

1 Q. Please provide electronic documents describing transmission pole and line
2 equipment inspection, testing, and maintenance programs and practices. These
3 documents should describe the activities conducted by equipment type, the time
4 period between time-based activities, and what triggers condition-based activities.

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7 A. Transmission pole and line equipment inspection, testing and maintenance are
8 addressed under Hydro's Wood Pole Line Management Program (WPLM) for all 69
9 kV, 138 kV and 230 kV circuits.

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11 The primary objectives of the WPLM program are to address four specific items.
12 These are: (1) inspect poles and associated line components such as conductor,
13 hardware and insulators; (2) test and treat all poles; (3) develop and implement an
14 electronic data collection system to ease the field data collection and subsequent
15 data analysis; and (4) make data based, optimized decisions to rehabilitate or
16 replace poles and associated hardware. The aim of this condition assessment
17 program is to ensure that deteriorated poles are identified and retreated for life
18 extension, and to identify in a timely manner, poles and line components requiring
19 replacement before failures occur.

20

21 Hydro's WPLM program is a comprehensive pole inspection, test and treatment
22 program. It consists of two 10-year cycles initiated in 2005. Under this program
23 poles are inspected by sounding, boring and visual means. Poles are then internally
24 treated with preservative where appropriate, and identified for scheduled repair, or
25 replacement if deemed necessary after analysis of the data is carried out by a
26 structural engineer. A limited number of full scale tests are also done each year to
27 validate the field data (see copy of the Transmission Line Management Program

1 Detailed Field Form used to collect data for condition assessment of poles and
2 associated line components, PUB-NLH-085 Attachment 1).

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4 The WPLM Program is not carried out on a line until it reaches the age of 20 years.
5 Prior to this, a snowmobile/ground patrol is implemented annually and a helicopter
6 patrol is conducted semi-annually. The data from these inspections is collected on
7 the attached Patrol Report (see PUB-NLH-085 Attachment 2) and is reviewed by the
8 transmission asset specialist to determine whether any corrective maintenance is
9 required. Both snowmobile/ground and helicopter patrols continue for the life of
10 the line.

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12 As a supplement to the existing programs described above, an infrared inspection
13 program operating on a three-year cycle on connecting hardware and accessories
14 was implemented in 2010. The data collected is reviewed by the transmission asset
15 specialists to determine whether any corrective maintenance is required.

TL # _____	Str # _____	Str Type _____	Weather _____
Date/Time _____	Pole #1 (Left)	Pole #2 (Center/DE)	Pole #3 (Right)
Pole Data 1 = New 5 = Replace*			
Pole Species	SYP DF WRC	SYP DF WRC	SYP DF WRC
Pole Treatment Penta, Creo, CCA, None	P C CCA N	P C CCA N	P C CCA N
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*			
Checking	Source	Comments	Load
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*			
Checking	Left/Source	Comments	Right/Load
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*			
Checking	Left (pole 1)	Right (pole 1)	Left (pole 3)
Rot	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
Other	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Detail Other			
Insulators			
Manufacturer NGK, Sediver, COB, Nema	NGK Sed COB N	NGK Sed COB N	NGK Sed COB N
Quantity of Each			
Type: Suspension, Standoff, Post	Susp Stand Post	Susp Stand Post	Susp Stand Post
Polymer Insulators?	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
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		



	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: Stockbridge, Torsional, Neoprene	Stock Torsion Neo	Stock Torsion Neo	Stock Torsion Neo
Dampers - Number per phase			
Bent?	Yes No	Yes No	Yes No
Missing?	Yes No	Yes No	Yes No
Moved?	Yes No	Yes No	Yes No
Counterweights - Number per phase			
Suspension Clamp			
Repair?	Yes No	Yes No	Yes No
Replace?	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
Perpendicular to line direction	" @ ' psi	" @ ' psi	" @ ' psi
Additional Space for Comments			
Supervisor Comments (Possible Mitigation 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 strc ending in 5 or 0 / Single Pole: strc ending in 0) * Number Rankings: 1 = <10 yrs old, 2 = ok for next cycle, 3 = Budgeted Replacement/Analysis Required 4 = Scheduled Replacement, 5 = Urgent Action Required ** Species: - Alder, Birch, Cherry, Fir, Maple, Pine, Popular, Spruce, Tamarack (Juniper), Willow			
Signature - Lead Hand			



PATROL REPORT

- CLIMBING
- FOOT
- AERIAL
- SNOWMOBILE

TL _____ STR _____ TYPE _____ DATE _____



Access Roads _____

Brush _____

Pole Condition _____

Counterpoise _____

Footings _____

Anchors _____

Guy Grips _____

Structure Plumb _____

Guys _____

Structure Members _____

X-Brace _____

Crossarm _____

Structure Hardware _____

Insulators _____

Conductors & Ass. Hardware _____

Jumper Pads _____

Dampers _____

OH6W & Ass. Hardware _____

REMARKS _____

Patrolman _____