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Harrop A. Freeman

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## PUBLIC UTILITY DEPRECIATION

HARROP A. FREEMAN

“When the Army’s on maneuvers,  
Out behind the staff I trudge.  
For the lawyers call me ‘colonel’  
But the soldiers call me ‘judge.’”

This familiar ditty concerning the Judge Advocate is only too apt in describing those of us who, as lawyers, try to mix economics in our presentations. Fellow lawyers excuse our legal shortcomings by favorable comment on our economic theories and economists are quick to recognize our legal lore. Yet, having long been a believer in the legal-economic approach, I was heartened by the recent first words of greeting from the former senior partner, with whom I first practiced utility law: “Tell your law students there is no more important subject for them than accounting.” I therefore make bold to approach the problem of utility depreciation economically as well as legally and to present material which would more normally appear in an economic rather than in a legal journal. I am particularly interested in depreciation as it relates to the rate of return—the point at which the interest of the utility, the consumer, and the public most clearly merge.

### *Does a utility depreciate?*

In spite of thousands of cases allowing depreciation, countless accounting treatises on the best method of reporting it, disputes as to the advisability of straight line or reserve methods, the question will not down: Does a utility depreciate? This is a reflection of misconceptions as to the nature of depreciation, the varying use of the term and conflicting theories and interests. Thus, to cite a radical view, the railroads have long urged that there is no depreciation in a properly maintained utility and that depreciation accounting injects speculation rather than certainty.<sup>1</sup> They seek thereby a deduction of all replacement costs as expenses. To answer this briefly (though the universal allowance of depreciation may render answer unnecessary), depreciation is a fact which exists apart from the accounting methods employed to reflect or conceal it; it has no relationship to the efficiency of the property being depreciated—the last corset a machine turns out may be as good as the first—but the fact is *it is the last*; depreciation does not depend upon use or earnings—a machine moves toward the junk pile whether used and whether profitable.

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<sup>1</sup>Depreciation Charges of Telephone Companies and Steam Railroad Companies, 177 I. C. C. 351, 382-383 (1931).

*The Supreme Court and depreciation*

No reference to the relation of depreciation to the problem of fair rate of return is found in the early advice of the Court on the method of determining such rate in *Smyth v. Ames*.<sup>2</sup> That depreciation should be allowed as a separate item, in addition to a fair rate of return, was soon thereafter recognized in the *Knoxville Water* case (The author has italicized at least four economic concepts indiscriminately mingled in two sentences):

"The Company is not bound to see its *property gradually waste*, without making *provision* out of earnings for its replacement. It is entitled to see that from earnings the *value of the property invested is kept unimpaired*, so that at the end of any given term of years the *original investment remains as it was at the beginning*. It is not only the right of the company to make such a provision, but it is its duty to its bond and stockholders, and, in the case of a public service corporation at least, its plain duty to the public."<sup>3</sup>

At a later date the same court gave very extended consideration to the problem in *Lindheimer v. Illinois Bell Telephone Company* thus (Again the author has italicized varying theories):

"Broadly speaking, *depreciation is the loss*, not restored by current maintenance, which is due to all the factors causing the *ultimate retirement of the property*. These factors embrace wear and tear, decay, inadequacy, and obsolescence. Annual depreciation is the loss which takes place in a year. In determining reasonable rates for supplying public service, it is proper to include in the operating expenses, that is, in the cost of producing the service, *an allowance for consumption of capital* in order to *maintain the integrity of the investment* in the service rendered. The amount necessary to be provided annually for this purpose is the subject of estimate and computation. In this instance, the Company has used the 'straight line' method of computation, a method approved by the Interstate Commerce Commission. 177 Inters. Com. Rep. pp. 408, 413. By this method *the annual depreciation charge is obtained by dividing the estimated service value by the number of years of estimated service life*. The method is designed to spread evenly over the service life of the property the loss which is realized when the property is ultimately retired from service. According to the principle of this accounting practice, the loss is computed upon the actual cost of the property as entered upon the books, less the expected salvage, and the amount charged each year is one year's pro rata share of the total amount. Because of the many classes of plant, some with long and some with short lives, some having large salvage and others little salvage or no salvage, and because

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<sup>2</sup>169 U. S. 466, 18 Sup. Ct. 418 (1898).

<sup>3</sup>City of Knoxville v. Knoxville Water Co., 212 U. S. 1, 13-14, 29 Sup. Ct. 148, 152 (1909).

of the large number of units of a class, the Company employs averages, that is, average service life, average salvage of poles, of telephones, etc.

"While property remains in the plant, the estimated depreciation rate is applied to the book cost and the resulting amounts are charged currently as expenses of operation. The same amounts are credited to the account for depreciation reserve, the 'Reserve for Accrued Depreciation.' When property is retired, its cost is taken out of the capital accounts and its cost, less salvage, is taken out of the depreciation reserve account. According to the practice of the Company, the depreciation reserve is not held as a separate fund but is invested in plant and equipment. As the allowances for depreciation, credited to the depreciation reserve account, are charged to operating expenses, the depreciation reserve invested in the property thus represents, at a given time, the amount of the investment which has been made out of the proceeds of telephone rates for the ostensible purpose of *replacing capital consumed*. If the predictions of service life were entirely accurate and retirements were made when and as these predictions were precisely fulfilled, the depreciation reserve would represent the consumption of capital, on a cost basis, according to the method which spreads that loss over the respective service periods. But if the amounts charged to operating expenses and credited to the account for depreciation reserve are excessive, to that extent subscribers for the telephone service are required to provide, in effect, capital contributions, not to make good losses incurred by the utility in the service rendered and thus to keep its investment unimpaired, but to secure additional plant and equipment upon which the utility expects a return."<sup>4</sup>

In its essential features this definition bears considerable similarity to the widely quoted statement in the Federal Power Commission's classification of accounts:

"... the loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of electric plant in the course of service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among the causes to be given consideration are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the art, changes in demand and requirements of public authorities."<sup>5</sup>

The Supreme Court seems to have combined the view of a wasting asset with the idea that depreciation is to provide replacement; has considered depreciation's function as maintaining both the value of property and the original investment (capitalization); has spoken in the same breath of pro-

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<sup>4</sup>292 U. S. 151, 167-169, 54 Sup. Ct. 658, 664-665 (1934).

<sup>5</sup>Federal Power Commission, *Uniform System of Accounts for Public Utilities and Licenses* (1937) 5.

viding for "retirement of the property," and for "consumption of capital." The Court's treatment of depreciation reflects the same lack of clarity of thought as to whether the relationship exists between *stockholders' investment* and the charge to the consumer, or the *physical assets* owned by the utility and the customer charge which appears in its general consideration of valuation and the rate of return.<sup>6</sup> This can be illustrated by a historical tracing of specific depreciation problems. On what base is depreciation to be figured? How is functional depreciation to be treated?

It is usually stated that three bases of depreciation have been employed—"original cost," "reproduction cost," and "fair value." Perhaps it would be wise to consider these as two: (1) original cost and (2) reproduction cost (present fair value). The rule basing depreciation on original cost has been applied to certain accounts of steam railroads by the Interstate Commerce Commission since 1907; it has been applied by the U. S. Census Bureau since 1911; it is used by the Department of Agriculture and the Bureau of Mines; it was adopted by the Federal Trade Commission in 1916; in 1917 it was prescribed by the United States Fuel Administration and the War Ordnance Department, by the Aircraft Production Board in 1918, by the Federal Power Commission in 1921, and has been ordered by the Interstate Commerce Commission for telephone companies.<sup>7</sup> The various state commissions tended toward original cost, particularly Wisconsin,<sup>8</sup> New York,<sup>9</sup> New Jersey,<sup>10</sup> Illinois,<sup>11</sup> and Indiana.<sup>12</sup> Major support for depreciation based on present value or reproduction cost has always come from the judiciary.<sup>13</sup> The Su-

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<sup>6</sup>Although from *Smyth v. Ames*, 169 U. S. 466, 18 Sup. Ct. 418 (1898) to *West v. Chesapeake & Potomac Telephone Co.*, 295 U. S. 662, 671, 55 Sup. Ct. 894, 897 (1935), the Court followed the theory of testing rates in terms of what was a fair return on the fair value of property used for the public, its actual definition of the components of the rate of return in the famous three statements—attraction of capital (Brandeis, J. in *Missouri ex rel. Southwestern Bell Telephone Co. v. Public Service Commission of Missouri*, 262 U. S. 276, 43 Sup. Ct. 544 (1923)); comparable risk (Butler, J. in *Bluefield Waterworks & Improvement Co. v. Public Service Commission of West Virginia*, 262 U. S. 679, 43 Sup. Ct. 675 (1923)); and financial need (Sutherland, J. in *United Railways & Electric Co. of Baltimore v. West*, 280 U. S. 234, 50 Sup. Ct. 123 (1930)) has always been in terms of finances and investment.

<sup>7</sup>See Brandeis' dissent in *United Railways & Electric Co. of Baltimore v. West*, 280 U. S. 234, 266, 50 Sup. Ct. 123, 131 (1930).

<sup>8</sup>24 Wis. R. C. R. 557, 565 (1920).

<sup>9</sup>P. U. R. 1920D, 529; P. U. R. 1923A, 255.

<sup>10</sup>P. U. R. 1923A, 734.

<sup>11</sup>P. U. R. 1925D, 154, 166; P. U. R. 1928A, 57.

<sup>12</sup>P. U. R. 1925C, 431, 438.

<sup>13</sup>*United Fuel Gas Co. v. Railroad Commission of Kentucky*, 13 F. (2d) 510, 523 (E. D. Ky. 1925); *Michigan Public Utilities Commission v. Michigan State Telephone Co.*, P. U. R. 1925C, 158, 163; *United Railways & Electric Co. of Baltimore v. West*, 280 U. S. 234, 266, 50 Sup. Ct. 123, 131 (1930).

preme Court seemed to lay the issue at rest in the *United Railways* case, when it categorically demanded reproduction cost as a base:

"The allowance for annual depreciation made by the commission was based upon cost. The court of appeals held that this was erroneous and that it should have been based upon present value. The court's view of the matter was plainly right. One of the items of expense to be ascertained and deducted is the amount necessary to restore property worn out or impaired, so as continuously to maintain it as nearly as practicable at the same level of efficiency for the public service. Manifestly this allowance cannot be limited by the original cost, because, if values have advanced, the allowance is not sufficient to maintain the level of efficiency. The utility 'is entitled to see that from earnings the value of the property invested is kept unimpaired, so that at the end of any given term of years the original investment remains as it was at the beginning.' *Knoxville v. Knoxville Water Co.*, 212 U. S. 1, 13-14, 29 Sup. Ct. 148, 152. This naturally calls for expenditures equal to the cost of the worn-out equipment at the time of replacement; and this, for all practical purposes, means present value. It is the settled rule of this court that the rate base is present value, and it would be wholly illogical to adopt a different rule for depreciation."<sup>14</sup>

This case was decided when the demand for "reproduction" and "fair value" as a rate base was in its heyday.

In *Los Angeles Gas & Electric Co. v. Railroad Commission*,<sup>15</sup> rate fixing involving use of actual costs rather than reproduction cost was approved; in the same year the Court stated that the amount and method of depreciation is a question of fact for the administrative agency.<sup>16</sup> In 1942, rates fixed on a basis of original cost less depreciation and the deduction of depreciation based on original cost as an operating expense were sanctioned.<sup>17</sup> At last in the *Hope* case,<sup>18</sup> the Court expressly overruled the *United Railways* case and authorized the computation of depreciation on the basis of original cost, thus completing the merry-go-round ride of depreciation based on cost, to depreciation based on present value, to depreciation based on cost.

From an accounting and logical standpoint the Supreme Court is only now on firm ground, for reproduction or replacement cost as a base has always been indefensible: (1) Only original cost depreciation accords with the pur-

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<sup>14</sup>280 U. S. 234, 254, 50 Sup. Ct. 123, 126 (1930).

<sup>15</sup>289 U. S. 287, 53 Sup. Ct. 637 (1933).

<sup>16</sup>*Clark's Ferry Bridge Co. v. Public Service Commission of Commonwealth of Pennsylvania*, 291 U. S. 227, 54 Sup. Ct. 427 (1934).

<sup>17</sup>*Federal Power Commission v. Natural Gas Pipeline Co. of America*, 315 U. S. 575, 62 Sup. Ct. 736 (1942).

<sup>18</sup>*Federal Power Commission v. Hope Natural Gas Co.*, 320 U. S. 591, 64 Sup. Ct. 281 (1944).

pose of depreciation accounting. (2) It is supported by the weight of authority and long-followed business practice. (3) Replacement for much of the utility property is the exception rather than the rule. (4) Replacement cost is inequitable to investors when prices fall and to consumers on a rising price scale, but original cost can do equity to both. (5) Administratively, replacement cost is impossible to handle, depending as it does on estimates of cost many years hence—which estimates may themselves change frequently.

If we consider "physical depreciation" as that resulting from wear, exposure, deterioration and similar causes which tend to reduce the physical capacity or life of the asset to render service, we shall be bound to recognize that we have not made allowance for all the items going to make up depreciation, for depreciation may result from change of regulatory standards or obsolescence or inadequacy, due to technical progress or even to increase in demand beyond present capacity. Telephone hand sets may have to be replaced by French phones, manual switchboards by new dial installations, and wires on poles by wires in underground conduit. All this is known as "functional" depreciation. It is one of the major risks of business. In fact Nash estimates utility retirement as 80 per cent functional.<sup>19</sup>

The statement already quoted from the *Knoxville* case, as well as the opinions in the *Minnesota Rate* cases<sup>20</sup> and *Kansas City Southern Railway v. United States*,<sup>21</sup> recognize both physical and functional depreciation. Early cases indicate that functional depreciation, with its risk factor, was originally treated as part of the rate of return.<sup>22</sup> It is submitted that by recognizing functional retirement as depreciation rather than as a component of rate of return, the Court has accepted a sound accounting position. The retirement is none the less real because it comes from functional rather than physical causes and the necessity for allocating expenses between accounting periods is none the less present. The view early taken by the Court had an element of wisdom in it which needs to be revived and brought into the present sound accounting position. Since one of the major "risks" of utilities is functional depreciation, and compensation for risk is one of the recognized components of a fair return,<sup>23</sup> if allowance is made for this "risk" as part of a rate of

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<sup>19</sup>NASH, *ECONOMICS OF PUBLIC UTILITIES* (2d ed. 1931) 88.

<sup>20</sup>230 U. S. 352, 33 Sup. Ct. 729 (1913).

<sup>21</sup>231 U. S. 423, 451-452, 34 Sup. Ct. 125, 134 (1913).

<sup>22</sup>*San Diego Land & Town Co. v. Jasper*, 189 U. S. 439, 446, 23 Sup. Ct. 571, 574 (1903); *Stanislaus County v. San Joaquin & King's River Canal & Irrigation Co.*, 192 U. S. 201, 24 Sup. Ct. 241 (1904); *City of Knoxville v. Knoxville Water Co.*, 212 U. S. 1, 29 Sup. Ct. 148 (1908). Cf. *Pacific Gas & Electric Co. v. San Francisco*, 265 U. S. 403, 419, 44 Sup. Ct. 537, 543, P. U. R. 1924D, 817 (1924).

<sup>23</sup>See note 6 *supra*.

return and also as a depreciation expense, the consumer is twice charged. The Court needs to consider that a public utility, to the extent that it is permitted a functional depreciation, has relieved itself of a major risk and a lower rate of return should accordingly be allowed.

The term "depreciation" is used in two different connotations, (1) current (sometimes called developing) depreciation and (2) accumulated (sometimes referred to as accrued depreciation). The first is a yearly expense aspect; the second is a measure of the extent to which any asset has been marked by past physical or functional depreciation for retirement. In double entry bookkeeping, they have a certain interrelation in that the other half of the expense entry is a posting to depreciation reserve which *on the books* is a measure of accumulated depreciation. Accumulated depreciation can also be measured by the actual state of the property (both physical and functional being considered). These varying aspects of depreciation, particularly when oriented to rate regulation based on present fair value, have given the Supreme Court considerable difficulty.

Because the Court, over the major part of the period, was allowing a fair return on the present fair value, and since present value (at least on the books) could be found by subtracting the accrued depreciation reserve from original cost, it came to be stated as a rule that accumulated depreciation must be subtracted from cost to arrive at the base on which the utility might earn a return.<sup>24</sup> It can be seen that the moment the commissions are relieved from rate making on the basis of present fair value of property, as they now have been,<sup>25</sup> the necessity for deducting the accumulated depreciation from original cost or investment ceases.

The language in *McCardle v. Indianapolis Water Co.*:

"The testimony of competent valuation engineers who examined the property and made estimates in respect of its condition is to be preferred to mere calculations based on average and assumed possibilities."<sup>26</sup>

seemed to place the Supreme Court in the position of determining current depreciation on the estimated age-life, but rejecting age-life and preferring inspection-valuation when computing accumulated depreciation.<sup>27</sup>

<sup>24</sup>A long line of cases following *City of Knoxville v. Knoxville Water Co.*, 212 U. S. 1, 29 Sup. Ct. 148 (1908) seem to take this position.

<sup>25</sup>*Federal Power Commission v. Natural Gas Pipeline Co. of America*, 315 U. S. 575, 62 Sup. Ct. 736 (1942); *Federal Power Commission v. Hope Natural Gas Co.*, 320 U. S. 591, 602, 64 Sup. Ct. 281, 287 (1944): ". . . it is the result reached not the method employed which is controlling . . . it is not theory but the impact of the rate order which counts. If the total effect of the rate order cannot be said to be unjust and unreasonable, judicial inquiry . . . is at an end."

<sup>26</sup>272 U. S. 400, 416, 47 Sup. Ct. 144, 150 (1926).

<sup>27</sup>Though the Interstate Commerce Commission has pointed out that the Court's

This same difficulty experienced in coordinating current depreciation and accrued depreciation with a fair-value rate base appeared again when the Court was faced with a case involving inadequate past allowances for depreciation<sup>28</sup> and one with excessive previous depreciation reserves.<sup>29</sup> In the *Knoxville* case, the earlier inadequate expense and reserve allowances did not prevent full current depreciation or deduction of observed accumulated depreciation, though the effect might be to deny a return on the full investment. In the *New York Telephone* case, a decrease in current allowances was not authorized to offset excessive prior depreciation and the reinvested depreciation was included in the rate base, thus making present consumers pay a return to the utility on funds contributed by former customers in excess of the reasonable cost of service.

The citation of Supreme Court cases and the discussion of depreciation as developed by that court does not imply that the Supreme Court should be the authority on methods of depreciation. Rather, the cases are meant to show that either the Supreme Court has not understood the problem of depreciation or has intentionally avoided committing itself to any specific plan. It is probable that the second is the correct explanation, for the Supreme Court recently has freed the administrative bodies of the necessity of following any specific formula in computing the final rate of return or any of the component factors, such as depreciation, which enter into their final conclusions.<sup>30</sup>

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language does not show that it would reject the figure actually in the depreciation reserve, 177 I. C. C. 351, 405-408 (1931), there was justification for a contrary interpretation in that the federal courts had previously favored the observation method. *Landon v. Court of Industrial Relations of State of Kansas*, 269 Fed. 433, 455 (D. C. Kan. 1920); *City of Winona v. Wisconsin-Minnesota Light and Power Co.*, 276 Fed. 996, 1004 (D. C. Minn. 1921); *Southern Bell Telephone & Telegraph Co. v. Railroad Commission of South Carolina*, 5 F. (2d) 77, 95 (E. D. S. C. 1925); *Stenger v. City and County of Denver*, 3 F. (2d) 285 (D. Colo. 1924); *United Fuel Gas Co. v. Railroad Commission of Kentucky*, 13 F. (2d) 510 (E. D. N. Y. 1925); *Pacific Telephone & Telegraph Co. v. Whitcomb*, 12 F. (2d) 279 (W. D. Wash. 1926); *Pacific Gas & Electric Co. v. San Francisco*, 265 U. S. 403, 406, 44 Sup. Ct. 537, 538 (1924). However, the States had utilized the age-life method for both current and accumulated depreciation. California (2 Cal. R. R. Comm. Dec. 777, 790 (1913)), New York (P. U. R. 1917A, 364), and Maryland (P. U. R. 1918E, 331) as well as Illinois, Missouri, New Jersey, Oregon and Nebraska preferred the age-life method.

<sup>28</sup>*City of Knoxville v. Knoxville Water Co.*, 212 U. S. 1, 29 Sup. Ct. 148 (1909).

<sup>29</sup>*Board of Public Utility Com'rs v. New York Telephone Co.*, 271 U. S. 23, 46 Sup. Ct. 363 (1926).

<sup>30</sup>*Clark's Ferry Bridge Co. v. Public Service Commission of Commonwealth of Pennsylvania*, 291 U. S. 227, 54 Sup. Ct. 427 (1934); *Federal Power Commission v. Natural Gas Pipeline Co. of America*, 315 U. S. 575, 62 Sup. Ct. 736 (1942); *Federal Power Commission v. Hope Natural Gas Co.*, 320 U. S. 591, 64 Sup. Ct. 281 (1944).

*Depreciation theory*

In few areas has the lawyer's failure to understand accounting concepts been more productive of confusion than in depreciation accounting. Somehow he has viewed the purpose of this accounting to accumulate a fund to keep plant at high efficiency, or to protect the credit position of the utility or to preserve the integrity of or amortize the investment and securities, or to provide new capital improvements in place of those wearing out, or to maintain unimpaired the present fair value of the property, or to provide for replacements. All these may be interesting arguments for depreciation or uses to which reserves may be put, but they are not the purpose of depreciation accounting. Depreciation accounting seeks two ends: (1) to provide the retirement costs of assets whose useful life has expired, and (2) to correctly allocate this cost to the various accounting periods.

All business today reflects its income and its costs on fixed accounting periods (usually one year) and since the whole tax structure is based on yearly periods, it has become essential to reflect all income and all deductions in the proper yearly period. This is one of the chief excuses for accounting systems. Further, in any business (and particularly in utilities) where the investors and the customers change from period to period, equitable treatment to each requires that income and *all* expenses be reflected in the correct period. Depreciation is as much an expense as fuel or typists.

Expressed in its simplest terms, depreciation accounting is nothing more than the allocation of the correct proportion of a long-range expense to the correct accounting period. That is, a building in which a workman works or a typewriter on which a typist types is as much a part of the expense of producing the automobile turned out by the workman or the manuscript completed by the typist as the labor of each. It differs only in the fact that its cost is spread over many units and over more than one accounting period of time. Thus viewed, depreciation is distinctly a cost concept.

Part of the difficulty experienced in transposing the accounting theory over to public utilities arises from trying to treat the physical plant or the typewriter both as long-term expenses *and as somehow related to the required rate base*. An example of the tortuous method employed to accomplish this by an extremely able economist will be seen in the excellent article by John Bauer, entitled *Depreciation and Effective Rate Control*<sup>31</sup> wherein, after recognizing depreciation as a cost concept, he tries to equate this to a "decline in service value" and then seeks to obviate the difficulty experienced

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<sup>31</sup>(1944) 54 YALE L. J. 92.

with the term "value" by insisting on a prudent investment or cost rate base.

It would seem to me that we need to face squarely the question whether depreciation has any relation to the rate base. The investors of X Company invest \$100,000, with which the company buys ten busses. It estimates a usable life for the busses of ten years and begins taking as a depreciation expense \$10,000 per year. Five years thereafter it has retired one bus from service, has purchased three new busses, and has \$10,000 in a depreciation reserve account. On what amount are the investors entitled to earn a rate? Is it on the original \$100,000, or on \$90,000 (\$100,000 minus the \$10,000 depreciation reserve), or on \$130,000 (the original \$100,000 investment plus the three new busses)?

Is it not fairly obvious that what the investors have committed to the public is their original investment and that this original investment continues to serve the public, whether it is in the form of new or old busses operating on the highway or a depreciation reserve account which shows to the public that sound economic policies are being followed by the company and permits the company, therefore, to raise new funds at more advantageous rates?

#### *Accumulated and current depreciation*

There are two basic points of view on depreciation accounting. One seeks to accumulate over the life of the property a sum equal to cost (emphasis on retirement). The second would permit replacements of property year by year charged to operating expenses with accumulation of a small reserve to provide for unusual variations in the annual change (emphasis on replacement and aimed in criticism of large reserves accumulated under the first theory). The straight line, sinking fund and annuity methods are typical of the first method. Amortization, retirement-expense, retirement-debt and renewal methods represent the second plan.

The straight line method takes as an expense and credits to a reserve an amount each year represented by cost divided by years of service. If fully carried out, it results in accumulating large reserves since the utility is not retiring the property until the end of the period and in the meantime builds its reserve until it might ultimately equal the cost of the property.

The sinking fund method proposes to reimburse the utility at the date the property is retired, the accruals of depreciation are year by year accumulated at interest or compound interest. It expects the reserve to earn while it is a reserve. The following table is often used to compare the methods:

COMPARISON OF COMBINED ANNUAL DEPRECIATION AND RETURN UPON A \$100 PROPERTY UNIT OF 20-YEAR LIFE, UNDER DIFFERENT METHODS OF PROVIDING FOR DEPRECIATION. ASSUMED RATE 5 PER CENT.

YEAR	STRAIGHT LINE METHOD			SINKING FUND METHOD		
	DEPRECIATION	RETURN	TOTAL	DEPRECIATION	RETURN	TOTAL
1	\$5.00	\$5.00	\$10.00	\$3.02	\$5.00	\$8.02
2	5.00	4.75	9.75	3.02	5.00	8.02
3	5.00	4.50	9.50	3.02	5.00	8.02
4	5.00	4.25	9.25	3.02	5.00	8.02
5	5.00	4.00	9.00	3.02	5.00	8.02
6	5.00	3.75	8.75	3.02	5.00	8.02
7	5.00	3.50	8.50	3.02	5.00	8.02
8	5.00	3.25	8.25	3.02	5.00	8.02
9	5.00	3.00	8.00	3.02	5.00	8.02
10	5.00	2.75	7.75	3.02	5.00	8.02
11	5.00	2.50	7.50	3.02	5.00	8.02
12	5.00	2.25	7.25	3.02	5.00	8.02
13	5.00	2.00	7.00	3.02	5.00	8.02
14	5.00	1.75	6.75	3.02	5.00	8.02
15	5.00	1.50	6.50	3.02	5.00	8.02
16	5.00	1.25	6.25	3.02	5.00	8.02
17	5.00	1.00	6.00	3.02	5.00	8.02
18	5.00	0.75	5.75	3.02	5.00	8.02
19	5.00	0.50	5.50	3.02	5.00	8.02
20	5.00	0.25	5.25	3.02	5.00	8.02

The annuity method assumes that property values depend on capacity to produce income. Therefore, if a piece of property has a ten-year service life, there is charged in the first year the loss of capacity to produce income ten years hence. Under this method the yearly allowance increases toward the end.

All these reserve methods tend to create large reserves. In a mature industry there comes a point at which annual retirements approximate annual depreciation charges. A study needs to be made of the time at which this normally occurs and it may then be desirable to limit the reserves which can be created to the average reserves as of that time. This would tend to engraft on the simpler, and accountingly more accurate, reserve methods the sound portion of the replacement theories.

Except in criticism of the large reserves under the reserve plan, the replacement methods fail to perform the proper function of depreciation accounting. They neither are concerned with retirement costs nor do they allocate expenses to a proper period. In attempting to cure the fault of large accumulation of reserves, the remedy has become worse than the disease.

#### *Effective commission regulation*

In the past, commission regulation of depreciation rates has been largely indirect, either by passing on depreciation allowances in rate cases or inci-

dentally approving or disapproving depreciation rates in the authorization of security issues. As appears later in this article, the actual depreciations reported on the books of utility companies rarely square with the rates they request in rate cases. Similarly, it was quite unsatisfactory to examine depreciation rate practices in a proceeding where the utility said, "We have utilized part of our depreciation reserve to invest in new facilities. We now need to purchase new equipment on the retirement of some of our old assets and desire to show that our securities will have sufficiently sound financial backing."

The commissions have also had a limited control over accounting procedures, particularly through the uniform system of accounts. However, in most instances the uniform system of accounts merely required the recording of annual depreciation without any power in the commission to fix the annual depreciation rate. The utility was free to adopt such depreciation rates as the management deemed desirable and were protected by the rule that commissions and courts could not supplant the managerial discretion of the company. Required reports to the commission may have informed them of the action of the company without giving any authorization for modification.

Of recent years, through legal or non-legal control, the commissions have largely adopted a uniform practice and the freeing of the commissions from court hamstringing in the *Hope Natural Gas* case will carry commission control further. The Federal Power Commission has adopted uniform systems of accounting for electric and natural gas companies<sup>32</sup> and the National Association of Railroad and Utilities Commissioners has recommended the same system of accounts.<sup>33</sup> All of the state commissions having jurisdiction of electric companies have adopted the Federal Power Commission's system.<sup>34</sup> Similarly, the Securities Exchange Commission has prescribed for public utilities, subject to its jurisdiction, the Federal Power Commission plan.<sup>35</sup>

In 1943, the National Association of Railroad and Utilities Commissioners issued a report on depreciation which has been adopted as the practice by over two-thirds of the public utility commissions. That report is so pertinent to an understanding of proper depreciation accounting that a substantial

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<sup>32</sup>F. P. C.—Uniform System of Accounts Prescribed for Public Utilities and Licenses, Subject to the Provisions of Federal Power Act, *effective* January 1, 1937; F. P. C.—Uniform System of Accounts Prescribed for Natural Gas Companies, Subject to the Provisions of the Natural Gas Act, *effective* January 1, 1940.

<sup>33</sup>N. A. R. U. C.—Uniform System of Accounts for Electric Utilities (1937); N. A. R. U. C.—Uniform Classification of Accounts for Gas Utilities (1923).

<sup>34</sup>*Note* (1944) 33 P. U. FORT. 168; MOODY'S, MANUAL OF INVESTMENTS, PUBLIC UTILITIES (1943) 38.

<sup>35</sup>S. E. C. RULE U-27.

portion of the summary thereof, as it appeared in the proceedings of the National Association of Railroad and Utilities Commissioners for 1943, page 85 and following, is set forth herein.

*"A. Nature of Depreciation*

1. The modern view of depreciation emphasizes the concept that the purchase of capital goods is in essence a purchase of future services.

2. The significance of the depreciation phenomenon may be described as follows:

- (a) Depreciation is the expiration or consumption, in whole or in part, of the service life, capacity, or utility of property resulting from the action of one or more of the forces operating to bring about the retirement of such property from service;
- (b) The forces so operating include wear and tear, decay, action of the elements, inadequacy, obsolescence, and public requirements;
- (c) Depreciation results in a cost of service.

\* \* \*

5. Depreciation accounting is the process of charging the book cost of depreciable property to operations over its life.

\* \* \*

7. In the past several methods have been employed to account for the consumption of the service or economic life of plant assets, including the retirement, replacement, appraisal, arbitrary write-down, retirement reserve, and depreciation methods. Only the depreciation method survives in general use.

8. There are two interrelated aspects of depreciation: annual expense and accrued depreciation. Annual expense is shown in the income statement; accrued depreciation is recorded in the depreciation reserve, a balance sheet account.

9. Depreciation is the using up of the economic or service life of an asset regardless of the specific factor which may ultimately cause the asset to be retired. It is the exhaustion of service life, not the particular cause of retirement, that is important.

10. Depreciation should not be confused with efficiency. A machine may be highly efficient when near the end of its service life and when it is almost fully depreciated in fact.

11. While the progress of depreciation may be retarded by proper maintenance, the view that maintenance prevents depreciation is unsound. Regardless of the degree of maintenance, economic life cannot be prolonged indefinitely.

12. The depreciation reserve measures that part of the cost of plant still in service which has been written off, usually as an operating expense. If the depreciation reserve has been properly determined, it measures the accrued depreciation. The depreciation reserve should preferably be shown on the asset side of the balance sheet as a deduction from depreciable plant.

13. The depreciation reserve is an account *contra* to the plant account. It is not a fund. Depreciation accounting normally results in the retention in the business of assets which otherwise might be distributed as dividends. Ordinarily these assets are not earmarked and, with minor exceptions, there is no reason why they should be.

14. The financing of replacements is not the purpose of depreciation accounting. Its purpose is to record as a cost of operations, the *pro tanto* cost of property consumed therein, thus maintaining the integrity of the investment whether or not replacement occurs. Where depreciation is computed on a base higher than the actual cost of properties, accretions to capital result; where the depreciation base is lower than the actual investment, capital impairment follows:

\* \* \*

#### C. Basis of Computing Depreciation

17. Depreciation should not be based upon fair value or replacement cost. In this respect the doctrine followed in *United Railways & Electric Co. v. West* [280 U. S. 234, 253 (1930)] misconstrues the economic nature of depreciation and would be administratively impossible of reasonably accurate application.

18. Depreciation expense should be based upon the cost of depreciable assets. The actual cost to a utility of properties acquired as operating units or systems may differ from their original cost. Under most current systems of accounts for utilities it has been established that depreciation shall be based on original cost.

19. Any difference between the cost and original cost less depreciation is recorded in the acquisition adjustment account. Since the proper disposition of amounts in this account must depend on the circumstances which gave rise to them, no specific rules for their accounting treatment are recommended.

#### D. Depreciation Methods

20. Several methods have been used to compute public utility depreciation, but only three are generally recognized or accepted today. These are the straight-line, compound-interest [modified sinking-fund], and sinking-fund methods.

21. The straight-line method is in very general use and is in the ascendency in the public utility field.

22. The straight-line method is simpler than, and is not as seriously affected by errors in estimates of service lives as the interest methods.

23. At all times prior to the end of the service life of a plant unit, the straight-line method results in a higher depreciation reserve than do the interest methods. In the case of long-lived plant and where a high interest rate is used under the interest methods, the difference between a reserve computed by the straight-line method and one computed according to the interest methods will be substantial. Conversely, the reserve computed according to the interest methods will approach the straight-line reserve as the interest rate approaches zero.

24. The straight-line method results in higher charges to consumers for depreciation and return [assuming the same rate of return] when property is young, and lower charges when property is old, than does either of the interest methods. It can be argued that under the 'present-worth' theory the real cost to consumers in the long run will be the same, regardless of the depreciation method, provided no extra profit accrued to the utility because of a differential between the sinking-fund interest rate and the rate of return. The total dollar charges to customers in the long run, however, will be greater under the sinking-fund or compound-interest methods than under the straight-line method.

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26. The straight-line method is generally recommended for public utility accounting and financial purposes and also for the computation of both depreciation expense and accrued depreciation for purposes of rate making.

27. Depreciation rates may be applied to individual units of depreciable property or to groups of units. The group plan has many advantages and should be used wherever property can rationally be grouped.

28. The determination of depreciation rates according to any reasonable procedure involves the use of judgment in the application of methods. Statistical data drawn from property experience and applied with judgment based on knowledge of the property should be given much greater weight than general judgments based principally on observation of the property.

#### *E. Current Charges and Adjustments of Reserves*

29. Current charges for depreciation expense should be based upon the best possible estimates of the amount properly applicable to the period covered by an income statement, without modification for excessive or deficient charges in the past.

30. The depreciation reserve should not be readjusted gradually through modification of the annual depreciation rates when the difference between the book reserve and the proper reserve is substantial. When the difference is not substantial it is satisfactory to spread the remaining net cost of the properties over their remaining lives.

31. In principle any necessary correction of depreciation reserves should be made through surplus or a special section of the income account. However, the adjustment of inadequate depreciation reserves, while sound in theory, presents many practical difficulties. Where such deficiencies are serious, it is desirable to make every effort to adjust them, although it is recognized that the application of a uniform rule without regard to what is equitable and feasible under the circumstances of individual cases might cause injury to security holders out of proportion to the long-range benefits. Therefore, it is concluded that the objective of correcting inadequate reserves should be approached with appropriate consideration of the practical effects of alternative courses of action.

*F. Depreciation in Income Taxation*

32. Because of certain special problems and provisions of the federal income tax laws and regulations, absolute consistency between the treatment of public utility depreciation for tax, corporate, and regulatory purposes may not now be feasible, but such consistency should be sought to the greatest practicable extent.

33. Inconsistencies between the treatment of public utility depreciation for income tax, corporate, and regulatory purposes have sometimes been unjustifiably great and often have been inadequately disclosed with attendant effects upon the tax liabilities of stockholders. Analysis of substantial differences in the treatment of depreciation for these respective purposes is necessary, both for the protection of the investor and for fully effective regulation.

34. Since the depreciation reserve builds up more rapidly under the straight-line method than it does under the interest methods, the use of the straight-line method tends to reduce the investors' risks and therefore to lower the cost of capital.

*G. Depreciation and the Investor*

35. Failure to make adequate provision for depreciation results in the impairment of capital, unless an appropriate retention of surplus is made. Depreciation policies and practices should, therefore, be taken into account in the consideration of questions of public utility finance.

36. Although the immediate interests of equity- and debt-holders may sometimes conflict, and although the short-run and long-run interests of investors as a class may sometimes differ, adequate provision for depreciation is essential to the protection of the interest of investors, taken as a whole and from a long-range point of view.

*H. Depreciation in Rate Making*

37. The same factors which cause annual depreciation expense also cause accrued depreciation. Accordingly, the same principles should be applied in determining annual depreciation expense and in determining accrued depreciation.

38. So-called observed depreciation is not accrued or existing depreciation. Depreciation is not visually observable; only the physical effects of some of the forces which operate to cause retirement can be observed.

39. A properly computed depreciation reserve is the best measure of accrued or existing depreciation, since such reserve reflects that part of the cost of the property in service which relates to the exhausted or expired economic or service life.

40. In fixing public utility rates adequate depreciation expense should be allowed according to the service life basis and, in principle, the reserve requirement determined on the same basis, should be deducted in

determining the rate base.<sup>36</sup> There are cases, however, where equity requires the deduction of the book depreciation reserve, even though it differs materially from the reserve requirement. The determination as to when this condition exists involves, among other things, consideration of the history of regulatory requirements in the jurisdiction and the experience and practices of the company. In other words, individual situations should be dealt with by the commission having jurisdiction in accordance with the facts in each case.

41. The use of the straight-line method in determining both depreciation expense and accrued depreciation is generally recommended for rate-making purposes.

42. The sinking-fund method may sometimes be used in rate-making when it is impracticable to determine the accrued depreciation. When the sinking-fund method is used in rate proceedings, the interest rate employed should be the same as the rate of return which is applied to the undepreciated rate base."

#### *Standard rate of depreciation*

Two methods of estimating depreciation are thoroughly recognized in accounting practice: the unit and the group rates. The unit procedure depreciates each item on a separate estimated-life basis, whereas the group method estimates the overall life of all of the units going to make up the enterprise. In practice, the commissions have applied the group method both in the type of evidence received and in the ultimate rate allowed as to ties, telephone hand sets, poles, transformers, rolling stock and similar types of assets. As to larger units, such as buildings, gas reserves and generating plants, proof is taken and discussion generally ensues on the unit method, but the ultimate depreciation rate allowed appears as an overall group rate for the utility. An examination of over 1300 commission and court cases passing on the allowance of depreciation rates between 1915 and 1945 shows that the ultimate rate was expressed as an overall rate for the utility in over 95 per cent of the cases. Another observation from these cases is that for any given public utility industry, the units going to make up the service-whole are sufficiently similar, that a common overall depreciation rate for each utility could be employed as a standard and that the large number of cases already passing upon the issue have established a sufficient experience to justify the determination of such a standard.

Public utility regulation is not the first administrative control of depreciation rates to fix upon general standard rates from which variations may be made but need not be allowed. Thus the Internal Revenue Department for

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<sup>36</sup>Note: This report was made before the *Hope Natural Gas* case.

many years has published the estimated useful lives and depreciation both on the group and the unit basis for most industries, and items for which depreciation may be claimed.<sup>37</sup>

In Table I and II will be found a graph and an analysis, by years and types of utility, of the actual allowances made by commissions and courts for depreciation in rate cases from 1915 to 1945. This shows a trend decrease in depreciation for each type of utility throughout the period. It also shows trend averages and weighted and unweighted general averages for each utility. It is submitted that from this material we can determine an average reasonable rate of depreciation allowance with some assurance that it will meet the approval of courts and commissions as maximum standard allowances. I would suggest that the following rates, being approximately the weighted averages for the last ten years and not varying more than one-quarter of one per cent from the thirty-year averages, could be employed:

Telephone	3.95	Gas	2.15
Electric	3.30	Natural Gas	3.50
Water	1.97	Street Railway	3.00

The Supreme Court has demanded that the commissions, in determining rates, should develop and be guided by "enlightened judgment."<sup>38</sup> It is believed that the historical experience with rates of depreciation is exactly the kind of material which will go to make up the enlightened judgment for which the court has asked.

Although Tables I and II reflect the allowances for depreciation which have been made in rate cases, no one is naive enough to believe that the utilities have used these same rates in their actual bookkeeping year by year. Many persons and bodies have commented upon this discrepancy between the depreciation rates urged in rate cases and the amounts actually reflected on the corporate books. Thus, the statistics of electric utilities in the United States, as published by the Federal Power Commission in 1942, shows that the reserve for depreciation and amortization of utility plants was 15.5 per cent

<sup>37</sup>Bulletin F revised January, 1931 and January, 1942; Depreciation Studies, published January, 1931. To refer to the January, 1942, revision of Bulletin F, "It contains information and statistical data relating to the determination of deductions for depreciation and obsolescence from which tax payers and their counsel may obtain the best available indication of bureau practice and the trend and tendency of official opinion in the administration of pertinent provisions of the internal revenue code. . . ." A typical statement as to group and unit depreciation is the following: "In general, it has been found that the composite life of 12½ years applies to cake bakeries, 14 years to bread bakeries and 20 years to biscuit manufacturers. The item life applicable to the baking industry is set forth in the following tabulation. . . ."

<sup>38</sup>Bluefield Waterworks & Improvement Co. v. Public Service Commission of West Virginia, 262 U. S. 679, 43 Sup. Ct. 675 (1923).

as of December 31, 1942, for class A and B privately owned electric utility companies, and 11.6 per cent as of December 31, 1938. As the average annual depreciation rate allowed in rate cases during this period was 3.30, the utilities had accumulated less than four years of depreciation.<sup>39</sup> I was unable to examine the actual amounts reported by the utilities for comparison with the rate allowed in the 1300 cases reported in Table I and II, but I did spot check approximately one in twenty and concluded that the rates employed were approximately two-thirds of the rates allowed.

### *A Proposal*

A new and clearer treatment of depreciation by the lawyer is required. Determination of the amount and method of depreciation is for the administrative bodies, not the courts. Depreciation must be allowed yearly to reflect expense in the proper period and do justice between customers of different periods. Depreciation is to provide the cost of retirement and not to reproduce the property. Even functional depreciation is related to the life-use of the *property* more closely than to the needs of capital and should therefore be allowed as other depreciation rather than as a part of the rate of return. There has been a sufficient historical experience with depreciation to permit the fixing of a "standard" overall depreciation deduction for each utility—to be varied in the discretion of the commission for unusual situations (such as extra heavy use, uncommonly rapid technological progress, etc.). I suggest the following group rates which should be used in preference to unit rates:

Telephone	3.95	Gas	2.15
Electric	3.30	Natural gas	3.50
Water	1.97	Street railway	3.00

It would seem undesirable that excessive reserves be built up to lie idle. It would be possible to establish by statistical studies the extent to which the depreciation rate allowed might build a reserve greater than the actual needs of the business. By then placing a ceiling on the reserve it could be restricted to actual needs.

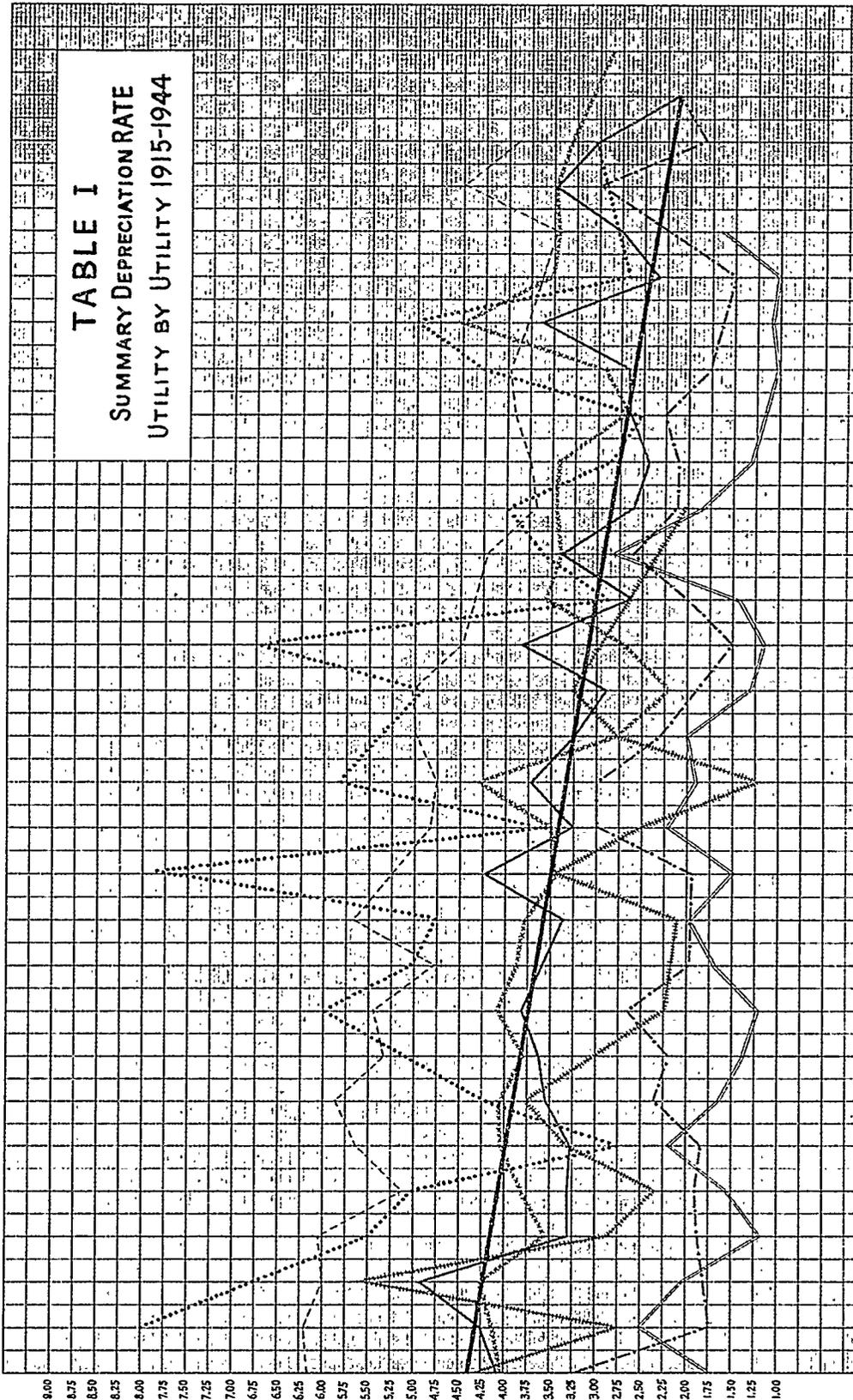
Direct power should be given to administrative agencies to fix annual depreciation rates and to require yearly expense charges in these amounts. Where the accrued depreciation reserves of a company are not in accord with actual physical and functional depreciation, the commissions should have power to require adjustment of the reserve, surplus and capital accounts.

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<sup>39</sup>See also Bauer, *Depreciation and Effective Rate Control* (1944) 54 YALE L. J. 92, 105.

# TABLE I

## SUMMARY DEPRECIATION RATE UTILITY BY UTILITY 1915-1944





These commission powers should not be merely ancillary to rate of return determination or the authorized issuance of securities. They should be direct and immediate.

When the legal treatment of depreciation in utility regulation becomes economically sound and effective, one of the major risks of business for which allowance is knowingly or unknowingly made in the rate of return will be minimized; the utility will attract capital at lesser rates and the consumer will be better served.