No. 21

THE INTERIM REPORT II

ON

THE FEASIBILITY STUDY

ON

EFFECTIVE UTILIZATION OF BANKO COAL

IN

THE REPUBLIC OF INDONESIA

(FY 1985)

(SUMMARY)

MAY 1986

JAPAN INTERNATIONAL COOPERATION AGENCY

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受入月日 '86. 8. 20	108
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Contents

1. Introduction

In response to the request of the government of the Republic of Indonesia, the Government of Japan decided to conduct the Feasibility Study on Banko Coal Effective Utilization as one of the international cooperation programs for the social and economic development of developing countries.

Japan International Cooperation Agency (JICA), the official agency responsible for the government of Japan, and Agency for the Assessment and Application of Technology (Badan Pengkajian dan Penerapan Teknologi: BPPT) as a counterpart agency concluded the Agreement (Scope of Work) on February 24, 1984.

The Institute of Energy Economics, Japan (IEE, Japan), as the consultant for the implementation of the Study, is undertaking the Study in close cooperation with the counterpart.

This Interium Report (Summary) illustrates and reports the results of the study carried out in FY1985.

2. Outline of the Study

The objective of the Study is to establish an appropriate master plan of effective utilization of Banko coal and to examine its technical, economic and financial feasibility, including coal gasification test, and to prepare a proposed project.

TYPE OF PROGRAM	Government-sponsored technical cooperation
AGENCY FOR THE IMPLEMENTATION Japanese side Indonesian side	JICA (Japan International Cooperation Agency) BPPT (Agency for the Assessment and Application of Technology)
OBJECTIVE	Feasibility study on effective utilization of Banko coal in Indonesia

COAL RESOURCES	Non-transportable brown coal reserved in Banko area of South Sumatra
APPLICATION TECHNOLOGY	Coal gasification
PRODUCTS	Synthetic fuel oil, chemicals
SCOPE OF THE STUDY	1) Market survey on alternative liquid fuel and basic chemicals in Indonesia 2) Survey on reserves, quality and mining cost of Banko coal 3) Survey on gasification characteristics of Banko coal, using a small scale test plant 4) Investigation of a master plan for effective utilization of Banko coal 5) Financial analysis and economic evaluation for proposed project
DURATION	1984 - 88 (5 years) 1) Strategic Investigation Stage : One year 2) Coal Gasification Test Stage : 2.5 years 3) Feasibility Study Stage : 1.5 years

3. Implementation Plan of the Study in FY1985

(1) Background of the Study in FY1985

In FY 1984, the following studies were carried out in view of strategic point.

1) Survey on background of the project
2) Preliminary survey on markets of brown coal and its derivatives
3) Survey on Banko coal resources and its preliminary mining cost estimation
4) Survey on brown coal utilization technology
5) Strategic investigation on Banko coal effective utilization
6) Study for coal gasification test

As the results of the above strategic investigation, the following conclusions were obtained.

i) The most possible utilization of Banko coal is production of fuel methanol, urea and electricity generation by coal gasification in view of market, technology, economics and Indonesian government policy.

ii) The measured reserves of Banko coal is enough for commercialization, 435 million tons. However the quality of Banko coal is "non-transportable-problem coal" because of spontaneous combustion and fragility during transportation and stock as well as high sodium-in-ash.

iii) The preliminary mining cost of Banko coal is estimated as 14 $/t (wet base) by non-continuous mining method. The selling price is estimated as approximately 25 $/t (dry base) on the basis of "cost and profit" for coal mining.

iv) Molten iron bath gasifier for synthesis gas production and fluidized bed gasifier for electricity generation are evaluated as the most superior technology for the time being.

v) It was revealed that spark assist diesel engine designed for neat methanol as fuel is ready for commercialization and has flexibility for fuel selection, diesel oil or neat methanol.

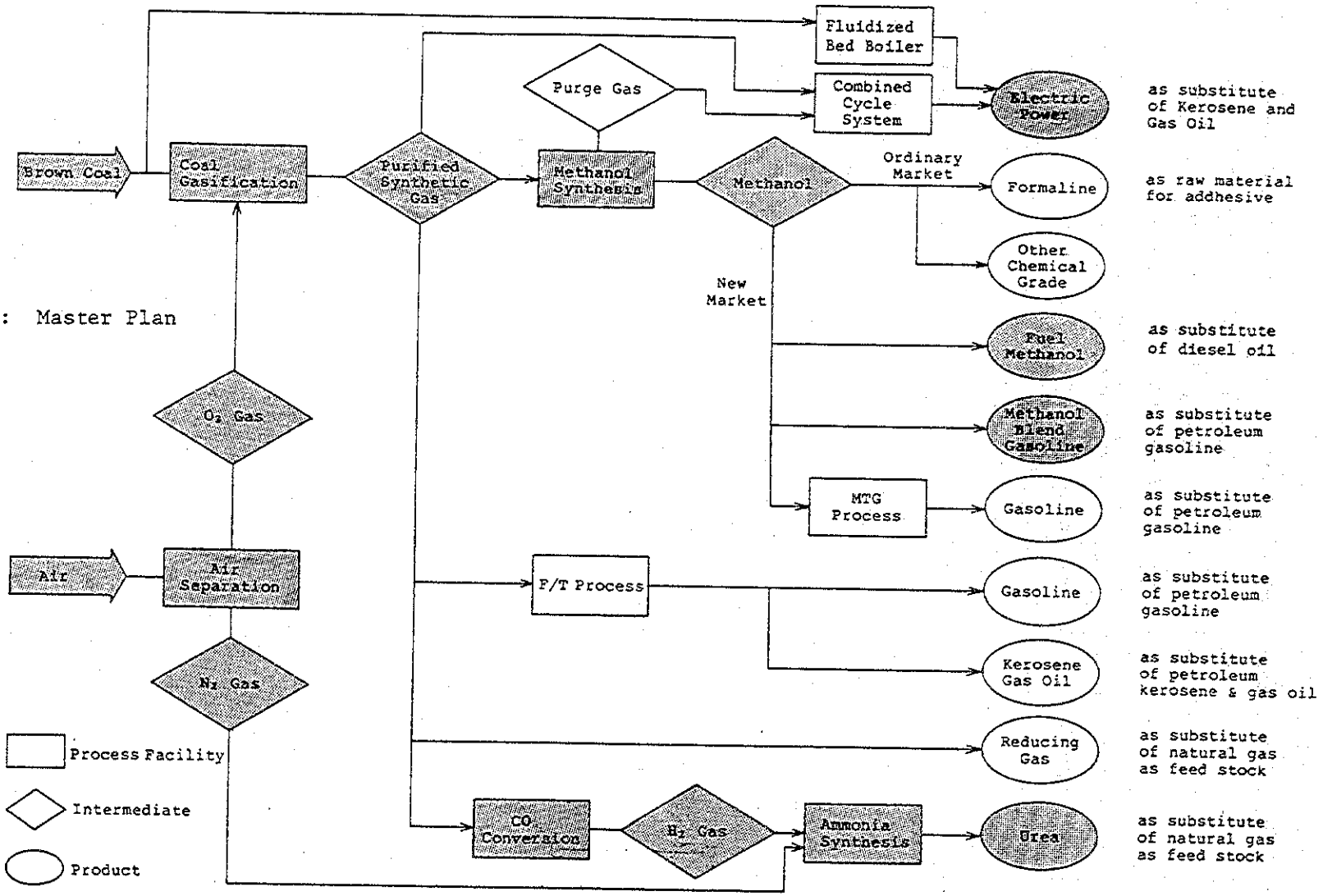
vi) Master plan and preliminary proposed projects for Banko coal effective utilization were proposed. (see Fig.-III)
However such a plan and projects must be studied furthermore in due course.

vii) Economic possibility of Banko coal utilization was studied on the basis of the estimated selling price of Banko coal and production cost data obtained from published literatures.
Production of fuel methal is "hopeful", but MTG (mobil) and urea depend on price of crude oil in future and the Government price policy for petroleum gasoline and natural gas.
Possibility of electricity generation by CGCC depends on future technical development.

viii) As conclusion of the strategic investigation, the effective utilization of Banko coal seems to be feasible in technical and economic stand point.

After deep discussion, JICA and BPPT agreed upon the results of the study of the 1st stage (strategic investigation stage) in FY 1984 and decided to proceed the 2nd stage (the coal gasification test stage) in accordance with Scope of Work concluded in Feb. 24, 1984.

Fig. III PRELIMINARY FLOW SCHEME AND MASTER PLAN FOR BROWN COAL UTILIZATION



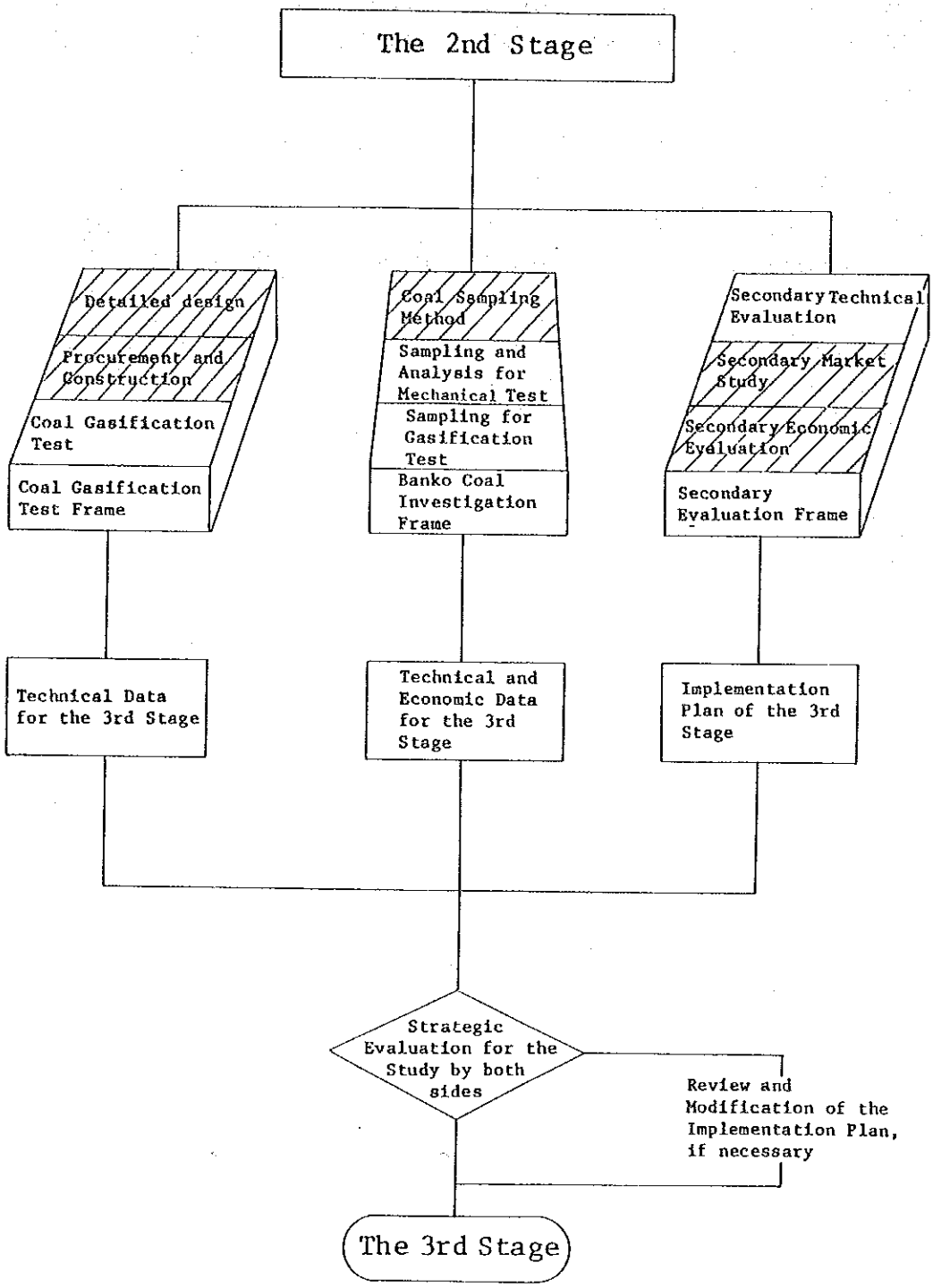
(2) Implementation Plan of the Study in FY1985

Fig. IV illustrates the flow chart of implementation plan of the 2nd stage and scope of the study in FY1985. Major subjects of the study in FY1985 were as follows;

1) Detailed design on coal gasification test facilities
2) Survey on coal quality
3) Preliminary evaluation of economic feasibility (on Fuel Methanol)
4) Investigation of the market for final product (on Fuel Methanol)

The details of the implementation plan in FY1985 were illustrated in the Inception Report-Stage II, issued in May, 1985.

Fig. IV Flow Chart of Implementation Plan of the 2nd Stage



: Scope of the study in 1985, including partial study

4. Executive Summary of the Study Results

All of the studies scheduled in FY 1985 have successfully been completed.

1) Detailed design of the coal gasification test facilities has been carried out and completed in September, 1985.
JICA has started the procurement of the equipment in accordance with the Scope of Work.
BPPT has continued the construction work of the pilot plant building in PUSPIPTEK and almost completed, excepting maintenance facilities.

2) Coal sampling study was carried out including shallow boring and deep boring in North West Banko and West Banko (partially).

The following were clarified:

i) The outcrop lines and coal seam structure in NW Banko and West Banko were grasped in detail.

ii) Sodium content in coal is maximum 0.6%, however sodium in ash is in the range of 0 - 40%.

iii) Coal samples (200 kg/sample x 10 samples) for the coal gasification test will be taken in NW Banko using two sets of 101 mm core drilling machines in FY 1986.

3) The project, producing 1,600,000 ton/year of methanol from Banko coal, was preliminarily evaluated in terms of financial viability and profitability.

i) The results show relatively low IRR of 13.5% (before tax) because the sales price of methanol (35¥/kg at gate, before tax) was assumed to be rather low, reflecting the current crude oil prices which have been extremely declined. Since the viability as well as profitability of the project highly depends on the sales price, there is a possibility that this project is appraised as viable in case of higher oil price than 30$/bbl.

ii) Provided that procured methanol is imported to Japan as transportation fuel, the estimated methanol sales price in Japan (44¥/l before tax) is between those of gasoline (96¥/l) and diesel oil (81¥/l), considering differ-

ence of overall energy efficiency for automobiles, while fuel methanol serves benefits to air pollution improvement.

4) According to the literature-study, fuel alcohol is paid attention as octane-enhancer point of view, while the U.S.A. and Japan are doing research and development efforts from environmental point of view.
Though no significant technological problems are expected for methanol use in gasoline and diesel engines, distribution system of fuel methanol and commercial production of methanol vehicles will probably be significant problems in penetration of fuel methanol.

5. Result of Detailed Design on Coal Gasification Test Facilities

The basic design on the coal gasification test facilities was successfully finished in FY 1984 and the results are reported on the Interim Report on May, 1985.

In this FY 1985, the detailed design was carried out on the basis of the basic design, and completed in September, 1985.

JICA has started the procurement of the equipments and materials of the test facilities in accordance with the undertaking of the Scope of work.

BPPT has continued the construction of the pilot plant building in PUSPIPTEK, including utility facilities, and almost completed the work.

The followings show the outline of the coal gasification test facilities.

(1) Basic design data

1) Process technology
Molten Iron Bath process

2) Capacity
Min 20 kg/hr (coal feed rate)

3) Scope of test facilities

i) Japan undertaking
Coal drying system
Coal pulverization and injection system
Melting furnace and accessaries
Gasifier
Produced gas filtration system
Slag treatment system
Coal, gas, slag and iron analyzers
Electrical and instrument system

ii) Indonesia undertaking
Utilities system
Pilot plant building
Maintenance system

(2) Detailed design data

1) Layout (see Fig. 4-2-2)
2) Sideview (see Fig. 4-2-3)
3) Assemble drawing of gasifier (see Fig. 4-2-10)
4) Piping and instrument diagram (see Fig. 4-2-23)

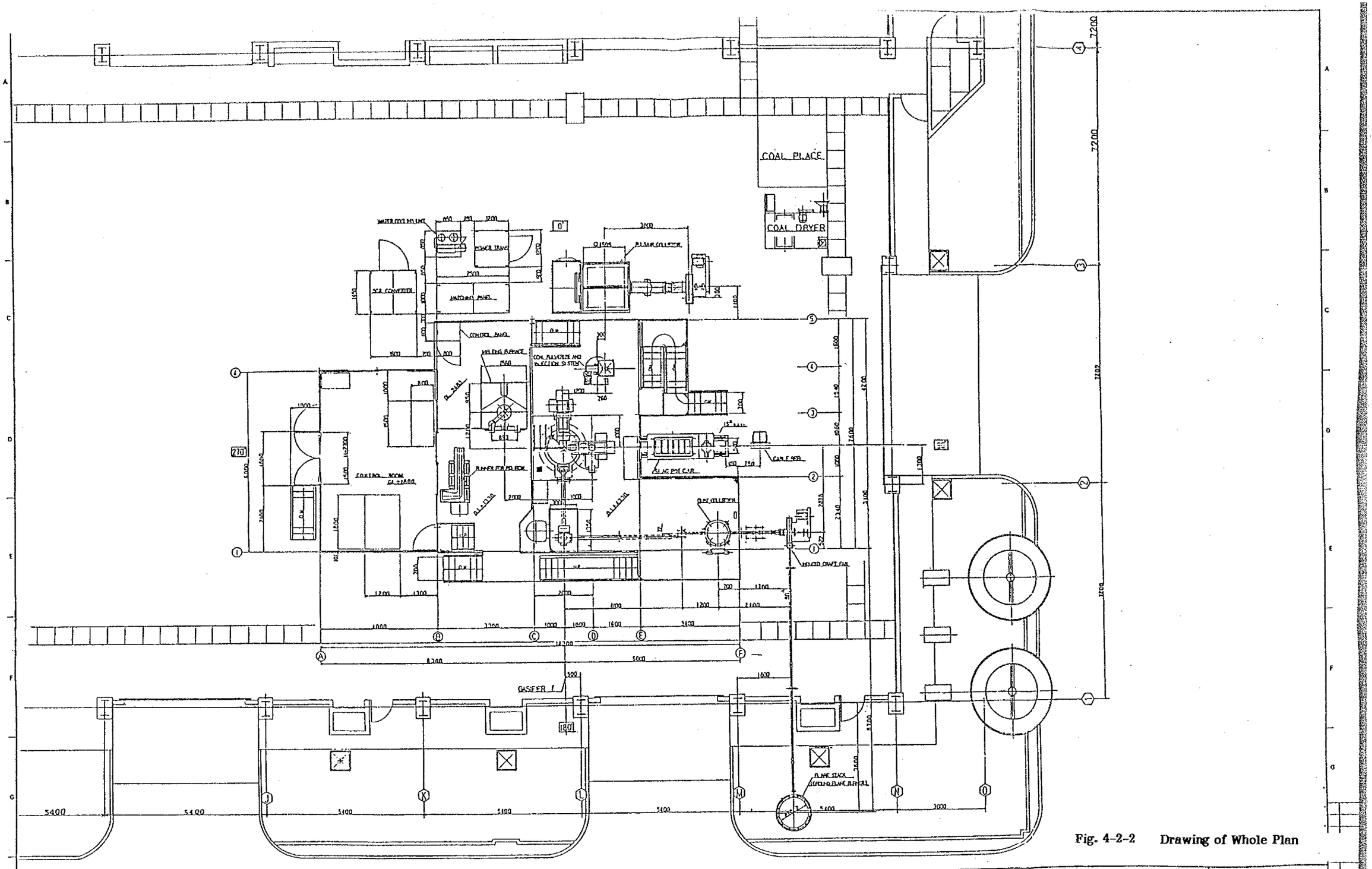


Fig. 4-2-2 Drawing of Whole Plan

REVISION		
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DATE	AUG 13, 85'
SCALE	1/80
MANAGER OF DEP.	
MANAGER	
CHIEF	
CHECKED BY	
DRAWN BY	

BANKO COAL GASIFICATION TEST PLANT

ARRANGEMENT DRAWING

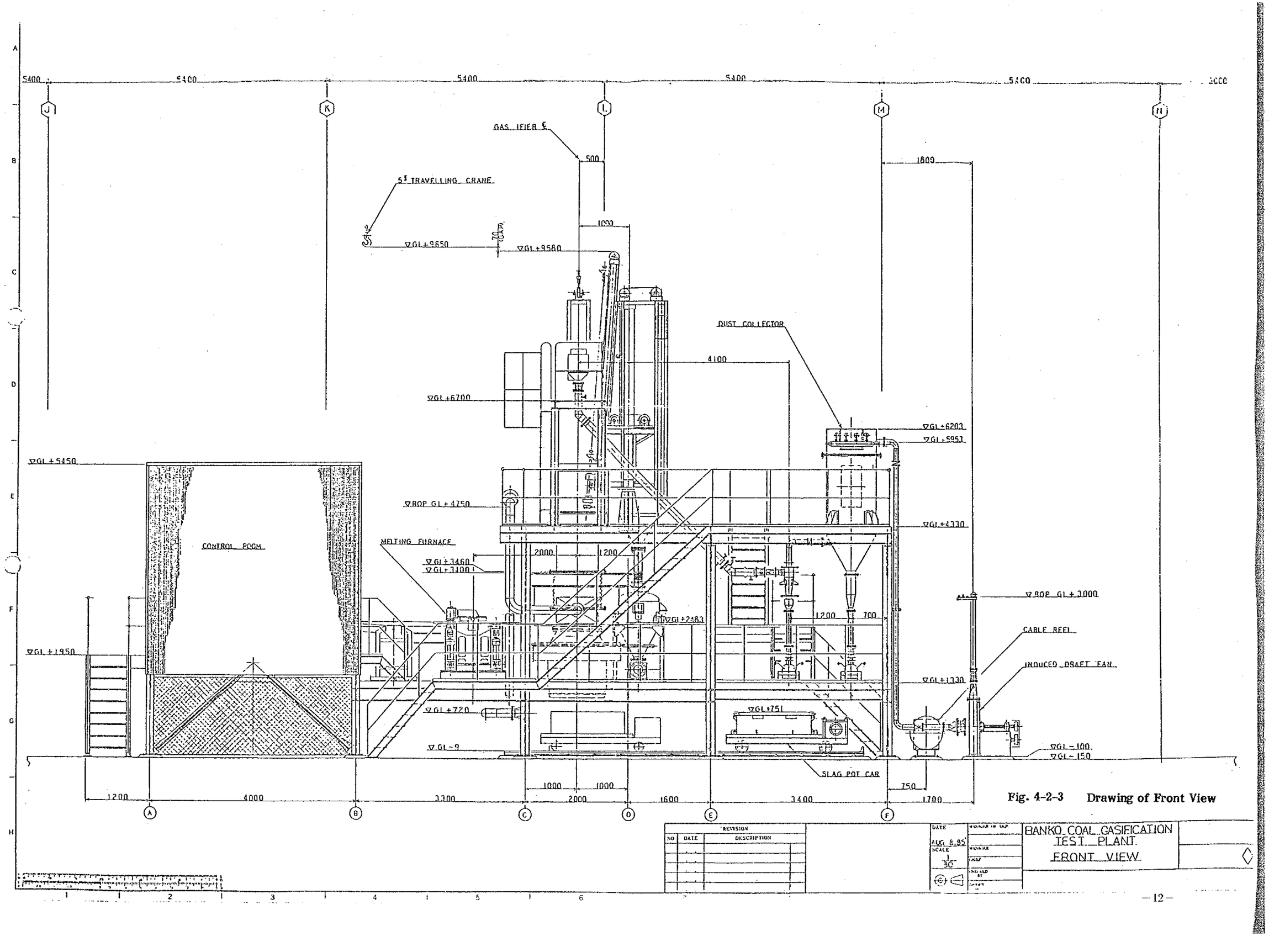
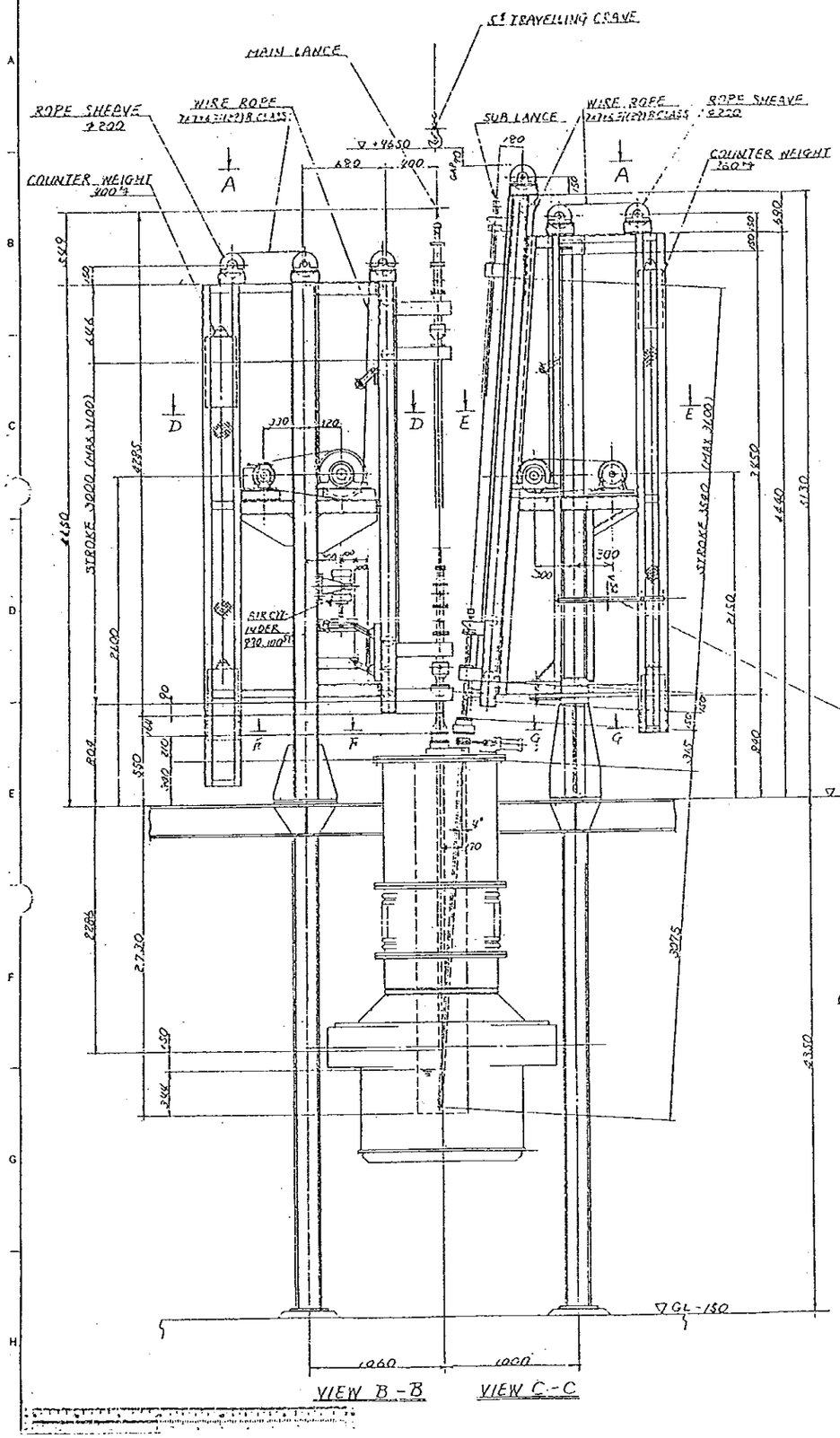
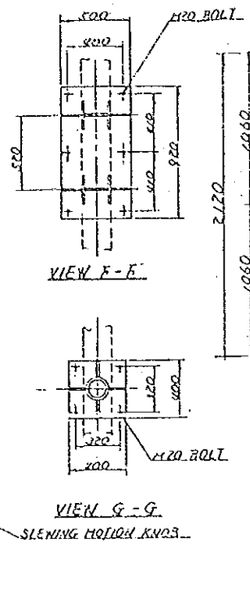
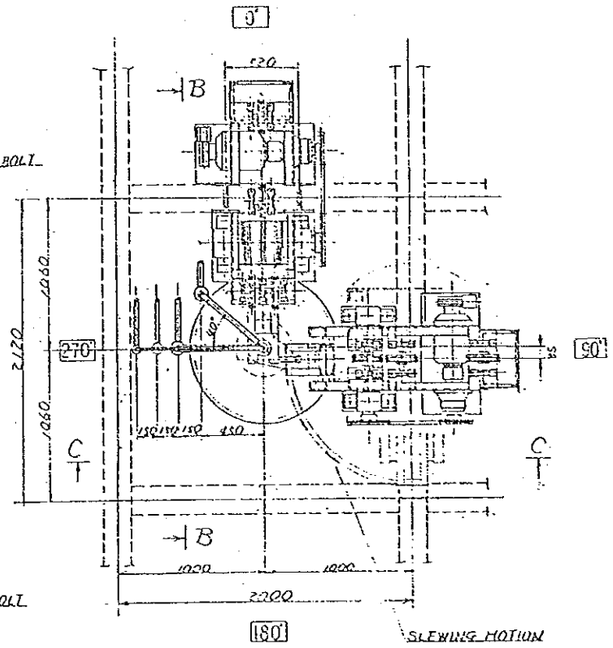


Fig. 4-2-3 Drawing of Front View

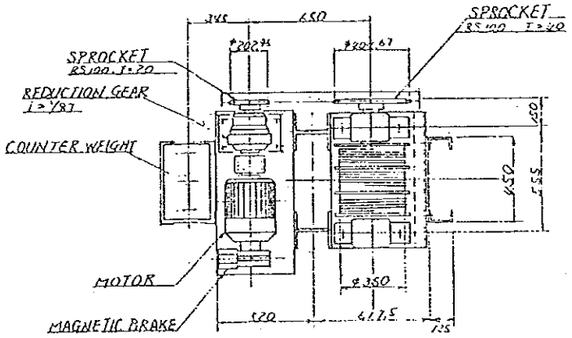






仕様 SPECIFICATION

メインランス MAIN LANCE	
巻上荷重(カウンターウェイト) WINDING LOAD	400kg
昇降ストローク ELEVATOR STROKE	3900 mm
ドラム径 DRUM	φ350 mm
ロープ径 WINDING ROPE	10 mm
ランス昇降速度 LANCE ELEVATOR SPEED	
高速 HIGH SPEED	10 m/min
低速 LOW SPEED	33 m/min
モーター MOTOR	15kW 4P/12P
回転数 ROTATION FREQUENCY	1500/500 rpm
非常巻上 EMERGENCY WINDING	カウンターウェイト COUNTER WEIGHT
減速比 REDUCTION RATIO	i = 1/87
サブランス SUB LANCE	
巻上荷重(カウンターウェイト) WINDING LOAD	260kg
昇降ストローク ELEVATOR STROKE	3540 mm
ドラム径 DRUM	φ200 mm
ロープ径 WINDING ROPE	φ10 mm
ランス昇降速度 LANCE ELEVATOR SPEED	
高速 HIGH SPEED	10 m/min
低速 LOW SPEED	3.3 m/min
モーター MOTOR	15kW 4P/12P
回転数 ROTATION FREQUENCY	1500/500 rpm
非常巻上 EMERGENCY WINDING	カウンターウェイト COUNTER WEIGHT
減速比 REDUCTION RATIO	i = 1/87



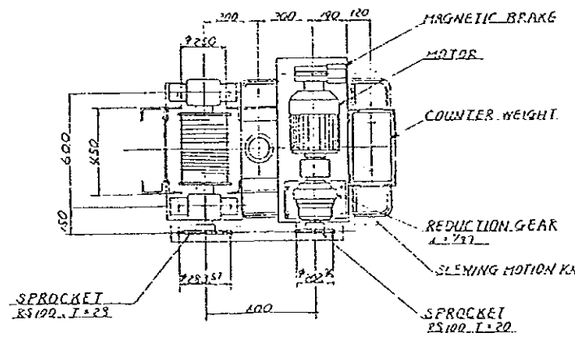


Fig. 4-2-10 Assemble Drawing of Main Lance and Sub-Lance

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	BANKO COAL GASIFICATION TEST PLANT MAIN LANCE, SUB LANCE LAYOUT

1ST FIGURE of TAG NUMBER	
X	機械 MACHINERY
V	バルブ VALVE
M	モーター MOTOR
E	電気品 ELECTRIC APPARATUS

2ND FIGURE of TAG NUMBER			
S	酸素 OXYGEN	1	石炭乾燥機 COAL DRYER
N	窒素 NITROGEN	2	石炭微粉化吹込装置 COAL PULVERIZER & INJECTION SYSTEM
L	LPG LIQUID PROPANE GAS	3	溶解炉 MELTING FURNACE
C	圧空 COMPRESSED AIR	4	ガス化炉 GASIFIER
A	空気 AIR	5	ダクト I. D. F DUCT I. D. F
W	冷却水 COOLING WATER	6	その他 OTHERS

SYMBOL	NAME
	SOLENOID VALVE
	AIR CYLINDER VALVE
	CONTROL VALVE
	PRESSURE REDUCING VALVE
	NEEDLE VALVE
	AIR PILOT VALVE AUXILIARY

Fig. 4-2-23 Piping & Instrument Diagram

BANKO COAL GASIFICATION TEST PLANT	
P. I. D	
インドネシア バンコ炭 ガス化試験装置	
P. I. D	
P3066	

6. Result of Survey on Coal Quality

(1) The objectives of the coal sampling study in FY 1985 are as follows:

1) To find out the outcrop lines in North West Banko and West Banko

2) To grasp coal quality in above areas

3) To study coal sampling method and places for 200 kg/sample to be tested in coal gasification test facilities

(2) For above objectives, the following studies were successfully carried out in NW Banko and West Banko (partially).

1) Reconnaissance
2) Topographic survey
3) Shallow holes drilling
4) Deep hole drilling

(3) 28 of deep boring data in NW Banko and West Banko (partilly) were provided by the Counterpart, including coal analysis data. Also additional data and information such as topographic maps, geological maps and outcrop/sub-outcrop maps were provided by the Counterpart.

(4) All of the data and information, including these of FY 1984, were analyzed and integrated as follows:

1) The outcrop lines and coal seam structure in depth 250 m were clarified in NW Banko and West Banko (see Fig. 5-4-12)

2) Sodium content in ash (consequently in coal) is
   i) increased in inverse proportion to total ash in coal, resulting maximum sodium content in coal is 6,000 ppm (0.6% in coal) (see Fig. 5-4-16)
   ii) increased in proportion to vertical depth from the surface (see Fig. 5-4-17)
   iii) however sodium content in ash is in the range of 0-40%.

3) Bulk coal sampling method using large diameter core drilling machine is most economical and reliable. 10 samples of 200 kg/sample of coal samples

will be taken from NW Banko in FY 1986, according to the following sampling plan.

Boring machines	:	2 units (core diameter 101 mmφ)
Max depth of boreholes	:	50.5 m
Total drilling length	:	645 m
Sampling places	:	9 places
Total weight of samples	:	2 tons (200 kg x 10 samples)
Working system	:	two shifts/day
Working period	:	3 months

As far as NW Banko, all geological data which are needed to review the result of the preliminary mining cost estimation are obtained by the study in FY 1985. Therefore it is recommended to study the mining cost of NW Banko coal in FY 1986.

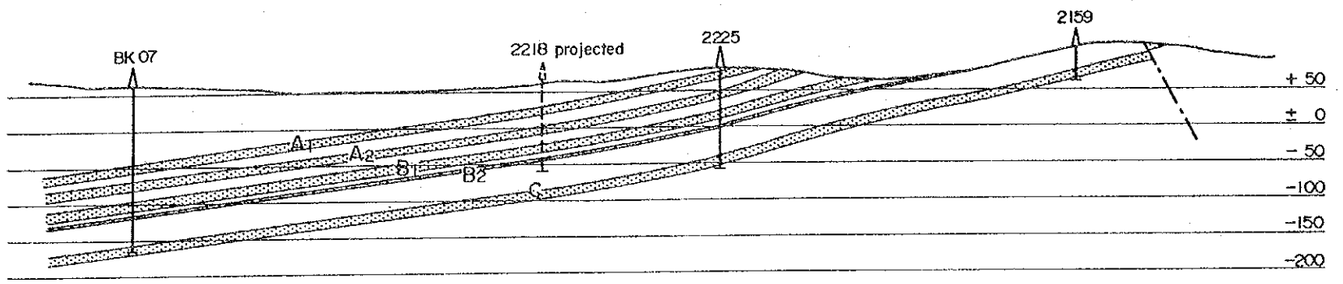
It is recommended that the coal sampling study in FY 1986 will be carried out in accordance with the following plan.

i) Coal sampling work at NW Banko (200 kg/sample, 10 samples)

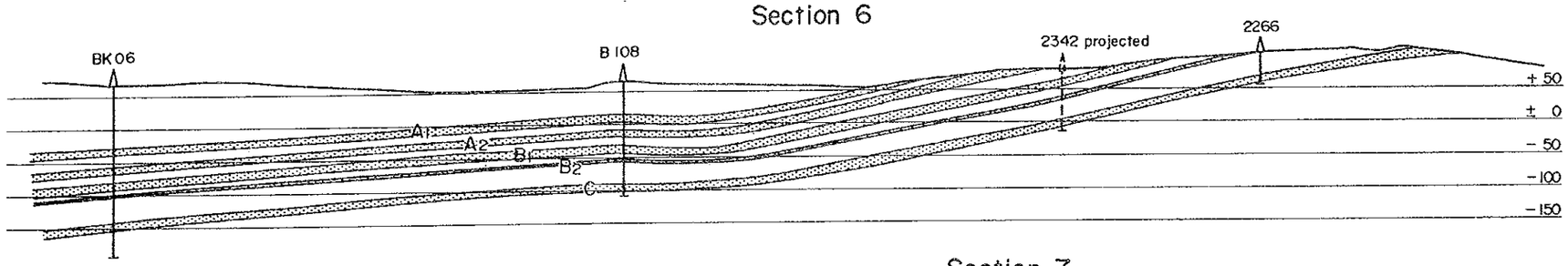
ii) Reconnaissance and topographic survey in West Banko (partially), North Suban Jeriji, and others.

Fig. 5-4-15 Estimated Vertical Section

Section 5



Section 6



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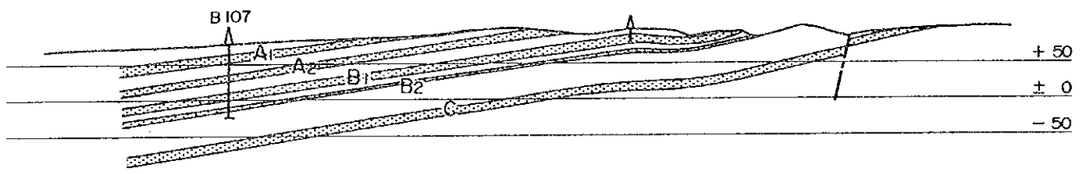
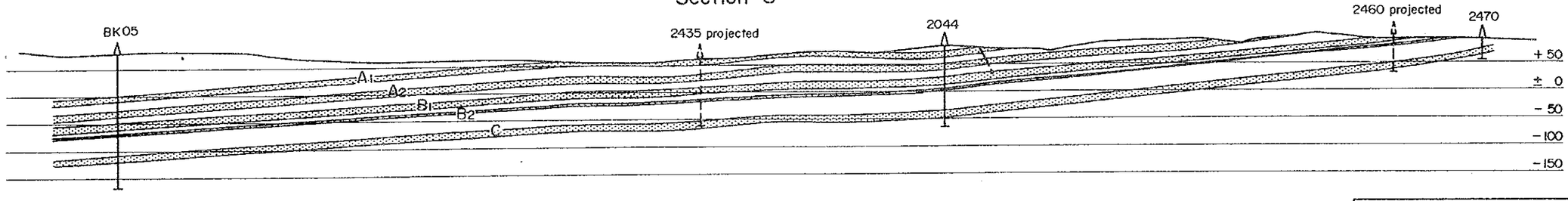
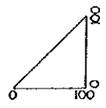


Section 8





JAPAN INTERNATIONAL COOPERATION AGENCY

(THE FEASIBILITY STUDY ON EFFECTIVE UTILIZATION OF BANKO COAL)

Cross Section

-- 5 ~ 8 --

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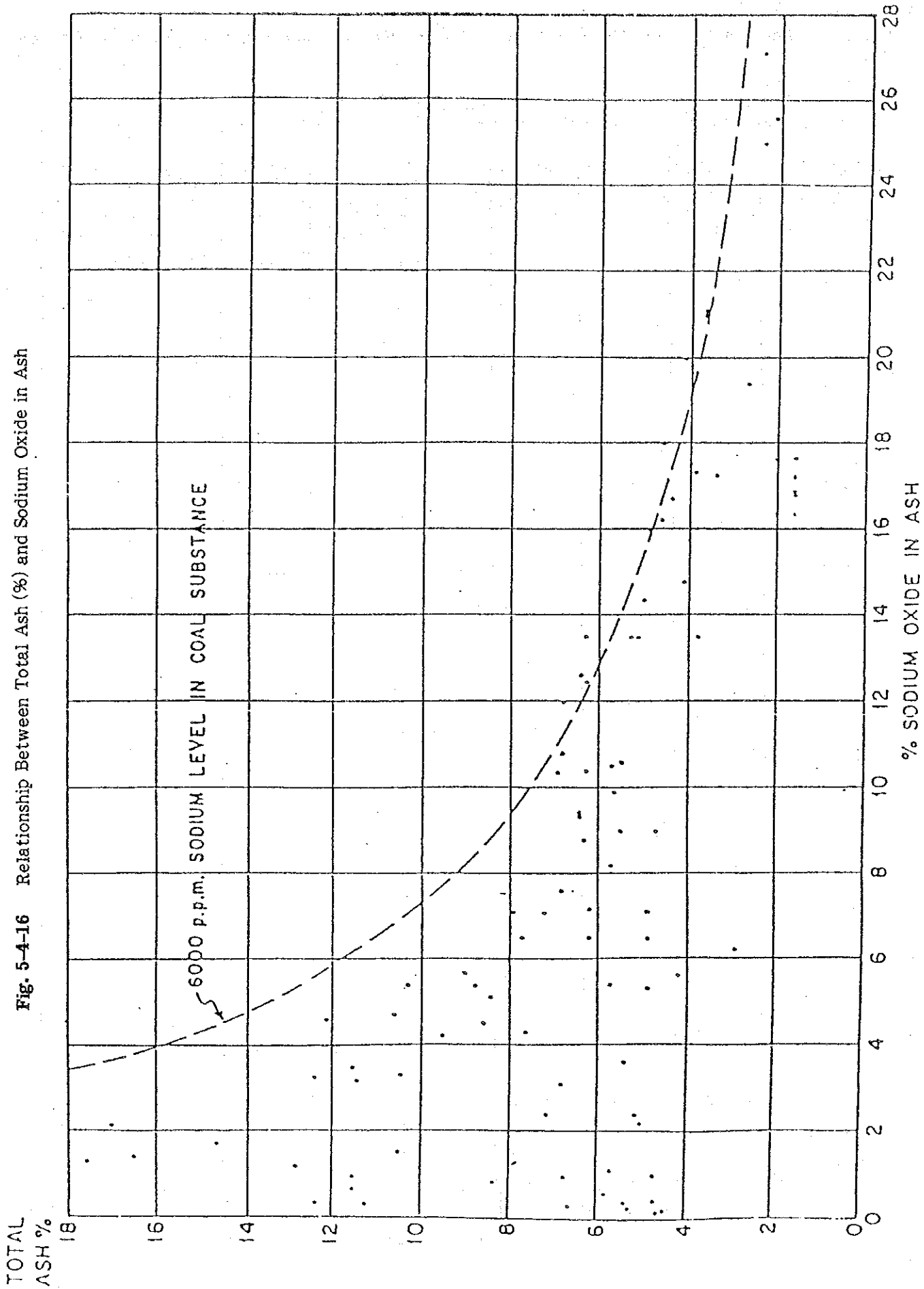
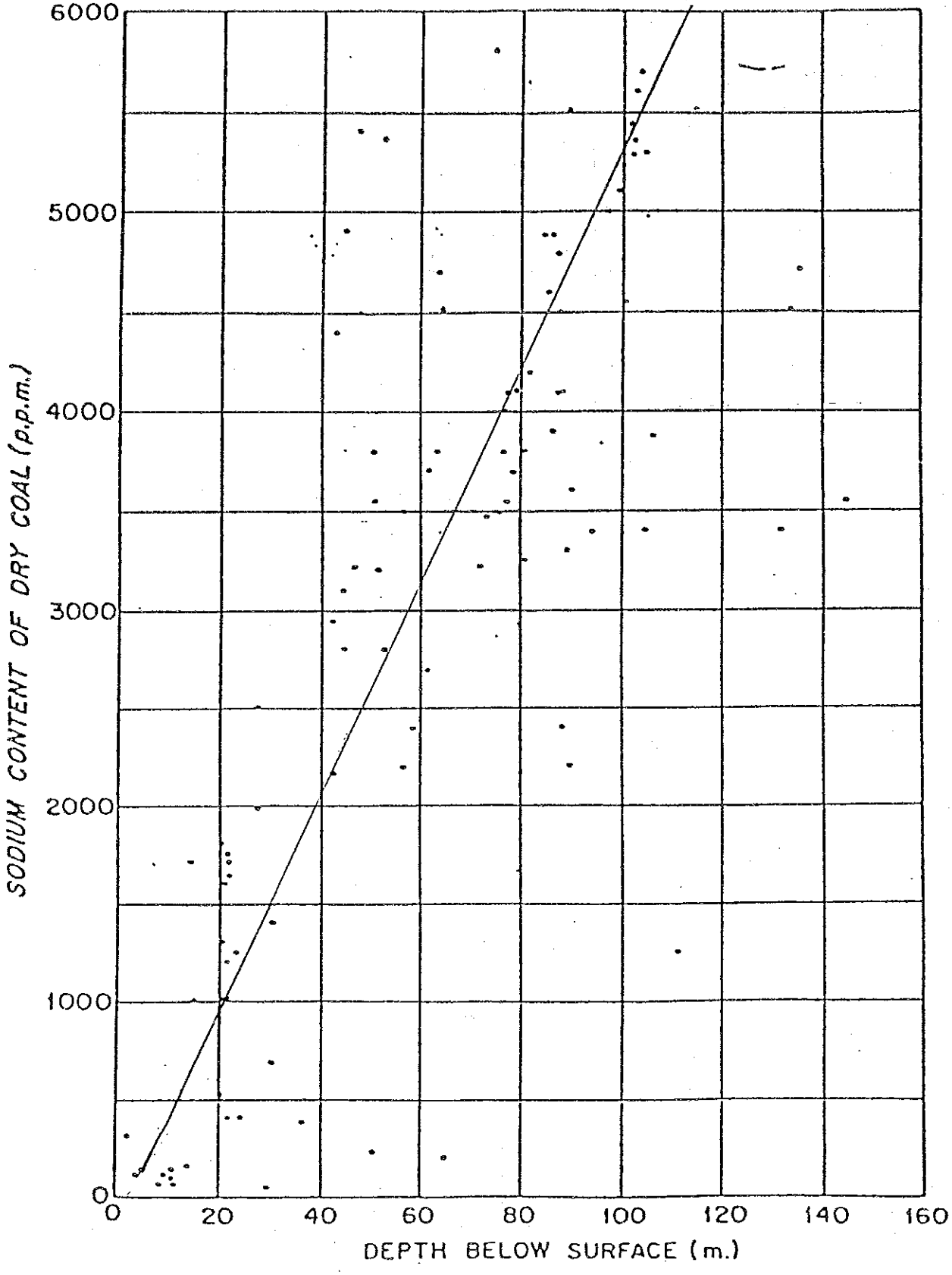


Fig. 5-4-16 Relationship Between Total Ash (%) and Sodium Oxide in Ash

Fig. 5-4-17 Relationship Between Sodium Content and Sample Depth Below Surface



7. Result of Preliminary Evaluation of Economic Feasibility

In order to grasp the outline of the methanol production from Banko coal in terms with its financial viability and profitability, financial analysis on the hypothetical coal-to-methanol project (hereafter referred to as the project) was carried out following the site reconnaissance and the conceptual design of the 5,000 ton/day methanol production complex.

(1) Reconnaissance of Banko area and Surroundings

The reconnaissance was mainly carried out to survey,

i) The geographical and topographical conditions of proposed plant sites (3 places)

ii) The means of equipment transportation

1) Proposed plant site

Three proposed palnt sites (Tanjung Priok, Desa Muara Enim, N.W. Banko) have the following advantages in common.

- Proximity to river
- Spacious and flat
- Proximity to mine site

The exact geological and topographical data, however, are not yet available that it is impossible to choose one out of three in this stage.

For this cost estimation study, Tanjung Priok was selected tentatively for its convenience of the equipment transportation.

2) Equipment Transportation Means

Because the road from Palembang to Muara Enim was revealed to be intolerable for heavy equipment transportation, the transportation by means of barge through the Musi and the Lematang River was taken into account.

Speculated from some hydrographic data obtained from DPMA (Directrate of Water Resources), the river condition from the Port of Palembang to Muara Enim where the equipment are expectedly unloaded is sufficient enough for transportation. (see Fig. 6-1-4, 6-1-5, 6-2-12)

(2) Conceptual Plant Design

Conceptual design work was carried out considering the results of the site survey.

1) Tanjung Priok was selected as plant site. (see Fig. 6-2-3)

2) Mined coal is carried by belt conveyor for 13 km from Banko to the plant site.

3) The plant consists of coal handling and gasification, methanol synthesis and distillation, utility supply system and other supporting facilities so that all the utilities except coal and raw water are generated and consumed internally.
(see Fig. 6-2-2, 6-2-10)

Basic specifications are,

· Raw Material	;	Low grade coal reserved in Banko area	
· Product	;	Fuel methanol (Chemical grade is tentatively assumed)	
· Capacity	;	Coal	- 3,800,000 ton/year (19% used as fuel)
		Product	- 1,600,000 ton/year
· Technology	;	Gasification	- Molten iron bath process
		Methanol Synthesis	- Standard process for chemical grade methanol production

4) Infrastructures are not considered since the major ones are existing in this area.

5) Estimated Plant Construction Cost is 989,500 x 10^6 rupiah (178,600 x 10^6 yen)

(3) Financial Analysis

1) Assumptions

i) Debt/Equity ratio ; 75/25

ii) Project life ; 30 years (1994-2023)

iii) Interest rate ; 8% p.a.

iv) Sales price at plant gate ; 194 rupiah/kg (35 yen/kg)

2) Results

i) IRR on total investment before tax, interest ; 13.5%

ii) Break-even price (IRR = Interest Rate) ; 143 rupiah/kg (25.9 yen/kg)

iii) First year to have profit before tax ; 3rd year

iv) Clean off of accumulated loss ; 5th year

As far as IRR is concerned, the resulting 13.5% of IRR cannot be considered as high rate in general standard due to large investment costs and low sales price. Being linked with the price of crude oil, the methanol price was set rather low in this study reflecting the current oil price which is extremely declined.

Provided that the crude oil price rises higher than 30$/bbl, for example, the viability of the project would be enhanced because the noncommercial Banko coal is not affected by oil price increase.

Fig. 6-1-4 Hydrographical Map

- through Palembang and Muara Enim -

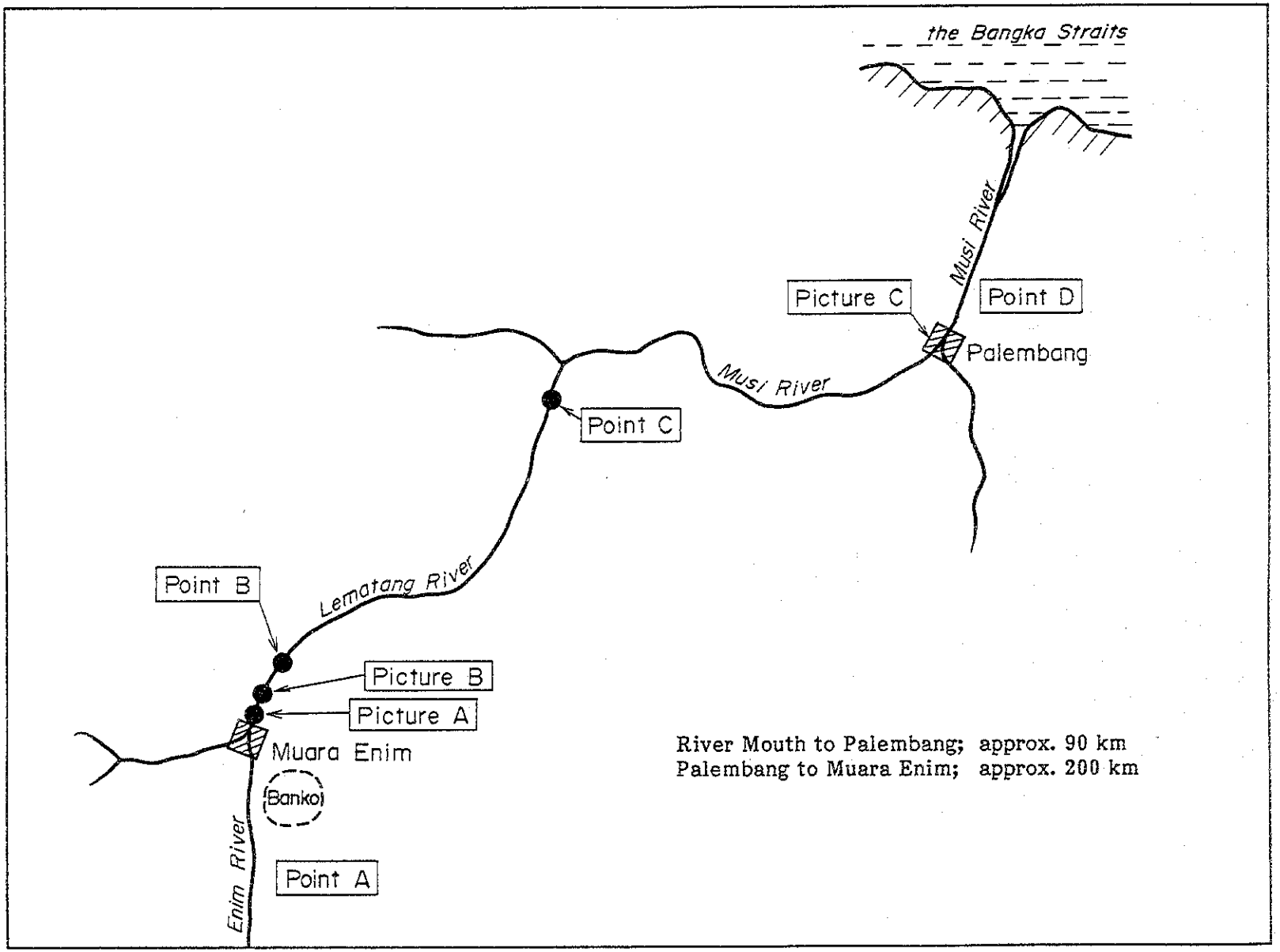
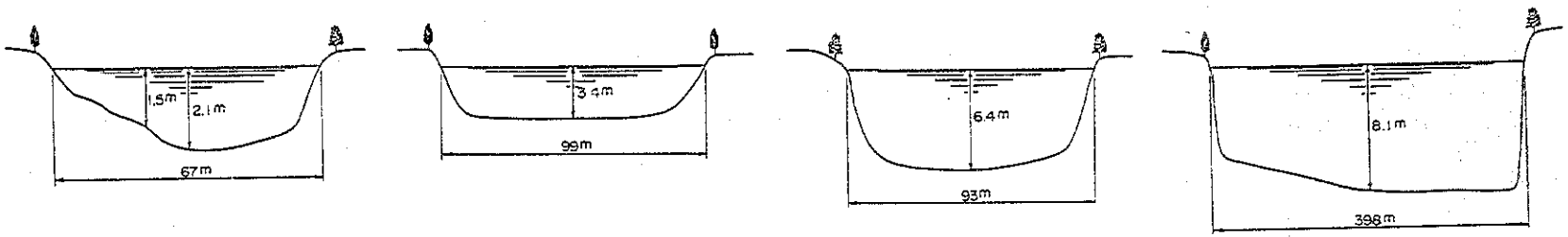


Fig. 6-1-5 Hydrographic Data of Rivers

(Nov., 1985)

Point		A	B	C	D
Place		Lingga	Pinang Belarik	Sungairotan	Tebing Abang
River		Enim	Lematang	Lematang	Musi
Location		Unknown	10 km downstream of Muara Enim	100 km downsteam of Muara Enim	unknown
Width,	m	67	99	93	390
Depth (Max.)	m	2.1	3.6	6.4	8.1
Velocity,	m/sec	0.58	0.82	0.84	0.84
Flow Rate, (estimated)	m^3/sec	49	208	398	2,302

Source; DIRECTORAT PENYELIDIKAN MASALAR AIR (DPMA)



3) Sensitivity of major cost-effective factors

The sensitivity analysis reveals that the methanol price and the construction costs vividly affect the profitability of the project while raw material cost affects it a little. In addition to it, yen's appreciation can not be ignored as long as loan is raised by yen. (see Fig. 6-3-4)

Variation		IRR %
Sales Price	30% down	7.0
Sales Price	30% up	18.5
Construction Costs	20% down	16.5
Construction Costs	20% up	11.2
Material Costs	30% up	12.3
Exchange Rate (rupiah to yen)	20% down	12.2

(4) Viability of Fuel Methanol

By using the fuel efficiency (kcal/km) and the price (yen/l) of methanol, gasoline and diesel oil, the fuel costs equivalent to 1 litre of methanol were estimated on the assumption that the produced methanol at Banko area is imported to Japan and delivered through the existing supply system. (see Table 6-4-2 and Fig. 6-4-1)

Results

	Volume Ratio (l/l-methanol)	Fuel Cost (yen/l-methanol equiv.)
Methanol	1.0	44
Gasoline	0.63	Before Tax 60 (After Tax 95)
Diesel Oil	0.44	Before Tax 36 (After Tax 46)

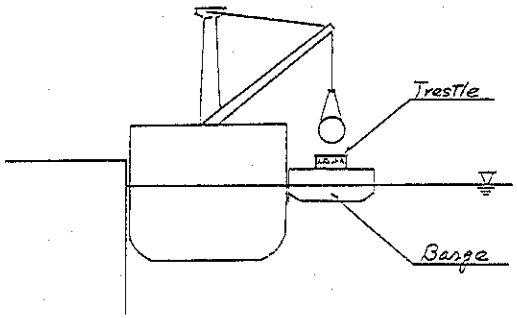
In order to promote the utilization of fuel methanol in Japan, which may decrease NOx emission from vehicles, the adjustment of taxation regulation for diesel oil is required.

REV. NO.	DATE	DESCRIPTION	SIGN

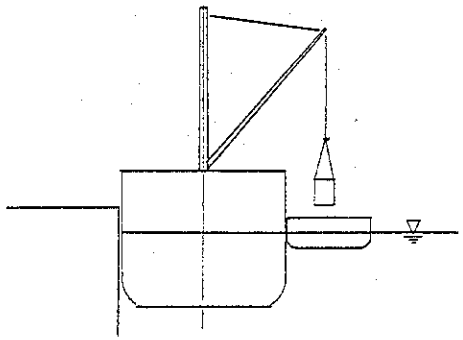
Fig. 6-2-12 Transportation Plan (1/2)

① Unloading at Palembang

2. Heavy Cargo

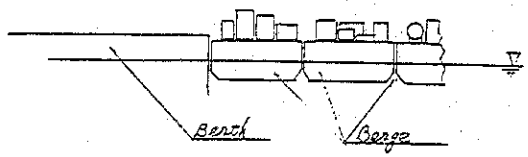


b. General Cargo



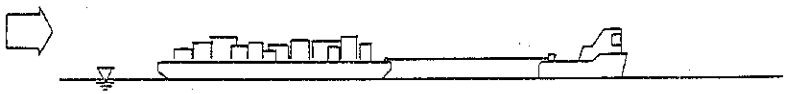
② Barge Mooring to Berth.

at Palembang Port



③ Barge Towing

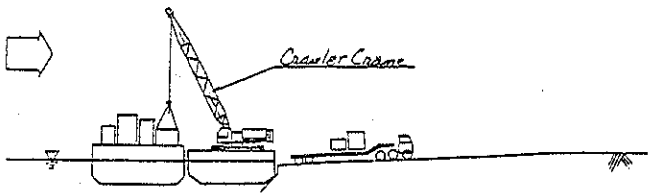
Single Towing



Palembang → Site (250km)

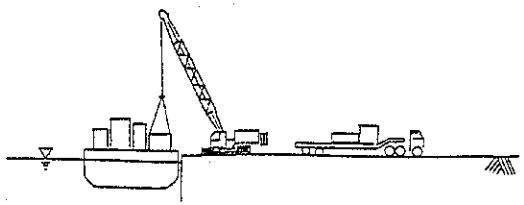
④ Unloading General Cargo

a. By Crane on Barge



④ Unloading General Cargo

b. By Crane on Ground



APP'D		INDONESIA METHANOL PJ.	
CHK'D			
DRW'N	U. Yokoshiji	Transportation Plan (1/2)	
TRC'D			
SCALE	DATE	DWG.NO. SA-F-1001	

CUSTR

COPY

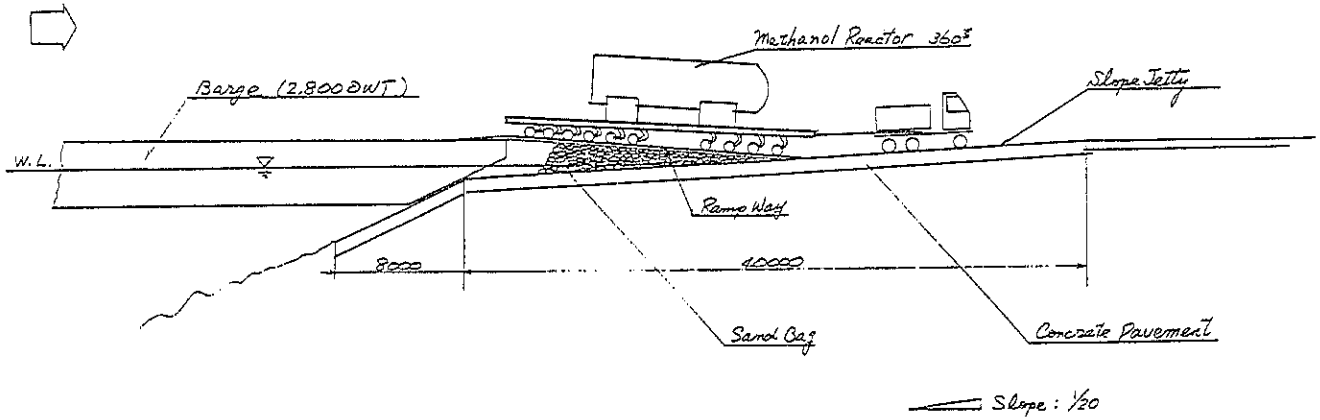
ISSUE

REV. NO.	DATE	DESCRIPTION	SIGN

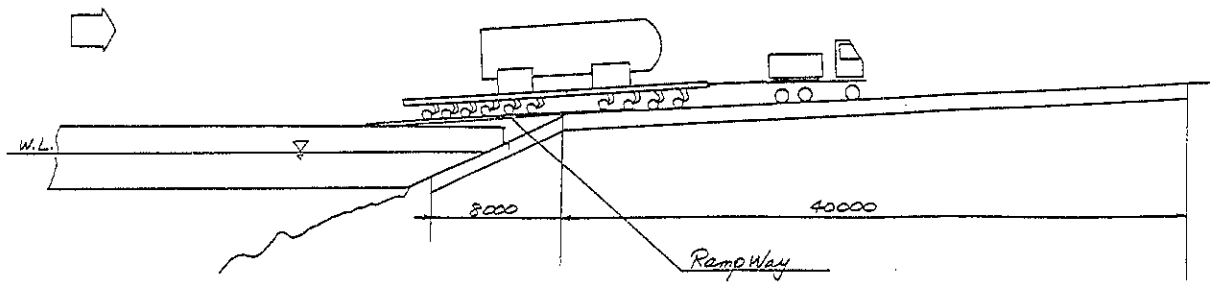
④ Unloading Heavy Cargo

Fig. 6-2-12 Transportation Plan (2/2)

a. Max. High Water Level



b. Low Water Level



APP'D		INDONESIA METHANOL PJ.	CUSTR
CHK'D			
DRW'N	N. Yabushiji	Transportation Plan (2/2)	
TRC'D		Roll-off Work for Heavy Cargo	
SCALE	DATE	DWG.NO. SA-F-1002	COPY / ISSUE

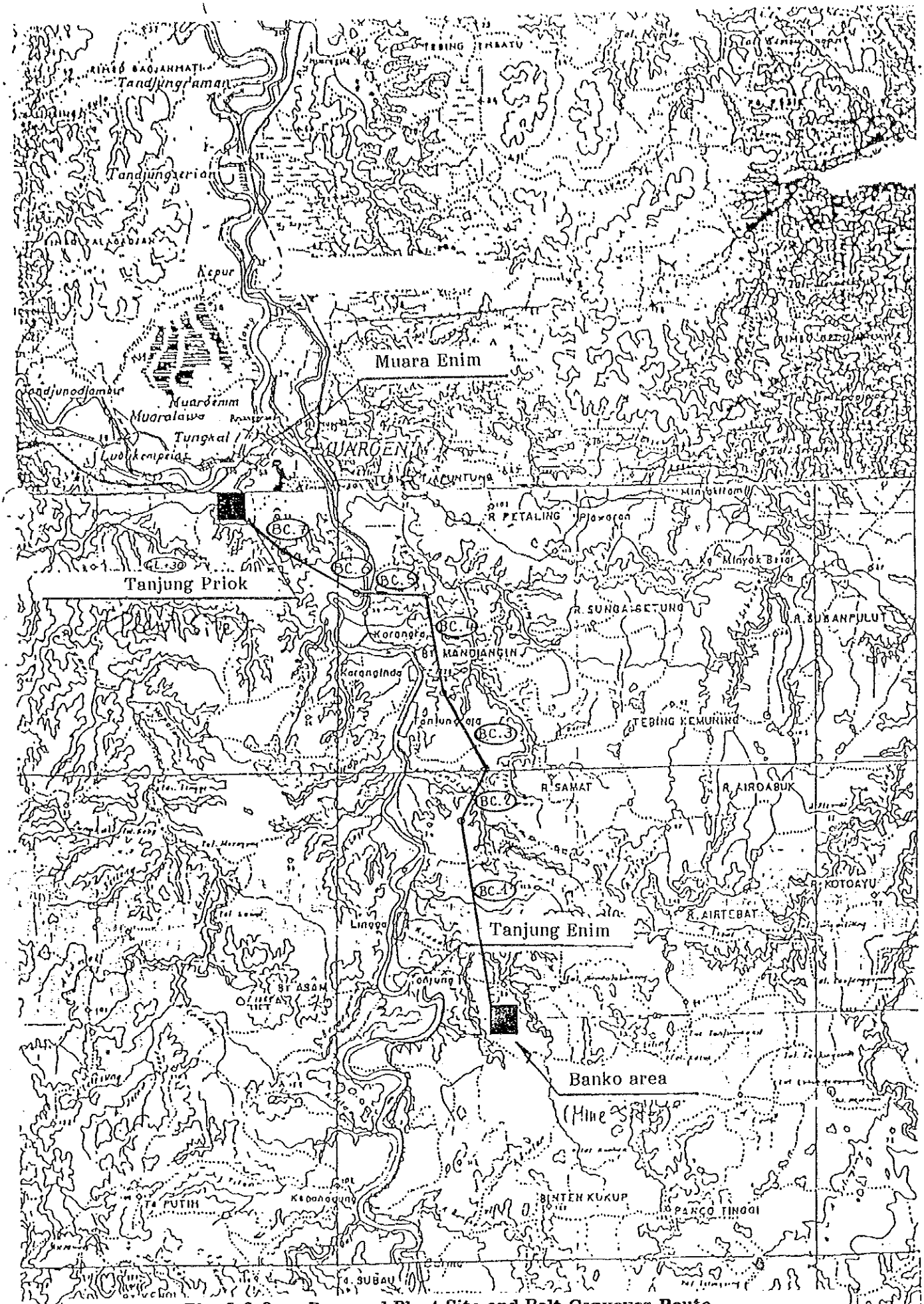
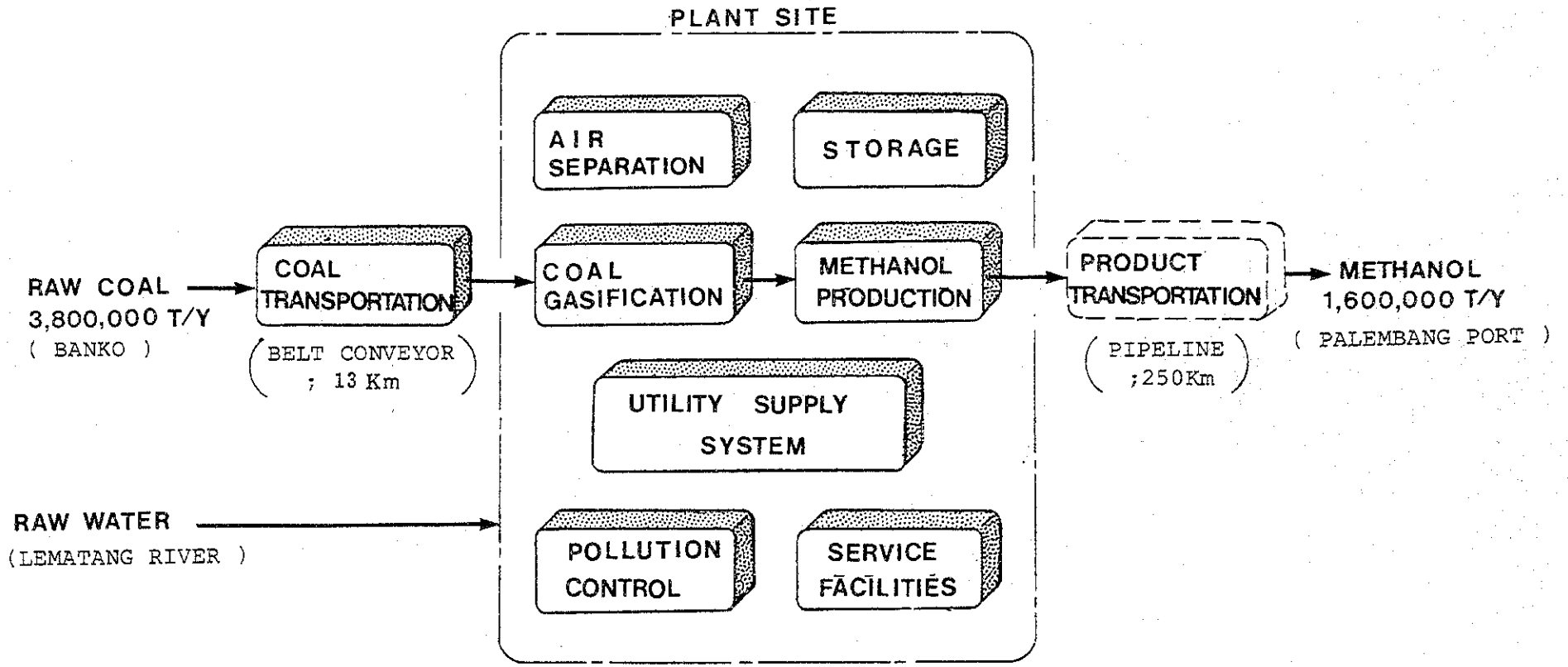


Fig. 6-2-3 Proposed Plant Site and Belt Conveyor Route

Scale; 1:100,000 (Original)

Fig. 6-2-2 Overall Block Flow Diagram



* Component facilities consisting each block are listed in Table

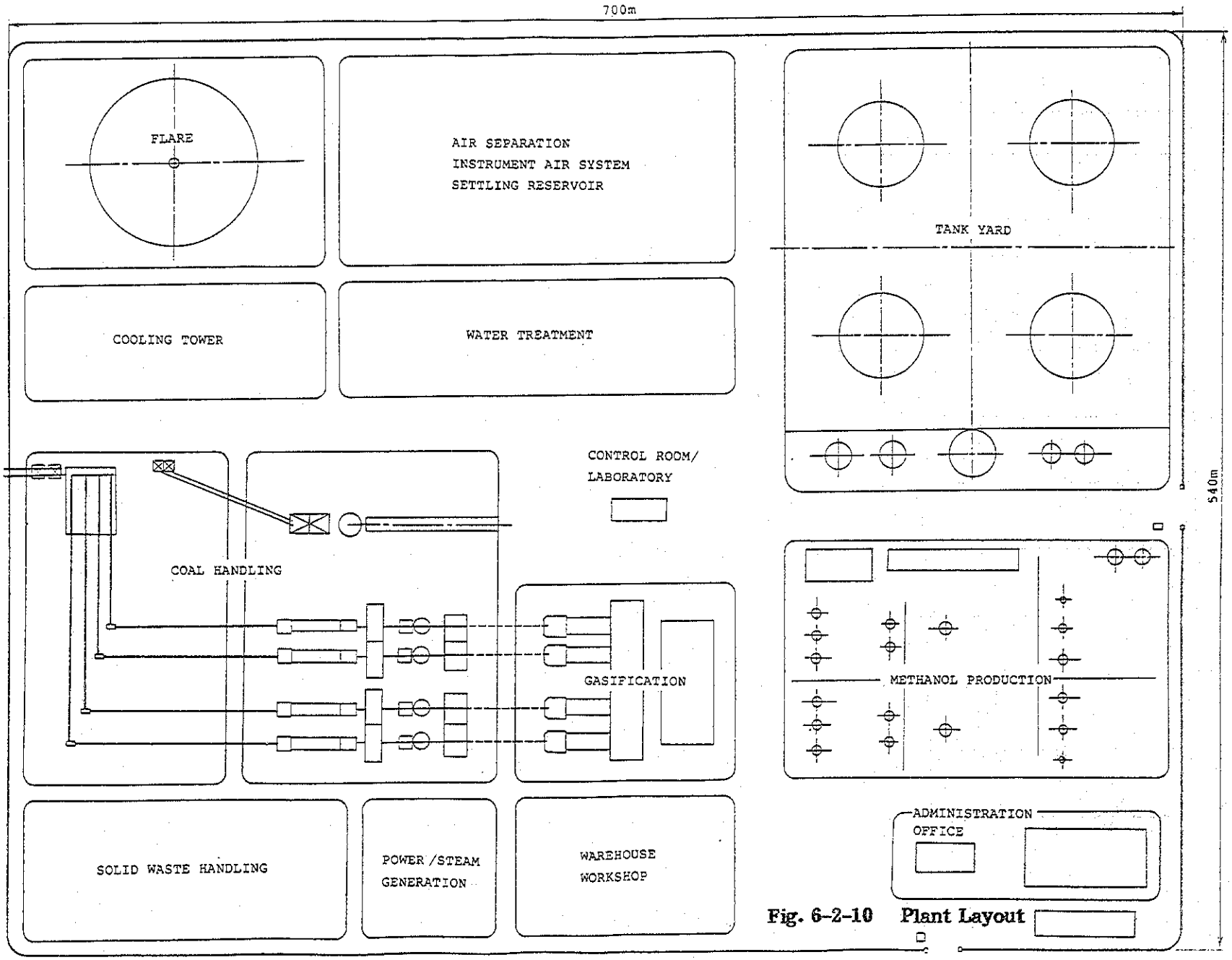
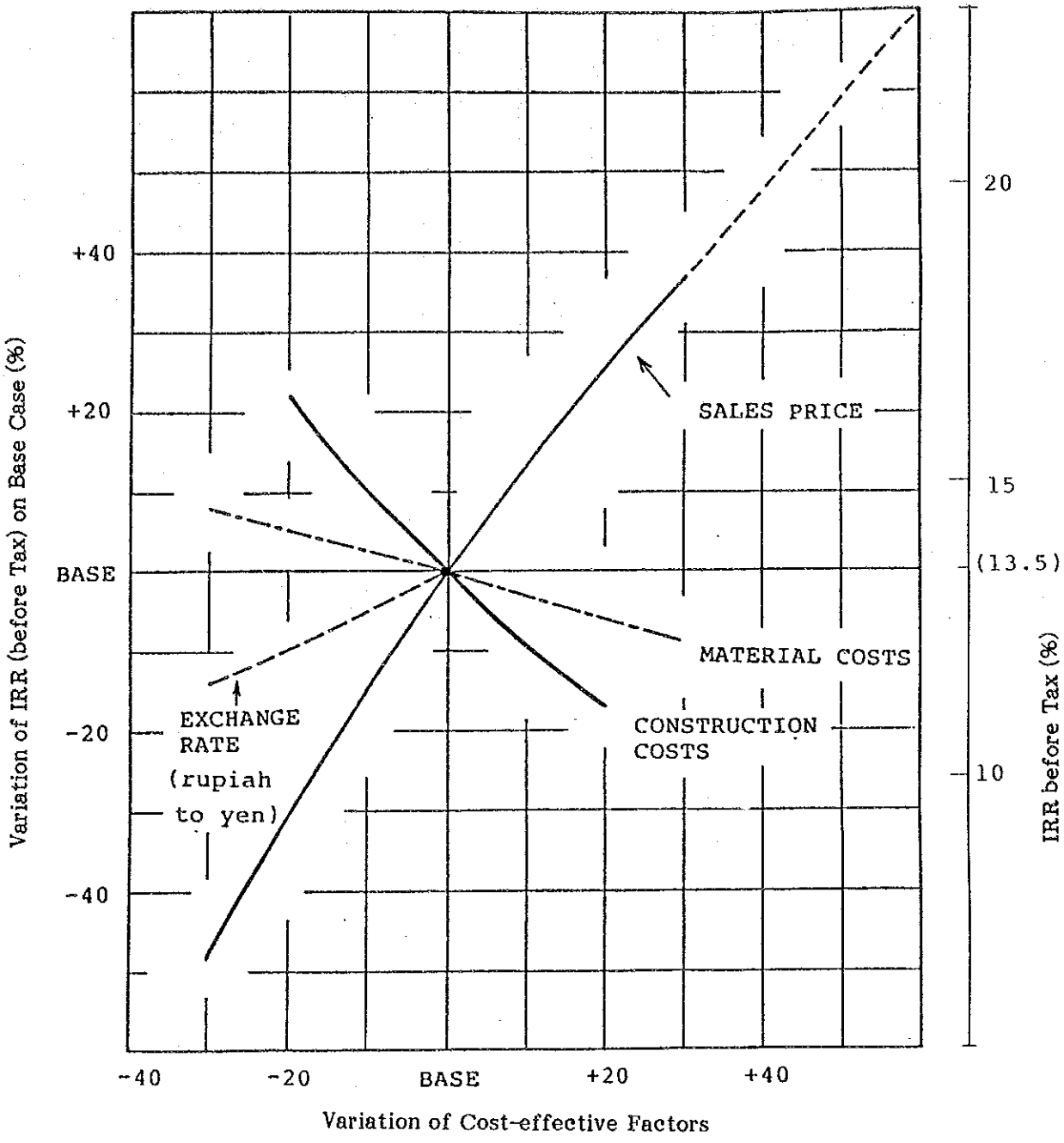


Fig. 6-2-10 Plant Layout

Fig. 6-3-4 Sensitivity of Cost-effective Factors



SALES PRICE (Yen/kg)	25		35	45	55
CONST.COSTS (10^6 yen)		150,000	(179,000) 200,000		250,000
MAT'L COSTS ($/ton)	10		(14.85)		20
EXCH. RATE (yen/rupiah)	0.12	0.15	0.18		

Table 6-4-2 Economic Comparison of Transportation Fuels

	L.H.V kcal/ℓ	Consumption Rate (kcal/km)	Retail Price (Yen/ℓ)	Required Volumetric Ratio (Equiv. to 1ℓ of Methanol)	Fuel Cost (Yen/ℓ-methanol equiv.)
Methanol	3,800	253	-	1.0	36 (Case I-1) 44 (Base) 53(Case I-2) 64 (Case I-3)
Gasoline	7,950	335	B.Tax 96 (A.Tax 150)	0.63 1)*	B.Tax 60 (A.Tax 95)
Diesel Oil	8.650	253	B.Tax 81 (A.Tax 105)	0.44 2)*	B.Tax 36 (A.Tax 46)

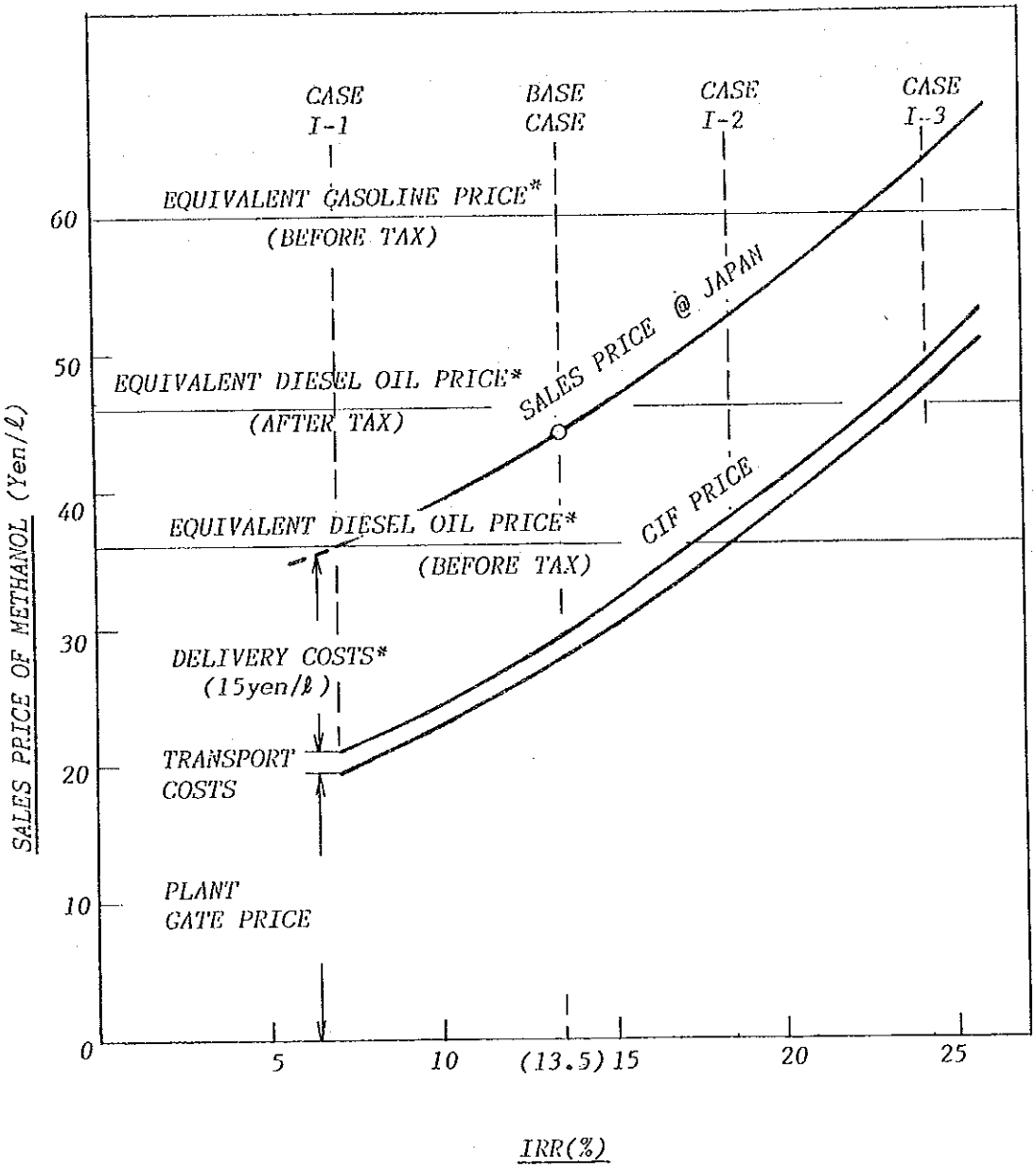
1)* $Req.Vol.Ratio = \frac{Gasoline(\ell/km)}{Methanol(\ell/km)} = \frac{335(kcal/km)}{7,950(kcal/\ell)} \Big/ \frac{253(kcal/km)}{3,800(kcal/\ell)}$

$= 0.63\ \ell$ - gasoline / ℓ - methanol

2)* $Req.Vol.Ratio = \frac{Diesel\ Oil(\ell/km)}{Methanol\ (\ell/km)} = \frac{253(kcal/km)}{8,650(kcal/\ell)} \Big/ \frac{253(kcal/km)}{3,800(kcal/\ell)}$

$=0.44\ \ell$ - diesel oil / ℓ - methanol

Fig. 6-4-1 Economic Evaluation of Fuel Methanol in Japan



* Source; Present Status and Utilization Potential of Fuel Methanol, NO.221, Resources Technology (July 1985)

8. Result of Investigation of the Market for Final Product

As to R & D activities of fuel methanol mainly in developed countries, most R & D efforts have been concentrated to gasoline engines and followed by those for diesel engines. They are oriented for automotive use. R & D efforts for power generation use such as boiler and gas turbine have not been so positively done and are rather geographically limited to the U.S.A. and Japan. These are done from environmental point of view because of its cleanness.

For the time being, fuel alcohol is paid attention as octane-enhancer point of view.

And also, in longer perspective neat methanol usage seems to be most promising among several usages of fuel methanol for automobiles. Though no significant technological problems are expected for methanol use in gasoline and diesel engines, distribution system of fuel methanol and commercial production of methanol-fueled vehicles will probably be significant problems in the future.

9. Conclusion and Recommendation

(1) Conclusion

All of the studies scheduled in FY 1985 have successfully carried out.
As the tentative conclusion of the study in FY 1984 and 85, the effective utilization of Banko coal seems to be feasible in technical and economic view point.

(2) Recommendation

1) It is recommended that the study in FY 1986 shall be proceeded as scheduled on Scope of Work.

2) It is recommended that "the Study on Market for Fuel Alcohol and its Supply System in Indonesia" shall be carried out in FY 1986 as one of subjects of the Feasibility Study, in response to the request of the Counterpart.

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