# INSPECTION OF WOOD POLES IN PLACE

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Originally, I was asked to present a paper on inspection and treatment of poles in place. Because of the complexities of both subjects and time limitations the focus will be on inspection. The opportunity to cover remedial pole treatment in the future would be welcomed. During the course of this paper, it is assumed that the pole inspector is also trained in the use of groundline treatment preservatives and would usually be applying the supplemental preservatives in conjunction with his inspection.

Wood poles support utility wires which span several hundred thousand kilometers. Over nine million such poles are in service and this represents over 4.5 billion dollars of investment to Canadian utilities.

Pole inspection and maintenance has become increasingly more important as the cost of poles and labor steadily increases. Besides the favorable economic aspect, safety for linemen and the public requires periodic inspections.

Inspection of the pole helps to maintain a safe plant, but inspection only, will not extend the service life of poles. Without treatment, the inspection cycle for older poles should be 3 to 5 years depending on the type of inspection. Each inspection cycle will find more decay and new rejects which must then be replaced at increasing costs. This is why most utilities in Canada and the United States combine inspection with remedial treatment.

The savings realized with a well planned pole maintenance program utilizing good inspection and in-place preservative practices, performed by qualified people will return more to a utility than almost any other type of investment by extending pole life while gaining increased reliability.

## At What Age Should Standing Poles First Be Inspected

Today most poles are well treated prior to installation and it is reasonable to expect an average of 30 to 40 years life. The problem is that wood has so many variables that some poles will decay much sooner than the average. Usually, maintenance programs begin when poles are between 10 to 20 years of age. Exhibit I is a typical work summary taken from a northern area of the United States.

## What Should The Reinspection Cycle Be

Inspection cycles depend on the thoroughness of the original maintenance program (See Exhibit II). If a comprehensive program is carried out, there should be no problem in using a 10 to 12 year cycle and possibly longer in extreme northern areas. Some statistics from the utility's own system may be required to establish the most economical cycle. Type of timber, original treatment and type of maintenance program will all have a bearing on the length of the cycle.

## Inspection Personnel

Without doubt, the one most important requirement for a successful and economically sound program is well trained and motivated pole inspectors, supervised by personnel that have themselves had a minimum of 3 to 5 years experience in pole inspection.

A trainee for inspector should have a minimum of two months instruction, primarily in the field under a qualified inspector. In addition, supervisory personnel should give classroom type instructions on poles, treatments, decay, wire load tables and other aspects of the job.

This training period is necessary even if Foresters or Wood Technicians are used as inspectors, because it takes time to become proficient with the tools of the profession. A basic understanding of wood is desirable, but not necessary.

## What Are The Tools Of The Profession

To say that a great deal of time, money, effort and discussion has been spent on the "How-to's of Pole Inspection" is an understatement.

Most people want to find and use the "one" tool or "best" instrument for the inspection of poles. Not only is the "one best" instrument expected to be accurate on all species and treatments, but it should be simple, speedy and economical. To date, no such instrument has been discovered.

What is available is a combination of tools which, when used by competent inspectors, will give excellent results. The following tools will do the job: excavation tools, hammer, drill, shell indicator, Shigometer, check scraper or wire brush and a chipper.



## Excavation Tools

Decay requires air, moisture and proper temperatures. These elements are normally present in optimum amounts about 15 centimeters below ground. Picks, bars and shovels are utilized to expose wood to at least this level. The most thorough inspection involves excavation around the complete perimeter to a depth of about 45 centimeters.

Inspection programs that do not check below groundline are poor, but there can be an economical place for quick inspections with no digging and this is in areas that have many poles and lines in extremely bad condition. Some of the Eastern utilities that have many miles of older, untreated Northern White Cedar lines qualify. There, a pre-inspection (culling inspection) is usually the best way to proceed in order to weed out bad poles, dangerous sections of line or entire lines that could be more economically rebuilt. Immediately following the culling inspection the remaining old poles should be excavated, reinspected and the good ones treated.

## Hammer

This tool is used on the pole from as high as a person can reach to below ground level. Poles are seldom rejected with a hammer, but the sound does give an indication of where the inspector should look for problems. In some cases poles are so bad that the hammer will go right through. A sonic instrument can be substituted for a hammer to locate possible spots of internal decay.

## Drill

An experienced person with a drill can tell by the "feel" if any wood is in a stage of advanced decay. Wood shavings can also be checked for decay.

## Shigometer

This instrument gives the inspector the capability of finding early decay before it can be located with a drill. This is of prime importance if a utility is trying to extend the life of its pole plant with fumigants. The Shigometer is the only practical instrument we know of to locate incipient, or beginning decay. The Shigometer is also a good check against the drill in case the inspector does not "feel" the decayed area.

## Shell Thickness Indicator

If the Shigometer is not used, this tool is needed. It should be inserted into each bored hole to probe for decay pockets or hollows that may have been missed in drilling. It can also be used to determine the thickness of remaining wood shell.

## Check Scraper or Wire Brush

The external portion of the pole should be scraped to help locate external decay on the pole surface or in checks. A wire brush can be substituted for a check scraper on cedar poles because it is excellent for picking up the sound of decay between sapwood and heartwood which is typical in butt or incised treated cedar.

## Chipper

Many people think this tool is only used to remove external decay, but it is an excellent tool to find the depth of decay and probably the best tool to find the extent of soft-rot type of decay. Soft-rots generally start on the outside of the pole and work their way into the wood. In the early stages, the wood looks and feels good, however, it may have lost much of its strength and is brittle. When the chipper is used the wood snaps off. An experienced person can tell when good wood is reached, because it is limber and does not break in a brash manner.

## Conclusions

Some utility personnel have been reluctant to start inspection programs because they have read reports where some of the individual tools mentioned above have been evaluated and found to be only 40 to 80% effective. Because of all the variables, the investigators have not evaluated the tools in combination as they should have. Anyone evaluating inspection tools or instruments should also see that the person who is using the tools has been properly trained and has actually inspected 500 or more poles before the evaluation begins.

More than one million poles are inspected each year by professionals with the combination of tools mentioned. Each year some pole owners pull poles and dissect them to check out the results of inspections. Those of which we are aware have almost always shown the inspector to be right. When errors have been discovered, the conclusions have been that human judgment, not the tools, was at fault.

You can't build a house with just a hammer and you can't inspect poles properly today with just one tool.





from the **UTILITIES DIVISION**

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**subject:** WORK SUMMARY

Owner: COMPOSITE OF NORTHERN UTILITY COMPANIES

Type of Work: GROUNDLINE INSPECTION AND TREATMENT OF DISTRIBUTION POLES

Date of Work: MAY 2, 1983 TO OCTOBER 27, 1983

| Summary — Poles Excavated: | Quantity | % |
|---|---|---|
| 1. Total Poles Externally Treated | 3,395 | 88.3 |
| 2. Total Poles Rejected | 450 | 11.7 |
| 3. Total Poles Inspected | 3,845 | 100.0 |
| 4. Total Poles Rejected or Decayed | 1,256 | 32.7 |

Poles Inspected Were Northern White Cedar Creosote Treated, Western Pine Penta Treated, Western Cedar Creosote Treated, Northern Pine Penta Treated, Southern Pine Creosote Treated, Western Larch Penta Treated, Western Cedar Penta Treated, Lodgepole Pine Penta Treated, Northern Pine Creosote Treated, Southern Pine Penta Treated, Douglas Fir Creosote Treated And Alaskan Yellow Cedar Creosote Treated.

Installation Of Poles Ran From 1927 To 1978.
(Average Age: 34 Years)

168 Poles Were Listed In Dangerous Condition (4.4%).

143 Poles Were Internally Treated With Hollow Heart And
197 Poles Were Internally Treated With Woodfume.

Exhibit I

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## GROUNDLINE DECAY BY AGE GROUP

Owner: COMPOSITE OF NORTHERN UTILITY COMPANIES

| POLE AGE | TOTAL NO. OF POLES INSPECTED | POLES REJECTED | | | CIRCUMFERENCE REDUCED, OSMOSE TREATED | | | TOTAL POLES REJECTED OR DECAYED | |
|---|---|---|---|---|---|---|---|---|---|
| | | Interior Decay (More than 1" from surface) | Outer Decay (1" or less from surface) | % To Total | Interior Decay (More than 1" from surface) | Outer Decay (1" or less from surface) | % To Total | No. | % To Total |
| 30+ | 2,600 | 250 | 50 | 11.5 | 163 | 506 | 25.7 | 969 | 37.3 |
| 25-29 | 465 | 76 | 13 | 19.1 | 53 | 17 | 15.1 | 159 | 34.2 |
| 20-24 | 372 | 36 | 3 | 10.5 | 31 | 5 | 9.7 | 75 | 20.2 |
| 15-19 | 394 | 18 | 3 | 5.3 | 29 | 2 | 7.9 | 52 | 13.2 |
| 10-14 | 11 | 1 | - | 9.1 | - | - | - | 1 | 9.1 |
| 0-9 | 3 | - | - | - | - | - | - | - | - |
| TOTALS | 3,845 | 381 | 69 | 11.7 | 276 | 530 | 21.0 | 1,256 | 32.7 |

Exhibit II

Table I

Reliability of Inspections
and
Recommended Cycles Based on Excavation Practices

| Type of Inspection | Cycle | Remarks |
|---|---|---|
| 1. Visual & Sounding | Yearly | Almost worthless. Even misses danger poles. Does nothing to maintain pole plant. |
| 2. Visual, Sonic Inspect & Bore; or Visual, Sound & Bore | 2-3 years | Finds 40-60% of the bad poles. Finds most danger poles, but not all. Does nothing to maintain plant. |
| 3. Visual, Partial Excavate 6" in one or two spots, Sound & Bore | 3-5 years | 80-90% of the rejects can be located. Fair inspection but does not prolong the life of pole plant. |
| 4. Excavate 6"-10" around entire circumference, Inspect and Treat to 18" all poles with decay or defects | 5-6 years | 90-95% of rejects can be located. Good inspection. Most of the poles that would fail early are treated. Usually, approximately 20% of the poles are excavated and externally treated. |
| 5. Visual, Excavate 18", Sound & Bore and Groundline Treat | 10-12 years | 99% of all rejects are located. Most economical in long run as the inspection is longer and the life of pole plant is extended. |

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