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Extractive Industries

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RESOURCES FOR THE FUTURE, INC.

NATIONAL income analysis calls for particular attention to the extractive industries, both to find what effect they have on the level of national income as a whole and to measure the income of the extractive industries themselves. The latter is a particular problem because a substantial proportion of mineral production is carried on by firms classified in the manufacturing sector of the accounts.

The use of federal income tax data for national income derivations makes a discussion of the tax law provisions applicable to the extractive industries necessary. Two features of the tax treatment of these industries are substantially unique. One is the percentage depletion allowance, which may even exceed the total cost of the investment. The other is the extent to which outlays of a capital nature may be charged against current income. Before discussing the Department of Commerce's treatment of the various items I shall outline the nature of these provisions with particular emphasis on recent changes which will have important implications for future computations.

Present Depletion Provisions

At present a depletion allowance may be taken on mineral income either as a percentage of income (a legislatively fixed percentage of gross income up to 50 per cent of net income before the allowance) or on an adjusted basis (modified residual cost). Rates of percentage depletion in terms of gross income range from 5 per cent for such minerals as sand and gravel to 27.5 per cent for oil and gas. Only soil, sod, turf, water, mosses, and minerals from sea water, air, or similar "inexhaustible" sources are excluded. The method of depletion used for a particular property in a given year is not subject to an election. The taxpayer must take the highest amount available for each property. Since depletion is computed separately for each property (or group of properties operated as an entity), a taxpayer may simultaneously obtain depletion at a statuatory percentage of gross income on some properties, at 50 per cent of net income before depletion on other properties, and at the adjusted basis on still other properties. The property-by-property rather

than taxpayer entity of computation is sometimes highly significant.[1]

Since percentage depletion is available whenever there is net income, no limit is set to the aggregate amount of depletion that may be allowed on a mineral property. In this respect it is a unique allowance; most business-tax accounting differences concern the timing of deductions or of the realization of income, not of the total amount to be taken as deductions over the life of an asset. Nor does the tax figure for depletion necessarily reflect the discovery value of the mineral produced during the year. Rather it is a complex, artificial number.

Prepaid Expenses and Charges Against Current Income

Not all exploration, development, and mineral rights costs enter the depletable basis of the property. Therefore the part of adjusted basis depletion due to such outlays is smaller than would be indicated by their absolute costs. The Revenue Act of 1951 and the Internal Revenue Code of 1954 have tended to reduce the portion of extractive industry investment recoverable through depletion since they allow more exploration and development outlays to be charged against current income or treated as prepaid expenses. The relevant provisions for oil and gas differ from those applicable to other extractive industries and so are treated separately.

MINERALS OTHER THAN OIL AND GAS

No attempt is made here to ascertain whether petroleum obtains more favorable treatment than other minerals. However, it is worthwhile to point out that such an evaluation cannot be made in the absence of information or the setting of confident assumptions concerning the relationship of gross to net income, the proportion of growth from developed sources as compared with new sources, the comparative scales

[1] The nature of the net income limitation can be misinterpreted. In writing of a similar limitation applicable to discovery depletion (the predecessor of percentage depletion), Solomon Fabricant said that, under the 1921 act, cost or March 1, 1913 depletion values were to be used if the discovery depletion exceeded the net income limitation, at that time 100 per cent of net income before depletion (*Capital Consumption and Adjustment,* National Bureau of Economic Research, 1938, p. 96). The actual provision was that if discovery depletion exceeded net income before depletion, it could be taken only to the extent of that net income. However, cost or March 1, 1913 depletion could be taken even if it exceeded net income.

In the same passage Fabricant warned of possible effects of the property-by-property rather than the taxpayer basis of calculations: "Depletion charges in 1934 and 1935 must have been affected somewhat by the elimination of consolidated reports owing to the net income provision of the law" (*ibid.,* p. 96, note 58). However, the consolidated corporation return was in no way linked to the net income provisions dealing with depletion.

of wildcat exploration and development activities, market behavior, and the proportionate reduction in tax liability as contrasted with tax reduction per unit of output.

To recover mining, exploration, development, and mineral rights costs, a taxpayer may charge them against current income, enter them as prepaid expenses to be written off in proportion to production, or capitalize them and claim adjusted basis depletion. It is to his interest to minimize the third because percentage depletion is available as an alternative to adjusted basis depletion, while either of the first two can be claimed in addition to percentage depletion. The relative advantages of the first two methods depend on anticipated tax rates, the level of net income on both the taxpayer and the property level, and the tax value of the loss carryover.

The treatment accorded these costs depends on the stage of operation attained by the property. Mining properties are considered to have three distinct stages—exploration, development, and production.

1. The exploration stage begins with the discovery of the property and continues until it is proved to be commercial. Until 1951 all outlays in this stage had to be capitalized and were, for the most part, recoverable only through depletion.

The Revenue Act of 1951 permitted the taxpayer to charge exploratory expenditures against current income or treat them as prepaid expenses up to $75,000 a year for four years, electing each year the one to be used for all such expenditures in the year. In 1954 this amount was increased to $100,000 for four years less the number of years for which these outlays had been charged against income or treated as prepaid expenses under the 1951 act. This election was probably exhausted for most taxpayers by the end of 1955, and it has probably not constituted a large part of total expenditures.

2. The development stage starts as soon as the property is proved to be commercial and lasts as long as the principal activity is the development of reserves rather than production. Before the Revenue Act of 1951, development expenditures in this stage were to be charged against current income up to the net operating income from the property. Expenditures in excess of current income were to be capitalized and were recoverable through depletion.

Since 1951 development outlays in excess of current income may either be charged against current income or treated as prepaid expenses to be charged off with production, by an annual election for all such expenditures in that year. In either event, investment to be recovered through depletion is not increased. In time, then, an even smaller pro-

portion of the Internal Revenue Service depletion figure will be in lieu of development expenditures.

3. The production stage starts when production rather than the development of reserves becomes the predominant activity and continues until abandonment. Before the Revenue Act of 1951 development costs in this stage could be charged against current income only to the extent necessary to maintain capacity. Outlays that increased capacity had to be treated as prepaid expenses.

Since 1951 the taxpayer, dependent on an annual election applicable to all such expenditures in the year, can either charge development costs against current income or treat them as prepaid expenses.

OIL AND GAS

In oil and gas the minimization of the formal recovery of outlays through depletion is accomplished largely by charging intangible drilling and development cost against current income. The regulation permitting expensing such outlays in the oil and gas industry goes back to 1917. The relationship between the expensing option (a binding rather than the annual one for mining) and discovery depletion differs from the relationship with percentage depletion.

Under discovery depletion (1918 through 1925 for oil and gas) capitalized intangible drilling and development costs were added to the remaining discovery value to be written off. Consequently, expensing was then less attractive than it is under percentage depletion which does not reflect capitalized costs. There have been some variations over time in precisely which outlays are subjected to expensing and under what circumstances one would expense.

The most important current difference between the expensing option for the oil and gas industry and what is available to the other extractive industries is that the alternative to expensing is recovery mainly through depletion in the oil and gas industry as contrasted with the prepaid expense alternative for other extractive industries. This means that for the oil and gas taxpayer capitalizing intangible drilling and development costs and obtaining percentage depletion, the amounts capitalized do not increase deductions. On the other hand, development costs not charged against current income in the other industries do increase deductions even if percentage depletion is taken, because they are taken as prepaid expenses which are charged off in addition to percentage depletion.

Since most oil and gas taxpayers have elected to charge intangible drilling and development costs against current income, it is of interest

to describe the scope of the costs covered by the election. Included are all wages, fuel, repairs, hauling, and supplies for the following purposes:

1. Clearing the ground, draining, road-making, surveying, and geological work necessary in preparing for drilling
2. Drilling, shooting, and cleaning wells in the original development
3. Construction of derricks, tanks, pipelines, and other properties required for drilling of wells and preparing them to produce oil or gas

The expenditures that may not be expensed (all structures and equipment with a salvage value) are recoverable through depreciation and consequently do not enter the depletion figure. These include derricks, casing, tubing, valves, compressors, boilers, tool houses, and machines. However, the wages, fuels, repairs, hauling, and supplies required for the installation and construction of these depreciable items are considered intangible drilling and development outlays for expensing purposes. (But not those related to the installation of equipment, facilities, or structures not necessary for the drilling of wells, such as structures for storing or treating oil or gas. These are recoverable through depreciation.)

Exploration and mineral rights costs are the only two types of oil and gas industry expenditures that must be recovered through depletion to some extent. Ordinarily the cost of mineral rights is considered to be recoverable through depletion only. However, several classes of expenditures that, from an economic and business viewpoint, are costs of mineral rights are charged against current income or treated as prepaid expenses.

Oil and gas mineral rights are generally purchased for a combination of an initial cash payment at the time of the transaction and additional payments expressed as a fraction of gross income from the property over its productive life (an override) or until the fractional payments aggregate to a specified amount (an oil payment). In either case, only the initial cash payment enters the depletion account. The subsequent payments, geared to production, are regarded as being realized by the recipient, not as entering the gross income of the operator for percentage purposes.

For the override this is fully satisfactory. Payments are made to the landowner as long as there is production. However, the oil payment

continues only until a specified amount is paid. While it is, in part, payment for current production, it might also be regarded as incorporating some payment for future production.

The third kind of payment, the delay rental, is a part of the cost of mineral rights but is not recoverable through depletion. Companies pay landowners stipulated sums for the right to postpone exploration and development of leases; one common provision is that the property be diligently developed. The landowner's interest in such prompt development follows from his right to an override or an oil payment. These delay rentals, which in the national aggregate are substantial, may, subject to an annual election, be charged against current income or be capitalized to be written off in proportion to production as prepaid carrying charges.

Geological and geophysical exploratory expenditures associated with the acquisition or retention of oil and gas rights, but not for the purpose of locating operating wells, are recoverable through depletion. Before 1950 certain general exploration expenditures not associated with particular properties could be charged against current income. The 1950 change requires that such general exploratory expenditures be proportionately allocated among the properties acquired within the area examined. If no property is acquired as a result of such a survey, they are charged against current income. This is the only recent change that increases the amount of the investment recoverable through depletion.

A characteristic of such elections is that the expensing option applies to the entity making the expenditure either directly or through a contractor. It does not extend to the components of the purchase price of operating properties. Consequently some portion of the purchase price of operating properties is recoverable through depletion. The purchase price is divided into an amount for depreciation and an amount for depletion in proportion to the ratio of fair market values of depreciable equipment and depletable leasehold costs.

Critique of National Income Procedures

TREATMENT OF DEPLETION

To obtain its national income figure for corporate net profits, the National Income Division of the Department of Commerce adds depletion allowances to the corporate net profits shown by the Internal Revenue Service *(Statistics of Income,* Part 2), where these figures are net of the allowable deductions for depletion. The reason given by the

NID for this procedure is that discovery values are not added to capital formation and consequently depletion should not be deducted from profits.[2]

Within a conceptual framework that does not count discovery values as capital formation, is the correct adjustment being made? It is not entirely clear whether the NID would exclude the depletion allowed if there were still cost depletion rather than percentage depletion. The Hagen and Budd paper in this volume would add the portion of the percentage depletion that represents development costs and would omit the portion that represents the value of mineral rights. But they consider that other capital consumption allowances made by the NID are already sufficient to take care of such development costs.[3]

However, these capital consumption allowances do not take care of exploration costs and mineral rights costs. As I have noted above, these costs are also to a considerable degree recoverable through depletion allowances alone. A conceptual framework that deducts depletion or its equivalent insofar as these cover development costs should also take exploration costs into account.

It may be thought that this principle should not apply to the costs of mineral rights on the grounds that these reflect realized or anticipated discovery values. But since mineral rights payments are counted as income of the recipient and cannot become depletion tax deductions until there is production, I consider that these costs should be included. Adjusted basis depletion as computed by the IRS includes costs of mineral rights.

The Treasury Department has made studies that give figures for adjusted basis depletion and percentage depletion.[4] Based on these studies, the following table shows the adjusted basis depletion that would have been allowable if there had been no percentage depletion from 1946 through 1949. But the figures reflect the reduction in the adjustment basis resulting from the percentage depletion of previous years. The last line shows the amount by which the NID figures for corporate

[2] *National Income Supplement, 1954, Survey of Current Business,* Dept. of Commerce, p. 41. Their statement tends to suggest a relationship between depletion for tax purposes and discovery values which does not really prevail. The Hagen and Budd paper in this volume makes this misunderstanding more likely because of its exposition (page 264) of why discovery values would have to be added to capital formation if depletion were not added to corporate profits.

[3] Page 265, note 69. Solomon Fabricant has said that the NID procedure adds back too much (*Studies in Income and Wealth, Volume Ten, NBER,* 1947, p. 54).

[4] 1946 and 1947: *Revenue Revision of 1950,* Hearings before House Ways and Means Committee, 81st Cong., 2d sess., Vol I, pp. 194 and 197. 1948 and 1949: *Resources for Freedom,* Report of the President's Materials Policy Commission, June 1952, Vol. V, p. 14.

profits after taxes[5] should be reduced if, as I hold, costs of mineral rights should also be deducted. In terms of allowable deductions, the relationships are as follows:

	1946	*1947*	*1948*	*1949*
Adjusted basis depletion as percentage of the actual total depletion	13.5	9.4	6.0	5.4
Excess depletion added to net profits, in millions	$108	$114	$103	$80

But this excess may easily be double the excess shown because of the difference between adjusted basis depletion and cost depletion.

Adjusted basis depletion is the alternative to percentage depletion, not cost depletion. The nature, but not necessarily the realistic proportions, of the relationship between cost and adjusted basis depletion is demonstrated in the following example.

Assume that exploration and mineral rights cost 100; that the content of the property is produced in equal amounts over five years; that there is substantial net income before depletion in the first year, some in the second year, and no net income before depletion in the remaining three years:

	1ST YEAR *Substantial Income*	2ND YEAR *Some Income*	3RD YEAR	4TH YEAR	5TH YEAR	FIVE YEAR TOTAL
			No Income			
Cost depletion	20	20	20	20	20	100
Adjusted basis depletion	20	5[a]	0[b]	0	0	25
Percentage depletion	80	20	0	0	0	100
Permitted by tax law	80	20	0	0	0	100
Addition to profit:						
NID	80	20	0	0	0	100
"Correct"	60	0	—20	—20	—20	0
NID "error"	20	20	20	20	20	100
Addition to profit of adjusted basis depletion taken into account	60	15	0	0	0	75
Error	0	15	20	20	20	75

[a] (100—80)÷4 This is the remaining basis after taking into account the depletion allowed in the first year times the proportion of the reserves remaining after the first year.

[b] Adjusted basis depletion after the second year is zero because the depletion deductions of the first two years equal 100. Adjusted basis depletion never becomes negative.

[5] *National Income Supplement, 1954,* Table 38, line 31, pp. 214 and 215. The excess is obtained by applying the percentage that the assumed adjusted basis depletion (from Treasury data referred to above) is of total depletion to line 2 of that table.

In the illustrations depletion allowed by the tax law is exactly equal to cost depletion. However, by adding all of depletion to corporate income, the NID approach overstates corporate income by 100 over the life of the property. Furthermore, and this is frequently overlooked, taking adjusted basis depletion into account does not in itself adequately reduce the amount which should not be added back to corporate income. In this particular case using adjusted basis depletion as though it were cost depletion would reduce the error from 100 to 75.

In any one year the proportionate overstatement may be higher or lower than that of the entire life of the property.

It is useful to cast this hypothetical arithmetic illustration in the form of five corporations in one year instead of one corporation over five years. Let Corporation A be in the same situation as the original hypothetical corporation in the first year; B be in the same situation as the original corporation is in the second year; and so on through E:

	CORPORATION A *Substantial Income*	CORPORATION B *Some Income*	CORPORATION C	CORPORATION D	CORPORATION E	FIVE CORPORATIONS
			No Income			
Cost depletion	20	20	20	20	20	100
Adjusted basis depletion	20	5[a]	0[b]	0	0	25
Percentage depletion	80	20	0	0	0	100
Permitted by tax law	80	20	0	0	0	100
Addition to profit:						
NID	80	20	0	0	0	100
"Correct"	60	0	—20	—20	—20	0
NID "error"	20	20	20	20	20	100
Addition to profit of adjusted basis depletion taken into account	60	15	0	0	0	75
Error	0	15	20	20	20	75

[a] See note a of previous table.
[b] See note b of previous table.

By design the result for the five entities is the same as that of the single corporation over a five year period. The NID would add 100 to corporate income because it is depletion even though there was 100 of cost depletion. And as before, utilizing adjusted basis depletion does not restore balance. It would incorrectly require the addition of 75 to corporate incomes.

The Treasury Department data discussed above indicated that the 1949 adjusted basis depletion is on the order of $80 million and that the NID therefore overstates corporate net income at least to that ex-

tent. I then argued that cost rather than adjusted basis depletion correctly gives the amount of the excess in the context of the NID approach. In the absence of information about cost depletion, I suggest that it could easily be double adjusted basis depletion, making the 1949 overstatement of corporate net income $160 million instead of $80 million. (At the same time it appears that 1949 corporate income before taxes is understated by $412 million because of expensing of oil and gas well drilling costs. This is discussed below in the section on "expensing of capital outlays.")

However, between the increased possibilities of recovering outlays by means other than depletion, increased levels of percentage depletion, and numerous technical changes, the proportionate error resulting from the NID procedure of adding depletion to corporate net income will decline in the future.

It must be kept in mind that percentage depletion has many dimensions in addition to the statutory rate. This can be illustrated by three provisions of the Internal Revenue Code of 1954.

Adjusted depletion decreases as a fraction of percentage depletion when percentage depletion is increased as well as when charges against income or prepaid expenses are used instead of depletion as a way to recover costs. Under the Internal Revenue Code of 1954, percentage depletion was increased by:

1. Modification in the meaning of mineral property
2. Elaboration of the income to which it is applicable
3. Removal of adjustments for it in loss carryback and loss carryforward

The first change allows the taxpayer to treat certain sets of properties as a unit for purposes of computing percentage depletion even though they are separate legal entitites. This will increase percentage depletion by a small amount because, in general, the combination of properties tends to reduce the effect of the 50 per cent of net income limitation.[6]

In regard to the second change, since gross income is multiplied by the percentage depletion rate, it is necessary to specify a point at which the material is to be valued for this purpose. The relevant income for percentage depletion purposes includes ordinary treatment processes.

[6] Exceptions arise under certain conditions when loss properties are combined with gain properties. However, this is not likely to happen, because the properties must be operated as a unit and the taxpayer selects the units for which combinations are made.

Under the new provision, for example, "dust allaying" of coal was added to the other "ordinary treatment" processes of breaking, sizing, loading, and treating to prevent freezing. The other source of elaboration of income for percentage depletion is by the liberalization of the amount of transportaion which may be included.

Finally, before the Internal Revenue Code of 1954, taxpayers using loss carryover had to eliminate percentage depletion in the year of the loss and in the year to which the loss was to be carried. Consequently, the amount of the loss would be reduced by the excess of percentage depletion over adjusted basis depletion, and taxable income of the year to which the loss would be carried would be increased by the excess in that year. This is no longer required.

In connection with possible reworking of the data of earlier periods it is important to take account of the profound importance of depletion based on March 1, 1913 values.[7] Table 1 shows that even as late as 1928 depletion derived from March 1, 1913 values predominated for many industries:

TABLE 1

Relative Magnitudes of Cost, March 1, 1913 Value, and Discovery Depletion for Minerals, 1928

Depletion type	*Gold and Silver*	*Copper*	*Lead and Zinc*	*Iron*	*Coal (1926)*	*Sulfur*
Cost	8.5	18.3	18.0	0.5	28.4	0.0
March 1, 1913	64.4	76.6	46.0	98.5	71.6	25.7
Discovery	27.1	5.1	36.0	1.0	0.0	74.3

Source: Based on data in *Depletion of Mines,* Hearings before the Joint Committee on Internal Revenue Taxation, 71st Cong., 3d Sess., 1930, Appendix.

Consequently, if March 1, 1913 depletion values are to be used in national income accounting as they are used in depreciation, important proportions of depletion should not be added back at least prior to 1932.

To summarize this discussion of the part of the depletion allowance that should not be added back to corporate net income consistent with the explanation given by the NID for adding back allowed depletion, I consider that the cost or March 1, 1913 depletion should not be added

[7] From *Depletion of Mines,* Hearings before the Joint Committee on Internal Revenue Taxation, 71st Cong., 3d sess., 1930, Appendix. The size of the discovery depletion allowances obtained by the oil and gas industry made discovery depletion the most important basis for the depletion allowances of the extractive industries as a whole.

back; that adjusted basis depletion understates the amount that should not be added back; and that the proportion that should not be added back is probably decreasing.

SOME THEORETICAL ASPECTS

Since the NID's explanation of its rationale is rather limited, I shall discuss the Hagen and Budd exposition. Their statement that the NID procedure gives a correct measure of net output if current discoveries are equal in value to current depletion[8] contains the essential ingredient of a conclusion directly opposite to that reached by its authors. If net output cannot be measured correctly without the measurement of mineral discoveries and depletion, the compelling answer should be that discovery values and depletion should be ascertained. They overlook the full implication of their statement of the one condition under which the NID procedure is correct and ascribe greater weight to what might be called a "common law" of near analogy with other economic phenomena. The analogy in this case is between the discovery of new reserves and "revaluation of an existing asset to accord with a change in our knowledge, than to production (i.e. the use of human and physical resources to create new goods and services)."[9]

Ultimately they rely upon an assertion rather than a demonstration that national income objectives are best served by the present practice. Given the correct measurement of gross and net national output as the ultimate purpose of national income accounting, it is difficult to see how an operation that yields correct answers under only one condition can be considered satisfactory from the theoretical standpoint simply because the operation is consistent with the manner in which certain somewhat similar situations are treated. The closer the analogy to the extractive industry case, the stronger becomes the position for entering the others into national income accounting. Some can be measured while others cannot, but those that can be measured should be included.

Finally, even when discovery values are equal to current depletion, the interpretative potential of the accounts is increased when the values are given. The fact that figures cancel each other does not mean that they should be neglected. Irrespective of how these resources become available, their increase or decrease is relevant to current and future national income and merits a record. In depletion there is a symmetry of the ultimate private and public values that makes accounting for

[8] See pages 264-266 of their paper for the section on which these comments are based.

[9] *Ibid.*, p. 265.

change desirable.[10] Even if it does not fully appear as a financial item, the formation and depletion of mineral values is of both private and public concern.

As to the lack of parallelism between land values and minerals, note that land values cannot be depreciated for tax purposes. They do not automatically alter as a function of the activity that gives them value.

That proper accounting for discovery and its depletion is preferable to accounting for neither does not mean that such an operation can be accomplished easily. Under discovery depletion, the intent of the law was that the depletion base be dependent upon the initial value of the find. Changes in estimated reserves could alter the rate at which the discovery value could be taken (more reserves lowering the depletion allowance per unit of output) but would leave the aggregate of deductions unchanged over the life of the property.

Hagen and Budd appear to have the same idea as to the appropriate measurement of discovery value.[11] But if the value sought is essentially the difference between the cost of finding reserves, their anticipated cost of production, and price realization, additions to reserves after discovery merit the same status as initially discovered reserves. Quantitatively, changes in proved reserves attributable to extensions and revisions are often many times as large as new proved reserves. In most years revisions and extensions exceed production.[12]

The meaning of "reserves" is far from unique, and the appropriate definition depends upon the purpose for which a reserve figure is sought. Although there are many possible interpretations of reserves, not many reserves figures are available.[13] The mineral census of 1954 will not contribute information along these lines since reserve questions were not included.

There are at least three levels of detail at which reserve values

[10] Depreciation allowed on patents and copyrights is an unnoticed exception to this general symmetry of public and private accounts. Patents and copyrights continue to serve even after they enter the public domain. Therefore, from a national income standpoint they need not depreciate. A good case might be made for adding back this part of depreciation whether based on original or acquisition cost.

[11] "Over its life (i.e. from just before its discovery until its exhaustion) we may either count the discovery value of the resource in the initial year and deduct depletion equal to discovery value over its lifetime . . ." (page 264).

[12] The juxtaposition of discovery depletion and this distinction on the sources of reserves should not be interpreted as meaning that discovery depletion was available only to new pools. The administration of discovery depletion was such that all oil and gas production was eligible. Indeed, the widespread distribution of discovery values was one of the secondary reasons advanced for the adoption of percentage depletion.

[13] Information of this type was sought by the President's Materials Policy Commission which found "at first hand that national estimates of reserves proved particularly meager and hard to come by" (*Resources for Freedom,* page 26).

might be ascertained: (1) physical quantities, (2) costs of new reserves including their finding, development, and production (which with anticipated prices would give discovery values), and (3) total mineral values (which includes continuously revaluing old reserves as well as new reserves).

Costs of finding new reserves is probably a good starting point toward ultimate solution of these problems. Both in the short and long runs such information would make a greater contribution toward the resolution of questions outside the national income field than of those within it.

Perhaps another useful approach to this entire question is through their discussion of depreciation. For the measurement of current depreciation they would want to measure "the cost of producing yesterday's machine with yesterday's technique at today's factor prices. . . ."[14] Some interesting results follow if "mineral reserves" are substituted for "machinery." The consequence could well be equivalent to some form of discovery value depletion. Special difficulties arise when it is no longer possible to find further reserves with yesterday's technology because all of the mineral formations which could be discovered with the old technique have already been found.

A short cut answer for the petroleum segment has been suggested by Raymond W. Goldsmith.[15] He would apply oil land prices to total oil area. But an appropriate sample by property type would be difficult to obtain and generalization from such a sample would be complicated.

In addition, oil property transactions are generally not at specific prices.[16] As I have noted before, usually there is a combination of an initial cash payment and a payment to be made from a fraction of gross income over the life of the property or until a specified sum has been received. For the oil and gas industry a payment of one-eighth of gross income to landowners is now traditional. Competition is expressed largely through the size of the initial payment.[17] Therefore, the size of the initial payments is more significant than would otherwise be thought.

The part of the payment expressed as a proportion of gross income could be analytically manageable. While this approach would not in

[14] Page 256.

[15] "Measuring National Wealth in a System of Social Accounting," *Studies in Income and Wealth, Volume Twelve,* NBER, 1950, p. 66.

[16] Carl Shoup also calls attention to this in "The Distinction between 'Net' and 'Gross' in Income Taxation," *Studies in Income and Wealth, Volume One,* NBER, 1937, p. 273.

[17] Because of tax law construction, oil payments rather than royalties are more attractive to the landowner and the oil operator (see my "Yields of Oil Payments and Overrides," *Taxes, The Tax Magazine,* June 1955, pp. 421-429).

itself answer the questions of concern here, it would indicate what the levels of mineral values are. Also, where payments for mineral rights are in part proportional to either gross or net income, some idea can be had of the minimum amount of discovery value anticipated.

In addition to changes in reserve quantities, there are important secular developments in the significance of the quality of reserves, involving both their grade (the portion of metal per unit of ore) and their physical characteristics (impurities and the structure of the ore body, among others). Technological developments in mining and purification[18] have probably tended to reduce reserve value differentials based on both quality aspects. Concurrently, over the long run, change in transportation effectiveness also has had an effect on mineral reserve values. Information of this type belongs in a statement of national wealth, and the long term objective should be to obtain and apply such knowledge.

Perhaps the depletion issue may not be able to be solved through annual national income accounting. Schedules of values for five or ten-year accounting periods may be more appropriate than annual figures for mineral values.

MEASUREMENT OF EXTRACTIVE INDUSTRIES INCOME

The NID cautions that its tabulations are unsatisfactory for some industries.[19] The mining group is one to which the warning particularly applies.

Employee compensation (largely Social Security data) is on an establishment basis, while corporate profits (from the IRS) is on a tax return basis that classifies establishments according to the main activity of the tax reporting unit, whether this is a single corporation or a group with a consolidated return. A severe asymmetry exists between employee compensation coverage and corporate profits coverage for mining because of the strong tendency for extractive activities to be conducted by manufacturing corporations but not for manufacturing activities to be carried on by corporations whose main activity is mineral production. The large amounts of depletion shown on corporate tax returns not classified under mining indicate how much the corporate income in the IRS mining and quarrying (including oil and gas) classification understates corporate income due to such activity because depletion is applicable to mineral extraction only. The following table, based on various issues of *Statistics of Income,* gives the

[18] See, for example, Harold Barger and Sam H. Schurr, *The Mining Industry, 1899-1939,* NBER, 1944, pp. 114-116 and 154-157.

[19] *National Income Supplement, 1954,* p. 67.

total depletion recorded and the amounts that went to the mining and quarrying IRS classification:

	Depletion Allowed (dollars in millions)		
Year	*Total*	*Mining and Quarrying*	*Percentage of Total in Mining and Quarrying*
1929	$559	$243	43.5
1930	463	183	39.5
1931	268	108	40.3
1932	246	102	41.5
1933	246	114	46.3
1934	312	185	59.3
1935	349	198	56.7
1936	437	227	51.9
1937	524	276	52.7
1938	437	205	46.9
1939	438	210	47.9
1940	475	237	49.9
1941	544	271	49.8
1942	579	239	41.3
1943	644	224	34.8
1944	712	231	32.4
1945	693	211	30.4
1946	799	237	29.7
1947	1,210	381	31.5
1948	1,711	554	32.4
1949	1,476	457	32.2
1950	1,709	601	35.5
1951	2,085	708	34.0
1952	2,113	703	33.3

Since 1943 only about one-third of depletion has gone to tax returns classified as mining. The 1934-1941 percentages are higher than the percentages before 1934 because consolidation of tax returns was not permitted during those years.

While not in complete harmony, depletion and net income before taxes are likely to be closely associated. If only one-third of depletion is obtained by corporations which are in the IRS mining and quarrying classification, it is a reasonable first approximation to assume that nonmining corporations have twice as much income from extractive activities as mining corporations and that total corporate mining income is three times as large as that given by the IRS. In the following table a first approximation is made at correcting the mining sector in-

come of the NID for the amounts of corporate income derived from extractive activities that are listed with manufacturing:

	(dollars in millions)				
	1929	*1937*	*1941*	*1947*	*1951*
1. National income originated, dollars[a]	2,048	1,912	2,299	4,191	5,551
2. Mining corporate income before taxes, dollars[b]	417	436	587	953	1,418
3. Percentage of corporate depletion received by mining corporations[c]	43.5	52.7	49.8	31.5	34.0
4. Adjusted mining corporate income before taxes, dollars	959	828	1,178	3,030	4,176
5. Revised national income originated, dollars	2,590	2,304	2,890	6,268	8,309
6. Percentage increase in national income originated	26.5	20.5	25.7	49.6	49.7
7. Compensation of employees, dollars[d]	1,539	1,368	1,621	3,070	3,910
8. Corporate income before taxes as percentage of compensation of employees	27.1	31.9	36.2	31.0	36.3
9. Adjusted corporate income before taxes as percentage of compensation of employees	62.3	60.5	72.7	98.7	106.8

[a] *National Income Supplement, 1954,* Table 13, pp. 176-177.
[b] *Ibid.,* Table 14, pp. 178-179.
[c] From my previous table.
[d] *National Income Supplement, 1954,* Table 18, pp. 184-185.

The main operation carried through in this table is the increasing of mining corporate income before federal and state income and excess profits taxes to reflect mining income listed on nonmining corporations' tax returns. This is done by multiplying the original corporate mining income before taxes by the reciprocal of the proportion of all corporate depletion received by corporations classified in mining by the IRS. For example, in 1941 mining corporations obtained about 50 per cent of total depletion allowed (line 3). The original corporate net income before taxes ($587 million in line 2) is multiplied by slightly more than two, resulting in $1,178 million. In line 5 national income originated is increased by the increase in mining corporate income before taxes, the difference between line 4 and line 2. As is seen in line 6, this procedure results in a nearly 50 per cent increase in national income originated in mining for 1947 and 1951.

Every measurement in which the industrial sector corporate net income is a component or a yardstick is altered by this change of the magnitude of extractive corporate income. In most measurements the proportionate impact is larger than that which is exerted on national income originated. For example, the adjustment increases 1951 corporate income before taxes from 36.3 per cent to 106.8 per cent of employee compensation.

The result of the analysis of the appropriateness of the NID pro-

cedure in adding back the entire depletion allowance to corporate net income is completely applicable in a commodity-by-commodity analysis. Corporate income before federal and state income taxes listed in *National Income Supplement, 1954,* makes no provision for depletion. This is consistent with the economy aggregates. However, it means that the industry and commodity corporate incomes before federal and state income taxes are overstated by at least the extent to which the depletion not taken into account as a deduction represents costs. If discovery values are relevant, the error may be larger.

From this discussion it would appear that the national income presentations for mining should not be used without careful adjustment.[20] Likewise, the national income data for nonmining industries that carry on a large amount of mineral activities should not be used without the necessary adjustment. As a case in point, "products of petroleum and coal"[21] corporate net income before taxes probably requires a downward adjustment in excess of 50 per cent.

EXPENSING OF CAPITAL OUTLAYS

Up to now I have been discussing the charging of development costs against current income to demonstrate its implications for the elimination of depletion in national income accounting. But the expensing of capital outlays in itself has important consequences in national income measurement.

No attempt is made by the NID to ascertain the net overstatement of current capital deductions when capital expenditures are charged against current income. If the stock of capital and the price level remain unchanged, charging expenditures for capital against current income will have the same effect as taking depreciation. However, if capital outlays increase, the annual amount charged will be larger than depreciation. The size of this excess will depend on the rate of growth of capital outlay and its average life. The longer the average life of the investment, the greater the amount of the overstatement of capital charges when capital expenditures are charged against current income.

A notion about the size of this overstatement of capital charges for oil and gas well drilling can be obtained by a fairly simple analysis of the petroleum oil and natural gas well drilling contribution to new construction activity as given in *National Income Supplement, 1954.*[22]

[20] For another effort at adjusting national income originated in mining industries, see Paul W. McGann, in *Minerals Yearbook, 1951,* Dept. of the Interior, pp. 8-9.

[21] *National Income Supplement, 1954,* Table 18, pp. 184-185.

[22] Table 31, p. 209.

The oil and gas well contribution to new construction activity exceeds intangible drilling and development costs by the cost of casing.[23] The difference is likely to be proportionate, so, although these calculations are made with the larger construction figures, if the results are expressed as ratios, they will hold for the smaller absolute amounts of expensed oil and gas well costs.

If one assumes a ten-year weighted average life for oil and gas wells (which is fairly low, especially under regulated production, and tends to understate the difference between depreciation and expensing), the expensed costs are the following multiples of what annual deductions would be: 1949, 1.845; 1950, 1.942; 1951, 2.164; 1952, 2.001; and 1953, 1.891.[24]

These results indicate that at the exhibited increase in expenditures and with an average ten-year normal life assumed, the expensing of oil and gas wells results in a charge against current income about double what it would be were a depreciation-type deduction taken. If drilling activity expenditures have increased more rapidly than the

[23] Oil and gas well drilling costs are listed in two forms in *National Income Supplement, 1954*. On page 123, oil and gas well drilling is credited with $1,279 million of new construction activity in 1950. On page 150, oil and gas well drilling is listed as charging $920 million of capital outlay to current expense. According to the text, the $1,279 million figure for new construction activity differs from the $920 million capital outlays charged to current expenses by the cost of oil well casing.

The construction figure as defined on page 126 covers "All costs of drilling . . . including the cost of casing (but not the cost of installed production equipment)." Capital outlays charged against current income are defined on page 152 as including all expenditures for oil and gas well drilling except cost of casings. This means that the cost of casing must be over 28 per cent of the total expenditure on oil and gas wells in the year. For 1947, casing is about 26 per cent of total expenditures. David Siskind (*"Drilling Costs," Petroleum Engineer,* January 1952, p. B-18) estimates that in 1947 casing constituted almost 25 per cent of total expenditures. However, his estimates of the absolute amounts are quite different.

Two further points should be made clear concerning the oil and gas well figures. Unsuccessful wells are included. While from the construction activity standpoint it may not be worthwhile distinguishing between successful and unsuccessful wells, it may be of substantial significance for other purposes. In this framework, water and gas injection wells are considered to be oil wells, and the taxpayer's intangible drilling and development option for tax purposes covers them.

[24] The method of making this computation can be illustrated by describing the procedure for 1949. The capital charge for 1949 in the absence of expensing is found by adding together half of the amount for 1939, the entire amounts for the years 1940 through 1948, and half the amount for 1949. This sum is then divided by ten to yield the allowance that would be permitted if expensing did not prevail.

Half of the 1949 amount rather than the entire figure is added because otherwise investment spread throughout the year would get a full year capital deduction allowance. The 1949 amount of investment is divided by the resultant figure. For 1949 the actual figure is $1,069 million while the derived figure is $579.35 million. Therefore, the 1949 deduction via expensing is about 1.85 times the amount it would be on a depreciation-like deduction.

National Income Supplement, 1954, data show, the overstatement multiple is larger than that derived here. There is some indication that the national income figures for total drilling costs and costs charged against current income are on the low side for at least the 1947-1953 period. David Siskind has attempted to estimate total oil and gas well drilling costs for 1947 through 1951:

	(dollars in millions)				
	1947	*1948*	*1949*	*1950*	*1951*
National Income Supplement, 1954[a]	$ 773	$1,051	$1,069	$1,279	$1,568
David Siskind[b]	1,076	1,435	1,446	1,730	1,901
Percentage increase	39	36	35	35	21

[a] Table 31, p. 209.
[b] "Drilling Costs," *Petroleum Engineer,* January 1952, p. B-18.

Some of this difference may be due to the wider definition of drilling costs in the Siskind study. However, since the NID figure is geared to extrapolations of 1939 census data, it is quite possible that it has gone somewhat astray.

In the present context it is the expensed portion rather than the drilling expenditure that is significant. Estimates (based on NID sources) of this part of the costs of oil and gas wells for the years 1946 through 1949 are given by Goldsmith.[25] These amounts are: 1946, $500 million; 1947, $575 million; 1948, $755 million; and 1949, $765 million. The 1950 figure is given in *National Income Supplement, 1954,* as $920 million.[26]

Since the total drilling cost listed by the NID appears to be low, the same would be true for expensed drilling cost figures derived from them. The arbitrary assumption is made here that expensed drilling costs are understated by the national income sources by half the percentage by which the Siskind study estimates their total costs to be understated. The revised amounts of drilling costs charged against current income are increased by 19.5 per cent for 1946 and 1947, 17.5 per cent for 1948 and 1949, and 10.5 per cent for 1950. This makes for the following revised expensed drilling outlays: 1946, $597 million; 1947, $687 million; 1948, $887 million; 1949, $899 million; and 1950, $1,017 million.

It was found above that expensing instead of the periodic writing off of drilling costs overstates deductions by a multiple of at least 1.845 in 1949 and 1.942 in 1950. This means that the revised deductions

[25] Raymond W. Goldsmith, *A Study of Saving in the United States,* Princeton University Press, 1955, Vol. 1, p. 957.
[26] See note 23 above.

would have been $487 million instead of $899 million in 1949, and $524 million in 1950. Thus, at the same level of activity, corporate net income before taxes would be larger than the NID figure by at least $412 million in 1949 and $493 million in 1950 if oil and gas well drilling and development costs were written off over a ten-year period instead of charged against current income.

As I noted previously, the NID overstatement of corporate income due to the part of depletion that should not be added back is combined with an understatement arising from the expensing of oil and gas well drilling. If adjusted basis depletion is the proper amount for this purpose, the net understatement for 1949 is $412 million minus $80 million, or $332 million. If an estimated cost depletion double the adjusted basis is thought to be the NID depletion error, the net understatement of corporate income before taxes is $252 million for 1949.

Mining corporate income before taxes for 1949 is given as $923 million.[27] When this amount is increased because of the proportion of depletion received by nonmining corporations it becomes $2,873 million. And the understatement of mining corporate net income before taxes because of expensing and the depletion correction is 11.6 per cent or 8.8 per cent, depending on whether cost or adjusted basis depletion is considered the form of depletion to be deducted in determining net income before taxes.

An adjusted basis depletion figure is not available for 1950. Assuming it to be the same fraction of allowable depletion as in 1949, adjusted basis depletion in 1950 is taken to be $92 million (5.4 per cent of $1,709 million depletion allowed). Expensing of drilling costs in 1950 is estimated to understate corporate income before taxes by $493 million. Therefore, the 1950 corporate income before taxes is understated by $401 million ($493 million minus $92 million) when adjusted basis depletion is considered. Taking cost depletion at double adjusted basis depletion, the 1950 corporate income before taxes understatement is $309 million.

Using the depletion proportion method, 1950 mining corporate income before taxes as given by the NID is increased from $1,374 million to $3,794 million. Then the net understatement of mining corporation income before taxes because of expensing and the depletion correction is 10.6 per cent if the adjusted basis depletion is considered, or 8.1 per cent if cost depletion at double adjusted basis depletion is considered more appropriate.

There is one important difference between the depletion adjustments and the expensing adjustment. The understatement of corporate

[27] *National Income Supplement, 1954,* p. 185.

profits because of expensing is dependent upon a continued growth in this form of investment. If the outlays were to decline, expensing would become a source of overstatement rather than understatement of corporate income.

Business Accounting versus Tax Accounting

Since tax data provide one of the main sources of national income data, it is to be expected that differences between business accounting and tax accounting become involved in national income discussions. Kenneth D. Ross assigns a higher significance to business than to tax accounting.[28] Since percentage depletion is not taken for business purposes, this might provide an additional justification for the NID approach to depletion, modified by the recognition of cost depletion.

So far as the question of the expensing of oil and gas wells is concerned and of its effects, Ross' presentation is faulty. His discussion rests on the mistaken impression that oil and gas well drilling costs are not charged against current income for federal tax purposes and that these costs are expensed by industry and capitalized for tax purposes, when the reverse is true. Nearly all of the large companies and most small companies capitalize these outlays for business purposes, even though virtually all of them charge them against current income as far as permitted by the tax law[29] in the determination of income tax liability.

Finally, his position that the consistent expensing of capital items does not materially distort year-to-year results is not necessarily correct. As has already been stated, the degree of error is dependent upon the rate of change of investment and upon the average life of the capital in question. It has been seen that for oil and gas wells the charging of these expenditures to current income makes for an annual allowance on the order of double what it would be otherwise.

[28] See p. 289.

[29] Dan Throop Smith and J. Keith Butters, *Taxable and Business Income,* NBER, 1949, p. 58 and Clark W. Breeding and A. Gordon Burton, *Taxation of Oil, and Gas Income,* Prentice-Hall, 1954, p. 193.