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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

101p.

PROJECT PAPER

2780222004201

Proposal and Recommendations
For the Review of the
Bilateral Assistance Subcommittee

JORDAN - POTASH PLANT

AID/BAS-016

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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

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AID/BAS-016

July 11, 1978

MEMORANDUM FOR THE BILATERAL ASSISTANCE SUBCOMMITTEE

SUBJECT: Jordan - Potash Plant

Attached for your review are recommendations for authorization of a loan to Jordan (the "Cooperating Country") in an amount not to exceed Thirty-Eight Million United States Dollars ($38,000,000) to help in financing certain foreign exchange costs of goods and services required for the project.

No meeting has been scheduled for this loan proposal; however, your concurrence or objection is requested by close of business on Wednesday, July 19, 1978. If you are a voting member, a poll sheet has been enclosed for your response.

Working Group on Bilateral Assistance
Office of Policy Development and Program Review

Attachments:
Summary and Recommendations
Project Analysis
Annexes 1 - 16

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AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

TO BE COMPLETED BY ORIGINATING OFFICE

1. TRANSACTION CODE ("X" appropriate box)
[XX] Original [ ] Change [ ] Add [ ] Delete

PP

DOCUMENT CODE 3

2. COUNTRY/ENTITY: Jordan

3. DOCUMENT REVISION NUMBER:

4. PROJECT NUMBER: 278-0210 ($5m) 278-0222 ($33m)

5. BUREAU: a. Symbol: NE; b. Code: 4

6. ESTIMATED FY OF PROJECT COMPLETION: FY 83

7. PROJECT TITLE - SHORT (stay within brackets): Potash Plant

8. ESTIMATED FY OF AUTHORIZATION/OBLIGATION: a. INITIAL mo. 7 yr. 78; b. FINAL FY 79

9. ESTIMATED TOTAL COST ($000 or equivalent, $1 =)

a. FUNDING SOURCE	FIRST YEAR FY 78			ALL YEARS		
	b. FX	c. L/C	d. Total	e. FX	f. L/C	g. Total
AID APPROPRIATED TOTAL	5,000	- -	5,000	38,000	- -	38,000
(Grant)	( )	( )	( )	( )	( )	( )
(Loan)	(5,000)	( )	(5,000)	(38,000)	( )	(38,000)
Other U.S. 1.						
Other U.S. 2.						
HOST GOVERNMENT	- -	10,000	10,000	15,000	119,000	134,000
OTHER DONOR(S)	35,000	- -	35,000	257,000	- -	257,000
TOTALS	40,000	10,000	45,000	310,000	119,000	429,000

10. ESTIMATED COSTS/AID APPROPRIATED FUNDS ($000)

a. Appropriation (Alpha Code)	b. Primary Purpose Code	c. Primary Tech. Code	FY 78 d. Grant	FY 78 e. Loan	FY 79 f. Grant	FY 79 g. Loan	FY 80 h. Grant	FY 80 i. Loan	ALL YEARS j. Grant	ALL YEARS k. Loan
SA	734	833		5,000		33,000				38,000
TOTALS				5,000		33,000				38,000
11. ESTIMATED EXPENDITURES				1,000		10,000		20,000		

12. PROJECT PURPOSE(S) (stay within brackets) [ ] Check if different from PID/PRP

To assist the Government of Jordan in increasing its foreign exchange earnings by producing and exporting approximately 1.2 millions tons of potash annually.

13. WERE CHANGES MADE IN BLOCKS 12, 13, 14, or 15 OF THE PID FACESHEET? IF YES, ATTACH CHANGED PID FACESHEET.

[ ] Yes [XX] No

14. ORIGINATING OFFICE CLEARANCE

Signature: S. A. Taubenblatt

Title: Director, Office of Project Development, Bureau for Near East

Date Signed: mo. day yr.

15. Date Received in AID/W, or For AID/W Documents, Date of Distribution: mo. 06 day 23 yr. 78

AID 1330-4 (7-75)

JORDAN - POTASH PLANT

Table of Contents

		Page
1.0	Summary and Recommendations	1
2.0	Background	5
3.0	Project Description	9
	--The Arab Potash Company	9
	--Production Facilities	10
4.0	Technical Assistance	16
5.0	Capital Cost Estimate	18
6.0	Financing Plan	23
7.0	Technical Analysis	26
8.0	Marketing	32
9.0	Financial Analysis	41
10.0	Economic Analysis	45
11.0	Environmental Analysis	48
12.0	Social Analysis	49
13.0	Implementation Plan and Schedule	50
14.0	Conditions and Covenants	56

ANNEXES

Annex No.	Subject
1.	Section 611(e) Certification
2	Statutory Checklist
3.	Site Plan
4.	Technical Advisors - Scope of Work
5.	Financial Advisors - Scope of Work
6.	Working Capital Calculation
7.	Debt Service Schedule
8.	Timetable for Marketing Activities
9.	Financial Projections
10.	Transportation and Loading Costs
11.	Initial Environmental Examination
12.	Break-Even Analysis
13.	Logical Framework Narrative
14.	Schedule for Construction and Initial Operation
15.	Evaporation System - Flow Chart
16.	Draft Project Authorization

1.0 Summary and Recommendations.

1.1 Borrower. The loan will be made to the Government of Jordan (GOJ) which will relend the entire amount of the loan to the Arab Potash Company (APC)1/.

1.2 Loan Amount. An amount of $5 million is to be provided from FY 1978 funds and an additional amount of $33 million from FY 1979 funds. The Project Agreement will contain all the terms and conditions applicable to the eventual total loan of $38 million, of which $33 million are expected to be added by Amendment early in FY 1979, subject to appropriation of funds.

1.3 Terms and Conditions.

(a) The first-step loan to the GOJ will be for 40 years, including a grace period of 10 years; interest will be charged at the rate of 2% per annum during the grace period and at 3% per annum thereafter.

(b) The second-step loan (reloan) from the GOL to the APC will be for a term of 20 years, including a grace period of 6 years and interest at 8% per annum; it is anticipated that one-half of the interest (4%) due the GOJ during the construction period will be deferred and paid by APC, together with interest on the deferred amounts, over a period of five years beginning in 1985, the year capacity production is estimated to be first achieved.

(c) A number of Conditions Precedent and Covenants will be included in the Project Agreement; they are listed and discussed in Section 14 of this Paper.

1.4 Summary Project Description.

(a) The Project is designed to increase the foreign exchange earnings of Jordan by generating exports worth over $100 million annually (in 1977 dollars)2/ which are expected to aggregate about

1/ See discussion of APC in paragraph 3.1.

2/ Expressed in current dollars, gross export earnings are likely to exceed $200 million annually by 1989.

$1.1 billion (in 1977 dollars) in net foreign exchange earnings over a period of 20 years.

(b) The Project consists of the construction of production facilities for 1.2 million tons of potash (potassium chloride) of standard fertilizer grade (containing 60% to 62% potassium oxide -- K_2O); included in these facilities are solar evaporation pans enclosed by dikes, brine pumping and transfer installations, carnallite harvesting equipment and a processing plant (refinery) in which carnallite will be processed into the end product, potassium chloride. Also included in the Project are storage facilities at the site, a truck fleet to transport potash from the site to Aqaba for shipment overseas, a steam plant in which the processing steam and part of the refinery's power will be generated, fresh water supply systems and a township in which first construction personnel and later APC's operating staff will be housed.

(c) The Project also includes a substantial amount of technical assistance which will be provided under a number of separate contracts, as follows:

(i) a contract for engineering and construction supervision which also includes a training element;

(ii) a contract for technical advisory services;

(iii) a contract for accounting and financial management assistance which will include a substantial training element; and

(iv) a contract for operating management to provide assistance in managing the plant and to train managing and operating personnel before the start and during the early years of operation.

1.5 Project Cost and Financing Plan.

(a) The total cost of the Project is estimated at $428.8 million, including a base cost of $268.9 million, physical contingencies of $26.9 million,

escalation of $57.5 million, working capital of $24.8 million and interest during construction of $50.6 million. The foreign exchange costs are estimated at $310.0 million and local cost at $118.8 million.3/

(b) The financing plan provides for equity financing of 45% ($193 million), debt financing of 51% ($218 million) and use of internal cash generation for 4% ($18 million) of the costs). Debt financing, in addition to the AID loan recommended here, is expected to be provided by the World Bank $35 million), the Kuwait Fund ($35 million), the Arab Fund for Economic and Social Development ($15 million), the Libyan Government ($50 million), the OPEC Fund ($7 million), and by commercial institutions ($20 million). Addtional financing during the construction period is expected to be provided by the GOJ in the form of a deferral of the differential between the interest it is charged by foreign lenders and the interest it is to receive under reloans to APC ($18 million). Equity financing will be provided primarily by the Arab Mining Company, the Islamic Development Bank and the GOJ (See Section 6 for details).

1.6 Mission Views.

The Mission fully supports the Project. The Mission Director's Section 611(e) certification is attached as Annex 1.

1.7 Statutory Checklist.

All statutory criteria are met. (See Annex 2 for Checklist.)

1.8 Source of Funds.

Funds for the proposed loan are to be provided from the Security Supporting Assistance appropriation for FY 1978 ($5 million) and Security Supporting Assistance expected to be appropriated for FY 1979 ($33 million). The $5 million loan was included in the Congressional Presentation for FY 1978 and the proposed $33 million loan in that for FY 1979.

3/See Section 5 for details.

1.9 Issues.

There are no unresolved issues.

1.10 Recommendation.

That a loan of $38 million to the GOJ with the terms stated in para-raph 1(a) and 1(b) and on the conditions referred to in paragraph 1(c), above, be authorized, using $5 million of FY 1978 and $33 million of FY 1979 Security Supporting Assistance funds, provided that the FY 1979 funds become available from the appropriation for that year.

2.0 Background

2.1 The first efforts to extract potash from the Dead Sea date back to 1930 when the Palestine Potash Ltd. began operations at the northern end of the Dead Sea. In 1937, a second plant was built in the south, at Sodom. By 1945, the combined production of both plants had reached 100,000 tons per year (tpy) of potassium chloride (KCl)[4/] Damage was suffered by both plants in 1948; most of the remaining facilities in the south were left in Israel when the truce line was established; the northern works were abandoned. In 1952, the Israeli Government formed the Dead Sea Works Ltd. which restored the facilities at Sodom and reached a production of 1,000,000 tpy in 1960. The facilities were expanded in the 1960's and now produce about 1.2 million tons a year.

2.2 On the Jordanian side, the Arab Potash Company (APC) was formed in 1956 to develop potash extraction from the Dead Sea. In 1960, after some experimental work at both ends of the Dead Sea, APC awarded a contract for a feasibility study to Western Knapp Engineering Co., of San Francisco, which submitted its report in 1962. That report recommended facilities for the production of potash, based on the evaporation of brine by solar energy, at a rate of 250,000 tpy. It became evident, however, that a plant of that size would not be economical and in 1964 AID financed a contract with Jacobs Engineering Company (JEC), of Pasadena, California, to review the earlier report by Western Knapp and carry out further technical and financial analyses. JEC carried out that work using Sir Alexander Gibb & Partners (AGP), then of London, now of Reading, England, as consultants on the civil works aspects of the project, such as dike design and evaporation pans.

4/KCl, marketed as muriate of potash, contains 60 to 62 percent of K_2O_5, its active nutrient.

2.3 As a result of the 1964 JEC study, it became clear that the minimum economic size of the facilities would be 500,000 tpy and discussions were initiated between APC, AID, the World Bank Group and, eventually, the Kuwait Development Fund, resulting in a decision that confirmation of ultimate productive capacity and feasibility was required prior to investing in plant construction. As a result, JEC was retained to undertake a detailed feasibility study which was completed in 1966; it concluded that, at relatively little additional cost, the facilities could be constructed to produce 1 million rather than 500,000 tpy.

2.4 One of the conditions for financial participation established by the potential lenders at that time was the participation in the project of a technically and commercially experienced foreign company. A number of companies showed interest and, in early 1967, W. R. Grace Co. made a formal proposal which led to a series of discussions between all the potential participants in the project. It was agreed facilities with a capacity of one million tpy could be constructed at a cost then estimated at $90 million. The expected export price for potash f.o.b. Aqaba was considered well within the market price, then ranging from $22 to $24 per metric ton. In June, 1967, because of conflict in the area development of the project stopped.

2.5 In 1974, the Jordanian Government asked JEC to update its 1966 study so that the viability of the project under current and foreseeable future market conditions could be assessed. It was found that the increase in potash prices that had occurred since 1966 would permit profitable operations even though current capital costs would be much higher than originally estimated. The construction of a trial dike, already envisaged in 1966, and a more detailed review of the commercial and technical aspects of the project were, however, still considered necessary. The IBRD renewed its interest in the project, consulted with both the GOJ and APC on numerous occasions and assisted them in preparing documentation for and assessing qualifications of firms which were invited to submit proposals for the Feasibility Study.

2.6 After a detailed analysis of the proposals and consultations with the interested firms[5] Jacobs International Inc. (JII), a wholly owned subsidiary of Jacobs Engineering Company, was selected as contractor for the feasibility study; AGP again was selected as subcontractor for the civil works aspects and the Technical Services Office, of Amman, Jordan, as subcontractor for other phases of the study program. A contract with JII was executed by APC on November 13, 1975. The Scope of Work incorporated into the contract included not only the normal elements of a technical and economic feasibility study but also extensive field work to establish evaporation rates, hydrological studies to determine the availability of fresh water for use in the processing plant and in the township, estimates of future levels of the Dead Sea and flood water run-off and the design and construction of trial dikes to determine optimal cross sections, construction methods and seepage control measures.[6] After competitive bidding, a contract for the construction of the trial dikes and related work was awarded to Brown and Root, of Houston, Texas; Whimpey, of London, England, served as subcontractor for drilling and soil analysis work. The entire program was budgeted at $10 million, of which AID made $6 million and IDA $1 million available as loans to the GOJ for relending to APC. The remainder of the funds was provided by the GOJ and APC.

2.7 Based on the field work carried out and the technical and economic studies completed, a Preliminary Report was issued by JII in December 1976. That Report was reviewed in a meeting held in London in June 1977 and attended by all institutions interested in financing part of the Project at that time. The draft of the Final Feasibility Report was issued in late December 1977 and reviewed by APC, the IBRD and AID in a series of meetings held in JII's offices in Pasadena, California, in January 1978. As a result of those

5/For details of the selection procedure, see pages 8 and 9, Project Paper for "Feasibility Study-Potash Production" (AID-DLC/P-2144), dated January 13, 1976.

6/See Annex I, ibid., for complete Scope of Work.

meetings, some changes were made in the Final Feasibility Report distributed in March 1978. At the meeting in London, the IBRD had agreed to prepare an Appraisal Report for distribution to all interested parties before the potential lenders met again to review the Final Feasibility Report. The IBRD's report was issued on February 16, 1978[7] and reviewed, together with the Feasibility Report, in meetings held in Amman from April 11 to April 13, 1978.

2.8 The Amman meetings were attended by the IBRD, the Islamic Development Bank, the Kuwait Fund, the Arab Fund for Economic and Social Development, the Libyan Arab Foreign Bank and AID as potential financiers and the APC, its consultants and the National Planning Council of the GOJ. The financing institutions represented concluded that the Project is feasible. The nature and amounts expected to be made available by each of the institutions is discussed in Section 6 of this Paper (Financing Plan).

7/ Report No. 1922(a)-JO, prepared by the Industrial Projects Department.

PROJECT DESCRIPTION

The Arab Potash Company

3.1 Capitalization.

The Arab Potash Company, which will own and operate the potash production facilities and related works to be financed in part with the proposed AID loan, was founded in 1956 and granted a 100-year concession by the GOJ in 1958. Under the terms of that concession, APC has the exclusive right within the territory of Jordan to exploit the mineral resources of the Dead Sea and benefits from a number of tax and other privileges, such as the duty-free importation of plant, equipment, and materials. The initially authorized capital of JD 4.5 million was subscribed by the GOJ (49.5% of the stock), by the Governments of Egypt, Iraq, Kuwait, Lebanon, Saudi Arabia, Syria, and Qatar, and by private shareholders, all of which held the remaining 50.5% of the stock. In February 1977, when discussions with a number of potential lenders began, the Board of Directors authorized an increase in the Company's capital to JD 40 million; JD 5.5 million had been paid in as of December 31, 1977.8/ After final cost estimates became available early in 1978, it became apparent that additional equity funds would have to be provided as a base for a larger volume of debt financing than had been anticipated earlier. The equity needed to fund 45% of the Project costs, the ratio agreed upon during the meetings in Amman held in April 1978, will amount to about 193 million (JD 63.7 million). A further increase in APC's capitalization is, therefore, planned for the near future.9/

3.2 Board of Directors.

The Chairman of the Board and General Manager is a businessman with substantial experience in Jordan and other Arab countries. The GOJ is represented on the Board with five members drawn from the Central Bank, the

8/From Balance Sheet in APC's Annual Report for 1977. Total assets amounted to JD 8.2 million. The expected distribution of equity among different shareholders is given in paragraph 6.2 below.

9/See Section 14 for Conditions Precedent relating to this matter.

National Planning Council, the Natural Resources Authority and the Ministry of Industry and Trade; three other members, representing Iraq, Kuwait and the Arab Mining Company, complete the present 9-member Board. The membership of the Board is expected to be enlarged to 11 when the further increase in equity is authorized; six of them will represent the GOJ, the majority shareholder, three the Arab Mining Company, which will hold a 25-percent interest, and two the other shareholders.10/

3.3 Staff.

In the course of the last two years, APC has begun to recruit technical and other professional staff needed for the construction and operation of the Project. The staff is being built up as the increasing Project activities require. Although APC appears to have no difficulty in recruiting technical personnel for its central office who have an appropriate professional background, substantial efforts will have to be made to form a management cadre with sufficient administrative and business expertise to run the day-to-day operations of the Company. The arrangements being made to obtain operational and training assistance should, however, be adequate to accomplish that task during the seven years that will elapse before the potash plant reaches full production.11/

Production Facilities.

3.4 Site.

The production facilities are located in, and on the eastern shore of, the southern basin of the Dead Sea, i.e. the area south of the Lisan peninsula (See Annex 3 - Site Plan). The Dead Sea is about 80 km long and up to 18 km wide, covering an area of about 900 km^2. It is fed by the Jordan River in the North but has no outlet. The northern part, i.e. the area north of the Lisan peninsula is up to 400 m deep but the southern basin is substantially dried up and its soft mud bottom exposed. The elevation of the Dead Sea surface north of the Lisan peninsula was, in 1977,

10/The new composition of the Board was approved by the GOJ in March 1977 but has not yet been implemented.

11/See Section 4 for the Technical Assistance component of the Project.

399.5 m below sea level. The system of dikes which will enclose the evaporation pans stretches from the southern tip of the Lisan peninsula to a point about 5 km north of the village of Safi at the southern end of the basin. The plant site is located about 8 km north of Safi on the road leading from Safi to the village of Mazra, a road now being widened and connecting, about 2 km south of Mazra, with the road leading up the escarpment to Karak and thence to the Desert Highway; in the south, the Safi-Mazra road connects with the new highway to Aqaba which is completed except for a few structures. The distance from Safi to Aqaba is about 200 km.

3.5 Project Elements.

The major elements of the project are (a) a brine intake structure and brine transfer system to bring the brine to the evaporation ponds and to move it from one pan to another; (b) a system of evaporation ponds in which the brine is concentrated in three stages, during the last of which carnallite precipitates; (c) a harvesting system to collect and transport the carnallite to the processing plant; (d) a processing plant in which fertilizer grade potash is produced from carnallite; (e) storage; (f) plant utilities (water and power); and (g) a township, in which first construction personnel and later operating staff will be housed, together with the necessary water and power supply systems. A description of these project elements is given in the following paragraphs; a more detailed discussion is contained in Section 7 (Technical Analysis).

3.6 Intake and Brine Transfer.

The intake structure from which Dead Sea brine will be pumped is located in relatively deep water off the northern tip of the Lisan peninsula. The brine then flows through a 10 km long canal along the western shore of the peninsula to its south-western point where the brine will be discharged into the evaporation pond (or pan) system. The pumps will be located on a platform at the end of an access dike about 900 m long. Three pumps of 1,200 HP each will be used. Other pumps of various capacities will be installed on the dikes to transfer brine from one pan to another.

3.7 Evaporation Pans.

The dike system will total about 58 km in length and enclose an area of 70.8 sq. km. The main dike, which constitutes the western boundary of the project site, will run parallel to the Truce Line, at an average distance of about 500 m from similar dikes built by the Dead Sea Works Ltd. (DSW) to enclose the pans used for the production of potash and other chemical products on the Israeli side of the Dead Sea. By far the largest pan, into which the brine will first be transferred from the Dead Sea, is the Salt Pan which will cover an area of about 40 sq. km. directly south of the Lisan peninsula. To its south lie two Pre-carnallite Pans totaling 14.8 sq. km. and three carnallite pans with a combined area of 16 sq. km. All pans except the salt pan, which will remain open towards the East, are enclosed by dikes on all sides. The dikes will be constructed from locally available materials, principally gravel and clay. Cross sections of dikes and construction methods were determined on the basis of detailed site investigations and trial dike construction carried out within the framework of the Feasibility Study.

3.8 Carnallite Harvesting.

Carnallite will be continuously harvested by track-mounted equipment equipped with a floating pipeline connected to shore-based pumps. The carnallite will be pumped to the refinery in the form of a slurry. (See the more detailed discussion of the harvesting equipment in Section 7). Since the carnallite pans are located in a soft mud area, a layer of salt will first be deposited to permit the harvesting equipment to operate and to prevent the admixture of mud to the carnallite slurry.

3.9 Carnallite Processing.

The slurry, which contains only 15 to 20 percent solids by weight, will first be dewatered by cyclones located on the dikes of the carnallite pans to obtain a density of 35 to 40 percent by weight. At the plant, the slurry is almost completely dewatered and the magnesium chloride is dissolved and separated from the remaining solids, a mixture of carnallite and sodium chloride. In the next step, hot-leaching, the potassium chloride

is dissolved and the solid sodium chloride thickened and removed by centrifugation. The liquid, which is rich in potassium chloride, is fed into a three-stage crystallizing system, operated at different temperatures (180°, 150° and 120°), in which potassium chloride crystallizes while the remaining sodium chloride remains in solution. After separation, the potassium chloride is dried, screened and treated to prevent caking; it is now in the form of standard-grade potash and ready for storage and shipment. Dust created during the last processing stages is separated in cyclones and, to collect the smaller particles, in an electrostatic precipitator. Automatic controls and monitoring devices are used to the extent that they increase plant efficiency or safety over the degree attainable with completely manual control.

3.10 Storage.

A warehouse with a storage capacity of 60,000 metric tons will be provided at the plant site. It will be used to store product which cannot be loaded as it comes from the refinery. Normally, potash will be conveyed from the dryer directly to one of two loading bins, the other being used simultaneously for loading of trucks. Truck scales are provided to control and record the weight of product leaving the plant. Additional storage for 150,000 tons will be provided at Aqaba.

3.11 Plant Utilities.

Neither water nor power required for plant operations are available at the remote project site and supply systems must therefore be constructed. Water requirements for the plant are approximately 5.6 million m^3 per year when the plant produces at its capacity of 1.2 million tons per year. For most process purposes brackish water can be used. Sources of water were explored during the Feasibility Study. Use of surface flows was eliminated because such flows are now partially used for irrigation and are likely to be fully used for that purpose in the future. Sufficient quantities of groundwater have been located in Ghor Safi, i.e. in the alluvial fan of the Wadi Hasa. The consultants recommend construction of seven wells around Safi which could supply the plant's water requirements. To the extent that agricultural uses of surface flows in the

Wadi Hasa permit such flows may also be used; this may be the case from May to August when irrigation water needs are low. (See also paragraph 7.12, below). The power required to operate the brine pumps and plant equipment amounts to about 20,000 kw on the average; the connected load will be almost 30,000 kw. The plant also needs over 190,000 lbs of process steam per hour. (See also discussion in paragraph 7.11).

3.12 Township.

During the construction of the project facilities, the engineering consultants, construction contractors and APC are expected to employ over 800 people at the project site. APC's operational staff stationed at the site after construction is completed will number over 600. Since it is impossible to obtain housing for a project staff of that size in the only two neighboring villages (Safi and Mazra), APC decided to house project staff in a township to be constructed for that purpose in reasonable proximity to the project site. The site is owned by APC and was chosen as the most suitable of eight possible sites investigated. It is located about 20 km from the plant site at an elevation about 150 m above the level of the Dead Sea. It will be accessible from both the Karak-Mazra and the Mazra-Safi roads by connecting roads to be constructed. The township will contain 380 houses to accommodate an estimated population of over 2,000 people. In addition, it will have a Town Center, a school, sports facilities, shops, a bank and a health clinic. Fire protection facilities, a police post, and religious buildings will be provided by the Government.

3.13 Water will be pumped to the Township reservoir from wells located near Mazra. The distribution system will operate by gravity. Total requirements are estimated at about 0.5 million cu.m. per year. A central sewerage system will also be constructed. Power will initially be provided by diesel generators installed in the township. These are expected to be replaced when power from the national grid becomes available.

3.14 Ancillary Project Facilities.

Two facilities not included in the scope of the project but, nevertheless, vital to its operations are an all-weather road from Safi to Aqaba and a loading dock at

Aqaba. The road has been under construction for several years and is almost completed. A dock is to be constructed at Aqaba, either to handle potash only or to handle, in addition, the output of the projected fertilizer plant at Aqaba. Planning for construction of the dock and financing arrangements are being actively pursued by the Jordanian Government.12/

3.15 Inland Transportation.

APC will own and operate its own truck fleet to move the plant output from the production site to Aqaba for ocean shipment. The hauling operation will require 31 rigs consisting of a tractor, a semi-trailer and a following trailer supported on a dolly. Each rig will have a capacity of 60 tons. Maintenance facilities, a wrecker and pick-up trucks for road service, and a garage will also be provided. (See paragraph 7.10 for a more detailed discussion).

12/ See Section 14 for Conditions Precedent and Covenants relating to the construction of loading facilities.

4.0 Technical Assistance.

4.1 During the development of the Project it became clear that APC would need substantial outside assistance both in the construction phase of the Project and during the first years of operation. Both APC and the potential lenders recognized that APC would have to build up the competence of its staff, primarily by on-the-job training to be provided by expatriate experts in technical as well as administrative disciplines. The arrangements discussed below have been agreed with APC.

4.2 Under its contract with APC, JII will provide, in addition to the Architectural and Engineering (A/E) services typically furnished by a consulting engineer, (a) overall project management assistance[13/] and (b) "start-up assistance"[14/]. "Plant Operations Assistance" is referred to in the contract[15/] but not included in the Scope of Work; JII merely states its willingness to provide such services. APC expects to enter into a separate contract for operational assistance with JII or another firm. The field staff to be assigned by JII and its subcontractors will work closely with APC's site staff during the construction phase and this collaboration should have a marked effect on APC's competence to deal with construction activities and provide valuable technical experience as background for plant operations to APC's personnel.

4.3 The assistance to be furnished by JII will be directed primarily to APC's field staff. It has, therefore, been agreed that APC will obtain the services of three to five well qualified technical advisors under a separate contract. Those advisors would work primarily with APC's management and, in fact, form part of the APC organization. At least one member of the advisory team, which may be supplemented with short-term specialists from time to time, is expected to remain in Jordan at least until construction of the Project is completed. A scope of work for these services has been agreed upon (see Annex 4) and APC issued a letter of intent to contract to King Wilkinson, of the Hague, Holland.

13/ Paragraph 1.B, Annex I to contract (Scope of Work)

14/ Paragraph 5.A, ibid.

15/ Paragraph 5.B, ibid.

4.4 APC has also recognized the importance of establishing a comprehensive system of accounting and financial reporting and control. To assist with this task, APC intends to obtain expert assistance from an international accounting firm; a letter of intent to contract has been issued to Deloitte, Haskins and Sells, of London. 72 work-months of such services are envisaged at this time. A scope of work has been agreed upon (see Annex 5). The advisors will be required to develop a training program for both in-house and outside training and to develop course materials for classroom training within the company.

5.0 Capital Cost Estimates.

5.1 The total cost of the Project is estimated at $428.8 million, of which $310.1 million will be required in foreign exchange and $118.7 in local currency. Those amounts are necessary to finance the cost of all production facilities, the township and other infrastructure investments (such as steam, power and water supply, roads and vehicles), A/E and other professional services, start-up expenses (other than normal operating costs), working capital, interest during construction, physical contingencies and escalation and the cost of the Feasibility Study.

5.2 The primary basis for the cost estimate is the Feasibility Study, as published in late February 1978. Earlier cost estimates prepared by JII were reviewed in detail during the meetings in Pasadena held in January 1978[16] during which certain changes in the pan lay-out, arrangements for the power supply and the site of the township were agreed upon; the cost estimate was then adjusted downward to reflect those changes. Estimates for working capital and interest during construction were prepared by the IBRD, which also agreed with the consultants on certain refinements and re-classification of cost items shown for the refinery. Table 5.1 is based on a revised cost estimate prepared by the IBRD after the meetings in Amman and distributed to the GOJ and all interested financing institutions on May 4, 1978; slight revisions in the amount provided for interest during construction were made subsequently. The only changes in the IBRD estimate made here are: (a) the addition of a line item for the technical and accounting advisory services; these were included but now shown separately in the IBRD estimate (Item 10); (b) a slight change in foreign exchange and local costs for Project Engineering and Management and a minor downward revision of the total cost for that item to reflect estimated contract costs (Item 11); and (c) minor revisions of the accounts provided for Physical Contingencies (Item 15). The grand total, i.e. the amount for Total Financing Required is unchanged. Notes on the Cost Estimate are in paragraph 5.3, below.

16/ See paragraph 2.7 above.

TABLE 5.1

CAPITAL COST ESTIMATES
(US$'000)

	Foreign Exchange	Local Currency	Total Total
1. Land[1/]	-----	3,030	3,030
2. Dike Construction	41,571	24,683	66,254
3. Brine Supply & Transfer System	19,659	5,015	24,674
Brine Supply System	7,575	1,932	9,507
Brine Transfer System	4,275	1,091	5,366
Temporary Brine Supply	7,809	1,992	9,801
4. Water Supply, Access Roads & Others	10,094	4,642	14,736
Water Supply System	1,267	195	1,462
Access Roads	900	1,100	2,000
Electrical Distribution	2,239	353	2,592
Insurance, Adm. Offices & Misc. Civil Works	5,688	2,994	8,682
5. Refinery	58,764	10,241	69,005
Machinery & Equipment	29,163	1,155	30,318
Electrical Distribution & Lighting	3,451	545	3,996
Insulation & Piping	16,173	4,151	20,324
Refinery Buildings	7,292	3,208	10,500
Site Works	2,685	1,182	3,867
6. Steam & Power Generation & Transmission	19,004	2,538	21,542
Equipment	11,133	440	11,573
Electrical Transmission & Distribution	4,314	681	4,995
Insulation & Piping	807	207	1,014
Power House & Site Work	2,750	1,210	3,960
Subtotal Production Facilities	149,092	50,149	199,241
7. Township	12,322	6,892	19,214
8. Potash Trucks	3,382	180	3,562
9. Project Engineering & Mgt.[2/]	20,355	875	21,230
10. Technical & Financial Advisors	1,200	300	1,500

TABLE 5.1

CAPITAL COST ESTIMATES
(US$'000)

(Cont.)

	Foreign Exchange	Local Currency	Total Total
11. Pre-Operational & Start-Up Expenses 3/	7,342	4,894	12,236
12. Post Start-Up Expenses 4/	2,400	600	3,000
13. Phase I (Feasibility Study) 5/	6,600	3,400	10,000
Subtotal - Items 7 to 13	53,601	17,141	70,742
BASE COST ESTIMATE - TOTAL	202,693	67,290	269,983
14. Physical Contingencies 6/	19,130	6,740	25,870
15. Price Escalation 7/	36,006	21,536	57,542
TOTAL PLANT COST	257,829	95,566	353,395
16. Working Capital 8/	22,361	2,412	24,773
17. Interest During Construction 9/	29,871	20,770	50,641
TOTAL FINANCING REQUIRED	310,061	118,748	428,809

1/ through 9/ - See "Notes on Cost Estimate" in Paragraph 5.3

5.3 Notes on Capital Cost Estimate.

1. Land. Not all the land needed for the refinery is owned by APC, although included in the concession area. The amount shown for land acquisition reflects APC's estimate of the price that will have to be paid for land not already owned by APC.

2. Project Engineering and Management. The total shown for this item is the estimated contract cost, exclusive of escalation and bonus payments, shown in Section 8 of the contract between APC and JII. Possible bonus payments, a maximum of $466,700, are provided for in the contingency. A provision for escalation is included in the amount shown for Price Escalation.

3. Pre-operational and Start-Up Expenses. The estimate for pre-operating and start-up costs includes $5.6 million for APC's head office and site staff until July 1982 and $6.6 million for the cost of the first two years of a contract for operational assistance. Assistance to be provided after 1982 will be financed from operating revenues and is so shown in the financial projections.

4. Post Start-Up Expenses. The amounts shown represent an estimate of the cost of changes, additions and adjustments to processing equipment which may become necessary as testing and start-up proceeds. The item provides, in effect, an additional amount for contingencies.

5. Feasibility Study (phase I). This item is included in the estimate, although it was previously financed by AID, IDA and GOJ, so that all costs related to the Project will be reflected in the estimate and properly considered in the financial and economic analyses and in computing the required equity. The GOJ intends to convert its loan and the reloans made to APC to finance the Feasibility Study into equity. The total equity will thus include the shares to be issued to the GOJ without a cash payment.

6. Physical Contingencies. The amounts provided represent an average of 11 percent of the cost of all production facilities, the township and Project Engineering and Management.

7. Price Escalation. The Base Cost Estimate reflects December 1977 prices. Escalation of foreign exchange costs is projected at 7.5 percent for 1978 and 1979 and 7 percent thereafter. Local price escalation is projected at 15.5 percent for 1978, 13 percent for 1979, 11 percent for 1980 and at 8.5 percent thereafter. Total price contingencies calculated on the basis of those projections amount to approximately 22 percent of the Base Cost Estimate, less the cost of the Feasibility Study.

8. Working Capital. The estimate of Working Capital requirements is based on the following calculations: (a) product inventory of 60 days' production; (b) accounts receivable reflecting 60 days credit; (c) 30 days' operating costs; (d) an inventory of fuel for 30 days' operation and of chemicals and other consumables needed for 60 days' production; and (e) an inventory of spare parts, with a value of approximately 14 percent of the escalated acquisition cost of machinery and equipment. The provision for Working Capital covers requirements through 1985.17/

9. Interest During Construction. The amount shown is calculated on the basis of an interest rate to APC of 8 percent p.a. on all loans other than those from the IBRD and commercial lenders to which a rate of 10 percent will be applicable.18/

17/ See detailed computation of Working Capital Requirement prepared by the World Bank in Annex 6.

18/ See Debt Service Schedule prepared by the World Bank in Annex 7.

6.0 Financing Plan

6.1 Debt/Equity Ratio.

During discussions of the Project with potential lenders during the past year, APC and the GOJ had agreed to a debt/equity ratio of 60/40. During the meeting in Amman in April 1978, it became clear, however, that it would be extremely difficult to obtain debt financing in the amount implied by that ratio. The suggestion was, therefore, made to increase the amount of equity financing to 45 percent of project costs. A debt/equity ratio of 55/45 was subsequently agreed upon with APC and the GOJ.

6.2 Equity Contributions.

The equity needed to finance 45 percent of the project costs is $193 million. The distribution of the shares after the projected increase in APC's capitalization is expected to be roughly as follows:

	Dollar Equivalent of Investment ($ million)	Percent of Total Equity
GOJ	98	51
Arab Mining Co.	48	25
Islamic Development Bank	12	6
Arab States and Private Shareholders	8	4
Others	27	14
TOTAL	$193 million	100

The Arab Mining Company is owned by various Arab Governments, principally of the oil-producing states. The 4 percent of stock to be held directly by Arab Governments and private holders represents essentially the shares they now hold. For the remaining $27 million worth of shares, the GOJ will, in effect, act as underwriter; possible purchasers of part or all of these shares are the Libyan Government, which may invest $10 million (about 5% of total equity) and the original

governmental and private shareholders to whom additional stock will be offered. Any shares not subscribed by others will be purchased by the GOJ, which may sell all or part of the stock exceeding 51 percent of total equity at a later time.

6.3 Debt Financing.

The following loans are now expected:

Institution	Amount ($ million)	Percent of Long-term Debt
IBRD	35	16%
AID	38	18%
Kuwait Fund	35	16%
Arab Fund	15	7%
Libyan Govt.	50	23%
OPEC Fund	7	3%
Commerical	20	9%
GOJ	18	8%
	218	100%

The amount shown for the IBRD loan, which is $10 million higher than that originally envisioned, is still subject to approval by the IBRD Board, which is expected. The GOJ loan of $18 million represents loans to be made by the GOJ to APC for that part of interest payments due the GOJ during the construction period which exceeds the amounts payable by the GOJ to foreign lenders other than the IBRD and commercial lenders; the latter will lend directly to APC with a Government guaranty. The total amount of such loans by the GOJ is the estimated difference between interest at 8 percent per annum payable by APC on reloans from the Government and an average interest rate of 4 percent payable by the GOJ on first-step loans from AID and the Arab lenders.

6.4 Summary Financing Plan.

In addition to equity and debt financing, APC will provide $18 million from its revenues during the early operating years (1983 to 1985) when construction is expected to be completed but the plant is not yet operating at capacity. During those years, substantial amounts will be required for working capital which are included in the capital cost estimate. The three

elements of the financing plan, i.e. equity, debt and internal cash generation, are summarized below.

Source of Funds	Amount ($ million)	Percentage of Project Cost
Equity	193	45%
Debt	218	51%
--AID	(38)	(9%)
--IBRD	(35)	(8%)
--Arab Institutions	(107)	(25%)
--Commercial	(20)	(5%)
--GOJ	(18)	(4%)
Internal Cash Generation	18	4%
TOTAL	429	100%

PROJECT ANALYSES

7.0 Technical Analysis

7.1 Solar Evaporation Pans.

The climate at the site is characterized by low rainfall, low humidity, high summer temperatures and a high incidence of sunshine; it is thus eminently suitable for the utilization of solar energy for the concentration of Dead Sea water by evaporation. The salinity of that water (brine) is about 30 percent, compared to about 4 percent for normal sea water. The salt content of the brine represents about 45 billion tons of dissolved solids of which about 75 percent are magnesium and sodium chlorides; the balance is made up of potassium chloride, calcium chloride, magnesium bromide and other substances. The total potash (potassium chloride) content of the Dead Sea is estimated at 2 billion tons.

7.2 The first step in the production of potash is the concentration of the brine in several steps until, in the last stage, carnallite precipitates. Carnallite, a double salt of magnesium and potassium, contains about 23 percent potash; it is the raw material from which potash is produced in the refinery. The concentration of the brine takes place in a series of three ponds (pans) which are enclosed by dikes; the area of the ponds will cover over 70 sq. km. and will require, for enclosure and separation of the ponds, dikes with a total length of about 58 km. The brine, which contains about 1 percent potash, will be pumped from the intake structure to the "salt pan", where most of the sodium chloride crystallizes and precipitates to the bottom of the pond. The brine will then be pumped across a separation dike into the adjacent Pre-Carnallite Pans, where additional sodium chloride will precipitate, and thence into the Carnallite Pans. A continuous system of pumping into and between the pans will be used so that carnallite can be harvested continually rather than in batches. The lay-out of the pans has been designed, and the transfer pumps have been sited and located, in such a manner that brine of the proper concentrations will be pumped into the different pans.

The salt deposited in the salt pan will be allowed to accumulate, making it necessary to raise the dikes periodically to maintain about 1 m brine depth in the pan. The dikes will have to be raised by about 2 meters after about 10 years of operation.[19] On the land side, the salt pan will not be enclosed, thus permitting the area covered to expand as the main dike is raised. All other pans will be completely enclosed by dikes. [19a]

7.3 To establish the width of the channel between the main dike to be constructed for APC and that built by the DSW to enclose its pan area, hydrological and meteorological studies were carried out. It was concluded that an average channel width of about 500 m will be adequate to pass a maximum flood volume of 1,600 m^3/sec, which was estimated to have a probability of occurring once in 1000 years. Since the data base used in the studies is, however, far from complete, it was decided to take the additional precaution of building some sections of the main dike with a lower crest so that any larger than expected flood volume that might occur would be diverted into the salt pan where damage would be minor; the operation of the critical carnallite pans would thus remain unaffected. Rip-rap protection, which is also used on the Israeli dikes, will be used on APC's main dike to prevent damage by flood waters or wave action.

7.4 The trial dike construction and soil testing carried out as part of the Feasibility Study permitted a detailed analysis of the stability and permeability of the soils on which the dikes will be constructed. Two major types of conditions were found, i.e. soft mud and salt deposits layered in mud. All dikes will be built with an impermeable clay core to control seepage but those dike sections to be built on a salt foundation, about 20 km, will also require the installation of a cut-off barrier below the dikes down to about 5 m into a contiguous clay bed. The method of placing that barrier was tested during the trial dike construction. The cross-sections of all dikes have been determined and the best construction methods ascertained. Gravel and clay, the principal construction materials, are available nearby in Wadi fans and on the Lisan peninsula.

19/Precipitated salt will accumulate at the rate of about 15 cm per year.

19a/See Annex 15 for Flow Chart.

7.5 Extensive hydrological studies were carried out to assess the likely changes in the level of the Dead Sea. The conclusion was reached that, barring the introduction of new factors, such as the conveyance of water from the Mediterranean to the Dead Sea, the recent trend would continue and the level of the Dead Sea fall by about 60 cm per year. Such falling would have no effect on the location or design of the dikes; the intake structure will be located in sufficiently deep water to be operable for at least ten years. It may then have to be relocated. Should the trend of changes in the sea level change, a sufficiently long period of time will be available to raise the crest of the dikes and thus prevent overtopping. The introduction of Mediterranean water, if it occurs may, in the long run, have the effect of stabilizing the level of the Dead Sea since it would be possible to balance the addition of water against the higher evaporation losses which a larger surface would entail. It is considered highly improbable that the addition of seawater to the Dead Sea brine would have a substantial effect on the salt concentration in the brine and thus on the production of potash.

7.6 The design of pans, and in particular the area allocated to each type of pan (salt, pre-carnallite and carnallite), is based on data obtained from the operation of test pans and meteorological data gathered within the framework of the Feasibility Study during the year preceding the establishment of design parameters. These data are more accurate than any available in the past but nevertheless may not completely reflect actual operating conditions over a number of years. That uncertainty has been taken into account. Even so, the advisability of providing a fourth carnallite pan was considered. After weighing the degree of probability that a fourth pan would be needed to obtain sufficient carnallite for the production of 1.2 million tons of potash and the additional cost of constructing a fourth pan, the decision was made to maintain the earlier three-pan design. Only three carnallite pans will, therefore, be constructed as part of the Project; a fourth pan can, however, be added later if production is to be expanded beyond the initial 1.2 million tons of potash.

7.7 On the basis of the hydrological studies done, and cross-checked to the extent possible, and of the

results of the dike construction trials conducted as part of the Feasibility Study, we conclude that the design of the main dike and its proposed location and the design of the interior dike system is sound. Allowances have been made for uncertainties in the data base by making conservative assumptions and introducing safety features into the design. With respect to the production of carnallite, the three-pan system could be operated in series rather than in parallel in the event that evaporation rates are lower than expected; it would be possible to obtain additional carnallite with this change in operating procedures.

7.8 Carnallite Harvesting.

Three methods of harvesting the carnallite deposited in the three carnallite pans were considered. "Semi-dry" harvesting would involve pumping out the pan from which carnallite is to be removed, then scraping the carnallite from the bottom of the pan and transporting it by truck to the processing plant. While this system would be technically feasible, one pan would be out of service at any given time; that fact, coupled with the high cost of transporting carnallite by truck, makes the system economically unattractive. A second system involves the use of cable-operated dredges; this is the harvesting system used by the Dead Sea Works. While otherwise attractive, the system has the disadvantage of requiring a complex cable system which may pose operating problems. The third system, the one recommended by the consultants and adopted subject to completing successful tests of a prototype machine, consists of a tracked carrier, designed to move on the bottom of the pan, on which a cutter and a slurry pump are mounted, both powered by diesel engines. A commercial laser system would assist the operator in guiding the harvester and prevent overlapping of passes. The carrier portion has successfully operated for several years in comparable conditions; the harvesting unit has also successfully operated in similar applications in the Great Salt Lake. While both elements of the proposed harvester have thus been tested separately in actual operations, they have never been tested as a unit. A prototype will, therefore, be ordered by APC, assembled and extensively tested before additional units are ordered. The harvester will be equipped with a floating pipe line through which the carnallite will be pumped ashore in slurry form. (The slurry will then be partially de-

watered and pumped to the refinery for processing). In the event that the trials present unexpected engineering problems which cannot readily be resolved, a floating harvester system will be used. This approach to providing harvesting equipment is considered satisfactory.

7.9 Refinery.

The refinery is designed to produce annually 1.2 million metric tons of potash (muriate of potash with 60-62% content of K_2O) of standard grade (granule diameter of 0.2 to 0.8 mm). The process proposed[20/] is essentially the same as that used by DSW; it appears a sound choice. In order to ensure consistent and reliable operation of the plant, some equipment will be provided with spare units; given the remote location of the plant and the high ambient temperature, the additional cost of spare units appears well justified.

7.10 Storage and Transportation.

Under normal operating conditions, potash coming from the refinery will be directly loaded into trucks. The storage facilities at the site, with a capacity of 60,000 tons or over 19 days' production, will be used only if shipment to Aqaba is for any reason impossible or indesirable. The decision to use a company-owned fleet of trucks for transportation of product to Aqaba, rather than contracting for such transportation, was based on an analysis of costs and considerations of reliability. On both counts, the purchase and operation of a truck fleet by APC appeared more advantageous. To transport a week's production in 6 days, the projected normal operating procedure, will requiring the loading and departure of a rig from the plant every 15 minutes. The round-trip time between the plant and Aqaba over a distance of about 200 km one-way has been calculated as between 8 and 9 hours. About 470 trips per week will be required to move the output of the plant. Almost 100 drivers, including relief drivers, will be needed to operate the fleet.

7.11 Power and Steam.

After detailed discussions between APC, the Jordan Electricity Authority (JEA) and the consultants, the

20/ See paragraph 3.9 above, for a summary description.

decision was made to generate power at the plant site only to the extent that the steam needed for the refinery could be used to generate power. The balance of the power will be purchased from JEA which will construct a transmission line connecting the site to the grid. An amount of $5 million for construction of the transmission line and related substations is included in the cost estimate for the potash project. JEA plans to build another transmission line connecting the plant with Aqaba when a steam power plant is built there. The line from Amman is to be completed by early 1981. The total connected load will be about 40 MW, including somewhat over 5 MW for the township. The average demand will be slightly more than half of the connected load. The power plant at the project site will have a capacity of 15 MW.

7.12 Water Supply.

The water sources selected for the supply of the refinery and Township, i.e. primarily groundwater and surface water only when it is not needed for irrigation, is a reasonable approach. It will, however, be necessary for APC to continue and expand its consultations with the Jordan Valley Authority (JVA), which has jurisdiction over water resources in the area. APC must ensure that it is aware of JVA's plans for more intensive use of both surface flows and groundwater and to avoid the location of wells at sites where water may not be available in the expected quantities if irrigation projects likely to be constructed at higher elevations significantly change the present pattern of surface and sub-surface flows. This matter has on several occasions been discussed with both APC and JVA and is the subject of a covenant we expect to include in the Project Agreement.21/

21/See Section 14, paragraph 14.4(f).

8.0 Marketing

8.1 Demand and Supply.

About 95 percent of the total world potash production is used as fertilizer, applied separately or mixed with the other two principal plant nutrients, nitrogen (N) and phosphate (P). Potash (potassium-K) is obtained either from a variety of ores or from natural brines in which it occurs in solution. Total world production of potash amounted to about 24 million tons (in terms of K_2O) in 1977, somewhat more than half of the production of N and slightly less than the production of P. Although deposits of potash are widely distributed, commercially useable potash can be produced economically only in relatively few locations. The six main producing countries, with their share of world production, are the USSR (29%), Canada (26%), East Germany (11%), West Germany (9%), the US (9%), and France (7%); all other countries together produced the remaining 9% of the total. The West European producers, through commercial arrangements generally known as the Potash Syndicate, and Canada have been the strongest forces in the market, but Canada is the only country, other than the USSR, which has significant reserves of potash ores and, therefore, can increase its production substantially. Canada's influence in world markets is, therefore, likely to increase.

8.2 World Demand.

During the past twenty years, world consumption of potash has grown at an average annual rate of 6.4%, from 6.8 million tons in 1956/57 to 23.8 million in 1976/77.22/ Of that total, Western Europe and North America consumed about half, other developed countries (primarily in Eastern Europe) 40% and the developing countries the remaining 10%. The relatively low consumption in the developing countries reflect the fact that, in most cases, N is the first plant nutrient introduced and that the application rates of P and K, which have less spectacular results, remain far lower for a longer period of time than agronomic analysis

22/All figures are in tons of K_2O.

and advice would indicate. Nevertheless, potash consumption in the developing world has in recent years grown at over 13% per year, outpacing consumption growth in all other parts of the world. The World Bank has projected the growth of world-wide demand at annual rate of 4.8% for the eight years from 1976/77 to 1984/85, from 23.8 million to 34.5 million tons. The rate of growth is projected to be higher in developing than in developed countries but, given their substantially higher base, demand in the developed countries will grow more in absolute terms.

8.3 World Supply.

The design capacity of potash producing plants in 1976/77 totalled 30.4 million tons of K_2O world-wide. Consistent and simultaneous production at design capacity by all producers is, however, never achieved, even where demand would justify full production. Historically, total production has never exceeded 90% of capacity. Effective capacity, as opposed to design capacity, was, therefore, in the neighborhood of 27 million tons in 1976/77 and may have grown to about 29 million tons since then. Actual production was even lower in recent years but reached 25 million tons in 1976/77, recovering somewhat from a slight drop in production to 23.7 million tons in 1975/76. Projections of the supply/demand balance, prepared by the World Bank for the period to 1984/85 are shown in the table on the following page. According to these projections the supply and demand will come into substantial balance about 1982; an excess of demand over supply amounting to about 2 million tons is forecast for 1984/85. The present excess capacity is thus expected to disappear within the next five years and new capacity would therefore be needed to meet demand thereafter. That new capacity is likely to be obtained initially by production improvements and expansions in existing plants and from two new mines in the USSR which are expected to be opened. In the second half of the next decade, additional capacity will, however, have to come from investment in new grass-roots plants; production costs in those plants will reflect, of course, the current cost of constructing new facilities. The demand and supply projections suggest that the APC plant would come into production at precisely the right moment, even if its marketing advantages, discussed in the following paragraph, are not taken into account.

8.4 Price Projections.

The average export price per ton of potassium chloride (KCl), during the period from 1955 to 1964 was $76, expressed in 1977 dollars. Because Canada and the USSR increased their production, prices in the following 5-year period dropped to an average of $59 and reached a low of $49 in 1968. At that point, the Provincial Government of Saskatchewan, where most Canadian potash mines are located, set production limits of 40% of capacity for the producers, established a floor price of about $63 and imposed a sizeable export tax on potash, currently $14 per ton of KCl. Reflecting the importance of Canada in the world potash market, prices rose quickly to $65 and increased steadily in the following years, until they reached $90 in 1975. In the following year the price dropped substantially, to $59 FOB Vancouver and $75 FOB Northwestern European ports. The average Canadian price between 1970 and 1976 was $68. During 1977, export prices averaged $55 FOB Vancouver and $70 FOB Northwestern European ports. The recent low prices, compared to prices in earlier periods, were the results of high inventories and slack demand.

8.5 Future price developments will be affected, in the first instance by the supply/demand balance discussed above. In the mid-1980's and beyond, the cost of new facilities needed to meet the expected increased demand will have its effect since the investments needed will not materialize unless the expected returns justify them; if they are not made, a supply shortage would result and drive prices upward. The World Bank has calculated that the FOB Vancouver price needed to result in a 10% return on investment is $71.70 per ton of KCl, expressed in 1977 prices, and $81.81 to produce a 15% return. These calculations assume that the Provincial export tax is not payable; if it is, prices would have to be correspondingly higher to produce the same return on investment. A price level of $80 per ton for production from new facilities is thus a conservative estimate. Prices can, therefore, be expected to increase gradually over an expanded period of time, as the need for new capacity increases and production from new plants constitutes a higher proportion of total production. Prices are therefore projected to reach $60 in 1980, $71 in 1985 and $80 in 1990, all expressed in 1977 prices, FOB Vancouver.

APC's Potential Markets

8.6 APC's production of 1.2 million tons of potassium chloride (equivalent to 720,000 tons of K_2O) constitutes about 2.3% of the 1977/78 world potash production capacity and will be equivalent to about 1.8% of world capacity projected for 1984/85. For APC, the South and East Asian and Pacific countries are a particularly attractive marketing target since shipments from Aqaba will enjoy a freight advantage of betwee $5 and $10 per ton compared to shipments from the countries supplying the bulk of potash to those markets at present.23/ By far the largest of these markets is India which imported 320,000 tons of K_2O in 1977. The Indian Government projects an increase of K_2O consumption to 1.1 million tons by 1985; even if one assumes that consumption will increase only to 800,000 tons by 1985, an increase of 480,000 tons would be sufficiently large to facilitate the entry of a new supplier. APC believes it will be able to sell 270,000 to 360,000 tons of K_2O, up to half its production, to India and other South Asian countries.

8.7 Capture of the Indian market to the extent envisaged, up to 45% of K_2O sales in 1985, may require competing with the present main suppliers of India not only on price and service but also on financing terms. At the lenders meeting in Amman in April 1978, APC was, therefore, asked to explore what export financing assistance might be available from Arab institutions, since medium and long-term financing cannot be offered by APC from its own working capital resources. This exploration must be undertaken promptly since the results will have a major affect on APC's marketing plan. (See proposed covenant in para.14.4 (c).)

8.8 South Asian countries other than India are not expected to be important markets for APC since their aggregate consumption of potash is at present only 40,000 tons per year of K_2O. The Far East and South-East Asia are important buyers of potash; Japan imported 660,000 tons of K_2O in 1976, Korea 160,000 tons, Malaysia 150,000 tons and the Philippines, Thailand and Indonesia together 165,000 tons. The total consumption of these countries is expected to grow to 1.8 million tons of K_2O by 1985 and will, therefore, be considered

23/ Canada supplied about 275,000 tons of K_2O to East and South Asia in 1976, East Germany 135,000 tons, and West Germany slightly over 100,000 tons; these three countries thus accounted for 510,000 tons out of total imports of about 630,000 tons.

as potential markets, even though APC's freight advantage, compared to shipments from Vancouver, are negligible in that part of the world. The situation is similar with respect to Australia, New Zealand and Oceania which should have a combined consumption of 480,000 tons of K_2O by 1985.

8.9 Among the Arab countries, only Morocco and Algeria import sizeable quantities of potash; their consumption is expected to grow from the present level of about 60,000 tons to 140,000 tons of K_2O by 1985. Most of the other Arab countries use potash, in the present small quantities, mostly in the form of potassium sulphate. That market could, therefore, be served by APC only if it installed the special facilities necessary for the conversion of potassium chloride to potassium sulphate. Unless and until the consumption of potash in those countries increases substantially, the production of potassium sulphate would probably not be economical for APC, but APC has agreed to examine this question in detail. Iraq is planning to build a complex fertilizer plant which might need up to 130,000 tons per year of potassium chloride by 1985. Jordan, of course, would be particularly well placed to supply those needs.

8.10 The U.S. is a net importer of potash and one of the largest consumers. Canada has until recently been the only major supplier but both the USSR and East Germany have in the last two years begun to export to the US. Since Canadian potash is shipped to the Southeastern and some other sections of the U.S. from Vancouver to California and thence overland, transportation and handling costs are very high, making competition from overseas producers possible. The US uses potash mostly in coarse (granular) form suitable for blending, and APC is, therefore, considering the possibility of installing compacting facilities at Aqaba to be in a position to compete in the US market.

8.11 Marketing Strategy.

APC has in the last several months been in contact with a number of firms, both in the US and elsewhere, which may be interested in some form of marketing collaboration with APC. Among the US firms are some who have recently sold their Canadian production

facilities to the Saskatchewan Government and are now looking for supplies to serve their established customers. In other markets, APC will operate either with its own sales staff or through agents; it has already begun to establish contacts with potential agents. Beginning several years before start-up of its own facilities, APC intends to conduct a "market seeding" program with purchased product to introduce APC as a supplier in its principal markets. Given the importance of a well defined and consistent marketing effort, APC has established a detailed timetable for the establishment of its marketing organization. That plan is shown in Annex 8.

8.12 Competitive Position of APC.

Production Costs. Production costs are estimated to amount to $13.22 per ton of KCl at the plant site (expressed in constant 1977 prices) after the plant reaches production at design capacity (estimated 1982). That cost is calculated as follows:

TABLE 8.12

PRODUCTION COST IN 1977 DOLLARS

	US Dollar Total Cost/Year	US Dollar Cost/Ton
Labor (Operating & Maintenance)	2,737,000	2.28
Fuel		
Residual Fuel Oil	6,772,000	5.64
Diesel Fuel	572,000	0.48
Gasoline	8,000	0.01
Subtotal	7,352,000	6.13
Chemicals	550,000	0.46
Other Consumables	600,000	0.50
Maintenance Materials	3,131,000	2.61
General & Administrative Expenses	892,000	0.74
Insurance	599,000	0.50
TOTAL	15,861,000	13.22

The cost of POL items is based on international prices, delivered at the plant, even though at present subsidies reduce these prices by about 75 percent. Uncertainties about the continuation of the Saudi/Jordanian arrangements underlying the current artificially low price, however, make it necessary to use the market price for projections of operating results.

8.13 Transportation Costs.

Transportation to Aqaba by truck would add another $3.04 per ton and port charges and loading costs a further $2.15. The total cost of potash FOB Aqaba is thus estimated as follows:

Production Cost	$13.22
Road Transport	3.04
Port and Loading Charges	2.15
Cost FOB Aqaba	$18.41

The road transportation charge includes $0.50 per ton for tolls, or road maintenance charges. Since the heavy traffic of trucks traveling between Safi and Aqaba will require unusually high expenditures for road maintenance, it was considered prudent to provide for a contribution by APC to the cost of maintenance. At this time, the per-ton cost is a provisional estimate only.

8.14 Port and loading charges were calculated on the basis of an investment of $33 million for the dock and loading equipment. The charges include the cost of labor, maintenance, depreciation (3 percent), insurance, utilities and a return on investment of 6 percent. The dock is expected to have a capacity larger than required for handling potash shipments. Assuming a capacity of 1.8 million tons, the dock operating costs were prorated to 1.2 million tons of potash shipments. (See details in Annex 10.)

8.15 Cost Comparison.

As mentioned above in paragraph 8.5, new facilities for the production of potash anywhere in the world will require much higher investments than those included in calculations of current costs, and such new investments will have an increasing effect on world prices during

the next decade. As the following table shows, APC's production costs are likely to be marginally lower and its depreciation charges marginally higher than comparable costs expected for new facilities in Canada. Transportation costs to Aqaba will, however, be substantially lower than transportation from Sasketchewan to Vancouver resulting in a distinct competitive advantage for APC. (Prospective Canadian costs were estimated by the World Bank.) The Canadian Provincial tax has not been taken into account.

Table 8.15-1

(in 1977 prices per ton of KCl)

	APC	Canada
Production Costs	$13.22	$14.50
Depreciation	21.18	18.00
Transportation and Loading	5.19	19.00
Cost F.O.B.	$39.59	$51.50

APC will thus have a substantial margin for price concessions once the current level of investment necessary for new production facilities has become an important factor in world market prices and, as the following projection of Canadian prices shows, will be comfortably competitive even in the mid-1980's before new investments are reflected to a marked degree in world prices.

Table 8.15-2

Projected Potash Prices 1978-1990
(in 1977 US$ per ton KCl, FOB Vancouver)

Year	1977 (est.)	1978	1979	1980	1981	1982	1983	1984	1985
Price/ton	51	53	57	60	63	65	67	69	71

Year	1986	1987	1988	1989	1990
Price/ton	73	75	77	79	80

8.16 It should be noted that the preceding analysis does not only ignore the Provincial tax in Canada but also the freight advantage of $5 to $10 (depending on destination of the cargo and the shipping market) for cargoes to the Indian subcontinent and other countries in the area. APC should, therefore, have no trouble competing with producers in other parts of the world.

9.0 Financial Analysis

9.1 Assumptions for Financial Projections.

The following assumptions have been made in preparing projections of operating results;

(a) Annual inflation rate for foreign exchange costs and revenues will be 7.5% in 1978 and 1979, and 7% thereafter; the inflation rate in Jordan has been assumed to decline from 15.5% in 1978 to 8% in 1982 and thereafter;

(b) The exchange rate bwtween the US dollar and the Jordanian Dinar will be stable at 3.03 to 1;

(c) Commercial production will start in mid-1982 at an average rate of 13% of capacity for that year; production will increase to 45% in 1983, 89% in 1984 and 100% in 1985 and thereafter;

(d) Sales revenues are based conservatively on a sales volume somewhat below that corresponding to the assumed production rates, i.e. 130,000 tons in 1982, increasing to the full production rate of 1.2 million tons only in 1986. That sales volume is 208,000 tons, or 7%, lower during the years 1982 and 1985 than the assumed production totaling 2,966,000 tons;

(e) The price per ton of potassium chloride will be $86 in 1982, increase to $105 in 1984 and continue to rise until it reaches $185 in 1989.[24] (These prices correspond to $65, $69 and $79, respectively, expressed in 1977 prices).

(f) Production costs after the plant reaches capacity production are $13.22 per ton and transportation costs to, and loading costs in, Aqaba total $5.19 per ton. Fuel costs, which constitute 46% of production costs, were computed at international prices rather than the subsidized prices in effect in Jordan because it is not certain that the subsidies will be in effect when and after the plant goes into operation. Transportation

24/ Year-to-year prices are shown in the third line of the Income Statement.

costs to Aqaba include an allowance of $0.50 per ton which may be charged as a toll or in some other form as a contribution to the cost of maintaining the Safi-Aqaba road.

(g) Interest charges will be 10% per annum for the loans from the World Bank and commercial lenders and 8% for the reloans of first-step loans to the GOJ by all other lenders, including AID;

(h) Grace periods under all loans, except those by commercial lenders, will run through 1984 and under commercial loans through 1983.

9.3 Financial Projections.

Cash Flow and Income Statements and Balance Sheets projecting the financial position of APC through 1989 are attached as Annex 9.[25] Under the assumptions listed in the preceding paragraph, after the first full year of production (1983), APC will begin to build-up very substantial cash which will enable it to meet its debt service very comfortably. The debt service ratio will rise from 1.7 in 1983 to 4.8 in 1989. The company will begin to show a profit in 1984 (almost $20 million) and increase its annual pre-tax profits to over $135 million by 1989. Tax payments will start in 1985, reducing profits to $18.9 million in 1984 and to just under $110.6 million in 1989. During the first two years of its operations, APC will, however, be financially vulnerable; under the stated assumptions, it would have only a nominal cash surplus in 1982 and 1983 (and a cumulative surplus of only $1.8 million), a cash reserve which is insufficient to cover the costs of a significant delay in plant start-up. Close adherence to the construction schedule is, therefore, of critical importance. Should start-up nevertheless be delayed, causing a substantial shortfall in sales revenues, either an increase in equity or short-term loans would presumably be considered as remedies. Given the very large cash surplus in subsequent years, any short-term borrowing that might become necessary could easily be repaid in short order. The cash flow projections also demonstrate the necessity for grace periods under most of the long-term loans to run through 1984; principal payments of about $24 million assumed due in 1985 could not be covered in 1984.

25/ All amounts are stated in current dollars.

9.3 Financial Rate of Return.

Expressed in constant 1977 prices, the financial rate of return for the Project is 12.6 percent before taxes and 11.3 percent after taxes. The latter rate would increase by more than one full point if the present fuel subsidy in Jordan were to be in effect during the entire 25-year period considered.

9.4 Sensitivity Analysis.

Sensitivity tests carried out for variations of 10 percent, up or down, of capital costs, sales revenues, production and inland transportation costs and of working capital, and for a one-year delay in construction, show relatively small fluctuations in the rate of return. A drop in sales revenues by 10 percent, the worst case of those examined, would still leave the rate of return at 11.0 percent. The reason for this relative stability of the return rate under different assumptions is the low ratio of operating costs to revenues, 46% in 1985 and 35% in 1989, which makes it possible to absorb a considerable drop in revenues below the estimated level without serious consequences. An increase in capital costs of 10% would result in a rate of return of 11.6%, just one point below the base case. Increases in working capital and in production costs of 10% have an even smaller impact on the rate of return.

9.5 Break-Even Point.

The break-even analysis presented in Annex 12, in which 1986 is taken as a typical case after capacity production is reached, shows that APC's break-even for profit will be at 43.1% of capacity and that the cash break-even point is at 26.2% of capacity. (Cash break-even is defined as the point where all cash expenses, but not depreciation, are covered by revenues; profit break-even is defined as the point where all charges to the profit account, including depreciation are covered.) These relatively low break-even points are another indication of the rather high financial stability of the APC operation in the face of fluctuations in sales revenues caused by operating or marketing problems.

9.6 The financial analysis, in summary, emphasizes the critical importance to the success of the Project of tight control of the construction schedule, of competent and effective assistance in plant start-up and operations

management during the early years of operations, and of close attention to marketing. In all these areas, APC has taken the necessary steps to ensure itself of the required outside assistance.

10.0 Economic Analysis.

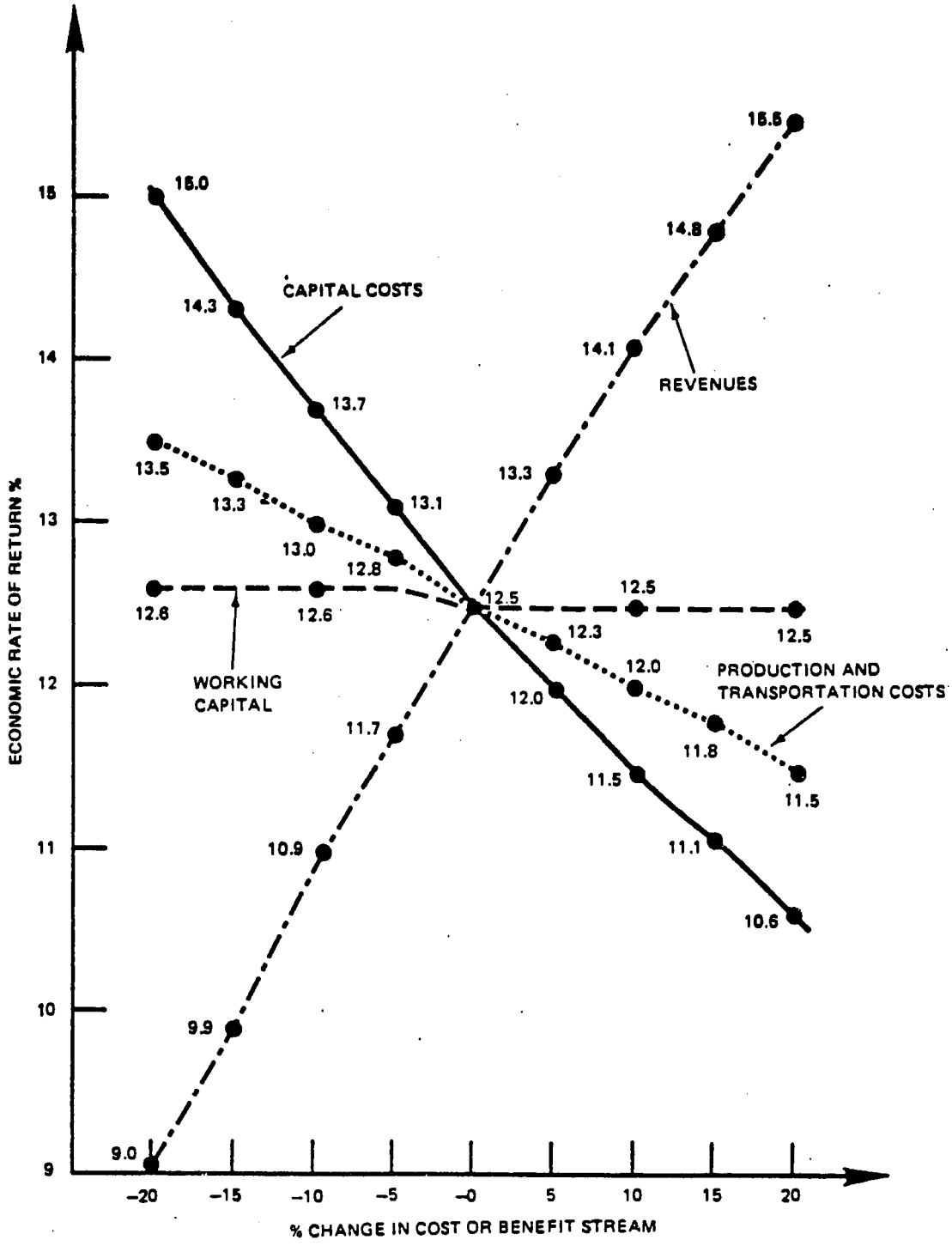
10.1 In preparing its calculations of the economic rate of return, the World Bank reviewed the individual financial cost and benefit items to ascertain what adjustments were needed for purposes of economic analysis. Since "tradeable" items are valued at international prices in the financial projections, those values have also been accepted for the economic analysis. The major "non-tradeable" (or local) items are fuel and labor. Fuel, as noted in paragraph 8.1, was valued at international prices in the financial analysis; labor costs were judged to reflect the opportunity cost of labor at the values used in the financial analysis because both skilled and unskilled Jordanian labor has been, and continues to be, exported to the Gulf countries and because there is no labor surplus in Jordan. Neither fuel nor labor costs were, therefore, adjusted. The only cost adjustment found to be required for the economic analysis was the addition of $0.60 per ton to the financial charge for loading costs at Aqaba valued in the financial analysis at $2.15 per ton; that addition was calculated to provide a 10% return on the investment needed to provide potash loading facilities. On the revenue side, the financial analysis uses exclusively international prices which, as such, reflect economic values; no adjustments were, therefore, necessary.

10.2 Economic Rate of Return.

The economic rate of return is calculated at 12.5 percent; since only minor adjustments were made to the values used in computing the financial rate of return, the financial and economic returns are almost the same. The sensitivity analyses performed by the World Bank are graphically presented on the following page. These analyses show that the effects of an increase in cost or a decrease in benefits within 20 percent of the base will not reduce the rate of return by more than 3½ points in any of the cases examined. The most unfavorable case, a reduction in revenues by 20 percent, would result in a rate of 9.0 percent; an increase in capital cost by the same percentage would reduce the rate to 10.6 percent.

TABLE 10.2

JORDAN–ARAB POTASH PROJECT
SENSITIVITY ANALYSIS
Economic Rate of Return
(In Constant Term)



Industrial Projects Department
February 1978

World Bank–18574

10.3 Foreign Exchange Earnings.

Net foreign exchange earnings during 20 years of operations would amount to $1.1 billion, calculated in 1977 dollars. After reaching capacity operation in 1985, the project will generate exports worth $160 million, equivalent to about 8 percent of Jordan's current exports.

10.4 Fiscal Impact.

The Project would have a substantial favorable impact on Jordan's budget. Considering returns to the Government in the form of taxes, dividends, guarantee fees on foreign loans and various charges to be paid by APC to the Government, and deducting the estimated recurring costs related to the project to be financed from the budget (such as road maintenance, school operation, etc.), APC would make a contribution to the Government of almost $1.0 billion over a period of 25 years. Included in that amount are cash reserves, exceeding requirements for operating reserves, which would presumably be invested in Government securities. Returns of $1.0 billion would represent a rate of return of about 25 percent on the Government's investment for the Project for the purchase of equity and financing of infrastructure.

10.5 Repayment Prospects.

A debt-service analysis was made recently (January-February 1978) by USAID and GOJ for the purpose of projecting the impact of the proposed Maqarin Dam and Potash Projects. The analysis concluded that Jordan's debt service relative to expected foreign exchange earnings is manageable. The analysis shows debt service as a percentage of exports and non-factor services peaking at 13.8 percent in 1979 and declining gradually thereafter (See Amman 1118). This proposed loan, considering the concessionary terms recommended, will not have a significant adverse impact on the debt-service ratio.

11.0 Environmental Analysis.

11.1 An analysis of the environmental impact of the Project was submitted by the consultants as part of their feasibility study. Emissions from the plant are estimated at 1/10 to 1/100 of the quantities permissible under US standards. Effluent will be discharged into the Dead Sea without any deliterious effects. Only a negligible effect on plant and animal life in the area of the plant is expected. A detailed discussion and an "Impact Identification and Evaluation Form" are attached as Annex 11.

12.0 Social Analysis.

12.1 The Project, located in a relatively isolated and thinly populated part of the country, is likely to have a substantial impact on life in that area. APC will be by far the largest employer, with the possible exception of the Government as a whole and the phosphate operation at Al Hasa, in the region between the southern outskirts of Amman and Aqaba. During construction of the Project, approximately 1,000 persons will be employed; the permanent staff will be around 500. New employment opportunities will, therefore, be created for the area's existing population which is now completely dependent upon marginal farming activities. The construction of a new township, which will include a school, clinic and shops, will be the first planned, well equipped and largest community on the Jordanian shore of the Dead Sea. It can be expected to become the center of growing commercial activity in the area, providing a near-by market for agricultural produce grown in the areas around Safi and Mazra and for services available in Karak.

12.2 The operating staff of the potash plant will include about fifty management and middle-management personnel, many of them in positions which require experience not now available in Jordan. After completion of the training program forming part of the Project and extending into the first three or four years of plant operations, a substantial group of trained and experienced staff will have been formed which can be utilized not only in the production and marketing of potash but also in ventures now in the planning stage, such as the production of bromine and magnesium. As APC matures as an operating company, it can also be expected that some of its personnel will find opportunities in other Jordanian companies. The creation of a new operating company in nich key staff is systematically trained for technical and commercial positions is thus likely to have an effect that, in the long run, will provide Jordan with a welcome addition to its managerial resources.

13.0 Implementation Plan and Schedule.

13.1 The construction of the project production facilities will be managed by APC with the assistance of JII as engineering and construction supervision consultants and King-Wilkinson as technical advisors.[26] At the same time, Deloitte, Haskins and Sells will assist APC in setting up and operating an accounting and financial control system.[27] A contract with a firm to supply operational management services remains to be negotiated;[28] it will become effective about one year before plant start-up and continue through at least the first three operating years.

13.2 Construction of the port facilities at Aqaba will be the responsibility of the Port Authority which will be assisted by consultants. The time-table for construction shows the following milestones:

--Completion of preliminary design	September 1978
--Issue of bid documents for construction	February 1979
--Award of contracts for construction and equipment	July 1979
--Start of construction	August 1979
--Completion of construction	July 1981

A final decision on the location of the potash loading dock will be made within the next two or three months after receipt of an analysis of alternatives from the consultants retained by the National Planning Council. It is likely that a dock will be built which will serve for loading both potash and the output of the phosphatic fertilizer plant to be built about 15 km south of Aqaba.

13.3 The need to develop its own staff is recognized by APC. Drafts of organizational plans, including organization charts, job descriptions, and a hiring schedule are being developed. Drafts of some of this material were submitted to the lenders during the meetings in Amman

26/ See Annex 4 for Scope of Work which serves as basis for contract negotiations.

27/ See Annex 5 for Scope of Work which serves as basis for contract negotiations.

28/ Detailed Scope of Work being developed.

in April 1978. During the last year, APC has filled several key posts and is continuing its recruitment of staff as project activities increase.

13.4 Implementation of the Project has already begun, financed initially with APC's own funds. The following activities have been initiated or completed:

(a) A contract for engineering and construction supervision services was signed with Jacobs International Inc. (JII) on November 5, 1977; subcontracts between JII and Sir Alexander Gibb and Partners, Jacobs International Ltd. (the Dublin subsidiary of Jacobs Engineering Company) and the Technical Services Office, Amman, have also been executed. These contracts were approved by AID.[29]

(b) Letters of Intent were issued by APC in early June to King-Wilkinson for Technical Advisory services and to Deloitte, Haskins and Sells for accounting and financial services. Both companies have begun work authorized by the Letters of Interest.

(c) Construction of access roads to the brine intake location on the Lisan peninsula has been completed.

(d) Drawings for the dike and brine transfer systems and related works, which are necessary for the issue of bid documents, have been completed; the bid documents for the civil works contract have been completed, reviewed by the Kuwait Fund and the IBRD and approved as amended during meetings in London on May 30 and 31.

(e) Technical Specifications for equipment to be purchased by APC outside of the mechanical contract have been completed; other parts of the bid documents are being prepared.

(f) A contract for the construction of the township was awarded to a Korean contractor in May 1978 after competitive bidding.

13.5 Detailed implementation schedules have been prepared by the engineering consultants and will be kept up-to-

29/ The Approval Memorandum, which contains an analysis of the contract between APC and JII is on file in NE/PD.

date by them. The Schedule shown in Annex 14 shows the major events.

(a) Township. Construction of the first elements of the township was scheduled to start before other major construction begins so that housing will be available for expartiate and local staff during the construction period; 75 housing units are to be completed by the end of 1978. Additional units and all infrastructure are to be completed by mid-year 1980.

(b) Solar Evaporation System. Bid Documents are to be issued on June 27, 1978; a bidders' conference will be held at the site on August 1, bids will be due on October 4, 1978 and the target for contract award is the end of December 1978. The contract will include supply and installation of all elements of the brine supply and transfer system, including all required pumps. Construction of the main salt pan dike and the first carnallite pan is to be completed by April 1980, together with the temporary brine supply line through which brine will be pumped into the carnallite pan to begin formation of the salt bottom. Completion of the other two carnallite and the precarnallite pans is scheduled for late 1980 and 1981. Carnallite deposition should thus start in 1981 and harvesting in mid-1982. Completion of the first carnallite pan will be on the critical path for carnallite harvesting and refinery start-up.

(c) Harvesters. A prototype unit of the harvesters is to be ordered in the fall of 1978, delivered about 12 months later and tested druing the following two to three months. This schedule will permit completion of any design modifications that may be necessary, and ordering and delivering the remaining units by the time the equipment is needed.

(d) Refinery. Orders for the steam and power plant are to be placed in early 1979, and for process plant equipment by mid-1979, for delivery to the site in mid-1980. Construction of the buildings, erection of all but two items of equipment (crystallizers and tanks),

installation of piping, electrical equipment and instrumentation and construction of all ancillary buildings will be done under one contract which is scheduled to be awarded by the end of 1979 and to be completed by the end of 1981. Under that schedule, the refinery and all ancillary works will be completed and tested by the time carnallite will become available from the first completed carnallite pan in mid-1982.

13.6 The construction schedule outlined above is tight and does not allow for much slippage without setting back the start of commercial operations. This is particularly true in the case of the solar evaporation system; if the first carnallite pan is not completed on schedule, the delay in starting commercial operations may be as much as a year because the summer months, during which most of the evaporation occurs, will be lost. Close monitoring of construction operations and constant attention to any modifications that may become necessary in elements of the construction activities is therefore absolutely essential. Both JII and AGP are fully aware of this and are making all efforts in keeping to the schedule of their own work to prevent any delay in awarding contracts.

13.7 Eligibility Date. APC signed the contract with JII on November 5, 1977; that contract covers, inter alia, the detailed design of the project facilities, including the preparation of bid documents. Since the first $5 million tranche of the AID loan is intended to cover the design of the Project, it is proposed that the eligibility date be the same as the date on which the contract with JII was signed.

13.8 Project Completion Date. Construction of the civil works is to be completed by the fourth quarter of 1981 and construction of the refinery and related works, including plant shake-down tests, by the middle of 1982, when carnallite in quantities necessary for sustained production will first become available. At that time, the construction of all the facilities will be completed. Engineering services will, however, continue until at least one year later;30/ payments to JII are, therefore, not likely to be completed until the end of 1983 at the earliest. Since part of such payments will

30/ The contract with JII provides for tests to demonstrate plant performance capability at 100 percent of capacity approximately 70 months from the effective date of the contract (November 1977), i.e. about September 1983.

be financed by AID, "AID inputs" will thus be provided beyond the end of the construction period. The PACD should therefore be set at March 31, 1984, to allow for some slippage in the schedule. It should be noted that the Project will not be considered completed by APC, the IBRD and probably other lenders until the plant achieves capacity production, scheduled for 1985. Should AID agree to finance any portion of the projected contract for operations management, the PACD may have to be extended beyond March 1984. In any event, monitoring of the Project should continue beyond 1984 until sustained production at or near capacity is achieved.

13.9 Procurement Plan.

In the several meetings which APC has held with some or all of the financing agencies expected to be involved in the Project,[31] it was agreed that the parallel rather than the joint financing system would be used. The civil works contract will be financed by the Arab financing institutions, supplemented by APC's own funds; the World Bank will finance refinery equipment, part of the consulting and advisory services, power plant equipment and other items to be selected. AID will finance part of the consulting services, harvesting equipment and other items to be selected. The initial $5 million to be provided by AID will be used to finance the design and related engineering services being provided by JII. To facilitate the best use of World Bank and AID funds, it is anticipated that AID will finance items to be awarded to US Companies under international bidding procedures; no problems are anticipated in coordinating World Bank and AID procedures in those cases. Bid documents will be prepared by the engineering consultants and reviewed by the financing agencies concerned before distribution to bidders. Bids will be evaluated by the consultants who will then submit their recommendations for award to APC and the financing agencies for approval. Contracts and purchase orders will be prepared by the consultants and signed by APC.

13.10 Monitoring and Reporting.

(a) The first-line responsibility for supervising, monitoring and reporting on construction activities rests with the engineering consultants. The consultants

31/ June 1977 in London; April 1978 in Amman, January 1978 in Pasadena and June 1978 in London.

will prepare weekly, monthly and quarterly reports for APC;[32] we expect that the quarterly reports will form part of APC's quarterly reports to AID.

(b) APC, assisted by the Technical Advisors, will monitor progress at the site, using both its resident site staff and personnel stationed in Amman.

(c) The AID Mission in Amman will monitor the project on the basis of APC's reports and frequent site visits. Problems will be discussed with APC and, where desirable, with the consultants.

(d) AID's monitoring in Washington will be less detailed than in Amman, and be based principally on APC's Quarterly Reports.

13.11 Evaluation.

No evaluations during project implementation are planned since the monitoring system described in the preceding paragraph will be adequate to keep AID fully informed of progress and problems that may arise and since major changes in the project will be impossible in any event after funds have been committed to contracts. It is doubtful that a formal ex-post-facto evaluation of the project would be useful. A Project Completion Report will be prepared by the Mission in Amman, and will indicate whether further evaluation would at that time appear desirable.

32/ Paragraph 1(i), Annex I, APC/JII contract.

14.0 Conditions and Covenants.

14.1 APC has already taken a number of steps necessary for implementation of the Project; before funds other than its own can be safely disbursed, however, several matters which have been agreed upon remain to be finalized. Some of these events are so crucial to the financing and implementation of the Project that they should occur before AID funds are disbursed; others, by their nature or because of particular circumstances cannot occur until some time after the expected signature of the Project Agreement; still others should occur by specified dates but some slippage would not necessarily endanger the success of the Project; finally, there are obligations which should continue for the life of the Project. In addition, the procedures of some lending agencies are such that their loans may not become effective until calendar year 1979. Finally, the first tranche of the proposed AID loan is intended to finance the design of the Project and its disbursement should, therefore, not be unduly delayed. With these considerations in mind, we propose the following special Conditions Precedent and Covenants on the grounds stated for each.

14.2 Conditions Precedent to Disbursement of first $5 million:

(a) Submission by APC of a firm financing plan.--Although the financing plan described in Section 6, above, has been agreed with APC and with most of the lenders, a formal confirmation of the amounts to be provided by each institution has not yet been received by APC but is expected within the next few weeks. A confirmation of the financing plan included in this Project Paper, or an acceptable alternate plan, must therefore be received by AID before any funds can be disbursed.

(b) A resolution by APC's Board of Directors authorizing the increase in the company's capital to JD 63 million.--That increase cannot be implemented until APC has formally authorized it. A general shareholders' meeting has been called for early August to approve the Board's i.e. commendation for the capital increase. We assume that it will take some time before the additional shares are fully subscribed and, in the interest of early initial disbursements, we propose to defer completion of subscriptions to the second set of Conditions Precedent discussed below.

(c) Execution of a relending agreement between the GOJ and APC acceptable to AID.

14.3 Conditions Precedent to Disbursement of any amount in excess of $5 million.

(a) Signature by the GOJ or APC of loan agreements with all lenders, other than commercial lenders and the Arab Fund for Economic and Social Development and written evidence that the Arab Fund intends to lend $15 million for the Project.--Exception from the requirement of signed loan agreements is desirable, in the case of commercial lenders, because commercial funds will not be needed until early 1980 at the earliest and it would be unnecessarily costly for APC to pay commitment fees and high interest rates for an extended period of time. Signature of an agreement with the Arab Fund is excepted because it will not be able to make its loan until calendar year 1979 and it would be unduly onerous to delay disbursements until that time. On the other hand, a declaration by the Fund that it intends to make the loan is needed as an indication that the financing plan is in fact realistic.

(b) Subscription to substantially all the shares to be issued to bring APC's capital to not less than JD 63 million.--By the fall of 1978, APC should be able to arrange for the subscription to its new shares issue.

(c) Signed contracts with firms acceptable to AID for the supply of technical and accounting and financial services.--Letters of Intent to Contract have been issued to both firms involved. Contract negotiations should be completed and contracts signed by the fall of 1978. These services are indispensable for the success of the Project and the continued availability of the firms involved should be secured before additional funds are disbursed. AID has already indicated that the firms selected are acceptable but not yet given its formal approval.

(d) Selection of a firm acceptable to AID to supply APC with operating management assistance.--APC has not yet selected a firm but, by the fall of 1978,

should have done so. Contract negotiations may, however, be protracted and the services will not be needed until about 1981. Signature of a contract is, therefore, proposed as a covenant rather than a Condition Precedent to Disbursement.

(e) Submission of a plan by the GOJ acceptable to AID, for financing the construction, and for constructing, potash storage and loading facilities at Aqaba.--Construction of these facilities is indispensable for the success of the Project; assurances in the form proposed are, therefore, essential.

(f) An indertaking by the GOJ and JEA to construct transmission and related power supply facilities adequate to furnish up to 17 MW of electricity to APC's potash plant beginning March 1, 1981.--An adequate power supply is required to reach full production; although agreed upon with JEA, formal assurance should be obtained that the power supply will be established in time to meet APC's schedule.

14.4 Covenants. Several of the following covenants are substantively identical to covenants included in the already negotiated draft agreement for the IBRD loan.

(a) APC undertakes (i) to contract by March 31, 1979 with a firm acceptable to AID for assistance in the management of the potash production facilities and for training of APC's technical management and operating personnel; and (ii) to continue employing advisors in production management until its ability to operate the plant successfully without such advisors can be demonstrated.--Consistent production at or near plant capacity, and a successful marketing effort, are the main conditions to be met if the objective of the Project is to be achieved. Such production can be achieved only if the technical management and operating personnel of APC are sufficiently experienced in running the production facilities without outside assistance, a situation which may not be reached for several years after start-up.

(b) APC shall appoint a qualified marketing executive by September 1, 1978.--That date was established by APC in a memorandum submitted to the lenders during the meetings in Amman after a detailed timetable for

marketing activities had been discussed with the World Bank and AID. Appointment of a marketing executive is the first step under that timetable. (See Annex 8.) The World Bank loan agreement will contain a similar covenant.

(c) APC shall submit to AID, by June 30, 1979, an analysis of credit facilities needed to finance its sales in accordance with its marketing plan, together with an analysis of credit sources which may be needed, in addition to its own working capital, to finance such sales.--Additional credit requirements were discussed during the Amman meetings, particularly with respect to sales to India, an important target of APC's marketing strategy. Early attention to possible credit sources is thus important. The World Bank loan agreement will contain a similar covenant.

(d) By March 31, 1979, APC shall submit to AID its analysis of the advisability of installing compacting facilities and facilities for the production of potassium sulphate, together with relevant cost estimates and preliminary construction schedules in the event that installation of such facilities appears warranted.--Compacting facilities would be needed for competition in the US; potassium sulphate is the preferred form of potash in most Arab countries. Decisions on construction of such facilities must be made soon if sales in these countries are contemplated on a substantial scale. The World Bank agreement will contain a similar covenant. (See paragraphs 8.9 and 8.10, above.)

(e) APC will continue its consultations with the Jordan Valley Authority to ensure that plans for supplying the plant and township with fresh water are consistent with the Authority's plans for the development of water resources in the area. (See para 7.12)

(f) APC's debt/equity ratio shall not be higher than 55/45 after project completion and not higher than 60/40 during project execution.--This confirms preliminary agreements; the World Bank agreement will contain a substantially similar covenant.

(g) APC will observe restrictions on the payment of dividends, on additional capital expenditures and on additional borrowing. -- These clauses will be substantially similar to the clauses in the negotiated IBRD

agreements and ensure that APC's financial resources are applied to the Project until it has operated at or near capacity for a 12-month period.

ANNEX 1

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

AMMAN — JORDAN

وكالة الولايات المتحدة للانماء الدولي

عمان - الاردن

June 17, 1978

CERTIFICATION PURSUANT TO SECTION 611(e)
OF THE FOREIGN ASSISTANCE ACT OF 1961
AS AMENDED

The Jordan Potash Project consists of the design and construction of a facility to produce (from Dead Sea brine) 1.2 million metric tons per year of potassium chloride, the most popular form of potash fertilizer. Taking into consideration the maintainance and utilization of projects in Jordan, previously financed or assisted by the United States, and taking into account all of the aspects of the Jordan Potash Projects, I, Christopher H. Russell, hereby certify that in my judgement Jordan has both the financial capability and human resources capability to actively carry out the design, construction and utilization of the Project.

Christopher H Russell

Christopher H. Russell
AID Director

Date: 17 June 1978

JORDAN - POTASH DESIGN

6C(2) - PROJECT CHECKLIST

Listed below are, first, statutory criteria applicable generally to projects with FAA funds, and then project criteria applicable to individual fund sources: Development Assistance (with a sub-category for criteria applicable only to loans); and Security Supporting Assistance funds.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? IDENTIFY. HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT? CHECKLIST IS UP TO DATE. STANDARD ITEM CHECKLIST HAS BEEN RECEIVED.

GENERAL CRITERIA FOR PROJECT.

1. App. Unnumbered; FAA Sec. 653(b)

   (a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that figure plus 10%)?

   (a) The $5 million loan was included in the Congressional Presentation for FY '78 and the proposed $33 million loan in that for FY '79.

   (b) Yes.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

   (a) Yes.

   (b) Yes.

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

   No further legislative action is required.

4. FAA Sec. 611(b); App. Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per Memorandum of the President dated Sept. 5, 1973 (replaces Memorandum of May 15, 1962; see Fed. Register, Vol 38, No. 174, Part III, Sept. 10, 1973)?

   Not Applicable.

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?

   The Project Paper contains a 611(e) certification.

A.

6. FAA Sec. 209, 619. Is project susceptible of execution as part of regional or multilateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. If assistance is for newly independent country, is it furnished through multilateral organizations or plans to the maximum extent appropriate?

Project will be executed in concert with other donors. Project will not directly encourage regional development programs. Jordan is not a newly independent country

7. FAA Sec. 601(a); (and Sec. 201(f) for development loans). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

Project will increase the flow of international trade by increasing the foreign exchange earnings of Jordan by generating exports worth over $100 million annually (in 1977 dollars) which are expected to aggregate about $1.1 billion (in 1977 dollars) in net foreign exchange earnings over a period of 20 years.

8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

U.S. consulting services, harvesting equipment, and other items will be procured with project funds.

9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.

The Project Agreement will so provide.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?

Jordan is not an excess currency country.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(c); Sec. 111; Sec. 281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out from cities to small towns and rural areas; and (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions?

Not Applicable.

BEST AVAILABLE COPY

e. FAA Sec. 202(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources?

f. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

3. Project Criteria Solely for Security Supporting Assistance

FAA Sec. 531. How will this assistance support promote economic or political stability?

This project will promote the economic stability of Jordan by providing the construction of a potash plant, the commercial ~~export~~ of which will substantially increase Jordan's foreign exchange earnings by generating exports.

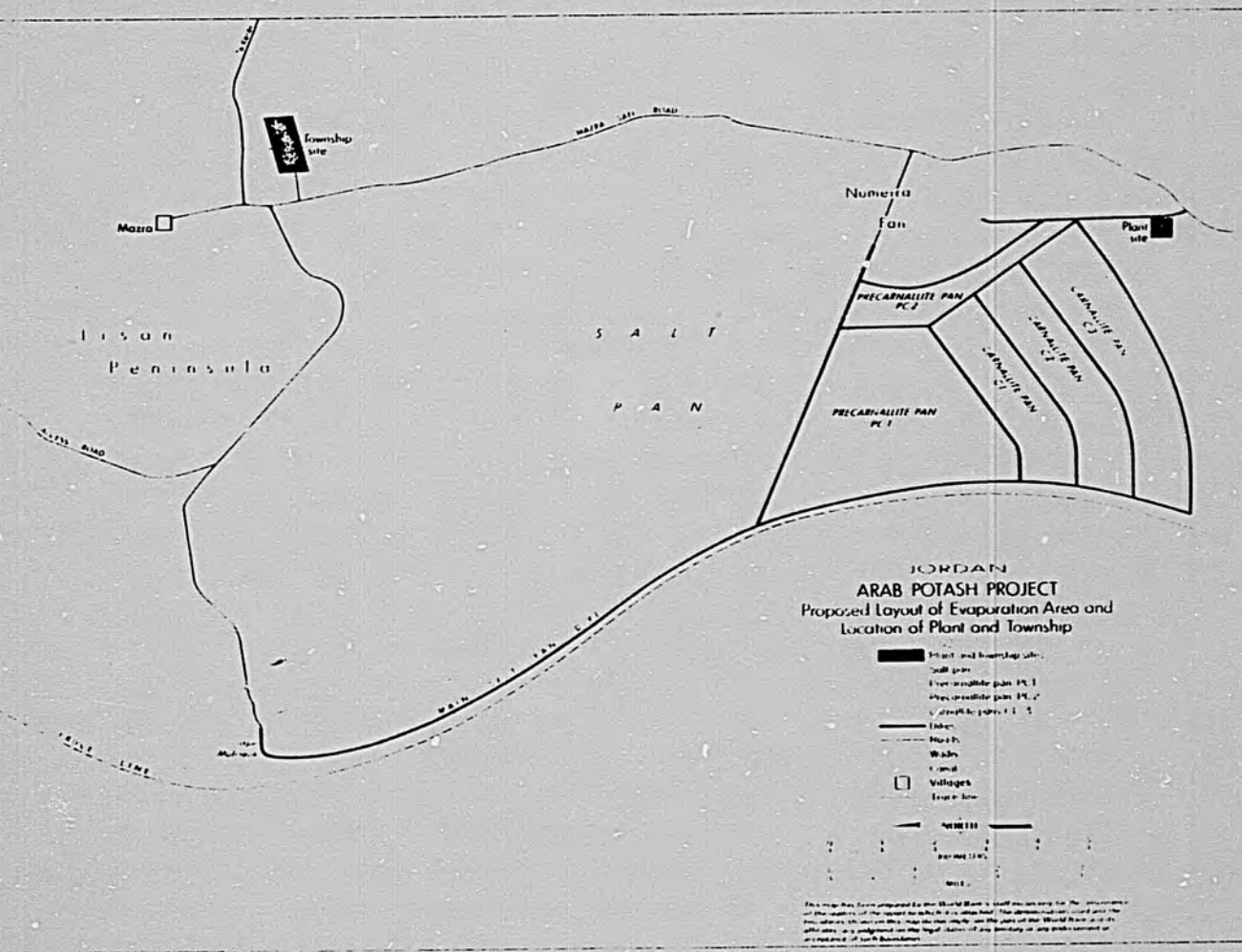
4. Additional Criteria for Alliance for Progress

[Note: Alliance for Progress projects should add the following two items to a project checklist.]

N.A.

a. FAA Sec. 251(b)(1), -(8). Does assistance take into account principles of the Act of Bogota and the Charter of Punta del Este; and to what extent will the activity contribute to the economic or political integration of Latin America?

b. FAA Sec. 251(b)(8); 251(h). For loans, has there been taken into account the effort made by recipient nation to repatriate capital invested in other countries by their own citizens? Is loan consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress (now "CEPCIES," the Permanent Executive Committee of the OAS) in its annual review of national development activities?


Township site
Mazra
Lisan Peninsula
SALT PAN
Numeira Tan
Plant site
PRECARNALLITE PAN PC 2
PRECARNALLITE PAN PC 1
CARNALLITE PAN C 1
CARNALLITE PAN C 2
CARNALLITE PAN C 3
JORDAN
ARAB POTASH PROJECT
Proposed Layout of Evaporation Area and Location of Plant and Township
Villages
NORTH

ANNEX 3

JORDAN - ARAB POTASH PROJECT

SCOPE OF WORK FOR TECHNICAL ADVISORY FIRM

Background

1. The Arab Potash Company (APC), a Company majority owned by the Jordanian Government, is implementing a project to commercially exploit the minerals contained in the Dead Sea brine. The Company's plant would be located at the southern end of the Dead Sea. Project construction would start during 1978 with the aim of commencing operation in mid 1982. APC would be producing 1.2 million metric tons per year of potassium chloride. The production process involves solar evaporation of Dead Sea brine in large shallow ponds, followed by refining utilizing the hot-leach/crystallization process. Utilities required and a township will also form part of the Project. The Company's output will be exported through the Port of Aqaba principally to the countries in the Indian and Pacific Ocean Area. The Company would transport its output to Aqaba (200 km) in its own trucks. Storage and ship loading at Aqaba would be the responsibility of the Aqaba Port Authority, a Government agency under the Ministry of Transport. The Project is estimated to cost US$420 million, including about US$325 million in foreign exchange. It would be financed 40% by equity and 60% by debt from regional and international financing institutions.

2. In November 1977, APC contracted the services of Jacobs International Inc. (JII) of USA to provide engineering services including design engineering, procurement, project management assistance and supervision of the project. JII in turn subcontracted Sir Alexander Gibb and Partners of UK to assist in civil engineering aspects and the Technical Service Office of Jordan to provide miscellaneous office assistance. More details about the responsibility of the consultants is shown in Attachment I.

Objectives

3. APC has decided to engage a consulting firm to act as its "Technical Advisors" which are expected to work closely with APC's technical staff and provide advice and solution to any unforeseen problems that may arise. The technical advisors are not expected to duplicate the work to be carried out by the engineering consultants. However, they will act as APC's advisors and owner's representatives to assist APC in the owner's supervision of the proper implementation of the project. The technical advisors will act as part of APC's staff and will work closely with local counterparts who will gradually take their responsibilities. The head of the advisory team will report directly to APC's general manager.

4. This Technical Advisory Body is expected to supply at least three specialists with substantive practical experience in three main engineering fields: civil, chemical, and mechanical. In addition, other specialists may be called upon to provide other specialized advice as needed. It is anticipated that most of such advice would be needed for short periods, but in some cases, such specialists may be needed over extended periods (3 to 12 months). At least the head of the team will be stationed in Jordan during the entire implementation of the project. Other specialists may be located, at least during part of the time, in the offices of the engineering consultants

in the USA and/or England and/or Ireland.

5. The specialists to be provided by the consulting firm should be highly qualified and with considerable experience in the execution of large chemical processing plants of a similar nature, preferably potash plants. Since the works involve the construction of some 60 km of dike on difficult terrain in a tropical environment, the civil engineer provided by the consulting firm should be highly qualified with extensive practical experience in dam construction in similar environment. He should also, preferably, be experienced in the other civil construction such as roads and housing. The chemical engineers should have extensive practical experience in the chemical field preferably in fertilizer production processes with particular experience in the extraction of potash by crystallization refining. The mechanical engineer should have considerable experience in chemical fertilizer machinery and equipment, principally for potash production including carnallite harvesting equipment.

Scope of Work

6. The specific areas where advice of the specialists will be required are:

(a) Comment of the appropriateness of the project's scope and specifications suggested by the consultants, including any subsequent changes.

(b) Provide assistance to APC in the supervision of the execution of the project.

(c) Assist APC in supervising all procurement activities and make comments to APC on the evaluation and recommendations for the award of contracts.

(d) Advise APC on any other matters concerning project design, implementation, and operation as APC may request from time to time.

The responsibilities of the different consulting firms will be as follows:

(1) JII will execute the conceptual engineering and design for the processing plant including instrument engineering, piping, civil, architectural, electrical, and mechanical designs. In particular, JII will: (a) prepare final specifications and design criteria for the harvesting system, including carnallite transport system to the processing plant and the testing of the system; (b) provide the necessary data for the solar evaporation system; (c) assist APC in pre-qualification of suppliers and submit their recommendations to APC; (d) prepare and issue bid documents for all major equipment, make technical and economic evaluation of all bids and make recommendations to APC for purchase; and (e) supervise, inspect, and approve all work to ensure its correct execution in accordance with the contract. In addition, JII will coordinate the works to be done by the Government on the highways connecting the plant site with Amman and Aqaba as well as the wharf construction, storage, and loading facilities at Aqaba. It will assist in the development of a continuing operating plan and a marketing plan.

(2) AGP will carry out all the final tests required for dike construction as well as civil engineering of the entire evaporation system, including pans, dikes, canals, intake and transfer structures, and temporary and permanent piping for the pan system. AGP will also be responsible for the design and procurement of the fresh water supply system; the electrical distribution system from the transformers to the various pumping stations; and all the conceptual architectural and engineering designs and specifications for the township including infrastructure, housing, social and commercial centers, electricity distribution, and sewerage and telephone systems.

(3) The Technical Services Office, a Jordanian engineering firm, will provide miscellaneous assistance such as secretarial help, recruitment of most local labor, minor engineering works and will liaise with the technical staff of JII and local authorities as required.

JORDAN - ARAB POTASH PROJECT

TERMS OF REFERENCE

FOR A FINANCIAL CONTROL & ACCOUNTING SYSTEM

Background

1. The Arab Potash Company (APC), a company owned primarily by the Jordanian Government, is implementing a project to commercially exploit the minerals contained in the Dead Sea brine. The company's plant would be located at the southern end of the Dead Sea and would start project construction during 1978 with the aim of commencing operation in mid 1982. In November 1977, APC contracted the services of the consultants Jacobs International Inc. (JII) and Sir Alexander Gibb and Partners to provide engineering services for project implementation, including the development of a cost accounting system for project construction. APC would be producing 1.2 million metric tons per year of potassium chloride. The production process involves solar evaporation of Dead Sea brine followed by refining utilizing the hot-leach/crystallization process. The company's output will be exported through the Port of Aqaba principally to the countries in the Indian and Pacific Ocean Area. The company would transport its output to Aqaba (200 km) in its own trucks. Storage and ship loading at Aqaba would be the responsibility of the Aqaba Port Authority, a Government agency under the Ministry of Transport. However, APC would have to maintain certain involvement in shipping to serve those markets which traditionally buy on a CIF basis. The project is estimated to cost US$420 million, including about US$325 million in foreign exchange. It would be financed 40% by equity and 60% by debt from various Arab funds and international agencies. More details about the company's proposed operations will be provided upon request.

2. APC has decided to engage technical assistance (accounting consultants) for the design and implementation of a financial control and accounting system. It is anticipated that the bulk of the consultants' work would be carried out over a period of about two years and, if necessary, APC will retain the consultants for an additional period to assist in the implementation and initial operation of the accounting system.

Objectives

3. The purpose of the technical assistance is to:

(i) design and assist APC in the implementation of a financial control and accounting system. Such system should be designed as to properly and timely reflect APC's operations and activities during project implementation and after the start of commercial operations. It shall be capable of accurately recording the various costs inputs from all aspects of APC's operations and should readily provide the wide range of data needed to assist management in its operations and financial decisions;

(ii) train APC staff to facilitate the implementation and use of the MIS and design instruction manuals setting out objectives and procedures of the system; and

(iii) assist in the initial implementation of the system.

Scope of Work

4. The accounting consultants shall discuss with APC about its needs regarding financial planning, general and cost accounting, and operations. Since the engineering consultants (JII) will develop a cost accounting system to reflect the cost of construction of the project, the accounting consultants should coordinate work with JII to ensure consistency and avoid duplication of activities. More specifically, the tasks of the accounting consultants shall be as follows:

(a) develop and help implement a "Cost Accounting System" with accounts classification into variable and fixed costs and direct and indirect costs, detailing cost centers. The cost accounting system should be able to generate information for assigning responsibility, measure labor and input productivity against standards, analyse and control cost variances (i.e., input and labor price and quantity, efficiency, overhead, and capacity variances) from the standards, and for determining the level of profitability of APC so that pricing decisions can be taken with the full knowledge of costs. The system should also include payroll accounting and procedures, including coding structures and recovery and control procedures;

(b) develop and help implement a "Standard Financial Accounting System" and general accounts classifications detailing balance sheets, income statements, cash flow statements, etc., together with related policies, systems procedures, principles of accounting recommended, follow up methods, and definitions. The system should develop and provide for the timely collection of accounts receivables and settlement of accounts payables. It should also contain standard and depreciation policy for fixed asset accounting;

(c) develop and help implement a system of "Financial Planning", including the introduction of operational objectives and the planned allocation of resources in the form of Operating Expense Budgets and Capital Expenditures Budgets (Cash Flows) which would be issued periodically as needed. The budgeting system should be coordinated with the financial accounts in order to reconcile budget variances with financial figures;

(d) develop and help implement policies and procedures, related analytical techniques, and mechanical tools to ensure project planning, formulation, justification, management, and control of the above budgets, including analysis of budget variances;

(e) help implement the use of related analytical techniques for the recording, planning, control, and evaluation of the "Operational Activities" of the company, including selling, order processing, work preparations, production inventory and material requirement, procurement, quality control, transportation, distribution and shipping, personnel, etc., and evaluate their financial implications;

(f) help implement "Internal Auditing Systems" through internal audit procedures and built-in internal checks especially for the handling and accounting of cash, payroll, purchasing, inventories, etc.;

(g) recommend and help install an "Organizational Structure" for the most efficient conduct of the accounting and finance functions within the context of the overall organization structure, determine communications channels, and write job descriptions for financial and accounting staff;

(h) determine the desirability of the use of the accounting machines or electronic data processing equipment;

(i) design and help implement the use of "Standard Forms" for recording and controlling all transactions; implement systems of "Management Reporting", including documentation procedures for the development of information in a frequency and amount as may be needed for decision making and corrective actions at different management levels;

(j) prepare an "Accounting Manual" to assist supervisions in ensuring the adequate accounting of all transactions, the timely and accurate presentation of information, and the training of staff. The accounting manual shall set forth a coded chart of accounts detailing and describing balance sheet accounts, income accounts, functional and departmental accounts, cost/profit centers, objective accounts, policies, standard procedure instructions, limits of authority, forms and methods governing their use, report formats (including an inventory of reports describing their purpose and method of preparation, assigning responsibilities for preparation, and seeking preparation dates, due dates, frequency and distribution), use of capital and expense budget programs (including guidelines distinguishing capital items and items charged directly to expense), etc.

5. The accounting consultants shall review financial and accounting staffing requirements and responsibilities during project execution and operations and shall:

(a) design a system for selecting of qualified financial and accounting staff as needed;

(b) identify training requirements, arrange in-house or outside training programs for financial and accounting staff, and prepare training course material;

(c) design policies and procedures with reference to hiring, performance, and progress reviews, promotions, discipline, salaries, and position classification; and

(d) provide, as necessary, one or two staff members to assist APC in the initial installation and implementation of the system.

Schedule for Consultancy Services

6. The accounting consultants shall prepare and submit the following reports within the time limit indicated below:

(a) An Inception Report listing the proposals, plans, and recommendations regarding the financial control and accounting system, including any need for the introduction and adaptation of electronic data processing equipment or alternative accounting machines within three months of contracting date.

(b) Progress Reports, at two months intervals, giving a statement of all work performed during the reporting period.

(c) A Main Report within 24 months summarizing all work performed and the recommendations of the consultants together with a list of all manuals prepared.

(d) A Final Report after the system has been implemented and the proper staff trained.

JORDAN - ARAB POTASH PROJECT

PERMANENT WORKING CAPITAL
(in '000 current dollars)

	1982	1983	1984	1985	1986	1987	1988	1989
I. Current Assets								
A. Accounts Receivables 60 days equivalent at prices shown in Table XI-	2,244	8,466	18,128	24,624	26,988	29,760	32,636	35,784
B. Inventory of Finished Goods (at cash costs) 60 days equivalent	1,886	5,245	8,220	9,472	10,180	10,942	11,759	12,684
C. Inventory of Spare Parts (at acquired costs)	4,932	5,256	5,472	5,832	6,228	6,696	7,164	7,668
D. Inventory of Raw Materials (at acquired costs)								
30 days equivalent of Fuel	377	498	848	993	1,060	1,140	1,220	1,306
60 days equivalent of Chemicals and Consumables	170	200	275	311	332	357	382	409
E. Operating Cash 30 days equivalent of Total Operating Costs	1,114	2,324	2,513	2,678	2,659	2,858	3,072	3,313
TOTAL CURRENT ASSETS	10,723	21,989	35,456	43,910	47,447	51,753	56,233	61,164
II. Less Current Liabilities								
A. Account Payables								
30 days equivalent of Fuels	377	498	848	993	1,060	1,140	1,220	1,306
Spare Parts	4,932	5,256	5,472	5,832	6,228	6,696	7,164	7,668
B. Short Term Loans 50% of Accounts Receivables	1.122	4,223	9,064	12,312	13,494	14,880	16,318	17,892
TOTAL CURRENT LIABILITIES	6,431	9,977	15,384	19,137	20,782	22,716	24,702	26,866
PERMANENT WORKING CAPITAL	4,292	12,012	20,072	24,773	26,665	29,037	31,531	34,298

ANNEX 6

JORDAN - ARAB POTASH PROJECT

PRINCIPAL AND INTEREST PAYMENT SCHEDULE FOR LONG TERM LOAN AND DEFERRED INTEREST
Total US$218.30 Million (JD72.05 Million)

	IBRD 1/			USAID 2/			Bilateral & Multilateral Agencies 3/4/			Commercial Loans 3/			Deferred Interests (GOJ) 6/			Total		
	Outstanding Principal at End of Year	Principal Repayments	Interests Payments	Outstanding Principal at End of Year	Principal Repayments	Interests Payments	Outstanding Principal at End of Year	Principal Repayments	Interests Payments	Outstanding Principal at End of Year	Principal Repayments	Interests Payments	Outstanding Principal at End of Year	Principal Repayment	Interests Payments	Outstanding Principal at End of Year (US$ M) (JD'000)	Principal Repayments (US$ M) (JD'000)	Interests Payments (US$ M) (JD'000)
1982	35.00	0	0*	38.00	0	0*	107.00	0	0*	20.00	0	0*	18.30	0	0*	218.30	0	0*
1983	35.00	0	1.46*	38.00	0	1.27*	107.00	0	3.57*	20.00	0	0.83*	18.30	0	0.61*	215.30	0	7.74*
1984	35.00	0	3.50	38.00	0	3.04	107.00	0	8.56	15.00	5.00	2.00	18.30	0	1.46	213.30	5.00	16.56
1985	30.00	5.00	3.50	35.29	2.71	3.04	99.36	7.64	8.56	10.00	5.00	1.50	14.64	3.66	1.46	189.29	24.01	18.06
1986	25.00	5.00	3.00	32.58	2.71	2.82	91.72	7.64	7.95	5.00	5.00	1.00	10.98	3.66	1.17	165.28	24.01	15.94
1987	20.00	5.00	2.50	29.87	2.71	2.61	84.08	7.64	7.34	0	5.00	0.50	7.32	3.66	0.88	141.27	24.01	13.83
1988	15.00	5.00	2.00	27.16	2.71	2.39	76.44	7.64	6.73	0	0	0	3.66	3.66	0.59	122.26	19.01	11.71
1989	10.00	5.00	1.50	24.45	2.71	2.17	68.80	7.64	6.12	0	0	0	0	3.66	0.29	103.25	19.01	10.08
1990	5.00	5.00	1.00	21.74	2.71	1.96	61.16	7.64	5.50	0	0	0	0	0	0	87.90	15.35	8.46
1991	0	5.00	0.50	19.03	2.71	1.74	53.52	7.64	4.89	0	0	0	0	0	0	72.55	15.35	7.13
1992	0	0	0	16.32	2.71	1.52	45.88	7.64	4.28	0	0	0	0	0	0	62.20	10.35	5.80
1993	0	0	0	13.61	2.71	1.31	38.24	7.64	3.67	0	0	0	0	0	0	51.85	10.35	4.58
1994	0	0	0	[illegible]	2.71	1.09	30.60	7.64	3.06	0	0	0	0	0	0	41.50	10.35	4.15
1995	0	0	0	8.19	2.71	0.87	22.96	7.64	2.45	0	0	0	0	0	0	31.15	10.35	3.32
1996	0	0	0	5.48	2.71	0.66	15.32	7.64	1.84	0	0	0	0	0	0	20.80	10.35	2.50
1997	0	0	0	2.77	2.71	0.44	7.68	7.64	1.23	0	0	0	0	0	0	10.45	10.35	1.67
1998	0	0	0	0	2.77	0.22	0	7.68	0.61	0	0	0	0	0	0	0	10.45	0.83

1/ Assuming loan signing in second half of 1978 with 13 years maturity including 6 years of grace at 10%.
2/ Assuming loan signing in second half of 1978 with 20 years maturity including 6 years of grace at 8%.
3/ Assuming loan signing in second half of 1978 with 20 years maturity including 6 years of grace at 8%.
4/ Includes US$7.0 million envisaged from the OAPEC Fund.
5/ Assuming loan signing in second half of 1979 with 8 years maturity including 4 years of grace at 10%.
6/ Assuming guarantee payment to GOJ (4%) being deferred for 6 years at 8% interest rate.

* Interest payments during 1982 and part of 1983 have been taken as interest during construction.

Industrial Projects Department
June 1978

ANNEX 7

Timetable for Marketing Activities to be Undertaken by APC

	Action	Date
(1)	Appointment of Sales Executive	September 1, 1978
(2)	Submission of Detailed Marketing Strategy	November 1978
(3)	Submission of Letters of Intention from Potential Potash Buyers	March 1979
(4)	Decision on the Installation of Compaction Facilities and Production of Potassium Sulphate	February 1979
(5)	Organization of Marketing Structure	June 1979
(6)	Staffing of Marketing Department	August 1979
(7)	Start of Training Programs for Marketing Staff	September 1979
(8)	Selection and Appointment of Local Representatives	January 1980
(9)	Drafting and Initiation of Promotional Activities	February 1980
(10)	Bidding of Tonnages Required for Market Seeding	Early 1980
(11)	Execution of Market Seeding Program	Early 1980-June 1982
(12)	Start of Commercial Operations	June 1982

JORDAN - ARAB POTASH COMPANY PROJECT

JORDAN - ARAB POTASH COMPANY PROJECT

PROJECTED INCOME STATEMENT

(IN CURRENT US$ 000)

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
CAPACITY UTILIZATION (%)	-	-	-	-	-	13	45	89	100	100	100	100	100
SALES VOLUME (000 TONS)	-	-	-	-	-	130	473	976	1,178	1,200	1,200	1,200	[illegible]
UNIT PRICE ($/TON)	-	-	-	-	-	86	95	105	127	140	154	164	[illegible]
SALES	-	-	-	-	-	11,180	44,935	102,480	149,606	168,000	184,800	196,800	[illegible]
OTHER REVENUES	-	-	-	-	-	304	676	515	477	455	496	540	[illegible]
TOTAL REVENUE	-	-	-	-	-	11,484	45,611	102,995	150,083	168,455	185,296	197,340	[illegible]
MANUFACTURING COSTS													
LABOR (OPER.AND MAINT.)	-	-	-	-	-	1,366	5,125	5,772	6,291	6,857	7,474	8,147	[illegible]
FUEL	-	-	-	-	-	1,950	6,207	10,844	12,751	13,634	14,590	15,620	[illegible]
CHEMICALS	-	-	-	-	-	146	464	811	954	1,021	1,092	1,169	[illegible]
OTHER CONSUMABLES	-	-	-	-	-	293	783	945	1,041	1,113	1,191	1,275	[illegible]
MAINT. MATERIALS	-	-	-	-	-	1,800	4,859	5,915	6,537	7,033	7,535	8,052	[illegible]
INSURANCE	-	-	-	-	-	827	893	963	1,039	1,112	1,190	1,273	[illegible]
GENERAL AND ADMIN													
PLANT	-	-	-	-	-	253	1,068	1,477	1,977	2,236	2,437	2,653	[illegible]
HEAD OFFICE	-	-	-	-	-	2,399	2,518	2,645	2,781	2,287	2,383	2,549	[illegible]
TECHNICAL ASSISTANCE	-	-	-	-	-	4,453	7,319	3,046	1,274	-	-	-	-
TRANSPORTATION AND DELIVERY (SAFI TO AQABA)	-	-	-	-	-	879	3,471	7,727	10,163	11,102	11,834	12,635	13,477
SUB-TOTAL	-	-	-	-	-	14,366	32,707	40,145	44,808	46,335	49,724	52,366	[illegible]
DEPRC. AND AMORT.	-	-	-	-	-	9,895	24,568	24,685	24,773	25,420	23,552	20,015	[illegible]
TOTAL OPERATING EXPENSES	-	-	-	-	-	24,261	57,275	64,830	69,581	71,755	73,276	72,331	[illegible]
OPERATING INCOME		-	-	-	-	(12,777)	(11,664)	38,164	80,501	96,699	112,019	125,958	[illegible]
INTEREST AFTER CONSTRUCTION													
SHORT-TERM LOAN	-	-	-	-	-	-	-	-	-	-	-	-	-
LONG-TERM (FOREIGN)	-	-	-	-	-	-	7,130	17,100	16,600	14,770	12,950	11,110	[illegible]
DEFERRED INTEREST (GOJ)	-	-	-	-	-	-	610	1,460	1,460	1,170	800	600	[illegible]
SUB-TOTAL	-	-	-	-	-	-	7,740	18,560	18,060	15,940	13,830	11,710	19,080
INCOME BEFORE TAX	-	-	-	-	-	(12,777)	(19,404)	19,604	62,441	80,759	98,189	112,248	135,206
TAXES	-	-	-	-	-	-	-	739	892	909	909	909	24,570
NET INCOME	-	-	-	-	-	(12,777)	(19,404)	18,865	61,549	79,850	97,280	111,339	110,636

INDUSTRIAL PROJECTS DEPARTMENT
DATE REPORT PREPARED - 06/10/78

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JORDAN - ARAB POTASH COMPANY PROJECT

PROJECTED CASH FLOW STATEMENT

(IN CURRENT US$ 000)

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
CASH GENERATION													
NET INCOME	-	-	-	-	-	(12,777)	(19,404)	13,865	61,549	79,850	97,280	111,432	110,836
DEPR. AND AMORTIZATION	-	-	-	-	-	9,895	24,568	24,685	24,773	25,420	23,552	20,015	20,015
INTEREST	-	-	-	-	-	-	7,740	18,560	18,060	15,940	13,830	11,710	10,090
SUB-TOTAL	-	-	-	-	-	(2,882)	12,904	62,111	104,383	121,211	134,663	143,065	140,742
CAPITAL FUNDS													
EQUITY	11,000	39,000	60,000	49,000	34,200	-	-	-	-	-	-	-	-
LT LOAN(FOR)	-	-	81,646	51,931	24,173	29,308	12,942	-	-	-	-	-	-
DEFERRED INTEREST (GOJ)	-	-	1,149	3,131	4,473	5,610	3,937	-	-	-	-	-	-
ST LOAN	-	-	-	-	-	-	-	-	-	-	-	-	-
SUB-TOTAL	11,000	39,000	142,795	104,062	62,846	34,918	16,879	-	-	-	-	-	-
TOTAL CASH AVAILABLE	11,000	39,000	142,795	104,062	62,846	32,036	29,783	62,111	104,383	121,211	134,663	143,065	140,742
CAPITAL EXPENDITURES													
PLANT AND OWNSHIP	-	21,445	152,079	91,861	43,564	6,593	3,265	2,346	1,761	-	-	-	-
WORKING CAPITAL	-	-	-	-	-	4,292	7,720	8,060	4,701	1,892	2,372	2,494	2,767
OTHER CAP.EXPENDITURES	11,000	1,155	2,521	3,039	6,036	5,915	815	-	-	3,231	3,458	-	-
INT. DURING CONSTRN.	-	-	3,595	9,162	12,546	15,118	10,220	-	-	-	-	-	-
SUB-TOTAL	11,000	22,600	158,195	104,062	62,146	31,918	22,020	10,406	6,462	5,123	5,830	2,494	2,767
DEBT SERVICE													
INTEREST ON LT LOAN(FOR)	-	-	-	-	-	-	7,130	17,100	16,600	14,770	12,950	11,120	9,290
INT. ON DEFERRED INT. (GOJ)	-	-	-	-	-	-	610	1,460	1,460	1,170	880	590	290
INTEREST ON ST LOAN	-	-	-	-	-	-	-	-	-	-	-	-	-
PRINC. REPAY. LT LOAN(FOR)	-	-	-	-	-	-	-	5,000	20,350	20,350	20,350	15,350	15,350
PRINC. REPAY. DEFERRED INT.	-	-	-	-	-	-	-	-	3,660	3,660	3,660	3,660	3,660
PRINC. REPAY. ST LOAN	-	-	-	-	-	-	-	-	-	-	-	-	-
SUB-TOTAL	-	-	-	-	-	-	7,740	23,560	42,070	39,950	37,840	30,720	29,090
TOTAL CASH REQUIREMENT	11,000	22,600	158,195	104,062	62,146	31,918	29,760	33,966	48,532	45,073	43,670	33,214	31,857
ANNUAL NET CASH SURPLUS	-	16,400	(15,400)	-	700	118	23	28,145	55,851	76,138	90,993	109,851	109,885
CUMULATIVE CASH SURPLUS	-	16,400	1,000	1,000	1,700	1,818	1,841	29,986	85,837	161,975	252,968	362,819	471,694
DEBT SERVICE COVERAGE	-	-	-	-	-	-	1.7	2.6	2.5	3.0	3.6	4.7	4.8

INDUSTRIAL PROJECTS DEPARTMENT
DATE REPORT PREPARED - 06/10/78

(IN CURRENT US$ 000)

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ASSETS													
CURRENT ASSETS													
[illegible]	-	-	-	-	-	1,114	2,324	2,513	2,678	2,859	2,850	3,073	3,313
[illegible]	-	-	-	-	-	2,244	8,466	18,128	21,624	26,938	29,750	32,[illegible]	32,714
[illegible]													
[illegible] GOODS	-	-	-	-	-	1,686	5,345	8,220	9,472	10,180	10,942	11,[illegible]	12,654
[illegible] WORKINGS	-	-	-	-	-	547	678	1,123	1,304	1,392	1,472	1,602	1,715
OTHER	-	-	-	-	-	-	-	-	-	-	-	-	-
SUB TOTAL	-	-	-	-	-	5,791	16,733	29,984	38,078	41,319	45,0[illegible]	47,0[illegible]	53,496
CASH [illegible]	-	16,400	1,000	1,000	1,700	1,919	1,841	29,986	85,637	181,975	2[illegible]	[illegible]	471,6[illegible]
FIXED AND OTHER ASSETS													
[illegible]	-	21,445	173,524	265,485	303,949	315,5[illegible]	318,807	321,153	322,914	323,913	3[illegible]	[illegible]	[illegible]
[illegible]	11,000	12,[illegible]	14,6[illegible]	17,7[illegible]	23,[illegible]	29,666	30,[illegible]	30,481	30,481	30,71[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	-	3,595	12,757	25,303	40,431	50,631	50,631	50,631	50,631	[illegible]	[illegible]	[illegible]
[illegible] ASSETS	11,000	33,600	191,795	295,857	358,003	385,629	399,979	402,275	404,036	407,267	410,7[illegible]	[illegible]	410,7[illegible]
[illegible] AND AMORT.	-	-	-	-	-	9,895	34,464	57,150	83,924	109,344	1[illegible]	[illegible]	1[illegible]
[illegible] AND OTHER ASSETS	11,000	33,600	191,795	295,857	358,003	375,733	365,464	343,124	320,111	297,922	277,827	[illegible]	[illegible]
TOTAL ASSETS	11,000	50,000	192,795	296,857	359,703	383,342	384,038	403,094	444,026	501,116	[illegible]	[illegible]	[illegible]
LIABILITIES													
CURRENT LIABILITIES													
[illegible]	-	-	-	-	-	377	498	848	993	1,050	1,140	1,[illegible]	1,3[illegible]
[illegible] OF LT DEBT(FOR)	-	-	-	-	-	-	5,0[illegible]	20,350	20,350	20,350	15,350	15,350	15,3[illegible]
[illegible] OF DEFER. INT.	-	-	-	-	-	-	-	3,260	3,660	3,260	3,[illegible]	3,[illegible]	-
[illegible]	-	-	-	-	-	1,12[illegible]	4,223	9,064	12,512	13,494	14,[illegible]	1[illegible]	17,[illegible]
[illegible]	-	-	-	-	-	-	-	-	-	-	-	-	-
OTHER	-	-	-	-	-	-	-	-	-	-	-	-	-
SUB TOTAL	-	-	-	-	-	1,499	9,721	33,922	37,315	38,354	35,0[illegible]	3[illegible]	34,543
LONG TERM DEBT (EXCL. CURR. PORTION)													
[illegible]	-	-	81,346	133,577	157,250	187,058	195,000	174,650	154,300	133,950	115,[illegible]	[illegible]	87,900
[illegible] INTEREST (DCD)	-	-	1,149	4,280	9,253	14,363	18,300	13,640	10,980	7,320	[illegible]	-	-
SUB TOTAL	-	-	82,795	137,857	166,503	201,421	213,300	189,290	165,280	141,270	12[illegible]	10[illegible]	87,900
EQUITY													
[illegible] CAPITAL	11,000	50,000	110,000	159,000	193,200	193,200	193,200	193,200	193,200	193,200	193,200	193,200	193,200
[illegible] EARNINGS	-	-	-	-	-	(12,777)	(22,162)	(13,317)	48,231	153,0[illegible]	22[illegible]	[illegible]	147,[illegible]
SUB TOTAL	11,000	50,000	110,000	159,000	193,200	180,422	161,017	179,882	241,431	321,262	41[illegible]	[illegible]	340,5[illegible]
TOTAL LIABILITIES AND EQUITY	11,000	50,000	192,795	296,857	359,703	383,342	384,038	403,094	444,026	501,116	[illegible]	[illegible]	[illegible]
RATIOS													
CURRENT RATIO (TO 1)													
[illegible] EXCESS CASH)	-	-	-	-	-	3.9	1.7	.9	1.0	1.1	1.3	1.3	1.5
[illegible] RATIO (TO 1)													
[illegible] EXCESS CASH)	-	-	-	-	-	5.1	1.9	1.8	3.3	5.3	8.5	11.3	15.2
[illegible]/EQUITY (TO 1)	-	-	.7	.8	.8	1.0	1.2	1.0	.6	.4	.3	.2	.1

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JORDAN - ARAB POTASH PROJECT

TRANSPORTATION COSTS AND LOADING COSTS

1. Transportation Costs between Safi and Aqaba (in 1977 Dollars)

	Total/Year	US$/Ton
Tires & Lubrication Oil	254,000	0.21
Maintenance	1,435,000	1.20
Truck Licence	78,000	0.06
Wages for Drivers (101 people)	667,000	0.56
Diesel Oil	617,000	0.51
Road Maintenance	600,000	0.50
Total	3,651,000	3.04

2. Loading Costs at Aqaba: Capital cost US$33 m for 1.8 m ton capacity

	Total/Year	US$/Ton[1/]
Labor	315,000	0.18
Maintenance	125,000	0.07
Depreciation (3%)	1,000,000	0.56
Insurance	165,000	0.09
Utilities	150,000	0.08
Miscellaneous	145,000	0.08
Return on Investment	1,970,000	1.09
Total	3,870,000	2.15

1/ Since the port capacity is 1.8 m tons, the portion used by potash (1.2 m ton) is calculated.

Annex 11

INITIAL ENVIRONMENTAL EXAMINATION

NARRATIVE DISCUSSION

Project Location:	Jordan
Project Title :	Potash Plant
Funding :	FY 1977 - $5.0 million
Life of Project :	$38.0 million
IEE Prepared By :	NE/PD, J. Shea
	Date: 06/15/77

Environmental Action Recommended: Negative Determination

It is considered that the proposed project will not have a significant effect on the environment and no further assessment is required.

Concurrence

The proposed project will not have a significant effect on the environment and therefore no further assessment is required.

Approved: [illegible]

Disapproved: _____

Date: 6/22/77

Clearance:
NE/PD, L. G. Rosenberg (Draft)
NE/PD/ENGR, E. Callahan (Draft)
GC/NE, G. Davidson (Draft)

Discussion of Major Environmental Relationship of Project Relevant to Attached Impact Identification and Evaluation Form

A. Description of Proposed Project

The project is designed to exploit one of the few large physical resources available to Jordan - the Dead Sea brine - which is rich in minerals and salts, including potash. It will be the largest single industrial project ever undertaken in Jordan. Recovery of Dead Sea potash will be accomplished by a solar evaporation process whereby brine is pumped from the Dead Sea to a system of evaporation pans wherein the brine is concentrated until the brine precipitates a crystalline carnallite mixture containing about 23 percent potash. This deposit will be harvested by specially designed continuous bottom-operated, track driven dredging equipment and then delivered in slurry form by a pipeline to an adjacent chemical refinery. In the refinery, the slurry harvested from the pans will be decomposed into sodium, magnesium, and potassium crystals. Potassium chloride will be separated and crystallized under the hot-leach/crystallization process using vacuum crystallizers. This process yields free-flowing potash crystals. Sodium chloride will be stored in an open area near the plant. There is no immediate plan to utilize this by-product although eventually APC may produce salt, bromine, magnesium oxide and potassium sulphate.

Potash will be transported by trucks from the plant site to the Port of Aqaba for storage and shipment to export markets. A recently completed two-lane 7-meter wide road between Safi and Aqaba is adequate for the transportation of the plant's output. A separate port facility is to be built at Aqaba to handle potash and phosphate exports. These facilities will include bulk and bagged storage, potash screening, bagging and bulk loading equipment and ship berthing facilities.

To accomodate the work force to be employed in both construction and operation of the plant facilities, a township will be built at a location about 20 km from the plant on a site owned by APC. The township will house, eventually, some 2,270 persons in 380 housing units. The township will also contain essential community facilities, including administrative offices, shops, a bank, a post office, a community center, schools, a health clinic, a fire station, a mosque and a church and a police station.

Because the plant location is remote and the area sparsely settled, normal utilities such as water and electricity are not now available. The project scope, therefore, includes provision for the supply of process water (an estimated 5.6 million cubic meters per year) and potable water for the township (an estimated 0.5 cubic meters per year). The project's power needs will be met from two different sources. On site generation of 15 MW, which would be sufficient to cover minimum operating needs connected with the stream requirements of the power plant, would be provided by a fuel-oil fired steam generating plant will be supplemented by power provided by an extension of the national electric transmission grid.

B. Discussion of Environmental Impacts

As part of the feasibility study for the project, the consultant was required to prepare an analysis of the environmental impact of the project. That analysis has been reviewed and found acceptable.

1. Present Setting

The topography of the landscape offers very little in terms of animal coverture. In addition, the sparseness of vegetation limits available food supply. For these reasons there is a very small land-animal population. Some local feeding is done at night by foxes, jackals, wolves, rabbits and hares but permanent habitation is limited. Many birds reside in the area and a large quantity of birds migrate through the Dead Sea area from north and south breeding and feeding during the appropriate seasons of the year. Alluvial materials from various side wadis and deposits along the eastern shore will be removed for use as a dike construction material. Displacement by location of the plant facility, dike areas and refinery is expected to have negligible effect on marine, invertebrate, amphibian and reptile life in the area. In addition, perennial plant life is sparse in the salt flat area to be occupied by the facility due to the fact that only a short time ago the area was submerged under the Dead Sea. To avoid adverse impact by flash flood erosion of the borrow areas these areas will be channelized. The project area is sparsely settled and those few that reside in the general area earn their livelihood principally from agriculture, mainly tomato crops. The hydrochloric acid emissions from

the dryer will be minimal and are expected to create no problem at all with existing vegetation. In order to minimize any possible adverse effects on agricultural activities in the project area, the prime source of water will be ground water accumulated in underground alluvial aquifers, after such water has been utilized for irrigation. The township site was selected after the Jordan Archeological Institute confirmed that no archeological remains exist underneath the planned site.

2. Emissions

Emissions from the facility will be primarily in the air with the largest source of emissions from the product dryer. An electrostatic precipitator will be installed on the dryer stack to reduce emissions to 43 lb/hour. Hydrochloric acid in gaseous form will also be emitted from the dryer stack to the atmosphere in the amount of 31 lb/hour. Sodium chloride (NaCl) will continuously by stockpiled as a solid at the rate of 116 tons/hour. Particulate air emissions from the erosion of these piles will be on the order of 10 lb/hour. Base on the experience over an extended period of a similar plant across the Dead Sea, the stockpiling of comparable volumes of NaCl has not created problems with existing vegetation. There will be continuous emissions from combustion of fuel and diesel oil in the boilers, dryers, harvesters, and trucks and engines. The volume of generated emissions has been calculated from the proposed production process. Emission conversion factors were derived from Environmental Protection Agency document AP-42 Emissions Handbook. Based on these calculations, the emissions are 1/10th to 1/100th the U.S. National Primary Air Quality Standards.

3. Waste Disposal

Liquid sanitary wastes from the facility within the plant area will be disposed of in an oxidation pond. Overflow from the pond will be released to the Dead Sea via a salt ditch leading from the plant to the Dead Sea. Salt concentrations in effluent channel and the large amount of residence time provided by the length of the ditch will completely destroy any bacteria existing in the oxidation pond discharge.

A piped system discharging to a sewage treatment plant will be installed in the township. After secondary treatment of sewage at a site at the western extremity of the site the effluent will be discharged into a wadi pond.

Disposal of common salt-tailings, involving some 460,000 cubic meters annually will be undertaken by building several piles and leveling these with a bulldozer as required. Disposal of waste brine and magnesium chloride will be made in a manner that provides minimum disturbance to the sea brine at the main intake point. All dikes will be regularly patrolled and inspected to ensure settling and seepage conform to predetermined acceptable levels.

IMPACT IDENTIFICATION AND EVALUATION FORM

Impact Areas and Sub-areas 1/	Impact Identification and Evaluation 2/
A. LAND USE	
1. Changing the character of the land through:	
a. Increasing the population	M
b. Extracting natural resources	M
c. Land clearing	M
d. Changing soil character	N
2. Altering natural defenses	N
3. Foreclosing important uses	N
4. Jeopardizing man or his works	N
5. Other factors	
_____	_____
_____	_____
B. WATER QUALITY	
1. Physical state of water	N
2. Chemical and biological states	M
3. Ecological balance	L
4. Other factors	
_____	_____
_____	_____

1/ See Explanatory Notes for this form.

2/ Use the following symbols:
N - No environmental impact
L - Little environmental impact
M - Moderate environmental impact
H - High environmental impact
U - Unknown environmental impact

August 1976

C. ATMOSPHERIC

1. Air additives ---------- N
2. Air pollution ---------- L
3. Noise pollution ---------- L
4. Other factors

_____ _____

_____ _____

D. NATURAL RESOURCES

1. Diversion, altered use of water ---------- L
2. Irreversible, inefficient commitments ---------- N
3. Other factors

_____ _____

_____ _____

E. CULTURAL

1. Altering physical symbols ---------- N
2. Dilution of cultural traditions ---------- L
3. Other factors

_____ _____

_____ _____

F. SOCIOECONOMIC

1. Changes in economic/employment patterns ---------- M
2. Changes in population ---------- H
3. Changes in cultural patterns ---------- L
4. Other factors

_____ _____

_____ _____

G. HEALTH

1. Changing a natural environment ---------- L
2. Eliminating an ecosystem element ---------- L
3. Other factors

_____ _____

_____ _____

H. GENERAL

1. International impacts ---------- L
2. Controversial impacts ---------- N
3. Larger program impacts ---------- N
4. Other factors

_____ _____

_____ _____

I. OTHER POSSIBLE IMPACTS (not listed above)

_____ _____

_____ _____

_____ _____

See attached Discussion of Impacts.

JORDAN - ARAB POTASH PROJECT

BREAK-EVEN ANALYSIS IN 1986
(in current dollar '000)

Cost	Fixed	%	Variables	%	Total	%
Labor (Op. & Maint.)	6,857	(100.0)	0	(0)	6,857	(100.0)
Fuel	2,727	(20.0)	10,907	(80.0)	13,634	(100.0)
Chemicals	203	(20.0)	818	(80.0)	1,021	(100.0)
Other Consumables	835	(75.0)	278	(25.0)	1,113	(100.0)
Maintenance Materials	5,275	(75.0)	1,758	(25.0)	7,033	(100.0)
Insurance	1,112	(100.0)	0	(0)	1,112	(100.0)
Administration	4,463	(100.0)	0	(0)	4,463	(100.0)
Transportation	3,331	(30.0)	7,771	(70.0)	11,102	(100.0)
Subtotal	24,803		21,532		46,335	
Depreciation	24,798	(100.0)	-	(0)	24,798	(100.0)
Interest Payment	13,740	(100.0)	-	(0)	13,740	(100.0)
Total Costs	63,341		21,532		84,873	
Percentage	74.6%		25.4%		(100.0%)	
Revenues					168,455	

Profit Break-even Point: 43.1% of capacity

Cash Break-even Point: 26.2% of capacity

JORDAN - ARAB POTASH PROJECT

FINANCIAL RATE OF RETURN

DATA TABLE
(in constant US$ '000)

	Capital Costs C1.	Working Capital C2	Prod. and Transp.Costs C3	Taxes C4	Revenues Sale B1
1977	11,000	0	0	0	0
1978	18,846	0	0	0	0
1979	138,649	0	0	0	0
1980	78,500	0	0	0	0
1981	37,969	0	0	0	0
1982	9,124	3,133	10,486	98	8,382
1983	2,789	5,252	22,402	358	31,240
1984	1,529	5,134	25,570	739	65,602
1985	1,012	2,798	26,671	892	89,335
1986	1,795	0	25,742	909	93,586
1987	1,801	0	25,898	909	96,508
1988	0	0	25,906	909	95,796
1989	0	0	26,040	7,981	101,176
1990	16,222	0	26,084	8,045	102,395
1991	16,186	0	26,026	15,938	102,172
1992	1,668	0	26,089	16,346	102,424
1993	1,667	0	26,073	16,346	102,351
1994	0	0	26,087	16,728	102,346
1995	0	0	25,817	17,089	102,247
1996	0	0	26,059	17,306	102,251
1997	0	0	26,039	17,897	102,172
1998	1,557	0	26,069	18,072	102,149
1999	1,555	0	26,025	18,307	102,254
2000	0	0	26,043	18,256	102,125
2001	(8,532)	(5,005)	26,064	13,235	102,086

Financial rate of return before tax = 12.6%.
Financial rate of return after tax = 11.3%.

ANNEX 13

LOGICAL FRAMEWORK NARRATIVE

1. Objectives

   a. Goal: The Goal of the Project is the increase of Jordan's economic independence from outside assistance.

   b. Purpose: The Purpose is to assist Jordan in increasing its foreign exchange earnings.

   c. Outputs: The Project Outputs are:

      (1) The construction of facilities necessary to produce 1.2 million tons of commercial grade potash reasonably on the established schedule;

      (2) The creation of an operating company managed and staffed by trained personnel able to conduct all company operations without substantial outside assistance.

2. Assumptions

   a. At the Goal level, the major assumption is that an improvement in Jordan's Balance of Payments position will remain a key factor in realizing Jordan's aspirations to become independent from foreign economic assistance. Another factor in reaching that objective is independence from outside support of its budget; the project will provide substantial revenue income to the Government of Jordan which, in the long run, should replace some of the budgetary assistance now required. The second assumption this is that the operations of APC will, during a 25-year period, contribute about $1 billion to Government resources.

   b. At the Purpose level, the principal assumption is that APC will produce and sell potash substantially at the design capacity of its plant.

   c. At the Output level the assumptions are:

      (1) that all funds to be provided under the financial plan will become available when needed;

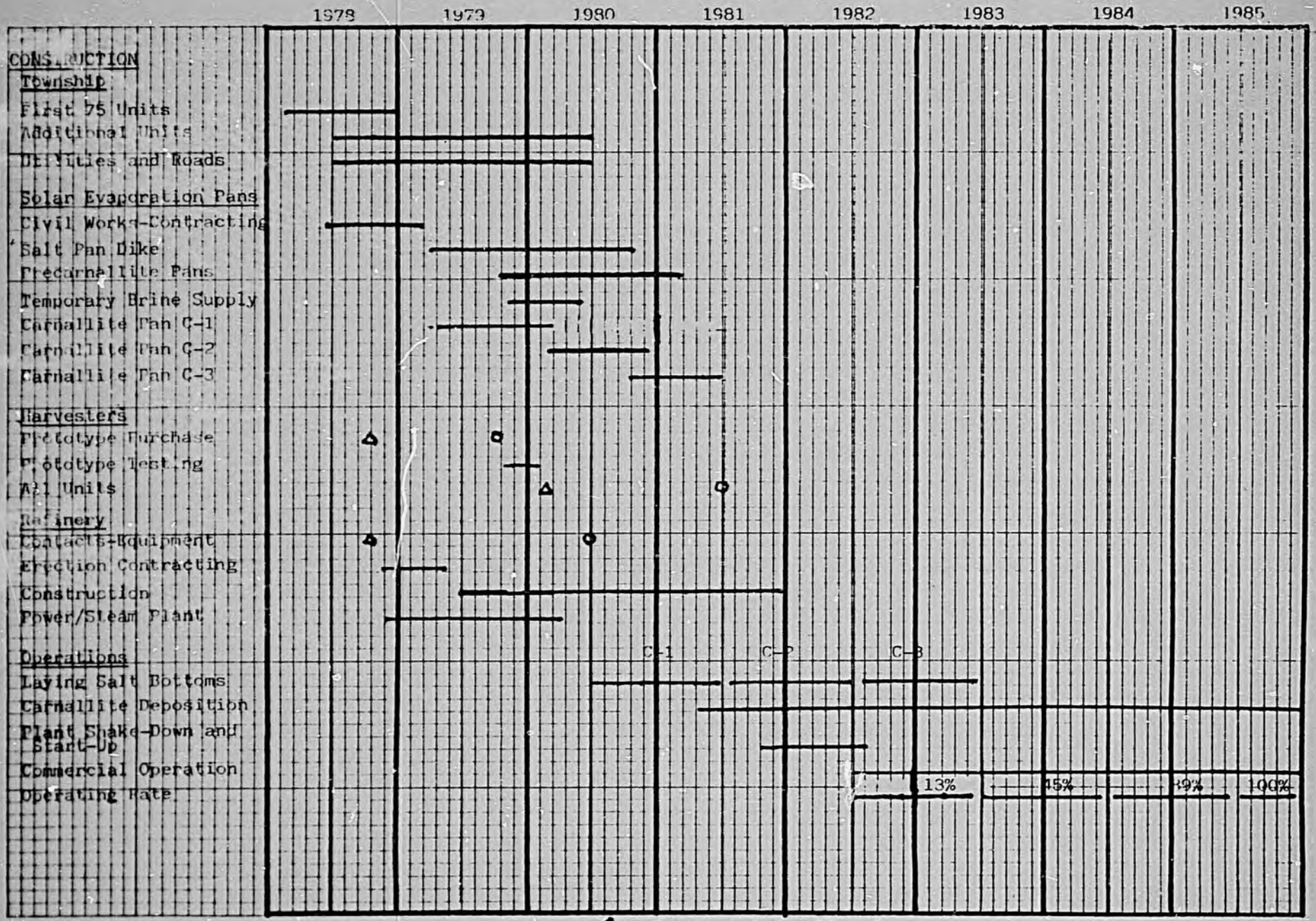
      (2) that the facilities can be built reasonably within the cost estimate;

(3) that the efforts of the consulting engineers to build the facilities on schedule are successful;

(4) with respect to Output No. 2, that all consultants having training functions will reach their training objectives and that APC will find the personnel needed for the operation of the company; and, finally,

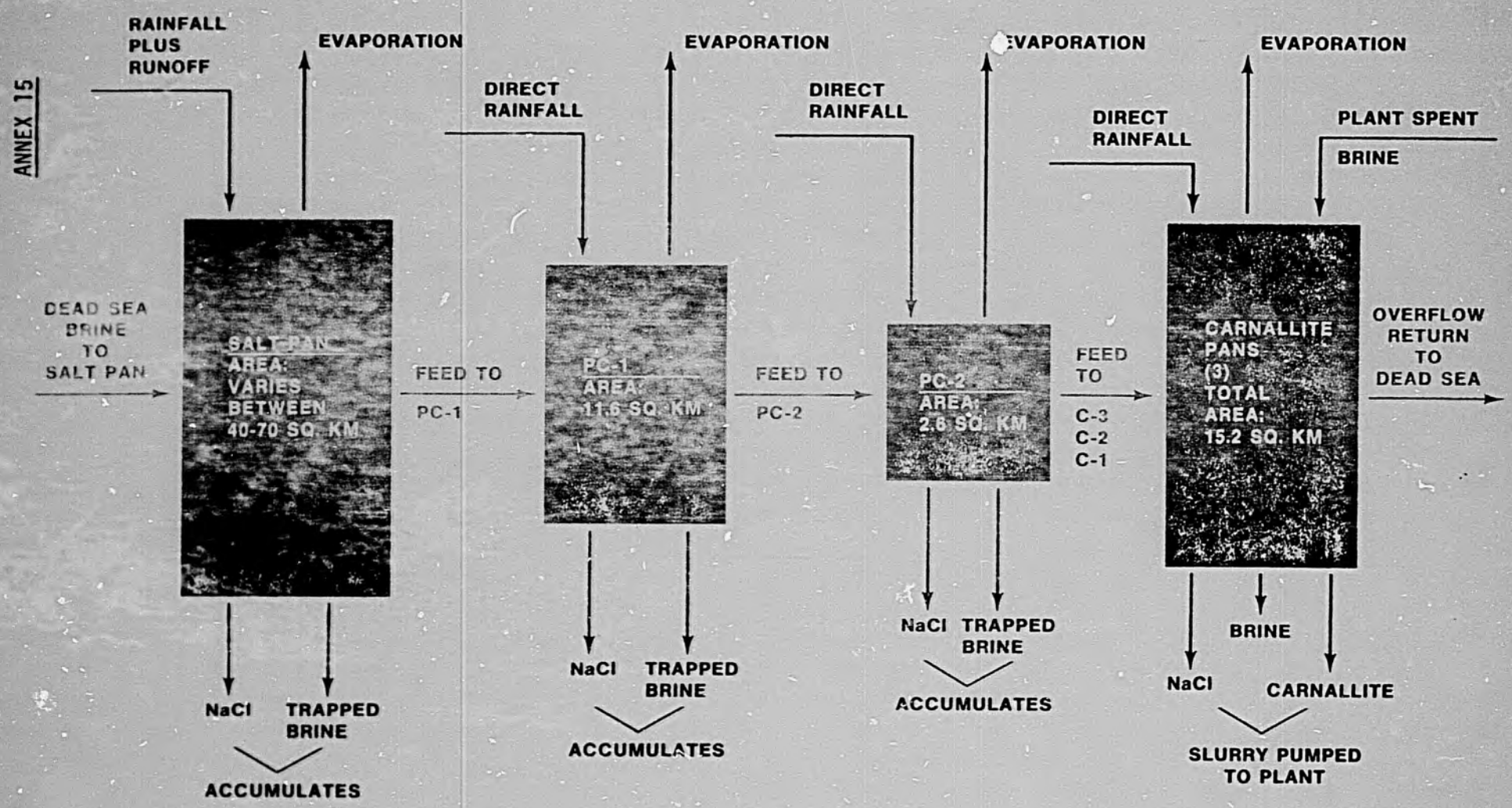
(5) that the political situation in the area remains sufficiently stable to construct and operate the plant.

SCHEDULE FOR CONSTRUCTION AND INITIAL OPERATION



ANNEX 14

EVAPORATION SYSTEM - FLOW CHART



PROJECT AUTHORIZATION

AND REQUEST FOR ALLOTMENT OF FUNDS

PART II

Name of Country: Jordan

Name of Project: Potash Plant

Number of Project: 278-0210

Pursuant to Part II, Chapter 4, Section 532 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Loan to Jordan (the "Cooperating Country") of not to exceed Five Million United States Dollars ($5,000,000) the ("Authorized Amount") to help in financing certain foreign exchange costs of goods and services required for the project as described in the following paragraph.

The project consists of the construction of production facilities for 1.2 million tons of potash (potassium chloride) of standard fertilizer grade (containing 60% to 62% potassium grade K20); also included in the Project are storage facilities, a truck fleet, a steam plant, fresh water supply systems and a township. The project also consists of technical assistance including engineering and construction supervision, accounting and financial management assistance and plant operation and management training.

I approve a total level of A.I.D. appropriated funding planned for this project of not to exceed $38,000,000, including the funding authorized above, during the period FY 1978 through FY 1979. $33,000,000 United States dollars will be available for an additional increment in FY 1979 subject to the availability of funds in accordance with A.I.D. allotment procedures.

I hereby authorize negotiation and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority subject to the following essential terms and covenants and major conditions; together with such other terms and conditions as A.I.D. may deem appropriate:

Interest Rate and Terms Repayment

The Cooperating Country shall repay the Loan to A.I.D. in United States Dollars within forty (40) years from the date of first disbursement of the Loan, including a grace period of not to exceed ten (10) years.

The Cooperating Country shall pay to A.I.D. in United States Dollars interest from the date of first disbursement of the Loan at the rate of (a) two percent (2%) per annum during the first ten (10) years, and (b) three percent (3%) per annum thereafter, on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

Source and Origin of Goods and Services

Goods and services financed by A.I.D. under the project shall have their source and origin in countries included in A.I.D. Geographic Code 941 except as A.I.D. may otherwise agree in writing.

Conditions Precedent to Disbursement of $5,000,000 loan.

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement of the $5,000,000 loan, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish in form and substance satisfactory to A.I.D.:

(a) submission by Arab Potash Company (APC) of a firm financing plan, including but not limited to a formal confirmation of the amounts to be provided by each participating donor institution; and

(b) a resolution by APC's Board of Directors authorizing the increase in the company's capital to JD 63 million.

Conditions Precedent to Disbursement of Any Amount in Excess of $5 million.

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement of any amount in excess of $5 million, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish in form and substance satisfactory to A.I.D.:

(a) Executive loan agreements by the GOJ or APC with all lenders other than commercial lenders and the Arab Fund for Economic and Social Development, and evidence in writing that the Arab Fund intends to lend $15 million for the Project;

(b) Subscription to substantially all the shares to be issued to bring APC's capital to not less than JD 63 million;

(c) Executed contracts with firms acceptable to A.I.D. for the supply of technical and accounting and financial services;

(d) Selection of a firm acceptable to A.I.D. to supply APC with operating management assistance;

(e) Submission of a plan by the GOJ acceptable to A.I.D. for financing construction and for constructing potash storage and loading facilities at Aqaba; and

(f) Evidence in writing of an undertaking by the GOJ and Jordan Electric Authority (JEA) to construct transmission and related power supply facilities adequate to furnish up to 17 MW of electricity to APC's potash plant beginning March 1, 1981.

Covenants

Borrower shall covenant that APC's debt/equity ratio shall not be higher than 55/45 after project completion and not higher than 60/40 during project execution.

John J. Gilligan
Administrator