Q. Please describe Hydro's transmission line inspections and transmission pole inspection and treatment policies and practices. In the response include who completed the inspections and whether Hydro has a formal policy stating the number of inspections to be completed each year, the expected inspection completion rate, how the inspections are tracked and the top level of management who monitors the completions consistent with policy and schedules and the title of the person held accountable for the completion of the inspection work consistent with the policy and the schedule. If transmission pole inspections are conducted, state the percent of poles inspected which have been rejected each year and replaced each year for 2011, 2012 and 2013.

A. During 2004-2014, Hydro has implemented a Wood Pole Line Management Program (WPLM) based on a Reliability Centered Maintenance (RCM) principle. Under this program, wood pole transmission structures and the associated line components are inspected periodically. Wood poles are inspected at an average rate of 2,500 poles per year. It is expected that 100% of the scheduled inspections for a given year will be completed between the months of May and November. Inspections are tracked through weekly progress reports submitted by regional Line Supervisors to the Transmission and Distribution Engineering group and the Transmission Asset Specialist.

The percentage of poles inspected which have been rejected and scheduled for replacement each year for 2011, 2012 and 2013 were approximately 4%, 3.5% and 1.5% respectively.

The steps that are involved in carrying out Hydro's transmission pole inspection and treatment program are presented below:

- Visual inspection;
- Sounding by a hammer and looking for internal decay or rot;
- Internal shell thickness measurement particularly when the pole sounds hollow. If a pole sounds hollow when struck (sounded) with a hammer, or a cavity is noted when boring/drilling to install boron rods , a 3/8 inch hole is drilled at an angle of 120 degrees around the location to determine the remaining shell thickness using a shell thickness indicator;
- Resistograph measurements are taken on an as required basis;
- Excavation below ground line (GL) has not been done normally, but will be included in the 2014 program at every tenth structure. During the early phase of this program, Hydro's experience showed less rot below GL but more on the pole top and along the pole height. Approximately 99% of Hydro's rejections are the result of conditions noted above ground level. Hydro first drills a hole at ground level for treating the pole with boron rods using an 1/8 inch auger bit at an approximately 45 - 60 degrees angle thus giving some idea what is happening below GL. Rot normally is found in the first foot or so below ground level;
- Core samples are taken from every tenth structure and tested for preservative retention level;
- All bolted connection points are treated at a foot below the bolt location, one rod at the bolt level and one rod at a foot above the connection. At ground level, three 3/8 inch holes are drilled at 120 degrees around the circumference of the pole. Three rods per hole are installed (a total of nine rods);
- Data is entered electronically in a data sheet and uploaded to a central database;

- Poles removed from the field are also destructively tested periodically at Memorial University to assess the in-situ rupture strength of the pole;
- If ant activity is noted in the poles, the poles are treated with timbor chemicals. "Liquid boron" is injected by drilling a 3/8 inch diameter hole and half a litre of liquid is manually pumped into the hole;
- Any loose hardware/bolts are re-torqued; and
- Steel transmission line inspections are completed on a ten-year cycle. One tenth of each steel line is climbed and inspected each year. Also, there is a ground/foot patrol conducted on one tenth of each line per year to be able to inspect anchors and footings. Work orders to complete this work are generated annually in the computer maintenance management system (CMMS) and are placed in the appropriate supervisor's backlog for completion. The inspections/patrols are completed by Hydro's transmission line maintenance crews. Any defects observed are recorded on a patrol report check book, and a work order is generated in the CMMS to have the defects corrected.

There are three functions of asset management that ensure inspections are identified, scheduled, executed and tracked. They are:

1. Long Term Asset Planning (LTAP) - the LTAP Manager is accountable for developing the preventive maintenance program. Accountabilities include: setting/modifying inspection frequencies, determining/modifying maintenance tactics and ensuring the preventative maintenance (PM) program is set up in the computerized maintenance management system (CMMS). The LTAP Manager also tracks any changes to the PM program.

2. Short Term Planning and Scheduling (STPS) - the STPS Supervisor ensures the PM program is included on the annual work plan, revisions/additions to PMs are entered into the CMMS, all activities have resources identified and weekly work schedules are developed. The STPS Supervisor also tracks progress of the annual work plan through monthly reports and annual work plan review meetings.

3. Work Execution (WE) - the WE Manager is accountable for execution of the PM program as identified in weekly schedules and annual work plans and to report back to the STPS Group any deviation of actual work completed versus planned work. The WE manager also ensures details of actual work completed are recorded in the CMMS and that corrective maintenance work orders are initiated for deficiencies found during PM inspections.

The Regional Manager is accountable for oversight and measurement of the STPS and WE functions and to ensure recovery plans are in place when the actual work completed deviates from the planned work. In addition, the Regional Manager is accountable for reporting progress of the PM program to the General Manager and status of any required recovery plans. The General Manager is ultimately accountable for all facets of asset management and to be fully engaged in ensuring recovery plans are in place and that performance measures are reported to the Leadership Team.