Depreciation

The Concept of Depreciation Regarding Public Utilities

The depreciation of physical structures, even the wear and tear of tools, has been recognized as a fact of mechanical life ever since the First Century B.C. However, general acceptance of the principle of depreciation and the practice of deducting depreciation expenses only took hold in this century.

Knoxville v. Knoxville Water Company (212 U.S. 1), decided in 1909, is considered to be a landmark decision in the area of public utility depreciation. For the first time, the Supreme Court discussed depreciation in a rate case, addressing itself to the issues of depreciation expense and accrued or existing depreciation in rate base determination. The recognition of depreciation expense by the Supreme Court in the Knoxville case provided a foundation for the conceptual acceptance of a "provision" for depreciation. However., the actual execution of this "provision" remained unclear. In the later part of 1912, the Interstate Commerce Commission (ICC) issued its Uniform System of Accounts for certain telephone companies. Among other procedures, it was determined that a depreciation expense for individual units should be designed to recover the cost of plant over its estimated life; and for group properties, over the estimated average service life. This generally accepted method of provision became known as depreciation accounting. Implicit in this methodology is the recognition of the age-life relationship of physical properties. As the need for information concerning plant mortality characteristics like service life became apparent, studies of human mortality and survivor curves or life tables (actuarial procedures) were applied to physical property.

In 1921, researchers began to work on retirement characteristics at Iowa State College. Ten years later, Robley Winfrey and Edwin Kurtz published Bulletin 103, entitled "Life Characteristics of Physical Property." In this seminal work, sixty-five individual survivor curves representing a range of physical properties were grouped into thirteen type survivor curves. Later, Mr. Winfrey expanded his research to include one hundred eleven additional survivor curves and five additional type survivor curves. To date, mathematical curve fitting, using Iowa-Type curves, is commonplace.

Currently, there are two principles governing the term, "depreciation": the "value concept" and the "cost allocation concept." In the value concept, all depreciable plant tends to diminish in value with the passage of time, due to forces such as obsolescence, wear and tear, and inadequacy. Consequently, depreciation can be determined by a series of periodic appraisals or estimates of plant value: the change in value between such estimates becomes a measure of the depreciation attributable to the period between estimates. Clearly, annual estimates for a complex and extensive utility plant would be a staggering undertaking . Since a utility needs to know depreciation on a monthly basis. In order to be reflected properly in earnings and expense reports, the value concept of depreciation is deficient.

The "cost allocation" concept aims at distributing the cost of depreciable plant in a manner properly related to the useful life of the plant. Thus, periodic financial reports have a degree of consistency which is highly desirable for the proper management of a company's financial workings.

The Federal Communications Commission for telephone companies defines depreciation as:

(n) "Depreciation," as applied to depreciable telephone plant, means the loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of telephone plant in the course of service from causes which are known to be in current operation against which the Company is not protected by insurance' and the effect of

> Which can be forecast with a reasonable approach to accuracy. Among the causes to be given consideration are wear and tear; decoy, action of the elements, inadequacy, obsolescence; changes in the art, changes in demand and requirements of public authorities.

The term "service value," used above, means the cost of a plant item less net salvage value, as defined by the Uniform System of Accounts for Telephone Utilities. Similar definitions are found in account guidelines provided by the Interstate Commerce Commission, the Federal Energy Regulatory Commission, and the National Association of Railroad and Utilities Commissions.

The cost allocation concept of depreciation has been accepted as the most practical and efficient way of blending this expense into the day-to-day conduct of modern business. Of course, there are many ways to allocate the "cost" of property to the various accounting periods during its life. What is important, however, is a proper matching of revenues and costs which does not distort the accounting record of net income. The simplest and most logical way to achieve this end is the use of a method which distributes the cost of property in a reasonable and consistent manner to all of the related accounting periods.

Methods of Computing Depreciation that are Considered Appropriate for Utility Properties

There are several methods for computing depreciation based on the cost allocation concept. Of all these methods, however, the straight-line approach is most widely used in utility operations. I will presently discuss some of these methods, including straight-line.

One way of computing depreciation is the "declining balance" method., which assigns more of the depreciation expense to the earlier years of the life of the plant. Known as "accelerated" depreciation, an accelerated effect is achieved by using a depreciation rate higher than a straight-line rate and applying it to the net plant balance. That is, the prior years' accruals are deducted each year to yield a "declining balance."

If estimates of service life are subject to wide possible errors., the declining balance method has an advantage because a relatively small amount of recovery is left to the period near the end of the life of the property. In addition, this method generates more internal funds from depreciation accruals, as long as total overall plant dollars continue to grow.

In my opinion, however, there are disadvantages which generally outweigh the advantages of this method. One disadvantage is that the calculated depreciation rate is so high that it causes early accruals to build up an excessive depreciation reserve, which results in an unreasonably depressed statement of net assets. That is, the early accruals exceed reasonable measures of early plant consumption.

A second method of computing depreciation is the "unit of production" method., which is closely related to the age-life procedures of the declining balance and straight-line methods. Rather than estimating service life, however, total service in terms of units of production, like hours of operation or unit volume of output, are used. A "unit of production" approach may be more accurate than other methods of depreciation in situations where plant property stands idle and then returns to operation for varying lengths of time. This method has often been applied in the field of transportation where miles of operation, ton-miles hauled, or hours of operation are used as the units of production. In addition, many gas pipeline companies employ the unit of production method to depreciate certain classes of property. In this application, it is argued that total production is more certain than service life. The critical questions are: can total service be more accurately forecast in production units or years of life span? Is consumption entirely unrelated to age or reasonably related to age?

Rapid changes in technology and other causes of obsolescence in today's environment often cause retirement of plant, even though the equipment is still functional. In fact, some applications of the "units of production" method of depreciation may require first an estimation of service life and then an application of average usage data to get total production data.

The "units of production" method assumes that each unit of production has the same cost of depreciation. However, this may not always be true. Service at times of peak load, for example, may involve more physical deterioration than during off-peak periods. Or operating at full capacity may result in greater wear and tear than if production is at less than full capacity.

Finally, a practical basis for the use of "service life" methods, rather than units of production, can be seen in the following classic example. Consider the depreciation of a buried gas or water main, or a buried electric or telephone cable. Does depreciation of the main or cable take place because of the volume of flow through it, or because it is buried in soil which acts on its exterior? Obviously, causes independent of the units of production dominate retirements of typical buried utility lines . This is just one illustration of the many reasons which limit the usefulness of units of production methods in the utility industry.

The straight-line method of computing depreciation expense charges the same amount for each year or accounting period over the service life of a plant item or a plant group, providing there is no change in the initial estimate of service life and salvage value. The depreciation expense is calculated by dividing 100% minus the net salvage value expressed as a percent, by the estimated average service life in years. For example, the depreciation rate for a plant having an estimated average service life of 25 years and a net salvage value of 0% would be 4.0%: (100% - 0%)/25 = 4.0%. Using this methodology, the depreciation rate is held constant over the life of the depreciable plant. Changes in the depreciation rate are made only when estimates of the average service life or salvage value of the asset are revised.

Clearly, the straight-line approach lends stability to the utility's operations by minimizing the fluctuations of expense from one accounting period to the next. Other methods, however, tend to peak the depreciation expense at some period in the life of the plant. In addition, the straight-line method ensures that each generation of customers pays an equivalent share of the depreciation expense over the life of the property. On the other hand, methods which peak the depreciation expense in earlier years generally require the earlier generation customers to pay more than their fair share of the depreciation expense;

while later generation customers pay less than their fair share.

Finally, use of the straight-line method of depreciation immediately yields rates and accruals without further factoring, estimating, or other adjustments applicable to other procedures. All in all, the straight-line method of depreciation appears to contain many advantages over other methods of computing depreciation expense, as its widespread use demonstrates.

The Estimated Service Life Concept, and the Methods Used to Estimate

First., the term "service life" refers to the span of years from the placement of a particular plant to its eventual retirement. "Average life" is the average expected life of all units of a particular group when new, and is the arithmetic average of the lives of the units.

The topic of proper estimation of service life covers such a wide spectrum of acceptable methodologies that I can only mention certain characteristics common to all methods of estimation. Typically, the determination of service life involves an engineering estimate of future effects of wear and tear, decay, actions of the elements, inadequacy, obsolescence, and public requirements. Often other factors, such as anticipated changes to newer or improved plant or specific management plans., must be given consideration. Generally, past experience gives an indication of life trends which can be used as one of the elements in developing the service life estimate. The development of smooth survivor curves from mortality data by actuarial methods is generally considered to be the most accurate and reliable method for depicting past experience.

A survivor curve represents the portion of original plant remaining in service each year. It is obtained from a frequency curve by cumulatively subtracting the portion of plant retired each year from 100% at placement to 0% at retirement of all units. When dealing with groups of property, however, all units seldom reach retirement at the same time. Some units will retire at an early age; many units, at a generally accepted average age; and a few units, at a late age.

Net Salvage Value

"Gross salvage" refers to the amount received from the disposal of material or equipment when the property in question is retired. "Net salvage," or "net salvage value," is the value of the retired property after the cost of its removal is deducted.

Since salvage value and cost of removal are the two factors that determine net salvage value, care should be taken to eliminate pure guesswork in estimations, and to analyze the salvage value net of the cost of removal realized in the past. Graphs can be prepared which show, in percentages, gross salvage, cost of removal , and net salvage for moving "bands" of time; for example, the years 1983-87, 1984-88-, 1985-89. These bands should be of sufficient length to expose any trends which may be reflected in the data. The results of this analysis can be used as a basis or starting point for determining future gross salvage and cost of removal to arrive at an estimate of net salvage value.

However, the above trends should not be considered the only means of predicting future salvage. Changes that may cause deviations from past trends, such as the method of removal or differences in kinds of material to be removed, can be recognized and included in the estimate of future salvage value.

Several methods exist today which provide a thorough study of past salvage experience, as well as an acceptable means for estimating future salvage values, but they are costly to employ in terms of dollars and man-hours. It is often difficult to justify the expense necessary to conduct this type of in-depth analysis, due to the relatively minimal effect on depreciation rates caused by different salvage values. Most utilities believe that reasonable salvage estimates can be made by trending net salvage experience and applying judgment.

It is true that the application of one or several of these methods to all of a company's plant would not be economically feasible. However, where severe changes in trends have occurred or where judgment and trend conflict, application of an in-depth study for the particular portion of plant affected can help considerably with a more accurate estimate of salvage value.