

1 Q. **Reference: Volume II, Wood Pole Line Management Program - Various, Tab 11, page i, lines 3**
2 **and 4.**

3
4 Under the program, transmission line inspection data of each year is analyzed
5 and appropriate recommendations made for necessary refurbishment and/or
6 replacement of line components including poles, structures, hardware, and
7 conductors in the subsequent year.
8

9 Please provide copies of Hydro’s inspection and maintenance guidelines for its transmission
10 lines of all voltage, including evaluation tools, techniques and methods. Describe any
11 differences in inspection and maintenance practices for 230 kV transmission lines versus
12 transmission lines of lower voltage.
13

14
15 A. Newfoundland and Labrador Hydro’s (“Hydro”) standard work method for inspections and
16 treatment under the Wood Pole Line Management Program and the associated inspection form
17 are included as NP-NLH-037, Attachment 1 and NP-NLH-037, Attachment 2, respectively. The
18 inspection form is populated electronically on tablets for direct syncing with Hydro’s database.
19

20 Hydro no longer utilizes the EDM¹ Pole Tester referenced in the work method. Hydro stopped
21 using this instrument due to unreliable results; it has since been discontinued and is no longer
22 supported by the manufacturer.
23

24 When performing inspections, Powerline Technicians assign a rating of 1 to 5 to each pole and
25 structure component. Table 1 outlines the pole conditions and post-inspection actions for each
26 rating.

¹ Engineering Data Management (“EDM”)>

Table 1: Pole Condition and Post-Inspection Actions

Condition	Rating	Post-Inspection and Treatment Action
Severe/Hazardous to Climb	5	Refurbishment required as soon as practicable.
Poor	4	Engineering analysis and subsequent refurbishment if deemed necessary.
Moderate	3	Follow-up inspection in five years.
No issues	2	None.
New (<10 Years)	1	Climbing inspection and treatment not required.

1 There are no major differences in procedures between transmission lines of different voltages.

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Standard Work Method - Approved

Work Method Number: SWM-003393

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Created By: Keith Saunders/NLHydro

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Task Area: Newfoundland & Labrador Hydro - Transmission Operations - Lines - Transmission - Line Energized - Common Transmission

Work Method Title: Wood Pole Structures - Perform Preservative Treatment

Work Method Type: Practice

1.0 Purpose:

This work method provides safe practices to follow for performing chemical treatments on wood pole structures.

2.0 Employee Protection and Training Considerations

2.1 PPE

The PPE to consider to perform this work safely includes:

Fall Protection, FR Clothing/Arc Flash Protection, Gloves - Leather Work Gloves, Head Protection - Hard Hat, High Visibility Clothing, Safety Boots - Resistive, Safety Glasses

2.2 Skills Training:

The skill training to consider to perform this work safely includes:

Arc Flash Awareness Training, Fall Protection Training, First Aid Training, WHMIS Training, Work Protection Code Training

2.3 Rules & Regulations:

The rules and regulations to consider to perform this work safely includes:

Environmental Emergency Response Program, Environmental SOPs, Minimum Approach Distances, WHMIS, Work Protection Code

2.4 Safety & Health:

The safety and health issues to consider to perform this work safely includes:

Cold Stress, First Aid, Safety & Health Handbook - Nalcor Safety & Health Program

2.5 Special Permits:

The permits to consider to perform this work safely includes:

Not Applicable

Recommended Tools And Equipment

7.1 Pole Drill

7.2 6", 9/16", Drill Bit (Pole)

7.3 18", 9/16, Drill Bit (Pole Butt)

7.4 Resistograph (if required)

7.5 Boron Rods

7.6 Hole Plugs

7.7 Core Sampler

7.8 Straws

7.9 Hand Held Data Collector

7.10 Masking Tape

- 7.11 EDM Pole Tester
- 7.12 Timbor Chemical Ant Applicator
- 7.13 Camera
- 7.14 Double Handline
- 7.15 Adjustable Wrench
- 7.16 Hammer

Work Method Practice

8.1 Obtain hold-off.

8.2 Clean and prepare tools.

8.3 Inspect structure.

8.3.1 Take three core samples out of the assigned pole in the structure. Core sampling will be taken from every 5th structure on 230 kV H-Frame & 138 kV H-Frame. Core sampling will be taken from every 10th structure on single pole construction lines.

Note: Perform resistograph test, if suspicious of rot.

8.4 For pole treatment at butt of pole:

- Drill holes approximately 120 degrees apart and at downward angle, as specified in instructions that come with treatment rods. Use a 18" drill bit.

- Install treatment rods.

- Install hole plugs.

8.5 For pole treatment at attachment points:

- Maintain minimum approach distance, when climbing structure and performing work. See the following pictures for different voltage examples:

[Picture 1 - 138 kV, H-Frame, Side Phase, Recommended Climbing](#)

[Picture 2 - 69 kV, H-Frame, Side Phase, Work Space](#)

[Picture 3 - 138 kV, H-Frame, Side Phase, Work Space](#)

[Picture 4 - 230 kV, H-Frame, Side Phase, Work Space](#)

[Picture 5 - 230 kV, H-Frame, Center Phase, Work Space](#)

- Maintain minimum approach distance, when drilling treatment holes. Drill holes approximately 120 degrees apart and at downward angle, as specified in instructions that come with treatment rods. Holes should be placed above attachment points, using a 6" drill bit. See the following picture for example on drilling holes in single pole structure:

[Picture 6 - 69 kV, Single Pole, Recommended Drilling](#)

- Install treatment rods.

- Install hole plugs.

8.6 Record information.

8.6.1 For poles rated 4 or 5:

- i. Take three core samples. If cavity is detected in the pole, take three resistograph readings at cavity location and take pictures.
- ii. Take shell thickness indicator measurements of the cavity 120 degrees apart and record the findings.
- iii. EDM pole tester readings shall be taken in-line and perpendicular to the line and recorded.
- iv. If ants are present and active, pole must be treated with Timbor and checked for a cavity. Take pictures.
- v. If pole has cracks or checks, record the depth and length. Take pictures.
- vi. Repair substandard conditions:
 - retorque loose hardware
 - restaple loose ground wire
 - rejoin broken ground wire
- vii. Record the reason for rating in patrol book and submit weekly to supervisor. Send white copy to appropriate Asset Specialist.
- viii. Ship core samples from the area offices (document on Material Transfer Form). Send copy to appropriate Asset Specialist weekly.
- ix. Tag 4 or 5 rated pole with rating number.
- x. Do not re-climb 5 rated pole. Data collected will be accessed by engineering and the 5 rated pole will be either:
 - replaced immediately
 - or**
 - replaced during next year refurbishment program
- xi. Take pictures of any noted defects, starting with the structure number sign.

8.7 Surrender hold-off.

Transmission Line Management Program Detailed Field Form														
TL # _____	Str # _____	Str Type _____	Weather _____ Date/Time _____											
			Pole #1 (Left)			Pole #2 (Center/DE)			Pole #3 (Right)					
Pole Data 1 = New 5 = Replace*			SYP DF WRC			SYP DF WRC			SYP DF WRC					
Pole Species			P C CCA N			P C CCA N			P C CCA N					
Pole Treatment Penta, Creo, CCA, None														
Pole Height														
Pole Class														
Pole Installation Year														
Checking - General			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5					
Deepest Check (inches)			<1 1 to 3 >3			<1 1 to 3 >3			<1 1 to 3 >3					
Widest Check (inches)			<1/2 1/2 to 1 >1			<1/2 1/2 to 1 >1			<1/2 1/2 to 1 >1					
Check Penetrates Groundline			Yes No			Yes No			Yes No					
Shell Separation - Severity			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5					
Shell Separation - Height Up Pole														
External Decay			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5					
Internal Decay			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5					
Shell Thickness (inches) or Solid			S			S			S					
Groundline Circumference (inches)														
Carpenter Ants			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5					
Woodpecker Holes			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5					
Pole Rating			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5					
Cross Braces 1 = New 5 = Replace*			Source			Comments			Load					
Checking			1 2 3 4 5						1 2 3 4 5					
Rot			1 2 3 4 5						1 2 3 4 5					
Cracks			1 2 3 4 5						1 2 3 4 5					
Other			1 2 3 4 5						1 2 3 4 5					
Detail Other														
Cross Arms 1 = New 5 = Replace*			Left/Source			Comments			Right/Load					
Checking			1 2 3 4 5						1 2 3 4 5					
Rot			1 2 3 4 5						1 2 3 4 5					
Cracks			1 2 3 4 5						1 2 3 4 5					
Other			1 2 3 4 5						1 2 3 4 5					
Detail Other														
Knee Braces 1 = New 5 = Replace*			Left (pole 1)			Right (pole 1)			Left (pole 3)			Right (pole 3)		
Checking			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5		
Rot			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5		
Cracks			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5		
Other			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5			1 2 3 4 5		
Detail Other														
Insulators			NGK Sed COB N			NGK Sed COB N			NGK Sed COB N			NGK Sed COB N		
Manufacturer NGK, Sediver, COB, Nema														
Quantity of Each														
Type: Suspension, Standoff, Post			Susp Stand Post			Susp Stand Post			Susp Stand Post			Susp Stand Post		
Polymer Insulators?			Yes No			Yes No			Yes No			Yes No		
Insulators per string - Tangent/Jumper														
Insulators per string - Deadend (D/E)														
Number of Strings (circle 1 or 2)			D/E: 1 2 T or J: 1 2			D/E: 1 2 T or J: 1 2			D/E: 1 2 T or J: 1 2			D/E: 1 2 T or J: 1 2		
Plumbness of insulator string														
Insulators to replace are numbered starting with 1 at conductor end. Add details in comments if necessary.			Replace											
			Flashed											
			Failed											
			Other											
General Structure Items														
General Plumbness														
Foundation Condition			Crib Rot / Submerged in Water / Eroded Concrete Damage / Crack Steel / Rust / Unlevel / Replace/Repair											

Transmission Line Management Program Detailed Field Form																
	Pole #1 (Left)			Pole #2 (Center/DE)			Pole #3 (Right)									
Conductor, Overhead Wires and Fittings																
Conductor Wear at Clamp or Deadend	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
Broken Strands at Clamp or Deadend																
Conductor Wear in Span or Splice	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
Broken Strands in Span or Splice																
OHWG Wear	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
Broken Strands																
Conductor Deadend Assembly	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
Conductor Vibration																
Dampers and Counterweights																
Type: Stock , Torsional , Neoprene	Stock	Torsion	Neo	Stock	Torsion	Neo	Stock	Torsion	Neo	Stock	Torsion	Neo	Stock	Torsion	Neo	
Dampers - Number per phase																
Bent?	Yes		No	Yes		No	Yes		No	Yes		No	Yes		No	
Missing?	Yes		No	Yes		No	Yes		No	Yes		No	Yes		No	
Moved?	Yes		No	Yes		No	Yes		No	Yes		No	Yes		No	
Counterweights - Number per phase																
Suspension Clamp																
Repair?	Yes		No	Yes		No	Yes		No	Yes		No	Yes		No	
Replace?	Yes		No	Yes		No	Yes		No	Yes		No	Yes		No	
Insulator Hardware (clevis, BLE Bolts, etc)																
Condition	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
Details																
Structure Hardware																
Defect Details																
Steel Towers (note details in comments)																
Member Condition	Worn Bent Loose Rusty Broken															
Guying and Anchors																
Anchor Rod Condition	Worn Bent Corroded						Number to replace									
Guy Wire	Slack Broken Corroded						Number to replace									
Guy Grips	Worn Broken/Damaged Corroded						Number to replace									
Number of Guys																
Number of Guy Guards In Place																
Vegetation & Terrain																
Species** (see below)	A B C F M P Pop S T W															
Height (feet)																
Density	Light Medium Heavy															
Urgency	Urgent 1-3 years 3-5 years															
Danger Trees																
Local Terrain Type (hilly, flat, etc.)																
Treatment Applied																
Cobra Rods (number per pole)																
TimBor Professional (L per pole)																
EDM PoleTest Data																
In-Line (diameter, height, and reading)	"	@	'	psi	"	@	'	psi	"	@	'	psi	"	@	'	psi
Perpendicular to line direction	"	@	'	psi	"	@	'	psi	"	@	'	psi	"	@	'	psi
Additional Space for Comments																
Supervisor Comments (Possible Mitrigation Approach)																
Rods: <40" G/L circumference - 2 per hole in 3 holes, >40" G/L circumference - 3 per hole in 3 holes Core Samples: 10% of poles (H-Frames: Right Pole of strrs ending in 5 or 0 / Single Pole: strrs ending in 0) * Number Rankings: 1 = <10 yrs old, 2 = Fine for next cycle, 3 = Follow-Up Inspection in 5 Years 4 = Analysis Required, 5 = Urgent Action Required ** Species: - Alder, Birch, Cherry, Fir, Maple, Pine, Popular, Spruce, Tamarack (Junpier), Willow																
Signature - Lead Hand																