
Nova Scotia Utility and Review Board

IN THE MATTER OF

*The Maritime Link Act, S.N.S 2012 c.9
and the
Maritime Link Cost Recovery Process Regulation, N.S. Reg. 189/2012*

NSPML Quarterly Report Q3 2023

October 15, 2023

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1 **1.0 INTRODUCTION**

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This is the Q3 2023 Quarterly Report for the Maritime Link as directed by the Utility and Review Board (UARB) where the UARB ordered in its Supplemental Decision:

[115]....detailed reports must be filed by NSPML on a semi-annual basis, on June 15 and December 15 each year. The reports shall commence December 15, 2013. Updated status reports must be filed quarterly.

As per the UARB’s order in its Decision regarding NSPML’s Application for final approval of Maritime Link Project Costs and approval of the 2022 cost assessment (M10206), NSPML continues its quarterly reporting to the UARB by way of this Report.

Given that the benefits to ratepayers of the Nova Scotia Block and Newfoundland & Labrador (Nalcor) market-priced energy are secured by Nova Scotia Power through the Maritime Link, Nova Scotia Power continues to report on these in its Quarterly Maritime Link Benefits Report.

1 **2.0 UPDATE OF PROJECT SCHEDULE**

2

3 The Maritime Link was placed in-service on January 15, 2018.

4

5 Details respecting the status of the Nalcor Project and Muskrat Falls are outlined in
6 Section 2.8.

7

8 **2.1 Safety**

9

10 Safety is a fundamental core value and integral part of every aspect of NSPML's
11 business. NSPML continues to be risk-focused on the assessment of all work activities.
12 There have been no recordable incidents to date in 2023.

13

14 **2.2 Commercial Activities**

15

16 All key major procurement initiatives are now closed.

17

18 **2.2.1 Land Access Agreements**

19

20 The majority of land rights are now in place. In NS, NSPML continues to await final
21 review and determination from the NS Government regarding expropriations for 54
22 parcels of land, many of them being small anchor easements where the anchor for the
23 transmission line towers is underground. These easements do not affect the ability of the
24 Project to operate according to plan. The Newfoundland & Labrador Government has
25 formalized the expropriation panel, and related land matters in NL are currently with the
26 panel. All lands have been expropriated; however, there are some lands where owners
27 could not be found where funds will be paid into trust, as well as a claim regarding
28 mineral rights.

1 **2.2.2 Joint Development Agreements**

2
3 The Regulation Service Agreement between NS Power and Nalcor (NLH) has
4 progressed pending establishment of protocols for usage by NS Power. NLH has
5 completed their filing with the NL PUB and there is now a tariff for regulation service
6 in Newfoundland & Labrador. It is noted that presently operations are not constrained
7 by this and there is no formal commercial need for the agreement. The remainder of
8 the agreements are completed, other than the two agreements relating to internal
9 matters to Nalcor to assign the agreements to an affiliate. The status of these
10 agreements does not impact the ability of the company to operate in fulfilment of its
11 obligations.

12
13 **2.3 Engineering Activities**

14
15 All engineering for the Project phase has been completed.

16
17 **2.4 Submarine Cables**

18
19 As discussed in the Maritime Link Q2 Quarterly Report and NSPML's 2024 Assessment
20 Application, additional cable protection is being considered for a number of areas that
21 NSPML has been monitoring.

22
23 NSPML has commenced a procurement solicitation which will determine the market
24 capabilities and options to complete the cable protection. NSPML will update the
25 UARB regarding the status of this assessment and work as it progresses in subsequent
26 reporting.

27
28 **2.5 Converters and Substations**

29
30 The Converters and Substations have been in service since January 2018 and continue
31 to perform well.

1 The planned Maritime Link monopole maintenance outages were completed in
2 September, 2023.

3
4 Energy availability for the Maritime Link up until September 30, 2023 is 97.4% and
5 monopole availability remains 99.9%.

6
7 As per the request from the UARB for a public summary of the November 14, 2022
8 outage discussed in the Q1 2023 Quarterly Report, please refer to Attachment 1.

9
10 **2.6 Transmission Lines**

11
12 The overhead transmission system continued to perform well into the fifth year of
13 operations with no significant reliability or availability issues experienced.

14
15 **2.7 Independent Engineer**

16
17 NSPML remains engaged with the Independent Engineer (IE) related to the Operations
18 phase of the Maritime Link, as per the Federal Loan Guarantee requirements.

19
20 The IE completed its review of NSPML's 2022 Operations and Maintenance activities;
21 please refer to Attachment 2.

22
23 The IE completed site visits of NSPML's assets in Newfoundland & Labrador in May
24 2023. Please refer to Attachment 3 for the site visit report.

25
26 **2.8 Status of Nalcor Project and Muskrat Falls**

27
28 **Muskrat Falls Assets**

29
30 All four units continue to operate as required (subject to planned maintenance activities)
31 under control of the Newfoundland and Labrador System Operator ("NLSO").

1 **Synchronous Condensers at Soldiers Pond**

2
3 As requested previously by the UARB, NSPML will file the GE root cause analysis
4 report for the SC1 outage once it becomes available. All three units are available to
5 operate as required and are dispatched accordingly by the NLSO.

6
7 **Labrador Island Link**

8
9 Since the testing and subsequent commissioning of the Labrador Island Link (LIL) it
10 has continued operating predictably and reliably for customers in Newfoundland &
11 Labrador, Nova Scotia and beyond. As with the Maritime Link commissioning
12 certificate received in 2018, there are punch list items that will be addressed over the
13 coming months The final version of LIL software is planned to be installed in 2024.

14
15 **2.9 Status of Benefits to NS Power Customers**

16
17 Customer benefits received to date are being reported by NS Power with its Quarterly
18 Maritime Link Benefits Report and otherwise in accordance with the Board’s directions
19 in Decision M10206.

20
21 NS Block deliveries have been strong since February of 2023. With relatively minor
22 exceptions, delivery shortfalls since that time were due to planned outages done in
23 accordance with good utility practice and in coordination amongst the region’s system
24 operators. In July, 82% of the NS Block was delivered with 99% being delivered in
25 August and 66% in September. Including make up energy, these delivery figures
26 increase to 138%, 174% and 92% respectively. As of the end of September 2023, 121%
27 of the contracted NS Block for 2023 has been delivered with redeliveries included.

1 **3.0 UPDATED COST SUMMARY**

2
3 NSPML continues to track and report costs, actual and forecast, consistent with the
4 methodologies used in the cost forecast represented in the Maritime Link Project
5 Application. Capitalized Project costs reported to the end of June 2023 have been
6 updated to reflect the Board's Decision in relation to unrecoverable costs. Costs
7 continue to be recorded in accordance with the Affiliate Code of Conduct. All costs
8 provided are in Canadian dollars.

9
10 Actual AFUDC has been tracked and recorded monthly up to December 31, 2017 and
11 has been adjusted from approximately \$209 million to approximately \$208 million in
12 accordance with the Board's Decision, and below the \$230 million amount originally
13 estimated.

14
15 **Total Actual Project Costs as of the end of Q2 2023**

16
17 The total actual Project capital costs incurred during Q2 2023 was \$63,326 primarily
18 relating to land and legal costs incurred for Project close-out activities.

19
20 Sustaining capital spend to the end of Q2 was \$304,432.

1 **4.0 ASSESSMENT FINANCIAL UPDATE 2023**

2

3 NSPML receives monthly cost recovery revenues from NS Power pursuant to the
4 Board's order.

5

6 With respect to the holdback mechanism, the threshold of 90% deliveries was fully
7 achieved in Q2 2023. Accordingly, \$6 million of holdback revenues was paid in Q2
8 2023 for the months of April, May and June in which 90% or more of deliveries were
9 achieved.

Date: November 25, 2022
Subject: Maritime Link Outage - November 14, 2022

Please see the attached Initial Incident Report for the November 14, 2022 Maritime Link Outage.

As background, the Maritime Link is owned and operated by Emera Newfoundland and Labrador (NSPML) as a regulated utility in Nova Scotia with an operating presence in both provinces for the benefit of customers in Nova Scotia and as part of the wider Lower Churchill Project customers in Newfoundland & Labrador.

Maritime Link is a 500MW High Voltage Direct Current (HVDC) interconnection using Voltage Sourced Converter (VSC) technology as supplied by ABB; now Hitachi Energy. This technology includes significant ancillary benefits that enable grid optimization and system contingency support. For example, the Maritime Link Static Synchronous Compensator (STATCOM) technology allows system operators to tune the grid voltage and provides ongoing and significant operating and reliability benefits. Additionally, and relevant to the subject event the Maritime Link's "Frequency Controller" leverages the Eastern Interconnection to push/pull energy in the event of sudden changes in grid frequency to manage the impacts of system trips and protect against under frequency load shedding among other things. As has been noted by NL Hydro, prior to the Maritime Link entering service these events occurred regularly and have been eliminated to a great extent because of the Maritime Link interconnection.

As detailed in the attached report a hardware failure at the Bottom Brook Converter Station resulted in Pole 2 entering an "overmodulated" state resulting in the system operator not being able to control active and reactive power on that pole. The other Maritime Link pole attempted to compensate and was unable to. The Nova Scotia Power System Operator (NSPSO) tripped both poles of Maritime Link seven minutes after the initiation of the event. Modifications have been made to the Maritime Link's Control and Protection software to protect against a similar failure in the future resulting in uncontrolled active or reactive power ramps.

The swing in power on Pole 2 resulted in a reduction of Newfoundland system frequency and voltage resulting in a significant impact on customers, most of whom were restored quickly.

One Maritime Link pole was restored within 4 hours of the event after performance was verified to be acceptable and the other pole was restored within 36 hours of the event with the implementation of the immediate actions identified in the attached Initial Incident Report.

The new interconnected system that now approaches completion and includes both Maritime Link and the Labrador Island Link will and has been providing substantive and

incremental system protection that greatly reduces the probability of events such as this having actual customer impacts.

Since Maritime Link entered operation in January of 2018 it has been performing well and has provided valuable and important system stability and energy security benefits to both provinces and customer bases. It has also enabled the transmission of significant volumes of energy between provinces and in parallel to the progress on the wider Lower Churchill Project has been bringing increasing and substantial economic benefits to both provinces. Maritime Link single pole availability was 100% for the calendar year; with an Energy Availability of 97.4% for the year with most of the shortfall due to planned maintenance.

MARITIME LINK: 2022 ANNUAL O&M REPORT

Prepared for: Natural Resources Canada and EMERA

IE Team Lead: Nik Argirov

Date: June 26, 2023.

Quality Assurance Statement

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1. GENERAL

Contractor: Argirov Engineering Inc.

Company: NSP Maritime Link (EMERA)

Annual Report Purpose:

Contractor is tasked to confirm that the budgeting and maintenance of the Maritime Link Project is being conducted in accordance with Good Utility Practice.

Limitations and Exclusions:

For purposes of this Report the Contractor relied on observations made during site visits as well as on the verbal and written information provided by the Company. Actual equipment inspections and the maintenance activities were not witnessed in person. Individual Work Orders and other work records were not reviewed by the Contractor.

2. SCOPE OF THE REPORT

- (a) A summary of any material routine and unscheduled maintenance which has been carried out since the last report as well as an updated review of the expected major maintenance requirements, timing, and milestones
- (b) A breakdown of costs incurred during the year covered by the applicable annual report with respect to operations and maintenance (O&M) including any variance from annual O&M budgets and a summary of any updates of O&M budgets
- (c) A summary of any staffing, training, or labor management issues
- (d) A list of changes to key personnel and the qualifications of new key personnel if any
- (e) Commentary on parts inventory and redundancy
- (f) A review of construction contractors' support and the ongoing management of post-completion technical risks
- (g) Ongoing compliance with major permits, and
- (h) A review of the state of repair of key equipment and facilities

3. REFERENCES

- [1] Maritime Link IE Update, 2022 Year End Review dated May 04, 2023
- [2] Maritime Link Operations Annual Maintenance Plan - 2022 Doc. No. D-000ED-0-950-03-058 dated 31/8/2021
- [3] SCHEDULE "J" OPERATING REPORT dated November 29th, 2022
- [4] Maritime Link IE Update Fall 2022, dated November 8, 2022
- [6] Maritime Link Outage - November 14, 2022 dated November 25, 2022
- [7] Maritime Link Operations Q1, 2022 Operations & Maintenance Report dated 2022/05/31 Doc. No. D-000ED-0-950-05-055
- [8] Maritime Link Operations Q2, 2022 Operations & Maintenance Report dated 2022/08/25 Doc. No. D-000ED-0-950-05-056
- [9] Maritime Link Operations Q3, 2022 Operations & Maintenance Report dated 2022/11/30 Doc. No. D-000ED-0-950-05-057
- [10] Maritime Link Operations Q4, 2022 Operations & Maintenance Report dated 2022/11/30 Doc. No. D-000ED-0-950-05-058

4. 2022 RECAP

4.1 Introduction

The Maritime Link is owned and operated by NSP Maritime Link Inc. (NSPML), a wholly owned subsidiary of EMERA Newfoundland & Labrador (ENL) Holdings Incorporated.

Commercial operation of the Maritime Link commenced on January 15, 2018. Resource development and competency training for Operations staff is ongoing.

Emera and NSPML staff are liaising with Nalcor/Newfoundland & Labrador Hydro for purpose of LIL HVDC commissioning and integration tests.

Objective of the IE review and of this Report is to ascertain the assets are maintained in accordance with Good Utility Practice.

4.2 Safety

Key accomplishments in 2022 include:

- Update to Field Level Risk Assessment (FLRA) process and assessment tool with focus on High-Energy, High-Hazard activities.
- Development & formalization of a Contractor Pro-Active Safety Recognition Program that emphasizes communication and demonstration of completed preventive actions.
- Occupational Health and Safety Association (OHSA) Incident Rate (IR) of zero hours was achieved during 2022. This resulted in over 450,000 staff hours without reportable injury since the Project became operational in 2018.

4.3 Pandemic Implications

Covid 19 pandemic protocols remained in place throughout the planned maintenance outage in Q2 of 2022. Following the outage work, pandemic protocols were lifted across the organization and normal operational practices and accepted standards for workplace housekeeping and sanitization were resumed.

4.4 Environment

Highlights:

- ENL was compliant with all environmental permits and regulations in 2022 and the company achieved its EMS Objectives and Targets.
- There were no Moderate or Significant environmental incidents during the reporting period.
- One minor environmental event occurred during the reporting period. It was caused by trace of oil at the discharge point from the spare transformer.
- ENL completed the scheduled inspections of 20% of the grounding line poles and documented the status of treated poles. To date none of the poles inspected showed evidence of excessive leaching of treatment into the surrounding soil.

- ENL successfully conducted its marine environmental monitoring program and together with the Ocean Tracking Network recovered stranded Upward Looking Sonar.

4.5 Performance

Availability and Reliability:

- Maritime Link STATCOMS were extensively utilized for enhancement of reliability and economies.
- There were four forced outages in 2022 resulting in 51 hours of forced unavailability (FEU) and one 3 hours long bi- pole forced outage.
- LIL and ML integrated testing took place at the year end.

CIGRE Performance Metrics:

	Q1	Q2	Q3	Q4	Targets
%EU	0.51%	1.54%	2.65%	2.87%	
%FEU	0.05%	0.05%	0.07%	0.29%	
%SEU	0.46%	1.49%	2.58%	2.58%	<1.25%
%EA	99.49%	98.46%	97.35%	97.13%	98%
BFO	0	0	0	1	0

Legend:

- EU Energy Unavailability
 FEU Forced Energy Unavailability
 SEU Scheduled Energy Unavailability
 EA Energy Availability
 BFO Bi- pole Forced Outage

Maritime Link 2022 Active Power Availability:

- Monopole: 99.97%
 Pole 1: 97.77% (2.03% were planned outages, 0.19% forced outages)
 Pole 2: 96.48% (3.13% were planned outages, 0.39% forced outages)
 Bi- pole: 94.29%

2022 Forced Outages:

- *February 8, 2022- DC Line Fault:* Line fault was caused by ice build up at the Cape Ray location. No equipment damage was reported.
- *September 14, 2022-Valve Hall door indicated open:* Pole 2 tripped when exterior valve hall door was indicated open. Additional door latching was retrofitted.
- *September 24, 2022-Pole 1 DC Line Fault:* Pole 1 tripped on DC Line Fault caused by extreme winds during Tropical Storm Fiona.

- *November 14, 2022- Tap Changer Failure:* Pole 2 converter transformer tap changer temperature transducer failed causing tap changer to lock itself out. A DC Voltage ramp was ordered but the tap changer was unable to regulate the converter bus voltage. Pole 2 power flow became uncontrollable due to overmodulation and Pole 1's attempts to compensate were unsuccessful. Both Poles were manually tripped by the NSPSO.

Corrective actions:

1. Replace faulty tap changer temperature transducer and RTD, inspect other transformers for same.
2. Implement RO-317 to disable the tap changer lockout initiating ramping and prevent overmodulation of converter.
3. Perform loss of control study with respect to overmodulation, PLL synchronism and harmonics production.
4. Connect tap changer temperature transducer alarm to HVDC Control and Protection System

4.6 Maintenance Activities

Summary

Within the framework of ENL maintenance program over 1600 planned maintenance (PM) activities were completed for the HVDC system and over 2500 Transmission Line inspections were carried out. Key activities in 2022 included:

- Two annual HVDC shutdown maintenance outages
- 5-year transformer maintenance and testing
- All overhead transmission inspections and subsea inspections
- All planned and critical corrective maintenance activities were completed at Woodbine, Bottom Brook and Granite Canal AC Substations as well as 100% of the Winter Readiness and Critical Maintenance Audit Plan Items.

HVDC Converter Stations

Pole 1 and Pole 2 planned HVDC System shutdown maintenance items were completed as planned. During this year 1610 Planned Maintenance (PM) activities were completed.

HVAC Substations and Associated Equipment

- All planned and critical corrective maintenance work was completed at Woodbine, Bottom Brook and Granite Canal.
- In order to limit Maritime Link transfer levels during abnormal system contingencies, Special Protection System (SPS) is being implemented in Bottom Brook Terminal Station 2. Construction is to be carried out in Q2 2023. Testing and commissioning time frame is TBD.
- Hitachi provided an updated Lifecycle Assessment (LCA) algorithm for components that meet obsolescence criteria necessitating replacement after 15 years of service life. Station Control and Monitoring Assets are entering end of service life and their replacement is expected in 2025.

Overhead Transmission and Grounding Lines

Significant amount of work in addition to the planned routine tasks was completed on HVDC line in 2022.

- HVAC 1 day outage for repairs to structure 125 – loose bolt in saddle and 2 missing insulator pins.

- HVDC NL – replace stolen counterpoise on 7 structures.
- Tree removal and pole straightening on NS Ground Line post Fiona.
- Vegetation Management contracts were executed in both NL and NS.
- Planned vegetation control along the HVAC Transmission was completed in Q3, 2022 with approximately 206 hectares treated along TL269 (HVAC Line) and some minor work in Nova Scotia.

Marine

- Full-length inspection survey of the subsea cables was completed by contractors using Remotely Operated Vehicle (ROV) equipped with Multi Beam Echo Sounder (MBES), Side Scan Sonar (SSS) and Visual inspections (in select locations). No material change was observed when compared to the 2021 survey results.
- Following Hurricane Fiona, ENL inspected the Horizontal Directional Drill (HDD) exit locations (rock berms) in Cape Ray and Point Aconi locations. There were no observable cable exposures noted as part of this investigation, however changes to protection were observed and NSPML is evaluating the need for incremental protection for these areas of interest.
- In 2022, ENL continued to engage the Department of Fisheries and Oceans (DFO) and the groundfish industry representatives in NS and NL. NSPML stayed informed about the changes to redfish quotas, timing of seasons, harvesting methodologies, and emerging fisheries in Cabot Strait.
- The Cable Integrity Risk Assessment was concluded at the end of 2022. When compared to the last assessment, results indicate an increased ice risk at Point Aconi due to the observed level of the cable cover. It should be noted that conservative criteria have been applied to this ice risk assessment.

4.7 Procurement

- Converter Stations' transformer maintenance agreement is with Pennecon Technical Services and General Trades Agreement is with Cahill Technical Services.
- Submarine Cable Survey was completed by Horizon and Seaforth Geosurveys and Nearshore Survey was done by Seaforth Geosurveys.
- Transmission Line Services Long Term Line Maintenance Agreement is with Connect Atlantic Utility Services (CAUS).
- Vegetation Management Program has been completed by Rigid Trucking and Excavating.

4.8 Claims

Active claims related to transmission line warranty work are being pursued through commercial warranty mechanisms. Discussions with multiple parties are ongoing [3].

5. O&M BUDGET

Breakdown of Forecasted O&M Costs in \$M	Operating Budget 2022	Costs Incurred to Dec. 31st, 2022	2023 Budget
Labour	3.5	4.6	4.2
General Administration	2.8	2.4	2.9
Maintenance:	8.6	8.4	6.5
Other	0.8	0.8	0.5
Insurance	3.8	3.5	4.1
Legal, regulatory & compliance	1.8	1.3	1.0
Contingency	0.3	0	0.0
Total O&M Budget	21.6	21.0	19.2

6. ENL ORGANIZATION REVIEW

With the conclusion of the ML Final Cost and 2022 assessment process some members of the “ML Project team” transitioned to other roles with Emera affiliates and some were integrated in the ENL organization’s Business Development, Regulatory and Finance functions. Main organizational changes in 2022 were:

- ENL’s CEO Richard Janega retired at the end of 2022. The ENL team under Norm Dimmell’s leadership as a President is now reporting to Emera’s EVP for Project Development and Operations Support Dan Muldoon.
- Some internal promotions within the team, notably Senior Manager Assets, Senior Technical Consultant, and Sr Director ESG and Commercial Affairs.
- Contracts Supervisor position was embedded within NSPML, was previously an outside contractor position.
- General Counsel and VP Business Development with responsibility for the Finance and Regulatory functions joined ENL.
- Sr Corporate Accountant was hired to fill a vacancy in the Finance team.
- Temporary resources including contractors and students supplement the permanent workforce.

7. CONCLUDING REMARKS

Appropriate maintenance management plans are in currently place. The management program consists of an umbrella long term asset management plan as well as the equipment inventory, maintenance procedure documentation and work order systems. HVDC performance reporting using CIGRE protocol is in place. Overhead transmission and grounding line repair contingency plans are in place.

For the time being the scheduled maintenance is carried out according to Original Equipment Manufacturer (O&M) manuals and recommendations. Service Level Agreements with number of consultants and contractors are in place or are being finalized. This approach is deemed to be the most appropriate and it is consistent with good utility practice.

Response to deficiencies and equipment failures has been timely and complete. Engineering solutions have and are being applied to power equipment and transmission line hardware problems. Solution for de-rating the HVDC during loss of transmission lines at Bottom Brook has been developed. The implementation of that Special Protection System is expected in Q3 2023.

LCP - ML PROJECT

SITE VISIT REPORT MAY 22 TO 25, 2023

Prepared for: Natural Resources Canada and NSP Maritime Link Inc. (NSPML)

IE Point of Contact: Nik Argirov

Date: July 10, 2023

Quality Assurance Statement

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1. GENERAL

Independent Engineer (IE) team conducted the Maritime Link (ML) project site visits in the province of Newfoundland between 22nd and 25th of May 2023. NSPML management representatives Craig Snelgrove and Deon Hamlyn led the site meetings and transported the IE team to the sites. Matt Seely, Emera HSSEQ specialist, accompanied the site visit team. Norm Dimmell, Rory MacNeill and Eric Cayouette participated, online, in the Maritime Update meeting at Bottom Brook. Eric Cayouette prepared Maritime Link IE Update, Spring 2023 document.

IE team: Nik Argirov (IE Team Lead)

Vlad Kahle (IE Electrical SME)

Hamdy Khalil (IE Transmission Lines SME)

The trip itinerary was as follows:

May 22:

- Travel and overnight in Deer Lake, NL

May 23:

- HVAC Line Key Inspection Points
- HVDC Line Key Inspection Points
- Cape Ray HDD site
- Cape Ray Transition Compound

June 24:

- Indian Head Electrode Site and Grounding Line
- HVAC Line Relocation
- Victoria River Crossing
- Maritime Link Update at BBR converter station
- Bottom Brook Converter Station

May 25:

- Travel from Deer Lake to home base

2. NEWFOUNDLAND PROJECT SITES VISITS– MAY 23 AND 24, 2023

Transportation to the sites was by road.

2.1. HVAC Line Key Inspection Points

The Inspection for the HVAC transmission line is on schedule. Expected to complete 10% of the climbing inspection by the Q3 of this year. Ground inspection is also on schedule. Expected to complete vegetation management on 50Ha on the HVAC starting July of 2023.

2.2. HVAC Line Relocation

The HVAC transmission line section between structure 842 and 846 was in steep slope and in erosion area. The relocation of this section is completed, and those structures are moved uphill in a better location.



2.3. HVAC Line Victoria River Crossing

The HVAC crosses the Victoria River with a long span at structure 476. No issues were observed with the crossing span. There have been woodpecker activities causing damage to the existing poles, however the repair was completed on site. The span also has bird diverters installed to protect birds from hitting the conductors.



2.4. HVDC Line Key Inspection Points

The Inspection for the HVDC transmission line is on schedule. Expected to complete 10% of the climbing inspection by the Q3 of this year. Ground inspection is also on schedule. Expected to complete vegetation management on 60Ha on the HVAC starting July of 2023.

Soil stabilization work at structure 462 involving placement of additional rocks and better leveling the side slope above and below the structure was completed in 2020. Also, a culvert was added around the structure.



2.5. Cape Ray Horizontal Drilling Site

The cable site and cable trench to the transition compound have been well maintained and were in perfect order. Grounds were restored. Adjacent to HDD site Emera installed public look out and information display.

2.6. Cape Ray Transition Site

The facility has been well maintained and is in perfect order. Cable temperature monitor is fully operational.

2.7. Indian Head Electrode Site

The facility has been well maintained and is in good order.

2.8. Bottom Brook Converter Station and Site

The tour of the switchyard and control room show the facility has been well maintained and is in good order.

The team also visited the spare material yard. The yard and shed are organized, clean and very tidy. There are insulators, hardware and FRP poles for emergency replacement.





3. MARITIME LINK UPDATE SPRING 2023- FINAL

a) Safety

- Parking lot safety brief emphasized that 1 in 5 accidents occur in parking lots.

b) Organizational Structure

- Current org chart dated April 2023 has been included in the Update document.

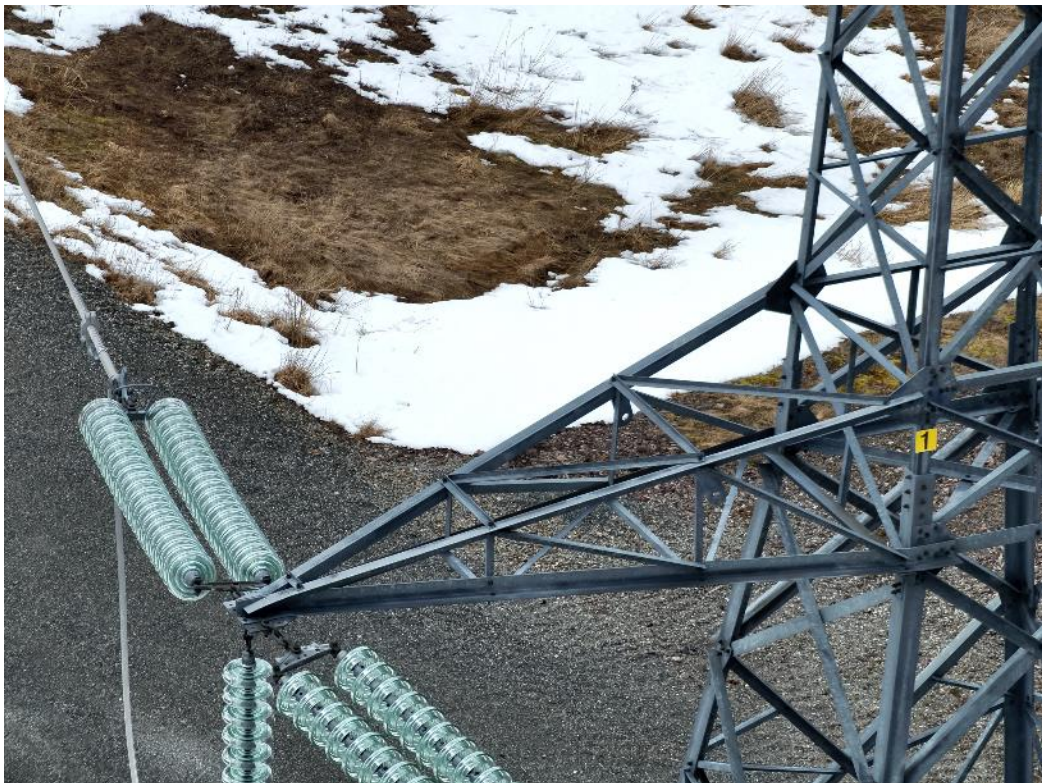
c) 2023 Planned Maintenance Outages

- Pole 1 outage is planned for Sept 11th .
- Pole 2 outage is planned for Sept 14th .
- Grounding Line and station outage is planned for Sept 17th .
- Maintenance scope includes IGBT inspections, capacitance measurements, annual transformer maintenance, valve cooling, fire protection, power apparatus maintenance (bushings, capacitors, reactors) and grounding line equipment.
- VBE (valve-based electronics) capacitor trip and alarm setting algorithm is still under review. The trip is currently turned off at the direction from Hitachi/ ABB.

d) Transmission Lines

- 10% climbing and 10% ground inspections are to be completed by mid- Aug. 2023.
- Spray treatment has been delayed to avoid interfering with caribou calving and expected to start in July 2023 and completed by Aug 2023.
- ENL engaged with Detect Atlantic to complete UAV / drone inspection of the HVDC transmission line in NS in April 2023. Inspections were completed on 122 out of 163 structures in 3.5 days. 4543 images have been recorded and 65

deficiencies identified. This process has a number of benefits such as survey efficiency, enhanced safety, lower environmental impact and reduced need for helicopter surveys. The following are samples of the imagery collected by the drone.



e) Availability

- HVDC availability remains on target. Monopole is at 99.9% and the Bi- pole availability has been 96.5%.

f) Forced Outages:

- On January 23rd supply from Bottom Brook Terminal 2 station was lost due to Bus 4 protection incorrect wiring connection(s). The forced outage duration was 51 hours. Detailed report is pending.
- On January 26th high winds caused Pole 2 DC line to ground fault inside the HVDC switchyard. The forced outage duration was 20 hours. Visual inspection did not detect any obvious damage to the DC conductor. Remedial action, possibly consisting of the modification to adjacent lamp standard, is being considered.
- On April 23rd bi - pole outage occurred during severe geomagnetic storm. Forced outage duration was 2.5 hours. The incident is being studied; a detailed report and corrective action plan are pending.
- On May 23rd Pole 1 tripped due to failure of a 3- pole molded case mini- breaker that caused loss of the voltage supply to Protection system A. The Protection trip was not inhibited due to supervising 'A' contact failure to open in conjunction with the breaker main contacts. The forced outage duration was 4.5 hours. Detailed analysis of the mini- breaker failure and the remediation plan are pending.

g) Bottom Brook Short Circuit

- Addition of the Special Protection System (SPS) is in progress. Panels are being installed and wired at BBKTS2 and the converter station. Commissioning plan is under development.

h) Security Incidents

- Two security incidents occurred in March 2023. Repairs were completed and additional security measures were implemented.

i) Planned 500MW tests

- ABB/Hitachi warranty ends January 2024; LTSA to be renewed for 2024.
- 500MW is now available from NL for transfer.
- Final testing before the end of warranty may include Audible Noise, AC / DC Harmonics and Radio Interference.
- Formal performance measurement testing requires downtime for background measurements and sustained durations. Testing may be carried out separately in each province.
- Preliminary measurements may be performed as soon as possible, to be followed by formal, more in-depth testing later in 2023.
- NLSO, NSPSO, NBSO and marketing entities plan a 4-hour test at full power. The tentative timeframe is June 2023.
- Measurements will be taken by NSPML staff; assisted by Hitachi Energy

4. IE COMMENTS

All sites are in order and are fully operational. Planned maintenance has been carried out and no safety or environmental issues have been reported to the IE. 2023 Maintenance Plan is in place and maintenance outages have been scheduled. Spare parts inventory is maintained in secure facility adjacent to the switchyard.

Minor corrective maintenance tasks have been completed or are in the planning stages. The four HVDC forced outages were duly analyzed and their outage causes were either identified or are still under investigation. HVDC performance remains on target with monopole availability of 99.9% and Bi-pole availability of 96.5%.