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THE CEMENT INDUSTRY IN IRAN 1/

by

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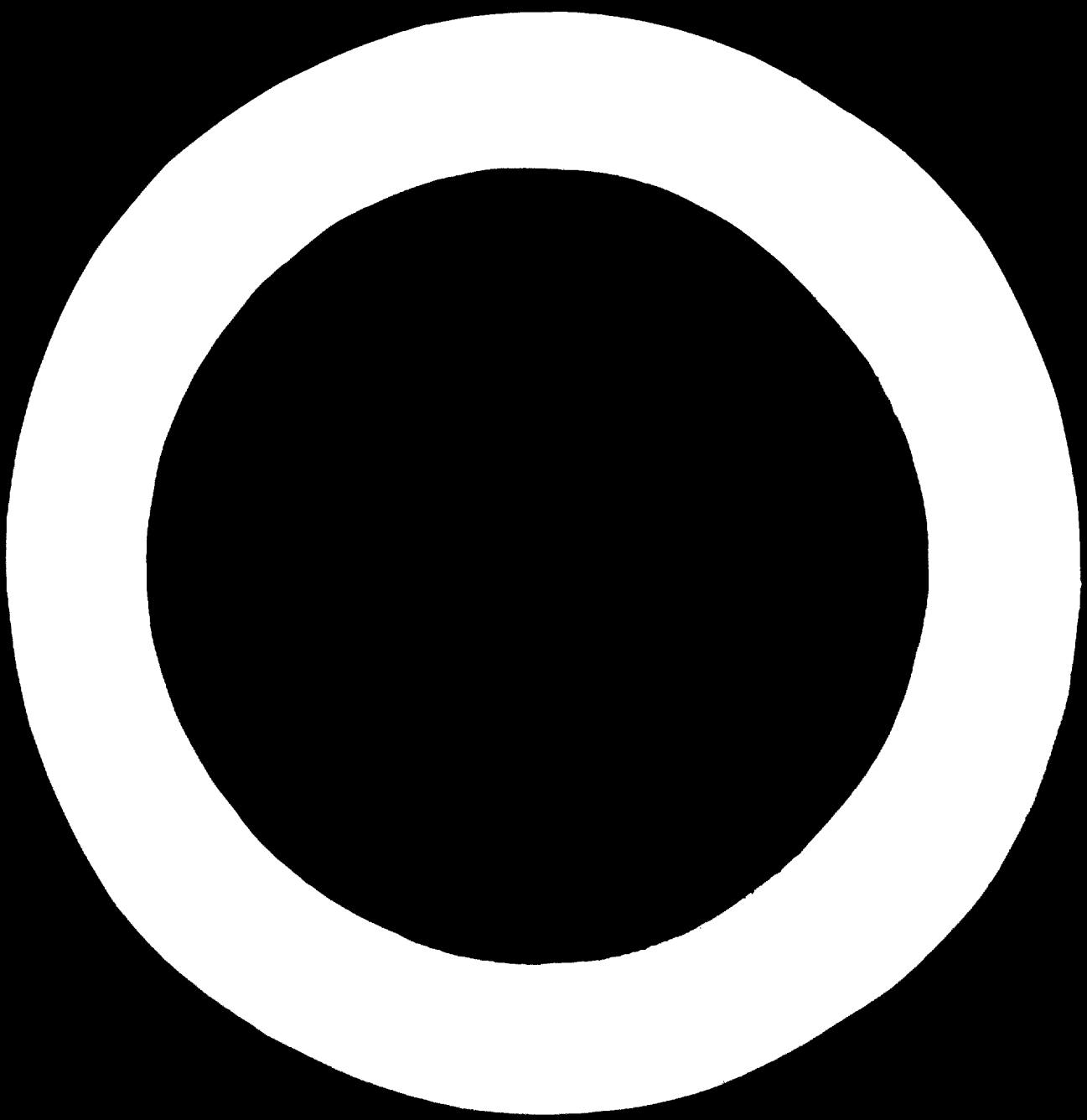


INTRODUCTION

History of the Cement Industry

The development of the cement industry, in common with that of many other large industries, has come about from a series of incidents that started many centuries ago. It is probable that clay was the first cementitious material, because it was widely distributed and required no preliminary processing. In fact, long before the appearance of man, clays were molded by contact with minerals, plants, and animals, and they supply many records of value in geology and other sciences.

Even in modern times, clay, in addition to that made into bricks, is used as a building material. In January, 1943, it was announced that a contract had been let in Chungking, China, for a 75,000 dollar clay building, to be used as the headquarters of the Office of War Information.

Sun dried bricks are used extensively. The abode brick made in the United States, Mexico, and some other countries where dry climates prevail, are sun dries. There is evidence that the brick in the Great Wall of China, in the vicinity of Shanahikwan, is sun dried.

It seems likely that, after clays, limes were among the first cementitious materials. Although clays can be used without any processing before the addition of water, in the case of limes, the application of heat precedes the addition of water.

One cannot proceed very far with the study of cement before coming across the name of Edystone, a group of gneiss rock in the English Channel off the coast of Cornwall. For many years this was the site of lighthouses. Previous to 1756, these were frame structures. In that year, John Smeaton was employed by the parliament to build a lighthouse which, it was hoped, would be permanent. It was well known that common limes would not harden under water, but, generally, it was believed that a high calcium lime was superior to one that had a lower calcium content. Smeaton found that lime made from limestones, relatively high in clay content, could harden under water.

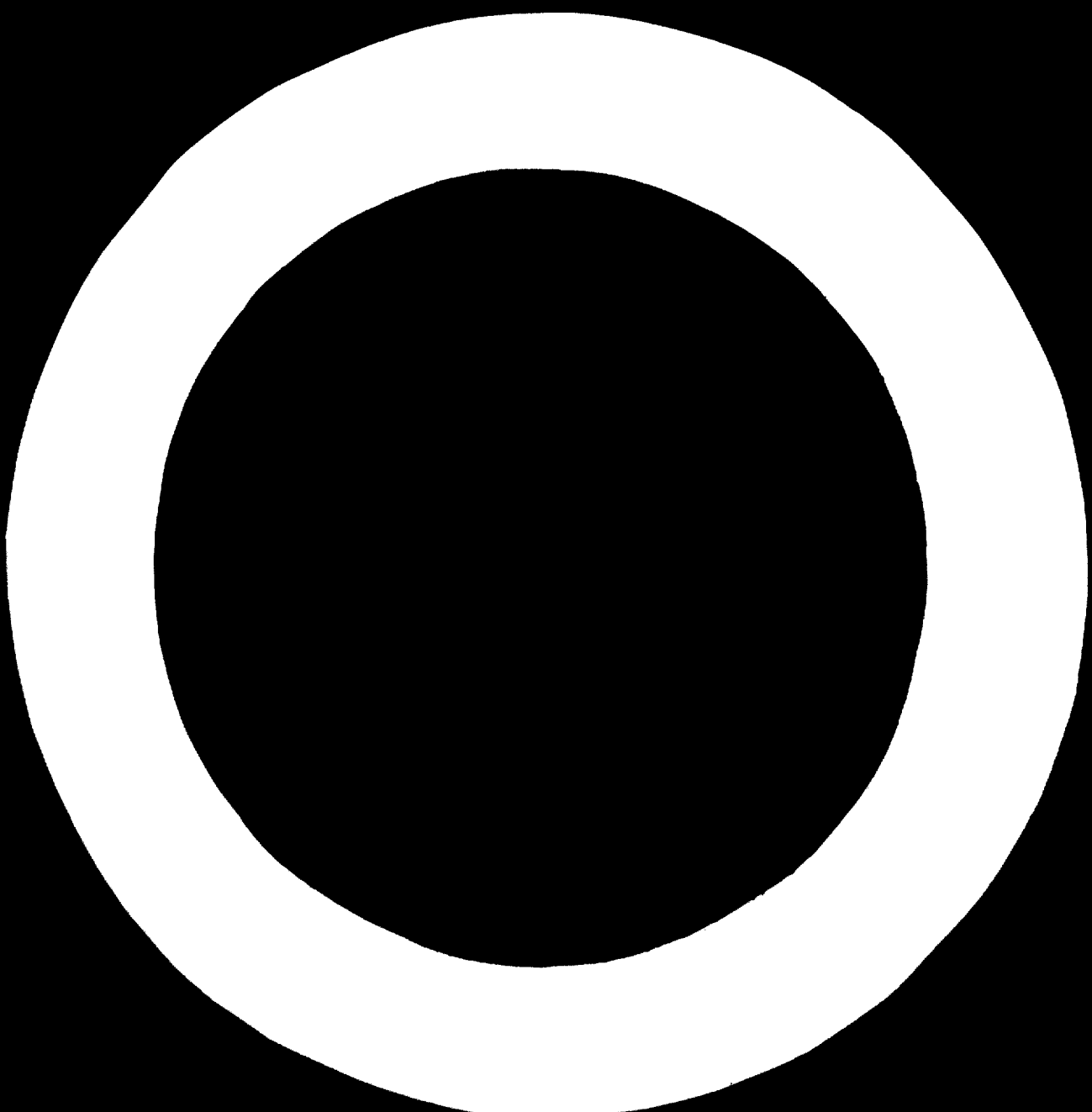
There was a deposit of such limestone at Aberthaw. It is known now that the hydraulic characteristics of such limes are due to the silicates they contain. A lighthouse, 72 feet high, was constructed of masonry, the mortar of which was made with Aberthaw hydraulic lime.

Pozzolana Cements were developed and used extensively by the Romans. The name "pozzolana," which today, is spelled in a variety of ways, was derived from Pozzuoli, a town in Italy a few miles from Naples and Mount Vesuvius. This material is of volcanic origin , containing compounds of silicon, aluminum, and some other elements. The Romans found that a hydraulic cementitious material could be make by mixing hydrated lime and a finely ground Pozzoloana. It is probable that Pozzolana were the first hydraulic cement developed.

In 1824 Joseph Aspdin, a stonemason, living at Leeds, England, was granted a patent for a new type of cementitious material. The color of the product after hydration reminded him of the limestone of the Isle of Portland. Because of this he named the product "portland cement". Portland, is the name of product made by a given process, some what analogous to Bessemer steel.

A fundamental difference between natural cements and portland cements lies in the selection and processing of the raw materials before they enter the kilns. On this basis, Portland cements have retained the lead in the field decades.

Although there are numerous cements recommended in relatively for special purposes, in general, those manufactured in relatively large quantities are portland, or they contain a portland and one or more other materials.



Althrough Iran like many other countries had used cementitions materials in construction in historical times, particularly in the construction of dams. The old Day Dam over the Karoon River and the Amir Dam over the (Koor)river examples the actual. beginnings of the cement industry in Iran came during this century after the ascent of the Pahlavi Dynasty to the Throne.

As a result of industrial reforms promulgated by the Pahlavi it became necessary for Iran to establish a cement factory to meet its growing demands for construction materials.

The first cement factory in Iran was constinded in the city of Ray, which is south of the capital, Tehran, in 1934. It's initial production was 100 tons daily. This insufficient to meet the increasing requirements of cement for construction and road building so in 1938 another factory with a daily production capacity of 200 tons was constructed close to the site of the original factory.

Up to the beginning of the second seven year development plan (1955), the government-owned Ray Cement factory with its daily production of 300 tons and the privately owned Mashad Cement factory with a 90 ton daily production capacity were the only suppliers of cement in Iran.

The requirment of the Second Plan in the feeld of construction were such that the production capacity of these two factories was insufficent to meet them so another factory was constructed in Shiraz called the Fars Cement Companeys with an initial daily production capacity of 250 tons.

1- Production Analysis

A. Present Production Units, Number and Specification.

presently there are thirteen cement factories in differnt areas of Iran, eleven of which are operational, while two are in the final stages of construction.

These factories are producing cement at a rate of 10-15% above their actual capacity; Considering a 330 day production year, the total volume of cement production is 4 million tons per year.

Permission has been given for the establishment of ten new cement factories which will commence production during the fifth Development-Plan (1973-1978) their names, locations and expected capacities are as follows:

Table 2.

B. Production Analysis

As a result of an increased capacity of the three original cement factories and the establishment of new factories, the volume of production increased form 300,000 tons in 1965 to 33 million tons in 1972. This means there was an eleven fold increase in volume of production during a sixteen year period, as well a an increase in the number of factories from three to thirteen.

(CAPACITY) per Ton

CEMENT FACTORIES SPECIFICATIONS

Factory Name	Factory Location	Year Established	Year Actiual Production Began	Initial Production Capacity (Daily)	Present Production Capacity (Daily)	Anticipated Capacity During plan	Production Method	Type Of Ownership
RAY Cement	RAY CITY	1310 - 1931	1312	100	600	2300	Dry	Public
FARS "	SHIRAZE	1329 - 1950	1335	250	1000	3000	"	Public & Private
TEHRAN "	GHANY ABAD	1331 - 1952	1335	700	3200	5200	WET	Private
MESHAD "	HASANABAD	1332 - 1953	1336	200	500	1200	DRY	"
SHOMAL "	GAGE HOOD	1333 - 1954	1337	100	400	—	WET	"
SHOMAL "	CHANY ABAD	1335 - 1956	1338	300	300	—	"	"
ESFEHAN "	ALY ABAD	1334 - 1955	1337	200	1000	3300	"	
LOGHAN "	MANGIL	1334 - 1955	1336	300	300	—	"	"
DORROD "	DORDOD	1334 - 1955	1338	600	2000	4000	WET	"
AZARBAIJAN "	SOOFIAN	1345 - 1966	1349	600	600	1600	DRY	Public & Private
KERMAN "	KERMAN	1345 - 1966	1349	300	300	3300	"	Public
ABEYEK "	ABEYEK	1348 - 1959	1351	3500	—	—	"	Private
ARYANEHR "	ESFAHAN	—	—	1000	—	—	—	Private

Table NO.2 — New Factories Which Will Commence Production during fifth plan

	Name	Location	DAILY Capacity PER TON
1	GORGAN & MASANDARAN Cement	GORGAN	2000
2	BANDAR ABAS Cement	BANDAR ABAS	2000
3	ZAHEDAN Cement	ZAHEDAN	1000
4	BEHBAHAN "	BEHBAHAN	2000
5	KERMAN SHAH "	KERMANSHAH	2000
6	YAZD "	YAZD	1000
7	REZAIAH "	REZIAH	2000
8	HAMEDAN "	HAMEDAN	1000
9	KASHAN "	KASHAN	2000
10	KORDESTAN "	KORDESTAN	2000

Table 3 shows that there was a decrease (or negative growth) in the annual production of cement in the years 1961, 1962 and 1966. These were years of economic crisis.

Although private construction was at a low level during the years 1968 and 1969, increased governmental housing activities and construction on the site of the Asian Fair (1969) accounted for an increased level of production during these years.

The average annual increase in cement production during the fourteen year period (1959 - 1972) was thirteen per cent.

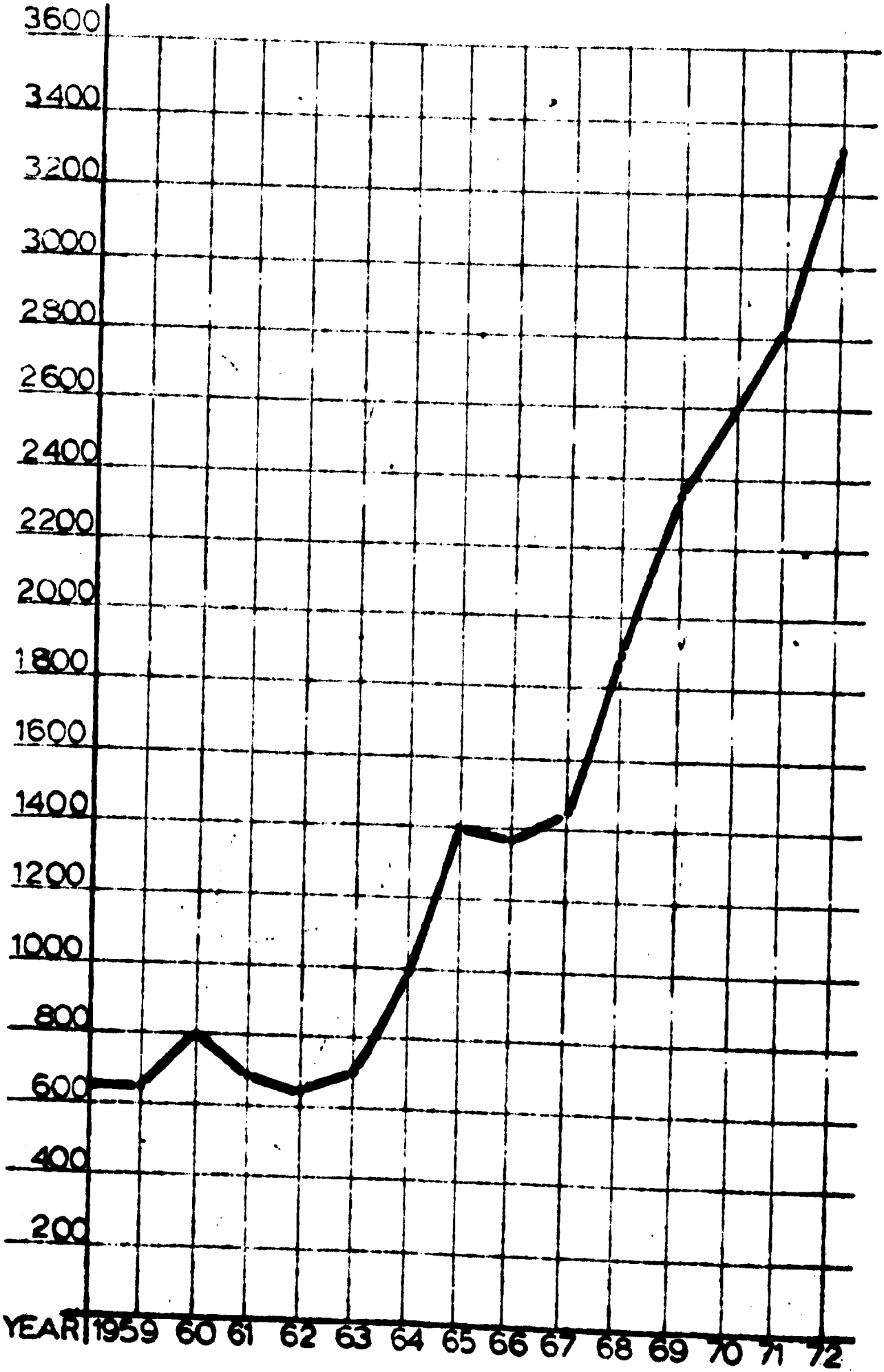
When production in the newly established factories has reached its capacity the average annual production should reach a level of 15,000 tons.

Table No. 3 — Production of Cement in Iran (For the Years 1959 to 1972)

YEAR	PRODUCTION (Ton)	ANNUAL Increase (Percentage)	INDEX
1959	660947	-	100
1960	800000	+21.04	121.04
1961	695000	-13.13	105.15
1962	667588	-3.95	101.00
1963	714954	+7.09	108.17
1964	1120269	+56.69	169.49
1965	1418632	+26.63	214.64
1966	1394960	-1.67	211.05
1967	1478407	+5.98	223.68
1968	1903940	+28.78	288.06
1969	2342030	+23.00	354.34
1970	2587097	+10.46	391.42
1971	2830203	+9.39	428.20
1972	3308232	+16.89	500.53

VOLUME
(THOUSAND TON)

PRODUCTION GROWTH
CHART . YEARS (1959 -72)



II Consumption Analysis

A. Analysis of Consumption Volume

Table 4 shows Cement Consumption in Iran during the period 1959-1972. The years 1961,1962 and 1963 show decreases in consumption which can be attributed to economic crisis during those years.

Since 1964 cement consumption in Iran has increased at a rapid pace because of the improved economic situation prevailing in the country as well as ever increasing housing construction. In 1972 cement consumption was four times that of 1959.

The average annual growth in cement consumption during this fourteen year period was thirteen per cent. The highest growth rate in the years 1968-1969. The reasons for the high consumption during these years was an increase in governmental housing activities and the exceptional construction activities related to the Asian Fair.

Comparing with volume of consumption in 1972 (3,364,076 tons) with the volume of production in the same year (3,308,282 tons). Is abvious that 98% of the cement consumed in Iran was supplied by local production and only 2% was supplied through import.

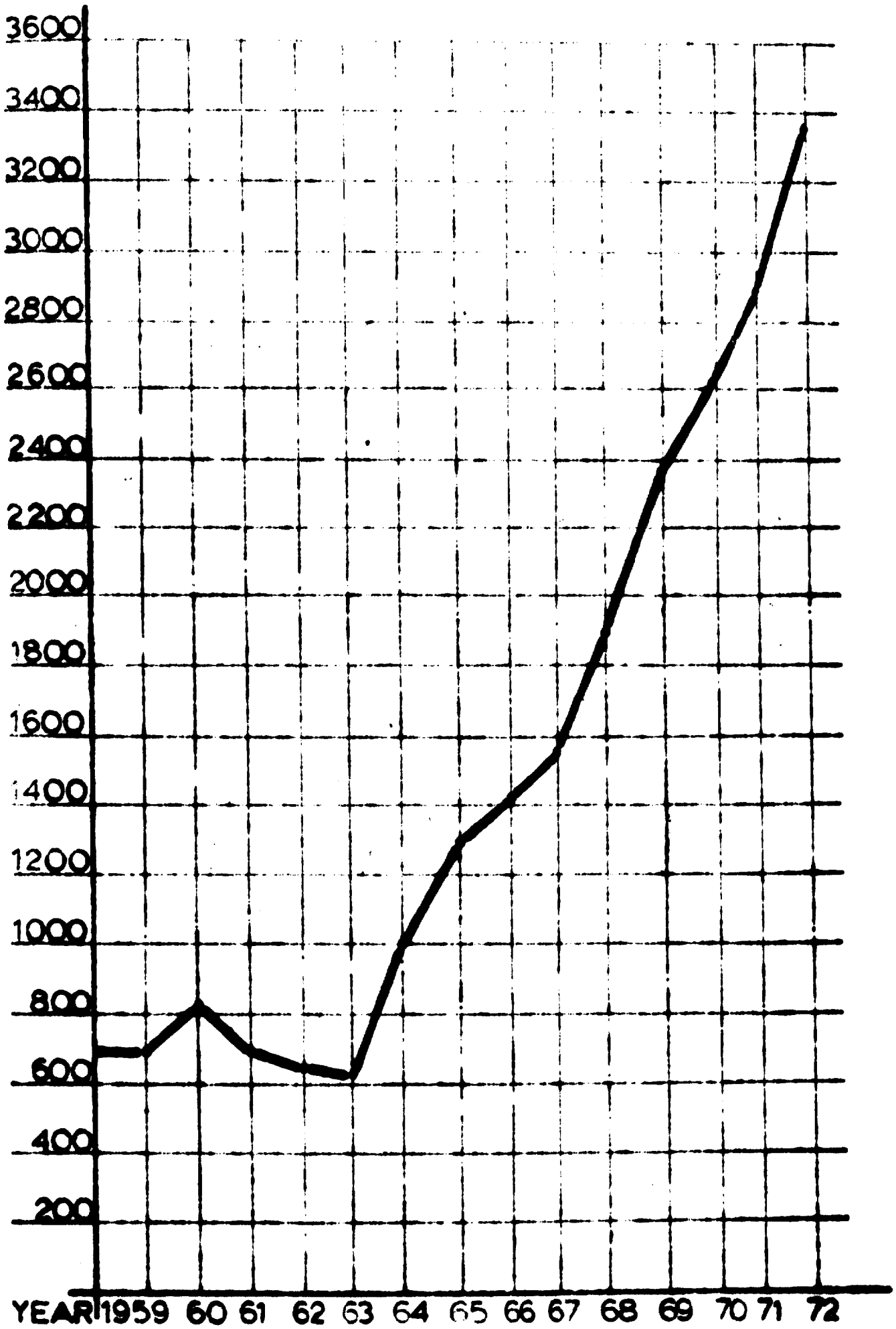
According to the statistics of the Iranian Ministry of Economy,55% of the cement produced in Iran is consumed by the construction industry,22% is used for road building,8% is used by manufacturers and 7% is used for other purposes.

Table No.4 — Cement Consumption in Iran (From 1959 to 1972)

YEAR	CONSUMPTION (Ton)	ANNUAL Increase (Percentage)	INDEX
1959	706150	–	100
1960	830167	+17.6	117.6
1961	720394	-13.2	102.0
1962	693235	-3.8	98.2
1963	691141	-.3	97.9
1964	1024615	+48.2	154.1
1965	1312521	+28.1	185.9
1966	1427079	+8.7	202.1
1967	1569000	+9.9	222.2
1968	1911022	+21.8	270.6
1969	2390284	+25.1	338.5
1970	2614211	+9.4	370.2
1971	2885208	+10.4	408.6
1972	3364076	+16.6	476.4

VOLUME
(THOUSAND.TON)

CONSUMPTION . GROUTH
CHART-YEARS(1959 -72)



B. Export Analysis

Until 1960 Iran did not export cements but in that year the government decided to export cements to Afghanistan to some Persian Gulf Areas. The decision to allow the exportation of cement was for several reasons.

a) to halt the economic crisis of that year

b) to get foreign exchange

c) to expand reiendly relations with neighboring countries

d) to increase export of other products (cement was a leading export item in these areas)

Government interference in cement export was limited to the years 1964 and 1965 it can be seen in Table 5 that these two years had years of which had exceptionally high volumes of exportation. Producers were not in favor of exporting cement because of the large internal demand and limited producing capacities of their factories.

In 1969; however, there was a 12.5% increase in the volume of cement exported over the previous year and in 1970 the increase was 75.76% over 1969. These substantial increases in the volum of export of cement were because of expanding importation.

In 1971 and 1972 there was a reduction in the volume of export (42.89%-1971 and 53.56%-1972) which had as its causes.

a) expansion of construction activities by the private section of the economy

b) import limitation.

C. Import Analysis

Up until 1966 most of the cement consumed in Iran and exported abroad was produced locally. Until that year very low volume of cement was imported, when export limitations were removed by the government in 1966 it was necessary to allow importation to keep cement movement in balance. The Iranian Parliament therefore passed a law permitting the importation of cement.

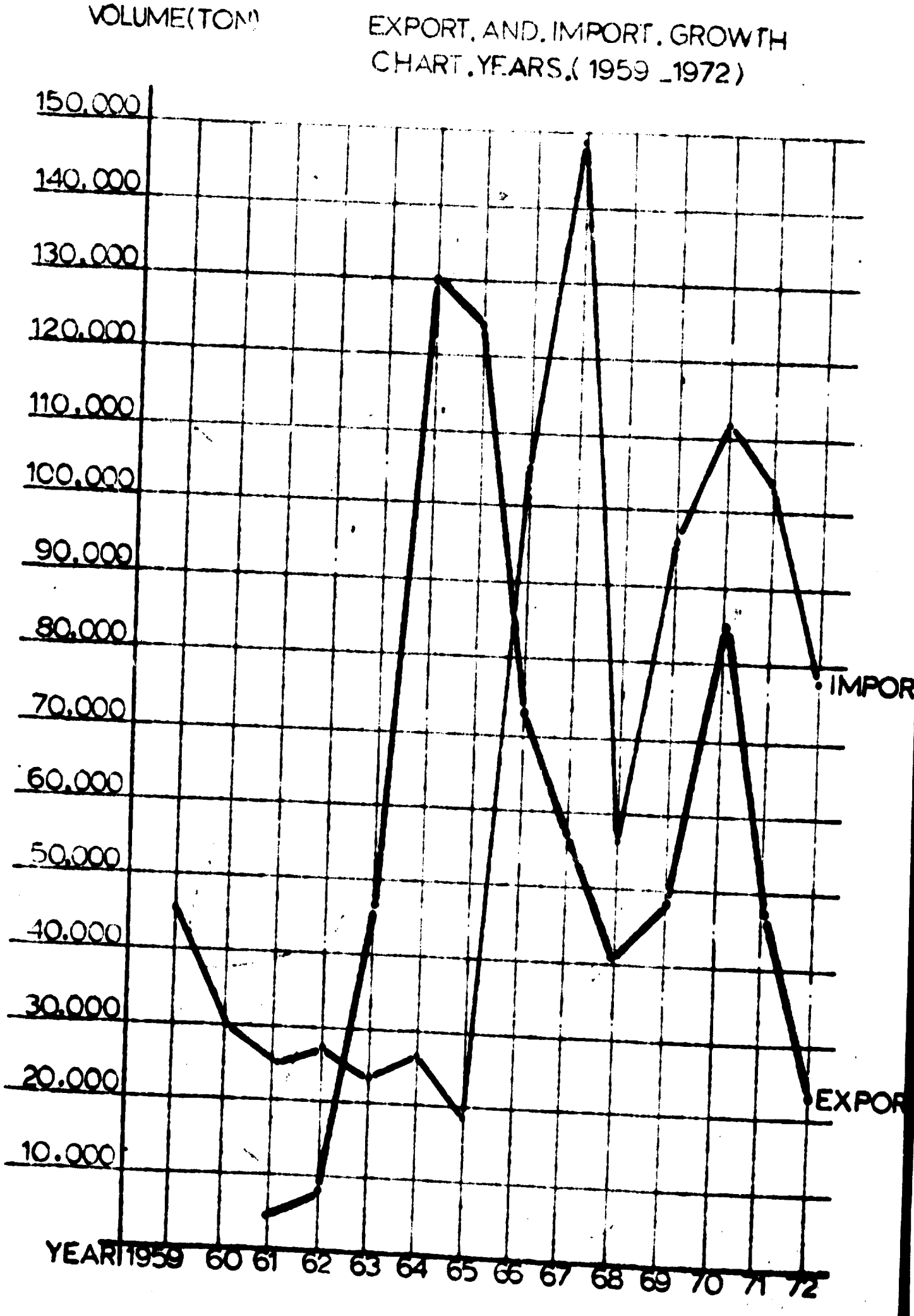
Initially cement was imported form Irag and the Sovit Union. Recently; however Pakistan has replaced Irag. as a supplier of cement to Iran.

Despite increased government construction activities the volume of import was reduced in 1968, factories were producing their maximum capacities.

In 1969 and 1970 there was an increase in the volume of cement imported but in 1971 and 1972 this was again reduced. This reduction was due to

a) shortage of cement in world market

b) increase in world price of cement.


VOLUME(TON)
EXPORT. AND. IMPORT. GROWTH
CHART. YEARS.(1959 _1972)
150,000
140,000
130,000
120,000
110,000
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
IMPOR
EXPOR
YEAR 1959 60 61 62 63 64 65 66 67 68 69 70 71 72

D. Direct and Indirect Role of Government in Price Stability and Production.

The Iranian government has had an importand role in the development of the cement industry both directly and indirectly.

1 Direct Role

a) The governmnet has established an organization The Center for Advising and Supervising the Consumptions Production and Export of Cement. This organization is also responsible for price control in the cement industry and it reviews prices annually.

b) import of cement and distribution of it in needed areas.

c) Establishment of sales organizations in all major cities and development centers.

d) Establishment of government factories in areas there is needed, and private sector is not willing to invest.

II. Indirect Role

Production

a) The government's effective role in the production of cement began 1931 when the requirements of cement for the construction of buildings and roads became so high that it was necessary to take measures to insure that the volume was sufficient to meet the demands. The result of the government's interference in the cement industry was stabilization of reasonable cement price.

b) The government has assisted the private sector by Providing financial assistance indirectly. Since the time of the Third Development Plan cheap and easily available loans have been provided through the Industrial Development Bank. and the Industrial Credit Bank.

c) Tax holiday for industries this policy has been very effective especially in the provincial areas.

d) Import duty and tax subsidiaries for cement factory machinery.

IV- Importand Factors in Present Cement Shortage.

Three basic Factors are responsible for the present shortage of cement in Iran.

1. No coordination between those responsible for planning construction material production and those aware of anticipated consumption of cement and other construction materials.

2. Lach of control on private investment and production programs in the field of construction materials.

3. Increased world wide consumptions of cement in recent years. The shortage of cement on the world market, attributed to sudden increased volume of consumption has created serious concern for consumers. Consumption has increased at a much more rapid pace than production and the gap cannot be filled by substitution materials. The price of cement on the world market has reached to an all-time high because of this shortage, and also increase in production costs.

Increased volume of local production can be the only solution to this problem, as attempting to overcome the shortage cannot be met by buying on the world market, since transportation costs increase the price even more.

4. Heavy substitution of cement for other construction Materials.

5. The building of several exceptionally large projects construction such as the Asian Olympic Stadium and the attached Olympic Village, verious dams, and few other similer projects.

7. Projected Future Demands for Cement (1973-1978)

As earlier mentioned, during the last five years the annual increase in cement consumption was about 15.4%. During the period of the Fifth Development Plan (1973-1978) the projected annual increase will reach 30%.

The reasons for this expected increase are:

1) Heavy government investment in construction activities
2) Housing programmed for this period is 750000 units (both public and private sectors)
3) Substitution
4) Rural development
5) expected increase in per capita income from present $600 to $900 in 1978

If the average per capita income during the period of the Plan is taken to be $750, then Per capita cement consumption in Iran should reach a level similar to that of countries like Spain and Greece.

Of course, considering the special conditions in Iran, especially climatic conditions (dry), it is posible that in reality the per capita consumption may reach a level of only 400 Kg per year.

This figure cannot be considered high since the population is expected to reach 36000000 by the end of 1978 and the predicted consumption will be above 15000000, tons.

Present production capacity is around 4000000 tons and the production of factories under construction or in the final stages of planning is expected to be another 4000000 tons.

This leaves a gap of 7000000 tons between expected production capacity and anticipated consumption.

New Government Policies Regarding Solution of Cement Problem

A. Table 2 shows that the government has given permission for the establishment of ten new cement factories which will go into production during the next five years. By that time consumption demand and production will be on the same level.

B. The government has taken the responsiblity for the importation of cement to overcome the shortage which exist until the newly established factories are producing at their full capacities.

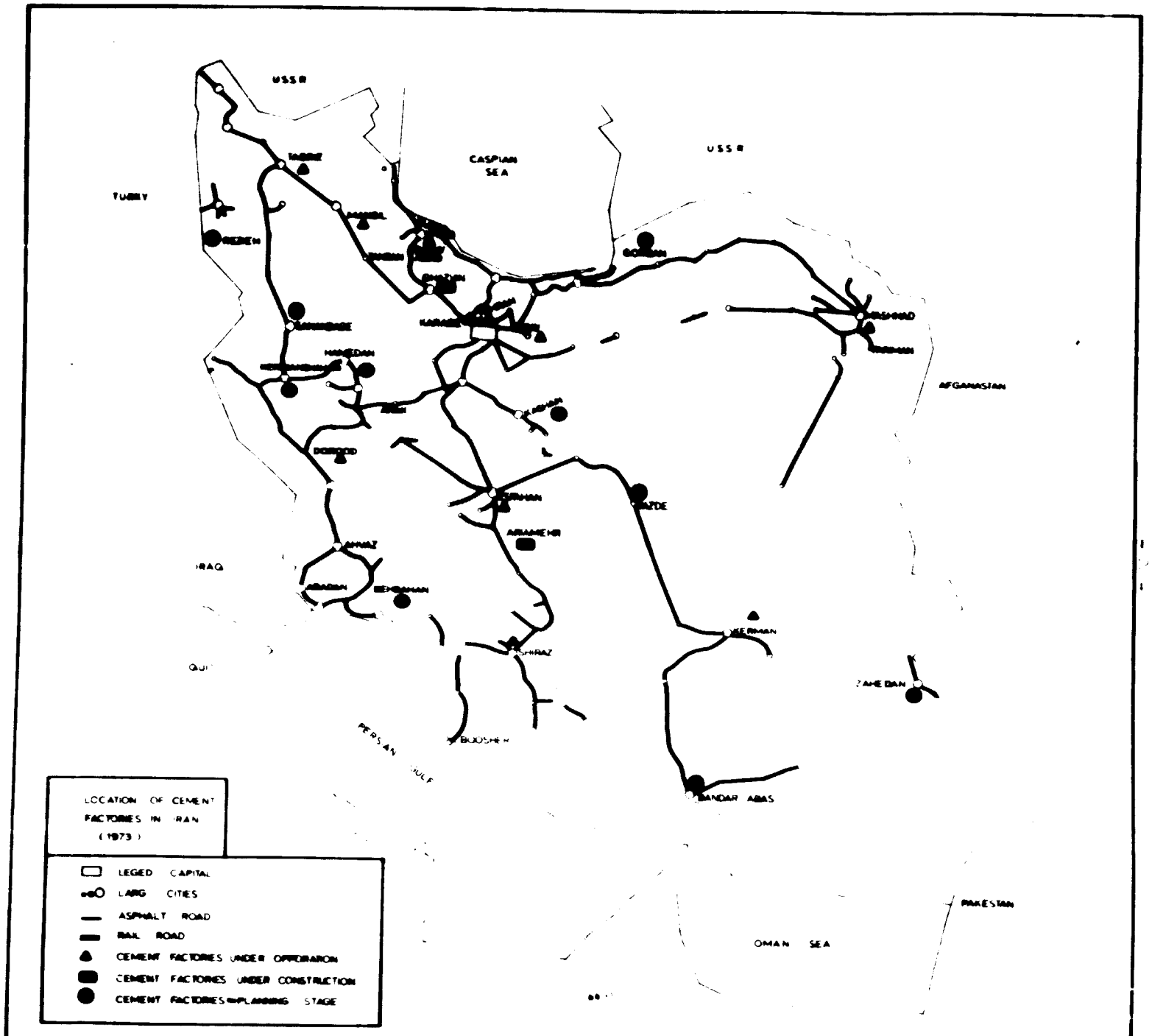
C. The government has taken responsibility for the distribution of cement through-out the country in order to keep price under control.

D. In order to overcome the problem of a lack of specialists in the cement industry, a number of schools for training technicians have been established.

E. Studies are being made, in collaboration with the Machine Building Plant in Arak and the Enginering Plant in Tabriz, to see if will be feasible to produce locally some of the equipment and machines necessary for the production of cement.

The Industrial Development and Removation Organization hopes to design and produce locally more than 50% of the machinery used in cement factories within the next few years.

It is expected that these new government policies will help to solve the problem of the bottlenech of cement in the Iranian market: It is also hoped that in the near future Iran will be able to export know-how, and machinery of Cement Industries to neighboring countries.


USSR
CASPIAN SEA
USSR
TURKEY
IRAQ
AFGANISTAN
PAKISTAN
OMAN SEA
PERSIAN GULF
BANDAR ABBAS
LOCATION OF CEMENT FACTORIES IN IRAN (1973)
LEGED CAPITAL
LARG CITIES
ASPHALT ROAD
RAIL ROAD
CEMENT FACTORIES UNDER OPPERATION
CEMENT FACTORIES UNDER CONSTRUCTION
CEMENT FACTORIES IN PLANNING STAGE