

Document of  
The World Bank

FILE COPY

FOR OFFICIAL USE ONLY

Report No. 1889b-PAK

STAFF APPRAISAL REPORT

PAKISTAN

TOOT OIL AND GAS DEVELOPMENT PROJECT

November 22, 1978

Energy, Water and Telecommunications Department  
South Asia Regional Office

This document has a restricted distribution and may be used by recipients only in the performance of their official duties. Its contents may not otherwise be disclosed without World Bank authorization.

### CURRENCY EQUIVALENTS

Rs 1.0	=	US\$0.101
Rs 9.9	=	US\$1.00
Rs 1,000,000	=	US\$101,000

### FISCAL YEAR

July 1 - June 30

### WEIGHTS AND MEASURES

1 Metric Ton (mt)	=	1,000 Kilograms (kg)
1 Metric Ton (mt)	=	2,204 Pounds (lb)
1 Kilometer	=	0.62 Miles
1 Ton of oil equivalent (Toe)	=	10 million Kilocalories
1 Barrel of oil (BBL)	=	0.15899 Cubic Meter
1 Cubic Meter (m <sup>3</sup> )	=	6.289 Barrels
1 Cubic foot (CF)	=	0.02832 Cubic Meter
MCFD	=	Thousand Cubic feet per day
MMCF	=	Million Cubic Feet

### PRINCIPAL ABBREVIATIONS AND ACRONYMS USED

GOP	-	Government of Pakistan
OGDC	-	Oil and Gas Development Corporation
OGTI	-	Oil and Gas Training Institute
PCP	-	Petroleum Commission of Pakistan
ERC	-	Energy Resources Cell
LPG	-	Liquefied Petroleum Gas
POL	-	Pakistan Oilfields Limited
PPL	-	Pakistan Petroleum Limited
AOC	-	Attock Oil Company
CIDA	-	Canadian International Development Agency
ODM	-	Overseas Development Ministry

PAKISTANTOOT OIL AND GAS DEVELOPMENT PROJECTSTAFF APPRAISAL REPORTTABLE OF CONTENTS

	<u>Page No.</u>
I. <u>ENERGY SECTOR</u> .....	1
Background .....	1
Historical Growth Patterns .....	1
Pakistan's Energy Resources .....	2
Future Energy Requirements .....	4
Energy Policies .....	4
II. <u>THE OIL AND GAS SECTOR</u> .....	6
Background .....	6
Organization and Structure .....	7
Investment .....	8
Development Prospects .....	10
Pricing .....	11
The Role of the Bank .....	16
III. <u>THE BENEFICIARY</u> .....	17
OGDC's Corporate Existence .....	17
Operations .....	18
Personnel .....	18
Budgeting and Accounting .....	18
Management Capabilities .....	19
Audit .....	20
Insurance .....	20

---

This report was prepared by Messrs. H. G. Schober, E. D. McCarthy, and Miss I. Zurayk, Energy, Water and Telecommunications Department.

<p>This document has a restricted distribution and may be used by recipients only in the performance of their official duties. Its contents may not otherwise be disclosed without World Bank authorization.</p>
--

	<u>Page No.</u>
IV. <u>THE PROJECT</u> .....	21
Background .....	21
Description of the Project .....	21
Implementation of the Project .....	23
Project Cost .....	23
Project Financing Plan .....	24
Allocation and Disbursement of the IDA Credit .....	25
Procurement .....	25
Refinery Expansion .....	26
Project Risks .....	26
Ecology and Safety .....	26
Schedule and Reporting .....	27
V. <u>FINANCIAL ASPECTS</u> .....	27
Past Financial Performance and Present Position .....	27
Financial Analysis of the Toot Project .....	30
OGDC's Future Financial Prospects .....	35
OGDC's Financing Plan .....	36
OGDC's Projected Financial Position .....	37
Recommendations .....	39
VI. <u>ECONOMIC ANALYSIS</u> .....	40
Justification of Toot Development .....	40
Rate of Return and Sensitivity Analysis .....	40
VII. <u>RECOMMENDATIONS</u> .....	41

LIST OF ANNEXES

1.01 (A)	Natural Gas Reserves
1.02 (B)	Oil Reserves
2.01	Pricing of Petroleum Products
3.01	Accounting and Management Information
4.01	Summary of Project Costs
4.02	Estimated Schedule of Disbursements
4.03	Allocation of Loans
4.04	Project Schedule
5.01	Graph-Crude Oil Prices vs. Rate of Return
5.02	Financial Projections for Toot
5.03	Financial Projections for OGDC
5.04	Notes and Assumptions on Financial Statements
6.01	Economic Analysis
7.01	Related Documents and Data Available in the Project File

## I. ENERGY SECTOR

### Background

1.01 The increase in world petroleum prices since 1973 has had a major adverse effect on Pakistan's balance-of-payments. Despite the fact that Pakistan is self-sufficient in important commercial energy sources such as natural gas and hydro power, the bulk of its petroleum needs is still imported. Out of a total commercial energy supply in 1975/76 of 366 trillion BTU (9.3 million TOE), approximately 39% was met by crude oil and refined petroleum products, almost 90% of which was imported. Although the substitution of petroleum products by natural gas has been instrumental in reducing the share of petroleum consumption in total energy demand from 51% to 39% between 1964 and 1976, net imports of oil and oil products have increased from \$50 million in FY73 to \$370 million in FY77, which is equivalent to 33% of the current account deficit. In the future, the scope for replacing petroleum consumption by alternative energy supplies, such as natural gas, will be much more limited than in the past. Unless new supplies of indigenous crude oil are discovered, petroleum imports will continue to increase with future growth in consumption of commercial energy, particularly in the transportation and agriculture sectors, where alternative energy supplies cannot be used economically.

### Historical Growth Patterns

1.02 Total energy consumption in the commercial sector increased by 7.5% per annum during 1965-1976, while GNP increased at approximately 5% during the same period. 1/ The breakdown of commercial energy demand by primary energy source shows natural gas and hydroelectricity have become increasingly important sources of commercial energy in the past decade, experiencing annual average growth rates in excess of 10%; this has been paralleled by a relative decrease in the use of petroleum and coal. The change in relative consumption patterns is a direct consequence of government policy which has been aimed at replacing petroleum consumption by natural gas and hydroelectricity. Current projections show that this trend is likely to stabilize in the future.

#### Share of Total Commercial Energy Demand (%)

	<u>FY 64</u>	<u>Actual FY 74</u>	<u>FY 76</u>	<u>Actual Annual Growth Rate 1964-1976</u>	<u>Projected Annual Growth Rate 1976-1983</u>
Petroleum	50.5	39.5	38.7	4	6
Natural Gas	23.0	38.1	37.4	11	11
Coal	17.0	7.0	5.5	-4	0
Hydel	9.5	14.9	17.8	13	13
Nuclear	-	0.5	0.6		
Total	100.0	100.0	100.0		

Source: "Energy Resources Cell"

1/ This energy/GNP elasticity of about 1.5 is fairly typical for countries at Pakistan's stage of economic development and is higher than the corresponding coefficient for more developed economies which is closer to 1.0.

1.03 The principal consuming sectors are the industrial sector ( including fertilizer production) which is responsible for approximately 42% of energy consumption, followed by transportation (17%) and power (17%). As of 1975, the consumption of commercial energy per capita was 0.12 tons of oil equivalent (TOE) which compares with a world average <sup>1/</sup> of 1.37 TOE, an average for developing countries of 0.27 TOE, and 0.15 TOE and 0.02 TOE, respectively, for India and Bangladesh.

#### Pakistan's Energy Resources

1.04 Pakistan's domestic energy resources are relatively unusual in being characterized by sizeable reserves of natural gas, substantial hydro potential, but only limited known reserves of crude oil and exploitable coal, and no uranium or other mineral ores which might be used as nuclear fuels. Thus, while hydroelectricity and natural gas have been developed extensively and now account for over half of Pakistan's total energy requirements, indigenous coal and crude oil supply a smaller proportion of these requirements. The relatively small contribution of coal and crude oil is attributable primarily to the poor quality and remote location of the country's principal coal deposits and to the low level of past petroleum exploration activity. Finally, as in most countries in South Asia, a large part of internal energy requirements i.e. approximately 50% for Pakistan, are still met by non-commercial energy sources such as firewood, animal dung, bagasse and maize roots, which constitute the bulk of energy supplies in rural areas.

#### 1. Natural Gas

1.05 Natural gas was first discovered in the mid-fifties and for more than two decades has been an important component of Pakistan's primary energy resources. The principal producing field is that of Sui in Baluchistan Province, which began production in 1958 and which currently is responsible for nearly 85% of Pakistan's annual gas production of 180 billion cubic feet (5.0 million TOE). Remaining recoverable reserves from the Sui reservoir are estimated at 7.16 trillion cubic feet (179 million TOE). The next largest field, Mari, is being utilized for the production of nitrogenous fertilizer. The remaining gas fields are much smaller and account for less than 8% of total production. Total proven "recoverable" reserves are estimated at 9.0 trillion cubic feet <sup>2/</sup> (225 million TOE) of which approximately 18.5% has been used. Recent discoveries, still to be fully evaluated, at Dhodak and Pirkoh, indicate that adequate gas supplies should be available to meet foreseeable internal demand until at least the year 2000. Annex 1.01 (A) shows Pakistan's natural gas fields and their reserves, and Map IBRD 13158 shows the location of these fields.

---

<sup>1/</sup> Including centrally planned economies.

<sup>2/</sup> A trillion cubic feet is equivalent to 28.3 billion m<sup>3</sup> or about 25 million tons of oil equivalent (TOE).

## 2. Hydro-electric Power

1.06 Pakistan has substantial hydro-electric power potential which has been estimated to be of the order of 25,000 MW; approximately 10,000 MW is considered to be "recoverable" economically.

1.07 Hydro-electric power sources provided 48 percent of the total installed capacity in Pakistan of 3,273 MW in 1977. Hydroelectric generation supplies the base load of the power system, whilst thermoelectric generation - 85% of which is produced from natural gas-fired plants - is normally used for meeting peak demand, in particular for firming up hydro-generation during the period March through May when the low reservoir levels reduce the output of the hydroplants. A major part of the hydro potential has been developed through the Tarbela dam project which, when fully completed in 1984, will provide 2100 MW, or more than 30% of total generating capacity. A number of other hydro-electric power development projects are being studied.

## 3. Coal

1.08 Extensive coal deposits have been detected in different areas of the country, but the quality of these resources is generally poor, having a high ash and sulphur content and a low heating value. The largest known coal field in Pakistan is Lakhra, producing coal of a quality suitable for minehead power generation. Proven recoverable reserves are currently estimated at between 150-170 million long tons (65-75 million TOE).

## 4. Oil

1.09 Pakistan contains extensive sedimentary basins having the characteristics for generating and accumulating hydrocarbons. Due mainly to the slow pace of exploration activity over the past twenty years, oil reserves are not precisely determined and estimates vary widely even for oil fields already in production. Estimates of recoverable reserves range from 35 million to 400 million barrels; (4.8 million tons to 55 million tons). Crude oil reserves in Pakistan are summarized in Annex 1.01 (b), and Map IBRD 13158 shows the location of the principal oil fields.

1.10 Production of crude oil is limited to six fields in the Potwar area in Punjab province of Northern Pakistan. It is currently about 9,500 barrels/day (0.45 million tons per year), and covers only 13% of Pakistan's current requirements.

## 5. Non-commercial

1.11 Non-commercial sources of energy have been used extensively in Pakistan and still account for an estimated 50% of total energy consumption, mostly in rural areas. These include firewood and animal dung (which account for roughly 70% of non-commercial energy consumption), bagasses, cotton-sticks and other farm wastes which owe their energy use to recent advances in farming techniques in the agricultural sector. Firewood resulting from the cutting of

trees is generally sold in the market; wood gathered from branches of trees is normally consumed directly by the farming population. Animal dung is used as fuel for cooking purposes, primarily in the rural areas. A modest programme for developing the use of biogas produced from animal dung in rural areas in Pakistan is being undertaken on an experimental basis, to replace firewood, animal dung and cotton sticks.

### Future Energy Requirements

1.12 Energy consumption is forecast to grow at a rate of 8.0% per year from 387 trillion BTU in FY77 to 615 trillion BTU in FY83. This forecast is based on an estimated GDP growth rate of 5.2% per year and an historically-based income elasticity of demand for energy of 1.54. <sup>1/</sup> Energy demand in this period will be met primarily by the availability of large amounts of hydroelectricity, following the completion of the Tarbela dam, and the expansion of natural gas supplies; consumption of these two energy resources are forecast to grow at approximately 13% and 11% per annum, respectively, and to account for 56% of primary energy consumption in 1983. Coal and nuclear power are expected to play a marginal role as sources of energy, and though consumption of liquified petroleum gas (LPG) is projected to increase rapidly, its overall contribution to Pakistan's energy supply will continue to be small. Despite the use of hydroelectricity and natural gas, the demand for petroleum is forecast to grow at 6% per annum from 4.2 million tons in FY77 to 6.0 million tons by FY83. In order to be able to meet this demand, Pakistan will have to import increased amounts of crude oil, at a cost of US\$370 million in FY77 rising to over US\$900 by FY83 (projected in current prices) unless indigenous crude oil in known fields is brought into production, and recent discoveries are evaluated and developed rapidly.

### Energy Policies

#### 1. Resource Development

1.13 Government policy in the development of energy resources is aimed at reducing Pakistan's dependence on imported energy. Maximum emphasis has, therefore, been laid first on the use of hydroenergy and, secondly, on providing a policy framework, which would stimulate a more intensive exploration for and development of petroleum resources than has taken place previously. To achieve the latter objective, the Government has: (a) provided the incentives to attract foreign private investment for oil and gas exploration, either on the basis of joint ventures or through production-sharing agreements; (b) reorganized and strengthened the technical and managerial expertise of the state-owned Oil and Gas Development Corporation (OGDC) in order that it might more effectively contribute to the development of known fields (Toot and Dhodak primarily) as well as to exploration in prospective areas by itself or in joint ventures with foreign oil companies .

---

<sup>1/</sup> These forecasts, which are based on a lower growth of GDP over the next 5 years as estimated by Bank staff, differ from those of government planning authorities who have projected energy growth rates of 11.7% based on a GDP growth rate of 7.6%.

1.14 The importance that has been attributed to developing indigenous energy resources is reflected in the volume of resources allocated to the energy sector in the period FY79-83. Approximately Rs. 33.5 billion (US\$3.1 billion) 1/ is allocated to energy sector investment. This amount represents 22% of total public investment during the period, a substantial increase from the sectoral share of 15.3% in FY71, and higher than the average share for energy investment in the developing countries, i.e., approximately 15%.

1.15 The bulk of investment is in the power sector and will be undertaken by the Water and Power Development Authority (WAPDA). WAPDA's expansion program will require a total investment of approximately 21,500 million rupees. 2/ Only modest investment is contemplated in coal, principally at the Lakra coal field, for minehead electric power station. Approximately Rs. 5.6 billion (US\$570 million) is earmarked for public investment in the oil and gas sector, more than 65% of which is to support OGDC's exploration and development program. A part of OGDC's total available resources would be invested in exploration drilling and would complement the exploration expenditures (estimated at US\$140 million) that are expected to be invested by private exploration companies during the same period.

## 2. Institutional

1.16 In March, 1977, the single Ministry responsible for fuel, water, power and natural resources was divided into two separate ministries, a Ministry of Petroleum and Natural Resources and a Ministry of Water and Power. Although considerable progress has been made at the policy level to provide the incentives which will bring about a rapid development of Pakistan's resources, a policy-making body is still lacking to formulate and coordinate a coherent national energy policy, especially in regard to relative pricing of various energy products which have adversely affected supply and demand patterns.

## 3. Pricing

1.17 Energy pricing policy has been guided by a twofold strategy. First, on the production side, incentives have been provided to stimulate the exploration for and development of petroleum resources by basing well-head prices for new oil discoveries on import parity. On the consumer side, the government has endeavoured to protect key productive sectors as well as low-income consumers from the major repercussions that would have been caused by a sudden rise in the domestic prices of key energy inputs, such as electricity and

---

1/ Preliminary estimates which may be modified after budget review in June, 1978.

2/ Slightly modified from estimate in government investment program. The investment program will be discussed more fully in the Third WAPDA power project which is being processed.

petroleum. As a consequence, the government has adopted cross subsidization pricing policies in regard to electricity tariffs and petroleum products, followed by gradual increases in tariffs and prices. This is discussed in greater detail in paragraphs 2.17-2.30.

## II. THE OIL AND GAS SECTOR

### Background

2.01 Pakistan has a land area of 310,000 square miles of which sedimentary basins, which have the characteristics for generation and accumulation of hydrocarbons, cover an area of over 250,000 square miles. In addition, offshore areas extending to 200 miles are also available for petroleum exploration and development.

2.02 Over the past 30 years, 160 exploration and development wells were drilled in Pakistan by foreign oil companies, and a further 20 wells by the state-owned petroleum company, OGDC. However, the pace of exploration activity in Pakistan has been uneven. Exploration activity by foreign companies reached a peak in 1958 following the discoveries of large gas fields in the mid-50s, but fell off again sharply from 1960 onwards as a result of the prevailing unattractive well-head prices for natural gas, the extremely large petroleum deposits being discovered in the Middle East and the relatively unattractive prospects for commercial production of crude oil in Pakistan at pre-1973 prices. During the 1960s most of the exploratory drilling was carried out by OGDC which was established in 1961 with the technical assistance provided by the Soviet Union. OGDC, however, made little headway towards Pakistan's primary objective in the sector, that of detecting increased reserves of crude oil.

2.03 The investment and efforts of the oil companies and the Government led to the discovery of nine commercial gas fields and five commercial oil fields. Oil and gas exploration in Pakistan has so far enjoyed a high success rate of about 20% as compared to a world-wide average of about 10%.

2.04 The advent of the increase in world oil prices and the resulting increase in the cost of oil imports heightened the urgency for a set of policies which would provide the incentives to step up exploration and drilling activity. A new package of incentives was drawn up in 1975 and the response has so far been encouraging. Some seven new agreements have been, or are about to be, concluded since 1975 with different companies who have committed themselves to approximately \$140 million of exploration expenditures in the period 1976-84, i.e. 15 to 20 wells, about twice the average of one well per year in the previous period. At the same time, the GOP increased its financial commitments to OGDC, which, after the 1975 reorganization, started to modernize its drilling equipment and to introduce modern management and exploration techniques. The most important discovery made by OGDC since 1975 has been the Dhodak field which, if confirmed by further studies to be financed under the proposed credit, could be the largest oil field discovered so far in Pakistan.

## Organization and Structure

2.05 The Ministry of Petroleum and Natural Resources 1/ has official jurisdiction over the development of oil, gas, coal and non-fuel mineral resources in Pakistan. The Ministry is composed of four directorates: Petroleum Concessions, Oil Operations, Gas Operations and Oil Movements.

2.06 Historically, the private sector has played an important role in the development of the petroleum industry in Pakistan. Over the past decade, however, and particularly since the Economic Reforms Order of 1972, government participation has increased appreciably, particularly in oil refining and marketing where the government controls 46% and 41%, respectively, of equity, and in gas transmission and distribution, which is now 95% government controlled. Although government involvement in the industry will remain substantial, it is expected that new policies towards exploration will result in a more balanced involvement of the private and public sector in the development of new petroleum resources.

2.07 Oil and natural gas production is at present primarily the responsibility of two companies, Pakistan Petroleum Limited (PPL) and Pakistan Oilfields Limited (POL), both with majority private ownership. PPL, in which Burmah Oil Company (BOC) holds 70% of the equity, is principally involved in the development of the Sui gas field. POL's main activity is to undertake exploration and production in the Potwar area where it is currently developing the Meyal field; 60% of POL's equity is held by Attock Oil Company (AOC).2/ The remaining sector production has been undertaken by the government-owned corporation, OGDC. Since 1947, the bulk of the exploration activity has been undertaken by PPL, POL, AOC, BOC and OGDC.

2.08 Pakistan's requirements for refined petroleum products are met by three refineries: Pakistan Refinery Ltd. (PRL), the state-owned National Refinery Ltd. (NRL), which are both located in Karachi and refine imported crude oil, and the AOC refinery 3/ which refines indigenous crude oil. The marketing companies in Pakistan are the state-owned, Pakistan State Oil Company (PSO) and the privately-owned, Pakistan Burmah Shell and Caltex; their

---

1/ As mentioned in paragraph 1.16, the single Ministry responsible for fuel, water, power and natural resources was divided into two separate ministries in March, 1977.

2/ Attock Oil Company is a London-based Company in which 51% of the equity is owned by a Saudi-Kuwaiti investment group and the remaining 49% by Attock Petroleum Limited.

3/ Hitherto fully-owned by AOC. An agreement has now been reached on future ownership in which AOC would retain 60% equity and the remaining 40% would be subscribed by the public.

market shares are respectively 60 percent, 28 percent and 12 percent. Petroleum products are distributed within Pakistan principally by rail, a smaller proportion by road and a very minor amount by pipeline.

2.09 There are two principal gas transmission companies, the Sui Gas Transmission Company (SGTC) which transports gas by pipeline from the Sui field to the Karachi area in the south, and the Sui Northern Gas Pipeline (SNGPL) which provides transmission lines that extend to the northern part of Pakistan. Both these transmission companies, originally in private hands, are now government-controlled, which has 87% and 70% shareholdings respectively in each of these companies. SNGPL also distributes gas in the Northern region, while SGTC sells gas to two distribution companies, the Indus Gas Company (IGC) and the Karachi Gas Company (KGC), both of which are government-controlled.

#### Investment

2.10 The sector investment program for the five year period 1979-83 has recently been completed. The principal elements of the proposed investment program are the following:

- (i) Major emphasis on bringing into full production known oil fields - principally Toot and Meyal - and to evaluating fully the production potential of the recently discovered Dhodak field;
- (ii) stepping up considerably the level of exploration activity, with an important share of the capital being provided by foreign exploration companies;
- (iii) modest investment in pipeline and refining capacity, sufficient to meet the forecast growth in demand of petroleum products by 1984; and
- (iv) further investment in gas transmission and distribution facilities.

2.11 The primary emphasis of the investment program is aimed at accelerating the pace of exploration and development activity in order to detect and bring into production new reserves of crude oil as soon as possible. A key element in the government's investment strategy has been to encourage the participation of foreign oil companies by providing the necessary incentives to attract exploration capital. At the same time, even though exploration activity by foreign exploration companies and, to a lesser extent, by privately-owned Pakistani petroleum companies will increase significantly during the period of the Plan, the overall amount - an estimated US\$140 million - is still relatively modest and would not be sufficient in itself to maintain an adequate level of exploration activity. For this reason, an important, complementary role must be played by OGDC in attaining the overall required level of exploration and development activity. As a consequence, the second element of the government's investment strategy has been to strengthen and streamline OGDC's management and technical capacities, and assign on a priority basis, the necessary budget resources.

2.12 Total sector investment between 1979-83 is tentatively estimated at US\$880 million. A breakdown of the planned investment is summarized below:

	<u>US\$ million</u>
Exploration and Development	540
OGDC	(400)
Private	(140)
Production	85
Mari field	(13)
Sui field	(22)
Meyal field	(50)
Pipelines and Refineries	130
Products line	(50)
Attock expansion	(25)
PRL visbreaker	(35)
Dhodak Topping plant	(20)
Marketing	25
Gas Transmission & Distribution	<u>100</u>
Total	880

The principal component of the sector investment plan is OGDC's investment program which comprises about US\$400 million <sup>1/</sup>, and which represents an almost three fold increase over the total government's contribution to OGDC since its inception. This plan will permit a sizeable level of exploration and development drilling to be undertaken; its implementation will be facilitated by the recent acquisition of modern drilling rigs and other ancillary equipment. The rest of the government's investment plan - i.e. in production, pipelines and refinery capacity, and gas transmission and distribution facilities - involves a relatively smaller level of investment which is necessary to meet the forecast growth in domestic demand for petroleum products and natural gas, respectively. This investment would be financed primarily from internal cash generation of the different operating companies and from local borrowing; except for the remaining government equity contribution for the products

---

<sup>1/</sup> Estimated investment expenditures are somewhat conservative and do not take into consideration OGDC's likely ability to be able to mobilize additional resources from other lending agencies to help finance the development of future fields once the production potential of such fields has been adequately proven.

pipeline, the planned investment would impose little burden on government resources. The proposed investment in refinery expansion reflects Pakistan's more pressing short-term need to add secondary refining capacity to existing facilities rather than a new refining capacity which would only exacerbate the growing imbalance between petroleum products supply and consumption patterns. During negotiations, it was agreed that the Association would review the Government's investment plans in the oil and gas sector, including any possible investment in LNG facilities that may be contemplated in the future (section 3.04, Credit Agreement).

#### Development Prospects

2.13 Crude Oil. In the short-term (1978-83), Pakistan's success in reducing its dependence on imported crude oil - which now accounts for 87% of total petroleum consumption i.e. 75,000 barrels/day - will be determined by its ability to bring three potential fields into full production: Toot and Meyal, which are already producing, and Dhodak which has yet to be developed. On the basis of present production levels, and the estimated pace of development drilling activity, the production of indigenous crude oil from discovered fields is projected to increase from an estimated 0.60 million tons (12,300 barrels/day) in 1977/78 to 2.40 million tons (49,300 barrels/day) by 1982/83 as a result of development drilling at the Meyal field by POL, and at Toot and Dhodak by OGDC:

	<u>1977/78</u>	<u>1982/83</u>
(i) <u>Private</u>	(million tons)	
POL fields	0.52	1.04
(ii) <u>OGDC</u>		
Toot	0.08	0.33
Dhodak	<u>-</u>	<u>1.03</u>
Total	<u>0.60</u>	<u>2.40</u>

The key variable in the short-term in estimating future domestic production is the potential of the Dhodak field which the proposed loan will help to evaluate. Estimates of the production potential from the field are necessarily speculative without additional seismic surveying and drilling, despite the promising results obtained so far. On the basis of the preliminary information gathered from one "wildcat" well, the Dhodak field is estimated to be capable of producing 21,200 barrels per day (1.03 million tons per year) by FY83.

2.14 The rapid development of known fields would have a significant impact on Pakistan's balance-of-payments in the period 1977-83. Increased production from the Meyal and Toot fields, and the start of production from Dhodak field in 1982 will reduce Pakistan's dependency on imported crude oil by an estimated US\$270 million in current prices by FY83.

2.15 In the medium-term, Pakistan's continuing dependency on imported crude oil will be critically determined by the success of current exploration activity being undertaken by foreign exploration companies and by OGDC. Given the increased levels of exploration expected, modest success of the planned 40-50 exploratory wells between 1976-84 could reduce the import bill even further in the mid-1980s. It is conceivable that by the late 1980s Pakistan could achieve self-sufficiency in crude oil.

2.16 Natural Gas. Production of natural gas has increased sharply in the past decade. Production in 1977 was 184 billion cubic feet, triple that of 1965 and nearly seven times the 1960 level. Since it is expected that relatively abundant supplies of natural gas will continue to be available in Pakistan, at least in the medium-term, production levels will be determined by the growth in local demand and any export markets that may develop. Assuming an annual GDP growth of between 5% to 6% per year, the growth of commercial energy consumption is projected at 8% annually and that of natural gas at 11% per annum. An important question which will require careful study and government decision will be the coordinated exploitation of existing dry gas fields (i.e. Sui) and newly discovered ones producing associated gas (i.e. Dhodak) whose only alternative use would be re-injection or flaring.

### Pricing

2.17 The pricing of crude oil and petroleum products in Pakistan has been dictated primarily by the country's need to adjust to the rise in the cost of crude oil imports since the end of 1973. The key elements in the government's pricing strategy have been (i) to increase well-head prices for new oil discoveries in order to encourage investment in domestic oil production, and (ii) to raise gradually average retail prices to near international levels, while endeavoring to protect certain key economic sectors and low-income consumers from the disruptive effects of an immediate adjustment of domestic prices. Overall, this pricing strategy has been generally successful. The impact of rapidly rising energy costs has been lessened, while exploration companies have already made an encouraging response to increased well-head prices for crude oil. Nevertheless, anomalies continue to exist in the pricing structure which require corrective adjustment and which are discussed in the ensuing paragraphs.

#### 1. Producer Prices

##### Oil

2.18 In order to provide the incentives to encourage further exploration and development of indigenous oil resources, the government, in a new policy initiative taken in 1975, has established that well-head prices for oil in new concession agreements with petroleum exploration companies will be based on international prices. There has already been an encouraging response to the assurance of increased well-head prices from foreign petroleum companies and it is anticipated that increased exploration activity by these companies will lead to new petroleum discoveries. Revision of "old oil" well-head

prices, is also under consideration. The GOP has almost finalized negotiations with POL and AOC on the development of the Meyal field, the largest privately operated oil field in Pakistan; within the framework of these negotiations, an agreement has already been reached on the price of "old" oil.

### Gas

2.19 The current well-head price for natural gas provides little incentive for new exploration for natural gas - which has now come to a standstill with the exception of OGDC's exploration program - and acts as disincentive to develop further known resources. Although supplies for natural gas in Pakistan are relatively abundant in being able to meet the projected growth in domestic demand in the medium-term, the regulation of natural gas prices at very low levels may require examination in the future, if additional reserves are to be developed for future domestic demand and for possible export markets.

## 2. Ex-refinery Prices

2.20 Pakistan's refineries were on a self-financing basis until 1973. Ex-refinery prices of petroleum products, which have been closely regulated since the increase in the price of crude oil, are currently too low to provide revenues adequate to cover the operating costs of the country's two principal refineries; the government has agreed to cover shortfalls in operating expenses. <sup>1/</sup> The payments do not impose a net fiscal burden on the Central Government since they are financed principally by a sizeable "development surcharge" tax on motor gasoline; this fixed return formula with its associated government contribution is cumbersome and provides little incentive to improve operating efficiency. A return to operating on a self-financing basis is needed and a more flexible price regulating system should be introduced to facilitate the corresponding adjustments in ex-refinery prices required by future changes in the price of imported crude oil. Moreover, specific pricing adjustments are needed to encourage the domestic production of liquefied petroleum gas, which is currently used mostly as a refinery fuel, but which could be substituted advantageously for imported kerosene and light diesel oil.

## 3. Consumer Prices

### Oil

2.21 Current prices of petroleum products to the consumer are characterized by: (a) retail prices which overall closely reflect the economic cost of importing, refining and distributing petroleum products; (b) cross subsidization of individual refinery products in which higher-priced motor gasoline subsidizes in part the prices of kerosene and light diesel oil; and (c) geographical price equivalence of petroleum products throughout Pakistan.

---

<sup>1/</sup> These shortfalls were financed by a system of equalization payments which assure the refineries a 15% return on paid up capital. These transfers are provided from surcharges levied in varying amount on refinery products.

2.22 Growth in the consumption of petroleum products has been held to a modest 3% per annum since 1973. In the four intervening years since the increase in oil prices, consumer prices have been increased on six separate occasions. The retail price of regular gasoline which accounts for 11% of petroleum consumption, is now US\$1.07 per US gallon, considerably higher than the price of gasoline in countries such as Thailand and Philippines, which are even more dependent on crude oil imports; high speed diesel, a key input in the transportation sector and responsible for a third of total consumption, is priced at US\$0.54 per US gallon which is higher than import parity. The changes in retail prices since 1973 as well as the various elements that comprise the pricing structure of petroleum products are described in Annex 2.01. On the other hand, the prices of kerosene and fuel oil have been held at levels equal to or lower than import parity; the pricing of these products has been lower than the equivalent prices for these products in other Asian countries. A comparison of the retail prices of principal petroleum products in a number of Asian countries is shown in the following table: 1/

	(Reg/Super) Gasoline	US\$/US Gallon Kerosene	High Speed Diesel Oil	(US\$/Metric Ton) Fuel Oil
Pakistan	1.07/1.62	0.34	0.54	59.7
India	1.73/1.80	0.82	0.82	92.0
Bangladesh	1.15/--	0.52	0.52	82.4
Thailand	0.74/0.80	0.51	0.47	86.4

2.23 The prevalence of cross subsidies has aggravated imbalances in the demand for light and middle distillates, which have to be met by the import/export of refined products and which is costly in terms of storage, transportation and handling. Modifications also need to be made in the geographical equivalence system, which has been in existence since 1966, in order to prevent current abuses in distributing refinery products, as well as to ensure that inland freight margins are adequate to cover transportation costs.

1/ For comparison, the international posted and contract prices (f.o.b.) for these products are:

(Reg/Super) Gasoline	Kerosene	High Speed Diesel Oil	(US\$/Metric Ton) Fuel Oil
0.41/0.45	0.40	0.37	83.1

Source: Petroleum Economics Limited - November/December 1977.

Gas

2.24 Natural gas consumer prices have been fixed historically at a level somewhat below that of fuel oil in order to provide an adequate incentive for its utilization. As such, it has been a key policy tool of the government in bringing about a rapid expansion in the use of natural gas in the industrial, commercial and the power sectors during the past years. Current retail prices are adequate. The large gap between producer and consumer prices is captured by a development surcharge tax component which provides an important source of revenue to the government.

4. Fiscal Contribution of the Sector

2.25 Petroleum Products: Two specific components comprise the current pricing formula for petroleum products: an excise duty tax and a development surcharge. A third element--the "inland freight margin"--is also part of the price formula and is specifically earmarked for reimbursing the actual transportation expenses of the marketing companies incurred in distributing petroleum products at a fixed sales price throughout the country. The contribution of each of these elements to the current prices of individual petroleum products is shown in Annex 2.01.

2.26 The revenue generated from the sale of petroleum products between 1975-77 is summarized below:

<u>FY</u>	<u>Excise Duty</u>	<u>Net Development Surcharge Receipts</u>
		PRS million
1976	763	+92
1977	740	+243
1978	900	-85
1979 <u>1/</u>	825	+91

1/ budget

Excise duty revenues contribute to Federal Government tax revenues. Development surcharge revenues, however, have been used for three primary purposes since the oil crisis:

- (i) to cover the costs of refinery operations (para. 2.20);
- (ii) to subsidize domestic prices of deficit import products (primarily kerosene); and
- (iii) to cover the full transportation expenses of the marketing companies since the inland freight margins are currently insufficient to meet actual expenses.

Any residual development surcharge tax revenue becomes a part of Central Government revenues. The utilization of the development surcharge tax revenues between 1975-77 is summarized below:

----- (PRS million) -----  
Utilization of development Surcharge

<u>FY</u>	<u>Total Revenue</u>	<u>Refinery</u>	<u>Storage</u>	<u>Deficit Imports</u>	<u>Freight Pool</u>	<u>Net Gov't Reserve</u>	<u>(+ Surplus)</u> <u>(- Deficit)</u>
1976	850	248	0	190	320	+92	
1977	738	109	26	175	185	+243	
1978	810	339	30	267	260	-85	
1979 <u>1/</u>	1025	386	30	218	300	+91	

1/ budget

2.27 During 1976 and 1977, the development surcharge tax revenues were sufficient to cover the operating shortfalls of the refineries and marketing companies, as well as provide a net contribution to government revenues; significantly, this contribution was largest in 1977 when the refinery operations were placed for a brief period on a self-financing basis. In 1978, however, losses were incurred by the Karachi refining operations, primarily because ex-refinery prices--which are government controlled--were not adjusted correspondingly with increases in the price of imported crude oil. As a consequence, the total revenue generated from the development surcharge tax in 1978 was insufficient to cover the cumulative requirements of the refinery operations, the inland freight pool and the subsidization of deficit import product prices, which in turn will require a net contribution to the sector from Federal Government revenues. As a result of further increases in consumer prices, however, net development surcharge receipts are again expected to be positive in 1979. During negotiations, the Government agreed to examine measures to establish a more flexible and efficient regulation of ex-refinery prices as well as the undertaking of a study which will examine specific pricing issues.

2.28 Natural Gas: Tax revenues generated from the sale of natural gas are of two kinds: excise duty and a development surcharge tax. Total revenues generated between 1975-77 are shown below.

-----PRS millions-----

<u>FY</u>	<u>Excise Duty</u>	<u>Development Surcharge Receipts</u>
1976	290	290
1977	310	390
1978 (Estimated)	320	480

All of the excise tax derived from the production of natural gas is earmarked for the budget of the provincial governments; as mentioned in paragraph 2.24 development surcharge tax revenues contribute directly to Federal Government revenues.

## 5. Recommendations

2.29 In spite of the periodic adjustments made to retail prices, the existing pricing structure has a number of defects. Overall, there remains a need to develop a long-term policy which, while consistent with the objective of ensuring that lower income groups have access to basic energy needs, would: (i) provide adequate incentives to develop existing oil and gas fields in an optimum way; (ii) reflect more precisely the economic costs of bringing refined products to the consumer, and (iii) establish interfuel price relationships more closely on the basis of the opportunity cost of competing fuels.

2.30 It is proposed that a study be undertaken to analyse and make recommendations on a number of specific pricing issues, including: (a) pricing of Liquefied Petroleum Gas (LPG); (b) rationalization of refinery prices; (c) analysis of the adequacy of the present system for distribution of petroleum products. The preliminary terms of reference for the consultants for this study have been completed and have been discussed with the government authorities during negotiations. The Government has agreed to undertake and complete the study by no later than December 31st, 1979.

### The Role of the Bank

2.31 The proposed credit will provide OGDC with the necessary financial and technical means to: (1) accelerate the development of the Toot field; (2) carry out the preliminary studies to assess the Dhodak discovery and (3) increase its technical capabilities through technical assistance and training. The Bank has already played an important institution-building role in identifying organizational deficiencies, weaknesses in planning and budgeting procedures and in management and accounting practices. Moreover, the Bank has assisted in shaping OGDC's investment plans over the five years by helping OGDC draw-up a program with the appropriate investment priorities and which balances correspondingly the likely availability of budget resources. As a result, OGDC is planning to concentrate its effort on the development of already discovered oil fields rather than spreading its resources more thinly on numerous exploration ventures.

2.32 With regard to the Bank's broader role in the sector, the proposed energy pricing study will help improve a number of shortcomings in current policy, particularly in regard to energy pricing. In the future, by maintaining a close collaboration with OGDC and the oil and gas sector as a whole, the Bank will help ensure that sector investment plans are adequately formulated in terms of priorities, and that sector policies will facilitate the efficient development and utilization of Pakistan's hydrocarbon potential.

### III. THE BENEFICIARY

#### OGDC's Corporate Existence

3.01 OGDC is a government owned corporation established in 1961 under Ordinance No. 37 with the technical and financial assistance of the USSR. The assigned functions of the Corporation are generally to "plan, promote, organize and implement programs for the exploration and development of oil and gas resources, and the production, refinery and sale of oil and gas, ..." Although a quasi-autonomous entity instructed to act on commercial considerations, OGDC has functioned in many respects as a government department in the oil and gas sector.

3.02 Thus far, OGDC's major activity has been prospecting (geological, gravity, seismic, etc. surveys) for petroleum deposits and the exploratory drilling of 16 wells. These efforts have been quite successful resulting in six discoveries: 4 relatively small gas fields, the Toot oil field and the Dhodak gas condensate field. In addition, OGDC recently announced the discovery of a major natural gas field at Pirkoh. Development of oil production up to now has been disappointing. Although Toot was discovered in 1968 only six wells have been drilled and of these only two (Nos. 1 and 6) were in production in 1977, averaging about 1,500 BPD. Leadership and administrative factors undoubtedly played a role, but the main cause for these poor results seems to be the depth and difficult drilling conditions characteristic of the field and the quality of the drilling materials and equipment. Loss of skilled manpower to more attractive employment opportunities in the Middle East further compounded these problems. In 1975, the government extensively reorganized the corporation under a new chairman and increased its financial resources. OGDC has now made a good start in modernizing its equipment base and in building up a trained staff. However, much still needs to be done before the organization can function on the scale necessary to effectively develop Pakistan's petroleum resources.

3.03 As a result of OECD's low production and aggravated further by hitherto low sales prices which have been fixed by the government, net income from operations so far has been insignificant and has contributed essentially nothing to OGDC's budget. Except for loans from the USSR and a small amount of borrowing from the National Development Finance Corporation, all of OGDC's financial resources have been provided through government equity contributions amounting to a total of US\$133 million equivalent. These contributions have increased sharply since 1973 and the reorganization, from US\$7.0 million in FY73 to US\$20 million in FY76 and US\$41 in FY77, and reflect the increased emphasis on developing domestic petroleum resources.

3.04 OGDC's overall management is vested in a Board of Directors consisting of not less than three and not more than five directors. The directors are appointed by the Central Government. The present Board comprises three members from the Ministry of Petroleum and Natural Resources and two members representing national petrochemical and mineral development corporations.

The Chairman of the Board also serves as the Chief Executive Officer of the Corporation. OGDC's headquarters are situated in Islamabad with regional offices and field offices located in other parts of the country.

### Operations

3.05 OGDC is, at the present time, primarily involved in the exploration, development and production of hydrocarbons, although its charter does permit its involvement in a broader range of activities, including the refining, distribution and transportation of oil gas and refined products. Within the framework of increased exploration by foreign companies, OGDC is planning to develop its service activities, particularly in drilling where it is planning to become involved in joint venture drilling operations which would supplement the availability of skilled manpower in the country and assist in the training of Pakistani nationals, thus permitting a larger drilling program in the future. The services of the joint venture operations would be available to both OGDC and to other exploration companies. The proposed project would considerably increase OGDC's scale of operations and expand its scope in downstream operations to include the processing and pipeline transportation of petroleum.

### Personnel

3.06 OGDC employs about 3,300 persons, constituting a force which would be considered overstaffed for a Western oil company but which reflects the labor intensive practices throughout South Asia. About 400 persons fall into the various skilled categories including drillers. In spite of a salary policy which is generally comparable to that of the private sector, there is a relative shortage of skilled technical personnel due to competition from the Middle East. The shortage is particularly severe for experienced and qualified people for the various drilling operations. To mitigate the manpower constraint on the level of exploration and development activity, OGDC is placing increased emphasis on internal training programs, staff participation in overseas technical training and the use of expatriate labor contracts. The proposed project would support this effort by providing for foreign drilling crews and by providing funds for strengthening the Oil and Gas Training Institute (OGTI).

### Budgeting and Accounting

3.07 OGDC's annual budget is prepared in October/November for the fiscal period beginning the following July 1. Physical targets are first set by the Board of Directors and a Budget Committee, consisting of senior executive officers, and the financial requirements are developed accordingly. A complete Annual Development Program is submitted to the government for review: this provides revised financial estimates for the current year, physical targets and financial requirements for the coming fiscal period together with a

breakdown of funds required in terms of local and foreign exchange. Preliminary government approval is normally conveyed to OGDC by April and the government's financial contributions to OGDC are formally incorporated in the national budget announced in June.

3.08 OGDC's Finance and Accounts Department is directed by a Finance Manager who is one of nine department heads reporting to the Chairman. The Finance Manager is assisted by a Chief Accounts Officer who in turn is supported by several qualified accountants responsible for stores and fixed assets accounting, costs and budget, and payroll and other ledger accounts.

3.09 Virtually all of the exploration and drilling costs incurred by OGDC since its establishment remain at present in its Balance Sheet under a deferred cost account. Continuing to retain and accumulate all drilling expenditures in this account, as has been done so far, will magnify the existing distortion in its financial statements. This is particularly true in view of the fact that a substantial portion of such costs are expected to relate to unsuccessful drilling and exploration expenditures. OGDC has agreed to revise its accounting practices in accordance with oil industry standards starting in late 1978 and to keep separate financial accounts of its operations by field.

#### Management Capabilities

3.10 OGDC management has improved considerably since 1975. The top echelon staff is competent, and there appear to be no major difficulties in directing the organization's present activities. However, there is a clear indication that as these activities increase in scope and complexity, improvements will be needed in the following areas:

- (i) Organizational Structure - Functions and responsibilities appear to be loosely defined, especially between services and operations, and many departments report directly to the chairman.
- (ii) Planning and Budgeting Procedures - Cost information appears to be accurate, but OGDC needs assistance in developing techniques for setting budgetary targets and making financial projections.
- (iii) Management Information System - The absence of adequate performance indicators and of a coherent monitoring and reporting system within OGDC has led to delays and inefficiencies in the execution of its drilling programs. An adequate management and information system is particularly important in a country where logistic problems are formidable.

3.11 In view of the foregoing, OGDC has agreed to employ an experienced and qualified management consultant, on terms and conditions acceptable to the Association, to review management and planning practices and to submit a report to OGDC by September 1979. OGDC has further agreed to discuss the recommendations with the Association with a view toward their timely implementation, beginning not more than 6 months after the consultant has issued his report. A summary description of the scope of the study is in Annex 3.01.

#### Audit

3.12 Under the terms of the Oil and Gas Development Corporation Ordinance, the accounts of OGDC must be audited by not less than two auditors, who shall be chartered accountants. OGDC is audited jointly by Ibrahim, Shaikh & Co., and Muniff, Ziauddin & Co., both Pakistani firms. Since 1975 the Finance and Accounts Department has proceeded to reorganize the corporation's historical accounts and, while this work is nearing completion, audit reviews still lag. OGDC management expect that by the end of 1978 audits will be on a current basis and that annual accounts will thereafter be audited within an acceptable period, which should be confirmed during negotiations, after the end of the respective fiscal year. OGDC has agreed that audited accounts for both the Toot project account and for OGDC as a whole will be submitted to the Bank not later than 12 months after the end of each fiscal year. These auditing arrangements are satisfactory.

3.13 As a wholly owned government corporation, OGDC is also subject to audit review by the office of the Comptroller and Auditor-General of Pakistan. These audits are normally conducted after completion of the commercial audit; for this reason and because of the overall work load of the Auditor-General's office, these reviews are not usually completed within a satisfactory time frame. Internal audit within OGDC is satisfactory; a separate department under the direction of a Chief Internal Auditor is established which reports to the chairman.

#### Insurance

3.14 OGDC carries adequate comprehensive insurance on its major facilities and equipment in operation. New drilling equipment is covered at replacement cost; older and relatively obsolete equipment is insured at book value. Insurance against hazards of acquisition, transportation, and delivery of goods is regularly arranged.

#### IV. THE PROJECT

##### Background

4.01 Until now, the portion of the Potwar basin around 60-80 miles southwest of Rawalpindi is the only area in Pakistan to yield crude oil production, averaging about 9,500 BDP during 1977. The largest field in the area, Meyal, owned and operated by Pakistan Oilfields Ltd. (POL), was discovered in 1968 and averaged about 6,500 BPD in 1977. OGDC's Toot field was also discovered in 1968 and accounted for approximately 1,500 BPD of the area's production in 1977. The remaining Potwar production is divided among four smaller mostly depleted fields. Both Toot and Meyal are estimated to have considerable unexploited production potential, of the order of 10,000 and 20,000 BPD respectively for the two fields.

4.02 In 1976 OGDC drilled a discovery well at Dhodak. (See Map IBRD 13158.) The discovery is considered to be of some significance because it is the first liquid petroleum find outside Potwar in a geological formation that is similar to oil producing areas in Iran and Iraq. Preliminary data from the discovery well indicates a gas condensate deposit containing what might be described as a very light crude oil with a high ratio of gas to oil. There are indications that the field contains one prolific horizon and possibly a second with production potential and that well productivity could be in the range of 1,500 BPD. OGDC estimates that the field might ultimately yield up to 20,000 BPD of condensate and 200 MMCFD of natural gas; however, further drilling and geophysical studies are required to confirm these estimates.

4.03 The Secretary of Petroleum and Natural Resources and Chairman of OGDC visited the Bank during April 1977 to discuss Pakistan's oil exploration and development program and the possibilities of Bank involvement and assistance. In early June 1977, a delegation representing the GOP and OGDC visited Washington to present a proposal for developing the Toot and Dhodak fields. After reviewing the available data, the Bank agreed to appraise the development of the Toot field but felt that further studies were necessary to establish the potential of the Dhodak field. This report is based on the result of an appraisal mission which visited Pakistan between July 10 and August 3, 1977, and of a short up-dating mission which returned in October 1977.

##### Description of the Project

4.04 The proposed project has three main objectives: (i) to boost domestic oil supplies by developing increased production from Toot; (ii) to assist OGDC in acquiring the necessary skills to carry on successful oil operations; and (iii) to evaluate the potential of the Dhodak discovery and prepare for its rapid exploitation. The individual components comprising the project are as follows:

1. The Toot Drilling Program

4.05 Eight wells are proposed: one delineation well (to define the lateral extent of the productive zone) to be drilled by an OGDC crew with one of the older drilling rigs and seven production wells to be drilled with two of the new American rigs manned by expatriate crews. A geological and reservoir engineering study by Core Laboratories Inc. during early 1977 estimated that the Toot field contained 49.4 million barrels of recoverable oil. Of this quantity, 13.3 million barrels could then be classified as "proved" on the basis of the available data. Since then, OGDC has completed and tested an additional well, and a preliminary re-evaluation of reserves by consultants estimates the proved recoverable reserves at 16.5 million barrels. It is expected that additional proved quantities will be verified as drilling continues and more data becomes available. A drilling consultant (provided by CIDA) would be assigned to the project for the duration of the drilling program. After completion of the delineation well, a reservoir study would be undertaken to assess the ultimate potential of the field and to determine what further steps should be taken for its exploitation. In addition the project would also provide materials and services for dual completions, production stimulation and well workovers, if the need for them develops during the drilling program.

2. Toot Surface Facilities

4.06 The project would include all facilities required to produce and market the crude oil and associated gas. The main items that would be included are gas-oil separators, oil and gas gathering systems, oil storage tanks, pumps, gas dehydration unit, an 8" crude oil pipeline (20 miles) and a short gas pipeline to the Sui Northern Pipelines Ltd. trunkline.

3. Logistic Support

4.07 The project would provide heavy duty trucks and trailers capable of transporting, rigging-up and supplying three drilling rigs and a short take-off and landing aircraft. OGDC's past drilling programs have been hampered by logistic problems. It has lacked the necessary motorized equipment to move its rigs and keep them supplied with the large quantities of imported drilling materials landed in Karachi. Dependence on rail transport causes long delays, and adequate rental road transport equipment is scarce and un dependable. The aircraft is needed for making emergency deliveries of critical supplies to remote drilling sites, especially during parts of the year when certain areas are inaccessible by road. The aircraft would also be used for medical and other emergencies in the field and for the transport of drilling crews.

4. Dhodak Studies and Project Preparation

4.08 The project would include a helicopter supported (because of the rough terrain) seismic survey of the Dhodak field and a reservoir evaluation after OGDC has drilled the required delineation wells. If, as is anticipated,

the field is found to have sufficient recoverable oil reserves, a feasibility study would be undertaken in early 1979 to define the development program and the required downstream facilities. A project could then be prepared by about late 1979.

#### 5. Training Program and Management Consultants

4.09 The project would assist the Oil and Gas Training Institute (OGTI) in establishing an effective training program to further the skills of OGDC's operating and technical staff. Funds would be available for expatriate instructors and for the procurement of laboratory equipment and training aids in the amounts of about US\$200,000 and US\$500,000 respectively. OGTI now conducts a limited training program in Karachi in a facility that can accommodate 20 students on a live-in basis. Because of the critical need for skilled workers in all phases of the petroleum industry, OGTI plans to substantially increase its training efforts. Future plans call for a new building in Islamabad where outside applicants as well as OGDC employees could enroll, but for the present additional space would have to be found in Karachi. OGDC has agreed to providing adequate quarters for the OGTI training program. Funds would also be included for management and accounting services for the purposes explained in para 3.10.

#### Implementation of the Project

4.10 OGDC's senior management is experienced and technically competent. CIDA, as part of its technical assistance program to the oil and gas sector, has engaged Petro-Canada to provide OGDC with technical assistance for the various phases of its operations, including the Toot Project. Accordingly, Petro-Canada would assist OGDC in establishing a project management team to implement the project. This group would include a project manager and staff largely recruited from the OGDC staff. Petro-Canada would determine and provide the foreign and technical experts needed by the unit to function effectively.

4.11 As previously noted the Toot drilling program would be executed with experienced foreign drilling crews and with the technical assistance of a deep-drilling expert provided by CIDA. Well services such as logging, perforations, mud engineering, stimulation and testing would be contracted to experienced and qualified international service organizations. Design and engineering of the surface production and related facilities would be assigned to Petro-Canada. The training program would be under the direction of a full time training director whose appointment would be on terms and conditions satisfactory to the Association. CIDA's technical assistance program includes the carrying out of reservoir studies of the Toot and Dhodak fields and the feasibility study of the Dhodak project after its producing potential has been determined.

#### Project Cost

4.12 The project is estimated to cost US\$73.0 million of which US\$55.0 or 75% represents the foreign exchange portion. Physical contingencies are

calculated on the basis of 10% against drilling, transport and studies, and technical assistance, all of which are well defined in scope and cost, and 20% against the surface facilities for which less definitive data was available. The cost of consultants is based on an average rate of US\$7,000 per month. The price contingency is based on an 8% escalation during FY1978, 7-1/2% during FY1979 and 7% during FY 1980. The estimated project costs are summarized below. Annex 4.01 give a more detailed breakdown of the various component costs.

	<u>In R's million</u>			<u>In US\$ million</u>		
	<u>Local</u>	<u>Foreign</u>	<u>Total</u>	<u>Local</u>	<u>Foreign</u>	<u>Total</u>
Tool Development Program	116.0	412.1	528.1	11.7	41.6	53.3
Dhodak Studies	4.0	16.0	20.0	0.4	1.6	2.0
Training and Management Consultants	2.0	8.0	10.0	0.2	0.8	1.0
Customs Duty	<u>15.8</u>	<u>-</u>	<u>15.8</u>	<u>1.6</u>	<u>-</u>	<u>1.6</u>
Basic Cost Estimate	137.8	436.1	573.9	13.9	44.0	57.9
Physical Contingency	16.6	49.5	66.1	1.8	5.0	6.8
Price Contingency	<u>19.6</u>	<u>59.4</u>	<u>79.0</u>	<u>2.3</u>	<u>6.0</u>	<u>8.3</u>
Estimated Project Cost	174.0	545.0	719.0	18.0	55.0	73.0

#### Project Financing Plan

4.13 The total estimated cost of the project, US\$75 million equivalent, including physical and price contingencies, is expected to be funded from the following sources:

	<u>US\$ million</u> <u>(equivalent)</u>	<u>%</u>
GOP <u>1/</u>	18.0	25
OGDC <u>2/</u>	5.0	7
IDA	30.0	41
ODM	12.0	16
CIDA	<u>8.0</u>	<u>11</u>
	<u>73.0</u>	<u>100</u>

1/ Local funds required for the project will be provided by the GOP exclusively.

2/ Use of drilling rig purchased by OGDC with its own funds.

4.14 Both the Canadian International Development Agency (CIDA) and the British Overseas Development Ministry (ODM) would participate in financing the foreign exchange expenditures of the project. CIDA has allocated US\$8 million to the Toot Project out of a total financing package of approximately US\$60 million which would finance other activities by OGDC in the petroleum sector. ODM will contribute US\$12 million, and the remaining will be met by an IDA Credit of US\$30 million.

4.15 The IDA credit would be assigned to the GOP who would onlend them to OGDC at a per annum interest rates of 10 percent. It is proposed that OGDC's repayments to the GOP be in accordance with the production related scheduled described in para 5.15. OGDC has started drilling three of the seven production wells, two of which are being drilled with expatriate crews furnished by a drilling contractor who was selected on the basis of the Association's guidelines for international competitive bidding. By Board presentation OGDC is expected to have disbursed US\$2.5 million toward the mobilization and day rate cost of these crews. This sum would be retroactively financed from the credit.

#### Allocation and Disbursement of the IDA Credit

4.16 The proposed IDA credit of US\$30.0 million would finance 100% of the foreign exchange costs listed in Annex 4.03. Disbursement from the proceeds of Credit account would be made on the following basis:

- (a) 100% of foreign expenditures for expatriate drilling crews.
- (b) 100% of foreign expenditures for directly imported goods;
- (c) 100% of local expenditures (ex-factory) for locally manufactured equipment/materials procured through ICB;
- (d) 70% of local expenditures for goods procured locally other than through ICB; and
- (e) 100% of expenditures for consultant's services, and 100% of foreign exchange expenditures for studies and training.

The credit would be fully disbursed by December 31, 1981 in accordance with the projected disbursement schedule in Annex 4.02.

#### Procurement

4.17 Goods and services financed under the proposed IDA credit would be procured in accordance with Association guidelines except that equipment or materials estimated to cost less than the equivalent of US\$100,000 and not exceeding in the aggregate US\$3,000,000 may be procured in accordance with OGDC's normal competitive procurement procedures which are acceptable to the Association. OGDC should record and report the status of disbursement against such purchases on a quarterly basis or at any other interval that the Association may reasonably request. The CIDA and ODM financing would be tied to

procurement in Canada and the UK respectively requiring 2/3 value added content in the goods and services purchased. With prior Bank approval, well services amounting to a total of about US\$5,000,000 and known to be performed by only a limited number of international firms, may be procured through international shopping. Qualified local suppliers participating in international competitive bidding would be accorded a preference of 15% or the prevailing duty rate whichever is lower. Bid invitation and evaluation would be the responsibility of OGDC with assistance of consultants.

#### Refinery Expansion

4.18 All crude oil production from the Potwar area is processed in AOC's refinery at Rawalpindi. At present its maximum capacity is about 10-11,000 BPD, but according to POL and OGDC forecasts future production from the area is likely to reach 30,000 BPD. Since it is not economically feasible to transport the entire surplus production to the Karachi refineries, throughput at the Rawalpindi refinery will have to be increased by about 20,000 BPD. AOC had deferred additional refinery investments pending the outcome of its negotiations with the GOP on ownership of the refinery and related issues. Under terms of an agreement entered into with the GOP during November 1978, AOC will expand refining capacity to 30,000 BPD and will accept up to 10,000 BPD crude oil from the Toot field. This arrangement is satisfactory to the Association.

#### Project Risks

4.19 The Toot oil field presents difficult drilling conditions, and it requires experience and skill to cope with them. OGDC has a good safety record at Toot, but it has experienced several technical failures which to a large extent can be attributed to poor materials and inadequate equipment. The modern deep drilling equipment now at its disposal along with the help of a drilling expert and experienced crews provided under the proposed credit should minimize such risks and provide OGDC with the basis for a successful drilling program.

4.20 In addition, there is also the possibility that the field may not live up to expectations. Reservoir behavior can never be fully predicted, and fields have been known to go dry before the anticipated oil was recovered. However, this is considered a minimum risk since the evaluation of recoverable reserves and of future production schedules are very conservative given the limited amount of information presently available. There is a good probability that future drilling could lead to an increase in the amount of recoverable reserves and productivity.

#### Ecology and Safety

4.21 OGDC's pollution and fire prevention practices during well drilling operations are standard for the petroleum industry and are satisfactory. Drilling crews undergo fire safety training. Periodic fire drills are held at rigs to emphasize the importance of this training. Blowout prevention equipment is installed on all wells in accordance with instructions in the

well's drilling manual. A fire truck and fire fighters are on duty on a 24 hour basis at each field. Hydrogen sulfide, an extremely toxic gas frequently present in petroleum deposits, is monitored at the mud degassing units and drilling crews are automatically alerted to hazardous concentrations. The only potential environmental pollutants are rig refuse such as wash water, lubricants and discarded mud. These are collected in waste pits which are allowed to dry by evaporation and then covered with earth. Oil production facilities on the small scale of OGDC's operations present only minimal pollution and safety problems.

#### Schedule and Reporting

4.22 The proposed project is scheduled to be completed by mid-1980 except for the training program which would extend on through the end of 1981. A project schedule showing timing of the major components is shown in Annex 4.04. OGDC has assured the Association that it will submit quarterly progress reports in an acceptable format. OGDC has also agreed to maintain a set of indicators to monitor its performance.

### V. FINANCIAL ASPECTS

#### OGDC's Past Financial Performance and Present Position

5.01 OGDC's activities have been until now predominantly confined to oil and gas exploration. Its past production has averaged less than 2,000 barrels per day of crude oil and 15 million cubic feet per day of natural gas together with minor amounts of condensate. The realized sales price for this output has in the past been as low as US\$70-80 per barrel of crude. After deduction of production costs, the net income from the sale of oil and gas has been insignificant and has contributed essentially nothing to OGDC's cash flow requirements. A summary of these requirements for the period between FY74 and FY77 is given below.

Fiscal Year Ending June 30	1974	1975	1976	Tentative 1977
	US\$ Millions			US\$ Millions
<u>Requirements for Funds</u>				
Drilling and Exploration Cost	3.0	3.3	5.4	9.8
Overheads	2.3	2.5	2.7	4.8
Net Sales and Other Receipts	(0.1)	(0.1)	(0.1)	(0.2)
Total Deferred Cost	5.2	5.7	8.0	14.4
Net Fixed Assets	(0.1)	0.6	4.2	26.4
Working Capital	5.1	7.5	4.7	4.1
Investments	0.4	0.1	0.1	0.1
Loan Amortization	<u>0.9</u>	<u>3.4</u>	<u>3.2</u>	<u>2.9</u>
Total Requirements	<u>11.5</u>	<u>17.3</u>	<u>20.2</u>	<u>47.9</u>
<u>Sources of Funds</u>				
GOP Equity Contribution	10.5	17.3	19.9	40.4
Workers' Gratuity Funds	0.1	-	0.2	3.8
Long Term Borrowing	<u>0.9</u>	<u>-</u>	<u>0.1</u>	<u>3.7</u>
Total Sources	<u>11.5</u>	<u>17.3</u>	<u>20.2</u>	<u>47.9</u>

5.02 Since OGDC's inception in 1961, the Government of Pakistan has contributed to it a total of about US\$130 million in the form of equity. These contributions have accelerated since 1973 and the reorganization of OGDC in 1975: the amounts increasing as shown in the table above, and reflecting the increased emphasis in government policy on development of proven reserves and the need to accelerate exploration. Only a small proportion of OGDC's financial requirements in recent years have been derived from internal cash generation and external credit sources.

5.03 Within the past few years, some change has occurred in the allocation of funds by OGDC. Prior to 1975, OGDC relied on its increasingly obsolete drilling and exploration equipment. Beginning in FY76 commitments were made to purchase new equipment; capital outlays on new rigs absorbed almost 50% of the corporation's available funds in the past fiscal year.

5.04 Financially, OGDC has operated essentially as a project account. The Corporation has generated little operating revenue and most expenditures have been allocated to, and accumulated in, fixed asset or deferred

cost accounts. The historical nature of OGDC as primarily a drilling and exploration entity, together with the anticipated impact of Toot and subsequent projects on the scope and scale of OGDC's operations, makes it necessary to analyze the Corporation's financial situation almost entirely on the basis of its future plans and programs.

5.05 A summary of OGDC's financial position in FY73 through FY76 and of its estimated position as of June 30, 1977 is given below:

<u>Fiscal Year Ending June 30</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>Tentative 1977</u>
	US\$ Millions				US\$ Millions
<u>Assets</u>					
Deferred Cost:					
Drilling and Exploration	33.1	38.3	44.0	52.0	66.4
Net Fixed Assets	3.3	3.2	3.8	8.0	34.4
Net Current Assets	16.2	21.3	28.8	33.5	37.6
Investments	<u>0.1</u>	<u>0.5</u>	<u>0.6</u>	<u>0.7</u>	<u>0.8</u>
Total Assets	<u>52.7</u>	<u>63.3</u>	<u>77.2</u>	<u>94.2</u>	<u>139.2</u>
<u>Liabilities</u>					
Equity	39.2	49.7	67.0	86.9	127.3
Workers' Gratuity Funds	0.4	0.5	0.5	0.7	4.5
Long-term Liabilities	<u>13.1</u>	<u>13.1</u>	<u>9.7</u>	<u>6.6</u>	<u>7.4</u>
Total Liabilities	<u>52.7</u>	<u>63.3</u>	<u>77.2</u>	<u>94.2</u>	<u>139.2</u>
Debt/Equity Ratio	25/75	21/79	13/87	7/93	5/95

5.06 Virtually all of the exploration and drilling costs incurred by OGDC since its establishment remain in its accounts under a deferred cost heading. The accumulated account now (end FY 77) totals about US\$66 million of which US\$14 million relates to the Toot field. To the extent that OGDC earns net operating revenues in the future, a portion of its past unsuccessful drilling costs can be charged to the annual accounts and, accordingly, reduce the Corporation's future tax liabilities. However, because of time limitations permitted on the carrying forward of aborted exploration and drilling costs, it is evident that certain outlays incurred by OGDC in the early stages of its development may no longer be used as offsets to future income. These costs should now be offset against the corporation's equity. As previously indicated (para. 3.09) OGDC has agreed to review the relevant accounts and to revise its accounting practices in accordance with oil industry standards, starting in late 1978.

5.07 The results for June 30, 1977, though preliminary, indicate that no significant change has as yet taken place in the nature of OGDC's operations. The debt/equity ratio remains low by conventional standards but reflects the realities of financing predominantly exploration activity as well as the non-availability of internally generated revenues to support a significant debt load. OGDC's present long-term debt is largely comprised of loans from the USSR for equipment and technical assistance, and of some loan assistance recently provided by the Pakistan National Development Finance Corporation.

#### Financial Analysis of the Proposed Toot Project

5.08 Development of the Toot field will provide OGDC with the first opportunity to make a modest but significant contribution to domestic oil production. The following summarizes the results of a discounted cash flow analysis of the proposed development and of the mission's projected accounts for the Toot field.

##### (a) Financial viability of the project

5.09 The financial viability of the Toot project <sup>1/</sup> is a function of the level of the payments that will be made to OGDC for the oil produced from project wells. The GOP has agreed to ensure that OGDC will earn a net of taxes (discounted cash flow) real rate of return on its investment in the project of not less than 10% (DCA Section 3.02).

5.10 Although adequate well-head pricing of Toot crude would be the best means to achieve this end, this course may be precluded by the GOP's intention to maintain oil price parity for all "old" oil produced in the Potwar area, i.e., oil from fields that were in production before the rapid escalation of prices beginning in 1973. Since it is now likely that Toot crude will be priced at parity with this "old" oil, the Government has agreed to ensure that, should it be required to achieve the agreed return, a supplementary payment per unit of production will be made to OGDC for the oil and gas produced at Toot. This payment would be in addition to the revenue directly realized from the sale of Toot project crude. The Government has also agreed to review periodically the payment structure so that, under conditions of efficient operation and within the limits set by international prices, the real rate of return would be maintained at 10% (DCA Section 3.02).

5.11 The wellhead prices for Toot project oil which would result in a real discounted cash flow return on the investment of 5%, 10% and 15% are as shown in the table below for the base case (characterized by Core Laboratories' most likely estimate of recovery of oil in place and of capital expenditure estimates made by the Association) and for a possible best case and worst case as defined in the table (see also Annex 5.01).

---

<sup>1/</sup> The term here refers to the incremental development of the Toot field and includes all direct and indirect investments related to this development.

Real (DCF) Rate of Return

	<u>Required Price of Oil per Barrel - US 1977 \$</u>		
	<u>5%</u>	<u>10%</u>	<u>15%</u>
Base Case <u>1/</u>	6.70	7.80	8.90
Best Case <u>2/</u>	4.20	4.90	5.60
Worst Case <u>3/</u>	8.80	10.30	11.80

5.12 These results are all based on a projection of production from seven wells using flow rate estimates derived from the Core Laboratories reservoir study (para. 4.05). The analysis also assumes that no taxes will be due during the productive lifetime of the field, but that a royalty of 12.5% of well-head value will be paid by OGDC throughout the period. Including provision for tax payments at a 50% rate would lead to an average increase in the required price of about 10%.

5.13 As shown in the rate of return summary (and the graph in Annex 5.01), the wellhead price for Toot project crude required, in these projections, to achieve the sought return could range (at 1977 prices) from \$4.90 to \$10.30 per barrel, depending on the proportion of future recovery of the oil in place and on capital expenditure costs. The well head price most likely to yield this return is presently judged by the Association to be of the order of US\$7.80 per barrel. In the event that the project proceeds as expected, this price would be just sufficient to cover all costs, including the 10% cost of the capital employed. The breakdown of the cost of crude oil per barrel in this Base Case is as shown in the table below. A detailed cash flow analysis of the project which takes account of the effect of inflation on revenues and costs is shown in Rupees in Annex 5.02.

	<u>Cost of Oil per Barrel - 1977 US\$ <u>4/</u></u>	<u>%</u>
Operating and Working Capital Cost	0.70	9
Capital Expenditure	6.20	80
Royalties	<u>0.90</u>	<u>11</u>
Total	7.80	100

1/ The Base Case assumes 15% recovery of oil in place in the Toot reservoir (Core Lab's most likely estimate) and final capital cost estimated by the mission.

2/ The Best Case assumes 20% recovery of oil in place (Core Lab's maximum estimated amount) and a 15% underrun in capital expenditures.

3/ The Worst Case assumes 13% recovery of oil in place (Core Lab's minimum estimated amount) and a 15% overrun in capital expenditure.

4/ Defined as the ratio of the net present value of the cash flow stream to the net present value of the production, both discounted at 10%.

5.14 The Government has recently negotiated with AOC a revised price of about US\$4.50 equivalent per barrel for its "old" Potwar oil. Therefore, if as expected the well-head price of Toot crude is soon to be set also at this level, a supplementary government payment to OGDC, amounting most likely to about US\$3.30 per barrel, will be required to achieve the agreed 10% real rate of return.

(b) Project Financing Plan

5.15 The incremental development of Toot would require a capital investment of US\$67 million which would be largely financed by debt: the proposed US\$29.3 million 1/ in IDA Credit, together with US\$20 million equivalent in bilateral aid from CIDA and ODM (see following table and Annex 5.02, p 3). The following analysis assumes that all these funds will be onlent by the Government to OGDC, in the case of the IDA Credit at 10% interest and of the funds from CIDA and ODM at 8.5%. Given the level of total borrowing and the projected depletion rate of the field, it would be prudent for OGDC to repay all these funds from production revenues on a scale that would see the total debt repaid before the field is depleted. The Association, therefore, recommended that OGDC be asked to service its debt to the Government on an annual basis on terms whereby debt service payments would be pro-rated to production from the Toot project. 2/ Since the adoption of such a repayment schedule would represent a departure from the usual Government practice of requiring level total repayments of onlent funds, this recommendation has been referred to the Accounting Division of the Finance Ministry for its consideration.

(c) Overall Toot Field Accounts

5.16 OGDC has had to date three producing wells at Toot. A fourth well, expected to become a producer, is presently being completed. The incremental development of the field, as envisaged in the Toot project, would add seven producing wells and one step-out. Should no additional reserves be proven at Toot, the productive lifetime of the field is not expected to extend beyond fiscal 1992.

5.17 Financial projections in the form of OGDC Toot field accounts are summarized below, detailed statements are given in Annex 5.02. These forecasts assume base case estimates of capital expenditures and of the oil recovery factor (para. 5.11), and payment of US\$7.80 per bbl for crude oil from Toot project wells. The price of oil produced from wells completed

---

1/ The remaining US\$0.7 million of the credit would go to OGTI.

2/ A suitable repayment scheme (one which has been assumed in the following financial projections) would take each yearly loan repayment to equal the value of the year's production multiplied by the ratio of the net present value of the loan payments to the net present value of the forecasted oil production, both discounted at the interest rate of the loan.

before the project is taken to be US\$3.00 per barrel through FY1978 (the price presently being earned) and US\$4.50 thereafter (the price expected as a result of the recently concluded AOC negotiations). The current price of US\$7 per MCF has been used for the associated gas produced. These oil and gas price estimates are in 1977 dollars; in the projected statements they are adjusted for inflation. The inflation rate assumed is 8.0% for 1978, 7.5% for 1979 and 7.0% for 1980 onwards.

5.18 Estimated requirements for the Toot field operation and the sources from which they will be met are given below:

	<u>1978-80</u>	<u>1981-83</u>	<u>1984-86</u>	<u>1987-89</u>	<u>1990-92</u>
	-----US\$ Millions-----				
<u>Requirements for Funds</u>					
Capital Outlays <sup>/1</sup>	71	1	-	-	-
Working Capital	(1)	26	11	7	1
Dividends	<u>3</u>	<u>25</u>	<u>16</u>	<u>8</u>	<u>3</u>
Total Requirements	<u>73</u>	<u>52</u>	<u>27</u>	<u>15</u>	<u>4</u>
<u>Sources of Funds</u>					
Internal Cash Generation	24	66	42	23	6
Less Debt Service	<u>8</u>	<u>30</u>	<u>15</u>	<u>8</u>	<u>2</u>
Net Internal Cash Generation	16	36	27	15	4
Long Term Borrowing	33	16	-	-	-
OGDC Equity	<u>24</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
Total Sources	<u>73</u>	<u>52</u>	<u>27</u>	<u>15</u>	<u>4</u>
Debt Service Coverage	3.0	2.2	2.8	2.9	3.0

<sup>/1</sup> Includes the cost of rig hire (for rigs provided for Toot operations by OGDC).

5.19 In the initial three-year period (FY1978 to FY1980), capital expenditure is shown to represent 97% of the total requirements for funds. These are provided for through borrowing (45%), by net internal cash generation (22%) and an assumed OGDC equity contribution of \$24 million (33%). Beyond FY81, net internal cash generation is shown to provide all of the requirements for funds, which include the dividends assumed paid to OGDC (para 5.23) as well as the projected increase in working capital.

5.20 The projected increase in working capital of about \$44 million over the lifetime of the field represents the redemption in the form of cash and bank balances of the totality of the equity invested in the Toot field for both exploration and development since its inception. Should more reserves be proven these funds could provide for the further development of the Toot field. They could otherwise, as has been assumed in the following projections of the corporations consolidated accounts, be used to provide a supplement for other OGDC operations.

5.21 At the level of payment assumed for Toot project crude, in spite of the envisaged high proportion of debt financing of the incremental Toot development, debt service coverage remains adequate throughout the field's lifetime.

5.22 Estimated operating results for the Toot field operations for the period between FY78 and FY92 are given below:

	<u>1978-80</u>	<u>1981-83</u>	<u>1984-86</u>	<u>1987-89</u>	<u>1990-92</u>
<u>Production</u>					
Crude Oil (mill. bbl)					
Toot Wells 1, 4, 6 & 7	2.5	1.8	0.9	0.4	-
Toot Project Wells	1.7	6.5	3.4	1.6	0.4
Natural Gas (bill. cu. ft.)					
Toot Wells 1, 4, 6 & 7	7.4	5.3	2.6	1.1	-
Toot Project Wells	5.3	19.5	10.2	4.9	1.3
<u>US\$ Millions</u>					
<u>Operating Revenues</u>					
Crude Oil	29	81	51	29	9
Natural Gas and Other Income	<u>2</u>	<u>2</u>	<u>2</u>	<u>1</u>	<u>-</u>
Total Revenues	31	83	53	30	9
<u>Operating Expenses</u>					
Operating Administrative and Training Costs	3	7	5	3	2
Depreciation/Depletion	13	41	22	13	3
Royalties	<u>4</u>	<u>10</u>	<u>6</u>	<u>4</u>	<u>1</u>
Total Operating Expenses	<u>20</u>	<u>58</u>	<u>33</u>	<u>20</u>	<u>6</u>
Net Profit from Operations	11	25	20	10	3
Interest	1	7	4	2	-
Overall Profit/Loss	10	18	16	8	3
Dividends Paid	3	25	16	8	3
Operating Ratio (%)	65	70	62	67	67

5.23 These results indicate that at the level of payments for crude which are assumed, the operating ratio would be satisfactory throughout the period. Provision could also be made in this case, for a total of US\$55 million in profits accrued between 1978 and 1992 to be transferred to OGDC as dividends in support, together possibly with the accumulated cash and bank balances (para 5.20), of its other development and exploration activities. Royalty payments to the Government would also total about US\$25 million in the same period.

#### OGDC's Future Financial Prospects

5.24 Though modestly profitable, the development of the Toot field, because of the small size of its reserves, cannot be expected to generate sufficient funds to provide significant support for an expanded program of exploration and development of the type envisaged by OGDC for the period extending through FY1983 and including the five years between FY1979 and FY1983 covered by the Government's Fifth Plan. The magnitude and characteristics of OGDC's future financial requirements and financial prospects will depend on the comparative profitability (relative to Toot) of its other prospects for oil and gas development and production. Considering the many interesting but unexplored sedimentary areas that are known to exist in the country, it is generally felt that Pakistan should at least have the potential for self sufficiency in oil. With an expanded program of exploration activity and the sophisticated oil prospecting equipment now available, the near term prospects for a commercial find appear encouraging.

5.25 OGDC's discovery well at Dhodak, as has been mentioned (para. 4.02), is of special significance. OGDC estimates the structure could produce approximately 1,500 BPD per well. While additional drilling and testing is required to establish the fields actual production potential, it is not unreasonable to plan for its possible commercial exploitation. If Dhodak lives up to expectation, OGDC's main efforts will have to be concentrated on developing the field and installing the necessary oil and gas production and pipeline facilities. On the other hand, if it should prove uneconomical or not especially profitable to develop, primary emphasis must be put on exploration until such time as a major commercial discovery is made, either by OGDC or by one of the foreign concessionaires whose contract includes provision for OGDC participation.

5.26 A six-year drilling and investment program, predicated on the assumption that the Dhodak field will prove to be as profitable as is currently predicted, has been planned by OGDC to cover the period between FY1978 and FY83. The detailed assumptions regarding the well drilling program, somewhat modified by the Association to take account of its assessments of the technical constraints, are summarized below:

	<u>Number of Wells</u>						<u>Total</u>
	<u>77/78</u>	<u>78/79</u>	<u>79/80</u>	<u>80/81</u>	<u>81/82</u>	<u>82/83</u>	
Toot Development	1	5	3				9
Dhodak Development	1	3	3	4	4	4	19
Other Development	1	1	3	3	4	4	16
Exploration	<u>1</u>	<u>1</u>	<u>2</u>	<u>4</u>	<u>6</u>	<u>6</u>	<u>20</u>
Total	4	10	11	11	14	14	64

5.27 Even though it is to be expected that this drilling program will be modified periodically to take account of new information on prospects and reserves, the mission felt that it would be useful to analyze the possible effect on OGDC's future financial position and prospects of the drilling program as it is presently foreseen.

#### OGDC's Financing Plan

5.28 Should the drilling program be executed as shown above, OGDC's projected overall financial requirements for the period FY78 through FY83, along with the sources from which they could be met, is as summarized below; detailed Sources and Applications of Funds Statements are given in Annex 5.03, with explanatory notes in Annex 5.04, Page 2.

	<u>FY1978</u>	<u>FY 1979-83</u>	<u>FY 1978-83</u>
	<u>Million US\$</u>	<u>Million US\$</u>	<u>%</u>
<u>Requirements for Funds</u>			
Capital Outlays - Toot	9	58	
Capital Outlays - Dhodak	11	214	
Other Development Drilling/ Facilities and Equipment	<u>4</u>	<u>119</u>	
Total Capital Outlays	24	391	64
Exploration	9	171	28
Increase in Working Capital	(3)	51	8
Increase in Investments	-	<u>1</u>	-
Total Requirements	<u>30</u>	<u>614</u>	<u>100</u>
<u>Sources of Funds</u>			
Net Internal Cash Generation	(2)	205	31
GOP Equity Contribution	32	158	30
Increase in Workers Funds	-	1	-
Proposed Toot Project IDA Credit	-	30	
Development Institutions	-	130	
Suppliers Credits and/or Commercial Loans	-	<u>90</u>	
Total Borrowing	-	<u>250</u>	<u>39</u>
Total Sources	<u>30</u>	<u>614</u>	<u>100</u>

5.29 The financing plan assumes that the payment structure detailed in para. 5.17 is adopted for Toot crude, and that the price earned on Dhodak oil is US\$12.50 per barrel (1977 dollars). This latter assumption is based on the premise that the Dhodak crude could command a US\$15.00 export price because of its special characteristics and that the transportation cost to Karachi would be about US\$2.50. Gas prices are to be reviewed and would have to be determined in the light of the pricing study recommended in para. 2.29 when more is known about Dhodak's potential. In this analysis prices of US\$7 and US\$11 per MCF have been assumed for gas production from Toot and Dhodak respectively (see Annex 5.04, p 1).

5.30 At these assumed level of payments, total internal cash generation, net of debt servicing, is projected to cover only 31% of OGDC's total requirement of funds in the period. This ratio is low but would increase significantly after FY83 if production from Dhodak proves to be anywhere near the levels currently projected and if commercially profitable production from the other possible developments begins shortly after FY83. A substantial increase in net internal cash generation would enable the corporation to assume gradually the full cost of its exploration activity, as well as the portion of its financial requirements for development not covered by borrowings. In the period between FY79 and FY83, which coincides with the Government's Fifth Plan, the Government's equity contribution, net of royalties paid to the Government by OGDC, is projected to be of the order of US\$110. This is approximately equal to the expected OGDC expenditure on unsuccessful exploration.

5.31 The total requirements of funds is projected to total US\$614 million during the period covered by the Government's Fifth Plan. This figure is about US\$90 million larger than the amount requested by OGDC and substantially larger (by about \$240 million) than the amount currently allocated to OGDC in the Plan. These projections have assumed, however, that the Government will, as expected, reassess the level of OGDC's investment plan periodically in the light of future developments, and that future modifications of the Plan would take account of OGDC's improved ability to borrow commercially should the profitability of Dhodak's development become more certain.

#### OGDC's Projected Financial Position

5.32 Projected financial statements from FY78 through FY83, predicated on the assumptions regarding Dhodak's productivity and OGDC's drilling program outlined above, are given in Annexes 5.01, 5.02 and 5.03 with explanatory notes in Annex 5.04.

5.33 Although virtually all of the exploration and drilling costs incurred by OGDC since its establishment remain at present in its Balance Sheet under a deferred cost account, in these projections (following the accounting practices observed by the major oil companies), all of OGDC's assumed unsuccessful drilling expenditures, as well as the related costs of geological and geophysical surveys, are charged, beginning in FY78, to its

annual accounts in the same year in which they are incurred. Past expenditure on unsuccessful drilling ventures is shown as a charge on equity in the tentative Balance Sheet shown for FY77. As a result, the deferred cost accounts shown on OGDC's Balance Sheets for FY77 through FY83 (Annex 5.03) reflect the past as well as the future costs of productive assets resulting from successful drilling ventures. This account has been written down to the extent of the depletion assumed for both Toot and Dhodak. This approach is consistent with OGDC plans to adopt oil industry standards starting in 1978 (para 5.06). A summary of OGDC's projected financial performance is given below:

<u>Year Ending June 30</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Crude Oil Production (10 <sup>6</sup> bbl)	0.6	1.5	2.1	5.7	8.9	9.5
Gas Production (10 <sup>9</sup> cf)	1.7	4.6	6.4	33.9	69.3	79.6
Net Profit from Operations (10 <sup>6</sup> US\$)	(7)	(4)	(3)	26	75	98
Overall Profit/Loss (10 <sup>6</sup> US\$)	(16)	(19)	(16)	(7)	28	50
Operating Ratio (%)	453	143	116	65	48	43
Rate of Return on Average Invested Capital (%)	(7.5)	(3.9)	(3.2)	9.3	27.7	30.8
Debt/Equity Ratio	-	13/87	38/62	42/58	36/64	29/71
Current Ratio	3.5	1.8	1.0	1.3	1.8	2.0
Debt Service Coverage	0.3	1.3	1.2	1.8	2.7	3.2

5.34 The results indicate that OGDC's overall financial position, taking the six-year period as a whole would, if OGDC's plans proceed as projected, be satisfactory. In the three-year period before production from Dhodak is assumed to begin, and ignoring ongoing exploration costs, the rate of return on average invested capital is negative, reflecting the comparatively small production from Toot; but after FY78 the debt/equity ratios remain well within accepted industry standards and debt service covering remains adequate.

5.35 Project financial performance would improve markedly in FY81 as a result of the revenue which could be generated from expected Dhodak oil and gas production. The rate of return on average invested capital would increase sharply from -3.2% in FY80 to about 9.3% in FY81. In addition, the Corporation would be expected to experience for the first time in FY82 an overall net profit inspite of the continuing heavy expenditures on explorations.

5.36 If Dhodak proves to be as commercially profitable a field as is at present assumed, and if the funds allocated to OGDC in the Fifth Plan are modified to take account of such a development, OGDC may well be on its way to becoming by the end of the projection period, an increasingly self-sufficient, financially viable and profitable petroleum development and exploration company. The level of payment for Toot oil, agreed to in DCA Section 3.02, would ensure that OGDC's financial position on its operations will be sound in the intervening years.

#### Recommendations

5.37 The present residual uncertainty regarding the potential of the Dhodak field precludes any attempt at this time to require that OGDC attain specific oil industry financial performance standards within the next few years. However, the Association should assist OGDC in setting up an analytical framework enabling the Corporation to make rational decisions and adequately monitor its operations and financial performance. During negotiations, agreement was reached on the following recommendations:

- (i) OGDC would revise its accounting practices in accordance with standards acceptable to the Association and maintain separate accounts for each of its fields (Section 4.01 of the draft Project Agreement);
- (ii) OGDC would submit to the Association each year, starting January 1, 1980, a report presenting a financial evaluation of the Took Project and an analysis of the financial position and prospects of OGDC as a whole (Section 4.03 of the draft Project Agreement);
- (iii) OGDC shall prepare and furnish to the Association, before it undertakes any major development in the oil and gas sector, an economic and financial analysis of the proposed project (Section 4.04 of the draft Project Agreement);
- (iv) the GOP would ensure that OGDC would achieve a net of taxes real rate of return on the project of not less than 10% (Section 3.02 of the draft Credit Agreement); and
- (v) the GOP shall consult with the Association on the scope and adequacy of its petroleum sector investment program and make available the funds and facilities required to carry out such programs (Section 3.04 of the draft Credit Agreement).

## VI. ECONOMIC ANALYSIS

### Justification of Toot Development

6.01 The Toot Project is part of the least cost investment program to meet the predicted growth in demand for petroleum products. The alternative solution to Toot would be the import of crude oil at a higher unit cost. Since domestic prices of petroleum products are roughly in line with international prices (paragraph 2.21) import cost savings are a legitimate measure of project benefits. The principal benefit derived from the development of the Toot field is the production of crude oil at a lower unit cost (para 5.12) than the equivalent import cost. Production from the Toot field will consist of crude oil and a minor amount of associated gas. The total oil recovered during the 15-year life of the field would be 15.3 million barrels (i.e. US\$200 million equivalent in 1977 crude oil prices).

### Rate of Return and Sensitivity Analysis

6.02 A rate of return has been calculated for the Toot Development component of the project on an incremental basis with past investments considered as "sunk" costs. An economic price of US\$15.25 per barrel of crude oil is used in calculating the economic rate of return. This is based on the 1977 C.I.F. Karachi cost of imported crude oil of US\$13.0, plus an adjustment of US\$2.25 for the rail transportation from Karachi to Islamabad, which represents the least cost, transportation mode for oil haulage within Pakistan. The benefits derived from the natural gas produced are very small and are not taken into account in calculating the economic rate of return. Similarly, no allowance has been made for possible future LPG extraction.

6.03 The economic cost and benefit streams for the project area are shown in Annex 6.01. The summary results from the economic rate of return calculation and sensitivity analysis are shown below. The parameters chosen in measuring the sensitivity of the project's rate of return are:

The Base Case: 15% recovery of oil in place in the Toot reservoir (Core Lab's most likely estimate) and final capital cost estimated by the mission.

The Best Case: 20% recovery of oil in place (Core Lab's maximum estimated amount) and a 15% underrun in capital expenditures.

The Worst Case: 13% recovery of oil in place (Core Lab's minimum estimated amount) and a 15% overrun in capital expenditure.

Intermediate Case 1: High oil recovery only.  
Intermediate Case 2: 15% capital cost underrun only.  
Intermediate Case 3: 15% capital cost overrun only.  
Intermediate Case 4: Low oil recovery only.

Economic Rate of Return

<u>Crude oil price in US\$/barrel</u>	<u>15.25</u>
Base Case:	56%
Best Case:	100%
Worst Case:	37%
Intermediate Case 1:	82%
Intermediate Case 2:	69%
Intermediate Case 3:	46%
Intermediate Case 4:	46%

6.04 As indicated above, the economic rate of return for the base case, assuming an economic price of US\$15.25 per barrel is 56%. The economic rate of return could with optimum conditions go as high as 100% and in the worst case as low as 37%. Although the rate of return is sensitive to the variations of the sensitivity parameters, it remains satisfactory even under these adverse assumptions.

VII. RECOMMENDATIONS

7.01 During negotiations the following issues were raised with OGDC and satisfactory assurances were obtained that:

- (a) OGDC would employ an experienced management consultant and would review the recommended improvements and their implementation with the Association (para. 3.11);
- (b) OGDC would submit audited accounts to the Association within twelve months after the end of each fiscal year (para. 3.12);.
- (c) OGDC would provide adequate facilities for OGTI's proposed training program (para. 4.09);
- (d) OGDC would appoint a full time training director (para. 4.11);
- (e) OGDC would employ experience and qualified consultants to carry out the various reservoir, seismic and geophysical studies at Toot and Dhodak and the Dhodak feasibility study (para. 4.11);
- (f) OGDC would submit quarterly progress reports to the Association (para. 4.22);
- (g) OGDC would revise its accounting practices and maintain separate accounts for each field (para. 3.09);

- (h) OGDC would consult the Association before undertaking any major oil or gas development projects and would make a financial analysis for any projects under consideration in accordance with criteria and procedures satisfactory to the Association (para. 5.37); and
- (i) OGDC would submit to the Association each year beginning January 1, 1979 projections of its future financial position and statements of its current situation (para. 5.37).

7.02 Assurances were obtained from the GOP during at negotiations that:

- (a) GOP would undertake an energy utilization, cost and pricing study in accordance with terms of reference agreed to with the Association; (para 2.30) and
- (b) GOP would establish the amount to be paid to OGDC, if any, in addition to receipts from the sale of oil and gas, for oil and gas produced at Toot in order to ensure a DCF rate of return on the project of at least 10% (para 5.14).

7.03 With satisfactory resolution of the items outlined above, the project constitutes a suitable basis for an IDA credit of US\$30 million.

ANNEX 1.01 (A)

NATURAL GAS RESERVES IN PAKISTAN (in TCF)

<u>Gas Fields</u>	<u>Location</u>	<u>Year of Discovery</u>	<u>Total Reserves</u>	<u>Total production up to 30/6/77</u>	<u>Balance</u>
Sui	Baluchistan	1952	8.62	1.46	7.16
Sari	Sind	1956	0.03	-	-
Hundi	Sind	1970	0.05	-	0.05
Dhulian and Meyal	Punjab	1944 & 1968	1.37	1.19	0.18
Dhodak */	Punjab	1976	4.5	-	4.5

\*/ Not yet fully evaluated. This figure is a very preliminary estimate.  
Source: The Fifth Plan 1977-83, Planning Commission, Government of Pakistan.

ANNEX 1.01 (B)

OIL RESERVES IN PAKISTAN AS OF JUNE 30, 1976 (in 1,000 barrels)

<u>Field</u>	<u>Oil in Place</u>	<u>Year of Discovery</u>	<u>Recover-able Oil Reserves</u>	<u>Cumulative Production</u>	<u>Remaining Recoverable Reserves</u>
Dhulian	93,000	1934	41,800	39,528	3,972
Balkasar	140,000	1946	31,600	28,840	4,160
Joyamair	25,000	1944	5,400	4,249	701
Meyal **/	265,000 (E)	1968	166,000 (E)	6,415	159,585
Toot */	333,000	1968	52,000	2,300	49,700
Dhodak **/	NA	1976	200,000	-	200,000

\*/ Based on CORE LAB reserve report.

\*\*/ Unproved.

(E) Estimate.

Source: Energy Resources Cell, Government of Pakistan, Acres Energy Resource Survey report, UNAIL Study.

PRICING OF PETROLEUM PRODUCTS

Retail Prices:

The retail price changes that have taken place since November 1973 are shown below:

Table 1

Changes in the Prices

(In rupees)

Item	1973-74			1974-75		1975-76		Percentage Increase since Pre Nov. 1973	
	Pre Nov. 1973	Nov. 20, 1973	Jan. 1, 1974	Jan. 8, 1974	Feb. 1, 1975	Sept. 29, 1975	March 1976		Dec. 1976
1	2	3	4	5	6	7	8	9	
PETROLEUM PRODUCTS									
(per imperial gallon)									
100 octane	7.00	10.00	11.50	12.00	13.00	14.50	-	15.40	120
Regular Petrol	6.25	7.50	9.00	9.50	10.50	12.00	-	12.70	103
High speed Diesel Oil	3.00	3.95	5.00	5.50	5.50	6.00	-	6.35	112
Kerosene	2.00	2.50	2.50	3.00	4.00	4.00	-	4.00	100
Light Diesel Oil	1.75	2.30	3.75	4.00	4.00	4.00	-	4.00	128
Furnace Oil (per ton)	240	340	500	500	500	500	600	-	150

Source: Pakistan Economic Survey, 1976-77

A comparison of the current selling prices of refined petroleum products shows the cross-subsidization pricing system that had been in effect within Pakistan since 1966. (See Table 2). The implicit subsidies for kerosene and light diesel products vary between 15-30 percent depending on the distribution point within the country. Motor gasoline, however, is priced substantially above the international prices for this products, and the tax revenue generated, has been adequate until the current year to meet the subsidizing of import deficit products, kerosene and diesel, as well as covering shortfalls in the refinery operations and the inland freight margins.

Pricing Formula

The elements which comprise the current price formula for petroleum products are:

- (i) ex-refinery price;
- (ii) excise/customs duty;
- (iii) distributors' margin;
- (iv) petroleum development surcharge 1/; and
- (v) inland freight margin, out of which the marketing companies recover actual transportation expenses.

The sum of these price elements provides the "fixed sales price" of each petroleum product. Current fixed sale prices of the principal refined products and the breakdown by each element in the price formula, are given below:

Table 2

Cost Structure of Petroleum Prices per July 1, 1977 (in Rs/liter)

	<u>Ex-Refinery</u>	<u>Customs/Excise Duty</u>	<u>Development Surcharge</u>	<u>Distribution Margin plus Dealers Commission</u>	<u>Inland Freight Margin</u>	<u>Fixed Sales Price</u>
Super Petrol	1.70	0.88	0.59	0.12	0.11	3.40
Regular Petrol	1.41	0.88	0.29	0.13	0.09	2.80
High Speed Diesel	1.00	0.25	0.02	0.05	0.08	1.40
Light Diesel Oil	0.70	0.04	0.01	0.03	0.12	0.90
Kerosene	0.71	-	0.01	0.03	0.13	0.88

Source: Ministry of Petroleum and Natural Resources.

---

1/ It is the differential margin between the sales price and the "prescribed price" accruable to the oil marketing companies. It is a price stabilization measure which may lead to Government revenue or refunds to refineries, the latter being the case after world crude price increases in 1973.

PAKISTAN

TOOT OIL DEVELOPMENT PROJECT

Accounting and Management Information

1. Prior to OGDC's reorganization in 1975, the budgeting and accounting functions were carried out in a casual and unsophisticated manner. No consolidated annual financial statements were prepared for the Corporation. Budgets were developed for the entire operation but not for specific departments or activities. Drilling costs, for example, which comprise a large share of OGDC expenditures, were not budgeted on the basis of individual well costs and a specific drilling program. In essence, the Corporation was treated as an ongoing project entity, with the GOP directly providing most of the funds required, and expenditures either devoted to the purchase of stores and equipment and allocated to a fixed asset account or devoted to exploration and drilling activities and capitalized in a deferred cost account.

2. Since 1975, OGDC has undertaken to improve its accounting system and to move toward oil industry standards. Historical accounts have been reorganized and consolidated into annual financial statements and this work program is virtually up to date. Monthly costs are now tabulated by well, and by geological, seismic and gravity party, and budgets for FY1977-78 have been prepared and segregated by functional department for the first time. The Corporation is now implementing the use of computer facilities for routine accounting jobs such as stores and payroll activities, and this will be extended to other accounting functions later.

3. In spite of improvements in this direction since 1975, OGDC's management information and controls system remains weak. Management information that is regularly compiled and disseminated within the organization is oriented more toward providing operational information than to assessing performance. A greater and more regular use of performance benchmarks seems desirable as a means of identifying problem areas, improving accountability and control, and upgrading functional capabilities.

4. The present organizational structure of OGDC has served adequately in the past but may require modification in view of the anticipated growth, functional diversity, and locational dispersion of administrative and operational staff of the Corporation. For example, the proliferation of departmental functions - with the result that nine department managers now report directly to the chairman - may require an organizational restructuring in order to improve the identification and separation of major functional departments vis-a-vis supportive staff activities.

5. OGDC has benefited over the years from a number of training programs to improve the technical capabilities of its personnel, and additional assistance is provided as part of the project. Little training assistance,

however, has been available to OGDC in non-technical areas, and it is proposed that management and accounting consulting services be included to address potential problem areas. The following main activities are planned:

- (i) review of OGDC's present organizational structure and recommendations on its reorganization having regard to the main areas of activity the Corporation will become involved in, as well as the distribution of personnel between Islamabad, Karachi and various field offices;
- (ii) evaluation of the existing budget control system and recommendations on improvements;
- (iii) recommendations regarding improvement of OGDC's management information system; and
- (iv) evaluation of OGDC's accounting system in the context of oil industry practices, and recommendations and staff training regarding the implementation of improved accounting procedures.

6. The consulting effort will serve to complement the technical assistance that is being directed to OGDC, by examining the Corporation's organizational framework and management systems, and familiarizing finance and accounting personnel with accounting practices peculiar to the petroleum industry. The assignment is estimated to require about 14 man-months at an estimated cost of US\$100,000 equivalent.

PAKISTAN  
TOOT OIL DEVELOPMENT PROJECT  
SUMMARY OF PROJECT COSTS

	<u>IN PR'S MILLION</u>			<u>IN US\$ MILLION</u>		
	<u>LOCAL</u>	<u>FOREIGN</u>	<u>TOTAL</u>	<u>LOCAL</u>	<u>FOREIGN</u>	<u>TOTAL</u>
<u>TOOT DRILLING PROGRAM</u>						
Site Preparation	2.0	---	2.0	0.2	---	0.2
Materials & Services	43.6	231.7	275.3	4.4	23.4	27.8
Expatriate Labor	6.9	34.7	41.6	0.7	3.5	4.2
Local Labor	18.8	---	18.8	1.9	---	1.9
Geophysical & Reservoir Studies	1.0	2.0	3.0	0.1	0.2	0.3
Drilling Consultant	1.0	4.0	5.0	0.1	0.4	0.5
Use of Drilling Rigs	---	45.5	45.5	---	4.6	4.6
Sub-Total	<u>73.3</u>	<u>317.9</u>	<u>391.2</u>	<u>7.4</u>	<u>32.1</u>	<u>39.5</u>
<u>TOOT SURFACE FACILITIES</u>						
Engineering	5.0	3.0	8.0	0.5	0.3	0.8
Production Facilities	5.0	22.8	27.8	0.5	2.3	2.8
Civil Works	18.8	---	18.8	1.9	---	1.9
Gas Dehydration	1.0	8.0	9.0	0.1	0.8	0.9
Pipeline, Tank, Pumps, etc.	10.9	33.7	44.6	1.1	3.4	4.5
Sub-Total	<u>40.7</u>	<u>67.5</u>	<u>108.2</u>	<u>4.1</u>	<u>6.8</u>	<u>10.9</u>
<u>LOGISTIC SUPPORT EQUIPMENT</u>						
Road Transport	1.0	10.9	11.9	0.1	1.1	1.2
Cargo Aircraft	1.0	15.8	16.8	0.1	1.6	1.7
Sub-Total	<u>2.0</u>	<u>26.7</u>	<u>28.7</u>	<u>0.2</u>	<u>2.7</u>	<u>2.9</u>
<u>DHODAK STUDIES</u>						
Seismic Survey	2.0	8.0	10.0	0.2	0.8	1.0
Reservoir Evaluation	---	2.0	2.0	---	0.2	0.2
Project Preparation	2.0	6.0	8.0	0.2	0.6	0.8
Sub-Total	<u>4.0</u>	<u>16.0</u>	<u>20.0</u>	<u>0.4</u>	<u>1.6</u>	<u>2.0</u>
Assistance to OGTI	2.0	7.0	9.0	0.2	0.7	0.9
Mgmt. & Acct. Consultant	---	1.0	1.0	---	0.1	0.1
Customs Duty	15.8	---	15.8	1.6	---	1.6
Sub-Total	<u>17.8</u>	<u>8.0</u>	<u>25.8</u>	<u>1.8</u>	<u>0.8</u>	<u>2.6</u>
Basic Cost Estimate (BCE)	137.8	436.1	573.9	13.9	44.0	57.9
Physical Contingency (PC) <sup>1/</sup>	16.6	49.5	66.1	1.8	5.0	6.8
Price Contingency (13% of BCE + PC)	19.6	59.4	79.0	2.3	6.0	8.3
Estimated Project Cost	174.0	545.0	719.0	18.0	55.0	73.0

<sup>1/</sup> Phys. Cont. = 10% Drilling & Transport & Studies)  
20% Surface Facilities ) = 12%

Source: OGDC  
Mission Estimate

PAKISTAN

TOOT OIL DEVELOPMENT PROJECT

Estimated Schedule of Disbursement

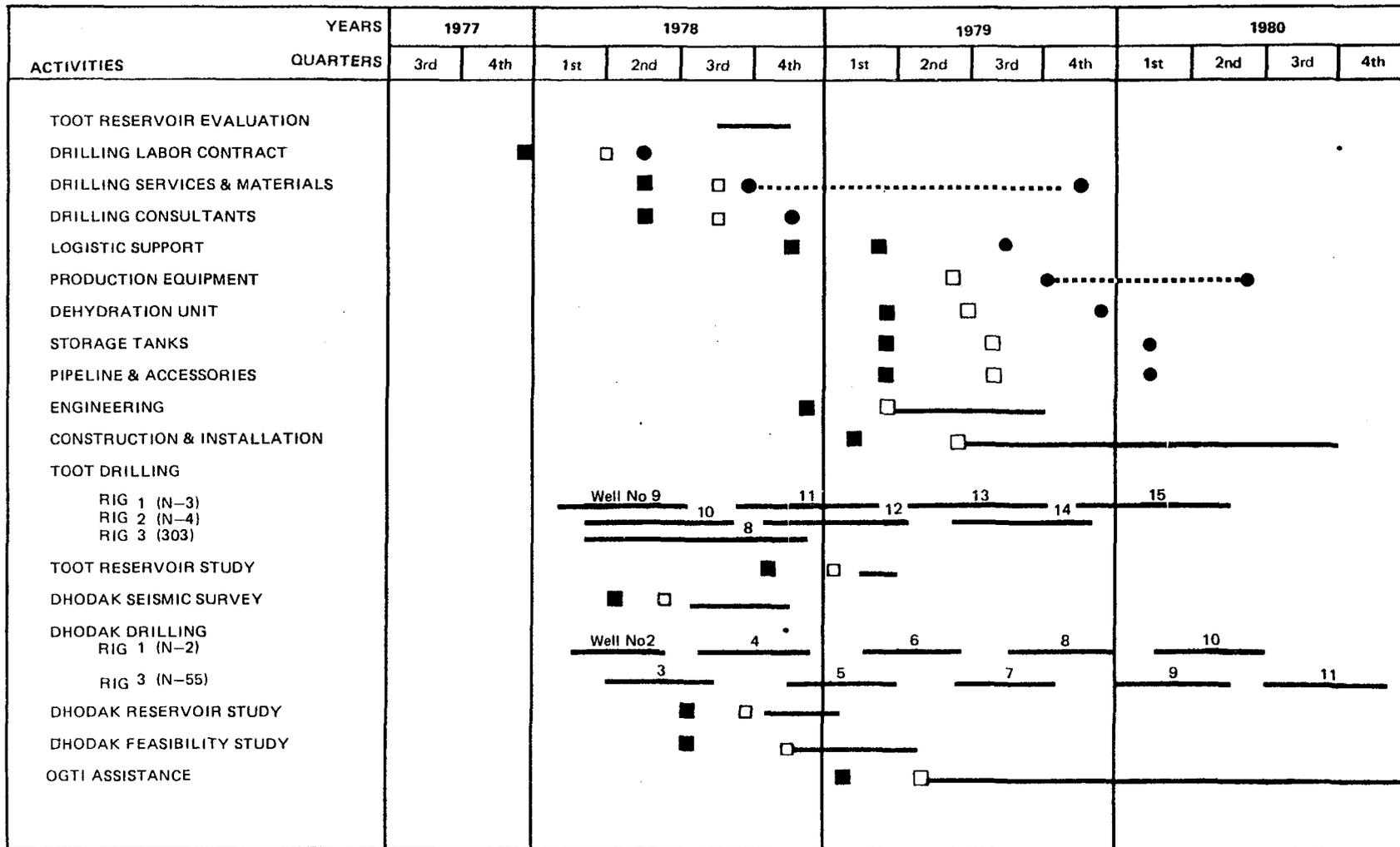
<u>IBRD Fiscal Year and Quarter</u>	<u>Cumulative Disbursement at End of Quarter (US\$ '000)</u>
<u>1978/79</u>	
June 30, 1979	4,000
<u>1979/80</u>	
September 30, 1979	9,000
December 31, 1979	13,000
March 31, 1980	17,000
June 30, 1980	19,000
<u>1980/81</u>	
September 30, 1980	21,000
December 31, 1980	23,000
March 31, 1981	25,500
June 30, 1981	27,000
<u>1981/82</u>	
September 30, 1981	29,000
December 31, 1981	30,000

PAKISTAN  
TOOT OIL DEVELOPMENT PROJECT  
ALLOCATION OF LOANS <sup>1/</sup>

	<u>IDA</u>	<u>ODM</u>	<u>CIDA</u>	<u>TOTAL</u>
	(US\$ Million Equivalent)			
<u>DRILLING PROGRAM</u>				
Equipment & Materials	12.4	6.0	---	18.4
Expatriate Labor & Well Services	8.5	---	---	8.5
<u>SURFACE FACILITIES</u>				
Engineering	---	---	0.3	0.3
Production Facilities	1.2	2.2	---	3.4
Gas Processing	---	---	0.8	0.8
Gathering System	---	1.1	---	1.1
Pipeline	1.2	---	---	1.2
<u>LOGISTIC SUPPORT EQUIPMENT</u>				
Heavy Duty Rig Transport	---	---	1.1	1.1
Cargo Aircraft	---	---	1.6	1.6
<u>STUDIES</u>				
Toot Reservoir Evaluation	---	---	0.2	0.2
Dhodak Seismic Survey	---	---	0.8	0.8
Dhodak Reservoir Evaluation	---	---	0.2	0.2
Dhodak Project Preparation	---	---	0.6	0.6
<u>MANAGEMENT &amp; TRAINING PROGRAM</u>				
Drilling Consultant	---	---	0.4	0.4
OGOC Management Training	---	---	0.1	0.1
OGTI Assistance	0.7	---	---	0.7
Sub-total	<u>24.0</u>	<u>9.3</u>	<u>6.1</u>	<u>39.4</u>
Physical & Price Contingencies	6.0	2.7	1.9	10.6
TOTAL	<u><u>30.0</u></u>	<u><u>12.0</u></u>	<u><u>8.0</u></u>	<u><u>50.0</u></u>

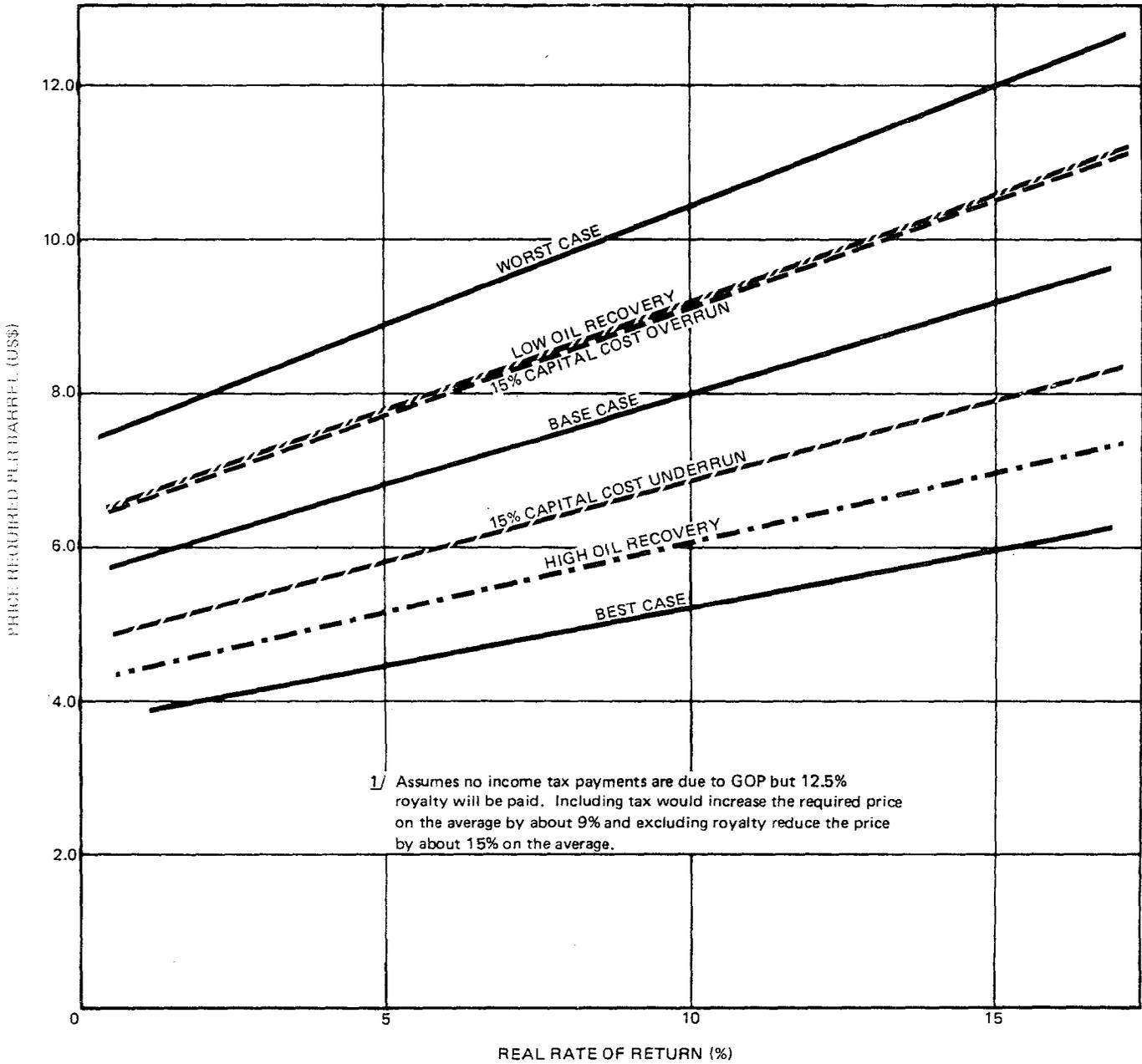
<sup>1/</sup> Includes grants by ODM & CIDA and excludes additional CIDA support for the Toot Project and the Petroleum sector.

**PAKISTAN  
TOOT OIL DEVELOPMENT PROJECT  
PROJECT SCHEDULE**



- Tender or Inquiry Ready
- Award of Contract or Placement of Order
- Delivery or Mobilization

PAKISTAN  
TOOT OIL DEVELOPMENT PROJECT  
CRUDE OIL PRICES VS FINANCIAL RATE OF  
RETURN OF THE TOOT PROJECT<sup>1/</sup>



EXPLANATION:

1. Base Case: Assumes 15% recovery of oil in place in the Toot Reservoir and final capital cost is as estimated.
2. Best Case: Assumes 20% recovery (maximum estimated amount) of oil in place and a 15% underrun in capital expenditures.
3. Worst Case: Assumes 13% recovery (minimum estimated amount) of oil in place and a 15% overrun in capital expenditures.
4. Intermediate Cases: These show the affect on required oil prices if either the recovery factor or the capital expenditure vary from the Base Case.

INCREMENTAL TOOT DEVELOPMENT  
IN MILLIONS OF RUPEES  
FINANCIAL NOMINAL RATE OF RETURN ON INVESTMENT

	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92
INFLATION	1.05	1.13	1.21	1.30	1.39	1.49	1.59	1.70	1.82	1.95	2.08	2.23	2.39	2.55	2.73
PRODUCTION															
OIL (MILL. BARRELS)	-	0.54	1.24	2.55	2.19	1.74	1.40	1.11	0.89	0.72	0.58	0.34	0.18	0.14	0.12
GAS (BILL. CU. FT.)	-	1.62	3.72	7.65	6.57	5.22	4.20	3.33	2.67	2.16	1.74	1.02	0.54	0.42	0.36
PRICES															
OIL (RUPEES/BARREL)	80.69	87.15	93.68	100.25	107.26	114.77	122.80	131.40	140.60	150.44	160.97	172.24	184.29	197.20	211.00
GAS (RUPEES/THOU. CU. FT.)	0.72	0.78	0.84	0.90	0.96	1.03	1.10	1.18	1.26	1.35	1.44	1.55	1.65	1.77	1.89
REVENUES															
CRUDE OIL	-	47.04	116.16	255.64	234.90	199.70	171.92	145.85	125.13	108.32	93.36	58.56	33.17	27.61	25.32
NATURAL GAS	-	1.26	3.12	6.89	6.31	5.38	4.62	3.93	3.36	2.92	2.51	1.58	0.89	0.74	0.68
MISCELLANEOUS	-	-	12.01	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL REVENUES	-	48.32	131.29	262.53	241.21	205.08	176.54	149.78	128.49	111.24	95.87	60.14	34.06	28.35	26.00
EXPENSES															
OPERATING EXPENSES															
OPERATING COST	-	3.20	7.89	17.37	15.96	13.57	11.68	9.91	8.50	7.36	6.34	3.98	2.25	1.88	1.72
ADMINISTRATIVE COST	-	1.12	2.40	2.57	2.75	2.94	3.15	3.37	3.61	3.86	4.13	4.42	4.73	5.06	5.41
OPR ADM & TRG COST	-	4.32	10.29	19.94	18.71	16.51	14.83	13.28	12.11	11.22	10.47	8.40	6.98	6.94	7.13
CAPITAL INVESTMENTS															
WELLS PRODUCING	58.97	223.46	170.55	-	-	-	-	-	-	-	-	-	-	-	-
WELLS STEP OUT	13.45	37.99	-	-	-	-	-	-	-	-	-	-	-	-	-
DRILLING PROGRAM	8.28	-	-	3.86	-	-	-	-	-	-	-	-	-	-	-
SUBTOTAL DRILLING	80.70	261.45	170.55	3.86	-	-	-	-	-	-	-	-	-	-	-
ROAD TRANSPORT	-	15.64	-	-	-	-	-	-	-	-	-	-	-	-	-
AIR TRANSPORT	-	8.94	-	-	-	-	-	-	-	-	-	-	-	-	-
SURFACE FACILITIES	-	30.17	56.45	6.43	-	-	-	-	-	-	-	-	-	-	-
PIPELINE	-	33.52	31.23	-	-	-	-	-	-	-	-	-	-	-	-
SUBTOTAL FAC & EQU	-	88.27	87.68	6.43	-	-	-	-	-	-	-	-	-	-	-
TOTAL CAP. COST	80.70	349.72	258.23	10.29	-	-	-	-	-	-	-	-	-	-	-
WORKING CAPITAL															
INCREASE IN INVENT.	-	3.02	-	-	-	-	-	-	-	-	-	-	-	-	(3.02)
ACCOUNTS PAYABLE	(13.45)	(44.84)	15.25	41.33	1.72	-	-	-	-	-	-	-	-	-	-
ACCOUNTS RECEIVABLE	-	8.05	13.83	21.88	(3.56)	(6.02)	(4.76)	(4.46)	(3.55)	(2.88)	(2.56)	(5.96)	(4.34)	(0.96)	(0.40)
TOTAL WORK. CAP.	(13.45)	(33.77)	29.08	63.21	(1.84)	(6.02)	(4.76)	(4.46)	(3.55)	(2.88)	(2.56)	(5.96)	(4.34)	(0.96)	(3.42)
ROYALTIES	-	5.88	14.52	31.96	29.36	24.96	21.49	18.23	15.64	13.54	11.67	7.32	4.15	3.45	3.17
TOTAL EXPENSES	67.25	326.15	312.12	125.40	46.23	35.45	31.56	27.05	24.20	21.88	19.58	9.76	6.79	9.43	6.88
NET CASH FLOW	(67.25)	(277.83)	(180.83)	137.13	194.98	169.63	144.98	122.73	104.29	89.36	76.29	50.38	27.27	18.92	19.12
ACCUMULATED NPV, 10%	(61.14)	(290.75)	(426.61)	(332.95)	(211.88)	(116.13)	(41.73)	15.52	59.75	94.20	120.94	136.99	144.89	149.87	154.45
ACCUMULATED NPV, 15%	(58.48)	(268.56)	(387.46)	(309.06)	(212.12)	(138.78)	(84.28)	(44.16)	(14.51)	7.58	23.98	33.40	37.83	40.50	42.85
ACCUMULATED NPV, 20%	(56.04)	(248.98)	(353.63)	(287.50)	(209.14)	(152.33)	(111.87)	(83.33)	(63.12)	(48.69)	(38.42)	(32.77)	(30.28)	(28.75)	(27.51)

NOMINAL RATE OF RETURN ON INVESTMENT = 17.8%

DEFLATED NET CASH FLOW (64.35) (246.17) (149.05) 105.63 140.37 114.13 91.17 72.13 57.28 45.87 36.60 22.59 11.43 7.41 7.00

REAL RATE OF RETURN ON INVESTMENT = 10.0%

Date: November 21, 1978

OGDC  
TOOT FIELD  
STATEMENTS OF INCOME  
IN MILLIONS OF RUPEES

	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92
INFLATION	1.05	1.13	1.21	1.30	1.39	1.49	1.59	1.70	1.82	1.95	2.08	2.23	2.39	2.55	2.73
PRICE OLD OIL	31.1	50.3	54.0	57.8	61.9	66.2	70.8	75.8	81.1	86.8	92.9	99.4	-	-	-
PRICE PROJ OIL	80.7	87.2	93.7	100.3	107.3	114.8	122.8	131.4	140.6	150.4	161.0	172.2	184.3	197.2	211.0
<b>PRODUCTION</b>															
CRUDE OIL (MILL. BBL.)															
TOOT WELLS 1467	0.6	1.0	0.9	0.7	0.6	0.5	0.4	0.3	0.2	0.2	0.1	0.1	-	-	-
TOOT PROJECT WELLS	-	0.5	1.2	2.6	2.2	1.7	1.4	1.1	0.9	0.7	0.6	0.3	0.2	0.1	0.1
NATURAL GAS (BILL. CU. FT.)															
TOOT WELLS 1467	1.7	3.0	2.7	2.2	1.7	1.4	1.1	0.8	0.7	0.5	0.3	0.3	-	-	-
TOOT PROJECT WELLS	-	1.6	3.7	7.7	6.6	5.2	4.2	3.3	2.7	2.2	1.7	1.0	0.5	0.4	0.4
<b>OPERATING REVENUES</b>															
CRUDE OIL															
TOOT WELLS 1467	18	50	49	42	35	30	25	21	19	15	10	9	-	-	-
TOOT PROJECT WELLS	-	47	116	256	235	200	172	146	125	108	93	59	33	28	25
NATURAL GAS															
TOOT WELLS 1467	1	2	2	2	2	1	1	1	1	1	-	-	-	-	-
TOOT PROJECT WELLS	-	1	3	7	6	5	5	4	3	3	3	2	1	1	1
MISCELLANEOUS INCOME	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-
<b>TOTAL REVENUES</b>	<b>19</b>	<b>100</b>	<b>182</b>	<b>307</b>	<b>278</b>	<b>236</b>	<b>203</b>	<b>172</b>	<b>148</b>	<b>127</b>	<b>106</b>	<b>70</b>	<b>34</b>	<b>29</b>	<b>26</b>
<b>OPERATING EXPENSES</b>															
OPR. ADM. & TRG. WELLS 1467	3	6	6	5	4	4	3	3	2	2	1	1	-	-	-
OPR. ADM. & TRG. PROJECT WELLS	-	4	10	20	19	17	15	13	12	11	10	8	7	7	7
OPERATING ADMINISTRATIVE AND TRAINING COSTS	3	10	16	25	23	21	18	16	14	13	11	9	7	7	7
DEPRECIATION/DEPLETION	9	44	79	158	137	110	89	69	59	50	44	30	18	5	4
ROYALTIES	2	12	21	37	33	29	24	21	18	16	13	8	4	3	3
<b>TOTAL OPERATING EXPENSES</b>	<b>14</b>	<b>66</b>	<b>116</b>	<b>220</b>	<b>193</b>	<b>160</b>	<b>131</b>	<b>106</b>	<b>91</b>	<b>79</b>	<b>68</b>	<b>47</b>	<b>29</b>	<b>15</b>	<b>14</b>
NET PROFIT FROM OPERATIONS	5	34	66	87	85	76	72	66	57	48	38	23	5	14	12
INTEREST	-	-	6	23	25	22	17	13	10	7	4	2	1	1	-
OVERALL PROFIT/LOSS	5	34	60	64	60	54	55	53	47	41	34	21	4	13	12
DIVIDENDS PAID	-	-	28	135	60	54	55	53	47	41	34	21	4	13	12
PROFIT RETAINED	5	39	71	-	-	-	-	-	-	-	-	-	-	-	-
<b>OPERATING RATIO (X)</b>	<b>74</b>	<b>66</b>	<b>64</b>	<b>72</b>	<b>69</b>	<b>68</b>	<b>65</b>	<b>62</b>	<b>61</b>	<b>62</b>	<b>64</b>	<b>67</b>	<b>85</b>	<b>52</b>	<b>54</b>

Date: November 21, 1978

OGDC  
TOOT FIELD  
STATEMENTS OF SOURCES AND APPLICATIONS OF FUNDS  
IN MILLIONS OF RUPEES

	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92
<b>SOURCES OF FUNDS</b>															
<b>INTERNAL SOURCES</b>															
NET PROFIT FROM OPERATIONS	5	34	66	87	85	76	72	66	57	48	38	23	5	14	12
DEPRECIATION/DEPLETION	9	44	79	158	137	110	89	69	59	50	44	30	18	5	4
TOTAL INTERNAL CASH GENERATION	14	78	145	245	222	186	161	135	116	98	82	53	23	19	16
OGDC EQUITY	69	175	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>LONG TERM BORROWINGS</b>															
PROPOSED TOOT PROJECT IDA CREDIT	-	38	147	77	29	-	-	-	-	-	-	-	-	-	-
POSSIBLE ODM & CIDA CREDITS	-	59	79	40	20	-	-	-	-	-	-	-	-	-	-
TOTAL LONG TERM BORROWINGS	-	97	226	117	49	-	-	-	-	-	-	-	-	-	-
TOTAL SOURCES	83	350	371	362	271	186	161	135	116	98	82	53	23	19	16
<b>APPLICATION OF FUNDS</b>															
<b>CAPITAL OUTLAYS</b>															
TOOT WELL 7	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOOT PROJECT DRILLING	81	261	171	4	-	-	-	-	-	-	-	-	-	-	-
TOOT PROJECT FACILITIES & EQUIPMENT	-	88	88	6	-	-	-	-	-	-	-	-	-	-	-
TOTAL CAPITAL OUTLAYS	96	349	259	10	-	-	-	-	-	-	-	-	-	-	-
<b>WORKING CAPITAL</b>															
INVENTORY OIL	-	4	-	-	-	-	-	-	-	-	-	-	-	-	(4)
ACCOUNTS RECEIVABLE	3	14	13	21	(5)	(7)	(5)	(5)	(4)	(4)	(3)	(6)	(6)	(1)	(1)
CASH AND BANK BALANCES	-	-	-	39	115	61	49	36	32	28	25	23	17	1	5
ACCOUNTS PAYABLE	(16)	(42)	15	41	2	-	-	-	-	-	-	-	-	-	-
TOTAL INCREASE/DECREASE IN WORKING CAPITAL	(13)	(24)	28	101	112	54	44	31	28	24	22	17	11	-	-
DIVIDENDS PAID	-	-	28	135	60	54	55	53	47	41	34	21	4	13	12
<b>DEBT SERVICE</b>															
LOAN AMORTIZATION	-	25	50	93	74	56	45	38	31	26	22	13	7	5	4
INTEREST	-	-	6	23	25	22	17	13	10	7	4	2	1	1	-
TOTAL DEBT SERVICE	-	25	56	116	99	78	62	51	41	33	26	15	8	6	4
TOTAL APPLICATIONS	83	350	371	362	271	186	161	135	116	98	82	53	23	19	16
DEBT SERVICE COVERAGE	-	3.1	2.6	2.1	2.2	2.4	2.6	2.6	2.8	3.0	3.2	3.5	2.9	3.2	4.0

Date: November 21, 1978

OGDC  
TOOT FIELD  
BALANCE SHEETS  
IN MILLIONS OF RUPEES

	76/77	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92
<b>ASSETS</b>																
DEFERRED COST DEVELOPMENT																
DRILLING & EXPLORATION	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DEFERRED COST	142	238	499	670	674	674	674	674	674	674	674	674	674	674	674	674
LESS ACCUMULATED DEPLETION	-	-	35	94	223	330	414	482	535	579	614	643	658	666	670	674
NET DEFERRED COST	142	238	464	576	451	344	260	192	139	95	60	31	16	8	4	-
<b>FIXED ASSETS</b>																
FACILITIES AND EQUIPMENT AT COST	69	69	157	245	251	251	251	251	251	251	251	251	251	251	251	251
LESS ACCUMULATED DEPRECIATION	20	29	38	58	87	117	143	164	180	195	210	225	240	250	251	251
NET FIXED ASSETS	49	40	119	187	164	134	108	87	71	56	41	26	11	1	-	-
<b>CURRENT ASSETS</b>																
INVENTORY-OIL	1	1	5	5	5	5	5	5	5	5	5	5	5	5	5	1
ACCOUNTS RECEIVABLE	9	12	26	39	60	55	48	43	38	34	30	27	21	15	14	13
CASH AND BANK BALANCES	4	4	4	4	43	158	219	268	304	336	364	389	412	429	430	435
ACCOUNTS PAYABLE	(4)	(20)	(62)	(47)	(6)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
CURRENT PORTION OF L/T DEBT	-	(25)	(50)	(93)	(74)	(56)	(45)	(38)	(31)	(26)	(22)	(13)	(7)	(5)	(4)	-
NET CURRENT ASSETS	10	(28)	(77)	(92)	28	158	223	274	312	345	373	404	427	440	441	445
<b>TOTAL ASSETS</b>	<b>201</b>	<b>250</b>	<b>506</b>	<b>671</b>	<b>643</b>	<b>636</b>	<b>591</b>	<b>553</b>	<b>522</b>	<b>496</b>	<b>474</b>	<b>461</b>	<b>454</b>	<b>449</b>	<b>445</b>	<b>445</b>
<b>LIABILITIES</b>																
OGDC EQUITY CONTRIBUTION	201	270	445	445	445	445	445	445	445	445	445	445	445	445	445	445
ACCUMULATED PROFIT/LOSS	-	5	39	99	163	223	277	332	385	432	473	507	528	532	545	557
ACCUMULATED DIVIDENDS	-	-	-	(28)	(163)	(223)	(277)	(332)	(385)	(432)	(473)	(507)	(528)	(532)	(545)	(557)
NET EQUITY	201	275	484	516	445	445	445	445	445	445	445	445	445	445	445	445
<b>LONG TERM LIABILITIES</b>																
	-	(25)	22	155	198	191	146	108	77	51	29	16	9	4	-	-
<b>TOTAL LIABILITIES</b>	<b>201</b>	<b>250</b>	<b>506</b>	<b>671</b>	<b>643</b>	<b>636</b>	<b>591</b>	<b>553</b>	<b>522</b>	<b>496</b>	<b>474</b>	<b>461</b>	<b>454</b>	<b>449</b>	<b>445</b>	<b>445</b>
<b>DEBT/EQUITY RATIO</b>	<b>-</b>	<b>(0.1)</b>	<b>-</b>	<b>0.3</b>	<b>0.4</b>	<b>0.4</b>	<b>0.3</b>	<b>0.2</b>	<b>0.2</b>	<b>0.1</b>	<b>0.1</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

Date: November 21, 1978

PAKISTAN  
OGDC  
STATEMENTS OF INCOME  
IN MILLIONS OF RUPEES

	77/78	78/79	79/80	80/81	81/82	82/83
INFLATION	1.05	1.13	1.21	1.30	1.39	1.49
PRICE OLD OIL	31.1	50.3	54.0	57.8	61.9	66.2
PRICE PROJECT OIL	80.7	87.2	93.7	100.3	107.3	114.8
PRICE DHODAK OIL	129.3	139.7	150.1	160.7	171.9	183.9
PRODUCTION						
CRUDE OIL (MILL. BBL.)						
TOOT WELLS 1467	0.6	1.0	0.9	0.7	0.6	0.5
TOOT PROJECT WELLS	-	0.5	1.2	2.6	2.2	1.7
DHODAK	-	-	-	2.4	6.1	7.3
NATURAL GAS (BILL.CU.FT.)						
TOOT WELLS 1467	1.7	3.0	2.7	2.2	1.7	1.4
TOOT PROJECT WELLS	-	1.6	3.7	7.7	6.6	5.2
DHODAK	-	-	-	24.0	61.0	73.0
OPERATING REVENUES						
CRUDE OIL						
TOOT FIELD	18	97	165	298	270	230
DHODAK	-	-	-	386	1,049	1,343
NATURAL GAS						
TOOT FIELD	1	3	5	9	8	6
DHODAK	-	-	-	34	92	118
MISCELLANEOUS INCOME	-	-	12	-	-	15
TOTAL REVENUES	19	100	182	727	1,419	1,712
OPERATING EXPENSES						
OPERATING ADMINISTRATIVE AND TRAINING COSTS	9	20	25	50	76	87
DEPRECIATION/DEPLETION	75	111	165	338	435	455
ROYALTIES	2	12	21	85	164	197
INCOME TAXES	-	-	-	-	-	-
TOTAL OPERATING EXPENSES	86	143	211	473	675	739
NET PROFIT FROM OPERATIONS	(67)	(43)	(29)	254	744	973
INTEREST	4	3	18	91	135	137
NET PROFIT FROM SUCCESSFUL VENTURES	(71)	(46)	(47)	163	609	836
UNSUCCESSFUL EXPLORATION COSTS	89	139	109	228	327	337
OVERALL PROFIT/LOSS	(160)	(185)	(156)	(65)	282	499
OPERATING RATIO (%)	453	143	116	65	48	43

Date: November 21, 1978

PAKISTAN  
OGDC  
STATEMENTS OF SOURCES AND APPLICATIONS OF FUNDS  
IN MILLIONS OF RUPEES

	77/78	78/79	79/80	80/81	81/82	82/83	TOTAL 79 THRU 83	TOTAL 78 THRU 83
<b>SOURCES OF FUNDS</b>								
<b>INTERNAL SOURCES</b>								
NET PROFIT FROM OPERATIONS	(67)	(43)	(29)	254	744	973	1,899	1,832
DEPRECIATION/DEPLETION	75	111	165	338	435	455	1,504	1,579
TOTAL INTERNAL CASH GENERATION	8	68	136	592	1,179	1,428	3,403	3,411
GOP EQUITY CONTRIBUTION	318	497	378	442	232	5	1,554	1,872
INCREASE IN WORKERS GRATUITY FUNDS	2	2	2	2	2	2	10	12
<b>LONG TERM BORROWINGS</b>								
PROPOSED TOOT PROJECT IDA CREDIT	-	45	147	77	29	-	298	298
POSSIBLE FUTURE IBRD LOAN	-	-	218	198	69	10	495	495
POSSIBLE ODM AND/OR CIDA CREDITS	-	257	277	189	70	-	793	793
SUPPLIERS CREDITS AND/OR COMMERCIAL LOANS	-	-	327	297	139	129	892	892
TOTAL LONG TERM BORROWINGS	-	302	969	761	307	139	2,478	2,478
TOTAL SOURCES	328	869	1,485	1,797	1,720	1,574	7,445	7,773
<b>CAPITAL OUTLAYS</b>								
TOOT	89	325	241	10	-	-	576	665
DHODAK	106	199	734	711	287	188	2,119	2,225
ADDITIONAL DEVELOPMENT DRILLING FAC. & EQUIP.	40	169	218	228	277	287	1,179	1,219
TOTAL CAPITAL OUTLAYS	235	693	1,193	949	564	475	3,874	4,109
EXPLORATION	89	139	198	327	495	535	1,694	1,783
INCREASE IN WORKING CAPITAL	(28)	(19)	(21)	197	230	116	503	475
INCREASE IN INVESTMENTS	2	2	2	2	2	2	10	12
<b>DEBT SERVICE</b>								
LOAN AMORTIZATION	26	51	95	231	294	305	980	1,006
INTEREST	4	3	18	91	135	137	384	388
TOTAL DEBT SERVICE	30	54	113	322	429	446	1,364	1,394
TOTAL APPLICATIONS	328	869	1,485	1,797	1,720	1,574	7,445	7,773
DEBT SERVICE COVERAGE	0.3	1.3	1.2	1.8	2.7	3.2	10.2	10.5

Date: November 21, 1978

PAKISTAN  
OGDC  
BALANCE SHEETS  
IN MILLIONS OF RUPEES

	76/77	77/78	78/79	79/80	80/81	81/82	82/83
<b>ASSETS</b>							
DEFERRED COST DEVELOPMENT DRILLING & EXPLORATION	-	-	-	-	-	-	-
DEFERRED COST	217	411	842	1,366	1,751	2,278	2,833
LESS ACCUMULATED DEPLETION	-	-	35	92	226	381	550
NET DEFERRED COST	217	411	807	1,274	1,525	1,897	2,283
<b>FIXED ASSETS</b>							
FACILITIES AND EQUIPMENT AT COST	457	498	760	1,518	2,181	2,386	2,504
LESS ACCUMULATED DEPRECIATION	117	176	235	324	505	759	1,016
NET FIXED ASSETS	340	322	525	1,194	1,676	1,627	1,488
<b>CURRENT ASSETS</b>							
STOCKS AND SPARES	225	219	242	273	300	324	345
INVENTORY-OIL	1	1	5	5	21	21	21
ADVANCES AND DEPOSITS	153	153	153	153	153	153	153
ACCOUNTS RECEIVABLE	10	13	27	40	131	246	298
CASH AND BANK BALANCES	4	4	4	4	4	4	4
ACCOUNTS PAYABLE	(21)	(62)	(139)	(223)	(183)	(118)	(104)
CURRENT PORTION OF L/T DEBT	(26)	(51)	(95)	(231)	(294)	(309)	(315)
NET CURRENT ASSETS	346	277	197	21	132	321	402
INVESTMENTS	8	10	12	14	16	18	20
<b>TOTAL ASSETS</b>	<b>911</b>	<b>1,020</b>	<b>1,541</b>	<b>2,503</b>	<b>3,349</b>	<b>3,863</b>	<b>4,193</b>
<b>LIABILITIES</b>							
<b>EQUITY</b>							
CONTRIBUTIONS AND PROFITS	1,260	1,507	1,958	2,289	2,894	3,735	4,576
LESS UNSUCCESSFUL EXPLORATION COST	441	530	669	778	1,006	1,333	1,670
NET EQUITY	819	977	1,289	1,511	1,888	2,402	2,906
WORKERS GRATUITY FUNDS	45	47	49	51	53	55	57
LONG TERM LIABILITIES	47	(4)	203	941	1,408	1,406	1,230
<b>TOTAL LIABILITIES</b>	<b>911</b>	<b>1,020</b>	<b>1,541</b>	<b>2,503</b>	<b>3,349</b>	<b>3,863</b>	<b>4,193</b>
DEBT/EQUITY RATIO	0.1	-	0.2	0.6	0.7	0.6	0.4
CURRENT RATIO	8.4	3.5	1.8	1.0	1.3	1.8	2.0
RATES OF RETURN ON AVERAGE INVESTED CAPITAL(%)	-	(7.5)	(3.9)	(3.2)	9.3	27.7	30.8

Date: November 21, 1978

Notes and Assumptions on Financial Statements

A. Income Statements

1. Production from Toot project wells has been calculated on the basis of projected production from 7 wells using well flow rate estimates from the Core Laboratories reservoir study. The estimates used for production from Dhodak are based on OGDC's own forecasts. Gas production from Sari/Hundi is estimated to remain constant at 15 mmcf per day.
2. Operating Revenues from natural gas sales are based on an assumed price to OGDC of US\$0.07 per mcf for Toot gas. <sup>1/</sup> This is the price presently realized from gas production of Sari/Hundi and is generally equivalent to the well-head prices paid to other producers in the country. The price assumed for Dhodak gas is US\$0.11 per mcf. This figure was calculated on the basis of the assumption that OGDC should require a price for Dhodak gas sufficient to yield a 15% real rate of return on its investment in the required gas pipeline facility. Miscellaneous income represents the residual worth of transportation equipment.
3. Operating Costs, or direct production costs, are assumed to be US\$0.53 per barrel of oil - a figure which reflects OGDC's historical experience and estimates of future costs made by the Corporation's Production Department. Revenues accruing from natural gas sales at Sari/Hundi are offset by an equivalent allowance for production expenses of about 7¢/mcf.
4. Administrative Costs related to OGDC's production activities have been projected to be US\$0.1 million in the first year of each field's production and US\$0.2 million thereafter.
5. Training Costs have been projected on the basis of a modification of the estimates for training projected in the Corporation's six-year plan.
6. Depletion of accumulated deferred costs related to the Toot and Dhodak fields is assumed to extend over the useful lives of these fields and is calculated on a unit-of-production basis. Depletion of the deferred costs on the Toot field is assumed to begin in FY79.
7. Depreciation has been calculated according to schedules summarized below.

---

<sup>1/</sup> All operating revenues and costs are given in 1977 dollars.

	<u>Annual Depreciation</u> (Straight Line)
Machinery and equipment including drilling tools and rigs	15%
Transportation equipment	20%
Pipelines and surface facilities	10%

The existing asset base, which is heavily weighted by the recent addition of four new rigs, has been depreciated at 13% per year. A rate of obsolescence of 7% per year is assumed on engineering stores.

8. Royalty: Payments are expected to be at 12.5% of well head price.

9. Income Tax: OGDC is not expected to pay income taxes during this period because of the anticipated magnitude of its exploration expenditures and comparatively low earning capability before FY82.

10. Unsuccessful Exploration Costs are assumed to amount to 2/3 of OGDC's expenditure on exploration. This was based on OGDC's own estimate of its successful to unsuccessful drilling ratio of 1 to 3.

B. Statements of Sources and Applications of Funds

1. Capital Outlays: Projected year by year capital expenditures on Toot and Dhodak development as well as on exploration are shown in the Statements. The detailed projections of capital outlays on additional development drilling facilities and equipment are given below:

	<u>In US\$ Millions</u>						
	<u>77/78</u>	<u>78/79</u>	<u>79/80</u>	<u>80/81</u>	<u>81/82</u>	<u>82/83</u>	<u>Total</u>
Development Drilling	4.0	4.0	13.0	14.0	19.0	20.0	74.0
Facilities and Equipment	-	<u>13.0</u>	<u>9.0</u>	<u>9.0</u>	<u>9.0</u>	<u>9.0</u>	<u>49.0</u>
	4.0	17.0	22.0	23.0	28.0	29.0	123.0

2. Increase in Working Capital: The increase of US\$50 million in working capital during the period includes US\$25 million assumed to have been spent on the acquisition of engineering stores.

3. GOP Equity Contribution: Projected year by year funds flow deficits were assumed to be provided for by a government equity contribution.

4. Borrowings: Loan amortization of all funds borrowed by OGDC or onlent to it by the Government and relating specifically to expenditure on development is assumed to begin with the start-up of production. Repayment of development related onlent funds is calculated on a production scaled basis.

C. Balance Sheets

5. Deferred Cost Account: Until now, exploration and development expenditures incurred by OGDC have been accumulated in a deferred cost account and, except for some minor amounts that have been charged against the Corporation's revenues, the account which totals US\$66.4 million is roughly equivalent to total expenditures since OGDC's inception in 1961. The amount includes direct as well as overhead and depreciation costs associated with both successful and unsuccessful exploration and drilling activities of the Corporation. OGDC's estimate of 1/3 as its historical drilling success ratio has been taken as the basis of the assumption that 21.9 of the 66.4 \$ million represent the net cost of successful drilling ventures and the remaining 44.5 \$ million the unsuccessful exploration costs. It is known that US\$14.3 million of the assumed US\$21.9 million in productive assets represents the net deferred cost on the Toot field.

- 63 -  
 INCREMENTAL OIL DEVELOPMENT  
 ECONOMIC REAL RATE OF RETURN  
 BASE CASE

ANNEX 6.01

	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92
PRODUCTION															
OIL (MILL. BARRELS)	-	0.54	1.24	2.55	2.19	1.74	1.40	1.11	0.89	0.72	0.56	0.34	0.15	0.14	0.12
GAS (BILL. CU. FT.)	-	1.62	3.72	7.65	6.57	5.22	4.20	3.33	2.67	2.16	1.74	1.02	0.54	0.42	0.30
PRICE															
OIL (DOLL./BARREL)	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25
VALUE															
CRUDE OIL	-	8.24	18.91	38.89	33.40	26.54	21.35	16.93	13.57	10.98	8.85	5.19	2.75	2.14	1.83
TOTAL VALUE	-	8.24	18.91	38.89	33.40	26.54	21.35	16.93	13.57	10.98	8.85	5.19	2.75	2.14	1.83
EXPENSES															
OPERATING EXPENSES															
OPERATING COST	-	0.29	0.56	1.15	1.16	0.92	0.74	0.59	0.47	0.38	0.31	0.18	0.10	0.07	0.06
ADMINISTRATIVE COST	-	0.10	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
TOTAL OPR. & ADM. COST	-	0.39	0.86	1.55	1.36	1.12	0.94	0.79	0.67	0.58	0.51	0.38	0.30	0.27	0.26
CAPITAL INVESTMENTS															
WELLS PRODUCING	5.40	18.95	13.45	-	-	-	-	-	-	-	-	-	-	-	-
WELLS STEP OUT	1.23	3.22	-	-	-	-	-	-	-	-	-	-	-	-	-
DRILLING PROGRAM	0.76	-	-	0.28	-	-	-	-	-	-	-	-	-	-	-
SUBTOTAL DRILLING	7.39	22.17	13.45	0.28	-	-	-	-	-	-	-	-	-	-	-
ROAD TRANSPORT	-	1.33	-	-	-	-	-	-	-	-	-	-	-	-	-
AIR TRANSPORT	-	0.76	-	-	-	-	-	-	-	-	-	-	-	-	-
SURFACE FACILITIES	-	2.56	4.45	0.47	-	-	-	-	-	-	-	-	-	-	-
PIPELINE	-	2.84	2.46	-	-	-	-	-	-	-	-	-	-	-	-
SUBTOTAL FAC. & EGU.	-	7.49	6.91	0.47	-	-	-	-	-	-	-	-	-	-	-
TOTAL CAP. COST	7.39	29.66	20.36	0.75	-	-	-	-	-	-	-	-	-	-	-
WORKING CAPITAL															
ACCOUNTS PAYABLE	(0.92)	(2.78)	1.16	2.45	0.10	-	-	-	-	-	-	-	-	-	-
TOTAL WORK. CAP.	(0.92)	(2.78)	1.16	2.45	0.10	-	-	-	-	-	-	-	-	-	-
TOTAL EXPENSES	6.47	27.27	22.38	4.75	1.46	1.12	0.94	0.79	0.67	0.58	0.51	0.38	0.30	0.27	0.26
NET CASH FLOW	(6.47)	(19.03)	(3.47)	34.14	31.94	25.42	20.41	16.14	12.90	10.40	8.34	4.81	2.45	1.67	1.57
ACCUMULATED NPV, 30%	(4.98)	(16.24)	(17.82)	(5.87)	2.73	8.00	11.25	13.23	14.45	15.20	15.67	15.88	15.96	16.01	16.04
ACCUMULATED NPV, 40%	(4.62)	(14.33)	(15.59)	(6.70)	(0.76)	2.62	4.56	5.65	6.27	6.63	6.84	6.92	6.95	6.97	6.98
ACCUMULATED NPV, 50%	(4.31)	(12.77)	(13.80)	(7.06)	(2.85)	(0.62)	0.57	1.20	1.54	1.72	1.82	1.86	1.87	1.88	1.88
ACCUMULATED NPV, 60%	(4.04)	(11.47)	(12.32)	(7.11)	(4.06)	(2.54)	(1.78)	(1.40)	(1.21)	(1.12)	(1.07)	(1.05)	(1.04)	(1.04)	(1.04)

RETURN ON INVESTMENT = 55.743%

Date: November 21, 1978

PAKISTAN

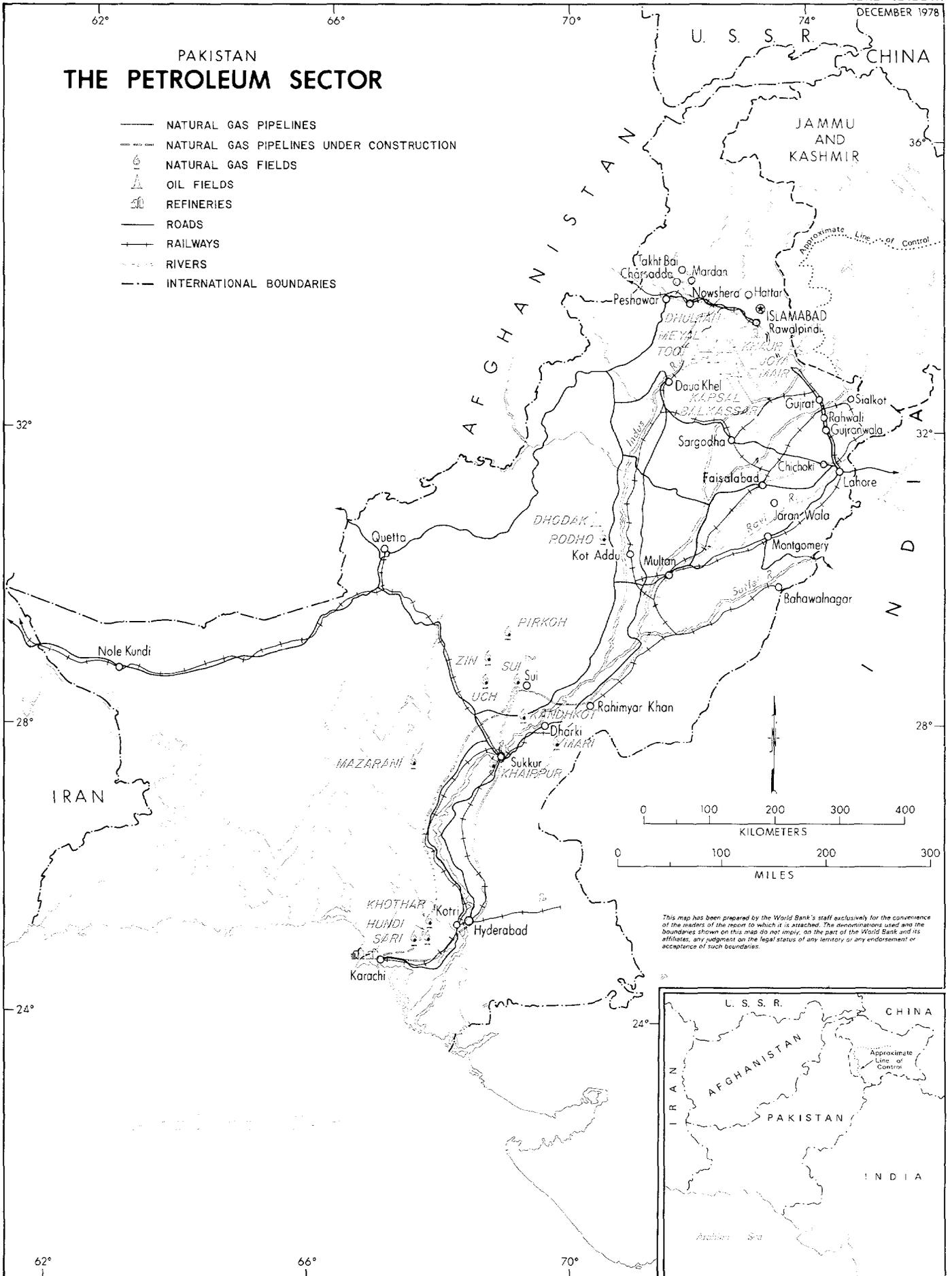
TOOT OIL DEVELOPMENT PROJECT

Related Documents and Data Available in Project File

- A. General Reports and Studies on the Sector and Subsector
- A1. United Nations Energy Survey of Pakistan (2 vols.), by Acres International Limited (1974).
  - A2. The Petroleum Industry in Pakistan - Background Information, by Petroleum Commission of Pakistan (1974).
- B. General Reports and Studies Related to the Project
- B1. Toot Field Study, by Core Laboratories, Incorporated (1977).
  - B2. Investment Study for Toot-Dhuliem Pipeline, by ENAR Protech Services Limited (1977).
  - B3. Proposal for Oil and Gas Training Institute, by OGDC Staff (1977).
  - B4. Toot-Dhodak Development Project by OGDC Staff (1977).
  - B5. Six Year Development Plan, by OGDC Corporate Planning Department (1978).

# PAKISTAN THE PETROLEUM SECTOR

- NATURAL GAS PIPELINES
- - - NATURAL GAS PIPELINES UNDER CONSTRUCTION
- NATURAL GAS FIELDS
- △ OIL FIELDS
- ⊞ REFINERIES
- ROADS
- + RAILWAYS
- ~ RIVERS
- - - INTERNATIONAL BOUNDARIES



*This map has been prepared by the World Bank's staff exclusively for the convenience of the readers of the report to which it is attached. The denominations used and the boundaries shown on this map do not imply, on the part of the World Bank and its affiliates, any judgment on the legal status of any territory or any endorsement or acceptance of such boundaries.*