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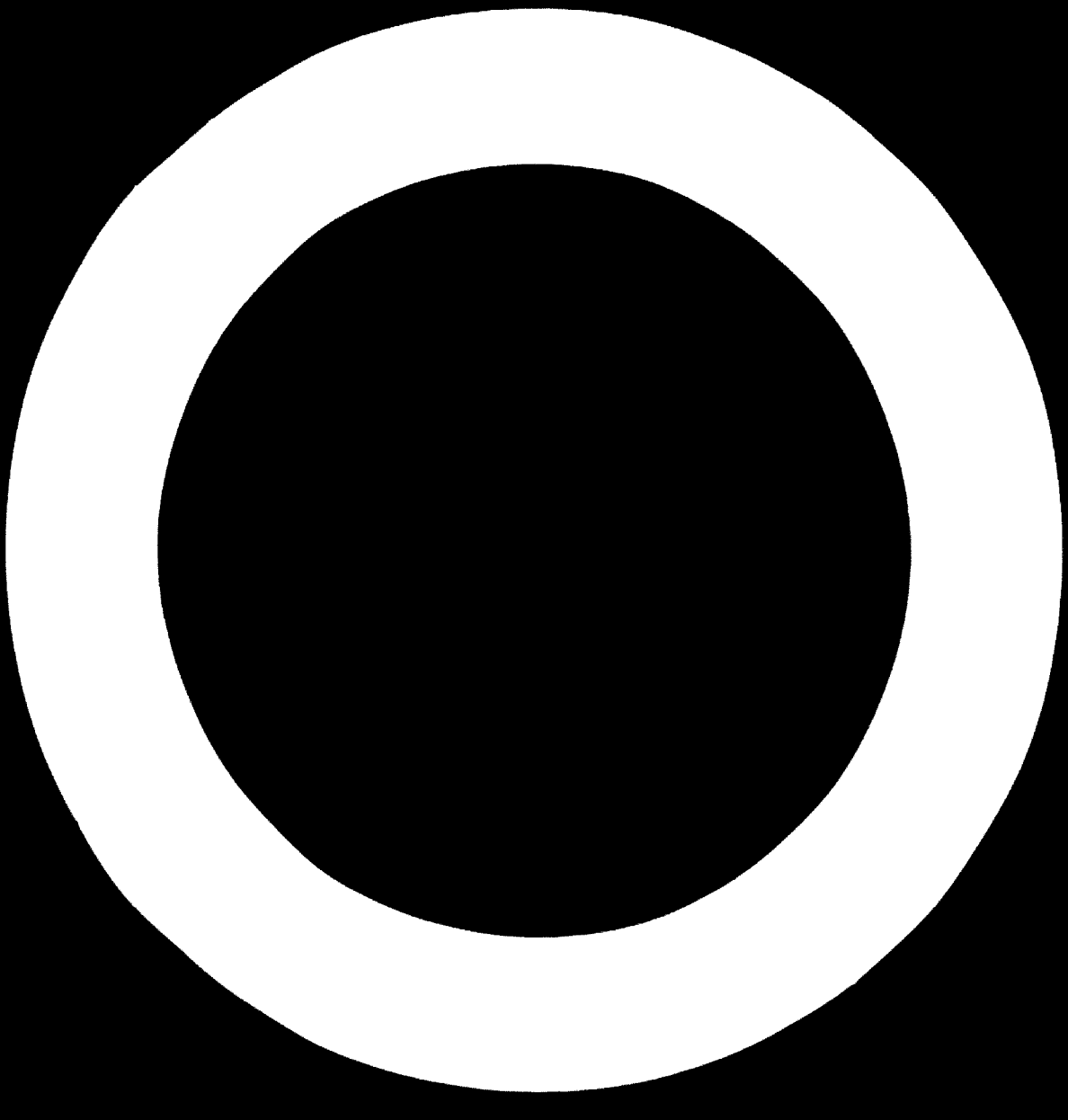
United Nations Industrial Development Organization

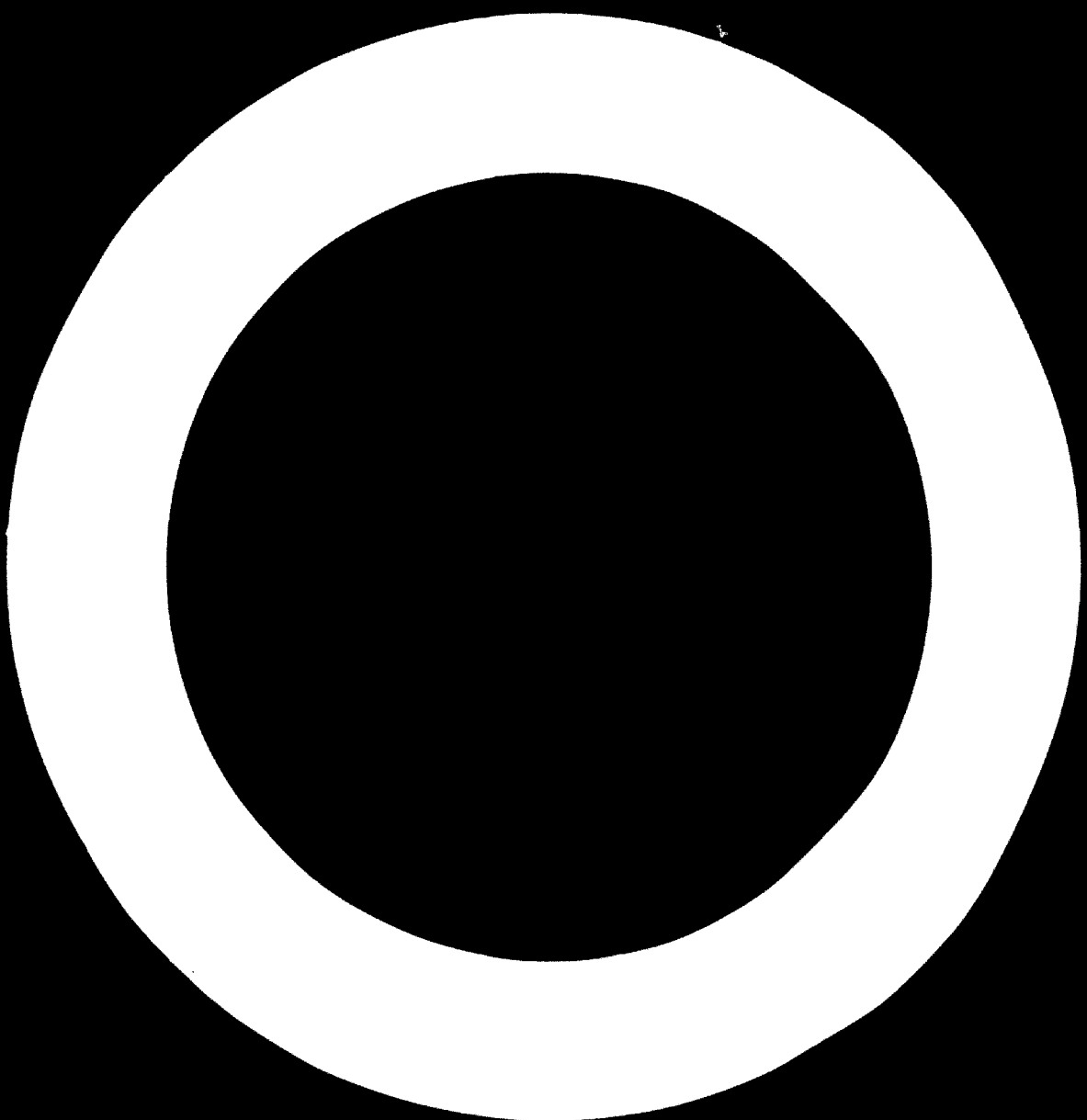
ORIGINAL: ENGLISH

INDUSTRIAL PERFORMANCE EVALUATION PROFILES STANDARD QUESTIONNAIRE FOR THE VEGETABLE OIL INDUSTRY [1]

(with Explanatory Notes)

ID. 94-3771





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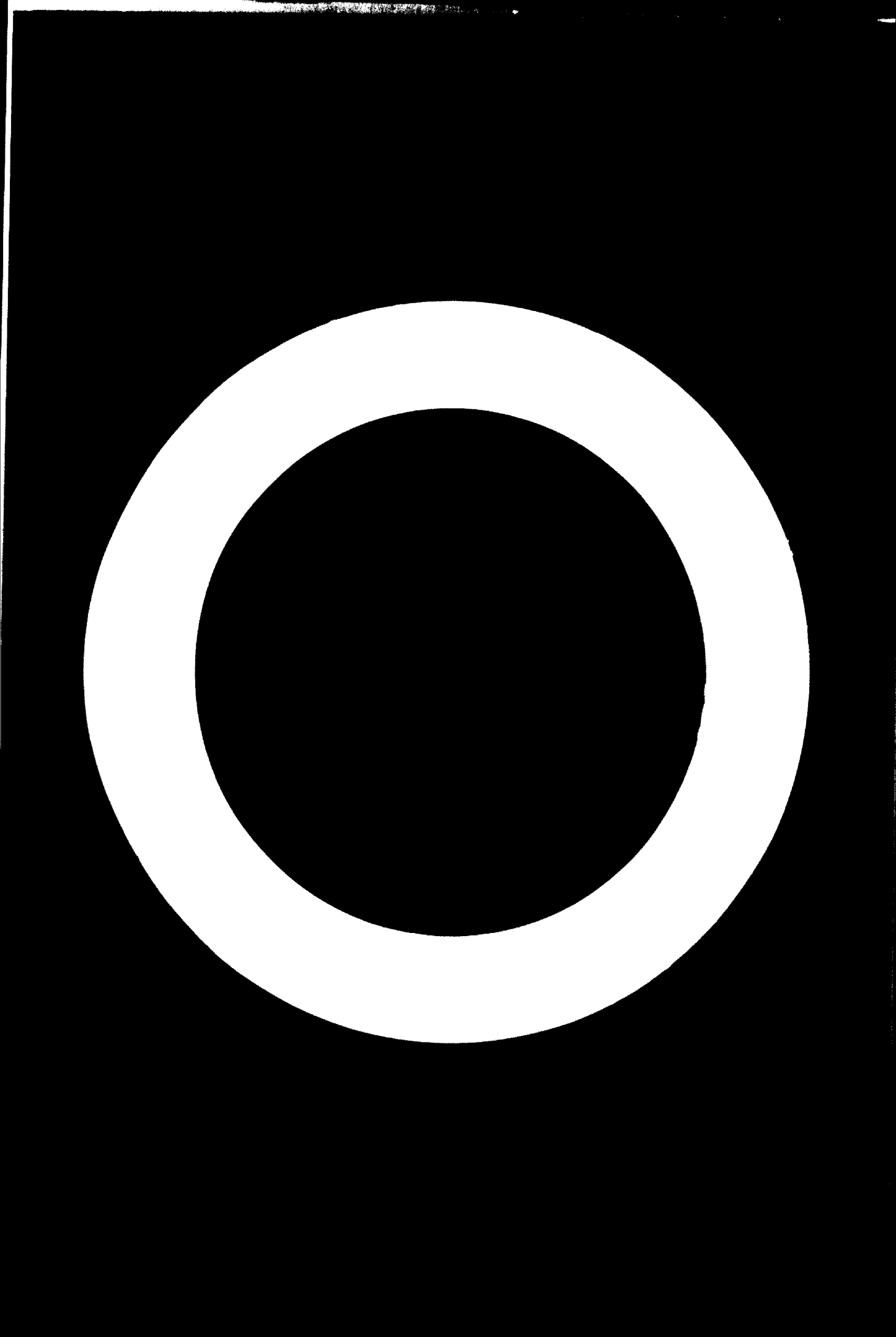

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The Industrial Performance Evaluation Profile (IPEP) was designed by the Industrial Development Centre for Arab States (IDCAS) in co-operation with the United Nations Industrial Development Organization (UNIDO) in order to provide management with a comprehensive diagnostic system for evaluating the economic and technical performance of the establishment reviewed and to create a scheme for interfirm comparison for those establishments participating in the programme.

It has been noticed in the past that management frequently evaluates the performance of an industrial establishment either from an engineering or from an economic point of view. The IPEP tries to overcome this shortcoming by closely joining the economic and technical aspects of performance evaluation.

The IPEP questionnaire is divided into:

- PART A - : Economic and financial description of the establishment
- PART B - : Technical description of the establishment
- PART C - : Performance evaluation

Although the suggested questionnaire is divided into three parts, it should always be kept in mind that they have to be read and filled in as one unit. Since the requested data are frequently not available at one central point of the company, close working relationships will have to prevail between the various technical, economic and accounting departments.

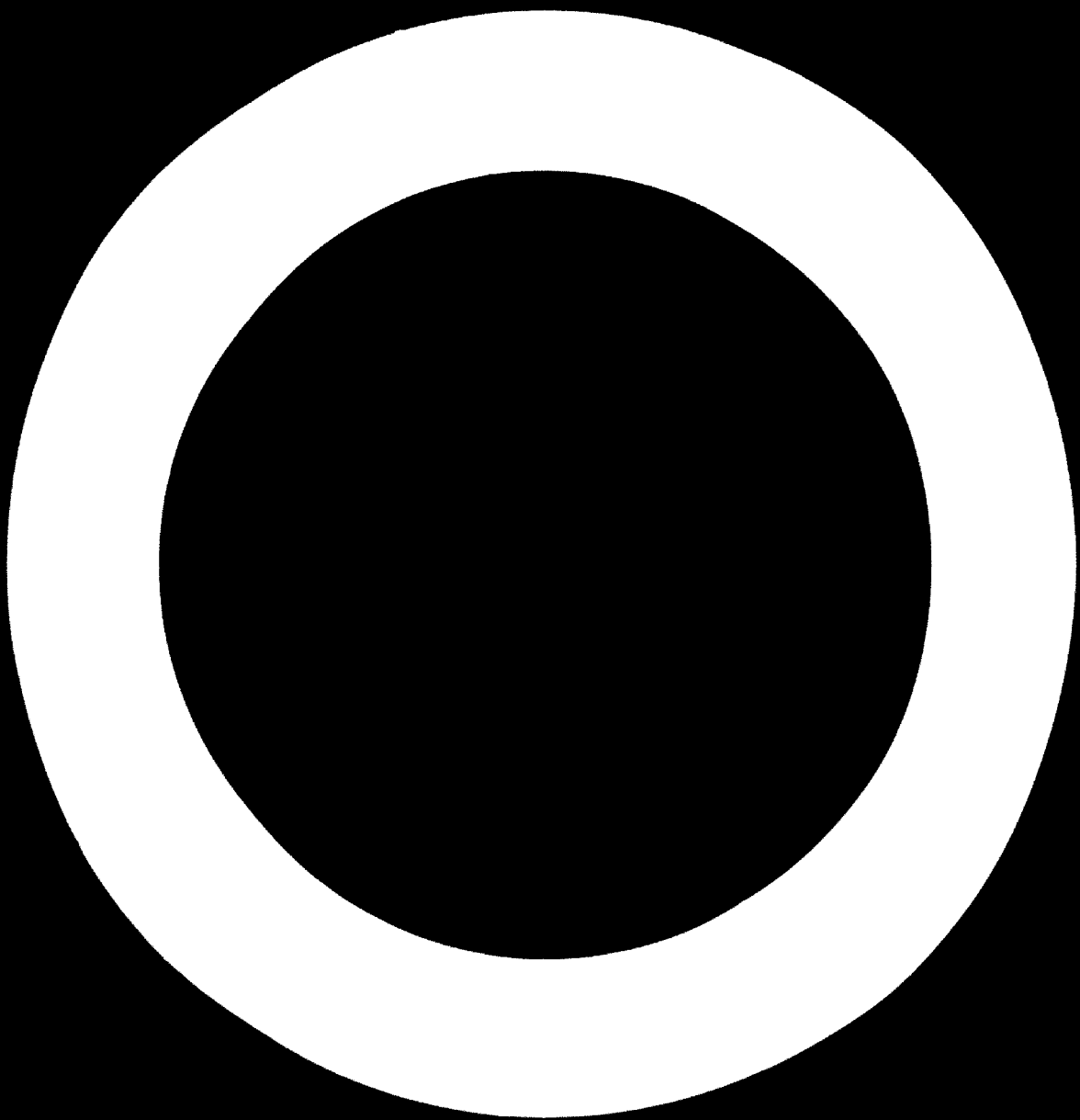
Some companies might not be in a position to supply all the information asked for in the standard questionnaire at the very beginning due to non-availability of data. However, management should feel that the IPEP will in the future prove useful to solve many managerial problems and that therefore measures should be taken to initiate improvements in the collection of technical and accounting data. It should also be recognized that the collected data could be of great importance for industrial planning.

It should be understood by the user of the IPEP questionnaire that this proposed version is only one way of looking at the problem of economic and technical performance evaluation. Many of the attached forms may have to be adapted to the conditions prevailing in the plant under study, since it is not possible to prepare a rigid questionnaire which can generally be applied to all firms.

The IPEP questionnaire for the vegetable oil industry is only one in a series which will gradually cover all major industries. The glass, cement and grain milling industries have already been covered and work is progressing for the food canning and fertilizer (nitrogenous and phosphorous) industries. Steel making, sugar refining, and tobacco and cigarette manufacturing will follow soon.

IDCAS intends to make wide use of the IPEP questionnaire in Arab countries through the General Organisation of Industry, Industrial Unions or Federations, Management Development and Productivity Centres or Institutes and Industrial Development and Studies Centres.

NOTE: In case the enterprise reviewed comprises several establishments, please utilise one questionnaire per establishment.



PART A

ECONOMIC AND FINANCIAL DESCRIPTION OF THE ESTABLISHMENT

This part gives details about the overall economic, financial and cost structure of the establishment under review. It shows the history of investment, the products manufactured and sold in the reporting year, the required material inputs as well as contract and commission work since many industries may need this particular service. Value added should obtain the attention of the experts collecting the data for the standard questionnaire in the field. Fixed assets should be given in as much detail as possible focussing especially on the process equipment leaving, however, the information about existing capacities to Part B, the technical description of the establishment. The calculation of the desired working capital should take account of the actual requirements of the company which are frequently underestimated thus leading to severe liquidity problems during the daily operation of the company.

Of particular significance for a careful analysis of the economic performance are cost accounting data. Even if the establishment uses only financial accounting, efforts should be made to fill in the departmental cost sheet for the production and service cost centres as well as for the general overhead cost centres.

A summary presentation of the cost of production, the profit and loss account as well as of the financial statement should make it possible to obtain sufficient data which are not only needed for the economic performance evaluation but also for interfirm comparison.

Supplementary information on future plans of the establishments and governmental policies close this part.

Data indicated in Part A will not be repeated in the following parts even if required at each individual stage of the performance evaluation.

EXPLANATORY NOTES

Ad.I.A.: Kind of activity: Indicate the primary product group or the industry under which the establishment (or firm) is classifiable (e.g. in terms of the National Industrial Classification Code)

Year of reference: the year of 19.. is preferred; the years of 19.. and 19.. are acceptable. The business year, not necessarily confirming to the calendar year, is acceptable. Please note that the same year of reference should be maintained throughout the different sections of this study.

I. GENERAL DESCRIPTION

I.A. COUNTRY:

KIND OF ACTIVITY:

YEAR OF REFERENCE: from 19 to 19

OWNERSHIP:

( ) Wholly privately owned enterprise

( ) Wholly government-owned enterprise

( ) Semi-governmental enterprise (mixed ownership)

- governmental .....%
- private .....%

If it is a joint venture of foreign and domestic capital indicate the share of each party in the total capital stock:

Domestic .....%

- governmental .....%
- private .....%

Foreign .....%

EXPLANATORY NOTES

Ad.II.: Those business transactions which are not connected with the current productive activities should be excluded (revenue from re-sales, capital gains on investment, inventory revaluation, etc.).

Ad.II.A.: The classification of products in specific products (or group of products) should be given in order of importance of their outputs and in enough detail for a precise indication of the product-mix.
If the establishment (or firm) has a very extensive product-mix, use an additional sheet, if necessary, or classify the products by groups of products.
The following items should be specified under other sales (II.A.2.):

- marketable by-products
- marketable processing wastes
- contract and commission work done by subcontractors (see Part A, III.D.)

However, the following items should be excluded from the annual output:

- scales of scrapped capital assets
- revenue from re-sales (goods purchased from outside and resold without receiving any further fabrication)

- The nominal capacity corresponds to the output which can be achieved under normal operating conditions. The nominal capacity is sometimes also referred to as the economic capacity since the costs of production reach their optimum. The technological capacity corresponds to the maximum physical output as e.g. guaranteed by the produces of equipment. Production at the technological capacity level is frequently not the most profitable one, since it can only be reached at very high costs. Disturbances in the supply of raw materials or fluctuations of the labor force normally prevent management from reaching the technological capacity.

- Nominal capacity output may not be exactly identifiable for all individual products especially when the product-mix of the basic production processes is flexible. For the latter case, indicate approximate capacity output levels achievable with the same pattern of product-mix as the actual.

- Goods produced is defined as the amount of final and intermediate products produced for sale.

- Sales price (per unit e.g. ton) exclusive sales tax refers to the market price applicable to the delivery at factory, excluding any sales tax, no matter whether the latter is actually collected by the establishment (or firm) considered.

- Total value of goods produced is the value of all products which are produced for sale during the 12-month period. Sales tax should be excluded.

- Total value of goods sold: the value of goods actually sold during the 12-month period partly accrues from annual production and partly from changes in inventories.

Ad.II.B.: Exports are to be listed as part of total sales as mentioned under II.A.

II. PRODUCTS, ANNUAL OUTPUT AND SALES

II. A. QUANTITY AND VALUE OF ANNUAL PRODUCTION AND SALES:

Specific product (or group of products) (1)	Nominal capacity output (2)	Goods produced (tons) (3)	Goods sold (tons) (4)	Sales price per ton (excl. sales tax) (5)	Total value of goods produced (6)=(3)x(5)	Total value of goods sold (7)=(4)x(5)
1. Main products						
a - Crude oil						
b - Oilcakes						
c - Extracted meal						
d - Refined oils						
e - Hydrogenated oils (veg. ghee)						
.....						
2. Other sales						
a - Linters						
b - Hulls						
c - Soapstock						
d - Oxygen						
.....						
Total						

II. B. EXPORTS:

Total exports within the year of reference ☐ (000)

Major export products	Unit price f.o.b. for export	Quantity exported	Total value

EXPLANATORY NOTES

Ad.III.: The information considered in this section relates to the material, energy and business service inputs required for the 12-month period considered. Of course, materials purchased on capital account, mainly investment expenditures especially the material used for production of own equipment within the establishment, if any, should not be included here.

Ad.III.A.: - Specific production materials should be listed in terms of normal commercial usage. In the event of particular industry involves packaging as a major process (i.e. food canning and bottling industry), packaging material should be treated as direct production materials. The same applies to petroleum and coal in the petro-chemical and coal chemical industries.
Fees paid for contract and commission work should be entered in III.D and not here.
- Unit of weight or measurement should be expressed in terms of the metric system. When various products are shown as a group, an approximation of the total weight or value is desired.
- Quantity consumed stands for the amount of material consumed within the year of reference, irrespective of whether it was purchased in that period or taken from stocks.
- Information on internal supply is requested only for those materials or semi-finished products which are partly acquired from outside and partly produced by the establishment.
- Unit price as paid by the establishment (or firm) is the price inclusive of freight and insurance costs plus import duties and taxes.
- Total value of purchase C.I.F. corresponds to that part of quantity consumed which has been purchased from external suppliers, excluding the value of internally supplied material (if any).

Ad.III.B.: - Ad.1: Describe in parentheses the major elements of packaging material involved. See also explanations under III.A.
Ad.2: Parts and supplies used for regular maintenance of production equipment (including miscellaneous hand tools not considered as capital assets) are distinguished from production materials and entered here.
Ad.3: Other materials and supplies used for non-manufacturing activities refer primarily to those used in administrative work.

Ad.III.C.: - For the column headings, see the notes for III.A.

Ad.III.D.: - If there is any <u>contract and commission work</u> performed by subcontractors on the materials supplied by you, enter the total fee paid during the year considered.

Ad.III.E.: - Ad.2: Of this item, <u>other business services purchased may include</u>:
- legal and consulting costs
- insurance fees (other than those included in the c.i.f. costs of production materials)
- expenses for training services purchased
- executive expenses (e.g. business entertainment, staff travel allowances, etc.)

However, the following items should be <u>excluded</u> from this sub-section:
- non-wage, non-salary payments to workers (e.g. subsidies for housing, transportation, cafeteria and other welfare activities (IV. 4.)
- rentals (IV. 5.)
- royalties paid (IV. 6.)
- sales taxes and other indirect business taxes (IV. 7. and 8.)
- income taxes withheld and to be paid
- dividends.

III. ANNUAL CONSUMPTION OF MATERIALS AND ENERGY

III. A. DIRECT PRODUCTION MATERIALS:

Specific production material	Unit	Quantity consumed		Unit price (000)	Total value of purchase c.i.f. (000)	% imported	Import duties (000)
		Purchase	Internal supply				
Total value							

III. B. OTHER MATERIALS AND SUPPLIES:

1. Auxiliary material (_____)
2. Factory supplies
3. Other materials and supplies for non-manufacturing activities (e.g. office supply)

Total value

III. C. ENERGY AND WATER:

Running materials	Unit	Quantity consumed		Unit price (000)	Total value of purchase c.i.f. (000)	% imported	Import duties (000)
		Purchase	Internal supply				
1. Electricity	000 kWh						
2. Solid fuels:							
- _____	t						
- _____	t						
- _____	t						
3. Liquid fuels and lubricants:							
- _____	t						
- _____	t						
- _____	t						
4. Gas	000 m³						
5. Steam	000 t						X
6. Water	000 m³						
Total value							

III. D. CONTRACT AND SUBCONTRACT WORK:

Total fee for commission and contract work performed by subcontractors

III. E. BUSINESS SERVICES PURCHASED:

1. Transport, storage, insurance
2. Communications (e.g. postal fees), advertisements and other business service purchased

Total value of business services purchased:

EXPLANATORY NOTES

Ad.IV.: In case the establishment is a branch of a larger enterprise and is dependent on the central office for some of the cost and financial data, it may not have adequate branch accounts on all the items in this section. Rents, interests, royalties, corporate income, etc. would then be estimated only on an imputation basis. But even such estimates, if crude, are important for the purpose of this study, i.e. to grasp the value added generated by the productive activities of the establishment.

Ad.IV. - Ad.1: The classification of workers and employees according to primary and secondary production cost centres as well as the service cost centres is given in part B of the questionnaire. Salaries and wages should be shown inclusive of income tax but exclusive of social security contributions.

Ad.3: All the social security contribution, whether they are wholly or partly included in the nominal gross wages and salaries, should be isolated here.

Ad.4: Non-wage, non-salary payments to workers and employees are payments for expenditures such as:
- Working clothes and similar supplies to workers
- Enterprise's subsidies on housing
- Transportation
- Other welfare activities

Ad.7: Sales tax normally includes:
- tax that accrues when sales take place, and
- tax that accrues as production takes place
In the event raw material taxes are charged as a part of production tax (or production tax is calculated on the basis of materials used or purchased), indicate this kind of tax accrual, if these values are not yet included in the purchase value, c.i.f. of the material (see III.A. and III.C.). It is particularly important that these taxes be adjusted to reflect the annual accrual over the year considered instead of the taxes actually paid during the year.

Ad.8: Other indirect business taxes include those that reflect neither current production nor profit as actually reported in the firm's profit and loss statement. But this study needs the figure representing the profitability of the firm's or establishment's productive activities, properly adjusted by excluding from the estimates of annual productive revenue and cost
- capital gains on investment
- re-sale of goods
- inventory revaluation, etc.

Ad.11: If there is any particular depreciation policy being followed (either to accelerate or to defer depreciation), please describe it in the footnote space at the bottom.

IV. VALUE ADDED

	Value in '000
1. Annual wages and salaries of (for [ ] persons) workers and employees of primary and secondary production cost centres	
2. Annual salaries and wages of (for [ ] persons) employees and workers of service cost and general overhead cost centres	
3. Social security contributions	
4. Non-wage, non-salary payments to workers	
5. Rents payable or borrowed capital assets	
6. Interests on loans and royalties paid	
7. Sales tax	
8. Other indirect business taxes: - _____ - _____ - _____	
9. Corporate income before tax Subtotal	
10. (-) Subsidies	
11. Net value added	
12. Annual depreciation: - Machinery and equipment - Factory and office facilities - Buildings - Non physical capital assets	
Gross value added	

EXPLANATORY NOTES

A4.7.: The section relates to the existing physical fixed capital assets in the establishment (or firm) whether purchased new or second hand or produced by the establishments on facilities.

- In the case of a branch establishment, which is dependent on the control office for the book-keeping of the data on assets, attempts should be made to produce the best estimates possible on the basis of the branches inventory as well as the records as may be kept at the firm's central office.

- Both total original and replacement value of each specific type of fixed capital assets should be given.

- The original purchase is defined here on as to provide an idea as to how much it would cost if the existing asset were replaced by new functional equivalent. The age of the asset and the speed at which the wholesale price of similar assets have been rising in the past will thus be the major factors responsible for the gap between the original purchase and replacement value. In some cases the fire insurance value may provide a basis for arriving at a sensible estimate for the replacement value. Even rough estimates are acceptable for our purposes. If the physical asset is ... that its functional equivalent can no longer be found in today's market write simply "obsolete" under replacement value. If a given type of equipment involves two or more units of different age, indicate the average age.

A4.7 A. ... and improvements are e.g. the levelling of the ground, clearing away of rubbish, filling of holes, etc.

A4.7 B.: The value of buildings should be computed together with construction work involved but exclude insofar as possible
- value of land (V.A.)
- value of operative auxiliary facilities (V.B.)

A4.7 C.: For the purpose of this study each major process equipment should be itemized with a view to indicating the core processing equipment that is crucial in determining the capacity of each processing shop, and the quality of the products processed. For this purpose, it is advisable to select and list major items in order of the primary and secondary production steps centres as described in Part B. Such listing will be facilitated by distinguishing operational processing equipment (to be listed under V.B.)
Note that the capitalized value of process equipment could include:
- duties and taxes paid at the time of the purchase
- transport and installation service costs. It is desirable to separate, if only by approximation, the transport and installation costs from the purchase price of the equipment and indicate it in V.C.4.

A4.7 D.: Operational machines and equipment are those which are designed specifically for the use in a particular industry and are typical for the manufacturing of the group of products considered.

V. FIXED CAPITAL ASSETS

	Number	Total original purchase value in [illegible]	Total replacement value in [illegible]	Average age
A. LAND				
1. Land (Total acreage: [ ] m²)				
2. Land improvements				
B. BUILDINGS				
1. Primary industrial buildings (Total floor space: [ ] m²)				
2. Auxiliary buildings (power plant, laboratory, mechanical shops and garages etc.				
3. Warehouses				
4. Office and administration buildings				
5. [illegible]				
Total value of land and buildings				
C. [illegible].				
1. [illegible]				
[illegible]				

EXPLANATORY NOTES

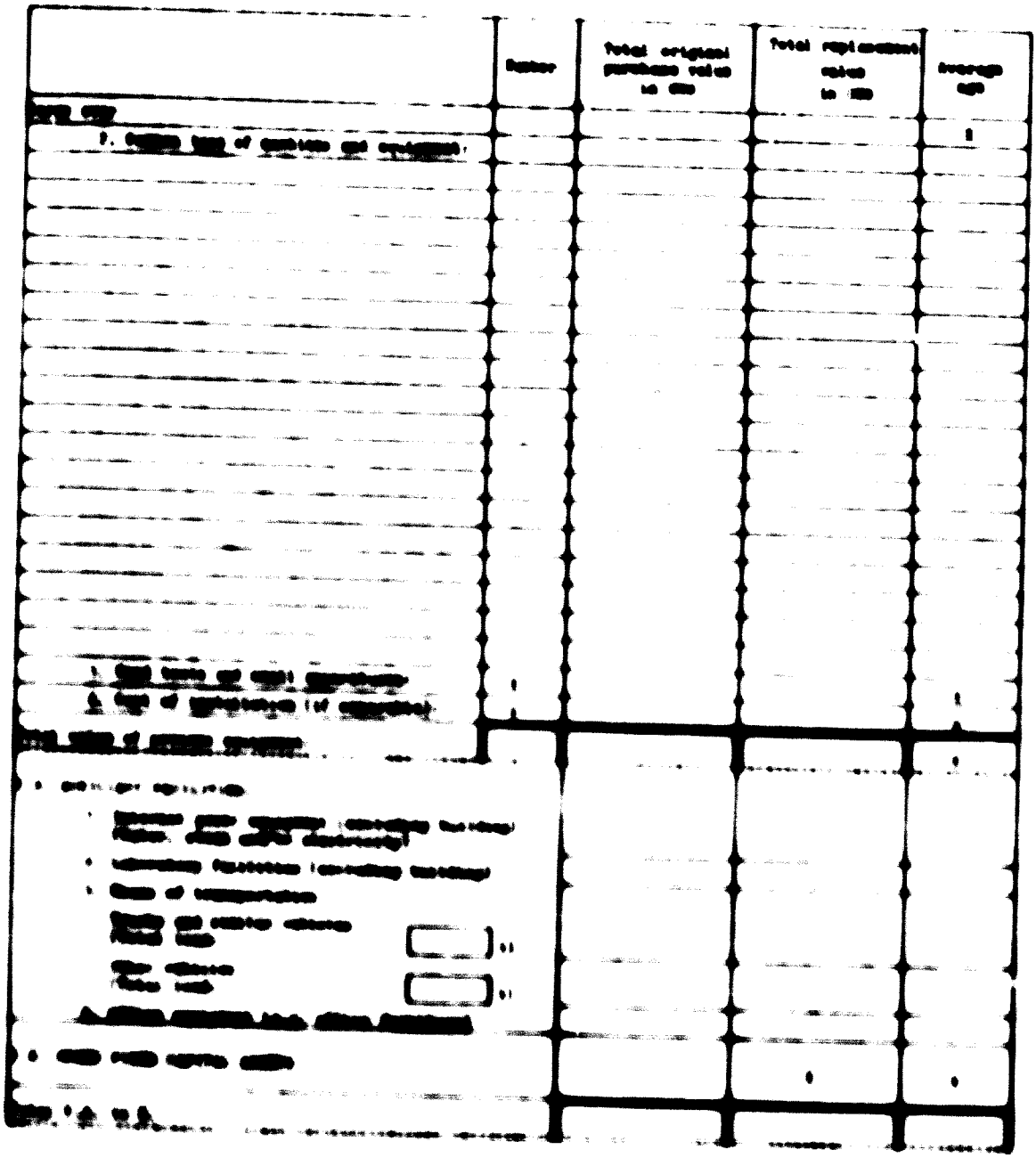
A4.1.1.- A4.2: - Common type of machines and equipment, no matter if custom made, the type which can be widely used in many industries with limited modifications, such as:
- transporting solids (cranes, conveyors, hoists, etc.)
- power-drivers purchased separately
- industrial pumps, compressors, blowers, etc. of general types
- dressed lumber, tanks and other containers
- weighing, cleaning, packing equipment of general types
- machines and equipment in auxiliary facilities (e.g. power-driven hand tools, metal working, welding, cleaning machines for repair and maintenance shops)

- It is preferable to group major types of common equipment for each production cost centre

A4.3 - Hand tools and small apparatuses refer here only to those which are considered as capitalized assets; miscellaneous hand tools and machine accessories treated entirely as consumable supplies should be excluded here (see III.B.2)

A4.4 - Cost of installation relates to the part of the capitalized cost of equipment that occurred at the installation phase of machinery and equipment. It consists of the cost of labour and technical services as well as transportation and installation materials. These costs may not be readily available in older establishments. However, please attempt to provide an estimate of these costs wherever possible, and especially when such installation costs are believed to be an important part of the equipment value.

A4.5.1.- other fixed assets (details of remaining items which are neither else listed (intangible capital assets, firm organizational costs, capitalized patents, etc.)



EXPLANATORY NOTES

A1.V[illegible]. A. and B.: The annual average of inventories and liquid assets may be estimated from the records of the plant relating two or more points of time during the year (monthly, quarterly or half-yearly). If the records are available only for a particular date in the year considered, strike out "average" and indicate the date.

A8.VI.C.: - Total working capital requirements may or may not deviate much from the total value of actual inventories and liquid assets. What is asked here is a diagnostic review of what ought to be considered as the normal working capital requirements for the current scale of production under the normally expected conditions of market in the country or region considered.

- The [illegible] refers to the magnitude of the [illegible] working capital referred to the normal monthly allowances for respective items.

VI. WORKING CAPITAL

VI.A. INVENTORIES (average):

	Value in (000)
- Production materials	.....
- Other materials and supplies	.....
- Work-in-progress	.....
- Finished products	.....
Total average inventories	.....

VI.B. LIQUID ASSETS (average):

- Cash on hand and in bank	.....
- Marketable securities and bonds	.....
- Accounts receivable from delivery of goods and services	.....
- Other accounts receivable	.....
- Prepaid expenses	.....
Total average liquid assets	.....

VI.C. REQUIRED WORKING CAPITAL:

Working capital requirements to be considered under current business conditions are as follows:

	Value in (000	Equivalent number of months
- Production materials	.....	.....
- Other materials and supplies	.....	.....
- Finished products	.....	.....
- Wages for primary operative workers	.....	.....
- Other wages and salaries	.....	.....
- Training costs	.....	.....
- Administrative costs, sales costs and contingencies	.....	.....
- Other special items		
_____	.....	.....
_____	.....	.....
Total desired working capital	.....	

EXPLANATORY NOTES

VII. DEPARTMENTAL COST CENTRES - Table 1

The production process should be broken down into the various production departments and auxiliary departments which for accounting purposes should correspond to production and service cost centres.

The example of the departmental cost sheet might not always correspond to the conditions prevailing in each plant and should therefore be changed accordingly, particularly with regard to the break down into production and service cost centres. The situation might occur where proper cost accounting data are not available in the company but only data from the financial accounts. In this case it is suggested to first fill in the "total amount column" based on the financial accounting data. An attempt should then be undertaken to estimate the distribution of the different material, labour and overhead cost items on the production and service cost centres, distribution, selling, administration and finance existing in the plant. As a guide to this suggested distribution all those cost centres which should be charged with a proportion of the total amount of the various cost items are marked with "x". If this guide is followed it will be possible to distribute all cost items directly and to obtain a picture about the total costs accrued in each production cost centre, service cost centre, in the distribution, selling and marketing department as well as in the administration and finance department during the accounting period.

The attached proposal of a departmental cost sheet has been designed along the following lines:

- Horizontally, Table 1 lists the different cost centres which are responsible for production, services, warehouse and distribution, selling and marketing, administration and finance.

- Vertically, Table 1 shows the cost items related to material, wages [illegible].

EXPLANATORY NOTES

(VII. Table 1)

NOTES REGARDING COST ITEMS LISTED IN TABLE 1

1. The cost of materials (item I: 1,2,3,4,8) issued to cost centres should be based on "net invoice price" for local purchases and CIF for imports plus custom duties and transport inwards.

2. Water, electricity and steam (item I: 5,6,7) purchased from local authorities should be charged to the respective cost centres at the actual prices charged by such authorities.

3. Temporary labour (item II: 1) is usually compensated on the basis of global rates to which no labour-related costs are attached. Temporary labour cost should be stated separately for managerial purposes.

4. Expenses incurred for contractual maintenance (item III: 1) work may be directly charged to the specific cost centre with which it can be clearly identified. Otherwise, such expenses may be charged to the maintenance cost centre for subsequent apportionment.

5. Contractual freight expenses (item III:2) incurred for the transport of raw materials should be included in the purchasing price of this commodity. Contractual freight expenses incurred for the delivery of the final product should be charged to the distribution cost centre.

6. Insurance premium (item III:3) should be apportioned to the various cost centres on the basis of the total value of assets insured in each centre. For simplicity reason they may be charged to Administration.

7. Depreciation (item III:4) should be calculated on the basis of the original value of fixed assets according to the methods and rates adopted by management. Such methods and rates should be stated in a footnote.

8. Travelling expenses (item III:5) may be allocated to "Selling and marketing" and "Administration and finance" according to the nature of the assignment.

9. Rent (item III:6) is normally limited to the rent of warehouses and offices and should accordingly be charged to these cost centres. In rare instances, however, the entire factory may be rented.

10. Other expenses (item III:11) comprise all items not previously mentioned. These should be analysed and charged to the proper cost centres.

EXPLANATORY NOTES

(VII. Table 1)

1. Production Cost Centres are those areas of activity within the vegetable oil processing factory where industrial operations are performed with the purpose of producing vegetable oils. These cost centres are:

a - Delinting	f - Neutralizing
b - Decorticating	g - Bleaching
c - Pressing	h - Deodorizing
d - Solvent extraction	i - Winterizing
e - Bagging	j - Filling and packing

2. Service Cost Centres are those areas of activity which render the various services necessary for the smooth running of the plant.
The following service cost centres are commonly found in a vegetable oil factory:

a - Social services: including housing, health service, cantine, transport, company food stores, etc.

b - Plant management: of production workshops

c - Off-site transport: all transport activities which are not related to connected production processes

d - Purchasing: of raw material, spare parts and other supplies

e - Stores: for purchased raw materials, spare parts, packing materials, supplies and equipment

f - Repair and maintenance: of machinery and equipment, buildings, vehicles, etc.

g - Electricity: for productive and general use

h - Steam: for productive use

i - Water supply: in case of company's own supply

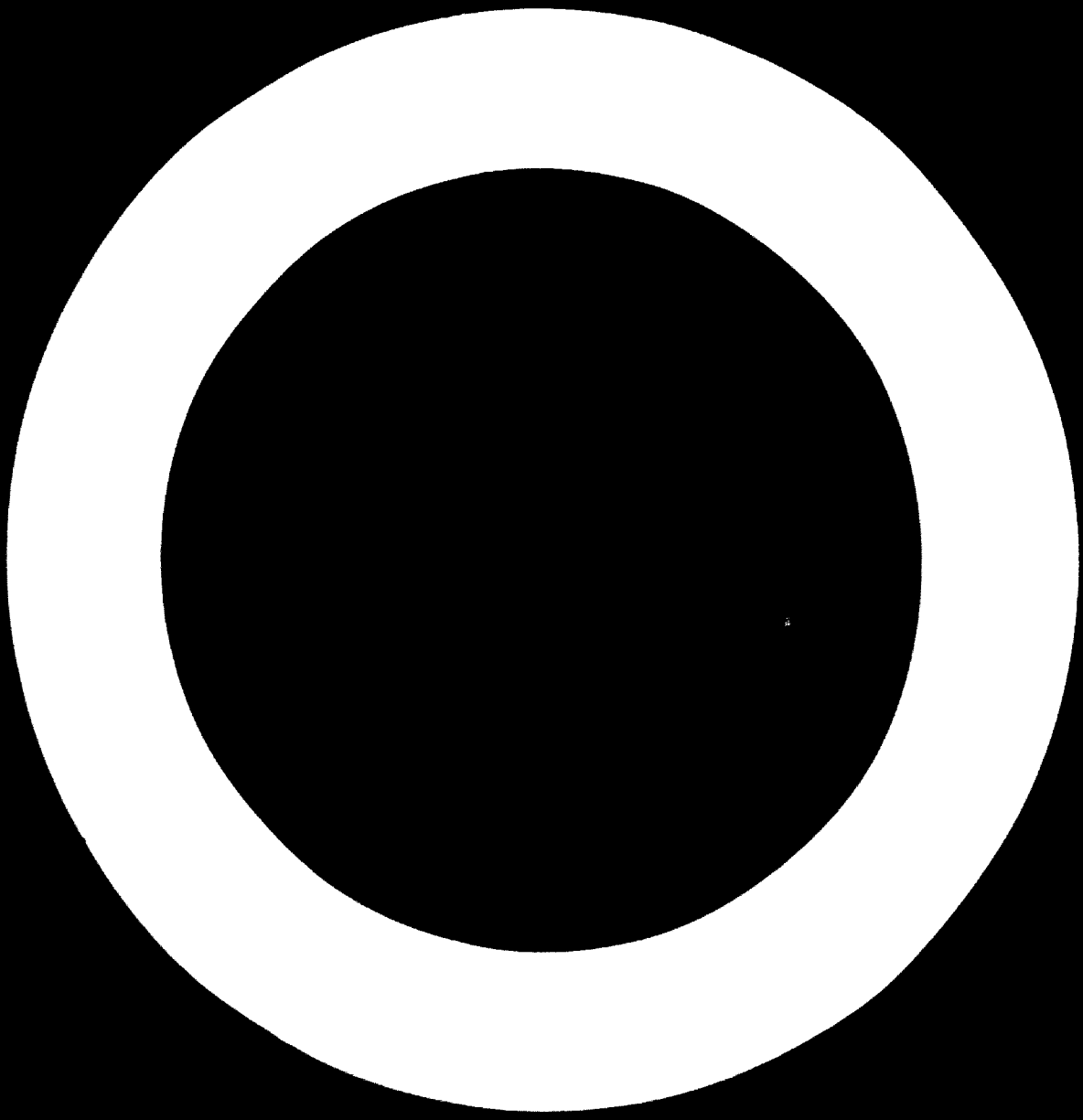
j - Laboratories: process control

Changes may be made according to the actual organisational structure of the factory under study.

3. Warehouse and distribution, selling and marketing are responcible for all distributional activities from the time the vegetable oil products have been placed in a salable condition until they are converted into cash.

4. Administration and finance comprise all activities related to managerial planning, control, and performance evaluation. Again, practice varies with respect to the number of centres to which these activities are actually assigned. Larger factories maintain specialised centres for planning, budgeting, costing, statistics, personnel training, accounting and finance. Smaller factories have a fewer number of such centres. Hence, it is suggested to accumulate all expenses related to administration and finance in one centre under this designation.

NOTE: Warehouse and distribution, selling and marketing, as well as administration and finance may be conceidered as General Overhead Cost Centres.



VEGETABLE OIL PLANT

[redacted] - Table 1

COST ITEMS	Total amount (a)-(j) + (1)-(10)+ (I)-(III)	PRODUCTION COST CENTRES: Oilseed Processing: Delinting (a)	Decorticating (b)	Pressing (c)	Solvent extraction (d)	Bagging (e)	Total oilseed processing (a)-(e)	Refining: Neutralising (f)	Bleaching (g)	Deodorising (h)	Winterising (i)	Filling and packing (j)	Total refining (f)-(j)	Total prod.cost centres (a)-(j)	SERVICE COST CENTRES: Social services (1)	Plant management (2)	Off-site transport (3)	Purchasing (4)	Stores (5)	Repair + maintenance (6)	Electricity (7)	Steam (8)	Water supply (9)	Laboratories (process control) (10)	Total service c.centres (1)-(10)	Wa + bu
A. [redacted]																										
B. Direct prod. mat.																										
Cotton seed		x																								
Other seed			x	x																						
Delinted seed			x																							
Prepared cake					x																					
Crude oil								x																		
Neutralised oil									x																	
C. Ancillary materials																										
Press cloth				x					x		x															
Caustic soda								x																		
Steam solvent					x																					
Ammonia					x																					
Bleaching earth									x																	
Other ancm. mat.																										
D. Factory supplies																										
Lubricants		x	x	x	x	x		x	x	x	x	x					x		x	x	x	x	x	x		
Spare parts+maintan.		x	x	x	x	x		x	x	x	x	x					x		x	x	x	x	x	x		
Other fact. supplies																										
E. Packing materials						x						x														
F. Electricity		x	x	x	x	x		x	x	x	x	x			x	x	x	x	x	x	x	x	x	x		
G. Steam				x	x			x	x	x													x			
Water supply					x			x	x	x	x									x				x	x	
H. Other suppl.(off.etc)																										
I. [redacted]																										
J. Production wages + charges																										
Basic wages																										
Social security																										
Health insurance		x	x	x	x	x		x	x	x	x	x														
Prod. bonuses																										
Overtime																										
Temporary labour																										
K. Wages + salaries of [redacted]																										
Basic salaries															x	x	x	x	x	x	x	x	x	x		
Social security																										
Health insurance																										
Bonuses																	x			x	x	x	x	x		
Overtime																										
L. [redacted]																				x						
M. Maintenance (contr.)																	x									
N. Freight (contractual)																										
O. Insurance																										
P. Depreciation																										
Buildings		x	x	x	x			x	x	x	x	x			x	x	x	x	x	x	x	x	x	x		
Machinery + equipm.		x	x	x	x			x	x	x	x	x							x	x	x	x	x	x		
Transport equipm.																	x									

Press cloth
Caustic soda
Hexan solvent
Ammonia
Bleaching earth
Other aux. mat.

3. Factory supplies
Lubricants
Spare parts+mainten.
Other fact. supplies

4. Packing materials

5. Electricity

6. Steam

7. Water supply

8. Other suppl.(off.etc)

II. LABOUR

1. Productive wages + salaries
Basic wages
Social security
Health insurance
Prod. bonuses
Overtime
Temporary labour

2. Wages + salaries of serv.,(staff),cell +mark.,adm.+finance
Basic
Social security
Health insurance
Bonuses
Overtime

III. OVERHEAD

1. Maintenance (contr.)

2. Freight (contractual)

3. Insurance

4. Depreciation
Buildings
Machinery + equipm.
Transport equipm.
Amortis. of non-phys. assets

5. Administr. expenses
Communication
Travel
Others

6. Rent

7. Taxes
Sales tax
Property tax
Indir. business taxes
Custom duties
Licenses and fees

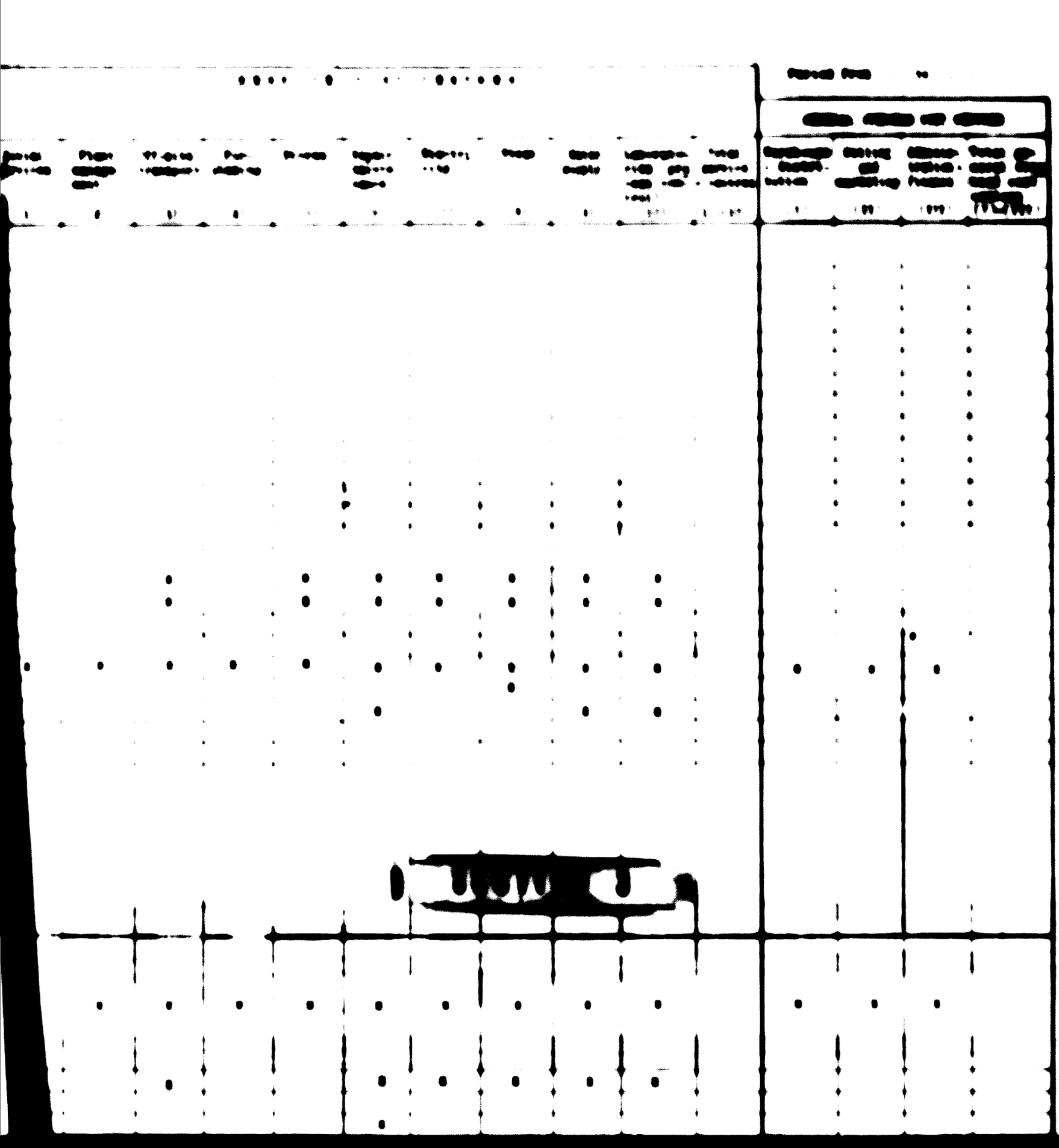
8. Inter.+oth.fin.exp.

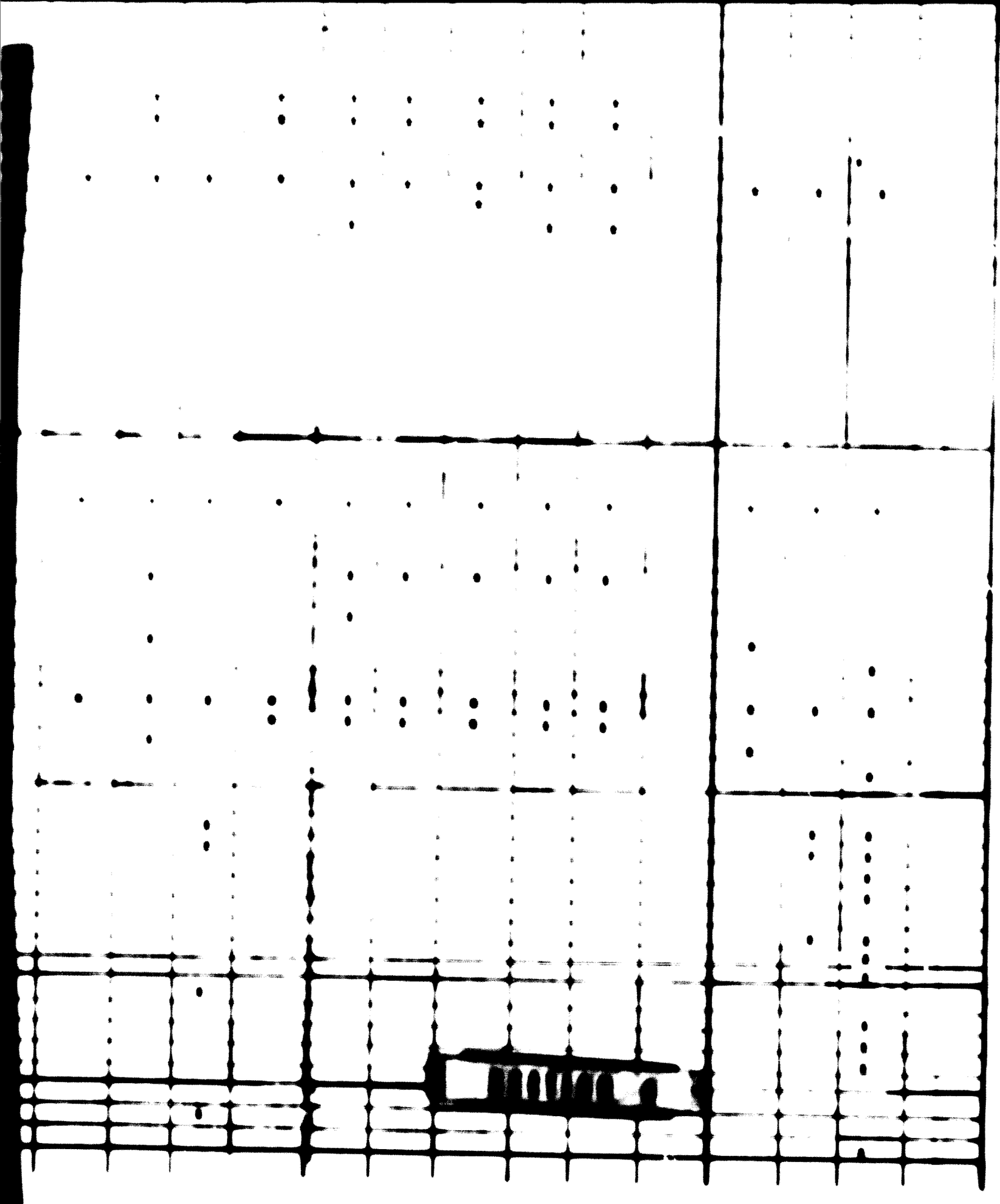
9. Royalties

10. Commissions
Sales
Purchasing

11. Other expenses

12. TOTAL (directly allocated costs)





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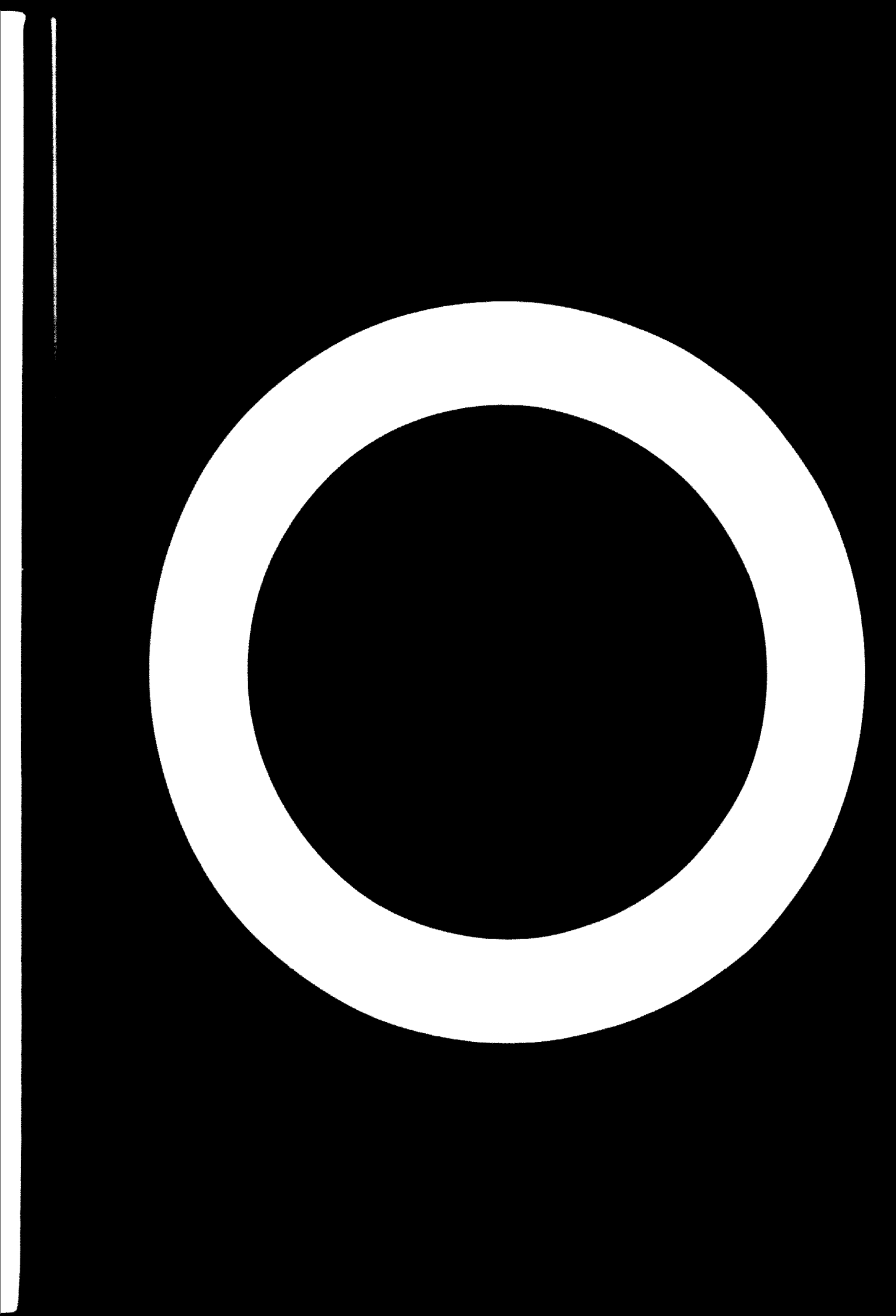
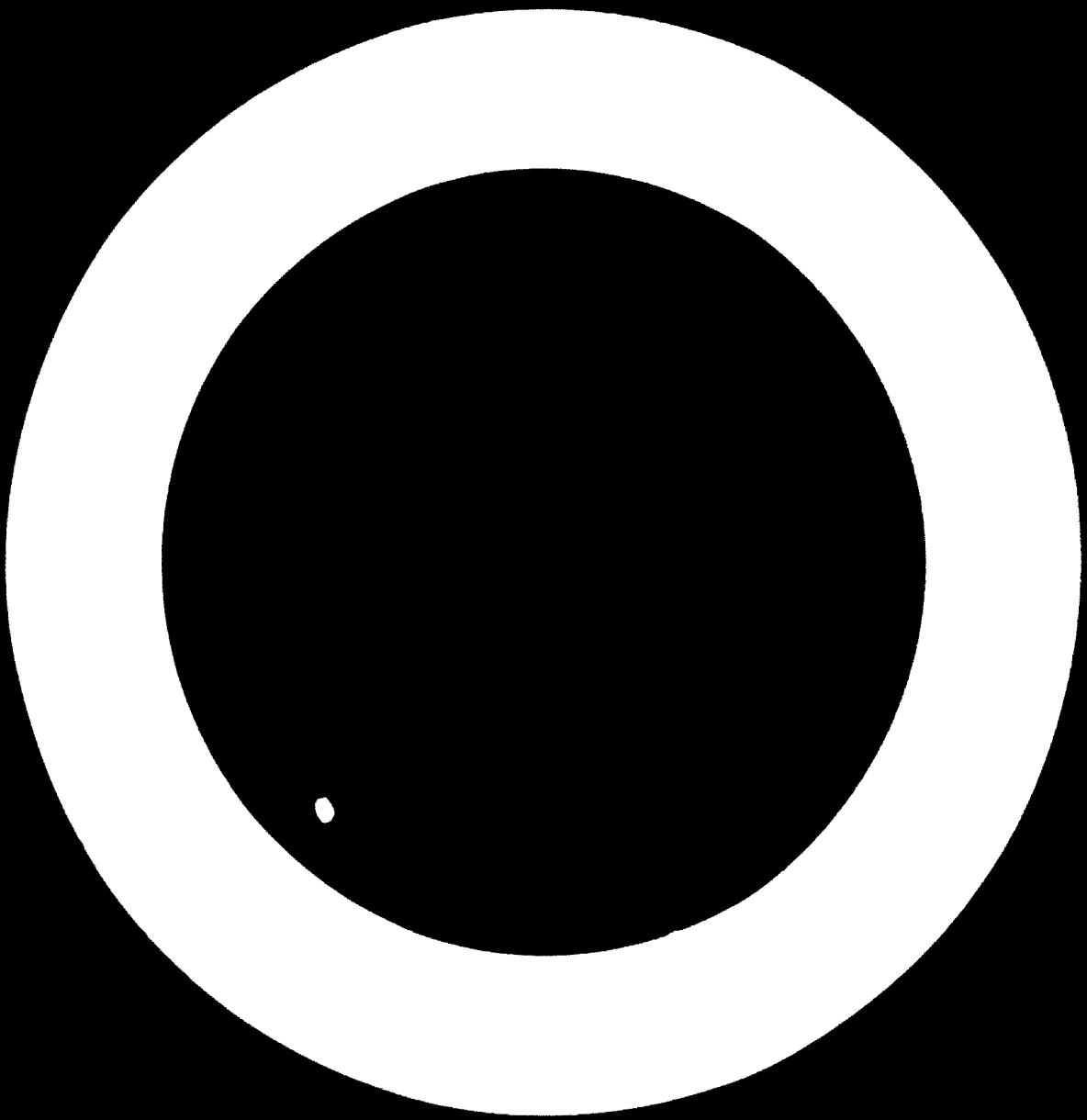


[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
[redacted]	---	■	■	■	■	■	■	■	■	■
[redacted]		---	■	■	■	■	■	■	■	■
[redacted]			---	■						
[redacted]				---	■					
[redacted]					---	■	■	■	■	■
[redacted]						---	■	■	■	■
[redacted]							---	■	■	■
[redacted]								---		
[redacted]									---	
[redacted]										---

Period from..... to.....

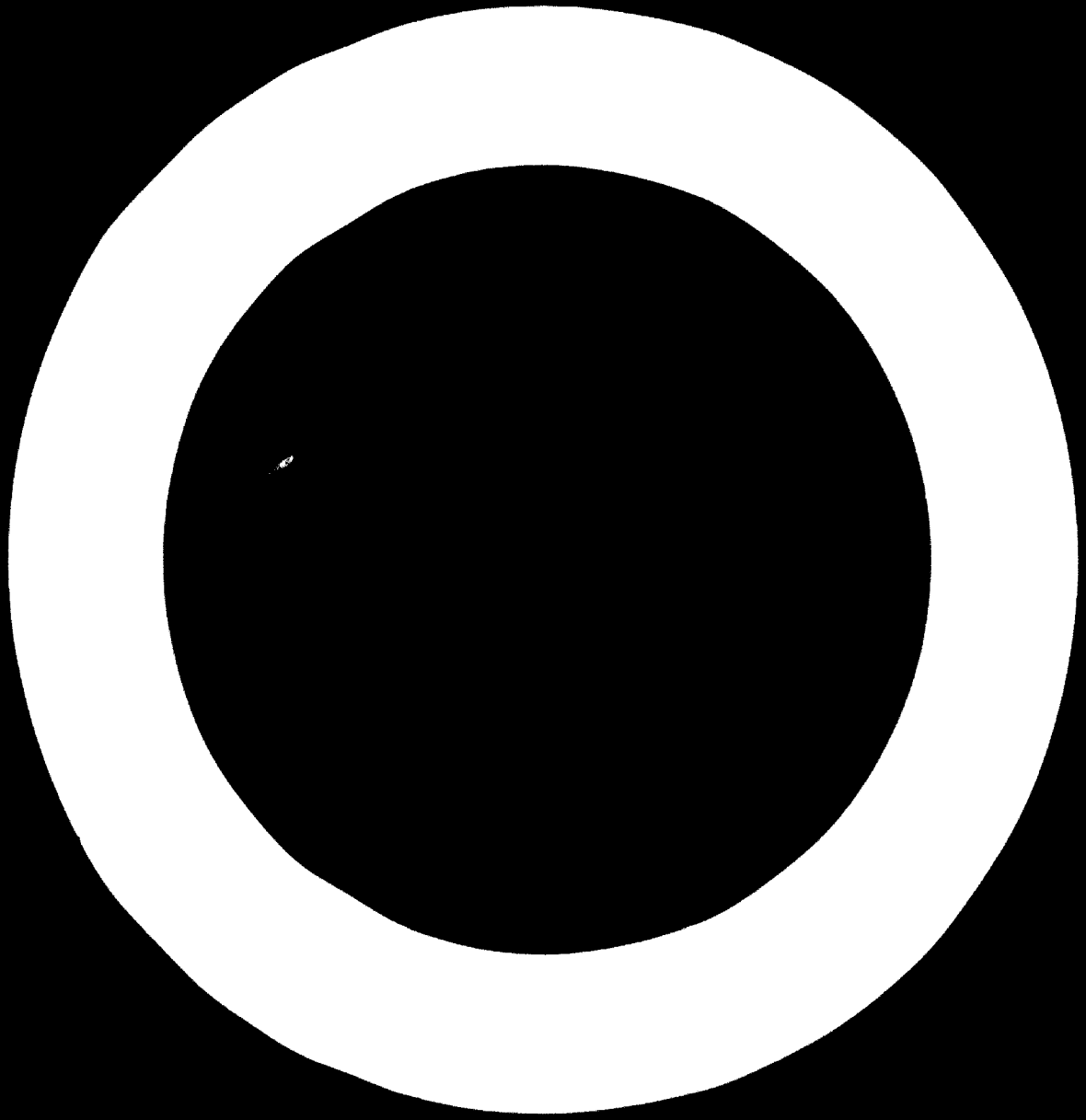
SERVICE COST CENTRES										PRODUCTION COST CENTRES										GENERAL OVERHEAD COST CENTRES			Distribution basis
Social services	Plant management	Off-site transport	Purchasing	Stores	Repair + maintenance	Electricity	Steam	Water supply	Laboratories (process control)	Delinting	Decorticating	Pressing	Solvent extraction	Bagging	Neutralising	Bleaching	Deodorising	Winterizing	Filling and packing	Warehouse + distribution	Selling and marketing	Administration+ finance	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(I)	(II)	(III)	
---	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	Number of employees
	---	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				Number of employees
		---	x																	x	x		Ton - kilometers
			---	x						x	x	x	x	x	x								Value of purchases
				---	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	Value of issued materials
					---	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	Maintan. man-hours
						---	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	MWh
							---					x	x		x			x					tons
								---					x		x	x	x	x					Quantity consumed
									---	x	x	x	x	x	x	x	x	x	x				Number of specimens examined



VIII. COST OF PRODUCTION

(see Part A.VII. Table 1, columns a-e and f-j and Table 2, columns a-j)

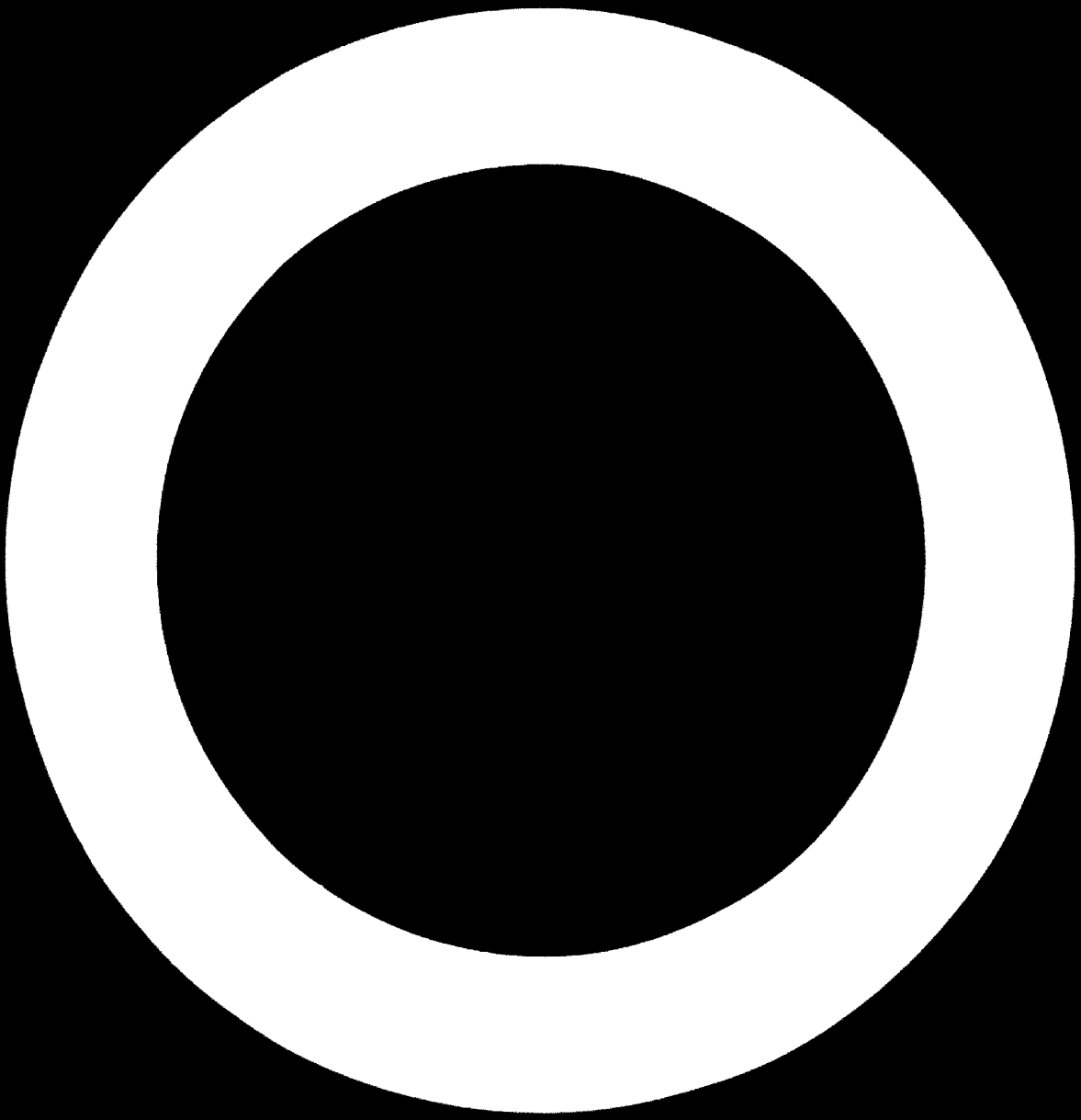
	Value in 000	
1. Delinting cost		+
2. Decorticating cost		+
3. Pressing cost		+
4. Solvent extraction cost		+
5. Bagging cost		+
6. Neutralising cost		+
7. Bleaching cost		+
8. Decdorising cost		+
9. Winterising cost		+
10. Filling and packing cost		+
11. Total production cost of oils (1+2+...10)		=
12. Add: inventories of finished goods at the beginning of the year		+
13. Subtotal (11 + 12)		=
14. Subtract: inventories of finished goods at the end of the year		-
15. Production cost of goods sold (13 - 14)		=



IX. SUMMARY PROFIT AND LOSS ACCOUNT

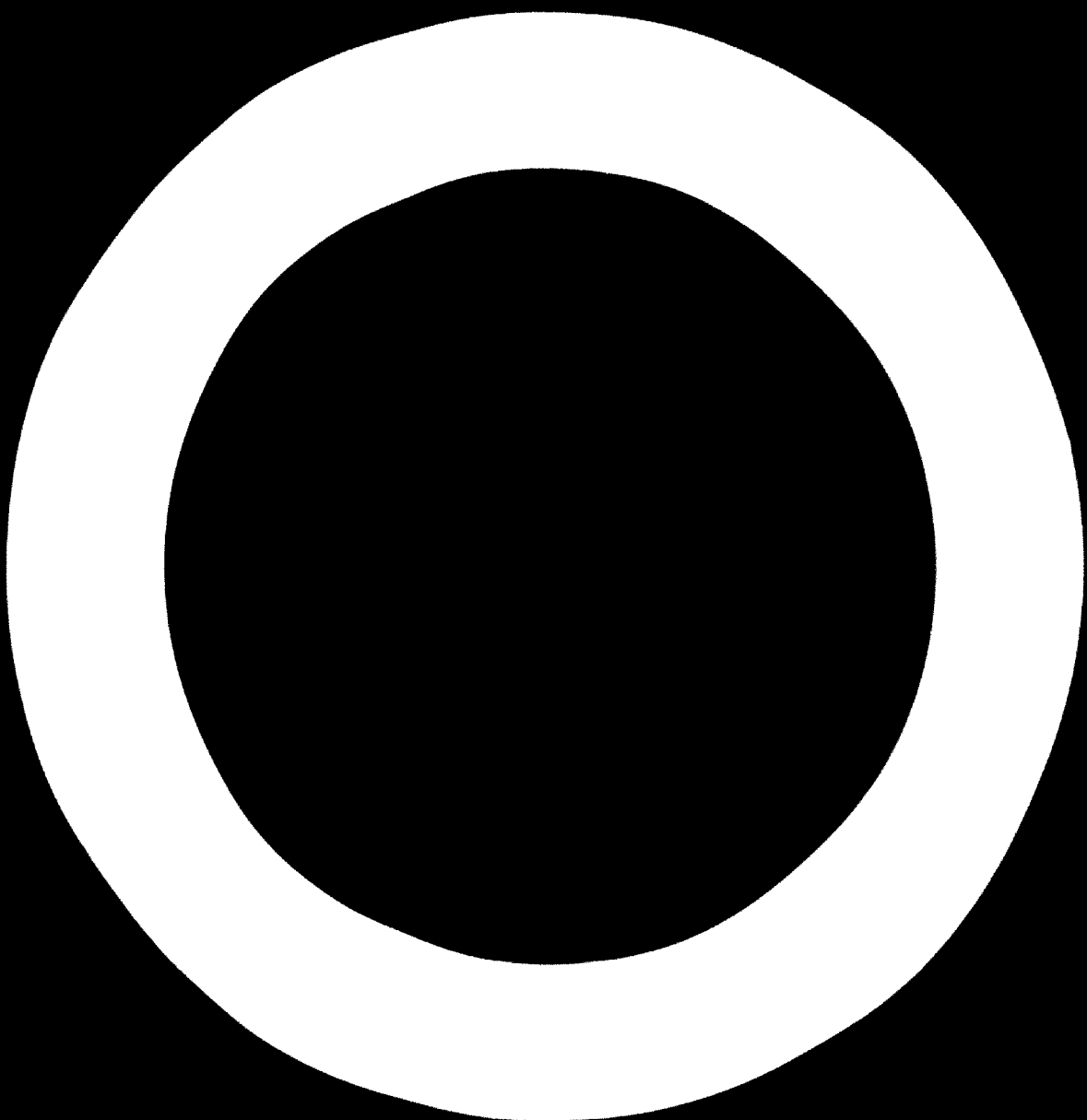
	Value in [illegible]	Value in [illegible]
1. Sales		
2. Subtract production cost of goods sold (see Part A.VIII.15.)		
3. Gross profit (1 - 2)		
4. Subtract warehousing and distribution cost		
5. Subtract selling and marketing cost		
6. Subtract administration and finance cost		
7. Subtotal (4+5+6)		
8. Trading profit (3 - 7)		
9. Subtract financial expenses		
10. Subtotal (8 - 9)		
11. Add non-trading income		
12. Net profit before taxes (10 + 11)		
13. Subtract taxes		
14. Net profit after taxes (12 + 13)		

NOTE: For 4., 5., 6.,: see Part A.VII. Table 1, columns I-III and Table 2, columns I-III



4. [illegible]

ASSETS	
1. Current Assets	
a) Material inventory	.
b) Work-in-progress	.
c) Finished goods stocks	.
d) Debtors	.
e) Others	.
2. Fixed Assets	
a) Land and Building	.
b) Machinery and equipment	.
c) Vehicles and other fixed assets	.
3. Non Trading Assets	.
4. Total Assets	.
SOURCES OF FINANCE	
1. Creditors	.
2. All other current liabilities	.
3. Long term debts	.
4. Net worth (i.e. owners' capital and reserves)	.
5. Total capital	.



[illegible]

[illegible]

[illegible]

	Product	[illegible]	[illegible]	[illegible]	Administrative and offices
[illegible]					
[illegible]					
[illegible]					

[illegible]

	First shift	Second shift	Third shift	
Primary operations				[illegible]
Auxiliary operations				[illegible]
Management and administration				[illegible]

[illegible]

1. [illegible] describe the external [illegible]

(a) excellent
(b) fair
(c) poor
(d) insignificant

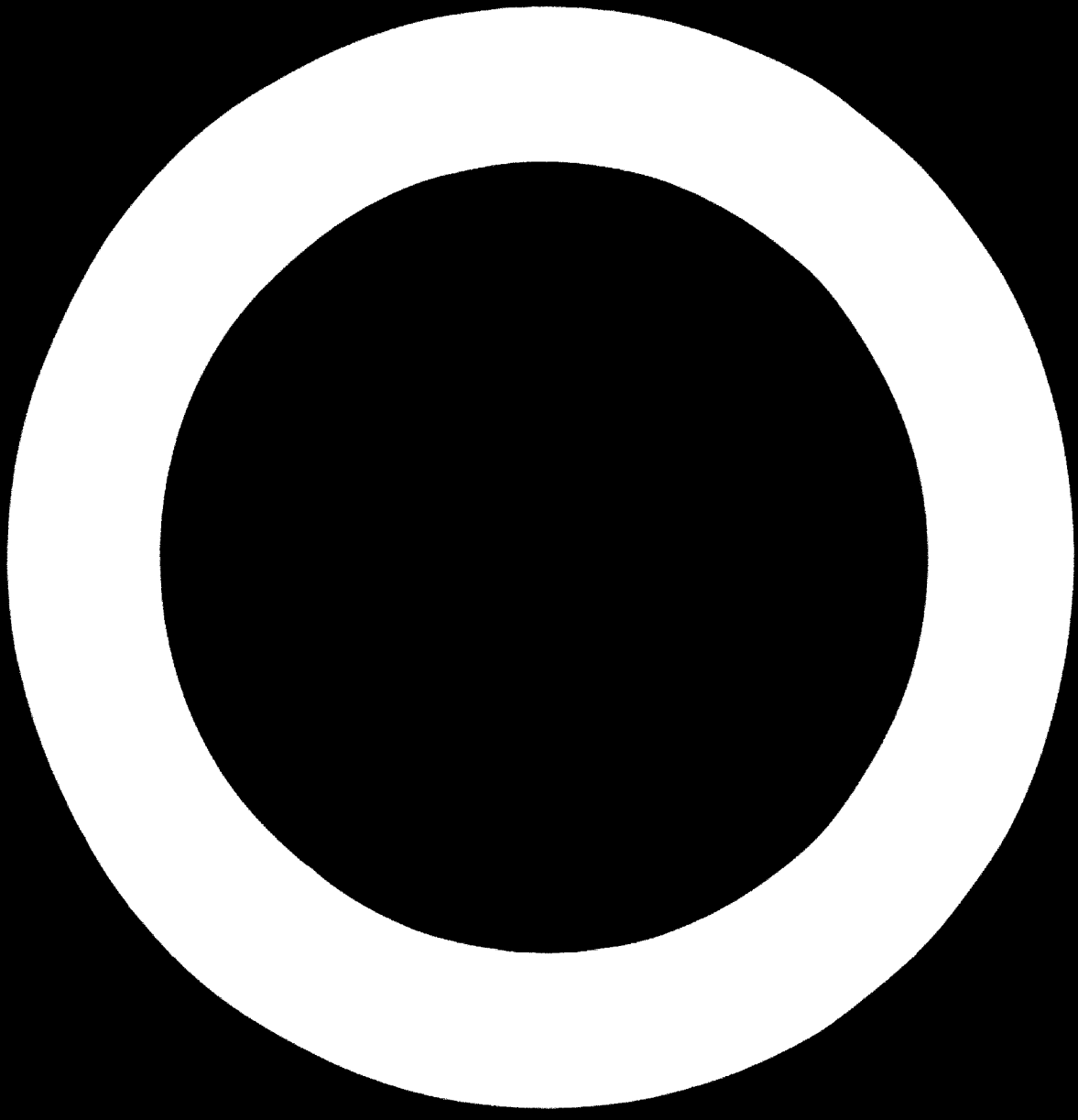
Transport		Public		Services	
External long distance	( )	Electricity	( )	Residents	( )
Internal long distance	( )	Water	( )	Health and recreation	( )
Local and city	( )	Gas	( )	Education	( )

2. If any of the above is rated "poor" describe the extent to which it adds to the enterprise's current operating costs: ______________________________

II. C. GOVERNMENTAL POLICIES:

1. Specific governmental policy measures, federal or local, particularly affecting the profitability of the enterprise: ______________________________

2. Desirable and reasonable policy measures which, if effected, would affect more favourably the viability of your enterprise and related activities: ______________________________



THE ALGEBRA OF THE SEARCH

This part of the questionnaire is prepared for the collection of basic data. Keeping in mind that it is required only if the following items are identified, one should delete, add or amend the items in this part of the questionnaire in order to prepare a separate picture of the plant. Management is encouraged to add any supplementary information which might further explain the technological characteristics of the plant.

The design of the questionnaire takes account of the fact that the production process breaking it down into unit entries and service unit entries. Also this part of the questionnaire is only dealing with technological data. It is expected that no difficulties will be encountered in obtaining the technical data as it might perhaps be the case with the economic data asked for in Part B.

For an appropriate evaluation and subsequent improvement of performance, the following aspects of the product and process have to be assessed and analysed:

a material flow

b energy consumption

c technology applied and equipment used

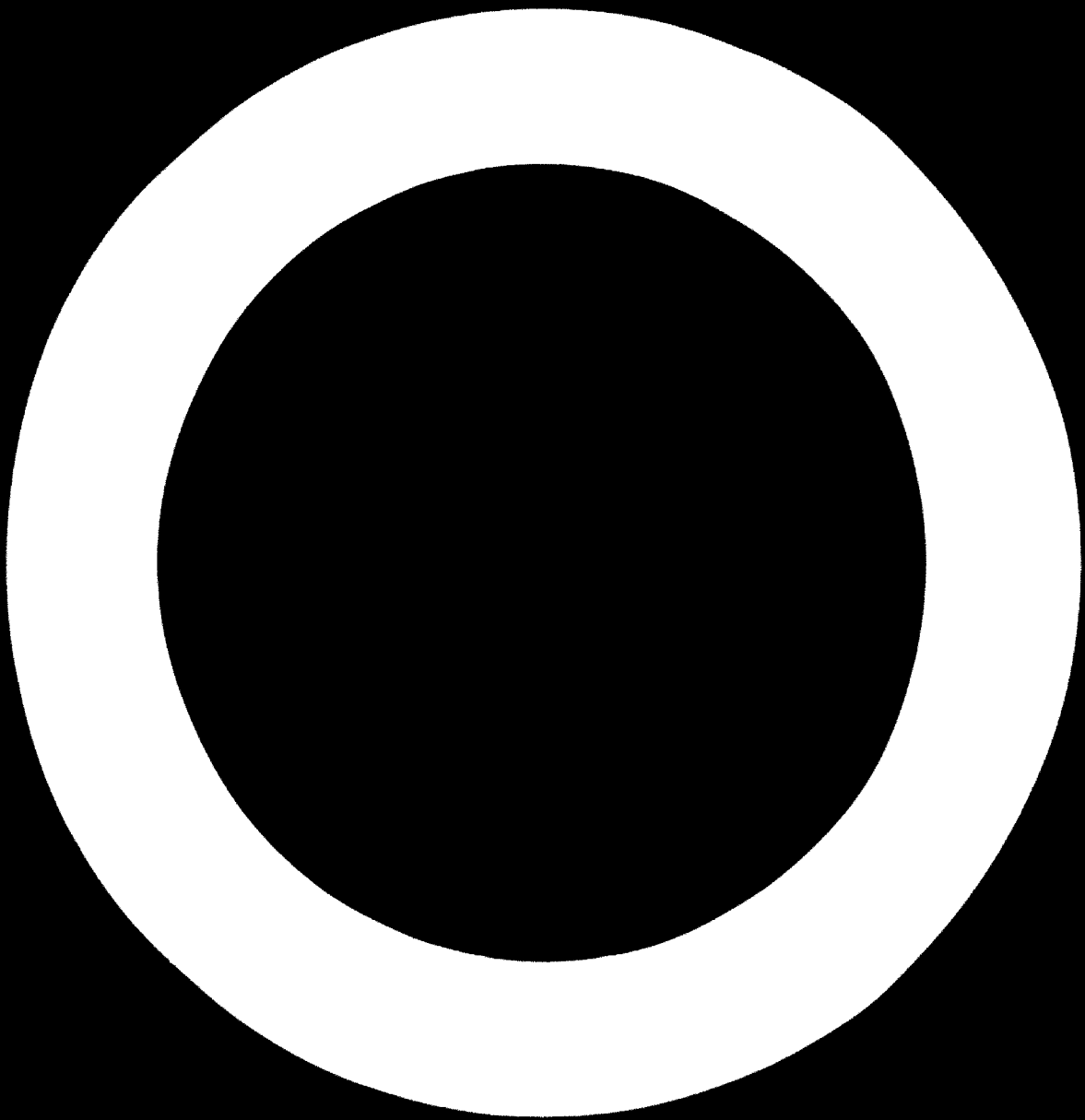
d) product and process control

e manpower requirements

f operating time

These six characteristics have to be presented in such a way that their interdependence becomes visible. For this purpose the essential data of the production process need to be summarized and presented in a suitable form. Experience has shown that a well prepared flow diagram is the most practicable way of supplying management with all the information necessary for the improvement of the technical and economic performance of the plant.

The vegetable oil industry is not uniform in its production process since a great variety of different oil-bearing raw materials has to be processed, having special characteristics and requiring individual treatment and care. In spite of this, efforts were made to give the questionnaire a form which is applicable for a great number of oilseeds including copra. Palm oil production and to some extent also olive processing are not covered by this questionnaire and will have to be dealt with separately.



[illegible]

Give here a general summary of the principles, material, output, number and capacities of machines available at each stage of production, power supply, state of supply or power generation, type of fuel, types of packaging, markets supplied, distance from plant. This general description is required to give only a first comprehensive impression of the plant under study.

GENERAL DESCRIPTION:

II. GENERAL INFORMATION

II.A. SITE OF THE FACTORY

1. Distance between the factory and raw material sources: -

2. Location of plant in relation to major consumption areas: -

3. Is the factory close to a main road? What is the distance between the factory and the nearest main highway?: -

4. Is the factory connected to a railway system?: -

5. Distance between the factory and water way: -

6. Distance between the factory and the nearest harbour: -

7. Distance between the factory and the main water supply sources: -

8. Source of power supply: -

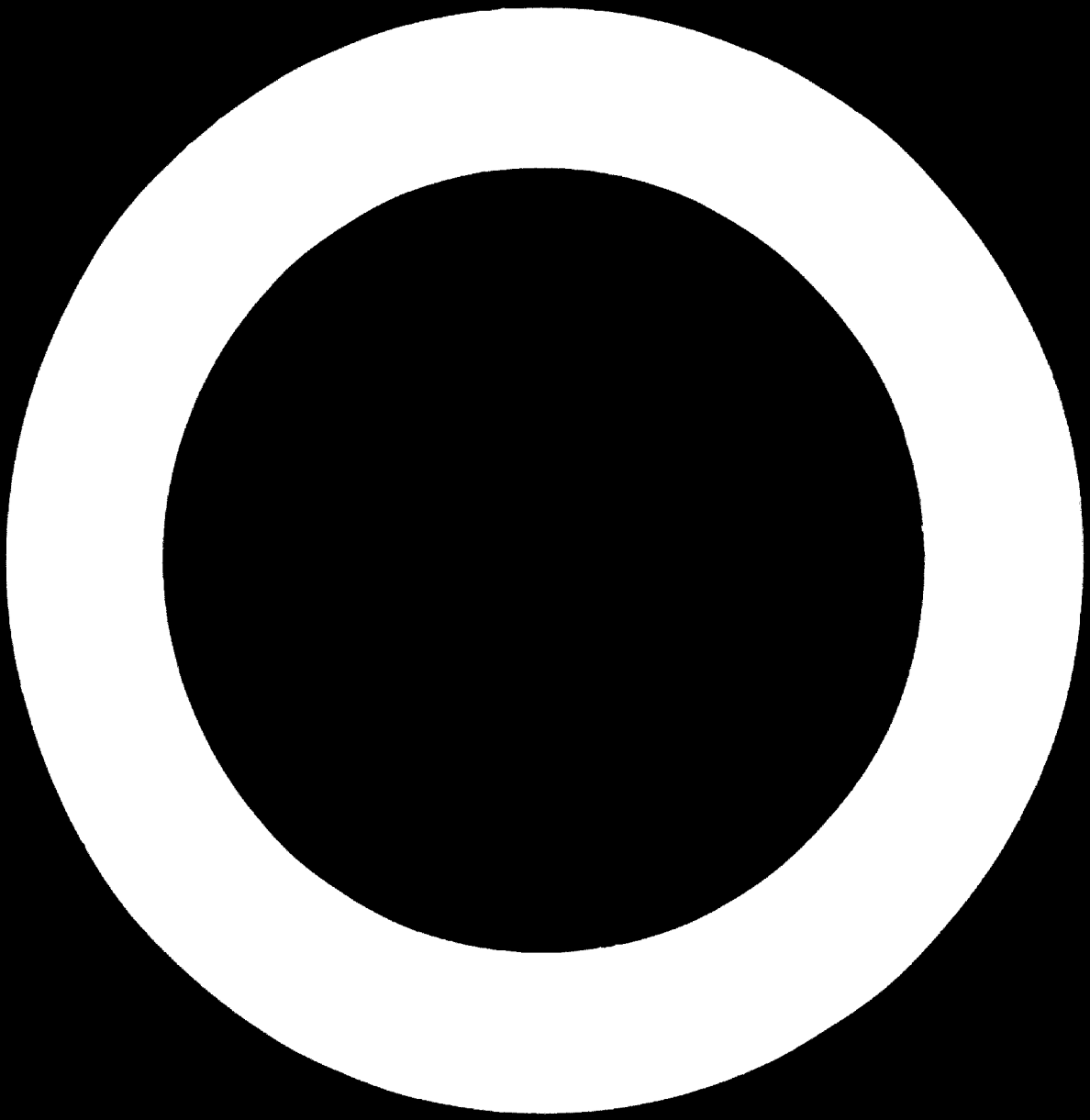
EXPLANATORY NOTES

The nominal capacity corresponds to the output which can be achieved under normal operating conditions. The nominal capacity is sometimes also referred to as the economic capacity since the costs of production reach their optimum. The technological capacity corresponds to the maximum physical output as e.g. guaranteed by the produces of equipment. Production at the technological capacity level is frequently not the most profitable one, since it can only be reached at very high costs. Disturbances in the supply of raw materials or fluctuations of the labor force normally prevent management from reaching the technological capacity.

Nominal capacity output may not be exactly identifiable for all individual products especially when the product-mix of the basic production processes is flexible. For the latter case, indicate approximate capacity output levels achievable with the same pattern of product-mix as the actual.

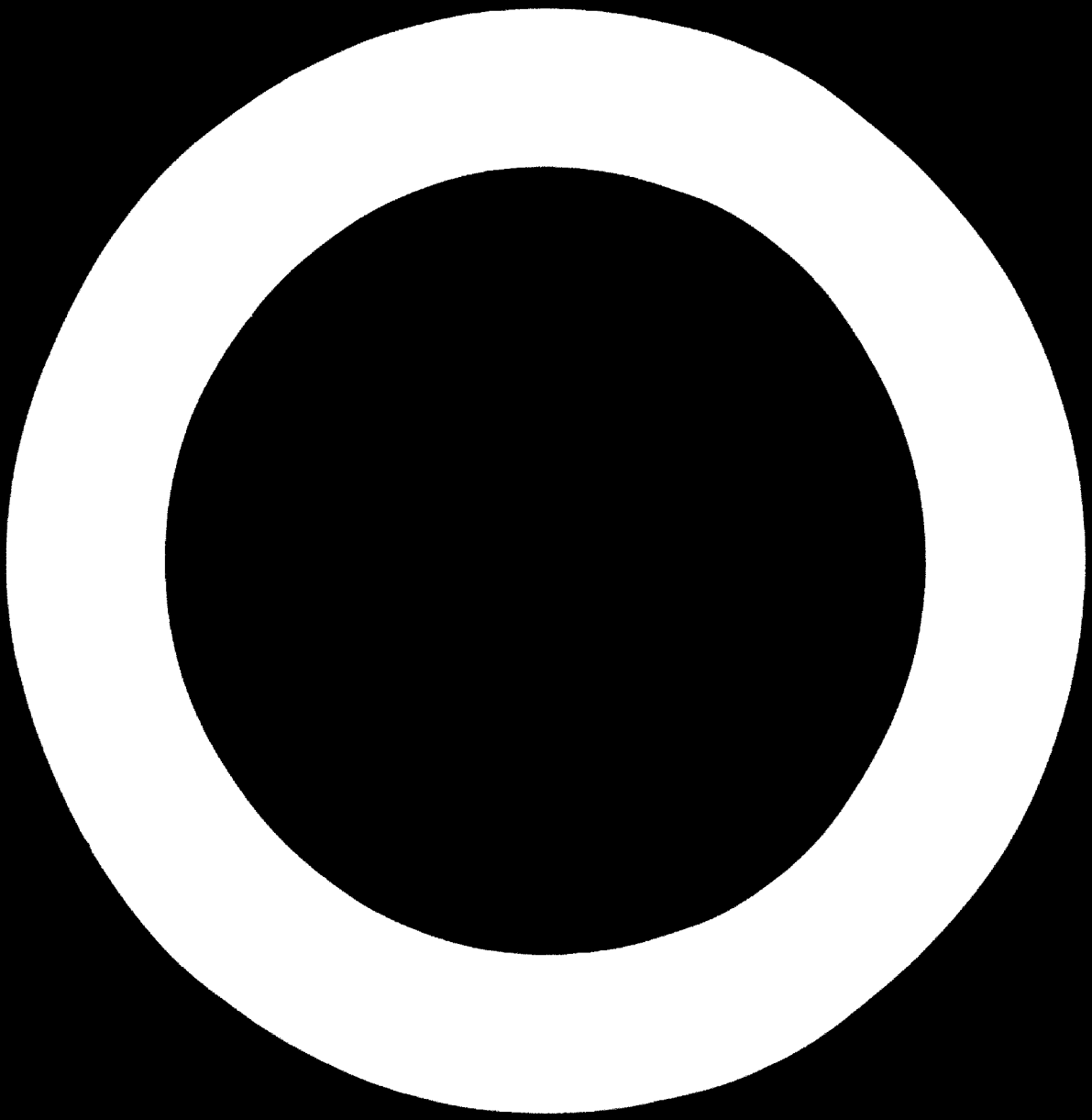
III. NOMINAL CAPACITY AND PRODUCTION (see Part A, II.A. and VII.A.)

Products	Nominal capacity and production in tons (000) for the past 3 years								
	19..			19..			19..		
	Nominal capacity	Production	Capacity utilization: %	Nominal capacity	Production	Capacity utilization: %	Nominal capacity	Production	Capacity utilization: %
Crude oil									
Oilcakes									
Extracted meal									
Refined oils									
Hydrogenated oils									
Others									
Linters									
Shells									
Soapstock									
Oxygen									
Others									



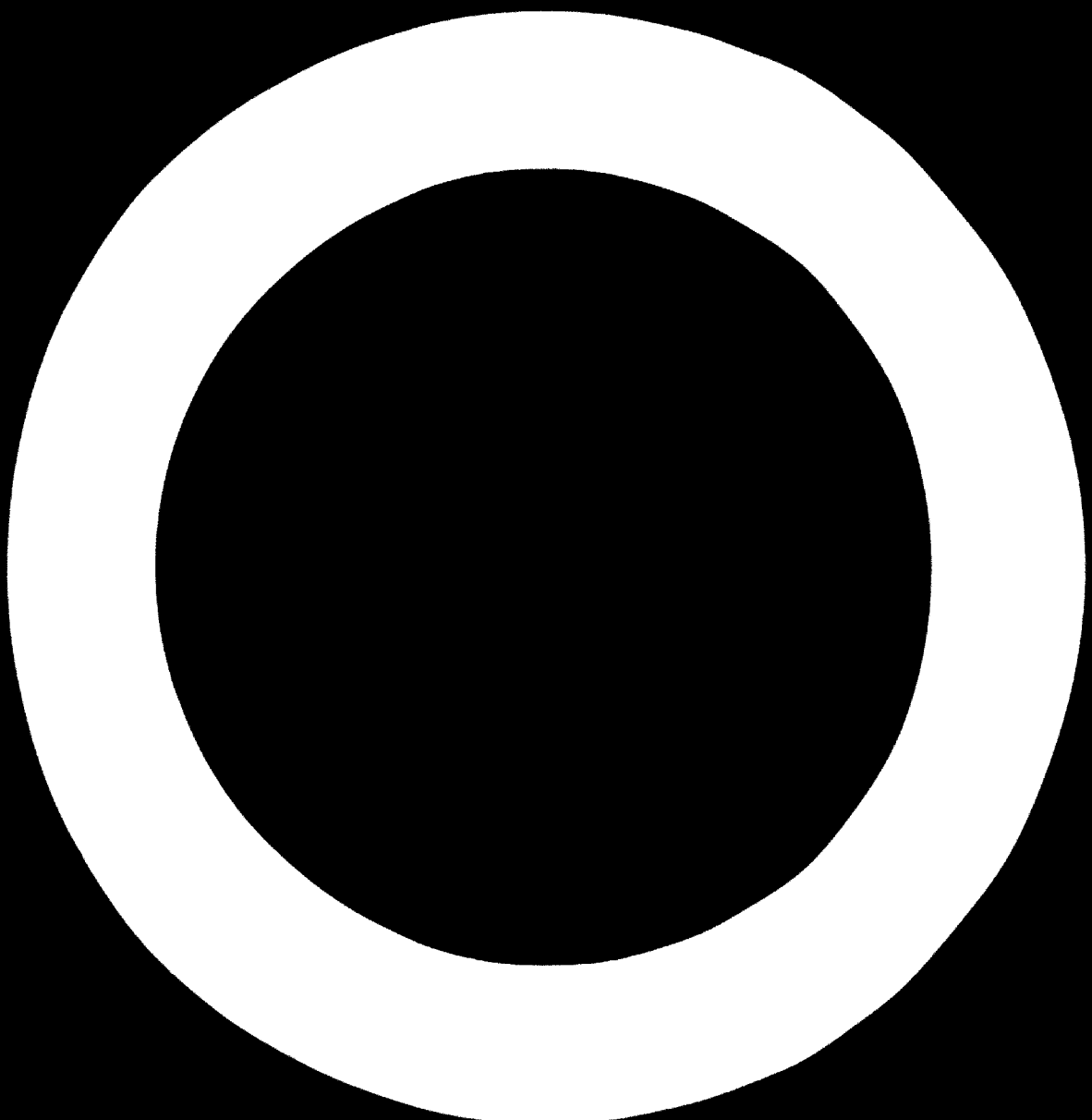
IV. AVERAGE RESULTS OF THE CHEMICAL ANALYSIS AND PHYSICAL TESTS OF MATERIAL INPUTS

SPECIFICATIONS	A) Oilseeds (type)			B) Delinted seed (Cottonseed)			C) Decorticated seed		
	Supplied by:			Own production	Supplied by:		Own production	Supplied by:	
1. CHEMICAL ANALYSIS									
Oil content (%)	x	x	x				x	x	x
Linters (%)	x	x	x						
Residual linters (%)				x	x	x			
Shells (%)	x	x	x						
Residual shells (%)							x	x	x
Oil content in shells (%)									
Protein content (%)	x	x	x				x	x	x
Solid impurities (%)									
FFA (free fatty acids)(%)									
Colour (LOVIBOND)									
Odour									
Melting point									
Humidity (%)	x	x	x	x	x	x	x	x	x
2. PHYSICAL CHARACTERISTICS									
Impurities (stone, etc.)	x	x	x						
Ripeness	x	x	x						
Fresh harvests	x	x	x						



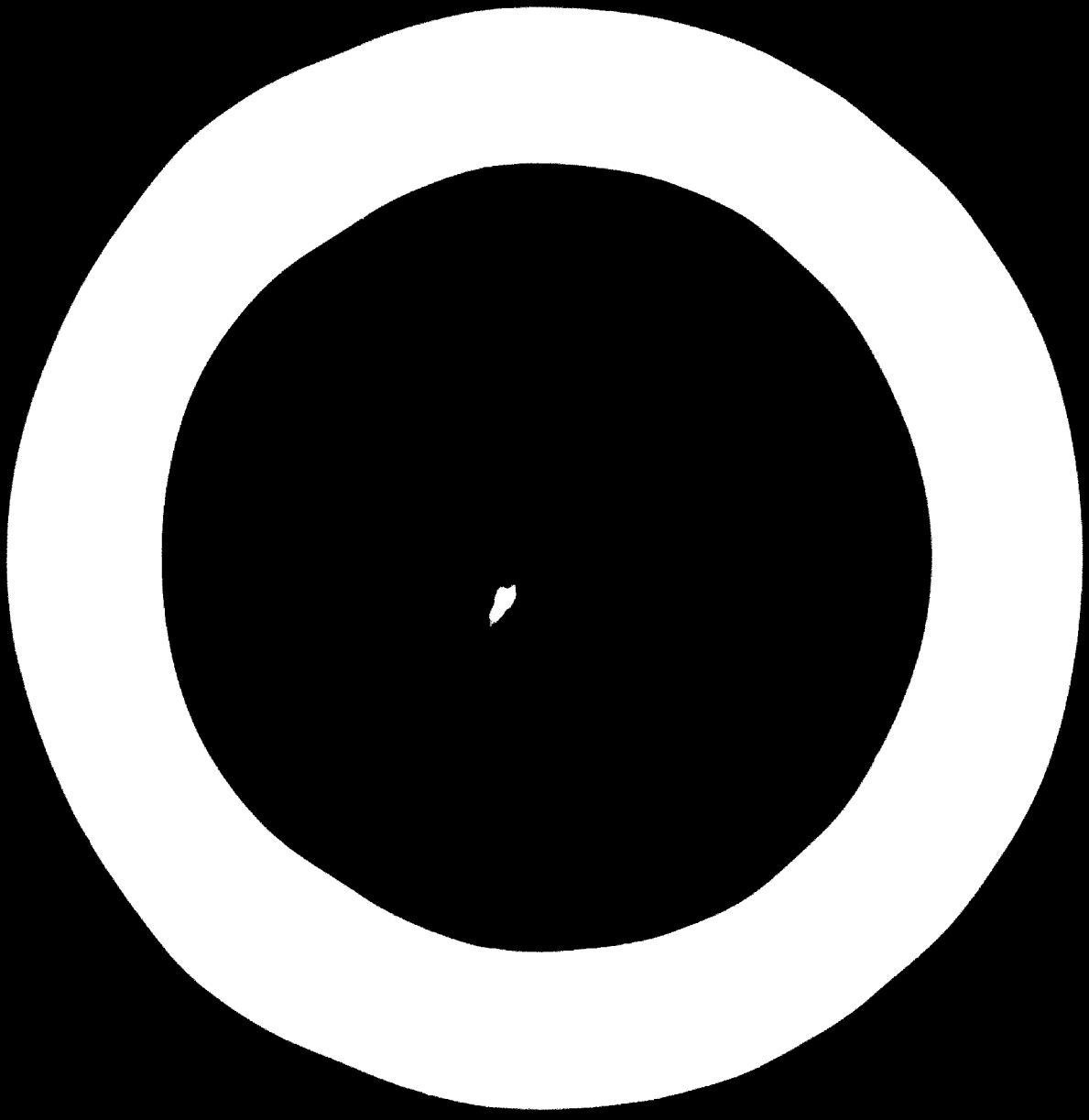
IV. AVERAGE RESULTS OF THE CHEMICAL ANALYSIS AND PHYSICAL TESTS F MATERIAL INPUTS ontinued

SPECIFICATIONS	D Crude il			E akes			F Neutralized il		
	wn production	Supplied by:		wn production	Supplied by:		wn production	Supplied by:	
1. CHEMICAL ANALYSIS									
Oil content (%)			x						
Linters (%)									
Residual linters (%)									
Shells (%)									
Residual shells (%)									
Oil content in shells (%)									
Protein content (%)	x	x							
Solid impurities (%)	x	x	x				x	x	x
FFA (free fatty acids) (%)							x	x	x
Colour (LOVIBOND)									
Odour									
Melting point									
Humidity (%)	x	x							
2. PHYSICAL CHARACTERISTICS									
Impurities (stone, ect.)				x	x	x			
Ripeness									
Fresh harvests									



IV. AVERAGE RESULTS OF THE CHEMICAL ANALYSIS AND PHYSICAL TESTS OF MATERIAL IMPORTED (continued)

SPECIFICATIONS	3) Bleached oil			4) Deodorized oil		
	Own production	Supplied by:		Own production	Supplied by:	
1. CHEMICAL ANALYSIS						
Oil content (%)						
Linters (%)						
Residual linters (%)						
Shells (%)						
Residual shells (%)						
Oil content in shells (%)						
Protein content (%)						
Solid impurities (%)						
FFA (free fatty acids)(%	x	x	x	x	x	x
Colour (LOVIBOND)	x	x	x	x	x	x
Odour				x	x	x
Melting point						
Humidity (%)						
2. PHYSICAL CHARACTERISTICS						
Impurities (stone, etc.)						
Ripeness						
Fresh harvests						



V. AVERAGE RESULTS OF THE CHEMICAL ANALYSIS AND PHYSICAL TESTS OF FINAL PRODUCTS

SPECIFICATIONS	A) Winterized oil			B) Hydrogenated oil fat			C) Extracted meal		
	Own production	Supplied by:		Own production	Supplied by:		Own production	Supplied by:	
1. CHEMICAL ANALYSIS									
Oil content (%)							x	x	x
Linters (%)									
Residual linters (%)									
Shells (%)									
Residual shells (%)									
Oil content in shells (%)									
Protein content (%)							x	x	x
Solid impurities (%)									
FFA (free fatty acids)(%)	x	x	x	x	x	x			
Colour (LOVIBOND)	x	x	x						
Odour	x	x	x						
Melting point				x	x	x			
Humidity (%)							x	x	x
2. PHYSICAL CHARACTERISTICS									
Impurities (stone, etc.)									
Ripeness									
Fresh harvests									

EXPLANATORY NOTES

For the analysis of the technical performance of the establishment it is suggested to divide it into the following production departments (cost centres):

a) Cottonseed delinting
b) Cottonseed decorticating
c) Pressing
d) Solvent extraction and bagging
e) Neutralisation
f) Bleaching
g) Deodorisation
h) Winterisation

These production cost centres will be analysed in Part B.VII.A. H.
It is suggested to utilise flow diagrams which consist of two parts:

- Part 1 - deals with the material flow, energy supply and product and process control and will be referred to as "Product Flow Diagram";

- Part 2 - deals with the production technology and equipment, manpower requirements and operating time and will be referred to as "Process Flow Diagram".

In both diagrams, appropriate space is provided for management to put in the requested data. It is advisable not only to provide quantities (kg or tons) of the relevant materials but to express them also in relative terms. In case the space available in the diagram is not sufficient additional explanations should be given on a separate sheet.

- Part 1 - "Product Flow Diagram"

a) The symbol ▽ characterises material, energy and water inputs
b) The symbol ▽ characterises an intermediate product destined for further processing or utilisation
c) The symbol ◇ characterises an end product
d) The symbol ▭ characterises a process
e) Dotted lines show a process or product which is not necessarily applicable but may be applied under certain circumstances
f) The remarks made under "laboratory test" (lab. test) always refer to essential tests of a particular product to be carried out in the laboratory, if available.

- Part 2 - "Process Flow Diagram"

a) The diagram is divided into vertical units which correspond to the installed equipment. The technical data of each equipment item are to be listed here.
b) Horizontally the diagram follows the production process.
c) The equipment is symbolised by its typical characteristics in order to obtain an easy overall view.
d) The manpower requirements are dealt with in such a way that each unit of equipment corresponds to one working place. A line should be drawn for each production worker per unit (one line = one worker, 2 lines = 2 workers, etc.).

VI. [illegible]

Draw the Process Flow Diagram (Flow Sheet) of the factory taking into consideration the flow of materials from "Raw status" to "Final products". Mention the relevant capacities of the production and sorting equipment of each section. The following Process Flow Diagram should be considered only as an example, leaving it up to the management of the establishment to design the Process Flow Diagram according to the existing organizational arrangement.

[illegible]:

A. [illegible]

transport
seed storage
delinting
lint storage
baling
lint bale storage
delinted seed storage

B. [illegible]

transport
seed storage
decorticator
hull storage
seed storage

C. [illegible]

transport
seed storage
crushing
conditioning
pressing
cake storage
oil clarifying
oil storage

D. [illegible]

transport
cake storage
preparation
extraction
solvent storage (hot solvent and fresh solvent)
meal desolventizing (desolventizer, condenser, meal cooling, meal storage and bagging)
miscella distillation (distillation, condenser, solvent water separator)

EXPLANATORY NOTES

"Process Flow Diagram" (continued)

e) The total number of production and non-production workers employed is shown in a sub-table which also takes account of the number of shifts per production worker.

f) The operating time is measured in hours day, days month and months/year. A line should be drawn accordingly.

If properly filled in it will easily be possible to utilise the Process Flow Diagram for the evaluation of both the technical production process and the equipment used.

Transport

The relationship between means of transport, distance and time needs to be analysed thoroughly, i.e. the greater the distance, the more rapid the means of transportation.

Storage

The existing storage volume should be utilised fully. If the storage volume is, for example, 100 m³ and the existing quantity to be stored is only 50 tons (if the specific weight were 0.8 kg/m³, the volume would be 62.5m³), then the storage volume is much too large and unjustified costs occur. A too small storage volume will force the plant's buying department to venture into unfavourable purchases in order to avoid a production stop.

Nominal capacity

The nominal capacity of an item of equipment is the designed capacity (manufacturer's guarantee). If the actual capacity were far below the nominal capacity, it could be due to the lack of spare parts, incorrect adjustment, lack of energy, bad attendance, etc. It may also be that the actual capacity exceeds the nominal capacity, which would indicate a high efficiency of the relevant production unit.

The capacity of each equipment item utilised in one individual production process, such as pressing, solvent extraction, etc., has to be compared with the capacity of the succeeding item of equipment in order to identify bottlenecks.

Manpower requirements

Each work place should be described sufficiently and the operator's responsibilities determined. This will provide the basis for training programmes for improving the worker's professional qualifications.

Operating time

The operating time of a plant has a large impact on its techno-economic performance. A continuous plant should run on three shifts (24 hours a day) and should be stopped only for cleaning and maintenance purposes. A batch-type plant should also follow this principle.

After the Process Flow Diagram has been completed for each cost centre, the utilised technology and equipment, the manpower requirements and the utilisation of the installed capacity should be evaluated.

VI. [redacted] (continued)

E. [redacted]

transport
oil storage
cooling
neutralization

F. [redacted]

drying
blending
filtration
buffer

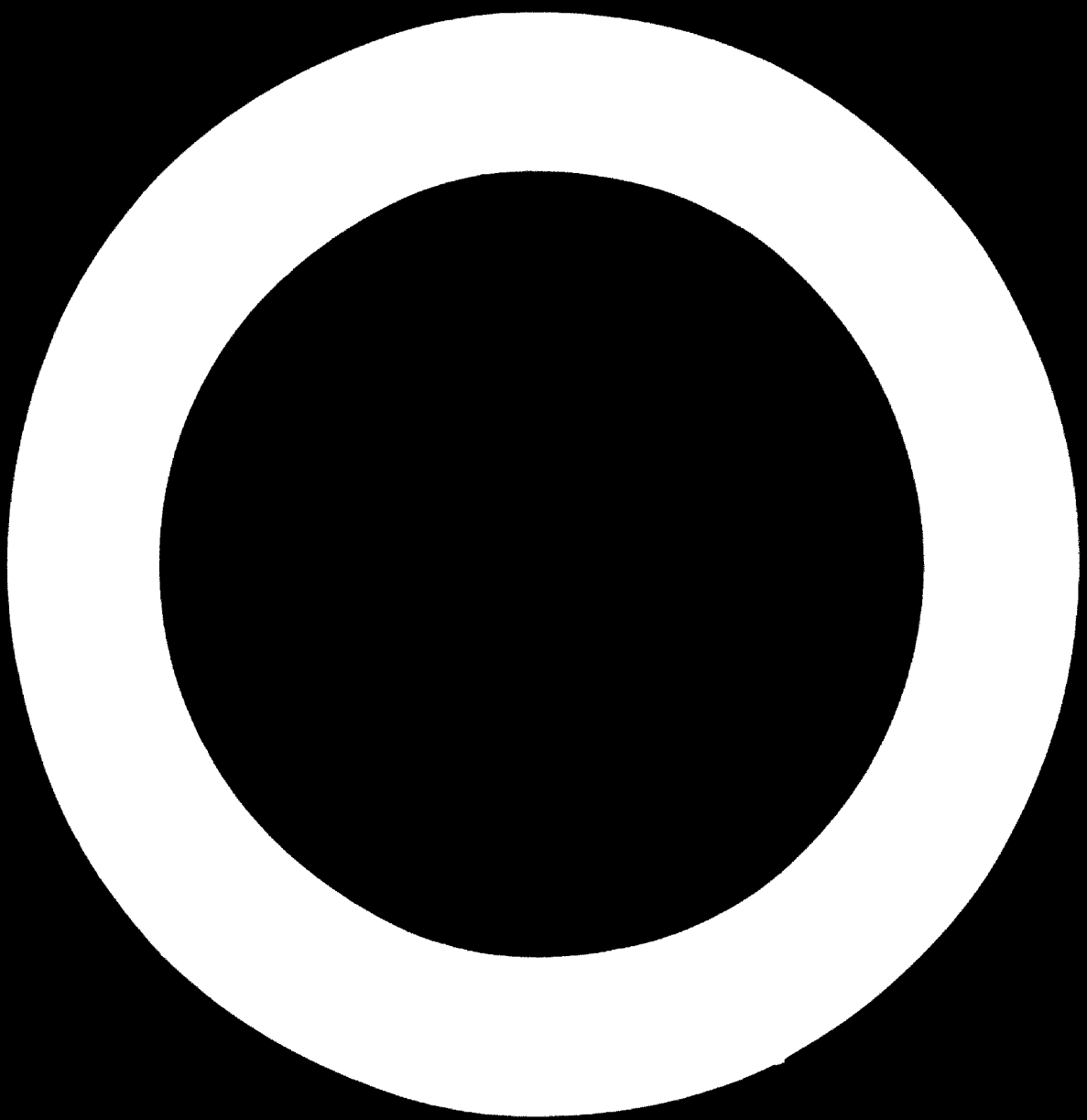
G. [redacted]

conservation
buffer tank

H. [redacted]

aggregation
cooling
filtration

I. [redacted]



VII. PRODUCTION DEPARTMENTS (COST CENTRES)

VII.A. COTTONSEED DELINTING DEPARTMENT

The following questions should be answered on the Product Flow Diagram (see next page):

a) Quantity (kg) of cottonseed processed;

b) Quantity (kg) of linted bales produced;

c) Quantity (kg) of delinted seed produced;

d) Electrical energy (kWh) consumed by the delinting process.

Seeds may be cut twice. First cut linters can be sold at a higher price. If only one cut is made the dotted lines for the second cut should be disregarded in the Product Flow Diagram.

The following laboratory tests are required:

a) % of linters contained in the cottonseed;

b) % of residual linters contained in delinted seed;

c) Residual linters should also be expressed as a percentage of pre-delinted seed if two cuts are made.

At least each new delivery of raw materials should be tested. It would, however, be desirable if tests could be carried out weekly or daily. In this case, average values should be listed in the Flow Diagram. The residual linter content of delinted seed should be determined daily in order to facilitate production process control.

The Product Flow Diagram lends itself to calculating the production loss (in actual quantities and/or percentages) by adding the product (delinted seed) and the by-product (lint bales) and deducting the sum from the raw material input (cottonseed).

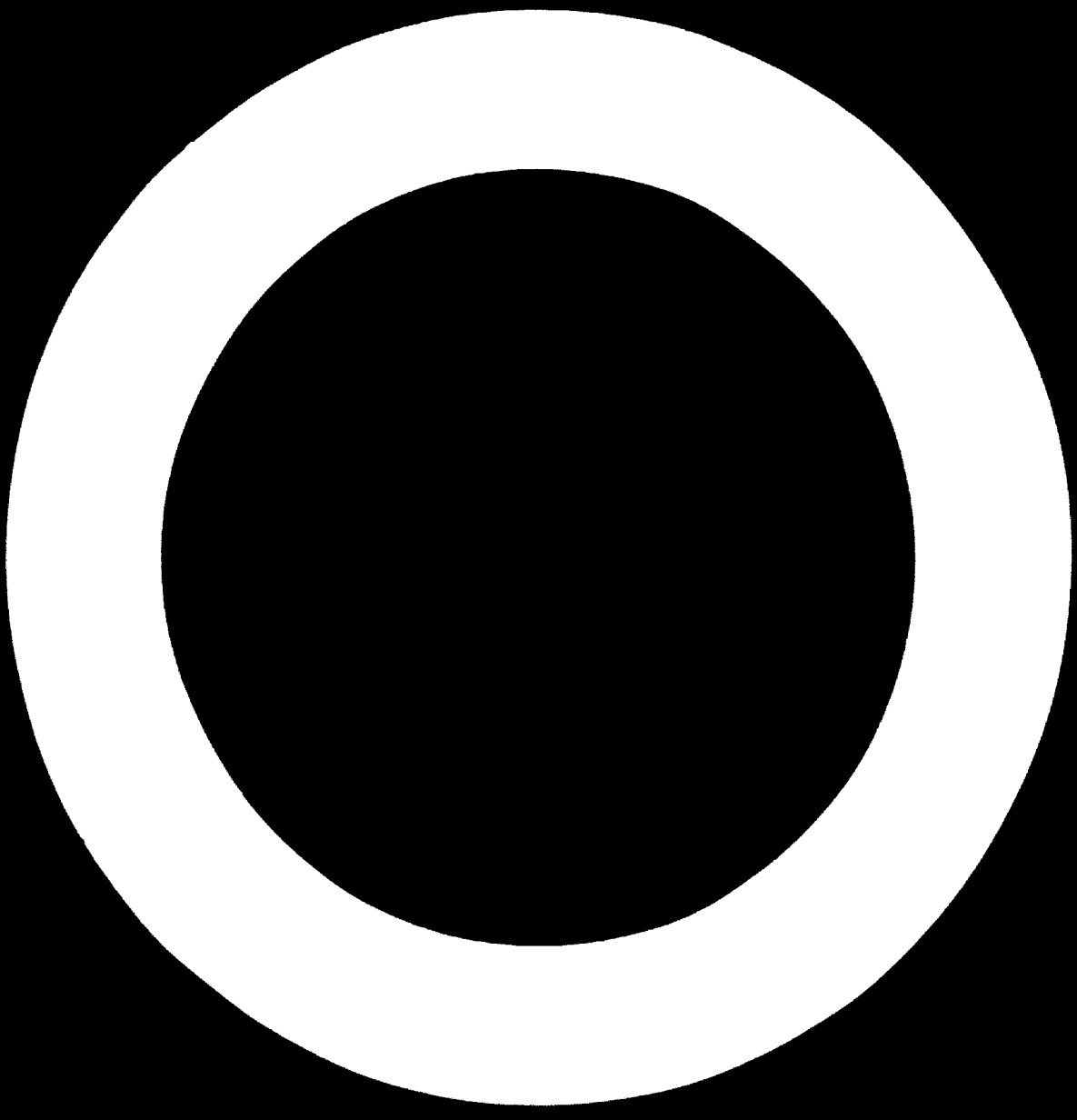
The loss of linters can also be calculated with the help of the data given in the Product Flow Diagram. The weight of linter bales produced plus the weight of residual linters obtained from the delinted seed (see laboratory test), plus the production loss is equal to the total weight of linters obtained from the raw seed (see laboratory test). It may, however, happen that the production loss becomes zero. This particular case would prove that a considerable part of the cottonseed has been damaged or broken and that the linters produced will contain an unreasonably high amount of cottonseed hulls or even meats. The readjustment of the delinting equipment would be the consequence.

Evaluation: after the Product Flow Diagram has been completed and evaluated, state:

a) total production loss: .....kg = ...%

b) production loss of linters: .....kg = ...%

c) consumption of electrical energy per ton of cottonseed processed: .....kWh/ton

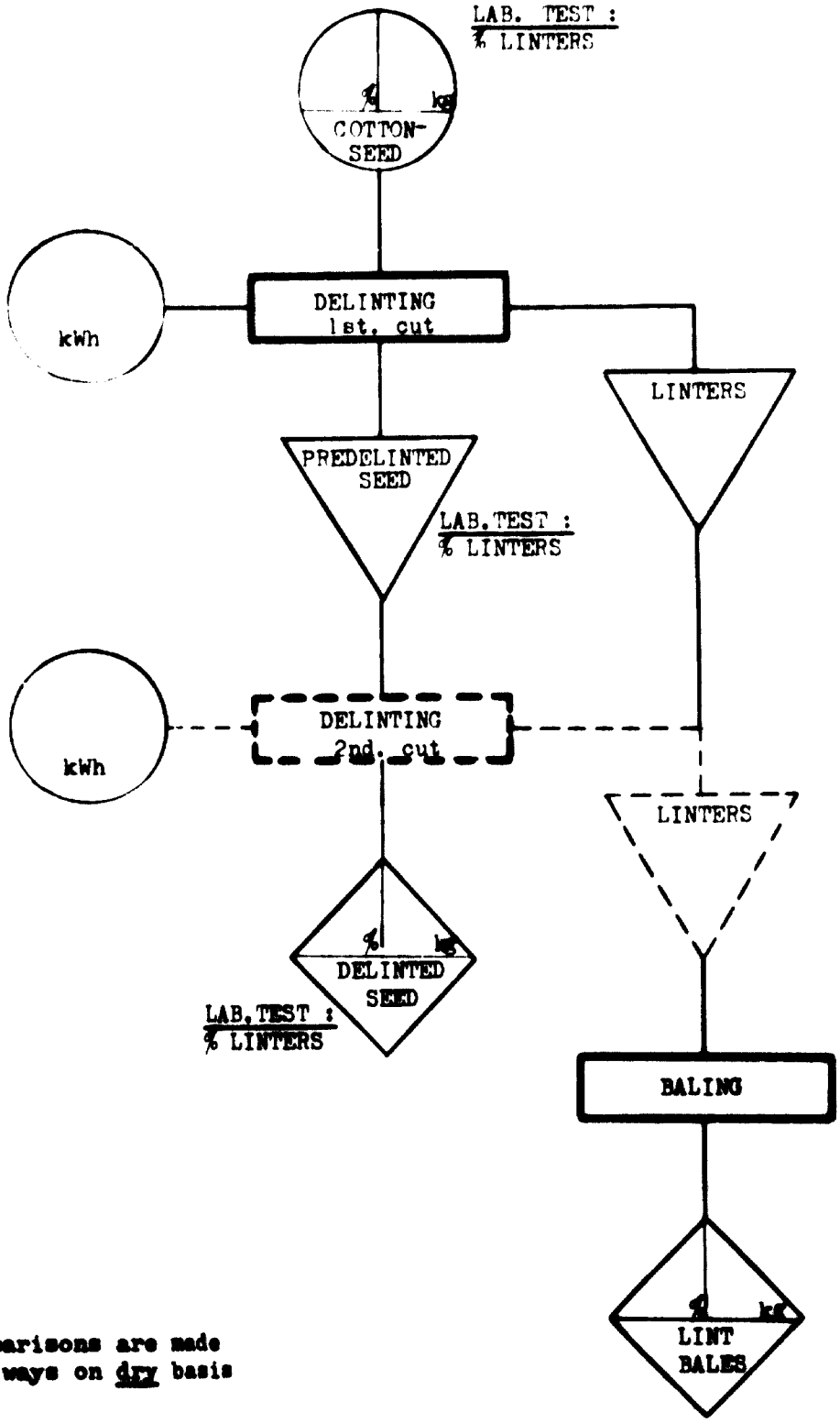


TIME PERIOD

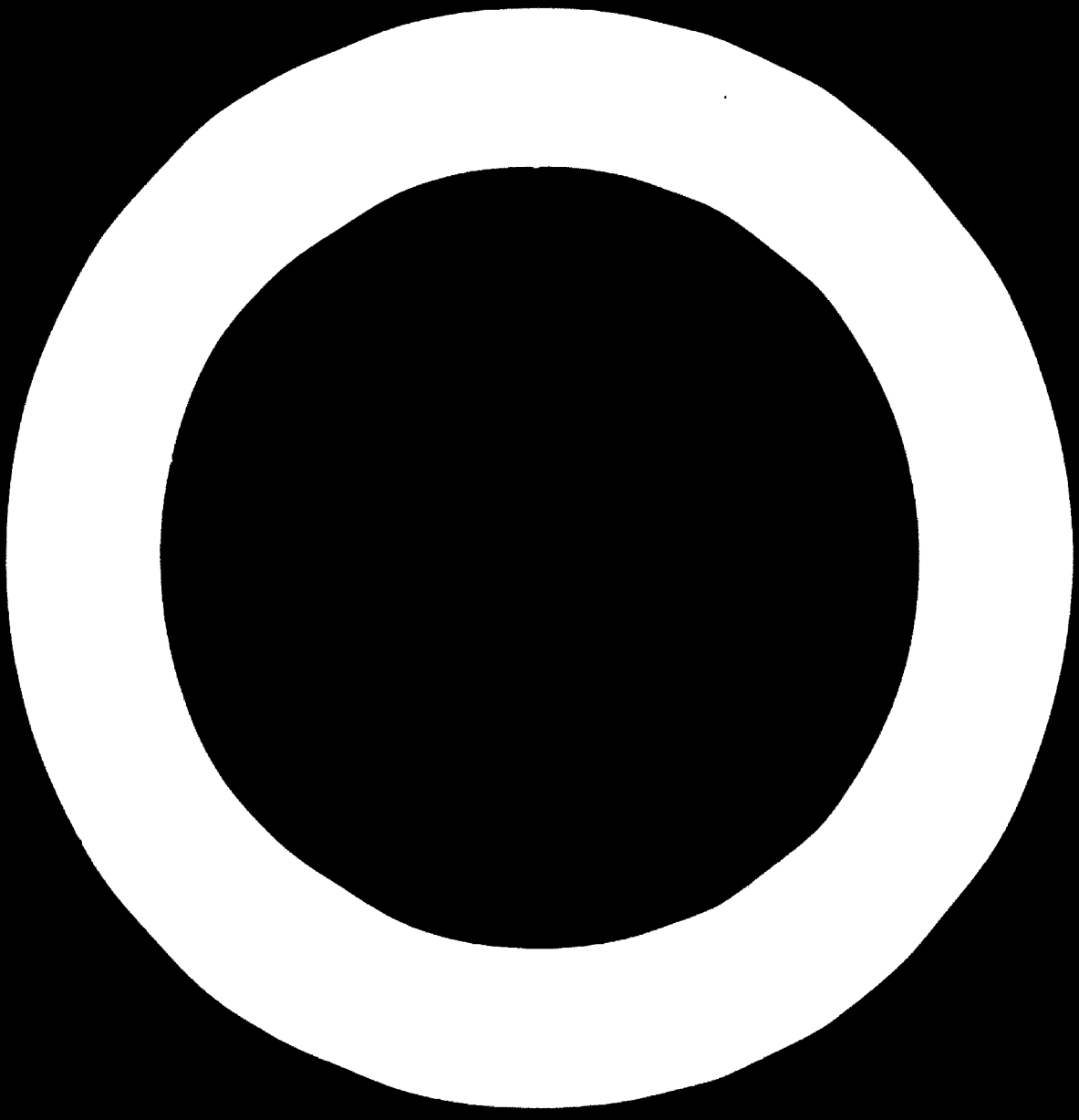
FROM ..... TO .....

VII.A. DELINTING

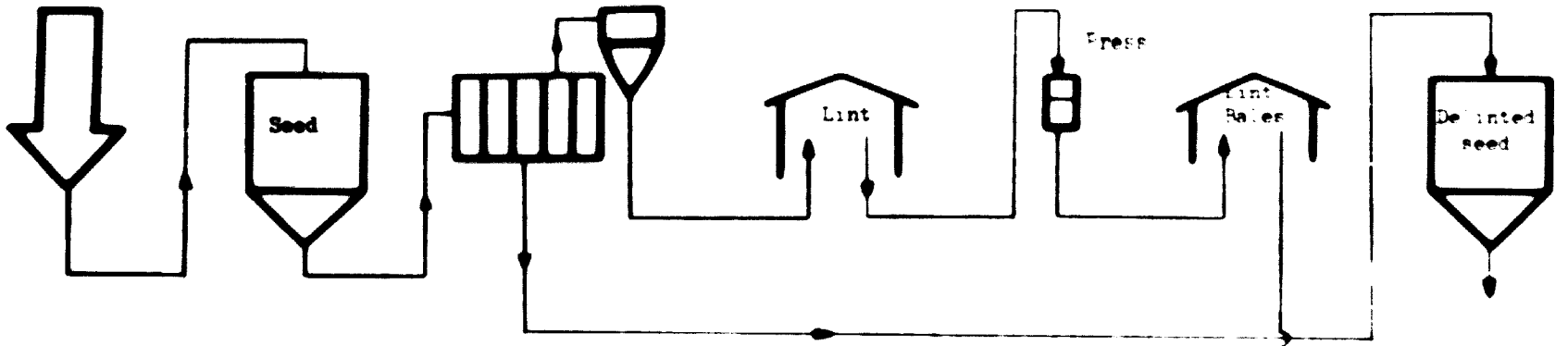
1. Product Flow Diagram



If comparisons are made then always on dry basis



TRANSPORT	SEED STORAGE	DELINTING	LINT STORAGE	BALING	LINT BALE STORAGE	DELINTED SEED STORAGE



Means:	**Volume (m^3):**	**Type:**	Volume (m^3):	Type:	Volume (m^3):	Volume:
Distance:	**Type:**	**Manufacturer:**	Type:	Manufacturer:	Type:	Type:
Time:	**Max.quant.stored:**	Nominal cap.(t/h)	Max.quant.stored	Nominal cap. (t/h)	# Quantities (t)	# Quantities (t)
		Real cap. (t/h)		Real cap. (t/h)		
		Number:		**Number:**		

L A B O U R (Production workers)

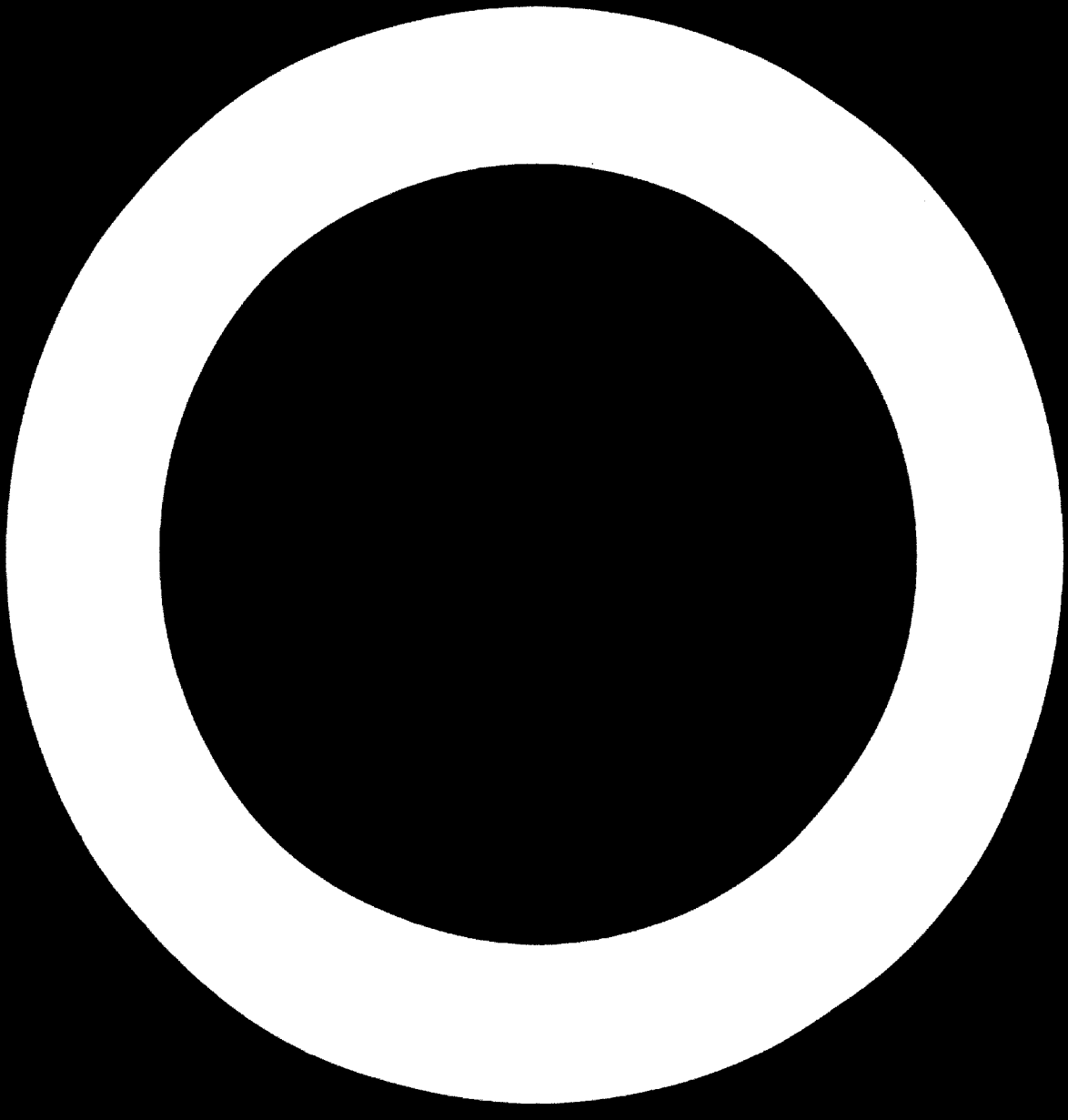
Total number of production workers times number of shifts:

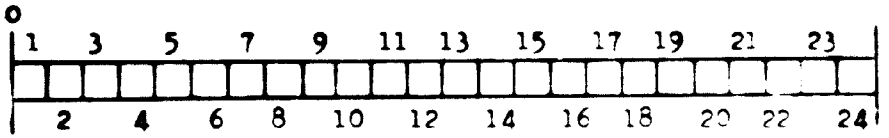
Non-production workers such as: - **repair**
- **laboratory**
- **supervisory**

TOTAL

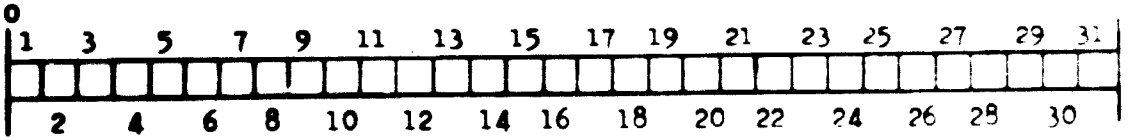
VII./1. DELINTING

1. Process Flow Diagram



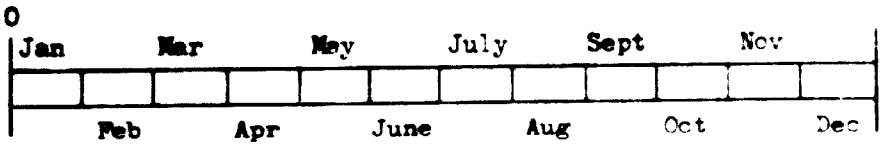


Hours /Day



Days /Month

Hours /Month

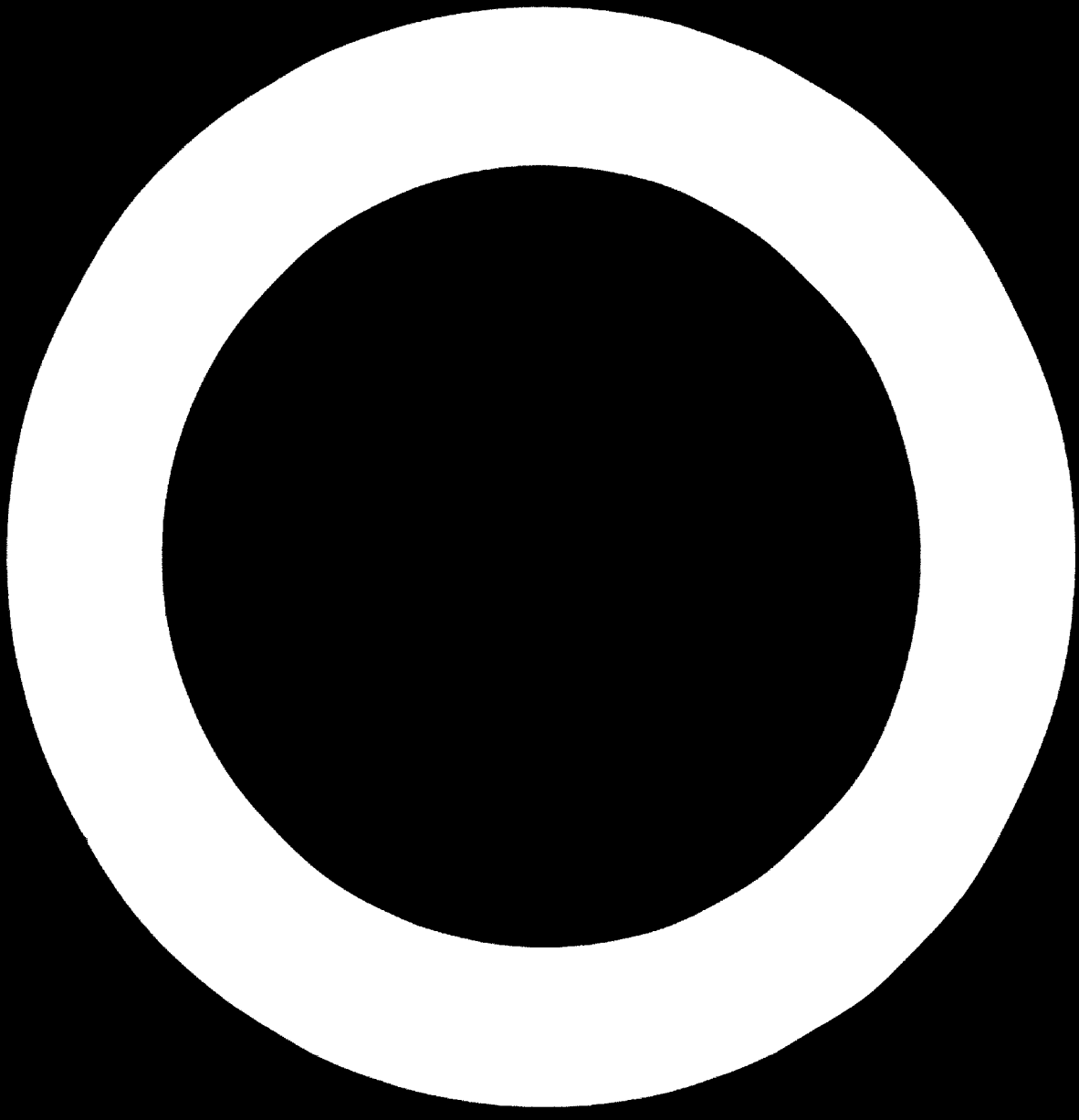


Months /Year

Days /Year

Hours /Year

VII.A.3. **OPERATING TIME**

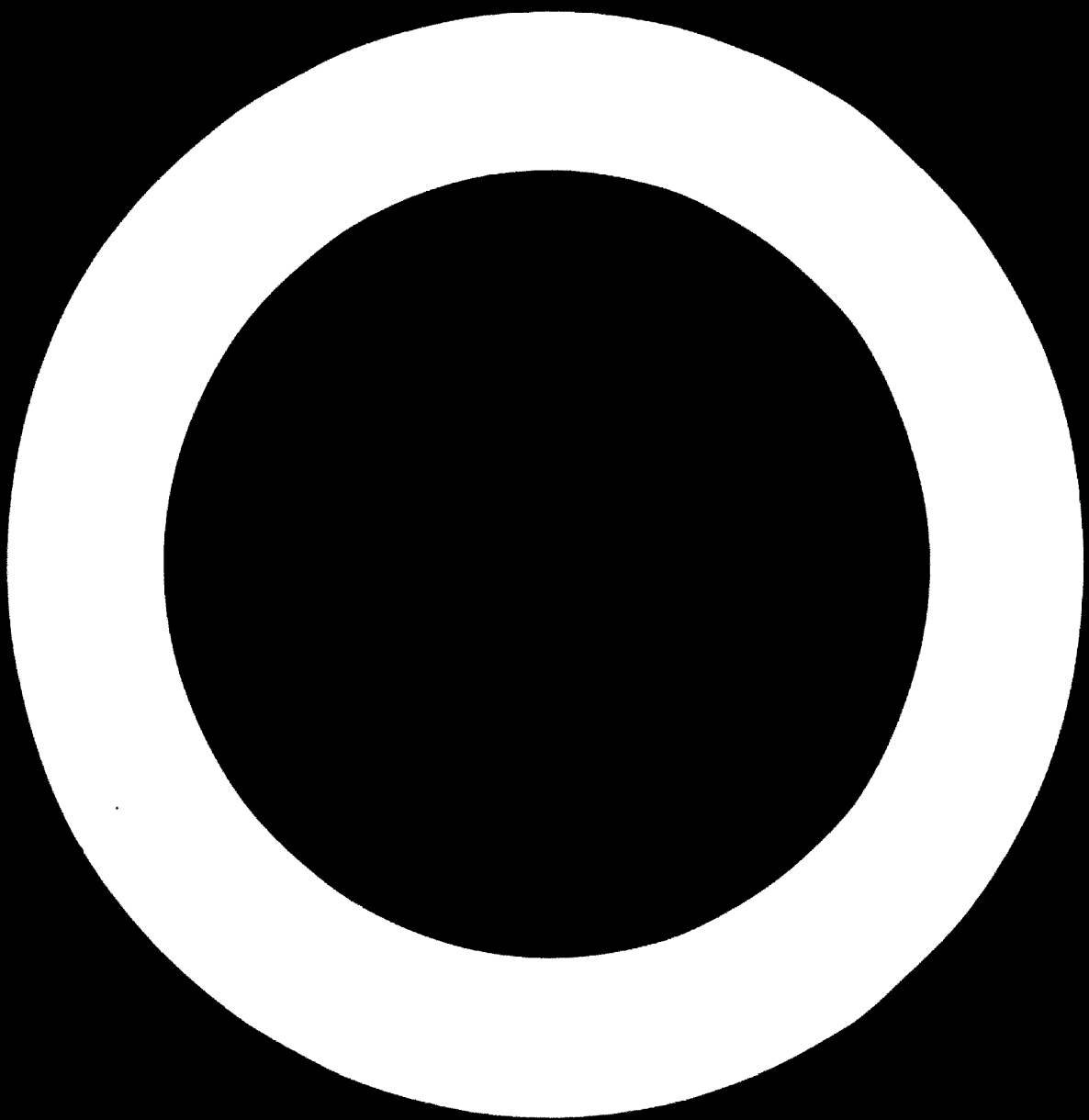


VII.A.4. COMMENTS ON THE COTTONSEED DELINTING DEPARTMENT

a) Technology and equipment:

b) Manpower requirements:

c) Operating time:



VII.B. COTTONSEED DECORTICATION DEPARTMENT

The following questions should be answered on the Product Flow Diagram (see next page):

a) Quantity (kg) of delinted or black seed processed;

b) Quantity (kg) of dehulled seed meat produced;

c) Quantity (kg) of hulls produced;

d) Electrical energy (kWh) consumed by the dehulling process.

Since cottonseed hulls are a by-product which very often goes to waste, it is important for an economically efficient production to make use of them in the most beneficial way possible. Part of the hulls may therefore again be added to the meat to be processed in the pressing plant (see Pressing Department). The greater part should either be used as boiler fuel or sold as animal fodder component.

It is, consequently, necessary to answer the following additional questions:

a) Quantity (kg) of hulls returned to the production process (added to meat);

b) Quantity (kg) of hulls used any other way. (Mention the specific utilisation in your case).

The following laboratory tests are required:

a) % of hulls and residual linters in delinted seed;

b) % of residual hulls in cottonseed meat;

c) oil content of the hulls.

Note: regarding the number of tests to be made, refer to VII.A.

The Product Flow Diagram lends itself to calculating the production loss (in actual quantities and/or percentages) by adding the product (dehulled seed meat) and the by-product (hulls) and deducting the sum from the raw material input (delinted seed).

The cottonseed hulls obtained may contain a certain amount of broken cottonseed kernels which amounts to a loss of meat and consequently of oil. It is therefore necessary to check this problem by carrying out the laboratory test mentioned above.

The loss of cottonseed meat can also be calculated with the help of the data given in the Product Flow Diagram.

a) Quantity of dehulled meat produced minus quantity of residual hulls (laboratory test) = Z

b) Quantity of delinted seed (raw material) minus quantity of hulls contained (laboratory test) = Y

c) Loss of cottonseed meat = X

d) X = Y - Z

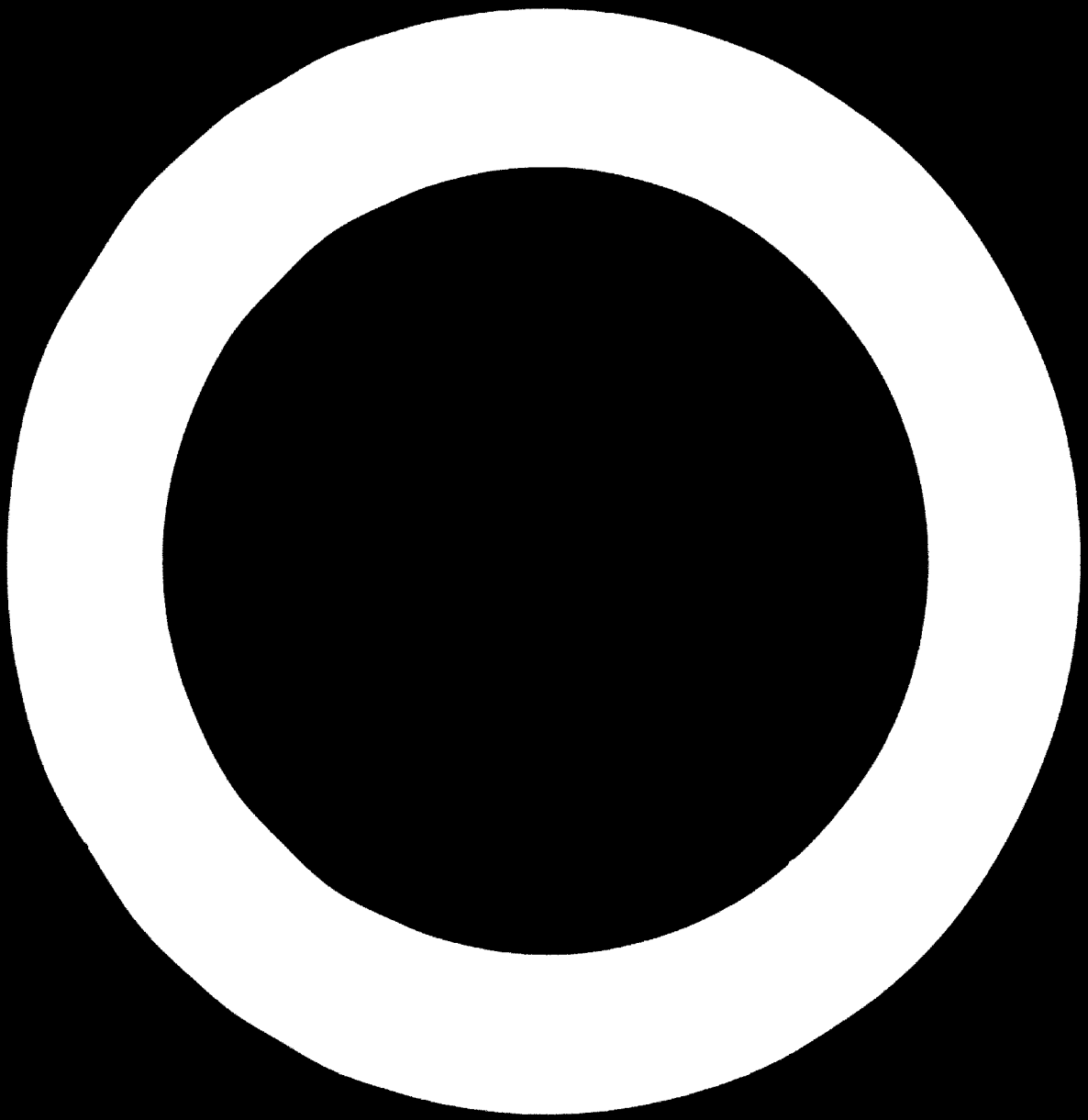
The content of residual linters should be disregarded in this column.

Evaluation: after the Product Flow Diagram has been completed and evaluated, state:

a) total production loss: .....kg = ...%

b) production loss of cottonseed meats: .....kg = ...%

c) consumption of electrical energy per ton of delinted seed processed: .....kWh/ton

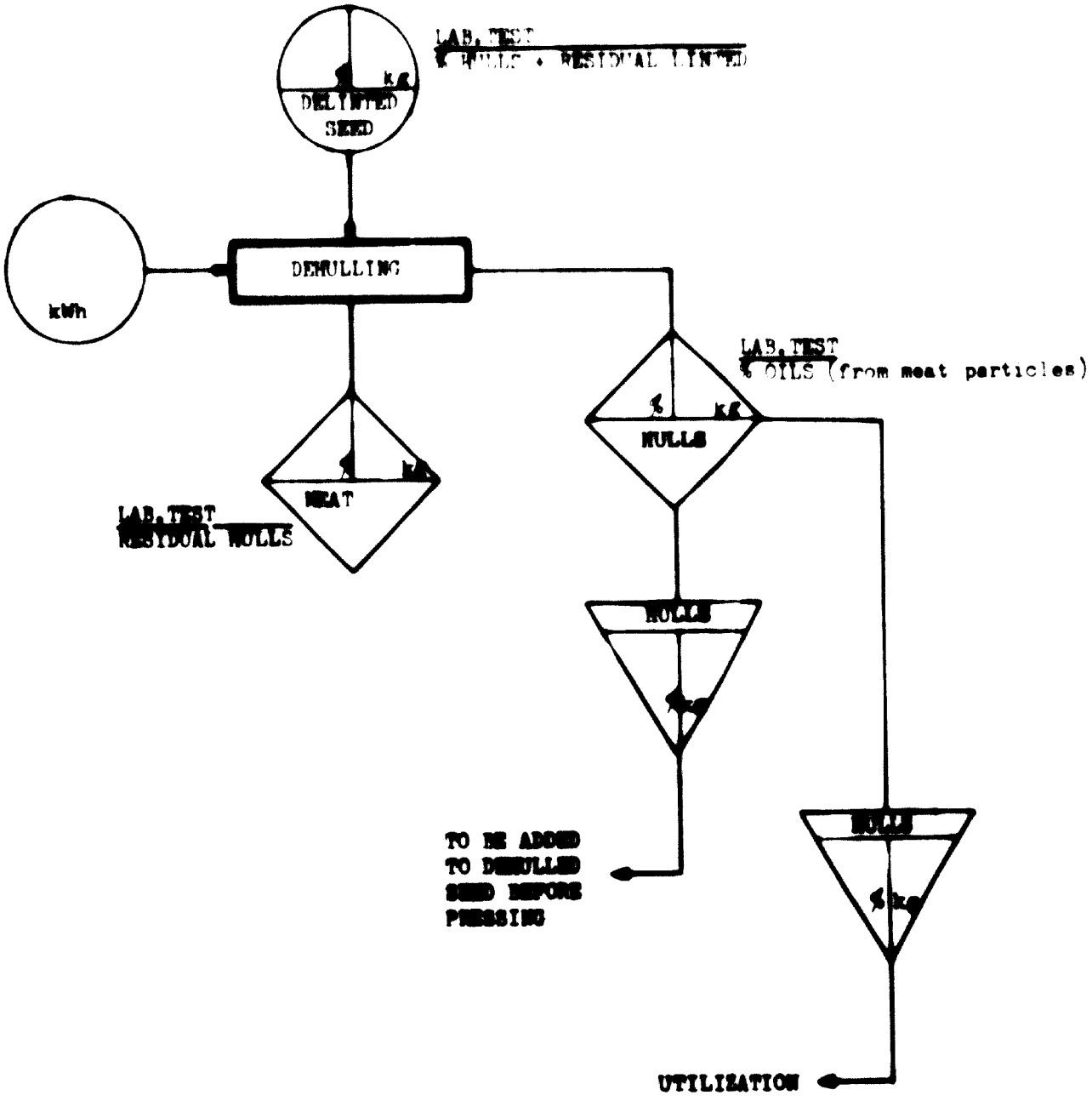


TIME PERIOD

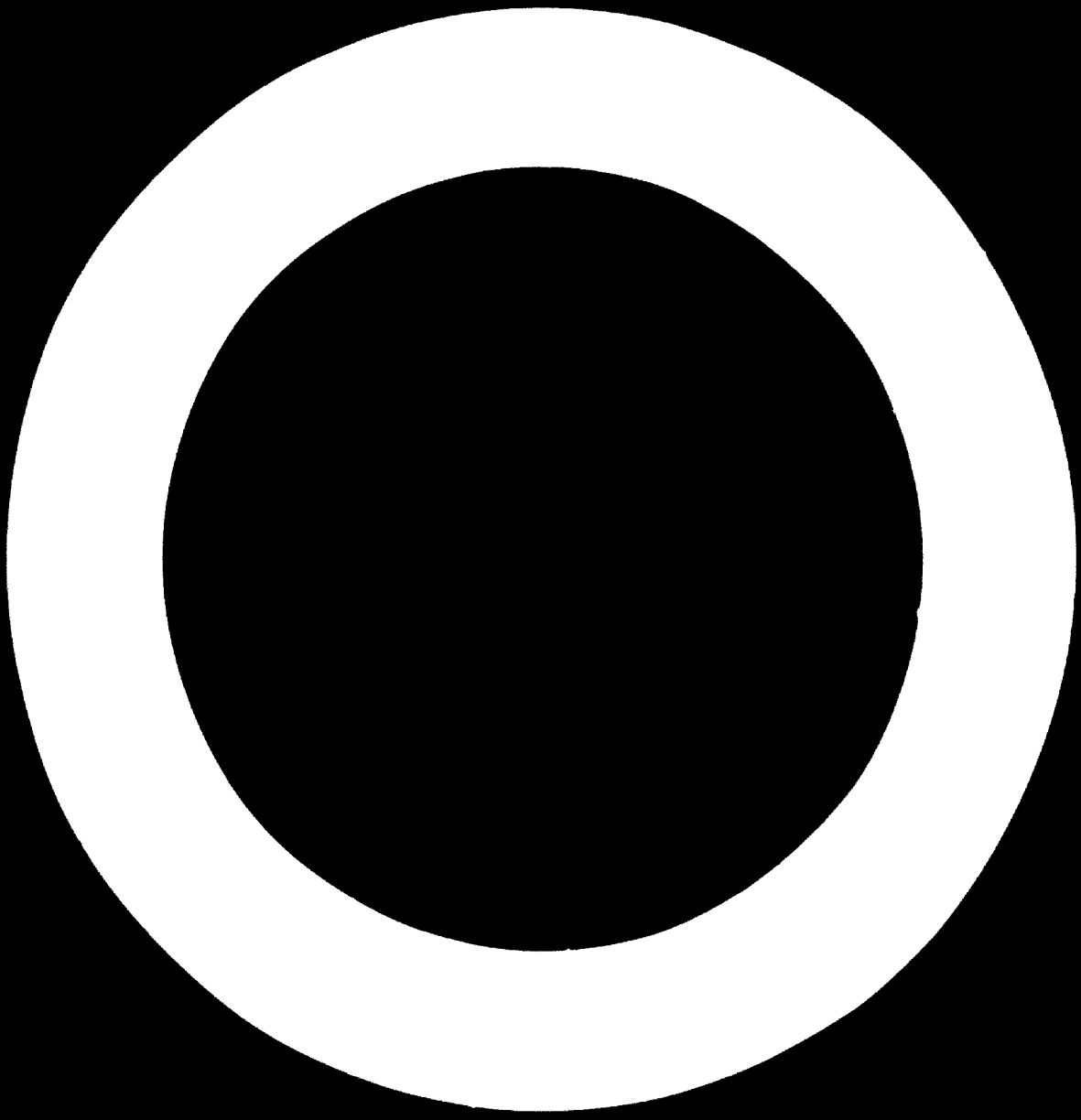
FROM ..... TO .....

... DECORTICATION

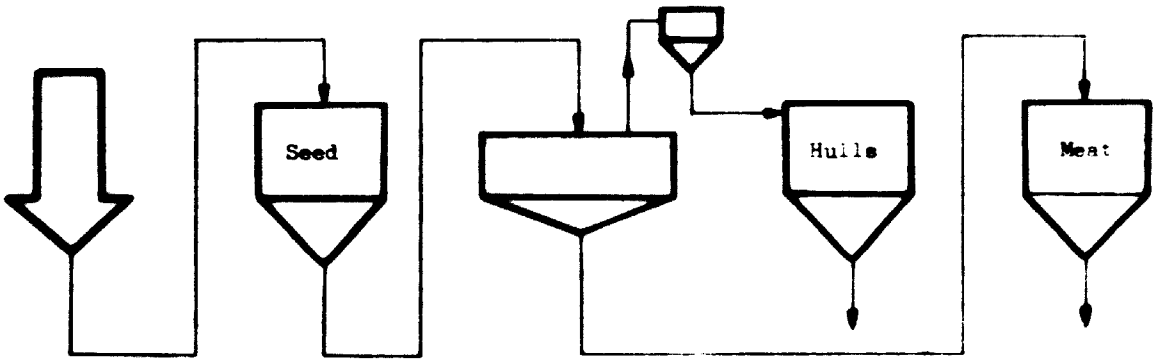
... Process Flow Diagram



If comparisons are made then always on dry basis



TRANSPORT	SEED STORAGE	DECORTICATION	HULL STORAGE	MEAT STORAGE



Means:	Volume (m^3):	Type:	Volume (m^3):	Volume m^3):
Distance:	Type:	Manufacturer:	Type:	Type:
Time:	Max.quant.stored	Nominal cap. (t/h)	Ø Quantities (t):	Ø Quantities (t):
		Real cap. (t/h):		
		Number:		

L A B O U R (Production workers)

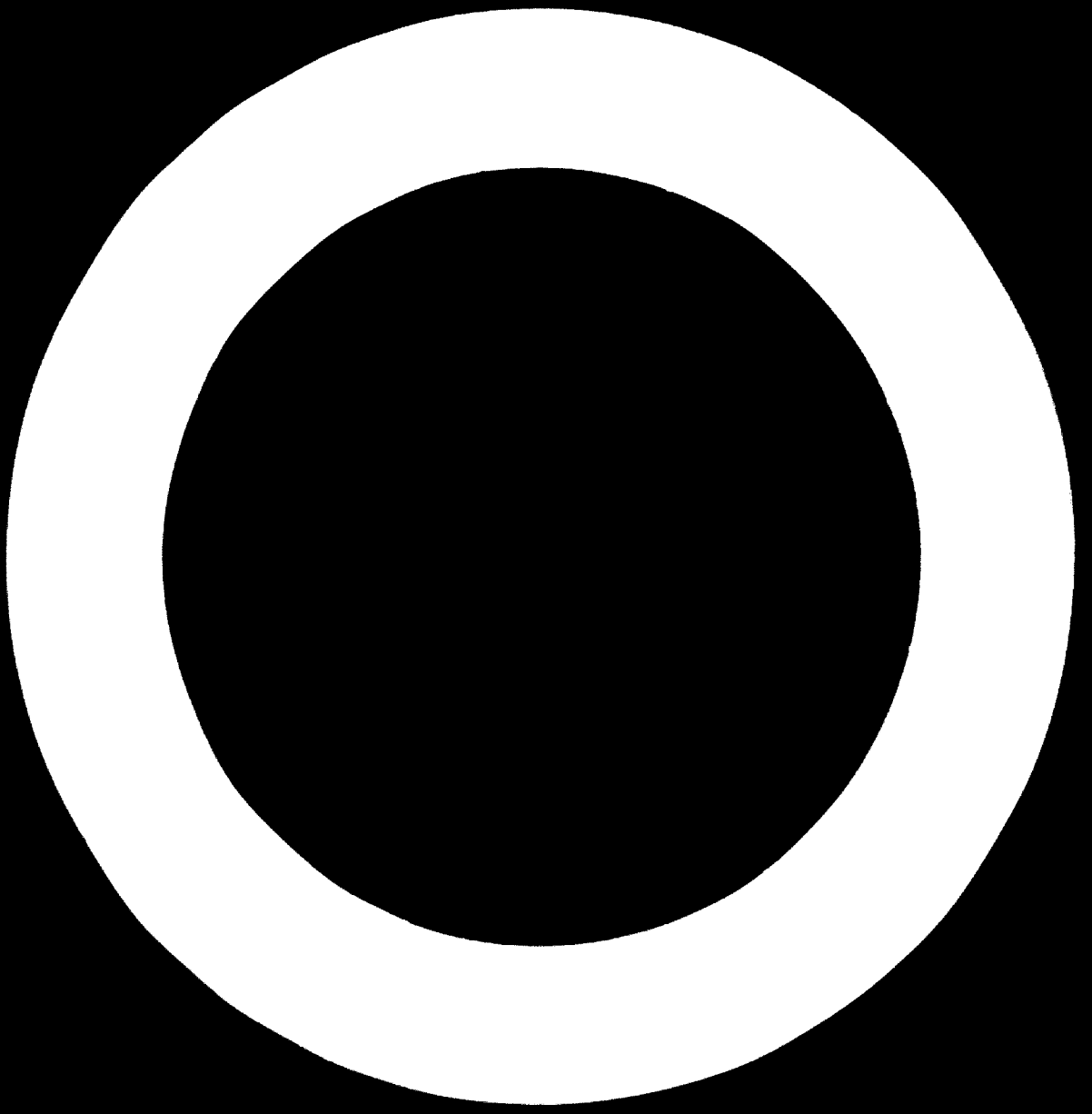
Total number of production workers times number of shifts:

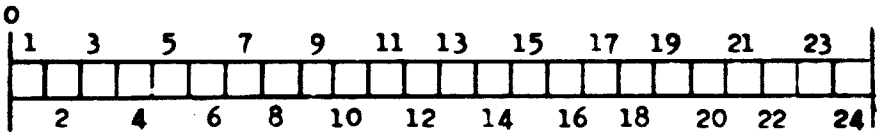
Non-production workers such as: - repair
- laboratory
- supervisory

TOTAL

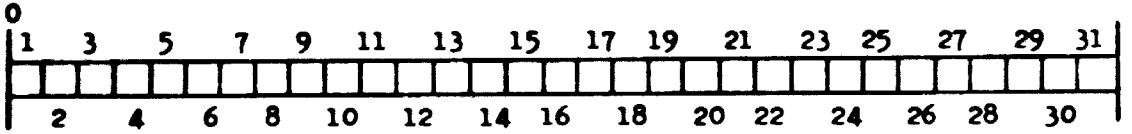
VII.B. DECORTICATION

2. Process Flow Diagram



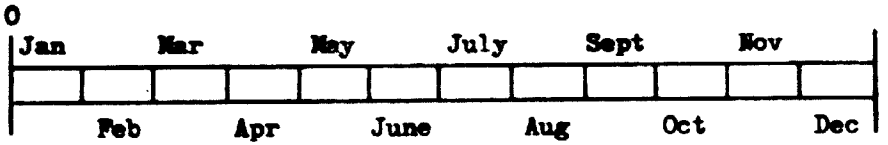


Hours/Day



Days/Month

Hours/Month

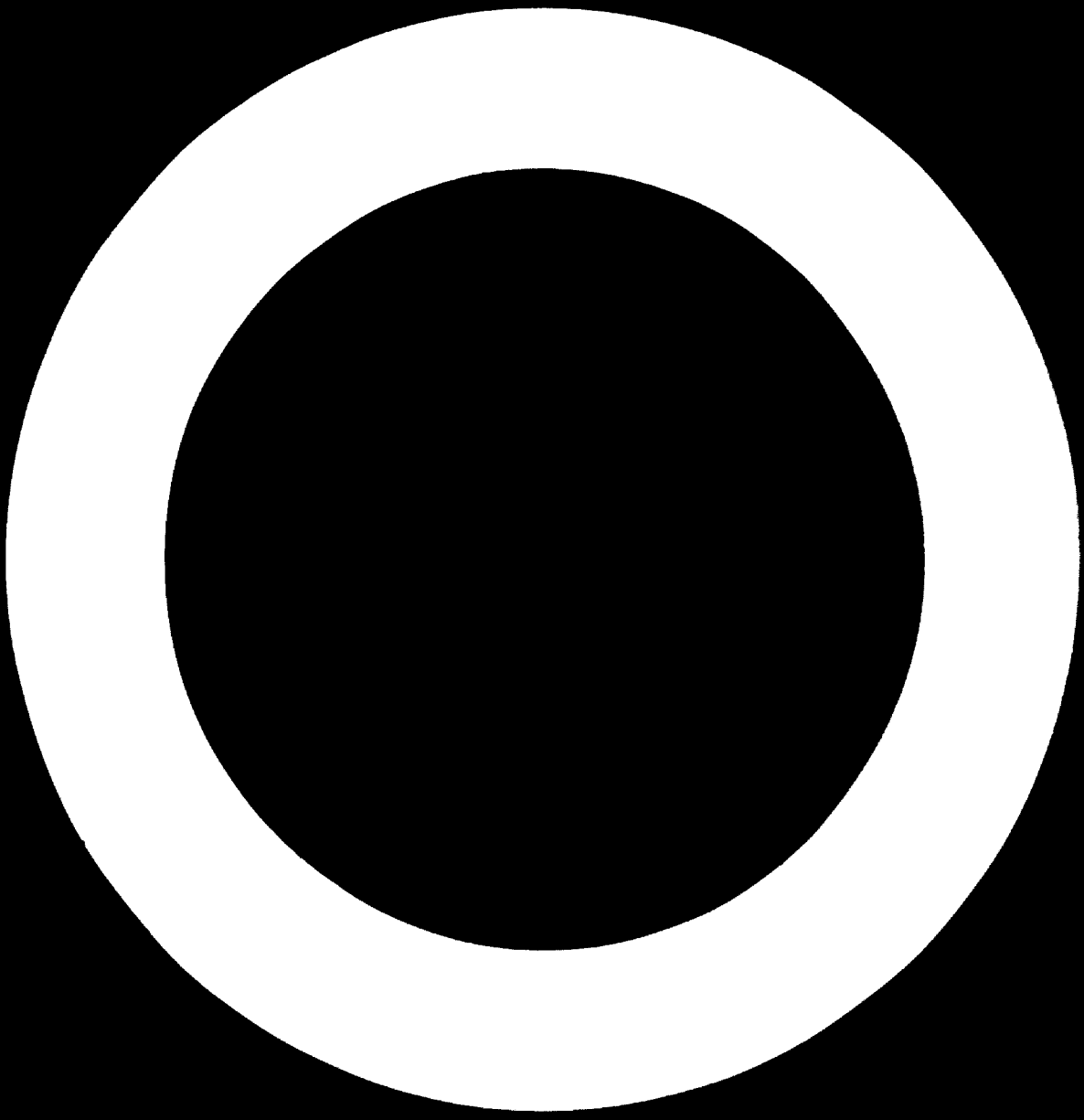


Months/Year

Days/Year

Hours/Year

VII.B.3. OPERATING TIME

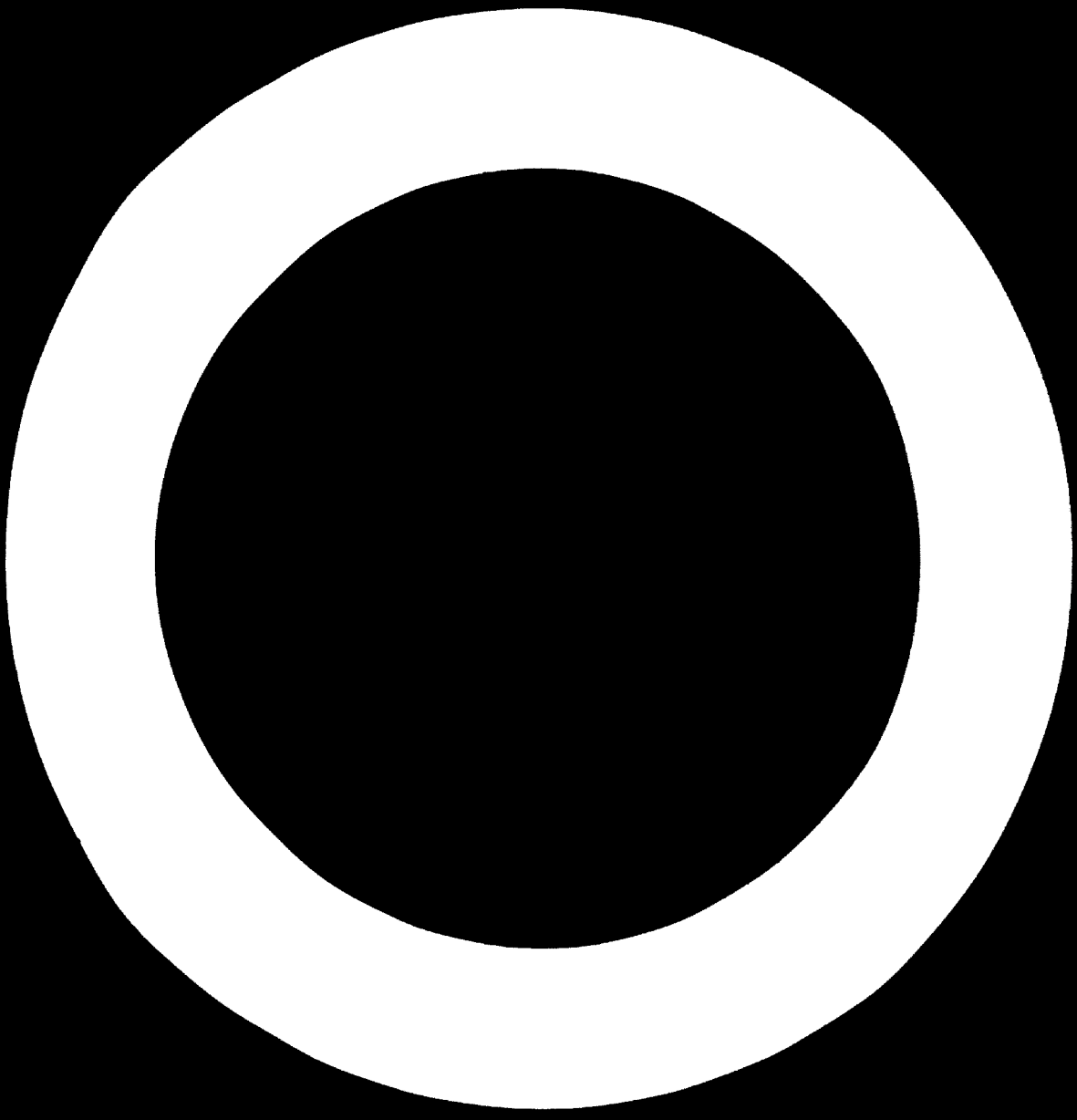


VII.B.4. COMMENTS ON THE COTTONSEED DECORTICATION DEPARTMENT

a) Technology and equipment:

b) Manpower requirements:

c) Operating time:



VII.C. PRESSING DEPARTMENT

The following questions should be answered on the Product Flow Diagram (attached):

a) Quantity (kg) of decorticated seed (meat processed);

b) Quantity (kg) of cleaned crude oil produced;

c) Quantity (kg) of oil cakes produced;

d) Electrical energy (kWh) consumed at the following stages of the process (if possible in detail, otherwise give total):

- preparation
- pressing
- cleaning
- others

e) Quantity (kg) of steam consumed by the various stages of the pressing process.

Since the filtration residues are quite often the reason for a considerable loss of oil, they should be returned to the preparation section of the pressing plant and be processed again. However, only small quantities should be added continuously to the prepared meat in order to avoid pressing difficulties. If they are not returned to the process, then state the quantities obtained in the appropriate place of the diagram and their utilization.

The following laboratory tests are required:

a) % of oil in the cottonseed meat (raw material);

b) % of residual oil in the press cakes;

c) % of protein in the press cakes;

d) % of solid impurities in the crude oil before filtration;

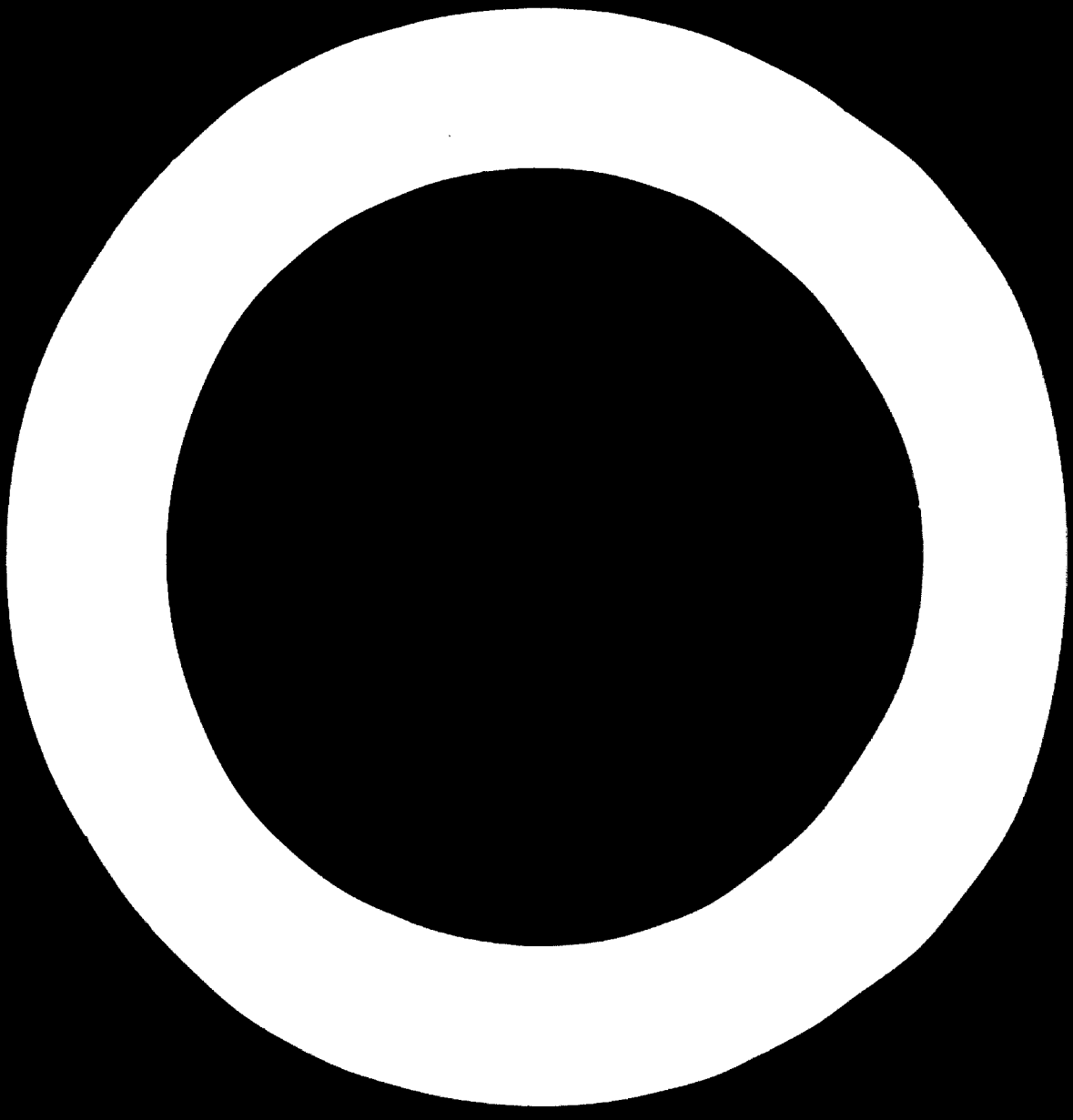
e) % of oil in the filter residues.

Note: regarding the number of tests to be made, refer to VII.A.

The protein content is the most important criteria for the marketing of press cakes. It also influences the efficiency of any plant. It is therefore necessary to study the market and to know the protein content of the marketable product. The production should then be adjusted accordingly. If, for example, the market asks for a minimum protein content of 35% and the cake produced proves to contain 40%, then 5% cottonseed hulls should be added to the meat before processing.

A plant should also be adjusted with respect to the oil cake's residual oil content which should be between 4% and 6% (screw press). A lower oil content may result in a partly burned cake and consequently reduced protein content or qualitatively harmed protein. A higher residual oil content would be a loss of oil.

The Product Flow Diagram lends itself to calculating the production loss (in actual quantities and/or percentages) by adding the product (cleaned oil) and the by-product (oil cakes) and deducting the sum from the raw material input (cottonseed meat).



VII.C. PRESSING DEPARTMENT (continued)

The loss of crude oil can also be calculated with the help of the data given in the Prodout Flow Diagram.

a) Quantity of cleaned crude oil produced = Z

b) Quantity of oil contained in the meat (laboratory test) = Y

c) Loss of oil = X

d) X = Y - Z

Evaluation: after the Product Flow Diagram has been completed and evaluated, state:

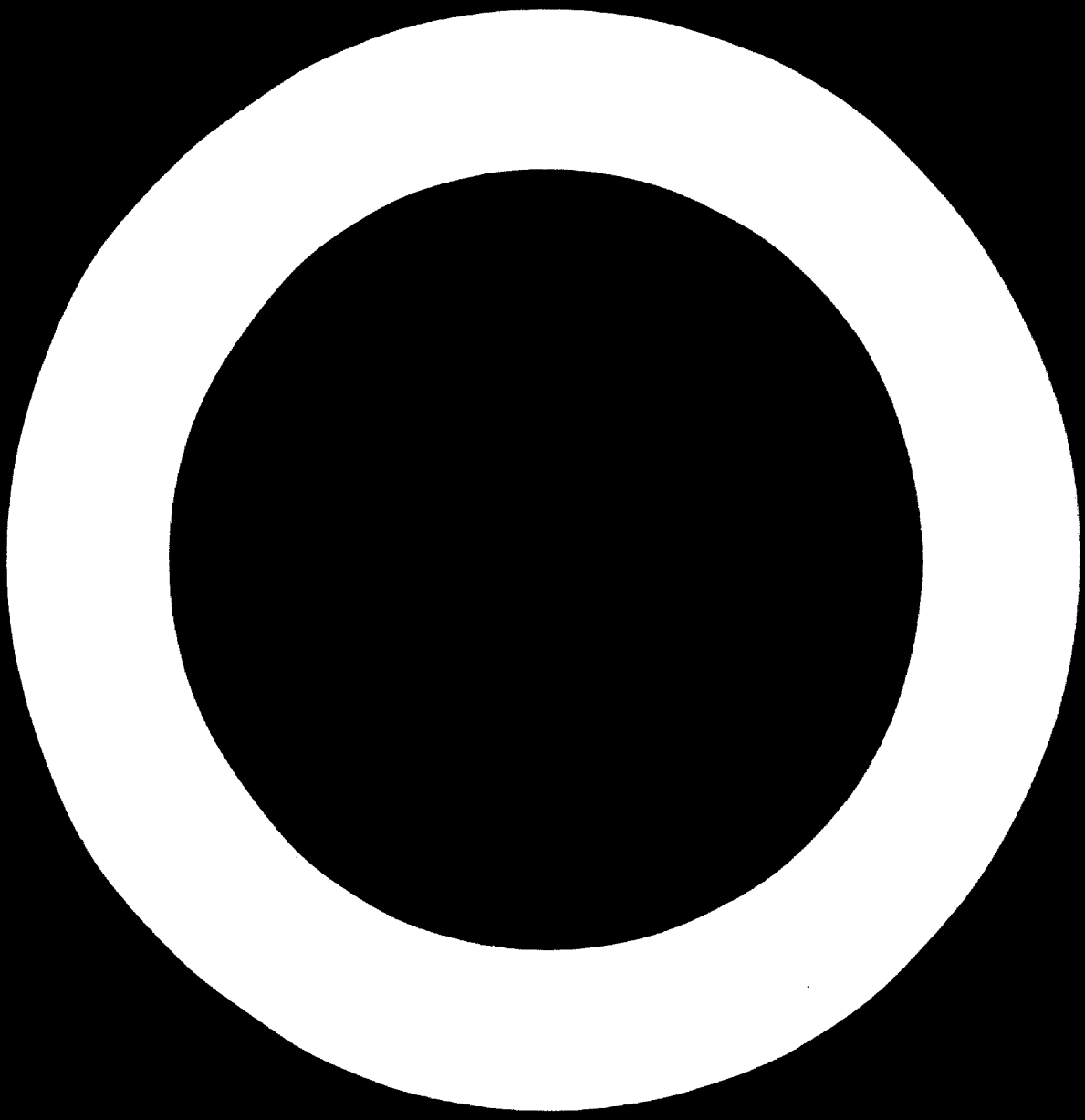
a) total production loss: .....kg = ...%

b) production loss of oil: .....kg = ...%

c) residual oil content in the cakes: .....kg = ...%

d) consumption of electrical energy per ton of meat processed: .....kWh/ton

e) steam consumption per ton of meat processed: .....kg/ton

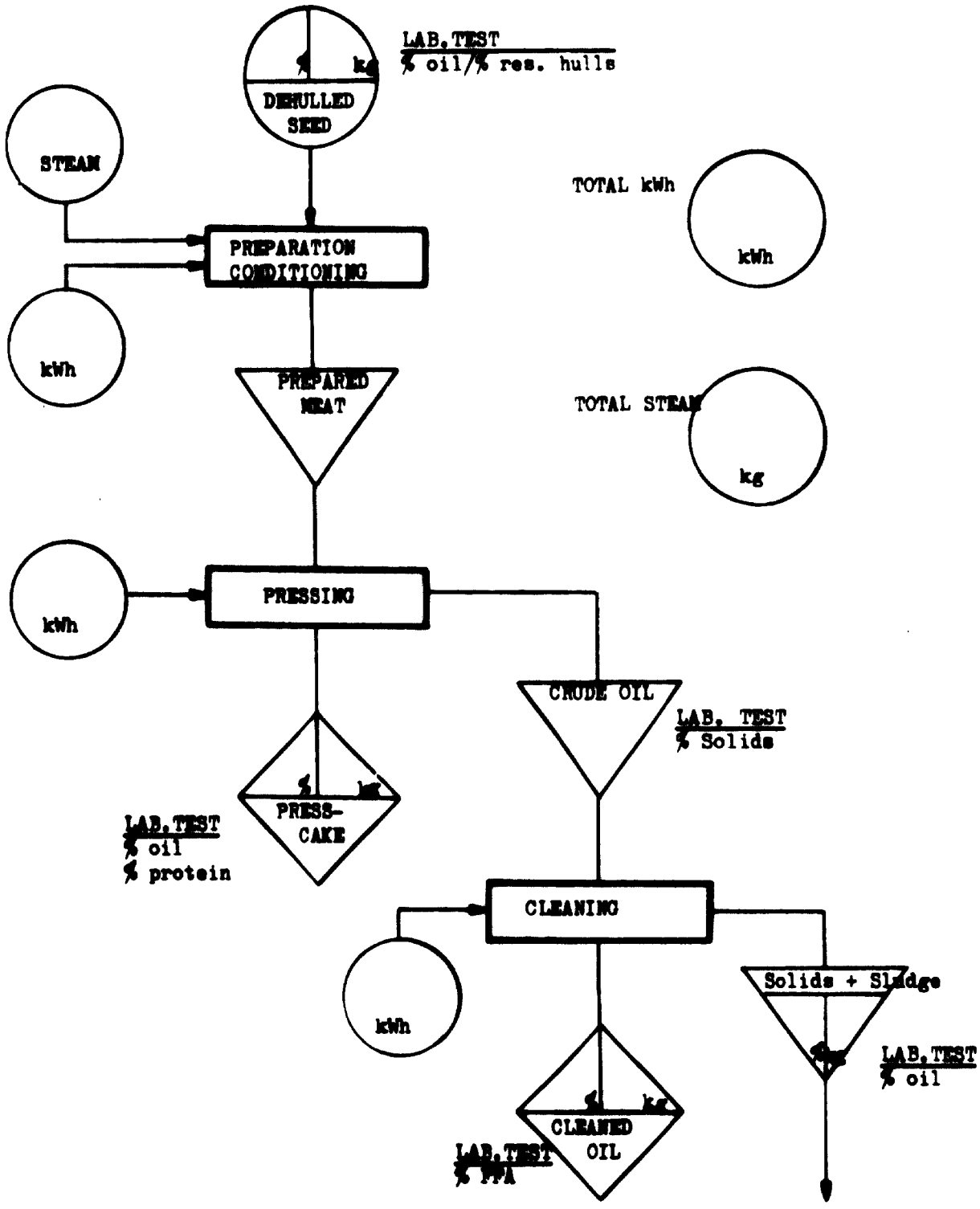


TIME PERIOD

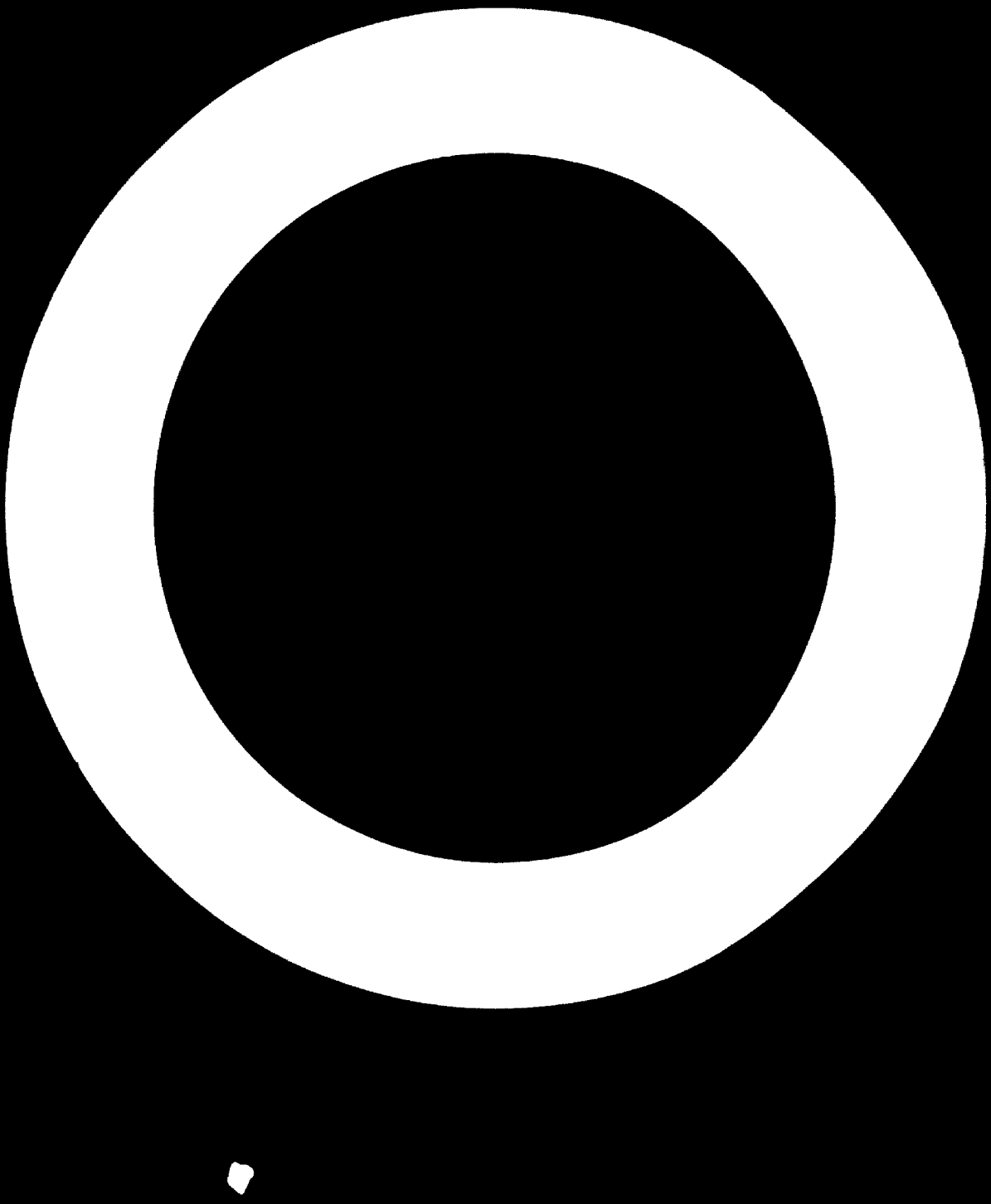
FROM ..... TO .....

VII.C. PRESSING

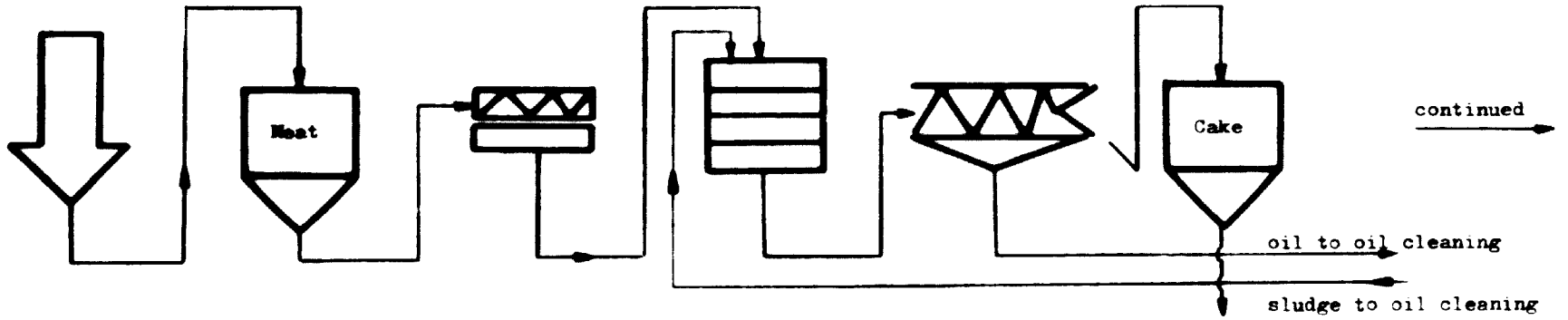
1. Product Flow Diagram



If comparisons are made then always on dry basis



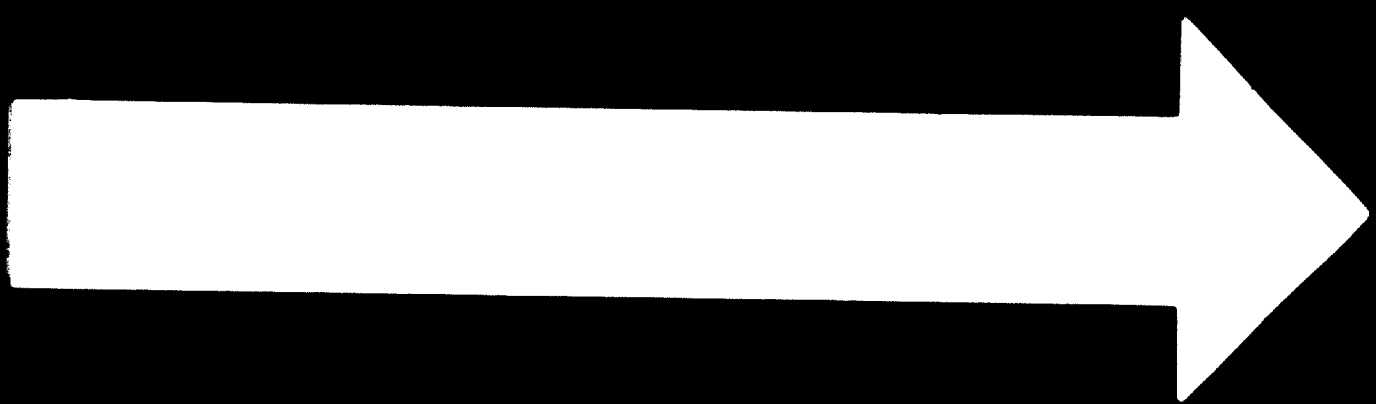
TRANSPORT	MEAT STORAGE	CRUSHING	CONDITIONING	PRESSING	CAKE STORAGE



Means: **Distance:** **Time**	Volume: Type: Ø Quantities stored:	**Type:** **Manufacturer:** **Nominal capac:** Actual Capac: **Number:**	Type: **Manufacturer:** Nominal Capac: Actual Capacity: Number:	Type: Manufacturer: Nominal Capac: Actual Capacity: Number	Volume: Type: Ø Quantities Stored:

L A B O U R (**Production workers**)

VII.C. PRESSING
2. Process Flow Diagram



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2 OF 2

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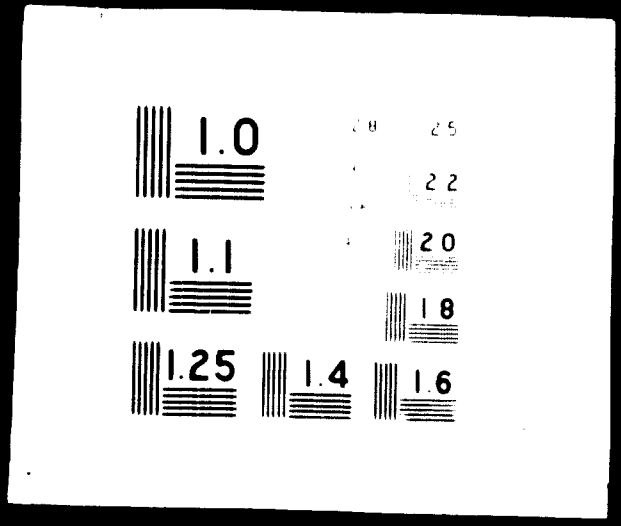
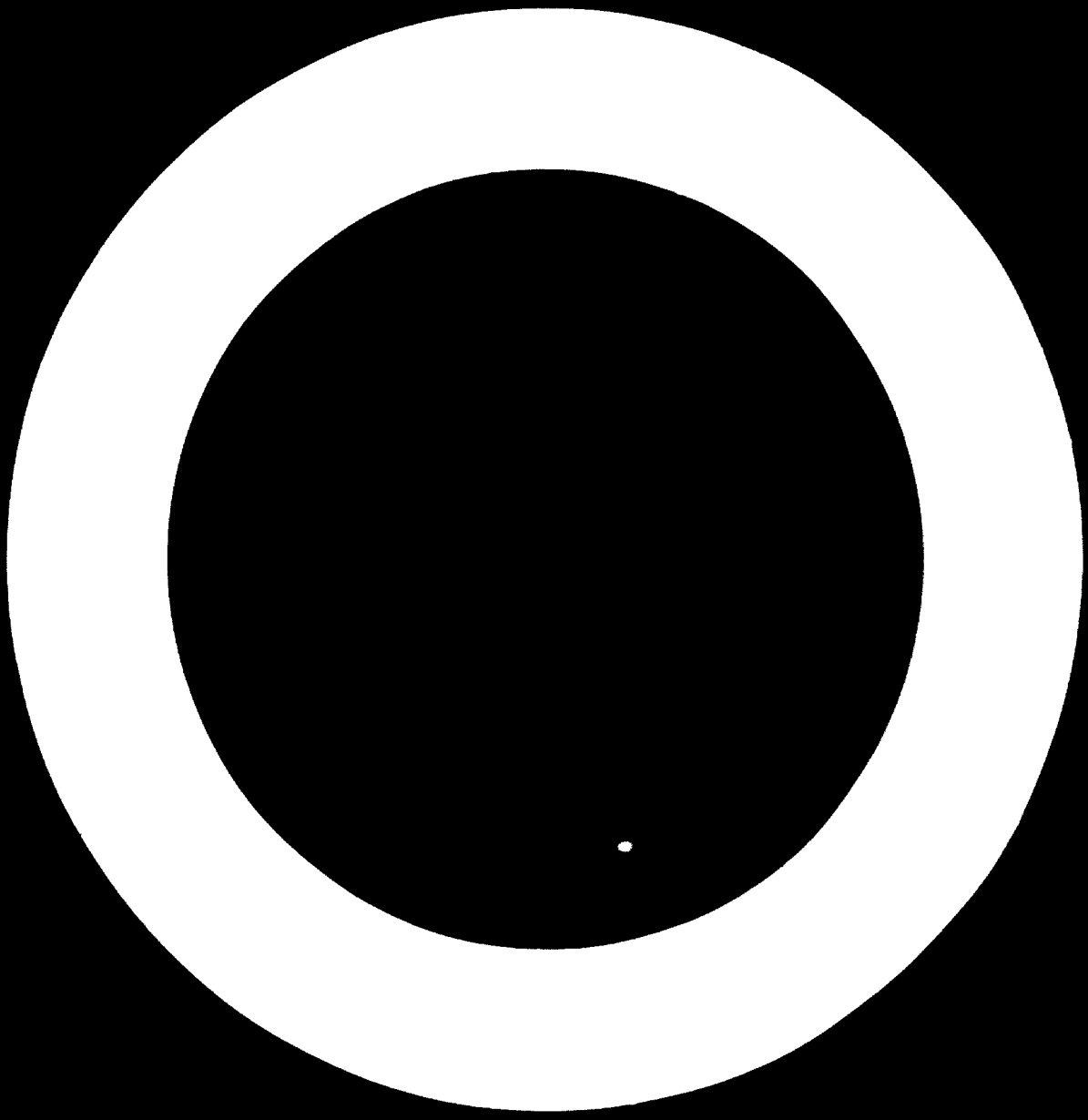
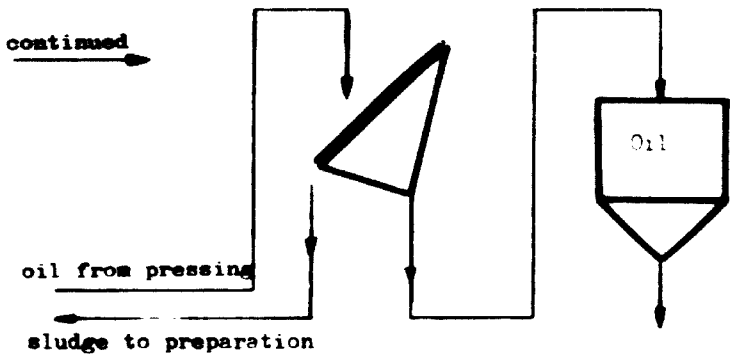




OIL CLEANING	OIL STORAGE



Type:	Volume:
Manufacturer:	Type:
Nominal capac:	Ø Quant. stored:
Actual Capacity:	
Number:	

L A B O U R (Production workers)

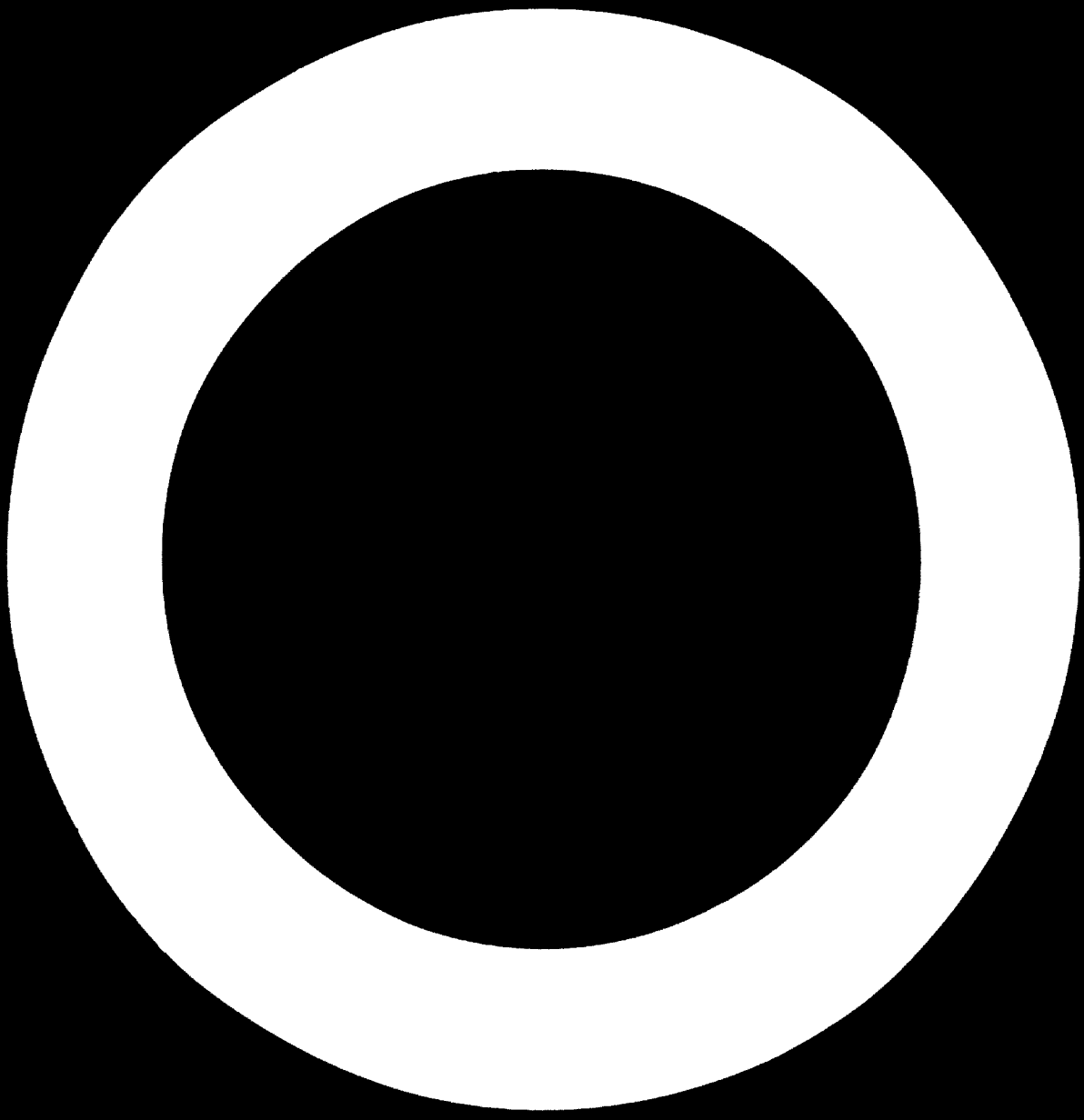
Total number of production workers times number of shifts:

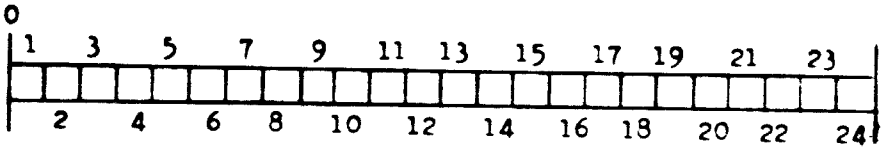
Non-production workers such as: - repair
- laboratory
- supervisory

TOTAL

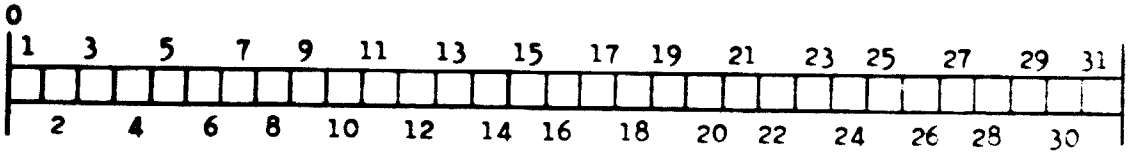
VII.C. **PRESSING**

2. **Process Flow Diagram** (continued)



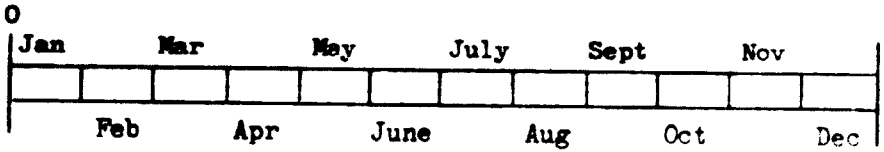


Hours/Day



Days/Month

Hours/Month

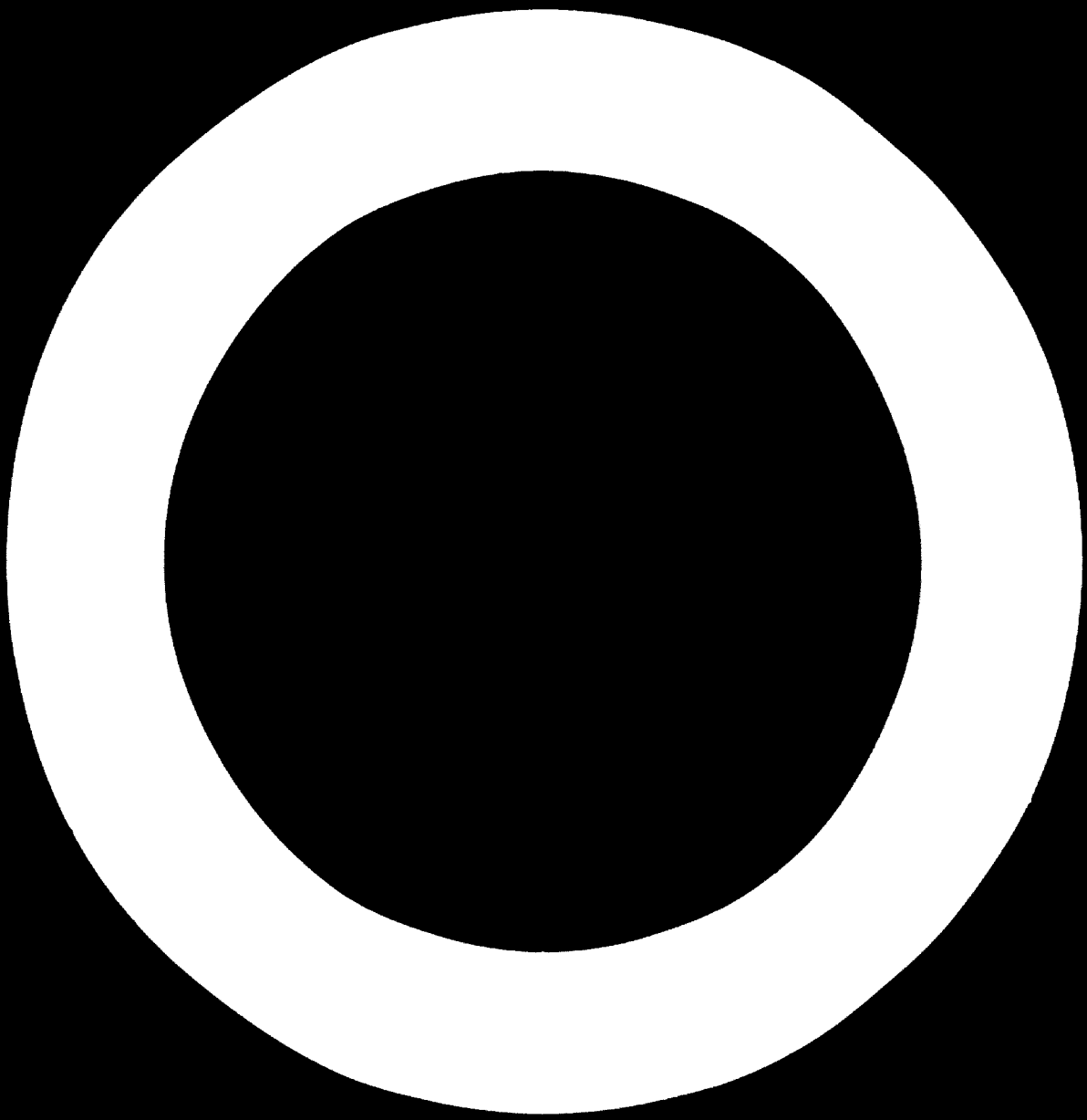


Months/Year

Days/Year

Hours/Year

VII.C.3. **OPERATING TIME**

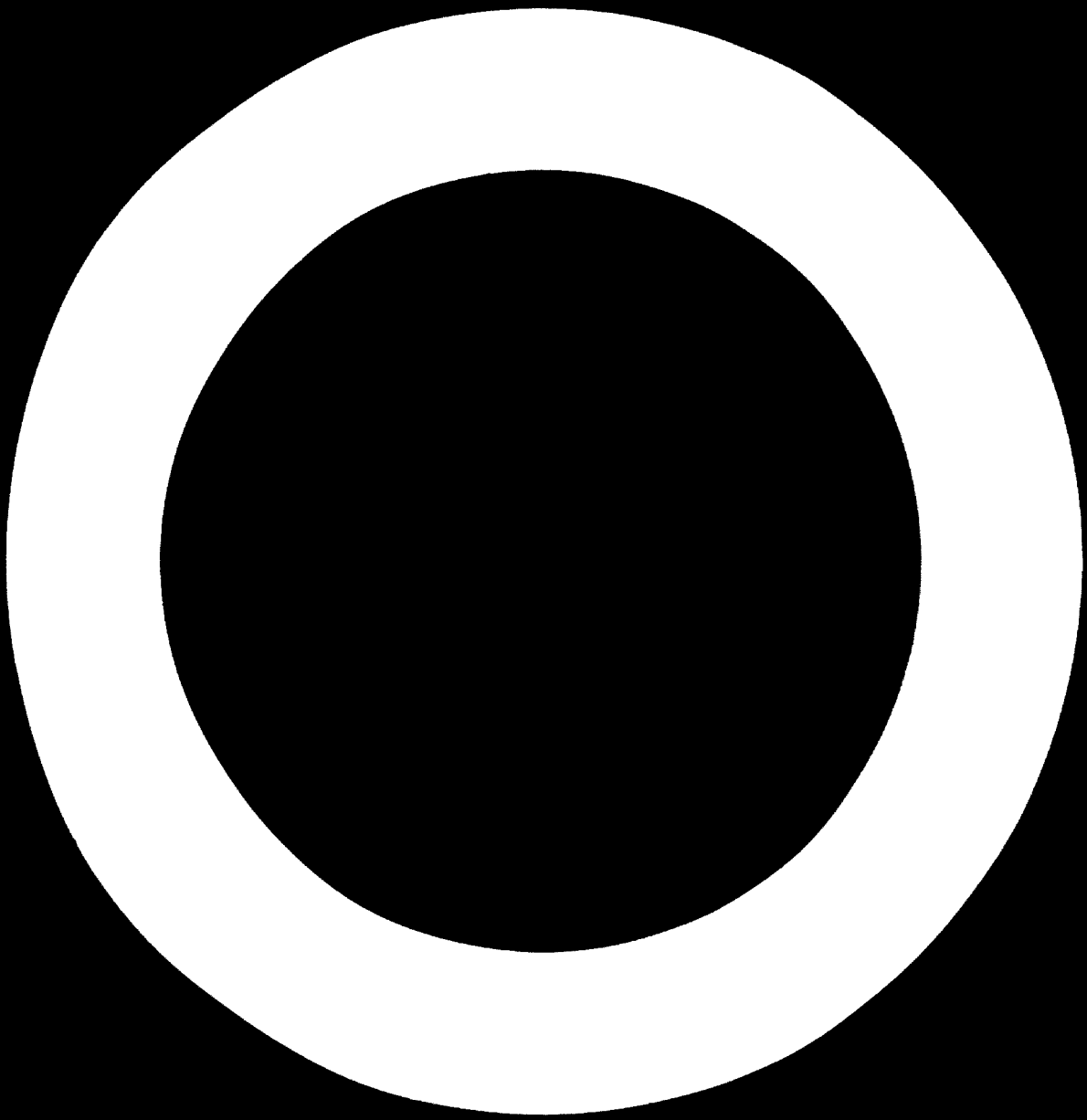


VII.C.4. COMMENTS ON THE PRESSING DEPARTMENT

a) Technology and equipment:

b) Manpower requirements:

c) Operating time:



VII.D. SOLVENT EXTRACTION DEPARTMENT AND MEAL BAGGING

The following questions should be answered on the Product Flow Diagram (attached):

a) Quantity (kg) of seed or press cakes processed;

b) Quantity (kg) of crude oil produced;

c) Quantity (kg) of fresh solvent used;

d) Electrical energy (kWh) consumed by the solvent extraction process;

e) Quantity (kg) of steam consumed by the solvent extraction process. If possible, state separately the steam consumption in the miscella distillation;

f) Total water consumption;

g) Cooling water temperature.

The assessments and evaluation to be made are based on the production process in any kind of a continuous solvent extraction plant. The Process Flow Diagram will, therefore, not be applicable for outdated batch type plants. However, the Product Flow Diagram may also be used in this case.

The quantity of fresh solvent added to the production process replaces the solvent loss and is therefore equal to the plant's solvent loss. It should not exceed 0.5% based on the quantity (tons) of raw material processed.

Solvent extraction is normally applied to oilseeds with a low oil content (about 20%), e.g. soya beans, cottonseed, etc. However, solvent extraction should also be applied to press cake processing if the residual oil content exceeds 10%. Oilseeds with a high oil content, ground nuts (45%), for example, are pre-pressed and the press cakes obtained with a residual oil content of about 15% - 20% are solvent extracted.

The following laboratory tests are required:

a) % of oil in the raw material;

b) Screening analysis of the broken (granulated) raw material or measurement of the size of the flakes;

c) % of oil in the miscella;

d) % of residual oil in the extracted meal;

e) % of protein in the extracted meal;

f) % of free fatty acids (FFA) in the oil;

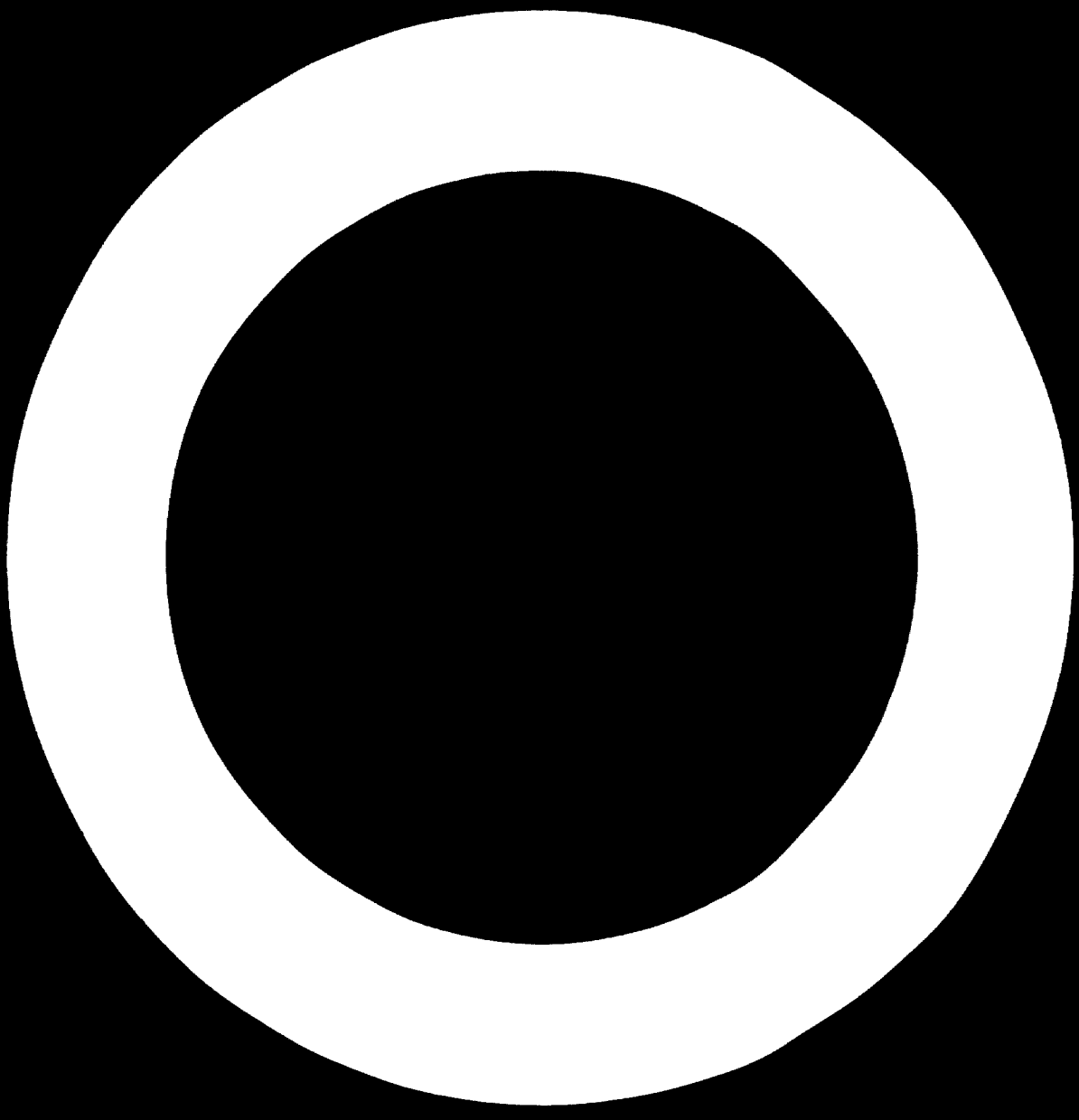
g) Inflammable point of the oil;

h) Control of water content in the back-solvent.

In a continuous production plant these tests have to be carried out daily.

The preparation (granulating or flaking) of the raw material plays a very important role and should therefore be attended to very carefully.

The miscella concentration should be in the range of 25% to 30%. A low concentration causes an over-loading of the miscella distillation capacity; a higher concentration, which will hardly ever be achieved, may result in a low extraction rate and high residual oil content in the meal.



VII.D. SOLVENT EXTRACTION DEPARTMENT AND MEAL BAGGING (continued)

The residual oil content in the extracted meal should always be in the range of 0.4% to 0.6% in any case below 1%.

The oil produced has to be practically solvent free. The inflammable point will be a useful indicator.

The solvent should be free of water. The presence of water in the solvent will decrease the extraction rate and will cause even more serious difficulties. Therefore the proper functioning of the solvent water separator is essential.

The Product Flow Diagram lends itself to calculating the production loss (in actual quantities and or percentages) by adding the product (oil) and the by-product (extracted meal) and deducting the sum from the material input.

The loss of crude oil can also be calculated with the help of the data given in the Product Flow Diagram.

a) Quantity of oil produced = Z

b) Quantity of oil contained (laboratory test) in the material input (press cake) = Y

c) Loss of oil = X

d) X = Y - Z

Evaluation: after the Product Flow Diagram has been completed and evaluated, state:

a) total production loss: .....kg = ...%

b) production loss of oil: .....kg = ...%

c) residual oil content in the extracted meal: .....kg = ...%

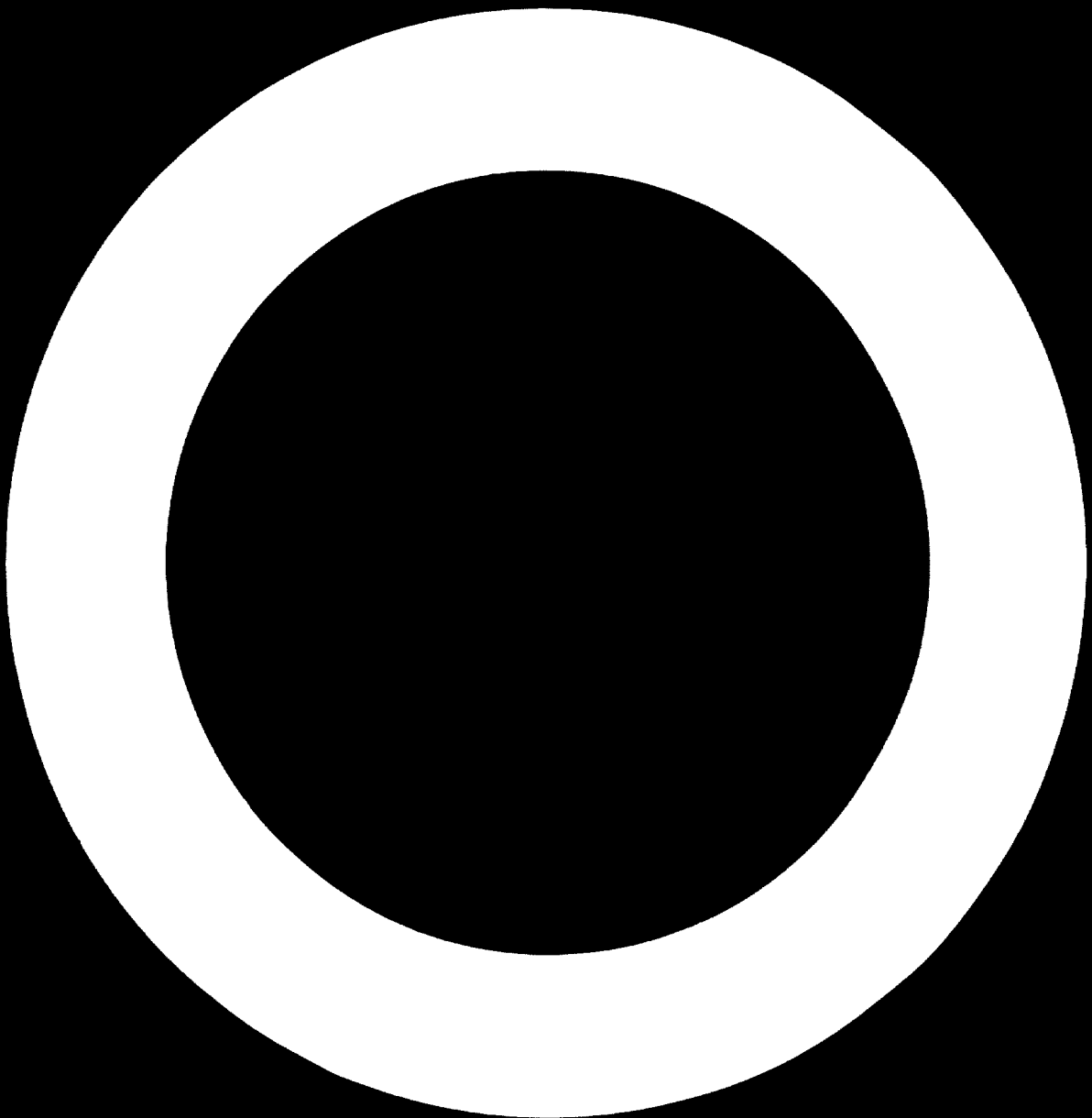
d) solvent loss: .....kg = ...%

e) solvent loss calculated per quantity of material input (press cake) processed: .....%

f) consumption of electrical energy per ton of material input (press cake) processed: .....kWh/ton

g) steam consumption per ton of material input (press cake): .....kg/ton

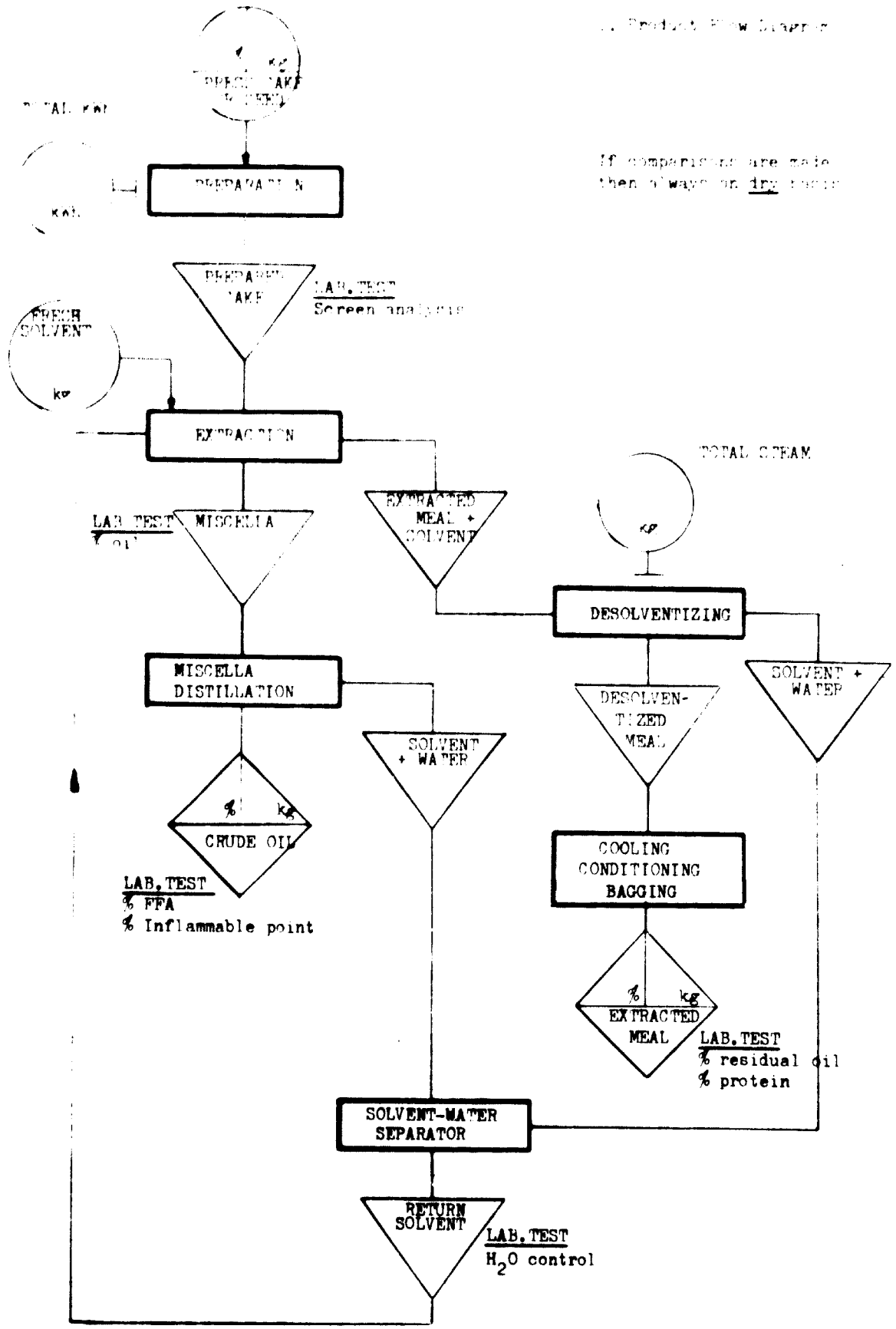
h) water consumption per ton of material input (press cake): .....m^3/ton

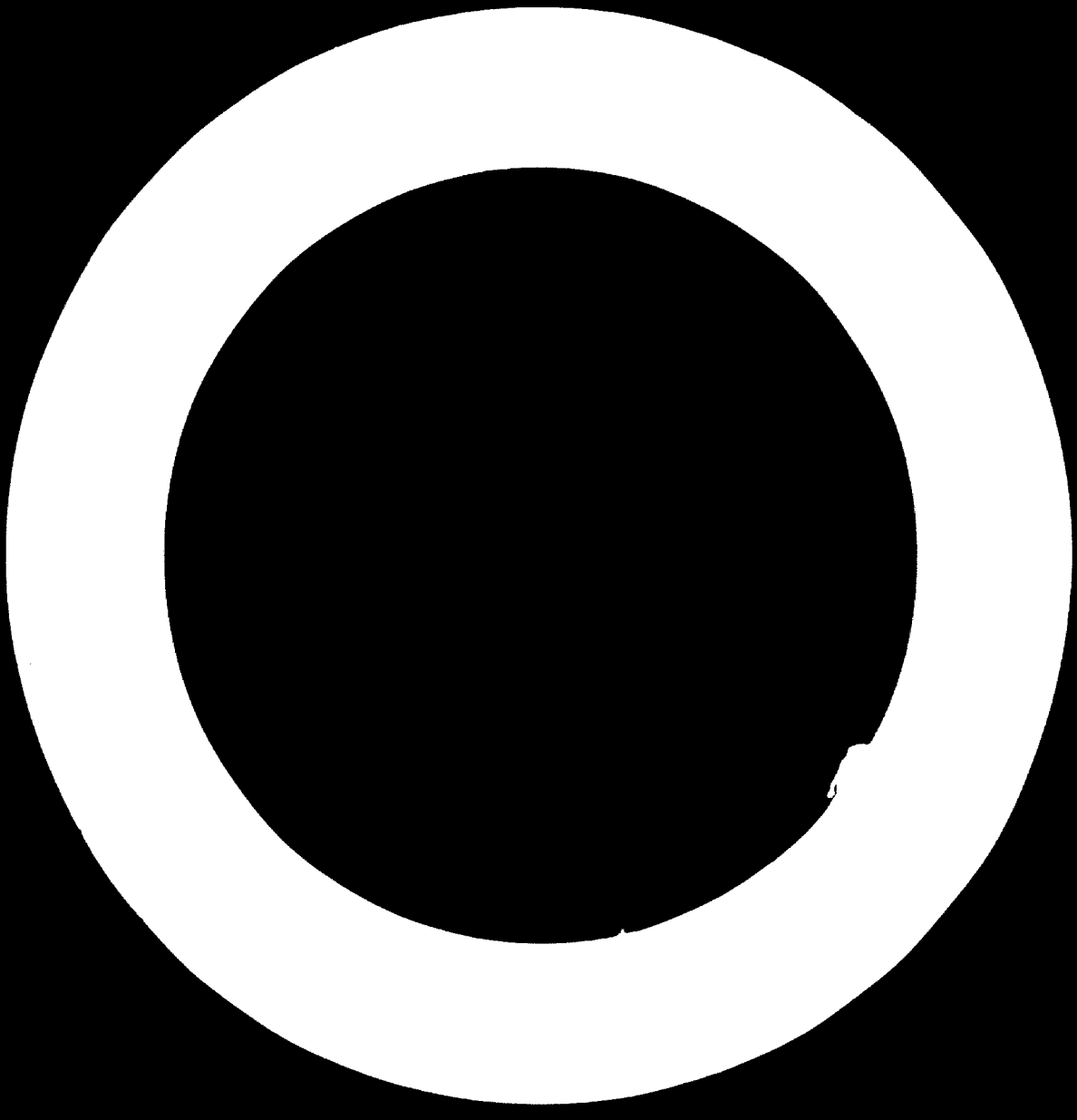


[illegible] SOLVENT EXTRACTION [illegible]

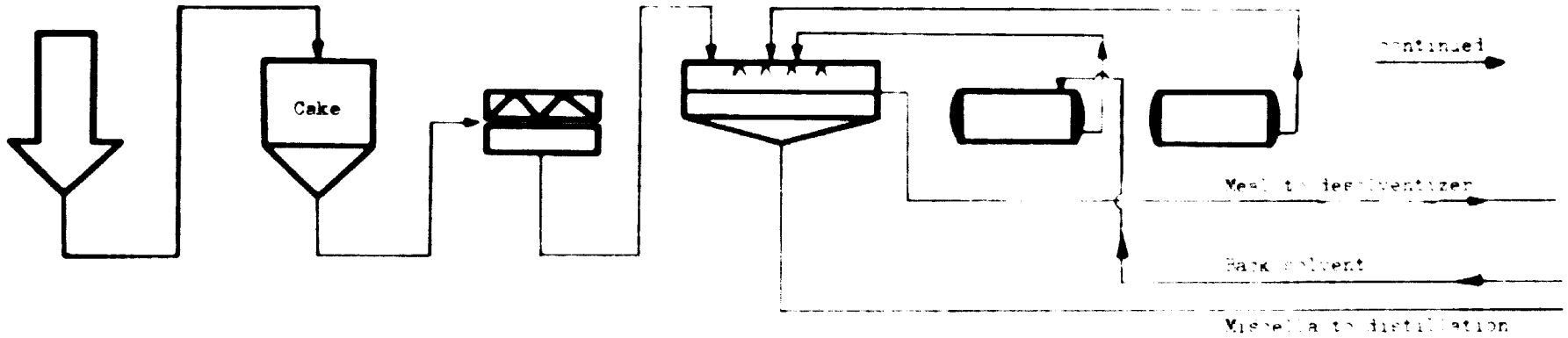
[illegible] Product Flow Diagram

If comparisons are made
then always on [illegible] basis





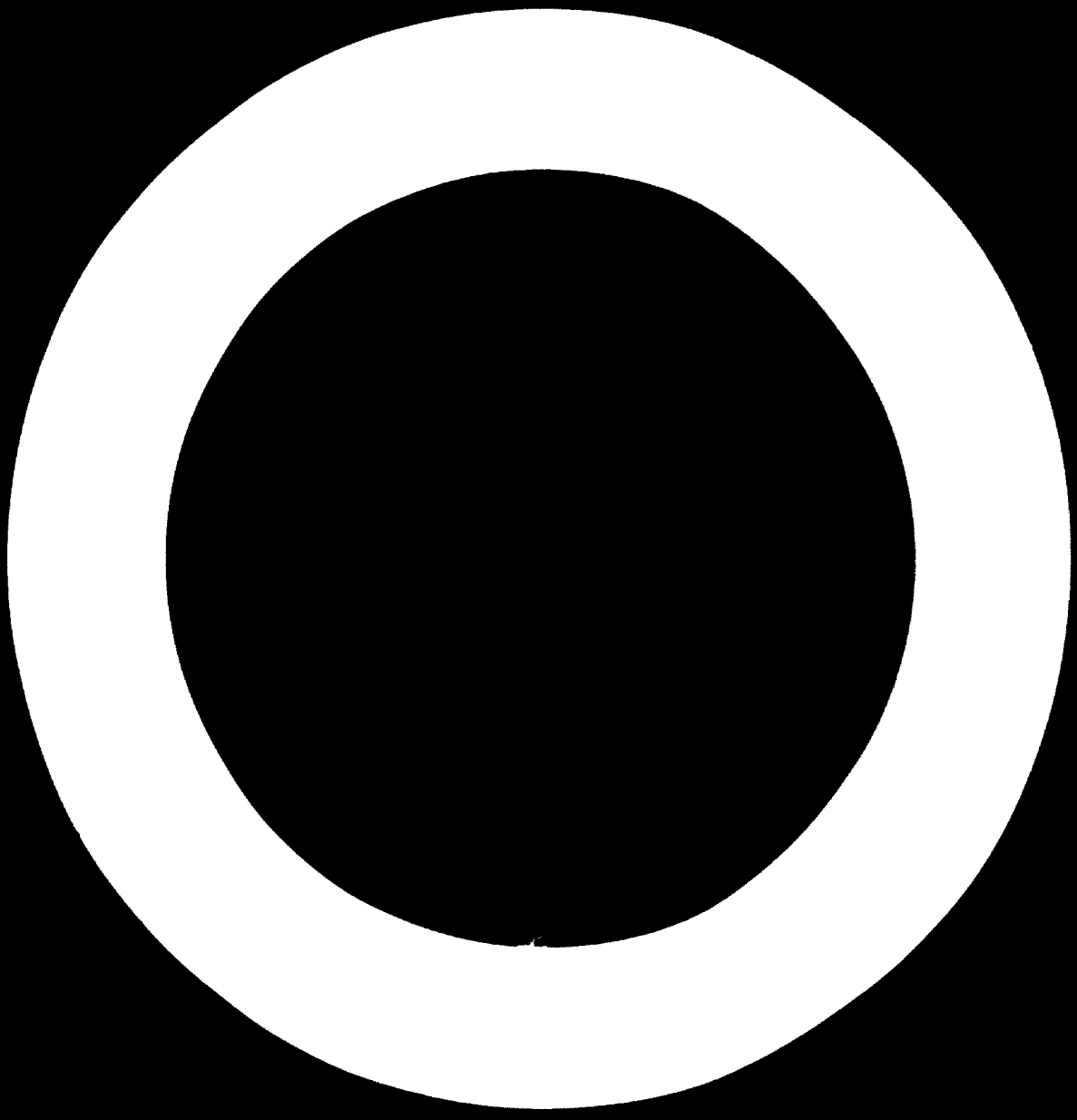
Transport	Cake Storage	Preparation	Extraction	Solvent Storage: Back Solvent	Solvent Storage: Fresh Solvent

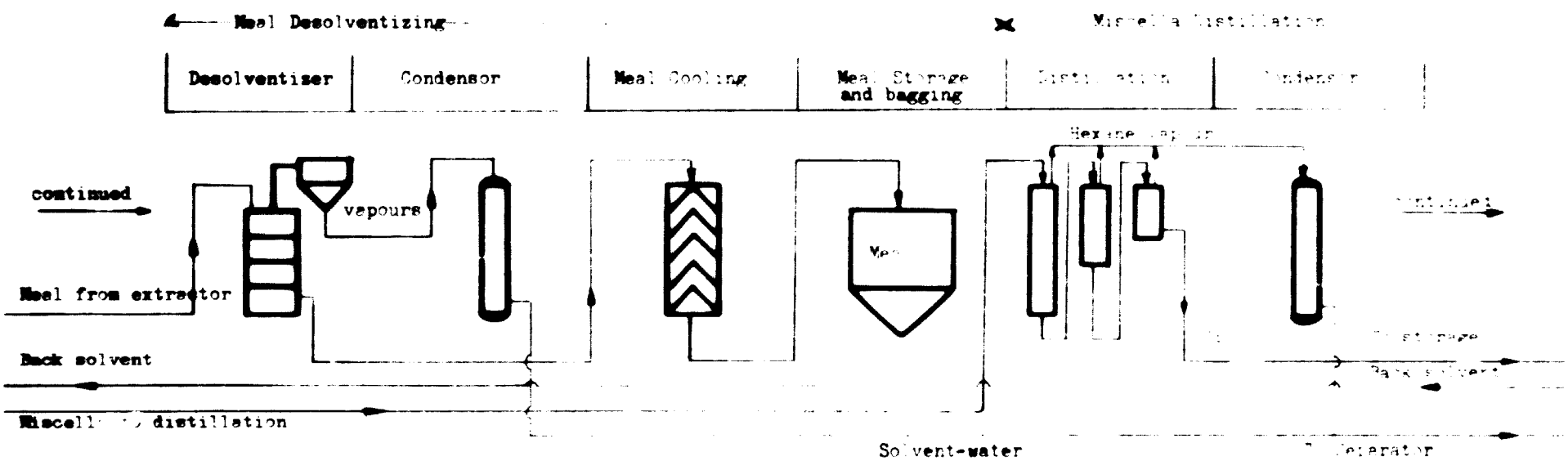


Means	Volume	Type	Type	Volume	Volume
Distance	Type	**Manufacturer**	**Manufacturer**	Type	Type
Time	**Max.** quantities Stored	Nominal capac.	Nominal capac.	Quantities	Quantities
		Actual Capac.	Actual capac.		
		Number			

L A B O U R (**Production workers**)

VII.D. SOLVENT EXTRACTION + BAGGING
2. Process Flow Diagram



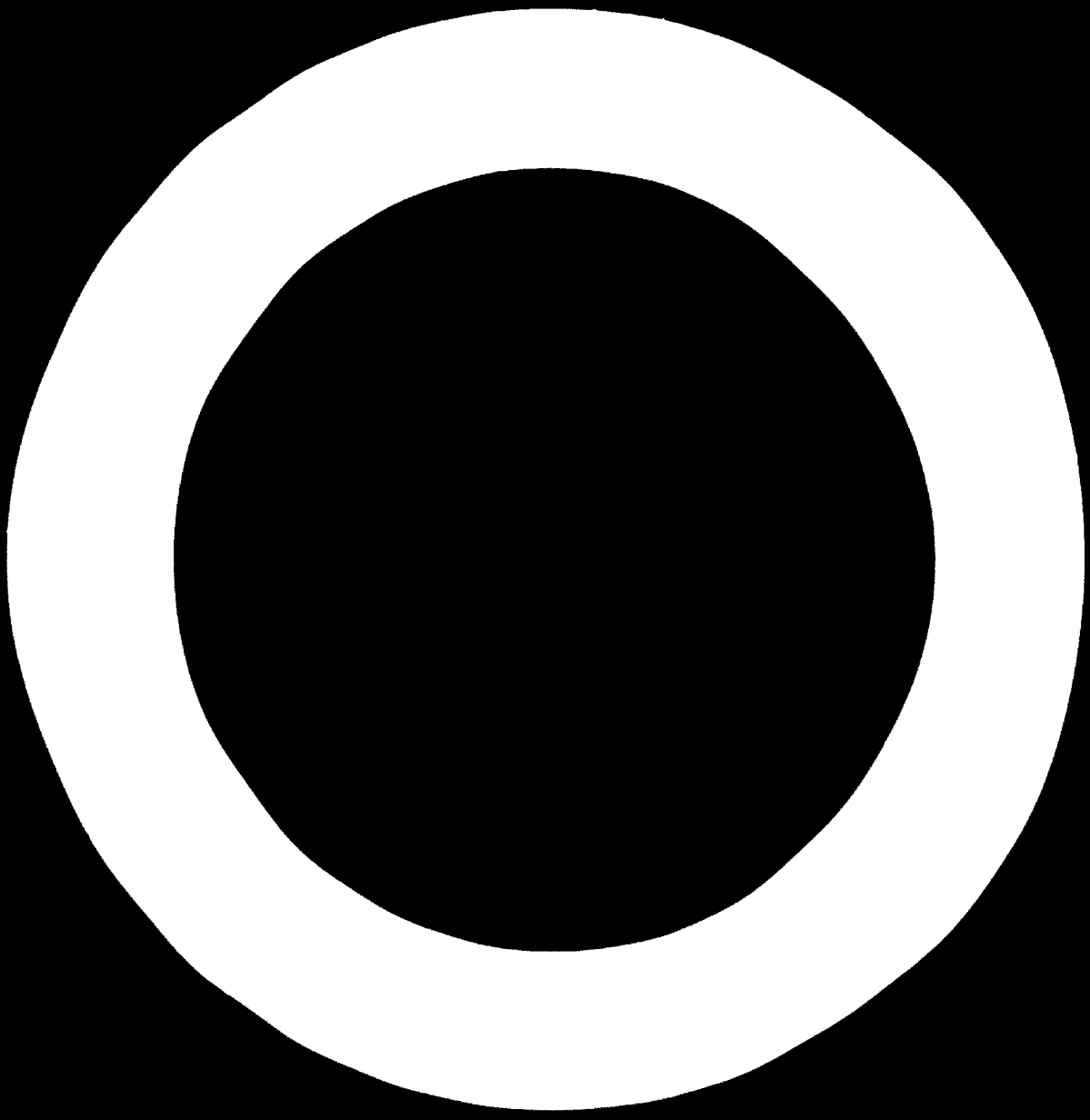


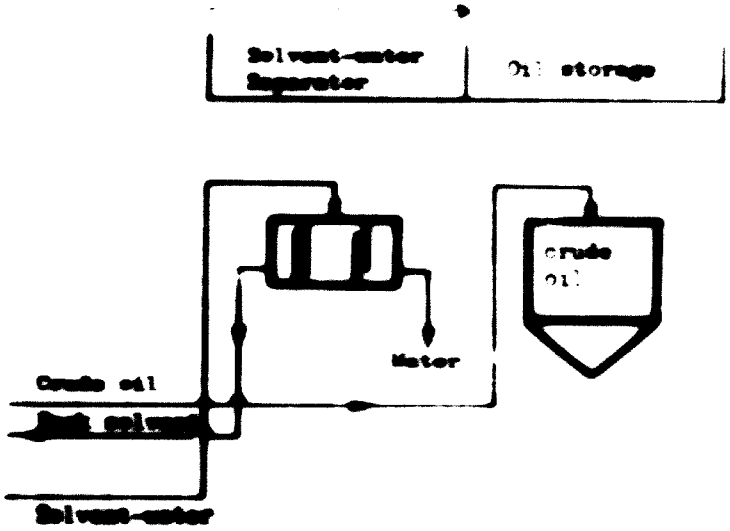
Type	Type	Type		Type	Type
Manufacturer	Manufacturer	Manufacturer	Type	Manufacturer	Manufacturer
Nominal capac.	Nominal capac.	Nominal capac.	Quantities	Nominal capac.	Nominal capac.
Actual capac.	Actual capac.	Actual capac.		Actual capac.	Actual capac.

(Production workers

VII.D. SOLVENT EXTRACTION + BAGGING

2. Process Flow Diagram (continued)



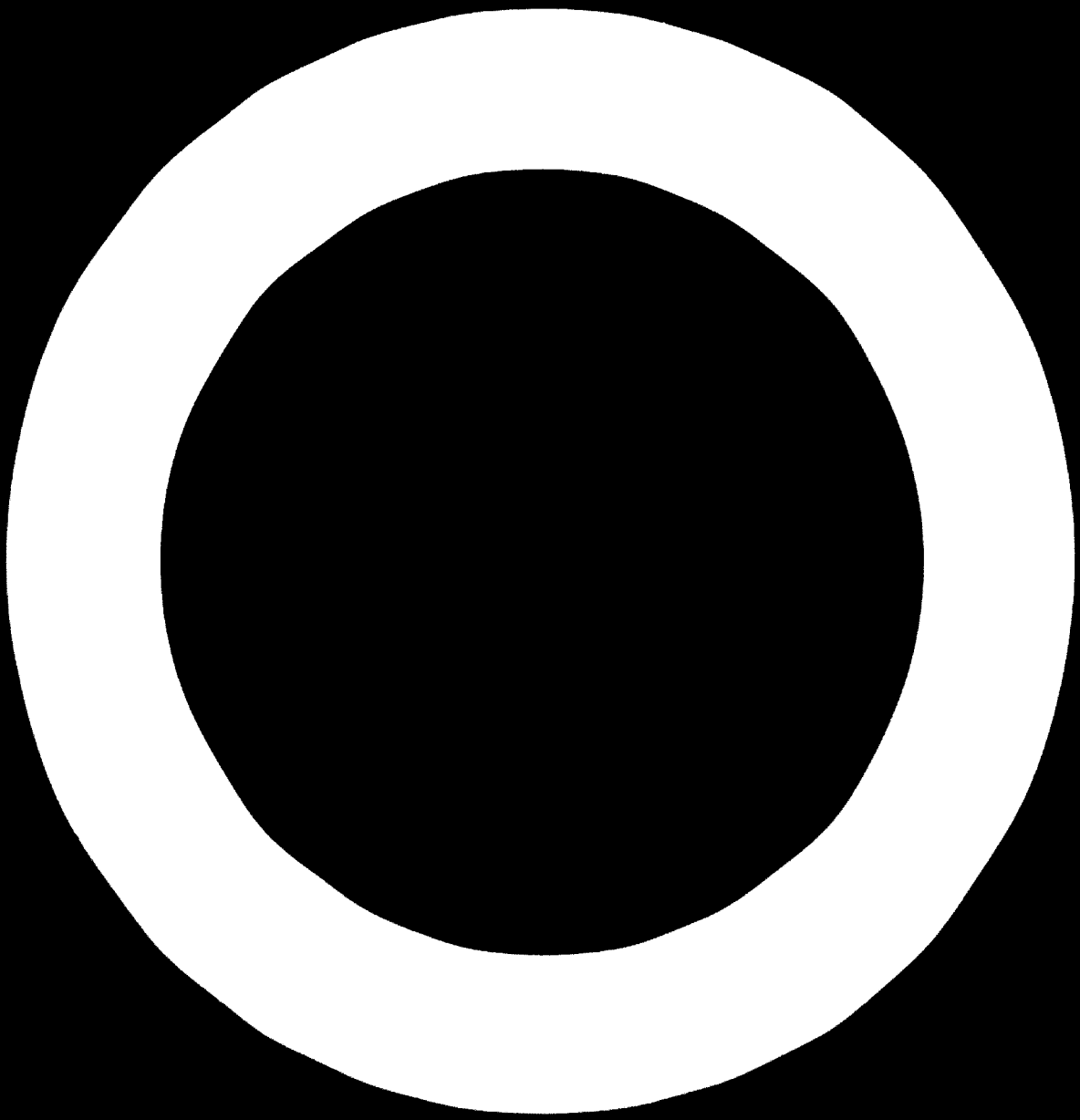


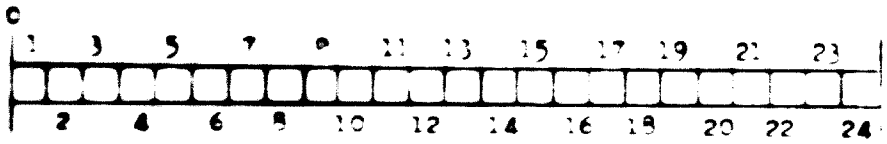
Type	Type
Volume	Volume
Manufacturer	Manufacturer

Total number of production workers times number of shifts:

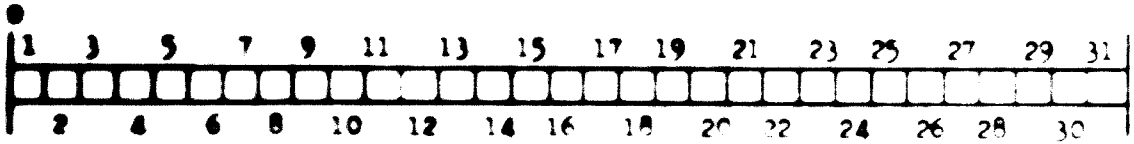
Non-production workers such as: Maintenance
Laboratory
Supervisor
Personnel

VII.B. SOLVENT EXTRACTION - BAGGING
2. Process Flow Diagram (continued)



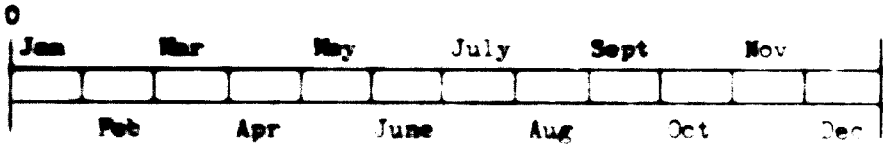


Hours/Day



Days/Month

Hours/Month

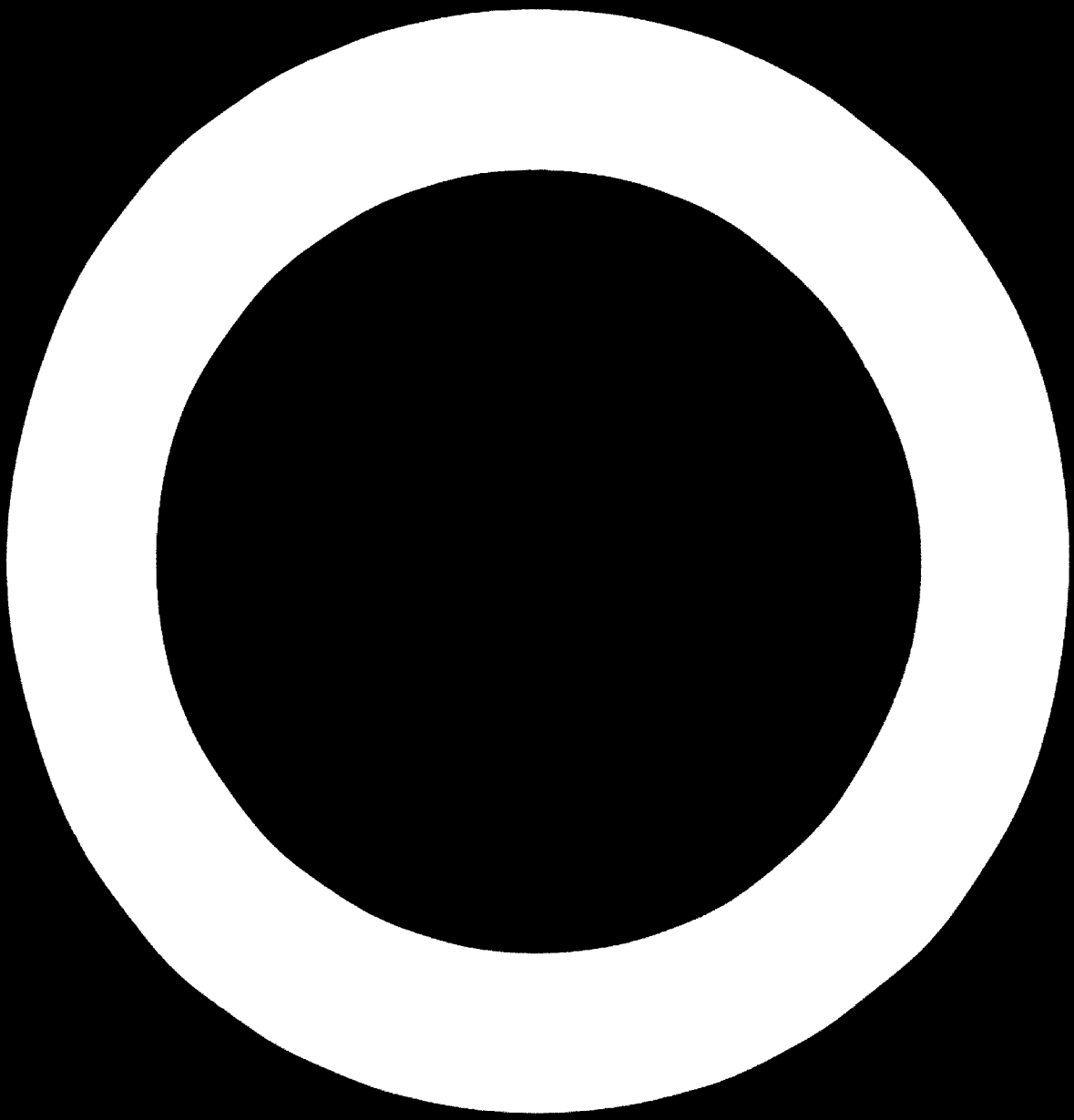


Months/Year

Days/Year

Hours/Year

VII.B.3. [redacted]



VII.D.4. COMMENTS ON THE SOLVENT EXTRACTION AND BAGGING DEPARTMENT

a) Technology and equipment:

b) Manpower requirements:

c) Operating time:

EXPLANATORY NOTES

The PROCESS FLOW DIAGRAM for the refining process summarises the neutralisation, bleaching, deodorization, winterization and filling/packing departments.

See pages 117, 119 and 121.

VII.E. NEUTRALIZATION DEPARTMENT

The following questions should be answered on the Product Flow Diagram (attached):

a) Quantity (kg) of crude oil processed;

b) Quantity (kg) of neutralized oil processed;

c) Quantity (kg) of phosphoric acid consumed;

d) Quantity (kg) of sodium hydroxide consumed;

e) Quantity (kg) of sodium chloride and/or other salt consumed;

f) Electrical energy (kWh) consumed by the neutralization process;

g) Quantity (kg) of steam consumed;

h) Quantity (m^3) of water consumed.

The following laboratory tests are required:

a) FFA content of crude oil;

b) FFA content of neutralized oil.

The Product Flow Diagram lends itself to calculating the production loss (in actual quantities and/or percentages) by subtracting the product from the raw material.

The fatty acids eliminated during the neutralisation process, however, should not be counted as production loss if the soapstock (fatty acids) is used in soap production or otherwise. The production loss would then have to be calculated as follows:

a) kg of crude oil minus kg of fatty acids contained = Z

b) kg of refined oil produced = Y

c) production loss = X

d) X = Z - Y

In order to measure the efficiency of the neutralisation process, the neutralisation factor can be defined as follows:

$$F = \frac{\text{FFA content in crude oil}}{\text{Fatty acids contained in soapstock}}$$

Evaluation: after the Product Flow Diagram has been completed and evaluated, state:

a) total production loss: .....kg = ...%

b) production loss excluding fatty acids: .....kg = ...%

c) neutralisation factor F = ...

d) consumption of sodium hydroxide .....kg/ton

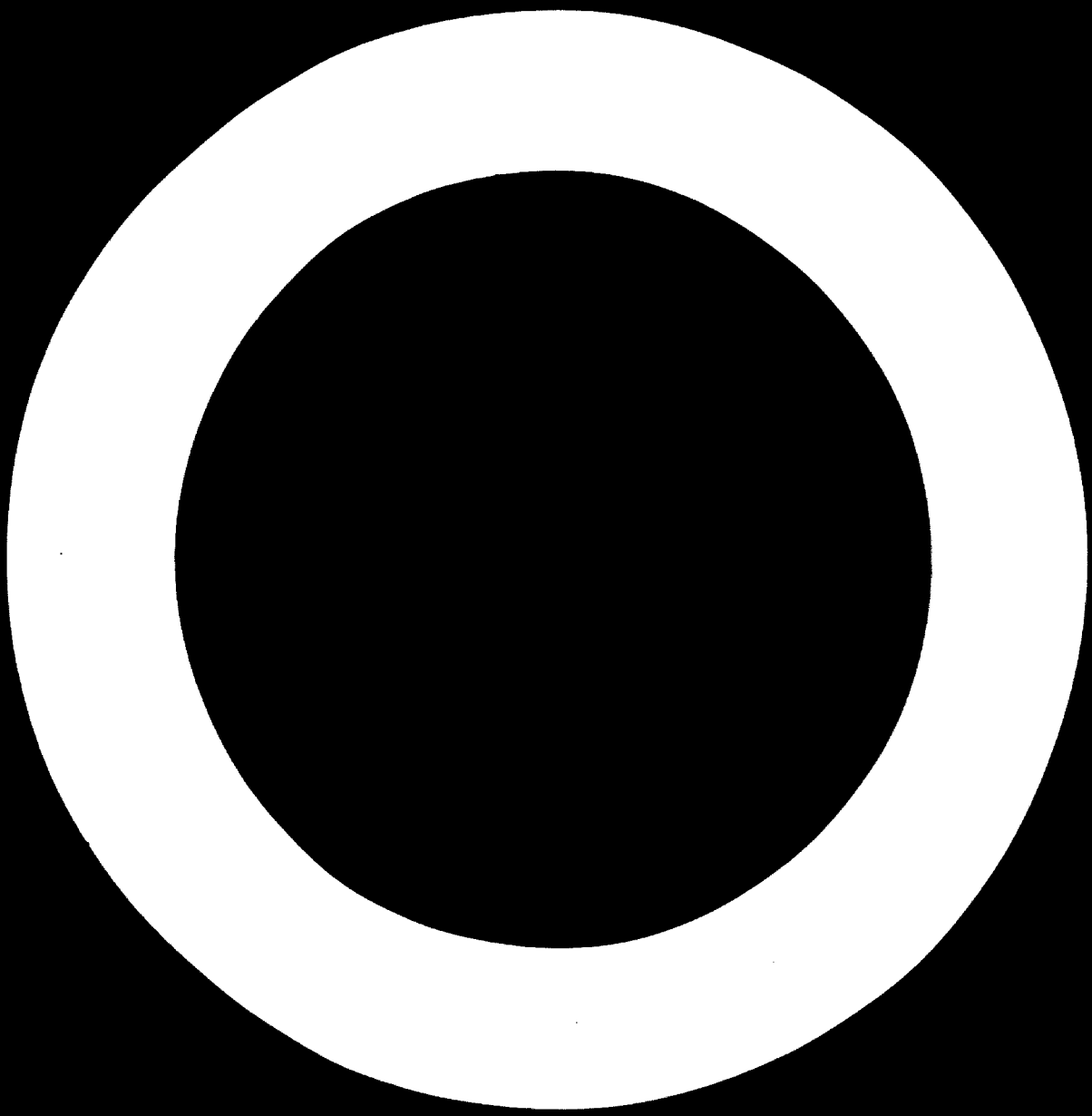
e) consumption of sodium chloride (salt) .....kg/ton

f) consumption of water .....m^3/ton

g) consumption of phosphoric acid .....kg/ton

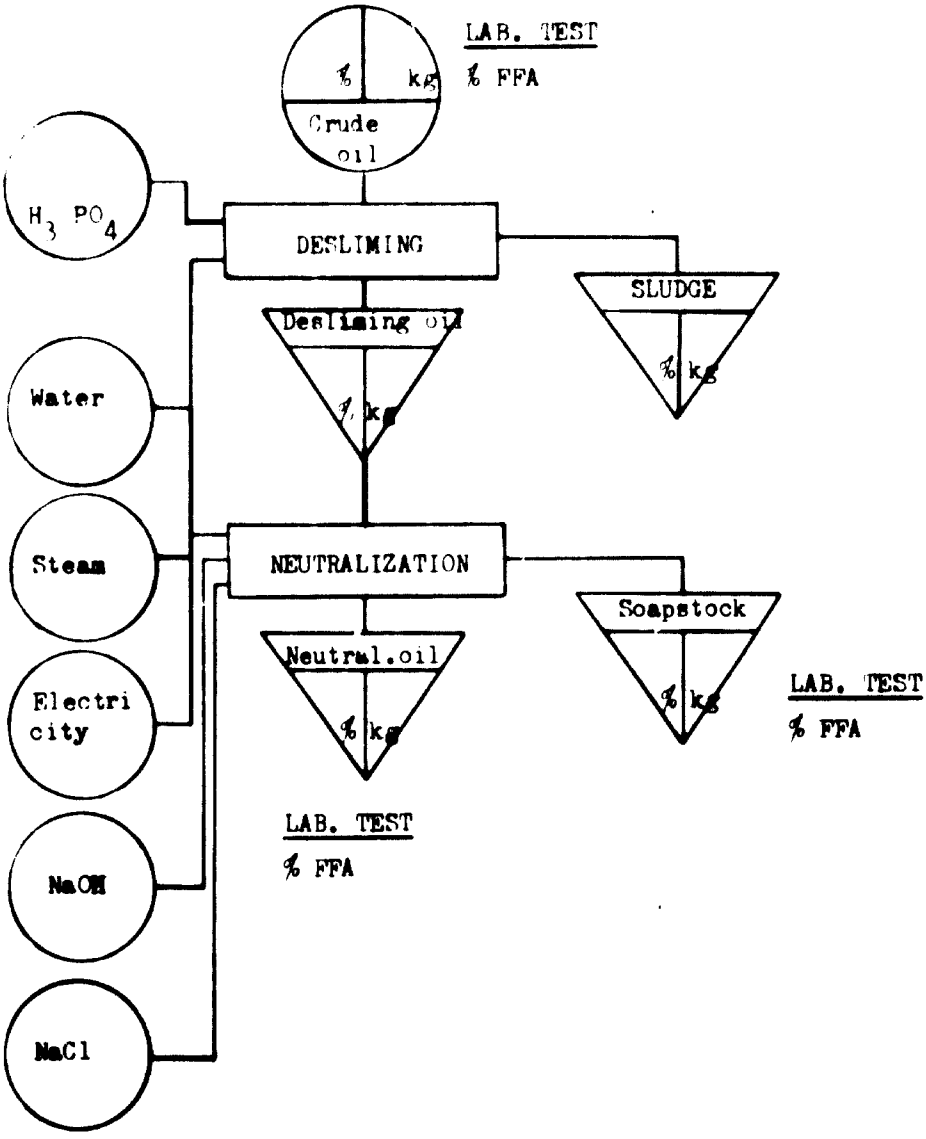
h) steam consumption per ton of crude oil .....kg/ton

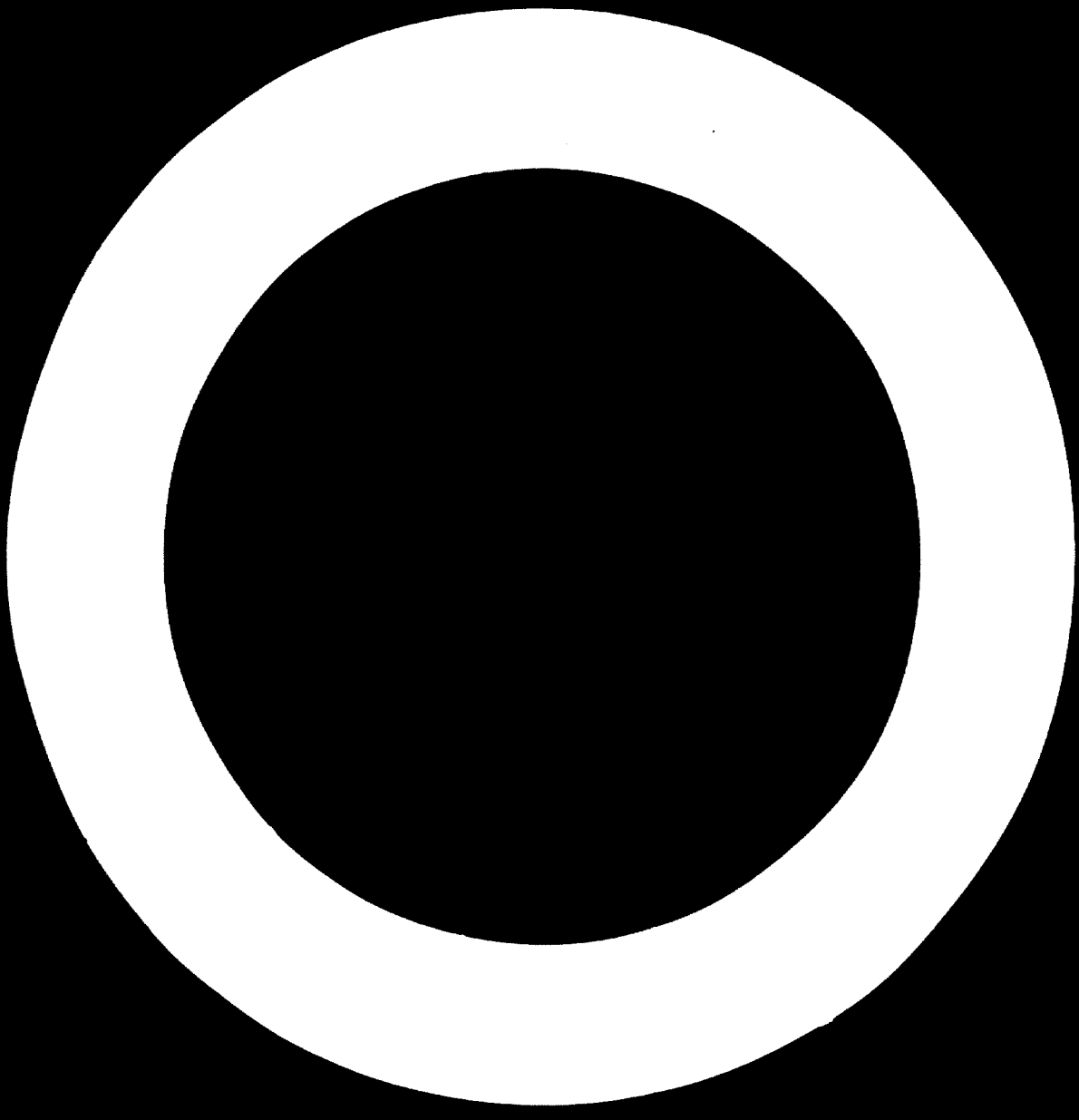
i) consumption of electrical energy per ton of crude oil processed .....kWh/ton



VII.E. NEUTRALIZATION

1. Product Flow Diagram





VII.F. BLEACHING DEPARTMENT

The following questions should be answered on the Product Flow Diagram (attached):

a) Quantity (kg) of neutralized oil processed;

b) Quantity (kg) of bleached oil produced;

c) Quantity (kg) of bleaching earth consumed;

d) Electrical energy (kWh) consumed;

e) Quantity (kg) of steam consumed.

The following laboratory tests are required:

a) Colour test of neutralized oil (LOVIBOND);

b) Colour test of bleached oil (LOVIBOND).

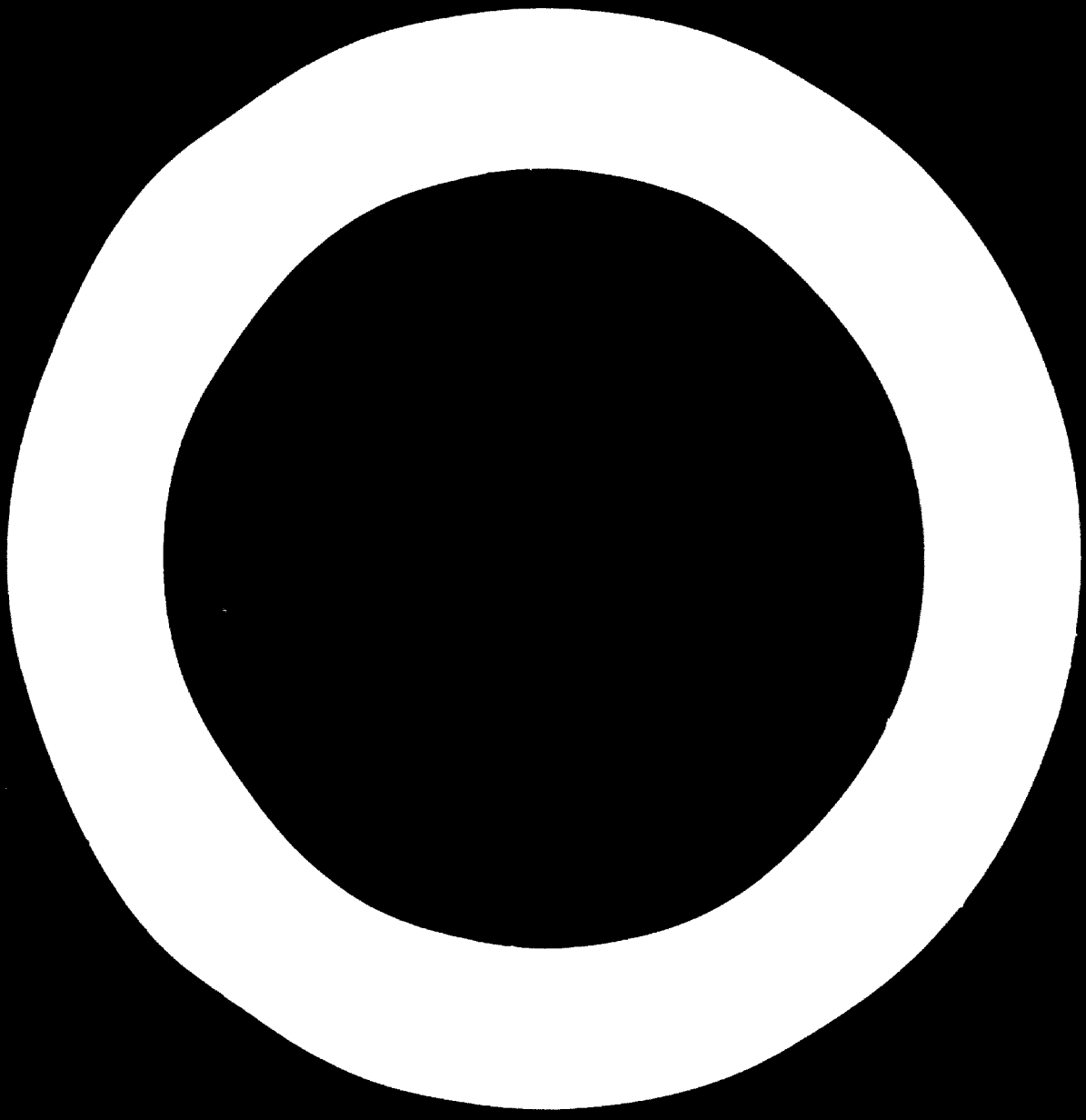
Evaluation: after the Product Flow Diagram has been completed and evaluated, state:

a) total production loss: .....kg = ...%

b) consumption of bleaching earth per ton of neutralised oil: .....kg/ton

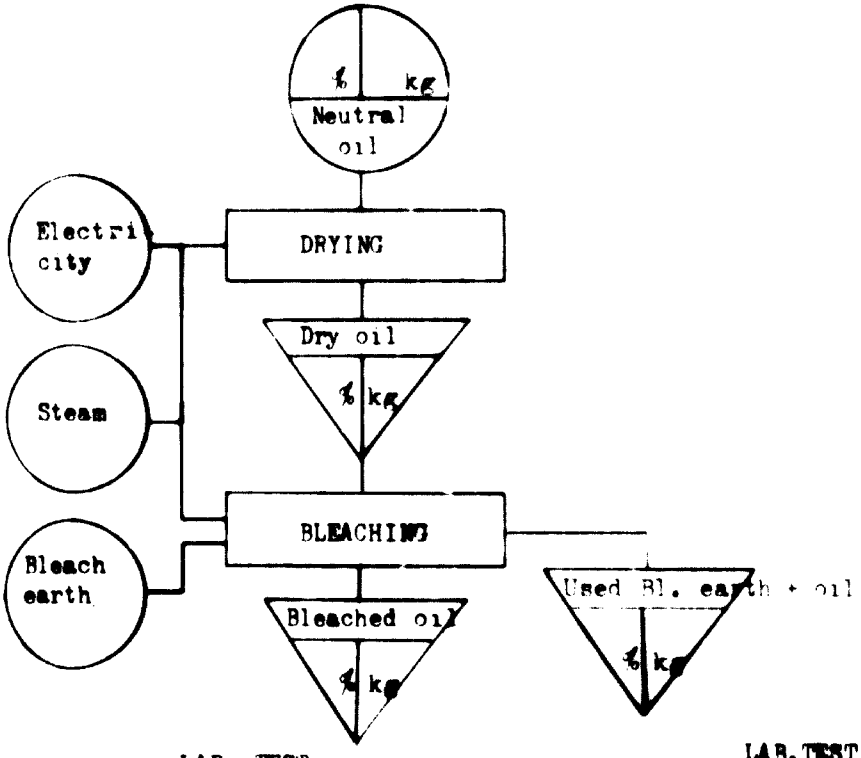
c) consumption of electrical energy per ton of neutralised oil: .....kg/ton

d) consumption of steam per ton of neutralised oil: .....kg/ton



VII.F. BLEACHING

1. Product Flow Diagram

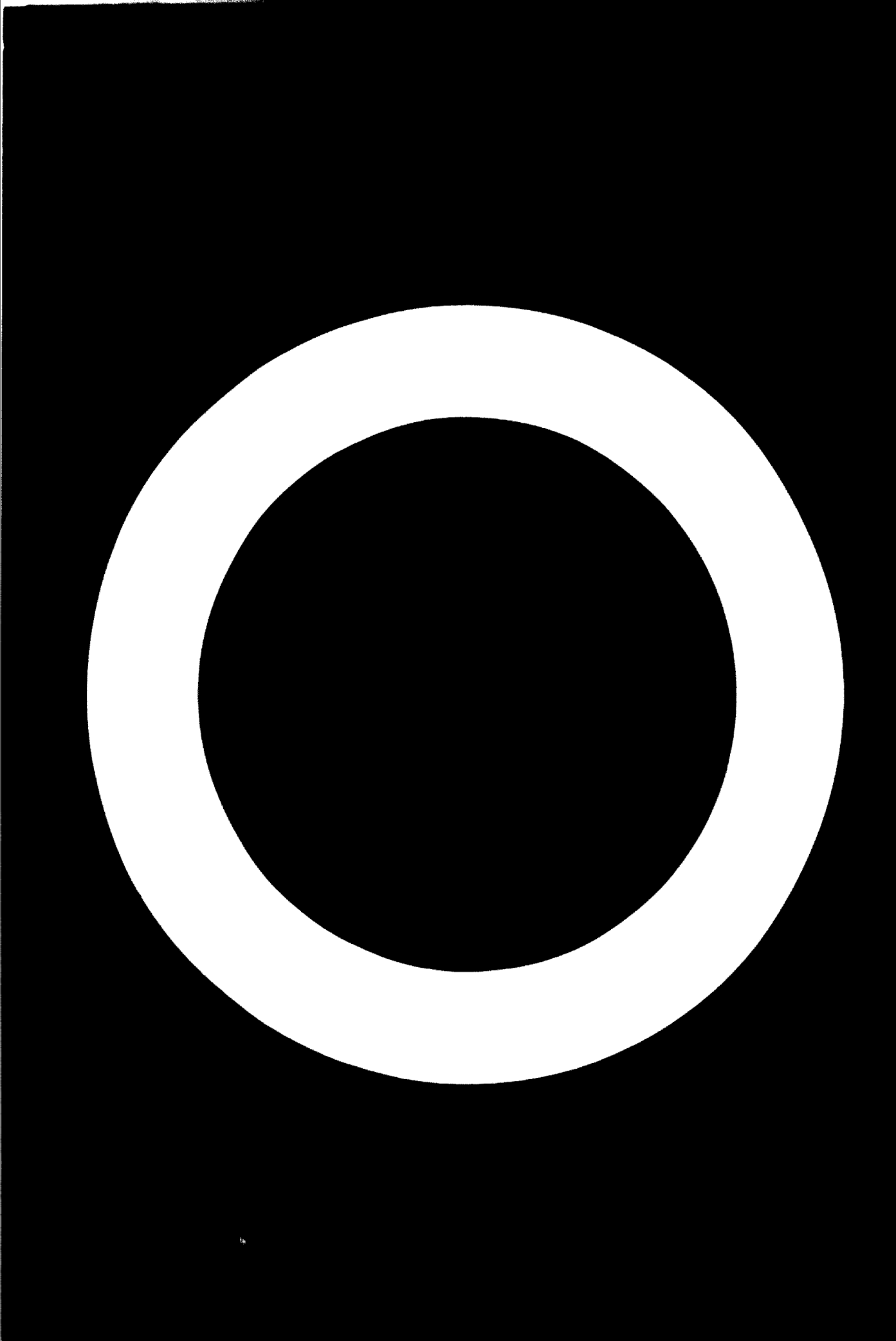


LAB. TEST

% FFA
Colour (LOVIBOND)

LAB. TEST

% oil in used earth



VI. DEODORIZATION DEPARTMENT

The following questions should be answered on the Product Flow Diagram attached :

a quantity kg of bleached oil processed;

b quantity kg of deodorised oil produced,

c Electrical energy kWh consumed;

d quantity kg of steam consumed.

The following laboratory tests are required:

a FFA content of deodorised oil;

b Colour test of deodorised oil;

c Odour test of deodorised oil;

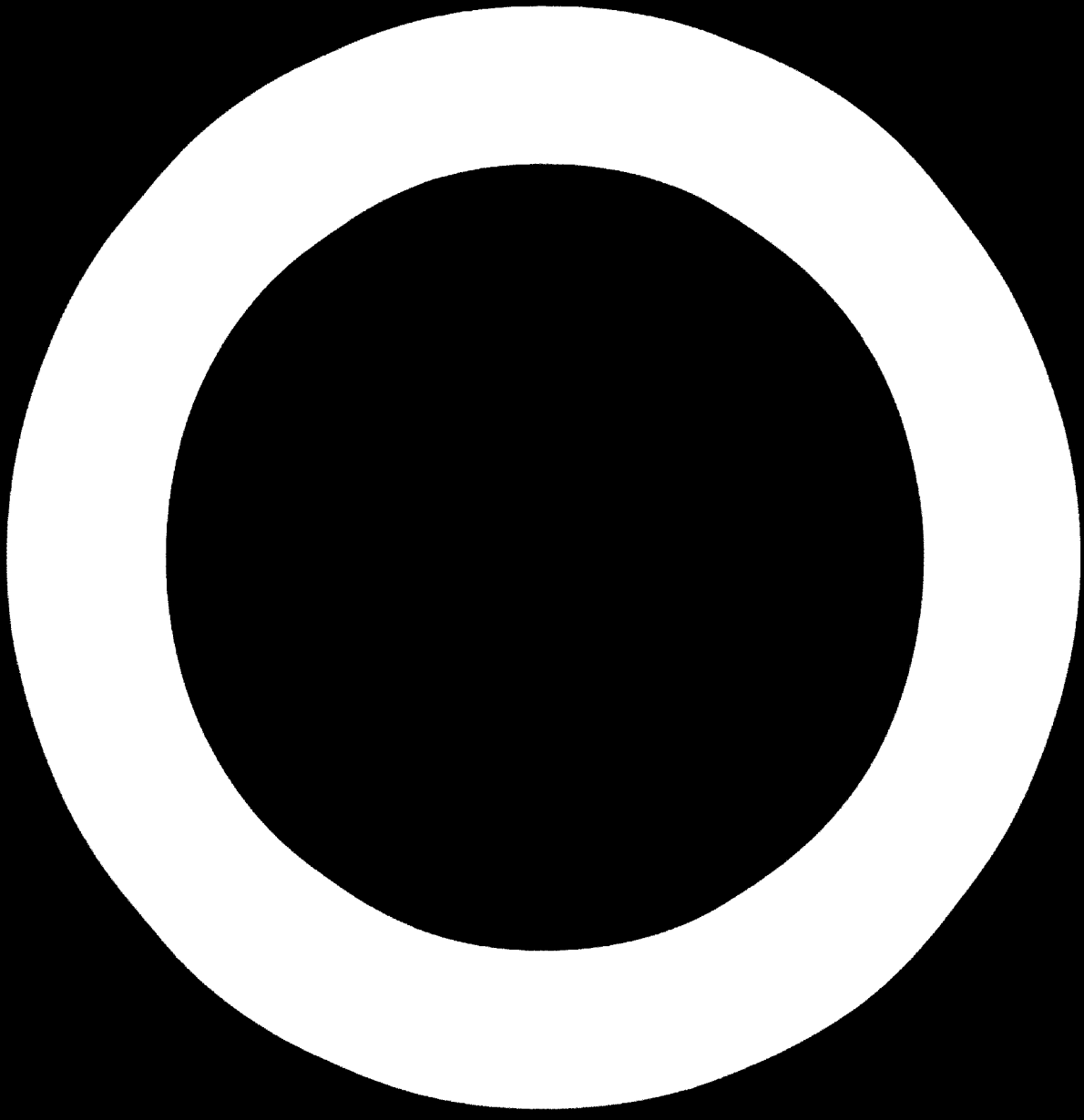
d High temperature frying test.

Evaluation: after the Product Flow Diagram has been completed and evaluated, state:

a) total production loss: .....kg - .....%

b) consumption of electrical energy per ton of bleached oil: .....kWh ton

c) consumption of steam per ton of bleached oil: .....kg ton



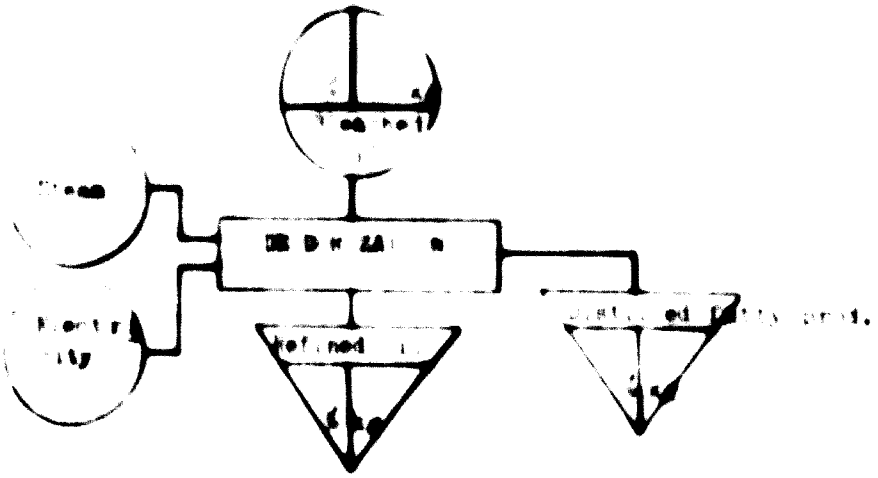
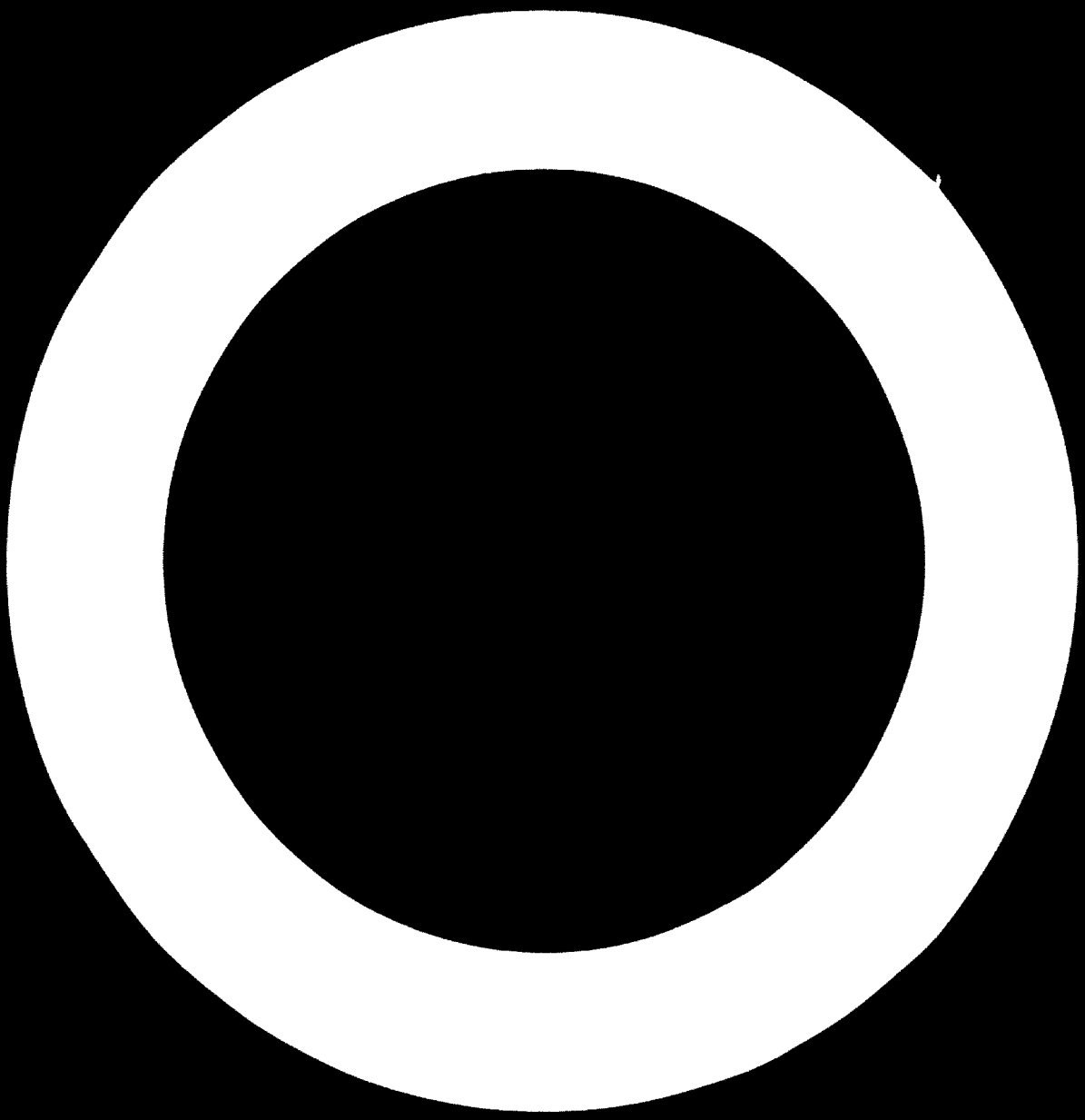


Table XXII

6 PPM

L WIDTH colour)

colour, taste



VII.H. WINTERIZATION OPERATION

The following questions should be answered on the Product Flow Diagram attached :

a quantity kg of deodorised oil processed;

b quantity kg of winterised oil produced,

c Electrical energy :

The following laboratory tests are required:

a FFA content of winterised oil;

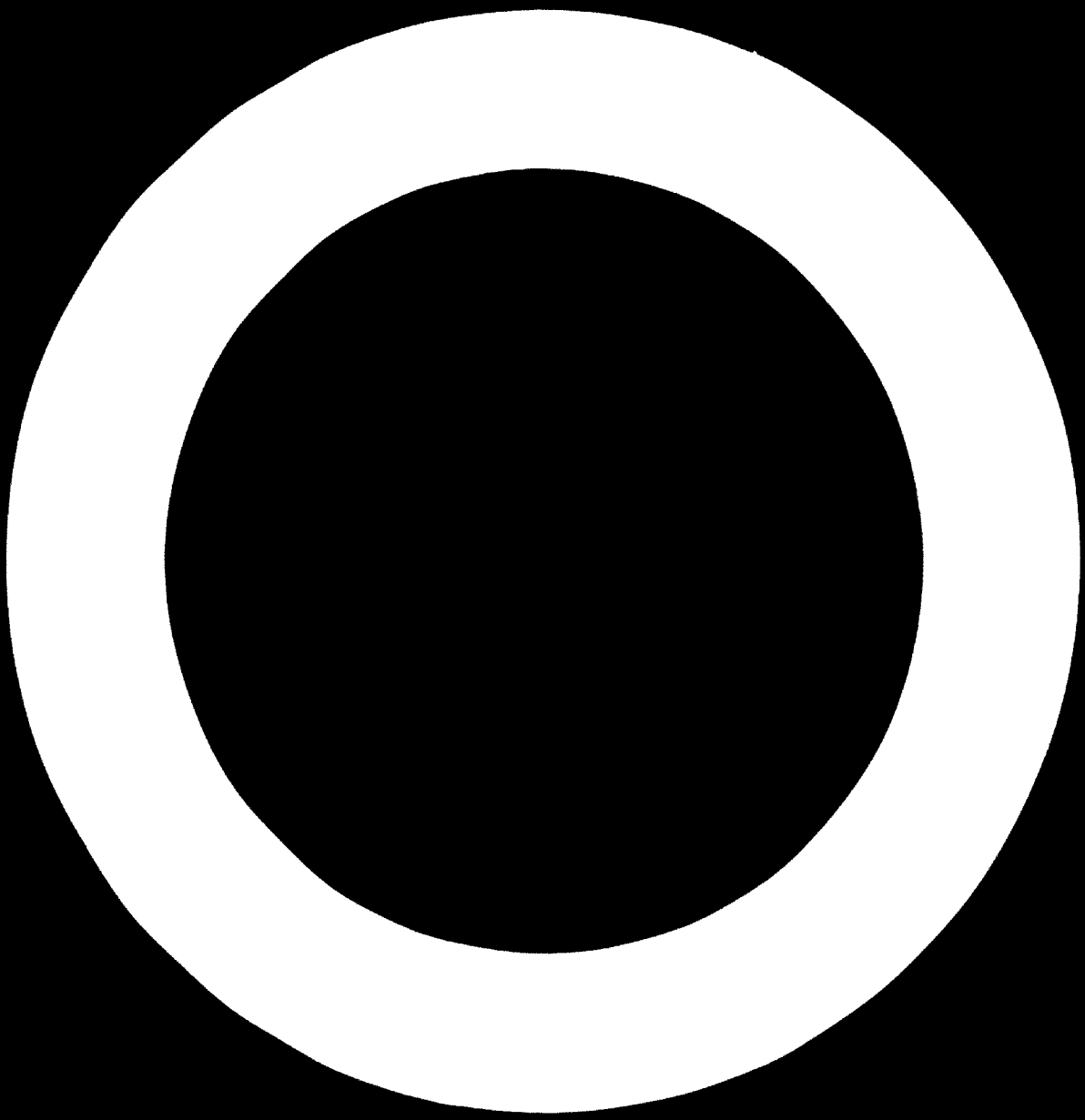
b Colour test of winterised oil;

c Odour test of winterised oil.

Evaluation: after the Product Flow Diagram has been completed and evaluated, state:

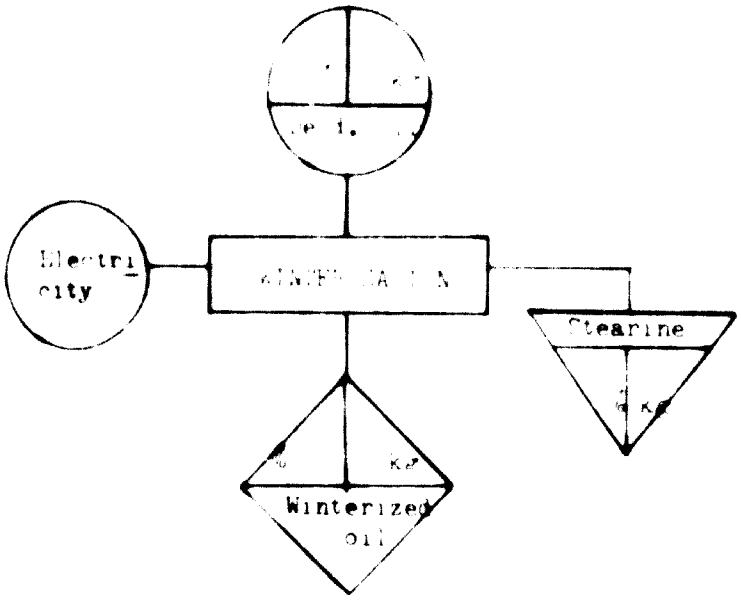
a total production loss: .....kg = ...%

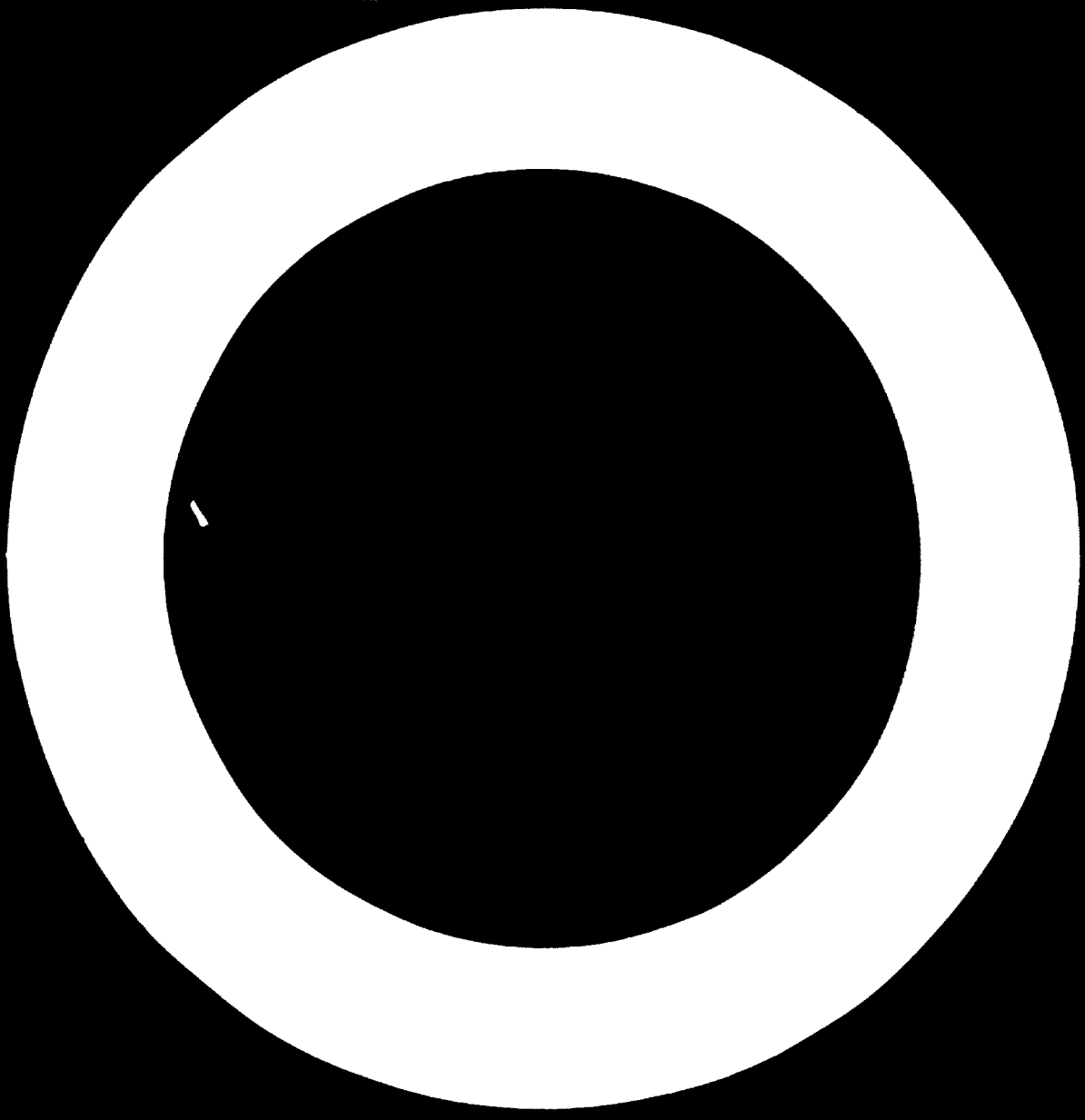
b consumption of electrical energy per ton of deodorised oil: .....kWh ton

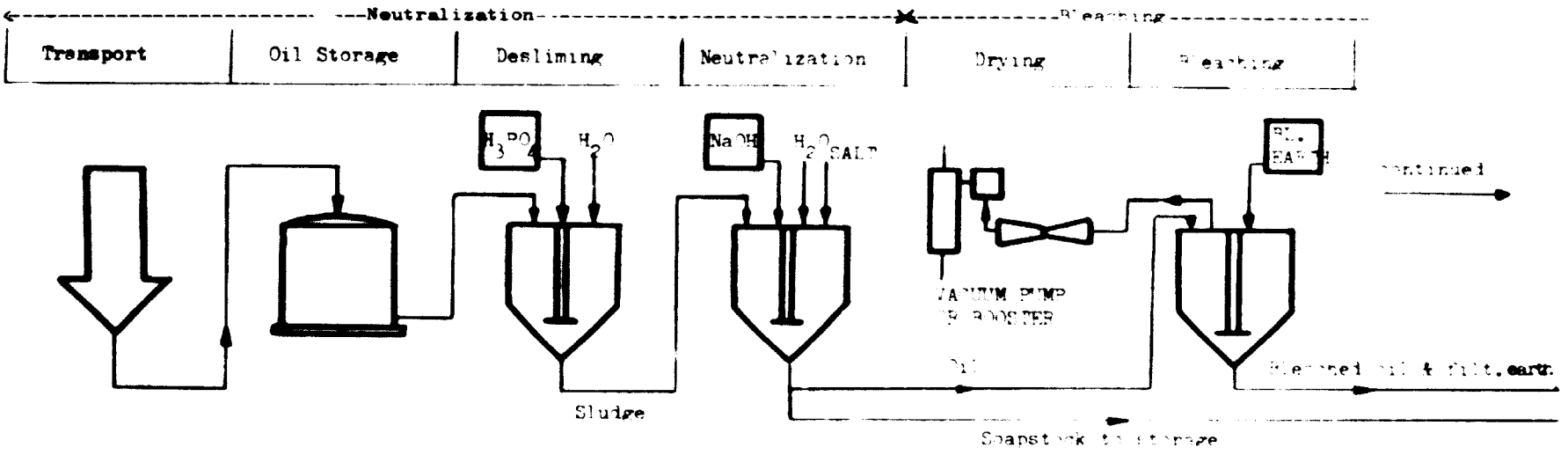


V ..H. WINTER ZA ..

1. Pr.. ..w Diagram





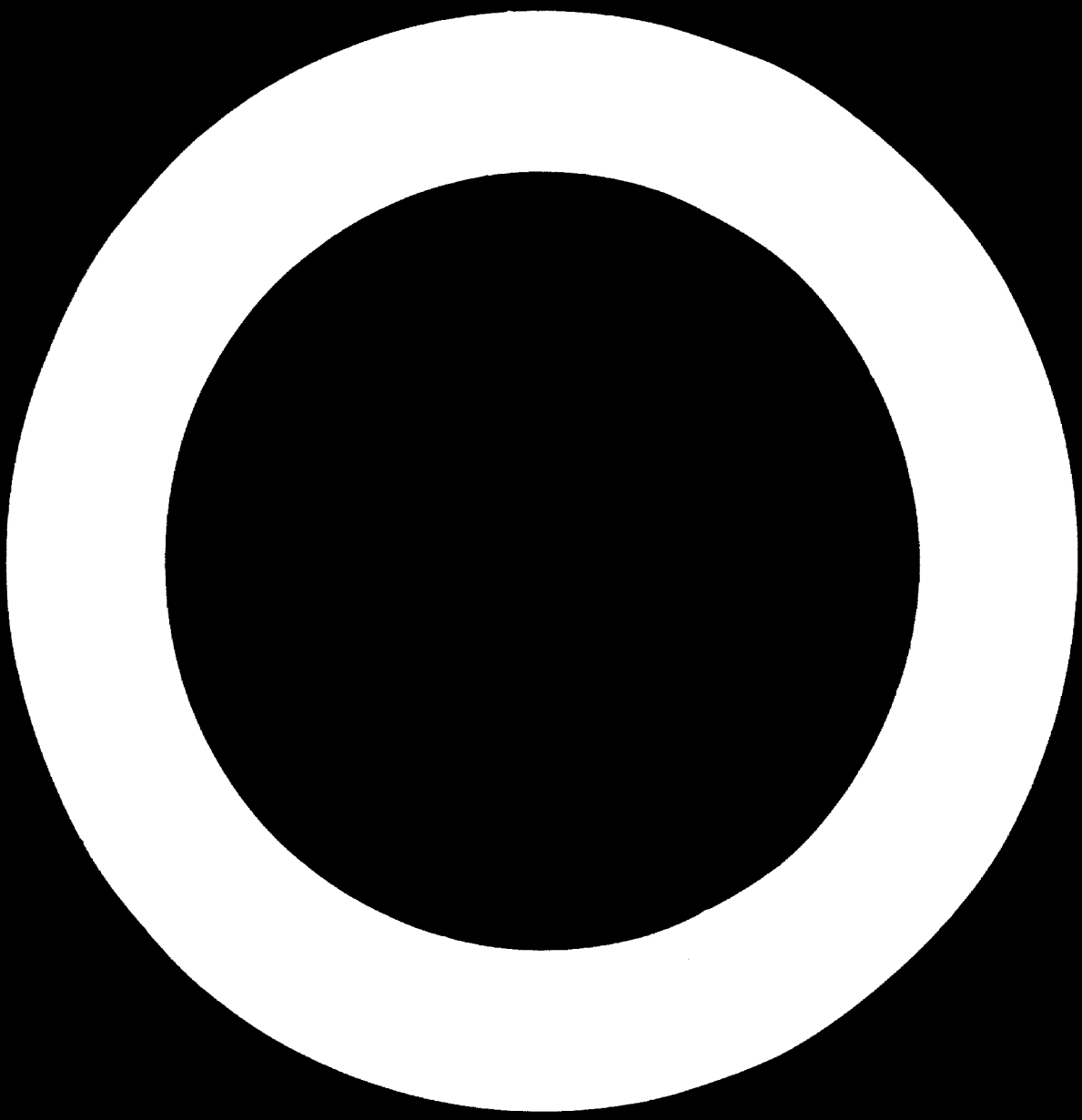


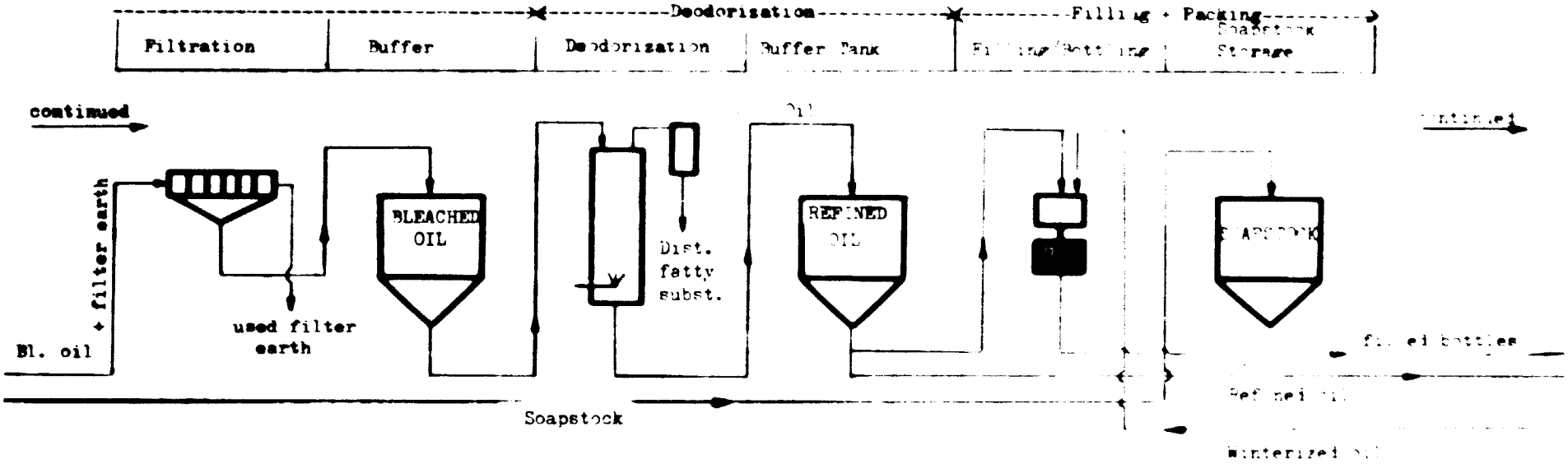
Means:	Volume:	Volume of vessel:	Volume:	Type:	Volume of cleaner:
Distance:	Type:	Kg per batch:	Kg per batch:	Nominal capacity:	Kg. per batch:
Time:	**Max.** Quantities Stored:	Ø time per batch:	Ø time per batch:	Actual capacity:	Ø time per batch:
	Storage Time Ø:	Manufacturer:	Manufacturer:	Manufacturer:	No. of plants:
					Number of Pr.

L A B O U R (**Production workers**)

VII. E.+F.+G.+H =(Refining) - NEUTRALIZATION, BLEACHING, DEODORIZATION AND WINTERIZATION

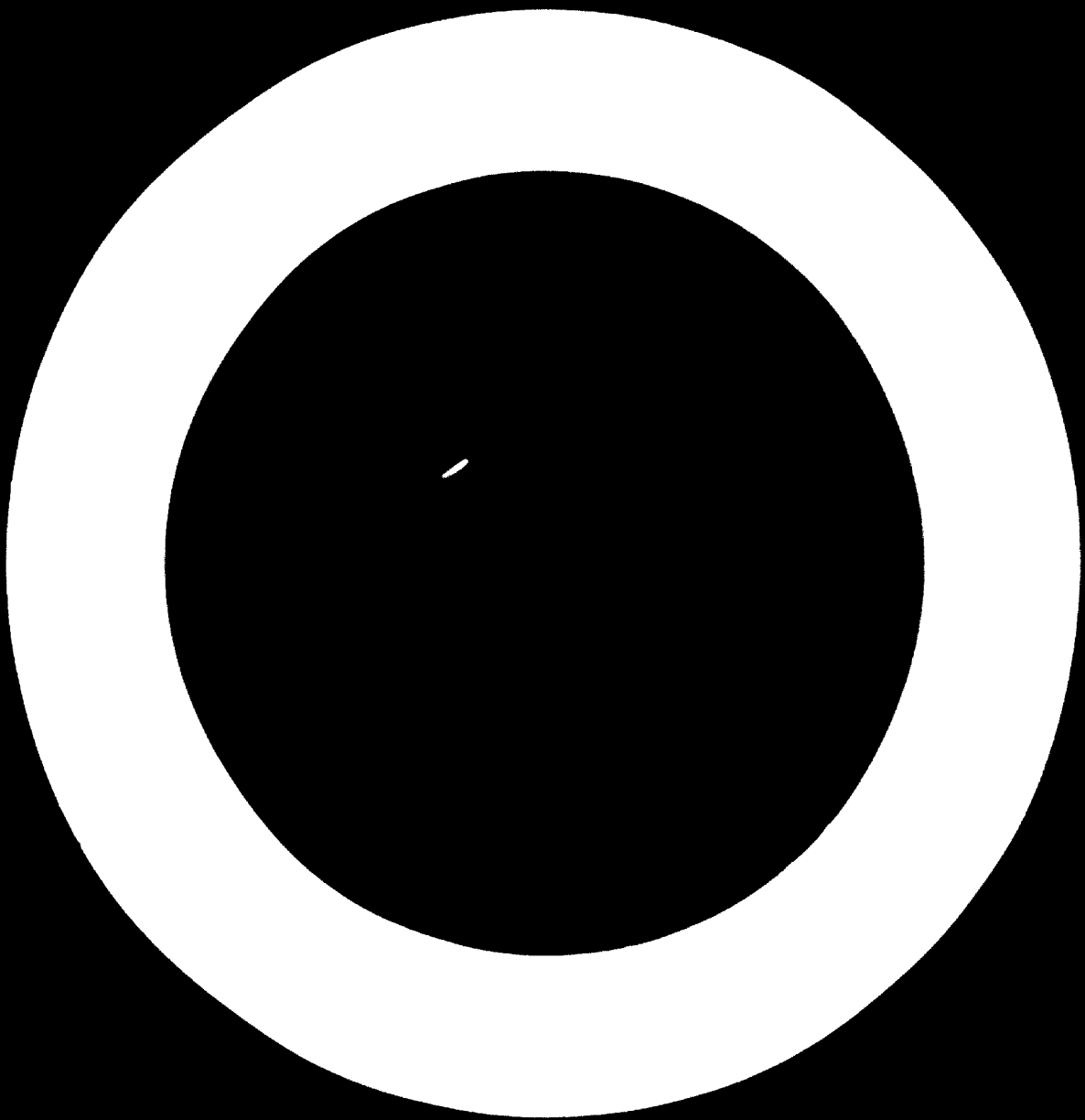
2. Process Flow Diagram

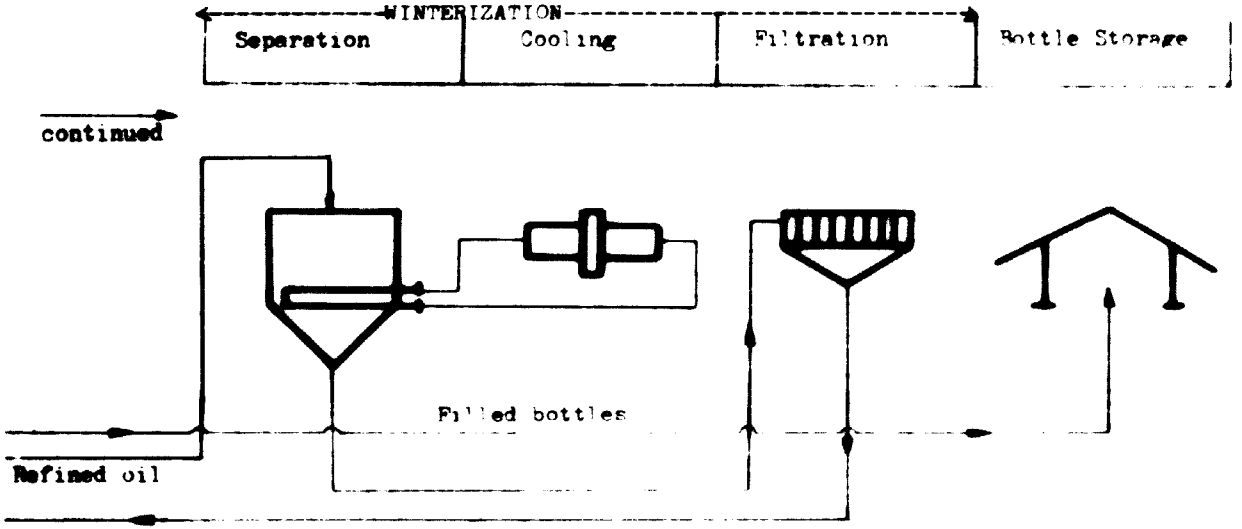




VII.E.+F.+G.+H. = (Refining) - NEUTRALIZATION, BLEACHING, DEODORIZATION, WINTERIZATION

2. Process Flow Diagram (continued)

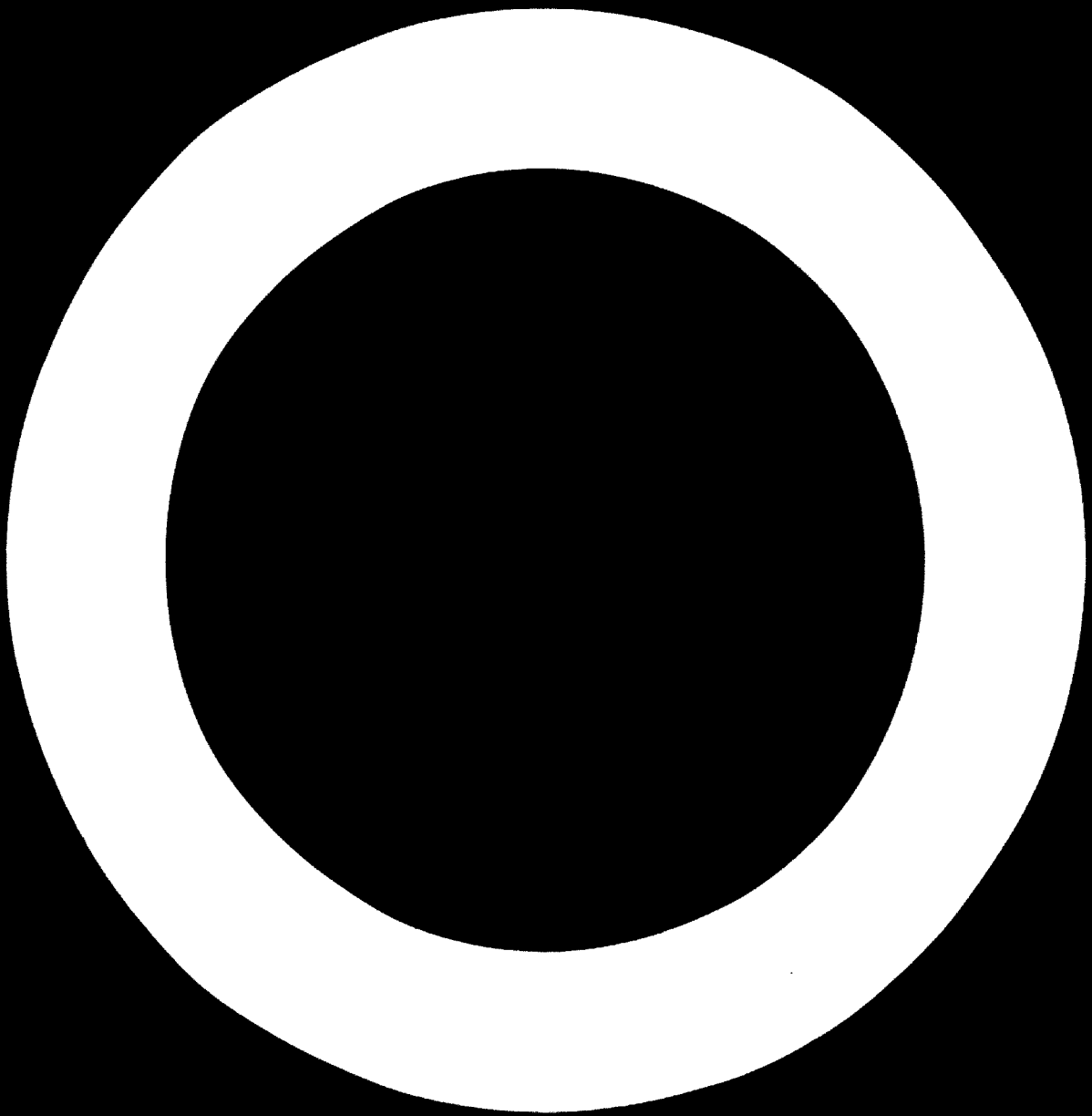


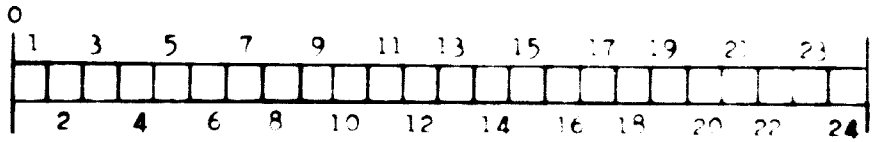


Type/volume:	Type:	Type:	Type:
Kg. per batch:	Nominal Capacity:	Nominal Capacity:	Nominal Capacity:
Time per batch:	Actual Capacity:	Actual Capacity:	Actual Capacity:
Manufacturer:	Manufacturer:	No. of plates:	
Temperature Ø:		No. of Pr.	

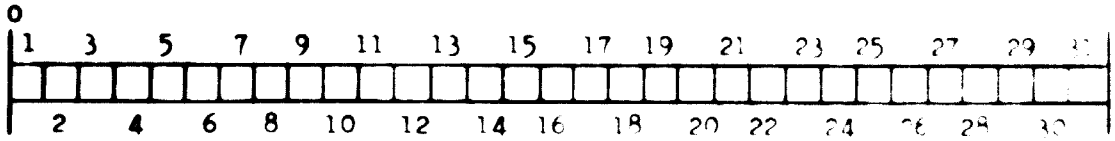
Total number of production workers times number of shifts:
Non-production workers such as:
Maintenance
Laboratory
Supervisor
Personnel

VII.E.+F.+G.+H. = (Refining) - NEUTRALIZATION, BLEACHING, DEODORIZATION, WINTERIZATION
2. Process Flow Diagram (continued)



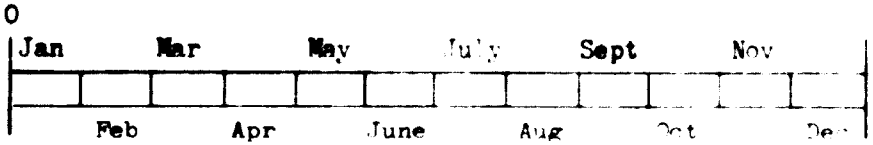


Hours/Day



Days/Month

Hours/Month

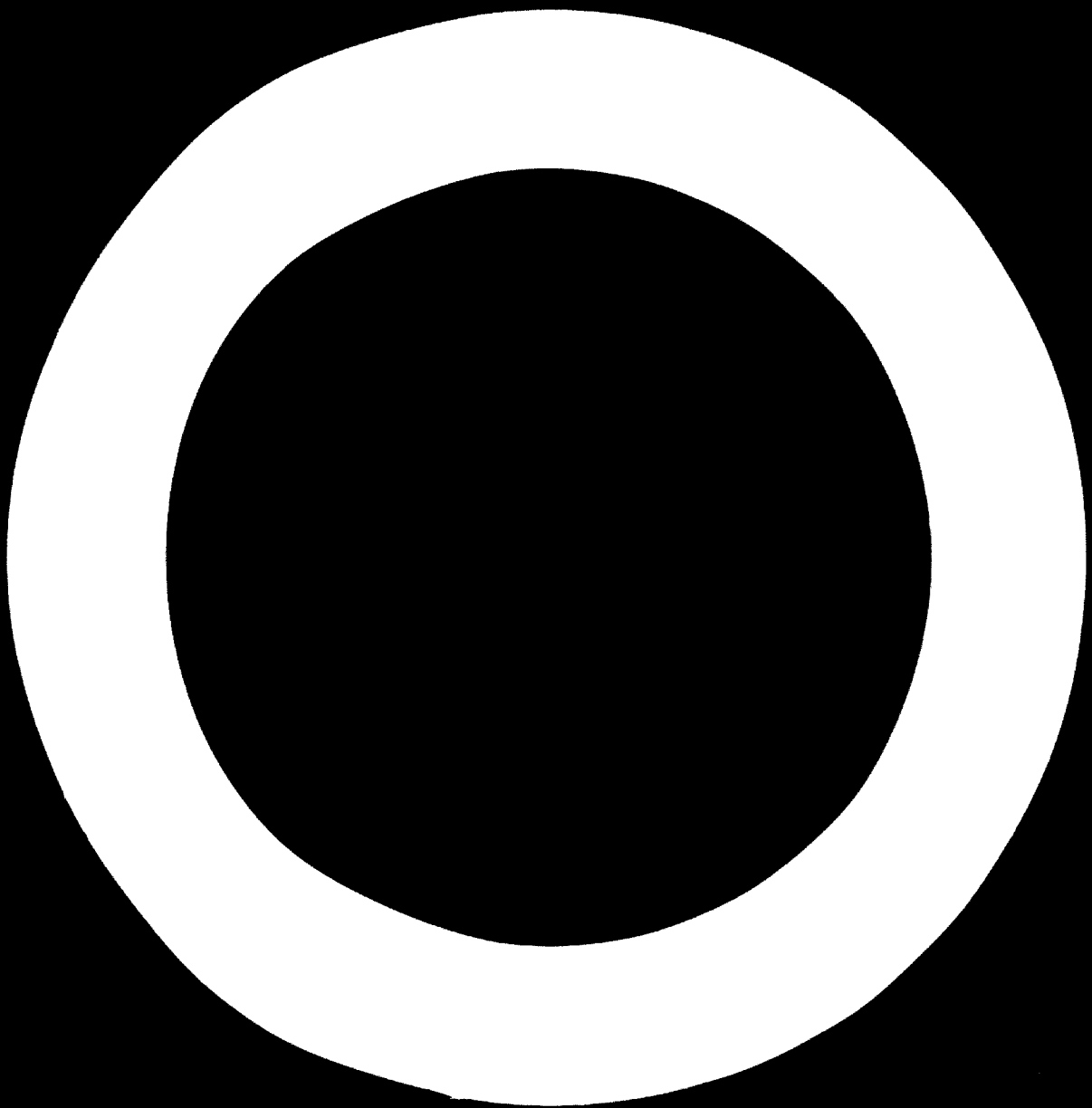


Months/Year

Days/Year

Hours/Year

VII. E.+F.+G.+H. 3. OPERATING TIME



VII.E.+F.+G.+H.). [redacted]TS IN THE NEUTRALIZATI N, BLEACHING, DE D RIZATI N AND WINTERIZATI N [redacted]TS

a) Technology and equipment:

b) Manpower requirements:

c) Operating time:

EXPLANATORY NOTES

Ad.VIII.A.: Production Cost Centres

The heading supervisory staff and foremen includes the technical personnel (engineers or similar) who are attached to the production cost centres for most of the year. This Profile study is interested in assessing the skill requirements for each specific production cost centre. Only those engineers who engage in managerial desk work and research and development may be classified in VIII.B.

If a significant portion of the establishment's work is operated seasonally, report the number of employed persons separately for each cost centre indicating their number in parenthesis to signify that it is included in the total.

VIII. [illegible]

A) [illegible] COST CENTRES	NUMBER OF EMPLOYEES AND WORKERS (annual average)									
	Supervisory staff and foremen	Day skilled	Day shift unskilled	First shift skilled	First shift unskilled	Second shift skilled	Second shift unskilled	Third shift skilled	Third shift unskilled	Total
1. Painting										
2. Decorticating										
3. Pressing										
4. Solvent extr.										
5. Bagging										
6. Neutralising										
7. Blending										
8. Bonderising										
9. Winterising										
10. Filling + pack.										
SUBTOTAL A)										

----------→

EXPLANATORY NOTES

Ad.VIII.B.2.: Plant management includes executive and managerial staff, department heads, and general plant supervisors not classified under VIII.A.

Total General Overhead Cost Centres includes the salarial staff of warehousing and distribution, selling and marketing, administration and finance.

VIII. [redacted] TABLE (continued)

B) [redacted] COST CENTRES	NUMBER OF EMPLOYEES AND WORKERS (annual average)									
	Supervisory staff and foremen	Day shift skilled	Day shift unskilled	First shift skilled	First shift unskilled	Second shift skilled	Second shift unskilled	Third shift skilled	Third shift unskilled	Total
1. Social services										
2. Plant management										
3. Off-site transp.										
4. Purchasing										
5. Stores										
6. Repair + maint.										
7. Electricity										
8. Steam										
9. Water supply										
10. Laboratories (process control)										
SUBTOTAL B)										
TOTAL A) + B)										
TOTAL GEN.OVERHEAD COST CENTRES	-	-	-	-	-	-	-	-	-	
GRAND TOTAL	-	-		-	-	-	-	-	-	

EXPLANATORY NOTES

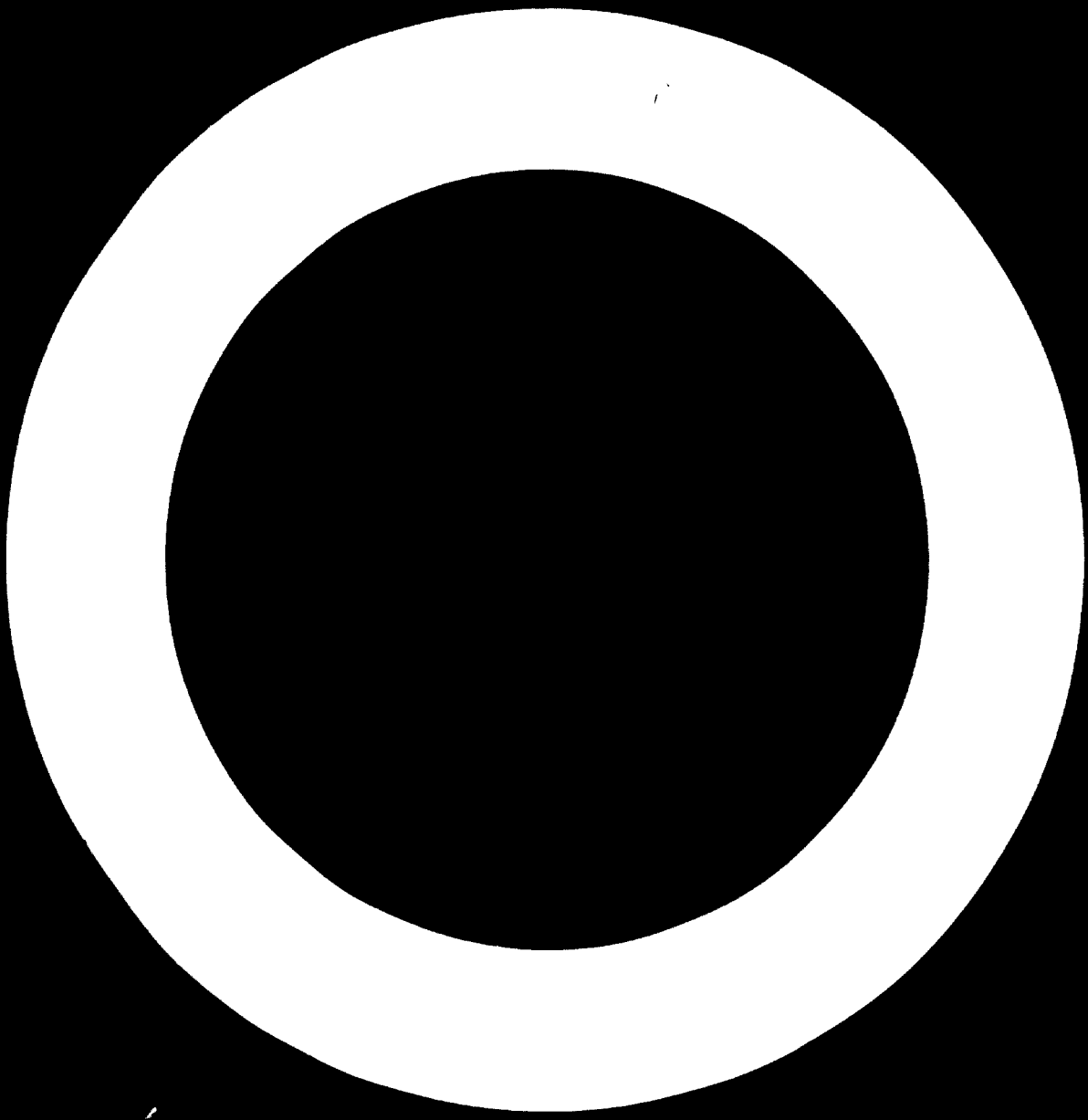
Ad.IX.: Production workers in this context include those skilled workers classified in VIII.A.1.-5.

Ad.1. Normal work-hours includs short resting periods and other occasional idle time but exclude lunch hours.

Ad.2. Normal (actual) average work-hours per skilled worker can be affected by overtime, seasonal labor, part-time labor and the number of shifts.

IX. WORKING TIME

	Day shift	First shift	Second shift	Third shift	
1. Normal daily work-hours per production worker					Hours
2. Normal annual work days per production worker					Days
3. Annual ( ) actual ( ) average work-hours per production worker					Hours



PART C

PERFORMANCE EVALUATION

The objective of this part of the Industrial Performance Evaluation Profiles is to indicate methods by which management can evaluate the performance of the firm.

The data used should be calculated for several accounting periods so that changes in performance can be identified: those moving adversely can therefore be investigated. The data used in Part A of the questionnaire contain the basic information necessary to complete Part C.

The performance evaluation should cover cost and productivity indices, financial ratios and the analysis of fixed and variable costs. Commercial profitability calculations are also suggested such as break-even analysis, pay-back period, simple rate of return and, if the data can be provided, also present value and or internal rate of return.
A model of a cash-flow table is attached.

I. COST AND PRODUCTIVITY INDICES

The starting point in cost efficiency evaluation is the calculation of a cost index which represents the average cost of the production process performed, or the service rendered by each cost centre. Such indices should be calculated for successive accounting periods and compared over time in order to establish a cost trend for each centre. Changes in these trends reflect the cost variation and provide the basis for managerial action towards cost reduction. In addition, certain productivity and technical ratios can be divised which help to explain cost differences and to identify specific areas of inefficiency.

Besides, the availability of such indices facilitates the preparation of budgets and the implementation of budgetary control. For plants applying the advanced techniques of standard costing, the calculation of actual or historical cost averages is pre-requisite.

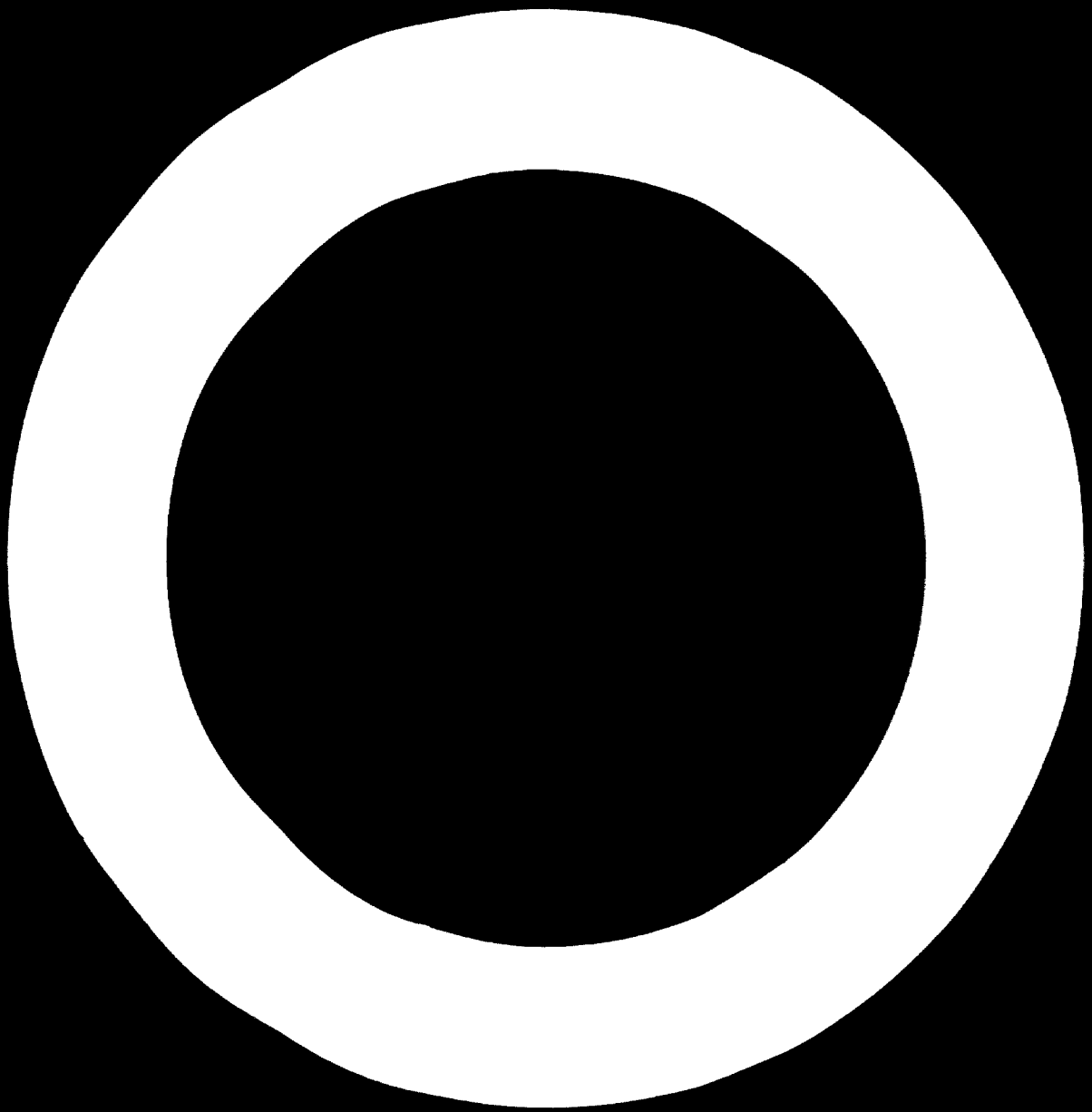
From the standpoint of the vegetable oil industry as a whole, the calculation of cost and productivity indices for each plant is the cornerstone of interfirm comparison within the industry.

1. PRODUCTION COST CENTRES

A general characteristic of the vegetable oil industry is that practically in each operation a by-product is obtained in addition to the main product.

The cost per unit of each main product should be considered a significant measure of efficiency for each operation or process.

From Part A.VII. Table 1 and 2, it can be seen that the total cost for each production centre equals the cost of materials, wages and overheads. Deducting the cost of materials processed, the balance shows the conversion or operating costs for the centre. Such balance represents the common cost of producing the main product, together with the by-product. In practice, this joint-cost problem is solved by deducting the sales value of each by-product from the operating cost of the respective centre. The remaining balance is considered the equivalent of the cost of processing the main product. Given the quantity of the main product obtained from the operation of the cost centre, it is possible to construct an



index of the cost unit for a particular centre. A series of cost indices can thus be constructed for each firm.

The following example is illustrative:

Delinting cost centre:

Total cost of the Delinting Department	D
- Cost of raw seed to be delinted	- R
= Total operating costs	= D - R
- Net sales value of lint	- V
= Net operating cost (D - R) - V	= C_1

Assuming that the quantity of delinted seed is Q_1 (tons),

total operating cost of delinting per ton = $\frac{(D - R)}{Q_1}$ and

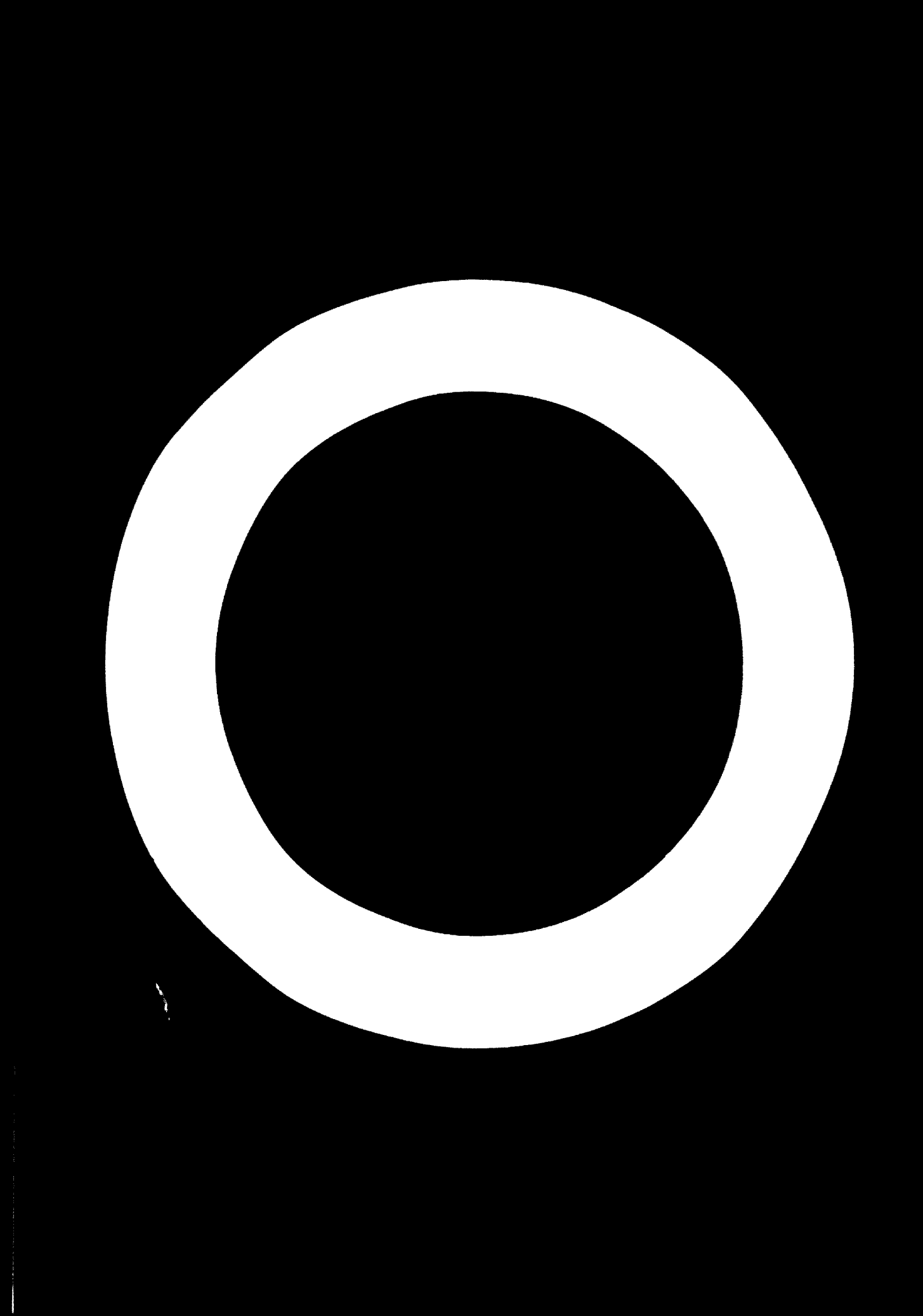
net cost of delinting per ton = $\frac{C_1}{Q_1}$

Indices for the cost of decorticating, pressing, solvent extraction, neutralizing, winterizing, bleaching, deodorizing, filling and packing, can be similarly constructed. By-products of these operations are linters, hulls, soapstock and oxygen.

Comparisons of each index over several periods (monthly, quarterly, etc.) reveal possible changes in cost efficiency in each production cost centre of the firm.

In addition it is recommended that significant cost components should be calculated for each of these operations as indicated below:

	19	19	19
1.1. **Delinting**: Production wages/ton			
Maintenance cost/ton			
Cost of energy consumed/ton			
1.2. **Decorticating**: Production wages/ton			
Maintenance cost/ton			
Cost of energy consumed/ton			
1.3. **Pressing**: Production wages/ton			
Maintenance cost/ton			
Cost of energy consumed/ton			



		19	19	19
1.4. Solvent extraction:	Production wages/ton			
	Maintenance cost/ton			
	Cost of solvent consumed/ton			
	Cost of steam consumed/ton			
1.5. Neutralizing:	Production wages/ton			
	Maintenance cost/ton			
	Cost of caustic soda and other chemicals (e.g. phosphoric acid)/ton			
1.6. Bleaching:	Production wages/ton			
	Maintenance cost/ton			
	Cost of bleaching earth/ton			
1.7. Deodorizing:	Production wages/ton			
	Maintenance cost/ton			
	Cost of energy consumed/ton			
	Cost of steam consumed/ton			
1.8. Winterizing:	Production wages/ton			
	Maintenance cost/ton			
	Cost of energy consumed/ton			
	Cost of filter cloth consumed/ton			

2. SERVICE COST CENTRES

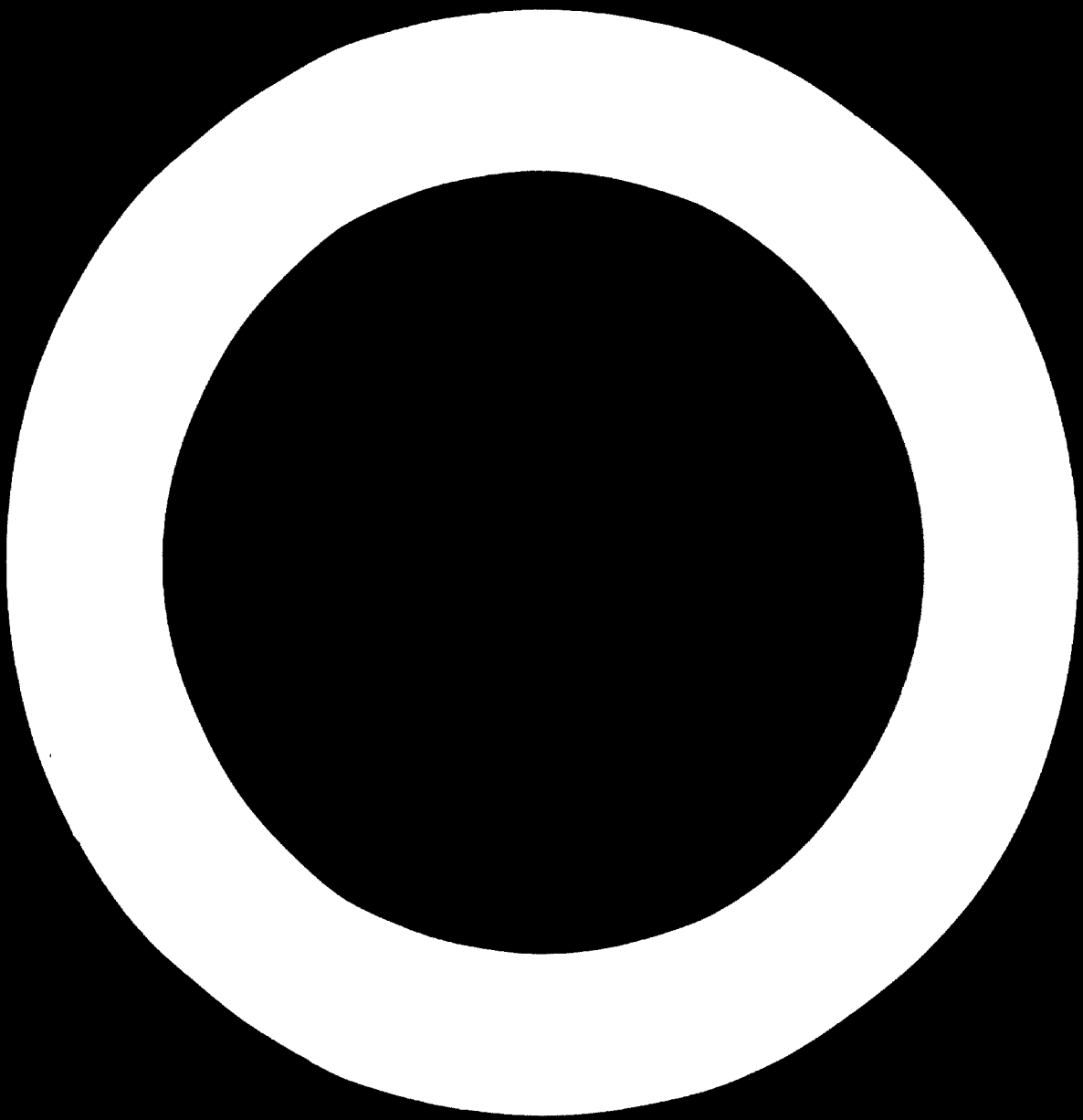
2.1. Social services
The cost index for social services may be expressed as the cost per employee of such services or alternatively as a percentage of the total direct and indirect wages and salaries.

2.2. Plant management
The share per employee in both production and service cost centres is a significant index.

2.3. Transport
The cost per ton/kilometer of the goods transported should be compared periodically with the rate charged by independent carriers.

2.4. Purchasing
The cost index for purchasing may be expressed as the share per monetary unit of purchases during the accounting period.

2.5. Repair and maintenance
The cost index for maintenance work should be expressed in the form of maintenance cost per production hour for the period.



2.6. **Electricity**
The cost per kWh of electricity generated should be compared periodically with the cost of electricity purchased.

2.7. **Water**
The cost per m^3 of water supplied from own sources should be compared periodically with the cost of water purchased.

3. WAREHOUSE, DISTRIBUTION, SELLING AND MARKETING

The cost index may be expressed in one of the following forms:

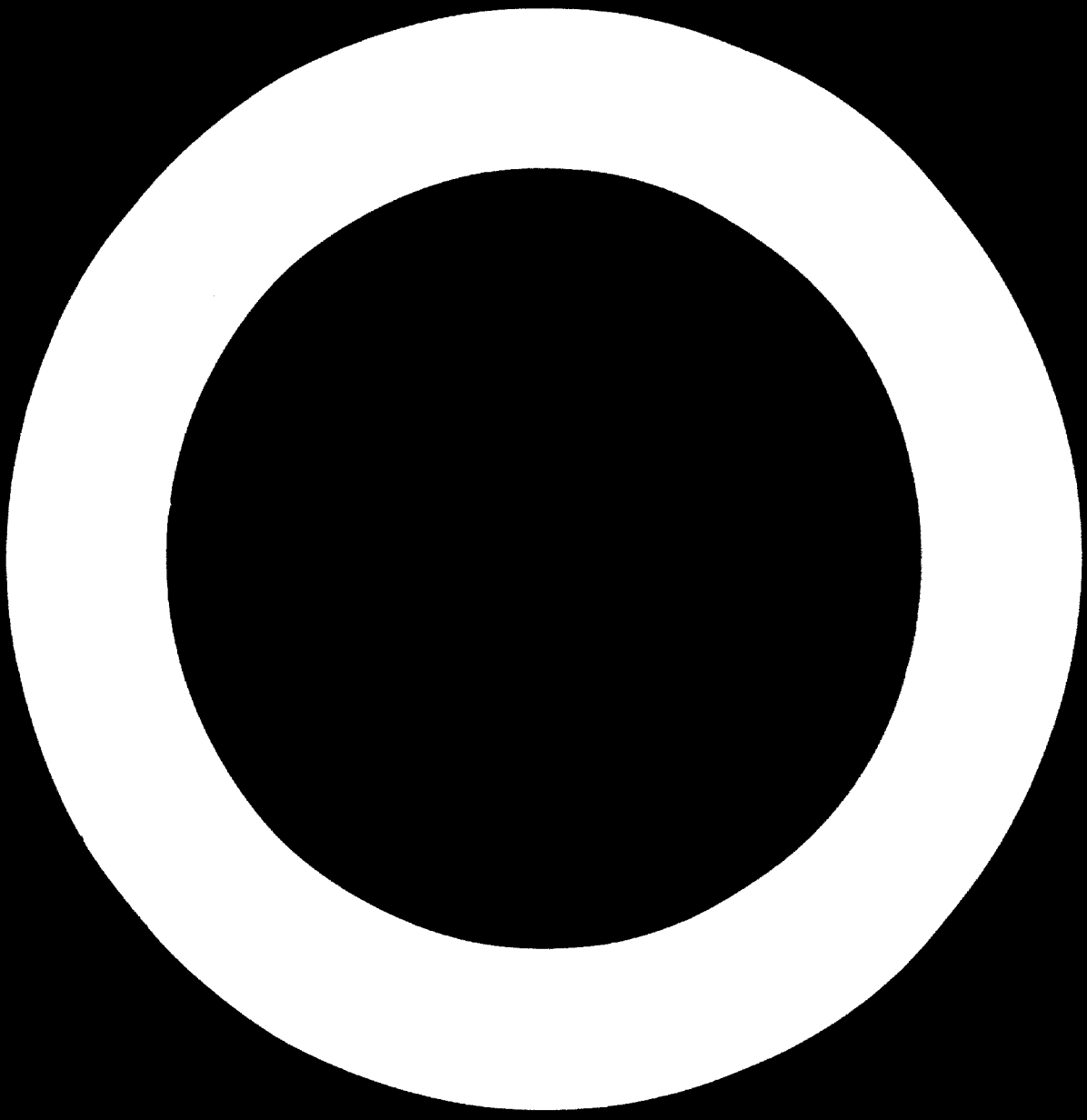
3.1. Warehousing and distribution cost per ton of final and by-products delivered

3.2. Sales and marketing cost per unit of sales

4. ADMINISTRATION AND FINANCE

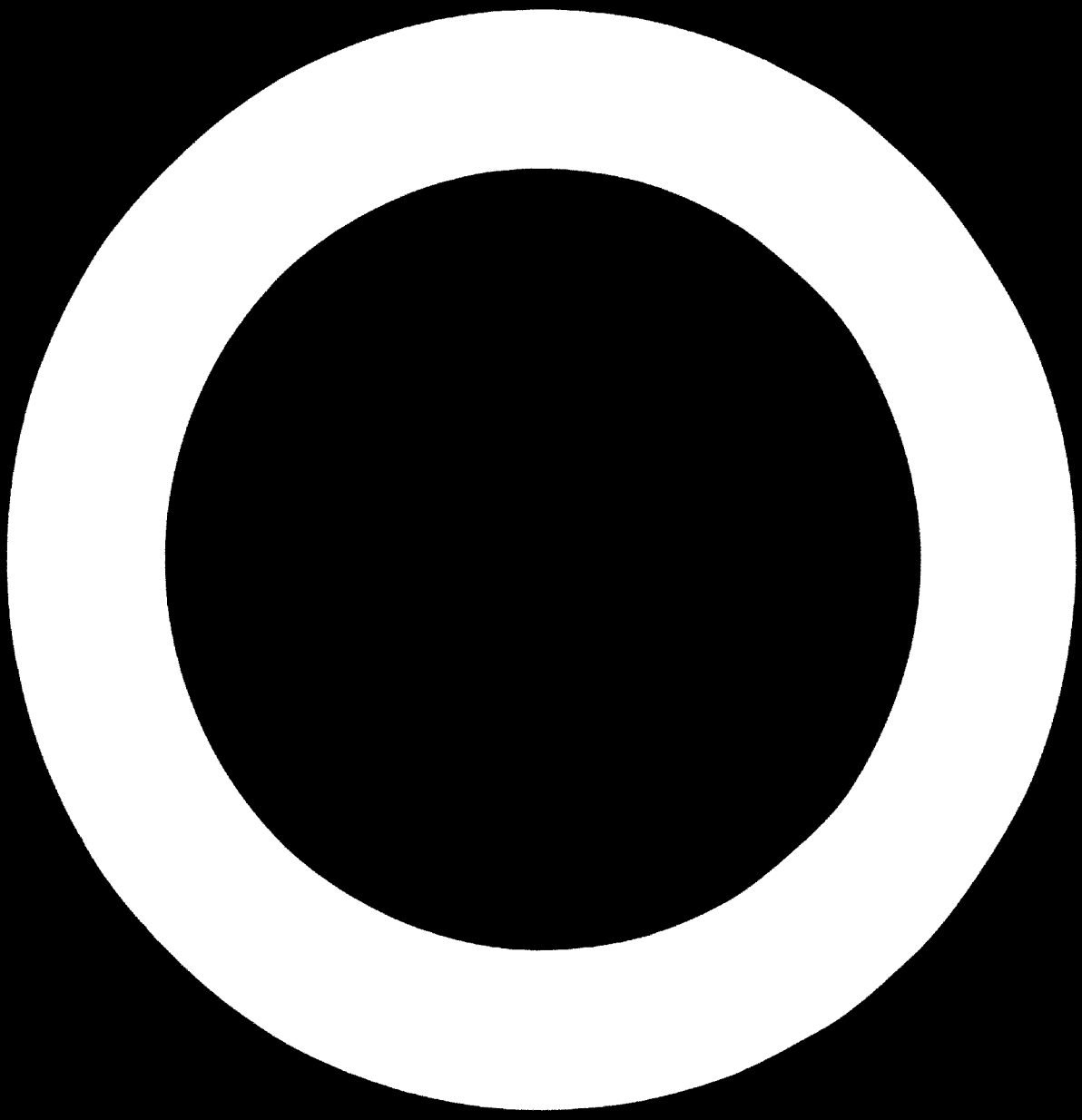
The cost of administration and finance should be expressed as a percentage of the total cost.

NOTE: The data required for the calculation of the foregoing indices can be obtained from the "Departmental Cost Sheet", Table 1 and Table 2. These indices should be computed for, at least, three years.

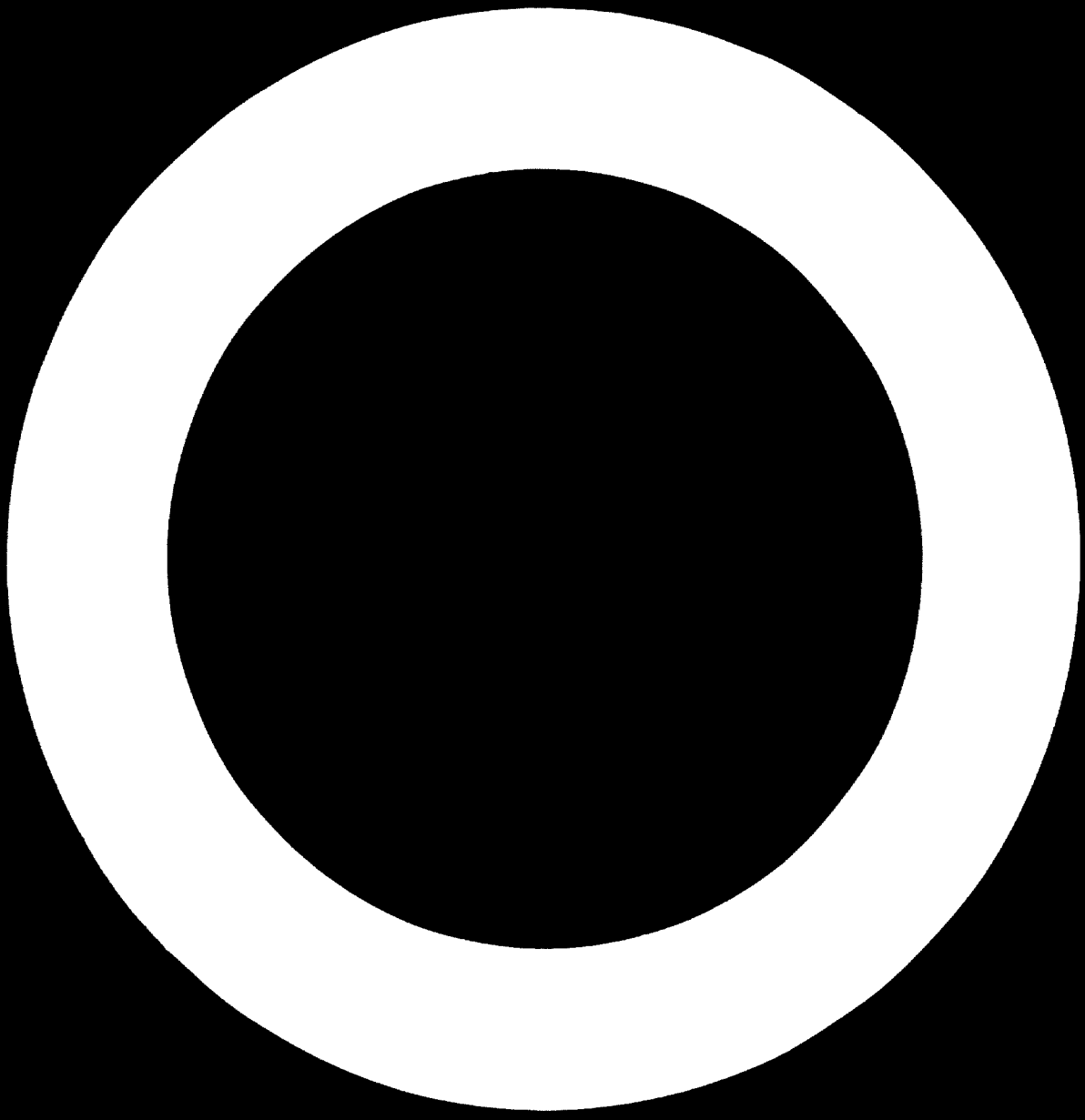


COST INDICES TABLE

	Period		
1. PRODUCTION COST CENTRES			
Cost of delinting ton produced			
Cost of decorticating ton produced			
Cost of pressing ton produced			
Cost of solvent extraction ton produced			
Cost of neutralizing ton produced			
Cost of bleaching ton produced			
Cost of deodorizing ton produced			
Cost of winterizing ton produced			
2. SERVICE COST CENTRES			
Social services cost per employee			
Plant management as percentage of total production and service costs			
Transport cost per ton, km			
Purchasing cost per monetary unit			
Maintenance cost per operating hour			
Cost of generated kWh			
Cost of m^3 water from own fountains			
3. WAREHOUSE, DISTRIBUTION, SELLING AND MARKETING			
Warehousing and distribution cost per ton of final and by-products delivered			
Sales and marketing cost per monetary unit of sales			
4. ADMINISTRATION AND FINANCE			
Ratio of administrative and financial cost to total cost			



Financial ratios	Ratio for the year		
	...	...	...
1. Ability to pay current debt			
a) Current assets: current liabilities			
b) Quick assets: current liabilities Quick assets = current assets − inventory			
c) Inventory turnover rate Cost of goods sold: inventory at historical cost			
d) Turnover of receivables Net sales: receivables			
2. Asset utilization			
a) Turnover of operating assets			
Fixed assets: sales			
Current assets: sales			
Total assets: sales			
b) Current asset utilization			
Debtors: sales			
Inventory: sales			
3. Return on investment			
Net profit: total operating assets			
4. Operating results			
a) Net profit: sales			
b) Production cost of sales: sales			
c) Cost of wareh., distr., selling and marketing: sales			
d) Administrative expenses: sales			
e) Financial expenses (inc. interest): sales			



III. CLASSIFICATION OF COST ITEMS: VARIABLE AND FIXED [illegible]

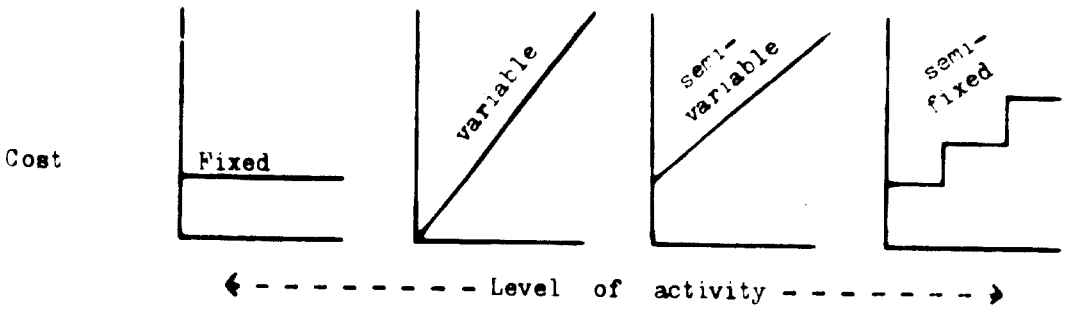
There are four main patterns of cost behaviour into which all cost items can be grouped:

1) Fixed costs: These costs remain unchanged regardless of changes in the level of activity. They are usually incurred on a time basis (examples: long-term contractual services, rents, admin. salaries)

2) Variable costs: These costs vary in direct proportion to the level of activity (examples: production materials, fuel, non-returnable containers)

3) Semi-variable costs: These vary with the level of activity but not in direct proportion (Maintenance costs are usually semi-variable since some maintenance work has to be done regardless of the level of activity, e.g. daily oiling of machines and periodical overhauling of plant and equipment)

4) Semi-fixed costs: These remain fixed within a certain range of the level of activity and increase by a given amount at a time, taking the form of a stepfunction (examples are: supervision, product inspection)



Segregation of cost items into the foregoing categories is based on the availability of actual cost data for each cost element over a fairly long period of time and for varying levels of activity.

Accurate classification of these costs should be done by statistical analysis of the recorded cost data after eliminating the distorting effects of changes due to other cost-determining factors (e.g. changes in the price level and managerial decision). The results of statistical analysis are usually supplemented by industrial engineering studies related to the variability of the various cost items in connection with the particular business conditions.

The presence of semi-variable and semi-fixed costs complicates the cost volume studies. To avoid such difficulties all cost items may, in practice, be only classified as fixed or variable.

EXPLANATORY NOTES

1. The cost of Spare parts has been classified as a fixed cost based on the assumption that proper maintenance is continuously provided.

2. The cost of Maintenance work done by outside contractors depends upon several factors such as: management policy, the age and physical condition of the plant and equipment, and the availability of outside contractors rather than the volume of activity.
   Maintenance costs should be carefully analysed by each firm and classified as variable or fixed costs according to the prevailing conditions.

3. It should be noted that Insurance on stocks is fixed for short-term periods only.

4. Depreciation: Assuming that the straight line method is used. However, if the accelerated method is applied, depreciation allowances will vary with the level of activity and should, consequently, be classified as a variable cost.

5. Royalties are usually fixed unless they are payable per ton of output produced.

Results obtained from the table can be usefully utilised by management for the following purposes:

1) Study of cost structure at the varying levels of activity.

2) Profit planning through the use of "break-even-charts" with its several variants, provided that the limitations of this technique are well realised.

This table presents a tentative classification of cost items into variable and fixed costs for the production of cement. It should be emphasized that the suggested classification is only tentative and should be subject to statistical and engineering studies to be conducted by each individual firm in the light of its own cost data.

Period:

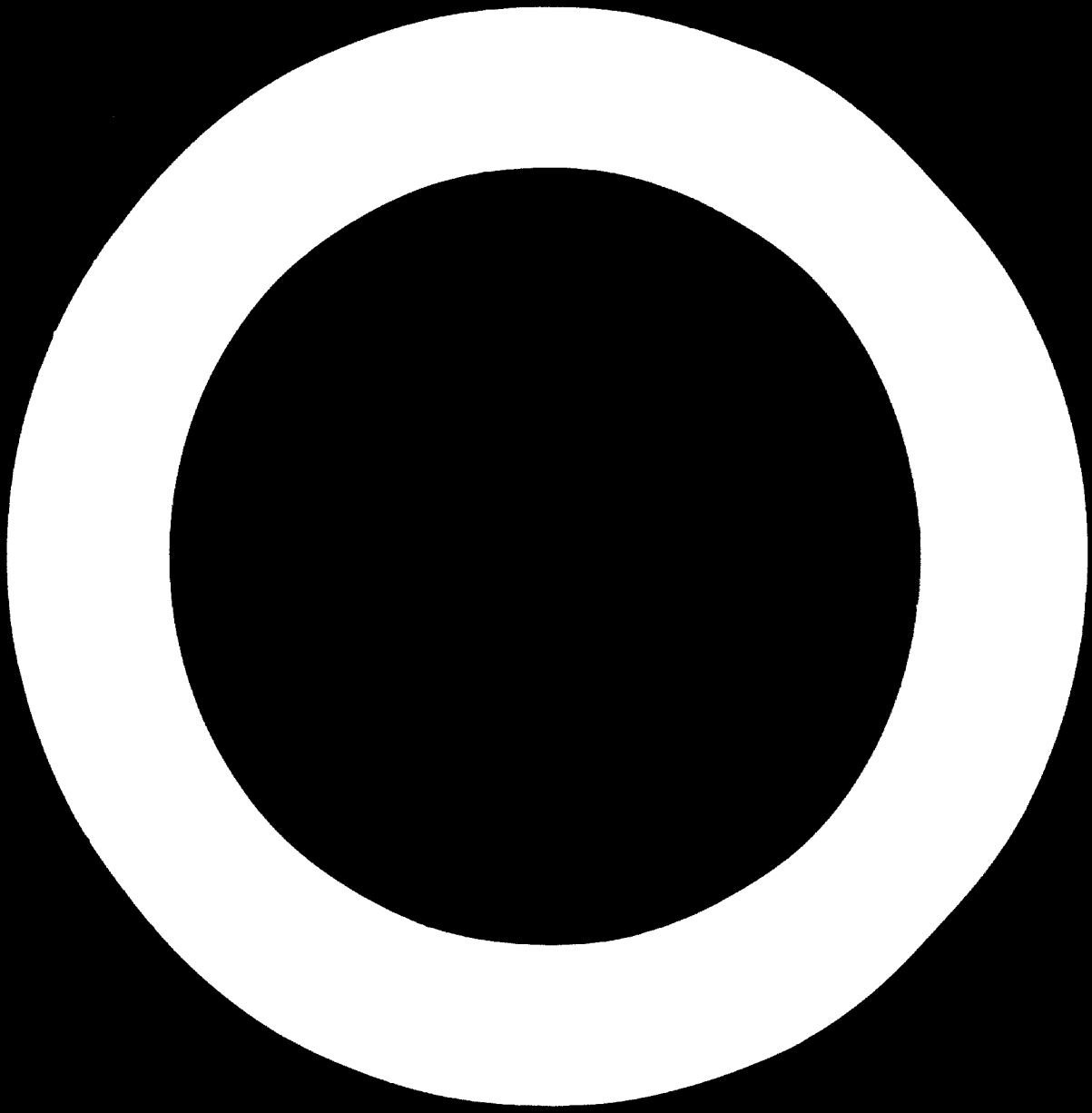
From: .....

To: .....

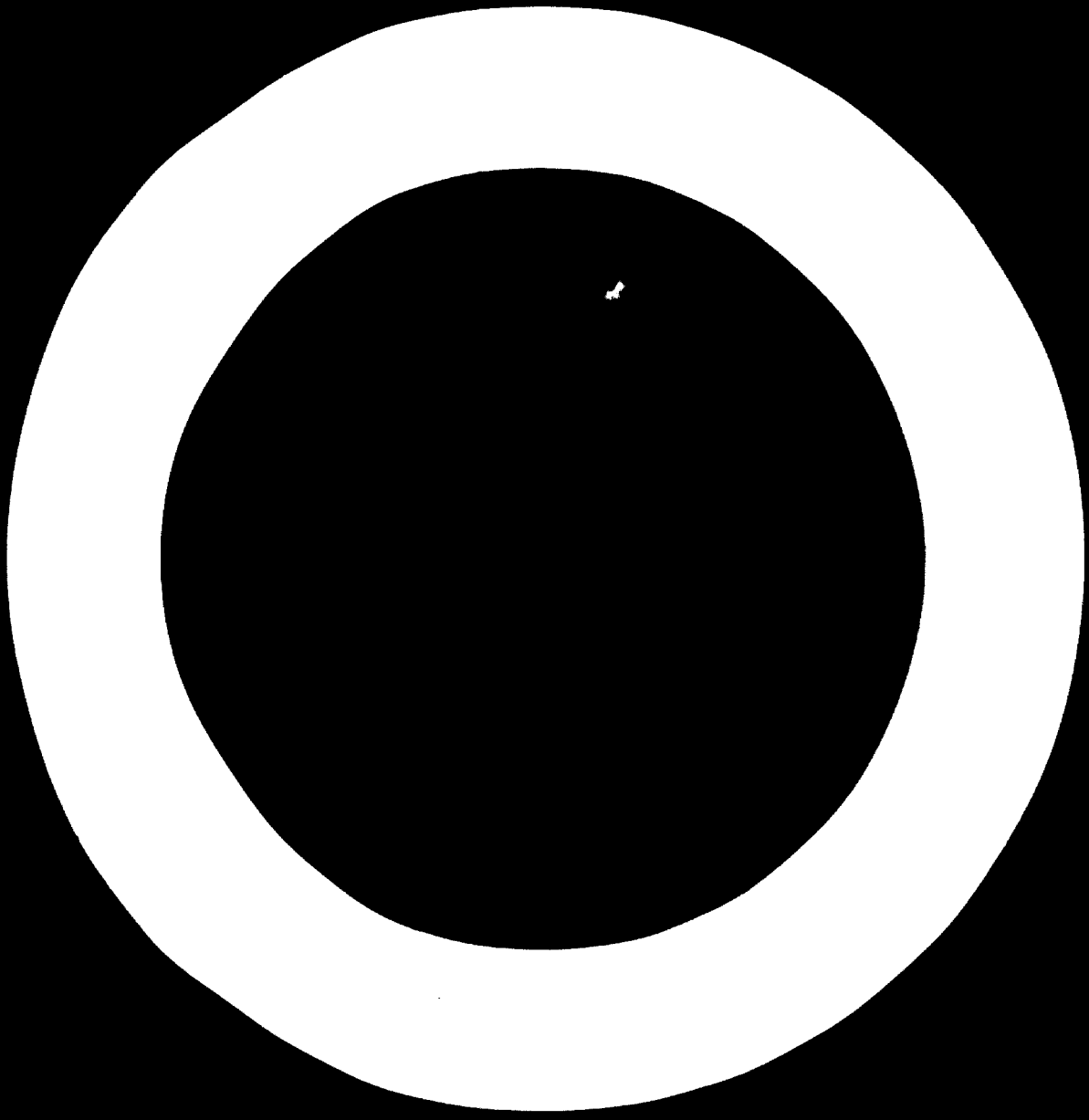
Level of activity - Volume of production .....
- Percentage of capacity utilized .....
- Number of operating hours .....

	£	£	%
Variable costs:			
Raw material			
Fuel oil (mazut) and gas oil			
Packaging			
Motor fuel			
Electricity and steam			
Water			
Production bonuses			
Overtime wages			
Temporary labour wages			
Freight			
Sales taxes			
Business taxes			
Sales commissions			
Purchasing commissions			
Total variable costs			
Fixed costs:			
Spare parts			
Maintenance supplies			
Office supplies			
Production wages and salaries:			
Basic wages			
Social security contributions			
Health insurance			

(cont...)



(Fixed costs):	£	£	%
Service wages and salaries:			
Basic wages			
Social security contributions			
Health insurance			
Distribution, selling and marketing wages:			
Basic wages			
Social security contributions			
Health insurance			
Maintenance			
Insurance			
Depreciation - buildings			
Depreciation - machin. and equipment			
Depreciation - transport equipment			
Amortization of non-physical assets			
Communication expenses			
Travel			
Other admin. expenses			
Rent			
Property tax			
Interest			
Financial expenses			
Royalties			
Total fixed costs			
Total costs			



V. COMMERCIAL PROFITABILITY CALCULATIONS

Although the IPEP questionnaire is primarily designed to help existing companies in assessing their overall economic and technological performance, it is suggested in this final chapter that it may also be used as a pre-requisite to evaluate the viability of expansion investments.

The profitability calculations listed below may not all be applied by management since some of them are more suitable to assess new investment proposals. If different methods of profitability calculations are still presented, it should be kept in mind that pre-investment studies are not only prepared for the construction of new factories but also for the expansion of already operating establishments.

Since it is not only required to evaluate the commercial profitability but also the economic and technical performance of such establishments it is recommended to utilize the IPEP questionnaire for this purpose.

A. BREAK EVEN POINT

$$BE = \frac{100 \cdot F}{R - V}$$

= the percentage of capacity utilization at which the sales revenue will equal production costs, where F = fixed costs, R = sales revenue, V = variable costs and BE = break-even point.

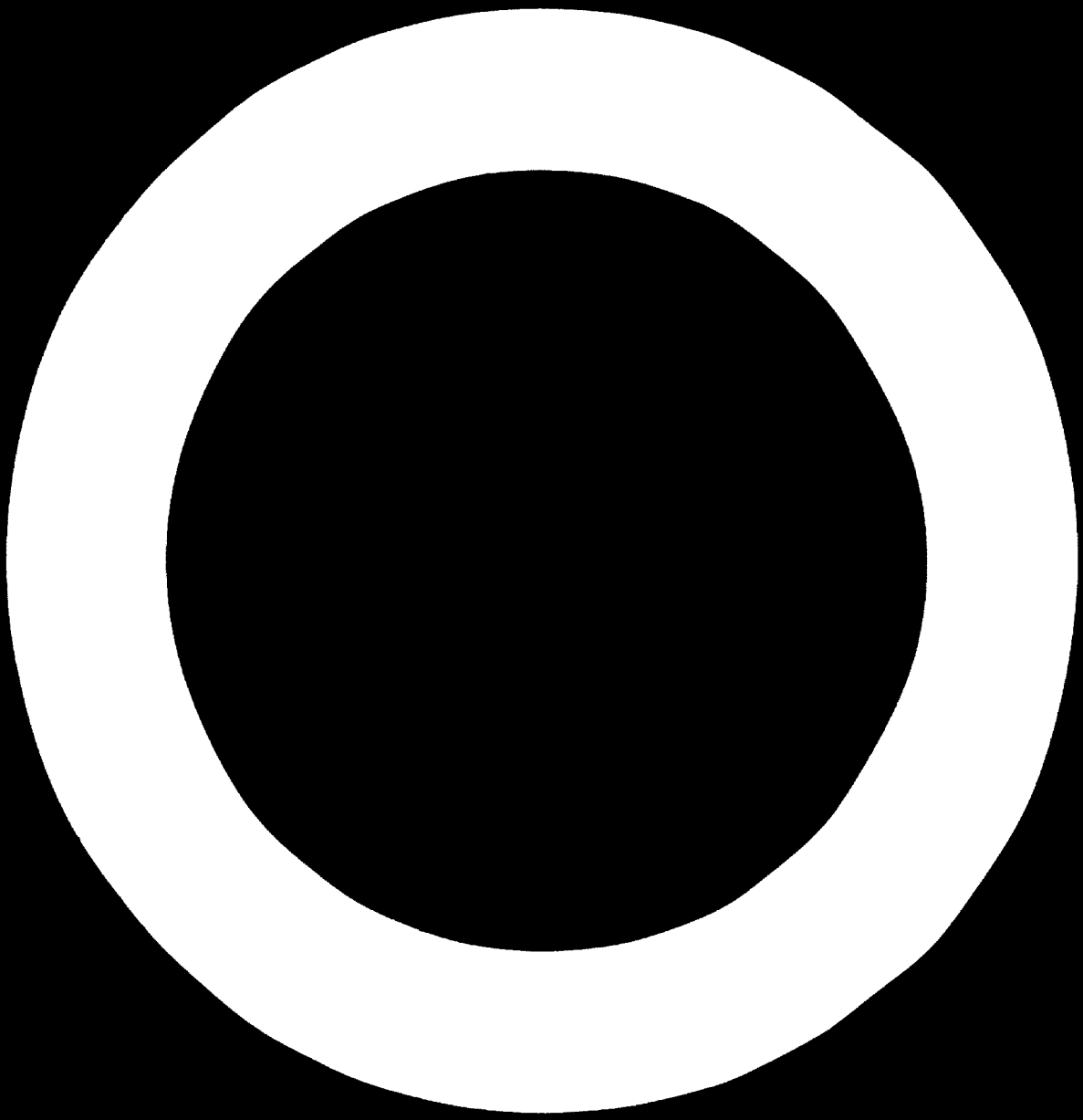
BE = _____ %

B. PAY-BACK METHOD

This method consists in computing the number of years over which the invested capital will be recovered from the profits and the depreciation. The value of land and of the working capital should not be included in the amount of the invested capital since both can be salvaged at the end of the project.

Pay-back period: $\frac{\text{Total assets - land - working capital}}{\text{Profit + depreciation}}$ = years

PAY-BACK PERIOD = _____ YEARS



C. SIMPLE RATE OF RETURN

$$\frac{\text{Profit} \cdot 1^{\text{st}}}{\text{fixed assets} + \text{working capital}} = \underline{\qquad\qquad} \%$$

D. DISCOUNTING METHODS

The discounting methods take account of the life of the investment project as well as of the timing of its costs and benefits by discounting both to the present date.

1. PRESENT VALUE

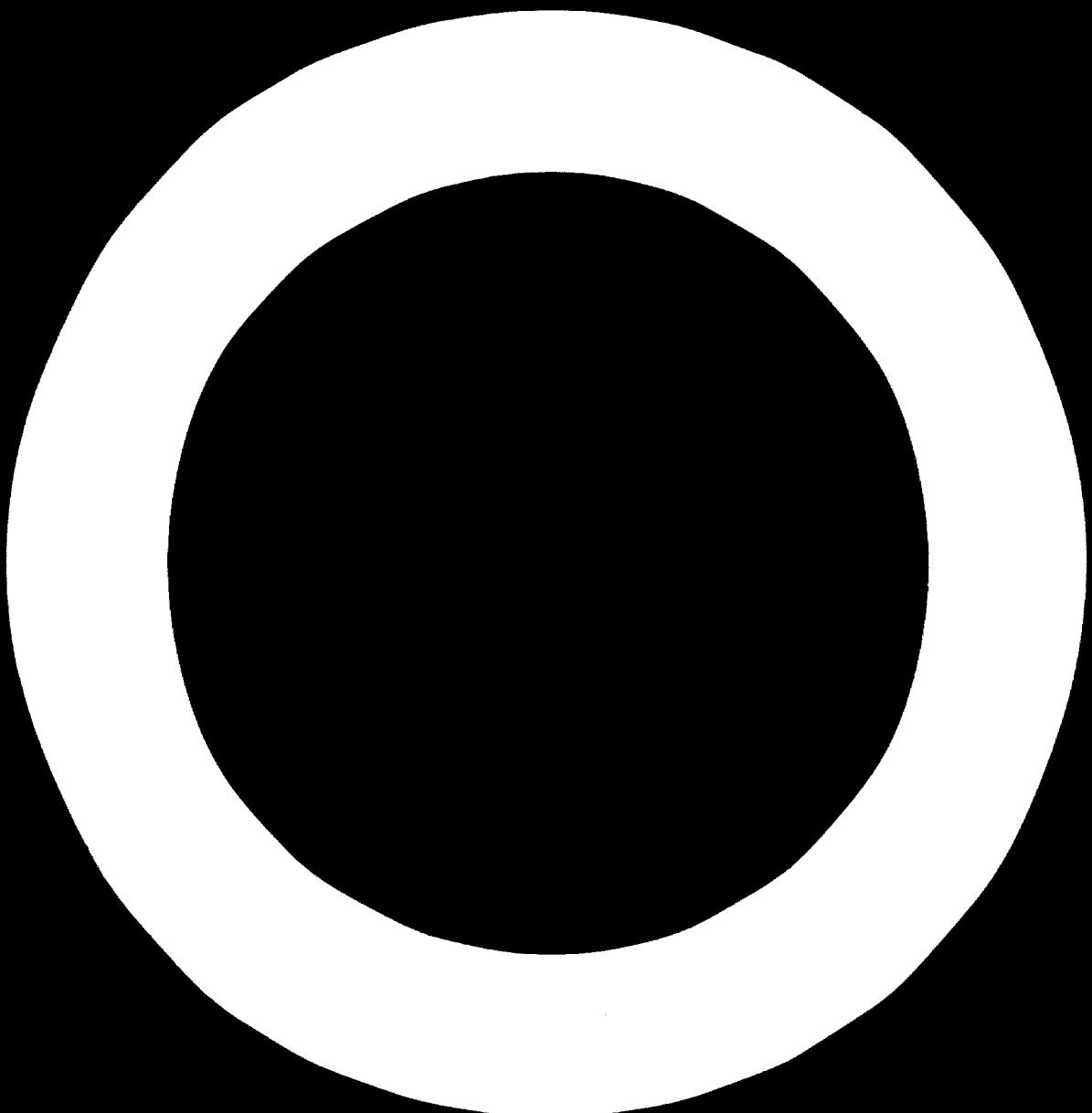
This method consists in discounting the costs and the benefits of the project to the present date at a fixed, pre-determined interest rate.

2. INTERNAL RATE OF RETURN

This method consists in finding the discount rate at which the present value of future benefits will be equal to the present value of investment.

3. CASH-FLOW TABLE

See next page for model of a cash-flow table.

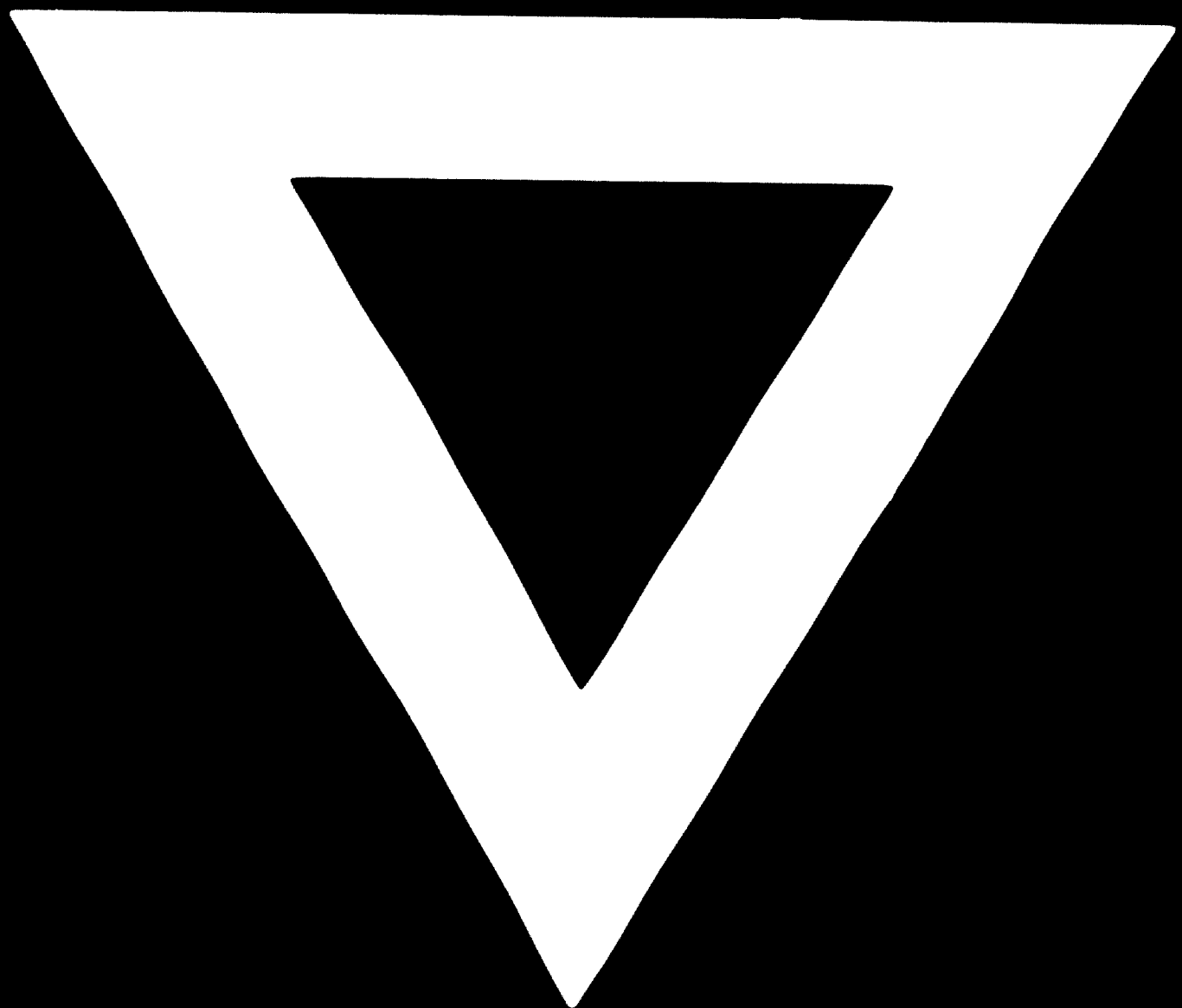


V. CASH-FLOW TABLE

	Year										Terminal value of assets
A. Sources of cash											
1. Financial resources made available											
1.1 Loans[1]											
1.2 Equity											
1.3 Suppliers credits											
1.4 Subsidies											
2. Sales revenue[2]											
B. Uses of cash											
1. Fixed capital expenditure made[3]											
1.1 Land, site improvements & building											
1.2 Machinery & equipment (new installation)											
1.3 Machinery & equipment (replacement)											
2. Net working capital made[4]											
2.1 Stocks of materials											
2.2 Work-in-process[5]											
2.3 Stocks of finished products											
3. Pre-investment & start up expenses[6]											
4. Production expenditure made[7]											
4.1 Personnel expenditure											
4.2 Materials[8]											
4.3 Administrative expenditure											
4.4 Indirect taxes & royalties											
4.5 Other expenditure (rents, contingencies, etc.)											
5. Debt service made[9]											
5.1 Interest on loans											
5.2 Repayment of loans & credits											
6. Dividends & profit taxes paid[10]											
C. Surplus/Deficit (A - B)											
SURPLUS/DEFICIT ACCUMULATED											

[1] Loans of different types should be shown separately.
[2] Annual value of production of finished goods minus annual accumulation of finished goods inventory.
[3] Fixed production costs minus production costs of finished goods.
[4] Not including interest during construction.
[5] Annual variations minus annual accumulation of materials inventory.
[6] This item stands for the part of profit which is to be paid out, namely profit tax, dividends, fees of the members of the directive board, management staff, loans to partners, etc. Actually, this item will be considered after the economic lives (cycles) for depreciation which are not indicated under item 4. (Production expenditure) for each item (shown by programmes, alternatives, etc.) is over and all remaining replacement (B.1.3.) can be assumed to any year by the investment experts.

Comments:



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