

# IFA Technical Conference

**Amman, Jordan  
2-6 October 1994**

# CURRENT SITUATION AND PROSPECTS FOR FERTILIZER INDUSTRY IN JORDAN

A.D. Ghosheh, Jordan Phosphate Mines Co.  
J. Salem, Arab Potash Company Ltd  
Jordan

## RESUME

*La Jordanie est l'un des principaux producteurs et exportateurs de phosphate et de potasse dans le monde. Actuellement, sa capacité de production annuelle de phosphate de différents types est d'environ 7,5 millions de t.*

*Au début des années 1980, la Jordanie est aussi devenue producteur et exportateur d'engrais, avec une capacité de raffinage de potasse d'environ 1,4 million t/an.*

*Depuis la signature de nouveaux accords d'entreprise de partenariat avec des sociétés étrangères pour la réalisation de nouveaux projets d'usines d'acide phosphorique et d'engrais, la capacité de transformation de phosphate du pays a significativement augmenté.*

*Dans cet exposé, des représentants de Jordan Phosphate Mines Co. (JPMC) et d'Arab Potash Co. (APC) décriront la situation actuelle et aussi les perspectives de développement futur de l'industrie des engrais en Jordanie. Des projets à long terme pour les deux sociétés seront présentés.*



## INTRODUCTION

Although Jordan is a small country in terms of area and population, its standing in the fertilizer world is on a different scale. Fertilizer industries remain the economic locomotive of Jordan. The country has vast reserves of phosphate and potash and is a leading exporter of both these fertilizer minerals.

The phosphate reserves were developed earlier. Sedimentary phosphate deposits have been mined in Jordan for more than 40 years.

The production of beneficiated phosphate rock will reach 9 million tons by the turn of this century and is produced by JPMC, a company incorporated with a majority share holding by The Government of The Hashemite Kingdom of Jordan.

In view of the vast experiences of JPMC in phosphate rock production and marketing and the excellent location of Aqaba to export phosphate to the growing markets of South and South-east Asia, and of the good quality of Jordanian rock, plans have been made for substantial increases in the phosphate and fertilizer production.

Phosphate rock is currently produced from 3 open-pit mines: El-hassa, El-abiad and Eshidiya.

Potash production at the Dead Sea began in 1983 when the Arab Potash Company commissioned its plant on the southern shore. Currently it is producing 1.2 million tons of potash for export and has become the third largest exporter to Asia and a key player on the world potash scene. Production from the Dead Sea is by evaporation in a solar pond system of an area of 100 km<sup>2</sup> through natural concentration and precipitation of the required salts and subsequent processing in a hot leach plant. The product is screened and transported to the terminal in Aqaba on the Red Sea.

These facilities were built at a cost of US\$ 500 million and included investments in the necessary infrastructure of the region. Further optimization was undertaken in 1986 and the capacity of the plant was increased to 1.4 million tons of product.

### PRESENT SITUATION

The annual production capacities of fertilizer materials in Jordan can be summarized as follows:

|                                     |                                      |
|-------------------------------------|--------------------------------------|
|                                     | million tons per year                |
| Rock Phosphate                      | 7.50                                 |
| Potash (KCl)                        | 1.80                                 |
| Total P <sub>2</sub> O <sub>5</sub> | 0.412 (including 740,000 TPY of DAP) |

The actual quantities produced during the last 10 years are presented in Table 1 below:

**Table 1: Fertilizer Raw Materials Production in Jordan**  
(000's tons per year)

| <u>YEAR</u> | <u>Rock Phosphate</u> | <u>Potash (KCl)</u> | <u>P<sub>2</sub>O<sub>5</sub> (all forms)</u> |
|-------------|-----------------------|---------------------|---|
| 1983        | 4748                  | 279.8               | 188.5   |
| 1984        | 6260                  | 486.9               | 294.1   |
| 1985        | 5920                  | 908.6               | 259.6   |
| 1986        | 6249                  | 1103.7              | 281.9   |
| 1987        | 6801                  | 1203.3              | 283.4   |
| 1988        | 5561                  | 1309.6              | 303.3   |
| 1989        | 6910                  | 1320.4              | 303.3   |
| 1990        | 6082                  | 1402.6              | 297.0   |
| 1991        | 4850                  | 1364.1              | 271.0   |
| 1992        | 5230                  | 1346.0              | 281.2   |
| 1993        | 4210                  | 1370.0              | 214.7   |

It can be noted, from these figures that the maximum phosphate rock production was recorded in 1989, but started to decline significantly in the following years. The main reason for this decline is the decrease in JPMC's exports, which can be attributed to the fall in world phosphate trade from about 44.1 million tons in 1989 to about 26.6 million tons last year according to IFA statistics.

The production of P<sub>2</sub>O<sub>5</sub> could not reach the design levels of 412,000 TPY due to technical problems in the phosphoric acid plant at JPMC's fertilizer complex in Aqaba, and only 214,700 tons were secured in 1993/1994.

The revamp of the phosphoric acid plant was completed by the end of 1993, and the start up was effected in December of the same year.

It is expected that the production capacity of phosphoric acid will be raised to 412 thousand tons (P<sub>2</sub>O<sub>5</sub>)/year.

Another revamp relevant to the sulphuric acid plant will be completed in middle of 1995. This plant, has two lines, each with a capacity of 1,800 tons/day. After the revamp, the capacity is expected to reach 4,400 tons/day.

## DOMESTIC CONSUMPTION AND RAW MATERIALS PROCESSING

Fertilizers consumption in Jordan is still relatively low, mainly due to limited cultivated area and low rates of application.

In 1993 the consumption amounted to about 50,000 tons of different types of phosphatic and nitrogenous materials. An increase of 7% per year has been recorded during the last five years. It is expected however, that nutrients consumption will reach some 59 kg/hectare by year 2000 versus 35 kg/hectare at the present time. This together with the anticipated increase in the total cultivated areas is expected to bring the annual consumption of fertilizers in Jordan to about 100,000 TPY by the turn of the century.

On the other hand, rock phosphate processing on a commercial scale was started in 1982 after the commissioning of JPMC phosphoric acid plant in Aqaba, while the use of potash as an ingredient in NPK blends began in 1987.

The domestic consumption/processing of fertilizer materials are summarized in Table 2, (expressed in thousand tons/year).

**Table 2: Fertilizer Processing in Jordan**  
(000's tons per year)

| <u>YEAR</u> | <u>Rock Phosphate</u> | <u>DAP</u> | <u>P<sub>2</sub>O<sub>5</sub></u> |
|-------------|-----------------------|------------|-----------------------------------|
| 1983        | 615.7                 | 2.195      |                                   |
| 1984        | 975.3                 | 1.290      |                                   |
| 1985        | 840.9                 | 2.585      |                                   |
| 1986        | 940.7                 | 3.615      |                                   |
| 1987        | 904.8                 | 2.855      |                                   |
| 1988        | 1017.3                | 12.254     |                                   |
| 1989        | 990.0                 | 4.310      | 0.148                             |
| 1990        | 972.9                 | 10.138     | 0.151                             |
| 1991        | 909.0                 | 9.151      | 0.142                             |
| 1992        | 982.0                 | 11.834     | 0.253                             |
| 1993        | 727.0                 | 18.510     | 0.217                             |

Potash consumption was very limited: 291 tons in 1992 and 207 tons in 1993 being used in NPK blends, although some potash are also imported in forms other than KCl.

## FERTILIZER EXPORT

Export volume of Jordan's fertilizer commodities, especially phosphatic fertilizers have been seriously affected during the last few years by the structural and economical changes in the world market. Jordan's traditional markets in India and East Europe, have in particular, undergone drastic changes, such as decanalisation and subsidy policy in India, and a cut in imports by some East European countries due to lack of financing. This situation has resulted in significant decrease in phosphate rock exports to these markets and consequently reduction in the levels of production.

Jordan's exports of fertilizer commodities are shown in Table 3.

**Table 3: Jordan's Exports of Fertilizer Commodities**  
(000's tons per year)

| <u>YEAR</u> | <u>Rock Phosphate</u> | <u>Potash (KCl)</u> | <u>DAP</u> | <u>MG.P<sub>2</sub>O<sub>5</sub></u> |
|-------------|-----------------------|---------------------|------------|--------------------------------------|
| 1983        | 3697                  | 211.2               | 362.9      | 18.4                                 |
| 1984        | 6260                  | 249.6               | 547.1      | 31.3                                 |
| 1985        | 4609                  | 932.9               | 506.2      | 31.9                                 |
| 1986        | 5198                  | 1123.1              | 555.3      | 21.7                                 |
| 1987        | 5544                  | 1222.4              | 562.7      | 5.2                                  |
| 1988        | 5110                  | 1305.5              | 626.4      | 7.7                                  |
| 1989        | 6411                  | 1258.8              | 578.4      | 22.1                                 |
| 1990        | 4874                  | 1404.2              | 612.8      | 18.0                                 |
| 1991        | 4245                  | 1411.4              | 578.6      | 6.2                                  |
| 1992        | 4302                  | 1235.4              | 558.20     | 18.1                                 |
| 1993        | 3550                  | 1476.7              | 511.9      |                                      |

## CURRENT AND FUTURE DEVELOPMENT PLANS

### 1. The Eshidiya Phosphate Mines

The development of Eshidiya phosphate deposit which within the next 10 years will be Jordan's only mining area, is aimed at producing about 9 million tons of phosphate rock by the turn of this century.

The argument in favour of developing Eshidiya ore body may be summarized as follows:

- Geological and minerable reserves consistent with the production target
- Better techno-economic parameters regarding mining, beneficiation and grade of concentrates.

JPMC is pushing to complete phase one of the Eshidiya mine development program, which will bring production to 3.5 million metric tons by 1995.

It is also planning to carry out the second stage development of the Eshidiya deposit, during 1996-1998. The Stage II project will increase phosphate rock production at Eshidiya from 3.5 million TPY planned under stage I, to 7 million by 1998. This project will enable JPMC to provide replacement tonnage for the declining phosphate production at the existing mines, and to meet the expected market demand (local/exports) of 1998.

The total estimated cost of Eshidiya stage II in which financing is required, is about US\$ 200 million.

The project will include:

Mining equipment, beneficiation plant equipment, including a washing and flotation plant, phosphate ore, rejects and product handling storage, blending yards, disposal, reclaim and loading facilities, both onto trucks and train, township expansion, industrial infrastructure expansion, including power distribution and water supply.

In addition to above projects which are already operational, there are a number of plans and projects under construction and/or active consideration.

## **2. Revamp of the Phosphatic Fertilizer Plant in Aqaba**

The Aqaba Fertilizers Complex started production in 1982. The nominal capacity of the phosphoric acid plant is 1250 tons  $P_2O_5$ /day through a consumption of about 1.3 million MT phosphate rock per year. However, due to certain technical problems in the design of this plant, such capacity was never attained. The actual capacity was around 900 tons  $P_2O_5$ /day. The major part of the produced phosphoric acid is used for the production of diammonium phosphate (DAP).

## **3. The New Cold Crystallization Potash Plant**

At a cost of US\$ 120 million of which 90 million were generated internally, The Arab Potash Company opened in June this year a 400,000 MT potash plant utilizing cold crystallization technology. This has brought APC's production capacity to 1.8 million tons of product. The new plant puts APC in sixth place in terms of worldwide production and provides a low cost product since the new plant uses less energy. The expansion also serves to emphasize the vital role of APC as a supplier to the growth markets in Asia where demand is expected to continue to grow in the next few years.

## **4. Other Potash Expansion Plans**

The Arab Potash Company is currently undertaking work to prepare the solar pond system to produce enough raw material for the production of an additional 400,000 MT of potash. Feasibility studies for this project are completed and a decision is expected during this year. This project would take APC's capacity to 2.2 million tons of product.

## **5. The Dead Sea Complex**

A Jordanian holding company has been formed with the directive of executing a number of chemical projects utilizing the mineral wealth of the Dead Sea. Among the projects are a salt plant producing 1.2 million TPY of industrial and table salt, a magnesium oxide plant producing 100,000 MT PY of MgO for refractories, a bromine and its derivatives complex as well as a potassium sulphate plant expected to produce 75,000 MT of potassium sulphate associated with di-calcium phosphate. Of the above, only the potassium sulphate project is a fertilizer project and as such would put Jordan a step further forward as the supplier of the widest possible range of fertilizers and fertilizer combinations.

## **JOINT VENTURE PROJECTS**

### **1. The Jordan - Japan NPK Plant**

The project is a joint venture scheme with four Japanese companies, and JPMC, APC to build a 300,000 t/y NPK fertilizer and di-ammonium phosphate (DAP) plant at Aqaba. Output from the plant will be sold to Japan. The Japanese partners in the venture, for which an agreement was signed in mid-1992, are the National Federation of Agricultural Cooperative Association (Zen-Noh) which has 30 per cent and Mitsubishi Corporation, Mitsubishi Kasei Corporation, Asahi Industries Company (each with 10 per cent). JPMC and APC each have 20 per cent.

## **2. The Indo - Jordan Plant**

One recently-formed venture is the Indo-Jordan Chemicals Company set up with Southern Petrochemical Industries Corporation (SPIC) of India and in which The Arab Investment Company of Riyadh has taken a 13 per cent stake. IJC plans to produce 200,000 tons a year of phosphoric acid at the Eshidiya phosphate mining site in the south inline with a strategy that production be close to raw materials and large phosphate reserves. The acid will be exported to India where ammonia will be added to make fertilizers. In late 1993, IJC awarded a US\$ 119 million contract to a French firm Krebs & Compagnie to build the plant which is due for completion at the end of 1996. The project also includes building an acid storage terminal at Aqaba port. Funding is being provided partly by local banks and the World Bank's equity investment arm, the International Finance Corporation (IFC).

## **3. The Jordan - Pakistan Project**

A new company called "FFC - Jordan Fertilizer Co." was formed and registered in Pakistan for the production of phosphatic/nitrogenous fertilizers. JPMC will own 10% of its capital, and will supply the total phosphoric acid annual requirements for a period of 13 years.

## **CONCLUSION**

In conclusion the fertilizer industry in Jordan is being developed in accordance with a long-term plan set up by the government of Jordan, to secure a rational exploration of the country's available natural resources. The development strategies have been elaborated with due consideration given to the present world market situation and future outlook.

The large reserves of phosphate deposits and Dead Sea brines, together with Jordan's geographical location, the experience gained during forty years of operation and marketing of fertilizer commodities in more than 30 countries in the world, provide the foundation on which Jordan's development strategies are based.

Apart from its own national interests, Jordan is achieving its role in meeting world fertilizer needs for decades to come by developing its fertilizer industry.

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