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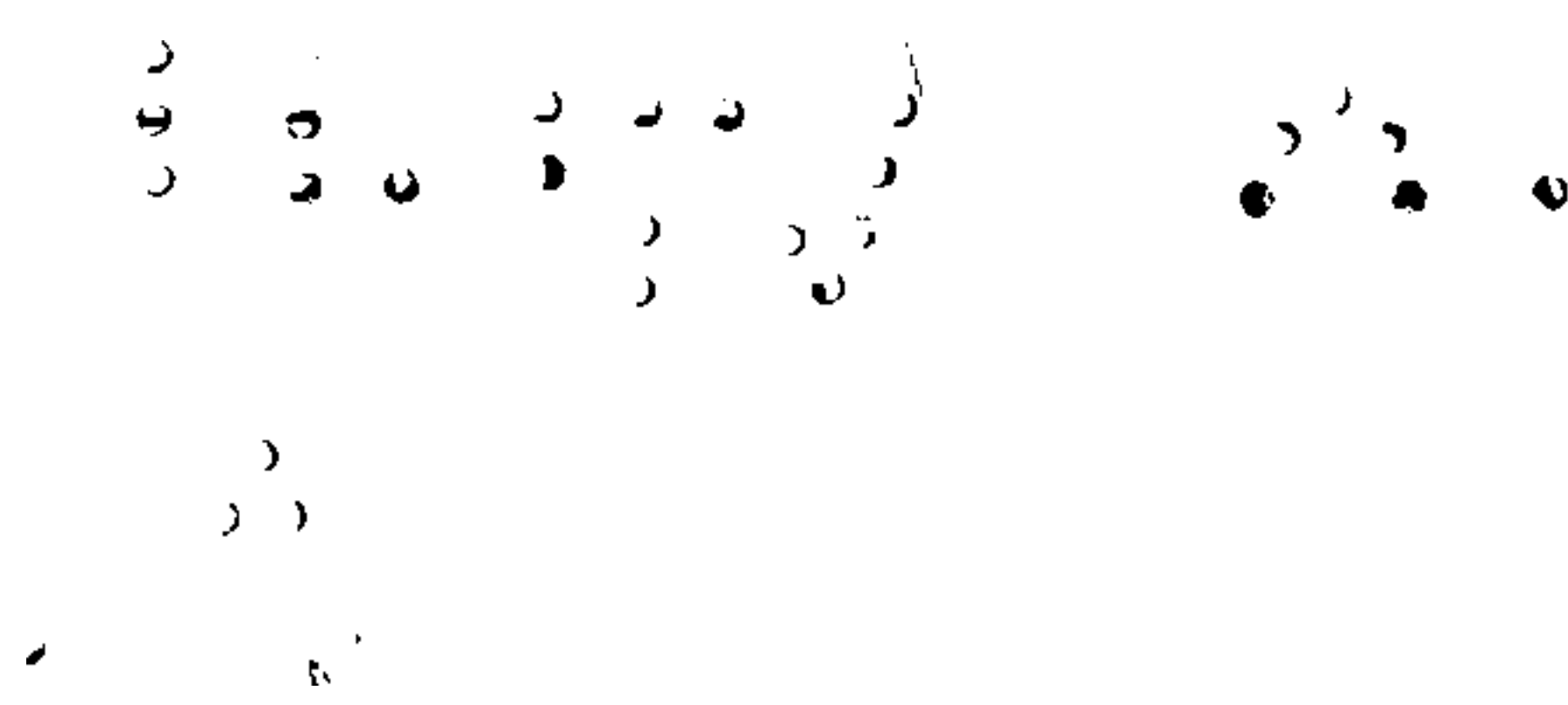
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DEPRECIATION IN THEORY AND PRACTICE

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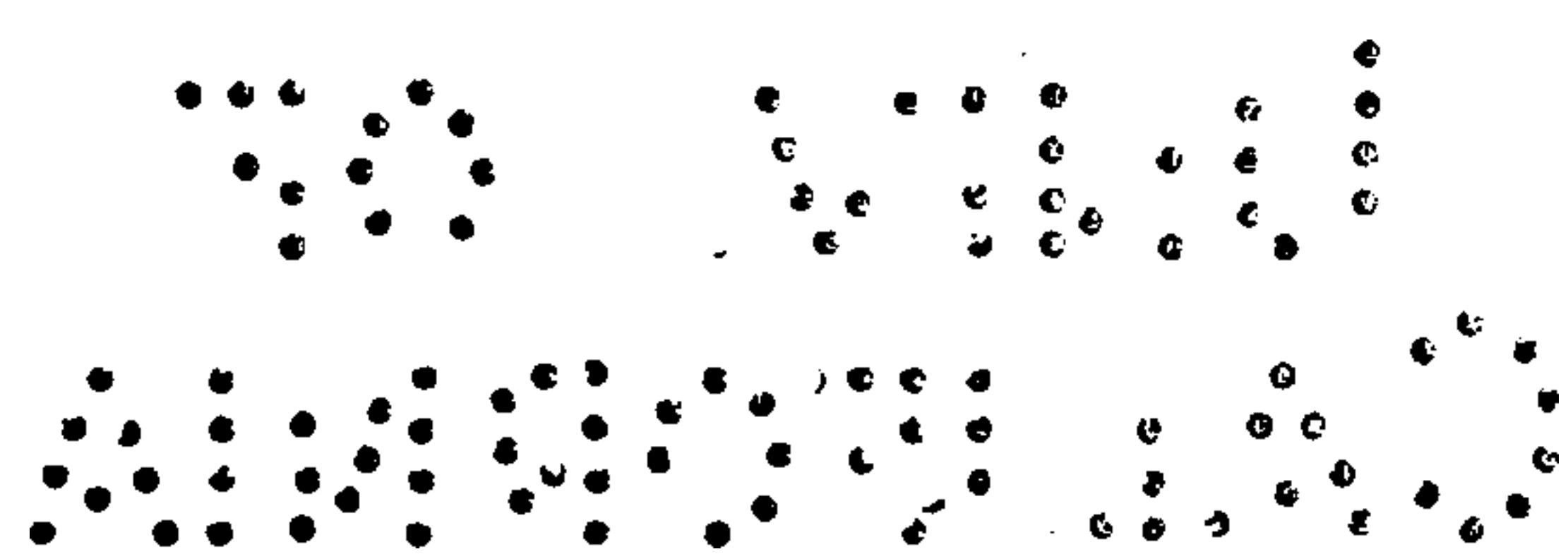
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DEPRECIATION IN THEORY AND PRACTICE

INTRODUCTION

The depreciation problem is one of live importance. It has recently attracted much attention on the part of accountants and engineers interested in the solution of problems of a financial character. Although the literature on the subject is constantly growing in volume, it is often difficult for the student to secure a good knowledge of the fundamentals of the subject because of the form which most of the recent discussions have taken.

Almost all of the material on the subject is in the form of magazine articles. Usually the writer of such an article fails to cover the field fully, preferring to expand on some point in which he is especially interested.

It is needless to say that this lecture does not cover in detail all phases of the matter. On the contrary, in the attempt to cover the essential features of the problem it has been necessary to omit referring to many things of secondary importance. It is believed, however, that this lecture covers the most important features of the problem, and if an interest in the subject and a fair understanding of its leading features is acquired by the student its purpose will have been fulfilled.

DEPRECIATION

By *depreciation* is meant the losses of plant value arising from physical or functional decay, excepting such losses as are compensated for through current repairs.

From the standpoint of the *cause* of depreciation it is either (a) *physical* or (b) *functional*.

Physical depreciation arises from wear and tear, weathering, and all other causes which diminish the strength or usefulness of the physical parts composing the plant.

Functional depreciation is the result of obsolescence or inadequacy.

Obsolescence occurs when some new invention or discovery partially diminishes the worth of a machine or other part of the plant.

Inadequacy arises through failure of the plant to fulfil well its proper function, and it is usually the result of expanding markets, community growth, etc.

In addition to the foregoing classification it is useful, for certain purposes, to further classify depreciation into *unit* and *composite* depreciation.

Unit depreciation is the loss in value, arising from either physical or functional causes, of a machine, or group of machines, or other parts of plant, which may be conveniently grouped together for accounting purposes.

Composite depreciation is the effect of physical or functional depreciation, or of both, upon the whole plant.

To illustrate: Composing a railroad are ties, rails, freight cars, locomotives, etc., in various degrees of depreciation. Some ties are new, others are 50 per cent depreciated, and still others are nearly worthless and soon to be replaced with new ones. All ties of a given age may conveniently be considered as a unit. If this is done, then the unit depreciation of one group may be found to be 10 per cent of cost new, of another 40 per cent of cost new, and so on. Other parts might be similarly classified. When, however, the plant as an entity is considered, it is quite evident that if it is kept in a condition of high efficiency, it cannot be permitted to depreciate to zero or any figure approaching zero. In fact, the effect of repairs and replacements will be to

retain the plant at perhaps 70 or 80 per cent of its original cost, and the 20 or 30 per cent depreciation of the whole plant is what we have called *composite depreciation*.

Evidently, unit depreciation and composite depreciation may be either physical or functional in character. Composite depreciation may be the result of both.

The purpose of this twofold classification into physical depreciation and functional depreciation on the one hand and unit depreciation and composite depreciation on the other hand will appear later.

MODERN ORGANIZATION

During recent years we have witnessed an increasingly great amount of capital invested in fixed assets, and these assets are usually owned by corporations which in turn are controlled by boards of directors and other officials. The stockholders of the corporation—who are the real owners—oftentimes have very slight influence in the determination of its policies and procedures. Consequently, it is of the utmost concern that their investments be protected and preserved by a correct and duly conservative policy on the part of the directors and other corporate officials.

STOCKS AND BONDS

Moreover, most corporations issue bonds which are sold to the public through associations of underwriters. These bonds are usually made a first lien upon the assets of the corporation. As a protection to the purchasers of bonds, who have no voice whatever in the affairs of the company, the physical constituents of the plant must be adequately protected and preserved.

The income from bonds is interest; that from stock is dividends. It is a long-established principle of account-

ing that before dividends may be declared out of the earnings of a company all expenses must be provided for. This is merely another way of saying that we must make sure that the balance of the income account which is labeled *net profits* and is to be used for payment of dividends or for increasing the surplus account, is in reality net profits.

DEPRECIATION, AN EXPENSE

Depreciation is one of the expenses which must be deducted from gross profits before net profits are determined. Some recent works on accounting fail to follow this very important and fundamental principle; and it is really surprising how many corporations make the deduction for accrued depreciation from so-called *net profits*.

PUBLIC SERVICE COMMISSIONS

The whole matter has been given an added significance as a consequence of the establishment by the federal and state governments of the public service commissions. These commissions have in many instances undertaken to regulate the charges for services performed by street railway, steam railway, gas, electric, and similar corporations, collectively known as *public service corporations*, because of the very intimate relation they bear to the welfare of the public in its dependence upon them for their services.

These commissions allow the public service corporations to make their expenses, and over and above their expenses an amount sufficient to make a fair return on the money invested in the utility by the stockholders.

Since depreciation is an expense, it is vastly important that its amount be carefully determined and accounted for; otherwise injustice may be suffered by those who

have invested their money in these very useful and essential enterprises.

PLANT VALUES

This situation renders it necessary for the accountant to maintain a very thorough and systematic record of the elements constituting plant value. Some of these costs of plants are *direct costs* and so may be charged directly to the proper account in the *Plant Ledger*. But others are indirect costs, and since it is impossible to charge them directly to specific accounts, they are best kept in a special classification of accounts known as the *Indirect Cost Accounts*. The leading indirect costs entering into an industrial plant are engineering, preliminary expenses, insurance during construction, interest during construction, and developmental costs.

An examination of the uniform accounts prescribed by the Interstate Commerce Commission will disclose the method pursued by that body in prescribing accounts for the proper recording of indirect costs.

THE PLANT LEDGER

The *Plant Ledger* should be so arranged as to present in a sufficiently concise form all the facts necessary to give a complete history of the various units composing the plant. It should be a loose-leaf book so ruled that it will contain space for the proper distribution of the depreciation burden over the life of the plant. A specimen page is shown on page 8.

The Plant Ledger should be controlled by a Plant Account in the General Ledger. This control should be planned after the usual method, such as is followed for Accounts Receivable and Accounts Payable Controlling Accounts.

(Note: When the Plant Account in the General Ledger shows cost less depreciation, the agreement between it

and the Plant Ledger is exact, but when a Depreciation Reserve Account is kept, the Plant Ledger is in agreement with the *difference* between the Plant Account and the Reserve for Depreciation.)

THE DEPRECIATION RESERVE

In addition to the Plant Account in the General Ledger, an account is kept in the General Ledger for the purpose of indicating the accrued or accumulated depreciation. This account is usually known as the *Reserve for Depreciation*, and its proper manipulation in the balance sheet is a long step toward the correct presentation of accounting facts.

USE OF DEPRECIATION RESERVE

The use of the Reserve for Depreciation may be indicated as follows:

The Plant Ledger will show the amount to be deducted for depreciation from the various units of the plant, this having first been determined by one of the several methods in vogue—straight line, reducing balance, sinking fund, etc.¹ (See short discussion of each method in the appendix at the end of this lecture.)

These, when added together, will constitute the total depreciation charge, which should be brought into the books by a journal entry, as follows:

Profit and Loss	
To Reserve for Depreciation	
To bring into the books as an expense	
the depreciation of plant for the year ending	

¹ It has not been thought desirable to introduce into this lecture a lengthy discussion of the various formulas employed in deducing the depreciation charge, because of the large amount of space that would be required. They may be found fully illustrated and described in the author's book, *Principles of Depreciation*, obtainable at many libraries.

To illustrate, let the following balance sheet represent the status of a newly established business:

BALANCE SHEET OF COMPANY X, AS AT

Building and machinery	10,000	Capital Stock	12,000
Cash	2,000		
	12,000		12,000

Next, let us assume that during the first year the depreciation of “building and machinery” amounts to 5 per cent of the cost, or $.05 \times \$10,000 = \$500$. In addition to the usual closing entries made at the end of the year, or other accounting period, the following entry will introduce into the books the adjustment necessary to record the effect of the depreciation:

Profit and Loss	\$500
To Reserve for Depreciation	\$500

The Reserve for Depreciation should now appear in the balance sheet, either on the liability side, as follows:

BALANCE SHEET OF COMPANY X, AS AT

Building and machinery	10,000	Capital Stock	12,000
Cash	2,500	Reserve for Depreciation	500
	12,500		12,500

or, as is coming to be regarded as the better form:

BALANCE SHEET OF COMPANY X, AS AT

Building and Machinery	10,000	Capital Stock	12,000
Less: Reserve for Depreciation	500	9,500	
Cash		2,500	
		12,000	12,000

DEVELOPMENT OF THE RESERVE

Next, we shall study the uses and development of the depreciation reserve. It must be kept in mind that the

object of bringing the depreciation charge into the books at the close of each accounting period is to have the Profit and Loss Account charged with the actual loss occurring as the result of depreciation. This is done whether the loss thus occurring is actually compensated for by replacements during the period or not. In fact, the value of the reserve arises chiefly from the fact that depreciation is not usually made good during the accounting period; but oftentimes many years intervene between depreciation and replacement. The depreciation reserve here enters to indicate the extent to which depreciation has exceeded replacements.

In practice this works out as follows. During the earlier years of the plant's existence, although few replacements are required, depreciation goes on apace and must be charged to the Profit and Loss Account and credited to the depreciation reserve. In this way, the depreciation reserve continues to increase in amount, and would continue to increase indefinitely were it not for the fact that another class of journal entries soon begins to reduce the amount of the reserve, and in an increasing degree, until finally, when the plant has arrived at its normal condition, and replacements are equal to the charges for depreciation, the reserve remains about stationary, like a reservoir, from which water is pumped as rapidly as it is accumulated from the inlets.

REPLACEMENTS

When any part of the plant is replaced an adjustment must be made crediting Plant Account and charging Reserve for Depreciation. In the Plant Ledger the individual unit account must at the same time be credited:

Reserve for Depreciation	20,000	
To Freight Cars		20,000
To adjust books when freight cars costing \$20,000 are scrapped.		

By this entry the Freight Cars Account is credited with the cost price, the same amount with which it was charged when the cars were purchased, perhaps twenty years before.

THE DEPRECIATION FUND

Considerable confusion and misunderstanding has existed in the matter of the relationship of depreciation reserves and depreciation funds. We have already indicated the correct use of the depreciation reserve. We shall now consider the use of the *depreciation fund*.

Depreciation reserve accounts are essentially adjustment accounts and their proper position in the balance sheet is on the liability side, or they may be shown as a deduction from the asset accounts to which they refer—the latter place being the better one, as we have noted.

Depreciation fund accounts, on the other hand, are asset accounts, and should be so indicated in the balance sheet. Depreciation reserves may be, and usually are, established without the formation of corresponding depreciation funds. The object of the depreciation reserve is to charge the Profit and Loss Account with the proper amount of expense resulting from plant deterioration and thus prevent an overstatement of net profits and consequent excessive disbursements in the form of dividends. Such a procedure means that somewhere among the assets there exists this reserved value which otherwise might have been wiped out as the result of an exaggeration of the net profits and consequent overpayment of dividends.

Should the management determine to locate more definitely this amount of wealth or value retained among the assets as a result of the establishment of the depreciation reserve, it may do so by designating a part of the assets, of proper amount, as a *depreciation fund*.

Since cash is the most liquid of all assets and the most easily transferred, cash is quite naturally the asset from which the fund will be created. For example, take the case of Company X, having a balance sheet as indicated on page 11. If the management determines to establish a depreciation fund equal in amount to the reserve for depreciation, viz., \$500, the following cash book entry is necessary:

Depreciation Fund	\$500
To Cash	\$500
To establish a depreciation fund to meet cost of future replacements.	

The balance sheet then appears as below:

BALANCE SHEET OF COMPANY X, AS AT			
Buildings and Machinery	10,000		Capital Stock 12,000
Less: Reserve for Depreciation	500	9,500	
Depreciation Fund		500	
Cash		2,000	
		12,000	12,000

VALUE OF THE FUND

It should be remembered that the establishment of a depreciation fund is a matter to be determined entirely by the policy of the management. If the fund is established, it will probably be placed aside in the form of investments of one kind, or another. Hence interest will accumulate thereon, and if this is in turn added to the fund, it will grow more rapidly than if it is turned back into the general income of the business. It follows that if the interest is added to the principal of the fund the annual instalments into the fund should not be as large as when the interest is not so added.

The value to the establishment of such funds would, in some cases at least, appear to be problematical, if not

positively undesirable. If a company is prosperous, can it not employ the cash to better advantage by permitting it to perform the usual function of a current asset? The really important step is the formation of the depreciation reserve, and failure to do so is a serious error. The establishment of the depreciation fund is rather a matter of policy, and the failure to do so may be advantageous rather than otherwise. Depreciation funds are used in practice, however, and there is good authority for their use under proper conditions.

APPLICATION OF PRINCIPLES

We shall now state and discuss some of the problems in which the depreciation question plays an important part. These problems have arisen mainly as the result of the peculiar relationship which has grown up between our government on the one hand and industry and commerce on the other. We shall give this subject a three-fold classification, treating it in the following order:

1. The Income Tax.
2. Valuation.
3. Uniform Systems of Accounts.

1. THE INCOME TAX

The income tax is now recognized as a fixed part of our fiscal system, and the future is likely to see an extension rather than a diminution of this tax. Depreciation is an important factor in a discussion of the income tax because net income, on which the tax is computed, can be determined only after proper allowance has been made for depreciation; and in this connection some rather complicated questions have arisen. To illustrate:

How shall the depreciation of goodwill be determined, and what allowance, if any, shall be made therefor?

Shall an allowance be made for bad debts?

How shall patents be depreciated?

What rules shall we apply in the case of coal lands and other natural deposits?

These and many similar questions have been answered by the U. S. Treasury Department and published in pamphlet form under the title, *Income Tax Regulations*. The most important of these regulations may be summarized, as follows:

1. The net income of a corporation is determined by deducting from the gross income (a) all expenses of maintenance and operation and (b) all losses actually sustained, including a reasonable allowance for depreciation.

2. In the case of mines, a reasonable allowance for depletion of ores and mineral deposits, not to exceed 5 per cent of the gross value, at the mine, of the output for the year under consideration.

3. If property has been acquired after January 1, 1909, and is disposed of, the difference between cost and selling price must be added to, or subtracted from, the gross income of the year in which it is sold, accordingly as it represents gain or loss.

— 4. No allowance is granted for depreciation of goodwill.

5. A proper allowance may be made for bad debts, but to be effective it must be actually charged off on the books.

6. Patents are monopolies granted for a period of seventeen years; hence, one-seventeenth may be charged off their actual cash cost. If a patent becomes worthless before the expiration of the seventeen-year period, whatever portion of the cost has not been written off may be written off in the year that such worthlessness is discovered.

7. In case of bonds purchased above par, the premium may be written off each year so that book value and redemption value will be equal when the bonds fall due. The amortization should be proportioned with respect to (a) purchase price, (b) maturity value, and (c) time of maturity.

In case of bonds issued below par, to be redeemed at par at date of maturity, the resulting loss should be similarly prorated.

8. Such an allowance may be made for depreciation of timber lands as will return the amount actually invested in them.

9. Depreciation of mines must likewise be based on the actual cost of the deposits.

2. VALUATIONS

Another important problem, the solution of which necessitates a consideration of the depreciation question, is that of the valuation of the properties of public utility companies. This problem has arisen in the following manner.

Our so-called *public utility corporations* operate on an essentially different basis than most of the private corporations. Public utility companies rarely exist on a basis of competition with one another, but in nearly every instance they possess certain monopoly privileges which have been granted to them by national, state, or municipal government. Thus, street car companies receive franchises from the municipality they serve and are granted the exclusive right of constructing car lines in the streets. Water, gas, and electric light companies receive similar franchises. Evidently, to permit two or more companies to enter into competition for the supply of street-car service, or gas, water, or electric current, would under ordinary circumstances result in a very costly and wasteful duplication of equipment. The same

is true of railroads; and the past history of American railroads has shown that they cannot successfully operate on a basis of open competition.

When competition does exist without causing such waste of duplication, it serves as an incentive on the part of company officials to keep the prices of their commodities at a reasonably low figure, lest they be undersold by their competitors. The retail grocery business serves as a very good illustration of this. But where competition does not serve as an adequate rate regulator, as in the case of most public utility companies, the question arises, what authority shall fix rates or prices and how shall this authority determine what rates or prices are just and equitable to both the public and the company?

This duty of fixing rates has been delegated to the public service commissions, and the basis upon which they proceed will be the subject of our further inquiry.

Capital legitimately invested ought to return to the investor a reasonable income. What constitutes a reasonable income on capital may differ somewhat with the circumstances—money market, risk involved, etc. For purposes of this discussion let us assume that 6 per cent constitutes a reasonable income on an investment in a public utility.

To the commission which seeks to permit a utility to earn a net income of 6 per cent on the investment certain problems will present themselves, as follows:

1. What is the actual cash value of the investment in the utility under consideration?

2. In determining the various expenses that the utility company may be permitted to deduct in order to arrive at the net profits, what allowance ought to be made for current depreciation losses?

3. Given the original cash cost of the utility in question, shall the return of 6 per cent be granted on this

original cost, or on the present depreciated value of the plant; and shall any allowance be made for appreciation, as of land, roadbed, etc., due to such causes as increase of population, natural community growth, etc.—increases in the value of the property not resulting from additional investments of money?

Two well-known theories have arisen as a result of the attempt to solve these questions. One is known as the *cost-to-reproduce theory*. Stated simply, it means that the public utility company should be permitted to earn a reasonable return on whatever sum it would require to reproduce its plant under present conditions. Clearly such a theory is advantageous to the corporation; consequently, we find it advocated by engineers and other experts in the employ of the public service corporations.

Under normal conditions community growth is sufficient, during the period of a few years, to increase the value of land so greatly that cost of reproduction of a plant may be considerably enhanced. Consequently, the cost-of-reproduction basis for rates oftentimes gives to the corporation a certain proportion of income over and above that which it would realize were it strictly limited to an adequate return upon its original investment. The cost-of-reproduction theory has been upheld in certain of the courts and by prominent writers on the subject.

The *cost-of-reproduction-less-depreciation theory* has also been upheld by many prominent authorities. Briefly, it holds that it is improper to grant a reasonable return upon what it would cost to reproduce a plant, since to do so would be to make no allowance for the depreciated condition of the plant, which might conceivably amount to as much as 20 or 30 per cent of the cost of reproduction. This theory does not go so far as to deny the company the benefit of the increase in the value of its lands, but it does deny that, in addition to receiving a

reasonable return upon this increased value, the company may justly expect a return upon present cost of reproduction new, when its plant is actually in a depreciated condition.

In opposition to this contention, the advocates of the cost-to-reproduce theory assert that as long as a plant is performing adequately its function of providing service to the public it is no concern of the public what the amount and extent of depreciation may be; and that consequently depreciation ought not to be deducted in determining the value of a plant for rate-making purposes.

The question appears to hinge largely on the question of the adequacy with which depreciation has been cared for in the accounts of the company. If adequate reserves for depreciation covering all accrued depreciation have been established, this means that in the past the corporation has been granted an allowance, through the annual depreciation charge, for all depreciation accrued to date, and at the same time, has been granted a reasonable return on its investment. This has resulted in the establishment of a depreciation reserve and the corresponding retention of values among the assets equivalent in amount to this reserve. If this reserve has been specially tabulated and set aside as a fund, its existence will not be questioned. But instead of being placed aside as a fund it might have been employed for either of two purposes, viz., (a) to liquidate bonded or other indebtedness of the company or (b) to make extensions to the plant.

If bonded or other indebtedness is liquidated, then it seems clear that the investment has been diminished by that amount, and consequently expenses in the form of interest charges have been diminished. Consequently, a smaller return would be adequate to provide a suitable return on the remaining investment.

On the other hand, if the fund is expended in the making of extensions, the depreciation of the original plant has been made good by the extensions paid for out of the depreciation fund. In this case the fund is retained in the business, and therefore the return ought not to be diminished.

Thus it is seen how important is sound accounting procedure when viewed from the standpoint of finance and governmental control. Well-kept records ought to be an aid, rather than a hindrance, in securing justice and fair treatment at the hands of the public service commissions. Indeed, good accounting systems are becoming absolutely essential to the relationship that has grown up between government and industry. This truth has been greatly emphasized by the work of the Interstate Commerce Commission, which has established certain standard procedures in handling depreciation in railroad accounting which will be the next topic considered.

3. UNIFORM SYSTEMS OF ACCOUNTS

Our consideration of this subject will be limited to the uniform accounts for railroads prescribed by the Interstate Commerce Commission and to certain of the requirements of the New York Public Service Commission for the First District. These will be sufficient to show the present tendency of commission control of accounting for depreciation.

The uniform system of accounts for railroads, which went into effect on July 1, 1914, was the result of a desire on the part of the Interstate Commerce Commission to obtain full information concerning railway construction and management. The efforts of the Commission, seconded by railway accounting officers, has resulted in the promulgation of a system of accounts

which, although not perfect, fulfils some important requirements.

The expenses of running a railroad may be classified as follows: (a) maintenance of way and structures, (b) maintenance of equipment, (c) transportation expenses, and (d) general expenses. We are here concerned with (a) and (b).

An examination of the Interstate Commerce Commission classification of accounts for maintenance of way and structures indicates no less than seventy-nine accounts among which these expenses are distributed. Of these the following cover depreciation, and at the same time afford for the student a study of the proper analysis of the elements that enter into the *way and structures* of a railroad.²

Roadway—Depreciation
 Underground Power Tubes—Depreciation
 Tunnels and Subways—Depreciation
 Bridges, Trestles, and Culverts—Depreciation
 Elevated Structures—Depreciation
 Ties—Depreciation
 Rails—Depreciation
 Other Track Material—Depreciation
 Ballast—Depreciation
 Right of Way Fences—Depreciation
 Snow and Sand Fences and Snowsheds—Depreciation
 Crossing and Signs—Depreciation
 Station and Office Buildings—Depreciation
 Roadway Buildings—Depreciation
 Water Stations—Depreciation
 Fuel Stations—Depreciation.
 Shop and Engine Houses—Depreciation
 Grain Elevators—Depreciation
 Storage Warehouses—Depreciation
 Wharves and Docks—Depreciation
 Coal and Ore Wharves—Depreciation
 Gas Producing Plants—Depreciation
 Telegraph and Telephone Lines—Depreciation
 Signals and Interlockers—Depreciation

² These accounts shall include charges covering the current losses from depreciation.

Power Plant Dams, Canals, and Pipe Lines—Depreciation
Power Plant Buildings—Depreciation
Power Substation Buildings—Depreciation
Power Transmission Systems—Depreciation
Power Distribution Systems—Depreciation
Power Line Poles and Fixtures—Depreciation
Underground Conduits—Depreciation
Miscellaneous Structures—Depreciation
Paving—Depreciation
Roadway Machines—Depreciation

Thus for each subdivision of way and structures a depreciation account is prescribed. This plan became obligatory on July 1, 1914.

For railroad equipment, however, the depreciation charge remains optional.

These accounts must be carefully distinguished from the depreciation reserve accounts. The accounts classified above are expense accounts and are closed into Profit and Loss, while the corresponding credits form the reserve accounts, which enter the balance sheet. The Commission prescribes three *reserve* accounts for depreciation, as follows:

Accrued Depreciation—Road.—This account shall be credited with amounts charged to Operating Expenses or other accounts to cover the depreciation of fixed improvements, the cost of which is included in account No. 701, *Investment in Road and Equipment*, or in account No. 702, *Improvements on Leased Railway Property*.

When any fixed property is destroyed, sold, or otherwise retired from service, the amount included in this account with respect to the property retired shall be charged hereto.

Accrued Depreciation — Equipment. — This account shall be credited with amounts charged to Operating Expenses or other accounts to cover the depreciation of the accounting company's equipment.

When any equipment is destroyed, sold, or otherwise retired from service, the amount included within this account with respect to the property retired shall be charged hereto.

Accrued Depreciation—Miscellaneous Physical Property.—This account shall be credited with amounts charged to Income or other accounts to cover the depreciation of property the cost of which is included in account No. 705, *Miscellaneous Physical Property*.

When any miscellaneous physical property is destroyed, sold, or otherwise retired from service, the amount included in this account with respect to the property retired shall be charged hereto.

The reader will notice that great care is taken in accounting for depreciation of railroad property, and this in spite of the fact that railroad companies usually have such extensive properties that current repairs and replacements do, in a very large measure, remain uniform from year to year. When a firm's capital is invested in a few buildings, it is much less likely that current repairs and replacements will be uniform, and consequently it is more important that accruing depreciation be adequately charged to Profit and Loss and credited to the proper reserve account.

The requirements of the New York Public Service Commission for the First District are, in principle, the same as those of the Interstate Commerce Commission. Thus, in its *Uniform System of Accounts for Electrical Corporations*, provision is made for a depreciation reserve under the following title:

ACCRUED AMORTIZATION OF CAPITAL

Credit to this account such amounts as are charged from time to time to Operating Expenses or other accounts to cover depreciation of plant and equipment, and other amortization of capital. When any capital is retired from service, the original money cost thereof (estimated if not known, and where estimated, that fact

and the facts upon which the estimate is based shall be stated in the entry), less salvage, shall (except as provided in account No. E100, "Fixed Capital, December 31, 1908,") be charged to this account. The amount originally entered or contained in the charges to any capital account in respect of such capital so going out of service shall be credited to such capital account, and any necessary adjusting entry made to the appropriate sub-account under the account Corporate Surplus or Deficit.

In studying the above and other illustrations of the practical application of the depreciation reserve, the student should be careful not to be misled by the variety of terms which mean essentially the same thing. It makes little difference whether we call the reserve for depreciation, "Accrued Amortization of Capital," or "Accrued Depreciation," or employ some other expression. The essential thing to remember is that the reserve for depreciation is an adjustment account employed for the purpose of securing greater accuracy and a better presentation of facts in the complex field of modern industrial and commercial enterprises.

APPENDIX

THE STRAIGHT-LINE METHOD

When this plan is pursued an equal amount is charged off to depreciation each year, and a corresponding credit is made to the reserve for depreciation. It is the simplest of all methods, and in using it no complicated computations are required.

If V represents the original investment,
 n the lifetime in years,
 V' the salvage value, and
 x the equal annual charge, then

$$x = \frac{V - V'}{n}$$

which is the general form of the straight-line formula, applicable to any amount and any length of time.

THE REDUCING-BALANCE METHOD

This method necessitates heavy charges during the early years of the plant's lifetime, since each year an equal percentage is taken on the reduced value as given at the close of the preceding year. The shorter the lifetime of the plant the larger must be this percentage in order that the values may be reduced to salvage value or zero in the given time. For example, if the life of a given asset is twenty-five years, its original cost 100 dollars, and its salvage value 1 dollar, then each year the balance from the preceding year must be reduced by 16.82 per cent of its amount.

If V' represents salvage value,
 V the original value,
 n the lifetime in years, and
 x the percentage required, then

$$x = 1 - \sqrt[n]{\frac{V'}{V}}$$

which is the general form of the reducing-balance formula applicable to any amount and to any length of time.

THE SINKING-FUND METHOD

According to this plan a definite fixed amount of money is placed aside periodically to accumulate at compound interest. It is assumed that the amounts thus reserved plus their accumulations of interest will at the end of a given time be sufficient to make the desired replacement.

If V equals original value, or fund to be accumulated,

n the period of years,

r the rate of interest, and

x the amount to be set aside annually, then

$$x = V \frac{(r - 1)}{(r^n - 1)}$$

which is the general form of the sinking fund formula and applicable to any amount, for any length of time, at any rate of interest.

THE ANNUITY METHOD

By this plan, the annual depreciation charge is determined by finding a sum which when deducted each year from the investment remaining from the previous year and increased by the interest on the investment at a given rate, will reduce the investment to salvage or zero in the given time, and at the same time return the full amount of the interest on the investment as it stands at the end of each year. Interest, which is included in the depreciation return, it must be remembered, is on the remaining investment.

If V represents the original value,

V' the salvage value,

n the lifetime of the asset,

r the rate of interest plus 1, and

x the equal annual charge, then

$$x = (Vr^n - V') \frac{(r - 1)}{(r^n - 1)}$$

which is the general form of the annuity formula, applicable to any amount, for any length of time, and any rate of interest.

TEST QUESTIONS

These questions are for the reader to use in testing his knowledge of the lecture. The answers should be written out fully in a notebook, but are not to be sent in.

1. Why is the depreciation problem one of live importance?
2. Define: depreciation, physical depreciation, functional depreciation.
3. Define: obsolescence, inadequacy.
4. What is unit depreciation, composite depreciation?
5. Why is depreciation an expense?
6. How is the depreciation problem related to commission regulation?
7. Describe the use of the Plant Ledger.
8. What is the value of the depreciation reserve?
9. Show how the growth of the depreciation reserve is limited.
10. What entry is made when a unit of the plant is replaced?
11. Describe the depreciation fund.
12. Why must depreciation be considered in determining the income tax?
13. What allowance does the government make for exhaustion of mineral deposits in calculating the income tax?
14. What is essential to make bad debts a proper allowance in the income tax?
15. How does depreciation enter into the valuation question?
16. Why are public utilities usually monopolies?
17. What are the cost-of-reproduction and the cost-of-reproduction-less-depreciation theories?
18. How does the Interstate Commerce Commission subdivide railway property for purposes of determining depreciation?
19. How does it establish a depreciation reserve?
20. How does the New York Public Service Commission for the First District care for depreciation?