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Report No. 456-UAR

Appraisal of Talkha II Fertilizer Project Egypt

May 28, 1974

Industrial Projects Department

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CURRENCY EQUIVALENTS

1 Egyptian Pound (LE)	=	2.55 US Dollars (US$)
1 US$	=	0.392 LE
Tourist Rate 1 US$	=	0.59 LE

WEIGHTS AND MEASURES

1 metric ton (T)	=	1,000 kilograms (kg)
1 metric ton (T)	=	2,204 pounds
1 kilometer (km)	=	0.62 miles
1 hectare (ha)	=	2.38 feddans
1 feddan	=	1.04 acres
1 cubic meter (M^3)	=	35.3 cubic feet (cu. ft.)

PRINCIPAL ABBREVIATIONS AND ACRONYMS

Arab Fund	- Arab Fund for Economic and Social Development
EGPC	- Egyptian General Petroleum Corporation
El Nasr, the Company	- El Nasr Company for Fertilizers and Chemicals (Societe el Nasr d'Engrais et d'Industries Chimiques; (SEMADCO))
GOACC	- General Organisation for Agricultural and Cooperative Credit
GOCI	- General Organization for Chemical Industries
GOFI	- General Organization for Industrialization
Government	- Government of the Arab Republic of Egypt
INP	- Institute of National Planning (Cairo)
N	- Nitrogen Content in Fertilizer
P_2O_5, Phosphate	- Phosphorus Pentoxide Content in Fertilizer
K_2O, Potash	- Potassium Oxide Content in Fertilizer
CIF	- Cost, Insurance and Freight
FOB	- Free on Board
TPY	- (Metric) Tons per Year
TPD	- (Metric) Tons per Day
KWH	- Kilowatt Hour
MW	- Megawatt
M^3/D	- Cubic Meters per Day
MCF	- Thousand Cubic Feet

Fiscal Year

July 1 - June 30	1962 to 1971
July 1 - December 31	1971 to 1972 (18 months)
January 1 - December 31	1973 onwards

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TALKHA II UREA MANUFACTURING PROJECT

SUMMARY AND CONCLUSIONS

i. The Government of the Arab Republic of Egypt has requested IDA financing for a large nitrogen fertilizer plant with a capacity of 570,000 metric tons per year (TPY) urea (262,000 TPY of nitrogen). The facilities will be owned by the El Nasr Company for Fertilizers and Chemicals (El Nasr), a wholly-owned subsidiary of the Government-owned General Organization for Chemical Industries (GOCI). Total financing required for the project is estimated at US$132 million with a foreign exchange component of US$93 million. Foreign exchange costs are to be covered by the proposed IDA Credit of US$20 million and other debt financing of US$69 million from the Abu Dhabi Fund, the Arab Fund for Economic and Social Development (Arab Fund), the Kuwait Fund, the Libyan Arab Foreign Bank and the State of Qatar. The IDA funds would be on-lent to the Company for fifteen years including five years grace and at an effective annual interest rate of 8.5% to El Nasr which would carry the foreign exchange risk during the period of the loan. The average Arab co-lender terms, both to the Government and the Company are for 19 years including five years grace and 5.2% annual interest. The residual financing of US$43 million equivalent including all local currency expenditures, working capital, and US$4 million in foreign exchange expenditures (for a portion of interest during construction) will be provided by the Government as equity.

ii. The new plant will be located at Talkha in the Nile Delta some 135 km north of Cairo and be implemented by El Nasr under the supervision of the General Organization for Industrialization, the authority responsible for the development of the industrial sector in Egypt. The project will utilize efficient modern technology and will use natural gas feedstock from the nearby Abu Mahdi gas field. It will be one of the largest fertilizer projects financed to date by the Bank Group. El Nasr has since 1947 been operating a calcium nitrate and ammonium sulfate fertilizer plant in Suez which stopped operating in 1969 following the military action in the area. The Company is currently erecting on the same site at Talkha a calcium-ammonium-nitrate (CAN) unit (Talkha I), dismantled from Suez where it was partially erected in 1967/68. This unit will also run on Abu Mahdi gas and is expected to start producing by the end of 1974. Although the Company has not operated since 1969, its financial position has remained sound because of adequate Government subsidies. Once Talkha I begins commercial operation, the Company is expected to be able to support itself and repay all its outstanding debt before the project (Talkha II) will be completed.

iii. El Nasr has capable management; during project implementation and plant start-up, it will be supported under a Technical Advisor, Cremer and Warner (UK) whose initial work is being financed by the IDA Engineering Credit of US$400,000 approved by the Executive Directors in November 1973. Additional

major responsibilities for project execution will rest with a General Contractor. The IDA Credit would cover the foreign exchange expenditures of the General Contractor and the Technical Advisor as well as a portion of equipment and materials, all procured under Bank/IDA guidelines.

iv. Nitrogen (N) fertilizer consumption in Egypt grew 7% per year in the 1950's and early 1960's but slowed to 3.5% during 1965-1972 to reach about 320,000 tons of N in 1972. Domestic production was only 100,000 tons of N in 1972 and Egypt has therefore become a major importer of nitrogen fertilizers to the extent of about 220,000 tons of N in 1972 with a current value of between US$50-60 million. Urea, introduced into Egypt in the early 1960s, is well suited to Egyptian agriculture and its use has increased rapidly, accounting for about 60% of total N imports in 1972.

v. Consumption of N has been adversely affected by low domestic production and limited availability of foreign exchange and, more recently, tight international supplies at high prices. Future consumption is conservativiely estimated to grow at about 4% per year and reach some 500,000 tons of N in 1980. Combined with production from capacity now in existence or under construction, the project will, under such growth assumptions, help make Egypt self-sufficient in nitrogen fertilizer production by 1980. However, the potential demand for nitrogen and other fertilizer grades is considerably higher since for an intensive and virtually fully irrigated agriculture as that of Egypt, fertilizer application will still be low particularly if Egypt moves towards more high-yielding crop varieties and the promotion of high-value, non-traditional exports to head off a potential food crisis and help overcome its strained balance of payment situation. Since, in addition, Egypt has a comparative advantage in producing its own nitrogen fertilizer, the project has a high priority in being moved forward quickly.

vi. The project is well located as it is close to its raw material source (natural gas) and marketing area and the site is already developed with largely existing infrastructure and utility supplies. The project's estimated production costs and assumed urea sales price ex-plant of US$95 per ton bagged are internationally competitive and compare favorably with import prices, which on the short-term are in excess of US$200 per ton CIF and about US$120-140 per ton CIF in longer term projections. The project will be soundly financed with an initial debt/equity ratio of 67/33 upon completion and 39/61 when consolidated within El Nasr's overall financial structure; furthermore, it is forecast to cover debt service more than three times and have a satisfactory liquidity. The project's (incremental) financial rate of return would be 19% before taxes.

vii. The economic rate of return of the project is calculated also at 19% based on the expected long-term price of US$120 CIF Egypt, and an assumed natural gas price of US$1.40/thousand cubic feet. It would remain satisfactory, at about 10%, under the most adverse foreseeable assumptions regarding urea and natural gas prices. Substantial unmeasurable benefits not accounted for

in the calculation of the economic return (such as training of labor, removal of fertilizer procurement constraints and additional agricultural production and exports) could also be attributed to the project. The project shows a net annual foreign exchange savings of about US$41 million.

viii. The project faces only moderate technical, managerial and commercial risks and based on agreements reached as summarized in Chapter VIII, is suitable for an IDA credit of US$20 million equivalent.

I. INTRODUCTION

1.01 The Government of Egypt has requested IDA assistance to help finance a portion of the foreign exchange costs of a new urea fertilizer plant at Talkha (Map IBRD-10724) with a capacity of 570,000 tons per year (TPY) of urea (262,000 TPY in terms of nitrogen nutrient). Total financing required would be about US$132 million, to be covered respectively by sources from Arab countries (52%); the Egyptian Government (33%); and IDA (15%). Work on the project would start in September 1974, and the plant is expected to be commissioned in December 1977. Annex 1-1 includes a glossary of technical terms.

1.02 Agriculture as well as fertilizer application and production are major factors in the Egyptian economy. Nitrogen fertilizer use is well established but domestic production is substantially less than consumption and no high-analysis fertilizer such as urea is now being produced. There are several existing fertilizer plants in Egypt, but this project would be the first in the country to use modern, large-scale technology and is aimed at replacing substantial current imports. The existing Egyptian fertilizer industry, including its products and raw materials, is described in Annex 1-2.

1.03 Due to limitations on foreign exchange, hostilities, and priority given to defense, the fertilizer industry and fertilizer consumption have virtually stagnated over the past few years, significantly slowing down the growth in agricultural output. The project, commonly described as Talkha II, will make a major contribution towards rationalization of the Egyptian fertilizer industry although other problems will still need to be overcome: (1) low use and production of phosphate and mixed fertilizers; and (2) inefficient operation in other existing production units.

1.04 The proposed credit would be the second industrial lending operation by IDA in Egypt, the first being Cotton Ginning Rehabilitation Project (Report No. 151a-UAR, June 28, 1973). Each of these two credits was preceded by an Engineering Credit to prepare the projects concerned and determine their feasibility. In the agricultural sector, IDA has financed two projects, (i) Nile Delta Drainage Project (No. PA-12a, October 14, 1969), and (ii) Upper Egypt Drainage Project (No. 80a-UAR, May 23, 1973) which were designed to improve drainage and agricultural productivity in the selected areas.

1.05 The Talkha II Project was identified by Bank missions in late 1972 and April 1973 1/ and appraised by Messrs. D. E. Brown (Chief), A. K. Basak, N. Petry, and B. Shen of the Industrial Projects Department following missions to Egypt in December 1973 and February 1974. The Arab Fund participated in the two appraisal missions.

1/ Review of Talkha II Urea Project, Report dated June 25, 1973 by Messrs. Carmignani, Pratt, Stevenson and Armstrong.

II. PROJECT SPONSORS

A. Organizational Framework

2.01 The project is to be carried out and operated by the El Nasr Company for Fertilizers and Chemicals (El Nasr) 1/ under the supervision of the General Organization for Industrialization (GOFI) and the Egyptian General Organization for Chemical Industries (GOCI). GOFI, attached to the Ministry of Industry, is responsible for fostering and coordinating industrial expansion in Egypt. GOCI, one of the 20 such Government-owned organizations covering virtually every segment of the Egyptian economy, is a holding company for the 29 largest Government-owned companies in the chemical sector, including El Nasr. The GOCI subsidiaries manufacture a wide range of products and are financially autonomous units, each with its own board of directors. The board chairmen of GOCI's seven largest firms, together with three university professors and GOCI's Chairman (Mr. Marei Ahmed Marei) and General Manager (Dr. Ahmed Shukri Salem) make up GOCI's Board of Directors.

2.02 GOCI implements Government policy in the chemical sector, and works jointly with GOFI and the companies' managements in preparing and implementing projects. GOCI receives annual budgetary allocations to meet its own operating costs. It was made a legal holding company in 1971, although it does not yet consolidate the financial statements of its subsidiaries (Annex 2-1). GOCI allocates investment funds among its subsidiaries, but its role therein is limited since all major investment decisions are made at the ministerial level. Once approved, the funds allocated to a given project are usually channeled through GOFI and disbursed under its supervision, although responsibility for actual project execution is effectively delegated to the ultimate operating company, i.e., El Nasr in the case of this project. GOCI's subsidiaries are, therefore, primarily responsible for operations and have only a limited role in policy and investment decisions. A description of GOFI's and GOCI's functions is contained in Annex 2-1.

B. El Nasr Company for Fertilizers and Chemicals

2.03 El Nasr is one of the largest of GOCI's subsidiaries. It owns two nitrogen fertilizer plants: (1) a calcium nitrate and ammonium sulfate plant at Suez with a combined capacity of 60,000 TPY of N; and (2) a calcium ammonium nitrate (CAN) plant now under construction at Talkha (Talkha I) in the Nile Delta, about 135 km north of Cairo, with an annual capacity of 98,000 tons of N. The Company has produced no fertilizer since 1969, when the Suez plant was closed due to lack of feedstock from the adjacent refinery which ceased production as a result of the Egyptian-Israeli hostilities. Construction of the

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1/ The appraisal report uses the above English name for the Company. The Company's legal name is Societe El Nasr d'Engrais et d'Industries Chimiques. Its common name in Egypt is SEMADCO (its cable address). The latter two names are used in the President's Report, Development Credit Agreement and the Project Agreement.

Talkha I plant (partially erected at Suez when the decision was taken in 1970 to move it to Talkha) is expected to be completed in late 1974. Since 1969, the Company has kept all of its staff of 4,250 employed in maintaining the Suez operations; moving and re-erecting the CAN plant at Talkha; and in providing engineering and general contracting services in Egypt and abroad. Of the remaining plants at Suez, El Nasr intends ultimately to recommission the calcium nitrate plant (capacity: 40,000 TPY of N) and move portions of the ammonium sulfate plant to Talkha to increase Talkha I capacity by 20,000 TPY of N.

2.04 The Company is organized along functional lines, with a manager each responsible for commerce, finance, administration, civil works, project planning, research, engineering and production (Annex 2-2). The five senior members of the Board of Directors have been with the Company since 1947-50, and the Chairman and Managing Director, Mr. Ibrahim El Dessouki, is on the Board of GOCI. The Company's management appears capable, although it will need some assistance to help it with its large expansion program.

C. Financial Analysis of El Nasr Company

1. Past

2.05 The Company's recent income statements, balance sheets and sources and application of funds, are shown in Annex 2-3 and summarized on the following page.

2.06 The Company was established in 1947 with an initial paid-in capital of £E 4.0 million. Loans from the US Exim Bank financed the calcium nitrate and ammonium sulphate plant at Suez. Until the 1967 hostilities, the Company's financial structure was sound, the debt/equity ratio being only 29/71 in 1967. The Exim Bank loans were repaid on schedule, and paid-in capital increased to £E 8.5 million by 1967, largely through retained earnings.

2.07 The 1967 war, however, limited the fertilizer production because of reduced refinery gas supply to the El Nasr plant. Operations continued at a lower level until 1969 when further military action put the refinery out of commission and stopped El Nasr's production completely. Pre-tax profit before 1967 had stood steadily at around 25% of sales revenue and, in 1967 reached 29% of sales or 16% of capital employed.

2.08 Profits as well as cash have been decreasing since 1967 and after the enforced stoppage in 1969 turned into losses, which were aggravated owing to the social objective of retaining all workers in the Company's employment. As compensation, the Government has been granting the Company since 1970 an annual subsidy to meet most non-capital expenditures excluding depreciation. These subsidies constitute revenue receipts, and are not repayable to the Government. In addition, between 1967 and 1972, the Government contributed £E 10 million to the Company for meeting capital expenditures on Talkha I and plans to make available another £E 12.7 million through 1974. The total contribution of £E 22.7 million will be credited to paid-in capital, and will not be refundable.

El Nasr - Summary of Financial Statements - Historical and Projections 1/
(in LE millions)

Fiscal Year 2/	1967	1969	1971	1973	1975	1977	1979
Income Statements & Cash Flow							
Capacity Utilization (%)	97	41	-	-	77	80	93
Production (tons '000) (CN, AS) 3/	363	144	-	-	244	254	352
Sales, (tons '000)	359	144	-	-	236	254	352
Revenues-Net	9.9	5.0	0.2	-	8.6	9.4	13.7
Cost of Goods Sold	6.1	4.7	1.6	-	5.2	5.9	8.7
Interest 4/	0.1	-	-	-	0.1	-	-
Depreciation	1.0	0.9	0.6	-	3.0	2.9	3.3
Net Income Before Taxes 5/	2.9	(0.4)	(2.0)	(0.3)	(0.7)	(0.1)	0.1
Net Income After Taxes	1.9	(0.5)	(0.7)	(0.3)	(0.7)	(0.1)	0.1
Operating Cash Flow 6/	3.0	0.5	0	0	2.3	3.5	3.4
Debt Service	0.4	1.0	1.2	1.4	1.1	0.7	0
Balance Sheets							
Current Assets	7.5	4.4	2.0	4.3	4.4	7.7	14.6
Accumulated Cash Surplus	4.9	1.4	0.6	1.2	1.2	4.3	10.9
Current Liabilities	5.2	4.0	4.7	1.6	0.7	0.7	0.7
Net Fixed Assets	21.8	24.3	27.8	32.5	34.1	30.1	23.7
Other Assets	0.8	0.8	0.8	-	-	-	-
Long-Term Debt	7.3	6.4	4.9	3.4	1.2	-	-
Total Equity and Reserves	17.6	19.1	21.0	31.8	36.6	37.2	37.5
Current Ratio	1.4	1.1	0.4	2.1	6.5	11.4	21.5
Long-Term Debt/Equity Ratio	29/71	25/75	19/81	10/90	3/97	0/100	0/100
Debt Service Coverage	7.5	0.5	0	0	2.0	4.1	-7/

1/ Last year of actuals is 1973. Projections are for El Nasr without the Talkha II project.
2/ Fiscal year ended June 30 through 1971. Changed to December 31 from 1972 onward.
3/ Calcium nitrate (CN) and ammonium sulfate (AS).
4/ Interest on foreign debts capitalized with Talkha I project cost.
5/ Includes losses at Suez after 1973.
6/ Net Income before interest and depreciation and after tax: includes Government subsidies: 1971=LE 1,364,000; and 1972=LE 2,140,000.
7/ No long-term debt service due after 1977.

2.09 By the end of 1972, the Company's total long-term debt outstanding was £E 3.6 million, including £E 2.9 million in foreign debt due to German Federal Republic creditors, plus two previous years' overdue payments on local debt (included under current liabilities as short-term loans) of £E 2.3 million. However, the existing loans are all expected to be repaid by 1977 in accordance with the terms, and the Government has agreed that sufficient funds will be provided, as necessary, to the Company for this purpose.

2.10 El Nasr's latest available audited balance sheet as of December 31, 1972 shows that although the Company has no operating revenues, its financial structure is still sound, primarily on account of the Government's cash support. Equity and reserves stood at over £E 25 million, mostly represented by assets at Talkha. Of the total net fixed assets, only about £E 3 million or 11% are still in Suez. The financial statements of El Nasr are audited by the Central Agency for Auditing, a government agency. This arrangement is acceptable to the Association.

2. Future - Without the Project

2.11 The Company's projected income statements, balance sheets and sources and application of funds with Talkha I, but without Talkha II, are shown in Annex 2-4 and summarized on the previous page. Costs have been escalated through 1978 (when Talkha II will come on stream) and kept constant thereafter, except for salaries and wages which have been escalated at 3% annually throughout the forecast period (1975-1983), to reflect rising real wages. The ex-factory selling price of its fertilizer (CAN) has been assumed to be constant at the present level of £E 37.3 per ton (US$95/ton).

2.12 Talkha I is forecast to start operating by January 1975, but having been dismantled from Suez and re-erected at Talkha and using old, inefficient (particularly ammonia) technology, is expected to be able to produce at only 80% of capacity. Once Talkha II begins operations in 1978, it will supply ammonia to Talkha I, allowing 95% capacity utilization. The Suez plant is assumed to remain closed even though the Company may at some later date restart operations in part of the plant (para. 2.03); its overhead, therefore, will continue. Given the cost of natural gas (£E 8.75/ton or US$22.5/ton) and selling prices of CAN (£E 37.3/ton or US$95/ton), Talkha I operations are expected to be profitable with a low cash breakeven level of 55% of capacity. Profit before tax would rise from 8% of sales in 1976 to about 21% in 1980 and beyond.

2.13 The operations of Talkha I are forecast to lead to an acceptable rate of cash accumulation already during execution of the project. However, if plant commissioning is delayed or operations fail to reach the level anticipated, then additional funds may still be needed. To avoid Talkha I operations from interfering with the implementation of the project and to ensure that the urgently-needed fertilizers will be produced by Talkha I, the Government has agreed that it will provide funds as necessary and arrange for any technical assistance that may be needed to bring output to a satisfactory level quickly.

III. FERTILIZER MARKET AND MARKETING 1/

A. Agriculture in Egypt

3.01 Agriculture accounts for about 30% of Egypt's gross domestic product (GDP) and about half of total employment and it generates more than half of foreign exchange earnings from commodity exports (Annex 3-1). The growth rate in real terms in agriculture averaged about 3.5% annually over the past 15 years (1957-1972) but only 2% or less during the last five years (1967-1972). Shortage of foreign exchange and priority given to defense, especially since the 1967 war, have played a major part in limiting agricultural growth. Agriculture is concentrated in a narrow strip of land along the Nile between Aswan and Cairo and the Nile Delta.

3.02 The major recent development is the building of the Aswan Dam, which has permitted a shift to perennial irrigation and a continuing expansion of land reclamation. Egypt has about 2.7 million ha (6.5 million feddans) of agricultural land. However, its almost total irrigation permits a much larger cropped area - about 4.4 million ha (10.5 million feddans) - or about 1.6 crops per year per ha. The area cropped has risen by about 210,000 ha (500,000 feddans) since 1960, with most of this increase resulting since 1966-67, when the Aswan Dam made year-round water supplies available. Nevertheless, water availability has limited rice production; and shortages of fertilizer and high-yielding seed varieties, as well as inadequate extension services and farm management practices in general have limited growth in yields and production of most food crops.

3.03 Major crops are cotton, rice, maize, wheat, clover and fruit and vegetables with rice and cotton accounting for about 40% of the cultivated area, or 25% of the cropped area. Although cotton is a major earner of foreign exchange, this is achieved at the expense of food crops. Egypt has increased wheat imports from £E 58 million in 1960 to over £E200 million in 1973. Because of the growing wheat imports and rising prices, present indications are that Egypt may grow more wheat, and less cotton, in the next few years to augment local food production.

3.04 The Government controls the agricultural sector through various measures such as allocation of fertilizer and other inputs, designation of cotton acreage and purchase of the entire cotton crop and portions of other crops. These controls closely regulate the supply of basic food items for domestic consumption, and all agricultural exports. Prices received by farmers are usually well below export prices and are kept more or less constant. Agricultural production, therefore, is controlled by varying the supply and cost of farm inputs rather than by adjusting product prices.

1/ This Chapter is based largely on fertilizer studies prepared by the Institute of National Planning (INP), Cairo, in October 1973 and January 1974.

3.05 A comparison of crop yields in Egypt and some selected countries is given below:

Comparative Crop Yields
(1,000 kg/ha, 1970 data)

	Arable Land (Million ha)	Population (Millions) (1969)	Cotton	Wheat	Corn	Rice	Sugarcane
France	17.6	50	--	3.4	5.0	4.6	--
Germany	7.6	59	--	3.8	5.1	--	--
Canada	43.4	21	--	1.8	5.3	--	--
U.S.	175.0	203	0.5	2.1	4.5	5.1	96.8
Mexico	22.5	49	0.7	2.8	1.2	2.9	62.5
Japan	5.0	102	--	2.1	3.2	5.6	--
India	160.0	537	--	1.2	1.1	1.7	48.3
Sudan	7.1	15	0.5	1.2	0.7	1.8	--
Egypt	2.7	32	0.7	2.8	3.7	5.4	93.0

Source: 1970 FAO Production Handbook.

The table indicates that Egypt is a relatively efficient producer of cotton, rice and sugarcane, though less so of wheat and corn. However, the comparison is not entirely meaningful due to total irrigation, multiple cropping in Egyptian agriculture, and the relatively small land area. When these factors are considered, Egypt's yields, particularly of corn, wheat and fruits and vegetables, are relatively low. Limited land availability and a relatively high population (and growth rate) place a heavy burden on the sector to remain efficient. These data indicate that significant growth in the agricultural sector, including higher levels of fertilizer use is, therefore, feasible (para. 3.13).

3.06 Some major conclusions of the latest Bank report 1/ on Egyptian agriculture are: (i) yield-improving technologies in the principal crops must be developed urgently to head off a potential domestic food crisis and/or drastic decline in foreign exchange earnings; (ii) Egypt will have to promote high-value, non-traditional agricultural exports more intensively; and (iii) increased allocation of resources, including foreign exchange, to supply more fertilizer, insecticides, livestock feed and machinery are needed without which the agricultural growth targets cannot be achieved, particularly not without more fertilizer.

B. Historical Supply and Consumption of Fertilizer

1. Supply

3.07 Local production of nitrogen fertilizer, which began in 1951, includes calcium nitrate (16% N) and ammonium sulphate (21% N) at Suez; calcium

1/ "Current Economic Position and Prospects of the Arab Republic of Egypt," December 30, 1972, EMA-56A.

ammonium nitrate (31% N) at Kima (Aswan) and ammonium nitrate (34% N) at Helwan. Recent production and imports of nitrogen fertilizer are shown in Annexes 1-2 and 3-2 and are summarized below:

Nitrogen Fertilizer Supply in Egypt
(in 1,000 tons of N)

Year	1962	1965	1968	1970	1971	1972	1973
Production	107	159	140	119	109	103	51
Imports	56	116	147	203	174	285	n.a.
Total Supply	163	275	287	322	283	388	n.a.

Production decreased after 1968 for the reasons discussed in para. 2.07, and since then has remained at over 100,000 tons per year of N through 1972, but dropped sharply in 1973 on account of low production at Kima due to major maintenance work. Imports have risen rapidly, even though limited by availability of foreign exchange and, more recently, by sharp price increases combined with some supply constraints, to give an average annual supply increase of 9% during 1962-1972.

3.08 Phosphate fertilizer production and use are small compared to nitrogen fertilizers. Production is mainly low-grade single super phosphate (SSP), containing 15% P_2O_5 and made from domestic phosphate rock and imported sulphur. Local production began in 1950 and total installed capacity is now about 80,000 TPY of P_2O_5. Egypt does not import any phosphatic fertilizers.

2. Consumption

3.09 Egypt's fertilizer consumption since 1950 is shown in Annex 3-3 and summarized below:

Egypt Fertilizer Consumption, 1950-1973
(in 1,000 tons of Nutrient)

Fertilizer Type	1950	1960	1965	1970	1971	1972	Average Annual Increase (%) 1950/65	1966/72
N	96.0	172.0	253.0	330.0	299.0	327.0	6.7	3.6
P_2O_5	17.0	33.0	45.0	57.0	56.0	66.0	7.0	4.4
K_2O	0.2	2.0	0.4	1.4	1.8	1.5	-	-
Total	113.2	207.0	298.4	388.4	356.8	394.5		
Ratio N/P_2O_5	5.6	5.2	5.6	5.8	5.3	5.0		

Egypt's consumption of fertilizer nutrients rose from 113,000 tons in 1950 to nearly 400,000 tons in 1972, with growth rates of about 7% annually up to 1965 and 4% thereafter. The ratio of nitrogen (N) to phosphate (P_2O_5) consumption has remained at about 5 to 1 over the past two decades, which indicates a rather low phosphate application; and potash (K_2O) use continues to be very low. As mentioned earlier, the rate of increase in fertilizer consumption since the mid-1960's has been limited primarily by supply shortages but there have been other constraints such as government control on crop prices (fertilizer prices are also controlled) restricting profitability from fertilizer use and the strict allocation of fertilizers, favoring selected crops. Therefore, the past consumption does not reflect the country's actual needs. A continuation of the 7% annual growth rate in N and P_2O_5 consumption of the 50's and early 60's - surely a feasible target - would have brought about a nutrient consumption in 1972 of about 480,000 tons or some 22% above the consumption actually achieved in that year.

3.10 Egypt consumes only straight, rather than mixed or complex nitrogen and phosphate fertilizers: nitrogen as CAN (45% of consumption), urea (45%), and ammonium sulphate (10%); and phosphate mainly as single superphosphate. The use of urea (all from imports) has been increasing rapidly and reached about 160,000 tons of N in 1972, i.e., equal to about 61% of the proposed Talkhia II production at full capacity. Urea is agronomically well suited for Egyptian agriculture and its use compared to other nitrogen fertilizers should continue to increase.

C. Projected Consumption of Fertilizers

1. Fertilizer Application Rates

3.11 Future consumption of nitrogen and phosphate fertilizers through 1982 are based on typical application rates worked out by the Cairo Institute of National Planning and the Ministry of Agriculture as shown in the following table:

Fertilizer Application Rates in Egypt
(Nutrient kg/ha cropped)

	1966		1973		1982	
	N	P_2O_5	N	P_2O_5	N	P_2O_5
Wheat	87	0	114	0	143	0
Corn	87	0	138	0	191	0
Rice	71	36	79	36	91	36
Cotton	85	36	100	36	119	36
Sugarcane	238	36	238	36	250	36
Vegetable	na	na	105	36	110	71
Clover	0	36	0	36	0	52

The above data, based on prescribed application rates, show only a modest increase in nitrogen use per hectare of cropped area during 1973-1982. As for phosphate, its application rate would continue to be low, thus constituting a constraint for increased agricultural yields, particularly of wheat and corn on which no phosphate use is contemplated even in the future.

3.12 Egyptian officials generally feel that fertilizer application rates in the country are high. This is true when compared to the application rates in countries with extensive agricultural land such as Canada, Australia and India. However, the Egyptian rates are lower than the ones in countries with limited agricultural land but intensive farming, i.e. factors which also apply to Egypt, as shown in the following table:

Comparison of Fertilizer Application Rates (1970)
(Kg of Nutrients Per Hectare of Cropped Area)

Japan	331
South Korea	257
Belgium	307
Netherlands	282
D.R. of Germany	280
Czechoslovakia	223
Egypt (1972 figure)	94

Source: FAO Fertilizer Handbook, 1970.

2. Consumption Forecasts by Nutrients

3.13 The Government projections for different nutrients (through 1982 based on the above application rates) shown in Annex 3-3 are given below:

Projected Fertilizer Consumption by Nutrients
(1'000 TPY)

	1972	1982	1985	Annual Growth Rates (%) 1972-82	1982-85
N	327.0	506.0	514.0	4.5	0.8
P_2O_5	66.0	211.0	211.0	12.1	-
K_2O	1.5	74.0	77.0	48.0	1.2

The above Government projections for nitrogen appear conservative and for the other two nutrients reflect the objective of bringing the N-P-K ratios into better relationship to each other. They also appear to be influenced by expected fertilizer availability and the attempt to cover minimum needs rather than by unrestrained demand and indicate that in the early 1980's, nutrient consumption would already level off. Total consumption of nutrients is forecast to double approximately between 1972 and 1985. The forecast reflects a rise in the per ha consumption from 94 Kg to 157 Kg, and assumes that cropped

area would expand from the present 4.2 million ha (10.5 million feddans) to 5.1 million ha (12.6 million feddans). But, as pointed out previously, the projected per ha nutrient consumption is low for an intensive agriculture such as that of Egypt. The projections also assume that Egypt will not yet have moved strongly along the recommendations spelled out in para. 3.06, i.e. promotion of yield-improving technologies and of non-traditional exports, which all require substantially increased fertilizer application. One might also expect that the high prices of foodgrains are likely to accelerate the trend in Egypt towards the production of more high-yielding varieties of wheat, maize and rice.

3.14 The following table gives more detailed projections of consumption for nitrogen, the nutrient the project will produce, together with the projected supply through 1985:

Egypt - Projected Supply and Consumption of Nitrogen Fertilizer
(in 000's tons of N)

Production /1	1970	1972	1973	1974	1975	1976	1977	1978	1980	1982	1985
	(Actual)		(Est.)	----------Projected----------							
Kima (Aswan)	117	93	30	78	100	113	120	122	125	125	125
Helwan	-	10	21	31	42	42	42	42	42	42	42
Talkha I	-	-	-	-	75	98	98	113	117	117	117
Talkha II	-	-	-	-	-	-	-	196	249	249	249
Total	117	103	51	109	217	253	260	473	533	533	533
Consumption	330	327	381	381	409	410	438	456	492	506	514
Apparent Deficit (Surplus)	213	215	330	272	192	157	178	(17)	(41)	(27)	(19)

/1 Production from Suez is excluded. Talkha I rated at 100% output once Talkha II is fully operating.

3.15 The forecast assumes that all nitrogen fertilizer capacity will be operated at high rates from 1980 onward (i.e., Talkha II at 95% and the rest of the industry at 100%), so that, from the supply side also, the above projections are conservative with the result that the expected balance between domestic production and consumption to be reached by 1978 is more likely to remain as a supply shortage. The above official forecasts also show a relatively constant consumption of nitrogen fertilizer up to about 1976, which indicates that they take account of the limited availability of domestic production and imports until then. Nonetheless, imports are expected to range from 157,000-272,000 tons of N per year until Talkha II will be operating commercially in 1978, equivalent to some US$45-80 million per year at present world market prices.

3.16 The Ministry of Agriculture's projections of phosphate and potash fertilizer consumption show P_2O_5 use increasing from 65,000 tons in 1972 to 211,000 tons by 1982 (about 12.5% increase per year), and K_2O use rising from 2,000 tons in 1972 to 74,000 tons in 1982 (para. 3.13). In view of Egypt's severe foreign exchange constraints, and particularly as long as the present high cost of imports persists, these increases may be optimistic, unless Egypt were to expand its own phosphate fertilizer production capacity for which some tentative plans now exist. If all nitrogen and phosphate consumption were to rise as forecast, then the 5 to 1 ratio of N to P_2O_5 in 1972 would improve to 2.4 to 1 by 1982.

3.17 Egypt currently uses negligible amounts (and has no firm plans of using increased quantities) of compound or complex fertilizers. However, since both N and P_2O_5 nutrients are needed, and needed in an optimal ratio, to maximize crop yields, further P_2O_5 use should be evaluated including its use in mixed fertilizers. Furthermore, as already mentioned, the above forecast of nitrogen fertilizer consumption does not take into account any appreciable expansion of reclaimed land, new seed varieties, etc., which could require major increases beyond the forecast level. It was, therefore, recommended that Egypt undertake a comprehensive fertilizer sector study to determine the growth potential and the program necessary to achieve such growth. The study should include consideration of the next fertilizer project which is likely to be an N/P_2O_5 fertilizer expansion at Talkha within the next few years. The Government has agreed to commence such a study by not later than June 30, 1975 and consult with IDA on the preparation of the study and the implementation of the resulting program.

D. Marketing and Pricing System

3.18 The Government closely controls supply and consumption of fertilizer. The Ministry of Agriculture sets the application rates and determines the quotas of fertilizer made available to each farmer according to his area, location and the crop rotation which he will follow in cultivating his land. Since the farmer cannot buy less than the norms prescribed, a lower limit on national fertilizer consumption is established by these quotas.

3.19 The General Organization for Agricultural and Cooperative Credit (GOACC), a public sector organization, procures and distributes all locally produced and imported fertilizers in accordance with the Agricultural Ministry's quotas (Annex 3-4). GOACC operates about 400 fertilizer warehouses throughout the country with a total storage capacity of about 400,000 tons. Some 4,000 small cooperative stores handle retail sales and distribution to the farmer. This distribution system has been working satisfactorily.

3.20 Another Government agency that plays a major role in the marketing and pricing of fertilizers is the General Organization for Agricultural Prices Equalization (GOAPE); it determines prices and the amounts, types and sources of fertilizer to be purchased (including imports) and monitors distribution

through the GOACC, to which it pays about 6% of the value of fertilizer to finance storage and distribution costs. GOAPE functions as a clearing agency, balancing high prices for some farm inputs (e.g., urea), against subsidies on others (e.g., pesticides).

3.21 At the farm level, all (except one) nitrogen fertilizers are sold at uniform prices on a nutrient basis throughout the country but net plant prices are set differently to reflect actual production costs of individual fertilizer manufacturers. Present 1974 net plant prices and farm level prices are shown below:

Fertilizer Prices in Egypt

	Net Plant Price /1 (bagged)				Farm Level Price /2 (bagged)			
	Material		Nutrient		Material		Nutrient	
	ŁE	US$	ŁE	US$	ŁE	US$	ŁE	US$
Urea (46% N)	39.4 /3	100.5	85.6	218.5	63.0	160.0	136.0	348.0 /4
AN (33.5% N)	41.1	105.0	123.0	313.0	45.8	117.0	136.0	348.0
CAN (31% N)	38.5	98.0	120.0	316.0	42.8	109.0	138.0	352.0
AS /5 (20.5% N)	27.8	70.9	136.0	346.0	29.0	74.0	142.0	361.0
CN /5 (15.5% N)	22.6	57.6	145.0	371.0	26.0	66.3	168.0	428.0

/1 Net plant price includes delivery to regional warehouses.

/2 For credit sales. For cash sales to cooperatives, reportedly 5% less. Including ŁE 1/ton tax, transport, wholesale and retail margins.

/3 Assumed price for Talkha II production including ŁE 2/ton freight. Actual price not yet determined by Government.

/4 Current price from imports is ŁE 64/ton. Assumed price of ŁE 63/ton is equivalent to AN price on nutrient basis.

/5 AS (Ammonium Sulfate), CN (Calcium Nitrate) from closed Suez plant.

The assumed net plant price for urea, US$218/nutrient ton, is substantially below the comparable price for CAN, US$316/nutrient ton; which reflects the efficient large-scale technology to be incorporated into the project's urea production. The large difference between the net plant price and farmer price for urea is an effective tax that accrues to GOAPE and would be used to offset losses on other commodities that are sold at subsidized prices. The cost structure of other nitrogen producers is not completely known but generally is higher than in Talkha's CAN plant. Since GOACC and GOAPE pool all supplies, the Talkha II urea project, whose output during 1979-80 will account for about half of domestic production in those years, would potentially allow a reduction of fertilizer prices to farmers to levels more in line with long-range international prices. However, the short-term world prices are high (para. 7.01) and no retail fertilizer price reductions in Egypt are likely in the near future.

3.22 El Nasr will distribute most of Talkha's production in the Delta within a distance of about 150 km. El Nasr or GOACC will be responsible for delivery of fertilizer to the regional warehouses of GOACC. All material will be shipped in polyethylene bags and an estimated 80% will be delivered by road and the balance by rail. River transport is not contemplated. Since most of the project's production will displace current imports through Alexandria, no major distribution difficulty is contemplated. However, transportation is generally a problem in Egypt and without proper planning, bottlenecks in daily distribution may arise. A detailed analysis of distribution requirements for Talkha will be included in the recommended fertilizer sector study (para 3.17).

3.23 Fertilizer is sold on credit through the GOACC and the village cooperatives. Terms have been subsidized (about 4% annual interest) and over 90% of the fertilizer was distributed on credit in the late 1960's. Credit for fertilizer has leveled at around £E 33 million for several years, implying a limitation on credit. Although GOACC indicates that credit facilities will be expanded as needed to meet fertilizer requirements, they were unable to forecast credit needs and this subject will be included in the sector study (para 3.17).

3.24 The cooperative system is relatively well developed for the distribution of specific inputs and collection of crops, with each village organized into cooperatives but extension services, such as for increased use of high-yielding seed varieties and higher crop productivity, and farm management practices need much improvement. The cooperative structure is essential since land tenure is characterized by many small holdings as a result of land reform legislation in 1952 and 1961. About 95% of farmers hold 57% of agricultural land in farms of less than 2 ha (5 feddans) in size.

IV. THE PROJECT

A. Project Scope

4.01 The project will be located at Talkha adjacent to the CAN plant now under erection (para. 2.03) and consists of a single-stream 396,000 tons per year (TPY) ammonia plant; two identical urea plants with a combined capacity of 570,000 TPY; a plant for the manufacture of 4,000 polyethylene bags per hour; and all necessary ancillary facilities. The ammonia plant includes 66,000 TPY capacity that would be utilized for increasing the capacity and production of Talkha I. All plants will employ modern, commercially proven technology to ensure efficient operation (Annexes 4-1 and 4-2). The present site area is about 60 ha, of which 40 ha are occupied by the CAN plant, leaving 20 ha for the project, which is adequate. The site is on the banks of the Nile and has good rail and road connections. The towns of Talkha and Mansoura, a power station, and a factory housing colony are also nearby.

B. Raw Materials and Utilities

4.02 The principal raw material will be natural gas supplied from the newly developed Abu Mahdi field, some 40 km from Talkha, and the project's requirements at full production are estimated at 1.2 million cubic meters/day (M^3/D). The gas composition is suitable for ammonia production. The gas company, owned by the Egyptian General Petroleum Corporation (EGPC) and ENI of Italy, has determined that reserves are adequate to supply Talkha I and II as well as the Talkha power station for at least 30 years at their combined consumption of 2.6 million M^3/D. An independent consultant (Cremer and Warner, U.K.) has confirmed the gas reserves and the adequacy for the project of the pipeline system that is to connect the gasfield with Talkha. The Government has also given its assurance that the pipeline system will be implemented in time for Talkha requirements. This system (not part of the project) with a capacity of 3.3 million M^3/D is under construction and is expected to be completed during 1974, to start serving Talkha I. El Nasr has negotiated a satisfactory 20-year gas-supply contract with the gas company at a price of £E 8.75 per ton (US$22.3/ton) which is equivalent to US$0.018/$M^3$ or US$0.51/1,000 cubic feet and is based on the prevailing fuel oil price in Egypt; the contract contains escalation provisions which links the gas price to the price of fuel oil in Egypt.

4.03 Power is to be supplied from the adjacent power station on a preferential basis at US$0.015/Kwh. The power station has adequate capacity to supply the needs of the project and the Government has agreed that the additional transmission and transformer facilities will be provided by the power company when required by the project. Talkha will generate its own steam and water for industrial and drinking purposes will be obtained from the Nile. The supply of all utilities is thus satisfactorily ensured.

C. Employment and Training

4.04 The project will provide employment for about 1,350 persons, primarily as skilled personnel for management, operations and maintenance, with many to be recruited from El Nasr's existing staff (4,250) that still includes surplus manpower from the Suez plants. Although somewhat high, the proposed manning level is acceptable. Existing personnel and facilities of El Nasr plus the General Contractor and Technical Advisor will be utilized in training, and arrangements will be made for some specialized training outside Egypt. The project execution plan (paras. 4.06-4.08) defines the training program in more detail as part of the responsibility of the project's General Contractor (yet to be selected).

D. Ecology

4.05 The plant will be designed to meet standards established by the Egyptian Ministry of Public Health. These standards are specific and rather strict for liquids to safeguard against any potential pollution of the Nile. Non-gaseous effluents from the project are small and will be treated in the

wastewater treatment unit now under construction at Talkha I at little extra cost. Egyptian regulations for gaseous effluents are not well defined, but there are no problems associated with gaseous effluents from todays efficiently designed ammonia-urea plants, particularly not with the Abu Mahdi natural gas which is virtually sulphur free. Pollution control facilities, forming about 2% of project costs, are therefore satisfactory.

E. Project Execution

4.06 The entities responsible for project execution will be (a) El Nasr, under the general supervision of GOFI and GOCI; (b) technical Advisor; and (c) General Contractor. Cremer and Warner (UK) have been selected as the Technical Advisor following Bank guidelines and their initial work is being financed by an IDA Engineering Credit 1/ which was approved by the Executive Directors on November 13, 1973 (para. 1.04). The detailed project execution plan has been prepared by El Nasr and Cremer and Warner and the broad outline is given below.

4.07 Procedures for selecting the General Contractor are completed and the Contractor is expected to be selected by September 1974. Bids will be sought on a fixed price basis for all engineering work and project management including procurement services for all major process units and other facilities, and on a cost-plus-fee basis for the Contractor's erection and site supervision services. The General Contractor directly, or through his subcontractors, will bear the single responsibility for the execution of the project through commissioning with full guarantees for the project's capacity, efficiency, mechanical warranties and completion time. Equipment procurement will be conducted from the General Contractor's office by El Nasr's project team including the General Contractor and the Technical Advisor. Final approval and placing of equipment orders will be done by El Nasr (paras. 5.07 and 5.08). The Government has agreed that it and its relevant agencies will issue all import licenses and give other approvals promptly in accordance with a critical path schedule to be prepared by El Nasr and agreed to by the El Nasr Company, the Government, the General Contractor and IDA, within three months of the selection of the General Contractor. The project completion date, which is defined as successful demonstration of all guarantees, and completion of 90 days operation at 80% capacity utilization or above, is estimated as April 1, 1978.

4.08 Detailed civil engineering will be carried out by El Nasr or another Egyptian firm; civil construction by local contractors; and plant erection by El Nasr, or another local contractor all supervised by the General Contractor. El Nasr has formed a project team headed by Mr. Helmy Attia, the present General Manager of Finance, and other engineering staff from its project engineering group to work with the Contractor and coordinate the project with other operations at Talkha. The Company staff is limited in size and will be supplemented by the Technical Advisor as needed to implement the project.

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4.09 IDA has reached tentative agreement with the Arab co-lenders 1/ regarding procedures to be followed during project execution and supervision, covering such matters as procurement procedures, allocation of goods and services to IDA and Arab co-lender financing, provision for later shifting of goods and services as needed to disburse fully each source of financing (paras. 5.07 and 5.08). These procedures have been confirmed by El Nasr and similar procedures are expected to be arranged between the Arab co-lenders and El Nasr.

V. CAPITAL COSTS AND FINANCING PLAN

A. Capital Costs

5.01 Total financing required for the project is estimated at £E 51.9 million (US$132.4 million) including £E 36.6 million (US$93.4 million) foreign exchange cost (Annex 5-1):

1/ The Arab co-lenders funds are expected to be administered, during project execution, by the Arab Fund and the Kuwait Fund. Procedures regarding supervision, exchange of information, and reporting requirements will be completed once this committee is formed.

Summary of Capital Costs
(in millions)

	Egyptian Pounds			US Dollars			% of
	Local	Foreign	Total	Local	Foreign	Total	Total Cost
Engineering Services /1	0.2	3.4	3.6	0.6	8.6	9.2	7
Civil Works	4.0	0.7	4.7	10.1	1.9	12.0	10
Equipment & Materials	0.4	16.4	16.8	1.0	41.8	42.8	35
Spare Parts	0.1	1.0	1.1	0.2	2.5	2.7	2
Freight	1.3	0.2	1.5	3.3	0.4	3.7	3
Erection	3.7	1.8	5.5	9.3	4.5	13.8	11
Furniture, Vehicles, & Office Equipment	0.4	-	0.4	1.2	0.1	1.3	1
Preoperating & Start-up Expenses	0.9	0.1	1.0	2.3	0.3	2.6	2
Total Erected Plant Costs	11.0	23.6	34.6	28.0	60.1	88.1	71
Contingencies							
Physical	0.8	2.4	3.2	2.0	6.1	8.1	7
Price	1.7	8.0	9.7	4.4	20.3	24.7	20
Total Contingencies	2.5	10.4	12.9	6.4	26.4	32.8	27
Total Fixed Assets	13.5	34.0	47.5	34.4	86.5	120.9	98
Working Capital	0.5	0.5	1.0	1.3	1.3	2.6	2
Total Project Cost	14.0	34.5	48.5	35.7	87.8	123.5	100
Interest during Construction	1.3	2.1	3.4	3.3	5.6	8.9	
Total Financing Required	15.3	36.6	51.9	39.0	93.4	132.4	

/1 Including US$400,000 refinancing of the Engineering Credit (para. 4.06).

These estimates were prepared by El Nasr and Cremer and Warner, based on January 1974 prices and thus take account of equipment price increases in major supplying countries due to the recent petroleum price hikes. Physical contingencies provided are 7% and 10% of local and foreign erected plant costs, respectively. Price escalations assume 20% annual increase in 1974 and 12% in 1975, for the foreign costs, and 8% annual increase in 1974 and 1975 for local costs (based on Egyptian conditions). Virtually all supplies are expected to be ordered by the end of 1975. Foreign price escalation was determined in consultation with several engineering companies. No import

duties are allowed for and the Company has applied to the Government for exemption from such duties. The estimates assume a project implementation period of 39 months, beginning in September 1974, and including six months for start-up and commissioning.

5.02 Projections of price escalation are very difficult under current conditions, even more so for equipment for the fertilizer and related industries which are expanding rapidly throughout the world. Inability to obtain materials in time, longer delivery periods or even lack of an adequate response to requests for bids could all lead to higher foreign exchange costs than estimated. However, this possibility is considered reasonably small -- though it cannot be discounted entirely -- because of the provision of high contingency reserves. The above project costs estimates, therefore, are considered realistic.

5.03 Initial working capital is estimated at £E 1.0 million (US$2.6 million) which will be provided (Annex 5-2) by the Government as part of its equity contribution (as shown in the financing plan), by short term loans or by El Nasr's own resources.

B. Financing Plan

5.04 The financing plan for the project will be as follows:

Financing Plan
(in millions)

	Egyptian Pounds			US Dollars			% of
	Local	Foreign	Total	Local	Foreign	Total	Total
Debt							
IDA	-	7.8	7.8	-	20.0	20.0	15.1
Abu Dhabi Fund	-	4.0	4.0	-	10.1	10.1	7.6
Arab Fund	-	8.6	8.6	-	22.0	22.0	16.6
Kuwait Fund	-	9.3	9.3	-	23.7	23.7	17.9
Libyan Arab Foreign Bank	-	4.0	4.0	-	10.1	10.1	7.6
Government of Qatar	-	1.3	1.3	-	3.4	3.4	2.6
Sub-total	-	35.0	35.0	-	89.3	89.3	67.4
Equity							
Government of Egypt	15.3	1.6 /1	16.9	39.0	4.1 /1	43.1	32.6
Total	15.3	36.6	51.9	39.0	93.4	132.4	100.0

/1 Represents a portion of interest during construction and working capital.

Equity financing of the project would be only 33% of the total cost, with debt financing accounting for 67% which is somewhat higher than would normally be desirable. However, this capitalization is acceptable in view of the fact that (1) there will be no outstanding debt on Talkha I once Talkha II starts operations; (2) debt service coverage afforded by Talkha II itself is expected to be satisfactory (more than three times); and (3) the debt service of El Nasr's consolidated operations would be covered more than four times.

5.05 The IDA Credit to the Government will be on-lent to El Nasr at 8.5% effective annual interest, repayable over 15 years including 5 years grace and with the Company bearing the exchange risk during this period. Details of the Arab co-lenders financing are shown in Annex 5-2 and average 5.2% interest and 19 years maturity including 5 years grace, with the terms to the Government and the Company being the same in most cases. Confirmation of the terms and conditions of the Arab financing, including who bears the exchange risk will be a condition of effectiveness of the IDA Credit.

5.06 The equity financing 1/ of £E 16.9 million (US$43 million) will be provided by the Government, drawing on El Nasr's own resources to the extent available. However, the Government's obligation to provide the equity financing to the project will be independent of El Nasr's ability to generate internal funds from Talkha I during the execution of the project. The Government will also provide all additional funds (foreign and local) that may be required to cover any cost overrun in the project, on terms satisfactory to IDA, including any additional funds for the pipeline system, in the unlikely event that these would be needed (para. 4.02).

C. Procurement and Allocation of IDA Credit

5.07 IDA and Arab co-lenders foreign exchange financing will be on a parallel basis, with separate, specific lists of goods and services. The list allocated to IDA financing will consist of: (i) engineering and management costs essentially for the services of the General Contractor and the Technical Advisor; (ii) major equipment such as compressors, reactors and pressure vessels, proprietary equipment, and construction equipment; and (iii) materials such as structural steel, reinforcing steel, and instruments. The allocation of the IDA credit and Arab co-lender funds is shown below:

1/ The Development Credit Agreement provides for £E 15.9 million as equity and £E 1.0 million initial working capital on terms consistent with the agreed financial covenants (para. 6.11). The appraisal report assumes the working capital will be provided as equity.

Allocation of Loan Funds
(US$ millions)

		IDA Credit	Arab Co-lenders
1.	Engineering & Management Costs /1	12.0	0
2.	Equipment and Materials	3.0	59.5
3.	Construction Materials	3.0	0
4.	Interest during Construction	0	2.8
5.	Working Capital	0	0
6.	Unallocated	2.0	7.0
		20.0	69.3

/1 Including technical advisor services, the refinancing of the US$400,000 Engineering Credit (para . 4.06), and erection costs shown in the table in para. 5.01.

The Arab co-lenders' funds will be disbursed against the balance of the project's foreign cost and, any IDA-allocated items were they to exceed the amount of the proposed credit, would be transferred to the Arab co-lenders list of goods and services.

5.08 There will be pre-qualification for all suppliers of equipment and materials (i.e. independent of the sources of finance) and their technical evaluation will be done by the General Contractor (paras. 4.06 - 4.09). IDA-financed items will be procured in accordance with the Bank Group's procurement guidelines and although none of the IDA goods is expected to be procured in Egypt, pre-qualified local suppliers would receive, for purposes of bid evaluation, a preference of 15% or the amount of customs duty, whichever is lower. Equipment and materials will be purchased, at cost, in accordance with the Bank Group's or the Arab co-lenders procurement guidelines. For IDA funds, international competitive bidding will be used with the exception of about US$3 million of proprietary items or items with limited availability that will be procured by "international shopping." The Arab co-lenders procurement procedures are expected to be similar to those of the Bank with the exception that the regulations of the Arab League must be followed and all countries, including Eastern bloc countries (but excluding Israel), are permitted to bid and there is no preference for local or Arab States suppliers.

5.09 Estimated disbursements of the proposed IDA Credit and Arab financing are shown in Annex 5-3.

VI. FINANCIAL ANALYSIS

A. Analysis of the Project

6.01 The financial analysis of the project is done on an incremental basis and uses estimated 1978 prices. The project's revenues and operating costs (including the assumptions on which they are based) are given in Annex 6-1 and are summarized below:

Talkha II - Revenues and Operating Costs
95% Capacity Utilization

	US$ millions per year	US$ per ton	
		Urea	Ammonia
Revenues			
Urea (542,000 TPY)	51.5	95.0	-
Ammonia (62,700 TPY) /1	6.9	-	110.0
Net Sales	58.4	95.0	110.0
Operating Costs			
Natural Gas	7.9	12.2	21.4
Chemicals & Catalysts	0.9	1.5	2.7
Bags (polyethylene chips)	2.7	5.0	-
Maintenance Materials	2.9	5.1	3.1
Power	1.0	1.8	0.5
Labor	2.9	5.4	-
General Expenses	0.8	1.5	-
Total Operating Costs	19.1	34.5	27.7

/1 Ammonia which is not used for production of urea is transferred to Talkha I at Talkha I production costs.

6.02 The urea price has not yet been determined by the Government, except the principle that it should reflect costs plus a reasonable profit. The financial projections are based on an assumed ex-factory selling price of urea of ₤E 37.3 per ton (US$95) which has been kept constant throughout the forecast period. The above price has been determined so as to achieve a financial rate of return before taxes of about 20%. In comparison, the assumed urea price represents only two-thirds of the present ex-factory price of CAN on a per ton nitrogen basis (para. 3.21).

6.03 It is projected that Talkha II will produce about 62,700 tons per year of ammonia in addition to ammonia requirements for urea, which will be transferred to Talkha I for further processing into CAN. In the project analysis it is assumed that the transfer price will be US$110 per ton ammonia which equals the Talkha I production costs for ammonia.

6.04 The principal raw material, representing about 41% of total operating costs, is natural gas which has been assumed to be available at US$0.51 per MCF (equivalent to ŁE 8.75 or US$22.3 per ton); this price is sufficient to cover costs (including reasonable profits) for collection, purification and delivery of the gas to the Talkha plant. Although the gas price is fixed under a 20-year supply contract, it may be subject to change in step with the Government's policy on the price of fuel oil. Should this happen, the selling price of urea would correspondingly have to be adjusted and appropriate assurance has been obtained from the Government. Since the proposed ex-factory price, ŁE 37.3/ton, is well below the farm level price of about ŁE 62/ton and actual distribution costs account for only about ŁE 6/ton, the ex-plant price could be increased substantially before affecting the price of urea at the farm. Polyethylene bags, another important input, will be produced from imported polyethylene as part of the project and will also cover the bagging requirements of Talkha I. Operating costs have been escalated to arrive at 1978 prices, the first year of Talkha II production, and kept constant thereafter except for salaries and wages which were increased at 3% annually throughout the project life to reflect a rising trend in real wages. On these bases, the estimated operating costs are adequate. They are low in comparison to most other fertilizer projects the Bank Group has financed as the project benefits from a good location relative to the major sources of materials and utilities, low cost of feedstock, inclusion of bag making and some sharing of overhead expenses with the Talkha I operations.

6.05 Detailed financial projections for the project (incremental income statements, funds flow and balance sheets) together with the major assumptions are contained in Annex 6-2 and summarized on the following page:

Talkha II - Summary of Incremental Financial Projections
(in £E million)

Year ending Dec. 31	1978	1979	1980	1981	1982
Income Statements and Cash Flow					
Production % of Capacity	71%	85%	95%	95%	95%
Revenues	15.1	18.1	20.2	20.2	20.2
Cost of Goods Sold	3.7	4.4	4.7	4.8	4.8
Interest	2.1	2.1	2.0	1.8	1.7
Depreciation	6.7	6.7	6.7	6.7	6.7
Net Income before Taxes /1	2.6	4.9	6.7	6.8	6.9
Net Income after Taxes	2.6	4.7	6.3	6.4	6.5
Operating Cash Flow /2	11.4	13.5	15.0	14.9	14.9
Debt Service	2.1	3.3	4.0	4.0	4.0
Balance Sheets					
Current Assets	10.6	18.5	22.8	26.9	31.0
Accumulated Cash Surplus	8.9	16.6	20.6	24.5	28.4
Current Liabilities	1.4	2.4	2.5	2.6	2.7
Total Fixed Assets	44.2	37.5	30.1	24.0	17.3
Long-Term Debt	33.8	31.7	29.6	27.3	24.8
Equity	19.5	21.9	21.4	21.0	20.7
Ratios					
Current Ratio	7.4	7.9	9.1	10.3	11.2
Long-Term debt/Equity Ratio	63/37	59/41	58/42	57/43	55/45
Debt Service Coverage (times)	5.5	4.2	3.7	3.7	3.7

/1 Includes a small amount of income from other sources.
/2 Net income before interest and depreciation but after tax.

6.06 Revenue forecasts are based on a build-up of production from 71% of capacity in 1978, the first year of commercial operation, to 95% of capacity in 1980 and thereafter. The construction period, expected to end in December 1977, includes six months commissioning and although the plant may then already produce fertilizer, no revenues have been assumed. With standard-sized and commercially-proven plant units, the performance guarantees from the General Contractor and assured supplies of natural gas and power from nearby sources, the assumed capacity utilization is reasonable.

6.07 The project is expected to earn a profit before tax from the first year of operations, reaching a level of 33% of net sales by 1980. The profit break-even point is 64% capacity utilization in 1978 and 52% in 1983, while the profit break-even sales price declines from £E 30.9 (US$78.8) per ton of urea in 1978 to £E 20.6 (US$52.6) in 1983. Debt service coverage is

expected to exceed 3-times throughout the project life and cash build-up to be significant as reflected by the increase of the current ratio from 7.4 in 1978 to 11.4 in 1983. The project's debt/equity ratio would be 63/37 in 1978 which will, because of the high earnings, improve quickly to 55/45 by 1982.

B. Financial Rate of Return

6.08 The financial rate of return before and after income taxes is 19% and 18% respectively, based on the assumed urea price of US$95 per ton ex-plant (Annex 6-3). The difference is small because El Nasr pays taxes only on retained profits (15% of before tax profits). However, as mentioned in para. 3.21, the urea price has not yet been determined by the Government, except the principle that it should reflect costs plus a reasonable profit. Also the urea price on which the financial projections are based is - in terms of nutrient - only about two-thirds of the price of other nitrogen fertilizers currently produced in Egypt. A sales price difference of ±25% changes the financial return (before tax) to 25% and 12% respectively. A one year delay in project completion decreases the return to 16% and a 10% cost overrun to 18%. Should Talkha II run only at 80% of capacity throughout its life instead of the 95% as projected, the return drops to 16%. Finally the return will decline to 15% if the gas price were to double to US$1.00 per MCF or conversely with such higher gas price the urea price would have to be increased by 22%, i.e., to about US$116 per ton, to maintain a financial return of about 20%.

C. Analysis of El Nasr Company

6.09 Detailed consolidated projections for El Nasr (combining Talkha I and Talkha II income statements, funds flow and balance sheets) are given in Annex 6-4 and summarized on the following page:

El Nasr-Summary of Consolidated Financial Projections
(in LE million)

Year ending Dec. 31	1976	1977	1978	1979	1980	1981
Income Statements & Cash Flow						
Production % of Capacity:						
CAN	80	80	92	93	95	95
Urea	-	-	71	85	95	95
Revenue	9.4	9.4	28.5	31.8	34.2	34.2
Cost of Goods Sold	5.7	5.9	12.0	13.1	13.8	13.9
Interest	-	-	2.1	2.1	2.0	1.8
Depreciation	2.9	2.9	10.0	10.0	8.8	8.7
Net Income before Taxes	(0.0)	(0.1)	2.8	5.0	7.9	8.0
Net Income after Taxes	(0.0)	(0.1)	2.8	4.8	7.4	7.5
Operating Cash Flow /1	**2.9**	**2.8**	**14.9**	**16.9**	**18.2**	**18.1**
Debt Service	0.6	0.7	2.1	3.3	4.0	4.0
Balance Sheets						
Current Assets	5.8	8.7	21.8	33.1	40.6	47.9
Accumulated Cash Surplus	2.4	5.0	16.6	27.6	34.9	42.0
Current Liabilities	0.7	0.7	2.1	3.0	3.2	3.4
Total Fixed Assets	72.7	81.1	71.1	61.1	52.4	43.6
Long-term Debt	29.4	35.1	33.8	31.7	29.6	27.3
Equity and Reserves	48.4	54.1	56.9	59.4	60.1	60.9
Ratios						
Current Ratio	8.5	12.8	10.3	10.9	12.6	14.3
Long-Term Debt/Equity Ratio	38/62	39/61	37/63	35/65	33/67	31/69
Debt Service Coverage (times)	5.2	4.1	7.1	5.2	4.5	4.5

/1 Net income before interest and depreciation but after tax.

6.10 While by the end of construction of Talkha II (December 1977), the project by itself is expected to have a long-term debt/equity ratio of 67/33 it would be 39/61 if consolidated with Talkha I and the Company's consolidated debt service coverage would exceed 4.0 times from 1978 onwards. A rapid cash build-up is anticipated after 1978 because of substantial depreciation provisions and the assumption that there would be no new capital investment in the future except for normal renewals and replacements. Assuming furthermore (as is done in these projections) that there would be no cash distribution beyond the 85% of net income normally paid out to the Government and the Company's

employees, the current ratio would remain above 8:1 throughout. While in practice it is more likely that the Company will be expanded further and/or that it will have to transfer additional funds to the Treasury, it is evident that El Nasr's financial position can be kept on a sound basis throughout the life of the project.

6.11 Nevertheless, to safeguard the Company's financial strength, the following assurances were obtained: (i) during project implementation (Talkha II) the Government will continue, as necessary, to provide funds to help El Nasr repay its existing debt in accordance with its terms by not later than December 31, 1977 and keep its working capital adequate so as not to interfere with the maximum possible production of fertilizer from Talkha I; (ii) thereafter the Government will not withdraw funds from the Company if, as the result, the current ratio would fall below 1.5:1 or, should that become necessary, provide funds to El Nasr to maintain the current ratio at least at that level; (iii) without prior consultation with the Association, El Nasr will not, during construction of the project, undertake any further capital investments (other than Talkha I and II and any replacement and modernization of existing facilities) exceeding £E 2 million in any one year and after project completion if, as the result of such investments, the Company's debt/equity ratio would exceed 50/50; (iv) in setting the ex-factory urea price the Government will allow El Nasr reasonable profits at efficient production levels and to cover its long-term debt service at least 1.5 times, within the framework of the Company's efficient operations; and (v) without limitations of the provisions of (iv), the retail price of urea at the farm level should be comparable to other nitrogenous fertilizer, on a nutrient basis.

D. Major Risks

6.12 The project faces only moderate technical, managerial and commercial risks. The potential for substantial delays and major cost overruns during project implementation, unless caused by a general overbooking in the fertilizer equipment supply industry, is rather low because of (i) El Nasr's experience in managing, constructing, and operating other fertilizer projects; (ii) guarantees to be provided by engineering contractors for timely completion; and (iii) participation in project implementation by the Technical Advisor and General Contractor. The Commercial risks of the project are acceptable since Egypt has been importing urea since the mid-1960's (the project output would largely replace imports) and urea use is thus well established.

VII. ECONOMIC ANALYSIS

A. Raw Material and Fertilizer Prices

7.01 World urea prices in recent years have fluctuated sharply with supply/demand imbalances, new technology, petroleum prices and currency revaluations. A typical ammonia/urea plant capacity in 1974 is 5-10 times larger than in the early 1960s. This increase in size, parallel with improvements in technology, reduced production costs substantially and a large increase in supply in

the late 1960s caused urea prices to drop sharply. In 1970, urea prices were about US$50-60/ton. During 1970-1973, the increase in demand was not matched with increased supply and at present there is a significant shortage of urea and other fertilizer material throughout the world. These shortages along with recent price increase of petroleum, the principal nitrogen fertilizer raw material, plus changes in currency values have pushed up urea prices substantially. Current CIF urea prices are US$200-300/ton. With expanding capacity, the shortage should be alleviated, at least in part by 1977-78, when urea prices are expected to level off at then current prices of about US$120-140/ton FOB bagged Persian Gulf port, varying thereafter with petroleum prices and inflation to reflect further changes in cost of production. The above FOB Persian Gulf prices assume surplus gas at US$0.50/MCF, Talkha II construction costs, a return on capital of 20%, and US$10/ton transport and handling costs from factory to Persian Gulf port. It is an economic price and does not take into consideration commercial factors such as higher assigned gas prices, supply and demand distortions, and further rising transport costs, which could have a major affect on future fertilizer prices.

7.02 The economic evaluation of Talkha II is based on a CIF delivered Egyptian port price for bagged urea of US$120/ton and a natural gas price of US$0.50/$M^3$ (US$1.40/MCF) which is equivalent in heating value to heavy fuel oil at US$54/ton. This latter assumption is somewhat arbitrary, but since it is based on the substitution of fuel oil for the gas used by Talkha, it reflects a conservative price under Egyptian conditions.

B. Economic Rate of Return

7.03 The economic rate of return is 19% based on the expected long-term price for imported bagged urea of US$120 per ton CIF Egyptian port, with the same price being assumed ex-factory at Talkha and a delivered gas price of US$1.40/MCF (para. 7.04). Assuming Egypt's opportunity cost of capital in the industrial sector is 12%, this is an attractive rate of return (Annex 7-1). The relatively high return reflects the several advantages of the project: (i) import substitution; (ii) optimum and economic use of the indigenous raw material, natural gas; (iii) economies of scale in production facilities; and (iv) optimum use of the existing facilities at Talkha. In addition, there are substantial unmeasurable benefits not included in the calculation of the economic return, such as training of labor, removal of fertilizer supply constraints and additional agricultural production and exports, that are also attributable to the project.

7.04 The economic return is sensitive to changes in the price of urea, and varies from 23% to 10% respectively with a $\pm$25% change in the urea sales price. The return is also sensitive to project delays and cost overruns - a one-year delay decreases the return to 16% and a 10% cost overrun lowers it to 17% - and to the gas price as discussed below.

7.05 The opportunity cost of natural gas and its effect on the economic return of the project presents a special case in view of rapidly changing petroleum (including natural gas) supply conditions and prices. The price of natural gas, delivered and suitable for fertilizer feedstock, can range from

about US$0.30-0.50/MCF (US$10-17/ton fuel oil) for surplus gas currently being flared (as in the Persian Gulf); to about US$0.50-1.00/MCF (US$17-35/ton fuel oil) as feed to an export LNG or urea plant; to US$1.40-2.00/MCF (US$54-70/ton fuel oil) as a substitute for domestically consumed petroleum for fuel purposes. 1/ The above range of gas prices compares to US$0.50/MCF used in the financial return (para. 6.02). The opportunity cost of natural gas varies considerably more than that of liquid petroleum since the conversion cost of gas to other useful products (such as LNG or urea) and its transportation costs (by pipeline or as LNG) vary over a much wider range than that of oil. As a result, the opportunity cost of gas (or gas products) for export is usually much lower than for domestic consumption. Therefore, for this project, since urea is for domestic use and the natural gas, at least in part, displaces domestic liquid fuel consumption, an equivalent heating value of fuel oil and gas has been used in determining the opportunity cost of gas. The economic return of 19% noted in para. 7.03 is based on a gas price of US$1.40/MCF (equivalent to US$54/ton heavy fuel oil or about US$7-8 per barrel. The return decreases to 14% if the gas price increases to US$2.00/MCF (equivalent to US$70 per ton of heavy fuel oil or US$10/barrel) but increases to 24% if the gas price falls to US$1.00/MCF.

7.06 If petroleum prices in world trade continue at a relatively high level of US$6-12/barrel (US$42-84/ton), equivalent to a natural gas price of about US$1-2/MCF, then the economic price of urea must increase also. At the higher price levels for gas, alternative fuels such as coal and lignite on a world-wide basis, are likely to become economic feedstocks for nitrogen fertilizers.

C. Foreign Exchange Savings

7.07 The project requires an estimated foreign exchange expenditure of US$93 million. In return, the project will enable the country to avoid importing fertilizer whose gross annual CIF bagged value (at US$120/ton of urea) would amount to about US$65 million at 95% capacity utilization. The net foreign exchange savings are estimated at about US$41 million/year.

VIII. AGREEMENTS REACHED

8.01 Agreements have been reached with the Borrower (the Government) and the Company on the following major points:

A. The Government

(1) To keep the Company in adequate funds until completion of the project to: (a) complete Talkha I as scheduled and allow

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1/ Numbers in parenthesis are equivalent prices for heavy fuel oil based on heating value, and are included for information only, not to impute a corresponding opportunity cost of oil.

its maximum production of fertilizer; (b) repay all existing debt in accordance with its terms not later than December 31, 1977 (paras. 2.08, 2.09 and 2.13);

(2) To commence a study and prepare a program of future fertilizer production, use and distribution by June 30, 1975, and consult with IDA on preparing the study and implementing the program (para. 3.17);

(3) To issue import licenses and take other action promptly in accordance with a Critical Path Schedule (para. 4.07);

(4) To on-lend the US$20 million IDA credit to the Company for 15 years including 5 years grace at an effective annual interest rate of 8.5%, with the Company bearing the foreign exchange risk during this period (para. 5.05);

(5) To provide £E 15.9 million in equity for the project, and £E 1.0 million initial working capital on terms and conditions consistent with the agreed financial covenants (paras. 5.03, 5.05, 5.06 and 6.11);

(6) To provide any additional funds, both foreign and local, as needed to complete the project, on terms satisfactory to IDA, and maintain after project completion the Company's current ratio above 1.5:1 (paras. 5.06 and 6.11);

(7) To establish an ex-factory price for urea that will allow the Company reasonable profits at efficient production levels and to service its long-term debt by at least 1.5 times and without limitations on the foregoing, set the retail price of urea on a comparable basis with other locally produced nitrogen fertilizers on a nutrient basis (para. 6.11);

(8) To provide required gas and power supply facilities, including any funds that might be needed; to cover the requirements of Talkha (paras. 4.02 and 4.03); and

(9) To keep Talkha I in good running condition, including allowing the Company to obtain supplies and services from outside Egypt, as may be required (para. 2.13).

B. <u>The Company</u>

(10) To (i) maintain its current ratio at 1.5 or above after completion of the Project; (ii) consult with IDA before undertaking any further major capital investment exceeding £E 2 million in any one year prior to project completion, and thereafter, if, as a result of such investment, the Company's debt/equity ratio would exceed 60/50 (para. 6.11); and

(11) To prepare a critical path schedule, to be approved by IDA, for the execution of the project (paras. 4.06 and 4.07).

8.02 In addition, completing arrangements for the balance of the foreign exchange financing (US$69 million equivalent) for the project, under terms and conditions acceptable to IDA and the execution of a subsidiary loan agreement between the Government and El Nasr are conditions of effectiveness of the Credit (para. 5.05).

8.03 Based on the above agreements the project is suitable for an IDA Credit of US$20 million.

Industrial Projects Department
May 29, 1974

EGYPT: TALKHA II FERTILIZER PROJECT

GLOSSARY OF TECHNICAL TERMS

1. Following is a description of the technical terms used in this report:

2. Plant Nutrients: Essential to plant growth are some 16 elements, 6 in large and the remainder in small or micro quantities. Carbon, hydrogen, oxygen, nitrogen, phosphorus and potassium comprise the first six, and others of lesser significance include calcium, magnesium, sulfur, silicon, zinc, iron, aluminium, manganese, boron, sodium, and copper. Carbon, hydrogen and oxygen are readily available from the atmosphere and water. Nitrogen, phosphorus and potassium -- three main nutrients -- and the other elements are drawn from the soil. Unless supplemented by regular additions of materials containing the three main nutrients, soil is soon depleted of fertility by cropping. Use of organic materials such as animal and vegetable wastes can be utilized but the scale and intensity of modern agriculture have far exceeded the availability of natural "fertilizers." Consequently, the majority of the world's primary plant nutrient needs are now supplied in the form of manufactured or "chemical" fertilizers. To an increasing degree, secondary nutrients such as calcium, magnesium, sulfur, and micro nutrients such as boron, zinc, copper and manganese are also added to soils along with the primary nutrients in ratios prescribed by agronomists according to specific crop and soil needs.

3. Chemical Fertilizers: Chemical compounds suitable as fertilizers should be high enough in nutrient content; stable to avoid hazards and handling problems; and readily water soluble and available to plant root systems. Commercially available materials meeting these requirements to a large degree are:

Primary Fertilizer Materials

	% of N Nutrient		% of P_2O_5 Nutrient		% of K_2O Nutrient
Urea	46%	Triple Super-phosphate	46%	Potassium Chloride	61%
Ammonium Nitrate	34%			Potassium Sulfate	54%
Amonium Sulfate	21%	Single Super-phosphate	18%		
Diammonium Phosphate	18%	DAP	46%		

Because of the high nutrient content of urea, diammonium phosphate and potassium chloride (KCL), they are some of the most popular fertilizer materials in the world today. It is the common practice to report the nutrient content of materials in terms of percentages of N and P_2O_5 (phosphorus pentoxide) and potassium K_2O (potassium oxide).

4. Complex or NPK Fertilizers: All three primary nutrients (N, P_2O_5, K_2O) are frequently applied to the soil at the same time in ratios varying with the nutrient requirements of different crops. To facilitate handling, the several required chemicals are usually agglomerated into uniform granules for distribution. The analysis of each nutrient is given as a ratio to describe the NPK product. Thus 15-15-15 complex fertilizer contains 15% each of N, P_2O_5, and K_2O; and 12-24-12 complex fertilizer contains 12% N, 24% P_2O_5 and 12% K_2O.

5. Phosphate Water Solubility: The agronomic availability (or efficiency) of phosphate materials vary substantially. A common practice is to use water solubility as a criterion although in acidic soils it is a less significant factor. Higher P_2O_5 water solubility permits the fertilizer to be absorbed more rapidly. The minimum recommended in most cases is about 60% solubility but in some cases up to 80-85% solubility is preferred.

6. Ammonium Nitrate (AN) is produced by reacting ammonia with nitric acid. Nitric acid (HNO_3), in turn, is made from ammonia (NH_3). AN contains 34.5% nitrogen, half in the ammonium form and half in the nitrate form, and is very hydroscopic. It also is a commercial explosive. In many countries, a diluent -- e.g. limestone -- is added to lower the analysis and negate the explosive properties as well as to minimize the hydroscopic properties.

7. Electrolysis is the process of separating water into hydrogen and oxygen, by passing direct current through a weak caustic potash solution. The hydrogen is subsequently converted into ammonia (NH_3) as in the Aswan (Kima) fertilizer plant.

8. Partial Oxidation is a method of producing hydrogen from hydrocarbon fuels of almost any type by a non-catalytic reaction with oxygen followed by removal of the by-product, carbon monoxide. (It is used in the Talkha I plant.)

9. Feedstocks are the hydrocarbons used to produce hydrogen for the ammonia synthesis; in the proposed Talkha II plant, the feedstock would be natural gas which is usually the most economical choice when available. Other potential feedstocks are naphtha, fuel oil, crude oil, coal or lignite.

10. Urea is known chemically as carbamide or NH_2CONH_2 - the normal amide of carbonic acid; this compound contains about 46% N, all in the ammonium form. It is considerably less hydroscopic than ammonium nitrate and it is the most widely used straight nitrogen fertilizer today.

11. Urea Synthesis: Urea is made by reacting ammonia with carbon dioxide. Since both of the materials are produced during the ammonia synthesis, urea production is usually undertaken alongside an ammonia plant. Unfortunately, the corresponding acid of carbon dioxide (carbonic acid) does not form stable ammonium salts as do nitric, sulfuric or phosphoric acids.

Therefore, simple neutralization as used in making ammonium nitrate and sulfate fertilizers is not possible. Instead, ammonia and carbon dioxide are combined under heat and pressure to make ammonium carbomate which, although unstable, can be dehydrated under pressure to form urea, a stable compound. Again, unfortunately, the overall reaction is completely reversible and even at 300 atmospheres pressure and 200°C, the conversion to urea in a single pass through the reactor is under 70%. This introduces several complications: high pressure must be used to maximize conversion; unconverted reactants must be separated and recycled; increased corrosion under the high temperatures and pressures used must be overcome, and urea decomposition into undesirable products must be minimized. In recent years, several engineering and producing companies have developed ways of surmounting these problems, and large plants capable of producing a thousand tons per day, or more, of urea to rigid chemical and physical specifications are now operating successfully for long periods throughout the world.

Petroleum Units and Measures

12. The petroleum industry historically has used units of measure based on the English measuring system. Conversion rates for some units are given below:

1 barrel	= 42 US gallons;
1 US gallon	= 0.95 liters = 0.00095 M^3;
1 ton crude oil	= 7.0 barrels (approximately, based on the crude oil specific gravity); and
1 ton oil	= 1.25 M^3 of natural gas (approximately, based on oil and gas compositions)

The conversion rates between volumetric units, such as gallons, and weights are approximate since the specific gravity of the oil varies slightly with its composition.

13. Materials that exist in the form of gases, such as methane (natural gas), are measured in volumetric units. Since gases are compressible, standard conditions of temperature and pressure (0° C and 1.0 atmosphere) are used to define the quantity (in volume) of gas, and designated as "normal cubic meters" or "normal cubic feet."

Industrial Projects Department
January 1974

EGYPT: TALKA II FERTILIZER PROJECT

FERTILIZER INDUSTRY IN EGYPT

A. Nitrogen Fertilizer Industry

1. The industry is wholly State-owned through the General Organization for Chemical Industries (GOCI) and existing companies are: (i) El Nasr Company for Fertilizers and Chemicals with plants at Suez and Talkha; (ii) El Nasr Company for Coke at Helwan; and (iii) Egyptian Chemical Industries (Kima) at Aswan. El Nasr is planning to set up a 570,000-TPY urea plant at Talkha (adjacent to the existing Talkha I plant), the subject of this report. The existing and planned nitrogen fertilizer capacity and production are shown in Tables 1 and 2. Fertilizer distribution, marketing and procurement are undertaken by the Ministry of Agriculture in conjunction with the Fertilizer Prices Stabilization Office, which also controls fertilizer imports, and the General Organization for Agricultural and Cooperative Credit (GOACC).

2. Nitrogen fertilizers in Egypt are made from a variety of feedstocks: oil refinery gas at Suez; coke-oven gas at Helwan; and hydrogen (from electrolysis of water) at Aswan. Recently discovered natural gas will be used for CAN and urea production at Talkha. Production of ammonia and urea from natural gas is ideal, because the by-product carbon dioxide from the ammonia plant can be combined with ammonia to make urea. Brief details of the gas supply for the Talkha plants are given in Section C of this Annex.

3. Different production costs for ammonia (and corresponding costs of nitrogen in fertilizers) will prevail at Talkha in the two adjacent units (producing CAN and urea respectively). The ammonia plant supplying the CAN unit, although never operated, was designed and purchased some 10 years ago before the development of modern, high efficiency plants using steam-turbine driven centrifugal compressors. Moreover, the plant uses relatively costly partial oxidation technology instead of reforming of natural gas with steam and air, and is a double-train unit of 360 tons per day. The proposed Talkha II ammonia-urea plant would contain a single-train, centrifugal compressor-driven ammonia unit of 1,200 TPD capacity, and utilities integrated with the urea unit. Ammonia produced at Helwan in relatively small units by partial oxidation of coke-oven gas will involve high cost. At Kima (Aswan), although the price of power used to produce electrolytic hydrogen[1/] is about $0.002 per KWh, ammonia production costs should be comparable to those at Helwan and Talkha I. The closed plants at Suez are also small inefficient units based on partial oxidation of refinery gas, and involving high production costs. Expansion at Kima was envisaged some time ago, but the Government had some reluctance to allocate additional power to Kima for increased nitrogen (or phosphate) fertilizer production, as the opportunity cost of power seems likely to increase in the near future given alternative uses.

1/ The Nangal Project in India, 46-IN, January 2, 1973, describes in detail the economics of producing nitrogen fertilizer by electrolysis.

The possibility of using heavy fuel oil to expand nitrogen capacity at Kima has been discussed in Egypt, but it is doubtful that this proposal will be an economic alternative for Egypt.

4. The Government has under consideration another large ammonia/urea plant, to be located near Alexandria, that would be export-oriented. The plans for this project are in a very preliminary stage and it would be implemented well after the start of the Talkha II project.

5. Further expansion and/or diversification is possible at Talkha. A portion of the existing ammonia plant could be converted inexpensively to methanol/formaldehyde production to supply the industrial needs of these chemicals in Egypt. Also, nitrophosphate production, based on the already existing nitric acid/ammonium nitrate plant could prove to be economically attractive.

B. Phosphate Fertilizer Industry

6. The phosphate fertilizer industry is also owned by the Government. The El Nasr Phosphate Company operates three plants which are all designed to produce single superphosphate (SSP), a low-grade granulated material containing about 15% P_2O_5, in the following quantities (see also Tables 1 and 2):

El Nasr Phosphate Company Plants

Plants and Location	Capacity (TPY) SSP	Capacity (TPY) P_2O_5 Content
Kafr el Zaiyat (midway between Alexandria and Cairo)	200,000	30,000
Abu Zabal (near Cairo)	200,000	30,000
Assiut (midway between Cairo and Aswan)	135,000	20,000
TOTAL	535,000	80,000

7. The Abu Zabal plant is undergoing major maintenance work and its output may increase in the near future to about 40,000 TPY P_2O_5. In addition, some 56,000 tons of blast-furnace slag containing 10 to 12% P_2O_5 are produced at the Helwan steel plant and sold locally as fertilizer. The slag production is expected to nearly double during 1974 when a second blast furnace will be in full operation. Total P_2O_5 fertilizer capacity will then be:

	1975 Capacity (in TPY)	
	Product	P_2O_5 Content
El Nasr Phosphate Company	535,000	80,000
Helwan Steel Plant	110,000	12,000
TOTAL	645,000	92,000

8. Single superphosphate is produced in the form of granules from domestic phosphate rock and sulfuric acid produced from imported sulfur and pyrites, and is shipped in plastic-lined jute sacks.

9. Considerable reserves of phosphate rock exist in Egypt (see Map, IBRD-10047). However, phosphate rock production is small and Egypt is not significant in the world trade in phosphate rock. In the eastern desert lie several medium-grade (approximately 30% P_2O_5) deposits of commercial significance. Those near the Safaga port have been mined for many years, especially for exports, and are substantially depleted. Further south are the Qusayr deposits, which have also been mined for many years. South of Safaga, at Hamrawein, is another extensive deposit which will soon supply domestic and some export needs. Mining and beneficiation equipment are being installed which, by the end of 1974, should produce annually 0.6 million tons of 32-34% P_2O_5 grade, 1.2 million tons of 23% P_2O_5 grade and 0.3 million tons of 28-30% P_2O_5 grade. Reserves are estimated to be sufficient for 15 years' production. In the Nile Valley, other commercially-sizeable reserves exist: (a) near Sebeija, south of Luxor, where over 100 million tons of 21% P_2O_5 grade rock are known and under exploitation; and (b) at Abu Shigela (over 11 million tons of proven reserves); (c) and at Hagaria, west of Naga Hamadi (at least 14 million tons of proven reserves). The biggest known deposit is at Abu Tatura in the Kharga region of the Western Desert, where 600 million tons of 28% P_2O_5 grade phosphate rock have been identified. However, these reserves lie under 30 meters of overburden and are in a remote area. The following table summarizes annual phosphate rock production and consumption:

Phosphate Rock Consumption and Exports

(1,000 Tons of Product)

	1966	1967	1968	1969	1970	1971
Domestic Consumption	660	700	1,140	660	716	500
Exports	n.a.	n.a.	n.a.	400	210	180

Proposed Production of Phosphorus in Egypt

10. During the last few years, detailed discussions have been held with the USSR, the US and the Federal Republic of Germany about installing a large elemental phosphorus complex at Aswan or further down the Nile at Sebeij a near suitable phosphate rock deposits. Metallurgical coke, made from imported coal, is proposed to be barged from the Helwan unit. The USSR has proposed a project based on using Aswan hydropower that would include four 72-megawatt furnaces to manufacture about 105,000 TPY of phosphorus (262,500 TPY of P_2O_5) of which 40,000 TPY would be shipped to the USSR and 65,000 TPY would be converted in Egypt to phosphoric acid. In turn, this acid would be used to produce for domestic use and exports about 250,000 TPY of diammonium phosphate for agricultural and animal-feed purposes, plus 30,000 TPY of sodium tripoly-phosphates for detergents. An earlier proposal to make triple superphosphate from furnace acid has been dropped. The total project cost is estimated at about US$300 million (including costs of development of a new mine, ore beneficiation facilities, feed preparation furnaces, downstream chemical plants, and power and other infrastructure facilities). The high project cost, uncertainties in the export markets and prices, and increased needs for alternative uses of power are major outstanding issues. The total power production of the new Aswan High Dam should be 2,100 MW from 12 turbines[1/] when the lake is filled. The proposed phosphorus complex would consume about 320 MW or 15% of the total. A large aluminum smelter and other electro-thermal plants (ferro-silicon) are also under consideration, and competition for power use, including for the purpose of rural electrification, is increasing. As a result, it is doubtful that a phosphorus project will be implemented in the near future.

C. Natural Gas and Petroleum Production in Egypt

11. Abu Madi Gasfield (Table 3): In conjunction with ENI of Italy, the Egyptian General Petroleum Corporation (EGPC) has developed a new natural gasfield at Abu Madi, about 40 km north of Talkha. The joint venture company has drilled 7 wells of which 5 have proved productive. Identified recoverable reserves are estimated between 30 billion and 40 billion cubic meters.[2/] A pipeline with a capacity of 3.3 million cubic meters/day to Talkha and a field gathering and gas treating plant are under construction and are scheduled for completion by the end of 1974. Field pressure is sufficiently high so that compression will not be necessary for the first several years of pipeline operation. Anticipated daily consumption in cubic meters/day is 26 million

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1/ Present output is about 1,200 MW. The old Aswan Dam downstream has a 200 MW capacity. At full operation, the Kima CAN plant uses about 300 MW.

2/ A report by ENI should be completed by March 1974 which should indicate reserves more precisely. In addition, El Nasr has been asked to utilize a gas consultant to prepare a report that would assist IDA in completing its appraisal of this project.

cubic meters/day of which 8 million would be for the Talkha I CAN plant, 13 million for the Talkha II urea plant, and 5 million for a local power station and township. The above level of total consumption should give the reserves identified to-date a life of at least 30 years and additional reserves could be proven as drilling continues. The gas is priced to the Talkha plants at LE 8.75 per metric ton for a period of 20 years. The pricing basis used is the equivalent heating value of fuel oil in the country, which is priced at LE 7 per ton (US$17.8/ton). This price has been constant for a number of years and does not reflect the recent changes in the world petroleum situation regarding both supply and prices. The contract between the Government of Egypt and ENI provides for adjustment in fuel oil prices but the Government has the option of setting domestic prices and it is expected that the Government gas price to El Nasr will be maintained at the agreed level for the foreseeable future. However, El Nasr has been asked to interpret through a gas consultant the various contracts more precisely.

12. Other Gasfields: Two additional major gas discoveries have been made in the Delta area: the one at Abu Kir is comparable in size to the Abu Madi gasfield; and the other at Abu Gharahib has known recoverable reserves of about 40 billion cubic meters. By 1975/76, the gas from the latter will be piped to Helwan and Cairo at the rate of 4 million cubic meters per day. Bids on this line are now being received.

13. Other Hydrocarbons: Total annual refinery capacity in Egypt is about 8 million tons per year from two plants in Alexandria (of 1.5 million TPY and 3.0 million TPY capacity respectively) and one in Cairo (of 3.5 million TPY capacity). In 1972 and 1973, local oil production was about 8.5 million tons of crude. Recent drilling has indicated additional oil and gasfields in the Western Desert, but exploration costs are yet unknown with a ratio of producing to dry holes being about 1:14. An increase in local gas production and use will release more crude and refinery products for export, thus giving gas a relatively high opportunity cost. Condensible hydrocarbons to be exploited from the Abu Gharahib and Abu Madi natural gasfields are expected to total 250,000 TPY and 70,000 TPY respectively. Details of Egyptian crude petroleum and refinery products are given in Table 4. Egypt has recently approved construction of a major oil pipeline of 80-120 million TPY capacity to be installed between Suez and Cairo. This line will primarily serve as an alternative transport for the Suez Canal and should not affect the economics of oil production in Egypt nor have any effect on the economic cost of producing urea from natural gas at Talkha.

Industrial Projects Department
December 1973

EGYPT: TALKHA II FERTILIZER PROJECT

TABLE 1

Existing and Planned Fertilizer Manufacturing Capacity

Type of Product, Company and Status	Location	Year of Start-up	Product and % Nutrient	Capacity (in 000 TPY) Product	Capacity (in 000 TPY) Nutrient	Remarks
Nitrogen Fertilizers						
Existing and Operating:						
1. Kima	Aswan	1960	CAN (31%)	370	115	Based on electrolysis process.
2. El Nasr for Coke	Helwan	1971	AN (33.5%)	120	40	Based on coke-oven gas.
Existing and Not Operating:						
3. El Nasr for Fertilizer	Suez	1961	AS (20.6%)	100	21	Plants stopped operations in 1969 following interruption of refinery.
4. El Nasr for Fertilizer	Suez	1951	CN (15.5%)	270	42	Off-gas supply.
Planned:						
5. El Nasr for Fertilizer	Talkha	1974	CAN (31%)	250	78	Plant, transferred from Suez.
6. El Nasr for Fertilizer	Talkha	1978	Urea (46%)	570	260	Project presented for IDA financing.
Phosphate Fertilizers						
1. El Nasr Phosphate Co.	Kafr - Zaryat	1950	SSP (15%)	200	30	Based on domestic phosphate rock plus imported sulfur and pyrites.
2. El Nasr Phosphate Co.	Abu Zabal	1951	SSP (15%)	200	30	No definite plans for P_2O_5 production expansion known.
3. El Nasr Phosphate Co.	Assuit	1965	SSP (15%)	135	20	
4. El Nasr Iron & Steel Co.	Helwan	1965	BFS (10%)	50	5	Based on ground blast-furnace slag. Capacity could double after 1974 when new furnace is in operation, depending on ores used.

Note: For purposes of this report, CN is defined as calcium nitrate containing 15% N.
CAN is defined as ammonium nitrate diluted with various amounts of ground limestone to give products containing from 26 to 31% N.
AN is ammonium nitrate without limestone added, 33.5% N.
AS is ammonium sulfate containing 20.6% N.
SSP is single superphosphate containing 15% P_2O_5.
BFS is blast furnace slag containing about 10% P_2O_5.

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EGYPT: TALKHA II FERTILIZER PROJECT

TABLE 2

Past and Future Production of Nitrogen and Phosphate Fertilizers
(1,000 TPY of N and P_2O_5)

Sources	Actual Production				Projected Production										
	1965	1970	1971	1972	1973 (Est.)	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985
Nitrogen Fertilizers															
1. Kima-(CAN)	99	117	105	93	30 1/	78	100	113	120	122	125	125	125	125	125
2. El Nasr for Coke (AN)	--	--	--	10	21	31	42	42	42	42	42	42	42	42	42
3. El Nasr for Fertilizer (CAN)	--	--	--	--	--		75	98	98	113	117	117	117	117	117
4. El Nasr for Fertilizer (Urea) 2/	--	--	--	--	--	--	--	--	--	196	222	249	249	249	249
5. El Nasr, Suez CN and AS 3/	60	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL	159	117	105	103	51	109	217	253	260	473	506	533	533	533	533
Phosphate Fertilizers															
1. Kafr el Zaiyat, Abu Zabal (SSP) 4/, and Assuit Plants	38	61	73	75	80	90	100	100	100	100	100	100	100	100	100
2. Helwan Steel Plant Furnace Slag 5/	4	3	3	5	5	7	10	10	10	10	10	10	10	10	10
TOTAL	42	64	76	80	85	97	110	110	110	110	110	110	110	110	110

1/ This plant is undergoing major repairs in 1973-1974.
2/ On the basis of a 1725 TPD urea plant.
3/ Although these plants are still standing, future operation is doubtful and potential production is excluded.
4/ Individual plant outputs not available. Capacity will expand to 100,000 TPY by 1975.
5/ Estimated. Future output will depend on type of ores used.

Industrial Projects Department
December 197[illegible]

EGYPT: TALKHA II FERTILIZER PROJECT

TABLE 3

Properties of Abu Mahdi Natural Gas

The stripped gas will be piped from the Abu Madi field about 40 kilometers north of Talkha and will enter the plant at two pressures: 40 atmospheres for feedstock use and 6.7 atmospheres for fuel purposes. The gas has the following properties:

Chemical Composition	% vol.	% wt.
Nitrogen	0.385	0.62
Carbon dioxide	0.688	1.72
Methane	92.766	84.49
Ethane	4.117	7.03
Propane	1.211	3.03
Butanes	0.529	1.74
Pentanes	0.165	0.68
Hexanes	0.138	0.67
Heptanes plus	0.001	0.02
	100.000	100.00
C_4 - plus content % vol (max)	0.9	
Sulfur - ppm (max)		10.00

Physical

Specific Gravity (air = 1)	0.607
Gross Colorific Value (Btu/lb)	23,056
Gross Btu/cubic foot at 60°F and 14.696 psia.	1,072.600
Dew point at Delivery	below 0°C
Molecular Weight	17.57

Industrial Projects Department
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EGYPT: TALKHA II FERTILIZER PROJECT

TABLE 4

Egyptian Crude Petroleum and Refinery Products
(1,000 tons)

July 1 - June 30	1966/67	1967/68	1968/69	1969/70	1970/71
Crude petroleum production	6,339	5,700	10,939	14,344	16,364
Sources:					
El Morgan	554	4,857	8,516	11,284	13,695
Other fields	5,785	843	2,423	3,060	2,669
Shares					
Egyptian	6,339	3,757	7,033	9,022	10,331
Partners'	--	1,943	3,906	5,322	6,033
Exports	1,209	1,973	5,679	11,288	13,237
Egyptian share	1,209	583	1,917	6,326	7,765
Partners' share 1/	--	1,390	3,762	4,962	5,472
Domestic consumption 2/	n.a.	5,258	6,292	4,000	4,562
Egyptian share	5,130	3,174	5,116	2,696	2,566
Partners' share	--	553	144	360	561
Imports	n.a.	1,531	1,032	944	1,435
Petroleum products production					
Gasoline	853	655	675	452	617
Kerosene and Jet Fuel	989	625	547	418	655
Diesel	1,516	845	819	476	672
Fuel Oil	4,202	2,296	2,746	1,353	2,155
Butane Gas	80	40	27	10	9
Asphalt	115	99	128	17	67

1/ Does not include sales to Egyptian refineries.

2/ Estimated. Amounts from local production (Egyptian and Partners' shares) calculated as residuals. Imports from customs returns, which may be understated; 1970/71 estimated on basis of 11-month data (contracts for April and May 1971). No allowance for changes in stocks.

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EGYPT: TALKA II FERTILIZER PROJECT

GENERAL ORGANIZATION FOR CHEMICAL INDUSTRIES

1. The Egyptian General Organization for Chemical Industries (GOCI) was established in 1961 as a Government agency to own and supervise the twenty-nine largest companies in the chemical sector. It is one of 26 general organizations subordinate to the Ministry of Industry and the General Organization for Industrialization, a department of the Ministry of Industry.

2. The GOCI's subsidiary companies manufacture a wide variety of products:

Chemical Fertilizers:
Calcium nitrate, calcium ammonium nitrate (CAN), ammonium sulfate, ammonium nitrate, and superphosphate.

Pulp and Paper:
Products range from printing paper to corrugated boxes to playing cards.

Wood and wood products:
Plywood, fiberboard, particle board, veneer and furniture.

Industrial Chemicals:
Caustic soda, coke, coal gas by-products and dyestuffs.

Rubber:
Tires, tubes, belts and hoses.

Plastics:
Melamine, household goods (e.g.,kitchenware), storage batteries, synthetic leather, polyvinylchloride piping, vinyl-coated fabrics, thermoplastic and bakelite products.

Leather tanning:
Clothing leather, calf leather and boxide leather.

Mining:
Rock phosphate, talc, asbestos, manganese ore, quartz, feldspare and fluorspar.

Miscellaneous chemical products:
Industrial gases, paints and insecticides, etc.

3. The total invested capital of the GOCI's subsidiary companies is about LE 300 million (US$765 million), and the aggregate value of their

production during the eighteen-month period, July 1971 to December 31, 1972[1] was LE 152 million. Less than 4% was exported and of the LE 71 million in raw materials and spares consumed, about half was imported. The following summary data[2] show the development of Egypt's major industrial companies during the four-year period 1968/69-1971/72:

	Million of £ Egyptian			
	1968/1969	1969/1970	1970/1971	1971/1972[3]
Total invested capital	240	254.3	281.2	300
Value of production	87.6	88.5	97.5	101
Value of exports	2	3.1	4.6	3.1
Number of employees (Nos.)	37,753	45,980	45,127	47,515
Salaries and wages	11	13	12.5	14.3

4. The GOCI is subordinate to the Ministry of Industry and is responsible to that Ministry in supervising the operations of the subsidiaries. Its Board of Directors consists of the Chairman, Eng. Marei Ahmed Marei; the General Manager, Dr. Ahmed Shukri Salem; the Chairmen of the Boards of El Nasr Company for Fertilizers and Chemical Industries, the Kima Fertilizer Company, two paper companies, a plastics company, and a dyestuffs company; and three university professors.

5. The GOCI is responsible for implementation of Government (Ministry of Industry) policy in the industrial sector and works jointly with the General Organization for Industrialization (GOFI) and the companies' managements in formulating and preparing capital projects for presentation to the Ministry of Industry. GOCI's technical department provides general staff support to the subsidiaries. Nominally, it also receives a portion of each

---

1/ The financial year before 1972 covered the period July 1 June 30. Beginning with 1972 the financial year was changed to coincide with the calendar year (ending December 31), and the accounts for 1971/72 covered the previous 18 months (from July 1971 to December 1972).

2/ GOCI and all other general organizations were made legal holding companies only in 1971 and do not as yet publish consolidated financial statements. GOCI prepares an "Operating Parameters" report which relates aggregate performance to budgetary targets. GOCI plans to begin consolidated accounting in the near future. The companies' financial accounts are kept independently and are audited by the Auditor General, who reports to Parliament.

3/ From <——— July 1, 1971 - June 30, 1972.

of its subsidiaries' profits as a management fee, but it turns these funds over to the Treasury along with the portion of profits it collects as the companies' shareholder. Within strict limits, GOCI can allocate investment funds among its holdings; it receives a general budgetary allocation for the purpose of renovating production facilities which it can allocate among its companies. But any decision involving an expansion in production units must go through the project approval process described requiring approvals at ministrial levels.

Industrial Projects Department
January 1974

EGYPT: TALKA II FERTILIZER PROJECT

EL NASR COMPANY DESCRIPTION AND ORGANIZATION CHART

1. The El Nasr Company for Fertilizers and Chemical Industries (El Nasr) is one of the largest companies in the chemical sector under the General Organization for Chemical Industries (GOCI) and one of three companies in Egypt engaged in the manufacture of nitrogenous fertilizers. Its principal assets consist of a calcium nitrate plant and an ammonium sulfate plant at Suez and a calcium-ammonium nitrate plant at Talkha, 135 kilometers north of Cairo. Like most industrial companies in Egypt, it is entirely owned by the Government, having been nationalized in 1961.

2. The Company has been in existence since 1947, when it was founded under private Egyptian ownership with the name Societe Egyptienne d'Engrais et d'Industries Chimiques Suez. The Company had an initial paid-in share capital of £E 4 million. In 1948, the Company received a loan of US$7.25 million from the US Eximbank for the construction of the Suez plant with a capacity of 40,000 tons per year nitrogen as calcium nitrate product, and began commercial operations in 1951. In 1960 the ammonium sulfate plant (20,000 TPY N) was constructed alongside the calcium nitrate plant, financed in part by an Eximbank loan of US$5 million.

3. In July 1961 the Government decreed that all major industrial companies were subject to nationalization, with individual shareholdings in any given firm to be limited to a market value of £E 10,000, and assets above that limit passing into State ownership. The owners were paid for their first £E 1,000 of assessed equity in cash, for the next £E 14,000 in short-term Government bonds, and for the balance in long-term Government bonds. The Government acquired 100% of El Nasr, and in 1962 it was renamed Societe El Nasr d'Engrais et d'Industries Chimiques, Suez (the legal name of the Company) and placed under the supervision of the GOCI. In 1963-64 the Company secured a loan (DM17.88 million) from the Kreditanstalt fur Wiederaufbau (KFW) and suppliers' credits from Koppers (DM3.83 million) and BASF (DM63.75 million) for the construction of the CAN plant (250,000 TPY, 31% N) at Suez (now the Talkha I plant).

4. In 1967 a kraft paper mill at Suez with paid-in equity of £E 1.5 million was merged with the Company. The paper mill produced 18,000 TPY of kraft paper, and approximately 20% of its output was fertilizer bags. In 1972 the kraft paper facility was re-sited in Alexandria, split apart from El Nasr Company and merged with the National Kraft Paper Company, another enterprise under the GOCI's supervision.

5. With the start of hostilities in 1967, El Nasr Company's plants were forced to operate at reduced levels. Until 1967, the Company operated

at close to 100% of capacity and generated average profits before taxes of 25% on paid-in equity. The financial year 1966-67 was a record year for sales and profit. In 1969 a direct hit on the adjacent refinery which had supplied the basic feedstock (refinery gas) for the fertilizer plants forced their complete shut-down, and since July 1969, the Company has produced no fertilizer, and has run at a loss.

6. In the interim since 1969 and until its plants can begin operating again, the Company has been dependent on State subsidies. Management and labor have demonstrated flexibility and esprit de corps in keeping the enterprise operating primarily as a service organization, lending its engineers and technicians to other companies within Egypt, and selling services to other Arab countries. The Company had gained experience by erecting and starting up its ammonium sulfate unit in 1961. This experience had proven valuable in 1966 when the prime contractor for the CAN plant (Chemico) ceased work in a dispute over project delays and cost overruns and the Company was forced to take over the contracting and supervision of construction and start-up. The Company itself had successfully contracted for and erected the partial oxidation (Koppers) unit and the nitric acid (BASF/Uhde) plant and had partially completed the erection of the ammonia plant when the decision was taken in 1971 to move the entire CAN plant to Talkha, located in the Delta 250 kilometers by rail northwest of Suez. The Company carried out the job of disassembling and moving the plant and is responsible for erection at Talkha, including over-all supervision, design engineering, general and detailed civil engineering, supervision of civil works execution (by local sub-contractors), and mechanical construction and erection. The CAN plant is due to begin commercial operation in early 1975.

7. In addition to its own plants, the Company's engineers, technicians, and skilled laborers have carried out the following jobs:

a. Conducted the start-up of the H_2 plant at the Suez Petroleum Refinery Company (1966);

b. Erected and started-up two sulfur mills for the Kafr El Zayat Insecticide Company complete with all electrical and instrument connection (1970);

c. Assisted in the erection and start-up of the El Nasr Company for Coke's AN plant at Helwan (1970-73);

d. Erected the Misr Chemical Company's sodium carbonate plant in Alexandria (1970-73);

e. Assisted in the construction and erection of the superphosphate plants at Asyut and Abu Zaabal;

f. Assisted in the construction, erection, and start-up of a large urea plant in Kuwait; and

g. Conducted start-up and continue to supervise operation of the ammonium nitrate plant at Hems, Syria.

As many as 650 engineers, chemists, fitters, masons, welders, equipment operators, riggers and laborers were employed in each of the above assignments for six months to four years.

8. As a result of this extensive experience the Company maintains its labor force intact while developing a skilled group of engineering, construction and maintenance personnel. This experience should serve to minimize the costs of the proposed Talkha ammonia/urea plant and to help keep downtime to a minimum once the plant goes into commercial operation.

9. The Company's organization chart is shown on page 5 of this Annex. The Board of Directors includes the Managing Director, his four senior officers, and four representatives of labor. The five senior management members of the Board are appointed by the President of the Republic. They have all been with the Company since 1947-50 and have spent half their careers with the Company under private enterprise operation.

10. Labor relations are said to be good, and the four labor representatives on the Board reportedly share management's over-all perspective. The Company is over-staffed by private enterprise standards, having a total of 4,250 people on the payroll (including a contingent of unknown size left over from the kraft paper mill which no longer belongs to the El Nasr Company).

11. The work force is divided among Suez, Talkha, Cairo and other companies' sites (although at present the Suez site is abandoned). Approximately 2,500 persons are engaged in the erection of the CAN plant at Talkha. The remaining 1,750 are divided between those engaged in administrative functions in Cairo and those on loan to other companies for work in on-going construction projects. When the CAN plant at Talkha reaches full capacity in 1975, it will employ 2,000 with 600 utilized in production, 900 in engineering, maintenance and utilities and 500 in administrative duties. It is expected that the proposed ammonia urea project will employ another 1,350.

12. The Company management controls day-to-day operation of the enterprise, within the constraints defined by the nationalization laws of 1961 and subsequent legislation. As a profit center the Company is expected to survive on its own financially, but it has little or no direct control over the unit costs or sources of its inputs. Selling prices are determined on a cost-plus basis and are mutually agreed upon by the Company, the GOCI and the Ministry of Industry, usually at a margin of 20 - 25% over costs. The Company has only one customer, the General Organization for Agricultural and Cooperative

Credit (GOACC) of the Ministry of Agriculture which is the agency responsible for procurement and distribution of fertilizer.

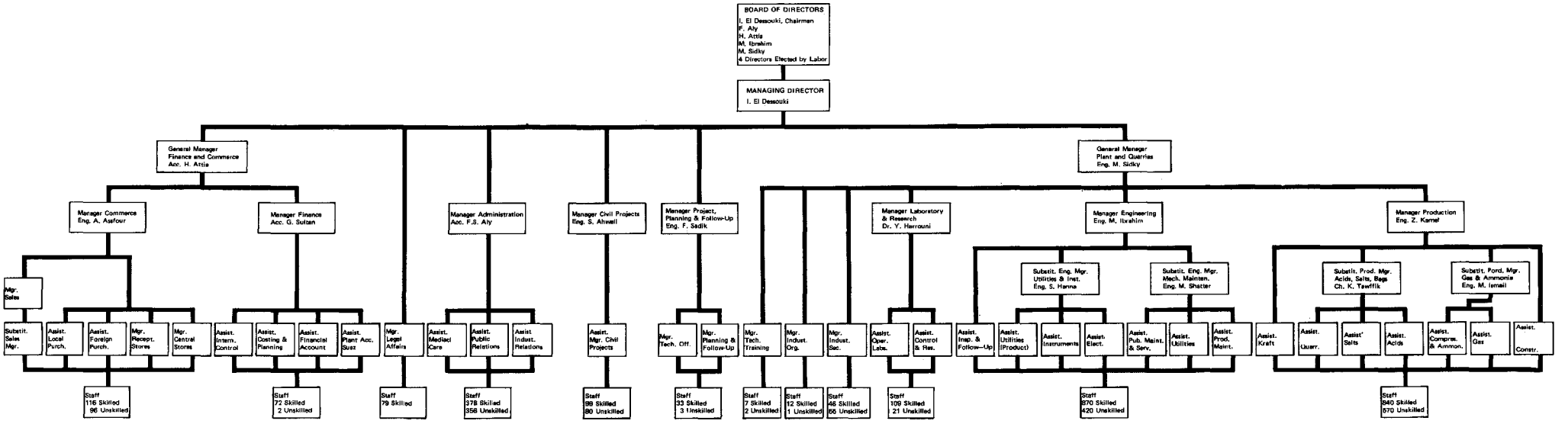
13. Investment decisions and the flow of funds of the company are defined by law and illustrate the degree to which the Government participates directly in the major decisions. The company submits its budget forecasts and year-end accounts to the GOCI for supervision and auditing. The company can utilize its depreciation reserves and 10% of its net income at the discretion of the company's Board of Directors, but any proposal for expansion must be cleared by the GOCI and the General Organization for Industry (GOFI) and ultimately by the Ministry of Planning and the Ministry of Industry. The normal sequence is for the company to draft a proposal which includes a budget by year and a sources and uses of funds statement. A formal feasibility study is then prepared by the GOFI in consultation with the Company and the GOCI and cleared through the Ministry of Industry to the Ministry of Planning which compiles the proposals into the national plan for submission to the Central Planning Committee, a cabinet branch, which after consideration, in turn, submits the national plan for approval by the Parliament. (The Talkha ammonia/urea project has been through this approval process already and has gone to tender, but the Government has been unable to find financing for it.)

14. Once approval for a project is obtained, generally the GOFI is charged with execution of the project, and the assets are transferred to the company as they are purchased. The project is subdivided by years and each year's budgeted capital expenditure must be approved by the company, the GOCI and the GOFI.

15. The distribution of excess funds generated by the company's operations is similarly governed by law. The ompany can retain only 10% of net income for its discretionary use with an additional 5% being earmarked for investment in Government bonds. The remaining 85% of net income is distributed through GOCI to the Treasury, the GOCI (as a management fee) and the Company's employees. The financial year ends December 31, and the books must be closed by March for certification by Government auditors by the end of April. A General Assembly meeting of the GOCI, equivalent to a shareholders' meeting and presided over by the Ministry of Industry, meets in May to review the prior year's operations, clear the audited financial statments and approve the proposed distribution of net income. The actual payout of cash then takes place in May.

16. The profit distribution laws are somewhat flexible; for example, the company is allowed (with the consent of the Ministry of Industry) to make provisions out of net income for reserves for expected future costs before any distribution takes place.

EGYPT
EL NASR COMPANY FOR FERTILIZERS AND CHEMICAL INDUSTRIES
ORGANIZATION CHART
as of May 1973



INDUSTRAIL PROJECTS DEPARTMENT
MAY 1973

World Bank—7773

EGYPT: TALKHA II FERTILIZER PROJECT

EL NASR COMPANY - HISTORICAL INCOME STATEMENTS
(LE' 000)

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972 1/
Production Capacity Utilization (%)										
Calcium Nitrate (15.5% N)	97	100	99	97	97	52	41	-	-	-
Ammonium Sulphate (20.6% N)	-	65	80	84	97	46	32	-	-	-
Nitric Acid Concentrated	82	70	76	85	102	92	57	-	-	-
Kraft Paper 2/	-	-	-	-	73	62	68	3	-	-
Production (TONS' 000)										
Calcium Nitrate	267	275	271	267	263	140	111	-	-	-
Ammonium Sulphate	1	65	80	84	98	47	32	-	-	-
Nitric Acid Concentrated	2	2	2	2	2	2	1	-	-	-
Kraft Paper	-	-	-	-	14	11	12	-	-	-
Sales Volume (TONS' 000)										
Calcium Nitrate	264	271	278	263	259	147	111	-	-	-
Ammonium Sulphate	-	65	80	84	98	47	32	-	-	-
Nitric Acid Concentrated	2	2	2	2	2	2	1	-	-	-
Kraft Paper	-	-	-	-	13	10	11	1		
Sales (LE' 000)										
Net Product Sales	6187	8251	8789	8573	9807	5923	4913	108	-	-
Services	8	25	6	40	48	15	78	57	202	198
	6195	8276	8795	8613	9855	5938	4991	165	202	198
Operating Costs	3/	3/	3/	3/						
Salaries, Wages and Benefits					1418	1512	1647	1490	1384	2058
Raw Materials					1849	1373	1315	31	-	-
Utilities					1107	788	676	8	6	4
Catalysts and Chemicals					115	121	78	10	6	3
Repairs & Maintenance					332	481	483	80	54	111
Bagging					743	91	87	-	-	-
Others					534	520	387	215	187	211
Depreciation	474	1022	908	927	966	1211	923	548	643	744
	4690	6527	6674	6339	7064	6097	5596	2382	2280	3131
Operating Profit	1505	1749	2121	2274	2791	(159)	(605)	(2217)	(2078)	(2933)
Other Income	111	87	127	143	225	240	168	366	70	154
Other Expenditure										
Interest	-	50	32	66	122	2	-	1	-	-
Miscellaneous	-	-	-	-	-	14	13	13	5	55
Profit Before Tax	1616	1786	2216	2351	2894	65	(450)	(1865)	(2013)	(2834)
Special Provisions 4/	25	290	465	7	607	-	-	-	-	-
Income Tax	70	120	185	110	402	20	13	8	5	13
Government Subsidy 5/	-	-	-	-	-	-	-	-	1364	2140
Profit After Tax	1521	1376	1566	2234	1885	45	(463)	(1873)	(654)	(707)

1/ For 18 months ended December 31, 1972. All prior years ended on June 30.

2/ Commenced production in 1967 in Suez but plant sold to National Kraft Paper Mill in Alexandria in 1972.

3/ The standardized Accounting System was introduced in 1967. The previous Accounting system has made it difficult to obtain a breakdown of operating costs except for depreciation.

4/ Includes staff gratuity, devaluation of stocks, depreciation of government inter-company holdings (LE 175,000 in 1964, LE 410,000 in 1965) and contingencies against loss from aggression (LE 400,000 in 1967).

5/ Government subsidies (equivalent to total operating costs excluding depreciation, less sales and other income) to compensate against inoperation arising from 1969 hostilities.

Industrial Projects Department
December 28, 1973

EGYPT: TALKHA II FERTILIZER PROJECT

EL NASR COMPANY - HISTORICAL BALANCE SHEETS
(LE' 000)

	1967	1968	1969	1970	1971	1972
Assets						
Current Assets						
Cash	4902	1544	1417	75 1/	628	2513
Accounts Receivable	673	1066	560	575	758 2/	1967 2/
Inventories	1360	1722	2037	293	234	179
Investments - Short-term	519	623	358	258	358	214
Total Current Assets	7454	4955	4372	1201	1978	4873
Fixed Assets						
Gross Fixed Assets	19549	19662	19984	20379	20354	19894
Less: Accumulated Depreciation	11328	12011	12676	12865	12596	12520
Net Fixed Assets	8221	7651	7308	7514	7758	7374
Construction in Progress	13605	16192	16984	18227	20082	21651
Total Fixed Assets	21826	23843	24292	25741	27840	29025
Other Assets						
Blocked Investments - Government Bonds	820	822	822	822	822	811 3/
TOTAL ASSETS	30100	29620	29486	27764	30640	34709
Liabilities						
Current Liabilities						
Accounts Payable	4660	3607	3532	3673	3662	2832
Short-term Loans 4/	585	1012	491	13	1005	2941
Total Current Liabilities	5245	4619	4023	3686	4667	5773
Long-term Loans						
Local - From the Government	620	620	620	620	620	658
Foreign	6667	6632	5763	5232	4312	2967
	7287	7252	6383	5852	4932	3625
Equity						
Share Capital including Government Allocations	8720	9763	11347	11597	14055	18047
Reserves and Provisions	6963	7941	8196	9306	9976	10740
Profit/Loss carried forward 5/	1885	45	(463)	(2677) 6/	(2990) 6/	(3476) 6/
Total Equity	17568	17749	19080	18226	21041	25311
TOTAL LIABILITIES	30100	29620	29486	27764	30640	34709
Debt/Equity Ratio	29/71	29/71	25/75	24/76	19/81	13/87
Current Ratio	1.4	1.1	1.1	0.3	0.4	0.8

1/ Government subsidy originally not requested in 1969 hoping to run the plant at full capacity, but 1969 Suez action prevented this.
2/ Includes delayed Government subsidies.
3/ LE 11,000 refunded by Government on readjustment of 1966 profit appropriation.
4/ Mainly represents uncovered letters of credit plus overdue foreign loans in 1971 (LE 920,000) and 1972 (LE 2,265,000).
5/ Appropriation of profit done after close of the financial year.
6/ Includes revaluations and adjustments:

	1970	1971	1972
Opening balance	(463)	(2677)	(2990)
Loss for the year	(1873)	(654)	(707)
Losses/Revaluation/Adjustments	(341)	341	221
	(2677)	(2990)	(3476)

Industrial Projects Department
December 28, 1973

EGYPT: TALKHA II FERTILIZER PROJECT

EL NASR COMPANY - HISTORICAL SOURCES AND APPLICATION OF FUNDS
(LE '000)

	1967	1968	1969	1970	1971	1972
Sources of Funds						
Net Income before Interest and After Tax	2,007	47	(463)	(1,872)	(654)	(707)
Depreciation	966	1,211	923	548	643	744
Increase in Share Capital	1,720	1,043	1,584	250	2,458	3,992
Increase in Long-Term Debts	2,753	941	108	524	307	614
Revaluation and Adjustments with the Government	-	-	-	(341)	341	221
Increase in Reserves and Provisions due to Adjustments	86	(406)	(48)	751	(242)	(56)
Total	7,532	2,836	2,104	(140)	2,853	4,808
Application of Funds						
Investment in Fixed Assets	7,981	2,794	1,156	2,187	2,093	4,140
Sales of Assets	-	(94)	(42)	(549)	(263)	(3,031)
Short-Term Investments	6	104	(265)	(100)	100	(144)
Inventories	800	362	315	(1,744)	(59)	(55)
Accounts Receivables	(130)	393	(506)	15	183	1,209
Current Liabilities	(3,872)	626	596	337	(981)	(1,106)
Interest	122	2	-	1	-	4
Loan Repayments	280	976	977	1,055	1,227	1,921
Profit Distribution	976	1,029	-	-	-	-
Blocked Investments	-	2	-	-	-	(11)
Total	6,163	6,194	2,231	1,202	2,300	2,923
Annual Cash Surplus	1,369	(3,358)	(127)	(1,342)	553	1,885
Accumulated Cash Surplus	4,902	1,544	1,417	75	628	2,513

Industrial Projects Department
December 28, 1973

EGYPT: TALKHA II FERTILIZER PROJECT

FINANCIAL PROJECTIONS FOR EL NASR WITHOUT THE PROJECT
(LE'000)

(FOR YEARS ENDING DECEMBER 31 EACH YEAR)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
INCOME STATEMENTS											
VOLUMES(TONS'000)											
CAN (31%N)	0	0	244	254	254	348	352	359	359	359	359
RESALE AMMONIA	0	0	0	1	1	4	5	5	5	5	5
UTIL. TALKHA I(%) 1/	0	0	77	80	80	92	93	95	95	95	95
PRICES(LE/TON)											
C A N	37	37	37	37	37	37	37	37	37	37	37
RESALE AMMONIA 2/	120	120	120	120	120	120	120	120	120	120	120
SALES(LE'000)											
C A N	0	0	8616	9303	9303	12981	13130	13390	13390	13390	13390
RESALE AMMONIA	0	0	0	120	120	480	600	600	600	600	600
OTHER	143	10	0	0	0	0	0	0	0	0	0
TOTAL	143	10	8616	9423	9423	13461	13730	13990	13990	13990	13990
OPERATING COSTS											
AMMONIA TRANSFER	0	0	0	0	0	2135	2420	2705	2705	2705	2705
NATURAL GAS 3/	0	0	623	674	674	674	674	674	674	674	674
CHEMICALS	3	3	68	87	93	107	109	111	111	111	111
UTILITIES	7	7	2070	2151	2151	2312	2320	2340	2340	2340	2340
BAGGING	0	0	574	599	641	737	745	761	761	761	761
MAINTENANCE MAT.	193	130	340	374	411	452	452	452	452	452	452
LABOR	1332	1043	1320	1360	1400	1442	1485	1530	1576	1623	1672
OTHER	234	170	200	490	490	490	490	490	490	490	490
TOTAL	1769	1353	5195	5735	5860	8349	8695	9063	9109	9156	9205
COST OF GOODS SOLD	1769	1353	5195	5735	5860	8349	8695	9063	9109	9156	9205
OPERATING PROFIT	-1626	-1343	3421	3688	3563	5112	5035	4927	4881	4834	4785
INTEREST	0	0	70	15	0	0	0	0	0	0	0
DEPRECIATION	325	410	2998	2971	2856	3242	3246	2020	2015	2015	2013
REPLACEMENT PROV. 4/	0	0	0	17	26	27	17	35	20	20	21
OTHER INCOME	-1626	-1343	-30	-30	-30	-30	-30	-30	-30	-24	-24
LOSS AT SUEZ 5/	0	0	1103	741	771	1658	1694	1724	1738	1771	1807
TOTAL	-1301	-933	4141	3714	3623	4897	4927	3749	3743	3782	3817
PROFIT BEFORE TAX	-325	-410	-720	-26	-60	215	108	1178	1138	1052	968
TAX 6/	0	0	0	0	0	0	0	0	0	0	0
PROFIT AFTER TAX	-325	-410	-720	-26	-60	215	108	1178	1138	1052	968
PROFIT DISTRIBUTED 7/	0	0	0	0	0	0	0	0	0	0	0
PROFIT RETAINED	-325	-410	-720	-26	-60	215	108	1178	1138	1052	968
CUM RET PROF BEG	-3476	-3801	-4211	-4931	-4957	-5017	-4802	-4694	-3516	-2378	-1326
CUM RET PROF END	-3801	-4211	-4931	-4957	-5017	-4802	-4694	-3516	-2378	-1326	-358

_/ FOR EXPLANATION OF FOOTNOTES SEE PAGE 4 OF THIS ANNEX.

INDUSTRIAL PROJECTS DEPARTMENT

MAY 1974

EGYPT: TALKHA II FERTILIZER PROJECT

FINANCIAL PROJECTIONS FOR EL NASR WITHOUT THE PROJECT
(LE'000)

(AS OF DECEMBER 31 EACH YEAR)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
BALANCE SHEETS											
CURRENT ASSETS											
CASH 1/	1216	877	1209	2361	4306	7655	10984	14280	17440	20736	23730
ACCOUNTS RECEIV.	1832	1567	559	534	534	534	534	534	534	534	534
INVENTORY	179	179	1643	1850	1850	1985	2027	2027	2027	2027	2027
GOE BONDS	0	0	0	0	0	0	0	0	0	0	0
OTHER	1025	1025	1025	1025	1025	1025	1025	1025	1025	811	811
TOTAL	4252	3648	4436	5770	7715	11199	14570	17866	21026	24108	27102
FIXED ASSETS											
GROSS FIXED ASSETS	19632	19414	46965	46965	46965	52212	52212	52212	52212	52212	52212
ACC DEPRECIATION 2/	12845	13255	16253	19224	22080	25322	28568	30588	32603	34618	36631
NET FIXED ASSETS	6787	6159	30712	27741	24885	26890	23644	21624	19609	17594	15581
CONSTRUCTION 3/	25759	30767	3316	4394	5247	0	0	0	0	0	0
TOTAL FIXED ASSETS	32546	36926	34028	32135	30132	26890	23644	21624	19609	17594	15581
TOTAL ASSETS	36798	40574	38464	37905	37847	38089	38214	39490	40635	41702	42683
CURR LIABILITIES											
ACCOUNTS PAYABLE	1607	985	679	679	679	679	679	742	729	724	716
OTHER	18	8	0	0	0	0	0	0	0	0	0
TOTAL	1625	993	679	679	679	679	679	742	729	724	716
LONGTERM LIABILITI											
LOCAL DEBT 4/	658	658	658	658	0	0	0	0	0	0	0
FOREIGN DEBT	2726	1650	574	24	0	0	0	0	0	0	0
TOTAL	3384	2308	1232	682	0	0	0	0	0	0	0
EQUITY											
SHARE CAPITAL 5/	24850	30744	30744	30744	31402	31402	31402	31402	31402	31402	31402
RESERVES 6/	10740	10740	10740	10757	10783	10810	10827	10862	10882	10902	10923
RETAINED EARNINGS	-3801	-4211	-4931	-4957	-5017	-4802	-4604	-3516	-2378	-1326	-358
TOTAL	31789	37273	36553	36544	37168	37410	37525	38748	39906	40978	41967
TOTAL LIABILITIES	36798	40574	38464	37905	37847	38089	38214	39490	40635	41702	42683

_/ FOR EXPLANATION OF FOOTNOTES SEE PAGE 4 OF THIS ANNEX.

INDUSTRIAL PROJECTS DEPARTMENT

MAY 1974

EGYPT: TALKHA II FERTILIZER PROJECT

FINANCIAL PROJECTIONS FOR EL NASR WITHOUT THE PROJECT
(LE' 000)

(FOR YEARS ENDING DECEMBER 31 EACH YEAR)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
FUND FLOW											
SOURCES											
INCOME BIAT 1/	-325	-410	-650	-11	-60	215	108	1178	1138	1052	968
DEPRECIATION	325	410	2998	2971	2856	3242	3246	2020	2015	2015	2013
REPLACEMENT PROV	0	0	0	17	26	27	17	35	20	20	21
SHARE CAPITAL	6803	5894	0	0	658	0	0	0	0	0	0
LONGTERM DEBT	0	0	0	0	0	0	0	0	0	0	0
TOTAL	6803	5894	2348	2977	3480	3484	3371	3233	3173	3087	3002
APPLICATION											
FIXED ASSETS	5599	5008	150	1078	853	0	0	0	0	0	0
SALES OF ASSETS	-1753	-218	-50	0	0	0	0	0	0	0	0
GOE BONDS	0	0	0	0	0	0	0	0	0	0	0
INVENTORY	0	0	1464	207	0	135	42	0	0	0	0
ACCOUNTS REC	-135	-265	-1008	-25	0	0	0	0	0	0	0
OTHER ASSETS	0	0	0	0	0	0	0	0	0	-214	0
ACCOUNTS PAY	1225	622	306	0	0	0	0	-63	13	5	8
INTEREST	0	0	70	15	0	0	0	0	0	0	0
LOAN REPAYMENTS	3164	1086	1084	550	682	0	0	0	0	0	0
PROFIT DISTRIBUTED	0	0	0	0	0	0	0	0	0	0	0
TOTAL	8100	6233	2016	1825	1535	135	42	-63	13	-209	8
YRLY CASH BALANCE	-1297	-339	332	1152	1945	3349	3329	3296	3160	3296	2994
CUM CASH BAL	1216	877	1209	2361	4306	7655	10984	14280	17440	20736	23730
RATIOS											
OP RATIO BEF DEP	12.37	135.30	0.60	0.61	0.62	0.62	0.63	0.65	0.65	0.65	0.66
OP RATIO AFT DEP	14.64	176.30	0.95	0.92	0.92	0.86	0.87	0.79	0.80	0.80	0.80
DEBT SERVICE COV.	0.00	0.00	2.03	5.24	4.10	0.00	0.00	0.00	0.00	0.00	0.00
CURRENT RATIO	2.62	3.67	6.53	8.50	11.36	16.49	21.46	24.08	28.84	33.30	37.85
DEBT/EQUITY RATIO	0.10	0.06	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1/ FOR EXPLANATION OF FOOTNOTES AND DEFINITION OF RATIOS SEE PAGE 4 OF THIS ANNEX.

INDUSTRIAL PROJECTS DEPARTMENT

MAY 1974

EGYPT: TALKHA II FERTILIZER PROJECT

Footnotes to Financial Statements and Definition of Ratios

Income Statements

1/ Capacity utilization expected to rise from 1978 because of assumed ammonia purchases from another source such as Talkha II.

2/ Ministerial decree has already fixed CAN (31%N) price at £E 37.3 per ton. Price of Ammonia in cylinders to industrial users is assumed to be £E 120 per ton.

3/ Natural gas priced at £E 6.75 per ton; limestone at £E 1.0 per ton.

4/ Replacement Provision to cover rising replacement costs of fixed assets.

5/ Mainly standings charges, since no production from the CN plant has been assumed in the projections. Government subsidies (£E 1,596,000; £E 1,313,000 in 1974) stop with start-up of Talkha in 1975. Wages of staff working on Talkha II construction capitalized to 1977, but recharged to Suez thereafter, although in the event, these wages will be absorbed by operation of Talka II.

6/ Tax only payable on retained earnings after all cumulative losses have been written off.

7/ Profit is only distributed after all cumulative losses are written off.

Balance Sheets

1/ Cash build-up is notional and based on the assumption that profits are paid out only after all cumulative losses have been written off.

2/ Does not include additional depreciation allowance for covering rising replacement costs.

3/ Construction in progress includes expenditures for transfer of assets from Suez and expenditures for providing interface equipment for Talkha II and for capital improvements of Talkha I.

4/ Assumed to be converted into equity in 1977.

5/ Increase in equity of £E 6,803,000 in 1973 and £E 5,894,000 in 1974 due to capital expenditures for Talkha I and for payment of outstanding current liabilities accrued because of forced shutdown.

6/ Includes additional depreciation for covering rising replacement costs.

7/ No long-term debt service due after 1977.

Fund Flow Statements

1/ Income before interest but after tax.

Definition of Ratios

Operating Ratio Before Depreciation (OP RATIO BEF DEP) = Cost of Goods Sold/Total Sales.

Operating Ratio After Depreciation (OP RATIO AFT DEP) = (Cost of goods Sold + Depreciation)/Total Sales.

Debt Service Coverage (DEBT SERVICE COV.) = (Income before interest but after taxes + depreciation)/(interest payments + loan repayments).

Current Ratio (CURRENT RATIO) = Current Assets/Current Liabilities.

Debt/Equity Ratio (DEBT/EQUITY RATIO) = Total Longterm Debt/(Total Equity + Total Longterm Debt). The figure shown, if multiplied by 100%, thus gives the percentage of debt with respect to total financing.

Industrial Projects Department
May 1974

EGYPT: TALKHA II FERTILIZER PROJECT

AGRICULTURE IN EGYPT

A. Past Growth

1. Agriculture is Egypt's most important economic sector in terms of contribution to GDP (about 30%), employment (about half), and foreign exchange earnings (about 55% of total commodity exports in unprocessed form, with processed agricultural goods accounting for an additional 30%). The growth rate of value added (in real terms) in agriculture has averaged about 3.5% annually over the past 15 years, but slowed to 2% or less annually in the period 1967-1971. This decrease reflected declines in the growth rates of both crop yields and labor productivity. The shortage of foreign exchange, low investment in agriculture and fertilizer, and the priority given to defense and other sectors, especially since the 1967 war, have been significant influences limiting agricultural growth. Cotton as a foreign exchange earner and bilaterial trade ties have been important influences on agricultural production and trade. The major development of the last decade was the completion of the Aswan High Dam, which permitted a shift from basin to perennial irrigation and the expansion of the agricultural area through reclamation.

B. Cultivated Land

2. The land area under cultivation in Egypt is between 6.5 million and 7 million feddans. However, almost total irrigation and long-growing season permit a much larger cropped area -- about 10.5 million feddans -- which means that about 1.6 crops per year per unit of arable land are obtained on average. The area cropped has increased about 500,000 feddans since 1960, with most of this increase resulting since 1966/67, when water from the Aswan High Dam made year-round water supplies available. Rice and cotton currently account for about two-fifths of the arable land, and a quarter of the cropped area. The cotton area remained at about 1.6 million feddans over most of the past decade, but the rice area increased by more than 500,000 feddans, reaching 1.1 million feddans by the late 1960's. The cotton area is allocated by the Government. Rice has become an increasingly popular summer crop because its price has generally been favorable and it is not affected by high water tables. However, because of its high water demand, the area cultivated in any district is limited by the capacity of the canal system to deliver irrigation water.

3. The regulation of cotton and rice areas has effectively controlled the summer cropping pattern, and the constraints imposed by the rotation system have effectively restricted growth of the major food and feed crops: wheat, maize and berseem (clover). These crops currently account for 1.3 million, 1.5 million and 2.7 million feddans, respectively. The only crops other than rice which have experienced area increases in the past decade are sugarcane, and fruit and vegetables.

C. Government Policy

4. While agricultural policy in the 1960's was fairly successful in terms of export earnings (largely from cotton and rice -- and for cotton due to favorable world prices rather than an increased volume of exports), Egypt has had to increase food imports (largely wheat and wheat flour) from LE 30 million in 1959/60 to over LE 95 million in 1970/71.

5. The shortage of foreign exchange has affected agriculture in two major ways. Pressure is exerted to maintain or increase earnings from traditional exports and to develop new agricultural exports. At the same time, agriculture has had to compete with other high-priority sectors for scarce foreign currency to finance capital and intermediate goods imports. In Egypt, where land is limited and relatively intensely cropped, increases in production come primarily from improved yields, which result from the use of better production methods with larger applications of inputs such as fertilizers, pesticides, new seeds and farm equipment which usually involve some foreign exchange component. But these requirements are not all being met. For example, shortages of imported fish meal have seriously affected poultry production, while the rationing of foreign exchange for fertilizer imports has constrained the growth of fertilizer use in the case of most crops.

6. Although more than 90% of Egyptian farmland is in either private or small-scale cooperative sectors, the Government's controls are pervasive. The purchase of the entire cotton crop and portions of other crops (rice, wheat, sugarcane, onions, etc.) by village cooperatives, at centrally determined prices, has been the principal method of regulating the supply of exports and of basic food items for domestic consumption. For export commodities, prices received by farmers are determined independently, while for essential domestic commodities there is a complex system of taxes and subsidies. There is a distinct policy of maintaining farm prices relatively constant, and of varying the cost of farm inputs rather than adjusting prices received by farmers, to influence production. Thus, the Government influences farm income and the production possibilities of farmers.

7. The Government also has a major impact on the sector's activities through budget administration. In recent years, a relatively low percentage of public investment has been allocated to agriculture (15-18% of the total). The announced target of the Government is an increase of about 40% in agricultural value added over the next decade. But it is questionable whether this growth can be achieved with allocation to agriculture (including irrigation) of only some 13% of public investment, as is proposed in 1973-1977 Plan. And, while the Plan itself targets a substantial enlargement of investment funds as compared with recent years, the continuing high priority given to defense and to industrial development make the goals for agricultural investment and output appear overly optimistic.

D. Major Problems

8. The latest Bank economic report on Egypt (December 1972) and the Bank "Report on Agro-Industries and Rural Development in Egypt" (March 1973) describe the major issues and problems relating to Egyptian agriculture. The economic report stresses that greater reliance must be placed on yield-improving technologies in the main field crops to head-off a potential domestic food crisis and/or a drastic decline in foreign exchange earnings (or savings) from these crops. However, this will call for increased allocations of foreign exchange for import (or investment in domestic production facilities) of fertilizers, insecticides, livestock feed and certain farm machinery. Both reports recommend that Egypt pursue more intensively its efforts to promote high-value non-traditional agricultural exports, and conclude that the rationing of ertilizers in recent years has constrained the growth of yields and output. Doubt is expressed whether Egypt's growth targets for the sector could be achieved with the relatively small share of resources allocated to agriculture under the 1973-1977 Plan.

9. There are certain characteristics of the Government administrative structure in agriculture that limit its ability to face up to many of the current key issues in agricultural development planning and programming. One of these is the fragmentation of responsibility for sector development among several ministries, in particular the Ministry of Agriculture and Agrarian Reform, the Ministry of Irrigation, and Ministry of Land Reclamation, the Ministry of Industry, the Ministry of Finance, Economy and Foreign Trade, and the Ministry of Planning. Some steps have been taken to coordinate: land reform and land reclamation under the supervision of the Ministry of Agriculture; Agriculture and Irrigation through a Ministerial Committee for Production; and other activities through a Supreme Council for Agricultural Development under the Minister of Agriculture. However, there are still quite distinct lines drawn between the land reform areas (about 1 million feddans), the old land (about 5 million feddans) and the newly-reclaimed lands (about 712,000 feddans). Likewise, the division of responsibilities between the Ministry of Agriculture and the Ministry of Irrigation, together with the rather different orientation of the two Ministries -- Agronomy and Engineering -- presents problems for coordinated planning. The cotton and rice industry organizations are supervised by the Ministry of Finance, Economy and Foreign Trade. The Ministry of Industry is responsibly for the fertilizer, textile and food processing industries. With this division of responsibility, and a generally inadequate forward planning system, the orderly and rapid development of the agricultural sector may prove to be difficult.

Industrial Projects Department
March 1974

EGYPT: TALKHA II FERTILIZER PROJECT

Production of Nitrogen and Phosphate Fertilizers in Egypt
(1,000 TPY of Nutrients)

	Sources	Actual Production				Projected Production										
	Nitrogen Fertilizers (N)	1965	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985
1.	Kima (CAN)	99	117	105	93	31 3/	78	113	120	122	125	125	125	125	125	125
2.	El Nasr Co for Coke (AN)	-	-	-	10	21	31	42	42	42	42	42	42	42	42	42
3.	Talkha I of El Nasr (CAN)	-	-	-	-	-	0	75	98	98	113	117	117	117	117	117
4.	Talkha II of El Nasr (Urea) 1/	-	-	-	-	-	-	-	-	-	196	222	249	249	249	249
5.	Suez Plant of El Nasr (CN and AS) 2/	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	159	117	105	103	51	109	217	253	260	423	506	533	533	533	533
	Phosphate Fertilizers (P_2O_5)															
1.	Kafr el Zayat, Abu Zabal and Assuit Plants (SSP) 4/	38	61	73	75	80	90	100	100	100	100	100	100	100	100	100
2.	Helwan Steel Plant Furnace Slag 5/	4	3	3	5	5	7	10	10	10	10	10	10	10	10	10
	Total	42	64	76	80	85	97	110	110	110	110	110	110	110	110	110

1/ On the basis of a 1,200 TPD ammonia plant.
2/ Although these plants are still in operation, their future production is doubtful and, therefore, excluded.
3/ This plant is undergoing major repairs.
4/ Individual plant outputs not available. All have comparable capacities and 100,000 TPY represents their total maximum capacity, assuming no expansions.
5/ Estimated. Future output will depend on type of ores used.

Industrial Projects Department
January 1974

EGYPT: TALKHA II FERTILIZER PROJECT

Imports of Nitrogen Fertilizers by Egypt
(1,000 Tons)

	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71	1971/72
Nitrogen Nutrient							
CAN (26%)	21	17	66	22	7	-	-
AN (33.5%)	-	-	-	13	65	47	5
AS (20.6%)	96	37	27	28	12	34	57
Urea (46%)	24	22	37	46	82	90	173
Total N	141	76	130	109	166	171	235
Product							
CAN (26%)	82	65	255	85	25	-	-
AN (33.5%)	-	-	-	40	185	140	15
AS (20.6%)	464	181	130	135	57	165	277
Urea (46%)	53	48	80	99	179	195	375
Total Product	599	294	465	359	446	500	667

Industrial Projects Department
January 1974

EGYPT: TALKHA II FERTILIZER PROJECT

FERTILIZER CONSUMPTION, APPLICATION RATES AND CROPPING PATTERNS

A. Past Consumption

1. The data below summarizes the past consumption of fertilizer in Egypt:

Table 1

Past Fertilizer Consumption, 1950/51-1971/72
(in 1,000 Tons of Nutrient)

Years	Nitrogen	Phosphate	Potash	NPK Total Consumption	N/P_2O_5
1949/50	96	17	0.2	113	5.6
1959/60	172	33	1.9	207	5.2
1960/61	181	34	2.0	217	5.3
1961/62	186	38	0.3	224	4.9
1962/63	204	39	1.0	244	5.2
1963/64	227	43	1.0	271	5.3
1964/65	253	45	0.6	299	5.6
1965/66	280	53	0.4	334	5.3
1966/67	264	44	0.6	309	6.0
1967/68	259	38	1.5	299	6.8
1968/69	275	51	1.4	327	5.4
1969/70	330	57	1.4	388	5.8
1970/71	299	56	1.8	357	5.3
1971/72	327	66	1.5	395	5.0
Annual Growth Rates (%)					
1951-60	5.7	6.5			
1960-65	7.7	8.5			
1965-70	3.5	2.5			

Source: Ministry of Agriculture, Draft Paper on Fertilizer Policy.

Nitrogen is the prominate fertilizer used with the N/P_2O_5 ratio being about 5:1. Insignificant amounts of potash are used. The growth rate of

fertilizer used was reasonable up to the mid-1960's but dropped subsequently to a very low rate due mainly to production and import limitations.

B. Future Consumption

2. The forecast of fertilizer consumption by the Ministry of Agriculture is shown below in Tables 2, 3 and 4:

Table 2

Projected Requirements of Fertilizers
1973 - 1985
(in 1,000 Tons of Nutrients)

Years	Nitrogenous Fertilizers (N)	Phosphate Fertilizers (P_2O_5)	Potassic Fertilizers (K_2O)	Total	Ratio N/P_2O_5
1973[1/]	381	121	30	532	3.1
1974	381	123	31	535	3.1
1975	409	129	32	570	3.2
1976	410	191	34	635	2.1
1977	438	192	60	690	2.3
1982	506	211	74	791	2.4
1985	514	211	77	802	2.4

1/ Preliminary estimate.

Source: Ministry of Agriculture.

3. The agricultural national plan for the period 1972-1985 aims at increasing agricultural production by about 50%. This increase in the value of agricultural production is to be achieved through several ways, the most important of which is the increase in agricultural productivity through the use of improved technology. Fertilizer is assumed to play an important role in the attainment of this projected growth.

4. The following table shows the projected needs of nitrogenous fertilizers for various crops:

Table 3

Projected Requirements for Nitrogen Fertilizers for Various Crops*

(in 1,000 Tons of N)

Crops	1973 (est.)	1974	1975	1976	1977	1982	1985
Wheat	54.7	54.8	59.1	59.1	64.0	75.0	76.2
Barley	3.5	3.2	3.5	4.0	4.0	6.5	6.9
Maize	86.8	85.3	94.3	91.7	98.6	116.3	120.0
Millet	23.1	21.9	22.6	22.2	23.6	33.5	34.4
Rice	40.5	40.5	43.1	43.2	45.7	48.3	50.9
Legumes	3.9	4.0	4.4	4.5	4.8	5.5	5.7
Cotton	69.3	69.3	74.3	74.3	79.2	82.5	80.0
Flax	2.6	2.5	2.7	2.8	3.0	2.9	2.5
Oilseeds	3.0	3.2	3.7	4.1	4.6	5.5	5.7
Sugarcane	22.9	24.1	25.7	26.7	29.5	30.4	31.9
Onions	5.0	5.1	6.0	6.1	6.2	7.0	8.0
Vegetables	37.9	38.9	39.8	41.2	41.9	53.1	54.9
Fruit	22.0	23.0	24.8	26.0	27.5	32.3	34.9
Others	5.5	4.8	4.9	4.8	5.0	7.3	1.5
Total N	380.7	380.6	408.9	410.2	437.6	506.1	513.5

Annual Growth Rates:

1973-77	3.6%
1977-82	3.7%

* Years refer to cropping years.

Source: Ministry of Agriculture.

C. Fertilizer Application Rates

5. Tables 4, 5 and 6 give the planned or the recommended nitrogen application rates for different crops. These rates indicate a trend toward increased rates for the majority of crops. This trend is gradual for nitrogen fertilizers but shows a sudden increase for phosphate and potash fertilizers in 1976 and 1977 for certain crops. However, no phosphate is planned for wheat and maize, reflecting the current practice.

6. Phosphate fertilizers for vegetables are planned to increase from a rate of 15 kg (of P_2O_5) per feddan during 1973-1975 to 30 kg in 1976, remaining constant at that level in the near future. The same trend is forecast for fruits and some oilseeds.

7. Potash fertilizers are confined to fruits and vegetables. Their consumption per feddan is planned to remain constant during 1973-1975 at a level of 24 kg (of K_2O), and then increase to 36 kg in 1976. From 1977 on, their use per feddan will increase to 48 kg for both fruits and vegetables.

8. Fertilizer experiments are scanty particularly for phosphate and potash fertilizers and, therefore, their role in total fertilizer application can hardly be determined. Furthermore, the fertilizer response of different crops will depend to a large extent upon the general level of agricultural technology. In the absence of such a comprehensive analysis, it is assumed that the planned rates represent the best available indication of the extent of the composition of fertilizer use in the coming decade. Projected requirements were calculated (Tables 4, 5 and 6) accordingly taking into account the changes in the cropping pattern and new land area contribution:

Table 4

Planned Nitrogen Fertilizer Rates, 1973-1985
(National Averages per Feddan in Kg of N for Various Crops)

Crops	1966 (Actual)	1973 (Est.)	1974	1975	1976	1977	1982	1985
Wheat	39	48.0	48.0	52.0	52.0	56.0	60.0	60.0
Barley	16	27.0	27.0	31.0	31.0	35.0	45.0	45.0
Maize	39	58.5	58.5	65.5	65.5	72.5	80.0	80.0
Millet	39	49.5	49.5	53.0	50.3	56.0	60.0	60.0
Rice	31	33.0	33.0	35.0	35.0	37.0	38.0	38.0
Legumes	8	8.0	8.0	8.5	8.5	9.0	10.0	10.0
Cotton	37	42.0	42.0	45.0	48.0	50.0	50.0	50.0
Flax	31	39.0	39.0	39.5	39.5	40.0	40.0	40.0
Oilseeds	-	16.8	17.0	18.3	18.5	19.7	21.0	21.0
Sugarcane	99	99.0	99.0	101.0	101.0	103.0	105.0	105.0
Onions	64	78.0	78.0	79.0	97.5	97.5	80.0	80.0
Vegetables	-	46.5	46.5	46.5	46.5	46.5	46.6	46.5
Fruits	-	74.1	74.1	76.1	76.1	78.2	80.3	80.3
Others	-	44.5	49.5	53.0	53.0	56.5	60.0	60.0

Source: Ministry of Agriculture.

Table 5

Planned Phosphorus Fertilizer Rates, 1973-1985
(National Averages per Feddan in Kg of P_2O_5 for Various Crops)

Crops	1966	1973	1974	1975	1976	1977	1982	1985
Rice	15	15.0	15.0	15.0	22.5	22.5	22.5	22.5
Legumes	50	15.0	15.0	15.0	15.0	15.0	22.5	22.5
Cotton	15	15.0	15.0	15.0	22.5	22.5	22.5	22.5
Flax	15	10.0	10.0	10.0	15.0	15.0	15.0	15.0
Oilseeds	15	15.0	15.0	22.5	22.5	22.5	30.0	30.0
Onions	15	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Vegetables	15	15.0	15.0	15.0	30.0	30.0	30.0	30.0
Fodder	15	15.0	15.0	15.0	22.5	22.5	22.5	22.5
Fruits	-	15.3	15.8	15.8	15.8	30.6	30.6	30.6
Others	-	15.0	15.0	15.0	30.0	30.0	30.0	30.0

Source: Ministry of Agriculture.

Table 6

Planned Potash Fertilizer Rates, 1973-1985
(National Averages per Feddan in Kg of K_2O for Fruits & Vegetables)

Crops	1973	1974	1975	1976	1977	1982	1985
Vegetables	24.0	24.0	24.0	24.0	48.0	48.0	48.0
Fruits	36.0	36.0	36.0	36.0	48.0	48.0	48.0

Source: Ministry of Agriculture.

D. Cropping Pattern

9. The cropping pattern in Egypt is determined by several factors. Aside from the two major existing constraints--land and water--the following factors are taken into account in determining the cropping pattern in Egypt:

(1) Soil building crops, e.g., leguminous crops that improve the soil's productivity due to its nitrogen-fixing character;

(2) Fodder crops to feed farm animals and to cope with livestock production targets; and

(3) Grains which can be divided into cash crops and subsistence crops for farm consumption.

10. It was against these considerations that the triennial (i.e., three-year) rotation system has emerged throughout most of Egypt. Given the severe land and water constraints, the general cropping pattern in Egypt shows limited change over time. The general cropping system can be depicted as follows:

Table 7

General Cropping Pattern in a Cropping Year

Permanent Crops:	Orchards
Semi-Permanent:	Sugarcane
Whole Year Crops:	Berseem and Cotton
Basic Winter Crops	**Basic Summer Crops**
Wheat	Rice
Barley	Groundnuts
Beans	Maize
Lentils	Millet
Perm-Berseem	Sesame
Onions	Summer Vegetables
Flax	
Winter Vegetables	

11. It follows that the increase in the area of one crop is only feasible at the expense of other crops. The expansion in rice area for instance can be achieved at the expense of maize or cotton. The rise in wheat area can be compensated by a decline in either cotton or berseem area, whereas the expansion of fruits and vegetables (both winter and summer) affects mainly cotton and possibly other crops.

12. Over the past 12 years (1959/60-1971/72), some minor changes in the cropping pattern took place within this structural framework. These changes are shown in table 8 which summarizes the percentage distribution of the cropped area according to main crops during that period:

Table 8

Percentage Distribution of Cropped Area According to Crops
(1959/60-1971/72)

Crops	1959/60	1969/70	1971/72
Wheat	14.1	11.7	11.2
Rice	6.8	11.5	10.7
Maize	17.6	13.4	13.5
Cotton	18.1	14.6	13.2
Berseem	8.7	15.7	13.2
Fruits	1.2	2.4	2.4
Vegetables	3.5	6.6	6.7
Others	30.0	24.1	29.1
Total	100.0	100.0	100.0

Source: Ministry of Agriculture

13. The following tables (9, 10, 11 and 12) show the projected cropping pattern:

Table 9

Projected Cropping Pattern (1973-1977) for Old Land
(in 1,000 Feddans)

Crops	1972 (Actual)	1973 (Est.)	1974	1975	1976	1977
Wheat	1,239	1,090	1,080	1,070	1,065	1,065
Barley	91	90	80	70	70	70
Maize	1,531	1,440	1,410	1,390	1,345	1,300
Millet	483	450	425	410	400	400
Rice	1,146	1,130	1,130	1,130	1,130	1,130
Legumes	447	460	475	490	500	505
Cotton	1,527	1,615	1,605	1,595	1,585	1,580
Flax	44	42	42	42	42	42
Oil seeds	103	107	107	107	117	117
Sugarcane	201	210	220	230	240	260
Onion	49	64	65	76	77	78
Fodder	2,896	2,932	2,902	2,852	2,802	2,752
Vegetables	749	765	780	795	820	830
Fruits	249	250	255	260	265	270
Others	68	70	70	70	70	70
Total	10,823	10,715	10,646	10,587	10,528	10,469

Source: Ministry of Agriculture.

Table 10

Projected Cropping Pattern (1973-1977) for New Land
(In 1,000 Feddans)

Crops	1972 (Actual)	1973 (Est.)	1974	1975	1976	1977
Wheat	55	50	62	66	72	78
Barley	41	39	39	42	42	43
Maize	42	43	48	50	55	60
Millet	16	17	17	17	18	18
Rice	93	96	98	100	103	106
Legumes	19	23	24	25	25	27
Cotton	25	35	45	55	65	70
Flax	17	24	23	26	28	32
Oil seeds	59	74	82	95	105	114
Sugarcane	22	21	23	24	24	26
Onion	-	-	-	-	-	-
Fodder	292	298	338	358	378	403
Vegetables	49	51	57	61	66	72
Fruits	44	47	56	66	76	82
Others	51	42	27	22	21	18
Total	824	858	936	1,007	1,078	1,149

Source: Ministry of Agriculture.

Table 11

Projected Cropping Pattern (1973-1977) for Old and New Land
(In 1,000 Feddans)

Crops	1972 (Actual)	1973 (Est.)	1974	1975	1976	1977
Wheat	1,294	1,140	1,142	1,136	1,137	1,143
Barley	132	129	129	119	112	113
Maize	1,573	1,483	1,458	1,440	1,400	1,360
Millet	499	467	442	427	418	418
Rice	1,239	1,226	1,228	1,230	1,233	1,236
Legumes	466	483	499	510	525	532
Cotton	1,552	1,650	1,650	1,650	1,650	1,650
Flax	61	66	65	68	70	74
Oil seeds	162	181	189	202	222	231
Sugarcane	222	231	243	254	264	286
Onion	49	64	65	76	77	78
Fodder	3,188	3,228	3,240	3,210	3,180	3,155
Vegetables	798	816	837	855	886	902
Fruits	293	297	311	326	341	352
Others	119	112	97	92	91	83
Total	11,647	11,573	11,585	11,594	11,606	11,618

Source: Ministry of Agriculture.

Table 12

Projected Cropping Pattern (1982 and 1985) for Old and New Land
(In 1,000 Feddans)

Crops	1982			1985		
	Old Land	New Land	Total	Old Land	New Land	Total
Wheat	1,110	140	1,250	1,120	150	1,270
Barley	83	62	145	80	74	154
Maize	1,310	144	1,454	1,360	140	1,500
Millet	460	98	558	419	155	574
Rice	1,100	170	1,270	1,240	100	1,340
Legumes	495	54	550	505	65	570
Cotton	1,600	50	1,650	1,560	40	1,600
Flax	40	32	72	46	17	63
Oil seeds	110	150	260	100	170	270
Sugarcane	220	70	290	244	60	304
Onions	80	7	87	100	-	100
Fodder	2,580	640	3,220	2,665	551	3,216
Vegetables	935	207	1,142	923	257	1,180
Fruits	300	102	402	303	131	434
Others	121	-	121	25	-	25
Total	10,545	1,926	12,471	10,690	1,910	12,600

Source: The figures presented in this table are adjusted figures of two projections: (1) Ministry of Agriculture; and (2) FAO, Prospective Study of Agricultural Development for the A.R.E., Rome, 1973.

14. The projected cropping pattern, which is presented in the above tables, shows: (1) The cotton area is kept constant at a level of about 1.6 million feddans. This area will suffice to meet the cotton needs of local industries and also of exports given the fact that the Plan assumes an increase in cotton productivity from the level of 1.04 tons per feddan in 1972 to 1.20 tons in 1977 with the use of better yielding seed varieties; (2) For rice, the Plan envisages its area under the "old" land to remain at the present level of about 1.0 million feddans and a slight increase in its area under the "new" land. The Plan aims at increasing rice productivity per feddan from 2.2 tons in 1972 to 2.6 tons in 1977; (3) The projection entails an increase of about 240,000 feddans in the old land for some basic food crops such as beans, sugarcane, sesame, lentils, onions, fruits and vegetables. Such increases, though of smaller magnitude, are planned in the new land, particularly for fruits; and (4) As a result of increasing the area under the above-mentioned food crops, and keeping the cotton area at a relatively high level, there will be a decrease in the areas under wheat, maize, barley, and berseem of about 700,000 feddans, as can be seen from the following figures:

Cropwise Distribution of Area
(In 1,000 Feddans)

Crop	1972 (Actual)	1977 (Projected)
Wheat	1,294	1,143
Maize	1,573	1,360
Barley	132	113
Berseem	1,732	1,580

15. Despite a decrease in the area of wheat and maize, the Plan estimates higher levels of production for these two crops. Wheat productivity per feddan is expected to increase from 1.3 tons in 1972 to about 1.7 tons in 1977 mainly due to the use of better seeds. Therefore, despite the projected decrease in total wheat area by some 14%, total wheat production is expected to increase by about 12%.

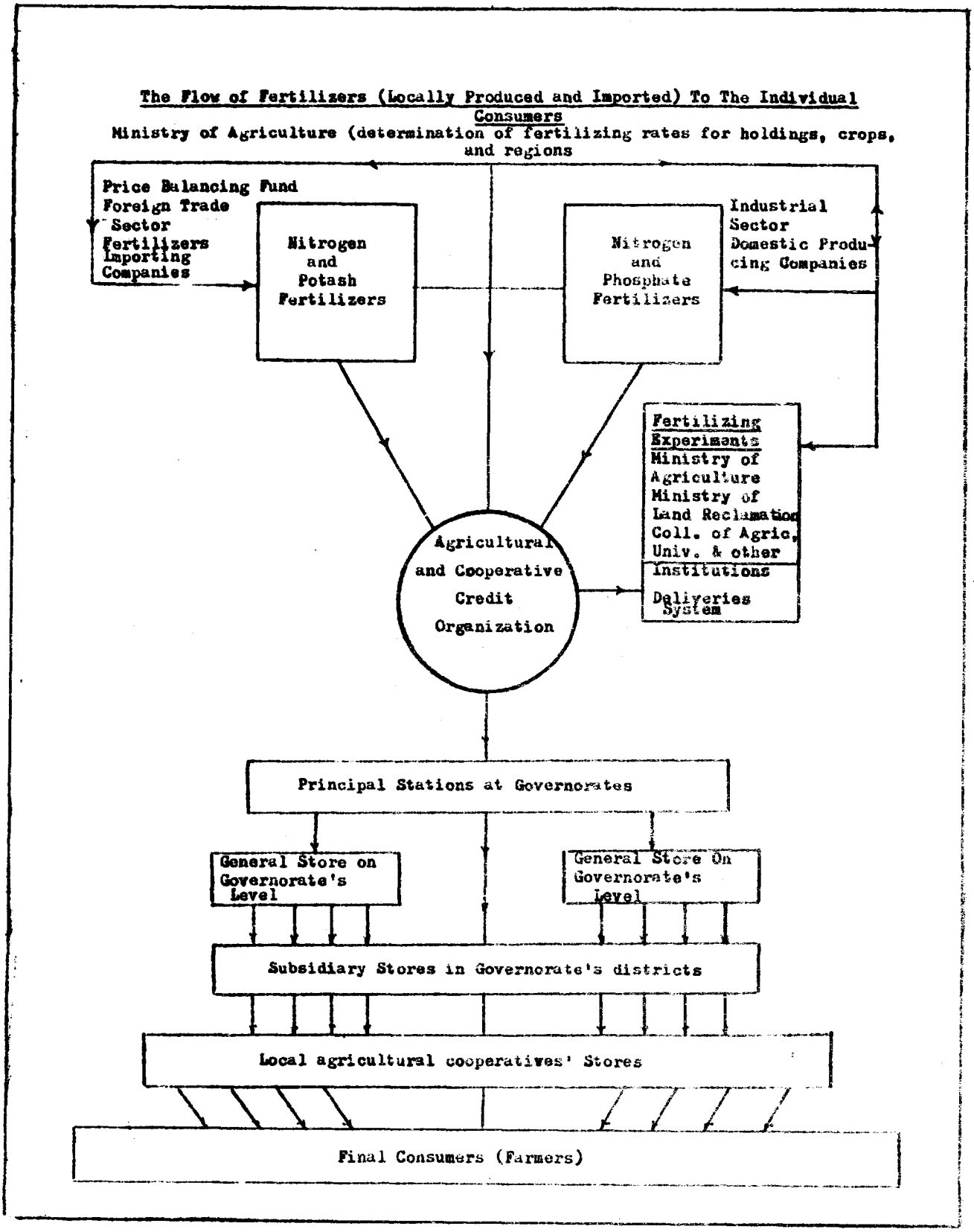
16. Maize yields are projected to increase by about 33% which will more than compensate for the reduction in area. Several new high-yielding varieties being introduced are expected to cover all the maize area by 1977.

E. Development of the New Lands

17. The above discussed projections for crop pattern have taken into account two facts; First, the total agricultural land in Egypt has been decreasing owing to the expansion of non-agricultural uses of land. It is estimated that the annual losses of cultivated land in the past few years has amounted to about 60,000 feddans. However, several legislative measures were adopted recently to curtail further losses and, therefore, the projections were based on average annual losses of cultivated land of about 20,000 feddans. Secondly, the area of the new land that is being put under cultivation is planned to increase from about 480,000 feddans in 1972 to about 668,000 feddans in 1977, based on the land reclamation program. On the whole, the new land cropped area percentage to total cropped area is projected to increase from 7.1% in 1972 to 10.0% in 1977.

Industrial Projects Department
December 1973

The Flow of Fertilizers (Locally Produced and Imported) To The Individual Consumers



EGYPT: TALKHA II FERTILIZER PROJECT

DESCRIPTION OF FACILITIES

A. Talkha I (Under Construction)

1. The Talkha I Unit is an ammonium nitrate (AN) facility supplied from Germany (Federal Republic) nearly 10 years ago for installation at Suez and to be based on flare gas from a local refinery. The project construction was interrupted by hostilities in 1967, and the entire plant has been moved to Talkha starting in 1970; the plant's design capacity is 318,000 TPY of CAN (31% nitrogen), equivalent to 98,000 TPY N. A minor expansion to 117,000 TPY N is proposed, which entails moving additional facilities from Suez. Ammonia would be provided from Talkha II. The existing ammonia plant at Talkha is based on partial oxidation of feedstock and gas purification, followed by reciprocating, electrically-driven compression and ammonia synthesis. The air separation-oxygen unit was supplied by Linde and the ammonia unit by Uhde on BASF design. Although the equipment is new, this ammonia plant is obsolete by comparison with those built in the last few years (i.e., based on steam-reformed naphtha or natural gas, plus steam-driven, centrifugal compression).

2. The nitric acid plant, supplied by Uhde is a standard low-pressure design based on nine converters, with emphasis on energy saving and maximum catalyst recovery. The ammonium nitrate BASF-Uhde neutralization section is also standard. The AN concentration and prilling unit was supplied by Didier and includes a prill tower plus rotary equipment for drying, cooling and conditioning the prills. Provisions for grinding and adding limestone are included. Bagged storage for about two weeks production or 10,000 tons is under construction.

3. Off-site facilities include steam generation, electrical sub-stations, water treatment, offices, laboratories, maintenance shops and garages. The site is level and firm with a total area of about 60 hectares, of which 20 are taken up by the AN plant, 20 by its off-sites, leaving another 20 for the proposed urea project. Estimated employment for Talkah I is about 800 on production, plus 900 on maintenance and utilities, and 400 on engineering and administration, or a total of 2,100.

B. Proposed Talkha II Project

4. The proposed project comprises a 1,200 TPD single-stream ammonia plant and a 1,725 TPD twin-stream urea plant, corresponding to annual capacities of 396,000 tons of ammonia and 570,000 tons of urea. All necessary off-sites and other facilities would also be included. Material balances and flow sheet are shown in Annex 4-2.

5. Ammonia plant design would be based on steam-reformed natural gas. Compression, heat and energy recovery would be based on steam-turbine-driven centrifugal machines. Urea unit design would be based on the most economical

process which could be a stripping process embodying centrifugal compression and maximum thermal recycle and heat recovery. Urea would be produced in prilled, uncoated form and packed in plastic bags for prompt shipment and use.

C. Natural Gas Supply

6. Natural gas feedstock and fuel for the project would be supplied from the new Abu Mahdi field some 40 km away via a 0.3-meter diameter pipeline at 40 atmospheres pressure. This field has sufficient reserves to supply both the fertilizer plants and the local power station for at least 30 years, according to the Egyptian General Petroleum Corporation (EGPC). Further details of gas resources are given in Annex 1-2.

D. Ecology, Infrastructure and Utility Systems

7. Some facilities and off-sites will be shared with the Talkha I unit with a consequent saving in costs. However, the ammonia-urea project will operate independently from the existing production units.

8. Availability of utilities should not be a problem. Ample fresh water is available from the nearby Nile for process, cooling, steam and other purposes. An adjacent 100 MW power station, directly linked to the fertilizer plants (which have a top-consumer priority) should ensure a reliable and adequate power supply. Liquid plant and sanitary wastes will be treated before discharge into the Nile, to conform with legal requirements of the Ministry of Public Health, in conjunction with effluents from the CAN plant. Air pollution is not anticipated to be a problem. The only raw material is natural gas which contains less than 10 parts per million sulfur, which will be removed to avoid contaminating the ammonia plant catalysts. Other gas streams, such as hydrogen, carbon monoxide, and ammonia are contained within the process. The only gaseous effluent is carbon dioxide, virtually all of which is consumed in producing urea.

9. Plastic bag manufacture from imported polyethylene is being included in the project scope with capacity to include all Talkha requirements. Bagging and shipping facilities (by road and rail) are also included.

10. The El Nasr Talkha factory is already linked with good road and rail systems which are adequate for handling an additional 1,725 TPD of fertilizer. The lack of availability of adequate road trucks and railroad cars could present a problem in view of the general shortage of transport facilities in Egypt. However, since most of production will be consumed within a radius of about 100 km and largely replace imports, little difficulty is anticipated. An annual plant storage capacity of about 30,000 tons of bulk fertilizer has been proposed by El Nasr Company as being the minimum size to accommodate probable fluctuations in transportation and consumption.

E. Manpower and Training

11. El Nasr Company's estimated additional manpower needs for the proposed project are:

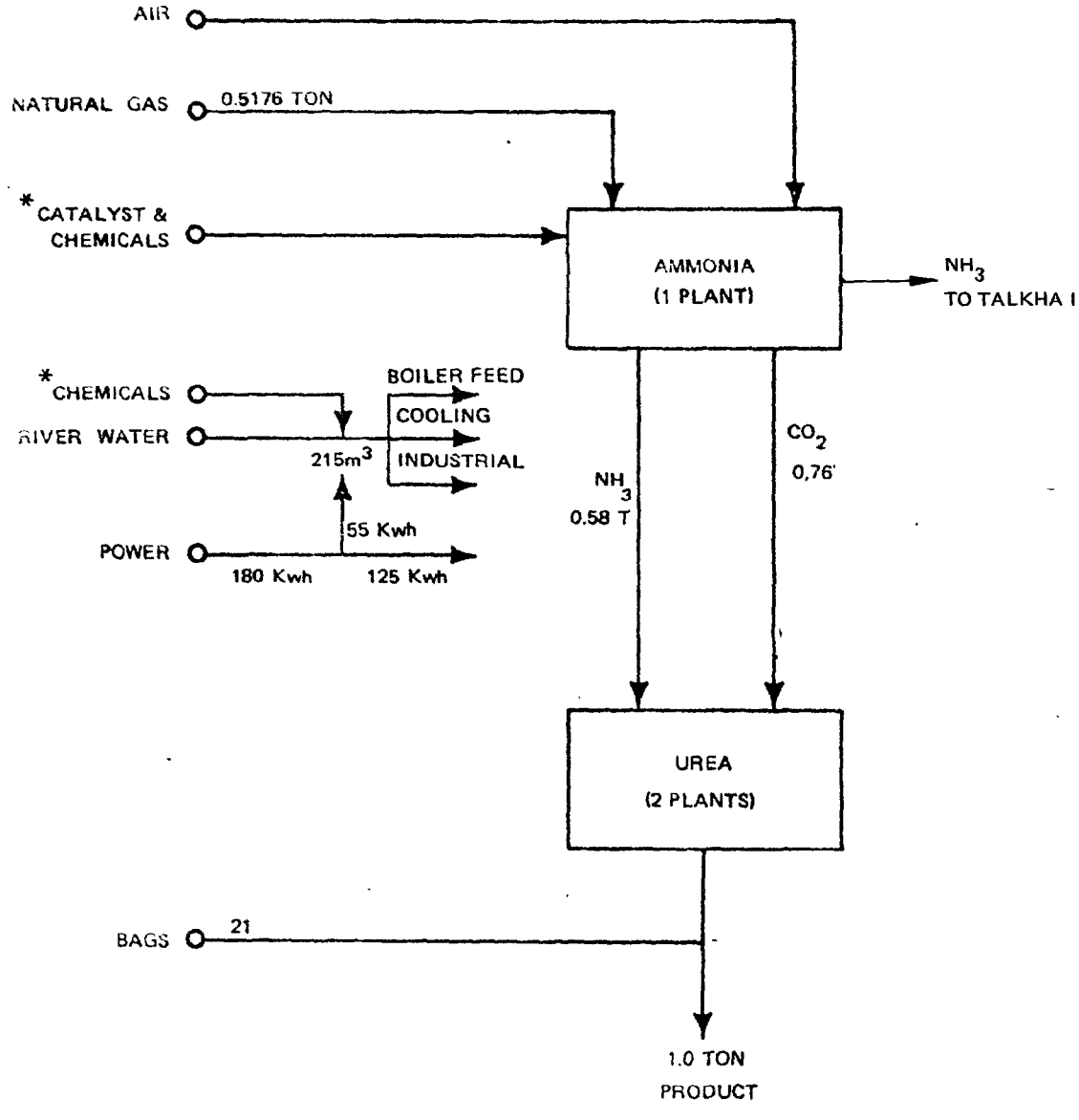
400	Operating
800	Maintenance and Technical
130	Sales and Administration
20	General Management
1,350	Total

12. The General Contractor will be requested to include provisions for specialized training. In addition, El Nasr will train staff from its existing personnel at the existing Talkha facilities. Some (as yet unspecified) will be recruited from the current surplus staff from the Suez plants. El Nasr cannot make a definitive statement until a decision, expected shortly, is made regarding the future of the Suez fertilizer plant.

Industrial Projects Department
January 1974

EGYPT: TALKHA II FERTILIZER PROJECT

MATERIALS & UTILITIES FLOW DIAGRAM
(Per Ton of Urea at 100% Capacity Utilization)



Industrail Projects Department

EGYPT: TALKHA II FERTILIZER PROJECT

PROJECT CAPITAL COST ESTIMATES

1,200 TPD AMMONIA CAPACITY

	US$000			LE 000		
	Local	Foreign	Total	Local	Foreign	Total
Process Licenses & Engineering[1]	500	7,500	8,000	195	2,940	3,135
Technical Advisor	100	1,100	1,200	40	430	470
Erection & Start-up Supervision[2]	660	4,000	4,660	257	1,570	1,827
Buildings & Civil Works-						
Site Development	150	-	150	58	-	58
Temporary Facilities	160	-	160	63	-	63
Ammonia Plant	1,900	-	1,900	745	-	745
Ammonia Storage	160	-	160	63	-	63
Urea Plant	1,600	-	1,600	627	-	627
Urea Storage & Handling Facilities[3]	3,150	-	3,150	1,235	-	1,235
Utilities	1,200	-	1,200	470	-	470
Sewers & Drainage	120	-	120	47	-	47
Housing for Employees	1,160	-	1,160	455	-	455
Roads[4]	1,500	-	1,500	588	-	588
Railways	800	-	800	314	-	314
Miscellaneous[5]	-	100	100	-	40	40
Reinforcing Bars and Wood[6]	(1,800)	1,800	-	(706)	706	-
Total Buildings & Civil Works	10,100	1,900	12,000	3,960	745	4,705
Equipment and Materials-						
Ammonia Plant	-	21,500	21,500	-	8,430	8,430
Ammonia Storage[7]	-	400	400	-	157	157
Urea Plant[8]	-	10,000	10,000	-	3,920	3,920
Urea Storage and Handling Facilities[9]	-	1,600	1,600	-	627	627
Utilities[10]	-	4,700	4,700	-	1,843	1,843
Yard Piping	-	500	500	-	196	196
Catalyst and Chemicals[11]	-	1,100	1,100	-	432	432
Bag Factory	-	1,000	1,000	-	390	390
Miscellaneous[12]	-	2,000	2,000	-	784	784
Local Manufacturing	1,000	(1,000)	-	390	(390)	-
Total Equipment and Materials	1,000	41,800	42,800	390	16,390	16,780
Ocean Freight and Marine Insurance[13]	3,210	500	3,710	1,260	195	1,455
Inland Freight[14]	320	-	320	125	-	125
Erection[15]	8,600	500	9,100	3,370	196	3,566
Transportation Means	770	120	890	303	47	350
Furniture, Office Equipment and Fixtures	380	-	380	150	-	150
Spares[16]	220	2,500	2,720	85	980	1,065
Start-Up[17]	650	-	650	265	-	255
Pre-Operating Cost[18]						
Egyptian Team Expenses	11	40	51	4	16	20
GOFI's Fees	433	-	433	170	-	170
Management Cost	1,063	-	1,063	417	-	417
Training	23	80	103	9	31	40
Total Pre-Operating Cost	1,530	120	1,650	600	47	647
Total Fixed Capital Cost Before Contingencies	28,040	60,040	88,080	10,995	23,545	34,540
Contingencies-						
Physical[19]	1,960	6,117	8,077	770	2,399	3,169
Price[20]	4,400	20,313	24,713	1,725	7,966	9,691
Total Fixed Assets	34,400	86,470	120,870	13,490	33,910	47,400
Net Working Capital	1,275	1,275	2,550	500	500	1,000
Total Project Cost	35,675	87,745	123,420	13,990	34,410	48,400
Interest During Construction	3,274	5,717	8,991	1,284	2,242	3,526
Total Financing Required	38,949	93,462	132,411	15,274	36,652	51,926

Industrial Projects Department
May 1974

EGYPT: TALKHA II FERTILIZER PROJECT

PROJECT CAPITAL COST ESTIMATES

FOOTNOTES

1/ Including $130,000 for the ammonia plant's process license, $1, 00,000 for the urea plant's process license, $4,610,000 for the ammonia plant's engineering, $1,360,000 for the urea plant's engineering, and $500,000 for the off-sites' engineering.

2/ For erection: $3,200,000 for foreign personnel and $520,000 for local personnel. For start-up: $800,000 for foreign personnel and $140,000 for local personnel.

3/ Civil works for facilities to handle 30,000 tons of bulk urea and 5,000 tons of bagged urea. The civil works contains a larger capacity than the actual storage capacity (see footnote 9) in order to allow room for further expansion.

4/ 6,000 meters of roads.

5/ For grating/walkways.

6/ The item in brackets represents a transfer from local to foreign currency.

7/ 1 sphere for 2,000 tons of ammonia.

8/ 2 streams of 900 tons-per-day each.

9/ Facilities for 21,000 tons of bulk urea and 4,000 tons of bagged urea.

10/ Excluding transformers, cables, and switchgear of $1 million.

11/ Initial loading

12/ This item in brackets can possibly be moved from foreign to local currency. It includes firefighting equipment ($0.5 million), 2 cranes of 200 tons each ($1.0 million), and scaffolding and sheltering ($0.5 million).

13/ 7.5% of the foreign currency cost of the equipment to be paid in local currency except $0.4 million in foreign currency for special equipment.

14/ $16 per ton for an estimated 20,000 tons.

15/ Cost of hiring 2,000 workers for approximately 2 years at LE70 per worker per month plus insurance in foreign currency.

16/ Approximately 6% of total equipment cost.

17/ Including only the cost of material and utilities; cost of labor is included in pre-operating cost.

18/ Including Egyptian team expenses during study period.

19/ 7% of local currency components; 10% of total foreign currency cost of equipment and materials plus $0.5 million to cover workshop machinery.

20/ Price Escalation

A. The basis proposed for price escalation differentiates inflation effects on materials and equipment from effects on services.

B. Equipment and Materials

(i) It is assumed that by mid-1975 the perturbed situation prevailing at January 1974 will have responded to control measures introduced by major equipment exporting countries and that procurement of equipment and materials will then be on a fixed price basis. Such fixed prices will include the vendors' estimates of their cost inflation during the period of manufacture and delivery. Therefore, inflation need be provided up to the time of placing of orders and not beyond.

(ii) If the general contractor's start date is assumed before the end of September, 1974 it would be expected that he would be in a position to place orders for the long-delivery critical equipment items by end of June 1975. These items would commit a substantial proportion of the equipment cost at that time. An escalation factor can be applied to the whole equipment/materials cost at that point.

C. Services

(i) These costs relate to the contractor's home office costs for engineering, procurement, and supervision of construction and commissioning. These are payroll and overhead costs, and inflation applies throughout the construction period, according to the disbursement schedule on these items, assumed as 30%, 40%, and 30% over 3 years 1975, 1976 and 1977.

(ii) License fees are also included in the "services" cost. There is no way of knowing how licensors compute their fees. They could be fixed and treated on the same basis as the equipment, but it would be more conservative to assume escalation as in C (i) above.

(iii) The Technical Advisor's fees and expenses are also a service but the ceiling cost is fixed under the consultancy contract and no provision for further escalation is included.

D. Escalation Rates

(i) Pre-contract period - Capital cost estimates have been prepared as at January 1974. These costs presume that, if a contract became effective at that date, for execution over three years 1974, 1975, and 1976, the cost estimates would hold good. To allow for

further escalation between January 1974 and tenders received by end June - mid-July 1974, with prices open for acceptance for 90 days, a rate of 1½%/month is assumed. Over 6 months, compounded, this gives an increase of 9.34% which has been rounded up to 10%.

(ii) Equipment and Materials - On the basis of the bulk of the value being committed by about July 1975, escalation from the start of the contract to July 1975 has been allowed at 15% once only.

(iii) Services - After the pre-contract period escalation has been calculated at 10% per annum compound on a disbursement schedule of 30%, 40%, 30% for the years 1975, 1976, and 1977.

Industrial Projects Department
February 22, 1974

Egypt: Talkha II Fertilizer Project

Initial Working Capital Requirements for Talkha II

The initial working capital requirements are calculated to cover one month's production expenditures in addition to the initial inventory requirements for raw materials.

Item	Amount (LE '000)
Salaries and Wages	90
Polyethylene Chips(3 months' supply)	265
Natural Gas	205
Utilities	26
Chemicals (Initial loading of catalysts is included in project)	10
Maintenance Materials (Initial set of spares included in project)	25
Other	25
Cash Balance to mainly cover any interest payments that might become due during the first month of operations	620
	1,266
Less: Accounts Payable (Natural Gas, Utilities, Chemicals and Maintenance Materials)	266
Funds Required	1,000

Industrial Projects
May 1974

Egypt: Talkha II Fertilizer Project

Financing Plan

Arab Co-Lender Financing[1/]

Source	Amount, Millions		
	Dinars	US$	LE
Arab Fund	KD 6.5	21.97	8.62
Kuwait Fund	KD 7.0	23.66	9.28
Abu Dhabi Fund	KD 3.0	10.14	3.98
Libyan Bank	LD 3.0	10.14	3.98
Government of Qatar	KD 1.0	3.38	1.33

Kuwaiti Dinar (KD) converted at US$3.38/1KD
Libyan Dinar (LD) converted at US$3.38/1LD

1/ See Annex 6-1 for terms and conditions

EGYPT: TALKHA II FERTILIZER PROJECT

Proposed Disbursement Schedule

(US $ '000)

IDA Credit

Calendar Year	Disbursement	Cumulative Disbursement	Balance
1974	2,970	2,970	17,030
1975	10,030	13,000	7,000
1976	4,000	17,000	3,000
1977	3,000	20,000	0

Loans from Arab Sources

Calendar Year	Disbursement	Cumulative Disbursement	Balance
1974	0	0	69,300
1975	27,700	27,700	41,600
1976	28,500	56,200	13,100
1977	13,100	69,300	0

Industrial Projects Department
February 22, 1974

EGYPT: TALKHA II FERTILIZER PROJECT

Assumptions used in the Financial Analysis of Talkha II

1. Sales Prices:

The ex-factory selling price of urea has been assumed to be US$87 (£E 37) per ton, so as to give a 20% financial rate of return before tax.

The transfer price of ammonia which is produced by Talkha I and used by Talkha II is projected to be US$110 (£E 43.1) per ton based on production costs of Talkha I ammonia. Proceeds from the transfer are treated as a reduction in operating costs.

2. Operating Costs:

For urea and the incremental ammonia, the fixed costs are as follows:

i) Labor, £E 1.0 million in 1978 prices, to be inflated as 3% per annum over the life of the project.

ii) Other expenses, £E 0.3 million at 1978 prices.

The variable operating costs for the yearly production of 542,000 tons of urea and 62,000 tons of ammonia to be transferred to Talkha I are:

	US $ per ton of		£E per ton of	
	Urea	Ammonia	Urea	Ammonia
Natural Gas	12.20	21.37	4.78	8.38
Chemicals & Catalysts	1.46	2.64	0.57	1.04
Power	1.80	0.54	0.71	0.21
Bags (Polyethylene Chips)	5.00	-	1.96	-
Maintenance Materials	5.12	3.07	2.01	1.02
Total	25.58	27.62	10.03	10.83

Operating costs were escalated by between 3% and 10% from 1974 to 1978 levels and are kept constant thereafter except for labor costs which are escalated at 3% per year to reflect a real rising trend of wages. All repairs and maintenance expenditures are written off in the year they occur. No capital improvements are envisaged during the life of the project.

3. Depreciation

Depreciation is based upon the Standardized Accounting System in force in Egypt, which specifies that assets must be depreciated at the following rates:

Deferred Revenue Charges and Interest during Construction	20%
Cranes and Vehicles	12½-20%
Plant and Equipment	10 -15%
Buildings, Constructions, Roads and Railways	2 - 6%

4. Other Income

Other income is interest income resulting from investments into Government bonds.

5. Income Tax

Income tax is calculated at 39.55% of retained earnings. Taxes on distributed earnings are not the responsibility of the Company.

6. Retained Earnings

It is assumed that 85% of the profit before taxes is paid out to the Government and to the Company's employees, of the remainder, 5% is used for compulsory purchases of Government bonds in the following year and 10% is shown in the cash balance.

7. Effect of Talkha II

To reflect the effect Talkha II will have on the Company, distribution of profit and tax calculations take into account the financial position of the Company without the project. Taxes are not paid and profits are not distributed before all cumulative losses of Talkha I have been written off.

8. Debt Calculations

The following assumptions have been made with respect to terms and conditions of loans which will be made available to El Nasr for financing of the project.

Source	Amount (LE'000)	Amount (US$'000)	Interest %	Grace Period (Years)	Amortization Period (Years)	Interest During Construction Financed ?
Arab Fund	8,616	21,971	6.5	5	15	Yes
Kuwait Fund	9,278	23,659	4.0	5	15	No
Abu Dhabi Fund	3,976	10,139	4.5	6	13	Yes
Lybian Bank	3,976	10,139	6.5	5	11	No
Govt. of Qatar	1,326	3,381	6.5	5	11	No
Sub-total	27,172	69,289	Avg.5.2	-	-	-
IDA	7,843	20,000	8.5	5	10	No
Total Loans	35,015	89,289	Avg.6.0	-	-	-

Industrial Projects Department
May 1974

EGYPT: TALKHA II FERTILIZER PROJECT

INCREMENTAL FINANCIAL PROJECTIONS FOR TALKHA II
(LE'000)

(FOR YEARS ENDING DECEMBER 31 EACH YEAR)

	1978	1979	1980	1981	1982	1983
INCOME STATEMENTS						
VOLUMES(TONS'000)						
UREA	405	485	542	542	542	542
UTIL. TALKHA II(%)	71	85	95	95	95	95
PRICES(LE/TON)						
UREA	37	37	37	37	37	37
SALES(LE'000)						
UREA	15088	18069	20192	20192	20192	20192
TOTAL	15088	18069	20192	20192	20192	20192
OPERATING COSTS						
AMMONIA TRANSFER	-2135	-2420	-2705	-2705	-2705	-2705
NATURAL GAS	2454	2785	3113	3113	3113	3113
CHEMICALS	296	335	375	375	375	375
UTILITIES	312	354	395	395	395	395
BAGGING	796	949	1060	1060	1060	1060
MAINTENANCE MAT.	917	1039	1161	1161	1161	1161
LABOR	1000	1030	1061	1093	1126	1159
OTHER	300	300	300	300	300	300
TOTAL	3940	4372	4760	4792	4825	4858
INVENTORY ADJ.	-239	0	0	0	0	0
COST OF GOODS SOLD	3701	4372	4760	4792	4825	4858
OPERATING PROFIT	11387	13697	15432	15400	15367	15334
INTEREST	2078	2078	1973	1844	1710	1566
DEPRECIATION	6733	6733	6734	6734	6732	4776
OTHER INCOME	0	-3	-8	-15	-22	-30
TOTAL	8811	8808	8699	8563	8420	6312
PROFIT BEFORE TAX	2576	4889	6733	6837	6947	9022
TAX	0	164	469	473	475	593
PROFIT AFTER TAX	2576	4725	6264	6364	6472	8429
PROFIT DISTRIBUTED	0	2355	6724	6779	6799	8492
PROFIT RETAINED	2576	2369	-461	-415	-327	-62
CUM RET PROF BEG	0	2576	4945	4485	4070	3743
CUM RET PROF END	2576	4945	4485	4070	3743	3681

INDUSTRIAL PROJECTS DEPARTMENT

MAY 1974

EGYPT: TALKHA II FERTILIZER PROJECT

INCREMENTAL FINANCIAL PROJECTIONS FOR TALKHA II
(LE'000)

(AS OF DECEMBER 31 EACH YEAR)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
BALANCE SHEETS										
CURRENT ASSETS										
CASH	0	0	0	735	8913	16638	20627	24535	28393	30415
ACCOUNTS RECEIV.	0	0	0	0	1143	1376	1537	1537	1537	1537
INVENTORY	0	0	0	265	504	504	504	504	504	504
GOE BONDS	0	0	0	0	0	0	84	323	564	806
OTHER	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	1000	10560	18518	22752	26899	30998	33262
FIXED ASSETS										
GROSS FIXED ASSETS	0	0	0	0	50926	50926	50926	50926	50926	50926
ACC DEPRECIATION	0	0	0	0	6733	13466	20200	26934	33666	38442
NET FIXED ASSETS	0	0	0	0	44193	37460	30726	23992	17260	12484
CONSTRUCTION	1188	20817	40568	50926	0	0	0	0	0	0
TOTAL FIXED ASSETS	1188	20817	40568	50926	44193	37460	30726	23992	17260	12484
TOTAL ASSETS	1188	20817	40568	51926	54753	55978	53478	50891	48258	45746
CURR LIABILITIES										
ACCOUNTS PAYABLE	0	0	0	0	251	285	319	319	319	319
OTHER	0	0	0	0	1178	2074	2172	2306	2450	2602
TOTAL	0	0	0	0	1429	2359	2491	2625	2769	2921
LONGTERM LIABILITI										
LOCAL DEBT	0	0	0	0	0	0	0	0	0	0
FOREIGN DEBT	1165	15973	28735	35015	33837	31763	29591	27285	24835	22233
TOTAL	1165	15973	28735	35015	33837	31763	29591	27285	24835	22233
EQUITY										
SHARE CAPITAL	23	4844	11833	16911	16911	16911	16911	16911	16911	16911
RESERVES	0	0	0	0	0	0	0	0	0	0
RETAINED EARNINGS	0	0	0	0	2576	4945	4485	4070	3743	3681
TOTAL	23	4844	11833	16911	19487	21856	21396	20981	20654	20592
TOTAL LIABILITIES	1188	20817	40568	51926	54753	55978	53478	50891	48258	45746

INDUSTRIAL PROJECTS DEPARTMENT

MAY 1974

EGYPT: TALKHA II FERTILIZER PROJECT

INCREMENTAL FINANCIAL PROJECTIONS FOR TALKHA II
(LE'000)

(FOR YEARS ENDING DECEMBER 31 EACH YEAR)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
FUND FLOW										
SOURCES										
INCOME BIAT 1/	0	0	0	0	4654	6803	8237	8208	8182	9995
DEPRECIATION	0	0	0	0	6733	6733	6734	6734	6732	4776
REPLACEMENT PROV	0	0	0	0	0	0	0	0	0	0
SHARE CAPITAL	23	4821	6989	5078	0	0	0	0	0	0
LONGTERM DEBT	1165	14808	12762	6280	0	0	0	0	0	0
TOTAL	1188	19629	19751	11358	11387	13536	14971	14942	14914	14771
APPLICATION										
FIXED ASSETS	1188	19629	19751	10358	0	0	0	0	0	0
SALES OF ASSETS	0	0	0	0	0	0	0	0	0	0
GOE BONDS	0	0	0	0	0	0	84	239	241	242
INVENTORY	0	0	0	265	239	0	0	0	0	0
ACCOUNTS REC	0	0	0	0	1143	233	161	0	0	0
OTHER ASSETS	0	0	0	0	0	0	0	0	0	0
ACCOUNTS PAY	0	0	0	0	-251	-34	-34	0	0	0
INTEREST	0	0	0	0	2078	2078	1973	1844	1710	1566
LOAN REPAYMENTS	0	0	0	0	0	1178	2074	2172	2306	2450
PROFIT DISTRIBUTED	0	0	0	0	0	2355	6724	6779	6799	8492
TOTAL	1188	19629	19751	10623	3209	5810	10982	11034	11056	12749
YRLY CASH BALANCE	0	0	0	735	8178	7725	3989	3908	3858	2022
CUM CASH BAL	0	0	0	735	8913	16638	20627	24535	28393	30415
RATIOS 2/										
OP RATIO BEF DEP	0.00	0.00	0.00	0.00	0.25	0.24	0.24	0.24	0.24	0.24
OP RATIO AFT DEP	0.00	0.00	0.00	0.00	0.69	0.61	0.57	0.57	0.57	0.48
DEBT SERVICE COV.	0.00	0.00	0.00	0.00	5.48	4.16	3.70	3.72	3.71	3.68
CURRENT RATIO	0.00	0.00	0.00	0.00	7.39	7.85	9.13	10.25	11.19	11.39
DEBT/EQUITY RATIO	0.98	0.77	0.71	0.67	0.63	0.59	0.58	0.57	0.55	0.52

1/INCOME BEFORE INTEREST BUT AFTER TAX

2/FOR DEFINITION OF RATIOS SEE ANNEX 2-4, PAGE 4

INDUSTRIAL PROJECTS DEPARTMENT

MAY 1974

EGYPT: TALKHA II FERTILIZER PROJECT

EL NASR COMPANY - CONSOLIDATED FINANCIAL PROJECTIONS
(LE'000)

(FOR YEARS ENDING DECEMBER 31 EACH YEAR)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
INCOME STATEMENTS											
VOLUMES(TONS'000)											
CAN (31%N)	0	0	244	254	254	348	352	359	359	359	359
RESALE AMMONIA	0	0	0	1	1	4	5	5	5	5	5
UREA	0	0	0	0	0	405	485	542	542	542	542
UTIL. TALKHA I(%)	0	0	77	80	80	92	93	95	95	95	95
UTIL. TALKHA II(%)	0	0	0	0	0	71	85	95	95	95	95
PRICES(LE/TON)											
C A N	37	37	37	37	37	37	37	37	37	37	37
RESALE AMMONIA	120	120	120	120	120	120	120	120	120	120	120
UREA	0	0	0	0	0	37	37	37	37	37	37
SALES(LE'000)											
C A N	0	0	8616	9303	9303	12981	13130	13390	13390	13390	13390
RESALE AMMONIA	0	0	0	120	120	480	600	600	600	600	600
UREA	0	0	0	0	0	15088	18069	20192	20192	20192	20192
OTHER	143	10	0	0	0	0	0	0	0	0	0
TOTAL	143	10	8616	9423	9423	28549	31799	34182	34182	34182	34182
OPERATING COSTS											
AMMONIA TRANSFER	0	0	0	0	0	0	0	0	0	0	0
NATURAL GAS	0	0	623	674	674	3128	3459	3787	3787	3787	3787
CHEMICALS	3	3	68	87	93	403	444	486	486	486	486
UTILITIES	7	7	2070	2151	2151	2624	2674	2735	2735	2735	2735
BAGGING	0	0	574	599	641	1533	1694	1821	1821	1821	1821
MAINTENANCE MAT.	193	130	340	374	411	1369	1491	1613	1613	1613	1613
LABOR	1332	1043	1320	1360	1400	2442	2515	2591	2669	2749	2831
OTHER	234	170	200	490	490	790	790	790	790	790	790
TOTAL	1769	1353	5195	5735	5860	12289	13067	13823	13901	13981	14063
INVENTORY ADJ.	0	0	0	0	0	-239	0	0	0	0	0
COST OF GOODS SOLD	1769	1353	5195	5735	5860	12050	13067	13823	13901	13981	14063
OPERATING PROFIT	-1626	-1343	3421	3688	3563	16499	18732	20359	20281	20201	20119
INTEREST	0	0	70	15	0	2078	2078	1973	1844	1710	1566
DEPRECIATION	325	410	2998	2971	2856	9975	9979	8754	8749	8747	6789
REPLACEMENT PROV	0	0	0	17	26	27	17	35	20	20	21
OTHER INCOME	-1626	-1343	-30	-30	-30	-30	-33	-38	-45	-46	-54
LOSS AT SUEZ	0	0	1103	741	771	1658	1694	1724	1738	1771	1807
TOTAL	-1301	-933	4141	3714	3623	13709	13735	12448	12306	12202	10129
PROFIT BEFORE TAX	-325	-410	-720	-26	-60	2791	4997	7911	7975	7979	9990
TAX	0	0	0	0	0	0	164	469	473	475	593
PROFIT AFTER TAX	-325	-410	-720	-26	-60	2791	4833	7442	7502	7524	9397
PROFIT DISTRIBUTED	0	0	0	0	0	0	2355	6724	6779	6799	8492
PROFIT RETAINED	-325	-410	-720	-26	-60	2791	2477	717	723	725	906
CUM RET PROF BEG	-3476	-3801	-4211	-4931	-4957	-5017	-2226	251	969	1692	2417
CUM RET PROF END	-3801	-4211	-4931	-4957	-5017	-2226	251	969	1692	2417	3323

INDUSTRIAL PROJECTS DEPARTMENT

MAY 1974

EGYPT: TALKHA II FERTILIZER PROJECT

EL NASR COMPANY - CONSOLIDATED FINANCIAL PROJECTIONS
(LE'000)

(AS OF DECEMBER 31 EACH YEAR)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
BALANCE SHEETS											
CURRENT ASSETS											
CASH	1216	877	1209	2361	5041	16568	27622	34907	41975	49129	54145
ACCOUNTS RECEIV.	1832	1567	559	534	534	1677	1910	2071	2071	2071	2071
INVENTORY	179	179	1643	1850	2115	2489	2531	2531	2531	2531	2531
GOE BONDS	0	0	0	0	0	0	0	84	323	564	806
OTHER	1025	1025	1025	1025	1025	1025	1025	1025	1025	811	811
TOTAL	4252	3648	4436	5770	8715	21759	33088	40618	47925	55106	60364
FIXED ASSETS											
GROSS FIXED ASSETS	19632	19414	46965	46965	46965	103138	103138	103138	103138	103138	103138
ACC DEPRECIATION	12845	13255	16253	19224	22080	32055	42034	50788	59537	68284	75073
NET FIXED ASSETS	6787	6159	30712	27741	24885	71083	61104	52350	43601	34854	28065
CONSTRUCTION	25759	31955	24133	44962	56173	0	0	0	0	0	0
TOTAL FIXED ASSETS	32546	38114	54845	72703	81058	71083	61104	52350	43601	34854	28065
TOTAL ASSETS	36798	41762	59281	78473	89773	92842	94192	92968	91526	89960	88429
CURR LIABILITIES											
ACCOUNTS PAYABLE	1607	985	679	679	679	930	964	1061	1048	1043	1035
OTHER	18	8	0	0	0	1178	2074	2172	2306	2450	2602
TOTAL	1625	993	679	679	679	2108	3038	3233	3354	3493	3637
LONGTERM LIABILITI											
LOCAL DEBT	658	658	658	658	0	0	0	0	0	0	0
FOREIGN DEBT	2726	2815	16547	28759	35015	33837	31763	29591	27285	24835	22233
TOTAL	3384	3473	17205	29417	35015	33837	31763	29591	27285	24835	22233
EQUITY											
SHARE CAPITAL	24850	30767	35588	42577	48313	48313	48313	48313	48313	48313	48313
RESERVES	10740	10740	10740	10757	10783	10810	10827	10862	10882	10902	10923
RETAINED EARNINGS	-3801	-4211	-4931	-4957	-5017	-2226	251	960	1692	2417	3323
TOTAL	31789	37296	41397	48377	54079	56897	59391	60144	60887	61632	62559
TOTAL LIABILITIES	36798	41762	59281	78473	89773	92842	94192	92968	91526	89960	88429

INDUSTRIAL PROJECTS DEPARTMENT

MAY 1974

EGYPT: TALKHA II FERTILIZER PROJECT

EL NASR COMPANY - CONSOLIDATED FINANCIAL PROJECTIONS
(LE'000)

(FOR YEARS ENDING DECEMBER 31 EACH YEAR)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
FUND FLOW											
SOURCES											
INCOME BIAT 1/	-325	-410	-650	-11	-60	4869	6911	9415	9346	9234	10963
DEPRECIATION	325	410	2998	2971	2856	9975	9979	8754	8749	8747	6789
REPLACEMENT PROV	0	0	0	17	26	27	17	35	20	20	21
SHARE CAPITAL	6803	5917	4821	6989	5736	0	0	0	0	0	0
LONGTERM DEBT	0	1165	14808	12762	6280	0	0	0	0	0	0
TOTAL	6803	7082	21977	22728	14838	14871	16907	18204	18115	18001	17773
APPLICATION											
FIXED ASSETS	5599	6196	19779	20829	11211	0	0	0	0	0	0
SALES OF ASSETS	-1753	-218	-50	0	0	0	0	0	0	0	0
GOE BONDS	0	0	0	0	0	0	0	84	239	241	242
INVENTORY	0	0	1464	207	265	374	42	0	0	0	0
ACCOUNTS REC	-135	-265	-1008	-26	0	1143	233	161	0	0	0
OTHER ASSETS	0	0	0	0	0	0	0	0	0	-214	0
ACCOUNTS PAY	1225	622	306	3	0	-251	-34	-97	13	5	8
INTEREST	0	0	70	15	0	2078	2078	1973	1844	1710	1566
LOAN REPAYMENTS	3164	1086	1084	550	682	0	1178	2074	2172	2306	2450
PROFIT DISTRIBUTED	0	0	0	0	0	0	2355	6724	6779	6799	8492
TOTAL	8100	7421	21645	21576	12158	3344	5852	10919	11047	10847	12757
YRLY CASH BALANCE	-1297	-339	332	1152	2680	11527	11054	7285	7068	7154	5016
CUM CASH BAL	1216	877	1209	2361	5041	16568	27622	34907	41975	49129	54145
RATIOS 2/											
OP RATIO BEF DEP	12.37	135.30	0.60	0.61	0.62	0.42	0.41	0.40	0.41	0.41	0.41
OP RATIO AFT DEP	14.64	176.30	0.95	0.92	0.92	0.77	0.72	0.66	0.66	0.66	0.61
DEBT SERVICE COV.	0.00	0.00	2.03	5.24	4.10	7.14	5.19	4.49	4.51	4.48	4.42
CURRENT RATIO	2.62	3.67	6.53	8.50	12.84	10.32	10.89	12.56	14.29	15.78	16.60
DEBT/EQUITY RATIO	0.10	0.09	0.29	0.38	0.39	0.37	0.35	0.33	0.31	0.29	0.26

1/INCOME BEFORE INTEREST BUT AFTER TAX

2/FOR DEFINITION OF RATIOS SEE ANNEX 2-4, PAGE 4

INDUSTRIAL PROJECTS DEPARTMENT

MAY 1974

EGYPT: TALKHA II FERTILIZER PROJECT

FINANCIAL RATE OF RETURN FOR TALKHA II - COST AND BENEFIT STREAM[1]

(LE'000)

Calendar Year	Operating Year	Cost 1 Capital Cost[2]	Cost 2 Gas	Cost 3 Other Variable Costs[3]	Cost 4 Fixed Costs[4]	Cost 5 Taxes	Benefit 1 Urea Sales	Benefit 2 Ammonia Transfers
1974	-4	1,377	-	-	-	-	-	-
1975	-3	19,854	-	-	-	-	-	-
1976	-2	23,044	-	-	-	-	-	-
1977	-1	8,035	-	-	-	-	-	--
1978	1	-	2,454	1,404	2,217	0	15,088	2,135
1979	2	-	2,785	1,637	2,639	164	18,069	2,420
1980	3	-	3,113	1,830	2,522	469	20,192	2,705
1981	4	-	3,113	1,830	2,554	473	20,192	2,705
1982	5	-	3,113	1,830	2,587	475	20,192	2,705
1983	6	-	3,113	1,830	2,620	593	20,192	2,705
1984	7	-	3,113	1,830	2,655	600	20,192	2,705
1985	8	-	3,113	1,830	2,691	700	20,192	2,705
1986	9	-	3,113	1,830	2,728	700	20,192	2,705
1987	10	-	3,113	1,830	2,766	700	20,192	2,705
1988	11	-	3,113	1,830	2,805	700	20,192	2,705
1989	12	(1,000)[5]	3,113	1,830	2,845	700	20,192	2,705

1/ Derived from the capital cost estimates and income statement unless otherwise specified.
2/ For derivation of capital cost estimate for ROR calculations see following page.
3/ Consisting of chemicals and catalysts, power and bags.
4/ Consisting of labor and general expenses, and maintenance materials. Labor costs escalate by 3% each year.
5/ Consisting of marginal working capital in 1989.

Base Cases: Financial Rate of Return, before Taxes: 19%
Financial Rate of Return, after Taxes : 18%

Industrial Projects Department,
February 22, 1974

EGYPT: TALKHA II FERTILIZER PROJECT

Capital Cost Estimate for Financial Return Calculations

	Amount (£E '000)
Total Financial Cost Estimate of Project (Annex 5-1)	51,926
Less Adjustments:	
(a) Interest During Construction	3,526
(b) Price Contingencies	9,691
Total Adjustments	13,217
Financial Capital Cost Estimate (in 1974 costs)	38,701

To convert the Financial Capital Cost Estimate into 1978 costs, the following assumptions about the pattern of expenditures and the yearly escalation factors have been made:

(£E '000)	1974	1975	1976	1977	Total
Financial Capital Cost Est.	943	15,478	14,810	7,470	38,701
Yearly Escalation	14%	11%	7.5%	7.5%	-
Conversion Factor to convert to 1978 costs	1.46	1.2827	1.556	1.075	-
Financial Capital Cost Estimate Used in ROR Calculations (in 1978 costs)	1,377	19,854	23,044	8,035	52,310

Industrial Projects Department
May, 1974

EGYPT: TALKHA II FERTILIZER PROJECT

ECONOMIC RATE OF RETURN FOR TALKHA II, COST AND BENEFIT STREAMS[1]
(LE '000)

Calendar Year	Operating Year	Cost 1 Capital Cost[2]	Cost 2 Gas[3]	Cost 3 Other Variable Costs[4]	Cost 4 Fixed Costs[5]	Benefit 1 Urea Sales	Benefit 2 Ammonia Transfer
1974	-4	1,334	0	0	0	0	0
1975	-3	19,244	0	0	0	0	0
1976	-2	22,330	0	0	0	0	0
1977	-1	7,780	0	0	0	0	0
1978	1	0	6,871	1,404	2,067	18,980	2,135
1979	2	0	7,798	1,637	2,214	21,921	2,420
1980	3	0	8,716	1,830	2,362	25,536	2,705
1981	4	0	8,716	1,830	2,390	25,536	2,705
1982	5	0	8,716	1,830	2,418	25,536	2,705
1983	6	0	8,716	1,830	2,446	25,536	2,705
1984	7	0	8,716	1,830	2,476	25,536	2,705
1985	8	0	8,716	1,830	2,507	25,536	2,705
1986	9	0	8,716	1,830	2,539	25,536	2,705
2987	10	0	8,716	1,830	2,571	25,536	2,705
1988	11	0	8,716	1,830	2,604	25,536	2,705
1989	12	(1,000)[6]	8,716	1,830	2,635	25,536	2,705

1/ Derived from the capital cost estimates and income statement unless otherwise specified
2/ Please see page 2 of this Annex for its derivation
3/ The cost is US $1.40 per MCF.
4/ Consisting of chemicals and catalysts, power, and bags
5/ Consisting of labour, general expenses, and maintenance materials. Labour cost escalates by 3% each year.
6/ Consisting of marginal working capital in 1989.

Base Case:
Economic Rate of Return: 19%

Industrial Projects Department
March, 1974

EGYPT: TALKHA II FERTILIZER PROJECT

Capital Cost Estimate for Economic Return Calculations

	Amount (£E '000)
Total Financial Cost Estimate of Project (Annex 5-1)	51,926
Less Adjustments for Economic Capital Cost Estimate:	
(a) Assume 10% of local erection costs as taxes and transfers	300
(b) Assume 40% of local cost of civil works as unskilled labor, to be shadow priced at 50%	900
(c) Interest During Construction	3,526
(d) Price Contingencies	9,691
Total Adjustments	14,417
Economic Capital Cost Estimate (in 1974 costs)	37,501

To convert the Economic Capital Cost Estimate into 1978 costs, the following assumptions about the pattern of expenditures and the yearly escalation factors have been made:

(£E '000)	1974	1975	1976	1977	Total
Project Expenditures	914	15,003	14,351	7,233	37,501
Escalation	14%	11%	7.5%	7.5%	-
Conversion Factor to convert to 1978 costs	1.46	1.2827	1.1556	1.075	-
Economic Cost Estimate Used for ROR Calculation (in 1978 costs)	1,334	19,244	22,330	7,780	50,688

Industrial Projects Department
May, 1974

EGYPT: TALKHA II FERTILIZER PROJECT

ANNUAL FOREIGN EXCHANGE SAVINGS[1/]

Cost of Goods Sold	LE '000 Local	LE '000 Foreign	LE '000 Total
Natural Gas	3,113	-	3,113
Chemicals and Catalysts	-	375	375
Power	395	-	395
Polyethylene Chips (for bags)	-	1,060	1,060
Maintenance Materials	-	1,161	1,161
Labor [2/]	1,200	-	1,200
Other Expenses	300	-	300
Depreciation [2/]	1,484	3,303	4,787
10% Return on Total Capitalization Minus Working Capital	1,650	3,370	5,020
Total	8,142	9,269	17,411

	LE '000	US$ '000
Gross Foreign Exchange Value of Urea Sales[3/] (542,000 TPY)	25,490	65,000
Estimated Foreign Exchange Content of Production Costs	9,269	23,634
Annual Foreign Exchange Saving	16,221	41,366

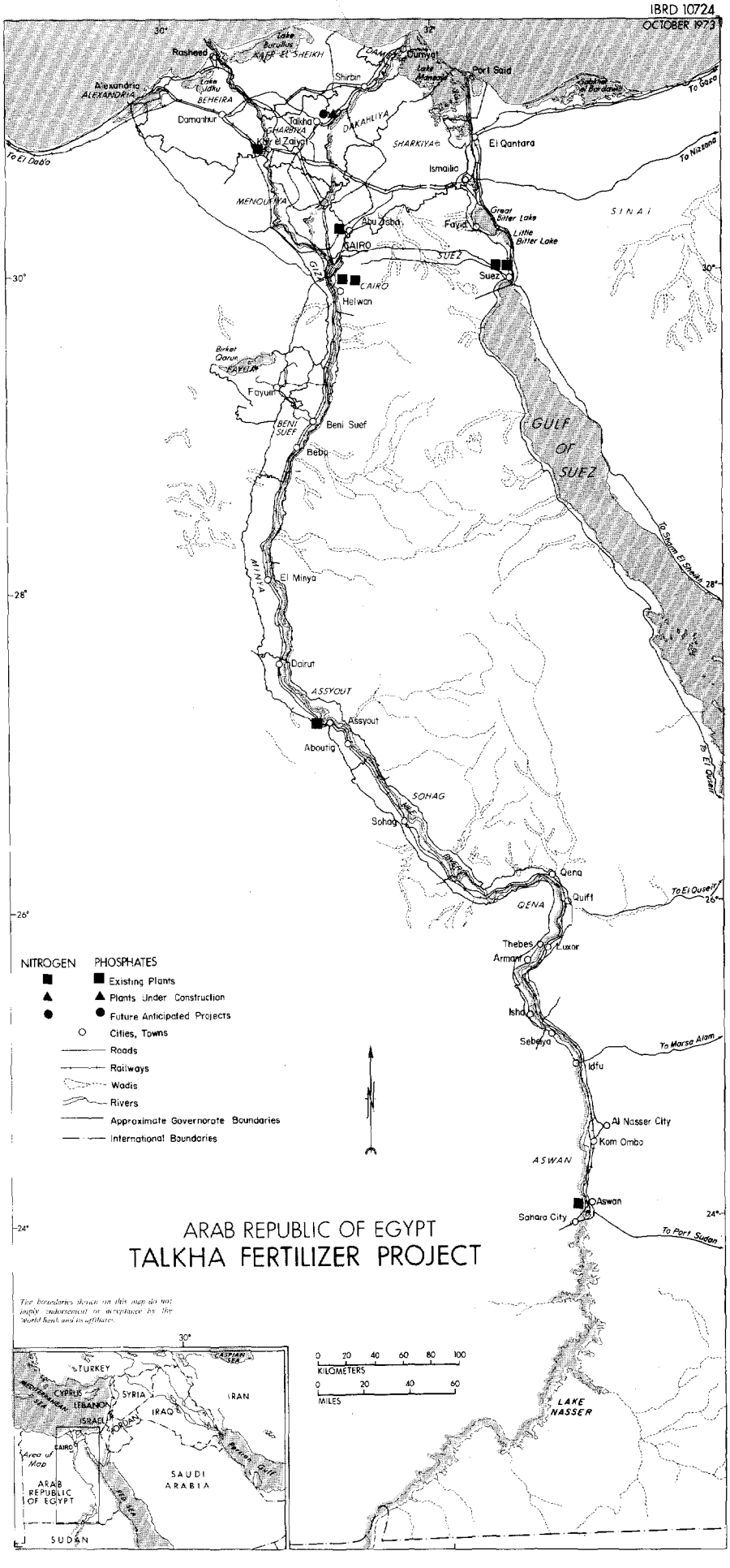
1/ Foreign exchange savings due to additional production of CAN made possible by the project are small in comparison to the savings achieved through urea production and are not included. Capacity utilization of Talkha II is assumed to be 95%.

2/ Average cost during project life.

3/ Assuming US$ 120 per ton CIF Alexandria.

Industrial Projects Department
March 1974

IBRD 10724
OCTOBER 1973



ARAB REPUBLIC OF EGYPT
TALKHA FERTILIZER PROJECT

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