AD-A051 390 COAST GUARD RESEARCH AND DEVELOPMENT CENTER GROTON CONN F/G 13/10
CUTTER RESOURCE EFFECTIVENESS EVALUATION MODEL. EXECUTIVE SUMMA--ETC(U)
JUN 77 A PASSERA, D S PRERAU, C W PRITCHETT

UNCLASSIFIED CGR/DC-14/77 USCG-D-44-77 NL

| OF |

AD
A051 390

END
DATE
FILMED
4-78
DDC

REPORT NO. CG-D-44-77

CUTTER RESOURCE EFFECTIVENESS EVALUATION MODEL
EXECUTIVE SUMMARY

C. W. Pritchett and F. M. Hamilton
USCG Research and Development Center
Avery Point, Groton, CT 06340
and
A. Passera and D. S. Prerau
Transportation Systems Center
Kendall Square, Cambridge, MA 02142

June 1977

FINAL REPORT

Document is available to the U. S. public through the
National Technical Information Service,
Springfield, Virginia 22161

Prepared for

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD
OFFICE OF OPERATIONS
Washington, D.C. 20590

NOTICE

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

The United States Government does not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

The contents of this report reflect the views of the Coast Guard Research and Development Center, which is responsible for the facts and accuracy of data presented. This report does not constitute a standard, specification or regulation.

D. L. Birkimer

DONALD L. BIRKIMER, Ph.D., P.E.
Technical Director
U.S. Coast Guard Research and Development Center
Avery Point, Groton, Connecticut 06340

(19)

Technical Report Documentation Page

1. Report No. (18) USCG-D-44-77

2. Government Accession No.

3. Recipient's Catalog No.

4. Title and Subtitle (6)
CUTTER RESOURCE EFFECTIVENESS EVALUATION MODEL. EXECUTIVE SUMMARY.

5. Report Date (11) June 1977

6. Performing Organization Code

7. Author(s) (10) A./Passera, D. S./Prerau, C. W./Pritchett and F. M./Hamilton

8. Performing Organization Report No. (14) CGR/DC-14/77

9. Performing Organization Name and Address
USCG R&D Center
Avery Point
Groton, CT 06340

Transportation Systems Center
Kendall Square
Cambridge, MA 02142

10. Work Unit No. (TRAIS)

11. Contract or Grant No.
None

12. Sponsoring Agency Name and Address
Department of Transportation
U.S. Coast Guard
Office of Operations
Washington, DC 20590

(12) 25p.

13. Type of Report and Period Covered (9)
FINAL REPORT,
June 1975 - 1977

14. Sponsoring Agency Code
Jun

15. Supplementary Notes
This report summarizes a series of reports which document the Cutter Resource Effectiveness Evaluation Project at the CG R&D Center and Transportation Systems Center.

16. Abstract
This report provides a concise overview of the Cutter Resource Effectiveness Evaluation Model which evaluates the performance of HPWC and conventional craft in Coast Guard missions. The background of the project is briefly discussed to provide an historical perspective of the CREE Model. An overview of the technical aspects of the model is presented. Appendices contain sample results to illustrate the technical aspects.

A

17. Key Words
advanced marine vehicles, watercraft assessment, evaluation, mission analysis, operations analysis, modeling

18. Distribution Statement
Document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	25	

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

408 730 1B

METRIC CONVERSION FACTORS

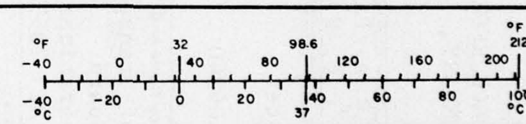
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



PREFACE

This volume is one of a series which collectively documents the Cutter Resource Effectiveness Evaluation Project. The complete documentation includes the following:

- Executive Summary
- Volume I: Analysis and Synthesis of Coast Guard Programs
- Volume II: The Evaluation of Craft Performance in Coast Guard Programs
- Volume III: Utilization of the Cutter Resource Effectiveness Evaluation Model
- Users/Programmers Guide to the Cutter Resource Effectiveness Evaluation Computer Program

The study was requested in August 1974 by the Office of Operations and until August 1975 was directed by CAPT C. L. BLAHA, Chief, Plans and Programs Staff. Subsequent efforts have been directed by CAPT P. M. JACOBSEN, Chief, Plans and Programs Staff. The initial Project Monitor in G-OP staff was Mr. P. J. D'ZMURA. Since October 1975, LCDR B. C. MILLER of the G-OP staff has been Project Monitor. The Project Office in G-DOE-2 has been CDR A. TURNER.

This study was conducted by the Coast Guard Research and Development Center, Groton, Connecticut, with technical assistance from the Department of Transportation's research and development activity, Transportation Systems Center, Cambridge, Massachusetts. The full-time study team members were:

LCDR F. M. HAMILTON (R&DC)	MR. A. PASSERA (TSC)
MR. C. W. PRITCHETT (R&DC)	DR. D. S. PRERAU (TSC)

Additional assistance was provided by the following:

CWO H. HUDGINS (R&DC)	FI1 R. YOUNG (R&DC)
MR. H. GREEN (R&DC)	MS. L. KOSTRICH (TSC)
MR. K. MURPHY (TSC)	MS. M. E. MAHONEY (R&DC)
MR. J. GARLITZ (TSC & IOCS, Inc.)	MS. I. LARROW (R&DC)
MS. J. COLLIER (TSC)	Cadet 1/C G. McGARVA
MS. P. CONCANNON (TSC)	MS. S. KEAVENY (R&DC)
MS. R. CHIN (TSC)	

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

Preceding Page Blank - Fi

1.0 BACKGROUND

The Cutter Resource Effectiveness Evaluation Project was initially concerned with the rather well-defined objective of determining the type of craft which should replace the aging WPB fleet, with an emphasis upon using HPWC (High Performance Watercraft) in the mix of craft selected to replace the patrol boats. Later, the Office of Operations redirected the "WPB Replacement Project" to include a much broader consideration of HPWC to determine the potential for utilization of HPWC in all Coast Guard missions. The thesis for this redirection and expansion in the study was that HPWC could improve Coast Guard mission performance in some areas, yet would be less effective than conventional craft in other areas. Later, after considerable problem definition, a project title change, and planning by personnel in both the Office of Operations and the Office of Research and Development, an approach to the investigation of the suitability of HPWC in Coast Guard missions was developed and a Specific Administrative/Planning Requirement for the project was issued by the Office of Operations in January 1976.

2.0 CREE PROJECT OBJECTIVES

The Specific Administrative/Planning Requirement contained the following objectives:

a. To determine the mission-related capabilities, limitations, and operational and support requirements of high performance watercraft and of conventional Coast Guard vessels (with and without aircraft), present and future.

b. To develop a method which provides a quantitative description of the costs and effectiveness of HPWC and conventional vessels and which presents a quantitative evaluation of the craft considered in task, program and multi-program mission performance, singly, comparatively and within a mix of resources.

c. As an end product, to provide the Office of Operations with a theoretical model, implementing computer programs, and documentation which satisfy the above objectives, with sufficient flexibility so that the user may tailor the computational procedures to his operational or analytical requirements.

As discussed more fully in the next section, the CREE Model is composed of three major elements entitled *Concepts of Operations*, *Craft/Task Evaluations*, and *Scenario Calculations*. The first element is where the user sets up his problem by defining the operational requirements, selects the resources for evaluation and develops his scenario for use in the evaluation. The second and third elements are those areas where the mission-related capabilities and limitations of HPWC and conventional Coast Guard vessels are determined, and where the quantitative effectiveness evaluations of craft performance are made. The project has been closely monitored by the Operations Planning Staff insuring that, among other things, sufficient flexibility exists in the model for a user to tailor the computational procedures to his specific requirements.

Although the outputted craft capabilities and limitations, and the effectiveness evaluations are highly sensitive to the user-specified operational requirements (e.g., expected sea state, geographic distances, and anticipated workload), the CREE Model does not address support requirements as desired by the SOR objective (a). Nor does the model address costing as requested by the SOR objective (b). Including support requirements was considered in one way as having too small an effect on the effectiveness evaluations in comparison with the operational requirements, and in another way, too complex an issue to incorporate into the methodology which was fairly well developed when the SOR was issued. The incorporation of costing on the other hand, although desirable, was agreed to be less valuable than originally envisioned and, therefore, given a rather low priority with respect to other items arising subsequent to the issuing of the SOR, namely, some major refinements to make the results of the model more realistic.

In addition to the model not addressing support requirements and costing, the model does not fully tackle the problem of multi-unit operation. Basically, the model is designed for single-unit evaluation and any multi-unit operations must be considered external to the computerized model using a series of single-unit runs. Furthermore, at the present time, considerations of aircraft operating from and with surface vessels has yet to be programmed although the methodology has been developed. Present planning envisions delivery of two versions of the CREE model; one version, formally documented, will be strictly single-unit; the second version, informally documented, will be a modified single-unit computer program that incorporates a limited aircraft capability to provide some multi-unit evaluation capability.

The primary reason a more complete multi-unit capability has not been incorporated into the CREE Model, is that the complexity of the methodology is orders of magnitude greater than the quantification of single-craft effectiveness. In addition, there is some question as to whether the approach taken in the CREE Model (probabilistic) would be acceptable for force mix analysis. Perhaps a simulation-type model would be more appropriate. In any case, further definition of the force mix analysis problem is in order, prior to any continued effort at modeling in this area. It is expected that user experience with both versions of the CREE Model by the Office of Operations will provide more insight into what should be undertaken in future efforts at multi-unit modeling.

3.0 TECHNICAL ASPECTS OF THE CREE MODEL

The Cutter Resource Effectiveness Evaluation Model is presently made up of three major elements as shown in Figure 3-1 and listed as follows:

a. Concepts of Operations

b. Craft/Task Evaluations

c. Scenario Calculations

Broadly speaking, the Concepts of Operations element is concerned with modeling the job to be performed and the method of craft deployment. This is where the operational requirements are specified, various craft and suitable methods of deployment are chosen, and task-oriented scenarios are constructed. Concepts of Operations is the starting point for use of the CREE Model and has been organized in such a fashion that the user has great flexibility in choice of requirements, selection of craft and construction of scenarios. Figure 3-2 illustrates the information flow from Concepts of Operations to other portions of the CREE Model.

The Craft/Task Evaluation element of the CREE Model consists of three sections that eventually provide a numerical evaluation of craft performance of a task. The first section, called Craft Characteristics (CHAR), takes the craft concept specified in the Concept of Operations and determines typical detailed characteristics of that craft. The second section, called Parameter (PARAM), uses these Craft Characteristics coupled with various operational requirements from the Concept of Operations, and calculates dimensionless numerical values (parameters) indicative of the craft's performance in a variety of areas, such as maneuverability at various operational speeds, towing ability, and seakindliness, to cite a few. These Parameters form the input for the third section, called Task Probability of Success (TPOS), which calculates craft performance of a task. The outputs of the Craft/Task Evaluations element are numerical values indicative of how a given craft performs the given tasks with the specified operational requirements. Figure 3-3 illustrates the organization of Craft/Task Evaluations.

The Scenario Calculations element addresses the performance of craft in a larger arena - that of complete sorties or missions, in either single or multi-program scenarios. Because scenarios are made up of tasks, like search, tow, board or transit, and since craft performance of tasks is quantified in the Craft/Task Effectiveness output, the Scenario Calculations element utilizes this output as shown in Figure 3-1. In addition to these values, the frequency of task occurrence is also considered in evaluating overall craft performance in the scenario. The calculations incorporating the Task POS, and the frequency of task occurrence are accomplished by the Program Probability of Success (PROPOS) element of the CREE computer program, which has as its output, values for craft mission effectiveness for the specified operational requirements.

Appendix B contains sample problem computer output of the CREE Model for a sample ELT problem.

OVERVIEW OF CUTTER RESOURCE EFFECTIVENESS EVALUATION MODEL

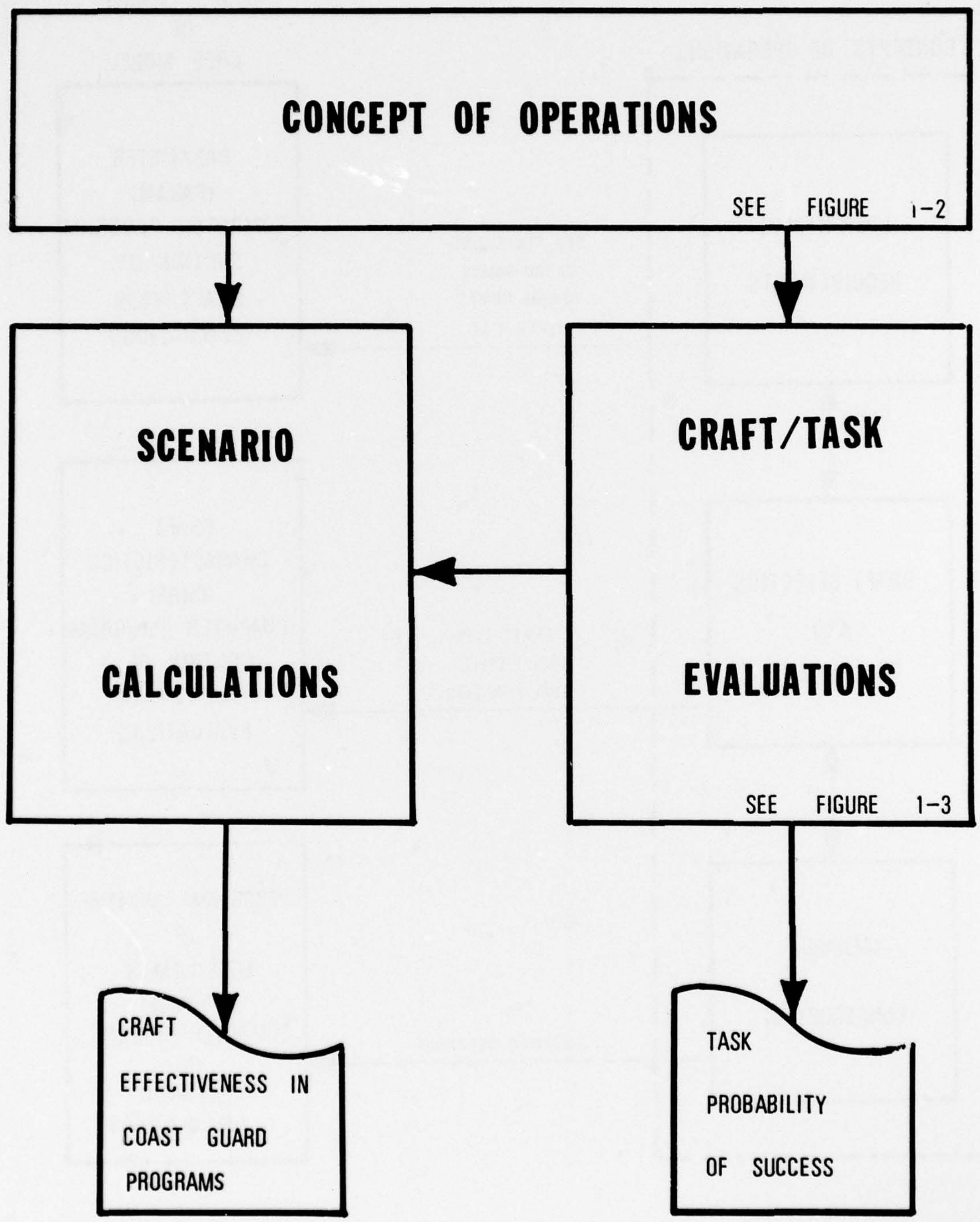


FIGURE 3-1

CONCEPT OF OPERATIONS

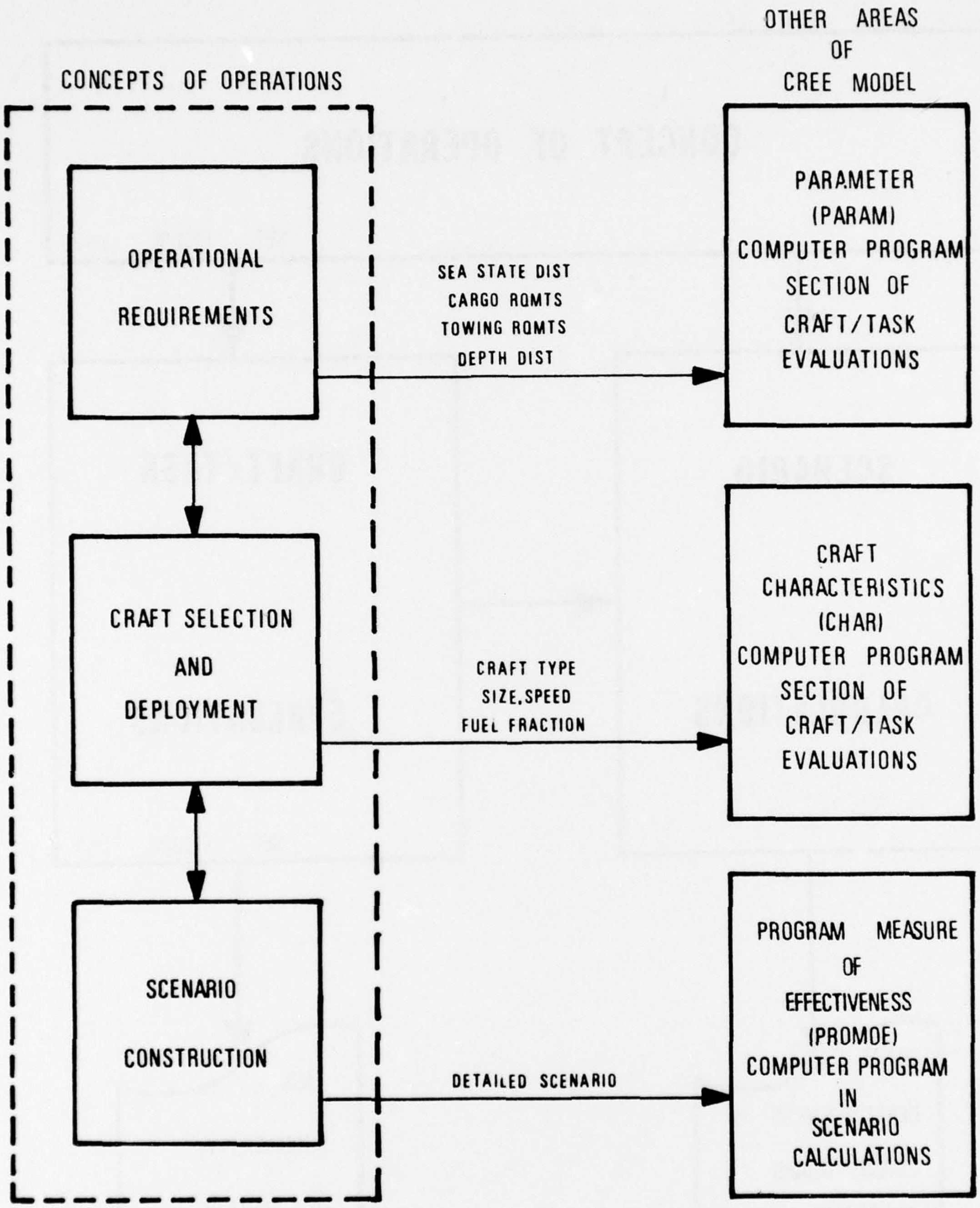


FIGURE 3-2

CRAFT/TASK EVALUATIONS

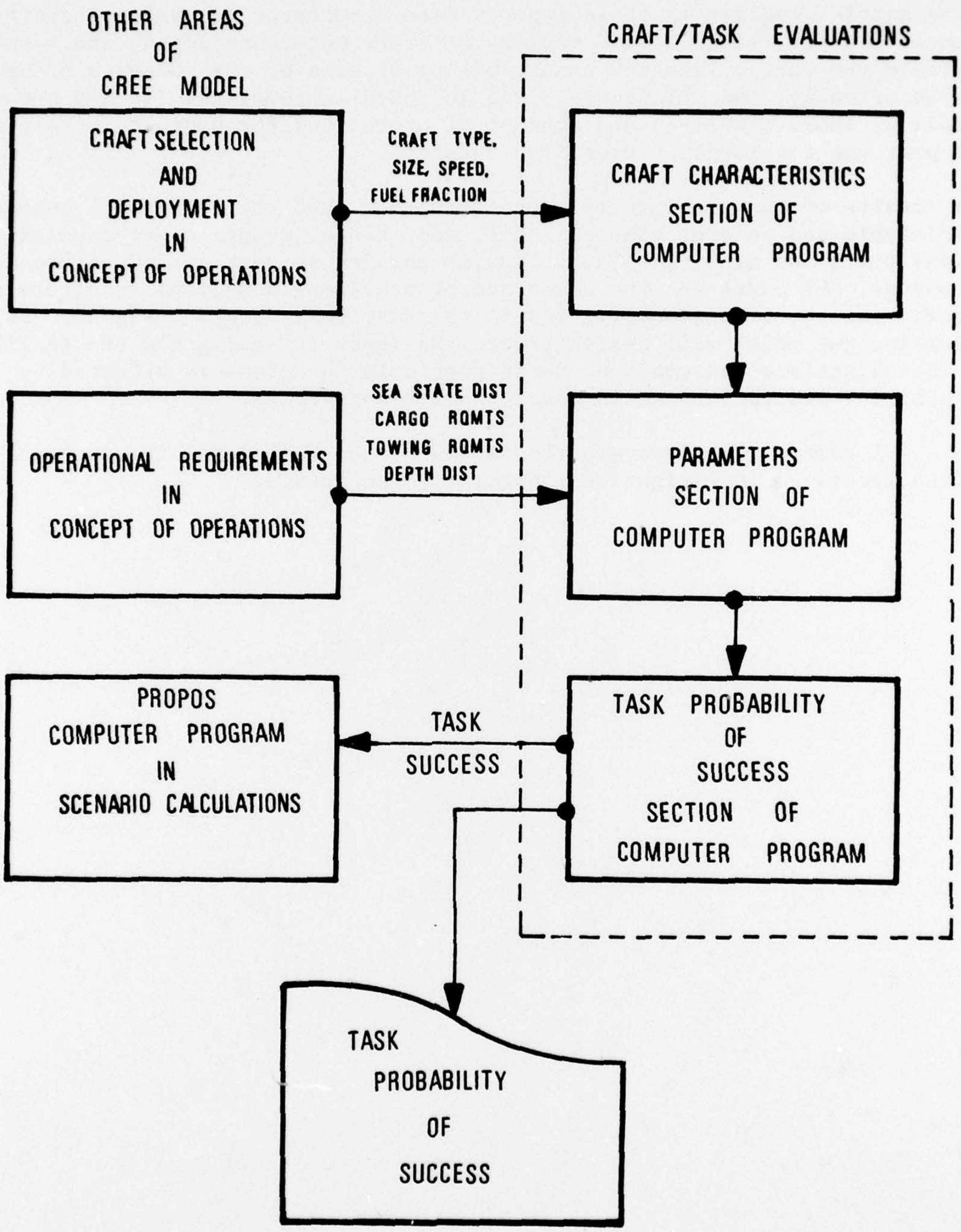


FIGURE 3-3

4.0 APPLICATION OF THE CREE MODEL

The CREE Model can be used to evaluate either craft performance in a fixed scenario, or the suitability of a concept of operations with a given craft. The choice is dependent upon the desires of the user. The procedure followed for either case only depends upon which variables remain fixed in a series of model runs. The sample problems in these reports were structured to evaluate craft performance; however, since a wide variety of craft were considered, the results do illustrate the suitability and unsuitability of some of the concepts of operations. Specifically, the ELT Sample Scenario, used in these reports and shown in Appendix A, shows a well-chosen concept of operations for hydrofoil craft but a rather poor one for larger conventional vessels.

The results of the preliminary exercising show that the CREE Model behaves in a predictable and understandable manner, and, hence, should prove invaluable for various craft and mission-related studies and investigations. On a broader scale, however, the model has the advantage of providing a unified structure and organization for the diverse activities in the many Coast Guard missions. Using and exercising the model will assist Program Managers in seeing how the realization of the objectives and goals of their particular programs is affected by craft capability and variations in operational requirements.

Table 4-1 summarizes the evaluation steps of the CREE Model illustrating the various levels of investigations that may be performed.

TABLE 4-1

SUMMARY OF CREE MODEL EVALUATION STEPS

LEVEL OF EVALUATION	INPUT TO EVALUATION	EVALUATION CRITERIA	LOCATION IN MODEL OUTPUT
CRAFT	Craft Type Craft Size Craft Speed Fuel Fraction	Craft Characteristics	Craft Characteristics Output Page
TASK	Craft Characteristics and Operational Requirements and Tasks	Parameters	Parameter Output Page
		Task Probabilities of Success	Task POS Output Page
SORTIE	Above	Task Probability of Success Task Time Task Fuel	Sortie Output Page
SCENARIO	and	Sortie Probability of Success Sortie Frequency of Occurrence Sortie Time & Fuel	Sortie Output Page (Table 4-2) - Volume II - Sortie Summary Page
	Scenario	% Scenario Completed Probability of Successfully Completing Scenario Average Sortie Composition and Average Time & Fuel	Scenario Overall Results Page
	Above and User Chosen Tasks and Time Frame	Important Tasks Completed in <u>X</u> Days of Operation	Scenario Evaluation Page

5.0 CONTENTS OF THE STUDY DOCUMENTATION

The theoretical aspects of the CREE Project are documented in the following volumes:

(a) "Executive Summary" is a concise overview of the CREE Project.

(b) Volume I - "Analysis and Synthesis of Coast Guard Programs" addresses the analysis of the Coast Guard Programs and the logic of the structured synthesis necessary to obtain useable scenarios. Volume I describes the modeling procedure followed and contains the detailed information necessary to construct scenarios. A simple scenario is presented as an example.

(c) Volume II - "Evaluation of Craft Performance in Coast Guard Programs" explains and documents the computer program that provides the typical characteristics and capabilities of the various types of HPWC, conventional, and Coast Guard vessels. It describes the logic and presents the procedure for developing Task Probabilities of Success and other quality indicators; and this volume details the computational procedures that are utilized to obtain figure-of-merit values, or effectiveness values for vessel performance in single or multi-program scenarios.

(d) Volume III - "Utilization of the Cutter Resource Effectiveness Evaluation Model" contains various craft evaluations in sample scenarios to illustrate the application and sensitivity of the CREE model.

(e) "User's Manual" contains detailed programmer documentation regarding the content, format and procedures utilized in the CREE Model computer programs.

APPENDIX A

SAMPLE ELT SCENARIO

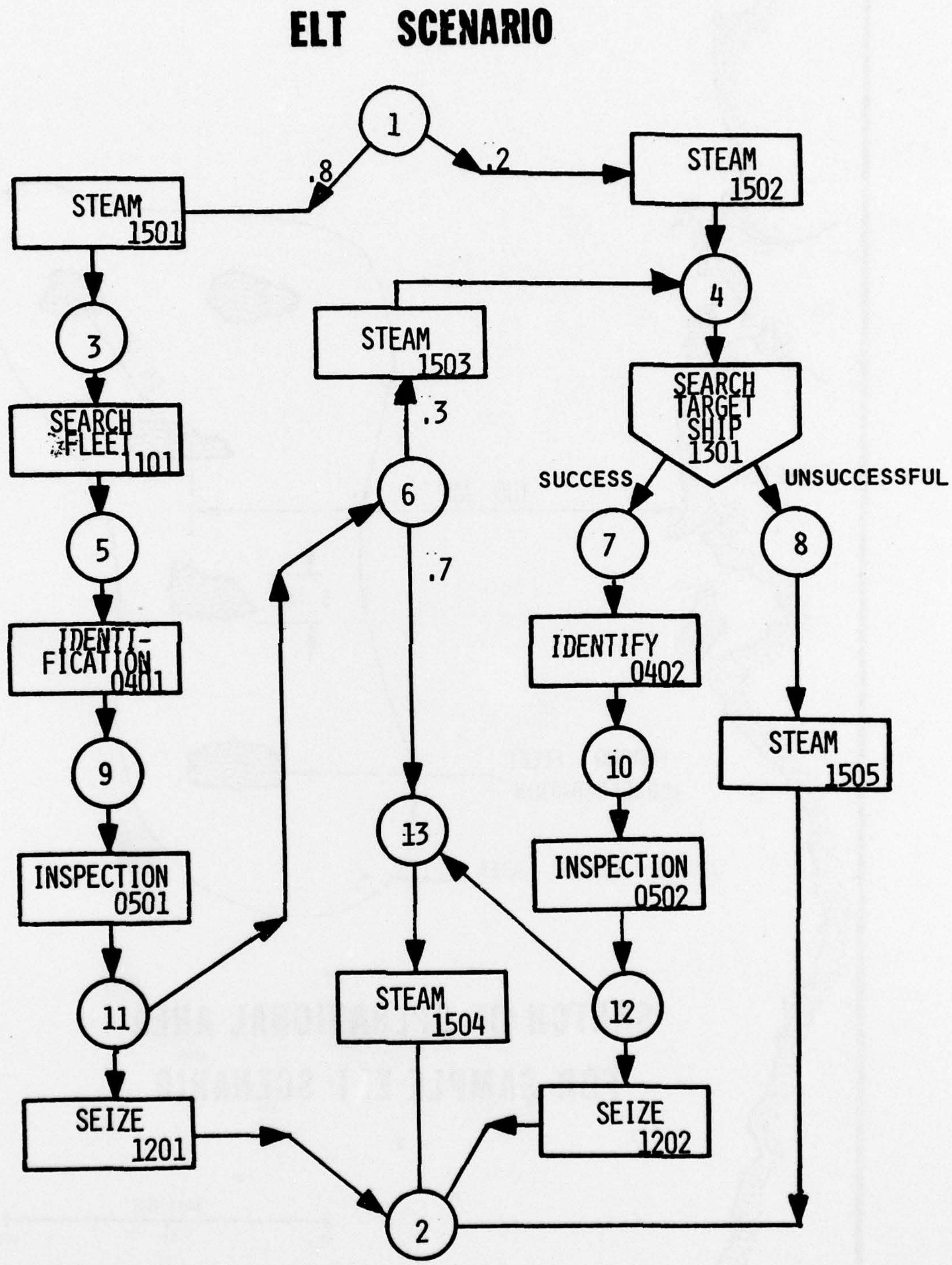


FIGURE A-1

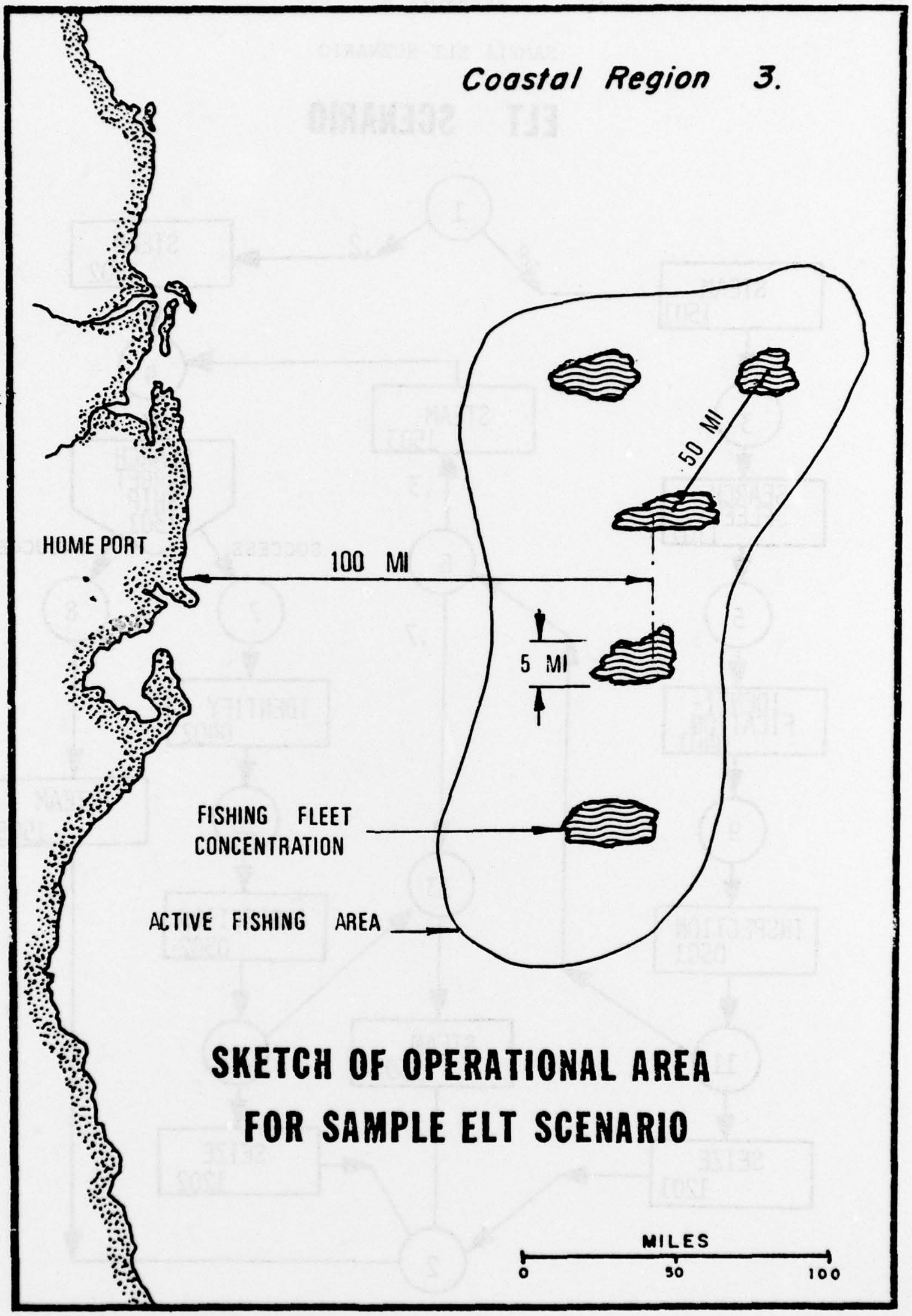

Coastal Region 3.
50 MI
HOME PORT
100 MI
5 MI
FISHING FLEET
CONCENTRATION
ACTIVE FISHING AREA
SKETCH OF OPERATIONAL AREA
FOR SAMPLE ELT SCENARIO
MILES
0
50
100

FIGURE A-2

APPENDIX B

SAMPLE CREE COMPUTER PROGRAM OUTPUT

C R A F T   C H A R A C T E R I S T I C S

CRAFT TYPE	PLANING CRAFT
DISPLACEMENT	96 TONS
LENGTH	100 FEET
DESIGN SPEED	40 KNOTS
FUEL FRACTION	0.50

LENGTH	100.0	FEET
BEAM	18.2	FEET
DRAFT	6.0	FEET
LENGTH/BEAM RATIO	5.50	
DRAFT/LENGTH RATIO	0.06	
DISPLACEMENT	95.5	TONS
SURVIVABILITY	5	SEA STATE
TOWS VESSELS UP TO	941.	TONS
USEABLE DECK AREA	455.	SQUARE FEET
CARGO CAPACITY	21.3	TONS
FUEL CAPACITY	21.3	TONS
USEFUL PAYLOAD	42.7	TONS
INSTALLED POWER	6182.	HORSEPOWER
POWER TO WEIGHT	64.7	HP/TON
TRANSPORT EFFICIENCY	1.62	HP/TON-KNOT
RANGE AT CRUISE SPEED	578.	NAUTICAL MILES
ENDURANCE AT CRUISE SPEED	16.5	HOURS

	FLANK SPEED	CRUISE SPEED	REDUCED SPEED	ON SCENE	
ENGINE TYPE	(GT)	(GT)	(GT)	(DE)	
CALM WATER SPEED	40.0	35.0	12.0	5.0	KNOTS
SFC (WEIGHT)	0.54	0.58	0.89	0.35	LBS/HP-HR
SFC (VOLUME)	0.08	0.09	0.13	0.05	GAL/HP-HR
HP UTILIZED	6181.8	5022.7	2053.8	440.1	HP
FUEL CONSUMPTION	495.1	432.5	272.0	23.0	GAL/HR
FUEL CONSUMPTION	12.4	12.4	22.7	4.6	GAL/NAUT MI
ENDURANCE (FUEL)	14.4	16.5	26.3	310.2	HOURS
RANGE	577.3	578.3	315.3	1550.9	NAUTICAL MI
TURNING RADIUS	322.6	282.3	96.8	40.3	YARDS
CRAFT MOTION	1.4	1.1	0.5	0.4	G
AVG FUEL RATE	409.1	364.9	249.9	23.0	GAL/HR
AVG SPEED	28.1	24.8	11.8	5.0	KNOTS
TOW SPEED	-	-	6.2	-	KNOTS

CRAFT PARAMETERS

CRAFT TYPE   PLANING CRAFT
DISPLACEMENT   96 TONS
LENGTH   100 FEET
DESIGN SPEED   40 KNOTS
FUEL FRACTION   0.50

VISIBILITY DISTRIBUTION NO. 2
TOW DISTRIBUTION NO. 1
DEPTH DISTRIBUTION NO. 1
SEA STATE DISTRIBUTION NO. 6
(AVERAGE SEA STATE=3.0)

TASK CODE	CARGO CPCTY	DRAFT	MANEUV	SEA STATE	TOW	
	CC	DF	MN	LS	TW	
ON SCENE:						
BRD	--	1.00	0.93	0.90	--	BOARD
FFF	--	1.00	0.93	0.86	--	FIGHT FIRE FROM CG VESSEL
FFO	--	--	--	0.95	--	FIGHT FIRE ON ANOTHER VESSEL
GAS	--	1.00	0.93	0.94	--	GENERAL ASSISTANCE
INS	--	--	--	0.95	--	INSPECTION
LEQ	--	1.00	0.93	0.86	--	LOAD EQUIPMENT
LOI	--	--	--	0.95	--	LOITER
LSB	--	1.00	0.93	0.86	--	LAUNCH SMALL BOAT
MAC	--	1.00	0.93	0.95	--	MONITOR ACTIVITIES
MOS	--	1.00	0.93	0.95	--	MONITOR OIL SPILL
OBA	--	--	--	0.95	--	ON BOARD ASSISTANCE
OSC	--	--	--	0.95	--	ON SCENE COMMANDER(GENERAL)
RBP	--	1.00	0.93	0.90	--	RETRIEVE BOARDING PARTY
ROB	--	1.00	0.93	0.86	--	RETRIEVE OBJECTS
RPE	--	1.00	0.93	0.86	--	RESCUE PEOPLE
RSB	--	1.00	0.93	0.86	--	RETRIEVE SMALL BOAT
SSI	--	1.00	0.93	0.95	--	STAKEOUT SPECIAL INTEREST VESSEL
SZE	--	--	--	0.95	--	SEIZE
TWS	--	1.00	0.93	0.86	--	TAKE WATER SAMPLE
ULQ	--	1.00	0.93	0.86	--	UNLOAD EQUIPMENT
WQB	--	--	--	0.95	--	WORK EQUIPMENT FROM SMALL BOAT
WQD	--	1.00	--	0.86	--	WORK EQUIPMENT @ DRIFT
WQF	--	1.00	0.93	0.86	--	WORK EQUIPMENT @ FIXED POSITION

TASK PROBABILITIES OF SUCCESS

CRAFT TYPE	PLANING CRAFT
DISPLACEMENT	96 TONS
LENGTH	100 FEET
DESIGN SPEED	40 KNOTS
FUEL FRACTION	0.50

VISIBILITY DISTRIBUTION NO. 2
TOW DISTRIBUTION NO. 1
DEPTH DISTRIBUTION NO. 1
SEA STATE DISTRIBUTION NO. 6
(AVERAGE SEA STATE=3.0)

TASK CODE	TASK PROB. OF SUCCESS	TASK
ON SCENE:		
ASST	0.875	ASSIST
BORD	0.841	BOARD
MNAC	0.887	MONITOR ACTIVITIES
RTRV	0.801	RETRIEVE
WAIT	0.950	WAIT
WEQD	0.859	WORK EQUIPMENT @ DRIFT
WEQP	0.801	WORK EQUIPMENT @ POSITION
REDUCED SPEED:		
SDIU	0.926*	SEARCH FOR DISTRESSED UNIT
SESC	0.950	SLOW ESCORT
SPAT	0.950	SLOW PATROL
SPEO	0.926*	SEARCH FOR PEOPLE
TOWS	0.926	TOWS
CRUISE SPEED:		
ESCT	0.950	ESCORT
IDNT	0.517	IDENTIFY
PATL	0.950	PATROL
STGT	0.517*	SEARCH FOR TARGET
TRPT	*****	TRANSPORT
TRST	0.950	TRANSIT
FLANK SPEED:		
RSPD	0.950	RESPOND

* THIS IS THE P.O.S. OF THE ABILITY TO SEARCH. CRAFT'S SUCCESS IN FINDING THE OBJECT OF THE SEARCH IS DEPENDENT UPON SCENARIO (E.G., SEARCH AREA)

***** DEPENDENT UPON SCENARIO (E.G., FOOTPRINT AND WEIGHT OF CARGO)

ELT SCENARIO 4
SORTIE NUMBER 5

OPERATIONAL REQUIREMENTS:	SELECTED CRAFT:
MAXIMUM DURATION 24.0 HOURS	PLANING CRAFT
RANGE FRACTION 0.90	DISPLACEMENT 96 TONS
VISIBILITY GOOD	DESIGN SPEED 40 KNOTS
AVERAGE SEA STATE 3.0	FUEL FRACTION 0.50

GROUP NAME	TASK NAME	LOCATION CODE	TASK TIME (HRS)	TASK FUEL (GALS)	TASK POS
		1			
STEAM		150201			
	*INTERDICT	150204	5.3	2184	0.95
		150202			
		4			
SENSOR SEARCH		130101			
	*SEARCH FOR SHIP : FOUND	130102	2.0	734	0.52
		7			
IDENTIFY		40201			
	*IDENTIFY CRAFT	40203	0.5	200	0.52
		40202			
		10			
INSPECT		50201			
	*LAUNCH SMALL BOAT	50203	0.3	5	0.80
	*INSPECTION	50204	2.0	46	0.95
	*RETRIEVE SMALL BOAT	50202	0.3	5	0.80
		12			
SEIZE		120201			
	*SEIZE	120203	1.0	23	0.95
	*ESCORT	120202	6.0	2203	0.95
		2			

TIME TO COMPLETE SORTIE (HRS) 17.4

FUEL CONSUMED IN SORTIE (GALS) 5404

SORTIE PROBABILITY OF SUCCESS 0.4829

SORTIE FREQUENCY OF OCCURRENCE 0.0056

************* SORTIE SUMMARY *************

ELT SCENARIO 4

OPERATIONAL REQUIREMENTS:

MAXIMUM DURATION 24.0 HOURS
RANGE FRACTION 0.90
VISIBILITY GOOD
AVERAGE SEA STATE 3.0

SELECTED CRAFT:

PLANING CRAFT
DISPLACEMENT 96 TONS
DESIGN SPEED 40 KNOTS
FUEL FRACTION 0.50

FRACTION OF SCENARIO COMPLETED 0.5955

SORTIE NO.	SORTIE TIME (HRS)	SORTIE FUEL (GALS)	FREQUENCY OF OCCURRENCE	SORTIE PROBABILITY OF SUCCESS	SORTIE SUCCESSFUL OCCURRENCE
1	17.8	5480	0.0720	0.4829	0.0348
2	16.8	5457	0.4536	0.4829	0.2191
3	17.6	5475	0.0080	0.4829	0.0039
4	16.6	5452	0.0504	0.4829	0.0243
5	17.4	5404	0.0056	0.4829	0.0027
6	16.4	5381	0.0059	0.4829	0.0028

************** SCENARIO OVERALL RESULTS **************

ELT SCENARIO 4

OPERATIONAL REQUIREMENTS:	SELECTED CRAFT:
MAXIMUM DURATION 24.0 HOURS	PLANING CRAFT
RANGE FRACTION 0.90	DISPLACEMENT 96 TONS
VISIBILITY GOOD	DESIGN SPEED 40 KNOTS
AVERAGE SEA STATE 3.0	FUEL FRACTION 0.50

PERCENT OF SCENARIO COMPLETED 59.6

PROBABILITY OF SUCCESSFULLY COMPLETING SCENARIO 0.29

SPECIFICATIONS OF THE AVERAGE SORTIE:

TIME TO COMPLETE AVERAGE SORTIE 16.9 HRS

FUEL CONSUMED IN AVERAGE SORTIE 5458.4 GALS

TASK COMPOSITION IN AVERAGE SORTIE:

TASK CODE	TIMES COMPLETED	TASK NAME
ON SCENE:		
BRD	0.03	BOARD
INS	0.29	INSPECTION
LSB	0.26	LAUNCH SMALL BOAT
RBP	0.03	RETRIEVE BOARDING PARTY
RSB	0.26	RETRIEVE SMALL BOAT
SZE	0.04	SEIZE
REDUCED SPEED:		
NO TASKS		
CRUISE SPEED:		
ESC	0.04	ESCORT
IDC	0.01	IDENTIFY CRAFT
IDF	0.28	IDENTIFY FLEET
SFL	0.28	SEARCH FOR FLEET
SSH	0.01	SEARCH FOR SHIP: FOUND
TRA	0.53	TRANSIT
FLANK SPEED:		
INT	0.01	INTERDICT

************** SCENARIO EVALUATION **************

ELT SCENARIO 4

OPERATIONAL REQUIREMENTS:	SELECTED CRAFT:
MAXIMUM DURATION 24.0 HOURS	PLANING CRAFT
RANGE FRACTION 0.90	DISPLACEMENT 96 TONS
VISIBILITY GOOD	DESIGN SPEED 40 KNOTS
AVERAGE SEA STATE 3.0	FUEL FRACTION 0.50

IMPORTANT TASKS COMPLETED IN 50 DAYS OF OPERATION

	TASK CODE	TIMES COMPLETED	TASK NAME
ON SCENE:			
	INS	14	INSPECTION
	SZE	2	SEIZE
REDUCED SPEED:			
	NO IMPORTANT TASKS SPECIFIED		
CRUISE SPEED:			
	IDC	0	IDENTIFY CRAFT
	IDF	14	IDENTIFY FLEET
FLANK SPEED:			
	NO IMPORTANT TASKS SPECIFIED		

☆ U. S. GOVERNMENT PRINTING OFFICE: 1977--701-793--209