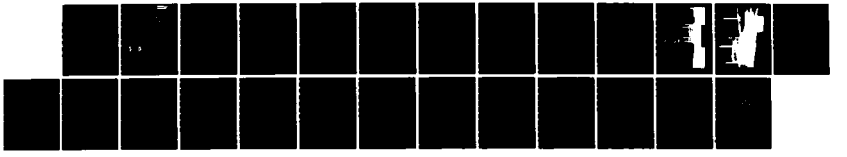
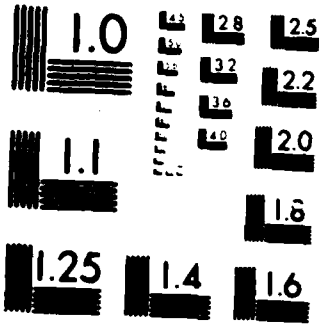
AD-A165 767 PROJECT METEOR VOLUME 1 EXECUTIVE SUMMARY(U) NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON DC CHESAPEAKE DIV C CHERN JUL 77 CHES/NAVFAC-FPO-1-7717-VOL-1 1/1

UNCLASSIFIED F/G 4/1 NL





MICROCOPY RESOLUTION TEST CHART

PROJECT METEOR

EXECUTIVE SUMMARY

FPO-1-77(17, VOL. I)
JUNE 1977

(Prepared for
Naval Research Laboratory Code 8322 B)

OCEAN ENGINEERING
AND CONSTRUCTION PROJECT OFFICE
CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON, D.C. 20374

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION
Unclassified

1b. RESTRICTIVE MARKINGS

2a. SECURITY CLASSIFICATION AUTHORITY

3. DISTRIBUTION AVAILABILITY OF REP.
Approved for public release; distribution is unlimited

2b. DECLASSIFICATION/DOWNGRADING SCHEDULE

4. PERFORMING ORGANIZATION REPORT NUMBER
FPO-1-77(17, Vol. I)

5. MONITORING ORGANIZATION REPORT #

6a. NAME OF PERFORM. ORG. 6b. OFFICE SYM
Ocean Engineering
& Construction
Project Office
CHESNAVFACENGCOM

7a. NAME OF MONITORING ORGANIZATION
Naval Research Laboratory
Code 8322 B

6c. ADDRESS (City, State, and Zip Code)
BLDG. 212, Washington Navy Yard
Washington, D.C. 20374-2121

7b. ADDRESS (City, State, and Zip)
Washington, D.C.

8a. NAME OF FUNDING ORG. 8b. OFFICE SYM

9. PROCUREMENT INSTRUMENT INDENT #

8c. ADDRESS (City, State & Zip)

10. SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT #	PROJECT #	TASK #	WORK UNIT ACCESS #

11. TITLE (Including Security Classification)
Project Meteor Executive Summary

12. PERSONAL AUTHOR(S)
C. Chern

13a. TYPE OF REPORT 13b. TIME COVERED FROM TO 14. DATE OF REP. (YYMMDD) 77-06 15. PAGES 16

16. SUPPLEMENTARY NOTATION

17. COSATI CODES

FIELD	GROUP	SUB-GROUP

18. SUBJECT TERMS (Continue on reverse if nec.)
Project Meteor,

19. ABSTRACT (Continue on reverse if necessary & identify by block number)
This volume summarizes the engineering service provided by the Ocean Engineering and Construction Project Office, Chesapeake Division, Naval Facilities Engineering Command to the Naval Research Laboratory, Code 8322B, for the Project METEOR. The main theme of the service is to utilize an (Con't)

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT
SAME AS RPT.

21. ABSTRACT SECURITY CLASSIFICATION

22a. NAME OF RESPONSIBLE INDIVIDUAL
Jacqueline B. Riley

22b. TELEPHONE
202-433-3881

22c. OFFICE SYMBOL

DD FORM 1473, 84MAR

SECURITY CLASSIFICATION OF THIS PAGE

BLOCK 19 (Con't)

existing jack-up barge, SIR ROBERT, for use as a meteorological measurement platform offshore of the northwestern corner of San Nicolas Island, California.

The engineering services include: (1) feasibility studies on the conversion of the SIR ROBERT to an offshore platform, and (2) a site survey at San Nicolas Island.

The feasibility studies developed two feasible concepts which could be achieved either (1) by means of anchor stabilization or gravity weight ballast system for converting the SIR ROBERT into a fixed offshore platform, or (2) by attaching rubber tire wheels to the hull of SIR ROBERT to convert it into an amphibious platform. Foundation analysis based on the assumption of favorable soil conditions from available literature suggested a stable foundation for a fixed gravity platform or a trafficable beach for a wheeled amphibious platform. The estimated project costs were $151,570 to $337,880 for a fixed platform and $275,610 for an amphibious platform. However, both concepts were considered strongly site dependent and each study required confirmation of assumed site conditions prior to proceed further into design.

A brief discussion on a third concept wherein the SIR ROBERT would move on site under its own power for meteorological measurements and would be moored inside a nearby cove for protective sheltering is also presented. The concept was not studied in detail due to schedule constraints.

A thorough site survey at San Nicolas Island was conducted in accordance with the project plan. Ten Navy organizations contributed their specialities and support to the survey efforts. The results of the survey concluded that the hostile offshore environment is unsafe for a fixed platform and that the weak trafficability gradient measurements of the sand beach were unsuitable for an amphibious platform. The northern region of the island's shoreline also possess neither a natural water channel nor a protective cove for the SIR ROBERT to operate in a mobile/jack-up mode.

A recommendation was made to the sponsor upon completion of the site survey that the engineering efforts on the use of the SIR ROBERT in Project METEOR be curtailed. Having participated in the site survey and seeing the hostility of the offshore environment relative to the SIR ROBERT, the sponsor concurred.

PROJECT METEOR

VOLUME I

EXECUTIVE SUMMARY

by C. Chern

July 1977

Approved by: S.C. Ling, Manager
Engineering Analysis
Branch

Approved by: C.E. BODEY, Dir.
Engr. & Design
Division

Ocean Engineering and Construction Project Office
Chesapeake Division
Naval Facilities Engineering Command
Washington, D.C. 20374

ABSTRACT

This volume summarizes the engineering service provided by the Ocean Engineering and Construction Project Office, Chesapeake Division, Naval Facilities Engineering Command to the Naval Research Laboratory, Code 8322B, for the Project METEOR. The main theme of the service is to utilize an existing jack-up barge, SIR ROBERT, for use as a meteorological measurement platform offshore of the northwestern corner of San Nicolas Island, California.

The engineering services include: (1) feasibility studies on the conversion of the SIR ROBERT to an offshore platform, and (2) a site survey at San Nicolas Island.

The feasibility studies developed two feasible concepts which could be achieved either (1) by means of anchor stabilization or gravity weight ballast system for converting the SIR ROBERT into a fixed offshore platform, or (2) by attaching rubber tire wheels to the hull of SIR ROBERT to convert it into an amphibious platform. Foundation analysis based on the assumption of favorable soil conditions from available literature suggested a stable foundation for a fixed gravity platform or a trafficable beach for a wheeled amphibious platform. The estimated project costs were $151,570 to $337,880 for a fixed platform and $275,610 for an amphibious platform. However, both concepts were considered strongly site dependent and each study required confirmation of assumed site conditons prior to

proceed further into design.

A brief discussion on a third concept wherein the SIR ROBERT would move on site under its own power for meteorological measurements and would be moored inside a nearby cove for protective sheltering is also presented. The concept was not studied in detail due to schedule constraints.

A thorough site survey at San Nicolas Island was conducted in accordance with the project plan. Ten Navy organizations contributed their specialities and support to the survey efforts. The results of the survey concluded that the hostile offshore environment is unsafe for a fixed platform and that the weak trafficability gradient measurements of the sand beach were unsuitable for an amphibious platform. The northern region of the island's shoreline also possesses neither a natural water channel nor a protective cove for the SIR ROBERT to operate in a mobile/jack-up mode.

A recommendation was made to the sponsor upon completion of the site survey that the engineering efforts on the use of the SIR ROBERT in Project METEOR be curtailed. Having participated in the site survey and seeing the hostility of the offshore environment relative to the SIR ROBERT, the sponsor concurred.

CONTENTS

FIGURES

1. INTRODUCTION

1.1 Background

Project METEOR is the code name for experiments that determine the behavior of a laser beam through the marine atmosphere. San Nicolas Island, off the California coast, was chosen as a project site because the atmosphere on the island's northwest coast exhibits minimal terrestial effects. Part of the project involved the installation of a jack-up research barge, with meteorological instrumentation attached, to gather data. Previously, such a barge, SIR ROBERT, had been used successfully in the Chesapeake Bay (see Fig. 1). The SIR ROBERT was shipped to the West Coast for the continuation of Project METEOR (see Fig. 2). The plan called for the installation of the SIR ROBERT offshore of the northwestern end of San Nicolas Island to provide a platform where meteorological measurements could be made, free from surf and island atmospheric effects. Six possible sites which are considered suitable for the meteorological measurements are shown by Roman numerals in Fig. 3. It is noted that site No. VI is located on shore and is not within the original scope of this study.

1.2 Tasking

The work reported hereinafter was accomplished by the Ocean Engineering and Construction Project Office (Code FPO-1), Chesapeake Division, Naval Facilities Engineering Command

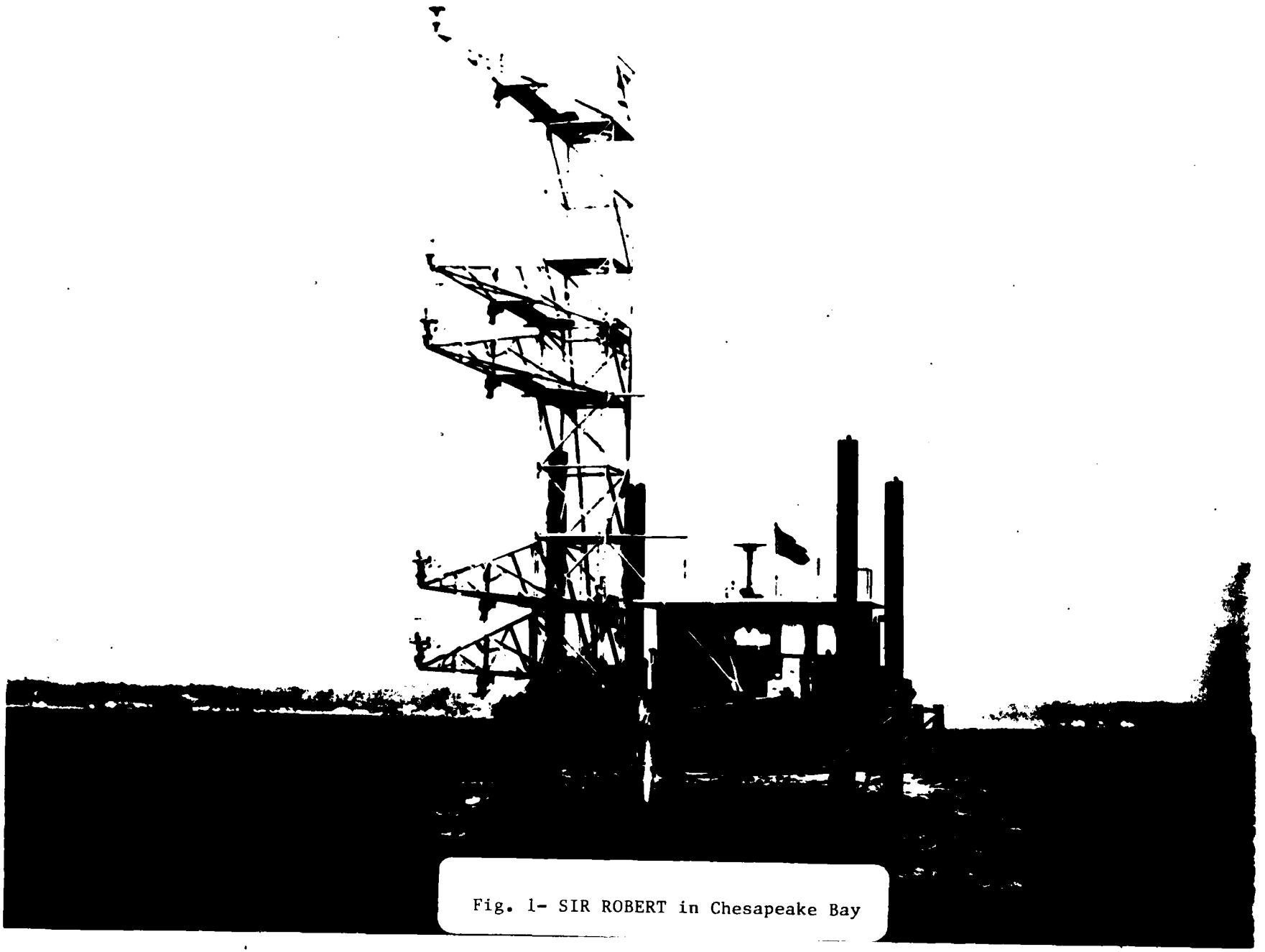


Fig. 1- SIR ROBERT in Chesapeake Bay

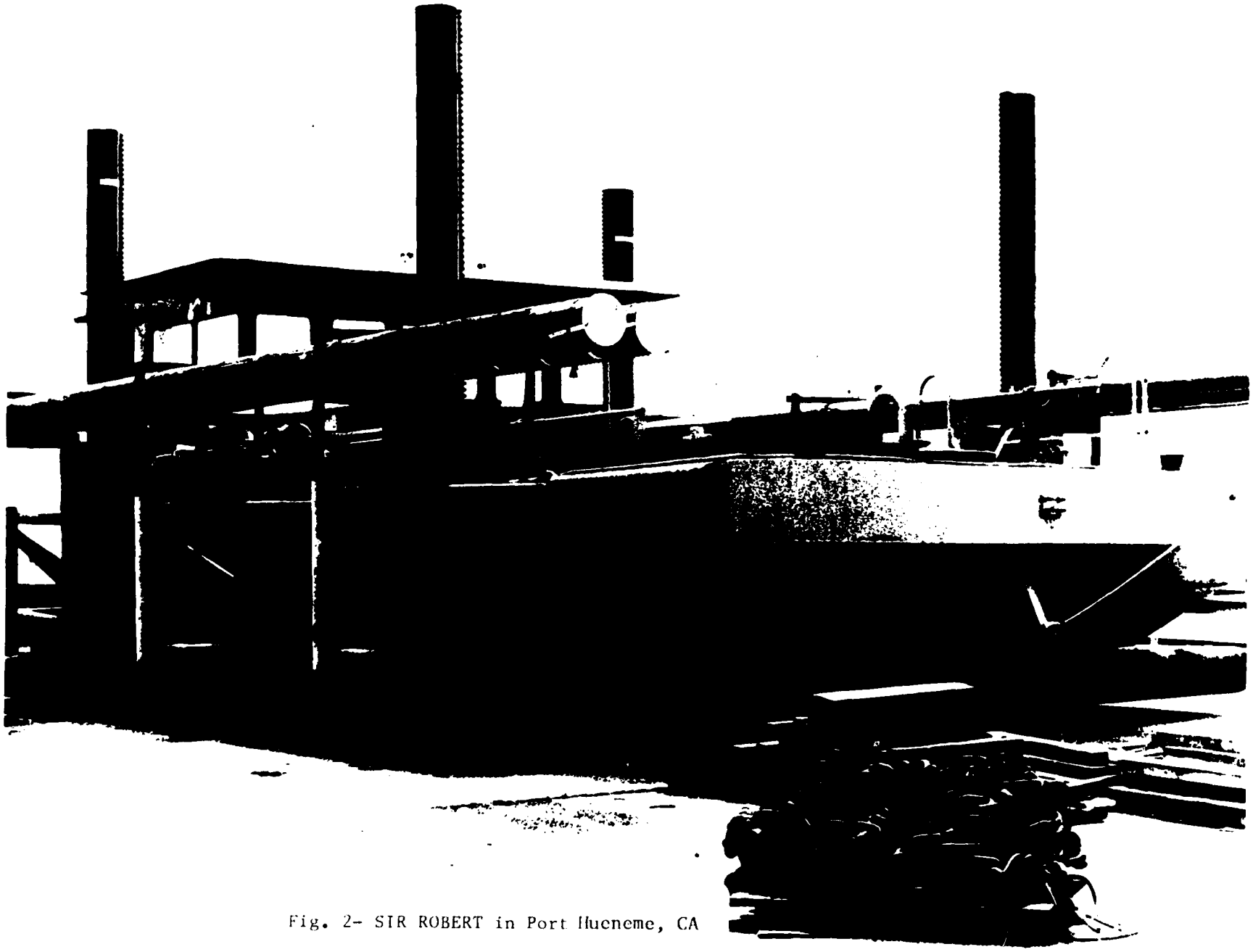


Fig. 2- SIR ROBERT in Port Hueneme, CA

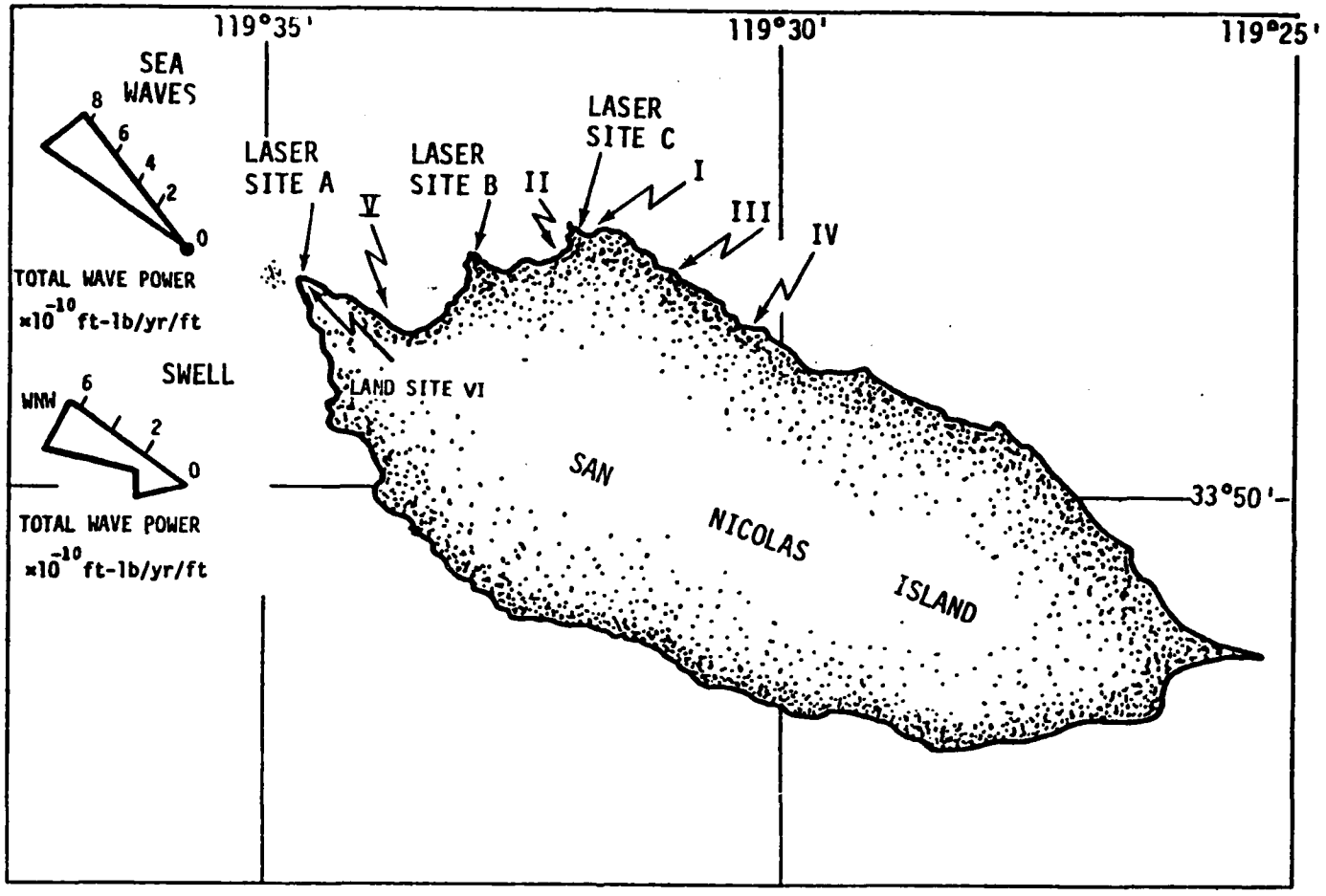


Fig. 3 Six Prospective Meteorological Tower Sites

(CHESNAVFACENGCOM) in response to the Work Request N00173-77-WR-70136 from the Naval Research Laboratory (NRL), Code 8322B, for engineering support to Project METEOR. The detailed Scope of Work from NRL is reproduced as an appendix to Part I in Volume II of this report.

1.3 Objective

The ultimate objective of the NRL tasking to FPO-1 was to utilize the existing jack-up barge, SIR ROBERT, for use in Project METEOR as an offshore platform for meteorological measurements.

2. ENGINEERING APPROACH

2.1 Introduction

The CHESNAVFACENGCOM support to Project METEOR proceeded simultaneously in two efforts. One of the area efforts included the feasibility studies on the conversion of the SIR ROBERT to an offshore platform for meteorological measurements. The other effort involved the organizing, coordinating, and conducting of the site survey.

The main purposes of the feasibility studies were to:

- modify the SIR ROBERT for use as an offshore platform
- establish a project schedule for completion within the spring-summer 1977 timeframe
- estimate the project cost
- find out the problem areas and the possible solutions

The objectives of the actual site survey were to:

- assess the environmental conditions at the primary siting areas to allow an engineering approach for the installation of the SIR ROBERT to be developed
- select a specific site for the installation of SIR ROBERT
- determine the environmental design criteria for the selected site.

Detailed descriptions of both activities are presented, respectively, in Volume II (Feasibility Studies on the Conversion of the SIR ROBERT to an Offshore Platform) and Volume III (Site Survey) of this report.

2.2 Feasibility Studies

The feasibility studies considered the conversion of the SIR ROBERT to an offshore platform. Efforts were directed towards the modification of the existing barge structure to either a fixed gravity platform or a wheeled amphibious platform. Both structural modification concepts were determined as feasible if all the assumptions on the environment were validated. Therefore, the workability of these two concepts are strongly site dependent. A third concept to operate the SIR ROBERT as it was and to move the barge inside a nearby cove for sheltering purposes was given a cursory consideration. The workability of the third concept depended on the finding of a natural navigation channel and a safe protective cove.

2.2.1 Fixed Gravity Platform

Two approaches to platform stabilization were studied. These were:

- CEL embedment anchor stabilization system (SYSTEM A)
- Gravity weight ballast stabilization system (SYSTEM B)

The estimated project cost was in the range of $212,940 to $337,880 for System A, and was $151,570 to $284,010 for System B.

System A was abandoned because (1) it showed a higher project cost and (2) it might encounter an objection in the environmental impact statement (EIS) from the State of California due to the use of explosives for anchor installation. The variation of the project cost in System B reflects the degree of the foundation work which may be required depending on site conditions. A firm flat base will require less amount of field work than a scourable undulating seafloor and hence the cost will be cheaper.

Based on the soil information provided by the sponsor, a foundation analysis was performed. The results of the analysis indicated the assumed sandy soils in the vicinity of the Thousand Springs Cove, San Nicolas Island, would support the SIR ROBERT. It is noted that the foundation analysis was based on the assumed favorable conditions, such as an internal friction angle of 30° for the sand. Actual test of soil samples may have deviated from this assumption. The foundation analysis and the estimated project cost would have been adjusted in accordance with the field conditions.

From the evaluation of the available wave data obtained in the vicinity of the Thousand Springs Cove in March 1977, a serious concern was raised on the safe operation of System B (see Project Chronology in the Appendix to this volume). This reemphasized the need for a site survey to determine the applicability of the System B concept.

2.2.2 Wheeled Amphibious Platform

An alternative method of utilizing the SIR ROBERT is to attach rubber tires to the barge structure. The converted SIR ROBERT would be rolled up and down the beach for offshore operation and would only operate in low sea conditions. Thus, the foundation problem and the platform safety relative to the extreme wave as described in the previous concept (System B above) will no longer exist.

Major items relative to the conversion of the SIR ROBERT to a wheeled amphibious platform involved the following:

- Design and fabrication of a supporting frame
- Acquisition of 8-36x41 48 ply tires
- Fabrication of rims and shafts for the wheels
- Design and installation of a launching system

The estimated project cost for this approach come to $275,610. The external power source to operate the launching system was not included in this estimated project cost. This concept depended strongly on the trafficability of the sands on the San Nicolas Island beaches.

2.2.3 Mobile/Jack-up Operation Mode

Under this concept, the SIR ROBERT would be jacked-up during meteorological measurements and would be moved under its own power to a sheltered cove or the lee side of San Nicolas Island for protective mooring when not making measurements. This concept depended totally on the feasibility of the near-shore environment of the island.

2.3 Site Survey

The purpose of the site survey at San Nicolas Island was to determine the best location for the installation of the research barge, SIR ROBERT, and quantify the associated environmental conditions for use in engineering design calculations. The chain of command and the organizations of the survey team are illustrated schematically in figure 4. It is seen that a total of ten Navy organizations contributed their specialities and supports to the survey activities.

Six prospective meteorological measurement tower sites were considered for the survey activities. The six prospective sites are indicated by Roman numerals in figure 3. It is noted that Site No. VI is a land site, not really within the scope of the FPO-1 engineering efforts.

The concepts considered for each of the prospective sites shown in figure 3 are as follows:

- Site No. I is for a fixed gravity platform (System B).
- Sites Nos. II and V are for a wheeled amphibious platform.
- Sites Nos. III and IV are for the mobile/jack-up operation mode.
- Site VI is an alternative land site if offshore sites prove to be unacceptable.

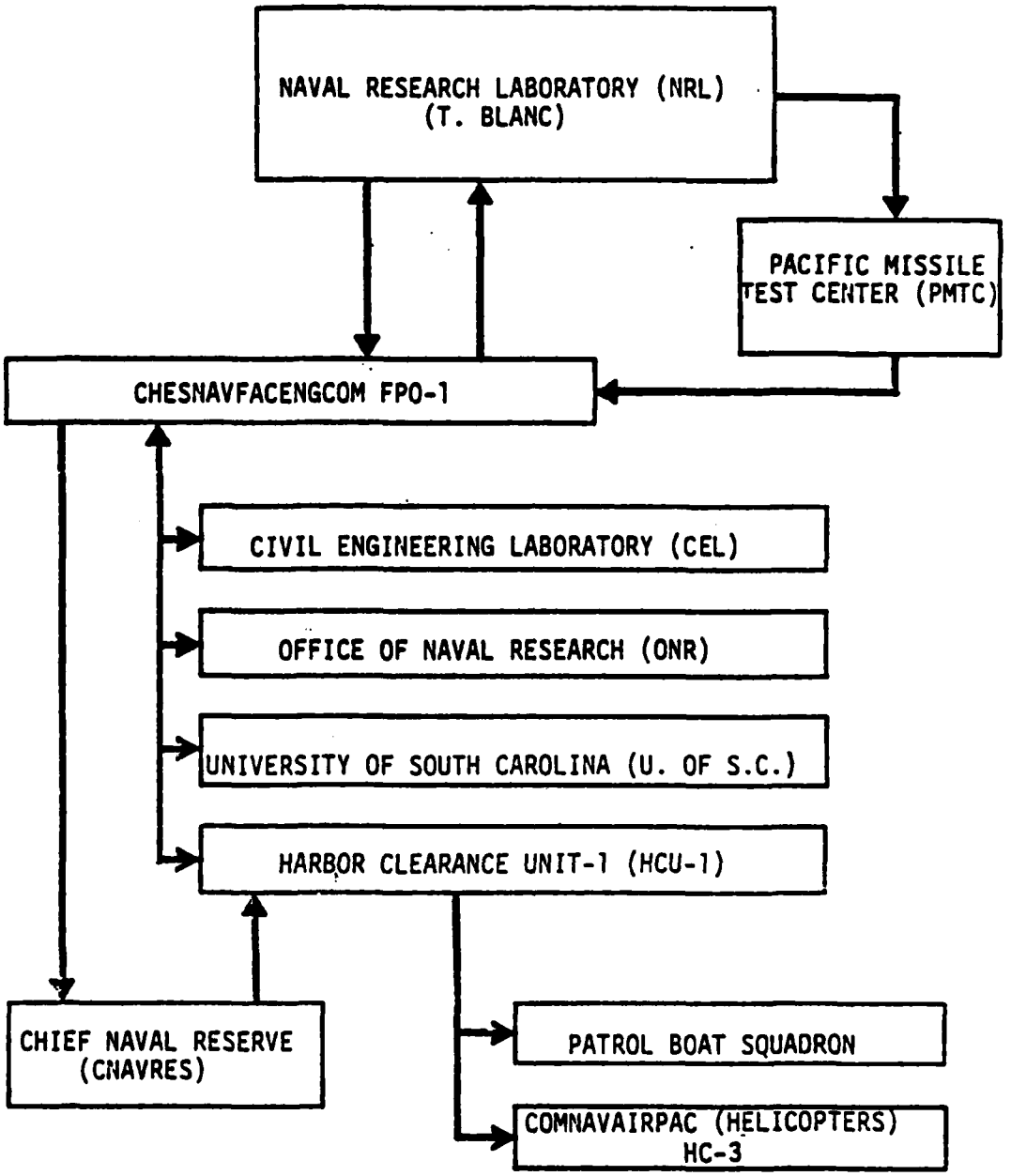


Figure 4.-Commands and Organizations Involved in the Site Survey

3. CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

- The results of the feasibility studies indicate that structural modifications of the SIR ROBERT to either a fixed gravity platform or a wheeled amphibious platform are feasible. The estimated project cost is in the range of $151,570 to $337,880 for a fixed gravity platform and is $275,600 for a wheeled amphibious platform. The operational viability of each concept and the variation of the project cost in both concepts are strongly site dependent. Therefore, a complete understanding of the site environment is a necessity for conducting further engineering service.

- The results of the thorough site survey conclude that the offshore environment of the northwestern corner of San Nicolas Island is too hostile to install the modified SIR ROBERT as a fixed gravity platform and that the cove penetration resistance gradient measurement (10 MN/m^3) for most of the beach areas is too low to operate the SIR ROBERT as an amphibious platform.

- A third concept of operating the SIR ROBERT in a mobile/jack-up mode is also unfeasible because the northern side of San Nicolas Island has strong longshore currents, and consequently, positioning and handling of the barge

in this area would be difficult. The coast in this region is extremely rocky and poses an additional hazard in the event of maneuvering crisis.

3.2 Recommendation for Action

A recommendation, which was made after the site survey and received concurrence by the sponsor, was that the plan of using the SIR ROBERT offshore of San Nicolas Island, California, for the Project METEOR be curtailed. The reason for the abandonment of the plan is that the site is not suitable for the use of the SIR ROBERT.

APPENDIX

PROJECT CHRONOLOGY

Date	Subject	Action
2/1/77	Project Kickoff Meeting	Mr. Blanc delivered scope of work (see Appendix in Part I of Volume II). FPO-1 starts feasibility study on using SIR ROBERT as fixed offshore platform.
3/8/77	Completion of Feasibility study on fixed offshore platform	FPO-1 provided report (Part I of Vol. II) and recommended performance site survey prior to design. Mr. Blanc agreed.
3/24/77	Discussion on the safety of fixed offshore platform	FPO-1 reported unfavorable environmental condition at San Nicolas Island. Mr. Blanc reaffirms the request for site survey.
3/25/77	Feasibility study on Amphibious Platform	Mr. Blanc requested go-ahead on feasibility study on using SIR ROBERT as amphibious offshore platform in parallel to site survey.
4/15/77	Site Survey Report (on site)	Mr. Blanc cancels the use of SIR ROBERT based on results of site survey.

Comments

1. In Part I of Volume II and during the 3/8/77 meeting, it was emphasized that any concept would be very susceptible to site condition and detailed design effort should be limited until after completion of the site survey. Due to scheduling of appropriate participants and logistics associated with mounting

the site survey, the field survey activities did not take place until April 14, 1977. However, due to the tight Project METEOR schedule, Mr. Blanc gave the go-ahead to perform the feasibility study on converting SIR ROBERT to an amphibious platform in parallel with the site effort. The report on this study is included herein.

2. During the on-site survey at San Nicolas Island, Mr. Blanc decided to abandon the effort of using SIR ROBERT in Project METEOR.

END
FILMED
4-86
DTIC