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INTERMEDIATE ACCOUNTING

REVISED SIXTH EDITION

ACCOUNTING STANDARDS

Statements of Financial Accounting Concepts 1

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Intermediate Accounting

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APPENDIX: INTEREST METHODS OF DEPRECIATION

For many years the ***annuity*** and ***sinking-fund*** methods of depreciation have received attention from accounting theorists because of their focus on cost recovery and rate of return on the investment in depreciable plant assets. A depreciable plant asset represents a bundle of future services to be received periodically over the economic life of the asset. The cost of such an asset may be viewed as the present value of the equal periodic rents (services) discounted at a rate of interest consistent with the risk factors identified with the investment in the plant asset.

Annuity Method The annuity method of depreciation is appropriate when the periodic cost (depreciation) of using a long-lived plant asset is considered to be equal to the total of the expired cost of the asset and the implicit interest on the unrecovered investment in the asset. Depreciation Expense is debited and Accumulated Depreciation and Interest Revenue are credited periodically, as explained in the example below.

Assume that a computer with an economic life of five years and a net residual value of $67,388 is acquired by Dorsey, Inc., for $800,000. If the fair rate of interest for this type of investment is 10% compounded annually, the yearly depreciation expense is computed as illustrated below:

Computation of annual depreciation expense under annuity method

$$\text{Depreciation} = \frac{\text{cost of asset less present value of net residual value}}{\text{present value of ordinary annuity of 5 rents of 1 at 10\%}}$$

$$= \frac{\$800{,}000 - (\$67{,}388 \times 0.620921^{*})}{3.790787^{\dagger}}$$

$$= \frac{\$800{,}000 - \$41{,}843}{3.790787}$$

$$= \$200{,}000$$

*See Present value of 1 for five periods at 10% (Table 2 in the Appendix at the end of Chapter 5).
†See Table 4 in the Appendix at the end of Chapter 5.

A summary of the results of the annuity method of depreciation, and the journal entries to record depreciation for the first two years, are shown on page 627.

The summary on page 627 shows that: (1) Depreciation expense computed by the annuity method is debited for $200,000 each year; (2) interest revenue is credited each year with 10% of the unrecovered investment (carrying amount of the computer); (3) the difference between annual depreciation expense and interest revenue is credited to Accumulated Depreciation; and (4) the carrying amount of the computer at the end of Year 5 is $67,388, the net residual value at the end of its economic life. The total depreciation expense over the economic life of the computer exceeds its depreciable cost by $267,388 ($1,000,000 − $732,612 = $267,388), an amount equal to the implicit interest revenue recognized during the

Computation of a sinking-fund de under sinking method of deprec

DORSEY, INC.
Summary of Annuity Method of Depreciation

Year	Depreciation expense	Implicit interest revenue (10% of carrying amount)	Credit to Accumulated Depreciation ledger account	Balance of Accumulated Depreciation ledger account	Carrying amount of computer
0					$800,000
1	$ 200,000	$ 80,000	$120,000	$120,000	680,000
2	200,000	68,000	132,000	252,000	548,000
3	200,000	54,800	145,200	397,200	402,800
4	200,000	40,280	159,720	556,920	243,080
5	200,000	24,308	175,692	732,612	67,388
	$1,000,000	$267,388	$732,612		

Journal entries:	Year 1		Year 2	
Depreciation Expense	200,000		200,000	
Interest Revenue		80,000		68,000
Accumulated Depreciation		120,000		132,000
To record depreciation by annuity method.				

economic life of the computer. The net charge to income over the five-year period is equal to the depreciation base of the computer and ***increases*** each year. The annuity method of depreciation thus tends to produce a more constant rate of return on investment than, say, the straight-line method of depreciation. Consequently, the use of the annuity method of depreciation for assets acquired under capital leases has been advocated by some accountants in recent years.

Sinking-Fund Method The sinking-fund method of depreciation might be used when a fund is to be accumulated to replace a plant asset at the end of its economic life. Under the sinking-fund method, the amount of annual depreciation expense is equal to the increase in the asset replacement fund. The increase in the fund consists

Computation of annual sinking-fund deposits under sinking-fund method of depreciation

$$\text{Sinking-fund deposits} = \frac{\text{cost of asset less net residual value}}{\text{amount of ordinary annuity of 5 rents of 1 at 10\%}}$$

$$= \frac{\$800{,}000 - \$67{,}388}{6.1051^*}$$

$$= \$120{,}000$$

*See Table 3 in the Appendix at the end of Chapter 6.

of the equal periodic deposits (rents) plus the interest revenue realized at the assumed rate on the sinking-fund balance.

We shall illustrate the sinking-fund method of depreciation with the same example as we used to illustrate the annuity method, that is, a computer acquired by Dorsey, Inc., for $800,000 with an economic life of five years and a net residual value of $67,388 at the end of five years. If we again assume a 10% annual compound rate of interest, the annual deposits to the sinking fund are determined as shown at the bottom of page 627.

A summary of the results of the sinking-fund method of depreciation, and the journal entries to record depreciation for the first two years, are as follows:

DORSEY, INC.
Summary of Sinking-Fund Method of Depreciation

	Sinking fund				Depreciation and carrying amount		
Year	Annual deposit	Realized interest revenue (10% of fund balance)	Total fund increase	Fund balance	Depreciation expense	Balance of Accumulated Depreciation ledger account	Carrying amount of computer
0							$800,000
1	$120,000		$120,000	$120,000	$120,000	$120,000	680,000
2	120,000	$ 12,000	132,000	252,000	132,000	252,000	548,000
3	120,000	25,200	145,200	397,200	145,200	397,200	402,800
4	120,000	39,720	159,720	556,920	159,720	556,920	243,080
5	120,000	55,692	175,692	732,612	175,692	732,612	67,388
	$600,000	$132,612	$732,612		$732,612		

Journal entries:	Year 1		Year 2	
Sinking Fund	120,000		132,000	
Depreciation Expense	120,000		132,000	
Cash		120,000		120,000
Interest Revenue		12,000		12,000
Accumulated Depreciation		120,000		132,000
To record depreciation by sinking fund method				

The foregoing summary and journal entries show that: (1) Depreciation expense computed by the sinking-fund method is debited each year for ***increasing*** amounts equal to the total increase in the sinking fund; (2) interest revenue is credited each year with earnings at 10% on the fund balance; (3) the net charge to income (depreciation expense less interest revenue) each year remain constant at $120,000; and (4) the carrying amount of the computer at the end of Year 5 is $67,388, the net residual value at the end of its economic life.

The sinking-fund method of depreciation may be used without the accumulation of a sinking fund. However, depreciation expense still would be recorded equal to the hypothetical fund increases, as illustrated on page 628. The sinking-fund method of depreciation is used by only a few utility companies.

REVIEW QUESTIONS

1 Some business enterprises, particularly those owning improved real estate, may report an intermediate amount in their income statement labeled as "income before depreciation." Comment on this practice.

2 Distinguish among the terms ***depreciation, amortization,*** and ***depletion.*** How is depreciation accounting related to the replacement of a plant asset at the end of its economic life?

3 What are the three variables used in the computation of periodic depreciation expense? Is depreciation a valuation procedure or a cost allocation procedure?

4 The manager of an electric utility stated, "Our transmission lines are kept in good operating condition by regular repairs and maintenance, and their efficiency is relatively constant—they just don't depreciate!" Do you agree with this statement? Explain.

5 What is meant by the term ***estimated economic life*** of a plant asset, and how is it measured?

6 What are the major causes of a decrease in the economic life of a plant asset? How accurately may the causes be identified for a specific asset?

7 Jordan Company acquires delivery trucks for $18,000. These trucks have an economic life of six years based on physical deterioration and a net residual value of $3,000. Jordan typically sells a truck for $7,000 after operating it 100,000 miles. What is the depreciation base for a delivery truck? What is its estimated economic life to Jordan?

8 Both the quantity of plant asset services used each accounting period and the relative value of the asset services are factors in the choice of a method of depreciation. Explain.

9 **a** List the methods that may be used to compute depreciation.
b State two objections to the straight-line method of depreciation.
c List some advantages of the straight-line method of depreciation.

10 Many depreciable plant assets exhibit a declining productivity with advancing age. Explain how this fact may be used both as an argument for and as an argument against use of the straight-line method of depreciation.

11 During Year 5, a strike halted manufacturing operations of Arcadia, Inc., for four months. Depreciation of its spinning and weaving machines for the full year under the straight-line method is $216,000. Arcadia's operations for Year 5 resulted in a net loss of $132,000 (after deduction of depreciation expense). The president of