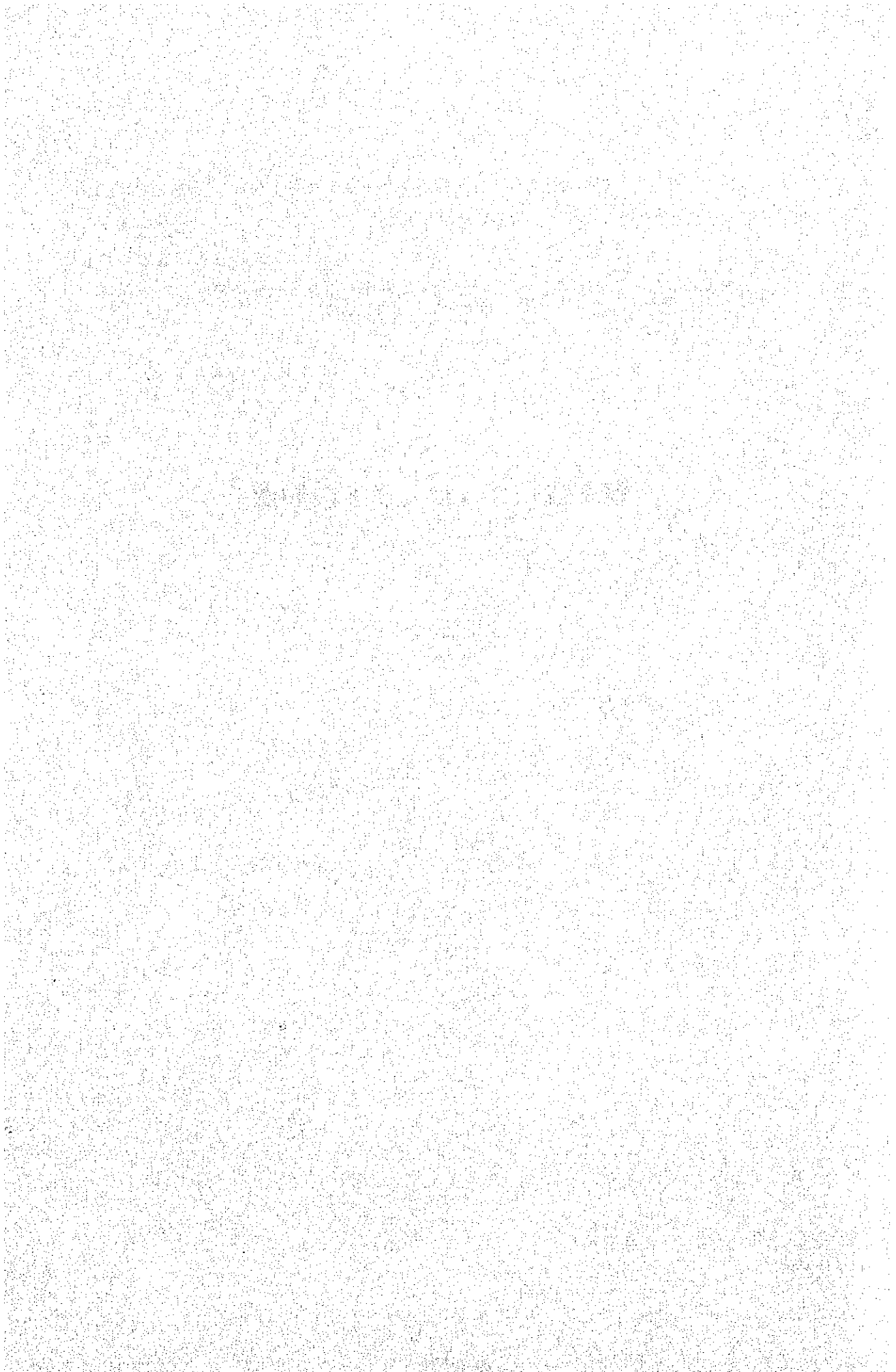


第6章 プロジェクトの評価



第6章 プロジェクトの評価

6-1 財政的評価

第5章で述べた諸費用によって本探査船を使用してデータを収集し解析して報告書を発行するまでの年間費用を概算してみると約870万ペソとなる。

一方、予算として表-8のごとく予定しているので、本船完成予定の1984年分と対比してみると、

表-8

	Beach & Offshore	Marine Geophysical	Marine Geological	Total
1982	P 653,478	P 2,393,356	P 1,472,046	P 4,518,880
1983	P 721,350	P 2,965,000	P 1,614,300	P 5,300,650
1984	P 547,780	P 3,643,660	P 2,465,660	P 6,657,100

(出所:MMRD作成の予算)

予 算	年間費用	差 額
666万ペソ	870万ペソ	204万ペソ

この不足額約204万ペソはBMG全体の1982年の予算額6,307万ペソに対して約3%にしかならない。

この程度の経費増は国家的経済政策から見て問題ないと判断する。

6-2 運営面の評価

船の母港もNAVOTAS漁港に決定しており、操船者もBCGSの経験者を予定しており、船の修理施設もフィリピン国内にあり、船自体の運営には問題ない。

しかし、探査機器には地震反射探査のような最新のものが多く、これ等機器の操作、維持管理、解析方法については日本を含む外国からの技術援助を十分考慮する必要がある。

また、探査データ処理を行うコンピューターの能力は、現在のものでは、地震反射探査の解析に必要なグラフィックディスプレイもなく、弱体である。

将来は、これらのデータ処理が可能のように能力の増強が必要である。

6-3 運営組織の評価

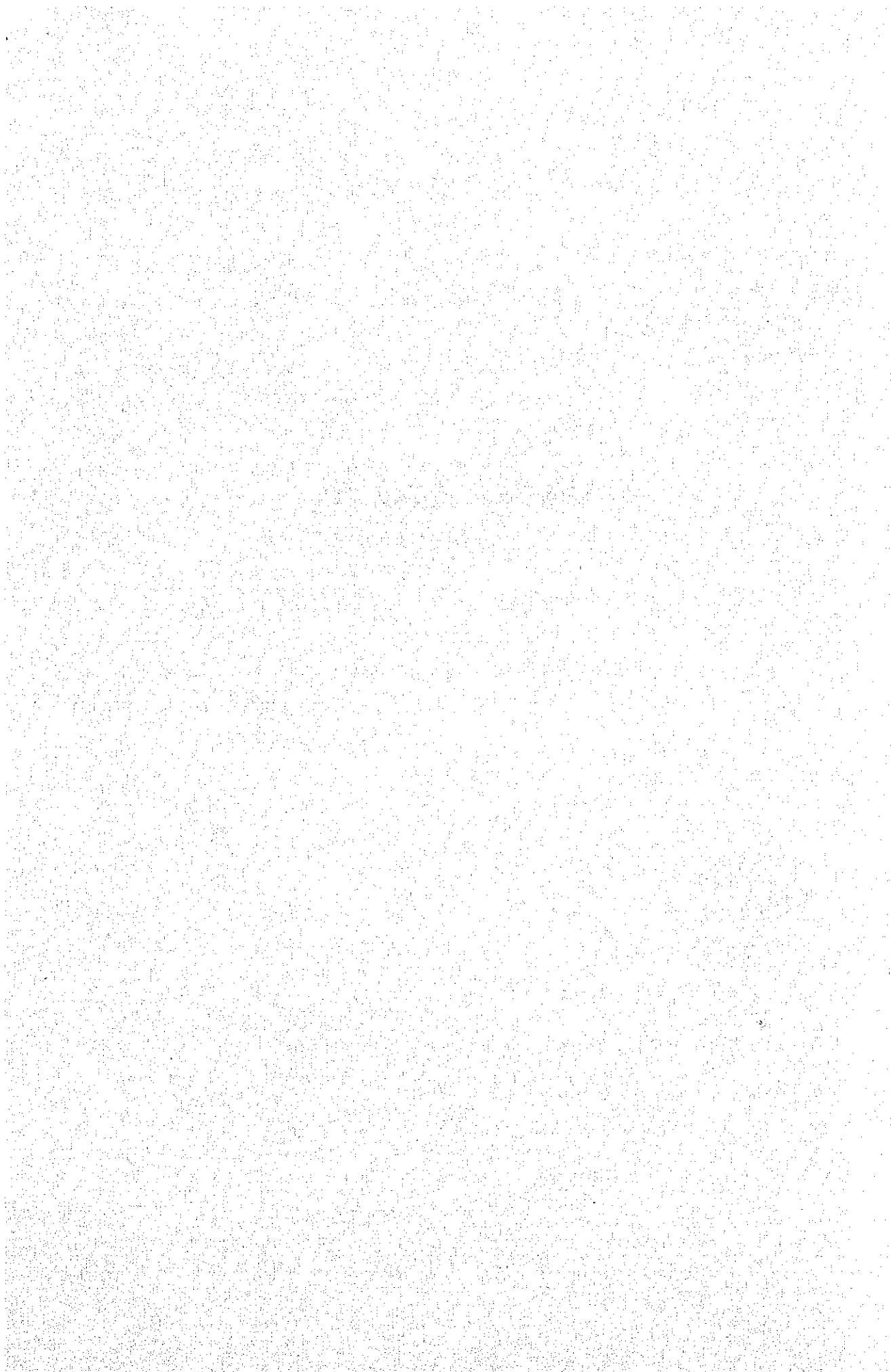
中心となって運営するのはBMGのMMRDであるが、この探査には関係する機関が多いので、これ等との連絡調整に十分な注意が必要である。しかもBMGとしては船を初めて持つことになるので科学者集団のMMRDにとっては新しい仕事が増すことになる。船の維持管理業務等については元船長を充当しているが、将来は関係機関の連絡調整の問題処理を含めてChiefの専任スタッフ・グループを形成する部所の設置が必要であろう。

グループのメンバーとしては科学者1名、船長級1名、書記1～2名が必要である。

なお、船関係の管理業務としては下記のような事項がある。

- A. 探査船業務の立案企画について、科学者と船長間の連絡調整。
- B. 入渠工事内容および費用の査定、ドックの選定。
- C. 船体、機器の一般修理および業者の手配。
- D. 船用品（燃料、清水、食料、部品等を含めて）購入の手配。
- E. 船員の技術指導
- F. 船員の雇入雇止、配乗業務。労務、厚生対策および賃金支払業務。
- G. 倉庫品の倉入倉出管理。
- H. 上記諸事項の査定および支払業務。

第7章 結論と勧告



第7章 結論と勧告

日本の金属原料輸入元を金額的に多い順で見るとオーストラリア、米国に次ぐ3番目の国がフィリピンであり、またフィリピン自体も工業化のための基礎資材としての鉱物資源の安定供給を必要としている。このため、海洋鉱物資源の新規開発は両国のみならず世界的にも非常に重要な問題であり、このために必要とされる本探査船計画を実現させることは極めて有意義なものと判断される。

供与後の運営については日本を含む外国からの技術援助が必要である。

本計画を順調に進めるための条件としては、

- ① フィリピン政府がB.M.G.に対し下記費用につき十分な財政措置をとること。
船の引渡しまでにフィリピン側で準備すべきもの。

- i) 埠頭倉庫
- ii) データ処理のコンピュータ設備
- iii) データの編集、分析および処理のための研究所
- iv) 岩石、古生物、冶金および化学上の分析のための研究所
- v) 収集サンプルとテープの保管室
- vi) 地質地図と報告費の印刷設備
- vii) 探査船運航事務所
- viii) プロジェクト実施のための財政上の準備

第5章および第6章で説明したごとく本探査の運営・維持管理費（年間約870万ペソ）を考慮せねばならない。

- ② フィリピンのコンピュータシステムの増強。即ちコンピュータのデータ処理能力アップと最新探査技術に対応できるような周辺機器の新設整備をすること。
- ③ 技術協力探査船の引渡し時点でフィリピン側より次の予定で教育訓練と回航のために人員を派遣して来る予定である。

Scheduled of Dispatch of Ship's complement and scientists to Japan for training and to ferry the survey vessel from Japan to the Philippines

Captain and Chief Engineer -- 2 months before ships delivery

Chief Scientist -- 1 month before ships delivery

4 Scientists and 7 Crew members -- 3 weeks before ships delivery

しかしながら本探査船は最新鋭の探査機器（特に地震探査機器）を搭載しているため、就航後の探査を順調に進めるためには上記教育訓練とは別途に科学者の探査技術の教育訓練は

かかせないものと判断される。フィリピン側の日本への技術援助要請は次に示されているとおりであるから、これらに対して、日本側も十分検討の上これに対応することが望ましい。

Proposed

Technical Assistance and Training Grants for
Offshore Mineral Exploration Project of
the Bureau of Mines and Geo-Sciences

In conjunction with the implementation of the proposed Offshore Mineral Exploration Project of the Bureau of Mines and Geo-Sciences, it is proposed that training in shipborne geological/geophysical survey operation be granted to the following technical personnel and expert assistance be provided in some fields of specialization related to marine geological/geophysical survey.

I. Training Grants

<u>Discipline</u>	<u>1982</u>	
	<u>No. of Trainees</u>	<u>Time and Duration</u>
A. Instrumentation and Technique in Offshore Survey Operation	2	6 months each July - December
B. Marine Geology and Oceanography	1	6 months July - December
<u>1983</u>		
A. Marine Geology and Oceanography	1	6 months January - June
B. Electronic Maintenance & Repair of Measuring Equipment used in Geophysical Survey Operation	2	4 months each January - April and May - August
C. Geophysical Data Processing and Interpretation using Computer	2	6 months each January - June and July - December
<u>1984</u>		
A. Geophysical Data Processing and Interpretation using computer	1	6 months January - June

II. Expert Assistance

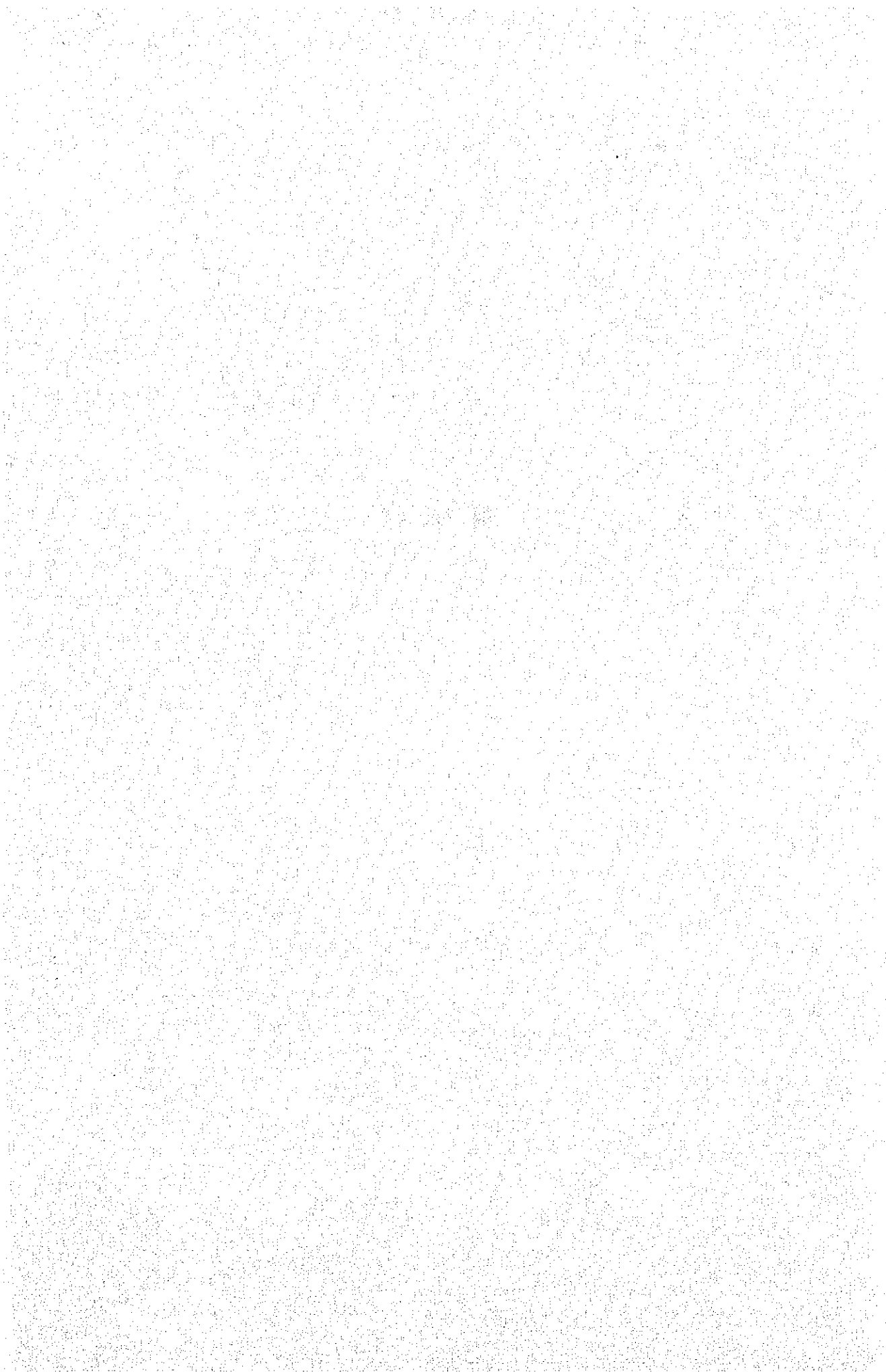
1983

<u>Expert/</u>	<u>Nature of Assistance</u>	<u>Requested No. of Expert</u>	<u>Duration/Time</u>
A. Marine Geophysicists			
1.	To advise in planning and execution of geophysical survey and train Filipino counterpart in all phases of survey operation.	1	6 months July - December
2.	To assist in compilation computer processing and interpretation of geophysical data, and formulation of computer program.	1	2 months November - December
B. Marine Geologists			
1.	To advise in planning and execution of sea-bottom sampling and sediment analysis	1	6 months July - December
2.	To assist in compilation and processing of off-shore geological data in relation to geotectonics and economic mineral deposition.	1	2 months November - December
C. Electronic Engineer			
1.	To advise and orient Filipino counterparts repair & maintenance of surveyed navigational equipment.	1	3 months August - October

<u>Expert/Nature of Assistance</u>	<u>Requested No. of Expert</u>	<u>Duration/Time</u>
A. Marine Geophysicist		
1. To continue assistance in compilation computes processing and interpretation of geophysical data and computer programming.	1	4 months February - May
B. Marine Geologist		
1. To continue assistance in compilation and processing of geological data and relate these to tectonics and economic mineral deposition in surveyed area.	1	4 months February - May
C. Electronic Engineer		
1. To continue assistance and orientation of Filipino counterparts in proper maintenance and repair of survey and navigation equipment.	1	3 months February - April

また、日本からの専門家派遣による技術協力も探査船引渡し後、研究者および機器メーカー技術者がフィリピン側の探査計画にしたがって、探査計画に参加することが望ましい。

資料編



資料一 1 調査団の構成

(1) 第1回 (昭和57年4月10日～昭和57年4月24日)

調査団長

服部 則夫 外務省経済協力局政策課首席事務官

調査団員(海洋資源 探査)

加賀美 英雄 東京大学海洋研究所助教授

調査団員(計画管理)

松岡 和久 国際協力事業団無償資金協力部基本設計課課長代理

調査団員(探査機材)

山田 孝三 (株) パシフィック航業

調査団員(船体設計)

中西 三郎 (財) 海外造船協力センター

調査団員(船舶機関設計)

高山 良一 (財) 海外造船協力センター

調査団員(運航計画)

佐原 吉郎 (財) 海事国際協力センター

(2) 第2回 (昭和57年8月8日～昭和57年8月14日)

調査団員(チームリーダー)

清水 嘉一郎 国際協力事業団無償資金協力部計画課課長代理

調査団員(船体設計)

中西 三郎 (財) 海外造船協力センター

資料-2 フィリピン 政府のカウンター・パート

Mr. Corpuz	Assistant Director General, National Economic Development Authority
Mr. Caoili	Deputy Minister, Ministry of Natural Resources
Mr. Roque	Assistant Secretary, Ministry of Natural Resources
Mr. Fernandez	Director, Bureau of Mines and Geo-Sciences
Mr. Comsti	Assistant Director, Bureau of Mines and Geo-Sciences, Ministry of Natural Resources
Mr. Teodoro	Chief, Marine Mineral Resources Division
Capt. de Guia	Bureau of Coast & Geodetic Survey, Retired
Mr. Muriel	Supervising Geologist II, Marine Mineral Resources Division
Mr. Martin	Supervising Geologist II, Marine Mineral Resources Division
Mr. Ventura	Director, Bureau of Coast & Geodetic Survey, Ministry of National Defence
Capt. Gler	Bureau of Coast & Geodetic Survey
Capt. Pascual	Bureau of Coast & Geodetic Survey
Capt. Aguilar	Engineer, Bureau of Coast & Geodetic Survey
Mr. Benito	1st class Radio Operator, Bureau of Coast & Geodetic Survey
Mr. Madrid	Chief, Oil and Gas Division, Bureau of Energy Development, Ministry of Energy
Prof. Santos	Department Chairman, Department of Geology & Geography, College of Arts and Science, University of the Philippines
Me. Rabuy	Head of the Center, Data Processing Center, Bureau of Lands, Ministry of Natural Resources
Mr. Cabanlig	Managing Director, Technology Resources Center, Ministry of Human Settlements
Mr. Villanuena	Head of Project Team, National Computer Center, Office of the President

資料一 3 調査の日程

(1) 昭和57年

- 4月10日(土) 東京発, マニラ着
- 11日(日) 調査業務打合せ
- 12日(月) 経済開発局及び天然資源省表敬, 日本大使館表敬, 打合せ
- 13日(火) 鉱山地球科学局(Bureau of Mines & Geo-Sciences)と調査スケジュール打合せの上, 日本側の計画概要説明および討議
- 14日(水) 鉱山地球科学局と要請探査船の内容に関する協議を行い, DRAFT MINUTES 検討
- 15日(木) 鉱山地球科学局に於いて, MINUTES 署名, 沿岸測地調査所にて運航関係につき調査。西独海洋調査船“SONNE”訪船調査
- 16日(金) フィリピン側要望事項につき検討
金属鉱業事業団マニラ事務所訪問, フィリピンでの事業内容聴取
- 17日(土) 調査業務打合せ
- 18日(日) 資料整理
- 19日(月) 予定基地ナボタス港調査, ナボタス漁港管理局と基地施設について協議
漁業調査船“SARDINELLA”訪船, 船舶運航, 保守, 配員等に関して調査
海洋鉱物資源課の施設, 配員, 調査
- 20日(火) 船舶保守, 修理施設調査(バタアン造船所)
エネルギー省エネルギー開発局, オイルエンドガス課調査
- 21日(水) フィリピン大学地質地理部及びコンピュータ施設調査, 天然資源省陸地局コンピュータ施設調査
- 22日(木) 測量船“ATYIMBA”訪船調査, ヒューマン, セットルメント省及び国立コンピュータセンターのコンピュータ施設調査
鉱山地球科学局との最終協議
- 23日(金) 日本大使館への調査経過報告
- 24日(土) マニラ発, 東京帰着

本調査に対しフィリピン側は主管の鉱山地球科学局長が接衝に当り, 探査専門家, 船舶専門家等を調査協力に配置して積極的に対応したので調査は順調に実施された。またMINUTES 署名後その経過は速かに局長より大統領に直接報告され, 4月22日の協議に於いて大統領も多大の関心を持っている旨が伝えられた。

(2) 昭和57年

- 8月 8日(日) 東京発、マニラ着
9日(月) 経済開発局及び天然資源省表敬
10日(火) 鉱山地球科学局(Bureau of Mines & Geo-Sciences)に最終報告書
(案)の説明を行い、内容討議
11日(水) 鉱山地球科学局に於いて討議
12日(木) 鉱山地球科学局とDRLFT MINUTES検討
13日(金) 鉱山地球科学局に於いて、MINUTES署名
日本大使館、JICAへの経過報告
14日(土) マニラ発、東京帰国

資料-4 ミニッツ

No.1

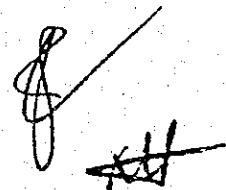
PHILIPPINES: OFFSHORE MINERAL EXPLORATION VESSEL
PROJECT

MINUTES OF DISCUSSIONS

In response to the request by the Government of the Republic of the Philippines (GOP), a Mission dispatched by the Government of Japan (GOJ) through the Japan International Cooperation Agency (JICA) visited the Philippines from 10th to 24th April in 1982 to carry out the Basic Design Study (the Study) on the OFFSHORE MINERAL EXPLORATION VESSEL PROJECT (the Project).

The Mission had a series of discussions and exchanged views with the officials of the Ministry of Natural Resources (MNR), the Bureau of Mines and Geo-Sciences (BMG) of MNR, the Bureau of Coast and Geodetic Survey of the Ministry of National Defense (BCGS) and the National Economic and Development Authority (NEDA).

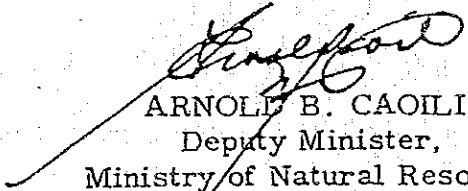
Both parties agreed to recommend to their respective Governments to review the result of discussions attached to



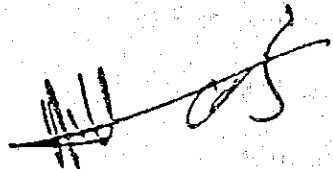
Philippines: Offshore Mineral
Exploration Vessel Project
15 April 1982
Page 2/.....

this minutes as "Major Points of Understanding" toward the
realization of the Project.

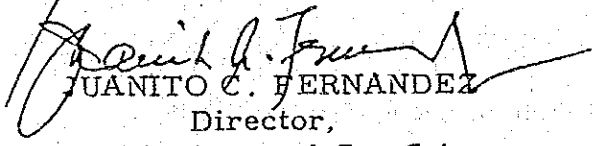
15th April, 1982



ARNOLFO B. CAOILI
Deputy Minister,
Ministry of Natural Resources



NORIO HATTORI
Leader,
JICA Mission



JUANITO C. FERNANDEZ
Director,
Bureau of Mines and Geo-Sciences

MAJOR POINTS OF UNDERSTANDING.

1. Outline of the Project.

1-1 Objectives.

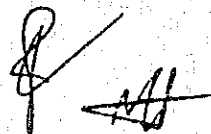
The Project will be carried out with the following objectives:

- 1) To study the geological and structural setting of offshore areas and identify the minerals and mineral deposits therein;
- 2) To identify and delineate the sediments and sedimentary deposits in offshore areas and evaluate its potential and economic mineral deposits; and
- 3) To provide fundamental geological information of the offshore areas.

1-2 Outputs.

The Project will have the following outputs:

- 1) Seismic interpretation, bathymetry, magnetics and sediment distribution maps at a scale of



1:100,000 or 1:250,000; and

2) Reports of marine geological studies.

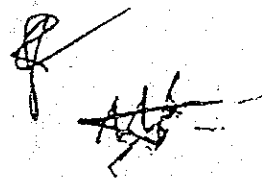
1-3 Activities.

Activities and agencies involved in the implementation of the Project is shown in ANNEX I.

1-4 Facilities necessary for the Project.

Facilities necessary for the Project consist of the following:

- 1) A Survey Vessel with Equipment;
- 2) A Pier, a Warehouse and other Shore Facilities for the Survey Vessel;
- 3) Computer Facilities for Data Processing;
- 4) Laboratories for Data Compilation, Analysis and Interpretation;
- 5) Laboratories for Petrographic, Paleontological, Metallurgical and Chemical Analyses;
- 6) Rooms for Storage of Reference Samples and Tapes;



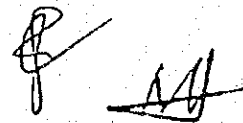
- 7) Printing Facilities for the Preparation of Maps and Documents; and
- 8) Office for Operation and Management of the Survey Vessel.

2. Basic Design of the Survey Vessel.

JICA undertakes the Basic Design Study in line with the Inception Report submitted and basic specification of the Survey Vessel and equipment as shown in ANNEX II.

3. Executing Agency for the Project.

BMG will be the executing agency of the Project and will assign the Chief of the Marine Mineral Resources Division (MMRD) as a Project Manager responsible for all activities in the implementation of the Project such as maintenance and operation of the Survey Vessel, selection of qualified personnel, and other related tasks. The project manager will be under the direct supervision and control of the Director of BMG.



4. Contribution of GOP to the Project.

4-1 Pier and Warehouse.

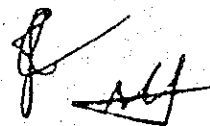
GOP shall construct a pier with water supply, electricity, telephone and mooring facilities, and a warehouse for storage of equipment and materials and shall be made available ^{the} at time of delivery of the survey vessel.

The basic idea of the modalities of accommodation is shown in the memorandum from the Assistant Secretary of MNR to the Director of BMG, as shown in ANNEX III.

The GOJ shall be informed of the detailed modalities of accommodation (including the location of the pier) through the Japanese Embassy in Manila by the time of the submission of the Draft Final Report of the Study.

4-2 Computer Facilities for Data Processing.

BMG shall have an agreement with the Bureau



of Lands of MNR or the Technology Resource Center to utilize computer facilities on time sharing basis.

- 4-3 Laboratories for Data Compilation, Analysis and Interpretation.

BMG shall provide laboratories for data compilation, analysis and interpretation.

- 4-4 Laboratories for Petrographic, Paleontological, Metallurgical and Chemical Analyses.

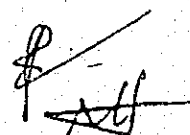
Petrographic, paleontological, metallurgical and chemical analyses of all collected samples shall be undertaken by using the facilities in the corresponding laboratories of the BMG, in particular the PETROLAB.

- 4-5 Rooms for the Storage of Reference Samples and Tapes.

Storage rooms for reference samples and tapes shall be provided in the MMRD.

- 4-6 Printing Facilities for the Preparation of Geological Maps and Documents.

Printing and preparation of geological and geophysical maps and documents will be arranged by



BMG with agencies that have map and document printing facilities.

4-7 Office for the Operation of the Survey Vessel

BMG shall provide an office for the survey vessel operation.

4-8 Financial Arrangement of the Project.

Cost estimates in the construction of a pier and a warehouse, maintenance and operation of the survey vessel, operation of data processing, compilation and interpretation, preparation of maps and documents, etc., will be made in the Study in close cooperation with BMG. These costs shall be borne by GOP.

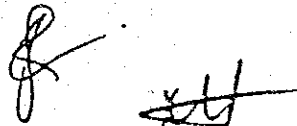
4-9 Manpower Recruitment.

BMG shall assign well-qualified scientists from within and other sources. BCGS shall provide the crew members. The proposed personnel are shown in ANNEX IV.

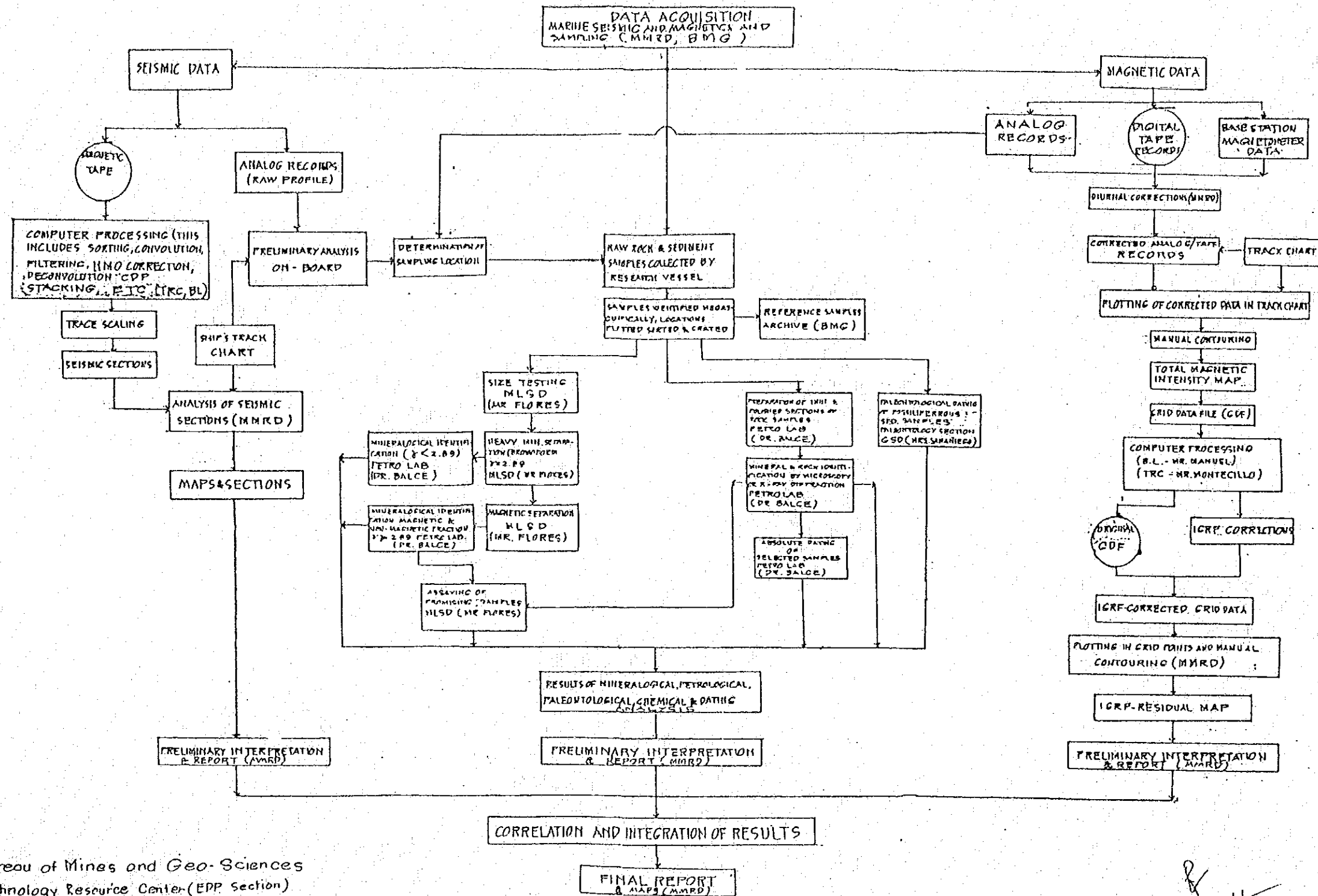
5. Requested GOJ's Contribution to the Project.

GOP requested the GOJ to finance for the consulting services and the construction of the Survey Vessel with equipment under the grant aid program of the GOJ.

Requested specification of the survey vessel and equipment are shown in ANNEX II.

Handwritten signature and initials in black ink.

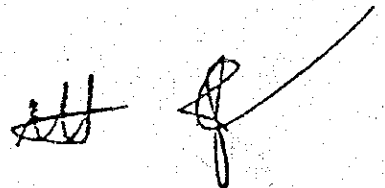
FLOW DIAGRAM OF OFFSHORE MINERAL EXPLORATION DATA AND SAMPLES PROCESSING, ANALYSIS AND INTERPRETATION



BMG - Bureau of Mines and Geo-Sciences
 TRC - Technology Resource Center (EPP Section)
 BL - Bureau of Lands (EPP Section)
 MMRD - Marine Mineral Resources Division of BMG
 MLSD - Metallurgical Laboratory Services Division of BMG
 PETRO LAB. Petrological, Mineralogical & Geochemical
 Services Laboratory of BMG
 GSD - Geological Survey Division of BMG

ANNEX II

SPECIFICATIONS
OF
OFFSHORE MINERAL EXPLORATION VESSEL



Type of ship The vessel to be designed and constructed as single screw, single rudder, twin diesel engine driven, long f'dle deck type offshore mineral exploration vessel, and to be engaged in research at the sea of not more than 200ms depth within 200 nautical miles economic zone of the Republic of the Philippines.

Classification American Bureau of Shipping (A. B. S.)
⚡ A1 (E) and ⚡ AMS.

Applied rule Philippine Merchant Marine Rules and Regulations as applicable to government survey vessel and Rules and Regulations of the Classification Society.

Flag The Republic of the Philippines

Principal dimensions

Length, overall	abt.	53.5 m
Length, b.p.		45.00 m
Breadth, moulded		10.00 m
Depth, moulded		4.80 m
Designed fully loaded draught, moulded		3.60 m
Gross tonnage (By Japanese measurement rule)	abt.	500 tons
Deadweight at designed fully loaded draught 3.6 m	abt.	280 metric tons
Complement		
Officer		9
Crew		12
Scientist		9
Guest		1

Total on board 31 persons

Tank capacity

Fuel oil tanks (100% full)	abt. 190 m3
Drinking water tanks (100% full)	abt. 35 m3
Fresh water tanks (100% full)	abt. 25 m3
Water ballast tank (100% full)	abt. 15 m3
Lubricating oil tank (100% full)	abt. 2 m3

Speed and endurance

Trial speed at maximum continuous output of main engines, at about 20% deadweight condition with clean bottom in calm weather and smooth deep sea. 12.0 knots

Service speed on the designed fully loaded draught of 3.60 m. at 90 % MCR of main engines with 15 % sea margin.

abt. 11 knots

Endurance based on total fuel oil tank capacity and ship's speed of 11 knots.

abt. 7,500
nautical miles

Propelling system

The propelling system to consist of two (2) main diesel engines, one reduction gear and one shafting system.

Main engine:	diesel engine	2 sets
	Maximum continuous output; Not less than 600 PS	
	Revolution	; Not more than 900 rpm
Reduction gear:	Non-reversible reduction gear	1 set
	Maximum transmitting output; Not less than 1,200 PS	
Propeller:	4 or 3 bladed controllable pitch type	1 set
	Propeller revolution; abt. 320 rpm	

Engine and propeller control system:

Control of start-stop of main diesel engines to be made at engine side in engine room.

Control of revolution of main diesel engines to be made at engine side in engine room and also to be remote control from the engine watch room and wheelhouse.

Control of reduction gear clutch on-off to be made at gear side in engine room and at engine watch room, and also clutch off to be remote control from wheelhouse.

Propeller pitch to be controlled from wheelhouse, engine watch room and at oil distribution box in engine room.

Electric Generator Plant

Main generator:	Diesel engine driven Abt. 140 KW, 445V, A.C., 60HZ, 3 ϕ , 1,200rpm	2 sets
Main generator prime mover:	Diesel engine Abt. 220 PS x 1, 200 rpm	2 sets
Emergency/port generator:	Diesel engine driven Abt. 30 KW, 445V, A.C., 60HZ, 3 ϕ , 1,800 rpm	1 set
Emergency/port generator: prime mover	Diesel engine Abt. 50 PS x 1,800 rpm	
Fresh water generator:	Vacuum type Max. 2.5 ton/day	1 set
Precision electric power supply:		1 set

Deck machinery

Steering gear	Type: Electro-hydraulic rum type two (2) pump units, one (1) to act as a stand-by	1 set
Windlass	Type: Electric driven type two (2) gypsy wheel two (2) warping head	1 set

Mooring capstan 1 set
Type: Electro-hydraulic driven vertical shaft
One (1) warping head type

Bow thruster 1 set
Type: Electric driven, controllable pitch
propeller type

Deck crane 1 set
Type: Hydraulic driven, slewing and luffing
type

Hydraulic power unit 1 set
For capstan, deck crane, sampling winch
(Notes: Each machinery not to be operated
simultaneously)

Life saving equipment

- 3 - Life rafts for 16 persons
- 51 - Life jacket
- 8 - Life buoys
- 6 - Rocket signals
- 12 - Parachute signals
- 4 - Self-igniting lights
- 3 - Self activating smoke signals
- 1 - Life line throwing apparatus

Fire fighting equipment

CO2 fire extinguishing system for engine room
Fire hydrant system for accommodation space.

Electric interior communication equipment

- 1 set - Common battery telephone
- 1 set - Automatic telephone
- 1 set - Engine order telegraph (Lamp type)
- 1 set - Electric propeller shaft tachometer
- 1 set - Clock
- 1 set - Public addressor
- 1 set - Rudder angle indicator

Electric nautical equipment

- 1 set - Gyro compass and auto pilot
- 1 set - Navigation echo sounder
- 1 set - Radar (relative motion)
- 1 set - Radio direction finder
- 1 set - Electro magnetic log
- 1 set - Magnetic compass
- 1 set - Wind speed & direction meter

Radio equipment

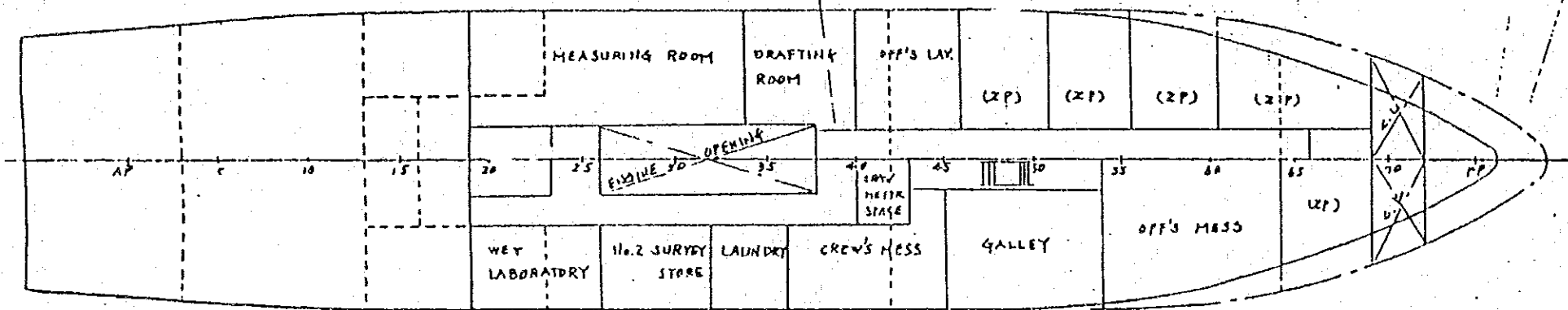
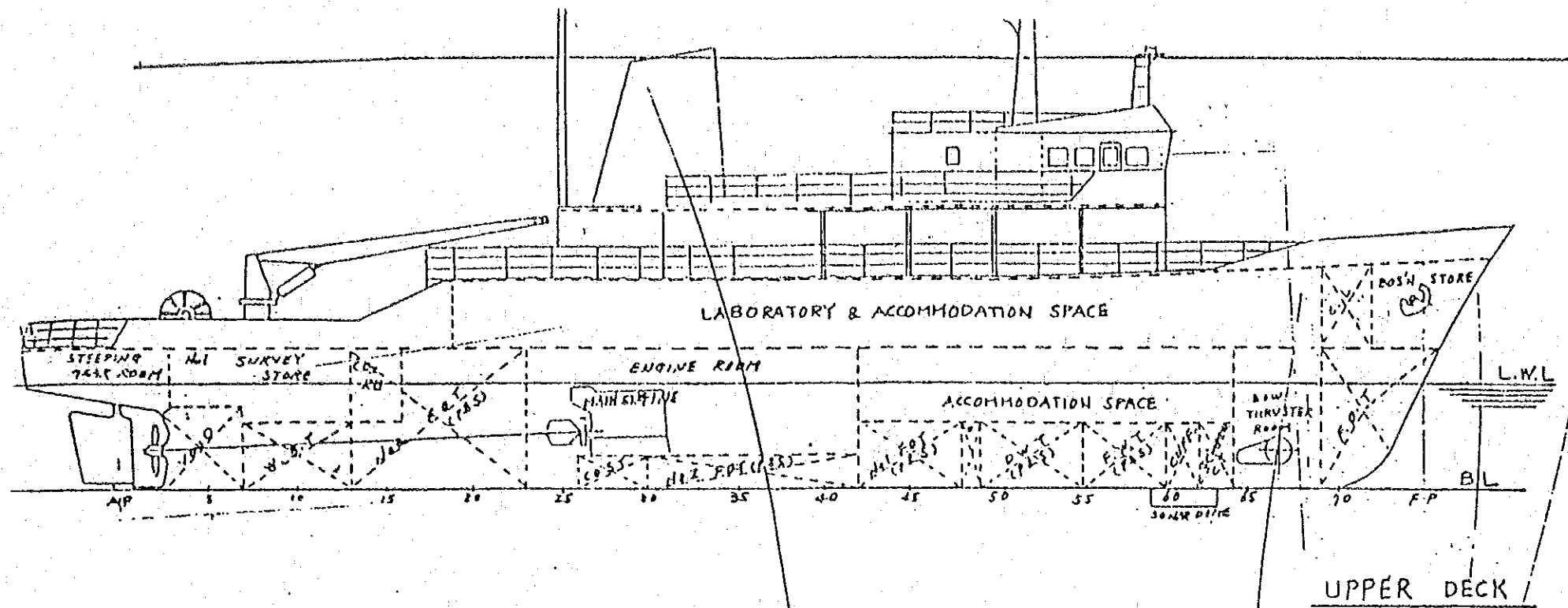
- 1 set - S.S.B. radio telephone
- 1 set - V.H.F. radio telephone
- 1 set - Portable radio apparatus for emergency use
- 4 sets - Survey boat V.H.F. transceiver

Survey equipment

- 1 - Survey echo sounder
 - 12 KHz & 30 KHz transducer, recorder
 - Measuring range: 0~200m, 0~8,000m
- 1 - Doppler sonar
 - Bottom tracking range: up to 400m
 - Speed range: -5~ $\frac{1}{2}$ 36 knots longitudinally
 - 10~ $\frac{1}{2}$ 10 knots transversely
 - Transmission frequency: 98~104 KHz
- 1 - Navigation satellite system
 - NNSS receiver, antenna
 - Receiving frequency: 150 MHz and 400 MHz
- 1 - Electronic position fixing system
 - Operating range: 40 nautical miles, line of sight
 - 3 Slaves
- 1 - Integrated navigation/data acquisition system
- 1 - Landing/Survey boat with davit
 - abt. 5m length
- 1 - Service boat for 6 persons
- 1 - Inflatable rubber boat
 - abt. 4m length

Multichannel seismic reflection system

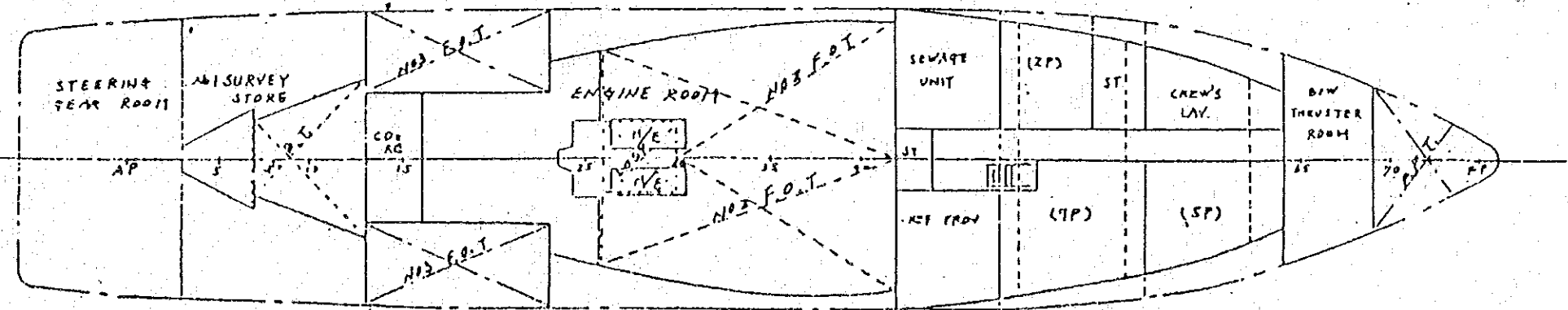
- 1 - 80 cu in water gun and 2 - 15 cu in water guns
- 1 - Water gun control and firing system
- 2 - Air compressors (electric motor driven 40 ft³/min at free air x 1500 psi)
- 1 - Streamer (50 m active section x 12, 30m stretch section x 3 and etc. total length approx. 830m, 24 channels)
- 1 - Amplifier and control system with recorder
- 2 - Magnetic tape consoles
- 1 - Proton magnetometer
 - Sensor
 - Recorder
 - Electronics console
 - Towing Cable (200m x 20 m/m ϕ) with cable winch
- 6 - Scuba diving gear
- 1 - Bottom sampler
 - 2 - Piston core sampler
 - 2 - Gravity core sampler
- 1 - Sampling winch for handling core samplers at the sea top to 200 m depth (1000m x 6 m/m ϕ) with gallows
- 1 - Hydrographic winch and davit (3,000m x 3 m/m ϕ)



TANK: TOP

PRINCIPAL PARTICULARS

LENGTH (O.A)	Ave. 53.5
LENGTH (B.P)	45.00
BREADTH (M ^{LD})	10.00
DEPTH (M ^{LD})	4.80
DESIGNED LOAD DRAUGHT (M ^{LD})	3.60
DEAD WEIGHT	280T
GROSS TONNAGE	Ave. 500 ^T
(BY JAPANESE MEASUREMENT RULE)	
SPEED (TRIAL)	12 KTS
COMPLEMENT	TOTAL ON BOARD 31 P



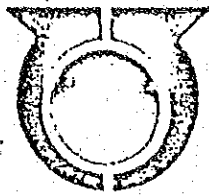
FLOOR AREA OF LABDRATORY

MEASURING ROOM	Ave. 30 M ²
DRAFTING ROOM	Ave. 12 M ²
WET LABORATORY	Ave. 12 M ²
NAVIGATION. ROOM	Ave. 6 M ²
NO.2 SURVEY STORE	Ave. 9 M ²
TOTAL	69 M ²

FLOOR AREA OF CREW'S ACCOMMODATION

MASTER class/person	Ave. 12 M ²
OFFICER class / -	Ave. 53 M ²
RATING class / ..	Ave. 25 M ²

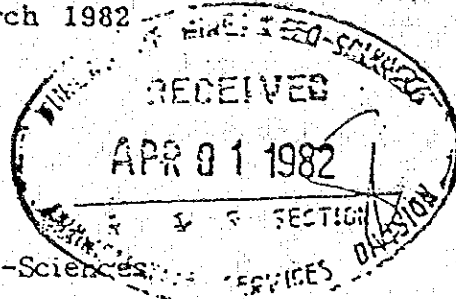
ANNEX IV



Republic of the Philippines

MINISTRY OF
NATURAL RESOURCES

25 March 1982



MEMORANDUM

TO : Juanito C. Fernandez
Director
Bureau of Mines and Geo-Sciences

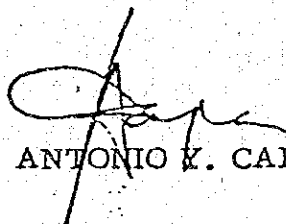
FROM : Antonio Y. Capay
Assistant Secretary

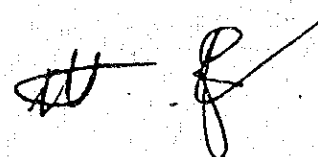
SUBJECT : Request for a Permanent Berthing Location
for the Geophysical/Geological Survey Vessel

Please be informed that the Philippine Fisheries Development Authority (PFDA) can accommodate the geophysical/geological survey vessel at its Navotas Fish Port and Fish Market (NFPFU) complex. Regular berthing space for the vessel will be designated accordingly, however, the party concerned should observe the payment of the corresponding fees as provided for in the harbor rules and regulation.

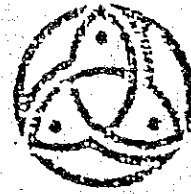
Attached is the Memorandum of Atty. Benito Q. Bengzon, General Manager of PFDA dated 17 March 1982 regarding this matter.

For your appropriate action.


ANTONIO Y. CAPAY



82-215



PHILIPPINE FISH
MARKETING AUTHORITY
7th & 8th Fl. PPSTA Bldg.
Beneke St., Quezon City
Metro Manila, Philippines
P.O. Box AC 610 Quezon City
Telephone Number 62-16-23

Republic of the Philippines
Ministry of Natural Resources

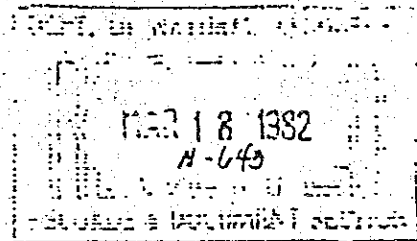
17 March 1982

MEMORANDUM

FOR : Antonio Y. Capay
Assistant Secretary
Ministry of Natural Resources

FROM : General Manager, PFDA

SUBJECT : Request for a Permanent Berthing Location for
the Geophysical/Geological Survey Vessel



In connection with your memorandum dated 09 March 1982, please be informed that the geophysical/geological survey vessel requested by the Philippine Government thru the Grant-in-Aid from the Government of Japan can be accommodated at the Navotas Fish Port and Fish Market (NFPFM) complex. A regular berthing space for the vessel will be designated accordingly. It is however, requested that the party concerned should observe the payment of the corresponding fees as provided for in our harbor rules and regulations.

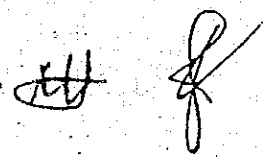
For your consideration.


BENITO BENGZON

PROPOSED PERSONNELS OF THE PROJECTA. Personnel of the Marine Mineral Resources Division, Bureau of Mines and Geo-Sciences who will be assigned to board the survey vessel on rotation basis and their qualifications

1. Carlos F. Teodoro — Chief, Marine Mineral Resources Division
B.S. Mining Engineering; Registered Geologist; Graduate Course in Geophysics (U.S.A.); Training in Geophysical Exploration (USGS), Interpretation of Aeromagnetic Data (Geological Survey of Federal Republic of Germany) and Interpretation of Geophysical Data (Society of Exploration Geophysics, Singapore); Participant in Remote Sensing Seminar (EROS Data Center, Sioux Falls, South Dakota, USA), Remote Sensing Workshop (USGS) and International conferences sponsored by CCOP and other UN agencies.
2. Salvador G. Martin — Supervising Geologist II
B.S. Geology; Research Fellow in Tectonics and Geodynamics of the Oceans (Universite de Bretagne Occidental, France); Diploma in Photogeology (ITC, Holland); Study Tour, Laboratory Facilities Serving the Offshore Industry (Norway).
3. Dominador A. Muriel — Supervising Geologist II
B.S. Mining Engineering; Registered Geologist, Post graduate training in Geology (Institute of Applied Geology, U.P.), Landsat Imagery Interpretation (EROS Data Center, Sioux Falls, South Dakota, USA) and Aeromagnetic Data Interpretation (GSJ, Japan).
4. Panfilo O. Montero — Supervising Geologist I
B.S. Mining Engineering; Registered Geologist; Post Graduate training in Geology (Institute of Applied Geology, U.P.); Diploma in Photogeology (ITC, Holland); Training in Landsat Imagery Interpretation (USGS, Flagstaff, Arizona, USA); Participant, Workshops/Seminars in Remote Sensing (Philippines, Thailand and Russia).
5. Angel A. Bravo — Supervising Geologist I
B.S. Geology, Post Graduate Training in Mineral Exploration (Japan) and in Quaternary Geology (Indonesia, sponsored by CCOP); Participant, Marine Seismic and Magnetic Survey in Leyte Gulf-Dinagat Sound (CCOP and BMG) and M.S. SONNE Mission in Sulu Sea of the Federal Institute for Geosciences and Natural Resources of the Federal Republic of Germany; Training in Basic FORTRAN Computer Programming (UP).

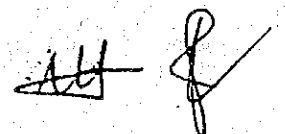
6. Leonardo Kalinisan - Sr. Mining Engineer
B.S. Mining Engineering; Training in Computer Programming and Aeromagnetic Data Interpretation (Japan); Post Graduate Training in Geophysics leading to Masters Degree (Australia).
7. Octavio C. Daclison - Sr. Geophysicist
B.S. Mining Engineering; Registered Geologist; Training in Mineral Exploration Employing Geochemical and Geophysical Techniques (Australia); Participant, Geological and Geophysical Offshore Prospecting on board Hakurei Maru including Data Analysis and Interpretation (Japan).
8. Edgardo V. Gonzales - Sr. Geologist
B.S. Geology; Participant, Group Training in Offshore Prospecting (Japan), Marine Seismic and Magnetic Survey in Leyte Gulf-Dinagat Sound (BMG, CCOP).
9. Neoman dela Cruz - Sr. Geologist
B.S. Mining Engineering; B.S. Geology; Participant, Group Training in Offshore Prospecting (Japan), Marine Seismic and Magnetic Survey in Leyte Gulf-Dinagat Sound (BMG-CCOP).
10. Jose R. Bustamante - Sr. Geologist
B.S. Geology; Participant, Group Training Course in Offshore Prospecting (Japan)
11. Eduardo R. Nuevo - Sr. Geologist
B.S. Geology, Post Graduate Studies in Marine Geology (Scripps Institution of Oceanography, USA); Participant, Marine Geological/Geophysical Survey in the Marianas on board the R/V Thomas Washington.
12. Macario del Rosario - Geophysicist
B.S. Mining Engineering; Basic FORTRAN Training (U.P.); Participant, Group Training Course in Offshore Prospecting (Japan), and Marine Seismic and Magnetic Survey in Leyte Gulf-Dinagat Sound (BMG-CCOP).
13. Alexander M. Lacanilao - Geophysicist
B.S. Mining Engineering; Research Fellow in Regional Tectonics in Southeast Asia Based on Aeromagnetic Data Processing and Interpretation.



14. Wilfredo T. Icaay - Geophysicist
B.S. Mining Engineering; Training in Basic FORTRAN Computer Programming (U.P.).
15. Reynaldo L. Villela - Geologist
B.S. Geology; Participant, Group Training Course in Offshore Prospecting (Japan); Training in Basic FORTRAN Computer Programming (U.P.).
16. Leonardo C. Madayag - Geologist
B.S. Geology; Participant, Workshop in Shallow Seismic Refraction Technique (CCOP) and in Marine Seismic and Magnetic Survey in Leyte Gulf-Dinagat Sound (BMG, CCOP).
17. Anselmo Abungan - Geologist
B.S. Geology; Training, Photointerpretation (U.P.); Training in Basic FORTRAN Computer Programming (U.P.).
18. Danilo M. Octaviano - Geologist
B.S. Geology; Participant, Marine Seismic and Magnetic Survey in Leyte Gulf-Dinagat Sound (BMG-CCOP).
19. Reuben M. Raval - Geologist
B.S. Geology, Participant, Marine Seismic and Magnetic Survey in Leyte Gulf-Dinagat Sound (BMG, CCOP).
20. Meliton delos Santos - Geologist
B.S. Geology
21. Cesar Cabrera - Geologist
B.S. Geology; Participant, Workshop in Remote Sensing (CCOP).
22. Gerardo G. Abarquez - Geologist
B.S. Geology
23. Eduardo Alforte - Geologist
B.S. Geology
24. Herminio G. Taquiqui - Geodetic Engineer
- Associate in Geodetic Engineering
25. Rodolfo A. Bautista - Computer II
3rd Year B.S. Civil Engineering; Training in Basic FORTRAN Computer Programming (UP).

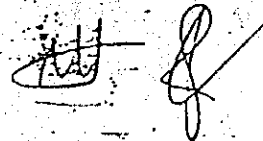
Alt

- 26. Honorio Cabanban - Electronic Technician
B.S. Electronic Engineering; Participant,
Marine Seismic and Magnetic Survey in
Leyte Gulf-Dinagat Sound (BMG, CCOP).
- 27. Enrico B. Zuño - Electronic Technician
Certificate in Electronics Technology
- 28. Saturnino Canangonan - Cartographer I
Architectural Drafting; 2nd year B.S.
Architecture
- 29. Arthur Cayananda - Cartographer I
Certificate in Drafting Technology
- 30. Razon Macabuhay - Geologic Aide
B.S. Geology
- 31. Godofredo Tolentino - Geologic Aide
- 32. Elner Amo - Geologic Aide
Private Pilot Certificate



B. The following members of the technical staff of the Geological Survey Division of the Bureau of Mines and Geo-Sciences and the Petrolaboratories donated by the Japanese Government will undertake paleontological, petrological, geochronological and paleomagnetic studies of samples.

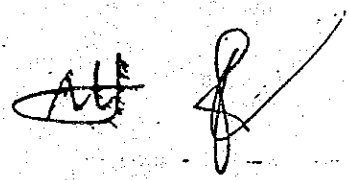
<u>Name</u>	<u>Qualification</u>	<u>Position</u>
1. Guillermo R. Balce	B.S. Geology, M.S. Geology D.Sc. Economic Geology (Japan)	Supv. Geologist II
2. George Bacuta	B.S. Geology, M.S. in Ophiolite Petrology	Supv. Geologist I
3. Lilian Rollan	B.S. Geology, Studying for M.S. Petrology (Australia)	Geologist
4. Maria Elveta C. Comsti	B.S. Geology M.S. Petrology (Australia)	Geologist
5. Cesar Samaniego	B.S. Geology Electron Probe Micro Analyzer Cepma Specialist	Geologist
6. Conrado Miranda	B.S. Geology Petrolab Specialist	Geologist
7. Catherine de Leon	B.S. Geology Training in Petrography (Germany)	Geologist
8. Olivia G. Bernardo	B.S. Geology Training in Petrology	Geologist
9. Asuncion Aguirre	B.S. Geology Training in Petrography	Geologist
10. Cynthia de Jesus	B.S. Geology Training in Petrography	Geologist
11. Belasanta Ferre	B.S. Geology	Geologist
12. Teofilo Abrasano, Jr.	B.S. Geology Studying: S.Sc. in Economic Geology	Geologist



13. Roberto Pabalan	B.S. Geology Pursuing D.Sc. in Economic Geology	Geologist
14. R.M. Samaniego	B.S. Zoology (UP)	Supervising Geologist (Paleontology)
15. Pacita P. David	B.S. Zoology (UP) Post Graduate in Vienna	Sr. Paleontologist
16. Paz D. Santiago	B.S. Zoology (UP)	Sr. Paleontologist
17. E.A. Espiritu	B.S. Zoology (UP)	
18. P.M. Alcantara	B.S. Geology (MIT) M.S. Geology Tsukuba, Japan	Sr. Geologist
19. E.A. Amiscaray	B.S. Geology (MIT)	Paleontologist
20. A. Y. Puzon	B.S. Geology (UP) Post graduate training in Germany	Paleontologist
21. F. P. Tumanda	B.S. Geology (UP)	Paleontologist
22. T. O. Maac	B.S. Geology (MIT)	Paleontologist
25. M. Agaler	B.S. Geology (MIT)	Paleontologist

C. The following members of the Metallurgical and Laboratory Services Division will undertake chemical analysis of samples and conduct metallurgical studies on the separation of the valuable minerals.

<u>Name</u>	<u>Qualification</u>	<u>Position</u>
1. Edwin B. Santelices	B.S. Met. Eng'g.	Metallurgist
2. Lolita G. Broces	B.S. Chemistry	Mineral Analyst
3. Edelmira T. Sanga	B.S. Chemistry	Chemist
4. Jose-P. Arzadon	4th Yr. Ind. Eng'g.	Chemical Lab. Aide
5. Barbara B.S. Ibon	Student B.S. Chemistry	Chemical Lab. Aide



D. The following officers and crew of the Bureau of Coast and Geodetic Survey will man the vessel:

Deck Officers

1. Captain - Ceferino Pascual, Captain B.S. Civil Engineer
2. Chief Mate- Renato B. Fier, Comdr. B.S. Electrical Eng'g
3. 2nd Mate- Jose Galo P. Isada, Jr. Lieut. B.S. Civil Eng'g.
4. 3rd Mate- Enrique A. Macaspac Lieut B.S. Civil Eng'g.
5. Chief Radio Operator - Basiliso Pebenito, Radio Operator graduate-course and radio technician

Engine Officers

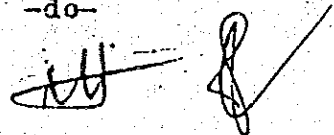
1. Chief Engr.- Feliciano Y. Aguirre B.S. Mechanical Eng'g.
2. 2nd Mar Engine- Jorge Caneto High School Graduate
3. 3rd Mar Engine- Rogelio Ocampo -do-
4. 3rd Mar Engine- Teodoro Vidallo -do-

Deck Crew

1. Chief Qm - Renato Pamating High School Graduate
2. Chief Bon - Eugenio Terencio -do-
3. Quarter Master- Rogelio Solis -do-
4. Seaman - Domingo Cortun -do-
5. Seaman - Apolonio Literano -do-

Engine Crew

1. Mar Engineman - Vicente Penado -do-
2. Mar Engineman - Armando Sayong -do-

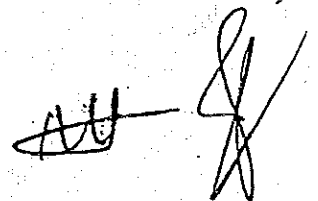


- 3. Mar Engineman - Antonio Pajarillaga High School graduate
- 4. Electrician -- Alvin Alim -do-
- 5. Machinist -- Ruben Denaga -do-

Steward

- 1. Chief Steward - Apolinar Donor -do-
- 2. Asst. Steward -- Rolando Indoc -do-

All the officers and crew have at least ten years experiences on board the survey vessels of the Bureau of Coast and Geodetic Survey. All the deck officers are Engineering degree holders. Some are graduates of Oceanography and Hydrography.



MINUTES OF DISCUSSION
ON
THE DRAFT REPORT OF THE BASIC DESIGN STUDY
ON THE CONSTRUCTION PROJECT OF OFFSHORE MINERAL
EXPLORATION VESSEL

The government of Japan has sent, through Japan International Cooperation Agency (JICA), a Basic Design Study Team to the Philippines from 8th to 14th, August 1982 for the purpose of submitting and explaining the Draft Report of Basic Design Study (Report) on the construction project of offshore mineral exploration vessel.

The team held meetings with the staff concerned of the Bureau of Mines and Geo-Sciences to explain and discuss the report. As a result of the discussion, both parties have agreed as follows:

1. The report principally satisfied the Philippine side.
2. Both parties confirmed each other on the following points:

1) Computer of Seismic Reflection System

One (1) computer system having dual functions of data acquisition and data processing shall be provided instead of two (2) computer systems, each having respective single function.

It is understood that for seismic data acquisition and data processing are not conducted simultaneously on board.

2) Survey Winch


One (1) sampling winch (up to 200 m depth) for handling core samplers with the same function and

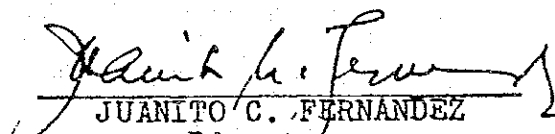
capacity (3,000 m x 9 m/m ϕ) of a hydrographic winch shall be provided in place of one (1) sampling winch (1,000 m x 9m/m ϕ) and one (1) hydrographic winch and davit (3,000 m x 3 m/m ϕ).

3. Following additional equipment and machines are necessary to be provided.

- 1) Lubricating Oil Purifier (1 set)
- 2) Inflatable Rubber Boat (1 set)
- 3) Lathe Machine (1 set)
- 4) Electric and Gas Welder (each 1 set)

August 13, 1982


KAICHIRO SHIMIZU
Team Leader
The Japanese Survey Team


JUANITO C. FERNANDEZ
Director
Bureau of Mines and Geo-Sciences



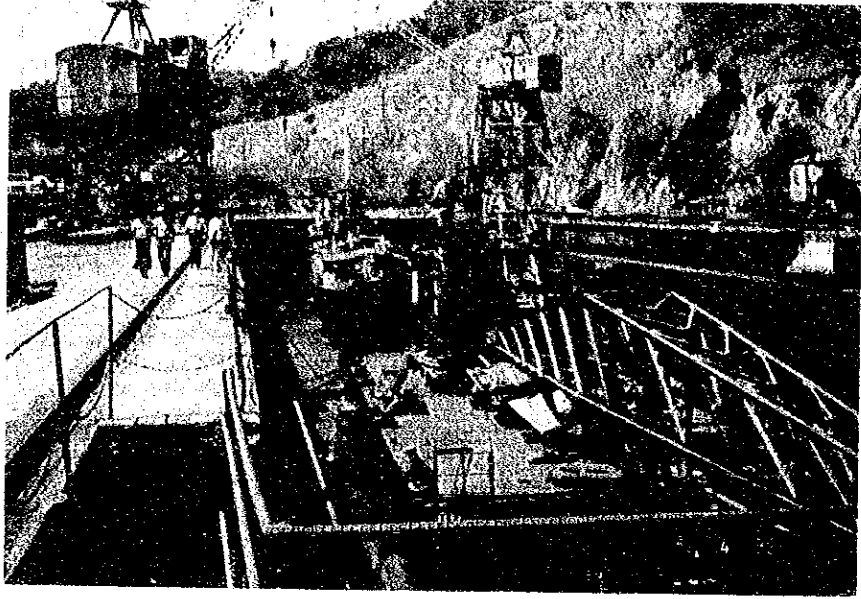
資料-5 参考写真



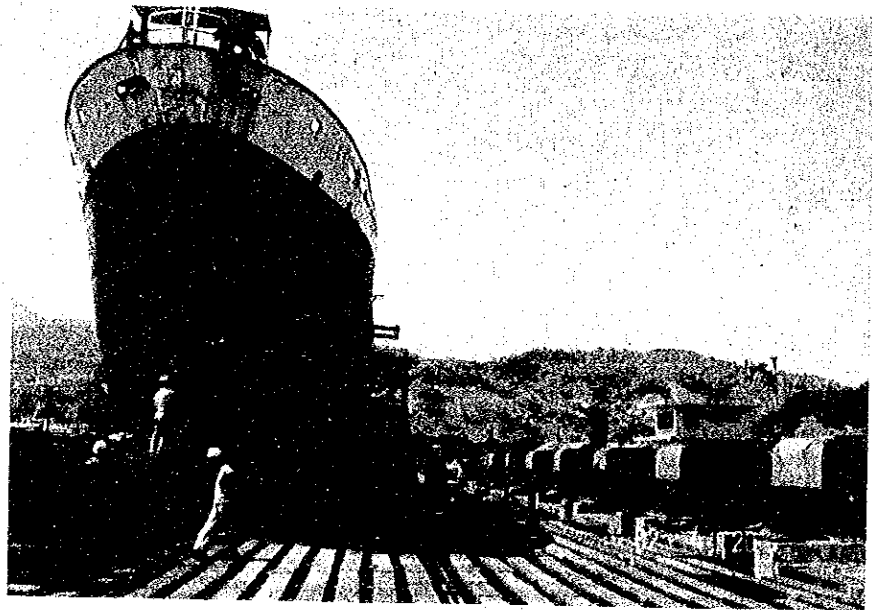
Navotas 漁港
No.3 Pier先端より基部を見る(探査船係留予定地)



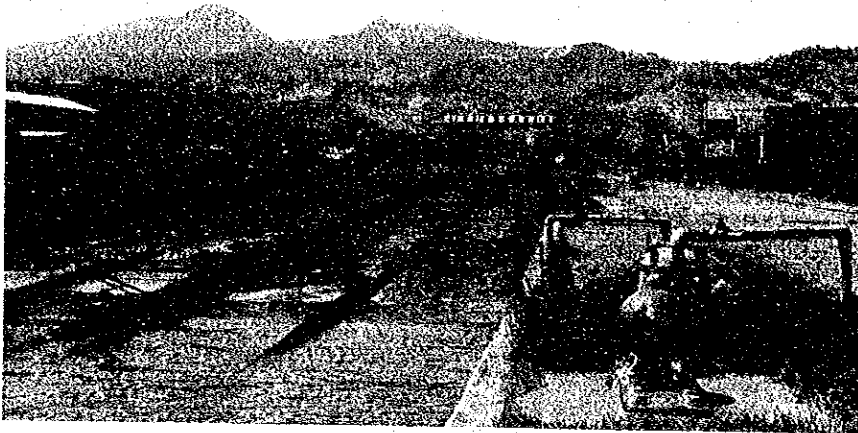
Pier基部商業地域予定地
(探査船用倉庫建設予定地)



グレーピング船渠



シンクロリフト船渠



曳き上げ船台



機械工場



