When a critical mass of components reaches end-of-life, such that it is more cost-effective to refurbish an entire line section than to replace components individually, then a Line (Refurbishment) Project is undertaken. Projects propose in this application are described in Sustaining Capital Exhibit D1, Tab 3, Schedule 2.

As noted above, it is cost prohibitive to collect asset condition information on all distribution line sections, nor is it necessary, as many of the line sections are in good condition. The process noted above is considered to be the most practical and cost effective means to manage the condition of these assets.

### 4.1.4 Wood Poles

Information used for determining the condition of wood poles is gathered from pole inspections and tests. Visual inspections identify numerous defects such as split tops, leaning poles, lightning damage, broken poles, wood pecker damage, rodent damage, shell rot, fire damage, insect infestation and other mechanical damage. The number and severity of these defects is used to assess condition. In addition, sounding tests using a hammer are employed to detect the presence of hollow areas in the pole, shell separation, or external decay. Poles that appear to have internal rot are further tested using a drill test that measures the shell thickness (amount of wood in good condition in the outer area of a pole).

Based on inspection and test results accumulated up to the end of 2008, Hydro One Distribution estimates that approximately 5% of the wood poles in the system are in "Poor" to "Very Poor" condition. The exact locations of these poles are identified during the normal course of the inspection cycle. Once identified, poles that are found to be in very poor condition are replaced in an expedient manner and those found to be in poor condition are replaced as part of the Wood Pole Structure Replacement Program

**Figure 4: Hydro One Distribution Wood Pole Demographics**

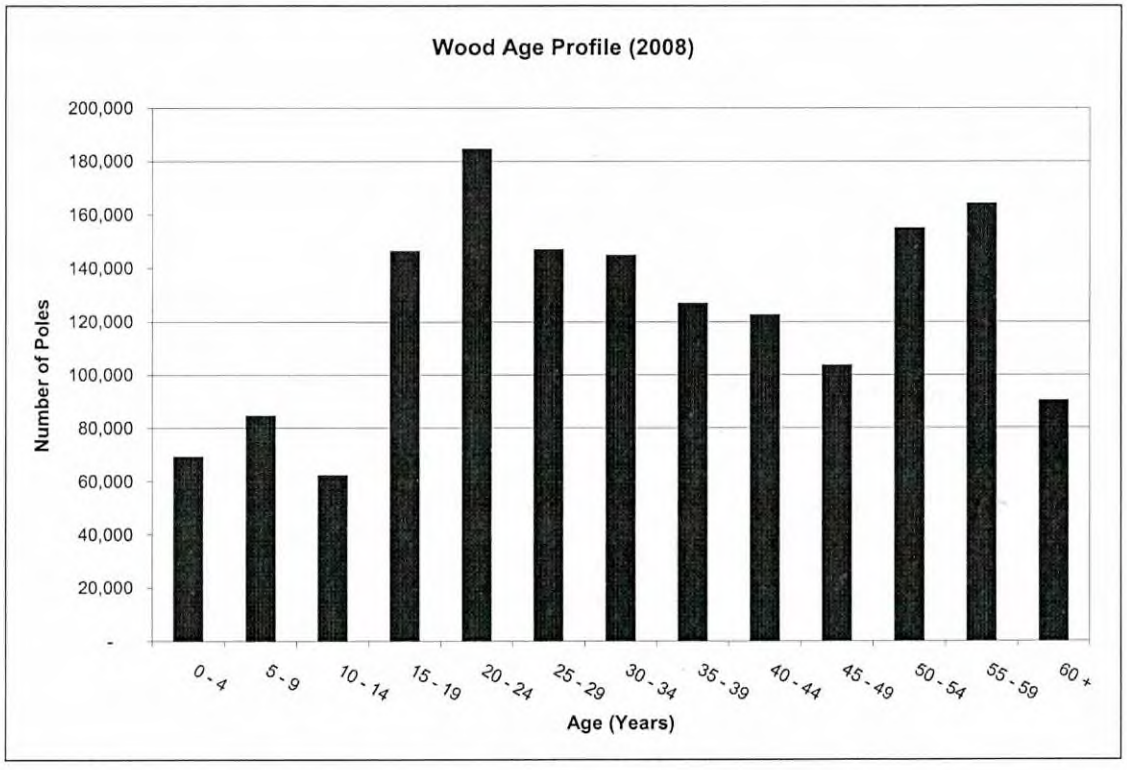


Figure 4 above is a representation of Hydro One Distribution's wood pole demographics and of particular interest is the large number of poles that are currently between 20 and 24 years of age. These poles have just started to move through Region 2 illustrated in Figure 3, where the replacement rates increase rapidly from approximately 1% to 4% over the next 10 years. In the past, the number of poles per year that have entered this Region has been about 25,000 to 35,000, but over the next 10 years the number will increase to as much as 45,000, thereby increasing the number of poles expected to be found at end-of-life. This information indicates that in the future one can expect an increasing number of pole replacements.

Failure modes and condition defects of MUSs include the typical defects that station transformers, switches, fuses and reclosers experience. Additional defects that a MUS can experience compared to that of a station can include damage to MUS feeder connection cables or trailer rust. The number of MUS defects Hydro One Distribution has noted is shown in Table 5 below.

**Table 5: MUS Defects**

| *Year* | *Number of MUS Defects* |
|---|---|
| 2010 | 40 |
| 2011 | 49 |
| 2012 | 32 |
| 2013 | 31 |

Trends and Impacts

On average two mobile unit substations have been refurbished each year under the Mobile Unit Substation program. Hydro One Distribution is proposing to maintain this level of refurbishments annually, as described in Exhibit D1, Tab 3, Schedule 2.

## 2.2 DISTRIBUTION LINES ASSETS

### 2.2.1 Poles

Poles comprise the single largest component of Hydro One Distribution's lines asset base. They are used to keep conductor and line equipment at a safe distance from the ground and other objects.

Hydro One Distribution's asset strategy for the management of distribution poles centers around their age and condition. The demographic profile enables the projection of long term pole replacement rates; whereas the condition information aids in the selection and prioritization of specific poles to be replaced annually. Hydro One endeavours to replace individual poles when they are observed to be near the end of their service lives, but before they fail, pose a safety hazard, or cause a service interruption. Where possible, these replacements are made in conjunction with other activities on the distribution system to increase efficiency and minimize the number of planned outages. At the same time, Hydro One carefully manages the demographics of the entire pole population to ensure a sustainable work program in the long term.

Demographics

A key indicator of the degradation of wood poles is their age. Older poles exhibit more advanced deterioration and are at a higher risk of failure. Analysis of wood pole failures has indicated that the expected life of a wood pole is approximately 62 years. Based on the current demographics of the Hydro One Distribution wood pole population, 180,000 poles are at least 62 years old, with an additional 140,000 poles reaching 62 over the next five years. The age distribution of wood poles owned by Hydro One Distribution is shown in Figure 12.

While not all of these poles require immediate replacement, they are at a higher risk of failure in the short term and are prioritized in the pole replacement program. The long term management of the high number of poles reaching their expected end of life requires increased funding for the pole replacement program as described in Exhibit D1, Tab 3, Schedule 2.

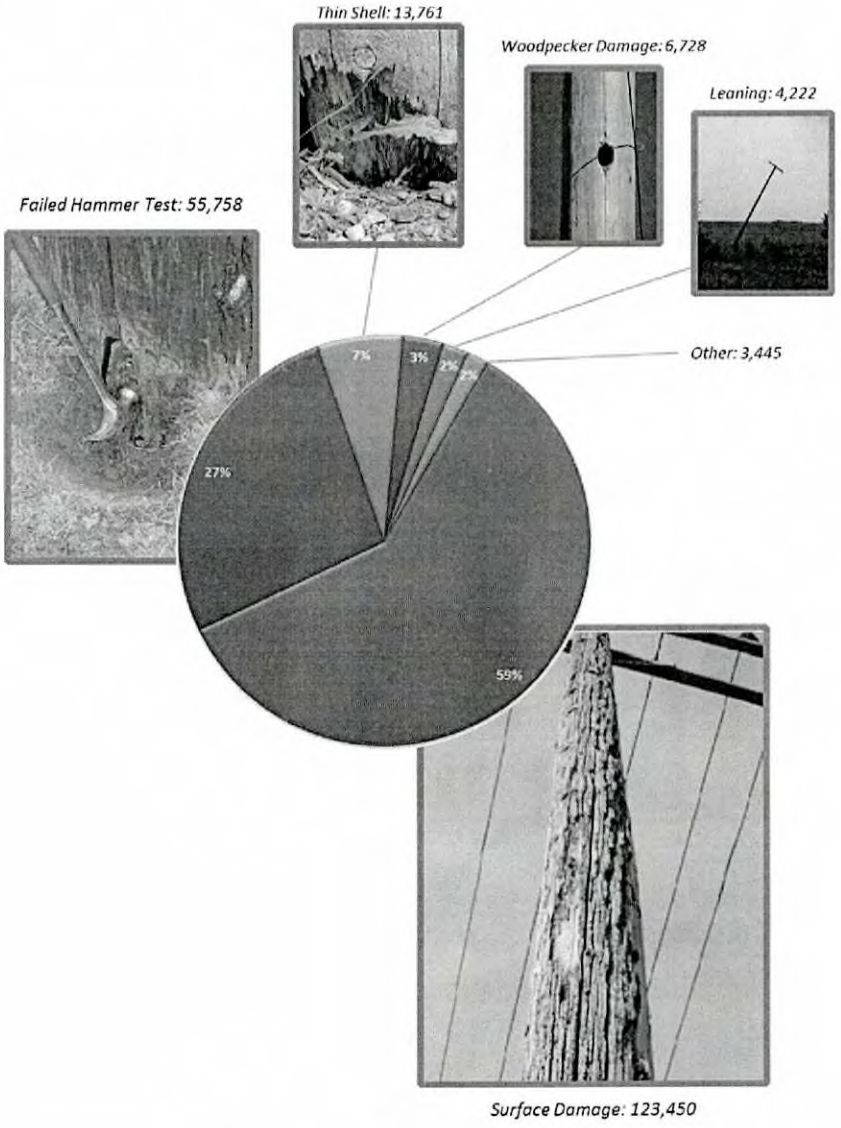


**Figure 13: Pole Defects**

Once a wood pole's condition has deteriorated to the point that it has a significant risk of failure under adverse weather condition, it is deemed end-of-life. All end-of-life poles must be replaced to ensure the system maintains an acceptable level of reliability and safety. The end-of-life determination for wood poles complies with Canadian Standards Association (CSA 22.3 No. 1 – Overhead Systems) criteria for pole strength.

Other Influencing Factors:

- Hydro One Distribution continues to address a subset of Red Pine wood poles that are experiencing premature degradation. These poles have a considerably shorter expected service life, and require replacement on a priority basis. Further details on the Red Pine pole issue can be found in proceedings EB-2012-0136 and EB-2009-0096.

- Beginning in 2015, Hydro One Distribution plans to include a systematic measure of criticality in the prioritization of pole replacements. The number of customers and downstream load of all circuits associated with each pole will be calculated and used to give higher priority to poles that have a potentially higher impact on reliability.

Trends and Impacts

Hydro One Distribution proactively replaced approximately 11,000 poles in 2013 under its pole replacement program. Over the next several years, an increasing number of poles are expected to reach the end of their service life each year. In order to manage the large number of replacements that will be rapidly required, Hydro One Distribution is proposing an increase in the number of replacements to approximately 15,200 poles annually. As can be seen in Figure 15, this proposed replacement rate will assist in mitigating the increased reliability and safety risk associated with ageing distribution poles.