Table VII-1 Main Equipment List of Refinery (14/15)

[Tankage, Off-site Facilities & Auxiliaries]

Item No.	Service	Q'ty	Description	Material	Remarks
1	Tankage		Please refer to Tank List (Table VII-2)		
2	Pumps				
2-1	Booster Pumps for Process Units	16	Centifugal Type		
2-2	Blender & Transformer Pumps	15	Ditto		
2-3	Shipping & Filling Pumps	20	Ditto		
2-4	Other Pumps	6	Reciprocating & Gear Type		
3	TEL Injection Facility for Gasoline	1 set			
4	Dye Injection Facility for Gasoline	1 set			
5	Addition Injection Facility for Jet Fuel	1 set			
6	Asphalt Drum Filling Machine	5 sets			
7	Asphalt Drum Paretizer	2 sets			
8	Waste Water Treatment	1 set			
9	Flare System	1 set			

Table VII-1 Main Equipment List of Refinery (15/15)

[Tankage, Off-site Facilities & Auxiliaries]

Item No.	Service	Q'ty	Description	Material	Remarks
10	Fire Fighting Facility	1 set			
11	Communication System	1 set			
12	Maintenance Equipment and Tool	1 set			
13	Laboratory Equipment	1 set			
14	Protective Appliance	1 set			
15	First-aid Appliance	1 set			
16	Transportation Machinery	1 set			

Table VII-2 Tank List (1/4)

Item No.	Service	Day of Storage	Flow Rate (BPSD)	Capacity (kl)		No. of Tanks	Type of Tanks
				Total	Each		
1	Feedstock Crude Oil	40	40,000	363,000	20,000	6	FR with Mixer
2	Intermediate						
2-1	Naph HDS Charge (WN)	15	8,418	25,000	12,000	2	DR with inner float
2-2	Reformer Charge (THN)	7	5,637	9,000	5,000	2	DR with inner float
2-w	Kero HDS Charge (KERO)	21	3,960	18,900	10,000	2	FR
2-4	GO HDS Charge (GO)	18	6,840	24,500	12,000	2	FR
2-5	FCC Charge (VGO)	15	12,503	37,300	12,000	3	CR
2-6	TC (AR)	15	22,906	68,300	12,000	6	CR
2-7	Vacuum Residue (VR)	15	12,200	36,400	12,000	3	CR with Heating Coil & Insulation
3	Components						
3-1	L't Naphtha (TLN)	15	3,096	10,500	5,500	2	FR
3-2	Reformate	15	4,472	15,200	8,000	2	FR
3-3	FCC Gasoline	15	5,989	20,400	10,500	2	FR
3-4	Treated GO (DSGO)	18	6,618	23,700	6,000	4	CR

Table VII-2 Tank List (2/4)

Item No.	Service	Day of Storage	Flow Rate (BPSD)	Capacity (kl)		No. of Tanks	Type of Tanks
				Total	Each		
3-5	EBHC GO	15	2,508	7,500	4,000	2	CR
3-6	FCC LCO	15	4,001	11,900	6,000	2	CR
3-7	FCC HCO	15	1,000	3,000	2,000	2	CR
3-8	Vacuum GO	15	2,617	7,800	4,000	2	CR
3-9	EBHC Residue	15	4,275	12,700	6,500	2	CR with Heating Coil
4	Product						
4-1	Propane	30	1,528	9,100	3,000	3	Sphere
4-2	Butane	30	2,510	15,000	3,000	5	Sphere
4-3	Prem. Gasoline	30	6,000	40,900	10,000	4	FR
4-4	Regular Gasoline	30	6,000	40,900	10,000	4	FR
4-5	Kerosene & Jet Fuel	36	3,960	32,400	8,000	4	FR
4-6	Gas Oil	30	11,068	66,000	11,000	4	CR
4-7	Fuel Oil	30	9,737	58,100	10,000	6	CR with Heating Coil & Mixer
4-8	Asphalt	30	600	3,600	1,000	4	CR with Heating Coil, Mixer & Insulation

Table VII-2 Tank List (3/4)

Item No.	Service	Day of Storage	Flow Rate (BPSD)	Capacity (kl)		No. of Tanks	Type of Tanks
				Total	Each		
5	Others						
5-1	Light Slop				2,000	1	FR
5-2	Heavy Slop				2,000	1	CR with Heating Coil & Mixer
5-3	HFO				2,000	1	CR with Heating Coil

Table VII-2 Tank List (4/4)

Item No.	Service	Day of Storage	Flow Rate (BPSD)	Capacity (kl)		No. of Tanks	Type of Tanks
				Total	Each		

* Remarks

Base of Tank Sizing

Crude Oil Tank including crude oil terminal	40 Days
Intermediate Tank	15
Product Tank	30

Tank Volume Calculation

$Q = V \times D \times 1/W$

Q : Tank Volume (kl)
V : Flow (kl/d)
D : Storage Days (d)
W : Working Factor

for Cone Roof	0.8
for Floating Roof	0.7
for Sphere	0.8

Type of Tanks

FR = Floating Roof Type
DR = Dome Roof Type
CR = Cone Roof Type

Table VII-3 Land Shipping Facilities List

1. LPG Tank-truck Shipping

(1) Loading Speed : 60 kl/h.p't

(2) Loading Point : For Propane 2 p't
For Butane 4 p't
For Propane & Butane 2 p't

(3) Shipping Pump : Propane 120 kl/h x 2 sets
Butane 180 kl/h x 2 sets

2. White Oil Tank-truck Shipping

	Premium Gasoline	Regular Gasoline	Kerosene	Gas Oil	Jet Fuel
(1) Loading Speed	← 120 kl/h·p't (Bottom Loading) →				
(2) Loading Point	← 16 p't →				1 p't
(3) Loading Nozzle	16	16	8	16	1
(4) Shipping Pump	$240^{kl/h}{}_{x3}{}^{sets}$	$240^{kl/h}{}_{x3}{}^{sets}$	$180^{kl/h}{}_{x2}{}^{sets}$	$330^{kl/h}{}_{x4}{}^{sets}$	$60^{kl/h}{}_{x2}{}^{sets}$
(5) Micro Filter	$360^{kl/h}{}_{x2}{}^{sets}$	$360^{kl/h}{}_{x2}{}^{sets}$	$360^{kl/h}{}_{x1}{}^{sets}$	$330^{kl/h}{}_{x4}{}^{sets}$	$120^{kl/h}{}_{x1}{}^{set}$

3. Fuel Oil Tank-truck Shipping

(1) Loading Speed : 80 kl/h

(2) Loading Point : 11 p't

(3) Shipping Pump : 290 kl/h x 3 sets

4. Asphalt Drum Filling

(1) Drum Filling Speed : 40 Drums/h.Filler

(2) No. of Fillers : 5 Fillers

(3) Filler Charge Pump : 25 kl/h x 2 sets

Table VII-4 Building List for Refinery

1. Administration and Welfare Buildings

No.	Description	Req'd No.	Specification
(1)	Administration Building	1	Reinforced Concrete Structure
(2)	Canteen	1	Ditto
(3)	Clinic	1	Ditto
(4)	Fire Fighting Station	2	Steel Frame Structure
(5)	Gate House	2	Reinforced Concrete Structure
(6)	Operator Center	1	Ditto

2. Building Related to Refinery Facilities

No.	Description	Req'd No.	Specification
(1)	Warehouse	3	Steel Frame Structure
(2)	Maintenance Shop	2	Ditto
(3)	Primary Substation	1	Reinforced Concrete Structure
(4)	Laboratory	1	Ditto
(5)	Octane Engine Shelter	1	Steel Frame Structure
(6)	Process Control Room and No. 1 Substation	1	Reinforced Concrete Structure
(7)	Utility Control Room and No. 2 Substation	1	Ditto
(8)	Tankage Control Room and No. 3 Substation	1	Ditto
(9)	Shipping Control Room and No. 4 Substation	1	Ditto
(10)	Field Office	3	Steel Frame Structure
(11)	No. 5 Substation	1	Reinforced Concrete Structure
(12)	No. 6 Substation	1	Ditto

2. Crude Oil Terminal

2.1 Process Flow

Fig. VII-15 shows the process flow of the crude oil terminal. Crude oil tankers arrive at the pier of dolphin type, and the crude oil is received by a crude oil tank of 40,000 kl capacity through a loading arm.

Guatemalan crude oil is also received by the 40,000 kl crude oil tank from the existing terminal facility.

The crude oil storage capacity has been set at the quantity that is equivalent to 30-days operation of the oil refinery, with five tanks installed, each having a capacity of 40,000 kl.

The crude oil stored in crude oil tanks is sent to the oil refinery by discharge pumps through a pipeline of 16 inch diameter and two booster stations.

2.2 Plot Plan

The crude oil terminal is installed in the area adjacent to the existing port facilities of Puerto Santo Tomas de Castilla. The terminal plot plan is shown in Fig. VII-16. The pier is designed in a dolphin type and its total length is 475 m. Positioning of this pier has been based on the water depth of Puerto Santo Tomas de Castilla and the rotation radius of a crude oil tanker when it arrives.

2.3 List of Major Facilities

Table VII-5 shows a list of major facilities for the crude oil terminal.

Fig. VII-15 Flow Diagram of Crude Oil Terminal

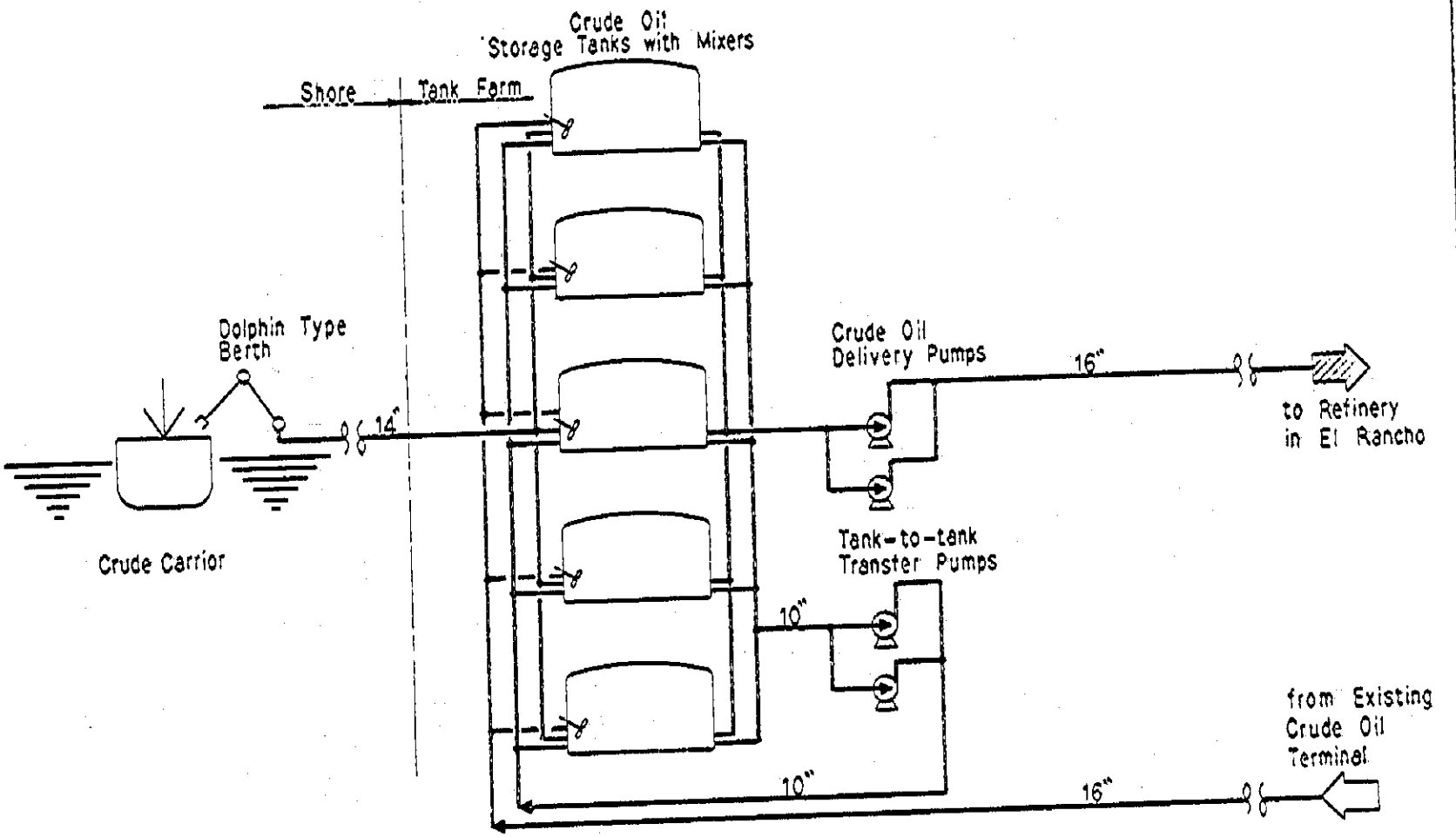
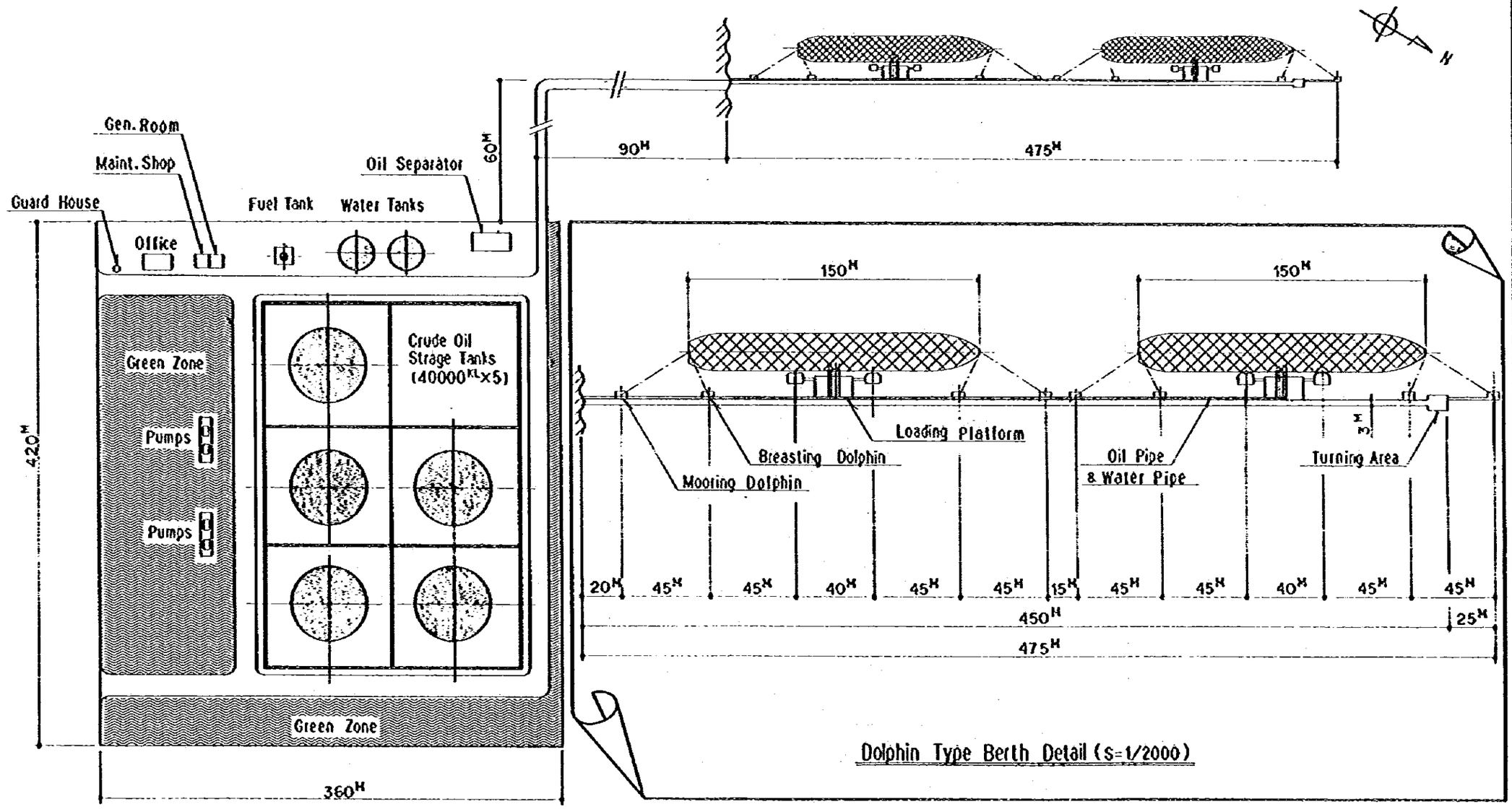


Fig. VII-16 Plot Plan of Crude Oil Terminal



Dolphin Type Berth Detail (S=1/2000)

Table VII-5 Main Equipment List of Terminal

Item No.	Service	Q'ty	Description	Material	Remarks
1	Crude Oil Storage Tank	5	Floating-roof Type with Tank Mixers, 40,000 kl	Carbon Steel	
2	Fuel Storage Tank	1	Cone-roof Type 180 kl	Ditto	
3	Water Tank	2	Cone-roof Type 10,000 kl	Ditto	
4	Crude Oil Delivery Pumps	2	Diesel Engine Driven $5.3\ m^3/min.\ \ 75\ kg/cm^2G$		
5	Tank-to-tank Transfer Pump	2	Centrifugal Type $7.5\ m^3/min.\ \ 30\ mH$		
6	Water Pump	2	Diesel Engine Driven $17\ m^3/min.\ \ 10\ Kg/cm^2G$		
7	Drain Pump	2	Centrifugal Type $8.3\ m^3/min.\ \ 30\ mH$		
8	Diesel Engine Genrator	2	650 KVA		
9	Oil Separator	1	API Type		

3. Pipeline

3.1 Process Flow

Fig. VII-17 shows the process flow of the pipeline. The crude oil is sent out of crude oil tanks by crude oil discharge pumps at the crude oil terminal, flows through No. 1 booster station about 75 km, and No. 2 booster station of about 150 km away from the crude oil terminal, as far as the oil refinery in El Rancho.

The pipeline is installed underground in a depth of 1 m. It is installed in an arch type when crossing over a river, and runs along Route CA9.

3.2 List of Major Facilities

Table VII-6 shows a list of major facilities for the pipeline.

Fig. VII-17 Pipeline

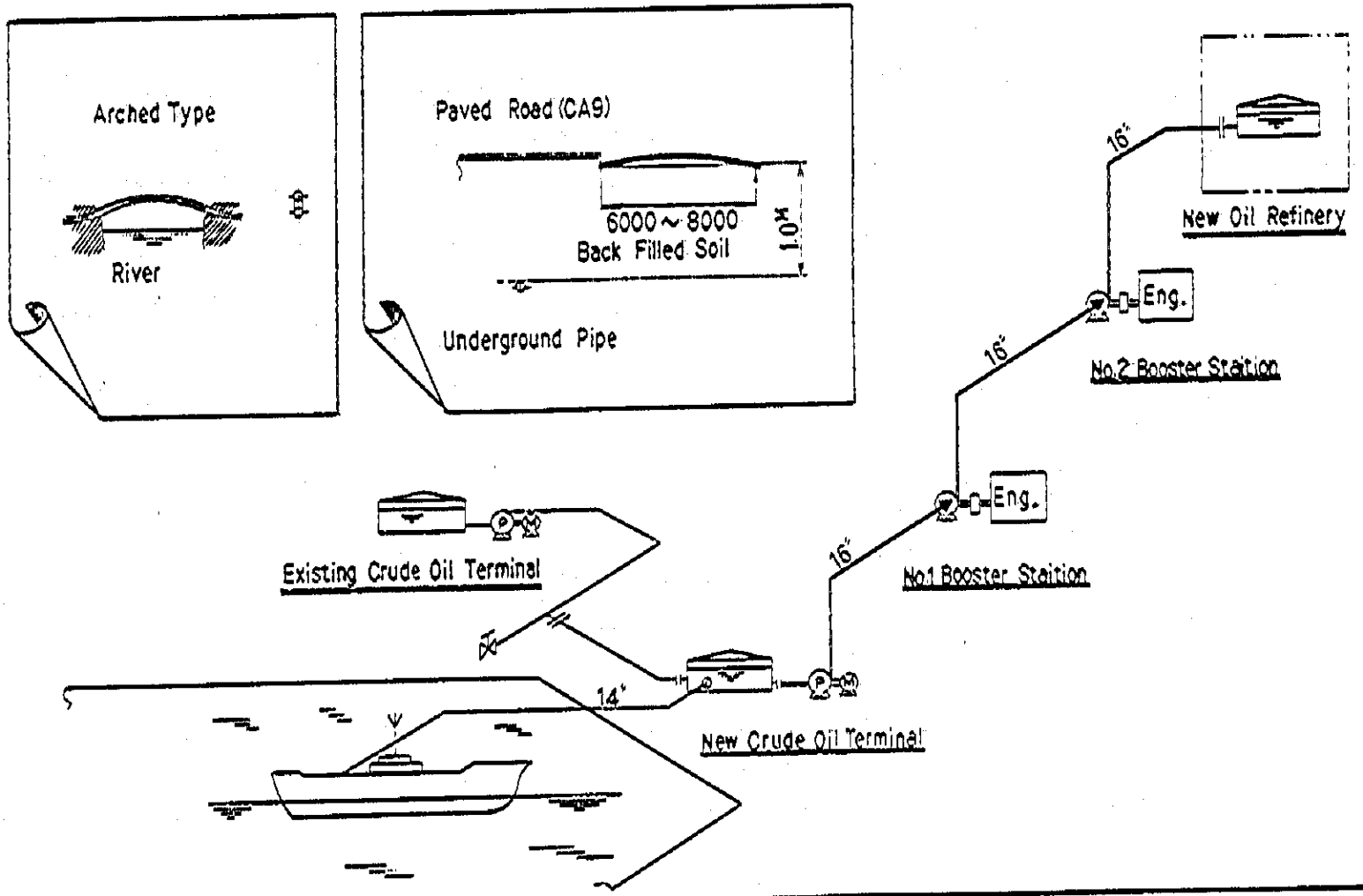


Table VII-6 Main Equipment List of Pipeline (1/2)

Item No.	Service	Q'ty	Description	Material	Remarks
1	Pipe	220 km	16 inch, 12 mm thickness Anticorrosion Method: Tape Rapping and Electricity	API 5L x 52	
2	Pump	2 sets/ B.S.	Diesel Engine Driven 5.3 m^3/min. 75 Kg/cm^2G		B.S.: Booster Station
3	Crude Oil Surge Tank	2/B.S.	Cone-roof Type 100 kl	Carbon Steel	
4	Fuel Oil Tank	2/B.S.	Cone-roof Type 30 kl	Ditto	
5	Diesel Engine Generator	2/B.S.	300 KVA		
6	Fire Fighting Facility	1 set/ B.S.			Based on NFPA
7	Cooling Water Facility	1 set/ B.S.			
8	Control Room	1 set/ B.S.			
9	Pipe Cleaning Facility	1 set/ B.S.			
10	Communication Facility	1 set/ B.S.			

Table VII-6 Main Equipment List of Pipeline (2/2)

Item No.	Service	Q'ty	Description	Material	Remarks
11	Environmental Facility	1 set/ B.S.	Oil Separator		

VOLUME VIII

CONSTRUCTION PLAN

VIII CONSTRUCTION PLAN

1. Transportation of Heavy Equipment

Among the refinery equipment, the largest equipment is the topper in terms of transportation unit. Its estimated dimensions and weight are 3,700 mm (ID) x 38,000 mm (L) and 100 t respectively. There are two proposed routes to transport the equipment including the topper; one is Route I, the highway (CA9) starting from San Jose on the Pacific Coast and arriving at El Rancho, while the other is Route II, the highway (CA9) starting from Puerto Santo Tomás de Castilla on the Atlantic Coast and arriving at El Rancho.

As a result of the filed survey including the survey on bearing capacity of bridges and radius of road curvature, Route II has been considered to be more suitable for transportation of large and heavy equipment, while both routes can be used for transportation of comparatively small equipment.

The following describes current situation and problems on the transportation through such two routes.

1.1 Route from the Pacific Coast (Route I, refer to Fig. VIII-1)

When the equipment are transported from the Pacific Coast, the port of disembarkation is San Jose.

One of berthes of San Jose port is 800 m long and 56 m wide with a permissible draft of 12 m. It can accommodate four vessels of each maximum 200 m long and about 20,000 DWT. However, there is not a gentry crane facility installed on the berth, nor is there a plan to install one

in the near future. A floating crane, accordingly, has to be used for unloading of the equipment.

The transportation route (CA9) from San Jose port to El Rancho is paved. The distance is about 185 km, and the road width at the narrowest part is 8 m.
On this route, there are 25 deck bridges, the narrowest width of which is 6 m and an allowable cargo weight is estimated to be about 80 t. All bridges between San Jose and Guatemala City are comparatively small, but there are five long bridges, which is also deep from the bridge girder to river bottom, on the route from the bridge girder to river bottom, on the route from Guatemala City to El Rancho. If these bridges must be reinforced to transport heavy equipment, it will be the work of extremely large scale. Also, there is one overpass of road (about 6 m clear height) and one overpass of railroad (about 10 m clear height) on this route.
While the radius of curvature of this route is smaller than that of the route from the Atlantic Coast, as described hereunder equipment of about 40,000 mm long may be transported by using the road width to its full extent. Nevertheless, when taking into consideration that Route I passes through Guatemala City, about 25 m, that is, the size of a large container should be the maximum for transportation through this route.

The approval by the Road Authority is necessary for the traffic of a vehicle which is larger than 2.5 m (W) x 20 m (L) x 4.1 m (H) and heavier than 38 ton.

1.2 Route from the Atlantic Coast (Route II, refer to Fig. VIII-1)

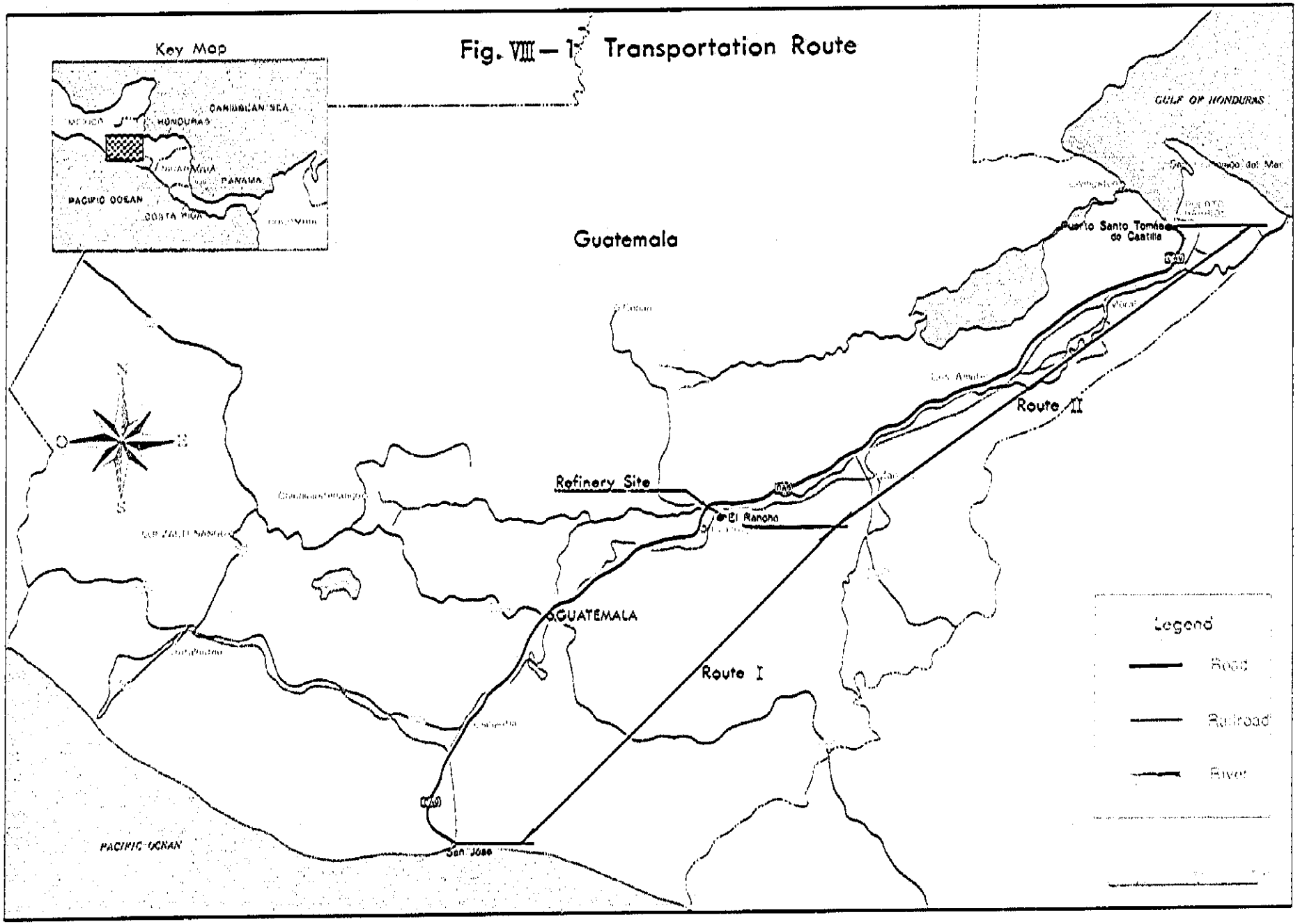
When the equipment are transported from the Atlantic Coast, the port of disembarkation is Puerto Santo Tomas de Castilla.

The berth of Puerto Santo Tomas de Castilla port is 950 m long (the clear berth length that can be used for disembarkation is 500 m) and 30 m wide, with a draft of 8 to 10 m. The size of vessels that can arrive at the pier is estimated to be about 12,000 DWT. (There is a record of 24,000 DWT vessel having arrived at the pier.)
There are a 50 t and a 150 t gantry crane on the berth. Sheds for storage are under construction. The handling charge is about 4.7 Q per ton, excluding the storage charge.

The transportation route (CA9) from Puerto Santo Tomas de Castilla to El Rancho is paved. The distance is about 200 km and the road width at the narrowest part is 8 m.
On this route, there are 54 bridges and the narrowest is 6 m wide. The estimated allowable cargo weight is about 80 t. All these bridges are not long, while the length from the bridge girder to the river bed is small. Even if the reinforcement is necessary, the work will not be too difficult. However, among 54 bridges, 10 bridges are overhead trussed bridges with about 4.5 m minimum clear height from the road surface to the bottom of the crossing members above road of the overhead truss. Therefore, some of the overhead trussed bridges needs reinforcement, and the crossing members above road must be removed or temporary bridges must be built.
There is no overpass of road or railroad on this route. Also, the radium of curvature of this route is greater than

that of the route from the Pacific Coast, and large and long equipment can be transported.

The approval by the Road Authority is necessary for the traffic of a vehicle that is greater than 2.5 m (W) x 20 m (L) x 4.1 m (H) and heavier than 38 ton.


Key Map
CARIBBEAN SEA
HONDURAS
PANAMA
PACIFIC OCEAN
COSTA RICA
Fig. VIII – 1 Transportation Route
Guatemala
GULF OF HONDURAS
Puerto Santo Tomás de Castilla
Route II
Refinery Site
El Rancho
GUATEMALA
Route I
PACIFIC OCEAN
San José
Legend
Road
Railroad
River

2. Construction Schedule

The construction schedule of the oil refinery, crude oil terminal and pipeline is shown in Fig. VIII-2.

Since it takes three years from the start of the basic design of the refinery until the start of a commercial operation, in order to start the commercial operation in January 1989, the contract for the engineering and construction has to be concluded by January, 1986.

Accordingly, an organization for the implementation of this project (Owner) has to be established in MEM as quickly as possible. The major works to be performed be the Owner before determining the contractor in January, 1986 are as follow:

(1) Finance arrangement

Implementation of this project requires a huge amount of investment of about 670 million quetzales.

(2) Preparation of tender specifications, etc., to select the contractor
The owner has to start studying the above in early 1985 at the latest.

The major time schedules related to the oil refinery, crude oil terminal and pipeline are as follows.

2.1 Oil Refinery

January, 1986	Conclusion of contract and start of basic design
April, 1986	Start of plant site preparation
June, 1986	Start of civil work
March, 1987	Start of erection work
October, 1988	Mechanical completion
October, 1988 - January, 1989	Trial operation
January, 1989	Start of commercial operation

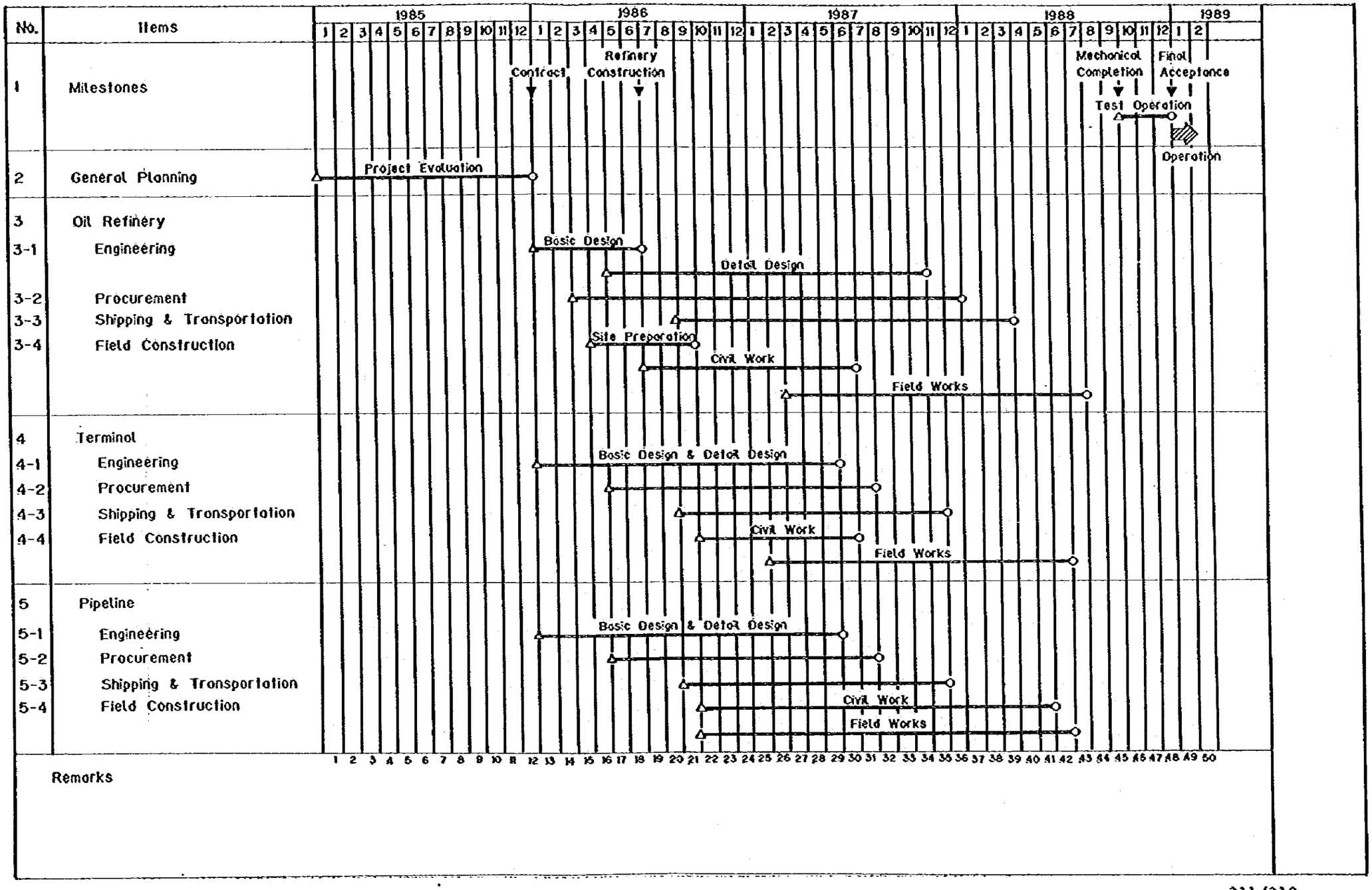
2.2 Crude Oil Terminal

January, 1986	Conclusion of contract and start of basic design
October, 1986	Start of civil work
February, 1987	Start of tank construction
June, 1988	Mechanical completion

2.3 Pipeline

January, 1986	Conclusion of contract and start of basic design
September, 1986	Start of civil work
October, 1986	Start of pipeline work
June, 1988	Mechanical completion

Fig. VIII-2 Schedule for Guatemala Oil Refinery



3. Labor Mobilization Plan for Construction

The total number of supervisors, skilled and unskilled labors for the construction of the oil refinery, crude oil terminal and pipeline, is shown in Fig. VIII-3 through Fig. VIII-5 respectively.

The number of personnel that this project employs for construction of the oil refinery, crude oil terminal and pipeline totals to about 63,000 man-months. The mobilization plan for each facility is as follows.

(1) Oil refinery

The construction of the oil refinery will have been completed in 28 months from July, 1986 to October, 1988, with personnel of 37,800 man-months required. The number of mobilized labors is 1600 men per day at the peak.

(2) Crude oil terminal

The construction of the crude oil terminal will have been completed in 21 months from October, 1986 to June, 1988, with personnel of 12,000 man-months required. The number of mobilized labors is 800 men per day at the peak.

(3) Pipeline

The construction of the pipeline will have been completed in 21 months from October, 1986 to June, 1988, with personnel of 13,200 man-months required. The number of mobilized labors is 800 men per day at the peak.

Fig. VIII-3 Mobilization Schedule for Oil Refinery

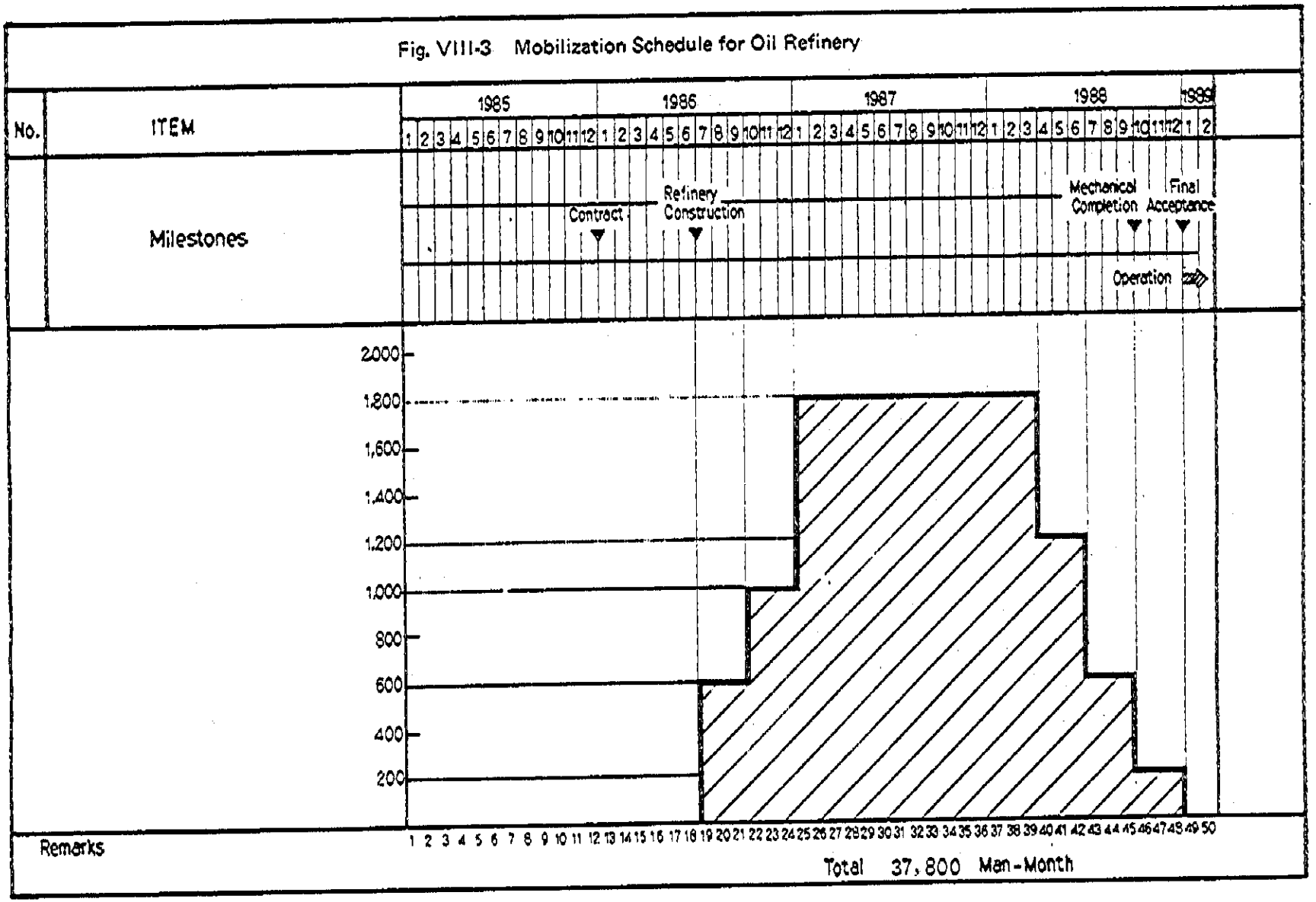


Fig. VIII-4 Mobilization Schedule for Terminal

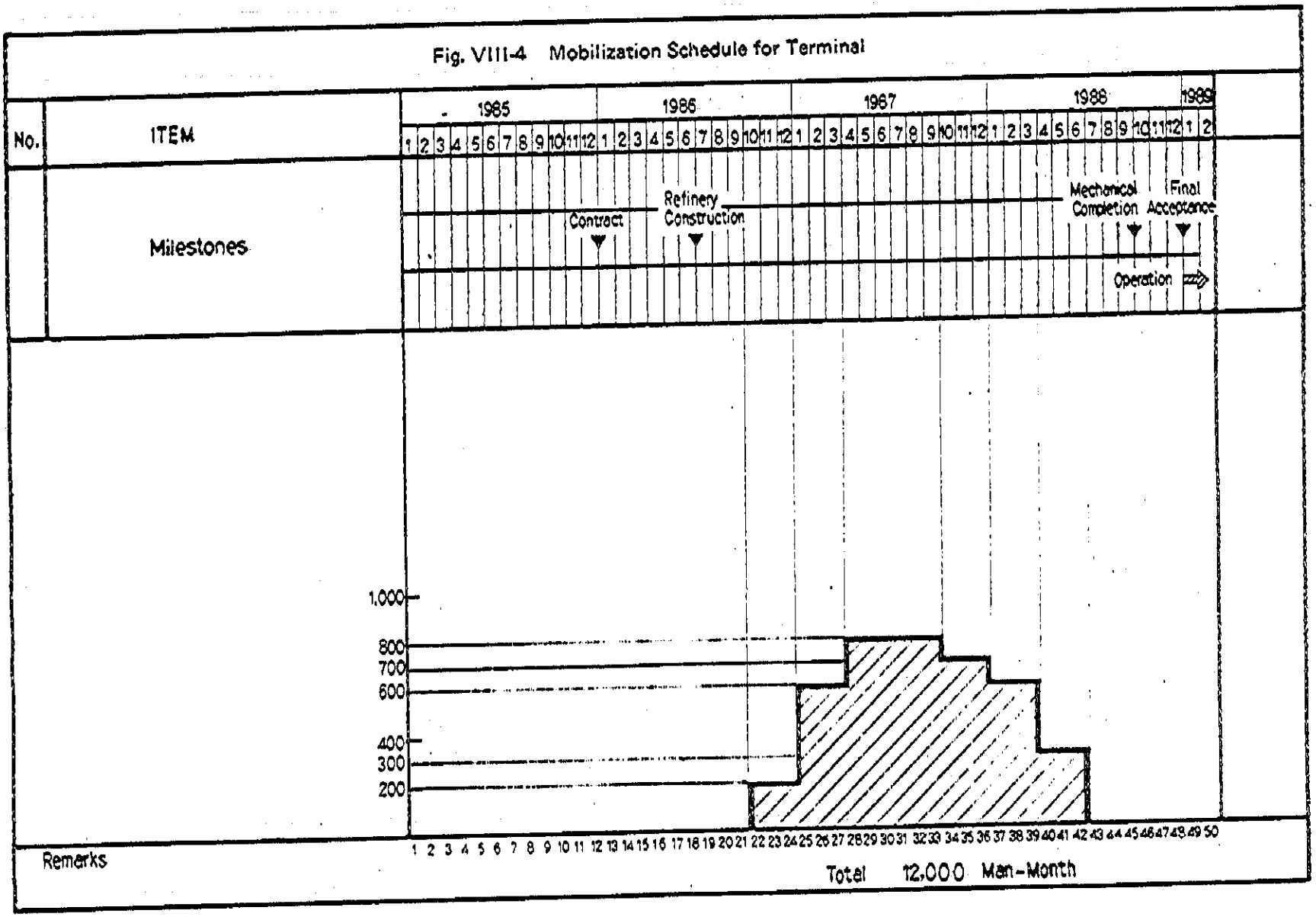
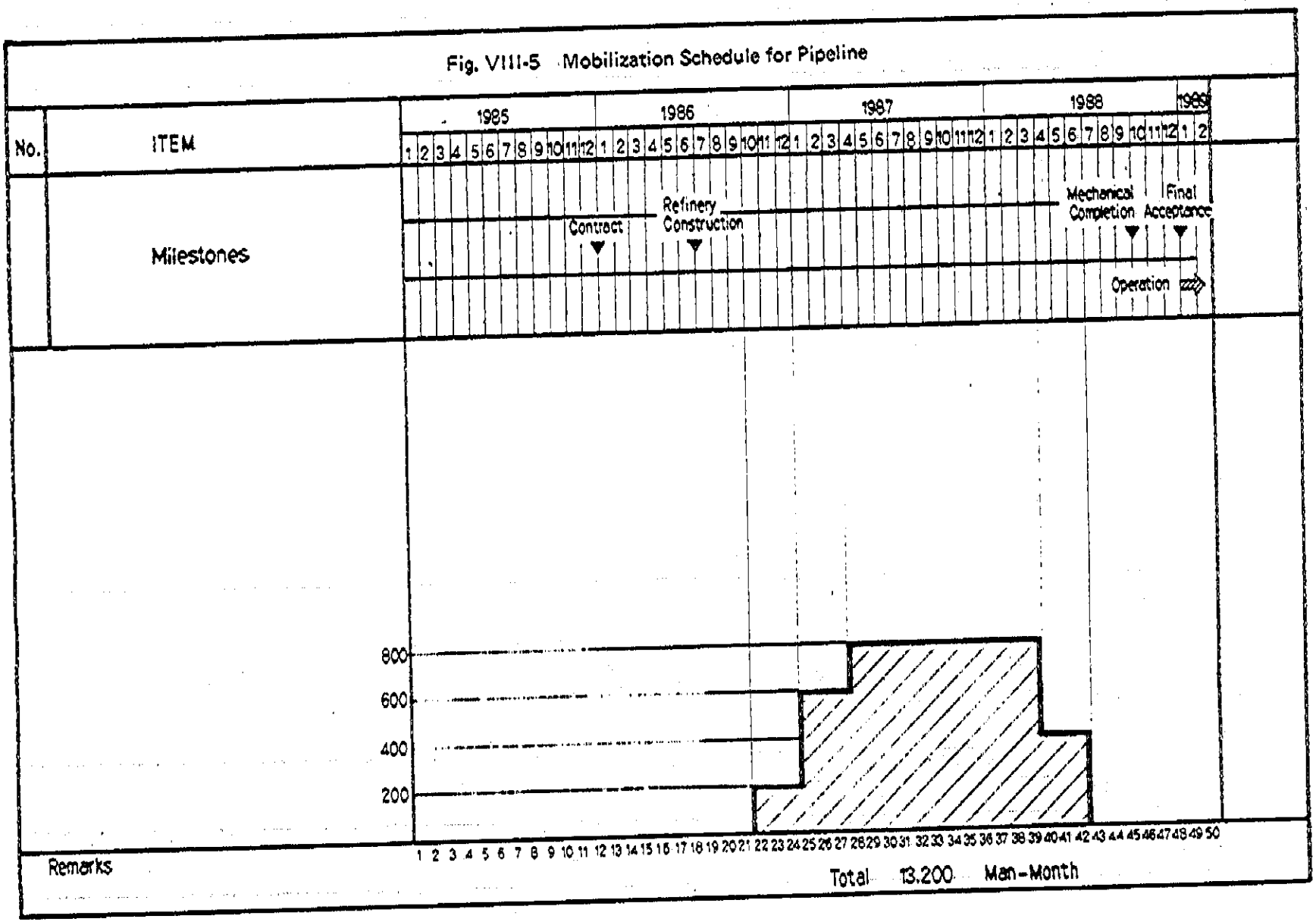


Fig. VIII-5 Mobilization Schedule for Pipeline



4. Investment Cost

4.1 Proconditions for Investment Cost Calculation

(1) The constract of this project is made on a lump sump basis.

(2) In accordance with the field survey, the items to be procured in Guatemala are civil engineering and building materials and works such as those for offices, equipment foundations steel structures, etc.

(3) Machinery, equipment and materials for the oil refinery, crude oil terminal and pipeline are procured in Japan.

(4) Skilled labors are brought in from Mexico.

(5) The conversion rate of currency is:
1 Quetzal = US$1.00 = Yen 235.

(6) The investment cost is based on the pirces as of end 1983.

4.2 Scope of Investment Cost Calculation

The scope of investment cost calculation is construction cost of the oil refinery, crude oil terminal and pipeline, including the following items:

(1) Land cost of oil refinery and crude oil terminal
(The pipeline is to be installed within the premises of National highway CA9, and no land cost is calculated.)

(2) Site preparation for the oil refinery and crude oil terminal.

(3) Crude oil receiving pier at the crude oil terminal

(4) Access roads to the oil refinery and crude oil terminal and temporary road for pipeline installation.

(5) Waste water piping and waste water pits for the oil refinery and crude oil terminal.

(6) Living accomodations for labors from foreign countries
The houses for employees of the oil refinery, crude oil terminal and pipeline are excluded out of the calculation.

4.3 Result of Investment Cost Calculation

The total investment cost for the oil refinery, crude oil terminal and pipeline is about 670 million quetzales. The investment cost is calculated as a total of the following items.

(1) Land cost
The procurement cost of land for each facility is calculated.

(2) Land preparation
Expenses necessary to prepare the site for the oil refinery and crude oil terminal are calculated. No preparation cost is calculated for pipeline since pipeline installation needs no land preparation.

(3) Civil engineering and building

All costs for civil engineering and building materials and works such as those for equipment foundations, buildings and pier are calculated.

(4) Equipment and machinery

All costs for equipment and machinery, such as, towers, tanks, heat exchangers, pumps, tanks, instrument equipment, electrical equipment and piping materials are calculated.

(5) Construction

All costs for field works such as for erection, piping, installation, electrical work, insulation work and painting, and living accomodations of workers are calculated.

(6) Engineering and supervising

The engineering fees for basic and detailed design, and supervising fees for construction and operation are calculated.

(7) Contingency

The investment cost calculation is based on the prices of end 1983, without escalation. Contingency on a technical aspect only is calculated.

A technical contingency is calculated on the basis of predetermined rates on the total costs of above Item (1) through (5), and the rates applied are 5% on the costs for the oil refinery, 3% on those for the crude oil terminal and 15% on those for pipeline. Rather higher rate has been applied as contingency to the pipeline construction inasmuch as the cost of civil engineering work fluctuates enormously dependent on the quality of soil.

Table VIII-1 shows the investment cost of each item.

Table VIII-1 Investment Cost

(Unit: 10^3 Quentzales)

	Refinery	Terminal	Pipeline
(1) Land Acquisition	2,106	536	——
(2) Site Preparation	20,861	2,701	——
(3) Civil & Buildings	81,012	26,119	5,690
(4) Equipment & Machinery	255,150	1,670	23,530
(5) Field Works	92,806	27,168	44,334
Sub-Total	(451,935)	(58,194)	(73,554)
(6) Engineering & Supervising	35,532	8,733	10,116
(7) Contingency	22,597	1,744	11,033
Total	510,064	68,671	94,703
Grand Total	673,438		

VOLUME IX

OPERATION PLAN

IX OPERATION PLAN

1. Supply and Demand of Petroleum Products

The stream factor of the new oil refinery is planned as follows:

Starting year	70%
Second year	90%
Third year and thereafter	100%

The comparison of the demand for petroleum products with the supply of petroleum products (from new oil refinery and existing Texas Petroleum Co.'s refinery) is shown in Table IV-1.

Table IX-1 indicates the following:

(1) Even after the operation start of the new oil refinery, the supply of gas oil is not enough and it has to be imported.

(2) The supply of gasoline, kerosene, jet fuel and fuel oil becomes excessive for about five years after the operation start of the new refinery, and the operation rate must be lowered either at the Texas Petroleum Co.'s or the new oil refinery.

(3) By 2002, 13 years after the operation start of the new oil refinery, shortage on petroleum products reaches $12,600 \times 10^3$ bbl/y = 38,000 bbl/d, and the construction of the next new refinery must be studied.

Table IX-1 Demand-Supply Projection

(Unit 10^3 bbl/y)

		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Demand																					
	LPG	715	742	769	798	828	859	891	924	959	995	1,032	1,071	1,111	1,152	1,195	1,240	1,287	1,335	1,385	1,436
	Gasoline	3,584	3,696	3,850	4,046	4,250	4,470	4,696	4,934	5,184	5,450	5,726	6,016	6,322	6,644	6,980	7,336	7,708	8,100	8,512	8,950
	Kerosene & Jet Fuel	1,110	1,144	1,187	1,232	1,278	1,326	1,376	1,428	1,482	1,539	1,597	1,657	1,720	1,786	1,854	1,925	1,998	2,075	2,155	2,238
	Gas Oil	5,751	6,017	6,352	6,706	7,081	7,473	7,885	8,319	8,777	9,260	9,764	10,298	10,860	11,451	12,071	12,729	13,416	14,142	14,907	15,708
	Fuel Oil	3,411	3,658	3,919	4,198	4,494	4,810	5,145	5,502	5,882	6,288	6,716	7,174	7,661	8,179	8,730	9,316	9,940	10,604	11,310	12,061
	Asphalt	112	111	111	111	111	111	112	112	112	112	112	112	112	113	113	113	113	113	113	114
Supply																					
New Refinery	LPG	531	683	759																	759
	Gasoline	2,772	3,564	3,960																	3,960
	Kerosene & Jet Fuel	876	1,126	1,251																	1,251
	Gas Oil	2,646	3,145	3,494																	3,494
	Fuel Oil	1,870	2,404	2,671																	2,671
	Asphalt	139	178	198																	198
Texaco	LPG	25																			25
	Gasoline	845																			845
	Kerosene & Jet Fuel	419																			419
	Gas Oil	1,476																			1,476
	Fuel Oil	1,627																			1,627
Surplus (+) or Deficit (-)																					
	LPG	-159	-34	+15	-14	-44	-75	-107	-140	-175	-211	-248	-287	-327	-368	-411	-456	-503	-551	-601	-652
	Gasoline	+33	+713	+955	+759	+555	+335	+100	-129	-379	-645	-921	-1,211	-1,517	-1,839	-2,175	-2,531	-2,903	-3,295	-3,707	-4,145
	Kerosene & Jet Fuel	-185	+401	+493	+438	+392	+344	+294	+242	+188	+131	+73	+13	-50	-116	-184	-255	-328	-405	-485	-568
	Gas Oil	-1,829	-1,396	-1,382	-1,736	-2,111	-2,503	-2,915	-3,349	-3,807	-4,290	-4,794	-5,328	-5,890	-6,481	-7,101	-7,759	-8,446	-9,172	-9,937	-10,738
	Fuel Oil	+86	+373	+379	+100	-196	-512	-847	-1,204	-1,584	-1,988	-2,418	-2,876	-3,363	-3,881	-4,432	-5,018	-5,642	-6,306	-7,012	-7,763
	Asphalt	+27	+67	+87	+87	+87	+87	+86	+86	+86	+86	+86	+86	+86	+85	+85	+85	+85	+85	+85	+84

2. Organization and Manning

2.1 Oil Refinery

Consideration must be given to the following factors when studying the organization and manning of the oil refinery:

- o Capacity and combination of units in the refinery
- o Quality and the number of employees
- o Local conditions

The proposed oil refinery has been made up of various advanced processes such as fluid catalytic cracking and ebullated-bed hydrocracking, etc. for its not so large a scale. Besides El Rancho, where the new oil refinery is proposed to be located, is not an industrial area. The maintenance of refinery must, accordingly, be conducted by the refinery personnel.

For the reasons above stated, the number of personnel required of the refinery amounts to 508, somewhat larger than in standard cases.

Fig. IX-1 shows the organization and manning of the oil refinery.

The refinery is managed by Production, Engineering and Administration Department under one general manager and deputy general manager.

- o Production Department

This department takes charge of the operation of

refinery plants, utility facility and shipping facility, as well as production control and quality control of products.

- o Engineering Department

  This department takes charge of the maintenance of refinery plants, utility facility and shipping facility.

- o Administration Department

  This department takes charge of general affairs, personnel, accounting, purchasing and security.

2.2 Crude Oil Terminal and Pipeline

Since the booster station of pipeline is automatically operated, it requires only three persons. The operation of the booster station is closely related with that of crude oil terminal. The number of the operators required for pipeline is incorporated in that for the crude oil terminal.

Fig. IX-2 shows the organization and manning of the crude oil terminal and pipeline. The required number of personnel is 35, consisting of the following:

o	Crude oil terminal	32 persons
o	Pipeline	3 operators

Fig. IX-1 Organization of Oil Refinery

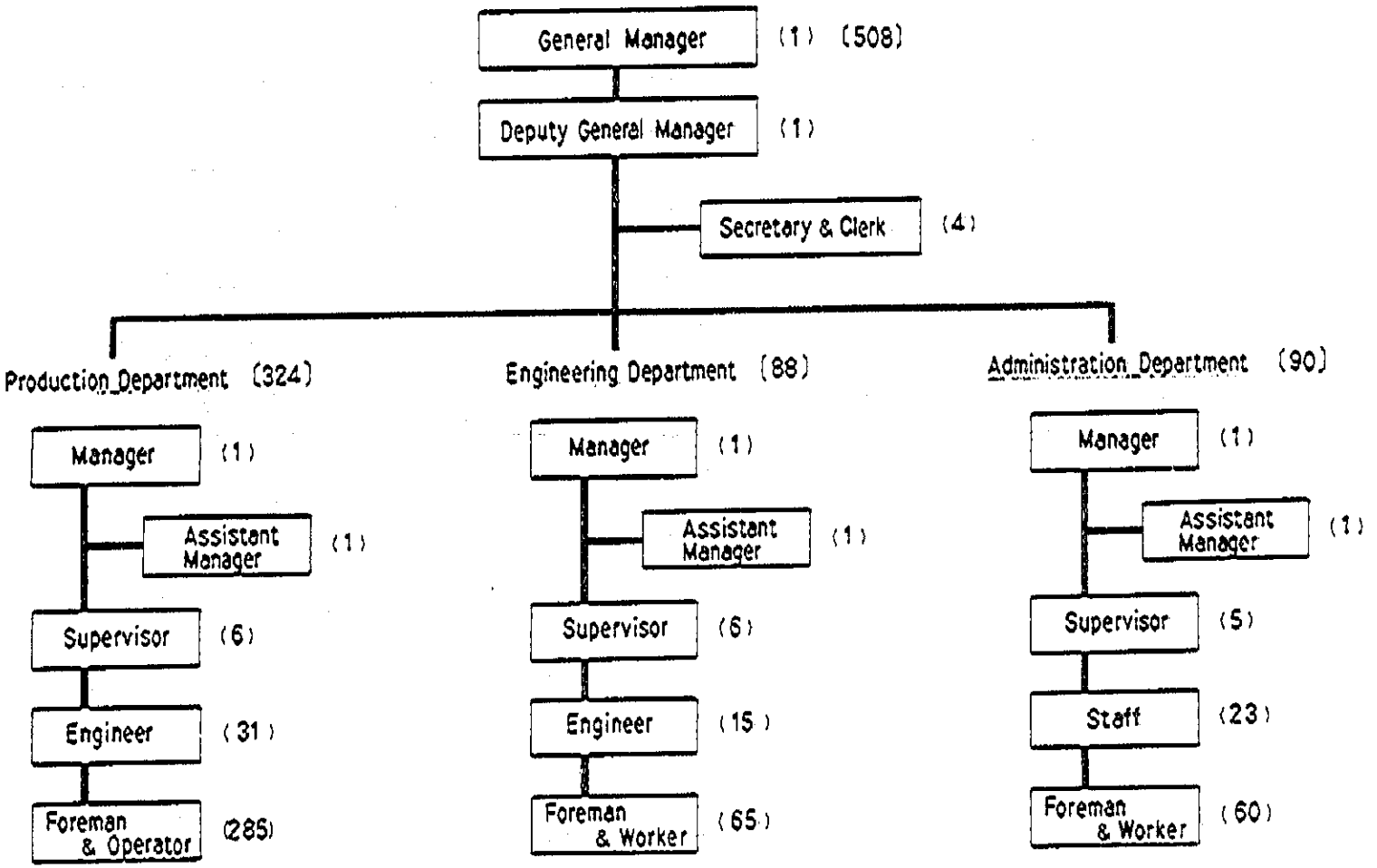
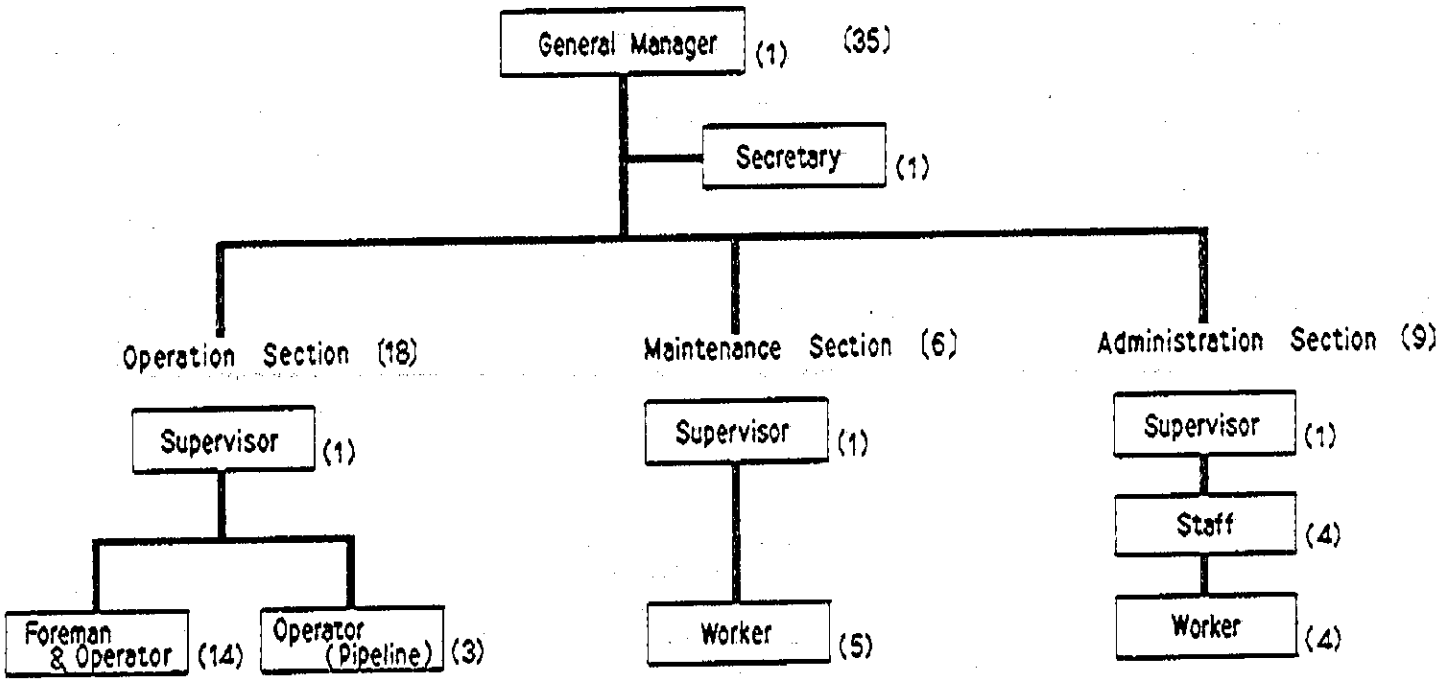


Fig. IX-2 Organization of Terminal & Pipeline



3. Operation Guidance and Tranining Plan

3.1 Operation Guidance

The new oil refinery is to be completed in October, 1988, and thereafter the test run is scheduled for three months. The operation guidance is given by the contractor in the form of supervising the test operation. Since this oil refinery is equipped with the fluid catalytic cracking and ebullated-bed hydrocracking unit, both of which are completely new in Guatemala, and operation of these two units requires highly advanced skills, the number of operators to be mobilized for the operation guidance should be rather large, that is, 100 persons x 3 months = 300 man-months.

Major subjects on the operation guidance are as follow:

- o Smooth test operation of the refinery
- o Guidance on operation of the fluid catalytic cracking and ebullated-bed hydrocracking unit
- o Unit operation guidance
- o Performance guarantee

3.2 Training Plan

Employees of the new oil refinery are to be trained in Guatemala and overseas.

(1) Overseas training

Overseas training is conducted in 1988. The number of trainess is 50, with foremen as the core member, and they are divided into three groups, each group being trained for three months. Since the overseas training must be completed before October, 1988, when the test operation starts, the training plan is set as follows:

Jan. 1988 - Mar. 1988	17 trainess
Apr. 1988 - Jun. 1988	17 trainess
Jul. 1988 - Sep. 1988	16 trainess

It is essential that these trainess participate in the construction of the refinery and try to master the skill except when they attend the above training courses.

(2) Training in Guatemala

Training in Guatemala is to be conducted from November, 1987 through August, 1988. The number of trainess is 100, consisting of foremen and operators.
A desirable form of training in Guatemala is that the 100 trainess are divided into five groups, each group being trained for two months in the existing Texas Petroleum's refinery. The training plan is set as follows:

Nov. 1987 - Dec. 1987	20 trainess
Jan. 1988 - Feb. 1988	20 trainess
Mar. 1988 - Apr. 1988	20 trainess
May 1988 - Jun. 1988	20 trainess
Jul. 1988 - Aug. 1988	20 trainess

It is essential that these trainess participate in the construction of the refinery and try to master the skill except when they attend the above training courses.

VOLUME X

FINANCIAL ANALYSIS

X FINANCIAL ANALYSIS

Financial analysis of this project is conducted in this Volume. On the basis of financial statement such as profit and loss statement, cash flow table and balance sheet worked out from total capital required, production costs, other expenses and estimated sales proceeds, the internal rate of return (IRR) has been calculated and evaluated.

1. Total Capital Requirement and Financing Plan

The total capital requirement is the total investment required until the start of commercial operation. The total capital requirement is summarized in Table X-1. Major preconditions assumed for this study are shown below.

- o Prices:

  Prices are based on those as of 1983 without escalation. The construction cost is also fixed accordingly.

- o Currency and exchange rate:

  The unit of currency is expressed in Quetzal, the Guatemalan currency. The exchange rates applied are 1 Quetzal = 1 US$ = 235 Yen.

- o Contract for construction:

  The contract is concluded on a lump sum basis.

- o Duties are not levied upon equipment and materials imported from foreign countries, since the new refinery is stateowned.

Table X-1 Total Capital Requirement

(Unit: 10^3 Quetzales)

	Foreign Currency Portion	Domestic Currency Portion	Total
Land Acquisition and Construction Cost			
Refinery	336,307	173,757	510,064
Terminal	30,845	37,826	68,671
Pipeline	42,803	51,900	94,703
Sub-Total	409,955	263,483	673,438
Pre-operating Expense	1,236	6,662	7,898
Working Capital	0	4,711	4,711
Interest during Construction	69,638	38,331	107,969
Sub-Total	70,874	49,704	120,578
Total Capital Requirement	480,829	313,187	794,016

1.1 Construction Cost

The construction costs of the refinery, terminal and pipeline are mentioned in detail in Chapter 4, Volume VIII and their investment plan for each year is shown below.

Table X-2 Investment Schedule

(Unit: 10^3 Quetzales)

Year	-3y	-2y	-1y	Total
Land Acquisition	2,642	0	0	2,642
Refinery Construction Cost	34,662	291,344	181,952	507,958
Terminal Construction Cost	42,161	24,337	1,637	68,135
Pipeline Lyning Cost	13,983	33,336	47,384	94,703
Total	93,448	349,017	230,973	673,438

(Note: -3y = 1986, -2y = 1987, -1y = 1988)

1.2 Preoperating Expense

Preoperating expenses estimated to be required during the construction of the refinery are as shown in Table X-3 below.

Table X-3 Preoperating Expense

(Unit: 10^3 Quetzales)

Year	-3y	-2y	-1y	Total
Training Cost	0	0	550	550
Administration Cost	249	1,753	4,488	6,490
Test Run Expense	0	0	858	858
Total	249	1,753	5,896	7,898

(Note: -3y = 1986, -2y = 1987, -1y = 1988)

(1) Training cost

Training cost includes living and travelling expenses of oversea trainees (Oversea trainees in Chapter 3, Volume IX OPERATION PLAN) and fees for trainers.

	(1,000 Quetzales)
Living expenses	450
Travelling expenses	50
Trainers' fees	50
Total	550

(2) Administration cost

Administration cost includes wages to be paid by the contractor to employees during construction and overhead expenses.

Table X-4 Administration Cost

(Unit: 10^3 Quetzales)

Year	-3y	-2y	-1y	Total
General Manager	71	71	71	213
Secretary	18	18	36	72
Manager	160	160	160	480
Superviser	0	605	605	1,210
Engineer and Staff	0	614	1,299	1,913
Foreman	0	285	1,139	1,424
Operator	0	0	1,178	1,178
Total	249	1,753	4,488	6,490

(Note: -3y = 1986, -2y = 1987, -1y = 1988)

(3) Test run expense

Test run expense includes chemicals and utilities to be spend during test run. The test run period is conducted for the period of three months and chemicals and utilities during the test run are estimated to be 50% of those to be spent during full load operation respectively. However, raw materials costs are not included because they should be covered by sales proceeds. The test run expense is estimated to be 858,000 quetzales.

(4) Royalty and cost of an initial change of catalysts and other agents

Royalty and initial cost of catalysts and other agents are included in the construction cost of the refinery.

1.3 Working Capital

Working capital is the fund necessary for smooth operation of daily production activities of the plant and

is usually divided into the initial working capital and working capital necessary after the startup of the plant. This study includes only the initial working capital as working capital. The working capital necessary after the startup of the plant is defined as the balance after deducting account payable from the inventory of materials and products on hand plus accounts receivable and incorporated in financial statements.

(1) Initial working capital

- Cash on hand
  It is assumed that cash on hand covering the variable costs for the first year after the startup of the plant except crude oil is available.

(2) Working capital after the startup of the plant

- Raw materials inventory
  The average crude oil inventory is calculated for 15 days and multiplied by the crude oil cost to obtain the raw materials inventory.

- Products inventory
  Products inventory for 15 days are multiplied by its cost to calculate the products inventory.

- Account receivable
  The sales proceeds are estimated to be cashed in 1.5 months and such portion of total sales proceeds has been reckoned up as account receivable.

o Account payable

The payment for crude oil is estimated to be made in one month and such portion has been reckoned up as account payable.

1.4 Financing Plan and Interest during Construction

The following conditions are assumed to calculate interest during construction.

(1) Capital

10% of construction cost is to be covered by the paid-up capital which is the equity.

(2) Long term loan

Part of the total capital requirement (except interest during construction) that cannot be covered by the equity is to be covered by long term loans. Interest on the long term loans is interest during construction. Repayment term of their principal and interest is as shown below.

Interest rate	:	9% per annum
Repayment of principal:		With a grace period of 3 years, repayment is made in 15 years by equal annual installments.

1.5 Disbursement Schedule

The disbursement schedule for the total capital requirement is shown in Table X-5.

Table X-5 Disbursement Schedule

(Unit: 10^3 Quetzales)

Year	-3y	-2y	-1y	Total
Refinery	36,768	291,344	181,952	510,064
Terminal	42,697	24,337	1,637	68,671
Pipeline	13,983	33,336	47,384	94,703
Preoperating Expense	249	1,753	5,896	7,898
Initial Working Capital	0	0	4,711	4,711
Interest during Contraction	4,878	37,741	65,350	107,969
Total	98,575	388,511	306,930	794,016

(Note: -3y = 1986, -2y = 1987, -1y = 1988)

2. Operating Cost

This chapter summarizes the operating cost necessary for this project. The operating cost consists of the variable cost and fixed cost. Costs of crude oil, chemicals, catalysts and utilities are included in the variable cost. The operating cost is summarized in Table X-6.

Table X-6 Operating Cost

(Unit: 10^3 Quetzales)

Year	1y	2y	3y - 20y
Variable Cost			
Raw Material	247,932	318,770	354,189
Chemical	605	779	865
Catalyst	1,438	1,848	2,054
Utility	2,760	3,548	3,942
Fixed Cost			
Direct Labor	3,656	3,656	3,656
Plant Overhead and Others Expense	3,901	3,901	3,901
Maintenance	15,823	15,823	15,823
Insurance	4,696	4,696	4,696
Total	280,811	353,021	389,126

(Note: 1y = 1989, 2y = 1990, 3y - 20y = 1991 - 2008)

(1) Crude oil cost

The crude oil cost is calculated by multiplying annual oil consumption by its unit price shown below.

Guatemalan crude oil	26.48 Quetzales/bbl
Maya crude oil	23.49 Quetzales/bbl
Isthmus crude oil	30.41 Quetzales/bbl

Annual crude oil consumption and crude oil cost are estimated as follows;

Crude oil consumption
(bbl/d)

	Guatemala	Maya	Isthmus	Crude oil cost (10^3 Quetzales/y)
First year	7,000	10,500	10,500	247,932
2nd year	9,000	13,500	13,500	318,770
3rd year and thereafter	10,000	15,000	15,000	354,189

(2) Cost of chemicals and catalysts

Cost of chemicals and catalysts in shown in Table X-7.

Table X-7 Chemical and Catalyst

(Unit: 10^3 Quetzales/y)

Chemical	
Refinery	788
Terminal	68
Pipeline	9
Sub-Total	865
Catalyst for Refinery Operation	
Fluid Catalytic Cracking Unit	657
Ebullated-Bed Hydrocracking Unit	1,007
Catalytic Reforming Unit	113
Naphtha HDS and Merox Unit	26
Kerosene/Gas Oil HDS Unit	68
Hydrogen Production Unit	183
Sub-Total	2,054
Grand Total	2,919

(3) Cost of Utilities

Water, electricity and fuel spent within the refinery are self-supplied and not reckoned up. Cost of utilities necessary for operation of the terminal and pipeline is shown in Table X-8.

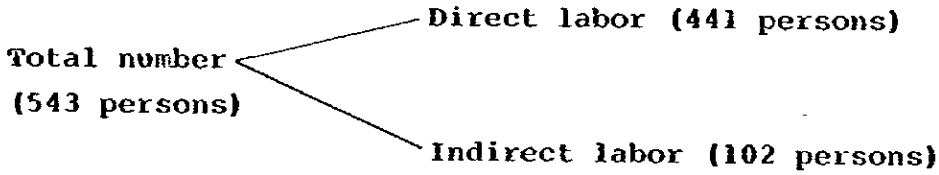
Table X-8 Utility

(Unit: 10^3 Quatzales/y)

Terminal Gas Oil	1,221
Electricity	2
Pipeline Gasoline	753
Gas Oil	1,966
Total	3,942

(4) Labor Cost

Labor necessary for this project is shown in Chapter 2, Volume IX and is classified as follows;



Direct labor includes foremen and lower, while indirect labor includes engineers and higher personnel, Labor cost in this study covers direct labor only and indirect labor cost is included in the plant overhead described later. The labor cost includes bonus and social security and is assumed to be 48.31% of wages to be paid to these personnel. Direct labor cost is shown in Table X-9.

Table X-9 Direct Labor Cost

(Unit: 10^3 Quatzales/y)

Foreman (80 persons)	1,139
Operator (331 persons)	2,357
Worker (30 persons)	160
Total (441 persons)	3,656

(5) Plant Overhead

1) Indirect personnel expense

Indirect personnel expense covers that of the general manager and managing staff and engineers and higher personnel. They number 102 as shown in Table X-10.

Table X-10 Indirect Personnel Expense

(Unit: 10^3 Quetzales/y)

General Manager	(1 person)	71
Deputy Manager	(1 person)	62
Security	(4 persons)	71
Manager	(3 persons)	160
Assistant Manager	(3 persons)	133
Superviser	(17 persons)	605
Engineer and Staff	(73 persons)	1,299
Total	(102 persons)	2,401

2) Office and other expenses

Office and other expenses include cost of stationary, communication and travelling and 1,500,000 quetzales is reckoned up for their annual cost.

Thus, the plant overhead totals to 3,901,000 quetzales annually.

(6) Maintenance Cost

Maintenance cost covers cost of repairs due to wear, tear and corrosion of facilities by operation of the plant. Maintenance cost for the refinery, terminal and pipeline is estimated to be 2.5%, 2.5% and 1.5% of the construction cost excluding land aquisition respectively. 15,823,000 quetzales is reckoned up annually.

(7) Insurance

Insurance cost includes fire insurance premiums for fixed assets and annual insurance cost is estimated to be 4,696,000 quetzales.

3. Financial Analysis

Based on the above studies, the following financial statements are prepared for financial analysis.

- o Profit and loss statement
- o Cash flow table
- o Balance sheet

3.1 Major Premises for Financial Analysis

The major premises for financial analysis of this project is summarized below.

(1) Project life

Construction period : 3 years
Commercial operation period: 20 years

(2) Price basis

Construction cost, production cost and product price are to be fixed as of 1983 with no escalation considered.

(3) Crude oil processing capacity

Crude oil processing capacity: 40,000 bbl/d

(4) Stream factor

First year	70%
2nd year	90%
3rd year and thereafter	100%

(5) Short term loan

Any shortage of funds after the start of a commercial operation is to be covered by short term loans on the following term.

Interest	:	12% per annum
Repayment	:	Repayment is made as soon as balance in fund is in the black.

(6) Depreciation and amortization

The depreciation and amortization methods applied are shown in Table X-11.

Table X-11 Depreciation and Amortization

	Depreciation Period	Depreciation Method	Salvage value (%)
Pipeline	15y	Straight line	0
Machinery and Equipment for Plant	10y	Straight line	0
Field Work	10y	Straight line	0
Civil and Building	10y	Straight line	0
Pre-operating Cost	5y	Straight line	0
Interest during Construction	15y	Straight line	0

(7) Income tax

No income tax is taken into account, because the refinery is state-owned.

3.2 Sales Plan

(1) Production plan

As mentioned in IX OPERATION PLAN, the supply of Guatemalan petroleum products will slightly exceeds the demand for 5 years after the new refinery is put into operation. Supply and demand is to be balanced by Texas Petroleum Company. The new refinery is to be operated at 70% in the first year, 90% in the 2nd year and 100% in the 3rd year and thereafter as described in the preceding chapter.

(2) Sales volume

All of petroleum products under this project are destined for home consumption.

(3) Selling prices

Petroleum products are to be evaluated in terms of prices ex factory. Survey in Gautemala indicate the following prices.

Petroleum products	Quetzales/bbl
LPG	28.548
Premium gasoline	48.132
Regular gasoline	46.578
Kerosene and jet fuel	48.930
Diesel oil	45.402
Fuel oil	27.832
Asphalt	27.832

Although field survey results showed 38.035 quetzales/bbl for asphalt, asphalt is usually traded at a lower price than fuel oil. Therefore, the same price as fuel oil is used for asphalt in this study.

Survey results are shown in Table X-12.

Table X-12 Sales Volume and Revenue

	LPG			Gasoline (P)			Gasoline (R)			Kerosene/Jet Fuel		
	1y	2y	3y - 20y	1y	2y	3y - 20y	1y	2y	3y - 20y	1y	2y	3y - 20y
Prod. Q'ty (bbl)	531,300	683,100	759,000	1,386,000	1,782,000	1,980,000	1,386,000	1,782,000	1,980,000	875,489	1,125,628	1,250,698
Unit Price (Quetzal/bbl)	28.548	28.548	28.548	48.132	48.132	48.132	46.578	46.578	46.578	48.930	48.930	48.930
Revenue (10^3 Quetzales/y)	15,168	19,501	21,668	66,711	85,711	95,301	64,557	83,002	92,225	42,838	55,077	61,197

	Gas Oil			Fuel Oil			Asphalt			Total		
	1y	2y	3y - 20y	1y	2y	3y - 20y	1y	2y	3y - 20y	1y	2y	3y - 20y
Prod. Q'ty (bbl)	2,445,654	3,144,413	3,493,792	1,869,427	2,403,549	2,670,610	138,600	178,200	198,000			
Unit Price (Quetzal/bbl)	45.402	45.402	45.402	27.832	27.832	27.832	27.832	27.832	27.832			
Revenue (10^3 Quetzales/y)	111,038	142,763	158,625	52,030	66,896	74,328	3,858	4,960	5,511	356,200	457,970	508,855

Note: o 1y = 1989, 2y = 1990, 3y - 20y = 1991 - 2008

o The revenue in the table is not adjusted by the changes of inventory and account receivable caused by the change of operating rate.

The following table shows the calculation procedure from the revenue in Table X-12 Sales Volume and Revenue to the sales income in Table X-15 Cash Flow.

Sales Income of Cash Flow

	1y	2y	3y	4y	5y - 20y
Revenue (10^3 Quetzales)	356,200	457,970	508,855	508,855	508,855
Prod. Qty (bbl)	8,632,470	11,098,890	12,332,100	12,332,100	2,332,100
Initial Inventory (bbl)	(0)	(392,385)	(504,495)	(560,555)	(560,550)
Final Inventory (bbl: 15 days)	(392,385)	(504,495)	(560,550)	(560,550)	(560,550)
Balance of Inventory (bbl)	392,385	112,110	56,055	0	0
Sales Adjusted by Inventory (bbl)	8,240,085	10,986,780	12,276,045	12,332,100	12,332,100
Sales Adjusted by Inventory *1 (10^3 Quetzales)	340,008	453,343	506,542	508,855	508,855
Initial Account Receivable (10^3 Quetzales)	(0)	(42,501)	(56,668)	(63,318)	(63,607)
Final Account Receivable*2 (10^3 Quetzales: 1.5 month)	(42,501)	(56,668)	(63,318)	(63,607)	(63,607)
Balance of Account Receivable (10^3 Quetzales)	42,501	14,167	6,650	289	0
Sales Income for Cash Flow (10^3 Quetzales)	297,507	439,176	499,892	508,566	508,855

Note: $*2 = *1 \times \frac{1.5}{12}$

3.3 Production Cost

Production cost is the aggregate of operation cost, depreciation, amortization and interest on loans as shown in Table X-13.

Table X-13 Production Cost

(Unit: 10^3 Quatzales)

Year	Operating Cost			Depreciation	Amortization	Interest	Total
	Variable Cost	Fixed Cost	Sub Total				
1	252,735	28,076	280,811	63,923	8,778	67,796	421,308
2	324,945	28,076	353,021	63,923	8,778	70,242	495,964
3	361,054	28,076	389,126	63,923	8,778	68,092	529,919
4	361,050	28,076	389,126	63,923	8,778	65,350	527,177
5	361,050	28,076	389,126	63,923	8,778	60,994	522,821
6	361,050	28,076	389,126	63,923	7,198	56,637	516,884
7	361,050	28,076	389,126	63,923	7,198	52,280	512,527
8	361,050	28,076	389,126	63,923	7,198	47,924	508,171
9	361,050	28,076	389,126	63,923	7,198	43,567	503,814
10	361,050	28,076	389,126	63,923	7,198	39,210	499,457
11	361,050	28,076	389,126	6,314	7,198	34,853	437,491
12	361,050	28,076	389,126	6,314	7,198	30,497	433,135
13	361,050	28,076	389,126	6,314	7,198	26,140	428,778
14	361,050	28,076	389,126	6,314	7,198	21,783	424,421
15	361,050	28,076	389,126	6,314	7,198	17,427	420,065
16	361,050	28,076	389,126	0	0	13,070	402,196
17	361,050	28,076	389,126	0	0	8,713	397,839
18	361,050	28,076	389,126	0	0	4,356	393,482
19	361,050	28,076	389,126	0	0	0	389,126
20	361,050	28,076	389,126	0	0	0	389,126

Note: The operating cost in the table is not adjusted by the changes of inventory and account payable caused by the operating rate.

The following table shows the calculation procedure from the operating cost in Table X-13 Production Cost to the operating cost in Table X-15 Cash Flow.

Operating Cost of Cash Flow

	1y	2y	3y	4y	5y - 20y
Operating Cost (10^3 Quetzales)	280,811	353,021	389,126	389,126	389,126
Initial Crude Oil Inventory (10^3 Quetzales)	(0)	(11,270)	(14,490)	(16,099)	(16,099)
Final Crude Oil Inventory (10^3 Quetzales)	(11,270)	(14,490)	(16,099)	(16,099)	(16,099)
Balance of Crude Oil Inventory (10^3 Quetzales)	11,270	3,220	1,609	0	0
Operating Cost Adjusted Inventory (10^3 Quetzales)	292,081	356,241	390,735	389,126	389,126
Initial Account Payable (10^3 Quetzales)	(0)	(21,600)	(26,832)	(29,650)	(29,516)
Final Account Payable (10^3 Quetzales: 1 Month of Crude Oil Cost)	(21,600)	(26,832)	(29,650)	(29,516)	(29,516)
Balance of Account Payable (10^3 Quetzales)	21,600	5,232	2,818	-134	0
Operating Cost for Cash Flow (10^3 Quetzales)	270,481	351,009	387,917	389,260	389,126

Note: Inventories are calculated as shown below:

	1 y	2 y	3y-20y
Crude Oil Inventory (bbl)			
Guatemalan	105,000	135,000	150,000
Maya	157,500	202,500	225,000
Isthmus	157,500	202,500	225,000
Inventory Cost (10^3Quetzales)			
Guatemalan	2,780	3,575	3,972
Maya	3,700	4,757	5,285
Isthmus	4,790	6,158	6,842
Total	11,270	14,490	16,099

3.4 Financial Analysis Method Applied

Financial Internal Rate of Return (FIRR) method is applied to profitability analysis.

(1) FIRR on I (FIRR on Investment)

FIRR on I means IRR assuming that all investment is financed by own funds and is an index indicating original profitability of the project excluding effects due to change in loan terms or equity ratio.

(2) FIRR on E (FIRR on Equity)

FIRR on E means IRR for the invested capital and is an index indicating profitability of only capital excluding loans.

The internal rate of return is calculated according to the equation shown below.

$$\sum_{i=0}^{N} \frac{(CFE) \text{ of } i}{(I+R)^{i}} + \frac{S + W}{(I+R)^{n}} = 0$$

(CFE) Represents cash flow element of each year

FIRR on I	FIRR on E
(CFE) = - Investment	(CFE) = - Equity
+ Revenue	+ Revenue
- Production Costs	- Production Costs
- Income Tax	- Income Tax
+ Depreciation	- Repayment of Debt
	+ Depreciation

where

R: Rate of return
i: ith year
N: Years after initial cash outlay to end of project
S: Salvage value
W: Working capital plus non-depreciable investment

3.5 Financial Analysis Results

(1) Profitability

Profitability of this project is shown in Table X-14.

Table X-14 FIRR for Base Case

FIRR on I (%)	FIRR on E (%)
11.2	17.6

As shown above, FIRR on I, profitability index is 11.2%. FIRR on E, index for capital profitability is 17.6%. These values are far above interest rate (9% per annum). The payout period is 7.4 years.

(2) Cash flow table

Cash flow for each year is summarized in Table X-15. Judging from the table, this project runs short of cash in the initial operation year only and needs short term loans. Repayment is completed in the 3rd year. Thereafter, no cash shortage is expected and the project is put in a sound financial condition.

Table X-15 Cash Flow (After commercial operation)

(Unit: 10^3 Quetzales)

Year	Sources of Fund				Application of Fund				
	Sales*2 Income	Long Term Loan	Short Term Loan	Total	Operating*3 Cost	Interest	(For S.T.L.)	Total	Balance
1	297,507	0	40,771	338,277	270,481	67,797	(2,446)	338,277	0
2	439,176	0	-17,924	421,252	351,009	70,243	(4,893)	421,252	0
3	499,892	0	-22,846	477,045	387,919	68,092	(2,742)	456,011	21,035
4	508,566	-48,408	0	460,158	389,260	65,350	0	454,611	5,547
5	508,855	-48,408	0	460,447	389,126	60,994	0	450,120	10,327
6	508,855	-48,408	0	460,447	389,126	56,637	0	445,763	14,683
7	508,855	-48,408	0	460,447	389,126	52,280	0	441,407	19,040
8	508,855	-48,408	0	460,447	389,126	47,924	0	437,050	23,397
9	508,855	-48,408	0	460,447	389,126	43,567	0	432,693	27,753
10	508,855	-48,408	0	460,447	389,126	39,210	0	428,336	32,110
11	508,855	-48,408	0	460,447	389,126	34,853	0	423,980	36,467
12	508,855	-48,408	0	460,447	389,126	30,497	0	419,623	40,824
13	508,855	-48,408	0	460,447	389,126	26,140	0	415,266	45,180
14	508,855	-48,408	0	460,447	389,126	21,783	0	410,910	49,537
15	508,855	-48,408	0	460,447	389,126	17,427	0	406,553	53,894
16	508,855	-48,408	0	460,447	389,126	13,070	0	402,196	58,251
17	508,855	-48,408	0	460,447	389,126	8,713	0	397,839	62,607
18	508,855	-48,408	0	460,447	389,126	4,356	0	393,483	66,964
19	508,855	0	0	508,855	389,126	0	0	389,126	119,729
20	508,855	0	0	508,855	389,126	0	0	389,126	119,729

Note: 1. The last figures in each number are not adjusted, since this table is summary of cash flow from computer output.

2. The figures of sales income are the adjusted numerals by the changes of inventory and account receivable.

3. The figures of operating cost are the adjusted numerals by the changes of inventory and account payable.

(3) Major financial indices

The major financial indices for each year is shown in Table X-16.

Table X-16 Major Financial Indices

Year	Profitability Indices			Stability Indices	
	Profit on Sales (%)	Profit on Capital (%)	Profit on Equity (%)	Net Worth Ratio	Currency Ratio
-3	—	—	—	45.0	—
-2	—	—	—	13.9	—
-1	—	—	—	8.6	—
1	-19.3	-9.0	-96.7	0.3	1.2
2	-8.7	-5.3	-57.9	-5.0	1.9
3	-4.3	-2.9	-32.0	-8.4	4.2
4	-3.6	-2.4	-27.0	-12.2	4.5
5	-2.7	-1.9	-26.0	-16.1	4.8
6	-1.6	-1.1	-11.8	-19.4	5.3
7	-0.7	-0.4	-5.4	-22.4	6.0
8	0.1	0.1	1.0	-24.8	6.7
9	1.0	0.7	7.4	-26.4	7.7
10	1.9	1.3	13.8	-26.6	8.8
11	13.5	9.2	100.1	-5.4	9.9
12	14.9	10.1	111.5	15.1	11.3
13	15.7	10.7	117.9	33.5	12.8
14	16.6	11.3	124.4	49.8	14.5
15	17.5	11.9	130.8	64.0	16.3
16	20.9	14.2	156.7	76.7	18.3
17	21.8	14.8	163.5	87.1	20.4
18	22.7	15.4	169.5	95.6	22.7
19	23.5	16.0	176.3	96.3	26.8
20	23.5	16.0	176.3	96.8	30.8

3.6 Sensitibity Analysis

A sensitivity analysis is conducted by fluctuating the following factors for the base case.

- o Change on construction cost (±10%)
- o Change on selling price (±10%)
- o Change on crude oil price (±10%)
- o Change on variable cost (Except crude oil) (±20%)
- o Change on fixed cost (±20%)
- o Change on interest rate (4% and 14% interest)
- o Change on capital (20%, 30% and 40% capital)

(1) Change on construction cost

Table X-17 shows FIRR changes as construction cost increases or decreases by 10%.

Table X-17 FIRR Changes on Investment Cost

(Unit: %)

	+10%	Base Case	-10%
FIRR on I	10.2	11.2	12.4
FIRR on E	13.6	17.6	22.2

FIRR on I increases by 1.2% and FIRR on E by 4.6% as construction cost is decreased by 10% as shown above.

(2) Change on selling price

Table X-18 shows FIRR changes as petroleum product selling price increases or decreases by 10%.

Table X-18 FIRR Changes on Product Sales

(Unit: %)

	+10%	Base Case	-10%
FIRR on I	15.7	11.2	5.4
FIRR on E	33.8	17.6	Minus

Change on selling prices exerts a great influence on FIRR as shown above. When the selling price of petroleum products is raised by 10%, for example, FIRR on I increases by 4.5% and FIRR on E by 16.2%.

(3) Change on crude oil price

Table X-19 shows FIRR changes when crude oil price increases or decreases by 10%.

Table X-19 FIRR Changes on Crude Cost

(Unit: %)

	+10%	Base Case	-10%
FIRR on I	7.4	11.2	14.5
FIRR on E	Minus	17.6	30.0

As shown above, change on crude oil price has a great effect on FIRR. If the crude oil cost decreases by 10%, FIRR on I increases by 3.3% and FIRR by 12.4%.

(4) Change on variable cost except crude oil cost

Effect of change on variable cost on FIRR is investigated. When variable cost increases by 20%, FIRR on I decreases by 0.1% and FIRR on E by 0.5%.

(5) Change on fixed cost

Effect of change on fixed cost on FIRR is investigated. When fixed cost shows a 20% increase, FIRR on I decreases by 0.6% and FIRR on E by 2.5%.

(6) Change on interest rate

Table X-20 shows effect of change on interest rate on FIRR on E. The annual interest rate of 9% on the long term loan for the base case is changed to 4% and 14% for sensitivity analysis.

Table X-20 FIRR Changes on Interest Rate

(Unit: %)

	Interest at 4% per annum	Base Case	Interest at 14% per annum
FIRR on E	44.2	17.6	Minus

As shown above, interest on long term loans affects FIRR on E considerably. Therefore, it is necessary to have a loan at low interest to make this project attractive to investors.

(7) Change on equity ratio

Table X-21 shows FIRR changes when the equity ratio for the base case is raised to 30% from 10%.

Table X-21 FIRR Changes on Equity Ratio

(Unit: %)

	Base Case (10%)	20%	30%
FIRR on E	17.6	15.4	13.9

As shown above, FIRR on E decreases to 13.9% from 17.6% when the equity ratio for the base case is raised to 30% from 10%.

Results of the sensitivity analysis are summarized in Fig. X-1 and 2.

Fig. X-1 Summary of Sensitivity Analysis
(FIRR on I to Variation of Financial Parameters)

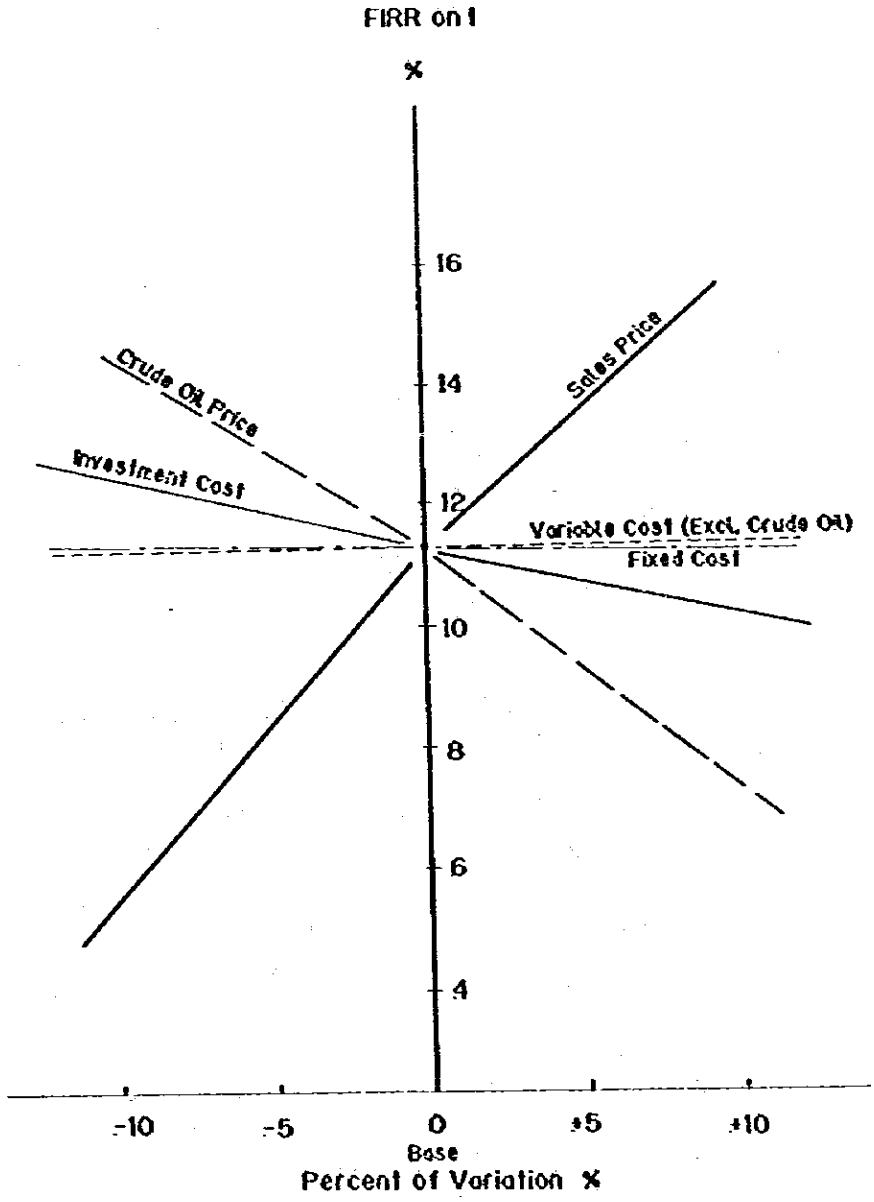
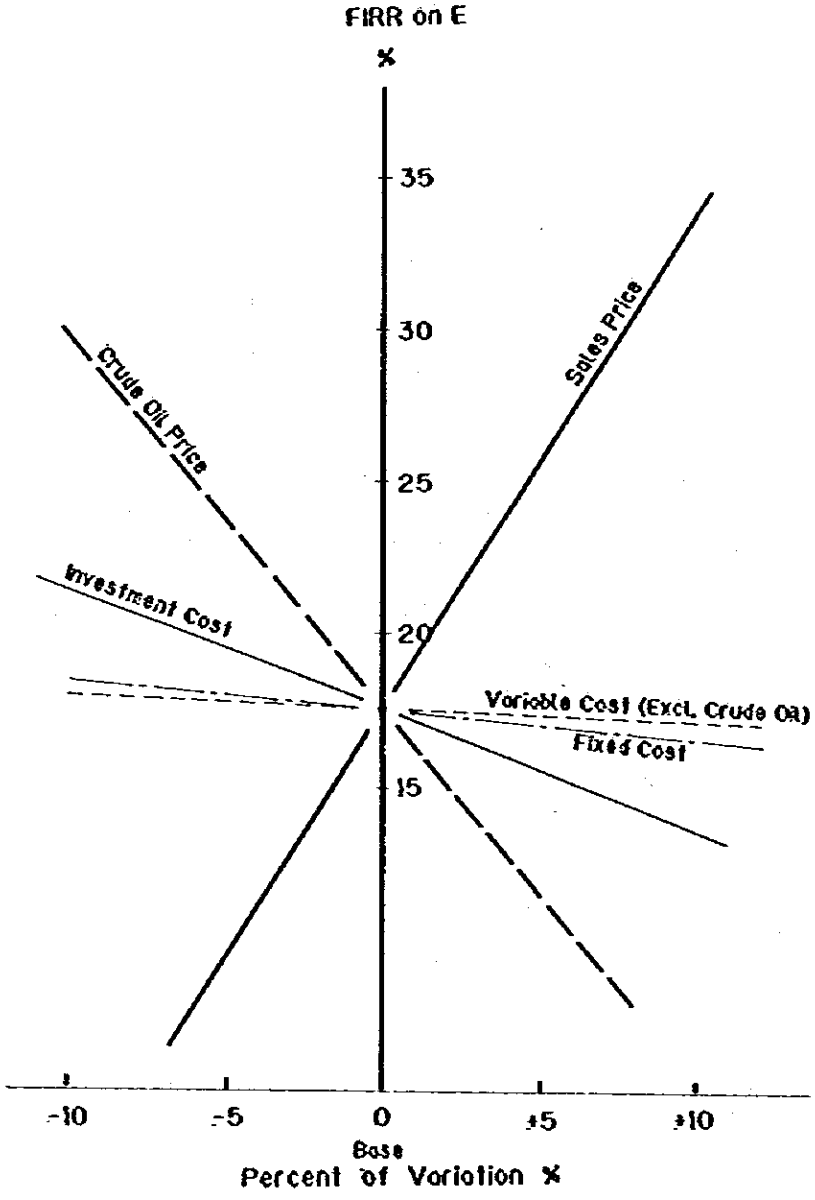


Fig. X-2 Summary of Sensitivity Analysis
(FIRR on E to Variation of Financial Parameters)



4. Study of Reference Cases

So far, the base case is analyzed and this chapter analyzes profitability for the following three cases as reference cases. Difference in the premise between the base case and reference cases is shown below.

Base Case	Taxes to be exempted Fixed price in 1983 Guatemala crude oil 10,000 bbl/d Maya crude oil 15,000 bbl/d Isthmus crude oil 15,000 bbl/d
Reference Case 1	Income tax to be imposed according to the tax law. Other conditions are same as for the base case.
Reference Case 2	Escalation to be taken into account. Other conditions are same as for the base case.
Reference Case 3	Guatemala crude oil used 100% or 40,000 bbl/d of Guatemala crude oil used other conditions are same as for the base case.

4.1 Reference Case 1

Income tax is imposed in this case. Tax rates are shown below.

(Unit: Quetzal)

Taxable Income	Tax	Tax on Excess
500,000	184,982.5	-
500,000 < a	-	(a - 500,000) x 48%

If before-tax profit is 500,000 quetzales, income tax is 184,982 quetzales. Furthermore, a tax rate of 48% is applied to the profit in excess of 500,000 quetzales. 21% is additionally imposed as surtax.

Table X-22 shows financial internal rates of return when the above taxes are imposed in the case 1-A and case 1-B where carry-over of red figures is allowed on the same base.

Table X-22 FIRR after Tax

(Unit: %)

	Base Case	Case 1-A	Case 1-B
FIRR on I (Before tax)	11.2 (In the red)		
FIRR on I (After tax)		9.5	10.0
FIRR on E (Before tax)	17.6 (In the red)		
FIRR on E (After tax)		11.3	13.7

4.2 Reference Case 2

Change on profitability of this project is studied for this case when escalation is taken into account. Escalation rates applied are shown below.

Construction cost	5% per year
Petroleum products	6% per year
Crude oil	6.8% per year
Variable cost	5% per year
Fixed cost	5% per year

Table X-23 shows financial internal rates of return when the above escalation rates are applied.

Table X-23 FIRR with Escalation

(Unit: %)

	Base case	Case 2
FIRR on I	11.2	14.1
FIRR on E	17.6	24.8

4.3 Reference Case 3

Financial internal rates of return are obtained for this case where 40,000 bbl/d of Guatemalan crude oil is processed by the refinery. Calculation results are shown in Table X-24.

Table X-24 FIRR with Guatemalan Crude Oil

(Unit: %)

	Base case	Case 3
FIRR on I	11.2	11.5
FIRR on E	17.6	18.6

FIRR values show some improvement when Guatemalan crude oil is used, because crude oil cost is lower.

VOLUME XI

SOCIAL AND ECONOMIC ANALYSIS

XI SOCIAL AND ECONOMIC ANALYSIS

Texas Petroleum Company is the only firm in Guatemala to produce petroleum products. A large quantity of petroleum products are imported at present. Operation of the new oil refinery can reduce petroleum product imports to exert a great influence on the Guatemalan economy. This Volume calculated the economic benefit and cost, and the economic internal rate of return, and analysed effect on international balance of payment.

1. Economic Benefit and Cost

Table XI-1 summarizes the economic effect of this project when it has been materialized, to calculate economic benefit and cost.

Table XI-1 Main Economic Benefit and Cost

Benefit	Cost
o Petroleum products	o Investment cost
o Decrease of transportation cost of petroleum products	o Raw materials and utilities
o Development of infrastructure	o Labor cost
o Increased employment opportunities	o Other expenses for plant operation

These benefits and costs are evaluated quantatively in terms of EIRR (Economic Internal Rate of Return) and the effect on foreign trade balance whenever quantitative measurement is available. Other benefits are evaluated qualitatively.

(1) Economic benefit

1) Direct benefit

Direct benefit of this project lies in economic value of petroleum products to be produced. Present petroleum products import can be replaced by those to be produced under this project and increased demand in future for these products can be covered by implementing this project. Reduction of transportation cost of petroleum products and terminal rental can be counted as benefit.

Table XI-2 shows the direct economic benefit at 100% operation.

Table XI-2 Direct Economic Benefit

	CIF Price (bbl/US$)	Production (bbl/y)	Benefit (10^3 US$/y)
LPG	28.430	759,000	21,578
Premium Gasoline	37.296	1,980,000	73,846
Regular Gasoline	35.994	1,980,000	71,268
Kerosene	36.162	1,250,698	45,228
Gas Oil	33.264	3,493,792	116,217
Fuel Oil	27.832	2,670,610	74,328
Asphalt	27.832	198,000	5,511
Sub-Total	-	(12,332,100)	(407,976)
Benefit from Saves	-	-	42,829
Total	-	-	450,805

Note: Petroleum product prices are based on CIF as of 1983.

Transportation cost saving of petroleum products is 1.124 cents/bbl.km x 220 km = US$2.473/bbl and terminal cost saving is US$1.0/bbl.

2) Indirect benefit

o Increase in employment opportunity

New employment opportunity is provided by this project, amounting to 543 persons which are required for operation of the refinery. Secondary increase in employment opportunity in peripheral industries can be expected to an great extent.

o Ripple effects on other industries

Table XI-3 shows supporting industries necessary for construction and operation of the refinery.

Table XI-3 Supporting Industries

Stage	Type of Supporting Industries
1. Construction	o Contractor-Site Preparation, Foundation, Erection, Electrical Wiring, Piping etc. o Building Materials Supply o Steel Works and Metal Fabrication o Transportation of Goods
2. Operation	o Repair Workshops-Valve Repairing, Electrical Machinery Repairing, Heavy Machinery Repairing o Reconditioning of Meters and Gauges o Steel Works and Metal Fabricators o Machining Shops o Foundry and Forging Works o Electroplating and Galvanizing Works o Automobile Garage (Repairing)

Among the above industries, Guatemala has civil engineering and building contractors, but mechanical industries have not reached full growth yet. Assistance by foreign contractors is necessary for the construction of this refinery. Once the new refinery is put in operation, plant maintenance work including periodical shut down may contribute to development of these industries.

o Other benefit

The economic benefit of Guatemalan own refinery is stabilization in prices of petroleum products under the present situation where prices petroleum product fluctuate in linkage with costs of international crude oils.

(2) Economic cost

The following items are counted as the economic cost of this project.

1) Initial economic cost

The initial economic cost includes the cost of construction and pre-operation expenses of the refinery, terminal and pipeline. A shadow exchange rate of 1.3 is applied to the cost calculated in the financial analysis to figure out the initial economic cost. The shadow price for unskilled labor necessary for the construction is estimated to be 0.6. Table XI-4 shows the initial economic cost.

Table XI-4 Initial Economic Cost

(Unit: 10^3 US$)

	-3y	-2y	-1y	Total
Construction	79,018	306,018	189,789	574,825
Pre-operation	192	1,348	4,821	6,361
Working Capital	0	0	3,624	3,624
Total	79,210	307,366	198,234	584,810

(Note: -3y = 1986, -2y = 1987, -1y = 1988)

2) Economic operating cost

The economica operating cost includes cost of labor, crude oil, chemicals, catalysts, utilities and maintenance. Because loan repayment, interest and insurance cost is a transfer cost in the financial analysis, they are exempted from economic operating cost. Table XI-5 shows the economic operating cost among the economic cost. In this calculation, domestic currency portion is converted with the exchange rate of 1.3.
Crude oil is evaluated in terms of CIF prices. Because the operation of the plant requires considerably high skills, no shadow price applied.

Table XI-5 Econimic Operating Cost

(Unit: 10^3 US$)

Year	1y	2y	3y - 20y
Crude Oil	247,932	318,770	354,189
Chemical	578	743	825
Catalyst	1,438	1,849	2,054
Utility	2,122	2,729	3,032
Labor	2,812	2,812	2,812
Maintenance	14,728	14,728	14,728
Plant Overhead	3,001	3,001	3,001
Total	272,611	344,632	380,641

Note: o 20% of chemical cost and 30% of maintenance cost are converted with the shadow exchange rate of 1.3 as dorestic currency portion.

o 1y = 1989, 2y = 1990, 3y - 20y = 1991 - 2008

2. Calculation of Economic Internal Rate of Return (EIRR)

From the economic benefit and cost described in the preceding chapter, the economic internal rate of return is calculated. Table XI-6 shows the economic benefit and cost.

Table XI-6 Economic Benefit and Cost

(Unit: 10^3 US$)

Year	Economic Benefit	Economic Cost	Balance	Discounted Flow
-3	0	79,210	-79,210	-72,925
-2	0	307,366	-307,366	-260,523
-1	0	198,234	-198,234	-154,690
1	315,564	272,611	42,953	30,858
2	405,725	344,632	61,093	40,409
3	450,805	380,641	70,164	42,725
4	450,805	380,641	70,164	39,335
5	450,805	380,641	70,164	36,214
6	450,805	380,641	70,164	33,340
7	450,805	380,641	70,164	30,695
8	450,805	380,641	70,164	28,259
9	450,805	380,641	70,164	26,017
10	450,805	380,641	70,164	23,953
11	450,805	380,641	70,164	22,052
12	450,805	380,641	70,164	20,302
13	450,805	380,641	70,164	18,691
14	450,805	380,641	70,164	17,208
15	450,805	380,641	70,164	15,843
16	450,805	380,641	70,164	14,586
17	450,805	380,641	70,164	13,428
18	450,805	380,641	70,164	12,363
19	450,805	380,641	70,164	11,382
20	450,805	380,641	70,164	10,479

Discount Factor: 8.62%

Based on the base case of the economic internal rate of return obtained from Table XI-6, the benefit and initial economic cost are changed by 10% each in reference cases. Table XI-7 shows economic internal rates of return in reference cases.

Table XI-7 Calculated EIRR

(Unit: %)

Base Case	Case 1	Case 2	Case 3	Case 4
8.6	15.4	-1.6	7.5	9.7

Case 1: Economic benefit +10%
Case 2: Economic benefit -10%
Case 3: Economic cost for investment +10%
Case 4: Economic cost for investment -10%

The criterion (cutoff rate) for judging implementation of the project by the economic internal rate of return is 8% to 12% according to the guideline of various international organs, depending on the nature of projects. The economic internal rate of return of this project shows 8.6% in the base case and is on the border line.

3. Effects of Project on International Balance of Payment

Effects of this project on the Guatemalan trade balance are studied.

(1) Outflow of foreign currency during construction

Table XI-8 shows breakdown of foreign currency requirement in total capital requirement. Foreign currency portion during construction amounts to about US$481 million. However, it is not counted as foreign currency outflow, because it is covered by long term loans from foreign countries.

Table XI-8 Breakdown of Foreign Currency Requirement in Total Capital Requirement

(Unit: 10^3 US$)

Investment Cost (Foreign)	Pre-Operating Expense	Initial Working Capital	Interest during Construction	Total
409,954	1,236	0	69,638	480,828

Note: Interest on loans in foreign currency only is shown.

(2) Outflow of foreign currency after the start of the commercial operation

The actual outflow of foreign currency after the start of the operation includes interest on long term loans, loan replayment, crude oil imports and operation cost in foreign currency. Table XI-9 shows calculated results. Foreign currency outflow for 20 years after the start of the operation amounts to about US$6,461 million.

Table XI-9 Foreign Currency Requirement

(Unit: 10^3 US$)

Year	Interest	Repayment	Crude Oil	Chemicals etc.	Maintenance	Total
1	43,275	0	186,764	1,922	11,076	243,037
2	43,275	0	240,125	2,471	11,076	296,947
3	43,275	0	266,806	2,746	11,076	323,903
4	43,275	32,055	266,806	2,746	11,076	355,958
5	40,390	32,055	266,806	2,746	11,076	353,073
6	37,505	32,055	266,806	2,746	11,076	350,188
7	34,620	32,055	266,806	2,746	11,076	347,303
8	31,735	32,055	266,806	2,746	11,076	344,418
9	28,850	32,055	266,806	2,746	11,076	341,533
10	25,965	32,055	266,806	2,746	11,076	338,648
11	23,080	32,055	266,806	2,746	11,076	335,763
12	20,195	32,055	266,806	2,746	11,076	332,878
13	17,310	32,055	266,806	2,746	11,076	329,993
14	14,425	32,055	266,806	2,746	11,076	327,108
15	11,440	32,055	266,806	2,746	11,076	324,123
16	8,655	32,055	266,806	2,746	11,076	321,338
17	5,770	32,055	266,806	2,746	11,076	318,453
18	2,885	32,058	266,806	2,746	11,076	315,571
19	0	0	266,806	2,746	11,076	280,628
20	0	0	266,806	2,746	11,076	280,628
Total	475,925	480,828	5,229,397	53,821	221,520	6,461,491

(3) Foreign currency saving

All petroleum products to be produced are destined for home consumption and no export is considered. Therefore, foreign currency saving is obtained by multiplaying the output of petroleum products by CIF prices.
A total of US$ 7,996 million is saved for the period of 20 years.

(4) Foreign currency balance

Foreign currency balance can be calculated by subtracting foreign currency saving from foreign currency outflow. Foreign currency balance for the period of 20 years shows a plus US$ 1,535 million. 3,300,000 bbl of Guatemalan crude oil is consumed annually under this project. If the crude oil is exported, foreign currency inflow for the period of 20 years totals to US$ 1,713 million. If export of Guatemalan crude oil is taken into account, foreign currency balance shows a deficit of US$ 178 million.

VOLUME XII

OVERALL EVALUATION AND RECOMMENDATION

XII OVERALL EVALUATION AND RECOMMENDATION

In closing this study, overall evaluation is made in this Volume. Financially feasible conditions for this project are that duties on equipment and materials imported are exempted, the owner is freed from income tax and average 10,000 bbl/d of Guatemalan crude is available for the period of 20 years. Exemption of duties and income tax has been confirmed with MEM. However it is necessary paying attention to effects of the new petroleum law, to observe the progress of Guatemalan crude oil output in future.

The Processes to be used for the new oil refinery are all commercially proven. Condition of the site and infrastructure, and technical level in Guatemala in no way hinder implementation of this project. Demands forecast for petroleum products support that the production scale of the new oil refinery is reasonable.

(1) Technical evaluation

The crude oil processing capacity of the new refinery is 40,000 bbl/d. In consideration of demands for petroleum products, the fluid catalytic cracking process and ebullated-bed hydrocracking process have been adopted for heavy crude cracking process. Both processes are already proven commercially but do not exist in Guatemala at present. The existing refinery in Guatemala is operating at a low operation rate but without any trouble. There will be no problem in technology transfer by providing training and operation guidance, although such advanced processes have been unknown in Guatemala. Therefore, it has been concluded that there is no problem from a technical point of view in materializing the new oil refinery.

(2) Financial evaluation

Results of financial analysis on the refinery, terminal and pipeline are summarized below.

1) Total capital requirement

Total capital requirement amounts to about 794 million quetzales including about 673 million quetzales for construction cost and about 121 million quetzales for interest during construction and other funds.

2) Financial internal rate of return

Financial internal rate of return on investment (FIRR on I) is 11.2%, showing that this project pays although its profitability is not very high. Financial internal rate of return on equity FIRR on E) is 17.6%, exceeding loan interest of 9%. The sensitivity analysis conducted reveals that change in selling price of petroleum products and in crude oil cost exerts a great influence on profitability. Change in construction cost also affects profitability considerably.
Change of the financial internal rate of return on investment (FIRR on I), representative indicator on profitability, is shown below.

o	Selling prices of petroleum product	10% up	+4.5%
o	Crude oil cost	10% down	+3.3%
o	Construction cost	10% down	+1.2%

(3) Economic evaluation

Results of social and economic analysis conducted are summarized below.

1) Economic internal rate of return

Economic internal rate of return (EIRR) is 8.6%. The criterion of various international organs on EIRR for judging implementation of a project is 8 to 12%. The above shows that this project pays.

2) Other economic benefit

In addition to 543 persons directly employed for operation of the new refinery, terminal and pipeline, much increase in employment opportunity in related industries can be expected, because about 16 million quetzales is spent annually as facility maintenance cost.

(4) Overall evaluation

According to financial analysis results, the financial internal rate of return on investment (FIRR on I) is 11.2% and indicates that this project pays although its profitability is not very high. According to economic analysis results, the economic internal rate of return (EIRR) is 8.6% and indicates that it is feasible economically. Increase in employment opportunity can be expected as other economic benefit. At present the Guatemalan economy depends mainly on coffee, cotton and other agricultural products, of which economic structure is easily influenced by weather and market conditions of the products, and is orienting itself for industrialization.

Taking the above into account, it would be preferable to implement and execute this project.
However, it should be necessary in implementing the project to study and examine this project from a national macro-economic standpoint, since it requires a vast amount of funds amounting to about 794 million quetzales.

(5) Recommendation

1) Establishment of the Owner of the project

A contractor for the new refinery must be decided not later than early 1986. To do this, the Owner must be established as early as possible to promote this project.

2) Incentive to oil exploration

The project is planned to process 3,300,000 bbl of Guatemalan crude oil annually. Output of Guatemalan crude oil under the new petroleum law enforced in 1983 must be carefully watched and incentives must be given to oil developers if necessary.

3) Effect of crude oil cost and product price on profitability of this project

A sensibility analysis is conducted on effect of crude oil cost and product price on profitability in the financial analysis. According to the results, it is found that both costs have a great influence on profitability.

If the crude oil cost increases by 10%, for example, FIRR on I decreases to 7.4% from 11.2%. If the product price decreases by 10%, for example, FIRR on I decreases to 5.4% from 11.2%. In either case, this project loses charm financially.

Therefore, if the crude oil cost and petroleum product prices as of end 1983 are used as a precondition, the project pays but may lose charm depending on trend of both prices. Therefore, it is necessary to carefully watch trends of crude oil cost and petroleum product prices in the future.

APPENDIX-1

SCOPE OF WORK

FOR

THE FEASIBILITY STUDY

ON

THE PETROLEUM REFINERY PROJECT

IN

THE REPUBLIC OF GUATEMALA

AGREED UPON BETWEEN

LA SECRETARIA DE MINERIA, HIDROCARBUROS Y ENERGIA NUCLEAR

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY

GUATEMALA, JULY 19, 1983

TTE. CNL. E INGENIERO SIGFRIDO ALEJANDRO
CONTRERAS BONILLA
SECRETARIO DE MINERIA, HIDROCARBUROS Y
ENERGIA NUCLEAR

KENJI IWAGUCHI
LEADER OF THE JAPANESE
PRELIMINARY SURVEY TEAM

I. INTRODUCTION

In response to the request of the Government of the Republic of Guatemala, the Government of Japan has decided to implement the feasibility study on the petroleum refinery project (hereinafter referred to as "the Study") under the Agreement on Technical Cooperation between the Government of Japan and the Government of the Republic of Guatemala signed on 28 March 1977.

The Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programs of the Government of Japan, will undertake the Study, in close cooperation with the authorities of the Republic of Guatemala.

La Secretaría de Mineria, Hidrocarburos y Energía Nuclear (hereinafter referred to as "SMHEN") by itself and/or through Dirección General de Minería e Hidrocarburos (hereinafter referred to as "DGMH") shall act as counterpart agency to the Japanese study team and also as coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

II. CONCEPT OF THE PROJECT

The project consists of a refining, pipeline and oil receiving terminal facilities.

III. OBJECTIVE OF THE STUDY

The objective of the Study is to examine the technical, economic and financial feasibility of the petroleum refinery project in the Republic of Guatemala.

IV. OUTLINE OF THE STUDY SCOPE

In order to achieve the above objective, the study will cover the following items:

1. Review on the background of the Project
   - 1.1. To review the Guatemalan economy
   - 1.2. To review the industrial development policies
     - (1) Present situation of industrial development.
     - (2) Development of economic infrastructure.
   - 1.3. To review the present situation of the demand-supply of petroleum products.
2. Study on the market and distribution channel of petroleum products
   - 2.1. To review the past trend in the demand for petroleum products
   - 2.2. To forecast the future demand by petroleum products
     - (1) LPG
     - (2) Premium gasoline (95 Oct) and regular gasoline (87 Oct)
     - (3) Kerosene and Jet Fuel
     - (4) Aviation gasoline
     - (5) Diesel oil
     - (6) Bunker C, or Fuel Oil
     - (7) Asphalts -AC-85-C, -AC-85-100, RC-250.
   - 2.3. To investigate the prices of petroleum products
   - 2.4. To assess the system and cost of marketing and distribution
3. Study on the crude oil.
   - 3.1. To investigate availability of Guatemalan crude oil
     - (1) Prospect of crude oil production
     - (2) Properties of crude oil
     - (3) Price
   - 3.2. To investigate the possibility of imported crude oil

(1) Type of crude oil to be imported

(2) Properties of crude oil

(3) Price

4. Study on the Project location and site

4.1. To investigate the natural conditions

(1) Meteorology

(2) Geology and topography

4.2. To investigate the socio-economic conditions

(1) Population, labor force and wages, etc.

(2) Industries

(3) Regional development plan

4.3. To investigate utilities and infrastructure such as electricity, water, transportation, marine facilities and communications.

4.4. To select the sites for refinery and oil receiving terminal, and the pipeline route.

5. Study on applicable laws and regulations.

6. Preparation of the basic plan and the conceptual design of the Project.

6.1. To determine the crude oil to be processed and the crude oil throughput capacity.

6.2. To determine the products and their optimum production scale

6.3. To examine three (3) alternatives of refining schemes.

6.4. To determine the process of refinery.

6.5. To determine the processing capacity of each processing unit

6.6. To determine the design standards of the proposed plants.

6.7. To prepare the process flow sheet including material balance

6.8. To prepare the conceptual design of the Project.

(1) Oil refinery plant

(2) Crude oil pipeline including pumping stations

(3) Crude oil receiving terminal

(4) Other facilities

6.9. To prepare plant layout of the proposed plants and other facilities.

6.10. To propose transport plan of materials for plant construction

6.11. To prepare implementation program of plant construction.

6.12. To prepare organization and manpower plan for plant construction and operation on the commercial basis.

6.13. To propose the commercial operation program.

6.14. To examine the environmental impacts.

7. Financial analysis.

7.1. Capital requirement.

(1) Fixed capital (land cost, construction cost of plants and other facilities and pre-operation cost, etc.)

(2) Working capital

(3) Expenditure schedule

7.2. Procurement of capital

7.3. Production cost

7.4. Projected income statement

7.5. Projected balance sheet

7.6. Projected flow statement

7.7. Financial internal rate of return

7.8. Sensitivity analysis based on possible variations in:

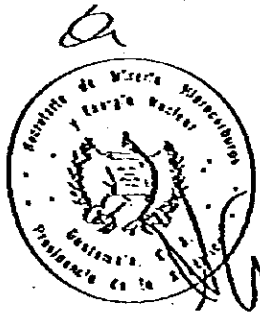
(1) Investment cost

(2) Price of crude oil

(3) Sales price

8. Economic and social evaluation.

9. Conclusion and recommendations.



V. FRAMEWORK AND SCHEDULE OF THE STUDY

The Study will be carried out by the following four steps:

1. Step A: Preparatory work in Japan
2. Step B: Field work in the Republic of Guatemala
3. Step C: Home office work in Japan
4. Step D: Presentation of and discussion on the Draft Final Report in the Republic of Guatemala.

The tentative schedule of the Study is as shown in the Annex.

VI. REPORTS

JICA will prepare and submit the following reports to the Government of the Republic of Guatemala.

1. Interim Report written in English, at the end of the Step B mentioned in the V.
   10 Copies
2. Draft Final Report written in English and Summary in Spanish, within seven (7) months after the commencement of the Step B mentioned in the V.
   15 Copies
3. Final Report written in English and Summary in Spanish, within two (2) months after the receipt of comments on the Draft Final Report by SEGEPLAN.
   30 Copies.

VII. UNDERTAKING OF THE GOVERNMENT OF THE REPUBLIC OF GUATEMALA.

The Government of the Republic of Guatemala shall accord privileges, immunities and other benefits contemplated in the Technical Cooperation Agreement, signed between the Government of the Republic of Guatemala and the Government of Japan on March 28, 1977, to the members of the Japanese Study Team and, through the authorities concerned, take necessary measures

to facilitate the smooth implementation of the Study.

In the same way, SMHEN shall make the necessary arrangements with the cooperation of other Governmental and non-governmental organizations concerned with the following.

1.1. To make best efforts for the safety of the Japanese Study Team.

1.2. To provide the necessary facilities to the Japanese study team for the remittances as well as utilities of funds introduced into the Republic of Guatemala from Japan in connection with implementation of the Study.

1.3. To secure permission to take all data and documents related to the Study including pthotograps out of the Republic of Guatemala to Japan by the Japanese study team.

2. SMHEN shall, at its own expense, provide the Japanese study team with the following, in cooperation with other agencies, if necessary.

2.1. Available data and information related to the study.

2.2. Counterpart personnel.

2.3. Suitable office space with necessary equipment whenever possible in Guatemala City.

2.4. Credentials of identification cards.

VIII. UNDERTAKING OF THE GOVERNMENT OF JAPAN

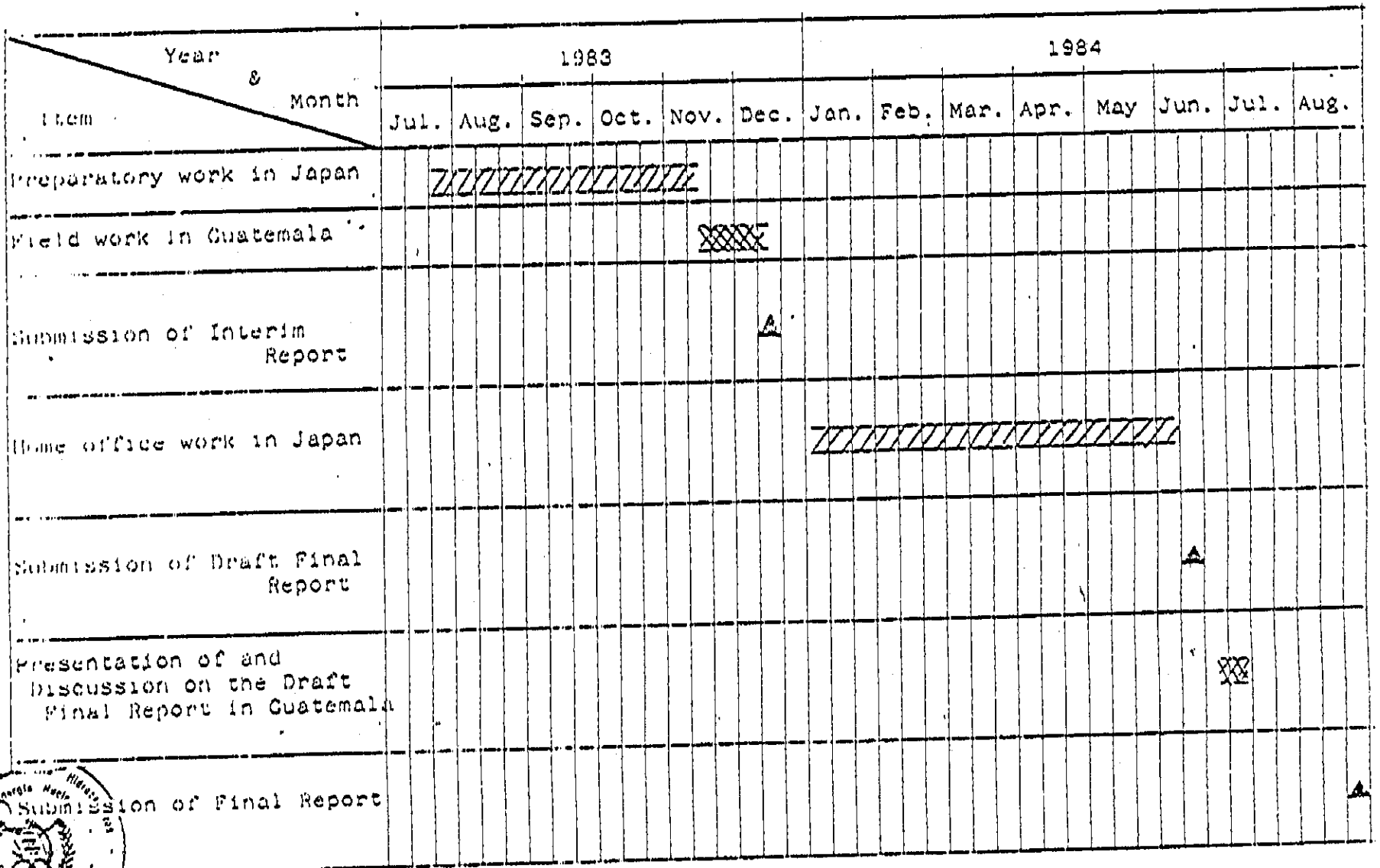
For the implementation of the Study, the Government of Japan will take the following measures:

1. To dispatch, at its own expense, study teams to the Republic of Guatemala.

2. To pursue technology transfer to the Guatemalan counterpart personnel in the course of the Study.

IX. JICA and SMHEN will consult with each other in respect of any matter that is not agreed upon in this document and may arise from or in connection with the Study.

TENTATIVE SCHEDULE OF THE STUDY



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APPENDIX-2

INTERIM REPORT

ON

THE PETROLEUM REFINERY PROJECT

IN

THE REPUBLIC OF GUATEMALA

AGREED UPON BETWEEN

MINISTERIO DE ENERGIA Y MINAS

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY

Guatemala, December 1, 1983

TTE. CRL. E INGENIERO SIGFRIDO
ALEJANDRO CONTRERAS BONILLA
MINISTERIO DE ENERGIA Y MINAS

SUSUMU SATO
LEADER OF THE JAPANESE
FIELD SURVEY TEAM

CONTENTS

1. Outline of Field Survey

(1) Background of Field Survey

1) This field survey team (hereinafter referred to as the TEAM) was dispatched to the Republic of Guatemala for survey mission from November 12, 1983 to December 4, 1983 based on the Scope of Work (hereinafter referred to as the S/W) mutually agreed by and between the Pre-survey Team of the Japan International Cooperation Agency (hereinafter referred to as JICA) and La Secretaria de Mineria, Hidrocarburos and Energia Nuclear (hereinafter referred to as MEM) on July 19, 1983.

2) The TEAM confered with related Guatemala government authorities, Guatemala private enterprises and Japanese joint concerns in Guatemala for 23 days on the following main objectives;

a. Data collection on the study

b. Confirmation of the study procedure

(2) TEAM MEMBERS

Mr. S. Satoh	Team Leader	Project Manager
Mr. Y. Suzuki	Engineer	Pipeline
Mr. S. Nishiyama	Engineer	Oil Refinery Plant
Mr. H. Sekiguchi	Engineer	Terminal Facility
Mr. S. Kobayashi	Engineer	Oil Refinery Process
Mr. M. Itagaki	Engineer	Civil and Architecture
Mr. E. Sugiyama	Economist	Marketing
Mr. A. Hashimoto	Economist	Finance and Economy
Mr. K. Koike	Economist	Marketing System

(3) Survey Schedule

DATE		AM/PM	SCHEDULE
NOV. 12	SAT.		Arriving Guatemala (PA-022)
13	SUN.		Preparation for field survey
14	MON.	AM	Visit to Japanese Embassy
		PM	Meeting with MEM
15	TUE.		Meeting with MEM
16	WED.		Visit to El Rancho (Proposed site of oil Refinery)
			Survey of Pipeline route
17	THU.		Visit to proposed site of terminal
			Survey of port facilities
			Survey of oil refinery plant (Guatecal Co.)
18	FRI.		Visit to San Francisco del Mar
			Survey of equipment transportation
19	SAT.		Report preparation
20	SUN.		Report preparation
21	MON.		Visit to San Jose Port

DATE		AM/PM	SCHEDULE			
NOV. 22	TUE.		Studies of National policies on industry development	Collection of data related to pipeline (map and others)	Investigation of natural conditions	Investigation of Major economic indices
23	WED.		Investigation of quantity and price of Guatemalan crude oil	Visit to Puerto Santo Tomas de Castilla	Studies of laws and regulations on oil refinery	Investigation of financial analysis preconditions
24	THU.		Investigation of quantity and price of imported crude oil	Visit to Puerto Santo Tomas de Castilla	Survey of local industries	-ditto-
25	FRI.		Investigation of supply and demand of petroleum products	Pipeline route survey	Conference with INDE	Investigation of economic analysis preconditions
26	SAT.		Report Preparation	Report Preparation	Report Preparation	Report Preparation
27	SUN.		-ditto-	-ditto-	-ditto-	-ditto-
28	MON.		Visit to Oil Refinery (Texas Petroleum Co.)		Meeting with local Industries	
29	TUE.		Investigation of Petroleum product. Distribution	Meeting with local Industries		Investigation of labor situation
30	WED.		Meeting with MEM			
DEC. 1	THU.	AM	Meeting with MEM (Signing interim report)			
		PM	Visit to Japanese Embassy			
2	FRI.		Leaving Guatemala (MX-908)			

(4) Main Attendant of the Meetings

1) Ministerio de Energía y Minas (MEM)

Minister Tte. Cnl. e Ing. Sigfrido Alejandro Contreras Bonilla

Director Ing. Marco Tulio Espinoza

Vice-Director Lic. Augusto Estrada

Department Head Ing. Jorge L. Huertas

Engineer Mario R. Cáceres

Engineer Ing. Roberto Chacón

Engineer Ing. José Arturo Estrada

Engineer Ing. Luis G. Paredes

2) Técnica de Pulpa y Papel, S.A.

Engineer Ing. Enrique Ruiz Girola

3) San Agustín Municipality Office

Mayor Oliverio Ayala Juárez

4) Guatcal Oil Co.

Engineer Julio Rafael Colón R.

Engineer Carlos A. Gómez

5) Crude Oil Terminal

Supervisor Richard White

6) Insivumeh (Meteorological Agency)

Engineer Estuadro Velásquez

Engineer Eddy Sánchez

7) Puerto Barrios Municipality Office

Mayor Luis A. Solís

8) Instituto Nacional de Electrificación (INDE)

Director José L. Terrón

9) Transformadora Industrial Pittsburgh
Des Moines y Cía. S.A. (TIPIC)
Director Fidelino Javier

10) Banco de Guatemala
Director Gabriel R. Castellanos

11) Texas Petroleun Co.
Engineer Héctor F. De León G.
Engineer Julio F. Martínez

12) Guatcal Co.
Engineer Julio Colón R.
Supervisor Carlos A. López

(5) Main items of Field Survey

Below listed were the scheduled site survey main items:

1) Background of planning an oil refinery

- ° Guatemalan economy
- ° Industry development policies
- ° Current situation of supply and demand of petroleum products
- ° Relationship with existing oil refineries (Texas Petroleum Co. and Guatecal Co.)

2) Investigation of petroleum product market and sales channels

- ° Trend of demand for petroleum products in the past
- ° Costs and sales channels of petroleum products
- ° Petroleum product prices

3) Investigation of crude oil availability

Crude oil produced in Guatemala

- ° Forecast of crude oil production
- ° Crude oil price

Imported crude oil

- ° Types of imported crude oil
- ° Crude oil prices

4) Survey of proposed sites for oil refinery plant, crude oil terminal and pipeline route

Natural conditions

° Weather conditions

° Geology and topography

Social and economical conditions

° Population, labor supply and wage level

° Local industries

° District development plan

Utility availability and public facilities

° Electricity

° Water

° Transportation

° Port

° Telecommunications

° Land cost

Selection of site for oil refinery, terminal and pipeline route

° Oil refinery

° Crude oil terminal

° Pipeline route

5) Investigation of related laws and regulations

° Old and new petroleum laws

° San Jose Agreement

° Other related laws and regulations

6) Investigation for the preparation of basic plan and conceptual design of oil refinery, terminal and pipeline.

° Determination of regulations and design standards to be applied to oil refinery

° Organization and necessary number of personnel for oil refining and crude oil terminal

7) Financial analysis

° Preconditions for financial analysis

8) Economic analysis

° Preconditions for Economic analysis

(8) Roles of the Guatemala Counterpart

In order to efficiently implement all survey work, the TEAM wished that the following conveniences were provided by the Guatemalan government. The Guatemalan government agreed to offer those roles.

1) Preliminary arrangement for our visit to the related governmental and private institutions and their effective cooperation with the TEAM for collecting necessary information.

2) Supply of six bottles, and sending six bottles to Japan by air cargo, each containing one liter of crude oil. since such sample is needed as basic material for a conceptual design of an oil refinery.

Supply of one drum crude oil and sending one drum By ship.

3) Participation and cooperation of Guatemala counterparts for the field survey, as listed below:

November 15 - November 18	1 person
November 21	1 person
November 22 - November 29	2 persons

4) Supply of related data (governmental plans and existing reports) which are in the possesion of the Guatemalan government and which are necessary for the survey, and detailed topographs (about 1/10,000 scale) and aviation photomap.

5) Supply of office with an appropriate space and facilities for clerical work of the TEAM.

2. Mutual Agreement Items

(1) Study Procedure

The TEAM explained the study procedure and MEM agreed to the procedure.

(2) Study Schedule and the Number of Reports

The TEAM confirmed the study schedule and the number of reports with MEM based on the S/W dated July 19, 1983. MEM agreed to the study schedule and the number of reports to be submitted by the TEAM.

(3) Selection of the Site

For the home office work in Japan, the TEAM hoped to select the site of oil refinery and importing crude oil terminal.

Based on the field survey and the existing reports, the TEAM selected El Rancho for Oil refinery and Puerto Santo Tomas de Castilla for importing crude oil terminal.

Detail is as follows

1) Oil Refinery

El Rancho and Puerto Santo Tomás de Castilla are the candidate sites of oil refinery.

As a result of comparison of annual cost co-related with investment cost and annual transportation cost, the case El Rancho has been found more economical than that of Puerto Santo Tomas de Castilla.

The TEAM, therefore, selected El Rancho as oil refinery site.

(Unit: MM US$)

	In case of El Rancho	In case of Sto. T. Castilla
*Annual Cost co-related with inves - tment cost	67	44
*Annual transpor-tation cost	13	52
TOTAL	80	96

2) Importing crude oil terminal

Puerto Santo Tomas de Castilla and San Francisco del Mar are the candidate sites of importing crude oil terminal.

In case of San Francisco del Mar, access road will have to be constructed to transport machinery and equipment for the terminal.

According to information obtained from MEM and Municipal Officer, there are a lot of suitable areas for the terminal in Puerto Santo Tomas de Castilla.

The TEAM, therefore, selected Puerto Santo Tomás de Castilla as importing crude oil terminal site.

(4) Capacity of Proposed Oil Refinery

Regarding the capacity of the oil refinery, MEM hoped that its capacity was targeted at 40,000 - 50,000 BBL/day.

The TEAM will study the capacity of the oil refinery based on the future demand of oil products in Guatemala taking the target of 40,000 - 50,000 BBL/day into consideration.

(5) Importing Crude Oil

According to the plan of MEM, Venezuelan and Mexican crude oil will be expected to be imported as raw material for the oil refinery, in case of shortage of Guatemalan crude oil.

The TEAM hoped to fix the kind of importing crude oil to study a conceptual design of the oil refinery.

MEM indicated Mexican MAYA as the most probable importing crude oil.

3. Result of Field Survey

1) Background of planning an oil refinery

There are two oil refineries in Guatemala, one owned by Guatcal Oil Co. and another owned by Texaco Petroleum Co. The oil refinery fo Guatcal has stoped since 1975 for an economic reason, while that of Texaco is said to be operating at a lower operation rate, because its does not necessarily meet or match demand on oil products in Guatemala.

Accordingly, such a large supply-demand gap of oil products is filled by imported oil products.

On the other hand, Guatemalan crude oil is expected to increase considerably by the enactment of New Petroleum Law.

Under these circumstances a new oil refinery has been planned and proposed by the government of Guatemala.

2) Investigation of market and distribution channels of Petroleum products.

The trend of demand on petroleum products, such as liquefied petroleum gas, gasoline, kerosine, diesel and heavy oil in the past eight years (1975-1982) has been investigated.

The TEAM requested MEM for the preceding two years demand data (1973-1974), but not all of those data have been available.

Data on prices and distribution channels of petroleum have been obtained.

3) Investigation of Guatemalan crude oil

The TEAM investigated the production of Guatemalan crude oil which will be affected to a great extent by the enactment of New Petroleum Law.

The price of Guatemalan crude oil is calculated by using the weighted ratio of estimated CIF prices at Atlantic Port of Arabian Light, Tia Juana Light and Maya, and their CIF houston prices.

The TEAM has obtained the terminal price at Santo Tomas de Castilla of the Guatemalan crude oil but could not obtain the price determining formula, which is said to be confidential.

As far as an imported crude oil is concerned, MEM indicated that Mexican MAYA would be the most probalble crude oil to be fed to the proposed oil refinery.

4) Survey of proposed sites for oil refinery, crude oil terminal and pipeline route.

The TEAM investigated the following at El Rancho; Puerto Santo Tomás de Castilla and route area connecting both sites.

° Natural Conditions

The TEAM collected stadistical data on temperature, humidity, rainfall and wind velocity from the Weather Bureau.

° Geology and Topography

The TEAM measured a soil bearing stress by means of a portable corn and obtained related maps (scale: 1/50,000), with which.

The TEAM will study the cost of site preparation,

access road construction and pipeline laying along the route.

° Utility, Public facilities and Infrastructure

The TEAM obtained from INDE necessary information on availability of commercial electric power and its reliability.

The TEAM investigated both routes from Puerto Santo Tomas de Castilla to El Rancho and from San José to El Rancho, to transport heavy machinery and equipment. According to a result of the survey, the route from Puerto Santo Tomas de Castilla to El Rancho is better than the other route with respect to bearing stress of bridges and curves of the road.

The TEAM investigated Puerto Santo Tomas de Castilla and Puerto San José, and their facilities such as berths piers, loading, unloading facility and so forth.

The investigation result will be reflected to the future plan of the proposed imported crude oil terminal.

The TEAM investigated telecommunication net works in Guatemala and also land cost around El Rancho and Puerto Santo Tomas de Castilla.

5) Investigation of related laws and regulations

° The Old Law (National Petroleum Regime Law)

stipulates that an oil field development shall be conducted in accordance with an exploration and exploitation contract to be concluded between the Government of Guatemala and oil development companies whereby fifty five percent (55%) of the total crude oil production shall fall to the share of the Government of Guatemala. The New Law (Law of crude Oil), on the other hand, stipulates that the Government of Guatemala shall share twenty percent (20%) of the total production for the crude oil of thirty degrees (30°) API; this percentage of share shall increase or decrease by one percent (1%) point respectively as API degree increases or decreases by each one percent (1%) point.

The new Law, further, stipulates that the Government of Guatemala shall have the right to share minimum thirty percent (30%) of the total crude oil production after and when the contractor will have recovered the cost of exploration, exploitation and operation expenses.

Having obtained the content of the New Law, the TEAM will review how much more exploration and development of oil field in Guatemala will be encouraged and activated to increase national crude oil production.

° San José Agreement

According to the comment made by MEM staff, the conditions of San Jose Agreement were modified with respect to credit conditions (percentages and interest) on August 3rd, 1983.

° Other related laws and regulations according to MEM, the laws and regulations applicable to an oil refinery, pipeline and terminal facility with regard to safety precaution and environmetal protection are not legislated at present.

The TEAM, therefore, will design such facilities, referring to or in accordance with laws and regulations applicable in Japan and U.S.A.

6) Investigation for a conceptual design of Oil Refinery, terminal and pipeline.

The TEAM visited Guatecal Oil Co. and Texaco Petroleum Co. to investigate organization, the number of personnel design standard and so forth.

The result will be reflected to the conceptual design of this project .

7) Financial and Economic Analysis

The study basis to be applied to the finantial and economic analysis of the project is determined as follows based on the discussions with MEM.

- The currency for the financial and economic analysis will be quetzal, and foreign currency will be converted into quetzal.
- Exchange Rate

  1 Quetzal = 1 US$
  1 Quetzal = 235 YEN

- Base of Price

  Calculations for financial and economic analysis will be based on the present value (as of Dec. 1983) without escalation however, one case of calculation for financial analysis will be calculated with escalation.

- Project schedule

  The year of plant start-up will be 1989 as temporary schedule.

- Project life for calculation

Project life for calculations will be 20 years.

° Onstream factor

The onstream factor mainly depens on the technical and marketing factors. In view of technical factor, the following rate will be adopted.

1st. year	70%
2nd. year	90%
3er. year and onward	100%

Note: Annual operating days: 330 days/year

° Financial terms and conditions

1) Debt equity ratio	90:10
2) Source of equity	Government
3) Long term loan	
- Interest rate	9% annual
- Installment	15 times
- Repayment	15 years
- Grace period	3 years
4) Short term loan condition	12% annual

5) Interest during construction will be capitalized

° Depreciation and amortization

1) Pipeline	15 years
2) Machinery and equipment	10 years
3) Election	10 years
4) Building and structure	10 years
5) Interest during construction	15 years
6) Pre-operating expense	5 years

° Taxes

All taxes are exempted due to the fact that the project will be executed by a governmental organization. However one case of financial calculation with taxable base will be conducted as a reference.

° Prices of raw material and products for the calculation of financial analysis

Domestic crude oil 26.88619 US$/BBL

Imported crude oil will be evaluated at the C.I.F. price in Guatemala as of the end of 1983.

L P G	0.67971	Q/Galone
P. Gasoline	1.146	Q/Galone
R. Gasoline	1.109	Q/Galone
A. Gasoline	1.146	Q/Galone
Kerosene	1.165	Q/Galone
Jet Fuel	1.165	Q/Galone
Diesel oil	1.081	Q/Galone
Fuel oil		Q/Galone
Asphalt		Q/Galone

° Operation Cost

Operation costs will be calculated based on following category:

Raw material cost / Utilities Cost / Chemical and catalyst / Labor cost / Plant overhead / Maintenance / Insurance / land rent / others

° Major incentives

The following incentives will be considered in the calculation of financial analysis with taxable base.

1) Loss carry forward
2) Exemption of import duties on machinery and equipment
3) Exemption from income tax for 2 years and 8 years

- Sensitivity analysis for financial analysis
  1) Investment cost
  2) Crude oil price
  3) Products sales price
  4) Others

4. Data List

(1) Sea Chart of Puerto Barrios and Matías de Galvez:.
1/12,500 1 sheet

(2) Maps of the Republic of Guatemala
1/250,000 5 sheets

(3) Maps of the Republic of Guatemala
1/50,000 33 sheets

(4) Geographical Maps of the Republic of Guatemala
1/500,000 4 sheets

(5) Municipalidad de Puerto Barrios "Capital de la Tierra de Dios" Memoria de labores 1982-1983

(6) Servicios Portuarios Impulsando el Desarrollo Nacional

(7) Memoria de Labores,1982

(8) Plan Urbano

(9) Mosaico de Expropiaciones

(10) Estudio Estructural del Muelle Reporte Geomecánico

(11) Reglamento para el Control de Pesos y Dimensiones de vehiculos Automotores

(12) Boletín Estadístico

(13) 1971 Informe 1982 Financiero y Estadístico

(14) Memoria de Labores 1982-1983

(15) Meteorological Data (51 pages)

(16) Flow data on Motagua River (7 pages)

(17) Tracks of the Tropical Cyclones (2 pages)

(18) Pronóstico de Mareas, 1983

(19) Boletín Sismológico, 1977-1980

(20) Atlas Climatológico de Guatemala

(21) Outline of TIPIC'S Personnel & Facility

(22) Condiciones de Sitio de la Fábrica
(Técnica de Pulpa y Papel, El Rancho)

(23) Informe Financiero y Estadístico (INDE)

(24) Reglamento para Depósitos de Petróleo y sus derivados

APPENDIX-3

PROJECT : GUATEMALA REFINERY

CASE-ID : FINAL

*****
* PROFIT & LOSS STATEMENT *
*****

CURRENCY UNIT : 1000 QUATZAL

QUANTITY UNIT : BLL

DATE-84. 5.14

	(1986)	(1987)	(1988)	(1989)	(1990)	(1991)	(1992)	(1993)	(1994)	(1995)
SALES REVENUE	0.	0.	0.	340007.	453343.	506542.	508855.	508855.	508855.	508855.
OTHER INCOME	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
COST OF GOOD SOLD	0.	0.	0.	329064.	413662.	451408.	453049.	453049.	453049.	453049.
INITIAL INVENTORY	0.	0.	0.	0.	15670.	18952.	20593.	20593.	20593.	20593.
PRODUCTION COST	0.	0.	0.	344734.	416944.	453049.	453049.	453049.	453049.	453049.
FINAL INVENTORY	0.	0.	0.	15670.	18952.	20593.	20593.	20593.	20593.	20593.
GROSS PROFIT ON SALES	0.	0.	0.	10943.	39681.	55134.	55805.	55805.	55805.	55805.
OPERATING EXPENSE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
VARIABLE COST-%	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
FIXED COST-%	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
OPERATING PROFIT	0.	0.	0.	10943.	39681.	55134.	55805.	55805.	55805.	55805.
NON-OPERATING INCOME	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
INTEREST FOR CASH	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MISCELLANEOUS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NON-OPERATING EXPENSE	0.	0.	0.	76574.	79020.	76870.	74128.	69771.	63835.	59478.
INTEREST FOR L.T.L.	0.	0.	0.	65350.	65350.	65350.	65350.	60994.	56637.	52280.
INTEREST FOR S.T.L.	0.	0.	0.	2446.	4893.	2742.	0.	0.	0.	0.
AMORTIZATION	0.	0.	0.	8778.	8778.	8778.	8778.	8778.	7198.	7198.
NET PROFIT BEFORE TAX	0.	0.	0.	-65631.	-39339.	-21736.	-18323.	-13966.	-8029.	-3673.
INCOME TAX	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NET PROFIT AFTER TAX	0.	0.	0.	-65631.	-39339.	-21736.	-18323.	-13966.	-8029.	-3673.
DIVIDEND	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
RETAINED EARNINGS	0.	0.	0.	-65631.	-39339.	-21736.	-18323.	-13966.	-8029.	-3673.
CUMULATIVE	0.	0.	0.	-65631.	-104970.	-126706.	-145029.	-158994.	-167024.	-170697.

PROJECT : GUATEMALA REFINERY
CASE-ID : FINAL

*****
* PROFIT & LOSS STATEMENT *
*****

CURRENCY UNIT : 1000 QUATZAL
QUANTITY UNIT : BLL

DATE-84. 5.14

	(1996)	(1997)	(1998)	(1999)	(2000)	(2001)	(2002)	(2003)	(2004)	(2005)
SALES REVENUE	508855.	508855.	508855.	508855.	508855.	508855.	508855.	508855.	508855.	508855.
OTHER INCOME	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
COST OF GOOD SOLD	453049.	453049.	453049.	398058.	395440.	395440.	395440.	395440.	389413.	389126.
INITIAL INVENTORY	20593.	20593.	20593.	20593.	17975.	17975.	17975.	17975.	17975.	17688.
PRODUCTION COST	453049.	453049.	453049.	395440.	395440.	395440.	395440.	395440.	389126.	389126.
FINAL INVENTORY	20593.	20593.	20593.	17975.	17975.	17975.	17975.	17975.	17688.	17688.
GROSS PROFIT ON SALES	55805.	55805.	55805.	110796.	113415.	113415.	113415.	113415.	119441.	119728.
OPERATING EXPENSE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
VARIABLE COST-2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
FIXED COST-2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
OPERATING PROFIT	55805.	55805.	55805.	110796.	113415.	113415.	113415.	113415.	119441.	119728.
NON-OPERATING INCOME	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
INTEREST FOR CASH	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MISCELANEOUS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NON-OPERATING EXPENSE	55122.	50765.	46408.	42051.	37695.	33338.	28981.	24624.	13070.	8713.
INTEREST FOR L.T.L.	47924.	43567.	39210.	34853.	30497.	26140.	21783.	17427.	13070.	8713.
INTEREST FOR S.T.L.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
AMORTIZATION	7198.	7198.	7198.	7198.	7198.	7198.	7198.	7198.	0.	0.
NET PROFIT BEFORE TAX	684.	5041.	9397.	68745.	75720.	80077.	84434.	88790.	106372.	111015.
INCOME TAX	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NET PROFIT AFTER TAX	684.	5041.	9397.	68745.	75720.	80077.	84434.	88790.	106372.	111015.
DIVIDEND	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
RETAINED EARNINGS	684.	5041.	9397.	68745.	75720.	80077.	84434.	88790.	106372.	111015.
CUMULATIVE	-170013.	-164972.	-155575.	-86830.	-11110.	68967.	153401.	242191.	348563.	459578.

PROJECT : GUATEMALA REFINERY

CASE-ID : FINAL

PROFIT & LOSS STATEMENT

CURRENCY UNIT : 1000 QUATZAL

QUANTITY UNIT : BLL

DATE-84. 5.14

	(2006)	(2007)	(2008)
SALES REVENUE	508855.	508855.	508855.
OTHER INCOME	0.	0.	0.
COST OF GOOD SOLD	389126.	389126.	389126.
INITIAL INVENTORY	17688.	17688.	17688.
PRODUCTION COST	389126.	389126.	389126.
FINAL INVENTORY	17688.	17688.	17688.
GROSS PROFIT ON SALES	119728.	119728.	119728.
OPERATING EXPENSE	0.	0.	0.
VARIABLE COST-2	0.	0.	0.
FIXED COST-2	0.	0.	0.
OPERATING PROFIT	119728.	119728.	119728.
NON-OPERATING INCOME	0.	0.	0.
INTEREST FOR CASH	0.	0.	0.
MISCELANEOUS	0.	0.	0.
NON-OPERATING EXPENSE	4356.	0.	0.
INTEREST FOR L.T.L.	4356.	0.	0.
INTEREST FOR S.T.L.	0.	0.	0.
AMORTIZATION	0.	0.	0.
NET PROFIT BEFORE TAX	115372.	119729.	119729.
INCOME TAX	0.	0.	0.
NET PROFIT AFTER TAX	115372.	119729.	119729.
DIVIDEND	0.	0.	0.
RETAINED EARNINGS	115372.	119729.	119729.
CUMULATIVE	574950.	694679.	814407.

PROJECT : GUATEMALA REFINERY
CASE-ID : FINAL

*****
* C A S H F L O W *
*****

CURRENCY UNIT : 1000 QUATZAL
QUANTITY UNIT : BLL

DATE-84. 5.14

	(1986)	(1987)	(1988)	(1989)	(1990)	(1991)	(1992)	(1993)	(1994)	(1995)
SOURCE OF FUND										
SALES INCOME	0.	0.	0.	297507.	439176.	499892.	508566.	508855.	508855.	508855.
OTHER INCOME	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
PAYED UP CAPITALS	44385.	23515.	0.	0.	0.	0.	0.	0.	0.	0.
1.	44385.	23515.	0.	0.	0.	0.	0.	0.	0.	0.
2.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
LONG TERM LOANS	54196.	365150.	306770.	0.	0.	0.	-48408.	-48408.	-48408.	-48408.
A.	54196.	365150.	306770.	0.	0.	0.	-48408.	-48408.	-48408.	-48408.
B.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
C.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SHORT TERM LOAN	0.	0.	0.	40771.	-17924.	-22846.	0.	0.	0.	0.
OTHERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	98581.	388665.	306770.	338277.	421252.	477045.	460158.	460447.	460447.	460447.
APPLICATION OF FUND										
MATERIALS	0.	0.	0.	257602.	316758.	352982.	354323.	354189.	354189.	354189.
VARIABLE COSTS	0.	0.	0.	4803.	6175.	6861.	6861.	6861.	6861.	6861.
MANUFACTURING	0.	0.	0.	4803.	6175.	6861.	6861.	6861.	6861.	6861.
OTHERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
FIXED COSTS	0.	0.	0.	28076.	28076.	28076.	28076.	28076.	28076.	28076.
MANUFACTURING	0.	0.	0.	28076.	28076.	28076.	28076.	28076.	28076.	28076.
OTHERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
INTERESTS	0.	0.	0.	67797.	70245.	68092.	65350.	60994.	56637.	52280.
FOR L.T.L.-A	0.	0.	0.	65350.	65350.	65350.	65350.	60994.	56637.	52280.
-B	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
-C	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
FOR S.T.L.	0.	0.	0.	2446.	4893.	2742.	0.	0.	0.	0.
INVESTMENTS	93448.	349017.	230973.	0.	0.	0.	0.	0.	0.	0.
LAND PIPE	2642.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BUILDING	13983.	50069.	49255.	0.	0.	0.	0.	0.	0.	0.
MACHINERY	76843.	298948.	181718.	0.	0.	0.	0.	0.	0.	0.
PREOPERATIONAL EXPENSE	5127.	39496.	71246.	0.	0.	0.	0.	0.	0.	0.
INCOME TAX	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
DIVIDEND	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	98575.	386511.	302219.	338277.	421252.	450011.	454611.	450120.	445763.	441407.
CASH SURPLUS										
ANNUAL	6.	154.	4551.	0.	0.	27035.	5547.	10327.	14683.	19040.
CUMULATIVE	6.	160.	4711.	4711.	4711.	25745.	31292.	41618.	56302.	75342.

PROJECT : GUATEMALA REFINERY
CASE-ID : FINAL

*****
* C A S H F L O W *
*****

CURRENCY UNIT : 1000 QUATZAL
QUANTITY UNIT : BLL

DATE-84. 5.14

	(1996)	(1997)	(1998)	(1999)	(2000)	(2001)	(2002)	(2003)	(2004)	(2005)
SOURCE OF FUND										
SALES INCOME	508855.	508855.	508855.	508855.	508855.	508855.	508855.	508855.	508855.	508855.
OTHER INCOME	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
PAYED UP CAPITALS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
LONG TERM LOANS	-48408.	-48408.	-48408.	-48408.	-48408.	-48408.	-48408.	-48408.	-48408.	-48408.
A.	-48408.	-48408.	-48408.	-48408.	-48408.	-48408.	-48408.	-48408.	-48408.	-48408.
B.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
C.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SHORT TERM LOAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
OTHERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	460447.	460447.	460447.	460447.	460447.	460447.	460447.	460447.	460447.	460447.
APPLICATION OF FUND										
MATERIALS	354189.	354189.	354189.	354189.	354189.	354189.	354189.	354189.	354189.	354189.
VARIABLE COSTS	6861.	6861.	6861.	6861.	6861.	6861.	6861.	6861.	6861.	6861.
MANUFACTURING	6861.	6861.	6861.	6861.	6861.	6861.	6861.	6861.	6861.	6861.
OTHERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
FIXED COSTS	28076.	28076.	28076.	28076.	28076.	28076.	28076.	28076.	28076.	28076.
MANUFACTURING	28076.	28076.	28076.	28076.	28076.	28076.	28076.	28076.	28076.	28076.
OTHERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
INTERESTS	47924.	43567.	39210.	34853.	30497.	26140.	21783.	17427.	13070.	8713.
FOR L.T.L.-A	47924.	43567.	39210.	34853.	30497.	26140.	21783.	17427.	13070.	8713.
-B	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
-C	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
FOR S.T.L.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
INVESTMENTS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
LAND RIPE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BUILDING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MACHINERY	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
PRECOPERATIONAL EXPENSE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
INCOME TAX	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
DIVIDENT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	437050.	432693.	428336.	423980.	419623.	415266.	410910.	406553.	402196.	397839.
CASH SURPLUS										
ANNUAL	23397.	27753.	32110.	36467.	40824.	45180.	49537.	53894.	58251.	62607.
CUMULATIVE	98759.	126492.	158602.	195069.	235893.	281073.	330610.	384504.	442755.	505362.

PROJECT : GUATEMALA REFINERY

CASE-ID : FINAL

*****
* C A S H F L O W *
*****

CURRENCY UNIT : 1000 QUATZAL

QUANTITY UNIT : BLL

DATE-84. 5.14

	(2006)	(2007)	(2008)
SOURCE OF FUND			
SALES INCOME	508855.	508855.	508855.
OTHER INCOME	0.	0.	0.
PAYED UP CAPITALS	0.	0.	0.
1.	0.	0.	0.
2.	0.	0.	0.
3.	0.	0.	0.
LONG TERM LOANS	-46408.	0.	0.
A.	-46408.	0.	0.
B.	0.	0.	0.
C.	0.	0.	0.
SHORT TERM LOAN	0.	0.	0.
OTHERS	0.	0.	0.
*** TOTAL ***	462447.	508855.	508855.
APPLICATION OF FUND			
MATERIALS	354189.	354189.	354189.
VARIABLE COSTS	6861.	6861.	6861.
MANUFACTURING	6861.	6861.	6861.
OTHERS	0.	0.	0.
FIXED COSTS	28076.	28076.	28076.
MANUFACTURING	28076.	28076.	28076.
OTHERS	0.	0.	0.
INTERESTS	4356.	0.	0.
FOR L.T.L.-A	4356.	0.	0.
-B	0.	0.	0.
-C	0.	0.	0.
FOR S.T.L.	0.	0.	0.
INVESTMENTS	0.	0.	0.
LAND PIPE	0.	0.	0.
BUILDING	0.	0.	0.
MACHINERY	0.	0.	0.
PREOPERATIONAL EXPENSE	0.	0.	0.
INCOME TAX	0.	0.	0.
DIVIDEND	0.	0.	0.
*** TOTAL ***	393483.	389126.	389126.
CASH SURPLUS			
ANNUAL	68964.	119729.	119729.
CUMULATIVE	572326.	692054.	811783.

PROJECT : GUATEMALA REFINERY
CASE-ID : FINAL

***** * BALANCE SHEET * *****

CURRENCY UNIT : 1000 QUATZAL
QUANTITY UNIT : BLL

DATE=84. 5.14

	(1986)	(1987)	(1988)	(1989)	(1990)	(1991)	(1992)	(1993)	(1994)	(1995)
CURRENT ASSETS										
CASH ON HAND	6.	160.	4711.	4711.	4711.	25745.	31292.	41618.	56302.	75342.
ACCOUNT RECEIVABLE	0.	0.	0.	42501.	56668.	63318.	63607.	63607.	63607.	63607.
MATERIALS	0.	0.	0.	11270.	14490.	16099.	16099.	16099.	16099.	16099.
FINISHED GOODS	0.	0.	0.	15670.	18952.	20593.	20593.	20593.	20593.	20593.
*** TOTAL ***	6.	160.	4711.	74151.	94820.	125756.	131591.	141918.	156601.	175641.
FIXED ASSETS										
LAND	2642.	2642.	2642.	2642.	2642.	2642.	2642.	2642.	2642.	2642.
BUILDING PIPE	13983.	64052.	113307.	105133.	96959.	88785.	80611.	72437.	64263.	56089.
MACHINERY	76823.	375771.	557480.	501740.	445991.	390242.	334493.	278745.	222996.	167247.
*** TOTAL ***	93448.	442465.	673430.	609515.	545592.	481670.	417747.	353824.	289901.	225978.
DEFERED ASSETS	3147.	44621.	115867.	107090.	96312.	84565.	80757.	71979.	64782.	57584.
*** TOTAL ASSETS ***	96561.	487246.	794016.	790756.	738725.	696960.	630095.	567721.	511284.	459203.
CURRENT LIABILITIES										
ACCOUNT PAYABLE	0.	0.	0.	21600.	26832.	29650.	29516.	29516.	29516.	29516.
SHORT TERM LOAN	0.	0.	0.	40771.	22846.	0.	0.	0.	0.	0.
ACCRUED ACCOUNT PAYABLE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	0.	0.	0.	62371.	49679.	29650.	29516.	29516.	29516.	29516.
FIXED LIABILITIES										
LONG TERM LOAN	54196.	419346.	726116.	726116.	726116.	726116.	677708.	629300.	580892.	532484.
DEFERED PAYMENT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	54196.	419346.	726116.	726116.	726116.	726116.	677708.	629300.	580892.	532484.
*** TOTAL LIABILITIES ***	54196.	419346.	726116.	788487.	775795.	755766.	707224.	658816.	610408.	562000.
CAPITAL										
PAYED UP CAPITAL	44365.	67900.	67900.	67900.	67900.	67900.	67900.	67900.	67900.	67900.
RESERVE	0.	0.	0.	0.	-65631.	-104970.	-126706.	-145029.	-158994.	-167024.
NET PROFIT BEFORE TAX	0.	0.	0.	-65631.	-34339.	-21736.	-18323.	-13966.	-8029.	-5673.
*** TOTAL ***	44365.	67900.	67900.	2269.	-37070.	-58806.	-77129.	-91094.	-99124.	-102797.
*** TOTAL LIA & CAP.***	98561.	487246.	794016.	790756.	738725.	696960.	630095.	567721.	511284.	459203.

PROJECT : GUATEMALA REFINERY

CASE-ID : FINAL

*****
* BALANCE SHEET *
*****

CURRENCY UNIT : 1000 QUATZAL

QUANTITY UNIT : BLL

DATE=84. 5.14

	(1996)	(1997)	(1998)	(1999)	(2000)	(2001)	(2002)	(2003)	(2004)	(2005)
CURRENT ASSETS										
CASH ON HAND	96759.	126492.	158602.	195069.	255895.	481073.	330610.	384504.	442755.	505362.
ACCOUNT RECEIVABLE	63607.	63607.	63607.	63607.	63607.	63607.	63607.	63607.	63607.	63607.
MATERIALS	16099.	16099.	16099.	16099.	16099.	16099.	16099.	16099.	16099.	16099.
FINISHED GOODS	20593.	20593.	20593.	17975.	17975.	17975.	17975.	17975.	17688.	17688.
*** TOTAL ***	199058.	226792.	258902.	292750.	333574.	578754.	428291.	482185.	540148.	602756.
FIXED ASSETS										
LAND	2642.	2642.	2642.	2642.	2642.	2642.	2642.	2642.	2642.	2642.
BUILDING PIPE	47916.	39742.	31568.	25254.	18941.	12627.	6314.	0.	0.	0.
MACHINERY	111498.	55747.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	162055.	98133.	34210.	27896.	21583.	15269.	8956.	2642.	2642.	2642.
DEFERED ASSETS	50300.	45168.	35990.	28792.	21594.	14396.	7198.	0.	0.	0.
*** TOTAL ASSETS ***	411479.	368112.	329101.	349438.	376750.	408419.	444445.	484827.	542790.	605398.
CURRENT LIABILITIES										
ACCOUNT PAYABLE	29516.	29516.	29516.	29516.	29516.	29516.	29516.	29516.	29516.	29516.
SHORT TERM LOAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ACCRUED ACCOUNT PAYABLE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	29516.	29516.	29516.	29516.	29516.	29516.	29516.	29516.	29516.	29516.
FIXED LIABILITIES										
LONG TERM LOAN	484076.	435668.	387260.	338852.	290444.	242036.	193628.	145220.	96812.	48404.
DEFERED PAYMENT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	484076.	435668.	387260.	338852.	290444.	242036.	193628.	145220.	96812.	48404.
*** TOTAL LIABILITIES ***	513592.	465184.	416776.	368368.	319960.	271552.	223144.	174736.	126328.	77920.
CAPITAL										
PAYED UP CAPITAL	67900.	67900.	67900.	67900.	67900.	67900.	67900.	67900.	67900.	67900.
RESERVE	-170667.	-170015.	-164972.	-155575.	-86830.	-11110.	66967.	153401.	242191.	348563.
NET PROFIT BEFORE TAX	664.	5041.	9397.	68745.	75720.	80077.	84434.	88790.	106372.	111015.
*** TOTAL ***	-102115.	-97072.	-86675.	-18930.	56790.	136867.	221501.	310091.	416463.	527478.
*** TOTAL LIA & CAP.***	411477.	368112.	329101.	349438.	376750.	408419.	444445.	484827.	542790.	605398.

PROJECT : GUATEMALA REFINERY

CASE-ID : FINAL

*****
* BALANCE SHEET *
*****

CURRENCY UNIT : 1000 QUATZAL

QUANTITY UNIT : BLL

DATE-84. 5.14.

	(2006)	(2007)	(2008)
CURRENT ASSETS			
CASH ON HAND	572326.	692054.	811763.
ACCOUNT RECEIVABLE	63607.	63607.	63607.
MATERIALS	16099.	16099.	16099.
FINISHED GOODS	17668.	17668.	17668.
*** TOTAL ***	669740.	789648.	909177.
FIXED ASSETS			
LAND	2642.	2642.	2642.
BUILDING PIPE	0.	0.	0.
MACHINERY	0.	0.	0.
*** TOTAL ***	2642.	2642.	2642.
DEFERED ASSETS	0.	0.	0.
*** TOTAL ASSETS ***	672382.	792090.	911819.
CURRENT LIABILITIES			
ACCOUNT PAYABLE	29516.	29516.	29516.
SHORT TERM LOAN	0.	0.	0.
ACCRUED ACCOUNT PAYABLE	0.	0.	0.
*** TOTAL ***	29516.	29516.	29516.
FIXED LIABILITIES			
LONG TERM LOAN	-4.	-4.	-4.
DEFERED PAYMENT	0.	0.	0.
*** TOTAL ***	-4.	-4.	-4.
*** TOTAL LIABILITIES ***	29512.	29512.	29512.
CAPITAL			
PAYED UP CAPITAL	67900.	67900.	67900.
RESERVE	459578.	574950.	694679.
NET PROFIT BEFORE TAX	115392.	119729.	119729.
*** TOTAL ***	642870.	762579.	882307.
*** TOTAL LIA .& CAP.***	672382.	792090.	911819.

PROJECT : GUATEMALA REFINERY
CASE-ID : FINAL

CURRENCY UNIT : 1000 QUATZAL
QUANTITY UNIT : BLL

DATE-84. 5.14

DCF PROOF LIST FOR ROI

IRR FOR INVESTMENT : 11.21 %

	(1986)	(1987)	(1988)	(1989)	(1990)	(1991)	(1992)	(1993)	(1994)	(1995)
INVESTMENT										
LAND	2642.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BUILDING PIPE	13983.	50069.	49265.	0.	0.	0.	0.	0.	0.	0.
MACHINERY	76863.	250948.	181718.	0.	0.	0.	0.	0.	0.	0.
PRECOPERATIONAL EXPENSE	249.	1753.	5096.	0.	0.	0.	0.	0.	0.	0.
WORKING CAPITAL	0.	0.	0.	47840.	15437.	7083.	423.	0.	0.	0.
OTHERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	93697.	350770.	236069.	47840.	15437.	7083.	423.	0.	0.	0.
RETURN										
PROFIT BEFORE TAX	0.	0.	0.	-65651.	-39339.	-21736.	-16325.	-13966.	-8029.	-3673.
-INCOME TAX	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
DEPRECIATION	0.	0.	0.	63923.	63923.	63923.	63923.	63923.	63923.	63923.
AMORTIZATION	0.	0.	0.	8778.	8778.	8778.	8778.	8778.	7198.	7198.
INTERESTS	0.	0.	0.	67747.	70243.	68092.	65350.	60994.	56637.	52280.
OTHERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	0.	0.	0.	74866.	103604.	119056.	119728.	119728.	119728.	119728.

DCF PROOF LIST FOR ROE

IRR FOR EQUITY : 17.61 %

	(1986)	(1987)	(1988)	(1989)	(1990)	(1991)	(1992)	(1993)	(1994)	(1995)
EQUITY										
INVESTMENT	93697.	350770.	236069.	47840.	15437.	7083.	423.	0.	0.	0.
-LOAN	54196.	365130.	306770.	40771.	0.	0.	0.	0.	0.	0.
INTEREST DURING CONST.	4878.	37741.	65350.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	44379.	23381.	-4551.	7069.	15437.	7083.	423.	0.	0.	0.
RETURN										
PROFIT BEFORE TAX	0.	0.	0.	-65651.	-39339.	-21736.	-16325.	-13966.	-8029.	-3673.
-INCOME TAX	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
DEPRECIATION	0.	0.	0.	63923.	63923.	63923.	63923.	63923.	63923.	63923.
AMORTIZATION	0.	0.	0.	8778.	8778.	8778.	8778.	8778.	7198.	7198.
-REPAY. L.T.L.	0.	0.	0.	0.	0.	0.	48408.	48408.	48408.	48408.
-REPAY. S.T.L.	0.	0.	0.	0.	17924.	22846.	0.	0.	0.	0.
OTHERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	0.	0.	0.	7069.	15437.	20118.	5970.	10327.	14683.	19040.

PROJECT : GUATEMALA REFINERY
CASE-ID : FINAL

CURRENCY UNIT : 1000 QUATZAL
QUANTITY UNIT : BLL

DATE-84. 5.14

DCF PROOF LIST FOR ROI

IRR FOR INVESTMENT : 11.21 %

	(1996)	(1997)	(1998)	(1999)	(2000)	(2001)	(2002)	(2003)	(2004)	(2005)
INVESTMENT										
LAND	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BUILDING PIPE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MACHINERY	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
PREOPERATIONAL EXPENSE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WORKING CAPITAL	0.	0.	0.	-2619.	0.	0.	0.	0.	-287.	0.
OTHERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	0.	0.	0.	-2619.	0.	0.	0.	0.	-287.	0.
RETURN										
PROFIT BEFORE TAX	684.	5041.	9597.	68745.	75720.	80077.	84434.	88790.	106372.	111015.
-INCOME TAX	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
DEPRECIATION	63923.	63923.	63923.	6314.	6314.	6314.	6314.	6314.	0.	0.
AMORTIZATION	7198.	7198.	7198.	7198.	7198.	7198.	7198.	7198.	0.	0.
INTERESTS	47924.	43567.	39210.	34853.	30497.	26140.	21783.	17427.	13070.	8713.
OTHERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	119728.	119728.	119728.	117110.	119728.	119728.	119728.	119728.	119441.	119728.

DCF PROOF LIST FOR ROE

IRR FOR EQUITY : 17.61 %

	(1996)	(1997)	(1998)	(1999)	(2000)	(2001)	(2002)	(2003)	(2004)	(2005)
EQUITY										
INVESTMENT	0.	0.	0.	-2619.	0.	0.	0.	0.	-287.	0.
-LOAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
INTEREST DURING CONST.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	0.	0.	0.	-2619.	0.	0.	0.	0.	-287.	0.
RETURN										
PROFIT BEFORE TAX	684.	5041.	9597.	68745.	75720.	80077.	84434.	88790.	106372.	111015.
-INCOME TAX	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
DEPRECIATION	63923.	63923.	63923.	6314.	6314.	6314.	6314.	6314.	0.	0.
AMORTIZATION	7198.	7198.	7198.	7198.	7198.	7198.	7198.	7198.	0.	0.
-REPAY. L.T.L.	43408.	43408.	43408.	43408.	43408.	43408.	43408.	43408.	48408.	48408.
-REPAY. S.T.L.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
OTHERS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*** TOTAL ***	28397.	27755.	32110.	33848.	40824.	45160.	49537.	53894.	57964.	62607.

PROJECT : GUATEMALA REFINERY

CASE-ID : FINAL

CURRENCY UNIT : 1000 QUATZAL

QUANTITY UNIT : BLL

DATE-84. 5.14

* DCF PROOF LIST FOR ROI *

IRR FOR INVESTMENT : 11.21 %

	(2006)	(2007)	(2008)
INVESTMENT			
LAND	0.	0.	0.
BUILDING PIPE	0.	0.	0.
MACHINERY	0.	0.	0.
PREOPERATIONAL EXPENSE	0.	0.	0.
WORKING CAPITAL	0.	0.	-67878.
OTHERS	0.	0.	0.
*** TOTAL ***	0.	0.	-67878.
RETURN			
PROFIT BEFORE TAX	115372.	119729.	119729.
-INCOME TAX	0.	0.	0.
DEPRECIATION	0.	0.	0.
AMORTIZATION	0.	0.	0.
INTERESTS	4356.	0.	0.
OTHERS	0.	0.	0.
*** TOTAL ***	119728.	119723.	119728.

* DCF PROOF LIST FOR ROE *

IRR FOR EQUITY : 17.61 %

	(2006)	(2007)	(2008)
EQUITY			
INVESTMENT	0.	0.	-67878.
-LOAN	0.	0.	0.
INTEREST DURING CONST.	0.	0.	0.
*** TOTAL ***	0.	0.	-67878.
RETURN			
PROFIT BEFORE TAX	115372.	119729.	119729.
-INCOME TAX	0.	0.	0.
DEPRECIATION	0.	0.	0.
AMORTIZATION	0.	0.	0.
-REPAY. L.T.L.	48400.	0.	0.
-REPAY. S.T.L.	0.	0.	0.
OTHERS	0.	0.	0.
*** TOTAL ***	66972.	119729.	119729.