Oregon State University
School of Business

Studies in Management and Accounting for the

FOREST PRODUCTS INDUSTRIES

LIFO Inventories in the Forest Products Industry

by
Thomas R. Johnson
Arthur Andersen & Co.

no. 11

LIFO INVENTORIES IN THE FOREST PRODUCTS INDUSTRY

THOMAS R. JOHNSON

INTRODUCTION

Choosing the method of inventory valuation is one of the most complex accounting decisions facing the financial management of a forest products company. Not only must they select the most appropriate cost valuation method—last-in, first-out (LIFO), first-in, first-out (FIFO), average or specific identification—but they must also consider such matters as allocation of wood costs by grade or species, use of standard costs, lower of cost or market, intra/intercompany profit elimination, reduction of costs for byproduct income, methods of determining raw material usage and production volumes, and frequency of physical inventories. In addition, once the cost valuation method has been chosen, management must determine the appropriate technique for determining cost—year-to-date average costs, prior month-to-date average costs, three month moving average cost, prior month production costs, etc.—under that method.

This monograph reviews the LIFO method of inventory valuation and the various LIFO alternatives currently available to a forest products company through a brief presentation of concepts and simplified examples. In addition, it discusses business and other considerations to provide the reader with knowledge of the various factors that must be considered when using the LIFO method.

Section 472(c) of the Internal Revenue Code requires a taxpayer who uses the LIFO method of inventory valuation to determine taxable income for income tax purposes to use the same LIFO method for financial reporting. Since the various valuation methods permitted by the IRS are in accordance with generally accepted accounting principles, this monograph describes valuation method alternatives permitted by the Internal Revenue Service Regulations (IRS Regs).

As can be expected, the IRS Regs regarding LIFO computations and alternatives are voluminous, and they are explained in great depth by the various tax reporting services and related reference material. Accordingly, this monograph does not go into great depth regarding the tax ramifications of various alternatives available. However, the reader is advised to seek competent tax advice before electing to change to LIFO from other inventory valuation methods as well as for proper LIFO treatment for new products, inventories obtained in acquisitions, use of single versus multiple pools, etc. Also, the reader should be aware that IRS Regs §1.162-3 and §1.471-3(c) permit only those items consumed or physically becoming a part of the end product to be valued using the LIFO method. Supplies normally are excluded from LIFO valued inventories. Additionally, many companies prefer to value intransit inventories using methods other than LIFO.

BASIC LIFO CONCEPT

The LIFO method of inventory valuation is purely a pricing technique through an assumed flow of costs. It assumes that the goods sold or raw materials used in production in any period are the most recently produced or acquired and that the goods on hand at the end of the period are the earliest produced or acquired. Assuming that the quantities on hand at the beginning and ending of the period are equal, valuing inventories using the LIFO method results in charging current operations with current replacement costs, while the balance sheet valuation of inventories tends to retain the costs at price levels at the time the LIFO method was adopted.

Another conceptual approach to LIFO is that a company must constantly maintain a relatively stable physical supply of goods as long as it is in business. A basic supply of goods is regarded as a "non-depreciable fixed asset" whose reported value should remain constant except for actual physical increases or decreases in the volume of goods on hand. Volume increases are recognized only on an annual, yearend basis and are valued at prices current in the year of addition. This view

This monography was published in June, 1980.

generally is compatible with the basic mechanics of LIFO as detailed in IRS Regs.

The major advantage of the LIFO method of inventory valuation is that it matches current costs with current revenues and, during periods of rising costs, it reduces the effect of inflation on periodic income. For countries, such as the United States, which permit the LIFO method of inventory valuation for determining taxable income this results in lower income taxes. For a more detailed discussion of the advantages and disadvantages of LIFO inventory valuation method, refer to the Study in Management and Accounting for the Forest Products Industry Monograph, "The Rush to LIFO; Is It Always Good for Wood Products Firms?" issued in December 1974.

IRS §1.472-1(a) state that under the LIFO inventory method, "the taxpayer is permitted to treat those goods remaining on hand at the close of the taxable year as being: (1) those included in the opening inventory of the taxable year, in the order of acquisition and to the extent thereof, and (2) those acquired during the taxable year."

To determine which goods included in the ending inventory were included in the beginning inventory or were acquired during the period, quantities of an item or items in the opening and closing inventories are compared. If the ending inventory quantities are greater than the opening inventory quantities, a quantity increase or "increment" has occurred. On the other hand, if ending inventory quantities are less than those in the beginning inventory, a decrease in quantities or a "liquidation" (sometimes called a decrement) has occurred. In a LIFO increment, the LIFO value of the ending inventory is obtained by adding the current year cost of the quantity increase to the LIFO value of the opening inventory. A liquidation is recorded by reducing the most recent layer or layers of increments in the opening inventory for the decrease in quantity.

This concept can best be illustrated by the following example.

Example 1:

Company A values logs using the LIFO method. Log inventories at December 31, 1977 consisted of:

Layer Year	Quantity (mbf)	Cost per M	LIFO Value
Base 1/1/59	40,000	$25	$1,000,000
1969	2,000	45	90,000
1976	500	90	45,000
	42,500		**$1,135,000**

At December 31 ,1978, Company A had 44,000 mbf of logs on hand and 1978 costs were $105 per M. Thus, they had an increment of 1,500 mbf during 1978. The LIFO value of the log inventory at December 31, 1978 would be $1,292,500 computed as follows:

Layer Year	Quantity (mbf)	Cost per M	LIFO Value
Base 1/1/59	40,000	$ 25	$1,000,000
1969	2,000	45	90,000
1976	500	90	45,000
1978	1,500	105	157,500
	44,000		$1,292,500

During 1979 Company A reduced their log inventory and had 41,000 mbf at yearend. Log costs for the year were $110 per M. The LIFO value of the December 31, 1979 inventory would be $1,045,000 computed as follows:

Layer Year	Quantity (mbf)	Cost per M	LIFO Value
Base 1/1/59	40,000	$25	$1,000,000
1969	1,000	45	45,000
	41,000		$1,045,000

Thus, the 1978, 1976 and a portion of the 1969 layers were liquidated and eliminated from consideration in future LIFO computations.

As a result of the liquidation, current operations were charged $247,500 ($1,292,500 – $1,045,000) for 3,000 mbf of logs (44,000 – 41,000) which is considerably lower than the $330,000 (mbf x $110) current cost of logs.

As shown in the preceding example, a substantial decline in the volume of logs usually produces significantly higher profits that certain readers of financial statements regard as "artificial". (Disclosure of the effect of LIFO liquidations on results of operations is discussed later in this monograph). Moreover, income taxes probably are due on such profits. Such additional tax liability could come at an inopportune time, although the company realized benefits from improved cash flow due to such an inventory liquidation.

Also, as illustrated by this example, one of the major concerns facing a company using LIFO is to manage inventory levels to prevent liquidation of low priced layers at any yearend that will be replaced after yearend. IRS Regs. §1.472-2(d) state that a liquidation in volume is permanent. Restora-

tion to normal volume must be treated as a new increment and priced at current costs in the year of replacement for both income tax and financial reporting purposes.

LIFO INVENTORY POOLS

The inventory group or groups into which items are classified when making LIFO computations are referred to as LIFO inventory pools.

IRS Regs §1.472-1(d) for the specific goods method state that inventory items may be included in the same pool only if they are of like kind. Separate pools must be established for dissimilar raw materials. One method available for a forest products company to pool dissimilar products using the specific goods method is to have a common pool for all wood content or paper content in inventories using the raw materials content method. Under this method, the wood content of logs, lumber, plywood, veneer, chips, etc. or paper content of roll stock, sheets, containers, tissue products, etc. is computed as of the end of the year regardless of the product mix. An example of this follows.

Example 2:

Company X had the following inventory quantities at yearend:

Logs	2,000 mbf
Plywood	1,120 mbf 3/8″ basis
Lumber	1,500 mbf

During the year its sawmill had a 1.25 overrun and its plywood plant had a 2.80 recovery ratio. The wood content of its inventory is computed using the specific goods, raw materials content pool method:

Logs		2,000 mbf
Plywood	1,120 ÷ 2.80 =	400 mbf
Lumber	1,500 ÷ 1.25 =	1,200 mbf
Total wood content		3,600 mbf

As shown in the above example, this method provides the company with more flexibility in managing inventory quantities than the specific goods multiple pool method (i.e. the fewer number of pools, the less chance for a liquidation) but with less flexibility than the dollar value, single pool method discussed below. Also, in this situation, the company may be able to elect to have LIFO pools for their labor component and overhead components of their inventory.

The dollar value pool IRS Regs adopted in 1961 permit the concept of a "natural business unit" in adopting dollar value pools. IRS Regs §1.472-8(b)(1) state that the natural business unit ordinarily consists of the entire productive activity of the enterprise within one product line or within two or more related product lines. Whether a forest products company is comprised of more than one natural business unit is a matter to be determined based on the facts of each circumstance. Considerations in the determination of one or more natural business units include (1) geographic location, (2) natural business divisions and units for internal reporting purposes, (3) the existence of separate and distinct production facilities and processes and (4) use of separate profit and loss records regarding each operation.

A multiproduct, multilocation forest products company could elect to have all its plywood operations regardless of location in one pool and its other operations (such as lumber, particleboard and pulp and paper) in separate pools. Or it could elect to have each natural reporting unit in separate pools. One primary advantage of single product pools for a multilocation company is that it reduces the number of computations required at yearend.

A company with more than one business unit can select the units for which LIFO will be used. However, the IRS has reserved the right to require a use of LIFO for goods not elected if income would be more clearly reflected. The IRS normally exercises this right only to prevent the shifting of income through intracompany transfers of goods.

The IRS Regs for dollar value LIFO permit the use of multiple pools in certain circumstances. These rules are very detailed, and other than for large multiproduct, multilocation forest products companies would not have much applicability.

SPECIFIC GOODS AND DOLLAR VALUE METHODS

The two basic methods of computing LIFO inventory values are the "specific goods" and the "dollar value" methods. The major difference in these methods is in how inventory quantities are measured.

Under the specific goods method, inventory quantities are measured in terms of physical units (mbf, tons, bdu) of individual items. Although closely similar items may be included in the same LIFO pool, in practice the specific goods method results in a separate LIFO pool for each major product (logs, lumber, plywood, paper, etc.) in the inventory. It is not uncommon for the quantity of

goods in one pool to rise considerably, requiring valuation at current prices for the increase, while another pool is correspondingly liquidated. Thus, the specific goods method with its proliferation of pools is likely to produce unwanted liquidations and consequent loss of LIFO benefits in the long run. Example 1 is an illustration of the specific goods method.

Under the dollar value method, inventory quantities are measured in terms of equivalent dollars at a fixed price level. The dollars used for measuring purposes are obtained as a part of the computational method used and are quantified in units of base dollars. Thus, a change in mix of the inventory items during the period will not alter the LIFO value of an inventory if the items, priced at base costs, were equal in total at the beginning and ending of a recording period. This is shown in the following example.

Example 3:

Beginning of Year

Item	Quantity (mbf)	Base Cost (per M)	LIFO Value
Logs	2,000	$ 90	$180,000
Plywood	500	150	75,000
Lumber	1,000	180	180,000
			$435,000

End of Year

Logs	3,000	$ 90	$270,000
Plywood	500	150	75,000
Lumber	500	180	90,000
			$435,000

In this example, no change in the LIFO value of $435,000 occurred even though the volume of logs increased and the volume of lumber decreased during the year.

METHODS FOR COMPUTING INCREMENTS

Three principal methods are permitted by §1.472-2(d) of the IRS Regs for computing annual LIFO increments for specific goods pools and for computing current costs for dollar value LIFO pools. These methods are LIFO (earliest) cost, FIFO (latest) cost and average cost. The application of each method is illustrated in the following example.

Example 4:

Company S has one plywood plant. Production and production costs, after elimination of intracompany log transfer price profits for the year, were:

Month	Volume mbf	Cost per M
January	13,000	$150
February	12,500	152
March-October	109,100	156
November	13,100	159
December	12,300	160
Total	160,000	$156

Company S's plywood inventory was 12,000 mbf at the beginning of the year and 13,500 mbf at the end of the year. Under the specific goods method, the 1,500 mbf LIFO increment is computed for each of the three cost methods as follows:

Cost Method	Units mbf	Per M	Amount
LIFO	1,500	$150	$225,000
FIFO	1,500	160	240,000
Average	1,500	156	234,000

Under the dollar value pool method, the current year's cost for the 13,500 mbf of plywood in the ending inventory is computed for each of the three cost methods as follows:

Cost Method	Units mbf	Per M	Current Year Cost Amount
LIFO (earliest)	13,000	$150	$1,950,000
	500	152	76,000
Total	13,500	$150.07	$2,026,000
FIFO (latest)	12,300	$160	$1,968,000
	1,200	159	190,800
Total	13,500	$159.91	$2,158,800
Average	13,500	$156	$2,106,000

This example indicates that in periods of rising costs the maximum tax benefit can be attained by choosing the LIFO cost method for determining annual increments and current costs.

METHODS OF COMPUTING LIFO VALUES FOR DOLLAR VALUE POOLS

The LIFO values for dollar value pools may be computed using one of four methods: (1) double extension method, (2) index method, (3) link

chain method and (4) retail method. The retail method has little applicability to forest products companies and will not be discussed in this monograph. IRS Regs §1.472-8(e)(1) indicate that a taxpayer may only use the double extension method for computing the base year and current year cost of a dollar value inventory pool unless the use of such method is impractical because of technological changes, the extensive variety of items or extreme fluctuation in the variety of items.

Double Extension Method

Under the double extension method, the quantity of each item in the pool at the close of the year is extended at both base year unit cost and current year unit cost. IRS Regs §1.472-8(e) provide that the base year unit cost must be maintained permanently, regardless of the method of computing LIFO values. These IRS Regs also provide guidelines for computing base year prices for new products.

After the extensions of the yearend units times the base year and current year unit costs have been made, the extensions are totaled. If the total of the extension of the yearend base year costs is greater than the beginning of the year amount, the ratio of current year costs and the base year costs is computed. The amount of the current year base increase in cost then is multiplied by this ratio to determine the addition to the LIFO value for the current year increment. The following example illustrates these computations.

Example 5:

Company F elected to use the dollar value single pool method of valuing LIFO inventories effective January 1, 1972. Their computations are made using the double extension method. A summary of the LIFO valuation at December 31, 1977 follows:

Layer Year	Base Cost	Ratio	LIFO Value
Base 1/1/72	$3,750,000	100.0	$3,750,000
1972	250,000	103.5	258,750
1974	100,000	106.0	106,000
1976	50,000	110.0	55,000
	$4,150,000		$4,169,750

December 31, 1978 inventories were as follows:

		At Base Year Cost		At Current Year Cost	
Item	Unit	Per Unit	Amount	Per Unit	Amount
Logs	2,000	$ 85	$ 170,000	$102	$ 204,000
Plywood	500	140	70,000	160	80,000
All Others	*	*	3,970,000	*	4,768,000
			$4,210,000		$5,052,000

Current year ratio 120.0 ($5,052,000 ÷ $4,210,000)

* Details not provided; computed individually in the same manner as logs and plywood.

The LIFO value at December 31, 1978 is $4,241,750 computed as follows:

Layer Year	Base Cost	Ratio	LIFO Value
Base 1/1/72	$3,750,000	100.0	$3,750,000
1972	250,000	103.5	258,750
1974	100,000	106.0	106,000
1976	50,000	110.0	55,000
1978	60,000	120.0	72,000
	$4,210,000		$4,241,750

If the extensions of the units in the December 31, 1979 inventory extended at base cost aggregated $4,130,000, the LIFO value at December 31, 1977 would be $4,147,750 computed as follows:

Layer Year	Base Cost	Ratio	LIFO Value
Base 1/1/72	$3,750,000	100.0	$3,750,000
1972	250,000	103.5	258,750
1973	100,000	106.0	106,000
1976	30,000	110.0	33,000
	$4,130,000	.....	$4,147,750

Index Method

As previously stated, an index method might be permitted if use of the double extension method is impractical. IRS Regs §1.472-8(e)(1) provide that an index may be computed either by double extending a representative portion of the inventory in a pool or by using other sound and consistent statistical methods. Due to the small number of items in the normal forest products inventory, the indexing method normally is not used by forest products companies. An index method must be justified and its acceptability cannot be assured. Therefore, this method should not be used merely to reduce clerical effort. If an indexing method is used, the company should compute base costs of their inventory by developing a ratio of the base prices to yearend FIFO prices. The yearend inventories priced at FIFO then are divided by this ratio and the resulting amount is regarded as equivalent to the extension of items at base prices. From this point forward, the computations are the same as the double extension method as shown in Example 5.

While the indexing procedure eliminates considerable effort, the obvious disadvantage of this system of determining base value of an inventory is that the quality of the computations is dependent upon the validity of the sample. Variations in the actual mix of products from year to year, combined with a fixed mix of items in the sample, which must be consistent, can produce erratic results that could be objectionable for financial reporting purposes.

Link Chain Method

The link chain method represents the ultimate short cut for valuing a dollar value LIFO inventory pool. The base value of an inventory is determined by use of a cumulative index. Each year the ratio of total yearend inventory priced at FIFO costs to the total yearend inventory priced at prior yearend FIFO cost is computed. The ratio determined for each year is "chained" to the ratios determined for prior years by multiplying the latest ratio by the cumulative ratio determined as of the close of the preceding year.

The closing inventory at FIFO costs then is divided by the latest cumulative index to arrive at a presumed cost of the closing inventory at base period prices. Thereafter, the normal procedures for identifying increments and liquidations are followed. An example of the use of the link chain method follows.

Example 6:

Company P elected to value their inventories using the dollar value LIFO single pool method effective January 1, 1974. Its computations are made using the link chain method and FIFO costs are used for valuing annual increments. A summary of its inventory information as of December 31, 1976 follows.

Layer Year	Annual Ratio	Cumulative Ratio	Total Inventory at Base Cost	Yearly Increment at Base Cost	LIFO Value
	(1)	(2)	(3)	(4)	(5) = (2)x(4)
Base 1/1/74	100.0	100.0	$6,000,000	$6,000,000	$6,000,000
1974	102.0	102.0	6,100,000	100,000	102,000
1975	103.0	105.0	6,500,000	400,000	420,000
1976	104.0	109.2	7,000,000	500,000	546,000
				$7,000,000	$7,068,000

FIFO inventories were $7,644,000 at December 31, 1976 and $10,890,000 at December 31, 1977. December 31, 1977 inventories at December 31, 1976 FIFO costs were $9,828,000.

At December 31, 1977:

(1) The annual ratio equals 12-31-77 inventories at FIFO divided by 12-31-77 inventories at 12-31-76 FIFO costs ($10,890,000 ÷ $9,828,000) or 110.8.

(2) The cumulative ratio equals 12-31-76 cumulative ratio times 12-31-77 annual ratio (109.2 x 110.8) or 121.0.

(3) The total inventory at base cost equals 12-31-77 inventory at FIFO cost divided by the 12-31-77 cumulative ratio ($10,890,000 ÷ 121.0) or $9,000,000.

(4) The yearly increment at base cost equals the 12-31-77 total inventory at base cost minus the 12-31-76 total inventory at base cost ($9,000,000 – $7,000,000) or $2,000,000.

(5) The LIFO value of the 1977 yearly increment equals the cumulative ratio times the yearly increment at base cost (121.0 x $2,000,000) or $2,420,000.

Thus, the 1977 layer year line in the above table would be:

Layer Year	Annual Ratio	Cumulative Ratio	Total Inventory at Base Cost	Yearly Increment at Base Cost	LIFO Value
	(1)	(2)	(3)	(4)	(5) = (2)x(4)
1977	110.8	121.0	$9,000,000	$2,000,000	$2,420,000
Prior year totals from above				7,000,000	7,068,000
Total at December 31, 1977				$9,000,000	$9,488,000

To price an increment under the link chain method using other than FIFO costs for valuing increments, an additional annual index must be computed to measure the price change to the level of LIFO (earliest) cost or average cost for the computation year. This measurement usually is based on price movement from the beginning of the year. The index for the increment is then chained to the same cumulative index as illustrated above.

When using the link chain method, it is important to realize that the yearend inventory must be priced at both current yearend and prior yearend costs to develop the cumulative ratio necessary to convert the inventory to base dollars rather than pricing the current yearend inventory at the base dollar price. The major advantage of the link chain method is that base costs do not have to be calculated when new products are developed. Although technically this method can be used for valuing any inventory where justified, the IRS currently interprets justification to be instances where inventory consists of many thousands of items frequently changing such that double pricing back to the base price is impractical.

The link chain method simplifies the calculation for LIFO inventory calculations for labor and overhead components of inventory where companies have selected to have a common pool for all wood content in their inventories.

A shortcoming a company should be aware of before electing the link chain method is that because of mix changes, even when full double extension is used, the method may not produce a wholly accurate reflection of price changes from the base. Obviously, if sampling techniques are used to determine the ratio, the same disadvantages previously discussed under the index method apply equally to the link chain method.

LIFO AND SECTION 631(a)

The current interpretation of the IRS Regs that requires taxpayers using the LIFO method for inventory valuation to compute LIFO inventory costs on the same basis for both tax and financial reporting does not require taxpayers to consider Section 631(a) timber values when valuing inventories for financial purposes. However, taxpayers electing Section 631(a) must substitute Section 631(a) timber values for timber cost amounts when computing their inventories for tax purposes, regardless of the inventory valuation method the taxpayer selects. Accordingly, forest products companies using the LIFO method must make a supplemental calculation for determining the amount of the Section 631(a) gain to be considered for the wood content in their inventories.

This concept can be illustrated more simply by expanding Example 1 as follows.

Example 7:

Company A has elected to value its log inventories using the specific goods, LIFO method. In addition, they have elected the alternative method of computing taxes as provided in Section 631(a). Log inventories at December 31, 1977 consisted of 42,500 mbf valued as follows:

Layer Year	Quantity (mbf)	Cost Per M	LIFO Value	Cost Plus 631(a) Gain Per M	LIFO Value for Taxes
Base 1/1/59	40,000	$25	$1,000,000	$30	$1,200,000
1969	2,000	45	90,000	55	110,000
1976	500	90	45,000	170	85,000
	42,500		$1,135,000		$1,395,000

During 1978, Company A harvested 100,000 mbf of timber having a book cost of $23.75 that was eligible for Section 631(a) treatment. The Section 631(a) fair market value for this timber was $225 per M. Timber harvested and logs purchased during 1978 totaled 175,000 mbf with a total cost of $18,375,000. Company A uses the average cost method for computing annual LIFO increments and assumes that the mix of qualifying and nonqualifying timber harvested and logs purchased during the year was the same as the mix in the ending log inventory of 44,000 mbf.

Thus, for financial purposes, the 1978 increment of 1,500 mbf (44,000 – 42,500) would be valued at $105 per M ($18,375,000 ÷ 175,000). Cost plus 631(a) gain per M would be computed as follows:

Total log costs for the year	$18,375,000
Less—cost of timber eligible for Section 631(a) gains—100,000 mbf at $23.75	(2,375,000)
Add FMV of timber eligible for Section 631(a) gains—100,000 mbf @ 225 per M	22,500,000
	$38,500,000
Divided by total timber harvested and logs purchased	175,000 mbf
Cost plus 631(a) gain per M	$220

Therefore, the December 31, 1978 log inventories would be valued as follows:

Layer Year	Quantity (mbf)	Cost Per M	LIFO Value	Cost Plus 631(a) Gain Per M	LIFO Value for Taxes
Base 1/1/59	40,000	$25	$1,000,000	$30	$1,200,000
1969	2,000	45	90,000	55	110,000
1976	500	90	45,000	170	85,000
1978	1,500	105	157,500	220	330,000
	44,000		$1,292,500		$1,725,000

As a result, log inventories for tax purposes would be $432,500 ($1,725,000-$1,292,500) greater than financial inventories and taxable income for 1978 would be $172,500 ($432,500 – ($1,395,000-$1,135,000)) higher than financial income as a result of the 631(a) gains in log inventories. This results in a timing difference that must be appropriately considered in accordance with APB Opinion No. 11 when computing Company A's tax provision for 1978.

Forest products companies also must consider the relationship between the company's ordinary income and Section 631 gains when determining whether or not to use the LIFO method of inventory valuation. A company anticipating that future capital gains will approximate or exceed total taxable income generally should not change to the LIFO method unless other tax planning alternatives which will increase taxable income are available. In most cases, the alternative capital gains tax computation would not change the amount of tax and the use of LIFO would reduce ordinary income without providing any tax reduction.

LIFO AND FINANCIAL REPORTING

Internal Operating Statements

Most forest products companies that have elected the LIFO method of inventory valuation prepare departmental, product or plant operating statements using the average, FIFO or standard cost methods of inventory valuation for internal reporting purposes. They make appropriate adjustments to reflect LIFO costs for external reporting purposes. In a recent IRS proposed regulation (discussed in more detail in a later section), the IRS has stated that internal management reports need not conform to the LIFO method.

Interim Reporting

The use of the LIFO inventory valuation method as compared to other methods of valuing inventories in the forest products industry, has two additional unknowns that may affect interim reporting: (1) the rate of change in unit cost for the year and (2) the quantity level of inventories at yearend.

If costs increase significantly during the year, there normally is a more negative impact on operating income than if costs remain relatively constant. Increases in the quantities of inventory normally will result in a larger variance between LIFO costs and costs used in the operating statements than if inventory levels remain relatively constant.

Therefore, to avoid yearend surprises, financial management of forest products companies using the LIFO method must make periodic LIFO calculations to determine the impact that the difference between average costs and LIFO costs has made on the operating profits for the year. Companies making quarterly reports to shareholders and other interested third parties should compute the difference between LIFO and average costs on a quarterly basis. Since the LIFO calculation is based on annual determinations, interim calculations must be made using a great deal of judgment. Several methods are used to make interim LIFO calculations, but the most common are the annual method and the quarterly method.

Under the annual method, an estimate of the total LIFO effect for the year is spread or apportioned among the quarters based on a ratio of the actual sales volume to date or dollar amount of cost of sales to the corresponding estimated amounts for the year. This method tends to result in an allocation of inventory costs to periods when the inventory is sold. Obviously, the method requires numerous judgmental decisions in the annual estimate and the interim charge to operation must be calculated on the best known information regarding cost levels, inventory quantities, future availability of raw materials and sales volume at the end of each reporting period.

Under the quarterly method, the LIFO inventory is calculated at the end of each quarter as if that quarter was the end of the fiscal year. This method may apportion the LIFO effect to periods other than when the product is sold. Since forest products inventories, especially logs, can fluctuate greatly from quarter to quarter, it is appropriate to provide replacement reserves as required by APB Opinion No. 28 for interim LIFO liquidations that are expected to be replaced by yearend.

LIFO Liquidations

Because of shortages in goods or changes in market conditions, some companies using the LIFO inventory method may be forced to liquidate a portion of their inventory base. A yearend replacement reserve for temporary liquidations of LIFO inventories is not permitted by the IRS or generally accepted accounting principles.

Material gains from liquidations of the LIFO inventory base should be clearly disclosed in the financial statements. The disclosure that is currently permitted by the IRS can include an explanatory statement describing the inventory methods utilized, the type(s) of raw materials or commodities purchased and/or an explanation of the economic conditions that resulted in the liquidation of LIFO inventory layers. Disclosure in a footnote to the financial statements similar to the following is acceptable to the IRS (Rev. Proc. 77-33).

> During 19X1 the inventory quantities were reduced. This reduction resulted in a liquidation of LIFO inventory quantities carried at lower costs prevailing in prior years as compared with the cost of 19X1 purchases, the effect of which decreased cost of goods sold by approximately $XXX and increased net income by approximately $XXX or $X per share.

In permitting this disclosure, the IRS has indicated that the computations made to determine the income effect of a penetration of a LIFO layer must be made on the same basis employed by the taxpayer in actually valuing its LIFO increments. For example, if the taxpayer values inventory increments using the average cost method, he also must use this method to determine the effect on income as a result of the penetration for purposes of the financial statement footnote.

Other Financial Statement Disclosures

Securities and Exchange Commission Regulations S-X 5-02(3)(c) requires registrants using the LIFO method of inventory valuation to disclose, where material, the excess of replacement cost or current cost over stated LIFO value. Since this information permits the readers of financial statements to calculate the effect of LIFO on operating income, most companies, including many non-SEC registrants, include this information in the footnotes to their financial statements for the beginning and ending inventories for each year of income presented. An example of such footnote disclosure is as follows:

> If the company had used the lower of first-in, first-out (FIFO) or market method of inventory valuation, inventories would have been $X, $Y and $Z higher than reported at December 31, 19X1, 19X2 and 19X3, respectively.

Obviously, when making the above calculation, intercompany profits must be eliminated and yearend market/cost relationships considered.

The IRS (Rev. Proc. 72-29) requires companies that have LIFO inventories acquired in a business combination, recorded as a statutory merger for federal income tax purposes and a purchase for financial accounting purposes and where the application of the principles of APB Opinion No. 16 results in a difference for any taxable years between the taxable income for federal income tax purposes and net income for financial accounting purposes due to the use of the LIFO inventory method by the acquiring company, to disclose this difference in its financial statements and in its federal income tax return. This disclosure also is required in any taxable year in which compliance with APB Opinion No. 16 results in a difference between the LIFO inventories reflected in the balance sheet for federal income tax purposes and financial accounting purposes. The disclosure in the financial statements and in the federal income tax returns may be in the form of a footnote or a separate schedule, but must explain the amount of and the reason for the variance in the LIFO inventories. These disclosure requirements apply to all taxable years in which the above differences occur, regardless of the year of acquisition, and regardless of the materiality of such differences for financial statement purposes.

In addition, generally accepted accounting principles require disclosure of the cost method used for stating inventories.

IRS Position Regarding LIFO Disclosures

In July 1979, the IRS (Proposed Regs, Fed. Reg. Vol. 44, No. 141 p. 42717) proposed to amend its regulations applicable to the financial statement conformity requirements of taxpayers who have elected to use the LIFO inventory method. Prior to this proposal, taxpayers who elected the LIFO method for tax purposes could not use any other inventory method for reporting income, profit or loss in credit statements or financial reports to shareholders, partners, other proprietors or beneficiaries. The proposed amendments, however, would permit the disclosure of profit or loss using another method if made as a supplement to or explanation of the taxpayer's "primary presentation in financial statements of income . . .".

The permitted supplemental disclosure can be made in footnotes, schedules and other appendices to the basic financial statements, but cannot be made parenthetically or otherwise on the face of the income statement. The supplemental disclosures also can be made in news releases, letters to shareholders, letters to creditors or other reports, but only if it is clearly identified as supplemental to the company's primary presentation of income and if the information (e.g., cost of goods sold, net income or earnings per share) also is reported using the LIFO method in the news release, letter or other report.

For financial statement inventory valuation purposes under LIFO, the proposed amendments would permit the use of market value in lieu of cost where market is less than the LIFO cost of inventory items. This is a change from existing regulations under which a taxpayer is deemed to have violated the LIFO conformity requirements if he provides certain reserves against the LIFO costs to reduce the carrying value of excess inventories, even if only for financial reporting purposes. In many situations, however, it may be difficult to conclude that market is below LIFO cost.

Some questions regarding the acceptability of certain supplemental disclosures remain unanswered. The Chief Accountant of the SEC has indicated that it may not be appropriate for a public company that uses LIFO to supplementally disclose earnings per share that would have resulted if the FIFO method had been used.

Final regulations, if adopted, will apply to all taxable years beginning after December 31, 1953, except that the proposed regulations regarding supplemental disclosure apply only to reports issued after July 17, 1979. Furthermore, the IRS has indicated that a taxpayer may rely on the proposed amendments in making disclosures in financial statements or other reports pending the adoption of final rules. If final regulations are more restrictive than those proposed, they will be effective only after they are adopted.

Prior to the issuance of the proposal described above, the IRS issued a series of rulings that outlined the allowable financial statement disclosures. These rulings generally were more restrictive than the current proposal.

TAX CONSIDERATIONS WHEN CHANGING TO LIFO

Unlike FIFO, which typically is used in combination with the lower of cost or market convention, the LIFO method of inventory valuation is solely a cost method for tax purposes (IRS Regs. §1.472-2(b)). To properly initiate a beginning inventory on the LIFO (cost) method, it is necessary to restore any writedowns made to the closing inventory of the preceeding year. Because an in-

creased tax basis for writedowns restored to inventory is effected, the IRS requires that income tax be paid on the increase. This payment becomes due in a lump sum. In some cases this requirement may significantly offset the benefits anticipated from LIFO.

Generally accepted accounting principles require inventories to be priced at cost or market, whichever is lower (ARB 43 Chap. 4). This subject is discussed further in the next section of this monograph. In Rev. Rul. 77-50 the IRS concluded that a taxpayer is not required to restore certain lower of cost or market writedowns made to the initial LIFO inventory for financial reporting purposes, and may continue to value its LIFO inventory at the lower of cost or market for financial reporting purposes.

Due to the technical nature of the LIFO IRS Regs and the various other matters that must be considered when making LIFO elections—such as prior reserves, number and types of pools and increment costing methods—competent tax advice should be obtained prior to filing the election.

NET REALIZABLE VALUE AND LIFO

Under generally accepted accounting principles, inventories on a LIFO basis must be reduced to the lower of cost or market, as contrasted to the LIFO costs definition for tax purposes. After the initial year of using LIFO, this normally ceases to be a problem as the spread widens between the low LIFO base cost and the net realizable value. However, in the first few years after LIFO adoption, the relationships of yearend LIFO costs and market must be evaluated closely.

The application of the lower of cost or market accounting principle is no different for inventories valued at LIFO than for inventories valued using other cost methods. Forest products companies usually compute market value by pricing their inventories on an item-by-item basis at the current market prices by grade and species and reducing the sum of such extensions by sales discounts, shipping costs and selling costs and, in the case of unfinished products, the current production costs to bring the unfinished product to a finished state. This "net realizable value" (NRV) then is compared with the LIFO cost to determine if a market writedown is required. Such comparisons are relatively easy if the specific goods or single product dollar value methods are used since such methods provide the total LIFO costs by product for comparison with the products net realizable value. The comparison of costs and net realizable value should be made on a product-by-product basis rather than comparing net realizable value for all items in the inventory with the total LIFO cost as shown in the following example.

Example 8:

Company L uses a specific goods LIFO inventory valuation method for each of its products. A summary of LIFO costs and NRV for each of its product pools at December 31, 19X1 is as follows:

Specific Goods LIFO Pool	LIFO Cost	NRV
Logs	$2,200,000	$3,100,000
Lumber	1,300,000	1,100,000
Veneer	400,000	450,000
Plywood	850,000	1,050,000
Total inventories	$4,750,000	$5,700,000

In this example, a $200,000 market reserve is required for lumber since the net realizable value of that product is less than its LIFO cost, even though the total LIFO cost for all inventories is less than the total net realizable value.

The application of the lower of cost or market principle is no different in this example than if FIFO costs were used; the comparison of cost and market should be made at the lowest point where the cost and NRV methodology produce comparable results. For instance, if a company prices finished lumber using separate FIFO costs for each specie, the NRV comparison should be made by specie. However, if a similar company prices finished lumber using an average cost for all lumber regardless of grade or specie, the cost/NRV comparison should be made by comparing total finished lumber costs with total finished lumber NRV.

Companies using multiple product dollar pools are not able to make these comparisons without making certain assumptions since the LIFO cost for each product loses its identity in such LIFO pools. As illustrated by Example 5, it is impossible to assign LIFO costs at December 31, 1978 to logs, plywood or the other products without making certain assumptions. There are several theories as to the methodology of making the dollar value LIFO costs/NRV comparison. The more common methods are:

A. The "problem" inventory should be the first to be liquidated; therefore, it is in the highest priced LIFO layer or layers.

B. Since the inventory items included in a dollar value multiple product pool lose their cost per unit identity, cost should be determined by the relationship of total base cost and total LIFO value.

C. The only comparison that should be made is to compare total LIFO costs with total NRV value of all items in the inventory.

D. Determine the reason for any inventory buildup and, if considered temporary, test its LIFO cost/NRV value relationship at the highest LIFO cost increment or increments. After this comparison has been made, the base cost and LIFO value for the items included in the inventory buildup should be deducted from the total LIFO computation and the balance of the items tested using methods A or B above.

The valuation reserves to reduce LIFO inventories to NRV discussed in this section are for financial purposes only. Even though these reserves are computed based on current interpretations of the IRS Regs for taxpayers using inventory valuation method other than LIFO, for tax purposes, LIFO is a cost method as opposed to a lower of cost or market method. Accordingly, such reserves are not an allowable deduction in determining taxable income or loss. Such valuation reserves are permitted by the IRS for financial reporting purposes according to the July 1979 proposal discussed in a previous section; however, prior to the issuance of that proposal some uncertainty existed as to whether or not such valuation reserves would jeopardize a taxpayer's LIFO election.

There is no authoritative generally accepted accounting principle to answer the question of whether financial reporting valuation reserves to reduce LIFO inventories to NRV (1) can be reversed to income in subsequent years if no longer required, or (2) become the LIFO cost which would be carried forward until the applicable LIFO layer is eroded. Advocates of the second position cite footnote (2) to ARB 43, Chapter 4, Statement 3, which states "In the case of goods which have been written down below cost at the close of a fiscal period, such reduced amount is to be considered the cost for subsequent accounting periods", and the related objection of a member of the AICPA Committee that issued ARB 43, Chapter 4, as support for their position. Supporters of the first position believe that the reserve should flow into income during the same period as the related product in order to properly match cost and revenue.

CONCLUSION

The LIFO inventory valuation method can be used for most items in the inventories of a forest products company. LIFO's principal benefit is that it reduces the effect of inflation during periods of rising costs and, therefore, results in lower income taxes. However, it also results in lower reported earnings.

The dollar value, single pool method generally provides the most flexibility for avoiding an undesired liquidation of a LIFO layer due to a temporary reduction in inventory levels as the more LIFO pools a company has, the greater the chance is for a liquidation. LIFO computations generally are more complex and voluminous than computations using other inventory valuation methods. Therefore, they may require additional records and clerical efforts. However, the annual costs and time requirements for maintaining the LIFO records should not be the major consideration in deciding whether or not to adopt LIFO, because if LIFO is properly studied and implemented, the significant costs occur when LIFO is first adopted. Since the use of the LIFO method is related to complex income tax regulations, competent tax advice should be obtained before adopting LIFO and when changes occur in the nature of the company's operations.

Monographs published to date:

"The Rush to LIFO: Is it Always Good for Wood Products Firms," issued in December 1974 and published in condensed form in the April 1975 issue of *Forest Industries* (This monograph was revised and reissued in January 1976).

"Accounting and Financial Management in the Forest Products Industries: A Guide to the Published Literature," issued in June 1975. (A Supplement to this monograph was issued in Marc 1977.)

"A Decision Framework for Trading Lumber Futures," issued in October 1975.

"Capital Gains Tax Treatment in the Forest Products Industries," issued June 1976.

"Measurement Difficulties in the Log Conversion Process," issued June 1977.

"Capital Budgeting Practices in the Forest Products Industry," issued March 1978.

"A Reporting and Control System for Wood Products Futures Trading Activities," issued July 1978

"Selected Issues of Financial Accounting and Reporting For Timber," issued November 1978

"Pool Log Transfer System," issued August 1979.

"Fundamentals of Financing Major Timber Acquistions," issued January 1980.

Studies in Management and Accounting for the Forest Products Industries

This series of monographs is published by the School of Business, Oregon State University, to disseminate information, research findings, and informed opinion about current problems and opportunities in the management of, and accounting for, enterprises in the forest and wood products industries.

Additional information about these Studies may be obtained from the program director, Dr. Robert E. Shirley, at the School of Business, Oregon State University, Corvallis, Oregon 97331.

Oregon State University