CHAPTER 8 PROBLEMS IN PROJECT IMPLEMENTATION

8.1 PROJECT IMPLEMENTATION STEPS

As described later, it is estimated that 33 months will be required to design and construct the planned refinery, including the period of test operation and adjustments. This means that basic design must be started in April 1980, if the commercial operation is scheduled to start in January 1983.

After this feasibility study is complete, it is required to take the following steps prior to the start of basic designing.

(1) Decision making on the construction of a refinery; and establishment of an executing body in Oman.

Construction of a refinery is a typical big project. In order to go on with such a project, Oman must never fail to set up a strong executing body having necessary authority and power, as well as responsibility. Set-up of this body shall be preferably concurrent with the decision making in favor of the refinery construction, or at least within a period not so later than the decision making.

(2) Selection of a consultant

Oman seems not to have sufficient experience and the highly accumulated technologies required for the refinery construction. It is considered a wise way for the aforementioned Oman's executing body to appoint an able consultant and to get assistance from the consultant in executing the subsequent two items of work.

(3) Establishment of a contract policy and tender specifications.

Basic policies have to be adopted for the scope of work to be shared with the contractor; the method of selecting a contractor; and types of contract. And a tender specifications best suited to the policies will have to be prepared.

(4) Selection of, and contract with, a contractor.

The executing body singles out a contractor on a bid or any other appropriate means, to commission it the jobs of refinery design and construction. Then, the body concludes a contract with the contractor. The keypoint in successful construction of the refinery is to appoint a contractor who is skilled in various specialities, possesses an established system of project engineering, and can mobilize sufficient number of workers for the construction.

8.2 CONSTRUCTION WORK

8.2.1 Project Engineering System

In designing a refinery, various types of expert engineers in such fields as chemical, mechanical, and electric engineering, instrumentation for control, civil engineering and architecture are required to work in close cooperation. This design work generally needs a total of several tens of thousand man-hours. The construction work involves foundation work for a variety of machinery, installation of machines, piping, electrical work, instrumentation work, etc., all of which go on in a complicated manner, while coordinating with one another in a complicated network of schedule. It is necessary that each work shall be in conformity with predetermined specifications, drawings and standards requested by law, and proceeds under the very strict quality control. A job-executing system called the project engineering takes charge in pushing forward each work in a precise, systematic and efficient manner.

The workers engaged in the construction work are required to get skilled not only in their own specialized fields, but to exhibit their full abilities under the system of project engineering, as well.

8.2.2 Period of Construction Work

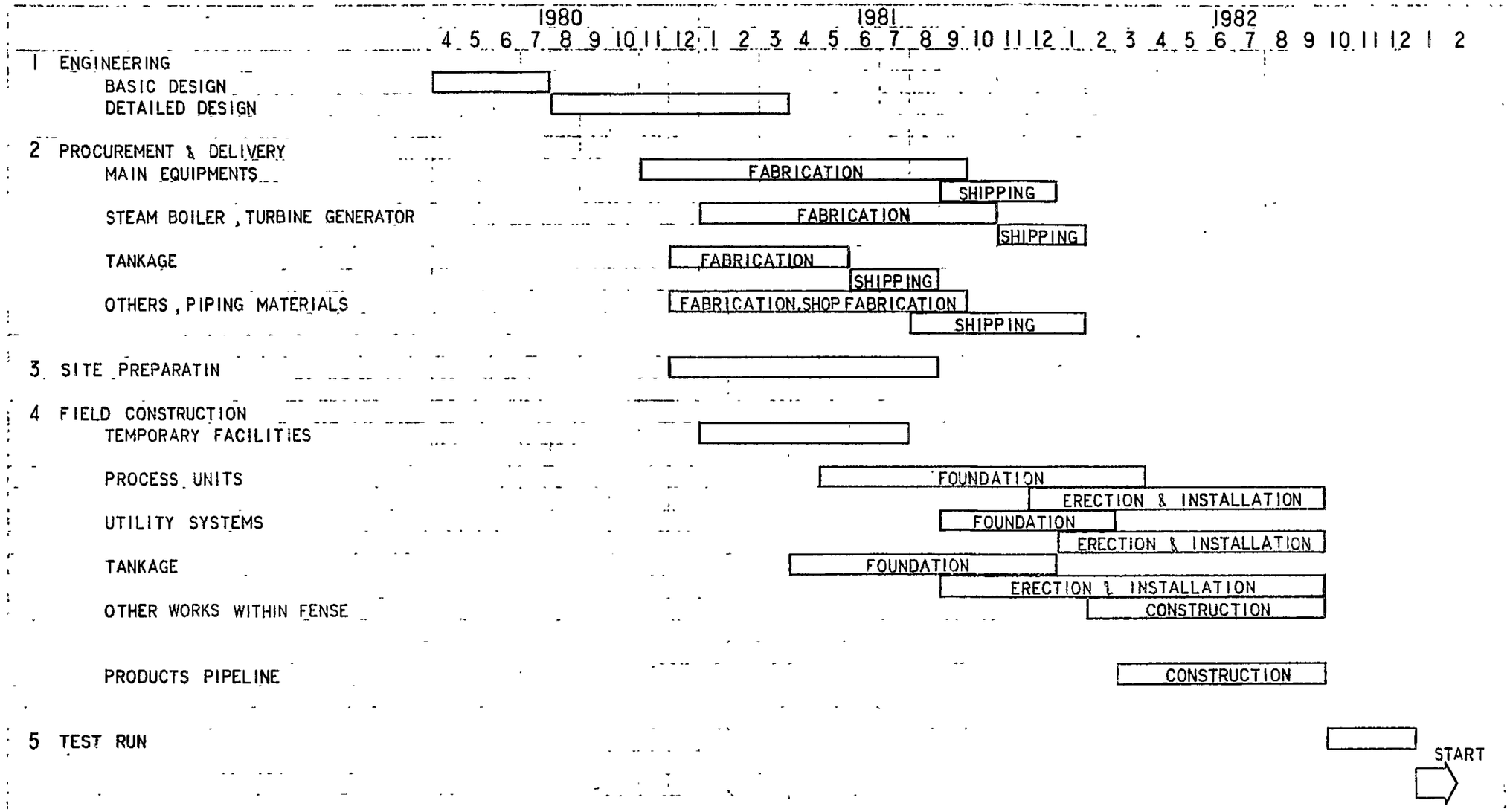
Even a competent contractor with rich experiences would need 30 months from the start of basic design to the mechanical completion of the refinery, as shown in Fig. 8-1. It will take 3 months for test runs and adjustment. Thus, the refinery is expected to be able to go into commercial operation from the 34th month.

8.2.3 Mobilization of Workers

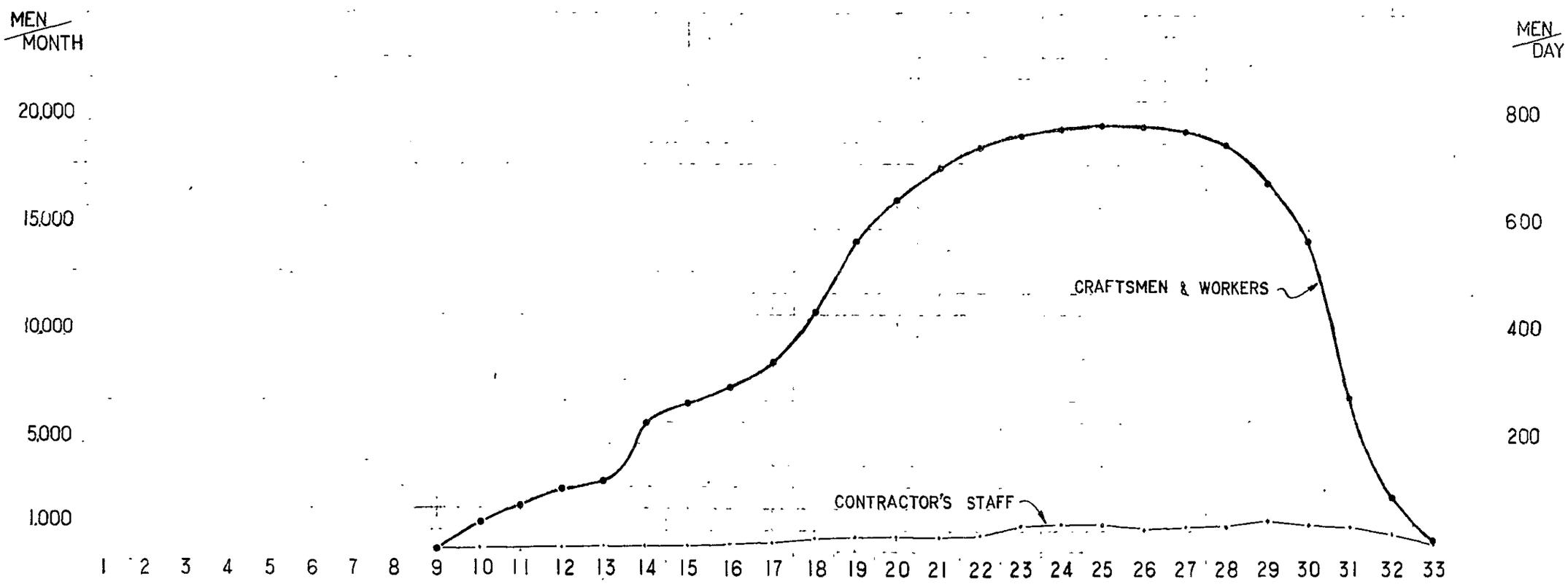
In light of experiences in similar work in the Mid-East area, the total number of workers necessary for the construction work in the refinery site is estimated at about 277,000 man-days. Fig. 8-2 gives a trend of the number of workers mobilized throughout the construction period. A maximum of 800 men should be mobilized in a day during the peak period. It should be noted, however, that this mobilization forecast is subject to change to a considerable extent, depending upon the level of skill which the workers actually mobilizable for work can have, as well as upon the willingness to work.

8.2.4 Availability of Construction Equipment

An observation at the time of site survey, as well as interviews with the stuff of construction companies having an experience in construction work in Oman, gave an impression that 30- to 125- ton crane trucks, many of which are required at the construc-



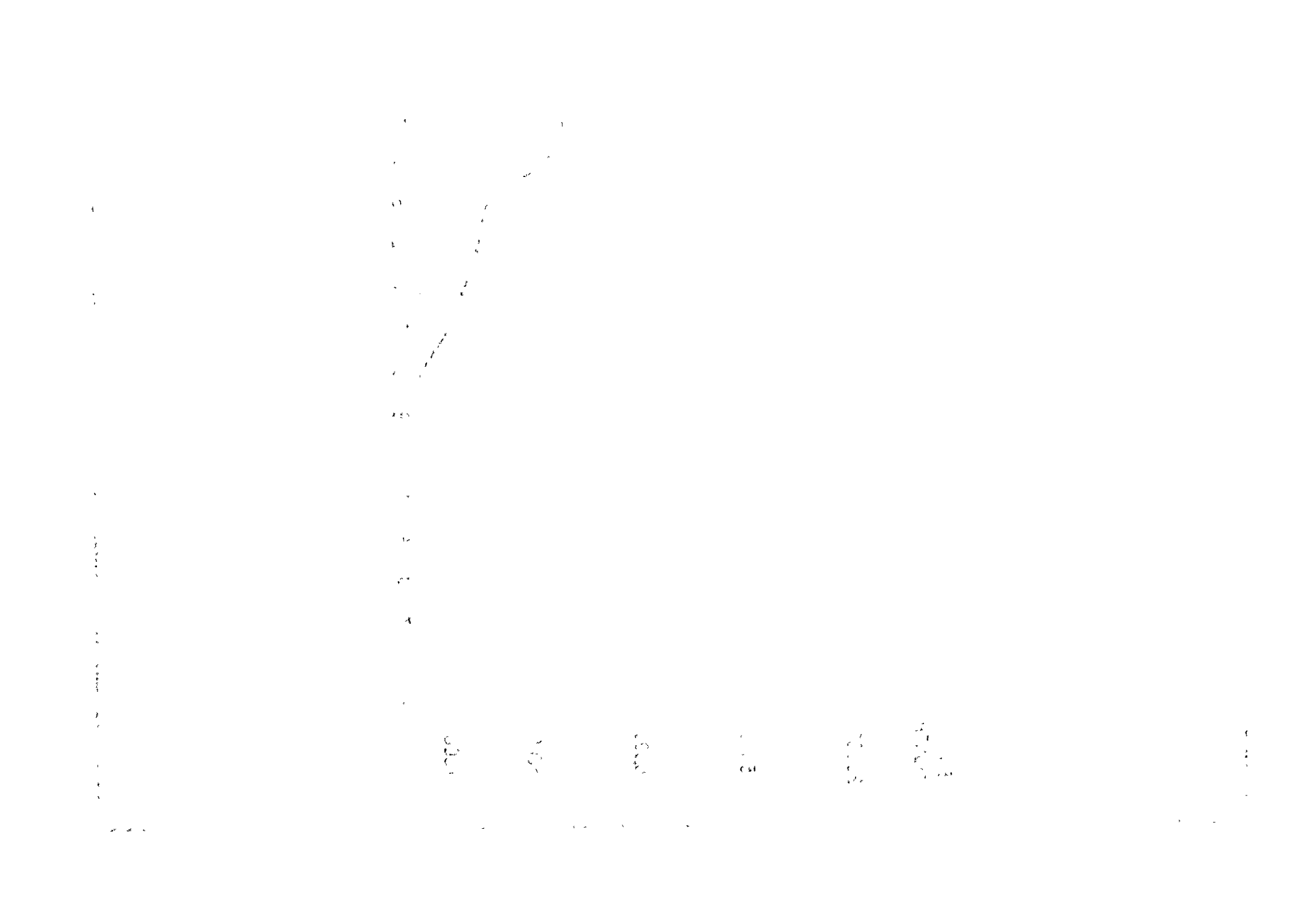
OMAN REFINERY PROJECT
PLANT CONSTRUCTION SCHEDULE
FIG. 8 – 1



OMAN REFINERY PROJECT

WORK FORCE MOBILIZATION AT CONSTRUCTION SITE

FIG.8-2



tion site, would not be so difficult to get. The afore-mentioned worker mobilization was forecasted on this premise.

However, installation of the main tower of atomospheric distillation unit, about 35 m high and 4 m in diameter, weighing 60 tons, would be difficult by the crane trucks. It is desirable in that case to use a ginpole or a 300- to 350-ton crane. A crane of this large size would be able to be effectively used in the installation of such large machinery as package boiler, heating furnace, etc., in addition to the above main tower.

8.2.5 Other Precautions

1) Unloading of machinery and construction materials.

It is expected that the machinery and construction materials for the refinery may be unloaded at Mina Quaboos port, and after cleared through the customs, they will be shipped to the site on land.

However, on-the-spot survey detected some fear that the transportation of large-size machinery and materials might be disturbed by roundabout, viaducts and sharp curves scattered along the road between the unloading port and the construction site. This possibility of hindrance was taken into consideration, when the period of transportation was set as 3 months, including sea transport, unloading, clearance and inland transport.

In order to avoid the afore-mentioned difficulties and to shorten the period of transportation, a possible alternative to land transportation is the direct unloading on the site by berthing the ship in the offing of the site and using barges to carry the goods from the ship to the shore. In this respect, the fact that the sea near the planned site is relatively calm would be benefitial. It is necessary, of course, to equip a temporary pier on shore in front of the site. The merits and demerits of this alternative would require close scans.

2) Temporary work

As shown in the construction schedule chart, the temporary work at the site is expected to start at the 10th month after the start of basic design. Of special importance is the facilities for receiving water and power required for the work. These facilities will call for detailed investigations.

8.3 PERSONNEL TRAINING PLAN

The personnel training plan described here is a proposition made out with a view to securing high-quality personnel indispensable for smooth operation of the refinery. At the same time, the plan serves as a basis for calculating a personnel training cost in Section 7.1 "Cost Estimation."

8.3.1 Trainees

The trainees are technical personnel who are to be manned to Production Dept., Technical Service Dept. and Maintenance Dept. Trainees are divided into two groups in light of the different training methods and periods. One is a group of those who are going to be managerial staff members, including assistant managers, supervisors, and foremen. The other is a group of operators, testers and technicians (hereinafter referred to as the operator class).

Table 8-1 gives the number of trainees in the respective classes.

As a reference, the following qualifications are required for the foremen-to-be and operators-to-be who will occupy the largest part of the trainees.

- Foreman: A high-school graduate, with 3 years or more of work experiences in a process industry.
- Operator: A high-school graduate or a man of equivalent education.

8.3.2 Training Methods and Periods

The training for the managerial class starts with the learning of management techniques through participation in the operation of an overseas refinery. Then, they are asked to attend at installation of major equipment at the construction site of the refinery, so that they can fully understand what types of equipment, piping and instruments make a refinery and how these components work. During test runs, the managerial trainees actually instruct the operators and have various management experiences under the close-to-normal operation, and prepare for the startup of commercial operation, while they are given guidance from the operation instructors sent by the contractor and process licensors.

As for the training of the operator class, they will be at first given basic lectures on the refinery and more specialized lectures corresponding to respective jobs which they are individually going to get. Later, at least 1 month before the end of construction period, they are desirably allowed to experience the equipment installation at the construction site, so they are ready to get practical training during test-run period.

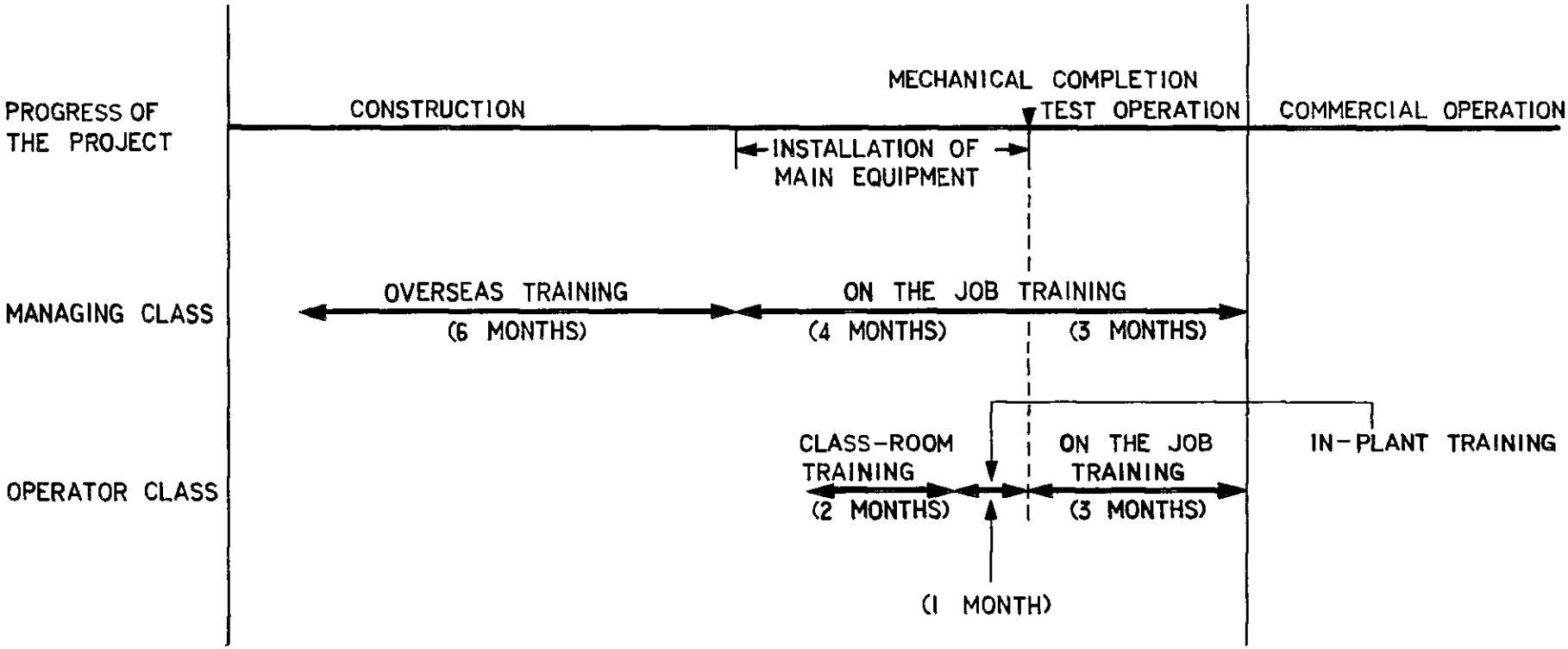
Table 8-1 Trainees

Job Classification \ Case	40,000 BPSD & 20,000 BPSD	
	Self-supply	Purchase
A) Managing Class		
1) Production Dept.		
Assistant Manager	1	1
Supervisor	3	3
Foreman	12	12
2) Technical Service Dept.		
Assistant Manager	1	1
Chief	3	3
3) Maintenance Dept.		
Manager	1	1
Chief	3	3
Foreman	12	12
Sub Total	36	36
B) Operator Class		
1) Production Dept.		
Operator	72	60
2) Technical Service Dept.		
Tester	10	10
Technician	2	2
3) Maintenance Dept.		
Technician	15	14
Warehouse Staff	2	2
Sub Total	101	88
Grand Total	137	124

(Source) JICA Mission

The foregoing training methods and time requirements are summarized in Fig. 8-3 by combining them with the progress of the plant construction work.

It may be worthy of mentioing that the personnel training cost is based on an assumption that all the trainees are paid 80 percent of their ordinary salaires during the training period plus, in case of the management class, the total expenses of overseas stay.



OMAN REFINERY PROJECT

TRAINING SCHEDULE

FIG. 8-3

ANNEX

ANNEX I

Modular Plant Construction Technique
(An Alternative to Conventional Site-Erected Plants)

1. GENERAL

In recent years many process plants including refineries and chemical plants have become more and more sophisticated, requiring complicated equipment and materials of high quality, as well as higher technologies for plant construction. In order to construct such process plants, a variety of work, including not only civil- and architectural work, but also equipment erection, piping, electrical work, instrumentation, thermal insulation and painting, must be implemented at the site under precise and systematic control. The construction work requires a great number of skilled workers, and modern construction equipment and materials are indispensable to help workers accomplish their jobs.

Unfortunately, these skilled workers and modern construction equipment can not always be available on due time in many of today's plant construction sites. Even if they are available, there still remain other difficulties, such as unfavorable climate, severe work conditions, etc., calling for strain and hard work of those who are concerned with the construction. Under these circumstances, quality of construction work largely depends on the extent of worker's skills and environmental conditions at the site. So far, this susceptibility has been taken for inevitable among the plant construction business circles.

However, concurrent with the progress in other scientific and technical fields, the construction technology, too, is developing rapidly. One of the developments is the technology of shop prefabrication which has recently been in more common use in plant construction to minimize uncertain fluctuations in workmanship. Initially this was limited to only the piping work. However, together with rapid development of transportation technologies, both inland and marine in recent years, this technology has made it possible to assemble as many equipment as possible to form a "module" of the plant within a limit imposed by the transportation means, and to transport modules to the site so that work at the site can be simplified.

The construction technique of this kind is generally called the "modular plant construction technique." It involves assembling most of plant equipment, not at the plant site, but at a module fabrication yard where fabrication work is carried out with the help of efficient facilities under thorough work control, without getting any adverse effect of weather conditions. Thus, perfect workmanship for construction work can be expected in anywhere of the world by making full use of modern construction machinery and equipment.

This new technique will be outlined below to give brief understanding of what it is like.

1.1 MODULAR PLANT CONSTRUCTION TECHNIQUE

The newly developed technique differs by companies in minor points, but it roughly consists of the following steps in common:

a) Engineering.
b) Procurement and/or fabrication of equipment and materials.
c) Module fabrication and loading-out.
d) Ocean transportation.
e) Civil and other works before module arrival.
f) Unloading, inland transportation, and module erection work.
g) Interconnecting modules, and other remaining works.

Each of these steps will be briefly described below, while picking up the difference between the new technique and the conventional one.

a) Engineering

Engineering work has little difference between the new and conventional technique. Even if the new technique is adopted, there is no special requirement for compact design. It never gives any damage to plant safety, easy operation and maintenance. If there is any change in engineering design of the plant based on the new technique, the change would probably be owing to other causes such as economic factors, and has basically nothing to do with the modular technique.

From an engineering point of view, major difference of the module technique is that the equipment, piping and structures should be designed to resist the rolling and pitching motions during marine transportation.

b) Procurement and/or fabrication of equipment and materials

This step, too, has little difference from the conventional technique. A sole difference is that most of equipment and materials are not shipped directly to the plant site, but by way of module fabrication yard. One of the advantage of the modular technique is perhaps the project schedule saving. A key factor for achieving this advantage is to deliver the equipment and materials timely to the module fabrication yard. In this respect, it is preferred that most of equipment and materials are procured not so far away from the yard. If they can be procured in the same country, saving in packaging cost, etc. can be expected.

c) Module fabrication and loading-out

The most drastic change by the modular technique is found in the steps of c), d) and f). First, most of the equipment and materials are collected in the module fabrication yard under the strict schedule control, and stored there under full quality control. Modules

are fabricated by using fully modernized facilities in the yard under the same strict schedule control as applied to the shipbuildings and offshore structures. The completed modules are loaded out on the ocean-going barges or special RO/RO ships and tightly fixed to the deck.

d) Ocean transportation

In recent years, the exploration and development of offshore oil fields are brisk. Affected by this movement, the technology of marine transporting super-heavy cargoes has made a big stride. It is very likely that newer, more convenient special types of carriers will appear in the years to come. At present, however, ocean-going barges of 120 mL x 30 mB are considred the most common type of carrier. Most contractors in this business seems to fully investigate the counter-measures against rolling/pitching motions and sea-water sprays.

e) Civil and other works before module arrival

Before modules arrive, some civil and construction works must have been finished at the plant site. These include civil work for a module unloading jetty, an access road from jetty to the site, foundation work for module erection, underground piping and power cable laying work. These types of work are similar to conventional ones, except that the foundation, on which modules are mounted, is of different shapes.

f) Unloading, inland transportation and module erection work

Modules are unloaded at the unloading jetty by lift-on/lift-off or roll-on/roll-off operation. The unloaded modules are then transported by heavy-cargo transporters (generally referred to as "dollies") to the site, taken near the corresponding foundation and mounted thereon by the lifting or jacking operation.

Work in the steps of c), d) and f) is characteristic of the new technique. The contractors reportedly have been working out various devices in the details of these steps. Figs. A-1 and 2 illustrate the sequence of work in steps c), d) and f). Figs. A-3 and 4 detail the unloading operation.

g) Interconnecting of modules, and other remaining work

After modules are placed on the foundations, they are interconnected with one another, overall-tested, and brought to "mechanical completion."

1.2 BASIC CONDITIONS AND ADVANTAGES OF MODULARIZATION

The requirements for successful accomplishment of the modular technique include the following items:

a) The plant site is on or near shoreline with reasonable shipping access to the shore.

b) The plant site is located in such an area that availability of local labor is insufficient near the site, and it must be imported from foreign countries, and therefore camps have to be set up for foreign workers.

c) Weather and working conditions at the plant site are relatively unfavorable.

A project carried out under these conditions will enjoy the following advantages over the conventional technique:

a) High quality.

b) Saving in construction cost (0–30%).

c) Saving in construction period (0–20%).

The percentage of cost-and schedule savings will vary considerablly depending on the local conditions. It is preferable to make full investigation and be assured of the effectivensess of this new technique prior to the project implementation.

2. POSSIBILITY OF MODULARIZATION FOR AN OMANI REFINERY

Proposed site conditions for the refinery are described in details in Chapter 5 of this report. As far as those conditions are concerned, either proposed site can meet all the requirements in favor of the modular technique application. Therefore, the modular technique seems to be a best approach for this refinery project.

It should be noted here that the modular technique is efficiently applicable mostly to process units and utilities units, while tankage and buildings are usually built by on-site construction work.

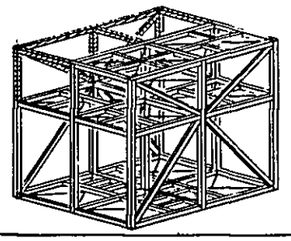
The most crucial point in applying the modular technique to this refinery project would be the place and method of unloading, and the method of inland transportation. Although Port Quaboos is not absolutely inadequate, the modular technique can be performed more effectively by constructing a temporary unloading jetty on the shore in front of the site, where ocean-going barges of 120 mL x 30 mB x 4 m in draft can directly berth.

Since the water in front of the proposed sites has sufficient depth at a relatively short distance from the shore, dredging work is considered relatively easy. The cost for jetty construction is estimated at about U.S.$1.5 million even in the worst case where a long jetty is projected offshore to reach a necessary water depth. Two barges are likely to be enough to transport all the modules. Therefore, even in case of the Mina al Fahal site, where a number of oil loading-and unloading facilities are located offshore, there would be no major trouble in offshore navigation and anchorage of other ships.

STRUCTURE PREFABRICATION (SHOP)

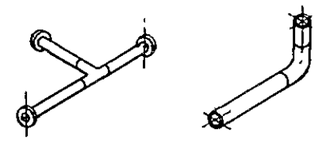
SHAPE STEEL
STEEL PLATE

MARKING AND CUTTING → ASSEMBLY AND WELDING → D.T. AND V.T.



STEEL PIPE
FITTING
FLANGE

MARKING AND CUTTING → FITTING AND WELDING → D T V T AND/OR NDE → PWHT



VALVE
HEAT EXCHANGER
VESSEL
PLATFORM AND LADDER
INSTRUMENT
ELECTRICALS

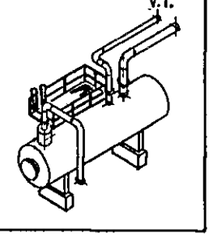
COATING

SURFACE PREPARATION → PAINTING → V.T.

SURFACE PREPARATION → PAINTING (EXCEPT WELDING POINT) → V.T.

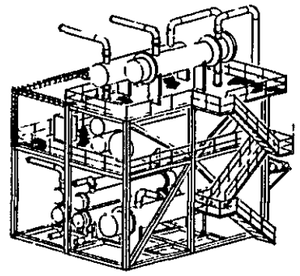
PRE-ASSEMBLY (SHOP)

PRE-ASSEMBLY → D.T. AND V.T.



ASSEMBLY (SHOP)

INSTALLATION AND ASSEMBLY → D.T. V.T. AND/OR NDE → PWHT → PRESSURE TEST → PAINTING AND/OR INSULATION → INTER CONNECTING DIMENSIONAL CHECK → PREPARATION FOR SHIPPING → CHECK BEFORE SHIPMENT

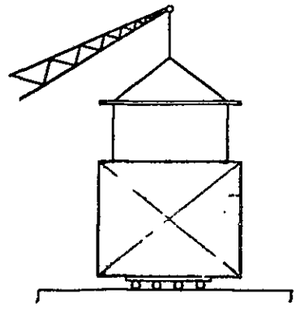


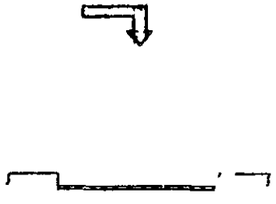
TRANSPORTATION

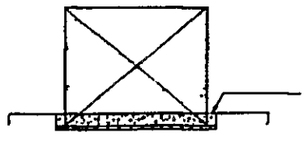
LOAD OUT AND TIE DOWN → MARINE TRANSPORTATION → UNLOADING → INLAND TRANSPORTATION

SITE CONSTRUCTION

SETTING ON FOUNDATION → D.T AND V.T → PLACING CONCRETE AROUND BASE FRAME → CUTTING TEMPORARY BRACING FIRE PROOFING → CONNECTING FITTING AND INSTALLATION OF-INSTRUMENT -ELECTRICAL → D.T V.T AND/OR NDE → LOCAL PWHT → PRESSURE AND LEAK TEST → FINAL PAINTING AND INSULATION → FINAL INSPECTION





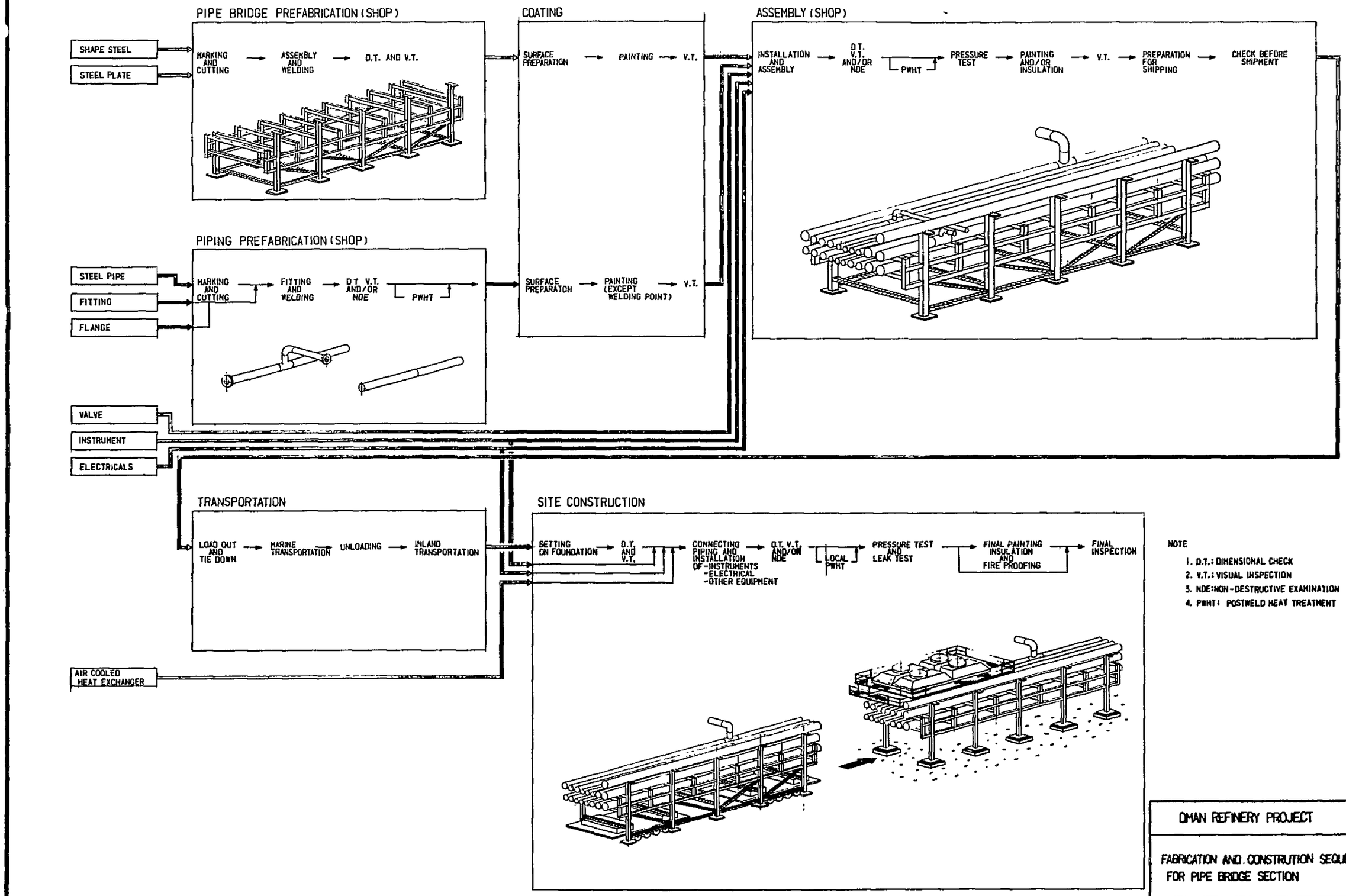


NOTES
1. D.T.:DIMENSIONAL CHECK
2. V.T:VISUAL INSPECTION
3. NDE :NONDESTRUCTIVE EXAMINATION
4. PWHT.: POST WELD HEAT TREATMENT

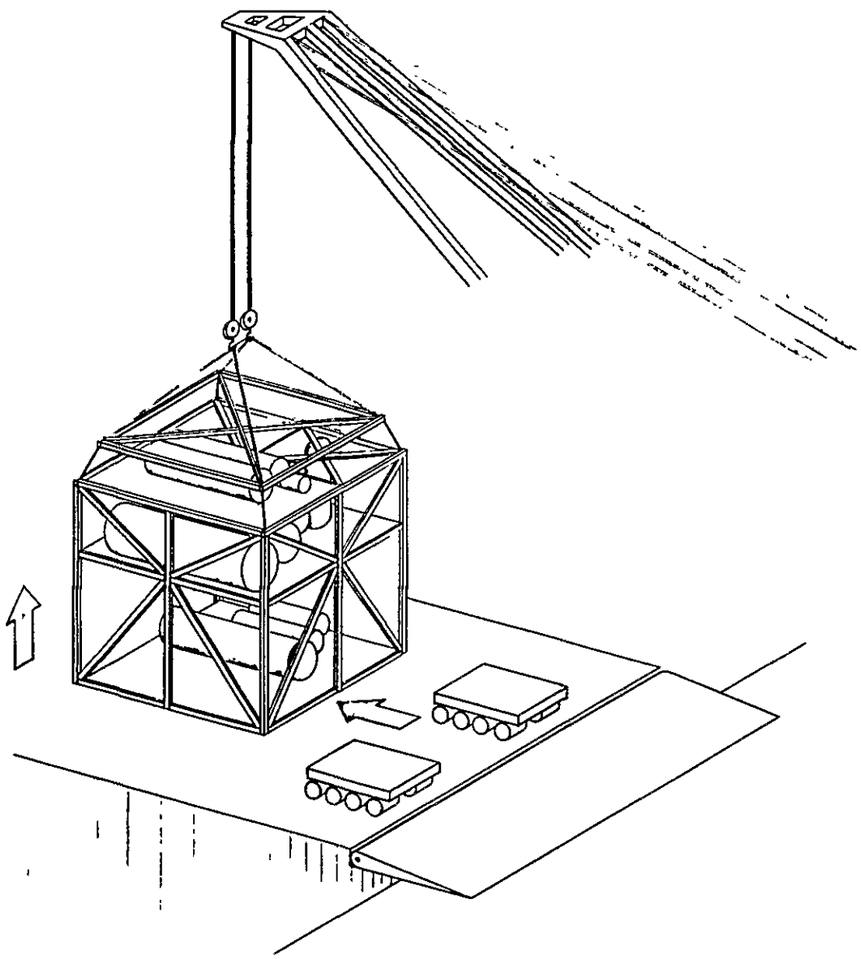
OMAN REFINERY PROJECT

FABRICATION AND CONSTRUCTION SEQUENCE FOR EQUIPMENT SECTION

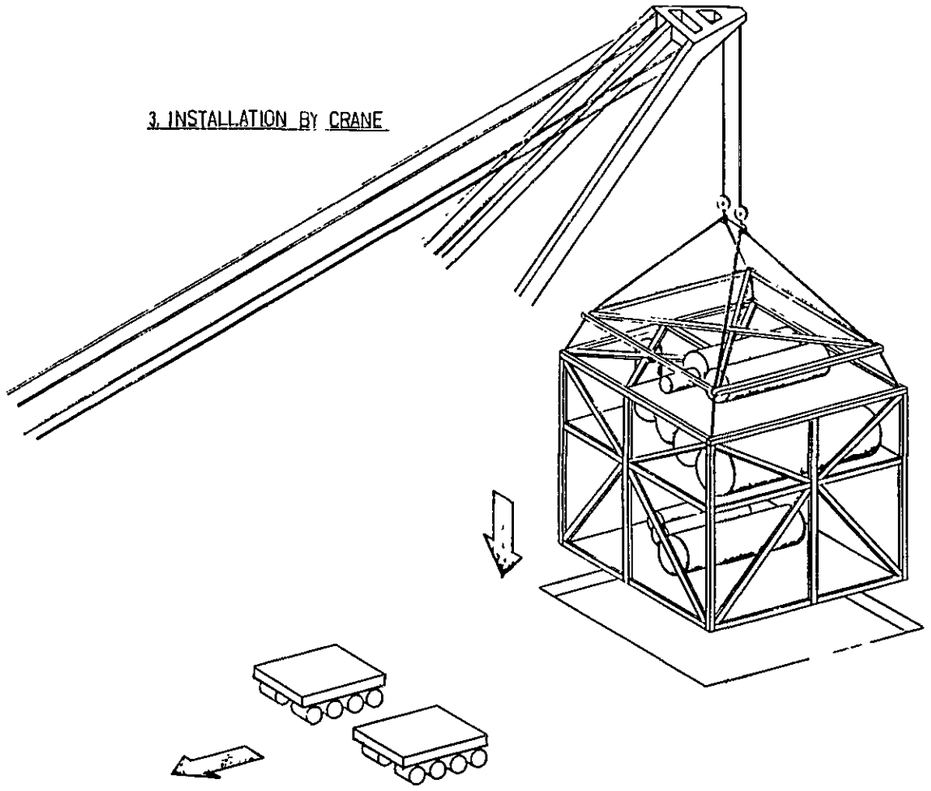
FIG. A-1

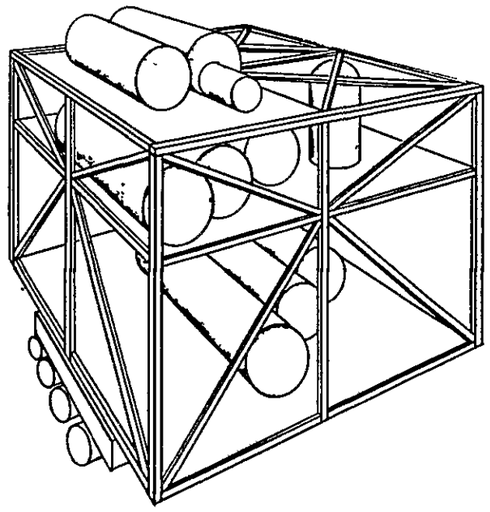

PIPE BRIDGE PREFABRICATION (SHOP)
SHAPE STEEL
STEEL PLATE
MARKING AND CUTTING
ASSEMBLY AND WELDING
D.T. AND V.T.
PIPING PREFABRICATION (SHOP)
STEEL PIPE
FITTING
FLANGE
MARKING AND CUTTING
FITTING AND WELDING
D.T. V.T. AND/OR NDE
PWHT
VALVE
INSTRUMENT
ELECTRICALS
AIR COOLED HEAT EXCHANGER
COATING
SURFACE PREPARATION
PAINTING
V.T.
SURFACE PREPARATON
PAINTING (EXCEPT WELDING POINT)
V.T.
ASSEMBLY (SHOP)
INSTALLATION AND ASSEMBLY
D.T. V.T. AND/OR NDE
PWHT
PRESSURE TEST
PAINTING AND/OR INSULATION
V.T.
PREPARATION FOR SHIPPING
CHECK BEFORE SHIPMENT
TRANSPORTATION
LOAD OUT AND TIE DOWN
MARINE TRANSPORTATION
UNLOADING
INLAND TRANSPORTATION
SITE CONSTRUCTION
SETTING ON FOUNDATION
D.T AND V.T.
CONNECTING PIPING AND INSTALLATION OF -INSTRUMENTS -ELECTRICAL -OTHER EQUIPMENT
D.T. V.T AND/OR NDE
LOCAL PWHT
PRESSURE TEST AND LEAK TEST
FINAL PAINTING INSULATION AND FIRE PROOFING
FINAL INSPECTION
NOTE
1. D.T.: DIMENSIONAL CHECK
2. V.T.: VISUAL INSPECTION
3. NDE: NON-DESTRUCTIVE EXAMINATION
4. PWHT: POSTWELD HEAT TREATMENT
OMAN REFINERY PROJECT
FABRICATION AND CONSTRUTION SEQUENCE FOR PIPE BRIDGE SECTION
FIG. A-2

1. LOADOUT BY CRANE



3. INSTALLATION BY CRANE



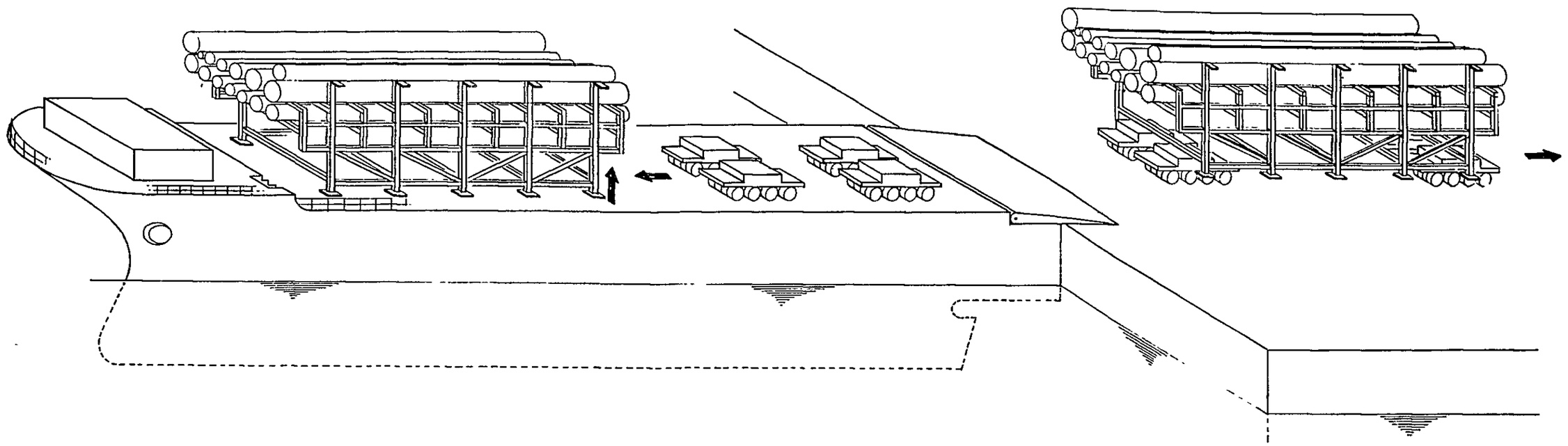


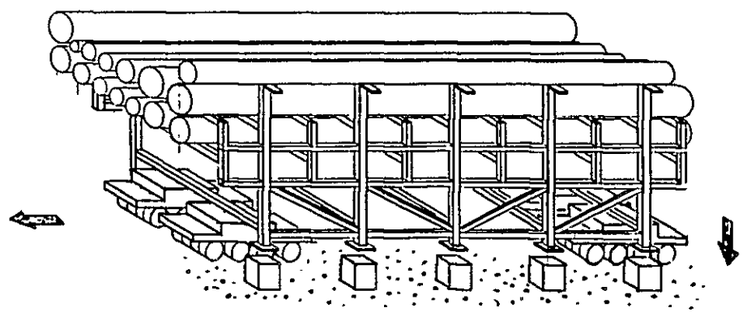
2. TRANSPORTATION BY DOLLY

OMAN REFINERY PROJECT
INLAND TRANSPORTATION AND INSTALLATION PIPE BRIDGE SECTION
FIG. A-3

1. LOAD-OUT BY DOLLY

2. TRANSPORTATION BY DOLLY





3. IN PRINCIPLE. THE LOADING, UNLOADING AND INSTALLATION WILL BE PERFORMED BY MEANS OF PLATFORM TRAILERS U-SING THEIR JACK-UP FUNCTIONS AND NO CRANE WILL BE USED

OMAN REFINERY PROJECT
INLAND TRANSPORTATION AND INSTALLATION PIPE BRIDGE SECTION
FIG. A-4

ANNEX II **TABLE A-1 PROJECTED FINANCIAL STATEMENTS (40,000 BPSD/P)**

INCOME STATEMENT — OMAN REF.F/S (40MBPSD/REFORMER/P)

(22 MAY 79) PART 1 UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
SALES REVENUE										
FOR DOMESTIC				43.8	48.2	50.6	51.0	51.4	51.8	52.1
FOR EXPORT				20.7	23.9	25.4	25.1	24.7	24.4	24.1
SUB TOTAL				64.6	72.1	76.0	76.0	76.1	76.2	76.2
DIRECT PRODUCTION COST										
RAW MATERIAL COST				58.2	65.0	68.5	68.5	68.5	68.5	68.5
OPERATING LABOR COST				0.9	0.9	0.9	0.9	0.9	0.9	0.9
UTILITY COST				0.8	0.9	0.9	0.9	1.0	1.0	1.0
OTHERS				1.1	1.1	1.1	1.1	1.1	1.1	1.1
SUB TOTAL				60.9	67.9	71.4	71.4	71.4	71.4	71.4
DEPRECIATION & ALLOWANCE				2.2	2.2	2.2	2.2	2.2	2.2	2.2
GENERAL EXPENSE				1.0	1.0	1.0	1.0	1.0	1.0	1.0
FINANCING COST				1.2	1.4	1.3	1.2	0.9	0.7	0.4
TOTAL PRODUCTION COST				65.3	72.5	75.9	75.8	75.6	75.4	75.1
INCOME BEFORE TAX				-0.7	-0.4	0.1	0.3	0.5	0.8	1.1
INCOME TAX										
NET INCOME				-0.7	-0.4	0.1	0.3	0.5	0.8	1.1
DIVIDEND										
RETAINED EARNINGS				-0.7	-0.4	0.1	0.3	0.5	0.8	1.1
CUM RETAINED EARNINGS				-0.7	-1.0	-1.0	-0.7	-0.2	0.7	1.8

— continued —

INCOME STATEMENT — OMAN REF.[illegible] (... 250/REFORMER/P)

(22 MAY 79) PART 2 UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
SALES REVENUE									
FOR DOMESTIC	52.4	52.4	52.4	52.4	52.4	52.4	52.4	52.4	768.3
FOR EXPORT	23.9	23.8	23.8	23.8	23.8	23.8	23.8	23.8	358.9
SUB TOTAL	76.2	76.2	76.2	76.2	76.2	76.2	76.2	76.2	1127.2
DIRECT PRODUCTION COST									
RAW MATERIAL COST	68.5	68.5	68.5	68.5	68.5	68.5	68.5	68.5	1013.2
OPERATING LABOR COST	0.9	0.9	9	0.9	0.9	0.9	0.9	0.9	13.4
UTILITY COST	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	14.4
OTHERS	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	16.4
SUB TOTAL	71.4	71.4	71.4	71.4	71.4	71.4	71.4	71.4	1057.4
DEPRECIATION & ALLOWANCE	2.2	2.2	2.2						22.5
GENERAL EXPENSE	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	14.5
FINANCING COST	0.3	0.1							7.6
TOTAL PRODUCTION COST	75.0	74.8	74.7	72.4	72.4	72.4	72.4	72.4	1101.9
INCOME BEFORE TAX	1.3	1.4	1.6	3.8	3.8	3.8	3.8	3.8	25.3
INCOME TAX									
NET INCOME	1.3	1.4	1.6	3.8	3.8	3.8	3.8	3.8	25.3
DIVIDEND									
RETAINED EARNINGS	1.3	1.4	1.6	3.8	3.8	3.8	3.8	3.8	25.3
CUM RETAINED EARNINGS	3.1	4.5	6.1	9.9	13.8	17.6	21.4	25.3	

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FUNDS OUTLOOK

OMAN REF.F/S (40MBPSD/REFORMER/P)

(22 MAY 79)

PART 1 UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
CASH GENERATION										
NET INCOME				-0.7	-0.4	0.1	0.3	0.5	0.8	1.1
ADD BACK DEPRECIATION				2.2	2.2	2.2	2.2	2.2	2.2	2.2
CASH FROM OPERATION				1.6	1.9	2.3	2.5	2.8	3.1	3.4
EQUITY	1.3	5.6	2.0							
LONG TERM LOAN	2.0	8.5	5.0	0.5						
SHORT TERM LOAN				1.9	0.5	-0.1	-0.5	-0.8	-1.0	
CAPITAL FUND	3.3	14.1	7.0	2.4	0.5	-0.1	-0.5	-0.8	-1.0	
TOTAL CASH AVAILABLE	3.3	14.1	7.0	4.0	2.4	2.2	2.0	2.0	2.1	3.4
CASH REQUIREMENT										
PLANT COST	3.3	14.1	7.0	0.5						
INC WORKING CAPITAL				3.5	0.4	0.2				
REPAYMENT L.T LOAN					2.0	2.0	2.0	2.0	2.0	2.0
PAYMENT OF DIVIDEND										
TOTAL CASH REQUIREMENT	3.3	14.1	7.0	4.0	2.4	2.2	2.0	2.0	2.0	2.0
CASH SURPLUS									0.1	1.4
CUM CASH SURPLUS									0.1	1.4

– continued –

FUNDS OUTLOOK

OMAN REF.F/S (40MBPSD/REFORMER/P)

(22 MAY 79)

PART 2 UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
CASH GENERATION									
NET INCOME	1.3	1.4	1.6	3.8	3.8	3.8	3.8	3.8	25.3
ADD BACK DEPRECIATION	2.2	2.2	2.2						22.5
CASH FROM OPERATION	3.5	3.7	3.8	3.8	3.8	3.8	3.8	3.8	47.7
EQUITY									9.0
LONG TERM LOAN									16.0
SHORT TERM LOAN									
CAPITAL FUND									25.0
TOTAL CASH AVAILABLE	3.5	3.7	3.8	3.8	3.8	3.8	3.8	3.8	72.7
CASH REQUIREMENT									
PLANT COST									25.0
INC WORKING CAPITAL								-4.1	
REPAYMENT L.T LOAN	2.0	2.0							16.0
PAYMENT OF DIVIDEND									
TOTAL CASH REQUIREMENT	2.0	2.0						-4.1	40.9
CASH SURPLUS	1.5	1.7	3.8	3.8	3.8	3.8	3.8	7.9	31.8
CUM CASH SURPLUS	3.0	4.7	8.5	12.3	16.2	20.0	23.8	31.8	

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CASH FLOW ANALYSIS — OMAN REF.F/S (40MBPSD/REFORMER/P)

(22 MAY 79) — PART I — UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
CAPITAL INVESTMENT	3.3	14.1	7.0	4.0						
INCOME BEF TAX				-0.7	-0.4	0.1	0.3	0.5	0.8	1.1
DEPRECIATION				2.2	2.2	2.2	2.2	2.2	2.2	2.2
INTEREST				1.2	1.4	1.3	1.2	0.9	0.7	0.4
CASH FLOW	-3.3	-14.1	-7.0	-1.3	3.3	3.6	3.7	3.7	3.8	3.8
DISCOUNT RATE	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
DISCOUNTED CASH FLOW	-3.1	-12.8	-6.1	-1.1	2.6	2.7	2.6	2.5	2.4	2.3
ACC DCF	-3.1	-15.9	-22.0	-23.1	-20.5	-17.8	-15.2	-12.7	-10.2	-7.9
INT.RATE OF RETURN	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52

— continued —

CASH FLOW ANALYSIS — OMAN REF.F/S (40MBPSD/REFORMER/P)

(22 MAY 79) — PART 2 — UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
CAPITAL INVESTMENT									28.5
INCOME BEF TAX	1.3	1.4	1.6	3.8	3.8	3.8	3.8	3.8	25.3
DEPRECIATION	2.2	2.2	2.2						22.5
INTEREST	0.3	0.1							7.6
CASH FLOW	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	26.9
DISCOUNT RATE	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
DISCOUNTED CASH FLOW	2.2	2.1	2.0	1.9	1.8	1.8	1.7	1.6	7.3
ACC DCF	-5.6	-3.5	-1.5	0.5	2.3	4.1	5.7	7.3	
INT. RATE OF RETURN	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	

— continued —

BALANCE SHEET — OMAN REF.F/S (40MBPSD/REFORMER/P)

(22 MAY 79) — PART I — UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ASSETS										
CURRENT ASSETS										
OPERATING CASH				0.5	0.5	0.5	0.5	0.5	0.5	0.5
RECEIVABLES				5.2	5.8	6.1	6.1	6.1	6.1	6.1
INVENTORIES				2.7	3.0	3.2	3.2	3.2	3.2	3.2
SUB TOTAL				8.4	9.3	9.8	9.8	9.8	9.8	9.8
CUM SURPLUS CASH									0.1	1.4
FIXED ASSETS										
PLANT & EQUIPMENT	3.3	17.4	24.4	25.0	25.0	25.0	25.0	25.0	25.0	25.0
LESS ACCUM. DEPRE.				2.2	4.5	6.7	9.0	11.2	13.5	15.7
NET FIXED ASSETS	3.3	17.4	24.4	22.7	20.5	18.2	16.0	13.7	11.5	9.2
TOTAL ASSETS	3.3	17.4	24.4	31.1	29.8	28.0	25.8	23.5	21.4	20.5
LIABILITIES										
CURRENT LIABILITIES										
PAYABLES				4.9	5.4	5.7	5.7	5.7	5.7	5.7
SHORT TERM LOAN				1.9	2.4	2.3	1.8	1.0		
SUB TOTAL				6.8	7.8	8.0	7.5	6.7	5.7	5.7
LONG TERM LIABILITIES	2.0	10.5	15.4	16.0	14.0	12.0	10.0	8.0	6.0	4.0
EQUITY										
PAID UP CAPITAL	1.3	6.9	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
CUM. RETAINED EARNIGS				-0.7	-1.0	-1.0	-0.7	-0.2	0.7	1.8
SUB TOTAL	1.3	6.9	9.0	8.3	8.0	8.0	8.3	8.8	9.7	10.8
TOT. EQUITY & LIABIL.	3.3	17.4	24.4	31.1	29.8	28.0	25.8	23.5	21.4	20.5

— continued —

BALANCE SHEET — OMAN REF.F/S (40MBPSD/REFORMER/P)

(22 MAY 79) — PART 2 — UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
ASSETS									
CURRENT ASSETS									
OPERATING CASH	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
RECEIVABLES	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
INVENTORIES	3.2	3.2	3.2	3.2	3.2	3.2	3.2		
SUB TOTAL	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
CUM SURPLUS CASH	3.0	4.7	8.5	12.3	16.2	20.0	23.8	31.8	
FIXED ASSETS									
PLANT & EQUIPMENT	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
LESS ACCUM. DEPRE.	18.0	20.2	22.5	22.5	22.5	22.5	22.5	22.5	
NET FIXED ASSETS	7.0	4.7	2.5	2.5	2.5	2.5	2.5	2.5	
TOTAL ASSETS	19.8	19.2	20.8	24.6	28.5	32.3	36.1	34.3	
LIABILITIES									
CURRENT LIABILITIES									
PAYABLES	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
SHORT TERM LOAN									
SUB TOTAL	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
LONG TERM LIABILITIES	2.0								
EQUITY									
PAID UP CAPITAL	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	
CUM. RETAINED EARNIGS	3.1	4.5	6.1	9.9	13.8	17.6	21.4	25.3	
SUB TOTAL	12.1	13.5	15.1	18.9	22.8	26.6	30.4	34.3	
TOT. EQUITY & LIABIL.	19.8	19.2	20.8	24.6	28.5	32.3	36.1	34.3	

TABLE A-2 PROJECTED FINANCIAL STATEMENTS (40,000 BPSD/S)

INCOME STATEMENT — OMAN REF.F/S (40MBPSD/REFORMER/S)

(22 MAY 79) — PART 1 — UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
SALES REVENUE										
FOR DOMESTIC				43.8	48.2	50.6	51.0	51.4	51.8	52.1
FOR EXPORT				20.7	23.9	25.4	25.1	24.7	24.4	24.1
SUB TOTAL				64.6	72.1	76.0	76.0	76.1	76.2	76.2
DIRECT PRODUCTION COST										
RAW MATERIAL COST				58.2	65.0	68.5	68.5	68.5	68.5	68.5
OPERATING LABOR COST				0.9	0.9	0.9	0.9	0.9	0.9	0.9
UTILITY COST				0.5	0.6	0.6	0.6	0.7	0.7	0.7
OTHERS				1.2	1.2	1.2	1.2	1.2	1.2	1.2
SUB TOTAL				60.8	67.7	71.2	71.2	71.2	71.3	71.3
DEPRECIATION & ALLOWANCE				2.4	2.4	2.4	2.4	2.4	2.4	2.4
GENERAL EXPENSE				1.0	1.0	1.0	1.0	1.0	1.0	1.0
FINANCING COST				1.2	1.5	1.4	1.2	1.0	0.8	0.5
TOTAL PRODUCTION COST				65.5	72.7	76.1	75.9	75.7	75.5	75.3
INCOME BEFORE TAX				-0.9	-0.5	-0.1	0.1	0.4	0.7	0.9
INCOME TAX										
NET INCOME				-0.9	-0.5	-0.1	0.1	0.4	0.7	0.9
DIVIDEND										
RETAINED EARNINGS				-0.9	-0.5	-0.1	0.1	0.4	0.7	0.9
CUM RETAINED EARNINGS				-0.9	-1.4	-1.5	-1.4	-1.0	-0.4	0.6

— continued —

INCOME STATEMENT — OMAN REF[illegible] (60MBPSD/REFORMER/S)

(22 MAY 79) PART 2 UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
SALES REVENUE									
FOR DOMESTIC	52.4	52.4	52.4	52.4	52.4	52.4	52.4	52.4	768.3
FOR EXPORT	23.9	23.8	23.8	23.8	23.8	23.8	23.8	23.8	358.9
SUB TOTAL	76.2	76.2	76.2	76.2	76.2	76.2	76.2	76.2	1127.2
DIRECT PRODUCTION COST									
RAW MATERIAL COST	68.5	68.5	68.5	68.5	68.5	68.5	68.5	68.5	1013.2
OPERATING LABOR COST	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	14.1
UTILITY COST	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	9.8
OTHERS	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	17.7
SUB TOTAL	71.3	71.3	71.3	71.3	71.3	71.3	71.3	71.3	1054.8
DEPRECIATION & ALLOWANCE	2.4	2.4	2.4						24.4
GENERAL EXPENSE	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	15.5
FINANCING COST	0.3	0.2							8.2
TOTAL PRODUCTION COST	75.1	74.9	74.7	72.3	72.3	72.3	72.3	72.3	1102.9
INCOME BEFORE TAX	1.2	1.4	1.5	3.9	3.9	3.9	3.9	3.9	24.4
INCOME TAX									
NET INCOME	1.2	1.4	1.5	3.9	3.9	3.9	3.9	3.9	24.4
DIVIDEND									
RETAINED EARNINGS	1.2	1.4	1.5	3.9	3.9	3.9	3.9	3.9	24.4
CUM RETAINED EARNINGS	1.7	3.1	4.6	8.6	12.5	16.5	20.4	24.4	

— continued —

FUNDS OUTLOOK — OMAN REF.F/S (40MBPSD/REFORMER/S)

(22 MAY 79) PART 1 UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
CASH GENERATION										
NET_INCOME				-0.9	-0.5	-0.1	0.1	0.4	0.7	0.9
ADD BACK DEPRECIATION				2.4	2.4	2.4	2.4	2.4	2.4	2.4
CASH FROM OPERATION				1.5	1.9	2.3	2.5	2.8	3.1	3.4
EQUITY	1.4	6.3	2.3							
LONG TERM LOAN	2.1	9.2	5.3	0.5						
SHORT TERM LOAN				1.9	0.6		-0.4	-0.7	-0.9	-0.5
CAPITAL FUND	3.6	15.4	7.6	2.4	0.6		-0.4	-0.7	-0.9	-0.5
TOTAL CASH AVAILABLE	3.6	15.4	7.6	4.0	2.5	2.3	2.1	2.1	2.1	2.9
CASH REQUIREMENT										
PLANT COST	3.6	15.4	7.6	0.5						
INC WORKING CAPITAL				3.5	0.4	0.2				
REPAYMENT L.T LOAN					2.1	2.1	2.1	2.1	2.1	2.1
PAYMENT OF DIVIDEND										
TOTAL CASH REQUIREMENT	3.6	15.4	7.6	4.0	2.5	2.3	2.1	2.1	2.1	2.1
CASH SURPLUS										0.7
CUM CASH SURPLUS										0.7

— continued —

FUNDS OUTLOOK

OMAN REF.F/S (40MBPSD/REFORMER/S)

(22 MAY 79)

PART 2 UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
CASH GENERATION									
NET_INCOME	1.2	1.4	1.5	3.9	3.9	3.9	3.9	3.9	24.4
ADD BACK DEPRECIATION	2.4	2.4	2.4						24.4
CASH FROM OPERATION	3.6	3.8	3.9	3.9	3.9	3.9	3.9	3.9	48.7
EQUITY									10.0
LONG TERM LOAN									17.1
SHORT TERM LOAN									
CAPITAL FUND									27.1
TOTAL CASH AVAILABLE	3.6	3.8	3.9	3.9	3.9	3.9	3.9	3.9	75.8
CASH REQUIREMENT									
PLANT COST									27.1
INC WORKING CAPITAL								-4.1	
REPAYMENT L.T LOAN	2.1	2.1							17.1
PAYMENT OF DIVIDEND									
TOTAL CASH REQUIREMENT	2.1	2.1						-4.1	44.2
CASH SURPLUS	1.5	1.7	3.9	3.9	3.9	3.9	3.9	8.0	31.6
CUM CASH SURPLUS	2.2	3.9	7.8	11.8	15.7	19.7	23.6	31.6	

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CASH FLOW ANALYSIS — OMAN REF.F/S (40MBPSD/REFORMER/S)

(22 MAY 79) — PART 1 — UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
CAPITAL INVESTMENT	3.6	15.4	7.6	4.0						
INCOME BEF TAX				-0.9	-0.5	-0.1	0.1	0.4	0.7	0.9
DEPRECIATION				2.4	2.4	2.4	2.4	2.4	2.4	2.4
INTEREST				1.2	1.5	1.4	1.2	1.0	0.8	0.5
CASH FLOW	-3.6	-15.4	-7.6	-1.2	3.4	3.7	3.8	3.8	3.9	3.9
DISCOUNT RATE	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
DISCOUNTED CASH FLOW	-3.4	-14.0	-6.5	-1.0	2.7	2.8	2.7	2.6	2.5	2.4
ACC DCF	-3.4	-17.4	-23.9	-24.9	-22.3	-19.5	-16.8	-14.2	-11.7	-9.3
INT RATE OF RETURN	7.89	7.89	7.89	7.89	7.89	7.89	7.89	7.89	7.89	7.89

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CASH FLOW ANALYSIS — OMAN REF.F/S (40MBPSD/REFORMER/S)

(22 MAY 79) PART 2 UNIT : $ M P.U

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
CAPITAL INVESTMENT									30.6
INCOME BEF TAX	1.2	1.4	1.5	3.9	3.9	3.9	3.9	3.9	24.4
DEPRECIATION	2.4	2.4	2.4						24.4
INTEREST	0.3	0.2							8.2
CASH FLOW	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	26.4
DISCOUNT RATE	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
DISCOUNTED CASH FLOW	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	6.4
ACC DCF	-7.0	-4.8	-2.7	-0.7	1.2	3.0	4.8	6.4	
INT RATE OF RETURN	7.89	7.89	7.89	7.89	7.89	7.89	7.89	7.89	

-- continued --

BALANCE SHEET.

OMAN REF.F/S (40MBPSO/REFORMER/S)

(22 MAY 79)

PART 1 UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ASSETS										
CURRENT ASSETS										
OPERATING CASH				0.4	0.5	0.5	0.5	0.5	0.5	0.5
RECEIVABLES				5.2	5.8	6.1	6.1	6.1	6.1	6.1
INVENTORIES				2.7	3.0	3.2	3.2	3.2	3.2	3.2
SUB TOTAL				8.3	9.3	9.7	9.7	9.8	9.8	9.8
CUM SURPLUS CASH										0.7
FIXED ASSETS										
PLANT & EQUIPMENT	3.6	19.0	26.6	27.1	27.1	27.1	27.1	27.1	27.1	27.1
LESS ACCUM. DEPRE.				2.4	4.9	7.3	9.8	12.2	14.6	17.1
NET FIXED ASSETS	3.6	19.0	26.6	24.7	22.2	19.8	17.3	14.9	12.5	10.0
TOTAL ASSETS	3.6	19.0	26.6	33.0	31.5	29.5	27.1	24.7	22.2	20.5
LIABILITIES										
CURRENT LIABILITIES										
PAYABLES				4.9	5.4	5.7	5.7	5.7	5.7	5.7
SHORT TERM LOAN				1.9	2.5	2.5	2.1	1.4	0.5	
SUB TOTAL				6.8	7.9	8.2	7.8	7.1	6.2	5.7
LONG TERM LIABILITIES	2.1	11.3	16.6	17.1	15.0	12.8	10.7	8.5	6.4	4.3
EQUITY										
PAID UP CAPITAL	1.4	7.7	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
CUM. RETAINED EARNIGS				-0.9	-1.4	-1.5	-1.4	-1.0	-0.4	0.6
SUB TOTAL	1.4	7.7	10.0	9.1	8.6	8.5	8.6	9.0	9.6	10.6
TOT. EQUITY & LIABIL.	3.6	19.0	26.6	33.0	31.5	29.5	27.1	24.7	22.2	20.5

— continued —

BALANCE SHEET

OMAN REF.F/S (40MBPSD/REFORMER/S)

(22 MAY 79)

PART 2

UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
ASSETS									
CURRENT ASSETS									
OPERATING CASH	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
RECEIVABLES	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
INVENTORIES	3.2	3.2	3.2	3.2	3.2	3.2	3.2		
SUB TOTAL	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
CUM SURPLUS CASH	2.2	3.9	7.8	11.8	15.7	19.7	23.6	31.6	
FIXED ASSETS									
PLANT & EQUIPMENT	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	
LESS ACCUM. DEPRE.	19.5	21.9	24.4	24.4	24.4	24.4	24.4	24.4	
NET FIXED ASSETS	7.6	5.1	2.7	2.7	2.7	2.7	2.7	2.7	
TOTAL ASSETS	19.6	18.8	20.3	24.3	28.2	32.2	36.1	34.4	
LIABILITIES									
CURRENT LIABILITIES									
PAYABLES	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
SHORT TERM LOAN									
SUB TOTAL	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
LONG TERM LIABILITIES	2.1								
EQUITY									
PAID UP CAPITAL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
CUM. RETAINED EARNIGS	1.7	3.1	4.6	8.6	12.5	16.5	20.4	24.4	
SUB TOTAL	11.7	13.1	14.6	18.6	22.5	26.5	30.4	34.4	
TOT. EQUITY.& LIABIL.	19.6	18.8	20.3	24.3	28.2	32.2	36.1	34.4	

TABLE A-3 PROJECTED FINANCIAL STATEMENTS (20,000 BPSD/P)

INCOME STATEMENT — OMAN REF.F/S (20MBPSD/REFORMER/P)

(22 MAY 79) — PART 1 — UNIT : MM R.J

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
SALES REVENUE										
FOR DOMESTIC				21.2	23.7	25.0	25.0	25.1	25.1	25.1
FOR EXPORT				11.2	12.5	13.2	13.2	13.2	13.2	13.2
SUB TOTAL				32.4	36.2	38.1	38.2	38.2	38.2	38.2
DIRECT PRODUCTION COST										
RAW MATERIAL COST				29.1	32.5	34.2	34.2	34.2	34.2	34.2
OPERATING LABOR COST				0.9	0.9	0.9	0.9	0.9	0.9	0.9
UTILITY COST				0.5	0.5	0.6	0.6	0.6	0.6	0.6
OTHERS				0.7	0.7	0.7	0.7	0.7	0.7	0.7
SUB TOTAL				31.1	34.6	36.4	36.4	36.4	36.4	36.4
DEPRECIATION & ALLOWANCE				1.5	1.5	1.5	1.5	1.5	1.5	1.5
GENERAL EXPENSE				0.8	0.8	0.8	0.8	0.8	0.8	0.8
FINANCING COST				0.8	1.1	1.2	1.2	1.3	1.4	1.5
TOTAL PRODUCTION COST				34.2	38.0	39.8	39.9	40.0	40.1	40.2
INCOME BEFORE TAX				-1.8	-1.8	-1.7	-1.7	-1.8	-1.9	-1.9
INCOME TAX										
NET INCOME				-1.8	-1.8	-1.7	-1.7	-1.8	-1.9	-1.9
DIVIDEND										
RETAINED EARNINGS				-1.8	-1.8	-1.7	-1.7	-1.8	-1.9	-1.9
CUM RETAINED EARNINGS				-1.8	-3.6	-5.3	-7.0	-8.8	-10.7	-12.6

— continued —

INCOME STATEMENT — OMAN REF.F/S (20MBPSD/REFORMER/P)

(22 MAY 79) — PART 2 — UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
SALES REVENUE									
FOR DOMESTIC	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	370.5
FOR EXPORT	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	195.1
SUB TOTAL	38.2	38.2	38.2	38.2	38.2	38.2	38.2	38.2	565.6
DIRECT PRODUCTION COST									
RAW MATERIAL COST	34.2	34.2	34.2	34.2	34.2	34.2	34.2	34.2	506.6
OPERATING LABOR COST	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	13.4
UTILITY COST	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	8.9
OTHERS	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	10.4
SUB TOTAL	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4	539.3
DEPRECIATION & ALLOWANCE	1.5	1.5	1.5						15.0
GENERAL EXPENSE	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	11.7
FINANCING COST	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	23.9
TOTAL PRODUCTION COST	40.3	40.4	40.5	39.1	39.2	39.3	39.4	39.5	589.9
INCOME BEFORE TAX	-2.0	-2.1	-2.3	-0.8	-0.9	-1.0	-1.1	-1.3	-24.3
INCOME TAX									
NET INCOME	-2.0	-2.1	-2.3	-0.8	-0.9	-1.0	-1.1	-1.3	-24.3
DIVIDEND									
RETAINED EARNINGS	-2.0	-2.1	-2.3	-0.8	-0.9	-1.0	-1.1	-1.3	-24.3
CUM RETAINED EARNINGS	-14.6	-16.8	-19.0	-19.9	-20.8	-21.8	-23.0	-24.3	

— continued —

FUNDS OUTLOOK

OMAN REF.F/S (20MBPSD/REFORMER/P)

(22 MAY 79)

PART I

UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
CASH GENERATION										
NET INCOME				-1.8	-1.8	-1.7	-1.7	-1.8	-1.9	-1.9
ADD BACK DEPRECIATION				1.5	1.5	1.5	1.5	1.5	1.5	1.5
CASH FROM OPERATION				-0.3	-0.3	-0.2	-0.2	-0.3	-0.3	-0.4
EQUITY	0.8	3.0	1.3							
LONG TERM LOAN	1.3	5.6	3.7	0.3						
SHORT TERM LOAN				2.2	1.8	1.6	1.6	1.7	1.7	1.8
CAPITAL FUND	2.1	9.3	5.0	2.4	1.8	1.6	1.6	1.7	1.7	1.8
TOTAL CASH AVAILABLE	2.1	9.3	5.0	2.1	1.6	1.5	1.4	1.4	1.4	1.4
CASH REQUIREMENT										
PLANT COST	2.1	9.3	5.0	0.3						
INC WORKING CAPITAL				1.8	0.2	0.1				
REPAYMENT L.T LOAN					1.4	1.4	1.4	1.4	1.4	1.4
PAYMENT OF DIVIDEND										
TOTAL CASH REQUIREMENT	2.1	9.3	5.0	2.1	1.6	1.5	1.4	1.4	1.4	1.4
CASH SURPLUS										
CUM CASH SURPLUS										

— continued —

FUNDS OUTLOOK — OMAN REF.F/S (20MBPSD/REFORMER/P)

(22 MAY 79) — PART 2 — UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
CASH GENERATION									
NET INCOME	-2.0	-2.1	-2.3	-0.8	-0.9	-1.0	-1.1	-1.3	-24.3
ADD BACK DEPRECIATION	1.5	1.5	1.5						15.0
CASH FROM OPERATION	-0.5	-0.6	-0.8	-0.8	-0.9	-1.0	-1.1	-1.3	-9.2
EQUITY									5.8
LONG TERM LOAN									10.9
SHORT TERM LOAN	1.9	2.0	0.8	0.8	0.9	1.0	1.1	-0.9	20.1
CAPITAL FUND	1.9	2.0	0.8	0.8	0.9	1.0	1.1	-0.9	36.8
TOTAL CASH AVAILABLE	1.4	1.4						-2.1	27.6
CASH REQUIREMENT									
PLANT COST									16.7
INC WORKING CAPITAL								-2.1	
REPAYMENT L.T LOAN	1.4	1.4							10.9
PAYMENT OF DIVIDEND									
TOTAL CASH REQUIREMENT	1.4	1.4						-2.1	27.6
CASH SURPLUS									
CUM CASH SURPLUS									

— continued —

CASH FLOW ANALYSIS OMAN REF.F/S (20MBPSD/REFORMER/P)

(22 MAY 79) PART 1 UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
CAPITAL INVESTMENT	2.1	9.3	5.0	2.1						
INCOME BEF TAX				-1.8	-1.8	-1.7	-1.7	-1.8	-1.9	-1.9
DEPRECIATION				1.5	1.5	1.5	1.5	1.5	1.5	1.5
INTEREST				0.8	1.1	1.2	1.2	1.3	1.4	1.5
CASH FLOW	-2.1	-9.3	-5.0	-1.6	0.8	1.0	1.0	1.0	1.0	1.0
DISCOUNT RATE	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
DISCOUNTED CASH FLOW	-2.0	-8.4	-4.3	-1.3	0.6	0.7	0.7	0.7	0.7	0.6
ACC DCF	-2.0	-10.5	-14.8	-16.1	-15.5	-14.8	-14.1	-13.4	-12.7	-12.1
INT RATE OF RETURN	-2.52	-2.52	-2.52	-2.52	-2.52	-2.52	-2.52	-2.52	-2.52	-2.52

– continued –

CASH FLOW ANALYSIS — OMAN REF.F/S (20MBPSD/REFORMER/P)

(22 MAY 79) — PART 2 — UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
CAPITAL INVESTMENT									18.5
INCOME BEF TAX	-2.0	-2.1	-2.3	-0.8	-0.9	-1.0	-1.1	-1.3	-24.3
DEPRECIATION	1.5	1.5	1.5						15.0
INTEREST	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	23.9
CASH FLOW	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	-3.9
DISCOUNT RATE	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
DISCOUNTED CASH FLOW	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.4	-8.0
ACC DCF	-11.5	-10.9	-10.3	-9.8	-9.3	-8.8	-8.4	-8.0	
INT RATE OF RETURN	-2.52	-2.52	-2.52	-2.52	-2.52	-2.52	-2.52	-2.52	

BALANCE SHEET — OMAN REF.F/S (20MBPSD/REFORMER/P)

(22 MAY 79) — PART 1 — UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ASSETS										
CURRENT ASSETS										
OPERATING CASH				0.3	0.4	0.4	0.4	0.4	0.4	0.4
RECEIVABLES				2.6	2.9	3.1	3.1	3.1	3.1	3.1
INVENTORIES				1.4	1.5	1.6	1.6	1.6	1.6	1.6
SUB TOTAL				4.3	4.8	5.0	5.1	5.1	5.1	5.1
CUM SURPLUS CASH										
FIXED ASSETS										
PLANT & EQUIPMENT	2.1	11.4	16.4	16.7	16.7	16.7	16.7	16.7	16.7	16.7
LESS ACCUM. DEPRE.				1.5	3.0	4.5	6.0	7.5	9.0	10.5
NET FIXED ASSETS	2.1	11.4	16.4	15.2	13.7	12.2	10.7	9.2	7.7	6.2
TOTAL ASSETS	2.1	11.4	16.4	19.5	18.5	17.2	15.7	14.3	12.7	11.2
LIABILITIES										
CURRENT LIABILITIES										
PAYABLES				2.5	2.8	2.9	2.9	2.9	2.9	2.9
SHORT TERM LOAN				2.2	4.0	5.6	7.2	8.9	10.6	12.4
SUB TOTAL				4.7	6.8	8.6	10.2	11.8	13.5	15.3
LONG TERM LIABILITIES	1.3	6.9	10.6	10.9	9.5	8.2	6.8	5.5	4.1	2.7
EQUITY										
PAID UP CAPITAL	0.8	4.5	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
CUM. RETAINED EARNIGS				-1.8	-3.6	-5.3	-7.0	-8.8	-10.7	-12.6
SUB TOTAL	0.8	4.5	5.8	4.0	2.2	0.5	-1.2	-3.0	-4.9	-6.8
TOT. EQUITY & LIABIL.	2.1	11.4	16.4	19.5	18.5	17.2	15.7	14.3	12.7	11.2

— continued —

BALANCE SHEET — OMAN REF.F/S (20MBPSD/REFORMER/P)

(22 MAY 79) — PART 2 — UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
ASSETS									
CURRENT ASSETS									
OPERATING CASH	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
RECEIVABLES	3.1	3.1	3.1	3.1	3.1	3.1	3.1		
INVENTORIES	1.6	1.6	1.6	1.6	1.6	1.6	1.6		
SUB TOTAL	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
CUM SURPLUS CASH									
FIXED ASSETS									
PLANT & EQUIPMENT	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	
LESS ACCUM. DEPRE.	12.0	13.5	15.0	15.0	15.0	15.0	15.0	15.0	
NET FIXED ASSETS	4.7	3.2	1.7	1.7	1.7	1.7	1.7	1.7	
TOTAL ASSETS	9.7	8.2	6.7	6.7	6.7	6.7	6.7	1.7	
LIABILITIES									
CURRENT LIABILITIES									
PAYABLES	2.9	2.9	2.9	2.9	2.9	2.9	2.9		
SHORT TERM LOAN	14.3	16.3	17.1	17.9	18.8	19.9	21.0	20.1	
SUB TOTAL	17.2	19.2	20.0	20.8	21.7	22.8	23.9	20.1	
LONG TERM LIABITILIES	1.4								
EQUITY									
PAID UP CAPITAL	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	
CUM. RETAINED EARNIGS	-14.6	-16.8	-19.0	-19.9	-20.8	-21.8	-23.0	-24.3	
SUB TOTAL	-8.8	-11.0	-13.2	-14.1	-15.0	-16.0	-17.2	-18.5	
TOT. EQUITY & LIABIL.	9.7	8.2	6.7	6.7	6.7	6.7	6.7	1.7	

TABLE A-4 PROJECTED FINANCIAL STATEMENTS (20,000 BPSD/S)

INCOME STATEMENT — OMAN REF.F/S (20MBPSD/REFORMER/S)

(22 MAY 7?) — PART 1 — UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
SALES REVENUE										
FOR DOMESTIC				21.2	23.7	25.0	25.0	25.1	25.1	25.1
FOR EXPORT				11.2	12.5	13.2	13.2	13.2	13.2	13.2
SUB TOTAL				32.4	36.2	38.1	38.2	38.2	38.2	38.2
DIRECT PRODUCTION COST										
RAW MATERIAL COST				29.1	32.5	34.2	34.2	34.2	34.2	34.2
OPERATING LABOR COST				0.9	0.9	0.9	0.9	0.9	0.9	0.9
UTILITY COST				0.3	0.4	0.4	0.4	0.4	0.4	0.4
OTHERS				0.7	0.8	0.8	0.8	0.8	0.8	0.8
SUB TOTAL				31.1	34.6	36.3	36.3	36.4	36.4	36.4
DEPRECIATION & ALLOWANCE				1.6	1.6	1.6	1.6	1.6	1.6	1.6
GENERAL EXPENSE				0.8	0.8	0.8	0.8	0.8	0.8	0.8
FINANCING COST				0.9	1.1	1.2	1.3	1.4	1.5	1.6
TOTAL PRODUCTION COST				34.4	38.2	40.0	40.1	40.2	40.3	40.4
INCOME BEFORE TAX				-2.0	-2.0	-1.9	-2.0	-2.0	-2.1	-2.2
INCOME TAX										
NET INCOME				-2.0	-2.0	-1.9	-2.0	-2.0	-2.1	-2.2
DIVIDEND										
RETAINED EARNINGS				-2.0	-2.0	-1.9	-2.0	-2.0	-2.1	-2.2
CUM RETAINED EARNINGS				-2.0	-4.0	-5.9	-7.9	-9.9	-12.0	-14.2

— continued —

INCOME STATEMENT — OMAN REF.F/S (20MBPSD/ REFORMER/S)

(22 MAY 79) — PART 2 — UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
SALES REVENUE									
FOR DOMESTIC	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	370.5
FOR EXPORT	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	195.1
SUB TOTAL	38.2	38.2	38.2	38.2	38.2	38.2	38.2	38.2	565.6
DIRECT PRODUCTION COST									
RAW MATERIAL COST	34.2	34.2	34.2	34.2	34.2	34.2	34.2	34.2	506.6
OPERATING LABOR COST	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	14.1
UTILITY COST	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	6.5
OTHERS	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	11.3
SUB TOTAL	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4	538.4
DEPRECIATION & ALLOWANCE	1.6	1.6	1.6						16.4
GENERAL EXPENSE	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	12.4
FINANCING COST	1.7	1.8	2.0	2.1	2.2	2.3	2.5	2.6	26.3
TOTAL PRODUCTION COST	40.6	40.7	40.8	39.3	39.4	39.5	39.7	39.8	593.5
INCOME BEFORE TAX	-2.3	-2.4	-2.6	-1.0	-1.1	-1.3	-1.4	-1.6	-27.9
INCOME TAX									
NET INCOME	-2.3	-2.4	-2.6	-1.0	-1.1	-1.3	-1.4	-1.6	-27.9
DIVIDEND									
RETAINED EARNINGS	-2.3	-2.4	-2.6	-1.0	-1.1	-1.3	-1.4	-1.6	-27.9
CUM RETAINED EARNINGS	-16.5	-18.9	-21.5	-22.5	-23.6	-24.9	-26.3	-27.9	

— continued —

FUNDS OUTLOOK

OMAN REF.F/S (20MBPSD/REFORMER/S)

(22 MAY 79)

PART 1 UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
CASH GENERATION										
NET_INCOME				-2.0	-2.0	-1.9	-2.0	-2.0	-2.1	-2.2
ADD BACK DEPRECIATION				1.6	1.6	1.6	1.6	1.6	1.6	1.6
CASH FROM OPERATION				-0.4	-0.3	-0.3	-0.3	-0.4	-0.5	-0.6
EQUITY	0.9	4.0	1.5							
LONG TERM LOAN	1.4	6.1	3.9	0.3						
SHORT TERM LOAN				2.2	2.0	1.8	1.8	1.8	1.9	2.0
CAPITAL FUND	2.4	10.2	5.4	2.5	2.0	1.8	1.8	1.8	1.9	2.0
TOTAL_CASH AVAILABLE	2.4	10.2	5.4	2.1	1.7	1.6	1.5	1.5	1.5	1.5
CASH REQUIREMENT										
PLANT COST	2.4	10.2	5.4	0.3						
INC WORKING CAPITAL				1.8	0.2	0.1				
REPAYMENT L.T LOAN					1.5	1.5	1.5	1.5	1.5	1.5
PAYMENT OF DIVIDEND										
TOTAL CASH REQUIREMENT	2.4	10.2	5.4	2.1	1.7	1.6	1.5	1.5	1.5	1.5
CASH SURPLUS										
CUM CASH SURPLUS										

— continued —

FUNDS OUTLOOK

OMAN REF.F/S (20MBPSD/REFORMER/S)

(22 MAY 79)

PART 2 UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
CASH GENERATION									
NET INCOME	-2.3	-2.4	-2.6	-1.0	-1.1	-1.3	-1.4	-1.6	-27.9
ADD BACK DEPRECIATION	1.6	1.6	1.6						16.4
CASH FROM OPERATION	-0.7	-0.8	-0.9	-1.0	-1.1	-1.3	-1.4	-1.6	-11.5
EQUITY									6.5
LONG TERM LOAN									11.7
SHORT TERM LOAN	2.1	2.3	0.9	1.0	1.1	1.3	1.4	-0.6	23.2
CAPITAL FUND	2.1	2.3	0.9	1.0	1.1	1.3	1.4	-0.6	41.4
TOTAL CASH AVAILABLE	1.5	1.5						-2.1	29.9
CASH REQUIREMENT									
PLANT COST									18.2
INC WORKING CAPITAL								-2.1	
REPAYMENT L.T LOAN	1.5	1.5							11.7
PAYMENT OF DIVIDEND									
TOTAL CASH REQUIREMENT	1.5	1.5						-2.1	29.9
CASH SURPLUS									
CUM CASH SURPLUS									

– continued –

CASH FLOW ANALYSIS — OMAN REF.F/S (20MBPSD/REFORMER/S)

(22 MAY 79) — PART 1 — UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
CAPITAL INVESTMENT	2.4	10.2	5.4	2.1						
INCOME BEF TAX				-2.0	-2.0	-1.9	-2.0	-2.0	-2.1	-2.2
DEPRECIATION				1.6	1.6	1.6	1.6	1.6	1.6	1.6
INTEREST				0.9	1.1	1.2	1.3	1.4	1.5	1.6
CASH FLOW	-2.4	-10.2	-5.4	-1.6	0.8	1.0	1.0	1.0	1.0	1.0
DISCOUNT RATE	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
DISCOUNTED CASH FLOW	-2.2	-9.2	-4.7	-1.4	0.6	0.7	0.7	0.7	0.7	0.6
ACC DCF	-2.2	-11.5	-16.1	-17.5	-16.9	-16.1	-15.4	-14.7	-14.0	-13.4
INT RATE OF RETURN	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23

– continued –

CASH FLOW ANALYSIS — OMAN REF.F/S (20MBPSD/REFORMER/S)

(22 MAY 79) — PART 2 — UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
CAPITAL INVESTMENT									20.0
INCOME BEF TAX	-2.3	-2.4	-2.6	-1.0	-1.1	-1.3	-1.4	-1.6	-27.9
DEPRECIATION	1.6	1.6	1.6						16.4
INTEREST	1.7	1.8	2.0	2.1	2.2	2.3	2.5	2.6	26.3
CASH FLOW	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	-5.3
DISCOUNT RATE	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
DISCOUNTED CASH FLOW	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.4	-9.2
ACC DCF	-12.8	-12.2	-11.7	-11.1	-10.6	-10.1	-9.7	-9.2	
INT RATE OF RETURN	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23	

– continued –

BALANCE SHEET — OMAN REF.F/S (20MBPSD/REFORMER/S)

(22 MAY 79) — PART 1 — UNIT : MM R.O

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ASSETS										
CURRENT ASSETS										
OPERATING CASH				0.3	0.3	0.4	0.4	0.4	0.4	0.4
RECEIVABLES				2.6	2.9	3.1	3.1	3.1	3.1	3.1
INVENTORIES				1.4	1.5	1.6	1.6	1.6	1.6	1.6
SUB TOTAL				4.3	4.8	5.0	5.0	5.0	5.1	5.1
CUM SURPLUS CASH										
FIXED ASSETS										
PLANT & EQUIPMENT	2.4	12.5	17.9	18.2	18.2	18.2	18.2	18.2	18.2	18.2
LESS ACCUM. DEPRE.				1.6	3.3	4.9	6.6	8.2	9.8	11.5
NET FIXED ASSETS	2.4	12.5	17.9	16.6	14.9	13.3	11.6	10.0	8.4	6.7
TOTAL ASSETS	2.4	12.5	17.9	20.9	19.7	18.3	16.7	15.1	13.4	11.8
LIABILITIES										
CURRENT LIABILITIES										
PAYABLES				2.5	2.8	2.9	2.9	2.9	2.9	2.9
SHORT TERM LOAN				2.2	4.2	6.0	7.8	9.7	11.6	13.6
SUB TOTAL				4.7	7.0	8.9	10.7	12.6	14.5	16.5
LONG TERM LIABILITIES	1.4	7.5	11.4	11.7	10.2	8.8	7.3	5.9	4.4	2.9
EQUITY										
PAID UP CAPITAL	0.9	5.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
CUM. RETAINED EARNIGS				-2.0	-4.0	-5.9	-7.9	-9.9	-12.0	-14.2
SUB TOTAL	0.9	5.0	6.5	4.5	2.5	0.6	-1.4	-3.4	-5.5	-7.7
TOT. EQUITY & LIABIL.	2.4	12.5	17.9	20.9	19.7	18.3	16.7	15.1	13.4	11.8

– continued –

BALANCE SHEET — OMAN REF.F/S (20MBPSD/ REFORMER/S)

(22 MAY 79) — PART 2 — UNIT : MM R.O

	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
ASSETS									
CURRENT ASSETS									
OPERATING CASH	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
RECEIVABLES	3.1	3.1	3.1	3.1	3.1	3.1	3.1		
INVENTORIES	1.6	1.6	1.6	1.6	1.6	1.6	1.6		
SUB TOTAL	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
CUM SURPLUS CASH									
FIXED ASSETS									
PLANT & EQUIPMENT	18.2	18.2	18.2	18.2	18.2	18.2	18.2	18.2	
LESS ACCUM. DEPRE.	13.1	14.7	16.4	16.4	16.4	16.4	16.4	16.4	
NET FIXED ASSETS	5.1	3.5	1.8	1.8	1.8	1.8	1.8	1.8	
TOTAL ASSETS	10.1	8.5	6.9	6.9	6.9	6.9	6.9	1.8	
LIABILITIES									
CURRENT LIABILITIES									
PAYABLES	2.9	2.9	2.9	2.9	2.9	2.9	2.9		
SHORT TERM LOAN	15.7	18.0	18.9	20.0	21.1	22.4	23.8	23.2	
SUB TOTAL	18.6	20.9	21.8	22.9	24.0	25.3	26.7	23.2	
LONG TERM LIABILITIES	1.5								
EQUITY									
PAID UP CAPITAL	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	
CUM. RETAINED EARNIGS	-16.5	-18.9	-21.5	-22.5	-23.6	-24.9	-26.3	-27.9	
SUB TOTAL	-10.0	-12.4	-15.0	-16.0	-17.1	-18.4	-19.8	-21.4	
TOT. EQUITY & LIABIL.	10.1	8.5	6.9	6.9	6.9	6.9	6.9	1.8	

TABLE A-5 CALCULATED EIRR (40,000 BPSD/P)

40MBPSD/P BASE CASE PR & COST 0%UP

YEAR	COST (INVESTMENT)	COST (OPERATION)	COST (SECURITY)	COST (TOTAL)	BENEFIT (REVENUE)	DIS. RATEIO	B/C RATIO	NET PV
1980	3.3	0.0	0.0	3.3	0.0	1	1.024	24.1
1981	14.1	0.0	1.6	12.5	0.0	2	1.022	19.8
1982	7.0	0.0	1.0	6.0	0.0	3	1.019	16.0
1983	4.0	61.9	0.0	65.9	64.6	4	1.017	12.8
1984	0.0	68.9	0.0	68.9	72.1	5	1.014	9.9
1985	0.0	72.4	0.0	72.4	76.0	6	1.011	7.3
1986	0.0	72.4	0.0	72.4	76.0	7	1.009	5.0
1987	0.0	72.4	0.0	72.4	76.1	8	1.006	3.1
1988	0.0	72.4	0.0	72.4	76.2	9	1.003	1.3
1989	0.0	72.4	0.0	72.4	76.2	10	0.999	-0.3
1990	0.0	72.4	0.0	72.4	76.2	11	0.996	-1.7
1991	0.0	72.4	0.0	72.4	76.2	12	0.993	-2.9
1992	0.0	72.4	0.0	72.4	76.2	13	0.989	-4.0
1993	0.0	72.4	0.0	72.4	76.2	14	0.986	-5.0
1994	0.0	72.4	0.0	72.4	76.2	15	0.982	-5.8
1995	0.0	72.4	0.0	72.4	76.2	16	0.979	-6.6
1996	0.0	72.4	0.0	72.4	76.2	17	0.975	-7.3
1997	0.0	72.4	0.0	72.4	76.2	18	0.971	-7.9

INTERNAL RATE OF RETURN = 9.9 REMAINDER= -0.08510

TABLE A-6 CALCULATED EIRR (40,000 BPSD/S)

40MBPSD/S BASE CASE PR & COST UP

YEAR	COST (INVESTMENT)	COST (OPERATION)	COST (SECURITY)	COST (TOTAL)	BENEFIT (REVENUE)	DIS. RATIO	B/C RATIO	NET PV
1980	3.6	0.0	0.0	3.6	0.0	1	1.023	23.0
1981	15.4	0.0	1.6	13.8	0.0	2	1.021	18.6
1982	7.6	0.0	1.0	6.6	0.0	3	1.018	14.8
1983	4.0	61.9	0.0	65.9	64.6	4	1.015	11.4
1984	0.0	68.8	0.0	68.8	72.1	5	1.012	8.5
1985	0.0	72.3	0.0	72.3	76.0	6	1.009	5.9
1986	0.0	72.3	0.0	72.3	76.0	7	1.006	3.6
1987	0.0	72.3	0.0	72.3	76.1	8	1.003	1.6
1988	0.0	72.3	0.0	72.3	76.2	9	1.000	-0.2
1989	0.0	72.4	0.0	72.4	76.2	10	0.996	-1.8
1990	0.0	72.4	0.0	72.4	76.2	11	0.993	-3.2
1991	0.0	72.3	0.0	72.3	76.2	12	0.989	-4.4
1992	0.0	72.3	0.0	72.3	76.2	13	0.985	-5.5
1993	0.0	72.3	0.0	72.3	76.2	14	0.982	-6.5
1994	0.0	72.3	0.0	72.3	76.2	15	0.978	-7.4
1995	0.0	72.3	0.0	72.3	76.2	16	0.974	-8.2
1996	0.0	72.3	0.0	72.3	76.2	17	0.970	-8.9
1997	0.0	72.3	0.0	72.3	76.2	18	0.966	-9.5

INTERNAL RATE OF RETURN = 9.0 REMAINDER= -0.16904

TABLE A-7 CALCULATED EIRR (20,000 BPSD/P)

20M8PSD/P BASE CASE PR & COST 0%UP

YEAR	COST (INVESTMENT)	COST (OPERATION)	COST (SECURITY)	COST (TOTAL)	BENEFIT (REVENUE)	DIS. RATEIO	B/C RATIO	NET PV
1980	2.1	0.0	0.0	2.1	0.0	1	0.993	-3.5
1981	9.3	0.0	1.4	7.9	0.0	2	0.991	-4.4
1982	5.0	0.0	0.6	4.4	0.0	3	0.988	-5.3
1983	2.1	31.9	0.0	34.0	32.4	4	0.985	-6.0
1984	0.0	35.4	0.0	35.4	36.2	5	0.981	-6.7
1985	0.0	37.2	0.0	37.2	38.1	6	0.978	-7.2
1986	0.0	37.2	0.0	37.2	38.2	7	0.975	-7.7
1987	0.0	37.2	0.0	37.2	38.2	8	0.971	-8.1
1988	0.0	37.2	0.0	37.2	38.2	9	0.968	-8.5
1989	0.0	37.2	0.0	37.2	38.2	10	0.964	-8.8
1990	0.0	37.2	0.0	37.2	38.2	11	0.960	-9.0
1991	0.0	37.2	0.0	37.2	38.2	12	0.956	-9.3
1992	0.0	37.2	0.0	37.2	38.2	13	0.952	-9.5
1993	0.0	37.2	0.0	37.2	38.2	14	0.948	-9.6
1994	0.0	37.2	0.0	37.2	38.2	15	0.944	-9.7
1995	0.0	37.2	0.0	37.2	38.2	16	0.940	-9.9
1996	0.0	37.2	0.0	37.2	38.2	17	0.935	-10.0
1997	0.0	37.2	0.0	37.2	38.2	18	0.931	-10.0

INTERNAL RATE OF RETURN = minus

TABLE A-8 CALCULATED EIRR (20,000 BPSD/S)

20MBPSD/S BASE CASE PR & COST 0% UP

YEAR	COST (INVESTMENT)	COST (OPERATION)	COST (SECURITY)	COST (TOTAL)	BENEFIT (REVENUE)	DIS. RATEIO	B/C RATIO	NET PV
1980	2.4	0.0	0.0	2.4	0.0	1	0.991	-4.8
1981	10.2	0.0	1.4	8.8	0.0	2	0.988	-5.8
1982	5.4	0.0	0.6	4.8	0.0	3	0.984	-6.7
1983	2.1	31.9	0.0	34.0	32.4	4	0.981	-7.4
1984	0.0	35.4	0.0	35.4	36.2	5	0.978	-8.1
1985	0.0	37.1	0.0	37.1	38.1	6	0.974	-8.6
1986	0.0	37.1	0.0	37.1	38.2	7	0.970	-9.1
1987	0.0	37.2	0.0	37.2	38.2	8	0.967	-9.5
1988	0.0	37.2	0.0	37.2	38.2	9	0.963	-9.8
1989	0.0	37.2	0.0	37.2	38.2	10	0.959	-10.1
1990	0.0	37.2	0.0	37.2	38.2	11	0.954	-10.4
1991	0.0	37.2	0.0	37.2	38.2	12	0.950	-10.6
1992	0.0	37.2	0.0	37.2	38.2	13	0.946	-10.8
1993	0.0	37.2	0.0	37.2	38.2	14	0.941	-10.9
1994	0.0	37.2	0.0	37.2	38.2	15	0.937	-11.0
1995	0.0	37.2	0.0	37.2	38.2	16	0.932	-11.1
1996	0.0	37.2	0.0	37.2	38.2	17	0.928	-11.2
1997	0.0	37.2	0.0	37.2	38.2	18	0.923	-11.3

INTERNAL RATE OF RETURN = minus

ANNEX III

FIELD SURVEY REPORT
FOR THE
FEASIBILITY STUDY
OF THE
OIL REFINERY CONSTRUCTION PLAN
IN
SULTANATE OF OMAN

MARCH, 1979

JAPANESE STUDY TEAM
JAPAN INTERNATIONAL COOPERATION AGENCY

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
P. O. BOX 216 MITSUI BLDG
2-1, NISHI-SHINJUKU, SHINJUKU-KU TOKYO
160 JAPAN

Your Excellency
Mr. Mohammed Zubair
The Ministry of Commerce and Industry
Sultante of Oman

Your Excellency:

We have the pleasure of submitting our report of the survey that have been carried out by our Survey Team in the Sultanate of Oman.

During the limited period of our stay in this country, we tried to make every effort to collect data and information relevant to the planning and construction of a petroleum refinery in Oman. We are confident that our purpose is achieved almost satisfactorily and that the data and information collected will form a sound basis to make our feasibility study on the refinery most scientific and reliable.

It is the sincerest hope of the Japan International Cooperation Agency as well as the Japanese Government that the technical cooperation with your Government as represented by the present study will further solidify the relationship already existence between our two countries.

Yours faithfully,

M. Kitamura

Mizuho Kitamura
Head of the Survey Team
for Refinery Construction
Plan in Oman.

CONTENTS

INTRODUCTION

In February and March 1978, the Japan International Cooperation Agency dispatched a group of experts to examine and identify potentials of industrialization in Oman.

Result of the study, which came out in the form of "The Prefeasibility Study for Industrial Development, Sultanate of Oman", has identified a refinery construction project as prefeasible, namely, a feasibility study being recommended.

In spite of some foreseeable disadvantages of constructing a refinery in Oman, the project is now regarded as necessity of Omani economy, not only in terms of domestic market but also in view of national security. Although several alternative refinery projects have been proposed and studied according to the I.B.R.D. report in 1977, none of them seems to have been successful in fully meeting requirements of Oman's economy which has been and still is rapidly changing. A new feasibility study on the refinery construction project is therefore needed at this moment.

We exerted every possible effort to gather information which will constitute a solid baisis of a neutral and scientific feasibility study on a refinery project in Oman. Furthermore the feasibility study is hoped to be made useful and practical enough to provide decision makers in the government of Oman with exact information as to what next steps be taken.

Our scope of work for this study is summarized in Annex 1.

The survey mission consists of the following eight experts:

1. Mr. Mizuho Kitamura
   Project Manager, Senior Techno-Economist
   (General Supervision)
2. Mr. Masahiro Nakamura
   Senior Plant Engineer
   (Refinery Design)
3. Mr. Tan Hashida
   Senior Economist
   (Economic Evaluation)
4. Mr. Kojiro Kobayashi
   Senior Civil Engineer
   (Plant Location, Civil Work Design)
5. Mr. Masashi Shishiwa
   Senior Project Engineer
   (Planning of Construction Work)
6. Mr. Ryosuke Hashimoto
   Senior Chemical Engineer
   (Refining Process Design)

7. Mr. Akio Iwaki
   Economist
   (Financial Evaluation)
8. Mr. Toshio Kurokawa
   Chemical Engineer
   (Market Research)

1. OUTLINE OF THE WORK PERFORMED

The main purpose of the present Field Survey is to collect data and information, which are to be analysed after the Survey Team goes back to Japan, and are to be used as bases of the further study.

During the stay of the Team in Oman, the collection of data and information has been carried out almost satisfactorily with few exception of those concerning the experience and record of past construction works which was performed in the country, as mentioned later.

The following is a brief description of the work performed by the Team.

1.1 Economy

Omani economy, having experienced modest growth both in 1977 and 1978, is now on the stage of stablized growth according to the Development Council and the Central Bank of Oman. Forecast of oil production has been revised upward and oil price increase in 1979 will undoubtedly stimulate economic growth to a certain degree.

The current lending interest rates of commercial banks are reported to remain not more than 11.5% p.a., which seems to be still high for financing industrial projects. The lending interest rate of 8% offered by the Oman Development Bank is therefore reasonable.

Foreign exchange rates of Rials Omani have been regulated by way of U.S. Dollars, on which R.O. has been pegged. Omani currency, consequently, suffered devaluation together with U.S. Dollars. Floating R.O. as such will not be a solution and be left out of consideration for the time being, according to the Central Bank. On account of this, development funds raised in the form of foreign currency other than U.S. Dollars may suffer from continued depreciation of value.

Construction of a refinery, which constitutes a major part of industrialization program of the current Five Year Plan, is also expected to remain as one of prime development project in the next Five Year Plan (1981–1985) now in preparation.

1.2 Policy on the Refinery Construction

Through repeated meetings with Ministry of Commerce and Industry, Ministry of Agriculture, Fisheries, Petroleum and Minerals as well as the Development Council, the Team had a

strong impression that the refinery project had been rendered an increasing importance in the policy making of the Government.

It is recognized by the Team that as early completion of the refinery as possible is desired when its necessity and economy are proven.

1.3 Market for Refined Petroleum Product

The team obtained from the Ministry of Commerce and Industry the past record of sales of various petroleum products up to the year 1978. Also obtained was a forecast of demand for the products from 1979 to 1985 that is agreed upon between the Ministry and Shell, the biggest marketer of the petroleum products in the country.

In addition the Team collected a number of statistics related to the consumption of petroleum products mostly up to 1978 from relevant organizations. The data collected are, among others:

- number of registered vehicles
- movement of civil aircrafts
- road construction
- electric power generation, etc.

These data are sufficient for the analysis of consumption of the petroleum products in the past and also for making the Team's own estimation for the future demand of the products.

1.4 Location of the Refinery

Two candidate locations were indicated by the Ministry of Commerce and Industry and by the Ministry of Agriculture, Fisheries, Petroleum and Minerals at the early stage of the Field Survey. Also indicated was that there is no third candidate, at least presently.

The two candidate locations are:

- Mina al Fahal area, in the existing PDO-Shell-BP compound
- Al Ghubra area, around the existing Electric Power and Desalination plants

The Team paid repeated visits to the two areas to make visual observations as well as interviews to the people of the existing establishements. At least one site in each of the two areas was found to be suitable as the site for the refinery.

The Team collected the following materials and information concerning the two candidate locations:

- topographical map
- climatic data
- tidal data

However, soil and marine data except for the tidal data have not become available during the stay of the Team, so that the Team has made request for the above data to the Ministry of

Commerce and Industry (concerning BP site) and SOGEX International Ltd. (concerning Electricity/Desalination site).

However, toward the end of the stay, the Team was told by the Ministry of Land Affairs and Municipalities that the Al Ghubra area is designated in the "CAPITAL AREA STRATEGIC PLAN" of April 1978 as "Reserve Area" in which no development will be permitted. Therefore, if the refinery is to be located in this particular area, special compromise should be made among the Ministries concerned.

As to the environmental problems, a Marine Pollution Law of 15th August, 1974 is already in force and it is suggested by the Central Laboratory that an environmental appraisal report should preferably submitted to the authority concerned prior to the start of the construction.

1.5 Crude Oil

The following is indicated to the Team by the Ministry of Agriculture, Fisheries, Petroleum and Minerals:

- Crude oils from various oil fields in the country are blended and sold under a single brand name of Oman Crude. However, the characteristics of the Crude have changed and will change according to the change of the blending ratio of the component crudes.
- The refinery shall be given the first priority as to the supply of crude oil, in spite of existing export agreements.
- The refinery will receive its crude supply at the entrance of the refinery from the existing PDO crude terminal. The crude supply could be made by minor modifications of either existing crude loading pipeline (to Mina al Fahal area) or the crude pipeline to the Power/Desalination Plants which is no more in use (to Al Ghubra area).
- The supply price of crude oil to the refinery shall be the market price.

The ministry also provided the Team with the following information:

- the Assay of Oman Crude lately placed on the market
- future prospect of blending ratio of various crude oils
- tank and piping arrangements of PDO crude terminal.

1.6 Utilities

The team is indicated by the Ministry of Electricity and Water as the following:

- The generating capacity of Al Ghubra Power Station will be increased in this September to 225 MW from present 125 MW, and further 300 MW of generating capacity will be added by 1985. Therefore, no problem is foressen as to the electricity supply for the construction and operation of the refinery.
- In line with the abovementioned new generating capacity of 300 MW of Al Ghubra, 25 million gallon per day of desalination capacity will be added so that water supply to the

refinery will become possible. However, it would be recommended the refinery have its own desalination plant and supply from public water system be considered as a stand-by.

- During the construction period, water supply to the site seems very difficult because of the limitation of the existing supply capacity. It will be recommended to consult the Water Resources Council who control the extraction of underground water.
- Presently flat electricity tariff of Baisa 20/KWH is applied to all consumers. Water price is Baisa 2.0/gallon for citizens and Baisa 3.0/gallon for industrial users.

The team also obtained information on the ground-water levels and analysis of the water from the Water Resources Department, Ministry of Agriculture, Fisheries, Petroleum and Minerals.

1.7 Construction Work

The Team tried to obtain information concerning the past records or experience of such construction works as those of oil tanks or big industrial plants in the country. For that purpose, the Team met a number of contractors who had taken parts in the construction works of the kinds as well as some of the owners of such installations.

The result was not very satisfactory. Some of the findings are as follows:

- Applicable national standards are only those for quality of water, aggregates, and cement for making concrete. There is no national building code. To imported plants, standards or codes of the exporting countries are mainly applied as well as company standards of such owner companies as Shell and BP.
- All major equipment and machinery and also most of major materials such as tank plate were imported. Installation was carried out by big foreign contractors who can manage to mobilize necessary construction machinery and skilled workforce. Local contractors are only capable of construction of small tanks and the alike.
- In Mina al Fahal area, no piling was needed for foundations of the Shell oil depots and the first stage of the BP depot. But for the second stage expansion of the latter which completed in 1978, piling works to the depth of 6 meters were needed. The Team interviewed the Port Services Corporation Ltd. and found that unloading facilities and experience at the Mina Quaboos, where the imported equipment and materials for the construction of the refinery are presumablly landed, are almost satisfactory.

Observations are made by the Team on the main roads connecting the two candidate locations to the Mina Quaboos. It was found that a number of roundabouts, overhead bridges, and overhead electricity lines may hinder the transportation of big equipment and machinery.

Then, the team approached SOGEX International Ltd., through the kind arrangement by Mr. Seif Salim al Mammary, the Undersecretary of the Ministry of Electricity and Water to obtain data on soil and marine conditions at Al Ghubra area and data related to the construction cost of the Electricity/Desalination plants. Although no immediate answer was obtained, SOGEX

agreed, not very willingly, to provide the data requested. Since the data are to become available after the departure of the Team, close follow-up and expedition by the Ministry of Commerce and Industry is most desired.

1.8 Existing Depots

The Team visited all of the three existing depots of the refined petroleum products in the country, two in Mina al Fahal area and one at Port Raysut near Salalah, Dhofar. All three depots serve as import terminals and domestic distribution basis.

One of Mina al Fahal depots is owned by Shell Market (Middle East) Ltd. The depot has nine tanks with a total storing capacity of around 24,000 tons. Products are mostly shipped from the terminal in Dubai by 3,000 ton coastal tankers.

Another depot in Mina al Fahal is owned by BP Arabian Agencies Ltd. It has a combined storing capacity of about 9,500 tons in sixteen tanks. Most of the products are from Caltex's refinery in Bahrain and carried by six tankers with capacities ranging from 350 to 2,800 tons.

The depot at Raysut is owned by the Ministry of Commerce and Industry and is operated by Shell. Total storing capacity is 16,000 tons in seven tanks. Products are brought mostly from Dubai and the number of trips by 2,500 ton coastal tankers is four times per month.

Even if the new refinery is completed, the depot at Port Raysut will maintain its present function, that is, to receive products and distribute them in the local market. Its storing capacity which corresponds to the demand for about two months at the present level of consumption, seems sufficient for that task.

In the contrary, the duties of the Mina al Fahal depots will have to change upon completion of the new refinery. They will no more be import terminals, but will be expected to serve as product storages of the refinery and also as distribution basis. Products to be sent to Raysut will also have to be shipped from these depots.

Present combined storing capacity of the two depots in Mina al Fahal area corresponds to the demand of about 0.8 month at the present level of consumption, which seems insufficient to meet the future increase of the demands. Therefore, it will have to be supplemented by new storage capacities in the refinery.

Unloading facilities of the Mina al Fahal depots that are presently used to receive products will be easily converted to loading services by minor modifications.

2. BASIS OF STUDY

2.1 Crude Oil

The base feedstock for the proposed refinery is the Oman Crude.

2.1.1 Properties

The properties of the Oman crude is as described in the Crude Assay dated June 1976, received from the Ministry of Agriculture, Fisheries, Petroleum and Minerals.

Although crude properties may be changed by blending of crudes from new oilfields, data and information now available is not sufficient to allow forecast of the properties as precise as the Crude Assay.

2.1.2 Supply conditions

A sufficient quantity of crude oil is supplied at the entrance of the proposed refinery.

2.2 Petroleum Products

Petroleum products to be studied are:

- LPG
- Super motor gasoline (Mogas 97)
- Regular motor gasoline (Mogas 90)
- Aviation fuel (Jet A-1)
- Domestic kerosene
- Gas oil (Diesel Oil)
- Bunker Fuel oil
- Aviation gasoline (Avgas)
- Asphalt (Bitumen)

2.2.1 Specifications

The specification of the petroleum products are fundamentally as described in the specifications of the following products received from the Ministry of Commerce and Industry:

- Super motor gasoline
- Regular motor gasoline
- Jet A-1
- Gas oil
- Bunker fuel oil

Specifications for the products other than the above are to be set forth in accordance with internationally accepted standards.

2.2.2 Prices

Prices of the petroleum products to be used in the financial analysis are as indicated by the Ministry of Commerce and Industry, that is:

	1978	1979	
– LPG	–	88.18	Baisa/kg
– Super motor gasoline	46.13	52.56	Baisa/L
– Regular motor gasoline	41.92	47.87	Baisa/L
– Jet A-1	42.47	48.15	Baisa/L
– Domestic kerosene	42.47	48.15	Baisa/L
– Gas oil	38.37	43.45	Baisa/L
– Bunker fuel oil	–	26.5	Baisa/L
– Aviation gasoline	–	–	Baisa/L
– Asphalt	–	–	R.O./ton

2.3 Site

Two site as indicated by the Ministry of Commerce and Industry and by the Ministry of Agriculture, Fisheries, Petroleum and Minerals are to be considered for the proposed refinery, they are:

Site A: PDO area at Mina al Fahal

Site B: Near Desalination Plant at Al Ghubra

2.4 Utilities

2.4.1 Water

Potable and industrial water are supplied at the fence of the proposed refinery by the Ministry of Electricity and Water at a price of 2 Baisa/gallon, which is the supply price to P.D.O.

Sea water is used for process cooling.

Electricity is supplied by the Ministry of Electricity and Water at the fence of the proposed refinery at a price of 20 Baisa/KWH.

Economy of owning the refinery's own generating plant is to be examined.

2.5 Oil Handling Facilities

2.5.1 Crude Oil Tank

Only a minimum capacity of crude tank that is technically needed is to be installed in the proposed refinery since the existing PDO crude tanks are promised to serve as the crude storage of the refinery.

2.5.2 Products Storage and Shipping

Existing depots for distribution are to be considered as supplements for the products storage to be held by the proposed refinery in order to economize the latter.

Pipelines to transfer the products to the two existing depots are included in the scope of the proposed refinery.

Existing unloading facilities of the two depots are easily be converted to products loading purposes by minor modifications, so that the costs of the convertion is not included in the study.

2.6 Financial and Economic Evaluation

2.6.1 Monery Term

All monetary value is to be expressed in terms of Rial Omani: (R.O.), fixed exchange rate to US$ being 2.89234:1.

2.6.2 Price Basis

Evaluation is to be made on "present price basis", i.e. no price escalation is to be considered.

2.6.3 Product price

Prices described under 4.2.2 are to be used as the ex-refinery prices of the products.

2.6.4 Crude Cost

US$ 13/bbl and US$ 15/bbl, which are the FOB export prices in 1978 and at present, respectively, of the Oman Crude of 35.5 degrees API, will be taken as the cost of the crude oil to the proposed refinery.

2.6.5 Utility Cost

Supply prices of water and electricity described under 4.4.1 and 4.4.2 are to be used as the costs of these utilities supplied from outside to the proposed refinery.

The cost of natural gas, if necessary, is to be set force at half the present price of crude oil in terms of heat value.

2.6.6 Depreciation

A ten-year straight-line method of depreciation is to be applied with 10% salvage value.

2.6.7 Taxation

No taxation will be considered since the proposed refinery is a government project.

3. STUDY SCHEDUELE

The Draft Final Report of the present study shall be submitted as quickly as possible in consideration of the urgent need of decision on the refinery project.

A number of the Experts shall visit Oman at the end of five weeks after the Draft Final Report is mailed, and shall stay in Oman for one week for presentation of and discussion on the Report.

Ten copies of the Final Report incorporating the results of the discussion shall be mailed within one month after the Experts' return to Japan.

Annex 1 March 1979

SCOPE OF WORK

Feasibility Study Team
for the Oil Refinery Construction Plan
in the Sultanate of Oman
JICA

Purpose of the Study

The purpose of the Feasibility Study is to assist the Government of the Sultanate of Oman in the preparation of a plan for the construction of an oil refinery which is expected to meet primarily the future demand for various refined petroleum products in the country.

Work Procedure

The overall procedure of the Feasibility Study intended by the Study Team is illustrated schematically in the attached chart, "WORK FLOW DIAGRAM".

The major activities in the Study are indicated by the boxes in the chart. There are two kind of boxes: double-edged and single-edged ones. The former represent the collection of data and information, which are to be undertaken mainly during the present Field Survey. The latter works concern mostly analyses of the data collected and the planning of refinery facilities based on the analyses mentioned above.

(1) Collection of Data and Information

The following is the description of major activities in accordance with the chart:

(a) Data on the Economy and Industry of the Country
- Economic and industrial policies
- Tax and financing systems
- Forecast of the economy
- Parameters and indicators concerning to the national economy
- Labour force, etc.

(b) Data on Markets for Refined Petroleum Products
- Past and present consumption of each refined petroleum products
- Demand forecasts for the refined petroleum products
- Present status and future prospects for the petroleum consuming industries
- Specifications of the petroleum products, etc.

(These data are to be concerned primarily to the domestic market, though data on the neighbouring countries will be collected by the Team as well as by the home officies mainly from literature.)

(c) Data on the Crude Oil Produced in the Country

- Names of crude oils and their places of production
- Properties
- Quantities available
- Methods and conditions of supply, etc.

(d) Data on Refinery Location

- Places regarded as candidates for the location of the refinery
- Natural conditions
- Infrastructures, etc.

(e) Data on the Utility Supplies

- Natural gas
- Electricity
- Industrial water
- Sea water, etc.

(f) Data related to the Planning of the Construction Works

- Overall natural and social circumferences
- Ports
- Land transportation
- Utilities for the construction works
- Labour
- Laws and regulations
- Locally available materials and equipment, etc.
- Environmental control

(g) Data on the Existing Depots for Petroleum Products

- Onwers and locations
- Type, number and capacity of tanks
- Operations, etc.

(2) Analysis and Planning

Based on the above data and information, the following works are to be carried out in the home offices:

(2.1) Market Analysis and Forecasting

Future demands for the each refined petroleum product as well as their expected specifications and competitive conditions are to be forecasted.

(2.2) Planning of the Refinery

Such major features of the refinery as location, crude processing capacity, refining scheme, requirements for the refining and utility plants, manning and organization, etc. are to be examined and proposed.

As an alternative to the refinery, a plan will also be worked out for a reserve storage of petroleum products for emergency.

(2.3) Cost Estimation

Construction and operating costs of the refinery and the reserve storage are to be estimated.

(2.4) Financial and Economic Analysis

Commercial profitability of the refinery is to be calculated and developed into a form of anticipated financial statements. Expected effects which the construction and operation of the refinery will exert on the national economy of the country are also to be estimated. Comparison will be made between the effects of the alternatives.

(2.5) Overall Evaluation and Recommendations

On the basis of the above studies, overall evaluation will be made on the refinery construction project. In addition, various problems which are likely to be encountered in the course of implementation of the project will be pointed out and recommendations will be made as to the necessary measures to be taken to cope with such problems.

(3) Reporting

The results of the study will be submitted as a Fianl Report in English language.

Prior to the completion of the Final Report, a Draft Final Report will be prepared and will be subjected to the review of the Government.

Some of the experts of the Study Team will be sent to the country to make presentation and discussion with the Government.

The Government is expected to give its comments, if any, on the Draft Final Report in writing to the experts.

Necessary improvements are to be made on the Draft Final Report incorporating the Government's comment. And the Final Report will be submitted in printed and bound form.

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