

CI C0080112

HYD Big Falls Unit 6 Rotor Re-Insulation

U&U

REDACTED

October 6, 2025



NSEB APPROVAL SHEET

Project Title: HYD Big Falls Unit 6 Rotor Re-Insulation

CI Number: C0080112

Date: October 6, 2025

Expenditure Profile			Type of Filing	
Year	Budget Amount	Project Estimate	☒	Capital Project Authorization
			☒	Unforeseen and Unbudgeted (U&U)
			☐	Planned & Advanced (P&A)
			☐	Subsequent Approval Item
2025		692,018	☐	Authorization to Overspend (ATO)
2026		195,706	☐	Scope Change
2027		137,902	☐	Final Cost (FIN)
Total	\$0	\$1,025,626		

COMMENTS

Submitted on behalf of NOVA SCOTIA POWER INCORPORATED



Authorized Signatory
Dave Pickles
Chief Operating Officer

DATE

October 1, 2025

Approved on behalf of NOVA SCOTIA ENERGY BOARD

DATE

CI Number: C0080112

Title: HYD Big Falls Unit 6 Rotor Re-Insulation

Start Date: 2025/05
In-Service Date: 2026/04
Final Cost Date: 2026/10
Function: Hydro
Forecast Amount: \$1,025,626

DESCRIPTION:

This project is for the re-insulation of 42 out of 44 rotor poles on Big Falls Unit 6’s generator. The remaining two rotor poles were refurbished in 2023 and do not require additional work. The project scope also includes refurbishment of slip rings, brushes and brush boxes, all disassembly work required to remove the rotor poles as well as re-assembly and balancing of the unit when the poles are re-installed. This work represents the sustaining investment necessary to maintain safe and reliable water management on the Mersey River, consistent with NS Power’s long-term strategy outlined in the Hydro Interval Plan (HIP) and Appendix G of the 2025 ACE Plan.

The Big Falls Hydro Station is located on the Mersey River. It operates 2 units at 5.3 MW each and it has been in operation since 1929. The plant is approaching 100 years of service life.

Summary of Related CIs +/- 2 years

Pursuant to Section 11.2 of the CEJC, related CIs for Hydro projects include “work completed on the same generating unit and dam structures, but not necessarily the same asset.”

- 2024 – CI C0059785 HYD BIF6 Electrical and Controls Upgrade \$717,995
- 2023 – CI C0056921 HYD BIF6 Turbine Bearing Replacement \$389,558

Depreciation Class: Hydraulic Production Plant – Mersey River Hydro System

Estimated Life of the Asset: 40 Years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 0.80%

JUSTIFICATION:

Justification Criteria: Hydro, Wind and Biomass

Why do this project?

This project is consistent with NS Power’s approach to sustaining capital investments across the Mersey Hydro System as outlined in Appendix G of the 2025 ACE Plan. Operational units like Big Falls Unit 6 play a critical role in managing water flows during high precipitation events, reducing reliance on manually operated spillways. Maintaining the availability and reliability of these units is essential to NS Power’s water management strategy, which prioritizes safe, controlled discharge through turbines to support downstream flood mitigation and environmental compliance. The re-insulation of rotor poles directly supports this strategy by restoring the unit’s operational integrity and ensuring it can fulfill its role in system-wide water control.

Big Falls Unit 6 was taken offline to investigate a potential oil leak in May 2025. During the rotor inspection, several rotor poles were found to have damaged insulation. The damage ranged from minor cracks to delamination of insulation material. Given the rotor’s operating speed of 163 RPM, deteriorated insulation poses a serious risk of electrical faults, mechanical imbalance, and unplanned outages.

Comprehensive electrical testing—including AC/DC drop tests, thermal imaging, and visual inspection—confirmed internal issues within the pole windings, suggesting degradation of both insulation and conductor leads. Additional hot spots were identified on the slip rings and brush boxes, further indicating compromised electrical performance.

These findings demonstrate that the generator cannot be safely or reliably returned to service without full refurbishment of the affected rotor poles.

Why do this project now?

During the May 2025 investigation into the oil leak, broken insulation on the rotor poles was discovered, and the unit has been unable to operate since. The unit is relied on to support water management on the Mersey River. When the unit is available, water can be managed through the unit during high precipitation events. This reduces the reliance on stop logs using manual hoists for water management during high rain events which carries risks of malfunction or inability to access site due to road conditions. The unit is a relatively high producer on the Mersey River, generating 5.3MW of maximum net capacity hydroelectric power, which is currently unavailable until the issue is resolved.

Why do this project this way?

A full refurbishment of all 42 rotor poles is the most cost-effective and operationally sound approach to restore the generator to service, while mitigating the risk that the deteriorated condition currently presents. Partial refurbishment would leave aging components in place, increasing the likelihood of future failures and requiring additional outages before the planned redevelopment or partial decommissioning of Big Falls. These additional unplanned outages would require significant labour costs for disassembly and reassembly in addition to lost generation from having the unit unavailable for the duration of additional refurbishment. This approach aligns with NS Power's sustaining capital strategy for the Mersey Hydro System, which prioritizes targeted investments to maintain safe and reliable operation during the interim period. Refurbishing all poles now ensures the unit can fulfill its role in water management and generation without further interruption, while avoiding piecemeal repairs that offer limited value given the station's expected utilization in the coming years.

Contingency Statement

Contingency for this project has been determined using a combination of internal subject matter expert (Professional Engineers) judgement and previous experience in generator disassembly projects. Consistent with the maturity matrix, this project is being filed as a Class 3 estimate with a contingency of 20 percent. Risks intended to be covered by this contingency include unforeseen conditions found during the disassembly, minor additional work required to refurbish the generator stator as well as additional labour required during the disassembly and reassembly of the generator. Deviation from the established schedule may require the use of overtime, which would also be managed through the contingency to ensure timely project completion.



Instructions: Select option in Column B. Columns C through G will auto-populate.

Document No: XXX-XX-XXXX-XXXX

Project Cost Estimate Input Checklist and Maturity Matrix						
Hydropower	Required Fields:	Estimate Classification				
Project Name: HYD Big Falls Unit 6 Rotor Re-Insulation	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete					
General Project Data						
A. Scope						
Project Scope of Work Description	Defined (D)	P	P	D	D	D
Site Infrastructure (Access, Construction Power, Camp, etc.)	Defined (D)	NR	P	D	D	D
B. Capacity						
Facility Output / Production Profile	Defined (D)	P	P	D	D	D
Electrical Power Requirements (when not the primary capacity driver)	Not Applicable (NA)	NR				
C. Project Location						
Plant and Associated Facilities	Defined (D)	P	P	D	D	D
D. Requirements						
Codes and/or Standards	Defined (D)	NR	P	D	D	D
Communication Systems	Not Applicable (NA)	NR				
Fire Protection and Life Safety	Not Applicable (NA)	NR				
Environmental Monitoring	Not Applicable (NA)	NR	NR			
E. Technology Selection						
Not Applicable						
F. Strategy						
Contracting/Sourcing	Defined (D)	NR	P	D	D	D
Excavation	Not Applicable (NA)	NR				
G. Planning						
Regulatory Approval & Permitting	Preliminary (P)	P	P			
Material Utilization (Borrow Sources)	Defined (D)	P	P	P/D	D	D
Logistics Plan	Defined (D)	P	P	P	D	D
Work Breakdown Structure (WBS)	Preliminary (P)	P	P	P/D		
Decommissioning/Demolition Plan	Defined (D)	NR	P	D	D	D
Integrated Project Plan	Not Applicable (NA)	NR				
Project Code of Accounts	Preliminary (P)	NR	P			
Project Schedule	Defined (D)	NR	P	D	D	D
Risk Register	Preliminary (P)	NR	P			
Stakeholder Consultation/Engagement/Management Plan	Preliminary (P)	NR	P			
Start-up & Commissioning Plan	Preliminary (P)	NR	P	P/D		
H. Studies						
Hydraulics	Not Applicable (NA)					
Topography & Bathymetry	Not Applicable (NA)					
Environmental Impact/Sustainability Assessment	Not Applicable (NA)	NR	P			
Environment/Existing Conditions	Not Applicable (NA)	NR				
Soils & Hydrology	Not Applicable (NA)	NR				
Geotechnical Investigation	Not Applicable (NA)	NR				
Technical Deliverables (Specifications and/or Drawings)						
Block Flow Diagrams	Complete (C)	S	C	C	C	C
Hydraulic Design & Probable Maximum Flood (PMF)	Not Applicable (NA)					
Equipment Data Sheets	Preliminary (P)	NR/S	P			
Equipment Lists: Electrical	Complete (C)	NR/S	P	C	C	C
Equipment Lists: Process/Utility/Mechanical	Complete (C)	NR/S	P	C	C	C
Design Specifications	Complete (C)	NR	S/P	C	C	C
Electrical One-Line Drawings	Complete (C)	NR	S/P	C	C	C
General Equipment Arrangement Drawings	Complete (C)	NR	S/P	C	C	C
Instrument List	Preliminary (P)	NR	S/P			
Construction Permits	Not Applicable (NA)	NR				
Civil/Structure/Architectural Discipline Drawings	Preliminary (P)	NR	S/P	P		
Demolition Plans and Drawings	Preliminary (P)	NR	S/P	P		
Erosion Control Plan & Drawings	Not Applicable (NA)	NR				
Fire Protection & Life Safety Drawings & Details	Not Applicable (NA)	NR				
Mitigation Measures (Aquatic, Terrestrial, Heritage, etc.)	Not Applicable (NA)	NR				
Dam Design & Drawings	Not Applicable (NA)	NR				
De-silting Basins	Not Applicable (NA)	NR				
Gates & Cranes Design & Drawings	Preliminary (P)	NR	P	P	P/C	
Intake Design & Drawings	Not Applicable (NA)	NR				
Penstock Design & Drawings	Not Applicable (NA)	NR				
Powerhouse Design & Drawings	Not Applicable (NA)	NR				
Spillway Design & Drawings	Not Applicable (NA)	NR				
Turbine and Generator Design & Drawings	Not Applicable (NA)	NR				
Electrical Schedules	Not Applicable (NA)	NR	NR/S			
Instrument & Control Schedules	Not Applicable (NA)	NR	NR/S			
Instrument Data Sheets	Not Applicable (NA)	NR	NR/S			
Spare Parts Listings	Not Applicable (NA)	NR	NR			
Electrical Discipline Drawings	Preliminary (P)	NR	NR	S/P	P/C	
Facility Emergency Communication Plan & Drawings	Not Applicable (NA)	NR	NR			
Information Systems/Telecommunication Drawings	Not Applicable (NA)	NR	NR			
Instrumentation/Control System Discipline Drawings	Not Applicable (NA)	NR	NR			
Mechanical Discipline Drawings	Not Applicable (NA)	NR	NR			
Auxiliary Electrical Design & Drawings	Preliminary (P)	NR	NR	S	P	
Auxiliary Mechanical Design & Drawings	Not Applicable (NA)	NR	NR			
Protection & Controls System Design & Drawings	Not Applicable (NA)	NR	NR			
Total # Deliverables for Class Estimate		8	27	23	19	16
% Defined/Complete towards Class Estimate		100%	100%	79%	66%	55%

Comments:

This project is being submitted as an AACE Class 3 estimate. The defined deliverables of this project indicate that 79% of the Class 3 deliverables have been completed. AACE recommends applying between 10% to 30% contingency to estimates in this class. A contingency value of 20% was selected to account for specific risks such as additional component refurbishments that may be required based on the as-found condition following unit disassembly, as there are components that are not accessible for assessment/inspection until after unit disassembly. Additional labour for disassembly and reassembly or use of overtime may also be required.

Legend:

The maturity level is an approximation of the completion status of the deliverable. The completion is indicated by the following descriptors:

General Project Data:

- Not Required (NR): May not be required for all estimates of the specified class, but specific project estimates may require at least preliminary development.
- Preliminary (P): Project definition has begun and progressed to at least an intermediate level of completion. Review and approvals for subsequent status has occurred.
- Defined (D): Project definition is advanced, and reviews have been conducted. Development may be near completion with the exception of final approvals.

Technical Deliverables:

- Not Required (NR): Deliverable may not be required for all estimates of the specified class, but specific project estimates may require at least preliminary development.
- Started (S): Work on the deliverable has begun. Development is typically limited to sketches, rough outlines, or similar levels of early completion.
- Preliminary (P): Work on the deliverable is advanced. Interim, cross-functional reviews have usually been conducted. Development may be near completion except for final reviews and approvals.
- Complete (C): The deliverable has been reviewed and approved as appropriate.

Inclusions

For the purposes of this document, the term *hydropower industries* is assumed to include private and public utilities involved with the production of electrical power, exclusive of transmission and distribution, using natural gravitational force of falling or flowing water, excluding tidal forces, to drive a turbine that powers a generator.

The common thread among private and public utilities (for the purpose of estimate classification) is their reliance on user requirements, statement of objectives, design reports (i.e. geotechnical investigations, sourcing borrow materials and hydraulic design/modeling) and/or environmental data collection and studies as primary scope defining documents. These documents are key deliverables in determining the degree of project definition, and thus the extent and maturity of estimate input information.

Cost estimates for hydropower facilities are typically composed of key features such as:

- Reservoir area preparation (e.g., clearing, removal of structures and earthmoving).
- River management (e.g., cofferdams, diversion channels or tunnels, sediment management plans, environmental monitoring programs).
- Principal structures (e.g., dams, dykes, intakes, penstocks, powerhouse(s), low level outlet(s), power tunnel(s), de-silting basin(s), and spillway structure(s)).
- Permanent infrastructure (e.g., access roads, railroads, bridges, offices, warehouse and housing).
- Temporary infrastructure (e.g., construction camp, site access roads, airport, workshops, construction power etc).
- Environmental mitigation features (e.g. fish ladder(s), water bypass and creation of new fish or wildlife habitat).
- Owner's costs (e.g., stakeholder involvement, licensing, studies and investigations, administration and overhead, catering).

Some, but not all, of these features are unique to the hydropower industries.

Typical hydropower facilities may include: turbines, generators, excitors, governors, transformers, gates for intake, spillway and draft tubes, and supporting electrical, mechanical, telecom, protection, and control systems. The water storage reservoir is typically required to support the operations of the hydropower facility.



TESTING

NorthPoint Job Number 57638

Customer PO: 5010070

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CUSTOMER: NSPI	EQUIPMENT: BIG FALLS 6	FRAME: N/A
MANUFACTURER: ASEA	ENCLOSURE: OPEN	KW: 5000
SERIAL/STYLE/MODEL NO.:		FREQ.: 60
TYPE: G3275	RPM: 163.6	MOTOR ☐ GENERATOR ☒
STATOR VOLTS: 6600	STATOR AMPS: 438	POWER FACTOR: 0.9
EXCITATION VOLTS: 120	EXCITATION AMPS: 337	CUST. SPEC. ☐ CUST. REQ. ☒

UNIT	NAMEPLATE
	
AS FOUND INSULATION RESISTANCE	
TEST AT 500VDC	1 MIN: 627.5MΩ
	10 MIN: 822MΩ
	DAR: 1.27
	PI: 1.31
	GOOD

INSULATION RESISTANCE AND POLARIZATION INDEX WAS FOUND TO BE ACCEPTABLE ON THE INITIAL TEST. THE REASON FOR NORTHPOINT TO BE ON SITE WAS TO ASSIST WITH EVALUATION OF ROTOR POLE CONDITION BASED ON EITHER ELECTRICAL TESTING RESULTS OR VISUAL CONDITION. THE FIRST TESTING AFTER CONFIRMATION OF THE INSULATION RESISTANCE WAS TO PERFORM A AC DROP TEST OF THE COMPLETE ROTOR.

AC DROP TEST 11 POLES PER TEST AT 55 VAC PER 11 POLES							
FIELD RESISTANCE		308.4 MILLI Ω		APPLIED VOLTS		TOTAL 207.17 V AC	
POLE 1	4.15	POLE 2	5.36	POLE 3	4.71	POLE 4	5.10
POLE 5	5.01	POLE 6	5.26	POLE 7	5.03	POLE 8	5.24
POLE 9	5.15	POLE 10	5.27	POLE 11	5.08	POLE 12	5.35
POLE 13	5.20	POLE 14	5.25	POLE 15	5.18	POLE 16	5.23
POLE 17	5.06	POLE 18	5.12	POLE 19	4.81	POLE 20	4.96
POLE 21	5.13	POLE 22	5.19	POLE 23	5.34	POLE 24	5.47
POLE 25	4.88	POLE 26	5.17	POLE 27	5.05	POLE 28	5.30
POLE 29	5.04	POLE 30	5.26	POLE 31	5.00	POLE 32	5.35
POLE 33	4.98	POLE 34	4.88	POLE 35	5.42	POLE 36	5.43
POLE 37	5.55	POLE 38	4.90	POLE 39	3.67	POLE 40	5.07
POLE 41	5.32	POLE 42	5.40	POLE 43	5.50	POLE 44	4.46



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AVG	5.05	MIN -10%	4.54	MAX + 10%	5.56	GOOD ☐	BAD ☒
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NOTES, COMMENTS:

THE ABOVE TESTING WAS COMPLETED WITH 55 VAC APPLIED TO ELEVEN POLES IN SERIES. DUE TO THIS METHOD OF TESTING THE POLES AT THE START AND END OF THE FOUR QUADRANT RESULT IN A LOWER DROP DUE TO A DIFFERENCE IN MAGNETIC FIELD TO ADJACENT POLES. TO CORRECT THIS FOR EVALUATION A SECOND TEST WAS CONDUCTED WITH A FIVE POLE OFFSET AND THE RESULTS FOR THE FOLLOWING POLES WERE UPDATED TO REFLECT THE SECOND TEST. POLES 10, 11, 12, 22, 23, 33 AND 34. FOR THE AVERAGE CALCULATION POLES 1 AND 44 WERE REMOVED DUES TO THEM BEING AT EACH END OF THE CIRCUIT ALONG WITH POLE 39 DUE TO IT'S LOWER DROP THAN THE REMAINING POLES. ONLY POLE 39 WAS OUTSIDE OUR TOLAREANCE OF +/-10% FOR AC POLE DROP TEST.

IT SHOULD BE NOTED THAT THE AC DROP WHEN COMPLETED IN HOUSE IS CONDUCTED WITH THE STATOR NOT IN THE STATOR BORE. THEREFORE THE ABOVE RESULTS CAN BE INFULENCED BY THE MAGNETIC FIELD OF THE ROTOR INTERACTING WITH THE STATOR LAMINATIONS. SUCH THINGS WAS INCONSISTANT AIR GAP CAN POSSIBLY EFFECT THESE RESULTS.

DC DROP TEST 44 POLES AT 8.97 VDC							
FIELD RESISTANCE		308.4 MILLI Ω		APPLIED VOLTS		TOTAL 8.97 VDC	
POLE 1	0.159	POLE 2	0.161	POLE 3	0.189	POLE 4	0.173
POLE 5	0.158	POLE 6	0.161	POLE 7	0.200	POLE 8	0.168
POLE 9	0.156	POLE 10	0.161	POLE 11	0.174	POLE 12	0.179
POLE 13	0.168	POLE 14	0.329	POLE 15	0.168	POLE 16	0.174
POLE 17	0.179	POLE 18	0.172	POLE 19	0.159	POLE 20	0.171
POLE 21	0.157	POLE 22	0.162	POLE 23	0.154	POLE 24	0.157
POLE 25	0.180	POLE 26	0.325	POLE 27	0.168	POLE 28	0.161
POLE 29	0.184	POLE 30	0.176	POLE 31	0.181	POLE 32	0.161
POLE 33	0.220	POLE 34	0.157	POLE 35	0.332	POLE 36	0.215
POLE 37	0.400	POLE 38	0.161	POLE 39	0.158	POLE 40	0.161
POLE 41	0.165	POLE 42	0.169	POLE 43	0.163	POLE 44	0.163
AVG	0.161	MIN -5%	0.153	MAX + 5%	0.169	GOOD ☐	BAD ☒

NOTES, COMMENTS:

DUE TO A WIDE VARIATION OF DC DROP TEST RESULTS DURING THE DC DROP TEST THE AVERAGE NUMBER USED WAS THE AVERAGE OF THE TWO REFURBISHED POLES IN 2023 AS THEY ARE CONSIDERED TO BE NEW. NTS STANDARD TOLERANCE FOR DC DROP TESTING IS SET TO +/-5%, IT IS OUR EXPERIENCE THAT OFTEN TIMES THE DC RESULTS TEND TO BE IN THE 2% RANGE FOR EDGE WOUND COILS SUCH AS THIS. AS NOTED ABOVE THERE ARE SEVERAL POLES WHICH HAVE A HIGHER DROP THAN THE MAXIMUM TOLERANCE OF +5% OR 0.169VDC.

WHEN EVALUATING THE RESULTS ABOVE THERE ARE THREE ITEMS THAT SHOULD BE TAKEN INTO CONSIDERATION:

1. IF A POLE HAS A SINGLE SHORTED TURN YOU WOULD EXPECT TO HAVE A LOWER DROP ACROSS THE POLE, IN THIS CASE THE POLES HAVE 57 TURNS SO A SINGLE SHOULD TURN SHOULD REDUCE THE DROP BY 1.75%. RESULTING A MINIMUM DROP OF 0.158VDC. ONLY FIVE POLE ARE SLIGHTLY BELOW THIS REDUCED TOLARENCE BY A VERY SMALL MARGIN RESULTING IN THE POSIBILITY THAT NO POLES HAVE SHORTED TURNS.
2. SEVERAL OF THE POLES HAVE EXTREMELY HIGH VOLTAGE DROPS, THIS WOULD INDICATE A HIGER RESISTANCE WITHIN THE POLES AND COULD BE DUE TO POOR CONNECTION OR PARTIALLY BROKEN LEADS DUE TO FATIGUE. THIS COULD ALSO BE DUE TO MOVEMENT OF THE POLES ON THE POLE BODY DUE TO DAMAGED WASHERS.



TESTING

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VISUAL CONDITION

NOTES, COMMENTS

BASED ON THE FINDINGS OF THE VISUAL INSPECTION, IT IS RECOMMENDED THAT MANY OF THE POLES SHOULD BE REMOVED TO REPAIR / REPLAC POLE COLLARS. BELOW ARE EXAMPLES OF COIL DEFECTS THAT WERE VISUALLY NOTED DURING THE INSPECTION.



POLE 1 AND 44 WHICH WERE
REFURBISHED IN 2023 AT DELSTAR
ENERGY



POLE 2: SECTION OF THE COLLAR
MISSING.



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POLE 3 WITH LARGE CRACK IN OUTER WASHER, THIS CAN ALLOW MOVEMENT OF THE COIL DURING OPERATION. COULD POSSIBLY ALSO PUT STRESS ON CONNECTION TO POLES 2 AND 4 IF THEY ARE SECURE IN PLACE.

POLE 6 INNER COLLAR CRACKED IN TWO LOCATIONS, A PIECE OF THE COLLAR COULD POTENTIALLY COME LOOSE FROM THE POLE DURING OPERATION. NOTE POLE 7 IS SHOWING HIGH DC DROP WHICH COULD INDICATE COPPER FATIGUE

POLE 19 APPEARS TO HAVE GAP BETWEEN FIRST INNER TURN AND LEAD. THIS POLE MAY HAVE BEEN REPAIRED AT SOME TIME.



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POLE 35 HAS A LARGE CRACK IN THE
OUTER COLLAR.



POLE 38 HAS A LARGE SECTION OF THE
INNER POLE MISSING AND MUST BE
REPAIRED.



POLE 41 HAS A LARGE CRACK IN THE
OUTER COLLAR WHICH COULD ALLOW
MOVEMENT OR FAIL DURING
OPERATION.



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ALTHOUGH NOT A FULLY CTRACKED POLE THE PICTURE TO THE LEFT INDICATES AND EXAMPLE OF WHAT NTS HAD DOCUMENTED IN THE POLE DROP TABLE AS POOR.

THE POLE TO THE LEFT HAS MINOR CRACK IN THE OUTER COLLAR, THIS WOULD BE AN EXAMPLE OF A POLE WHICH WOULD HAVE BEEN IDENTIFIED IN NTS POLE DROP TABLE AS HAVE BEEN REPAIRED AT SOME TIME.

NOTES:

BASED ON THE FINDINGS OF THE SITE VISIT NTS WOULD RECOMMEND THE REMOVAL OF THE FOLLOWING MINIMUM NUMBER OF POLES FROM THE ROTOR FOR EVALUATION AND REPAIRS:

AC DROP TEST: 39

DC DROP TEST MUST BE REMOVED: 3, 7, 14, 25, 26, 29, 33, 35, 36, 37

DC DROP SHOULD BE CONSIDERED BY NSPI: 4, 11, 12, 17, 18, 20, 30, 31

REMOVED DUE TO VISUAL CONDITION NOT NOTED ABOVE: 2, 6, 19, 38, 41

NSPI HAD PROVIDED IR PICTURES OF THE ROTOR WITH 150ADC FLOWING THROUGH THE CIRCUIT, THE ONLY POLE NOT IDENTIFIED DURING THE NTS TESTING WHICH WAS IDENTIFIED AS HAVING POTENTIAL HOT SPOTS IS POLE 13. THIS POLE SHOULD ALSO BE REMOVED FOR INSPECTION.



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PRICING SUMMARY FOR REPAIR OR COMPLETE REFURBISHMENT.

PARTIAL REPAIR:

BASED ON THE FINDINGS OF THE ON SITE INSPECTION AND THE ELECTRICAL TESTING OF THE ROTOR BY BOTH NORTHPOINT AND NSPI THERE ARE 25 POLES THAT SHOULD BE REMOVED FROM THE UNIT AND SENT IN FOR REPAIR.

IT SHOULD BE NOTED THAT THE LIST OF 25 POLES ABOVE THAT SHOULD BE REPAIRED IS A GOOD INDICATION OF THE OVERALL HEALTH OF ALL POLES. IF ONLY THE 25 POLES ARE REPAIRED THERE IS A VERY HIGH PROBABILITY THAT ISSUES WILL ARISE OVE THE COMING YEARS WITH THE REMAINING POLES.

ALSO NOTE THAT THE SCOPE OF WORK LISTED BELOW FOR REPAIR DOES NOT INCLUDE THE REPLACEMENT OF THE TURN INSULATION. IF ANY POLES HAVE SHORTHED TURN WITHIN THE COIL IR WILL REQUIRE COMPLETE REFURBISHMENT. THE ANTICIPATED COST FOR REFURBISHMENT OF 1-3 POLES WOULD BE [REDACTED]

SCOPE OF WORK FOR POLE REPAIRS

- INCOMING TESTING
- REMOVAL OF POLE COIL FROM POLE BODY
- SEPERAT FIRST AND LAST COMPLETE TURN OF THE COIL FOR INSPECTION
- TAPE FORST AND LAST TURN OF COIL WITH MIMCA B-STAGE TAPE AND CURE IN OVEN WITH NEW COLLARS
- APPLY NEW GROUND WALL TO POLE BODY
- TEST COILS PRIOR TO INSTALL ON POLE BODY
- INSTALL COIL
- ADJUST INNER COLLAR HEIGHT
- TEST COMPLETED COIL.

PRICE PER POLE [REDACTED]

NOTE: SCOPE IS BASED ON COIL BEING REMOVED FROM POLE BODY WITH DAMAGE TO COIL TURN INSULATION.

REFURBISHMENT OF 42 POLES:

BASED ON SUPPLIED INFORMATION

- BETWEEN TURNS INSULATION: 2 LAYERS OF NOMEX B-STAGE .005"
- GROUND WALL INSULATION: 4 LAYERS OF NOMEX 410 0.010"
- BONDING OF COILS ON THEIR POLE CORE
- SHIMMED COIL PROCESS : GP01 SHIMS
- PAINT: GLYPTAL 1201 (RED COLOR)
- INSULATED COLLARS GP01 CLASS F (1/2IN THK)
- TAPING OF TURNS (FIRST AND LAST)
- NO LEADS REPLACEMENT INCLUDED
 - LEAD HOLES TO BE PLUGGED ON ODD OR EVEN*
 - MINOR REPAIR ON LEAD IS INCLUDED*
- STANDARD PACKAGING (POLYTHENE SHEET WITH DESSICANTS)
- OLD INSULATION REMOVAL FROM THE COILS BY CHEMICAL ABATEMENT
- OLD INSULATION IS REMOVED IN A CHEMICAL SOLUTION, WASTE IS TRANSFORMED BEFORE DISPOSAL, THEREFORE REMOVING RESPONSABILITY FROM THE ENDUSER. WASTE IS THEN DISPOSED OF IN ACCORDANCE WITH ALL ENVIRONMENTAL LAWS PRESENT IN QUÉBEC

PRICE PER POLE FOR COMPLETE REFURBISHMENT [REDACTED]

BASED ON THERMAL IMAGES FROM NSPI IT IS ALOS RECOMMENDED THAT ATTIONAL WORK BE CONSIDERED AS PART OF THE ROTOR REFURBISHMENT. SEVERAL BRUSH BOXES AND BRUSHES HAVE SIGNE OF HEATING. IT APPEARS THERE BE UNEQUAL LOAD SHARING BETWEEN BRUSHES WHICH RESULTED IN SOME BRUSHES SHWOING SIGNS OF HEATING AS WELL AS LOW BRUSH PRESSURE. THERE IS ALSO CONCERNS OF SLIP RING CONDITION. SLIP RINGS SHOULD BE MACHINED AND POLISHED TO ENSURE GOOD CONTACT AND BRUSH BOXES SHOULD BE REPLACED. SCOPE OF WORK AND PRICING FOR ADDITIONAL ITEMS ARE INCLUDED BELOW.



TESTING

NorthPoint Job Number 57638
Customer PO: 5010070

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REFURBISHMENT OF ROTOR LEADS

- REMOVAL OF LOAD INSULATION
- CLEAN BARS AND INSULATE WITH EPOXY AND MICA TAPE, ADD ONE LAYER OF PROTECTIVE GLASS TAPE OVER TOP
- MANUFACTURE NEW G11 STANDOFF INSULATORS FOR MOUNTING OF BUS BARS ON ROTOR SPIDER AND SHAFT

PRICE FOR LEAD REFURBISHMENT

REFURBISHMENT OF SLIP RINGS

- GLASS BEAD ALL COMPONENTS
- MANUFACTURE OF NEW INSULATING BUSHINGS FOR SLIP RINGS
- MACHINE AND POLISH SLIP RING SURFACE
- PAINT WITH GYPTOL TWO PART EPOXY PAINT
- HI-POT TEST AT 2550 VDC.

PRICE FOR SLIP RING REFURBISHMENT

BRUSH AND BRUSH BOX REPLACEMENT

- EVALUATION OF THE BRUSH SPRING TENSION FOUND THE AVERAGE BRUSH PRESSURE IN POUNDS PER SQUARE INCH (PSI) IS 2.2LBS. THE RECOMMENDATION FOR BRUSH PRESSURE ON A SLIP RING ASSEMBLY SUCH AS THIS UNIT SHOULD BE IN THE RANGE OF 3.5-4.5 PSI.
- NORTHPOINT IS RECOMMENDING THAT THE BRUSH BOXES AND BRUSHES BE REPLACED WITH NEW. TOTAL OF 12 BOXES AND 24 BRUSHES HAVE BEEN INCLUDED IN OUR PROPOSAL

PRICE FOR BRUSH BOXES AND BRUSH

PRICE FOR TRANSPORTATION COST FROM MILTON NS TO NORTHPOINT AND WAJAX FACILITIES IS ESTIMATED AT

TOTAL COST SUMMARY FOR REPAIR

SCOPE

- REPAIR 25 POLES
- REPAIR BUS BARS
- REPAIR SLIP RINGS
- BRUSH BOXES AND BRUSHES
- TRANSPORTATION COSTS TO MONCTON
- **TOTAL COST OF REPAIR**

UNIT PRICE

EXTENDED PRICE

TOTAL COST SUMMARY FOR COMPLETE REFURBISHMENT

SCOPE

- REFURBISH 42 POLES
- REPAIR BUS BARS
- REPAIR SLIP RINGS
- BRUSH BOXES AND BRUSHES
- TRANSPORTATION COSTS TO MONCTON
- **TOTAL COST OF REPAIR**

UNIT PRICE

EXTENDED PRICE