2. Depreciation

Q. Please turn to the second section of your testimony, concerning depreciation as it relates to TELRIC studies. Would you please begin by briefly discussing the concept of depreciation, as it has traditionally been applied to public utilities?

A. Yes. 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. In the former issue of depreciation expense, the Court held that a company was not obligated to see its property gradually decline without making provisions out of earnings for the replacement of that property. In the latter issue, the Court held that a company is entitled to see that from its earnings, the value of the property invested is kept unimpaired, so that at the end of any given time the original investment remains as it was at the beginning. The recognition of depreciation expense by the Supreme Court in the Knoxville case provided a foundation for the acceptance of the concept of a "provision" for depreciation. The manner in which this "provision" was to be made, however, remained unclear.

In the latter 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 has become 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 such as service life become apparent, studies of human mortality and survivor curves or life tables (actuarial procedures) were applied to physical property. Around 1920, the Bell System began application of the Gampertz-Makeham formula to telephone facilities and introduced the "life table" to depreciation work.

The following year, 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, Winfrey expanded his research to include one hundred eleven additional survivor curves and five additional type survivor curves. In the ensuing years, it has been common for depreciation expenses to be calculated based upon mathematical curve fitting, using Iowa-type curves.

At least in recent years, two principles have governed the term "depreciation": the *value concept* and the *cost allocation concept*. In the value concept it is recognized that all depreciable plant tends to diminish in value with the passage of time, due to forces such as obsolescence, wear and tear, and inadequacy. This concept suggests that depreciation can be determined through a series of periodic appraisals or estimates of plant value, with the change in value between such estimates regarded as a measure of the depreciation attributable to the period between estimates.

To fully implement this concept, with monthly or annual valuation estimates for each item within a carrier's network, would be a staggering undertaking. A utility needs to know depreciation on a monthly basis in order to reflect it properly in earnings and expense reports; thus in practical terms depreciation value can only be approximated. However, it is at least theoretically possible to develop value estimates each month, computing depreciation/appreciation as the change in the value of the plant since the prior month's estimate.

The cost allocation concept aims at distributing the cost of depreciable plant in a manner properly related to the useful life of the plant. One strength of this approach is the consistency it creates for periodic financial reports, which is convenient and desirable from the perspective of managers, regulators and investors. In contrast, the value approach to depreciation potentially results in a pattern of fluctuating expense, due to variations in the underlying factors that contribute to decreases (or increases) in the value of particular items of plant.

Accordingly, the cost allocation concept of depreciation has been accepted as the most practical and efficient way of developing this expense for the day-to-day conduct of modern business. Of course, there are many ways that the "cost" of property may be allocated 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.

Q. What are some of the methods that can be used to compute depreciation using the cost allocation concept?

A. 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. A relatively high depreciation rate is used, but it is applied to the net plant balance. That is, the prior years' accruals are deducted each year to yield a "declining balance," which is then used in computing the depreciation expense for the subsequent year. This approach is sometimes referred to as "accelerated" depreciation, because it tends to allocate a disproportionately large fraction of the total cost in the early time period.

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 contrast, with a straight-line method, discrepancies in the correct service life have a larger impact on the amount of depreciation expense during the time period just prior to retirement. In addition, since accelerated depreciation methods create a larger amount of expense in the early years, the effect is to generate more internal funds from (non-cash) depreciation accruals and/or from reduced income taxes. Of course, if the accelerated method is used in computing the reported amount of earnings, there is a tendency to depress current earnings reported to investors, which may or may not be an attractive pattern from the perspective of management.

In the context of utility regulation, one disadvantage of this method is that since the calculated depreciation rate is high in the early years, the depreciation reserve builds up very rapidly, resulting in an unreasonably depressed statement of net assets. That is, the early accruals may exceed a reasonable allocation of the full cost of the plant to those years. Another disadvantage is that this methodology tends to create the appearance of high costs, which tends to translate into high rates under traditional rate-base regulation. Theoretically, the initial high level of expense may be offset by lower expense (and thus lower rates) in later years; however, the subsequent downward reduction in rates may occur only after a considerable lag, and thus ratepayers may be overcharged for a extended period of time. In the context of traditional regulation, at least, these disadvantages of accelerated depreciation generally outweigh its advantages; and thus it has generally not been used for ratemaking purposes.

Another method of computing depreciation rarely used with public utilities 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, it uses total service in terms of units of production, such as hours of operation or unit volume of output. This approach may be useful when plant property stands idle and then returns to operation for varying length of time. It 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. It is not common in telecommunications, where plant tends to be in continuous use and the cost of the item is more appropriately allocated in proportion to time rather than units of production.

By far the most popular method of computing depreciation expense is the straight-line method, which charges the same amount each year or accounting period over the service life of a plant item or a plant group. 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%). With this methodology, the depreciation rate is held constant over the life of the depreciable plant. Changes in the depreciation rate may occur 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 financial reporting by minimizing the fluctuations of expense from one accounting period to the next. Other methods, in contrast, 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. This approach is reasonable, particularly where each generation of customers receives roughly the same amount of value or benefit from the item in question.

Finally, use of the straight-line method of depreciation tends to be simpler than some of the other alternatives. It yields depreciation rates and accrual amounts without the further factoring, estimating, or other adjustments often required by other procedures. All in all, the straight-line method of depreciation holds many advantages over other methods of computing depreciation expense, as its widespread use demonstrates.

Q. Does general acceptance of the straight-line approach eliminate methodological controversies?

A. No. While there currently may be a consensus in favor of straight line depreciation, this does not mean that the resulting depreciation rates are uncontroversial. To the contrary, with a straight-line method, considerable controversy exists concerning the appropriate life span, or time period which should be used in developing the depreciation rates. Most significantly, rapid changes in technology and other causes of obsolescence in today's environment can cause early retirement of plant, even though the equipment is still functional, with substantial remaining potential production life. Hence, in recent years increasing emphasis has been placed on the "economic life" of an item, in an effort to more accurately apply the straight-line method.

Q. Would you briefly describe the estimated service life concept, and the methods used to estimate them?

A. Yes. 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 may cover a wide spectrum of acceptable methodologies, depending upon the context. 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 legal requirements. Sometimes, other factors must be given consideration—such as anticipated changes to the network design, anticipated changes in the customer mix or expectations, anticipated changes in technology, or specific management plans. Generally, past experience with the same or similar plant items provides an indication of life trends and can be a key element in developing the service life estimate.

Q. How is past experience formalized in such estimates?

A. The development of smooth survivor curves from mortality data using actuarial methods is considered an accurate and reliable method for depicting past experience. A survivor curve represents the portion of original plant remaining in service each year. When dealing with groups of property, 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.

In sum, an estimate of average service life can be determined by reviewing the past life data, observing the trend in life indicators and retirement rates, and considering new developments which might accentuate or reverse the trends. If future life indicators are expected to differ substantially from past ones, estimation of average service life will be difficult and steps should be taken to combine past realized life with future expected life.

In recent years, economic factors have tended to dominate the appropriate calculation of service life of telecommunications facilities, because many items of equipment will physically be capable of providing service after they are no longer economically viable to operate or maintain. In fact, trends in the pace of technological change, the tendency for the prices of specific items to inflate or deflate over time, and similar economic phenomena tend to strongly influence the actual pace of retirements. As a result, these economic factors have increasingly tended to dominate both the actual pattern of retirements and the calculated depreciation rates that are approved by regulators and used by the industry.

Q. Would you please briefly discuss salvage value?

A. Certainly. *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.

The pattern of past salvage and cost of removal experience can be used as a basis for estimating future net salvage values. However, it isn't always necessary to prepare these calculations. Where there is considerable uncertainty about the appropriate service lives, the calculation of net salvage values may add relatively little to the final result. Stated differently, it is often the case that the cost of removal is equal to, or nearly equal to, the gross salvage. Hence, the impact of net salvage on the final depreciation rate may be negligible. It is difficult to justify the expense necessary to conduct an in-depth analysis of this issue if wide differences of opinion exist concerning the appropriate lives of the various items. Of course, in such circumstances, one is unlikely to attain a high level of precision in calculating the depreciation rates in any event.

Q. Up to this point you have been speaking about depreciation in general terms. Do these general principles apply to an economic cost study?

A. Yes. Both the value and cost allocation approaches to depreciation are potentially applicable to an economic cost study. Where one is attempting to calculate economic costs on a period-by-period basis—carefully distinguishing between the costs incurred during year one relative to those incurred in year two, and so forth—the value approach to depreciation might be of particular interest. However, in the more typical context, where one is attempting to estimate economic costs on a generalized going forward basis, the cost allocation approach to depreciation will most likely be sufficient, and preferable (due to its simplicity).

When computing depreciation in an economic cost study, the most critical issue is selection of an appropriate and accurate service life for each item or category of investment. In this regard, there is relatively little difference between the depreciation issue as it applies to cost studies, and the depreciation issue as it applies to regulation generally. If an unduly long life is used, the resulting cost estimates and rates will tend to be too low. Conversely, if an unduly short life is used, the cost estimates and rates will tend to be too high.

Q. What is the FCC's position regarding depreciation lives used in economic cost studies?

A. The FCC has not established any firm rules concerning the appropriate methods to use in developing economic lives, or depreciation rates, for use in economic cost studies. The FCC already takes economic factors into consideration in determining the depreciation rates which it accepts for traditional regulatory purposes. In fact, economic obsolescence and other economic factors have led to a considerable shortening of the service lives approved for traditional regulatory purposes for most telecommunications carriers. Hence, there is no fundamental difference between the FCC's traditional approach to depreciation and the most logical approach to apply to an economic cost study.

The FCC has stated that, with regard to setting prices for unbundled elements, "[o]nly forward-looking, incremental costs shall be included in a TELRIC study." [August 8, 1996 Order, ¶690]. Further, in the definition of TELRIC contained in the Rules which have been stayed by the 8th Circuit, the FCC mandates that "[t]he depreciation rates used in calculating forward-looking economic costs of elements shall be economic depreciation rates." [Rule 51.505(b)].

In a recent report, the FCC Staff provided some comments concerning their view of the appropriate methods for computing depreciation in an economic cost study:

> We believe that depreciation schedules specified in a proxy model should be based on forward-looking costing principles and should reflect projected economic lives of investments rather than physical plant lives. As discussed above, we believe that the reported plant lives for loop-plant structures, such as conduit, manholes, and poles, are particularly important. Because of the relatively large investment necessary to construct such facilities, inaccurate estimation of the expected economic lives of such facilities may result in a significant under or overestimation of the forward-looking cost of these facilities. We also believe that the depreciation rates reported by incumbent LECs for financial purposes may provide information to determine the appropriate economic lives of facilities. [*The Use of Computer Models for Estimating Forward-Looking Economic Costs, A Staff Analysis*, January 9, 1997.]

Since the FCC establishes "projection" lives during its traditional triennial review process—considering technological change, market obsolescence, and other economic factors—it is readily apparent that these FCC-approved projection lives are a useful starting point in estimating depreciation rates for cost modeling purposes. Granted, there is no requirement to use the FCC's approved projection lives for this purpose. However, the FCC, indicated in its August 8, 1996, Implementation Order that federal or state approved depreciation rates are a reasonable starting point for TELRIC calculations. The FCC indicated that incumbent LEC's bear the burden of demonstrating that alternative rates would be more appropriate than those approved for traditional regulatory purposes. [Section 702].