

Study on cement
Industry

1934

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FOREWORD

Rapid industrialisation has been recognised as a powerful technique in the strategy of war against want. This technique when applied to the economy of developing countries, such as India, raises a host of problems, particularly relating to manpower planning and manpower utilisation. India, committed to give every Indian a decent living, has elected to industrialise the country. In this context, Indian economic development is synonymous with the utilisation of human resources.

Planning industries is a complex of several factors, the crux being the planning of skills. Unlike other resources, skill-development is an exercise in forward planning, with all its complicated variables. Manpower planning therefore, has to be specific, practicable and objective. At present industry-occupation relationships and ratios—necessary for forward planning—are so woefully inadequate in India, that serious attempts are being made to fill this gap in our economic and industry intelligence. Realisation of this felt need urged the Directorate of Employment, Madras to make a start; the result in the study on Cement Industry in Madras State just presented.

This study, undertaken jointly by the State Employment Market Information and Occupational Information Units of the Madras Employment Directorate, could not have been possible but for the willing co-operation of the Cement Industry managements in Madras State. Theirs have been a very heartening collaboration, based on an awareness of the needs of the hour. I am confident that the trail that they have served to blaze will canvass the co-operation of others also, when other industry-studies are undertaken.

In the planning and preparation of this study the bulk of drafting and industry - analysis fell on Sri M. S. Ramanujam, Employment Market Information Officer and the occupational analysis on Sri C. R. Chakravarthi, District Employment Officer (Occupational Information) of this Directorate.

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STUDY ON CEMENT INDUSTRY

(MADRAS STATE)

Introduction

1. Cement, a synthetic building medium of recent origin plays a vital role in our economy. Housing, roads, hospitals, schools, factories etc., that enter into the economics of our life require the solid touch of cement in varying degrees. With the teeming millions to be decently housed, schooled, hospitalised, employed, only to mention a few, cement industry is expected to play increasingly important role in our national life and development.

Aim of the Study

2. The aim of this study is to frame the norms of employment for cement industry for the assessment of manpower requirements. The Occupational structure of the industry, labour recruitment and training practices are also some of the problems that are studied in this report. The manpower data presented here will be useful for youth guidance, employment counselling, placement, industry and manpower planning and allocation of scarce resources.

Method of Approach

3. The industry data reported upon here relate to all the 4 cement factories in Madras State, namely Associated Cements in Madukkarai, Dalmia Cements in Tiruchi, India Cements in Thalayuthu and Madras Cements in Talukkappatti. A simple questionnaire was used, which was followed up by plant visits by the Employment Market Information and Occupational Information officials of the Directorate of Employment. Points relating to individual plants and occupational information about employees were discussed with plant officials.

History of the Cement Industry

4. Madras State has a complement of 4 cement factories. The total production of cement from these units, adds upto 10.67 lakhs tons per annum. The oldest is the Madukkarai Cement Works (1934), a subsidiary of the Associated Cement Company and the others are the Dalmia (Bharath) Cements in Tiruchy District (1939), the India Cements at Tirunelveli and the Madras Cements at Ramanathapuram District, which is of a very recent origin. This State with a copious supply of limestone offers good scope for Cement Industry, provided supply of power and coal is assured. The characteristic of this industry lies in the preponderance of fixed assets, as also its high fixed assets-sales ratio which makes it a capital intensive industry like the iron and steel, electricity generation and power industries.

Earlier Attempts in the Manufacture of Cement

5. Cement, a synthetic building material, was first invented in 1824 by Joseph Aspidin, a British bricklayer. Aspidin named his product "Portland

Cement" as he fancied that the colour of the hardened cement closely resembled that of Portland stone. In India the first attempt to manufacture cement was made early in this century when in 1904 a small factory was set up in Madras. The enterprise failed but 10 years later the industry was revived and then factories were established. Since then it has grown steadily.

Varieties of Cement

6. The term cement covers a wide variety of materials but in practice it means only structural cement used generally for building and other civil engineering purposes. Portland cement is the most important of them all, though structural cement of other types are also used. Besides the Portland cement, there are also other forms of cement such as Portland cement rapid hardening, heat Portland cement, Portland black furnace cement and sand cement. The cement produced in India is generally limited to Portland Cement of ordinary variety.

Properties of Cement

7. This artificially produced compound has the property of binding together with the help of a little water (and nothing else) sand, pieces of stone, big and small, into enormous masses of hard monolithic structures as in dams, bunds etc., or neat little blocks of desired shape which could be used like bricks in building construction. When this mixture of water, cement, sand and stone is further reinforced with small quantities of steel and cast into appropriate moulds we get columns or beams or piles which support heavy structures such as multi-storied buildings and bridges. Structures built with cement have the unique property of gaining strength with time, because of its intrinsic property of hardening with age particularly under humid conditions.

Manufacturing Process

8. The principal raw materials utilised in the manufacture of cement are limestone, clay, gypsum and coal. Calcareous sand, when and where available, is also sometimes used as a substitute for lime-stone. Lime-stone is obtained by blasting the sides of rugged rocks or by quarrying below the earth's surface. It is then transported to crushers where it is broken into small pieces by giant hammers. Together with clay and water, each in defined proportions, the crushed limestone is fed into grinding mills from where it issues as a thick creamy substance known as "slurry". The slurry is then stored in large silos where it is corrected to the required composition and is made ready for the next operation.

9. The rotary kiln, a steel cylinder 400 to 450 feet long and 10 to 12 feet in diameter, constitutes the most vital part of the cement plant. It is lined internally with refractory bricks, and is mounted on steel and rotates at a slight angle to the horizontal axis. Driven by a motor, the kiln rotates slowly. The corrected slurry is fed into the upper end of the kiln, while pulverised coal under high pressure is fired into the lower end, the temperature rising to about 2700 F. As a result of this process a complete chemical transformation of the slurry takes place and the slurry emerges from the discharge end of kiln in the form of dark hard pellets called "clinker". After cooling, the clinker is fed into the grinding mills where, along with a certain quantity of gypsum, — a retarding agent, its function being to ensure that cement when mixed with water does not set too rapidly — it is reduced to a fine powder.

From the grinding mills, cement is transported to storage silos with the aid of compressed air. These silos with capacities of 2000 tons or more each, are equipped to deliver cement either in bulk or to the packing plant. The finished cement is then discharged from the storage silos into hoppers which feed the packing machines. In their turn these machines pack the cement into jute or paper bags. The bags are then moved along conveyor belts and are loaded into railway wagons or trucks for onward despatch to consumers.

Employment in Cement Industry

10. Employment in the 4 factories included in this study is 4129 persons. Employment of children is all too rare in this industry. Of the sum total of persons employed in this industry 563 are women. Women constitute 13.7 per cent of all cement workers.

11. Construction and transportation in the mills are peripheral operations and they are done through contractors. The workers employed in these operations, therefore, are not shown on the rolls of the units. In this study employment in cement factories excludes those employed in the quarries.

12. Employment in cement industry in the State has been fairly stable through years. Judging from the labour turnover rate it would appear that the workers in this industry are fairly "committed" to industrial conditions. Though absenteeism is still a little on the high side, it could not be considered excessive. Since all the units are located amidst populous villages, the factory labour is drawn from these villages. This factor to some extent probably is the reason for non provision of housing facilities. One of the units, however, has a well laid-out residential quarters with modern amenities for both the labour and the staff. The proximity to labour supply has to a large extent abated the need for subsidised labour colonies. The employers find little difficulty in securing the services of unskilled workers. Skilled manpower is obtained either directly from open market or through a system of inplant training.

Recruitment and Hiring Practices

13. Generally the hiring practices in the factories have the sanction of tradition. With the development of personnel department, a scientific approach to the problem of hiring is slowly gaining importance. There are generally 4 modes of recruitment that they resort to:

- i. recruitment at the gates
- ii. through unions
- iii. through advertisement
- iv. through employment exchange.

One of the 4 units has a package deal with their unions that they seldom resort to any other channel of hiring. The others resort to all types of hiring, particularly for skilled artisans. All factors indicate that recruitment through recognised institutional channels like the Employment Exchange is seldom resorted to except as a desperate last minute effort.

14. The permanent solution to the scarcity of technical persons can be sought only in the augmentation of the general level of supply of such persons over the economy as a whole. Until such time that the supply and demand for such types attain reasonable equilibrium, ad hoc measures to meet contingencies are necessary. But they vary from unit to unit. Where units are large enough and have subsidiary units the position is a bit mitigated through transfer or promotion. Even this is limited by the fact that the entry occupations are generally ill-defined and not too well regulated. This is likely to disappear only when jobs get well defined and recruitment done with an eye on job-qualification and job satisfaction.

15. The demand for technical personnel would continue to cause concern. This anxiety is not typical only to this industry and the supply of technical persons cannot be achieved overnight. If it is known that technicians take anything between 18 months to 5 years to become so, the problem is more than apparent. An effective way to meet the demand is by forward planning of manpower requirements. Having settled the personnel requirements, industries, individually or collectively, should arrange for training such people. In this context it is not the institutional training alone that should be considered. Inplant training should also be developed. One unit has a regular scheme for training. Usually 310 apprentices are taken mostly in engineering sections and a few in the kiln. Yet another channel is to have well defined promotional channels for workers, in the industry itself. This by implication, impinges on the entire initial recruitment and management policy of the plant or industry. Enlightened management practice demands that initial selection of personnel is based on objective standards of workers and job satisfaction. If the initial recruitment at the lower cadres is done with an eye for the future, most of the troubles at a higher levels could be mitigated, though not eliminated. In this industry the mechanical section may hope to rise up in the ladder but not others. Measures such as evening classes, vestibule training etc. can certainly prepare the lower cadres for a hopeful future.

Occupational Pattern

16. Besides the scope of employment in a particular industry, the occupational content of such employment usually reflects the skill requirements therein. The manning pattern of the cement industry, for that matter in any industry, is comparatively stable over a period of years; it seldom changes in the short run as does employment. Both in terms of investment and efficiency, the manning pattern is a significant index of plan and performance. Manpower being an important element in any enterprise inclusive of its productivity, the requirements of manpower have to be broken down into occupations, if the ductive process has to bear any meaning to the economy.

17. This study has attempted the construction of an occupational matrix for the Cement Industry in this State. The pattern of occupational distribution has been worked out taking the weighted average for all the units in the State. This has been necessary because the units studied varied in the levels of production and employment. In the circumstances the use of simple average would not have been able to present a representative picture. In order that, the employment pattern is made comparable weighted average had been used, the weight assigned being the actual production (in tons) of the respective units. The number of employees in each unit is then multiplied by its weight

i. e. annual production in tons in that unit, products summed and divided by the sum of the weights and not by the sum of the items. Symbolically, this may be represented as

$$X = \frac{W_1 m_1 + W_2 m_2 + W_3 m_3 + W_4 m_4}{W_1 + W_2 + W_3 + W_4}$$

Where X stands for the weighted average W_1, W_2, W_3, W_4 , stands for the annual production (in tons) of the four units A, B, C, D respectively and m_1, m_2, m_3, m_4 , for the employment in the units A, B, C, D, respectively.

18. A detailed occupational analysis of the industry as a whole in Madras State is shown in Appendix II. The Statement shows (a) occupational distribution of total employment (average) (b) employment distribution for 1000 persons (c) employment by occupation for a lakh of tons for annual production (d) employment for 1000 tons of installed capacity per day. The percentage distribution of occupations by major divisions in the Cement Industry in Madras State is shown below.

Table - 1. Occupational analysis by major divisions in cement Industry in Madras State.

Occupational Classifica- tion.	Description	Percentage of Occupations in Plants.	
		IN MADRAS	ALL INDIA
0	Professional technical and related occupations	3.88	5.53
1	Administrative executive & managerial occupations	0.20	0.72
2	Clerical and related workers	8.47	7.54
3	Sales workers	0.03	0.04
4	Farmers & related workers	0.25	0.25
6	Transport & Communication workers	2.84	1.57
7 & 8	Craftsmen & Production workers	76.51	80.75
9	Services, sports & recreation workers.	7.82	3.60
All Occupations :		100.00	100.00

19. There are of course variations or similarities in certain respects relating to the percentage of occupational divisions. They may be attributed to (a) regional differences in management techniques and (b) the individual unit practices. By and large the State and the national pattern are not very dissimilar in most respects. It may be observed that the occupational norms presented in this study do not include investment-employment ratio for lack of more detailed information regarding

the price indices for cement machinery for a period of years. In the absence of such indices, it is not possible to work out the occupational in-puts at constant price which alone would have been more meaningful.

Important Occupations in Cement Industry

20. Some of the important occupations peculiar to the cement industry are (1) Burner (2) Tester (3) Gauger (4) Miller etc. The other occupations shown in the appendix are those which one comes across in any industry and they relate to the maintenance duties, administrative and clerical duties, security services and welfare amenities. Besides, the occupations coming under the mines and quarries may also have a particular significance to the cement industry though these occupations are commonly found in any mines and quarries. A brief description of these occupations which are of particular importance to the industry is given in Appendix III.

Occupational Outlook

21. Burners, fitters, welders, blasters are a few of the categories that are likely to have prospects of employment in this industry.

Side Industries

22. Though all the 4 units are mainly concerned in the production of cement, one of the units has extended its activities to certain other side industries such as production of refractories, glazed potteries, sanitary wares and spun pipes. Using the cement manufactured at site, as basic material, and certain other types of clay readily available at site and near abouts this concern is manufacturing refractory bricks, certain varieties of potteries and fancy articles, sanitary stone-ware pipes and cement spun pipes.

Uses of this Study

23. This study provides a basis for estimating requirements of manpower of different types of units for the future. The norms arrived at provide a rough yardstick for measuring future manpower requirements. The data collected will enable the employers to estimate requirements of technical personnel in relation to any planned expansion of production or the starting of new units.

APPENDIX II

Statement showing the weighted average of (1) Actual employment (2) employment distribution per 1000 persons (3) employment per 1 lakh ton of production and (4) employment per 1000 tons of installed capacity per day IN CEMENT INDUSTRY.

MADRAS STATE.

Ocl. Code No.	Occupation.	Weighted average relating to			
		Total empl.	Emplt. distribution per 1000 persons.	Emplt. per lakh ton of annual producn.	Emplt. per 1000 tons of installed capacity per day.
(1)	(2)	(3)	(4)	(5)	(6)
	ALL OCCUPATIONS	1272.00	1000.00	387.00	1196.00
0	Professional Technical & Related Workers	42.11	38.80	14.90	47.54
00	Architects, Engineers Surveyors	12.19	12.48	4.59	14.50
001	Civil Engineer	3.31	3.36	1.22	3.91
002	Mechanical Engineer	7.01	7.38	2.72	8.48
003	Electrical Engineer	0.93	1.03	0.38	1.24
004	Chemical Engineer	0.24	0.22	0.09	0.31
007	Surveyor	0.39	0.27	0.09	0.31
009	Works engineer	0.31	0.23	0.09	0.25
01	Chemists, physicists, geologists & other physical scientists	6.02	5.58	2.07	6.32
010	Chemists	6.02	5.58	2.07	6.01
03	Physicians Surgeons, dentists	0.87	0.70	0.28	0.93
030	Medical officers	0.87	0.70	0.28	0.93
04	Nurses Pharmacists and other medical technicians	8.24	6.51	2.62	8.37
040	Nurses	0.71	0.65	0.28	0.93
041	Midwives/Health visitors	1.26	0.96	0.38	1.24
042	Dressers	4.30	3.29	1.31	4.04
043	Compounders	1.34	1.13	0.46	1.54
046	Sanitary Inspectors	0.63	0.48	0.19	0.62
05	Teachers	5.94	5.42	2.34	7.73
051-2	Teachers-Secondary & Middle School	5.94	5.42	2.34	7.73
07	Social scientists & related workers	3.68	2.83	1.13	3.54
071	Accountants and auditors	2.11	1.64	0.67	2.35
075	Personal Officer	0.24	0.22	0.09	0.22
076	Labour/welfare officer	1.33	0.97	0.37	0.97

(1)	(2)	(3)	(5)	(6)	
09	<i>Draughtsman & Science engineering technicians N. E. C.</i>	5.27	5.28	1.87	6.15
090	Draughtsmen	3.90	3.23	0.73	3.98
091	Laboratory assistants	0.49	1.52	0.95	1.55
099	Tracers	0.78	0.53	0.19	0.62
1	Administrative, Executive & Managerial workers	2.00	2.06	0.75	2.36
13	<i>Directors, Managers and working proprietors</i>	2.00	2.06	0.75	2.36
133	Managers	0.69	1.96	0.66	2.11
139	Special officer for co-ordination	0.31	0.10	0.09	0.25
2	Clerical & Related workers	9.09	84.67	31.50	99.94
20	<i>Book-keepers and cashiers</i>	2.43	1.77	0.66	2.18
201	Cashiers	2.43	1.77	0.66	2.18
21	<i>Stenographers/Typists</i>	7.30	5.93	2.25	6.95
210	Stenographers	4.20	3.43	1.13	4.09
211	Typists	3.10	2.50	1.12	2.86
28	<i>Clerical workers miscellaneous</i>	78.32	64.56	24.56	77.47
280	Office Superintends/clerks	63.62	49.26	18.66	58.47
289	Time, store keepers	14.70	15.36	5.90	19.00
290	Office attenders/peons	11.04	12.41	4.03	13.34
3	Sales workers	0.39	0.27	0.09	0.31
33	<i>Salesmen, shop assistants & related workers.</i>	0.39	0.27	0.09	0.31
330	Provision stores incharge	0.39	0.27	0.09	0.31
4	Farmers Loggers etc.	3.49	2.52	1.04	2.79
40	<i>Farmers, & Farm managers</i>	0.39	0.27	0.09	0.31
404	Dairy Farm in-charge	0.39	0.27	0.09	0.31
412	Gardners	3.10	2.25	0.95	2.48
6	Workers in Transport & Communications	36.00	28.38	10.69	33.24
63	<i>Drivers, Fireman-railway engine</i>	13.06	9.47	3.85	11.64
630	Loco drivers	10.72	7.88	2.72	11.45
631	Firemen	2.34	1.59	1.13	0.19
64	<i>Drivers, Road Transport</i>	14.44	11.71	4.42	13.50
641	Drivers-motor vehicles	14.44	11.72	4.42	13.50
66	<i>Inspectors supervisors traffic controllers-transport</i>	7.80	5.30	1.88	6.42
662	Pointsmen	7.80	5.38	1.88	6.24
67	<i>Telephone telegraph & related tele communication operators.</i>	0.39	0.26	0.07	0.31

(1)	(2)	(3)	(4)	(5)	(6)
670	Telephone Operator	0.39	0.26	0.07	0.31
69	Transport Workers n.e.c.	0.31	1.64	0.47	1.55
692	Yard maistry	0.31	1.64	0.47	1.55
7 & 8	Craftsmen, Production process workers & labourers n. e. c.	991.30	765.11	298.22	919.70
71	Tailors, cutters and related workers	0.39	0.27	0.09	0.31
710	Tailors	0.39	0.27	0.09	0.31
73	Furnacemen, rollers, drawers, moulders, etc.	139.50	112.93	43.86	139.75
730	Mill attendants/furnacemen	5.67	4.64	1.69	5.41
733	Blacksmiths	27.25	21.26	8.62	25.97
734	Moulders	12.11	9.50	3.75	12.42
75	Toolmakers, machinist plumbers, welders, etc.	45.03	35.40	14.06	43.80
750	Fitters	76.56	60.89	23.24	74.00
751	Turners/drillers/machine tool operators	30.74	26.34	10.41	33.40
752	Fitter helpers/rod benders	1.98	2.26	0.74	2.49
753	Mechanics	7.61	5.43	2.15	6.08
754	Tinkers	0.70	0.49	0.19	0.56
755	Pipe fitters	0.60	1.09	0.38	1.24
756	Welders	19.75	15.37	6.38	20.73
757	Riveters & scalers	1.56	1.06	0.37	1.25
76	Electricians & related electrical & electronic workers	23.34	21.56	8.16	26.30
760	Electricians	12.37	12.36	4.78	15.30
764	Wiremen	10.34	8.71	3.19	10.38
769	Armature winder	0.63	0.49	0.19	0.62
77	Carpenters, Joiners, cabinet makers & related workers	10.04	7.78	3.08	9.90
770	Pattern makers/carpenters	10.04	7.78	3.08	9.90
78	Painters and paper hangers	1.41	1.14	0.47	1.47
780	Painters	1.41	1.14	0.47	1.47
79	Bricklayers, masons, and construction workers n.e.c.	8.89	7.66	2.91	9.44
791	Masons	8.58	7.44	2.66	9.19
799	White washer	0.31	0.22	0.25	0.25

(1)	(2)	(3)	(4)	(5)	(6)
81	Potters, Kilnman, glass & clay formers and related workers	33.79	31.71	11.63	36.80
810	Burners	15.38	13.16	4.97	15.51
811	Moulder assistants	0.62	0.45	0.19	0.50
815	Mill attendants	16.11	16.57	5.91	19.05
819	Gaugers	1.70	1.53	0.56	1.74
86	Testers, rotors, packers & related workers	12.46	11.18	4.12	13.67
860	Tester	1.43	1.70	0.56	1.90
861	Packers	11.03	9.48	3.56	12.77
87	Stationary engine & excavating & lifting equipment operators & related workers	47.66	40.63	14.71	47.18
870	Compressor driver/pump attendant	23.41	20.77	7.47	23.57
871	Foreman	2.60	2.39	1.03	3.40
872	Crane driver	10.23	7.49	2.91	9.01
874	Bull dozer driver	0.19	0.98	0.28	0.93
876	Greaser	9.36	6.34	2.25	7.47
879	Coal millers	1.87	2.67	0.77	2.80
89	Labourers N. E. C.	668.79	494.85	195.13	591.08
890	Gang maistry, gangmen	46.79	31.80	11.20	37.40
899	Unskilled workers/mazdoors	622.00	463.05	183.93	553.68
9	Services, sports & recreation workers	97.62	78.19	29.87	90.12
90	Firefighters, guards and related workers	71.60	57.21	22.59	68.30
903	Watchmen/Jameder/Havildar	71.36	56.99	22.50	68.00
909	Watch and ward Supervisors	0.24	0.22	0.09	0.30
91	Housekeepers, Cooks, maids & related workers	3.82	2.84	1.12	4.03
910	Club boy	0.31	0.12	0.09	0.25
911	Cooks	3.51	2.72	1.03	3.78
93	Building care takers & related workers	21.96	17.92	6.03	17.48
931	Sweepers/scavangers	21.96	17.92	6.03	17.48
99	Services, sports, recreation workers n.e.c.	0.24	0.22	0.09	0.31
999	Club marker	0.24	0.22	0.09	0.31

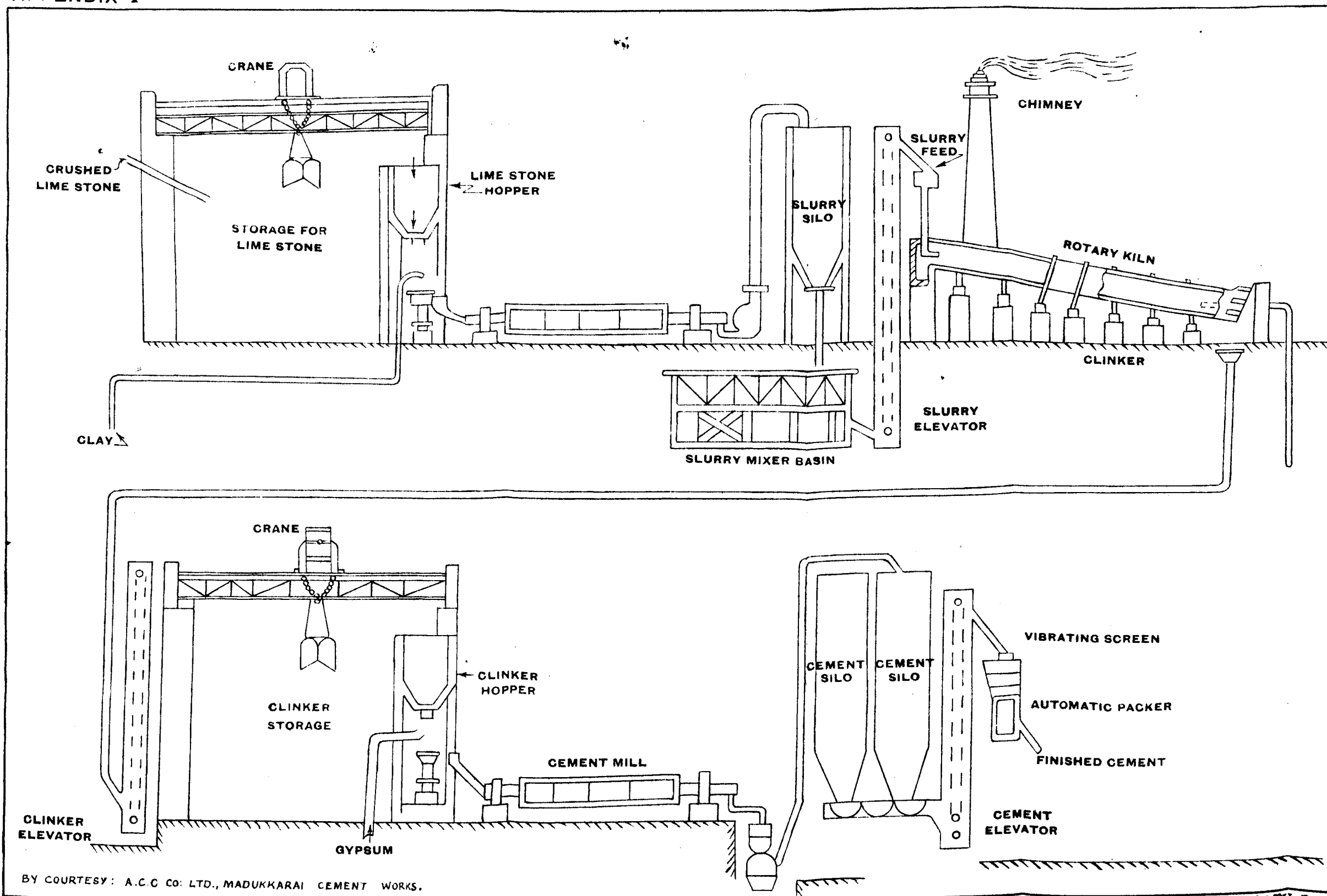
APPENDIX III

N

Statement showing the Occupational Descriptions, of IMPORTANT Occupations in Cement Industry.

Occupational Classification Code No.	Occupation	Description
(1)	(2)	(3)
130.50	Mines Manager	Controls and supervises operations in mines for extraction of minerals such as coal, ore, mica etc. observing statutory regulations, an in accordance with policy and direction of management. Ensures satisfactory production and safety of men and material.
810.50	Burner (Cement)	Operates special type rotary kiln to burn raw ground stone, clay and other material for manufacture of cement. Regulates proper amount of feed, speed of kiln, coal blast and draght to ensure production of clinker (burnt clay and stone) of right quality.
815.30	Slurymill attendant	Operates ballmill for finely grinding clay, clinker into slurry power and cement. Adjusts feed and speed of mill. Adjusts flow of water when grinding raw materials into slurry. Adjusts airdraft when grinding clinker into cement to avoid choking. Ensures grinding of material to specified fitness.
815.40	Granulator attendant	Tends granulator to splash raw materials of cement with spray of water to produce granules of proper size and attends to minor repairs of plants.
819.50	Gauger (Cement)	Test at periodical intervals samples of cement for physical properties such as compressions, tensile strength and setting time.
870.20	Compressor driver	Operates power driven air-compressor for supplying compressed air to drive pneumatic tools and equipment.
876.10	Compressor oilman and pumping attendant	Cleans and lubricates moving parts of stationery engines or machinery and performs various other related tasks such as checking nuts and bolts, lubricating oil, cooling system etc.
879.40	Coal Miller	Operates power driven machine and endless chain or belt conveyor to break coal into pieces of required size and to convey them to boiler.

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