system be removed and the reservoir remain below the spillway crest until a new, permanent system was installed. (See Attachment 3. See also Attachment 6 (protected) for related information on PPLM dams.)

- Even where it is not a state or federal regulatory requirement, owners of dams, including PPLM, are or have replaced flashboard systems with gates and/or inflatable dams to improve safety, reduce leakage, increase energy production and better control reservoir levels (see Attachments 4 and 5).

- Information on PPLM's existing flashboard systems and ongoing efforts at its facilities to replace aging systems may be seen in Attachment 6 (protected).

b. Attached are six documents that Essex has that support the above statement that current industry practice is to replace flashboard-stanchion systems with more reliable equipment. A synopsis of each document is presented below.

Attachment 1. *"Replacing Spillway Flashboards and Raising Reservoirs with Inflatable Dams/Gates"*, ASDSO Conference Proceedings, 2005.

The paper discusses significant disadvantages of flashboard systems, provides a summary of the recent advances in inflatable dam/gate technology and examines the performance issues, product features and options available to those involved in selecting and designing inflatable dam/gate systems. For the foregoing reasons, the State of New York does not allow the installation of flashboards on new dams. For existing dams the installation or continued use of flashboards is considered on a case-by-case basis. In the United States, over 230 inflatable dams/gates have been installed (2005); of which approximately half were for replacing spillway flashboards or to increase reservoir storage.

Attachment 2. *"New Adjustable Crest Gates On An Old Dam"*, ASDSO Conference Proceedings, 2011.

The project is located on the Spokane River, WA and is part of Avista's Spokane River Project. Page 3 explicitly states that the new, 2009 FERC license order stipulated that the existing flashboard system be replaced by some type of automated gate system. Benefits of the new system are listed on page 1 and include: reliable and precise reservoir control, improved personnel safety and improvement of public safety.

Attachment 3. *"Installing Hydraulic Crest Gates to Improve Flood Control at Hatfield"*, Hydro Review Magazine, July 2012.

The paper indicates that hydroelectric projects now must adhere to strictly enforced state and federal regulations for water level and flow regulations and respect the environmental and recreational interests upstream and downstream. Project owners must meet ever-higher dam safety and reliability standards and comply with Occupational Safety and Health Administration regulations.

In 1993, the town of Hatfield was flooded because the dam operators were unable to safely remove flashboards from the overflow section of the spillway in time. High flows, with significant amounts of debris, backed up along the wood and steel-framed system and boardwalk. The resulting 7 feet of reservoir surcharge overflowed the rim, flooding the town of Hatfield and ultimately breaching the power canal.

In 1999, the project started generating electricity again. However, due to concerns over the safety and reliability of the overflow spillway system, FERC required all flashboards to be removed and the reservoir to remain below the crest of the spillway. FERC also required the owner, North American Hydro, to improve the safety and reliability of the overflow spillway system.

Attachment 4. "*Rehabilitation of Madison Paper Anson Dam*", ASDSO Conference Proceedings, 2000.

The 9 MW Anson Hydroelectric Project located on the Kennebec River, Madison, ME is owned by the Madison Paper Industries (MPI). The project, built between 1921 and 1929 consists of a powerhouse and a 630-foot long dam. In 1995, MPI decided to undertake a project to repair the concrete structures, improve the crest control facilities to eliminate the use of wooden flashboards, and raise the headpond by 1.5 feet above the existing level. The paper describes how the existing flashboard system was replaced with a rubber dam. Stated benefits of the flashboard replacement included:

- Elimination of costly maintenance activities associated with replacing the wooden flashboards and improvement of workers safety.

- Reduction of up to 8 feet of headpond fluctuations which are inherent in the wooden flashboard system, benefiting upstream wetlands, fish and wildlife habitat, and reducing shoreline erosion.
- Increase of annual power generation by increasing the net head on the station and being able to avoid periods of lower headpond due to flashboard outages.

Attachment 5. "*Alternatives to Traditional Flashboard Systems*", Hydro Review Magazine, October 1989.

A new rubber dam was installed on the crest of a 37-foot high Ambursen spillway dam of the 50 MW hydroelectric project located on the Hudson River in New York. The 6-foot high, 360-foot long rubber dam was installed in 1987 replacing the existing 46-inch high wooden flashboards. The paper describes construction, gate installation and testing details, and provides an economic assessment of the increase in power generation due to replacement of the existing flashboard system.

Attachment 6 (protected). Exhibits from Docket No. D2013.12. 85.

Nineteen references to exhibits that provide information associated with the existing PPLM flashboard system and PPLM's flashboard replacement practice.

c. "Current practice, as accepted by FERC with respect to the described installation" refers to the requirement to provide double corrosion protection for post-tensioned rock anchors. Attached are three documents that Essex has that support the above statement. A synopsis of each document is presented below. In addition, Attachment 10 provides our understanding of the current status of post-tensioned rock anchors at the PPLM facilities, based on a review of available information provided in exhibits from Docket No. D2013.12.85.

Attachment 7. *"Third Post-Tensioned Anchors Stabilization At Olmos Dam"*, ASDSO Conference Proceedings, 2012.

The paper discusses shortcomings of previous anchor installations that have failed and the successful design and installation of the current anchors. The last bullet at the bottom of page 7 explicitly lists "Inferior corrosion protection by present day standards for permanent anchors" as a contributing factor to the failure of prior anchor installations. The corrosion protection for the new anchors is described on the top of page 10; "The corrosion protection was selected to be Class 1 (double corrosion protection) as described by PTI. It is the highest level of corrosion protection and is mandated when anchors are intended for permanent use rather than temporary use."

Attachment 8. *"High Capacity Tock Anchors at Santeelah Dam"*, ASDSO Conference Proceedings, 2000.

The paper discusses the design, installation and monitoring of post-tensioned rock anchors installed at the Santeelah Dam, NC. The second paragraph under the heading "Design" on page 5 explicitly states; "Epoxy coated and filled strands used in conjunction with a cement grout provide the double corrosion protection required by Federal Energy Regulatory Commission (FERC)."

Attachment 9. "*Recommendations for Prestressed Rock and Soil Anchors*", Post-Tensioning Institute.

The standards and criteria for fabrication, design, installation, stressing and testing of rock anchors are governed by the Post-Tensioning Institute (PTI). The current, PTI's Recommendations, PTI DC35.1-04, specifies two classes of corrosion protection for steel prestressed rock anchors:

> Class I Protection system encases the prestressing steel inside a plastic encapsulation filled with either grout or corrosion or corrosion inhibiting compound. An epoxy-coated strand tendon grouted into a drill hole that successfully passes the water pressure test also satisfies the requirements of Class I Protection system. Class I Protection is often referred to as an encapsulated tendon or double corrosion protected tendon. It is the highest level of corrosion protection and is mandated when anchors are intended for permanent, over 24-month use.
>
> Class II Protection system encases the prestressing steel over the free length and relies on the cement grout to protect the prestressing steel along the bond length. Class II Protection is often referred to as a grout protected tendon or a single corrosion protected tendon. Class II Protection system applies to temporary tendons with service life less than 24 months.

Attachment 10 (protected). Exhibits from Docket No. D2013.12.85

Exhibits from Docket No. D2013.12.85 indicate that over 300 prestressed or post-tensioned rock anchors (aka tendons) have been installed at PPLM's projects and developments to meet FERC stability requirements. The oldest reported application of rock anchors occurred in 1968. The anchors on the PPLM's sites vary in length, capacities, and level of corrosion protection. Attachment 10 presents specific available information on installation date, structures, number of tendons and predicted performance of the installed post-tensioned tendons for each project or development.

d. See Attachment 9, and reference above.

e. Essex calculated a projection of base capital expenditures for only the year 2021. That calculation included estimates of Base CapEx for four facilities: Black Eagle, Ryan, Hauser and Madison. The estimates were prepared using data provided in Northwestern Energy Exhibit JMS-1 and JMS-2 & p.JMS-20.

Referring to the "Capital" tab in the Exhibit, the Base CapEx estimates were developed as follows:

- Black Eagle – the 2019 and 2023 values of $360,000 were averaged resulting in the $360,000 estimated value in 2021.
- Ryan – the 2018 value of $540,000 and the 2023 value of $830,000 were averaged and then rounded up to an estimated value of $700,000 in 2021.
- Hauser – the 2022 value of $330,000 was used as the estimated value of Base CapEx in 2021.
- Madison - 2019 value of $250,000 and the 2024 value of $200,000 were averaged and then rounded up to an estimated value of $250,000 in 2021.

NorthWestern Energy
NWE-011 and NWE-012

Data Requests served April 11, 2014

NWE-012

Regarding: Due Diligence Analysis
Respondent: Szufnarowski

Please provide copies of all communications; emails; and notes, records of conversations and meetings, or calls (and any attachments or documents related thereto) between The Essex Partnership (or representative, employee, principal, or agent thereof) and the Montana Public Service Commission (or any commissioner, representative, agent, employee, or consultant thereof) between September 26,2013 and the present regarding any aspect of NorthWestern's evaluation of, purchase of, or Application for Approval of the Hydros.

RESPONSE:

See Attachment 11 for all e-mail communications (pursuant to an agreement with NorthWestern, documents pertaining to protected information in the checklist are not included).

See Attachment 12 for telephone conversation notes.