



NEWFOUNDLAND AND LABRADOR
BOARD OF COMMISSIONERS OF PUBLIC UTILITIES
120 Torbay Road, P.O. Box 21040, St. John's, Newfoundland and Labrador, Canada, A1A 5B2

E-mail: gyoung@nlh.nl.ca

2014-08-22

Mr. Geoffrey Young
Newfoundland and Labrador Hydro
P.O. Box 12400
St. John's, NL A1B 4K7

Dear Sir:

Re: Newfoundland and Labrador Hydro - the Board's Investigation and Hearing into Supply Issues and Power Outages on the Island Interconnected System – Requests for Information PUB-NLH-231 to PUB-NLH-300

Enclosed are Information Requests PUB-NLH-231 to PUB-NLH-300 regarding the above-noted matter. Responses to these Requests for Information (RFIs) must be filed by Friday, September 12, 2014.

If Hydro determines that it cannot meet the response date for any of these RFIs, Hydro must advise the Board and provide an explanation as to why it cannot respond to each RFI for which it is requesting an extension to file a response. Hydro must request an extension of time to file responses, if it intends to do so, by Thursday, August 28, 2014.

If you have any questions, please do not hesitate to contact the Board's Legal Counsel, Ms. Jacqui Glynn, by email, jgylhn@pub.nl.ca or telephone, (709) 726-6781.

Yours truly,


Cheryl Blundon
Board Secretary

/cpj
Encl.

ecc. **Newfoundland Power Inc.**
Mr. Gerard Hayes, E-mail: ghayes@newfoundlandpower.com
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Island Industrial Customer Group
Mr. Paul Coxworthy, E-mail: pcoxworthy@stewartmckelvey.com
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1 **IN THE MATTER OF**
2 the *Electrical Power Control Act, 1994*,
3 SNL 1994, Chapter E-5.1 (the “*EPCA*”)
4 and the *Public Utilities Act*, RSNL 1990,
5 Chapter P-47 (the “*Act*”), as amended; and
6

7 **IN THE MATTER** of the Board’s Investigation
8 and Hearing into Supply Issues and Power Outages
9 on the Island Interconnected System.

**PUBLIC UTILITIES BOARD
REQUESTS FOR INFORMATION**

PUB-NLH-231 to PUB-NLH-300

Issued: August 22, 2014

- 1 **PUB-NLH-231** Please confirm that the HVdc overhead line will have a separate shield
2 wire above the electrode line conductors.
3
- 4 **PUB-NLH-232** Please provide a brief functional description of the electrode line
5 protection system. Include in the response whether the protection will be
6 capable of detecting faults whether or not the electrode line is energised.
7
- 8 **PUB-NLH-233** Please confirm that normally all HVdc cables will be energised and in
9 service.
10
- 11 **PUB-NLH-234** Please confirm that transducers will be provided at the dc switching
12 stations to enable detection of whether the fault is on the cable or the
13 overhead line and that the information will be communicated to the
14 converter stations by fibre optic communication and that the restart will
15 be blocked if the fault is detected to be on the cable.
16
- 17 **PUB-NLH-235** Please explain the proposed transfer scheme including the timeline for
18 the transfer and the impact on power transmission for the cables in the
19 Strait of Belle Isle in the following situations:
20 a) a fault in the spare cable;
21 b) a fault in the primary cable which is operating in conjunction with
22 the spare cable; and
23 c) a fault in the primary cable which is operating by itself.
24
- 25 **PUB-NLH-236** Please explain the consequences of a HVdc cable failure if there is no
26 spare HVdc cable including the impact of the limitation of the HVdc cable
27 overload capability to a five minute period of 2 pu current on the supply of
28 power to the Island Interconnected System. In the response include both
29 the case of the Maritime Link being in and out of service.
30
- 31 **PUB-NLH-237** Please explain the operating restrictions that will be imposed on the
32 Labrador Island Link in the event of a cable being out of service.
33
- 34 **PUB-NLH-238** Please confirm that the dc cable has been designed for the polarity reversal
35 that may occur in the event of having to switch the spare cable from one
36 pole to the other. In the response include how many times during the life
37 of the cable can such a polarity reversal be allowed to take place and the
38 measures that will be taken to minimise the stress on the cable resulting
39 from a polarity reversal.
40
- 41 **PUB-NLH-239** Describe the plans Nalcor has to ensure that dc cable repairs can be
42 performed as quickly as possible including the equipment and spares that
43 will be available for such repairs to be carried out and whether Nalcor
44 intends to have a support agreement with the cable manufacturer or
45 another body for help in the event of a cable failure.

- 1 **PUB-NLH-240** Please explain what steps have been and will be taken to minimise the
2 number of flashovers on the overhead HVdc line, noting the proximity of
3 the overhead line to the coast and the fact that the HVdc line will attract
4 much higher concentrations of salt and other pollution compared with an
5 ac overhead line.
6
- 7 **PUB-NLH-241** It is understood that the 200ms shutdown time for a three phase or single
8 phase short circuit in the ac network near Soldiers Pond and near Muskrat
9 Falls is based on the use of a dual protection system. Please explain what
10 would happen if the breaker does not open, e.g. due to a breaker failure
11 and the consequence on the power supply to the Island Interconnected
12 System including whether load shedding will be required and if so, what
13 magnitude of load shedding would be required.
14
- 15 **PUB-NLH-242** It is understood that the HVdc cable installation will be performed by
16 several different contractors. Explain how the HVdc cable
17 contractor/manufacture will be involved in the supervision of the sub-
18 contracts that are critical to the long term reliability of the HVdc cable and
19 whether suitably qualified consultants will be engaged to supervise cable
20 manufacture, cable coiling and cable laying.
21
- 22 **PUB-NLH-243** It is understood that Nalcor will be doing the Horizontal Directional
23 Drilling to the cable manufacturer's specification. Please provide a clear
24 description of the responsibilities and interfaces between Nalcor and the
25 cable manufacturer and cable installer.
26
- 27 **PUB-NLH-244** It is understood that there will be a separate contract for the rock
28 placement protection of the cable. Please state who provides the detailed
29 specification in respect of the rock specification and the method for
30 placing the rocks and what supervision of this process will be provided by
31 Nalcor.
32
- 33 **PUB-NLH-245** It is understood that the overhead line will be designed by Nalcor and will
34 be constructed by separate contractors. Please explain the project
35 management and technical expertise that Nalcor has available to plan all
36 interfaces between contracts and to manage interface issues as they arise.
37
- 38 **PUB-NLH-246** Please provide a single line diagram of the converter stations and the dc
39 switchyards at the Strait of Belle Isle to show how the dc cables can be
40 connected and re-connected as planned should a cable failure occur.
41
- 42 **PUB-NLH-247** Please provide a single line diagram of the neutral area of the HVdc
43 converter stations showing how the electrode line conductors can be re-
44 connected and how the neutral conductors can be re-connected, if
45 appropriate.

- 1 **PUB-NLH-248** Please confirm that in the contract for the converter station equipment that
2 the guaranteed forced outage rate of the converter station poles are 4
3 outages per pole per year and that this guarantee is for the scheme and not
4 per end, i.e. that there can be up to 8 permanent pole failures in a year
5 without penalty being payable; that the number of pole outages does not
6 include outages caused by the HVdc overhead line, electrode line or HVdc
7 cables, nor outages caused by operator error; that the number of outages is
8 measured and averaged over 3 years; and in the event of a failure to meet
9 the average of 4 outages per pole, or 8 outages for the 2 poles, the
10 converter manufacturer is allowed to extend the monitoring period for
11 another 12 months, and to then choose the best 3 years as the measurement
12 of performance before penalties are applied.
- 13
14 **PUB-NLH-249** Further to PUB-NLH-248 please state what penalties will be applied if the
15 guaranteed performance is not met.
- 16
17 **PUB-NLH-250** Please confirm that the guaranteed forced energy unavailability in the
18 contract for the converter station equipment for single poles failures is
19 0.5% per year; that this guarantee is for the scheme and not per end; that
20 this energy unavailability does not include outages caused by the HVdc
21 overhead line, electrode line or HVdc cables, nor outages caused by
22 operator error; that the energy unavailability is measured and averaged
23 over 3 years, and in the event of a failure to meet the average 0.5% the
24 converter manufacturer is allowed to extend the monitoring period for
25 another 12 months, and to then choose the best 3 years as the measurement
26 of performance before penalties are applied.
- 27
28 **PUB-NLH-251** Further to PUB-NLH-250 please state what penalties will be applied if the
29 guaranteed performance is not met.
- 30
31 **PUB-NLH-252** Please confirm that in the contract for the converter station equipment the
32 guaranteed forced bipole outage rate of the HVdc scheme is 0.1/year; that
33 this number of bipole outages does not include outages caused by the
34 HVdc overhead line, electrode line or HVdc cables, nor outages caused by
35 operator error; the number of outages is measured and averaged over 3
36 years, and in the event of a failure to meet the average of 0.1 bipole
37 outages the converter manufacturer is allowed to extend the monitoring
38 period for another 12 months, and to then choose the best 3 years as the
39 measurement of performance before penalties are applied.
- 40
41 **PUB-NLH-253** Further to PUB-NLH-252 please state what penalties will be applied if the
42 guaranteed performance is not met.
- 43
44 **PUB-NLH-254** Please state what the guaranteed bipole forced energy unavailability of the
45 HVdc scheme is in the contract for the converter station equipment and
46 confirm that bipole energy unavailability does not include outages caused

- 1 by the HVdc overhead line, electrode line or HVdc cables, nor outages
 2 caused by operator error, that the energy unavailability is measured over 3
 3 years, and in the event of a failure to meet the guarantee the converter
 4 manufacturer is allowed to extend the monitoring period for another 12
 5 months, and to then choose the best 3 years as the measurement of
 6 performance before penalties are applied.
 7
- 8 **PUB-NLH-255** Further to PUB-NLH-254 please state what penalties will be applied if the
 9 guaranteed performance is not met.
 10
- 11 **PUB-NLH-256** Please confirm that in the contract for the converter station equipment the
 12 guaranteed Scheduled Energy Unavailability (SEU) of the HVdc scheme
 13 is 1.0% per year; that SEU does not include maintenance outages for the
 14 HVdc overhead line, electrode line or HVdc cables, nor scheduled outages
 15 caused by operator error; that the energy unavailability is measured over 3
 16 years, and in the event of a failure to meet the guarantee the converter
 17 manufacturer is allowed to extend the monitoring period for another 12
 18 months, and to then choose the best 3 years as the measurement of
 19 performance before penalties are applied.
 20
- 21 **PUB-NLH-257** Further to PUB-NLH-256 please state what penalties will be applied if the
 22 guaranteed performance is not met.
 23
- 24 **PUB-NLH-258** Please confirm that as a minimum the recommendations for spares
 25 holdings as included in the SNC Lavalin Report, Lower Churchill Project,
 26 Reliability & Availability Assessment of the HVdc Island Link, dated 10-
 27 Apr-2012, filed in response to PUB-NLH-212, will be maintained at all
 28 times.
 29
- 30 **PUB-NLH-259** Please state what would be the consequence on the power transmission
 31 capability of a permanent earth fault on one or of both of the electrode line
 32 conductors.
 33
- 34 **PUB-NLH-260** Please state what would be the consequence on the power transmission
 35 capability of a permanent open circuit fault on one or of both of the
 36 electrode line conductors.
 37
- 38 **PUB-NLH-261** Please provide the specified Reliability and Availability guarantee
 39 requirements for the converter stations included in the Maritime Link,
 40 providing at least the following information (using Cigre terminology):
 41 1. Mono-polar Forced Outage Rate (i.e. the total number of forced
 42 outages of the complete scheme in a 12 month period).
 43 2. Bipolar Forced Outage Rate (i.e. the total number of forced outages
 44 of the one pole in a 12 month period)
 45 3. Mono-polar Forced Energy Unavailability (i.e. the number of
 46 MWhrs as a percentage of the scheme rating multiplied by the

- 1 number of hours in a year that could not be transmitted due to
 2 forced outages on either of the poles).
- 3 4. Bipolar Forced Energy Unavailability (i.e. the number of MWhrs as
 4 a percentage of the scheme rating multiplied by the number of
 5 hours in a year that could not be transmitted due to forced outages
 6 on a pole)
- 7 5. Scheduled Energy Unavailability (i.e. the number of MWhrs as a
 8 percentage of the scheme rating multiplied by the number of hours
 9 in a year that could not be transmitted due to planned outages for
 10 maintenance).
- 11
- 12 **PUB-NLH-262** Please explain in detail the impact of outages and trips of the Maritime
 13 Link on the security of the power supply on the Island Interconnected
 14 System.
- 15
- 16 **PUB-NLH-263** Please explain in detail the extent that the Island Interconnected System
 17 depends on the support of Maritime Link (when in service) to avoid
 18 system collapse or load shedding in the event of faults or trips of the
 19 Labrador Island Link, major transmission lines, and trips of large
 20 generators.
- 21
- 22 **PUB-NLH-264** Provide any studies that have been performed to verify that there will be
 23 no adverse interactions harmonic, dynamic or transient between the
 24 Labrador Island Link and the Maritime Link.
- 25
- 26 **PUB-NLH-265** The report Appendix C10, SNC Lavalin Stability Studies dated March
 27 2012 filed by Hydro with the Application for Approval of the Upgrade of
 28 the Transmission Line Corridor included transient stability studies that
 29 showed load shedding taking place for faults other than bipole trips. Please
 30 explain why this happened and what will be done to prevent load shedding
 31 for those conditions.
- 32
- 33 **PUB-NLH-266** The report DC1210 HVdc Sensitivity Studies dated July 2010 filed by
 34 Hydro with its Application for Approval of the Upgrade of the
 35 Transmission Line Corridor included PSSE validation studies which did
 36 not include any results of a two terminal configuration Muskrat Falls (or
 37 Gull Island) Rectifier to Soldiers Pond inverter and also did not include
 38 any studies of a dc line fault or a pole trip. Has Hydro or Nalcor performed
 39 validation studies of a two terminal configuration and of a fault on the dc
 40 line? If yes, provide the studies. If no, why not?
- 41
- 42 **PUB-NLH-267** Further to PUB-NLH-266 it is noted that for a 3 phase fault at the Gull
 43 Island rectifier the PSSE model gives much faster dc power restoration at
 44 Soldiers Pond than the PSCAD model. Since the stability studies have
 45 used the PSSE model, it is possible that the predicted frequency excursion
 46 will be smaller than will be the actual case, and that more load shedding

- 1 will occur unless additional inertia is added to the Newfoundland system.
2 Has Nalcor considered this? If yes, what additional inertia will be
3 required? If no, why not?
4
- 5 **PUB-NLH-268** Please provide a cross section drawing of the line corridor where the ac
6 and dc lines are run in close proximity. Please show drawings of the ac
7 lines and the dc line within the corridor.
8
- 9 **PUB-NLH-269** Further to PUB-NLH-268 please explain what steps will be taken to
10 minimise the mutual induction between the ac and the dc lines.
11
- 12 **PUB-NLH-270** Further to PUB-NLH-268 please explain the steps that will be taken to
13 prevent contact between the ac line conductors and the HVdc line
14 conductors.
15
- 16 **PUB-NLH-271** Further to the response to PUB-NLH-223, which states that with all
17 maintenance complete the system can operate with all synchronous
18 condensers in service to provide maximum security, please provide details
19 of the anticipated operation of the synchronous condensers at Holyrood
20 and Soldiers Pond during the peak season. Please state the minimum
21 requirements for operation and if the remaining synchronous condensers
22 will be available offline or synchronized to the system.
23
- 24 **PUB-NLH-272** Further to PUB-NLH-271 if the remaining synchronous condensers are
25 offline what will be the risk to the Island Interconnected system in the
26 event of a high inertia synchronous condenser being tripped because of a
27 fault while the Labrador Island Link is operating at high power? How long
28 will it take before an offline synchronous condenser can be put on-line?
29
- 30 **PUB-NLH-273** What steps will be taken in the design of the converter station to minimise
31 prospective long term outages as a consequence of a fire in the control
32 room, in the control building, in the neutral area, or in the valve halls?
33
- 34 **PUB-NLH-274** Further to the response to PUB-NLH-217, page 2, lines 12-14 please
35 clarify what is meant by the statement "The Island Interconnected System
36 is planned to be able to sustain a successful single pole reclose for a line to
37 ground fault based on the premise **that all system generation is**
38 **available**". Does this mean all system generation has to be in service, or
39 ready to start within a specified time?
40
- 41 **PUB-NLH-275** Further to the response to PUB-NLH-217, page 5, lines 23-27 confirm that
42 if the Maritime Link is not available there could be a power shortfall in on
43 the Island Interconnected system of 300MW, until at least one of the poles
44 has been restored.

- 1 **PUB-NLH-276** Further to the response to PUB-NLH-217, page 9 which states the power
2 demand could be met until 2025 without the Labrador Island Link, if
3 300MW is made available via the Maritime Link, in what year would
4 there be a power shortage if there was no power available from the
5 Maritime Link?
6
- 7 **PUB-NLH-277** Further to the response to PUB-NLH-217, page 8 which states that 673
8 MW of load on the Island Interconnected System will have to be shed in
9 the event of the loss of both poles and the load shedding scheme is under
10 study, state when this study of the load shedding scheme will be complete.
11 If it is complete now, provide a copy.
12
- 13 **PUB-NLH-278** Further to the response to PUB-NLH-217, page 8-9 which states that
14 standby generation would be available in 10 to 20 minutes, information
15 filed by Hydro in response to GT-NP-NLH-007 in the Application for
16 Approval of a Capital Project to Supply and Install 100 MW of
17 Combustion Turbine Generation states that the start time for the new 100
18 MW gas turbine at Holyrood is 40 minutes to full load. What impact does
19 this have on the reliability associated with the Labrador Island Link?
20
- 21 **PUB-NLH-279** Further to the response to PUB-NLH-217, page 9 which states that
22 Hydro's standby capacity is 234.7 MW (including the new and existing
23 combustion turbines) explain in detail Hydro's plans regarding standby
24 generation required on the Island Interconnected System to supply load in
25 the event of a partial or complete loss of supply over the Labrador Island
26 Link.
27
- 28 **PUB-NLH-280** Further to the response to PUB-NLH-217, page 9 which states that up to
29 300 MW of import via the Maritime Link would be available in the event
30 of a complete outage of the Labrador Island Link and the response to CA-
31 NLH-028 which assumes 300 MW is available, explain in detail the
32 sources for such 300 MW and the arrangements in place to secure access
33 to this capacity. If no arrangements are in place, explain the steps that must
34 be taken to ensure access when needed to this capacity.
35
- 36 **PUB-NLH-281** Further to the response to PUB-NLH-218, where it is stated that "In the
37 event of a full loss of the Labrador Island Link, all deliveries on the
38 Maritime Link will be curtailed", please define the term "curtailment". Is it
39 a change to the power flow or a sudden interruption of the power flow?
40
- 41 **PUB-NLH-282** Further to the response to PUB-NLH-221 please discuss the impact of the
42 limitation of the cable capability (100% overload for 5 minutes, and no
43 continuous overload capability) on the overload capability of the Labrador
44 Island Link.

- 1 **PUB-NLH-283** Further to the response to PUB-NLH-224 please explain what priority will
2 be allocated to measures necessary to prevent and/or minimize power
3 supply interruptions such as load shedding, for events associated with the
4 Labrador Island Link, e.g. temporary bipole and/or pole blocks, prolonged
5 ac network faults near the rectifier or inverter stations, dc overhead line
6 faults with such events extending beyond the durations which have been
7 used in the transient stability studies.
8
- 9 **PUB-NLH-284** Update the response to PUB-NLH-004 to include data for 2014 year to
10 date (July 31) and include the reasons for any underfrequency trips in
11 2014.
12
- 13 **PUB-NLH-285** Further to the response to PUB-NLH-048 state the number of times and
14 the amount of capacity that Corner Brook Pulp and Paper Limited
15 supplied to Hydro each time under the arrangement for short-term capacity
16 assistance for the period December 31, 2013 to March 31, 2014.
17
- 18 **PUB-NLH-286** Further the response to PUB-NLH-048 state the total compensation paid
19 by Hydro to Corner Brook Pulp and Paper Limited under the short-term
20 capacity arrangement for the period December 31, 2013 to March 31,
21 2014.
22
- 23 **PUB-NLH-287** Update the response to PUB-NLH-148 to include data for 2014 year to
24 date (July 31). Include in the response an explanation for each forced
25 outage in 2014.
26
- 27 **PUB-NLH-288** Further to the response to PUB-NLH-209 confirm that contingency plans
28 relating to supply for the Island Interconnected System have not yet been
29 developed for a delay in the in-service dates of the Muskrat Falls and
30 Labrador Island Link projects.
31
- 32 **PUB-NLH-289** PUB-NLH-210 asked that any risk analyses relating to the Muskrat Falls
33 and Labrador Island Link projects be provided. In the response only the
34 report completed by the Independent Engineer was provided. Page 99 of
35 Attachment 1 of this response refers to a Schedule Risk Analysis
36 completed by Nalcor. Please provide this analysis and all other risk
37 analyses completed by Nalcor on any aspect of the projects including
38 schedule, construction risks and costs.
39
- 40 **PUB-NLH-290** Further to the response to PUB-NLH-210, page 27 of Attachment 1 states
41 that a "Cold Eye Review of Design and Technical Specifications, North
42 Spur Stabilization Works" completed by Hatch recommended additional
43 investigations and analyses. State these recommendations and explain the
44 status of any follow up investigation and analyses as a result of the
45 recommendations.

- 1 **PUB-NLH-291** Further to the response to PUB-NLH-210, page 99 of Attachment 1 which
2 states that weather risk has been mitigated by a “mega dome”, provide
3 details on this dome including the schedule for its construction,
4 operational experience of others with it and how it will mitigate the
5 weather risk.
6
- 7 **PUB-NLH-292** Further to the response to PUB-NLH-210 which provided the Independent
8 Engineer’s Report dated November 29, 2013, has the Independent
9 Engineer provided a subsequent report? If yes, provide a copy. If not,
10 when is the next report from the Independent Engineer scheduled?
11
- 12 **PUB-NLH-293** Further to the response to PUB-NLH-211 it is understood that Nalcor will
13 manage the project and technical interfaces between the many different
14 parties and companies which will be involved in the construction of the
15 Muskrat Falls and Labrador Island Link project. Please provide details of
16 the management infrastructure and expertise that Nalcor has available to
17 oversee this project.
18
- 19 **PUB-NLH-294** Further to the responses to PUB-NLH-214, PUB-NLH-217 and PUB-
20 NLH-218 confirm that for loss of one pole of the Labrador Island Link
21 HVdc transmission system the supply of power from the Labrador Island
22 Link project will, after system stability is established, be shared on a pro
23 rata basis between the Nova Scotia Block and the requirements of the
24 Island Interconnected System (IIS) with any shortfall for the IIS having to
25 be met by other generation on the IIS that is, there is no priority for
26 supplying the requirements of the IIS in the event of insufficient power
27 from Muskrat Falls to meet both Nova Scotia and the IIS’s requirements.
28
- 29 **PUB-NLH-295** A June 26, 2014 press release from Nalcor on the Muskrat Falls Project
30 states that “strategic investments to enhance system reliability” was one of
31 the contributing factors to an updated capital cost and further that “Nalcor
32 has also made several design enhancements to improve system quality and
33 reliability.” Explain in detail the system reliability enhancements that were
34 made that are referred to this press release and how they improved
35 reliability for the supply of Muskrat Falls Power to the Island
36 Interconnected System.
37
- 38 **PUB-NLH-296** In its response dated April 24, 2014 to the Liberty Consulting Group
39 Report, at page 12 of 18 Hydro referred to benchmarks for generation
40 reserve margins in the Canadian electrical utility as typically around 10%
41 for hydroelectric systems and in the range of 15-20% for predominantly
42 thermal systems. Provide the information relied on to state these
43 benchmarks, state whether the utilities included for the calculation of this
44 benchmark are interconnected to other systems and explain why a margin
45 of at least 12% is appropriate for Hydro to use for planning purposes.

- 1 **PUB-NLH-297** Further to the response to CA-NLH-047 and CA-NLH-028 please provide
 2 the Loss of Load Hours for each year until 2037 with the Labrador Island
 3 Link in service and with and without the Maritime Link in service.
 4
- 5 **PUB-NLH-298** Further to the response to GRK-NLH-033 confirm that restoration plans
 6 relating to a failure of the HVdc line have not yet been developed and state
 7 when such plans will be developed.
 8
- 9 **PUB-NLH-299** Further to the response to GRK-NLH-033 explain why a repair duration of
 10 two weeks was selected as the objective for the restoration plans which are
 11 to be developed and provide the information relied on to support that the
 12 two weeks objective is appropriate.
 13
- 14 **PUB-NLH-300** The response to GRK-NLH-038 states that after MHI's initial review
 15 Nalcor made changes to upgrade designs and provide increased reliability
 16 particularly in the Long Range Mountains and other regions in Labrador.
 17 Explain in detail the specific design changes that were made, the time they
 18 were made and how such changes will provide increased reliability.

DATED at St. John's, Newfoundland this 22nd day of August 2014.

BOARD OF COMMISSIONERS OF PUBLIC UTILITIES

Per


 Cheryl Blundon
 Board Secretary