

June 17, 2016

Ms. G. Cheryl Blundon Board of Commissioners of Public Utilities 120 Torbay Road, P.O. Box 12040 St. John's, NL A1A 5B2

Dear Ms. Blundon:

Re: Investigation and Hearing into Supply Issues and Power Outages on the Island Consumer Advocate's Requests for Information CA-NLH-145 to CA-NLH-168 (Teshmont Report)

In relation to the above noted application please find enclosed the original and twelve (12) copies of the Consumer Advocate's Requests for Information numbered CA-NLH-145 to CA-NLH-168 in relation to the Teshmont Report.

A copy of the letter, together with enclosures, has been forwarded directly to the parties listed below.

If you have any questions regarding the filing, please contact the undersigned at your convenience.

Yours very truly,

O'DEA, EARLE

/ THOMAS JOHNSON, Q.C.

TJ/cel Encl.

cc: Newfoundland and Labrador Hydro Attention: Geoffrey P. Young

> Newfoundland Power Inc. Attention: Gerard Hayes

Stewart McKelvey Stirling Scales

Attention: Mr. Paul Coxworthy

Grand Riverkeeper Labrador Inc. Attention: Ms. Roberta Frampton Benefiel

Mr. Danny Dumaresque

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IN THE MATTER OF

the *Electrical Power Control Act*, 1994, SNL 1994, Chapter E-5.1 (the "*EPCA*") and the *Public Utilities Act*, RSNL 1990, Chapter P-47 (the "*Act*"), as amended;

AND

IN THE MATTER OF

the Board's Investigation and Hearing into Supply Issues and Power Outages on the Island Interconnected System.

CONSUMER ADVOCATE REQUESTS FOR INFORMATION CA-NLH-145 to CA-NLH-168 Issued: June 17, 2016

1CA-NLH-145Reference:SummaryReport ofProbabilisticBased2Transmission ReliabilitiesAssessment - Island Interconnected3System:

"Hydro's current deterministic based Transmission Planning Criteria are similar to North American Electric Reliability Corporation (NERC) Transmission Planning standards; however, deviations from the NERC standards have been applied due to the isolated nature of the IIS and the potential cost impact of full compliance on the limited customer base." (pg 1-2)

11Has Hydro determined whether it will be required to implement12full compliance with NERC Transmission Planning standards upon13interconnection? Please provide any operating restrictions that will14be required until Hydro is in full compliance with NERC15Transmission Planning standards and provide the completion date16for Hydro to be in full compliance with NERC Transmission17Planning standards.

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 CA-NLH-146
 Reference:
 Summary
 Report
 of
 Probabilistic
 Based

 20
 Transmission Reliabilities
 Assessment - Island Interconnected

 21
 System;

"Hydro's current deterministic based Transmission Planning Criteria are similar to North American Electric Reliability Corporation (NERC) Transmission Planning standards; however, deviations from the NERC standards have been applied due to the isolated nature of the IIS and the potential cost impact of full compliance on the limited customer base." (pg 1-2)

What are the deviations from NERC standards applied by Hydro?

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1 CA-NLH-147 **Reference:** Summary Report of Probabilistic Based 2 Transmission Reliabilities Assessment - Island Interconnected 3 System: 4 "Hydro's current deterministic based Transmission Planning Criteria are 5 6 similar to North American Electric Reliability Corporation (NERC) 7 Transmission Planning standards; however, deviations from the NERC standards have been applied due to the isolated nature of the IIS and the 8 9 potential cost impact of full compliance on the limited customer base." (pg 1-2) 10 11 What does Hydro anticipate to be the cost impact of full 12 compliance with NERC standards? 13 14 CA-NLH-148 **Reference:** Summary Report of Probabilistic Based 15 Transmission Reliabilities Assessment - Island Interconnected 16 System: 17 18 "Based on CIGRE data, the expected pole failure rate for the LIL is 19 approximately 1.9 failures per year with an average duration of approximately 20 19.8 hours. These values are comparable to Hydro's assessment which included 21 an expectation of 2.0 failures per year with an average pole outage duration of 22 21 hours. HVdc system design ensures that failure of one pole, as documented 23 here, does not translate to customer outage"(pg 5) 24 25 Which CIGRE data is being referred to? Why is this data different 26 than that in 5.3.1. Line Commutated Converters (page 23-24) and 27 5.3.3. HVDC Overhead Lines (page 25 to 27) of the Teshmont 28Report? 29 30 31 32

1 CA-NLH-149 **Reference:** Summary Report of Probabilistic Based 2 Transmission Reliabilities Assessment - Island Interconnected 3 System: 4 "An overhead HVdc line failure rate of 0.19 outages/year/100 km with a 5 6 duration of 1.78 hours per outage was used in previous Hydro analysis. These 7 values were compared against Canadian Electricity Association (CEA) and 8 CIGRE data. CEA and CIGRE data indicated that expected outage durations 9 may be longer than the value proposed by Hydro. However, the overall forced outage rate of 0.00294% predicted by Hydro is comparable to the CIGRE value 10 of 0.00388%," (pg 5) 11 12 13 Why was the failure rate data not compared against other North 14 America data such as NERC? Please explain why North American data values were not considered more relevant than CIGRE. 15 16 17 CA-NLH-150 Reference: Nalcor Energy Probabilistic Based Transmission 18 Reliability Assessment-Island Interconnected System 19 ("Teshmont Report") pg (i): 20"A comparison was made between Pre-HVDC and Post-HVDC systems in terms 21 22of expected unserved energy to loads due to transmission and generation 23 outages using PSS®E software. System security, i.e. the ability of the system to 24 transition between each pre- and post-contingency operating condition and 25 remain stable, was not assessed in this study. That is to say, the analysis does 26 not include transient outages, but focuses on sustained outages only." 27 28 Please explain why the assessment completed by Teshmont did not 29 include a review of system security. 30 31

1 CA-NLH-151 Reference: Teshmont Report: pg (i):

2 "A comparison was made between Pre-HVDC and Post-HVDC systems in terms 3 4 of expected unserved energy to loads due to transmission and generation 5 outages using PSS®E software. System security, i.e. the ability of the system to transition between each pre- and post-contingency operating condition and 6 7 remain stable, was not assessed in this study. That is to say, the analysis does 8 not include transient outages, but focuses on sustained outages only." 9 Please provide the date when the studies will be completed to 10 11 demonstrate the stability of the system when transitioning from 12 pre- to post- contingency. Please provide the outline of the cases 13. that will be modeled and simulated in the stability study. 14 15 CA-NLH-152 **Reference:** Teshmont Report: pg (iii): 16 17 Referring to the table outlining revisions for the Teshmont Report. the initial draft was completed on September 17, 2014. In 2015 18 19 minor editorial changes were made (February 12, 2015). Nalcor 20provided final comments more than a year later on May 24, 2016. 21Why was there such a delay in finalizing and filing the Teshmont 22 Report? 23 24 CA-NLH-153 Teshmont Report - Section 4.3.3 - 230 KV **Reference:** 25 Transmission Lines (pg 16): 26 27"Based on a total of 59 sustained outages over 23 transmission lines with a total 28 length of 1510 km, an average failure frequency of 0.781 outages per 100 km 29 per year was calculated. This frequency was then multiplied by the length of 30 each line and divided by 100 to determine the average failure rate in outages 31 per year for line. This approach was considered valid because five years of data

| 1 | was consid | lered insufficient to provide statistically meaningful data for |
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| 2 | individual | lines, but it would be meaningful for the entirety of the 230 kV |
| 3 | system." | |
| 4 | | |
| 5 | | Why were the average failure frequency of 0.781 outages per 100 |
| 6 | | km per year and an average outage duration of 4.784 hours used |
| 7 | | instead of other (higher) values? |
| 8 | | |
| 9 | CA-NLH-154 | Reference: Teshmont Report - Section 4.3.3 - 230 KV |
| 10 | | Transmission Lines (pg 16): |
| 11 | | |
| 12 | "Outages d | ue to ac terminal station equipment such as circuit breaker failures |
| 13 | or misopera | tions are not included in this analysis." |
| 14 | | |
| 15 | | Hydro provided Teshmont with detailed outage data for the |
| 16 | | transmission lines. Please provide the outage data (failure |
| 17 | | frequency, failure rate and average outage duration) for the |
| 18 | | terminal stations for the same five-year period as the transmission |
| 19 | | lines. |
| 20 | | |
| 21 | CA-NLH-155 | Reference: Teshmont Report - Section 4.3.3 - 230 KV |
| 22 | | Transmission Lines (pg 16): |
| 23 | | |
| 24 | "The avera | age failure rates and average outage duration for the 230 kV |
| 25 | transmissio | n lines were calculated based on the data shown in Table 4. |
| 26 | However, 1 | Nalcor advised that the outages for TL201 and TL208 should be |
| 27 | excluded fi | om the calculations. It was explained that TL201 had insulator |
| 28 | issues that | were recently discovered and that have affected its reliability in the |
| 29 | past five ye | ars, and that TL208 had no customers for a prolonged period of time |
| 30 | and failure. | s were repaired at a lower priority." (emphasis added) |
| 31 | | |

| 1 | | Please provide details about the TL201 insulator issues that were |
|----|--|---|
| 2 | | recently discovered. |
| 3 | | |
| 4 | CA-NLH-156 | Reference: Teshmont Report - Section 5 - HVDC Reliability |
| 5 | | Data (Part 5.2) Data Provided by Nalcor Energy (pg 21): |
| 6 | | |
| 7 | 5.2. Data Pro | wided by Nalcor Energy |
| 8 | "The forced | outage rates and availability of the HVDC systems are highly |
| 9 | dependent or | their design, installation, and location (for example availability of |
| 10 | a spare con | verter transformers and/or submarine cables can significantly |
| 11 | improve the | reliability of the overall system). Therefore, unless details of a |
| 12 | specific syste | m are available, an accurate estimate of its forced outage rates and |
| 13 | availability cannot be calculated. For the purpose of this study, Teshmont is | |
| 14 | planning to use the following values, which are based on the information that | |
| 15 | was provided | to Teshmont by Nalcor Energy." |
| 16 | | |
| 17 | | What details of this specific system as regards its design |
| 18 | | installation or location were not made available to Teshmont? |
| 19 | | |
| 20 | CA-NLH-157 | Reference: Teshmont Report - Section 5 - HVDC Reliability |
| 21 | | Data (Part 5.2) Data Provided by Nalcor Energy (pg 21): |
| 22 | | |
| 23 | 5.2. Data Pre | wided by Nalcor Energy |
| 24 | "The forced outage rates and availability of the HVDC systems are highly | |
| 25 | dependent on their design, installation, and location (for example availability of | |
| 26 | a spare converter transformers and/or submarine cables can significantly | |
| 27 | improve the | reliability of the overall system). Therefore, unless details of a |
| 28 | specific system are available, an accurate estimate of its forced outage rates and | |
| 29 | availability of | cannot be calculated. For the purpose of this study, Teshmont is |
| 30 | planning to | use the following values, which are based on the information that |
| 31 | was providea | to Teshmont by Nalcor Energy." |

| 1 | | |
|----|--------------|--|
| 2 | | Further to the previous question, please provide Teshmonts' |
| 3 | | assessment of the impact of the unavailability of these details on its |
| 4 | | conclusions. |
| 5 | | vonoronona, |
| 6 | CA-NLH-158 | Reference: Teshmont Report - Section 5 – HVDC Reliability |
| 7 | CALCELLE 100 | Data (Part 5.2) Data Provided by Nalcor Energy (pg 21): |
| 8 | | Data (1 are 5.2) Data 110 aled by Pareor Energy (pg 21): |
| 9 | 5) Bata P | rovided by Nalcor Energy |
| 10 | | d outage rates and availability of the HVDC systems are highly |
| 11 | | on their design, installation, and location (for example availability of |
| | - | |
| 12 | - | nverter transformers and/or submarine cables can significantly |
| 13 | - | e reliability of the overall system). Therefore, unless details of a |
| 14 | | tem are available, an accurate estimate of its forced outage rates and |
| 15 | - | cannot be calculated. For the purpose of this study, Teshmont is |
| 16 | | use the following values, which are based on the information that |
| 17 | was provide | d to Teshmont by Nalcor Energy." |
| 18 | | |
| 19 | | Did Teshmont request any verification or background |
| 20 | | information/documents used by Nalcor in completing its |
| 21 | | "Reliability and Availability Assessment of the HVDC Island |
| 22 | | Link" dated April 10, 2012? If so, what |
| 23 | | verification/background/documents were provided and please |
| 24 | | provide the same. If Teshmont did not request any additional |
| 25 | | information, why not? |
| 26 | | |
| 27 | CA-NLH-159 | Reference: Teshmont Report - Section 5 – HVDC Reliability |
| 28 | | Data (Part 5.2) Data Provided by Nalcor Energy (pg 21): |
| 29 | | |
| 30 | 5.2. Data Pi | ovided by Nalcor Energy |
| 31 | "The force | d outage rates and availability of the HVDC systems are highly |
| | | |

1 dependent on their design, installation, and location (for example availability of 2 a spare converter transformers and/or submarine cables can significantly improve the reliability of the overall system). Therefore, unless details of a 3 specific system are available, an accurate estimate of its forced outage rates and 4 5 availability cannot be calculated. For the purpose of this study, Teshmont is 6 planning to use the following values, which are based on the information that 7 was provided to Teshmont by Nalcor Energy." 8 9 Did Teshmont seek verification for any of the values provided by 10 Nalcor Energy in section 14.6.1 of the Lower Churchill project performance requirements? If 11 what so, 12 verification/background/documents were provided and please 13 provide the same. If Teshmont did not request any additional 14 information, why not? 15 16 **CA-NLH-160** Reference: Teshmont Report - Section 5 – HVDC Reliability 17 Data (Part 5.2) Data Provided by Nalcor Energy (pg 21): 18 19 5.2. Data Provided by Nalcor Energy 20 "The forced outage rates and availability of the HVDC systems are highly 21 dependent on their design, installation, and location (for example availability of 22a spare converter transformers and/or submarine cables can significantly 23improve the reliability of the overall system). Therefore, unless details of a 24 specific system are available, an accurate estimate of its forced outage rates and 25 availability cannot be calculated. For the purpose of this study, Teshmont is planning to use the following values, which are based on the information that 26 27 was provided to Teshmont by Nalcor Energy." 28 29 In providing a probabilistic reliability assessment, what information would Teshmont typically request to complete a full 30 31 and accurate review?

| 1 | CA-NLH-161 | Reference: Teshmont Report - Section 5 – HVDC Reliability |
|----------------|---|--|
| 2 | | Data (Part 5.2) Data Provided by Nalcor Energy (pg 21): |
| 3 | | |
| 4 | 5.2. Data P | rovided by Nalcor Energy |
| 5 | "The force | ed outage rates and availability of the HVDC systems are highly |
| 6 | dependent | on their design, installation, and location (for example availability of |
| 7 | a spare co | onverter transformers and/or submarine cables can significantly |
| 8 | improve th | e reliability of the overall system). Therefore, unless details of a |
| 9 | specific sys | tem are available, an accurate estimate of its forced outage rates and |
| 10 | availability | cannot be calculated. For the purpose of this study, Teshmont is |
| 11 | planning to | o use the following values, which are based on the information that |
| 12 | was provid | ed to Teshmont by Nalcor Energy," |
| 13 | | |
| 14 | | Are there industry standards regarding the level of specificity |
| 15 | | required when providing an accurate probabilistic assessment? If |
| 16 | | so, what information is typically required to complete an |
| 17 | | assessment? |
| 18 | | • |
| 19 | CA-NLH-162 | Reference: Teshmont Report - Section 5 - HVDC Reliability |
| 20 | | Data (Part 5.2) Data Provided by Nalcor Energy (pg 21): |
| 21 | | |
| 22 | 5.2.1.2. H | VDC Overhead Lines |
| 23 | "Based on the Nalcor study the following are the expected failure rates and | |
| 24 | repair times for the HVDC overhead lines. | |
| 25 | Average failure rate per pole (based on 1100km length): 2.101/year | |
| 26 | Average repair time: 1.78 hours | |
| 27 | Average common mode failure rate: 0.02/year/100km | |
| 28 | Average co | mmon mode repair time: 24 hours" |
| 29 30 31 | 5.2.1.4. Ele | ectrode Lines |

| 1 | "In addition | , and in agreement with what was stated in the study, the above |
|-----------------|---|--|
| 2 | analysis wou | ld be considered only if the electrode lines will be constructed on a |
| 3 | separate woo | pd-pole line. As the electrode lines will be installed on the main dc |
| 4 | line towers, 1 | the reliability of the electrode lines is expected to be included in the |
| 5 | common mo | de failure of the dc line. Given that the electrode line in Labrador |
| 6 | will be consi | tructed on the main dc line towers for much of its length, it is not |
| 7 | anticipated t | hat the LIL's relatively long electrode line will impact or have a |
| 8 | major influence on LIL overall reliability." | |
| 9 | | |
| 10 | Reference: | NP-NLH-038, page 2, paragraph (f) states; |
| 11 12 | "Anti-cascaa | le requirements dictated that a maximum of 20 suspension 10 |
| 13 | structures would be permitted between full-tension deadends." | |
| 14 | | |
| 15 | Pleas | e explain the relationship between these data points. |
| $\frac{16}{17}$ | | |
| 18 | CA-NLH-163 | Reference: Teshmont Report - Section 5 – HVDC Reliability |
| 19 | | Data (Part 5.2) Data Provided by Nalcor Energy (pg 21): |
| 20 | | Data (1111 512) Bata Horney by Rateor Energy (pg 21), |
| 21 | | Please refer to sections 5.2.1.1 (HVDC Converters), 5.2.1.2 |
| 22 | | (HVDC Overhead Lines), 5.2.1.3 (HVDC Submarine Cables), and |
| 23 | | 5.2.1.4 (Electrode Lines) of the Teshmont Report. Are these |
| 24 | | outage criteria included in the performance guarantees in the |
| 25 | | contracts for these items? If not, please provide the outage criteria |
| 26 | | that were used in the contracts for each of these items. |
| 27 | | |
| 28 | CA-NLH-164 | Reference: Teshmont Report - Section 7 – Conclusion (pg 38): |
| 29 | | |
| 30 | "The voltage | source converter outage data was used to determine an overall |
| 31 | energy availability of a bipole system to equal approximately 97.3% not | |
| 32 | including th | e impacts of transmission line and bipole failures. This is |
| 33 | consistent w | ith the stated availability of Maritime Link at 95% to 97%." |
| | | |

| 1 | | |
|----------|--------------------|--|
| 2 | | Please provide the availability that was assumed for the Maritime |
| 3 | | Link (a) overhead transmission line, (b) submarine cable system |
| 4 | | and (c) grounding electrode (due to any time restriction that does |
| 5 | | not allow rated current). Please also confirm if these availability |
| 6 | | numbers are included as guarantees in the contracts for the (a) |
| 7 | | converter stations, (b) overhead transmission line, (c) submarine |
| 8 | | cable system and (d) grounding electrodes. |
| 9 | | |
| 10 | CA-NLH-165 | Reference: Teshmont Report - Section 7 – Conclusion (pg 39): |
| 11 | | |
| 12 | "Analysis of | 230 kV transmission line outages on the Island Interconnected |
| 13 | System delive | ered a comparison between ac transmission system reliability in the |
| 14 | Pre- and Po | st-HVDC cases. The expected unserved energy due to 230 kV |
| 15 | transmission | line contingencies in the Pre-HVDC case were calculated to equal |
| 16 | 100.8 MWh/ | year. Of that total 41.43 MWh/year is attributed to the loss of |
| 17 | TL208 , and | 58.03 MWh/year attributed to the loss of TL242. With approved |
| 18 | transmission | system upgrades, including the replacement of TL266, the |
| 19 | expected uns | erved energy due to 230 kV transmission line contingencies in the |
| 20 | Post-HVDC | case is reduced to 41.94 MWh/year attributed to the loss of TL208. |
| 21 | The analysis | concludes that based on a probabilistic reliability assessment, the |
| 22 | reliability of | the 230 kV transmission system on the Island Interconnected |
| 23 | System is imp | proved in the Post-HVDC case compared to the Pre-HVDC case." |
| 24 | | |
| 25 25 | Referencing I | EC 60826 at page 127 which states: |
| 26 | | |
| 27 | 60826 © IEC | |
| 28 | | ed to use a reliability level characterized by return periods of 150 |
| 29 | | s above 230 kV. The same is suggested for lines below 230 kV |
| 30 | | tute the principal or perhaps the only source of supply to a |
| 31 | particular ele | ectric load (level 2). |

| 2 of 500 years for lines, mainly above 230 kV which constitute the principal or 3 perhaps the only source of supply to a particular electric load. Their failure 4 would have serious consequences to the power supply." 5 | 1 | Finally, it i | 's suggested to use a reliability level characterised by return periods |
|---|----|---|---|
| 4 would have serious consequences to the power supply." 5 If a 1:50 year return period was used for comparison, yet IEC recommends using 1:150 return period (IEC 60826 Page 127), isn't this analysis inconsistent from a reliability perspective? 10 CA-NLH-166 11 CA-NLH-166 12 first power until 1-2 years after the Labrador Island and Maritime Link HVDC transmission systems are ready for commissioning. 13 Link HVDC transmission systems are ready for commissioning. 14 Does Hydro plan to commission and operate the HVDC 15 transmission systems at an intermediate power level until Muskrat 16 Falls is ready for test power? If yes, will Hydro request Teshmont 17 to review the reliability of this intermediate operation of the 18 HVDC transmission systems? 19 0 20 CA-NLH-167 21 first power until 1-2 years after the Labrador Island and Maritime 22 Link HVDC transmission systems are ready for commissioning. 23 Does Hydro plan to commission and operate the HVDC 24 transmission systems until Muskrat Falls is ready for test power, and if so, will Hydro purchase lower cost energy from points south to displace high cost energy produced at Holyrood during this period? 24 < | 2 | of 500 years for lines, mainly above 230 kV which constitute the principal or | |
| 5 If a 1:50 year return period was used for comparison, yet IEC 8 recommends using 1:150 return period (IEC 60826 Page 127), isn't 9 this analysis inconsistent from a reliability perspective? 10 II 11 CA-NLH-166 12 first power until 1-2 years after the Labrador Island and Maritime 13 Link HVDC transmission systems are ready for commissioning. 14 Does Hydro plan to commission and operate the HVDC 15 transmission systems at an intermediate power level until Muskrat 16 Falls is ready for test power? If yes, will Hydro request Teshmont 17 to review the reliability of this intermediate operation of the 18 HVDC transmission systems? 19 Iik HVDC transmission systems are ready for commissioning. 20 CA-NLH-167 21 first power until 1-2 years after the Labrador Island and Maritime 22 Link HVDC transmission systems are ready for commissioning. 23 Does Hydro plan to commission and operate the HVDC 24 transmission systems until Muskrat Falls is ready for test power, 25 and if so, will Hydro purchase lower cost energy from points south 26 to displace high cost energy | 3 | perhaps the | e only source of supply to a particular electric load. Their failure |
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| 7If a 1:50 year return period was used for comparison, yet IEC8recommends using 1:150 return period (IEC 60826 Page 127), isn't9this analysis inconsistent from a reliability perspective?101111CA-NLH-16612first power until 1-2 years after the Labrador Island and Maritime13Link HVDC transmission systems are ready for commissioning.14Does Hydro plan to commission and operate the HVDC15transmission systems at an intermediate power level until Muskrat16Falls is ready for test power? If yes, will Hydro request Teshmont17to review the reliability of this intermediate operation of the18HVDC transmission systems?20CA-NLH-16719Recent media reports indicate Muskrat Falls may not be ready for21first power until 1-2 years after the Labrador Island and Maritime22Link HVDC transmission systems?23Does Hydro plan to commission and operate the HVDC24transmission systems until Muskrat Falls is ready for test power,25and if so, will Hydro purchase lower cost energy from points south26to displace high cost energy produced at Holyrood during this27period?28The expected unserved energy calculations compare Holyrood30outages pre-HVDC to HVDC transmission outages post-HVDC.31Were outages of Hardwoods and Stephenville generating units | | | |
| 8 recommends using 1:150 return period (IEC 60826 Page 127), isn't 9 this analysis inconsistent from a reliability perspective? 10 11 11 CA-NLH-166 12 first power until 1-2 years after the Labrador Island and Maritime 13 Link HVDC transmission systems are ready for commissioning. 14 Does Hydro plan to commission and operate the HVDC 15 transmission systems at an intermediate power level until Muskrat 16 Falls is ready for test power? If yes, will Hydro request Teshmont 17 to review the reliability of this intermediate operation of the 18 HVDC transmission systems? 19 20 20 CA-NLH-167 21 first power until 1-2 years after the Labrador Island and Maritime 22 Link HVDC transmission systems are ready for commissioning. 29 CA-NLH-167 20 CA-NLH-167 21 first power until 1-2 years after the Labrador Island and Maritime 22 Link HVDC transmission systems are ready for commissioning. 23 Does Hydro plan to commission and operate the HVDC 24 transmission systems until Muskrat Falls is ready for test power, <td></td> <td></td> <td>If a 1:50 year return period was used for comparison, yet IEC</td> | | | If a 1:50 year return period was used for comparison, yet IEC |
| 9 this analysis inconsistent from a reliability perspective? 10 11 CA-NLH-166 Recent media reports indicate Muskrat Falls may not be ready for 12 first power until 1-2 years after the Labrador Island and Maritime 13 Link HVDC transmission systems are ready for commissioning. 14 Does Hydro plan to commission and operate the HVDC 15 transmission systems at an intermediate power level until Muskrat 16 Falls is ready for test power? If yes, will Hydro request Teshmont 17 to review the reliability of this intermediate operation of the 18 HVDC transmission systems? 19 20 20 CA-NLH-167 21 first power until 1-2 years after the Labrador Island and Maritime 22 Link HVDC transmission systems are ready for commissioning. 23 Does Hydro plan to commission and operate the HVDC 24 transmission systems until Muskrat Falls is ready for test power, 25 and if so, will Hydro purchase lower cost energy from points south 26 to displace high cost energy produced at Holyrood during this 27 period? 28 29 29 CA-NLH-168 The expected uns | | | |
| 1011CA-NLH-16612first power until 1-2 years after the Labrador Island and Maritime13Link HVDC transmission systems are ready for commissioning.14Does Hydro plan to commission and operate the HVDC15transmission systems at an intermediate power level until Muskrat16Falls is ready for test power? If yes, will Hydro request Teshmont17to review the reliability of this intermediate operation of the18HVDC transmission systems?19020CA-NLH-16721first power until 1-2 years after the Labrador Island and Maritime22Link HVDC transmission systems are ready for commissioning.23Does Hydro plan to commission and operate the HVDC24transmission systems until Muskrat Falls is ready for test power,25and if so, will Hydro purchase lower cost energy from points south26to displace high cost energy produced at Holyrood during this27period?282929CA-NLH-16831The expected unserved energy calculations compare Holyrood31Were outages of Hardwoods and Stephenville generating units | | | |
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| | 32 | | considered in the analysis? If so, how do they impact the results? If |

not, why not?

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Dated at St. John's, in the Province of Newfoundland and Labrador, this 17th day of June, 2016.

Thomas Johnson, Q.C.

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