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April 26, 2022

Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road, P.O. Box 21040
St. John's, NL A1A 5B2

Attention: Ms. Cheryl Blundon
Director of Corporate Services & Board Secretary

Dear Ms. Blundon:

Re: Application for Approval for Rotor Rim Shrinking and Stator Recentering at the Upper Salmon Hydroelectric Generating Station

Please find enclosed Newfoundland and Labrador Hydro's ("Hydro") application for approval for rotor rim shrinking and stator recentering at the Upper Salmon Hydroelectric Generating Station ("Upper Salmon"). This project is required for the safe and reliable operation of the Upper Salmon generating unit. The estimated cost of the project is \$3,999,800.

Should you have any questions, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

Shirley A. Walsh
Senior Legal Counsel, Regulatory
SAW/sk

Encl.

ecc:

Board of Commissioners of Public Utilities

Jacqui H. Glynn
PUB Official Email

Consumer Advocate

Dennis M. Browne, QC, Browne Fitzgerald Morgan & Avis
Stephen F. Fitzgerald, Browne Fitzgerald Morgan & Avis
Sarah G. Fitzgerald, Browne Fitzgerald Morgan & Avis
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Application for Approval to for Rotor Rim Shrinking and Stator Recentering at the Upper Salmon Hydroelectric Generating Station

April 26, 2022



An application to the Board of Commissioners of Public Utilities

IN THE MATTER OF the *Electrical Power Control Act, 1994*, SNL 1994, Chapter E-5.1 (“EPCA”) and the *Public Utilities Act*, RSNL 1990, Chapter P-47 (“Act”), and regulations thereunder; and

IN THE MATTER OF an application by Newfoundland and Labrador Hydro (“Hydro”) for approval to execute a rotor rim shrink and stator recentering at the Upper Salmon Hydroelectric Generating Station (“Upper Salmon”) pursuant to s 41(3) of the *Act*.

To: The Board of Commissioners of Public Utilities (“Board”)

THE APPLICATION OF NEWFOUNDLAND AND LABRADOR HYDRO STATES THAT:

A. Background

1. Hydro, a corporation continued and existing under the *Hydro Corporation Act, 2007*, is a public utility within the meaning of the *Act*, and is subject to the provisions of the *EPCA*.
2. Hydro is the primary generator of electricity in Newfoundland and Labrador. Hydro’s generating assets include nine hydroelectric generating facilities, one of which is the Upper Salmon. The Upper Salmon is located upstream of the Bay d’Espoir Hydroelectric Generating Facility and has been online since 1983. It consists a single vertical hydraulic turbine unit rated for 84 MW of generating capacity.

B. Application

3. Through the annual maintenance program for this facility, cracks on the rotor rim guidance keys had been identified and refurbished. The importance of these guidance keys to the operation of the Upper Salmon is discussed further in Schedule 1 to this Application. The degree of cracking and deterioration of the rotor rim guidance keys prompted a replacement project in 2018, as part of the Hydraulic Generation Refurbishment and Modernization project.¹ An inspection plan was subsequently implemented to track the condition of the rotor rim guidance keys and blocks.

¹ “2018 Capital Budget Application,” Newfoundland and Labrador Hydro, rev. October 3, 2017 (originally filed July 27, 2017), vol. II, tab 1.

Inspections performed in 2019 and 2020 revealed cracks in the welds on half of the keys, which were refurbished in place.

4. During the planned annual preventive maintenance checks and inspections in August 2021, a significant crack on a rim guidance block was discovered along with the shifting of two drive key assemblies upward within their slots. This is described in further detail in Schedule 1 to this application. This was the first occurrence where cracking was identified on the rotor rim guidance blocks and the first time that a whole assembly had shifted. This was evidence of further deterioration that required more extensive intervention.
5. Hydro consulted with the original equipment manufacturer (“OEM”), Andritz Hydro Canada Inc., and completed further inspections of all the rotor rim guidance keys and blocks. The results of this testing indicated extensive cracking. Through additional testing and consultation, as described in Schedule 1, Hydro determined that refurbishment was not possible on all of the blocks and keys. Due to the timing of Hydro’s discovery of these more extensive issues, Hydro was unable to include the proposed solutions in its “2022 Capital Budget Application.”² Additionally, due to the commitment to have the Upper Salmon unit in service for the 2021–2022 winter availability period and the length of time necessary to implement a long-term solution, Hydro decided to move forward with a short-term solution in 2021, with a long-term solution to be proposed later.
6. Hydro completed guidance block and key replacement in 2021 to return the unit to service in the short term, and followed the OEM’s recommendation to inspect the unit every 12 weeks or 2,000 hours of operation. The first inspection was completed in February 2022, consisting of visual and magnetic particle testing, and identified cracks in two of the newly installed keys. Although the cracked welds were refurbished, and magnetic particle testing performed to verify the refurbishment, the damage supports the necessity to move forward with the long-term solution. The long-term solution is discussed further in Schedule 1, and involves shrinking of the rotor rim and recentering the stator. The OEM’s correspondence with respect to the long-term solution is also provided as Attachment 1 to Schedule 1.

² “2022 Capital Budget Application,” Newfoundland and Labrador Hydro, rev. September 17, 2021 (originally filed August 2, 2021).

7. Hydro evaluated whether it should continue the condition monitoring of the Upper Salmon, with refurbishment as required, instead of proceeding with the long-term solution. This evaluation is discussed at Section 4 of Schedule 1. Hydro determined that the increased deterioration, involving further cracking and shifting, indicates that continued condition monitoring and refurbishment would not adequately address the issue and would not ensure the reliable operation of the Upper Salmon. Hydro determined that delay in implementation of a long-term solution increases the risk of unplanned expenditures, outages, and associated bypassed generation
8. Due to the time necessary for procurement, outage requirements, and the availability of the necessary equipment, execution of the long-term solution for the Upper Salmon is anticipated to take two years, at a total cost of \$3,999,800. However, as Hydro will continue the 12 week/2,000-hour inspections, if significant cracking is found, Hydro will make all efforts to complete the work in 2022. The project estimate and schedule are detailed in Tables 1 and 2 of Schedule 1.

C. Hydro's Request

9. Hydro submits that the proposed capital expenditures detailed above and further described in Schedule 1 to this application are necessary to ensure that Hydro can continue to provide service that is safe and adequate and just and reasonable as required by Section 37 of the *Act*.
10. Therefore, Hydro makes application that the Board make an Order pursuant to Section 41(3) of the *Act*, approving the rotor rim shrink and stator recentering at the Upper Salmon as more particularly described in this application and in the project description and justification document attached as Schedule 1.

B. Communications

11. Communications with respect to this Application should be forwarded to Shirley A. Walsh, Senior Legal Counsel, Regulatory for Hydro.

DATED at St. John's in the province of Newfoundland and Labrador on this 26th day of April 2022.

NEWFOUNDLAND AND LABRADOR HYDRO



Shirley A. Walsh
Counsel for the Applicant
Newfoundland and Labrador Hydro,
500 Columbus Drive, P.O. Box 12400
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Schedule 1

Upper Salmon Hydroelectric Generating Station Rotor Rim Shrink and Stator Recentering



Upper Salmon Hydroelectric Generating Station Rotor Rim Shrink and Stator Recentering

April 26, 2022

A report to the Board of Commissioners of Public Utilities



1 **Executive Summary**

2 This project is for the refurbishment of the Upper Salmon Hydroelectric Generating Station (“Upper
3 Salmon”) generating unit rotor and stator assemblies.

4 During the 2021 planned annual preventive maintenance checks on the Upper Salmon generating unit in
5 August 2021, a significant crack was discovered on a rotor rim guidance block, along with two drive key
6 assemblies that had shifted upward within their slots. Although rotor rim drive key cracking issues have
7 been known for the past decade and were being monitored, this was the first time that a rotor rim
8 guidance block had cracked, causing movement of the assemblies, indicating further deterioration that
9 requires intervention.

10 Further investigation involving Andritz Hydro Canada Inc., the original equipment manufacturer
11 (“OEM”), non-destructive examination (“NDE”) using magnetic particle testing, and metallurgy testing of
12 failed components indicated that immediate refurbishment, consisting of guidance block and key
13 replacement, was required in 2021 to return the unit to service in the short term, and a long-term
14 solution was required to ensure the reliability of the unit going forward. It is suspected that the cracking
15 is the result of the misalignment of the rotating and stationary unit components of the generator. The
16 short-term solution was implemented in the fall of 2021 with a long-term recommendation made by the
17 OEM to correct the misalignment issue on the generator by shrinking the rotor rim and recentering the
18 stator. A letter from the OEM supporting the proposed solution is provided as Attachment 1.

19 To ensure the safe and reliable operation of the Upper Salmon generating unit, Newfoundland and
20 Labrador Hydro (“Hydro”) recommends proceeding with the OEM’s recommendation to shrink the rotor
21 rim and to recenter the stator. This work is being proposed as a supplemental capital project, as the
22 condition of the unit was not known until after the “2022 Capital Budget Application” was submitted.¹
23 Project deferral is not recommended, as it jeopardizes the safe and reliable operation of this unit. This
24 project is anticipated to take two years to execute at an estimated cost of \$3,999,800.²

¹ “2022 Capital Budget Application,” Newfoundland and Labrador Hydro, rev. September 17, 2021 (originally filed August 2, 2021).

² \$959,400 in 2022 and \$3,040,400 in 2023.

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Attachment 1: Recommendation Letter from Andritz Hydro Canada Inc.

1.0 Introduction

This project is for the refurbishment of the Upper Salmon generating unit rotor and stator assemblies. The stator assembly (Figure 1) is the stationary part of the machine, which consists of a core and a frame. It serves as both a magnetic circuit and a supporting member for the generating unit. The core is made up of sheets of electrical steel that are formed into stacks and fastened in the welded frame. Stator windings fit into slots made in the core. The rotor (Figure 1) consists of a fabricated spider, laminated rim, field poles and windings, a brake ring, and collector rings. The proposed rotor rim shrink and stator recentering will correct the misalignment of the generator rotor to the stator, re-establishing the air gap, and strengthening the rotor rim by having the rotor rim shrunk onto the spider. This misalignment is the suspected cause of alternating magnetic forces on the rotor rim, resulting in fatigue cracking of the rim guidance keys and blocks. Having the rim shrunk onto the spider will make the rotor assembly less sensitive to these loads.

2.0 Background

Upper Salmon consists of a single vertical hydraulic turbine unit rated for 84 MW of generating capacity. The hydroelectric unit contains a generator (Figure 1), including the rotor and stator assembly, and a turbine connected by a drive shaft. The Upper Salmon generator rotor is designed with a floating rim, whereby the rotor has an inside spider that is attached to an outside rim using an assembly of rim guidance keys (32 top and 32 bottom) and rim guidance blocks (16 top and 16 bottom) (Figure 2 and Figure 3, respectively).

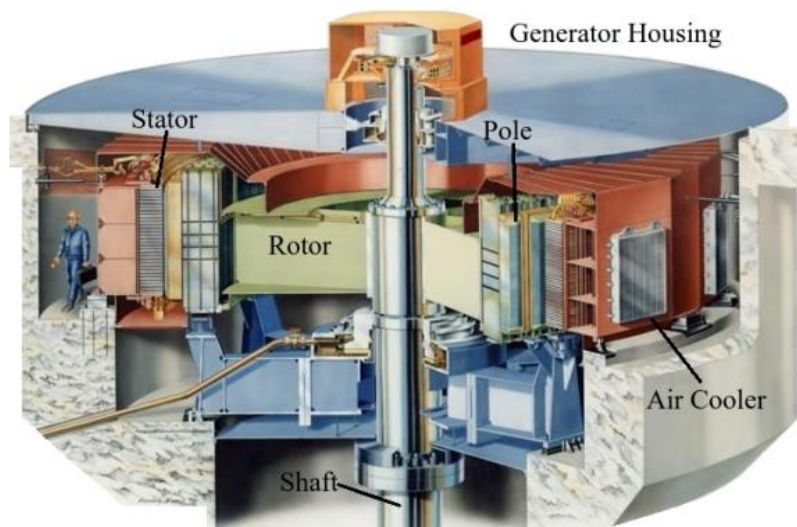


Figure 1: Generator Arrangement

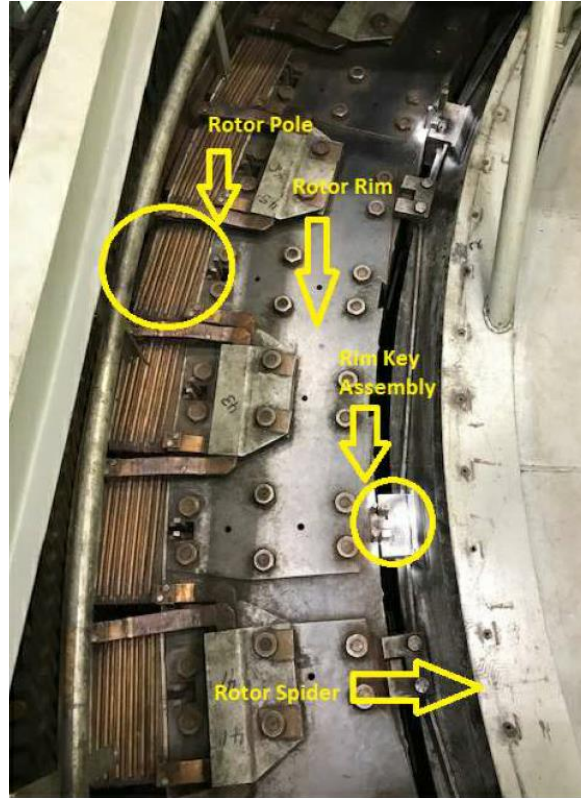


Figure 2: Upper Salmon Rotor Assembly

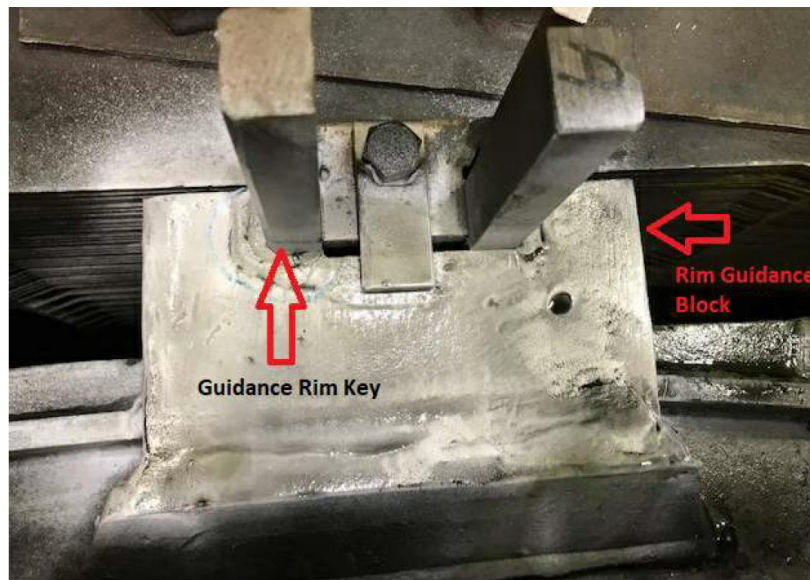


Figure 3: Rim Guidance Assembly

1 **2.1 Existing System**

2 The Upper Salmon generating unit was first put online on January 19, 1983. The unit is located upstream
3 of the Bay d’Espoir Hydroelectric Generating Facility and is accessed through the community of
4 St. Alban’s.

5 **2.2 Operating Experience**

6 Since 1983, Hydro has operated and maintained the Upper Salmon to provide safe and reliable
7 electricity to the Island Interconnected System.

8 The space between the stator and rotor, called the air gap, has been measured during preventive
9 maintenance at a six-year interval and measurements indicate that the air gap is no longer circular,
10 signifying the rotor and stator are misaligned.

11 Through the annual preventive maintenance program, cracks on the rotor rim guidance keys had been
12 identified and refurbished. The degree of cracking and deterioration of the rotor rim guidance keys
13 prompted a replacement project in 2018, as part of the Hydraulic Generation Refurbishment and
14 Modernization project.³ An inspection plan was subsequently implemented to track the condition of the
15 rotor rim guidance keys and blocks. Inspections performed in 2019 and 2020 revealed cracks in the
16 welds on half of the keys, which were refurbished in place.

17 During the planned annual preventive maintenance checks and inspections in August 2021, a significant
18 crack on rim guidance block #10 (Figure 4) was discovered along with two drive key assemblies, #5 and
19 #6, which had shifted upward within their slots (Figure 5 and Figure 6, respectively). This was the first
20 occurrence of cracking identified on the rotor rim guidance blocks and the first time that a whole
21 assembly had shifted. It was also noted that the rotor rim guidance assembly was close to hitting the
22 shrouds on the unit, as can be seen in Figure 5.

³ “2018 Capital Budget Application,” Newfoundland and Labrador Hydro, rev. October 3, 2017 (originally filed July 27, 2017), vol. II, tab 1.



Figure 4: Rotor Rim Guidance Block #10 Crack

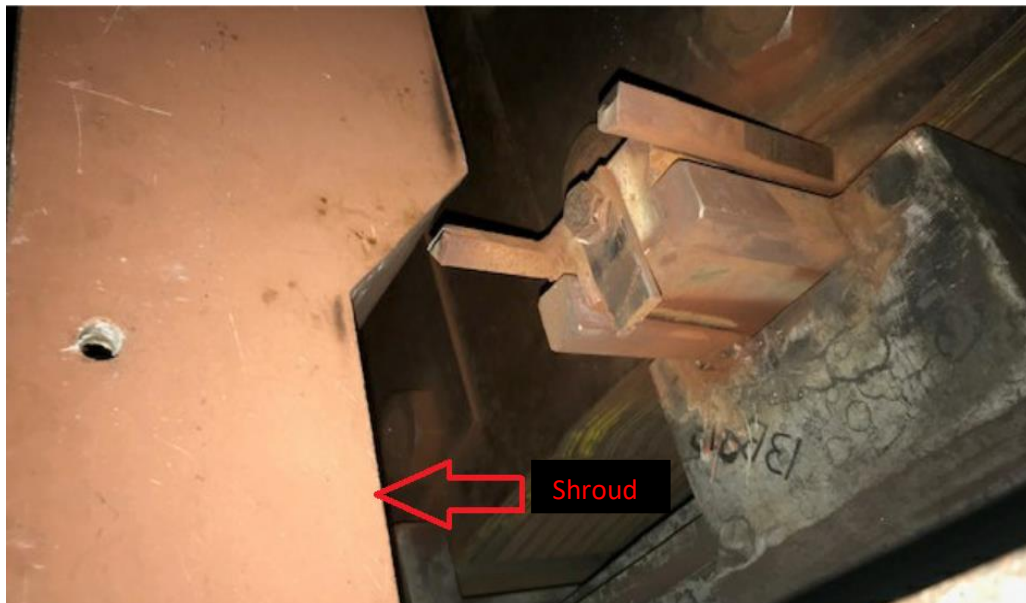


Figure 5: Raised Key Assembly #5



Figure 6: Raised Key Assembly #6

1 Based on the findings during the 2021 planned annual preventive maintenance outage, the OEM was
2 contacted to support the short- and long-term fixes for the Upper Salmon unit. A more detailed
3 inspection of all the rotor rim guidance keys and blocks was subsequently performed by an NDE
4 technician from Eastern Technical Services using magnetic particle testing. The results of the magnetic
5 particle testing indicated that 10 out of 16 guidance block key assemblies displayed cracking on either
6 the block, key welds, or both.

7 A failed rotor rim guidance key and a corner of one of the blocks that had failed were removed and sent
8 to Wayland Engineering’s metallurgy testing facility for failure analysis. The analysis indicated fatigue as
9 the failure mode for the guidance block sample provided.

10 With these results, Hydro, in consultation with the OEM, attempted to gouge the cracks to determine if
11 the guide blocks could be refurbished. Due to the depth of the cracks, Hydro determined that
12 refurbishment was not possible on all of the blocks and keys. It was also determined that it was not
13 possible to implement the long-term solution of a rotor rim shrink and stator recentering at that time
14 due to the commitment to have the Upper Salmon unit in service for the 2021–2022 winter availability
15 period. The long-term solution requires finite element analysis (“FEA”) to confirm design details and
16 procurement of specialty items such as stator sole plate keys, which have long lead times of up to six
17 months. Therefore it was determined that the Upper Salmon unit would have all the rotor rim guidance

1 keys welded and all blocks replaced as a short-term fix in 2021 under the Hydraulic In-Service Failures
2 project,⁴ and Hydro would seek approval to implement the long-term solution of rotor rim shrink and
3 stator recentering in 2022.

4 **2.3 Maintenance History**

5 As noted in Section 2.2, Hydro has been tracking air gap measurements and the cracking on the rotor
6 rim since the frequency of cracking and required refurbishment started to increase in 2010.
7 Refurbishment work, including welds, was done each year before the replacement project in 2018.
8 Additional condition monitoring was implemented after the 2018 project to track the integrity of the
9 work performed.

10 After the 2021 refurbishment, the OEM recommended inspecting the unit every 12 weeks or
11 2,000 hours of operation. The first inspection was performed in February 2022 and consisted of visual
12 and magnetic particle testing. The inspection identified cracks present in two of the newly installed keys.
13 The cracked welds were removed and refurbished and magnetic particle testing was performed again to
14 verify the refurbished welds. The unit was returned for service with the next inspection scheduled for
15 May 2022. The results of the February 2022 inspection further support the requirement to execute the
16 proposed long-term solution at this time.

17 **3.0 Justification**

18 The Upper Salmon has been providing safe and reliable electricity to the Island Interconnected System
19 for over 39 years. During this time in operation, the generator rotor and stator have become misaligned,
20 resulting in an inconsistent air gap. When the stator is eccentric to the center of rotation of the rotor,
21 the rotor rim experiences an alternating magnetic force at a frequency of once per revolution. The
22 alternating forces result in fatigue cracking of the welds of the drive key assemblies and cracking of the
23 rotor rim guidance blocks.

24 During the annual preventive maintenance in August 2021, a short-term refurbishment plan was
25 implemented to allow the Upper Salmon to operate through the 2021–2022 winter period. To ensure
26 the continued safe and reliable operation of the Upper Salmon generating unit, the OEM recommends
27 the implementation of the long-term solution—rotor rim shrink and stator recentering—to correct the

⁴ “2021 Capital Budget Application,” Newfoundland and Labrador Hydro, rev. November 2, 2020 (originally filed August 4, 2020), vol. I, s C, pp. C-28–C30.

1 alternating forces that result in fatigue cracking. A letter from the OEM supporting the proposed
2 solution is provided as Attachment 1.

3 The OEM has recommended Hydro complete this work at the next possible outage date. While Hydro
4 will have an outage in 2022 on the Upper Salmon generating unit, there are factors surrounding the
5 procurement of long-lead items, outage requirements, and equipment availability that pose a significant
6 risk to project completion in 2022. Therefore, Hydro is seeking a two-year period to execute this
7 supplemental project beginning in 2022.

8 **4.0 Analysis**

9 **4.1 Identification of Alternatives**

10 Hydro evaluated the following alternatives:

- 11 • Alternative 1: Continue the condition monitoring of the generator and refurbishing the rotor rim
12 guidance keys and blocks, as required; and
- 13 • Alternative 2: Proceed with the OEM’s recommended long-term solution of the rotor rim shrink
14 and stator recentering.

15 **4.2 Recommended Alternative**

16 Alternative 2 is the recommended alternative for this project based on the need to ensure the safe and
17 reliable operation of the Upper Salmon. Hydro has invested in expert analyses that indicate 10 out of 16
18 guidance block key assemblies displayed cracking on either the block, the key welds, or both. To ignore
19 these findings and continue with condition monitoring would not address or prevent further
20 deterioration. As such, Alternative 1 is not considered a viable solution to ensure the reliability of the
21 unit.

22 Hydro has been executing Alternative 1 since 2018. In 2021, it was necessary to execute an unplanned
23 refurbishment project, costing \$1.3 million, due to cracks on the rotor guidance blocks. Further to
24 reliability concerns, during the execution of this unplanned project, there was 75 GWh⁵ of bypassed
25 generation at the Upper Salmon. Delay in implementation of a long-term solution increases the risk of
26 unplanned expenditures, outages, and associated bypassed generation.

⁵ Generation bypassed included 8 GWh in August 2021, 32 GWh in September 2021, and 35 GWh in October 2021.

1 **5.0 Project Description**

2 This project is for the rotor rim shrink and stator recentering of the Upper Salmon generating unit
3 generator stator and rotor assemblies in 2022 and 2023 at an estimated cost of \$3,999,800. The project
4 estimate is presented in Table 1.

5 The refurbishment is anticipated to take two years to execute and will involve:

- 6 • In 2022:
 - 7 ○ Development of contracts for the refurbishment work and engineering;
 - 8 ○ Performance of the FEA study and the ordering of materials recommended from this study,
9 such as rotor pole keys, rotor shims, etc.;
 - 10 ○ Inspection of the overhead crane and the performance of an assessment for near maximum
11 load lift;
 - 12 ○ Inspection and testing of all required lifting devices to meet current standards;
 - 13 ○ Inspection of the rotor rim guidance guide blocks and keys as well as refurbishment, as
14 required; and
 - 15 ○ Development of a unit disassembly/reassembly procedure.
- 16 • In 2023:
 - 17 ○ Inspection of the rotor rim guidance guide blocks and keys as well as refurbishment, as
18 required;
 - 19 ○ Measurement of the out-of-roundness of rotor and stator;
 - 20 ○ Recentering of the stator;
 - 21 ○ Shrinking of the rotor rim onto the rotor spider, including the FEA study;
 - 22 ○ Cleaning of the rotor and stator assemblies; and
 - 23 ○ Testing and commissioning of the rotor and stator assemblies.

24 Based on the refurbishment in 2021, it was recommended that Hydro visually inspect the Upper Salmon
25 unit to ensure no additional cracking has developed over the winter. This requires regular inspections
26 that started in February 2022 and will be spaced 12 weeks apart, approximately 2,000 running hours on

1 the unit. While Hydro is proposing a two-year project to correct these issues in Upper Salmon, if
 2 significant cracking is found because of these inspections, Hydro will seek opportunities to complete the
 3 work in 2022.

4 The estimate for this project is shown in Table 1.

Table 1: Project Estimate (\$000)

Project Cost	2022	2023	Beyond	Total
Material Supply	220.9	0.0	0.0	220.9
Labour	106.5	800.0	0.0	906.5
Consultant	255.4	276.0	0.0	531.4
Contract Work	250.5	1,431.2	0.0	1,681.7
Other Direct Costs	4.9	76.4	0.0	81.3
Interest and Escalation	37.4	198.4	0.0	235.8
Contingency	83.8	258.4	0.0	342.2
Total	959.4	3,040.4	0.0	3,999.8

5 The anticipated project schedule is shown in Table 2.

Table 2: Project Schedule

Activity	Start Date	End Date
Planning:		
Front-end engineering and design	January 2022	April 2022
Design:		
Analysis and contract development	May 2022	June 2022
Design and Procurement:		
Procurement of required materials	May 2022	July 2022
Site Activities:		
Inspection and assessment of crane and rigging/lifting devices	May 2022	July 2022
Construction:		
Perform alignment and rotor shrink	July 2023	October 2023
Commissioning:		
Run up of the unit and balancing	October 2023	November 2023
Closeout:		
Project closeout documentation and lessons learned.	December 2023	December 2023

1 **6.0 Conclusion**

2 Hydro has been measuring the air gap on the Upper Salmon generating unit and monitoring cracks on
3 the rotor rim guidance keys since 2010. During annual maintenance on the Upper Salmon unit in
4 August 2021, Hydro found cracking on the rotor rim guidance keys and guidance blocks. During the
5 inspection, Hydro also found that full assemblies had shifted upwards in their slots. With consultation
6 from the OEM, a short-term fix was implemented in 2021 to correct all the cracking by replacing the
7 radial guidance blocks. The OEM also recommended a rotor rim shrink and recentering of the stator as a
8 long-term solution.

9 Hydro supports the OEM’s recommendations and proposes executing the rotor rim shrink and
10 recentering of the stator during the 2022 and 2023 maintenance seasons to address the misalignment in
11 the generator. The need for this project was not identified before the submission of Hydro’s “2022
12 Capital Budget Application” and work is required to proceed in 2022 to address the reliability risk to
13 generation from the Upper Salmon.



Attachment 1

Recommendation Letter from Andritz Hydro Canada Inc.




Newfoundland Labrador Hydro

Evan Broderick, P.Eng

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Engineering & Technology Division

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April 7th, 2022

Ref.: Andritz recommended remedy works Rev1

To Whom It May Concern,

In August of 2021 some of the guide blocks on the upper salmon rotor spider were found to have cracks running through them. The cracks were significant enough that a weld repair was not a viable solution since excavating the cracks down 30mm was not enough to remove the crack. After the cracks were found in the guide blocks, it was decided that the unit should not continue to run in that condition. The guide blocks were replaced in-kind at Andritz's recommendation for a temporary fix. This will allow the unit to continue to run but has only corrected a symptom of a larger problem.

A major contributor to these cracks can be forces generated from a misalignment between the rotor and the stator. When the stator and rotor are eccentric to each other there is a net radial unbalanced force on the rotor that can result in the keying system seeing a 1/rev cyclic force. Keying systems tend to have a problem resisting these forces if they become too large and over a long period of time and can result in cracking in the blocking system supporting the keys (as seen on Upper Salmon) or other damage to the keys themselves.

Two actions are traditionally taken to reduce the effects of a problem like this. The first action is recentering the stator to the rotor to reduce the net imbalance force on the rotor and the second action is to create a radial interference fit between the spider and the rim (known as a shrink fit). The action of recentering will reduce the radial imbalance but will not bring it back to zero and does not prevent this situation from occurring again in the future (if an eccentricity further develops the forces will come back). The second action, shrink fit, allows any eccentric forces to also be taken by the spider reducing the imbalance forces the keying system has to take. This solution is generally more robust in preventing further keying problems developing.

A rotor and stator sweep can provide the confirmation of the amount of misalignment, and it is one of the first steps that would be performed at site for the proposed scope of work. These measurements will be vital to in order to properly quantify the problem and actively allow a good centering the stator to the rotor. Therefore, Andritz's recommendation for a long term improvement to this unit is to combine a stator centering effort with a rim shrink.

If you have any questions, please do not hesitate to contact the undersigned for any clarification required. Thanking you in advance!

Yours faithfully,

Patrick Joly

Manager Parts & Services

Ted Monk

Director of Generator Engineering



Affidavit

IN THE MATTER OF the *Electrical Power Control Act, 1994*, SNL 1994, Chapter E-5.1 (“EPCA”) and the *Public Utilities Act*, RSNL 1990, Chapter P-47 (“Act”), and regulations thereunder; and

IN THE MATTER OF an application by Newfoundland and Labrador Hydro (“Hydro”) for approval to execute a rotor rim shrink and stator recentering at the Upper Salmon Hydroelectric Generating Station (“Upper Salmon”) pursuant to s 41(3) of the *Act*.

AFFIDAVIT

I, Robert Collett, of St. John’s in the province of Newfoundland and Labrador, make oath and say as follows:

1. I am Vice President, Engineering and NL System Operator for Newfoundland and Labrador Hydro, the applicant named in the attached application.
2. I have read and understand the foregoing application.
3. To the best of my knowledge, information, and belief, all of the matters, facts, and things set out in this application are true.

SWORN at St. John’s in the)
Province of Newfoundland and)
Labrador this 26 day of)
April, 2022 before me:)



Barrister – Newfoundland and Labrador



Robert Collett, P. Eng.