1922

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NATIONAL ASSOCIATION
of
COST ACCOUNTANTS

Official Publications

Vol. III MARCH 15, 1922 No. 12

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130 WEST 42nd STREET, NEW YORK CITY

The National Association of Cost Accountants does not stand sponsor for views expressed by the writers of articles issued as Publications. The object of the Official Publications of the Association is to place before the members ideas which it is hoped may prove interesting and suggestive. The articles will cover a wide range of subjects and present many different viewpoints. It is not intended that they shall reflect the particular ideas of any individual or group. Constructive comments on any of the Publications will be welcome.

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LOGGING COST[1]

The purpose of this article is to present the practical determination of logging costs from the view point of the lumber manufacturer rather than timber logging companies as it applies particularly to the western pine lumber industry.[2] The lumber in dustry is technically classified as a continuous or mass production manufacturing industry. The constituent elements of cost, i.e., direct labor, material, and overhead, as applied to logging follow the natural "flow of the product" from the standing timber to the sawmill pond, where it is turned over to the mill to be sawn into boards, planks, and timbers. The natural limitations of an article of this nature, will not permit of an exhaustive treatment of logging costs in all its details. Furthermore, the ideas presented should not be regarded as covering the whole field in a dogmatic discussion of the subject, but instead are suggestive. It is hoped that they may lead to the successful solution or final determination of some of the difficulties involved in keeping logging costs.

Need of Uniformity in Determining Logging Costs

The business of logging includes all operation from the stump to the sawmill pond inclusive.

Logging is the major element as a separate departmental function in the consideration of lumber costs. For this reason the importance of the practical demonstration of what constitutes true logging costs is of vital importance to the lumber manufacturer. The lumber industry is one of the most important in the United States. The methods of obtaining costs in this industry are not standardized. This is particularly true of logging costs. Anyone familiar with actual conditions in the industry will not dispute the statement that accounting efficiency, broadly speaking, is very low

[1] Pages 59-64 of the 1920 Year Book of the National Association of Cost Accountants contain a discussion of Some Questions in the Determination of Lumber costs such as: 1. What elements of cost shall constitute the stumpage or timber depletion charge? 2. Shall actual cost or market price be used as a basis for charging logs to the sawmill? 3. How shall quantity and grade of production be determined? 4. Can costs be established for the several grades of lumber produced by a mill?

[2] Summaries of the uniform system of the West Coast Lumbermen's Association and some other associations appear in an appendix to this article.

in comparison with other businesses. To be sure there has been a great improvement in recent years. In this connection, it is encouraging to note that the West Coast and Southern Pine Lumber associations have adopted uniform cost systems recently. Nevertheless it is safe to say that we are still in a rudimentary stage so far as general uniform cost finding methods suitable to the industry as a whole are concerned. But it is only fair to add that numerous other associations of lumbermen, realizing the necessity of uniform cost methods have adopted systems to their liking.

To-day, the average manufacturer is in a sort of dilemma. Income tax regulations are having a far reaching effect in the preparation of cost data. No matter what methods accountants may use, they must "lend a listening ear" to the Internal Revenue Department in the preparation of any system for the practical determination of logging costs. Federal legislation may help. The Caper bill which is designed to regulate forest products and the lumber business generally, shows that legislation is being thought of as a means of bringing about greater uniformity within the industry.[1] Among other things, the Caper bill proposes to regulate the accounting of the entire lumber industry similar to the regulation imposed by the Inter-state Commerce Commission with reference to steam railroads, etc. Whether it comes from forces within or without the industry, it is certain that uniform methods of cost finding will help to remedy existing conditions before long. The advantages to be gained through the adoption of such methods, in the way of assisting to prevent market demoralization, safe-guarding the business, and making possible comparisons of elements of cost, among different operators are well known results in those industries which have already adopted uniform cost methods.

Among the chief obstacles to the immediate adoption of a universal system are the differences of opinion within the industry as to the items that constitute the various elements of costs, and their cost accounting treatment of these items. For example, there is no unanimity of opinion as to what should be included in logging costs. It is believed that the account classification suggested below is based upon sound accounting principles, and will reflect true logging costs in the western pine lumber industry. The cost accounts should of course be tied into the general books, the actual cost data being tabulated on subsidiary records. The scope of this article will not permit of a discussion of the books and records used in the logging business.

Simplicity should be a rule in devising a suitable logging cost system. The books should not be burdened with numerous and unnecessary segregations in classifying information, and yet essential cost data should not be omitted. The uniform logging cost

[1] According to our present knowledge, this bill—Senate Bill No. 2878—has not been reported out of committee.

system should be simple enough to enable the operator to adopt the system to his particular requirements either by expansion or reduction. It is the writer's opinion that the use of the following twelve[1] chief logging segregations will supply dependable cost data to the operators in the western pine industry:—log purchases, logging contracts, log cutting, swamping and skidding, woods yarding and loading, railroad, railroad trackage construction, log drive, depreciation, logging overhead (burden), logs lost and stumpage. It might be well to state that the above segregations include or rather contemplate a combination of machine power and horse logging operations.

Log Purchases

All direct purchases of saw logs, including stumpage, (or the value of the standing uncut timber) and all labor incidental to delivery to company landing, or railroad tracks, where they will be transported to the sawmill, should be charged to the log purchases account.[2] In some sections, logs are purchased outright F.O.B. mill. In this connection the timber owner undertakes to perform all the labor necessary to deliver the logs at a given point for a consideration which includes the cost of the stumpage[3] as differentiated from company timber holdings. This account should be sub-divided into labor, supplies and expenses, the latter subdivision showing the contract purchase cost, while the cost of labor and supplies include the incidental company expenditures in connection with purchased logs.[4]

Logging Contracts

To the logging contracts account is charged the complete labor, supplies, and expense, excepting stumpage, which has been borne by logging contractors who undertake to make delivery of company timber at a designated place, either river, railroad track or sawmill. The labor referred to is that assumed by the company in connection with contract logging; the supplies are those furnished by

[1] The reader will note in the Appendix to this article that the West Coast Lumbermen's Association calls for nineteen segregations of logging costs but mentions that this number may be reduced for small operators.

[2] In the system of the West Coast Lumbermen's Association the Logs Purchased Account is charged with cost, plus towing charges of logs purchased, and with log buyer's salary, scaling, fees, etc. There is a note that the memorandum of the feet shall be entered opposite each debit. At the end of the fiscal period this account is closed into the Profit and Loss Account.

[3] See Appendix for statement about how stumpage is treated in the system of the North Carolina Pine Association.

[4] Some believe that the log purchases account should show only the cost of original purchases of logs and that it should be credited with depletion as logs are cut. Some believe also that stumpage should be carried in a separate account. These matters have been treated in the Forest Products Questionnaire of the United States Government.

the company to contractors; and the expense consists of those items which are credited to contractors for logs delivered.

There is no repair charge to this account unless the company furnishes equipment to contractors.

The total contract value of the logs covering contractor's credits for logs delivered should properly be shown under an "expense" sub-heading.

Log Cutting

Under log cutting the so-called "falling and bucking" charges are shown, separate accounts being kept for "labor" and "supplies."[1] Labor is charged with cutter's or sawyer's wages, while supplies are charged with such items as cross-cut saws, filers' wages, files, oil, etc.

Individual operation costs for log cutting by company employees, as well as all other operation costs in logging, can be found by dividing the total operating expense chargeable during a given period to the log cutting account, or other operation, by the actual thousand feet log scale of logs felled and bucked. In regard to transportation costs it is necessary to include all log scale footage at the track or river for the purpose of arriving at unit costs per thousand feet. It is of the utmost importance that log scale reports for log cutting should be sent to the cost department currently as the cutting progresses. While various log scale rules are used the Scribner scale is used largely for small or medium sized logs in the western pine industry for obtaining footage content of logs. It is a startling fact, but nevertheless true, that a good many sawmills figure their costs of logging on the actual logs delivered at the sawmill deck where they are scaled (log scale) before being sawn into lumber.[2] This procedure "gets the cart before the horse," and violates the fundamental principles of accounting. In ascertaining the cost of any commodity, exact information must be had in regard to at least two elements, quantity and value. The proper time to secure quantity of logs so as to obtain unit costs, should be when the timber is cut or depleted. In this way only can true costs be obtained, and the management informed of any leakage or loss, and the location of such waste or loss. Cost accounting is primarily designed to assist in efficient management. If it fails to reveal evidence which will lead to more economical production, it is useless. The writer knows of several comparatively modern and large "double-band" lumber manufacturers who still compute regu-

[1] In the system of the West Coast Lumbermen's Association the items which make up this account are the labor of fallers, buckers, filers, snipers, etc.; and supplies used, such as axes, saws, wedges, oils, etc.

[2] On this point see the discussion under logs lost on page 9.

larly their logging costs on the actual logs scaled at the mill, disregarding entirely spoiled and wasted, or unrecovered logs. These logs lost between the cutting operation and delivery to the mill have cost an outlay in labor, supplies and expense. From the personal observation of the writer, this loss in log scale from the woods to the mill varies considerably depending on the logging "chances." It is true that in the final analysis this shrinkage of log scale is absorbed in the lumber costs by those mills referred to, but this is beside the question.[1]

Swamping and Skidding

Woods operation generally demands considerable work in drawing logs from the stump, where they are felled, to a more advantageous position, for final loading and transportation to the sawmill. This work is technically known as skidding. It is also necessary to do work in the nature of clearing underbrush, etc., preparatory to log cutting and skidding, which is known as swamping. The swamping and skidding account should show the cost of labor, supplies and repairs under separate headings. The labor cost includes wages paid to teamsters, the cost of horse labor, the cost of horse power operations, including hay and grain, and other stable expenses. In the case of tractor or truck skidding, tractor and truck driver's labor should be charged to this account, including the supplies, gasoline, distillate, oils, grease, etc., used. Swampers' axes and other tools worn out on the job as well as labor expense would also come under this classification. Repairs should include all cost of repairs directly applying to the equipment used in skidding or swamping. Wire rope in "high line" skidding should be charged to this account.

Woods Yarding and Loading

The cost of woods yarding and loading includes labor, supplies, and repairs such as the labor of donkey engineers, firemen, loaders, chokermen, and all rigging men, directly engaged in handling the logs with donkey loaders and "jammers"; supplies, such as axes, oils, and fuel consumed by the donkey engines; and repairs to donkey loaders and equipment.

Railroad

Railroad cost includes labor, supplies, expense, and maintenance. The term maintenance is used in preference to repairs in harmony with the I.C.C. classification for railroads. Labor consists of wages paid to logging train crews. Supplies consist of oil, fuel, tools, etc. Expense consists of the log freight expense of transporting logs from the company track to the sawmill, and the labor expense of unloading logs at the sawmill pond. Maintenance

[1] See the discussion on Logs Lost on page 9 for further consideration of this topic also.

consists of repairs to railroad engines and logging cars, as well as the section crew labor of the company in repairing company trackage.

Railroad Trackage Construction

The cost of railroad trackage construction should be subdivided into labor and supplies such as the labor used in constructing road bed grade, bridging and initial steel laying, ties, blasting powder, tools worn out on the job, and practically every other supply used in road bed construction, except the railroad steel. These are current operating costs. In case the road bed can be used after the logging operations are completed, a reasonable amount consistent with valuation should be capitalized. Where the railroad grade will be in use for several years, as in a large operation, the initial cost should be capitalized as a deferred charge, and a Reserve for Railroad Trackage Construction should be set up on the books. From the amount of available cruised timber served by the logging railroad the amount of expense to charge into current costs is determined by dividing the total initial cost of road bed construction by the timber supply within a logging radius of the railroad, thus securing the unit cost. This unit cost is multiplied by the actual amount of logs that pass over such trackage for a given cost period.

Log Drive

Large logging operations frequently do not depend entirely on rail transportation in getting logs to the mill, where convenient logs are floated in streams adjacent to the timber cutting and the railroad tracks of the company. Log drives are therefore not uncommon. They usually occur in the spring of the year where water conditions are favorable. Generally speaking, this method of moving logs is rather expensive. The log drive account should show the driver's labor cost and board, as meals are usually included in "river driver's" wages; and such supplies as peavys, (kant hook having a metal socket pick), and such other supplies used in driving logs. In canyon-logging operations, where possible, logs may be shot down a chute directly into the stream from the adjacent hillside. The log drive costs should be kept under the subdivisions of labor and supplies.

Depreciation

Depreciation of logging equipment and camp fixtures should be determined by dividing the total cost of such equipment by the total estimated available footage of logs to be produced by the logging equipment, in order to find the unit charge per thousand feet. The salvage or residual value of such equipment should be deducted from the original cost in making the above calculation.

Depreciation should be separated as between "logging depreciation," and "transportation depreciation," the latter being on the rolling stock, company engines, etc. A proper reserve should of course be set up for all depreciation that is recorded.

Logging Overhead

Some of the general administrative expense should be included in the cost of logging, although this expense is disregarded by some manufacturers. It is considered better practice to distribute some of the administrative expense to the logging function. Salaries and wages, shut-down overhead, and sundry expenses are the subaccounts under logging overhead. Salaries and wages include the superintendent's salary, and wages of foreman, clerks, scalers, and timekeeper; and also the expenses allowed to these individuals. Logging operations are not always continuous due to various causes, yet it is necessary to hold the overhead organization during shutdown periods. For this reason shutdown overhead should show the cost of the expense in a shutdown period.[1] The "sundry expenses" subdivision should be used with great caution. Otherwise it becomes a "jack pot" for "dumping purposes" and is utilized to cover inefficiency. Such items as camp telephone, lighting systems, and such other general expense which cannot be properly classified elsewhere, might well be entered under Sundry Expense.

The logging function should be considered as a unit, and overhead should be distributed on the basis of thousand feet of timber logged during a given period. This method is known as the "process plan" of distributing overhead which is considered preferable.

Lost Logs

Logs which are the goods in process of the lumber manufacturer should be carefully accounted for, from the time they are cut until they are delivered to the mill. Any material loss during such time should be detected at once and proper entries should be made for this cost. From the very nature of the business there is considerable breakage in skidding, in log chutes, and in drives where some logs invariably are left behind, getting into inaccessible places, where they are never recovered. The logs lost, from various causes will vary in some operations from 2% to 10% of the entire logs felled. Logs lost should be charged at the actual cost, to the

[1] In the system of the West Coast Lumbermen' Association, the shutdown overhead account is charged during the operating months with expenses of an estimated amount sufficient to provide for overhead expenses during shutdown periods. These expenses when actually incurred should be charged to a Reserve for Shutdown Overhead account.

This cost in most manufacturing concerns is called idle time overhead which was exhaustively treated in the 1921 Year Book of the National Association of Cost Accountants, pp. 199-242 under the heading The Distribution of Overhead under Abnormal Conditions.

"Logs Lost" account, and credited to a Reserve for Logs Lost. Finally, the cost of logs is credited for the value of unrecovered logs, the reserve being charged. The fundamental purpose of this account is to show in operating costs the value of logs felled which are never delivered to the sawmill.

STUMPAGE

The cost of stumpage very appropriately comes under the cost of logs delivered to the mill pond. The Federal Timber Land Questionnaire sent out by the Government promises to regulate entirely what value can consistently be put on the timber holdings of each individual mill operator as of March 1, 1913. What amount to charge into current operations for stumpage has always been an important factor in the determination of log values. Especially is this true where large tracts of timber were acquired in the Northwest at a very nominal value. However, the question will probably be settled shortly through the Income Tax regulations, and practically all mill operators will adjust their books in conformity with the Questionnaire, and the decision of the Bureau.[1] Those who have acquired timber since March 1, 1913, should of course charge timber depletion at the actual cost, plus the carrying charges, setting up a Reserve for Timber Depletion for the cost purchase value of stumpage (including anticipated carrying charges during the time when timber is being depleted). If this procedure is carried out, the net value of the stumpage account would be the asset less the reserve. The reserve should be set up as well for those operators who acquired timber prior to March 1, 1913, as of that date.

As stated before the ideas in this article are only suggestive. To the above classification of accounts where horse logging is carried on to a great extent, "decking" may well be added as a separate segregation, sub-divided into labor and supplies, instead of including this operation in the cost of swamping and skidding as outlined above. Where machine power is largely used, the cost of "rigging ahead" may be added sub-divided into labor and supplies.

Any unusual or extraordinary repairs should be anticipated and equitably spread over a yearly period, charging a pro rata amount into current operating costs.

Finally, it should be borne in mind constantly that the cost accountant is not only making an historical record of facts, from which the management may draw correct conclusions for action, but that variations from standard normal costs should be shown. This feature is one of the highly important functions of any well organized and comprehensive cost system. For efficiency purposes,

[1] Existing practices of handling stumpage are covered by the present Income Tax Regulations, No. 62, Art. 229.

in order to show progress made, any reduction in the costs should be brought to the attention of the management promptly. It is vitally essential, therefore, in determining logging costs that this feature be given prominence in the final arrangement of the cost accountant's statement of the "cost of logs."

APPENDIX[1]

The West Coast Lumberman's Association has a Uniform Cost Accounting System. It is 214 pages, $8\frac{1}{2}$x$10\frac{3}{4}$ in length. It is very handsomely gotten up as uniform cost systems go. It has index tabs which mark the important divisions of the context. The foreword deals with the advantages of a uniform cost system which states that "general use of this system within the industry will, through composite analyses, accurately reflect fundamental conditions, enabling the industry to so regulate its merchandising that it will not be the last of staple commodities, in an upward swing on a rising market nor the first on the downward swing, never rising relatively as high as other staples, and always falling relatively lower as has been the case with lumber in the past." * * * "Operators will know definitely what returns must be obtained to sustain the industry in a manner commensurate with the welfare of communities which are largely dependent upon lumber manufacturing for their prosperity and civic progress." * * * "Each concern using the West Coast Lumbermen's Association Uniform Cost Accounting System will know the industry's composite cost of lumber through its various phases of, or steps of manufacture, and may compare such costs with similar data for the individual operation. Each concern using the system will know in grade percentage what constitutes the typical log and returns therefor, which may be compared with its particular results." * * * "Each form in the system is fully explained as to entries to be made in each column and the proper procedure to be followed in transferring to the general ledger and subsidiary ledger." The size of all forms is indicated. * * * "The standard classification of this system calls for nineteen segregations of logging costs, but the small operator may carry only such items as logging, railroad, sundries, depreciation and stumpage, which, if segregated, as between labor, supplies and other expense, as outlined, will be wholly comparable in totals with other operations which may use the complete classification. Under manufacturing costs, standard or complete classification calls for eighteen segregations. Small operators, however, may find it more desirable to carry only sawing, yard, sundries and depreciation, which, if built up as to outlined instructions, will result in entirely comparable totals." It was necessary "to adopt certain fundamental prin-

[1] This appendix was prepared by the Research Department of the National Association of Cost Accountants.

ciples as standard, including the following: The setting up of logging as a distinct operation. The carrying f.o.b. sales and underweights as separate returns for product. The carrying of shipping as a separate cost. The carrying of interest and discount as a financial cost." The next sections after the "Foreword" show sample forms of financial statements without figures and other forms consisting of 1. Cash Receipts and Settlement Journal, 2. Check Register, 3. Journal and Voucher Register, 4. Sales Journal, 5. Sales Analysis, 6. Distribution of (vouchers), 7. Journal Voucher, 8. Insurance Register, 9. Prepaid Supplies and Expenses Register, 10. A—Accounts Receivable, B—Accounts Receivable, C—Accounts Receivable, 11. Pay Roll, 12. Time Sheet (Camp), 13. Time Sheet (Mill), 14. Condensed Comparative Balance Sheet, 15. Condensed Operating Statement, 16. A—Detailed Operating Statement (1), B—Detailed Operating Statement (2), C—Detailed Operating Statement (3).

These sections are followed by a detailed chart (list) of accounts. The rest of the system is in three parts: The first explains the nature of debits and credits made to the accounts and how the balances are disposed of. The second contains an explanation of how all the forms are filled out. The third explains the method of compiling the statements.

The North Carolina Pine Association, an organization of manufacturers of North Carolina pine lumber, has adopted a uniform system known as the Manual of Cost Reporting. It is in the form of a brochure of twenty-five pages (6x9), fourteen pages of explanatory matter and eleven pages of forms.

In installing the system the following conditions should be held in mind: "It is not intended as an outline of a 'hard and fast' rule by which all of the concerns interested will be compelled to remodel their bookkeeping procedure; it is not the last word, so to speak, as to the proper distribution of operating costs; it is intended to provide the means by which the essential direct operating costs can be gathered monthly and reported in condensed form, on the special report which will be furnished by the Association; it is intended to outline the basis for a uniform classification of operating accounts (assuming that at least some of the mills are not adequately equipped for this bookkeeping function) the records for which can be maintained in a simple and yet very complete manner."

Costs for each operation are based on per "thousand board feet." This is therefore the cost unit. Stumpage is a direct cost. The cost of this is recorded at a uniform rate of $6.00 per thousand board feet as far as reports are concerned regardless of the rate used in charging off stumpage on the books.

One interesting feature of this system is that the consumption of supplies is based on market value rather than actual cost. This

basis is used because some mills make large advance purchases of supplies and because costs under this method parallel those of the mills which purchase as needs demand. The treatment of stumpage is explained in detail.

Monthly operating cost statements known also as group statements are shown for the following costs: 1. Logging. 2. Log transportation. 3. Sawmill. 4. Dry kilns. 5. Yarding and shipping. 6. Insurance and taxes. 7. Depreciation. 8 General Overhead. 9. Selling. 10. Planing Mill. These statements are sufficiently broad and elastic to meet the accounting requirements of both small and large mills. These statements are arranged to show detailed and total costs; and the average cost per thousand b. f. (board feet). The statements contain no hypothetical figures. Explanations stating the items to be entered in each one of these operating statements are furnished. A short statement without figures showing how the footage and value of mill waste is calculated is also shown. A chart which is a condensed outline of expense distribution, showing the charges applicable to lumber manufacture and sale is one of the main features of the system. This chart also shows "eliminated accounts" which contain the expenses that are not concerned with the manufacture and selling of rough and dressed lumber. This sheet shows in condenesd form all the items in the group sheets.

The California White and Sugar Pine Manufacturers' Association has a system called Proposed Segregation of Accounts for a Standard Accounting System. It consists of 23 mimeographed sheets, 8½ x 13. The system was adopted in September, 1918. The first section of the system contains a list of asset, liability, logging, transportation, mill, machine shop, power house, stable, selling, shipping, and general expense accounts. This is followed by a list of mill plant and equipment accounts. The rest of the system shows in detail the kind of entries made in these accounts and their disposition. Twelve forms are used. These are: 1. Log stock, 2. Manufacturing gain or loss, 3. Lumber stock, 4. Lumber gain, 5. Power house, 6. Machine shops, 7. Mill stable expense, 8. General overhead, 9. Mill store merchandise stock and gain, 10. Miscellaneous loss and gain, 11. Gain, and 12. Comparative balance sheets. These tentative forms have not been officially adopted by the Association because it is felt that conditions in the plant of each member vary to such an extent as to make the standardization of forms impractical.

The Southern Cypress Manufacturers' Association has a system known as "Standard Cost Forms." It consists of eighteen unbound sheets, 8½x14. The system is not rigid. The members who use it may divide the accounts suggested in the system into as many subdivisions as are necessary to cover their particular

operations. The system is divided into three sections: 1. Introduction (which contains among other things the advantages of the system), 2. seven monthly cost statements, and 3. explanation of what goes into these statements. The cost statements without figures are: 1. Logging (pull boat), 2. transportation costs (water), 3. transportation costs (rail), 4. logging (skidder), 5. other logging, 6. manufacturing costs, and 7. recapitulation of cost of production. All of the accounts that appear in these statements and the nature of the items which are entered in each account are indicated.

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