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FERTILIZERS INDUSTRY IN THE UAR

(Presented by the Government of the United Arab Republic)

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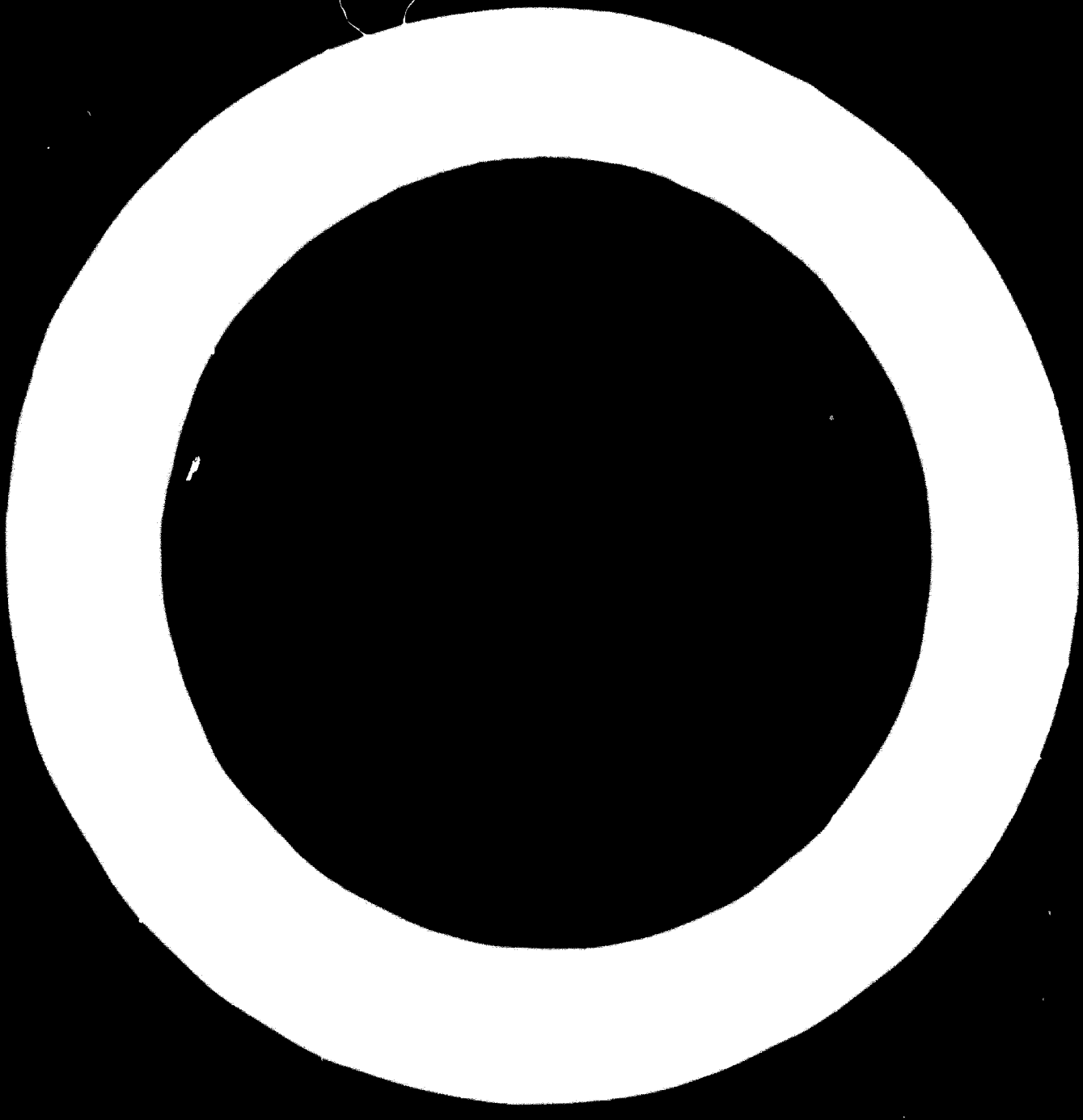

FERTILIZERS INDUSTRY IN THE UNITED ARAB REPUBLIC

I. INTRODUCTION

Chemical fertilizers are of paramount importance for the UAR for many reasons, the most important of which are the following:

A. The number of main crops is equal to 1.8 crop per year compared to one crop only in many parts of the world. Therefore the land must be provided with the appropriate amount of fertilizers to preserve its high rate of productivity.

B. The area of land that could be cultivated is limited according to the quantity of water which could be stored by the various dams and barrages erected at various places across the river; this fact shows the importance of increasing the land productivity in the vertical direction, and adequate fertilization is one of the important means to achieve this increase.

C. The continually increasing population of the Republic deem it necessary to increase the production of the land, to cope with the consumption of the population in food and clothing, and in the meantime maintain the same rate of the famous cotton exportation of the UAR to the various parts of the world.

D. The progressive increase in the standard of living of the population of the UAR since the revolution in 1952 is increasing the consumption per "capita" of food and clothing which are based on high agricultural productivity.

For these and other reasons the UAR is considered one of the high consumers of chemical fertilizers per unit cultivated area in the whol world.

II. WHAT FERTILIZERS ?

Agronomists of the UAR have been carrying out researches on fertilization for the assessment of the quantities of the various groups of fertilizers for the various types of land.

The results of their work could be summarized in the following :
The most important group of fertilizers for the land of the UAR are the nitrogen fertilizers; they show considerable effect on the crop in quantity and quality (except for the leguminous crops).

The consumption of the nitrogen fertilizers is also ever increasing. It was estimated in the year 1952 at 670,000 tons based on 15.5 per cent nitrogen. In the year 1962 the consumption was estimated at 1,250,000 tons based on 15.5 per cent nitrogen. The consumption in the year 1970 is expected to exceed 2,250,000 tons based on 15.5 per cent nitrogen, due to the increase in the cultivated area due to the high dam project as well as the increase of the rate of fertilization per unit area of cultivated land.

The phosphorus fertilizers come next in importance to the nitrogen fertilizers. The total consumption however is much less, and in 1960 it was 260,000 tons based on 15 per cent $P_2 O_5$ (phosphorus pentoxide). The consumption in the 1970 is expected to reach 1.3 million tons on the same bases. Agronomists however indicate that the consumption of phosphorus fertilizers should approximate 50 per cent of the nitrogen fertilizers consumption.

The potassium fertilizers are of very little importance for the agriculture in the UAR. The agronomists state that the cultivated area is rich in potassium and that for most of the crops we shall not need potassium fertilizers for a large number of years.

Mixed and complex fertilizers

In spite of the well known advantages of the utilization of mixed and complex fertilizers, yet neither farmers nor agronomists believe in their employment yet. Agronomists believe that the plants need the various fertilizers at different times and due to the alkalinity of the soil, part

of the soluble phosphate is transferred to insoluble form before the plant needs it; and therefore the application of mixed and complex fertilizers means a certain reduction in the availability of the phosphorus part in the fertilizers.

III. THE PRESENT SITUATION OF THE NITROGEN FERTILIZERS INDUSTRY

Although the nitrogen fertilizers are more important than the phosphorus fertilizers yet the nitrogen fertilizers industry started only after the second world war with the Suez Plant for the production of calcium nitrate 15.5 per cent nitrogen and an annual capacity of 200,000 tons. The production is planned on the utilisation of petroleum refinery waste gases "mostly methane" as the raw material for ammonia synthesis which is oxidized to nitric acid. The acid is neutralized with limestone to obtain the calcium nitrate fertilizer.

Calcium nitrate is highly soluble and therefore suitable for crops like maize and vegetables etc.

After the revolution a hydro-electric power station was executed at the old Aswan dam. The transmission of the generated power to Cairo was not economical, and it was planned to use the power of this station for the electrolysis of water and use the hydrogen for ammonia synthesis then oxidize half the ammonia to nitric acid. The nitric acid is then neutralised with the other half of the ammonia. The ammonium nitrate produced, is then diluted to 20.5 per cent nitrogen by mixing it with pulverized limestone. The Aswan Plant "well known as Kima" started production in 1960. Its capacity is about 550,000 tons per year. However, Kima started to produce ammonium nitrate with a concentration of 26 per cent nitrogen.

The Suez Plant was extended twice. The first extension increased the annual capacity from 200,000 tons to 250,000 tons of calcium nitrate and was executed in 1958. The second extension was the installation of a complete Ammonium Sulphate Plant 20.6 per cent nitrogen with an annual capacity of 100,000 tons. The process is based on burning sulphur to sulphuric acid, then neutralizing the sulphuric acid with ammonia. The

ammonium sulphate is the most appropriate fertilizer for rice and other crops. With regard to the alkalinity of the soil the ammonium sulphate leaves behind the sulphate ion which partly neutralizes this alkalinity. In other words, the ammonium sulphate improves the physicochemical characteristics of the soil.

IV. PRESENT SITUATION IN THE PHOSPHORUS INDUSTRY

The first plant was installed at Kafr El Zayat in 1937 with a capacity of 115,000 tons of super-phosphate 15 per cent P_2O_5 per year. The processing is based on treating the rock phosphate mined in many parts of UAR with sulphuric acid produced by the contact process. The raw material for the sulphuric acid is iron pyrites imported from Cyprus, Spain and other parts of the world. The second plant was installed at Abou Zaabal in 1944 with a capacity of about 70,000 tons per year. The processing at Abou Zaabal is the same as Kafr El Zayat i.e. using iron pyrites for the production of sulphuric acid and then treating the rock phosphate with sulphuric acid.

The UAR is rich in rock phosphate deposits. It exists in the Nile Valley at Edfu, on the red sea shore at Safaga and Kosseir, and in the new valley in the western desert.

The first Five Years Plan covered the extensions necessary to produce 616,000 tons per year. These extensions will be discussed in detail later.

Most of the super-phosphate is consumed for the fertilization of leguminous crops. However, the Ministry of Agriculture is popularizing its fertilization for almost all the crops to reach a consumption figure of 1.3 million tons planned for the year 1970.

V. PROJECTED PRODUCTION IN THE NITROGEN FERTILIZERS INDUSTRY

A. The first Five Years Plan included projects to increase the production to about 2,250,000 tons per year on the bases of 15.5 per cent nitrogen. The project could be summarized as follows:

a) At Suez:

A project: to install a plant to produce 260,000 tons per year of calcium nitrate 15.5 per cent nitrogen.

and a project: to install a plant to produce 160,000 tons per year of ammonium nitrate-limestone 20.5 per cent nitrogen.

b) At Helwan:

A project: to install a plant to produce 400,000 tons of ammonium nitrate-limestone per year with a content of 20.5 per cent nitrogen.

c) At Alexandria:

A project: to install a plant within the Petro Chemical complex to produce 200,000 tons ammonium nitrate 20.5 per cent nitrogen per year.

The contracts of the above mentioned projects were concluded and the execution is in progress. It should be noted here, that the total production of these projects added to the existing production reaches the target of consumption of 1970.

B. PROJECTS WITHIN THE SECOND FIVE YEARS PLAN

The reliability of the nitrogen fertilizer industry on local raw materials and the experience gained during this period has encouraged the Authorities to add some more projects within the second Five Years Plan for the purpose of securing on the one hand self sufficiency in case the consumption exceeds the estimated figures in 1970. It will also serve to satisfy the needs of some neighbouring countries. The projects are:

At Suez:

A project: to produce 200,000 tons of ammonium sulphate per year 20.6 per cent nitrogen. The process is based on the double decomposition between ammonium carbonate and gypsum existing in the Sinai peninsula.

At Helwan:

Two plants are projected:

The first project to produce 200,000 tons ammonium nitrate per year 20.5 per cent nitrogen.

The other project to install a Urea Plant with a capacity of 95,000 tons per year 46.0 per cent nitrogen.

All the projects at Helwan are based on using the Coke Oven Gas as the raw material for ammonia synthesis.

VI. PROJECTED PRODUCTION IN THE PHOSPHATIC FERTILIZERS INDUSTRY

A. The first Five Years Plan includes the following projects:

a) At Kafr El Zayat:

An extension of the plant with a capacity of 115,000 tons per year 15 per cent P_2O_5. The acid for the extension will be obtained by burning sulphur. This extension started production in 1964.

b) At Abou Zaabal:

An extension is planned to increase the total capacity to 186,000 tons per year. It is expected to start production in 1966.

c) At Assiut:

A plant is projected to produce 200,000 tons per year. This plant is expected to start production in 1967.

The production of all these projects is based on 15 per cent P_2O_5.

It could be seen that the total production when the first Five Years Plan is executed will be 616,000 tons per year, which is more than the expected consumption in 1970.

B. The second Five Years Plan includes a phosphorus complex plant to be installed in Aswan. This complex includes a plant to produce 100,000 tons per year of triple super phosphate 45 per cent P_2O_5. Moreover the second Five Years Plan includes a unit with a capacity of 400,000 tons per year of ordinary super-phosphate to be installed within the Société El Nasr d'engrais et d'industries chimiques.

VII. POTASSIUM FERTILIZERS

Although potassium fertilizer are hardly used in the UAR yet a project was incorporated within the second Five Years Plan to produce 5,200 tons per year of potassium sulphate recovered from the mother liquor in ethyl

alcohol distillation. This quantity is expected to be obtained at a reasonable cost and expected to be enough for the time being.

VIII. MANURES

Most of the peasants obtain their manure from their cattle sheds. However various projects will be installed in some countries to transfer the waste of the towns collected by Municipalities to manure and sell it to peasants at reasonable prices. The manure obtained in this way will be important for conditioning the newly reclaimed sandy soil based on the high dam project.

IX. MIXED AND COMPLEX FERTILIZERS

Although no projects are included for the production of mixed and complex fertilizers (for the reasons mentioned before); yet agronomists are started carrying out intensive researches on the utilization of mixed and complex fertilizers for various crops. The results of their studies will indicate the future trend in the fertilizers industry in the UAR.

X. SOME DIFFICULTIES ENCOUNTERED

A. Corrosion problems:

a) Vanadium-existing in the fuel oil employed for externally heating the reformer tubes- was found to corrode badly the refractory linning of the reformers, the stainless steel reformer tubes, and the chimney. Low vanadium fuel oil must be used for such purposes to reduce the corrosion rate and therefore reduce the stoppage of operation.

b) Corrosion of electrodes in water electrolysis: the electrode plating must be perfectly done otherwise corrosion takes place and undue stoppage of production for replacement of electrodes must take place.

c) The sulphur content of the feed stock as well as the fuel oil also cause corrosion troubles. Adequate methods should be employed to remove, or at least reduce the sulphur content.

B. Bagging Problems:

Th. deliquesce ce of nitrate .ertilizers necessitate taking appropriate measures for the silos, like air conditioning etc., also the corrosion nature of such materials necessitate special treatment for the silos and providing the bags with an imprevious layer to prevent contact between fertilizers and the external atmosphere. This increases the cost of bagging and therefore, increases the over-all cost of the fertilizers.

Many experiments were conducted on various types of bags.

The most appropriate was found to be jute bags lined with crêpe paper with a layer of polyethylene in between.

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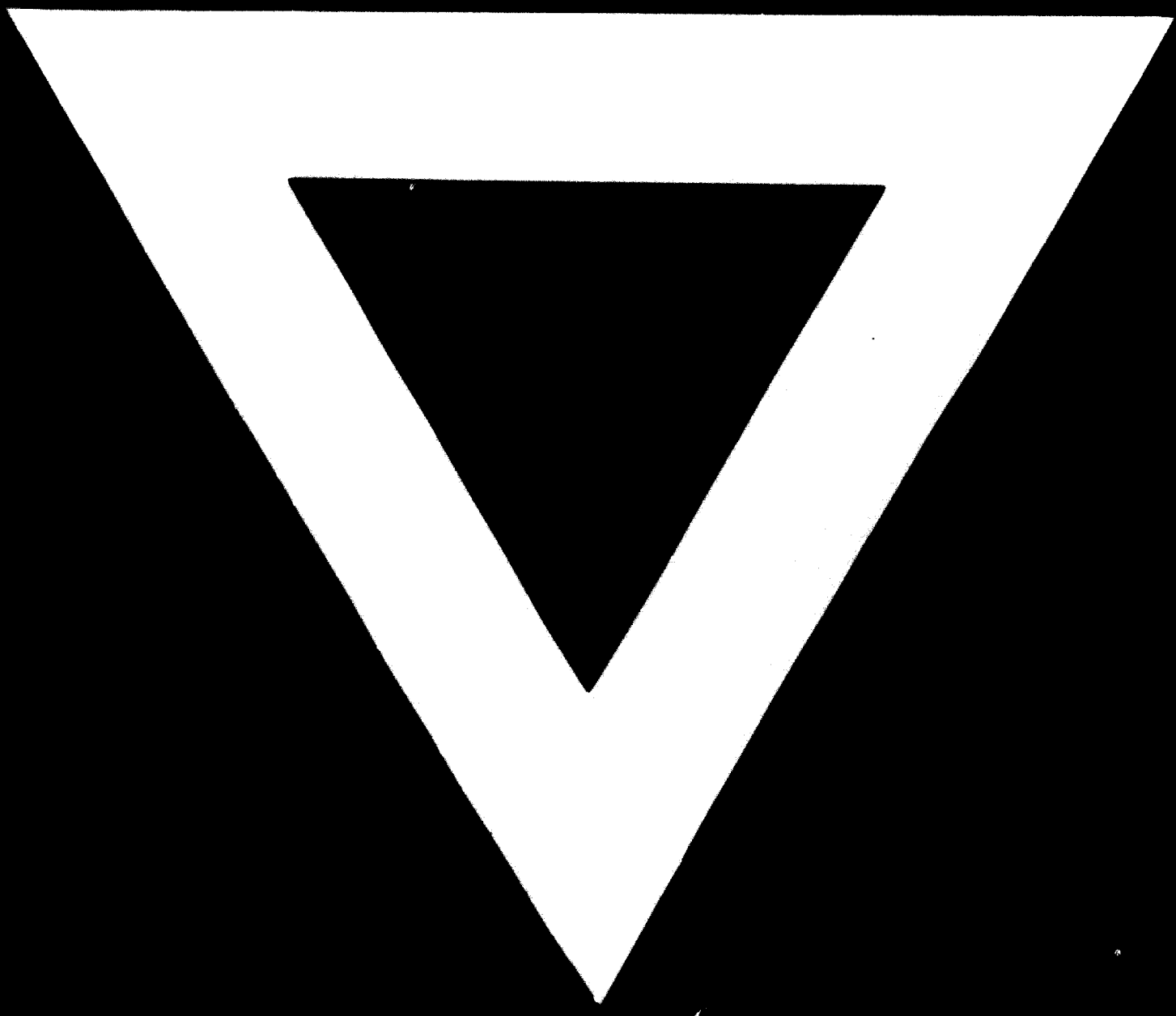

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