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1927

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Recommended Citation

Haskins & Sells Bulletin, Vol. 10, no. 05 (1927 May), p. 34-35

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Depreciation of Mines and Mining Machinery and Equipment

By JOHN R. FINCHER (*In-charge Accountant, New York Thirty-ninth Street Office*)

THE various methods of depreciation in common use, or advocated by writers on the subject, are based generally on the principle that the cost, less residual value, of the facility being depreciated should be amortized in some manner during the period of its usefulness. This principle undoubtedly is correct in theory for all ordinary enterprises in which the production, or return, bears some uniform relation to the use of the facility; but its application in the case of mining is questioned because of the inherent differences in economic conditions of operation.

The fundamental difference between the accounting for a mine and for another ordinary enterprise is first observed after the project has been fully equipped and operations have begun. After the mineral lands have been acquired, either through purchase or lease, the initial expenditures necessary to equip a mine for operation will consist of the cost of mine development work, such as shafts, slopes, tunnels, gangways, airways, drainage, etc., and the machinery and equipment necessary to handle the mineral output and waste material. After operations are begun there will be continually recurring expenditures for extensions of the mine workings and for additional machinery and equipment made necessary by such extensions, all of which will be required merely to maintain, without at all increasing, the average quantity output of mineral.

It is generally agreed that the initial cost of equipping a mine to begin operation must be capitalized. The subsequent expenditures for development and extensions, however, constitute a problem upon which there is much difference of opinion. If the practice is conformed to the accounting theory that the cost of all facilities expected to have a useful life of more than one year should be capitalized and depreciated over the period of usefulness, the property accounts would continue to increase until the very end of operation, causing progressive increases in the charges for depreciation. This would prove unsound because the increasing charges for depreciation would tend to increase the per-ton cost of mineral production progressively for each succeeding operating period.

In the early stages of operation of a mining project the per-ton cost of mineral production is comparatively low, because the recoverable mineral deposits are easily accessible. As mining progresses the deposits become daily less accessible and the maintenance of a stable output requires extensions of the workings and entails ever-increasing costs for transportation, while the greater depth of the workings entails greater costs for lifting and drainage, and added cost for the disposition of waste. If to the ever-increasing direct costs of mining we should add depreciation charges which mount higher each year, the per-ton cost of production during the later stages of operation would increase to a figure out of all proportion to the cost at the beginning. When we reflect that, aside from market fluctuations, the last ton of mineral produced is worth not one cent more than the first, the error in applying the principle to mine accounting becomes doubly impressive.

In theory, profits or losses arising from a business project can be accurately determined only when the undertaking is fully completed and the business is liquidated. Business expediency, however, has brought about the general custom of stating accounts annually, at which time the profits or losses of a going concern are approximated by estimating such factors as cannot be definitely determined. Little difficulty is experienced in applying this method in the case of ordinary enterprises which encounter fairly uniform conditions from year to year; but a mining enterprise has

been seen to experience so great variation in production costs, as between the different periods of its operation, that the operating results could fairly be viewed only as a unit over the entire life-period. If it is desired to divide the results of operation into some arbitrary periods less than the full life, means must be found to so equalize the cost of production between such periods that each may show a fair, uniform cost per unit of production.

As a practical expedient, many of the writers on mining advocate the practice of capitalizing the initial expenditures required to equip the mine, and of charging all subsequent expenditures for extensions and additional equipment to the production costs of the year in which the expenditure is made. In practice, this plan is followed with many degrees of modification. Some of the most conservative mining companies will charge against production costs all expenditures after the initial outlay, except those of comparatively large amounts which will be either capitalized or "deferred" for charging off in instalments. The less conservative companies modify the plan to suit the views of the company executives, the modifications varying in degree up to the point of charging off nothing, for the capitalization of which a logical excuse can be found.

The accountant objects to this plan because it supplies no rule or chart to guide him. The decision is left to the personal judgment of an interested individual, and this is very rarely dependable where personal interests are affected. The very elasticity of the scheme is an objection. The accountant is required to assume responsibility for statements of conditions of which he can have no personal knowledge and with respect to which he must be governed by the advice of the interested parties. The operator of a "stock-selling" mine can supply perfectly logical and legitimate reasons for capitalizing expenditures which the conservative operator would never even consider capitalizing.

The following outline is offered as an attempt to furnish both a plan for determining the class of expenditures to be capitalized, and to equalize the charges for depreciation over the different stages of operation.

At the time of beginning operations a survey, or forecast, should be made covering the entire life of operation (unless such life is estimated to extend materially beyond forty years, in which event forty years may be taken as a basis) and treating the following elements:

1. The initial cost of equipping the mine.
2. The cost, by years, of development work necessary in order to maintain average quantity production.
3. The cost of additional machinery and equipment made necessary by extension of the workings.
4. The cost of renewals and replacements necessitated by wear and tear, or obsolescence.
5. The tonnage of mineral expected to be recovered.

All factors except the first necessarily would have to be estimated. To the cost of originally equipping the mine there should be added the estimated cost of development work, of additional machinery and equipment, and of renewals and replacements, and the sum divided by the estimated tonnage of recoverable mineral, to arrive at an amount per-ton to be used in charging off depreciation. Credits resulting from charging depreciation to production costs should be credited to depreciation reserve. The cost of all mine development work and the cost of additional machinery and equipment should be capitalized, and the net cost of renewals and replacements should be charged to the depreciation reserve. At regular intervals, as might be found expedient, the actual costs incurred should be compared with the estimates used in the computation, and the depreciation charge revised if and when necessary.