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Cost Accounting for Fertilizer Manufacturers

BY F. C. BELSER, C. P. A.

The use of artificial fertilizers in the United States has until recently been confined almost entirely to the southern states, but there is now an increasing use of them in the northern states, and the tendency to more intensive cultivation of the soil will render such aids to agriculture more and more necessary.

The valuable constituents, or plant foods, which are required in fertilizers are nitrogen, phosphoric acid and potash. Nitrogen is usually supplied in the form of ammonia (NH_3) of which nitrogen forms $\frac{1}{4}$ by weight. The phosphoric acid must be in an available form, i.e., in combination with bases forming soluble salts and thus readily passing into the soil to be absorbed by the vegetation. Fertilizers containing these three elements (or sometimes but one or two of them) are manufactured in numberless combinations. While the different grades are known by brands and names, they are usually referred to by figures indicating the percentage of each of the valuable constituents contained therein; thus, the designation "2-8-2" indicates a fertilizer containing 2% ammonia, 8% available phosphoric acid and 2% potash. The remainder of the mixture is composed of the body of the materials used in the manufacture, and fillers, such as ground limestone, oyster shells and the like.

The materials used in the production of fertilizers are principally natural salts, such as the nitrates from Chili, and potash salts from Germany; phosphate rock from Florida, Tennessee, etc.; nitrogenous animal matter, such as packing house refuse and fish; cotton seed meal; and a variety of other materials. Sulphuric acid is required in conjunction with phosphate rock to obtain

phosphoric acid. The artificial fixation of atmospheric nitrogen has recently become an accomplished fact, and a substance is provided, containing about 20% nitrogen, which is used to some extent in the production of fertilizers.

A complete fertilizer plant usually consists of an acid plant, producing sulphuric acid; a wet mixing plant, producing acid phosphate; and a dry mixing plant, in which all the different grades of finished fertilizers are compounded. There are, however, a great many smaller manufacturers who confine their operations to the dry mixing process, buying the acid phosphate and other raw materials.

A few words of explanation of the processes may also be of interest to those unfamiliar with these operations. Sulphuric acid is produced by burning iron pyrites, containing approximately 50% of sulphur, in roasting ovens, thus generating sulphur dioxide. At the same time nitrogen tetroxide is generated from sodium nitrate, and the two gases are made to react with steam in large chambers lined with sheet lead. The residue of the roasted ore, called pyrites cinder, is sold for railroad ballast, etc.

Acid phosphate is produced by mixing equal, or nearly equal, parts by weight of sulphuric acid and ground phosphate rock. The resultant mixture (from 14% to 18% available phosphoric acid) contains about 10% moisture, but dries out and sets, and is subsequently used as an ingredient of dry mixed products.

Dry mixed products are prepared in accordance with formulæ for each brand or grade and these formulæ must be closely followed, so that the products shall conform to the stipulated analyses. The various ingredients are conveyed by barrow and compounded in mixers similar to those used for mixing concrete. Some use is also made of various forms of mechanical conveyors. Connected with the mixers are grinders, and also screens for throwing out foreign substances, so that the resultant product is not equal to the total weight of materials used.

GENERAL OUTLINE OF SYSTEM

In order efficiently to control the operations of a business, it is imperative that frequent balance sheets and statements of earnings be prepared, and in this article monthly statements are contemplated.

A complete set of books should be kept to record the opera-

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tions of each plant, controlling accounts over each being kept in the general ledger. These controlling accounts should be charged with all purchases and expenditures incurred on behalf of the plants, such charges being taken up on the respective plant ledgers.

A specimen card of accounts to be kept for each plant is appended hereto (Exhibit A). The accounts may be grouped under

- (a) Raw material inventory accounts
- (b) Products and by-products inventory accounts
- (c) Department operating accounts
- (d) Service accounts
- (e) Repair accounts
- (f) General accounts

Materials purchased should be charged to the raw material inventory accounts, and when reported used should be transferred to department operating accounts at cost. Labor and expenses should be charged to the department operating accounts for which they were incurred; but, when not applicable to any specific department, they should be charged to the service accounts which, in turn, should be distributed over the various departments. Repair charges should be kept separate and later distributed to the departments as more fully outlined hereafter. By-products should be credited to the departments at the values which will be recovered from them, and the remaining expenses of each department, representing the cost of the commodities produced during the period, should be charged to the inventory accounts provided for this purpose. Shipments should be charged to the general ledger (Cost of Sales account) at actual cost as shown by the product inventory accounts.

A voucher record for each plant should be kept, in order that all charges made on the general ledger may be conveniently recorded for posting and distribution on the plant ledger. For transfers between accounts on the plant ledger, a journal may be used.

RAW MATERIALS

Inventory accounts in quantity and value should be kept for each kind of raw material. The charges to these accounts should cover the entire cost of the materials, including freight, handling and unloading expenses, laboratory charges, etc. As materials are

used, they should be credited at the average cost brought down, and charged to the respective operating departments.

A complete record of materials received, giving name of shipper, commodity, weight, etc., should be forwarded by the factory to the general office each day. Columns should be provided for the use of the office, in which to record the value of the materials as shown by the vouchers issued to the vendors. A further column to show the incoming freight charges is also useful.

At the end of the month every item reported as received should be covered by vouchers, as well for the cost of the materials as for the freight thereon, so as to insure that no liability is omitted from the books. The clerical accuracy of the work may also be verified in this way, since the totals of all of the receiving reports may be agreed with the total of the materials column in the voucher record; and an efficient safeguard over the payment of freight is also obtained. If the vendor's invoice for any particular lot of material is not at hand when it is desired to close the accounts for the month, such materials may temporarily be taken up at an estimated value, to be adjusted to the true value in the following month. The charges to the inventory accounts on the ledger may be made either from the voucher record or from the receiving reports, both quantity and value being entered.

The basis for charging out materials used is the formula prescribed by the superintendent. The barrows, in which the materials are conveyed, are weighed just before being emptied into the mixers, the quantity being adjusted to a uniform weight for each ingredient by adding or removing the necessary amount. It is therefore only necessary to keep a tally of the number of barrows of each ingredient delivered to the mixers to permit of the total quantity being calculated.

In a similar manner, pyrites burned for the production of sulphuric acid may be weighed and reported daily, and also the quantity of acid and rock used in producing acid phosphate.

The daily reports will require to be analyzed to show the quantities of each kind of material used for producing each grade of product. This is best accomplished by heading a sheet for each grade, and listing the tally sheets received each day in the following form:

Date	Formula number	Material A	Material B, etc.	Total used	Total produced
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At the end of the month a summary may be made of all materials used for all grades, so as to reduce the number of postings, thus:

Grade	2-8-2		3-8-2		3-8-2 Remill		Total all Grades		
Production	10 tons		30 tons		20 tons		60 tons		
	lbs.	Value	lbs.	Value	lbs.	Value	lbs.	Price	Value
Material A.....	15,000	\$112.50	22,000	\$165.00			37,000	\$15.00	\$277.50
Material B.....	6,000	30.00	40,000	200.00			46,000	10.00	230.00
3-8-2 Goods.....					40,000	\$280.00	40,000	14.00	280.00
etc.									
Screenings*.....	1,000	2.50	2,000	5.00			3,000	5.00	7.50
Total.....	20,000	\$140.00	60,000	\$360.00	40,000	\$280.00	120,000		\$780.00
Material cost per ton.....		<u>\$14.00</u>		<u>\$12.00</u>		<u>\$14.00</u>			

This arrangement brings out the material cost for each grade of dry mixed goods, to which is to be added later the proportion of the operating expenses. The totals only need be posted to the credit of each inventory account, the grand total being charged to the dry mixing operating account. The screenings recovered (the difference between weight of materials used and weight of product reported) should be charged to an inventory account for screenings.

The materials used in the acid department and wet mixing department may be entered at once on the cost sheets for those departments (Exhibits B and C) and calculated at the average cost per ton as shown by the plant ledger. Each inventory account should be credited in detail and the totals charged to the respective operating accounts. The by-product secured from the acid department, viz: pyrites cinder, may be credited to the cost of operating and charged to an inventory account at the market price at which it can be disposed of.

Materials transferred from one plant to another should be charged at cost. Freight may be added by the receiving plant, but this could not be permitted if the same materials were re-shipped a number of times.

The ledger balances of materials on hand must be verified from time to time by physical inventories. This is most conveniently done after the close of the busy operating and shipping season, say on May 31st or June 30th, when stocks are at their

*These are deductions.

lowest. In order to facilitate the physical inventory, all materials received toward the close of the season should be kept in separate piles and a record kept of these. Estimates will need to be made of the quantities contained in other piles of materials on hand.

There are a number of causes of differences between the ledger and physical inventories. The atmospheric conditions give rise to fluctuations in weight, some of the materials absorbing moisture very rapidly. Acidulated fish is subject to considerable variation because it contains a large percentage of moisture, some of which drains off if the material is stored for any length of time. To as great an extent as possible, therefore, materials should be stored in separate piles for each lot received and accounted for on the books by lot numbers, an adjustment being made of the overage or shortage as each lot is exhausted. An additional reason for keeping lots separate is the fact that some of the materials used vary considerably in chemical analysis.

A large amount of loss is due to materials being dropped on the floors while being conveyed from the storage piles to the mixing machines. At the end of the season the floors are cleaned up and use is made of these cleanings, and the value so recovered may be credited to the inventory adjustment account to offset to that extent losses on shortages of materials. Since cleanings cannot be used as advantageously as new materials, however, a net loss for the year will probably result.

Steps can be taken by the management to prevent some of the losses and to reduce others, but a reserve must be created to cover such losses as are unavoidable. This may be done by charging to costs either a fixed rate per ton of product based upon past experience or a percentage of the value of all materials used.

In addition to the inventory accounts kept in the plant ledger, it is advisable to have a quantity record kept at the plant, a monthly or weekly report being drawn off and forwarded to the general office. In this way a check on the clerical work is secured, and at the same time the factory superintendent is kept advised of the general conditions.

SUPPLIES

Supplies such as fuel, oil and waste, repair parts, etc., may be charged at once to the various accounts for which they were purchased. If the amount involved is large a stores account may be

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opened and charged with all purchases, to be later distributed to expense and operating accounts as reported used.

LABOR

Labor in a fertilizer plant is generally entirely on a day-work basis, and the pay-rolls therefore present no difficulty. Nor does the distribution thereof present any difficulty, since employees are engaged usually in the same occupation throughout the month. The most important exception is in the case of unloading materials, for which purpose gangs of men may be withdrawn from their regular duties. Such labor should be charged to the material handled, as it represents an addition to the cost thereof. Labor spent on repairs should be charged either to the general repair accounts or to order numbers allotted to specific jobs.

Ordinary timebooks may be used, if a number of lines are allowed for each employee so that change of occupation during the period can be noted and calculated. By means of analysis sheets, the required distribution is then readily accomplished.

SERVICE ACCOUNTS

These accounts are provided for accumulating expenses which cannot be allocated directly to any one department. The cost of power is the principal charge of this nature in a fertilizer plant. At the end of the month the total power expense should be distributed over the departments on the basis of the horse-power required to operate each.

General factory expenses include such items as salary of superintendent, watchmen, insurance, taxes, fire protection, etc. If a general superintendent is maintained at the main offices of a company operating a number of plants a proportion of his salary and office expenses may be included in the expenses of each of the plants. A more or less arbitrary basis will have to be employed for distributing the total expense at any plant over the various operating departments; the total pay-roll of each department is suggested as one basis that might be used.

REPAIRS AND DEPRECIATION

The operating season of a fertilizer plant is, as a rule, limited, and most of the repairs are made in the season of smallest production. It is therefore necessary to spread the repairs for the entire

year equitably over the product for the entire year. The readiest method of accomplishing this is to create a reserve by a monthly charge to operations, on a tonnage basis. Against this reserve the cost of repairs, when made, may be charged. The monthly tonnage charge would of course be based on past experience.

In the acid plants, in addition to the repairs recurring annually, the lead chambers require renewal every four or five years. This fact therefore makes it imperative that accruing repairs and renewals should be provided for.

In order efficiently to control repair charges it is advisable to require a special authorization for incurring any expenditure exceeding a fixed maximum amount, and to allot an order number to each such authorization. The actual expenditure under each order may then be compared with the estimate previously made, and explanations demanded for any important discrepancies. This procedure should also be followed for all work on construction and renewals.

The cost of manufacture should include full provision for depreciation. In order to secure uniformity in the costs of each product it is preferable to make the monthly charge to the operating departments on a tonnage basis. The rate per ton to be used would be ascertained by first determining the total amount of depreciation for a year calculated at suitable rates for each class of building or equipment operated, and dividing this annual provision by the normal annual tonnage. No further provision for depreciation would be necessary for that portion of the acid plant which is covered in the charge for renewals referred to above.

IDLE PLANT EXPENSE

Some difficulty is encountered with respect to the unavoidable expenses incurred during the season of little or no production in the dry mixing department. This difficulty may be met by accumulating in one account all expenses incurred during the idle period, including a proportion of such expenses as power and general factory expenses in the months of very small production. This accumulated expense may then be written off over the busy months in some equitable manner, preferably on a tonnage basis. No such unabsorbed expenses should, however, be carried forward from one fiscal year to another.

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ACID DEPARTMENT

The charges to the acid department are clearly set forth in the cost sheet (Exhibit B), which is merely an analysis of the charges to the corresponding account on the plant ledger. At the end of the month the total charges represent the cost of the acid produced during the month, and this should be charged in both quantity and value to the inventory account provided for sulphuric acid. A corresponding credit must be made to acid department operating account, thus closing out this account.

WET MIXING DEPARTMENT

The cost sheet for the wet mixing department (Exhibit C) shows the analysis of this account. The procedure is similar to that of the acid department, the total product, in both quantity and value, being charged to acid phosphate account, thus closing out the wet mixing department operating account.

DRY MIXING DEPARTMENT

The procedure with respect to the distribution of materials over all of the different grades of fertilizers has previously been illustrated under the heading *Raw Materials*. It is necessary to add, for each grade, the proportionate operating expenses of the dry mixing department.

Exhibit D shows in detail the charges making up the cost of operating. A schedule should be prepared combining the cost of materials and the operating expenses in the following manner:

Grade	Production tons	Cost of materials	Operating expenses	Total cost	Cost per ton
2-8-2	10	\$140.00	@ \$2.00 \$20.00	\$160.00	\$16.00
3-8-2	30	360.00	@ 2.00 60.00	420.00	14.00
3-8-2 Remilled.....	20	280.00	@ 1.00 20.00	300.00	15.00
etc.					
Total.....	60	\$780.00	\$100.00	\$880.00	

Each product should then be charged to the respective inventory account in both quantity and value, and the total amount credited to dry mixing department.

While there is undoubtedly a variation in the cost of operation depending on the class of materials used, it appears impossible in practice to make any distinction as between grades. In some

large plants where different sections of the mill may be confined to the production of acid phosphates (goods made by simply diluting acid phosphate to various degrees of strength), ammoniated goods and potash goods, respectively, it may be possible to keep the expenses for each class separate. But in most mills the three classes are produced in the same machines and such a division is impracticable. Therefore, the total expense must be distributed over the product on a tonnage basis.

In order to prepare for the busy shipping season, quantities of the more popular grades are sometimes compounded in the dull season and stored. Before shipment all such stored goods must be remilled. It is obvious that this remilling operation, requiring very little grinding and almost no screening, is less costly than the first milling. The exact difference in cost cannot very well be determined, however, since both milling and remilling are done indiscriminately in the same machines. Some arbitrary distinction must therefore be made. It is suggested that, as a working basis, the remilling operation be considered as costing one-half as much as the first milling. If, therefore, in any month, forty tons were first-milled and twenty tons were remilled, the department would have performed work equivalent to first-milling fifty tons. Observation and tests could be instituted to determine the true relation between these operations.

SHIPPING EXPENSE

This expense begins when the finished product, ready for shipment, leaves the mixing machines. It is automatically weighed into bags, and as the machines would require some attendance even when goods are made up for stock, this attendance may be included in the cost of manufacture. The shipping expense should, however, include the cost of the bags, and printing, sewing up the bags, tax tags affixed in compliance with the laws of the various states to which the goods are shipped, the labor of loading on the cars, etc. These expenses may be considered as adding so much per ton to the cost of the goods shipped; or the entire amount may be considered as a deduction from the net proceeds of the sale of the product.

No part of this shipping expense must be allowed to be confused with the dry mixing expense, otherwise fertilizers made up for stock will be over-valued in the inventory accounts.

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SHIPMENTS

Shipments may be reported by the factory by merely returning the copy of the customers' orders originally sent to it. If, in addition, a daily record of shipments can be prepared by the factory office, the general office work is much facilitated. Such a shipment report should show:

- Order number
- Consignee
- Grade
- Quantity
- Transportation line
- Car number, etc.

In addition, blank columns should be left so that the general office

EXHIBIT A

CARD OF ACCOUNTS

PLANT LEDGER

(a) Raw materials and supplies, 1-50.

1. Fuel, coal
2. Fuel, wood
3. Stores account, supplies
4. Bags
5. Tax tags
6. Pyrites, foreign
7. Pyrites, domestic
8. Phosphate rock
9. Kainit
10. Tankage
11. Blood
12. Dry fish
13. Acid fish
14. Cottonseed meal
15. Muriate of potash
16. Sulphate of ammonia
17. Nitrate of soda
18. Sulphate of potash
19. Oyster shells
20. Limestone, etc.

In case of materials of high value, or materials varying in moisture or chemical contents, a separate account must be kept for each lot; thus, account No. 15, lot 1573, etc.

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may insert the customer's invoice number, selling value and pre-paid freight. The total of all the shipment reports for the month forms the basis of the entry charging customers' ledger and crediting sales account.

The amount of freight to be prepaid on each shipment should be inserted on the shipment report, and when paid the voucher number should be noted opposite each item. This insures, first, that the liability for all freight is taken up in the month shipments

EXHIBIT A—(Continued)

- (b) Products and by-products, 51-60
 - 51. Pyrites, cinder
 - 52. Floor cleanings
 - 53. Screenings, rough
 - 54. Screenings, ground
 - 55. Sulphuric acid
 - 56. Acid phosphate, rough
 - 57. Acid phosphate, screened
 - Separate account for each grade of screened acid phosphate, designated by percentage of available phosphoric acid.
 - 60. Dry mixed products
 - Separate account for each grade of dry mixed products, arranged according to analysis.
- (c) Department operating expense accounts, 61-65
 - 61. Acid department
 - 62. Wet mixing department
 - 63. Dry mixing department
 - Total expense to be closed out each month and charged to inventory accounts of products.
- (d) Service accounts, 66-75
 - 66. General factory expenses
 - Distribute over operating departments.
 - 67. Unloading expenses
 - Distribute over materials unloaded.
 - 68. Power
 - Distribute over operating departments.
 - 69. Laboratory expenses
 - Charge to operating departments. Charges may also be made to material accounts for services in connection with purchases.
 - 70. Shipping expenses
 - Charge to general ledger, as addition to cost of goods shipped or deduction from proceeds thereof.

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are made, and secondly, that no freight can be paid except as applying on a *bona fide* shipment.

It is now necessary to analyze the sales so as to determine the quantity shipped of each brand or grade, and the selling value thereof after deducting the prepaid freight. This classification may be obtained from the customers' invoices, or from the shipment report, by means of analysis sheets. When the volume of business is large, Hollerith tabulating machines may profitably be used to obtain this information, and at the same time to compile other valuable statistics as to the sales by territories, by salesmen, etc.

The sales should now be summarized by grades in a schedule somewhat as follows, so that the cost of manufacture of each grade may be entered and the gross profit thereon determined:

EXHIBIT A—(Continued)

(e) Repairs accounts, 76-80

- 76. Acid department
- 77. Wet mixing department
- 78. Power plant
- 79. Yard and general equipment.

Credit monthly provision on basis of tonnage, charging same to respective operating departments. Subdivisions of these accounts may be kept to record the expenditures on repairs to the different classes of property covered under each department.

(f) General accounts, 81-100

- 81. Insurance, fire
- 82. Insurance, accident
- 83. Taxes accrued
- 84. Pay-roll accrued

These accounts may be kept on the general ledger if preferred.

85. Special orders

Controlling the expenditures on special orders issued for repair and construction work, details of which may be kept in a subsidiary record.

86. Inventory adjustments

Create reserve by monthly charges to costs, to provide for losses of materials which cannot be avoided.

87. Idle plant expense

Distribute over busy months, preferably on a tonnage basis.

100. General ledger account

The general ledger account is to be kept in constant agreement with a corresponding account to control the factory operations carried in the general ledger.

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Grade	Tons	Selling value	Less: freight	Net sales		Cost m'pture		Gross profit	
				p. ton	amount	p. ton	amount	p. ton	amount
Total sales									
Deduct: Shipping expenses Allowances etc.									
Net sales									

Exhibit B								
FERTILIZER MANUFACTURING COMPANY								
COST OF OPERATING								
ACID DEPARTMENT				MONTH OF 191				
Production: This year;		Month To date		tons. Last year;		Month To date		tons.
				tons.				tons.
	Quantity	Price	Amount	Costs per ton				
				This year		Last year		
				Month	To date	Month	To date	
MATERIALS:								
Pyrites, foreign								
Pyrites, domestic								
Nitrate of soda								
Total materials								
Less:								
Cinder produced								
Net materials								
LABOR:								
Acid-maker								
Chambermen								
Pumpers								
Burnermen								
Cindermen								
Helpers								
Total labor								
CHARGES AND EXPENSES:								
Provision for repairs at per ton								
Depreciation at per ton								
Proportion of factory expenses								
Proportion of power expense								
Sundry supplies and expenses								
Total Expenses								
Total cost of Manufacture								

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The shipping expenses might also be deducted *pro rata* from the proceeds of each grade, but this is probably unnecessary—deducting it in total and showing the cost per ton being sufficient.

The column headed "Cost of manufacture" is taken directly from the inventory accounts on the plant ledger to which the postings are made as the items are entered on the schedule. The total of this column forms the basis of the entry charging cost of sales and crediting plant ledger.

A factor of considerable importance with respect to the proceeds of sales is the allowance which may have to be made to the customer when settling his account at the end of the season. If

Exhibit 6							
FERTILIZER MANUFACTURING COMPANY							
COST OF OPERATING							
BEST MIXING DEPARTMENT				MONTH OF		191	
Production: This year;—Month To date			tons. Last year;—Month tons. To date			tons. tons.	
	Quantity	Price	Amount	Costs per ton			
				This year		Last year	
				Month	To date	Month	To date
MATERIALS:							
	Sulphuric acid						
	Phosphate rock						
	Total materials						
LABOR:							
	Miller and assistants						
	Delivering rock						
	Crusher labor						
	Mixer and assistants						
	Bin men						
	Removing product						
	Total labor						
CHARGES AND EXPENSES:							
	Provision for repairs at per ton						
	Depreciation at per ton						
	Proportion of factory expenses						
	Proportion of power expense						
	Sundry supplies and expenses						
	Idle plant expense						
	Total expenses						
	Total cost of manufacture						

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the allowances can be estimated with any degree of accuracy they should be provided for in the accounts each month. In any case a reserve should be set aside amply sufficient to cover this contingency.

MONTHLY CLOSING

As indicated above, all operating and expense accounts are intended to be closed out each month. The accounts remaining open on the plant ledger should be combined with those on the general ledger when preparing the monthly balance sheet, under

Exhibit D					
FERTILIZER MANUFACTURING COMPANY					
COST OF OPERATING					
DRY MIXING DEPARTMENT		MONTH OF		191	
Production: This year;-Month To date	tons.	Last year;-Month To date	tons.	tons.	
	Amount	Costs per ton			
		This year	Last year		
		Month	To date	Month to date	
LABOR:					
Delivering materials					
Weighers					
Mixer labor					
Removing product to stock					
Total Labor					
CHARGES AND EXPENSES:					
Provision for repairs at per ton					
Depreciation at per ton					
Proportion of factory expenses					
Proportion of power expense					
Sundry supplies and expenses					
Idle plant expense					
Total expenses					
Total cost of manufacture (exclusive of materials)					
PRODUCTION DATA					
		Current Month		Year to date	
		tons	tons	tons	tons
This year;-First milling					
Re-milling					
Total (first milling equivalent)					
Last year;-First milling					
Re-milling					
Total (first milling equivalent)					

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the headings of inventories, reserve for accruing repairs, deferred charges, etc.

A statement of earnings should be prepared monthly. Starting with the net sales, cost of sales and gross profit as previously outlined, the expenses of selling and administration, interest, etc., as shown by the general ledger should be deducted.

Other monthly statements of great service to the management are these:

Statement of expenditure on special repair and construction orders.

Statement of the reserve for accruing repairs, showing provisions, expenditures, and balances.

Statement of sales, cost of sales, and gross manufacturing profits by brands and grades (see under heading of "Shipments").

Statement of inventories, showing quantity, price, and value of each class of material on hand (as shown by trial balance of the plant ledger).

Cost of operating acid plant (see exhibit B).

Cost of operating wet mixing plant (see exhibit C).

Cost of operating dry mixing plant (see exhibit D).

Cost of operating power plant,
etc.