[redacted]

UNCLASSIFIED

55
SERC90
14 APR 82

HEADQUARTERS OF THE COMMANDER IN CHIEF PACIFIC
PLANS AND POLICY DIRECTORATE
CAMP H. M. SMITH, HAWAII 96861

[7]

PLANS AND POLICY DIRECTORATE
RESEARCH AND ANALYSIS DIVISION
REPORT NO. 9-81

A METHOD FOR EVALUATING U.S. OVERSEAS BASES (U)

Joseph E. Hoagbin

September 1981

COPY NO 27 OF 6 COPIES

The views, opinions, and/or findings contained in this report are those of the study group and should not be construed as an official CINCPAC position, policy or decision unless so designated by other official documentation.

[redacted]

UNCLASSIFIED

[redacted]

HEADQUARTERS OF THE COMMANDER IN CHIEF PACIFIC
PLANS AND POLICY DIRECTORATE
CAMP H. M. SMITH, HAWAII 96861

PLANS AND POLICY DIRECTORATE

RESEARCH AND ANALYSIS DIVISION

REPORT NO. 9-81

A METHOD FOR EVALUATING U.S. OVERSEAS BASES (U)

J. E. HOAGBIN

September 1981

The views, opinions, and/or findings contained in this report are those of the author and should not be construed as an official CINCPAC position, policy or decision unless so designated by other official documentation.

PREFACE

( ) This report is the second in a series of three to be prepared for the CINCPAC Military Basing Agreement (MBA) Working Group. This working group is concerned with developing information that will be useful to US negotiators in the forthcoming 1984 negotiations with the Government of the Philippines (GOP) regarding continued US basing rights in the Philippines.

The study is to be accomplished in three stages, each of which is to be documented:

1. (U) Survey past reports to determine methods that have been used to evaluate overseas bases.

2. (U) Using information from the above survey, develop a method for evaluating US bases in the Philippines.

3. (U) Perform the actual evaluation.

(U) This report documents the second stage.

UNCLASSIFIED
UNCLASSIFIED

TABLE OF CONTENTS

UNCLASSIFIED
UNCLASSIFIED

SUMMARY

(U) This report discusses a proposed method for evaluating the US bases in the Philippines. The method is based on a methodology developed by the Rand Corporation and used in several studies published 10-15 years ago.

(U) The Rand methodology also calls for evaluating the functions performed by Philippine bases. Chief among these are the following:

1. (U) Prepositioning and forward deployment.
2. (U) Underway replenishment.
3. (U) Aircraft reconnaissance missions.
4. (U) Training.
5. (U) Worldwide communications.
6. (U) Providing navigation aids.
7. (U) Intelligence gathering using ground based equipment.

(U) The last three functions involve equipments that must be located precisely on the Earth's surface. It is not a simple matter to find alternative locations. If the bases in the Philippines were lost, then certain sub-functions could no longer be performed. It would be necessary to conduc a worldwide study to determine whether the loss of sub-functions in the Philippines could be compensated for by equipment elsewhere in the world. The evaluation of these latter three functions is considered to be outside the scope of this report. In the proposed evaluation, each of the first four functions would be treatd separately. In looking for alternative locations, it would not be necessary to relocate all of the functions to the same new location.

(U) One of the Rand publications is devoted to the evaluation of only US Philippine bases but it was published in 1968. This is Rand report number RM-5704-ISA (Reference (a)). This report contains considerable detailed cost data that can be updated, in particular:

- The cost of replacement of the facilities on US bases in the Philippines, in 1970 dollars
- The cost of construction and the 10-year cost of operation of oilers, ammunition ships, and combatant ships, in 1967 dollars

This Rand report is referred to frequently in the following pages.

(U) An important part of the cost of operating new bases would be the cost of additional ships and aircraft if the new bases are farther from potential trouble areas than the Philippines.

The appendices develop equations relating distance and round trip time to numbers of aircraft and ships required to perform particular functions. These equations also make it possible to determine how performance is degraded if additional ships and aircraft are not provided.

(U) The use of notional ships and aircraft is an important part of the method proposed in this report, and is a departure from the Rand methodology. However, this greatly simplifies the mathematics and bookkeeping and avoids using the digital computer simulators used by Rand.

A METHOD FOR EVALUATING U.S. BASES IN THE PHILIPPINES (U)

(U) The purpose of this report is to discuss a method for evaluating the US bases in the Philippines. The method is based on the methodology used by the Rand Corporation in several studies published 10-15 years ago. These studies have been reviewed in a report entitled, A Survey of Reports Discussing the Value of US Overseas Bases which was completed by J55 in August of 1981. Many of the reports discussed the evaluation of overseas bases but did not deal directly with the Philippines. One of the most valuable was the Rand Corporation publication RM-5704-ISA entitled, Some Military Implications of the Loss of Philippines Bases (Reference (a)). This report was issued in 1968. It contains much valuable information and will be referred to frequently throughout this report.

The Rand methodology calls for determining, for each alternative base location, the following:

- The cost of construction of new base facilities at the new location
- The cost of additional aircraft and ships required if a new base location is farther from a trouble area than the Philippines
- The additional cost of operation of the new base and additional ships and aircraft

(U) Several functions are performed by Philippine bases. If these bases were lost, it would not be necessary to move all functions to the same new location. Each function should be considered separately.

(U) Following is a discussion of how each would be handled.

(U) It would be assumed any new base location would have maintenance, repair, and overhaul facilities, and would have facilities for storing supplies, spare parts, prepositioned materiel and the like. Thus, these functions would be evaluated implicitly.

(U) The Philippine bases have excellent facilities for training pilots and ground personnel at the Zambales Peninsula and the Crow Valley Weapons Range (see Appendix A). In an effort to find alternative bases, the possibility of providing training facilities would be considered. If training facilities could not be provided, the cost of transporting personnel to training sites would be computed. Also, the cost of providing additional personnel would be considered. That is, if, for example, 10% of personnel are away on training to the CONUS, say, then it is evident that 1.1 men are required to keep one man in the field. The training referred to here is not of the sort that is gained during maneuvers and air exercises. The training provided by Philippine bases permits use of live ordnance by ships, aircraft, and ground personnel. The training problem would be somewhat oversimplified but time would not permit a complete study of this problem.

Classified by: Rand Corporation
Review on: November 1988

(U) There are three functions that must be considered outside the scope of the proposed study. These are:

- Communications
- Navigation
- Intelligence gathering, with ground based equipment

(U) Some of the equipment performing these functions must be located precisely on the Earth's surface. Attempting to find new locations involves interactions with equipment in other parts of the world. All in all, these systems are very complex. No useful recommendations or evaluations could be made in the few man-months proposed for this study. If there are no alternative locations for these functions (or certain sub-functions) then the proposed method is not useful, anyway. The evaluation of the loss of a function or sub-function requires the study of some sort of worldwide scenario to determine if the loss in the Philippines can be compensated for elsewhere.

(U) Now we come to three important functions, performed by Philippine bases, that can be evaluated using the Rand methodology. These are:

- Prepositioning and forward deployment
- Underway replenishment
- Aircraft reconnaissance

(U) Only the first two of these are evaluated in the Rand studies.

(U) The first step in attempting to evaluate these functions would be to find alternative locations for each. While this task should not be considered finished, many authors state the only alternatives that are suitable from the standpoint of politics, climate, location, terrain, and available real estate are

why is this classified. Merely cites "many authors."

(U) After having found alternative locations for bases, the next step is to find potential trouble areas. For the moment, we will assume these are NE Asia, SE Asia, SW Asia, and the Persian Gulf.

(U) The next step is to write scenarios each giving the following information:

- The locations of naval task forces
- The location of the naval base
- The place where ground troops are to be rapidly redeployed
- The location of the airbase
- The size of the force to be redeployed
- The fraction of the equipment and supplies that is prepositioned and the fraction of the personnel that is forward deployed. Since it is difficult to specify a single fraction, several values would be investigated in a parametric study.

- The areas to be kept under surveillance by aircraft reconnaissance missions.

- The location of the airbase for reconnaissance aircraft.

(U) In evaluating functions and missions, the study would be concerned with determining how many ships and aircraft are required to carry forces or supplies to the trouble area. No attempt would be made to determine the outcome of battles. This is in line with the Rand methodology and this approach makes it possible for the study to be conducted in a few man-months.

(U) Table 1, which may well be changed by the study, indicates that a large number of scenarios could be written. An effort would be made to limit the scenarios to only the most interesting cases.

(U) The methods used to determine numbers of ships and aircraft required to perform particular mission, will be applied to the Philippines as well as to alternative locations, for two reasons:

(U) This would permit comparison of study results with actual experience in the Philippines with respect to underway replenishment and P-3 ASW mission.

(U) This would make results obtained for alternative locations directly comparable to results for the Philippines. This accounts for the fact that the Philippines is included as one of the bases in Table 1. Hawaii and CONUS are included, also for two reasons:

- There is a slim possibility these might be alternative locations for some functions.

- This would show how costly it would be if the US gave up all bases outside of Hawaii and the CONUS. This has been suggested from time to time.

(U) The Rand studies made use of two computer programs. These were the Rand Underway Replenishment Simulator and the Rand Deployment Simulator. These simulators made it possible to handle the tremendous amount of bookkeeping associated with moving men and materiel using aircraft and ships with different speeds and capacities. The method proposed in this report is to use notional ships and aircraft. For any one function there would be only one type of ship or aircraft. The capacity and speed would be an average based on ships and aircraft in the inventory. This would greatly reduce the bookkeeping required in the evaluations. Using this approach, the simulators could be replaced by simple mathematical models discussed in Appendices D to F.

(U) The next step in the evaluation would call for determining the number of ships or aircraft required to perform each of the three functions listed above.

(U) Appendix D discusses the method for determining the numbers of ships and aircraft required for rapid redeployment of a large force from a base to a

trouble area. Important to such redeployments are prepositioning of materiel and forward deployment of military units at a forward base.

(U) Appendix E discusses the method of determining the number of oilers, ammunition ships, and combatant ships required to keep a naval task force on station and replenished.

(U) Appendix F discusses the method for determining the number of aircraft required for reconnaissance and similar missions.

(U) The next step in the proposed method would be to place a cost on constructing a new base and on performing the operations implied by the three functions that are evaluated.

(U) Table 2 summarizes the cost data available in RM-5704-ISA. One method of updating these data would be to simply apply a factor for inflation. However, this would not account for construction taking place after 1968, the data of the Rand study. Somewhat more research will probably be necessary. It is hoped that the Navy facilities engineers can supply some of the needed information.

(U) Unfortunately, no information is available at present on the operating cost of the bases listed in the table. Considerable research would be necessary to determine the annual operating cost of Philippine bases as well as the annual operating cost of bases in alternative locations. It may be necessary to omit the cost of operation of these bases and base the evaluation on the cost of new construction and the cost of conducting missions from the new bases. This is what Rand did. It appears to be pretty well known that the cost of operation of all Philippine bases is about $200-million per year. The evaluation may show that this is a small fraction of the cost of new construction, the cost of ships and aircraft, and the cost of operating ships and aircraft all spread over a period of 10 years, as Rand did. That is to say, the available information may be enough to provide an approximate evaluation that is considered accurate enough to be useful in judging whether Philippines requests for compensation are reasonable.

(U) The information in Table 2 is a summary of the detailed information in Appendices B and C. Appendix B gives the information from RM-5704-ISA on ships and Appendix C gives the detailed information on base facilities.

(U) The final step in the proposed evaluation is to compare the costs associated with the Philippines with the costs associated with alternative locations. This is the Rand methodology. The result of the study would be tables, similar to Table 1 in which the entries are costs instead of "x." At least one table would show the cost of moving the various functions from the Philippines to other bases compared to the cost of performing all of these functions at Philippine bases.

(U) TABLE 1

BASE LOCATIONS AND TROUBLE AREAS OF INTEREST IN SCENARIO WRITING (U)

	TROUBLE AREA			
Base Location	NE Asia	SE Asia	SW Asia	Persian Gulf
Philippines	x	x	x	x
Guam	x	x	x	x
Marianas	x	x	x	x
Australia		x	x	x
Hawaii	x	x		
CONUS	x	x		

(U) TABLE 2

SUMMARY OF COST DATA FROM RM-5704-ISA (U)
(Costs in millions of 1970 dollars)*

Item	Construction or Replacement Cost	10-Year Operating Cost Including Construction
Oiler		
Ammunition Ship		
Destroyer		
Cruiser		
Carrier		
Subic Bay/Cubi Point		
Clark AFB		
John Hay Air Station		
Naval Radio Station		
Navy Comm. Station, San Miguel		
Wallace Air Station		

How absurd deletion
cost of an oiler is easily obtained

*To convert to 1981 dollars, multiply by 2.4
To convert to 1984 dollars, multiply by 3.3 (see Appendix G)

APPENDIX A

Description of the US Bases in the Philippines (U)

(U) At the present time, the US operates six bases in the Philippines. These are (Reference (b)):

1. (U) US Naval Base, Subic Bay/Cubi Point
2. (U) Clark Air Force Base
3. (U) John Hay Air Station
4. (U) The US Naval Radio Station, Tarlac
5. (U) The US Naval Communication Station, San Miguel
6. (U) Wallace air Station

(U) Table A-1 shows the amount of real estate required for each of these bases. Each of these bases will be discussed in turn:

1. (U) Subic Bay and Cubi Point (see Reference (c)):

(U) Subic Bay

(U) This is the largest US naval base outside of the US. It has a natural deep water port covering 26,000 acres of water and over 36,000 acres of land.

(U) The base has three wharves each large enough to berth aircraft carriers.

(U) It has major ship repair facilities and does 60% of all 7th Fleet repair work and can handle 20-25 ships at one time. It can completely overhaul most US naval ships and can drydock all ships except cruisers and carriers. Its labor costs are less than anywhere else in the Pacific, being, in terms of man-days, one fourth those of Japan and one sixth those of Guam. The skilled Filipinos working at the base have wage rates about one-seventh those in the US.

(U) Subic has the largest naval supply depot in the world. It handles 2.5 million barrels of POL and one million tons of other supplies annually, and handles 100,000 requisitions per month. Its freight piers handle 1,000 container vans per month.

(U) The Navy magazine store at Subic repairs and issues ammunition and explosives. It stores 46,000 tons of ammunition worth about $200 million and handles about 15,000 to 25,000 tons per month.

(U) On an average day, Subic has from 8,000 to 10,000 7th Fleet personnel. The base has eight separate naval commands.

(U) The Zambales Peninsula, part of the base, is used for Marine training. The beaches are used for amphibious training. The land is used for ground maneuvers and for practice delivery of ordnance by ships, aircraft, tanks, and field weapons.

(U) The base employs 37,000 Filipinos as direct or indirect hires. It injects about $145 million into the local Philippine economy.

(U) Cubi Point Air Station:

(U) This base provides maintenance and supply support for naval aircraft. Aircraft can be offloaded from carriers. There are only three such bases in the world where this can be done.

(U) The base can host 150-200 aircraft and handles 15,000 takeoffs and landings per month. It handles 800 tons of freight and 3500 passengers per month.

(U) This is a home port for carriers. While in port, pilots use the airfield for training.

(U) A squadron of P-3s is based here for ASW operations in the Indian Ocean and the South China Sea.

(U) There is a fleet of tactical support squadrons which makes on-board deliveries to ships at sea. There is a fleet composite squadron that tows targets.

2. (U) Clark Air Force Base (see Reference (c)):

(U) This base covers 130,000 acres of land. It directly employs about 10,000 Filipinos and about 8,000 US military and civilian personnel.

(U) This is the third largest US overseas airbase. It has all-weather runways that service about 12,000 traffic movements per month. It can handle 2,900 tons of freight and 3,500 passengers per day. This is a major port in the Western Pacific for transferring from air to sea movement or from sea to air movement.

(U) The 13th Air Force is headquartered here. The base has a tactical fighter wing and a tactical airlift wing. There is a squadron of F-5s that acts as aggressor during air exercises.

(U) The base has aircraft maintenance and repair facilities. It can rebuild engines, for example.

(U) The Crow Valley Weapons Range, part of the base, is the most sophisticated Air Force training facility in Asia and is used to train Air Force, Navy, and Marine pilots. It has missile firing ranges, gunnery practice fields, and an electronic warfare range.

(U) The base has major stockpiles of war reserve munitions. This includes 12 million gallons of jet fuel and other materiel in a million square feet of storage area.

(U) The base pumps about $60 million annually into the local economy. About 90% of USAF funds spend in the Philippines is spent at Clark.

(U) Clark Air Force Base is the main US base of support for Diego Garcia.

3. (U) John Hay Air Station (see Reference (c)): This base houses a Voice of America transmitter. It also serves as a regional conference site and training facility for all USAF, Navy, and Marine elements in WESTPAC. In addition, its facilities provide temperate rest and recreation.

4. (U) The US Naval Radio Station (see Reference (c)): The base is the major military communications center west of Hawaii for all airborne activities in the Western Pacific and Indian Ocean. It has a satellite terminal, automatic switching equipment and provides voice and teletype alerting networks and airborne command post support.

Tarbc

5. (U) The US Naval Communication Station at San Miguel (see Reference (c)): This serves as the center for all 7th Fleet naval communications. It communicates with ship and shore stations worldwide.

6. (U) Wallace Air Station (see Reference (c)): This base provides radar control for the Philippine air defense system. It also has a drone launch facility for PACAF intercept training.

(U) TABLE A-1

ACREAGE OCCUPIED BY BASES IN THE PHILIPPINES (U)
(From Reference (a))

BASE	ACREAGE OCCUPIED
Subic Bay Complex	37,620
Clark AFB	131,315
John Hay Air Station	1,164
Naval Radio Station, Tarlac	886
Naval Communications Station, San Miguel	2,158
Wallace Air Station	492

APPENDIX B

Cost of Ships (U)

(U) RM-5704-ISA gives information concerning the ten-year systems cost of additional ships. The systems cost includes construction and operating costs.

(U) Table B-1 shows the ten-year systems cost of oilers and ammunition ships. The numbers were taken from a 1967 report, as indicated by the footnote to the table. RM-5704-ISA gives a table which indicates the inflation rate for each of the years from 1967 to 1970 was about 1.0%. Thus, the numbers in this table should be increased by 3.0% to reflect 1970 dollar costs.

(U) Table B-2 shows system costs for combatant ships in 1970 dollars. No breakdown of these costs was provided in the report.

(U) TABLE B-1

TEN-YEAR SYSTEMS COSTS OF NEW OILERS
AND AMMUNITION SHIPS (U)*

Type of Cost	AOR-1, New	AE-26, New
INVESTMENT		
New construction		
Incremental training and travel		
Ordnance, initial allowance		
Total investment		
ANNUAL OPERATING COSTS		
Direct		
Crew personnel costs		
Regular overhauls		
Alternation/installation		
Nonscheduled repairs		
Supplies and equipage		
Fuel and utilities		
Maintenance material		
Expendable ordnance		
Total direct costs		
Indirect		
Total operating costs		
Ten-year system costs		
15 percent back-up for ships in overhaul		
Total ten-year system costs available for WESTPAC deployment		

Source:

"Navy Program Factors" (U), OPNAV 90P-02, August 1, 1967, Sections SF-3, p. 10, S-3, p. 16, and H-3, pp. 2-3 (Confidential).

*To convert to 1981 dollars, multiply by 2.8.
To convert to 1984 dollars, multiply by 3.9 (see Appendix G).

(U) TABLE 2

TEN-YEAR SYSTEMS COST FOR COMBATANT SHIPS (1970 Dollars) (U)*

SHIP TYPE	TEN-YEAR SYSTEM COST
Destroyer	
Cruiser	
Carrier	

*To convert to 1981 dollars, multiply by 2.4.
To convert to 1984 dollars, multiply by 3.3.

APPENDIX C

Replacement Cost for US Bases in the Philippines (U)

(U) The Rand report, RM-5704-ISA gives considerable detailed cost information pertaining to the cost of replacement of US bases in the Philippines. Several of the pertinent tables have been copied and included in this appendix.

(U) Table C-1 shows how construction costs vary with location. These factors should be updated.

(U) Table C-2 shows the types of information available for the proposed evaluation. Note that the cost of operation of the Philippine bases is not available.

(U) Table C-3 gives definitions of abbreviations used in Tables C-4 to C-15.

(U) Tables C-4 through C-10 show the cost of replacement of the Subic Bay/Cubi Point complex.

(U) Table C-11 gives the replacement cost of Clark AFB.

(U) Table C-12 gives the cost of replacement of John Hay Air Station.

(U) Table C-13 gives the cost of replacement of the Navy Radio Station at Tarlac.

(U) Table C-14 gives the cost of replacement of the Navy Communications Station at San Miguel.

(U) Table C-15 gives the replacement value of Wallace Air Station.

(U) To convert the 1970 costs shown in Tables C-4 to C-15 to 1981 dollars, multiply by 2.4. To convert to 1984 dollars, multiply by 3.3 (see Appendix G).

(U) TABLE C-1

INDEX OF GEOGRAPHICAL CONSTRUCTION COST DIFFERENCES, PACIFIC THEATER (U)

(1970 Values)

Aleutians	3.0
N. Australia	2.3
S. Australia	1.1
Guam	1.8
Hawaii	
Honolulu Area	1.3
Other Oahu	1.4
Other Islands	1.6
Korea	0.7
Kwajalein	2.4
Marianas	1.8
Marshalls	2.4
Midway	2.2
Okinawa	1.0
Philippine Islands	1.1
Saipan	2.0
Taiwan	0.6
Thailand	
Sattahip Area	1.5
Other	1.8
Tinian	2.0
Vietnam	
Saigon Area	2.2
Other	2.5
Wake	2.2

(U) TABLE C-2

COST DATA (1970 DOLLARS) AVAILABLE IN RM-5704-ISA (U)

ITEM	CONSTRUCTION OR REPLACEMENT COST	TEN-YEAR OPERATING COST INCLUDING CONSTRUCTION
Oilers	x	x
Ammunition Ships	x	x
Destroyers		x
Cruisers		x
Carriers		x
Subic Bay/Cubi Point	x	
Clark AFB	x	
John Hay Air Station	x	
Naval Radio Station	x	
San Miguel Comm. Station	x	
Wallace Air Station	x	

(U) TABLE C-3

MEANING OF ABBREVIATIONS (U)

SF - Square Feet

OL - Outlets

COST - Original Construction Cost

BBL - Barrels

MI - Statute Miles

LF - Lineal Feet

KW - Kilowatts

(U) TABLE C-4

REPLACEMENT VALUE OF SUBIC BAY NAVAL STATION (U)
(costs in 1970 dollars)

Facility Code	Facility Name	Unit of Measure [a]	Cost Per Unit	No. of Units		Total Cost (Millions)
Buildings						
133	Nav Tng Aid/Bldgs	SF	28.0	140		.004
171	Training/Bldgs	SF	23.0	297		.007
213	Mtce:Ships	SF	27.0	13670		.369
214	Mtce:Tank Autmv	SF	23.0	658		.015
215	Mtce:Weapons	SF	24.0	8392		.201
217	Mtce:Electrx/Comms	SF	22.0	1804		.040
219	Mtce:Inst Rep Opn	SF	20.0	5615		.112
229	Pdctn/Mtce Rep Opn	SF	22.0	12468		.274
422	Ammo Storage/Instl	SF	28.0	2282		.064
432	Cold Storage/Instl	SF	38.0	18892		.718
442	Cov Storage/Instl	SF	9.0	59721		.537
540	Dental Clinics	SF	40.0	9600		.384
550	Dispensaries	SF	35.0	19360		.678
610	Admin Bldgs	SF	24.0	130731		3.138
721/2	Trp Hsg/Enlisted	MEN	3500.0	1769		6.192
723	Trp Hsg/Det Facil	SF	33.0	26950		.889
724	Troop Hsg/BOQ	MEN	10500.0	269		2.825
730	Pers Suppt/Svc	SF	24.0	186035		4.465
740	Community/Interior	SF	23.0	482930		11.107
Sub-total					*	32.019 [b]
Other Facilities						
124	Oper Fuel Storage	BBL	22.0	145		.003
132	Comms/Other	COST	1.4	2444		.003
159	Waterfront/Other	COST	1.4	20927		.029
179	Training/Other	COST	1.4	2494		.003
690	Admin Struc/Other	COST	1.4	1708		.002
750	Community/Exterior	COST	1.4	432104		.605
812	Electric/Distr Tmsn	COST	1.4	1806		.003
830	Sewage/Waste	COST	1.4	3042		.004
850	Roads,Walks,Parking	SY	5.0	3152		.016
870	Drainage/Fencing	COST	1.4	260778		.365
Sub-total					*	1.034 [b]
Total					**	33.053 [b]

Notes:

[a] See Table C-3 for explanation.

[b] Totals may not equal sum of items due to rounding.

(U) TABLE C-5

REPLACEMENT VALUE OF SHIP REPAIR FACILITY, SUBIC BAY (U)
(costs in 1970 dollars)

Facility Code	Facility Name	Unit of Measure[a]	Cost Per Unit	No. of Units		Total Cost (Millions)
Buildings						
141	Land Op/Bldgs	SF	25.0	2752		.069
171	Training/Bldgs	SF	23.0	14186		.326
213	Mtce:Ships	SF	27.0	269954		7.289
217	Mtce:Electrx/Comms	SF	22.0	11535		.254
218	Mtce:Misc Proc	SF	27.0	8453		.228
442	Cov Storage/Instl	SF	9.0	45798		.412
610	Admin Bldgs	SF	24.0	47805		1.147
730	Pers Suppt/Svc	SF	24.0	4921		.118
740	Community/Interior	SF	23.0	10992		.253
Sub-total					*	10.096[b]
Other Facilities						
124	Oper Fuel Storage	BBL	22.0	93		.002
452	Open Storage/Instl	SY	6.0	3050		.018
812	Electric/Distr Tmsn	COST	2.3	3135		.007
830	Sewage/Waste	COST	2.3	709		.002
840	Water:Supply+Distr	COST	2.3	300		.001
850	Roads,Walks,Parking	SY	5.0	2290		.011
870	Drainage/Fencing	COST	2.3	18010		.041
Sub-total					*	.083[b]
Total					**	10.179[b]

Notes:

[a] See Table C-3 for explanation.

[b] Totals may not equal sum of items due to rounding.

(U) TABLE C-6

REPLACEMENT VALUE OF NAVAL MAGAZINE, SUBIC BAY (U)
(costs in 1970 dollars)

Facility Code	Facility Name	Unit of Measure[a]	Cost Per Unit	No. of Units		Total Cost (Millions)
Buildings						
171	Training/Bldgs	SF	23.0	1610		.037
213	Mtce:Ships	SF	27.0	6846		.185
214	Mtce:Tank Autmv	SF	23.0	8683		.200
216	Mtce:Ammunition	SF	26.0	25986		.676
218	Mtce:Misc Proc	SF	27.0	3272		.088
229	Pdctn/Mtce Rep Opn	SF	22.0	1580		.035
421	Ammo Storage/Depot	SF	28.0	245040		6.861
422	Ammo Storage/Instl	SF	28.0	84676		2.371
431	Cold Storage/Depot	SF	38.0	722		.027
432	Cold Storage/Instl	SF	38.0	768		.029
441	Cov Storage/Depot	SF	9.0	1200		.011
442	Cov Storage/Instl	SF	9.0	24857		.224
610	Admin Bldgs	SF	24.0	10762		.258
721/2	Trp Hsg/Enlisted	MEN	3500.0	52		.182
750	Pers Suppt/Svc	SF	24.0	48		.001
Sub-total					*	11.185[b]
Other Facilities						
123	Fuel Disp/Land	COST	1.4	3500		.005
134	Nav Tng Aid/Other	COST	1.4	1062		.001
179	Training/Other	COST	1.4	300		.000
452	Open Storage/Instl	SY	6.0	810		.005
690	Admin Struc/Other	COST	1.4	200		.000
750	Community/Exterior	COST	1.4	500		.001
870	Drainage/Fencing	COST	1.4	13296		.019
890	Misc Util/Gnd Imprv	COST	1.4	167955		.235
Sub-total					*	.266[b]
Total					**	11.451[b]

Notes:

[a] See Table C-3 for explanation.

[b] Totals may not equal sum of items due to rounding.

(U) TABLE C-7

REPLACEMENT VALUE OF NAVY SUPPLY DEPOT, SUBIC BAY (U)
(costs in 1970 dollars)

Facility Code	Facility Name	Unit of Measure[a]	Cost Per Unit	No. of Units	Total Cost (Millions)
Buildings					
218	Mtce:Misc Proc	SF	27.0	50887	1.374
219	Mtce:Inst Rep Opn	SF	20.0	46920	.938
310	R+D Test/Bldgs	SF	33.0	1976	.065
432	Cold Storage/Instl	SF	38.0	42188	1.603
441	Cov Storage/Depot	SF	9.0	428874	3.860
442	Cov Storage/Instl	SF	9.0	145352	1.308
610	Admin Bldgs	SF	24.0	49131	1.179
730	Pers Suppt/Svc	SF	24.0	314	.008
Sub-total				*	10.335[b]
Other Facilities					
122	Fuel Disp/Marine	COST	1.4	3158	.004
123	Fuel Disp/Land	OL	3400.0	20	.068
124	Oper Fuel Storage	BBL	22.0	2802	.062
125	Fuel/POL Lines	MI	61500.0	29	1.784
126	Fuel Disp/Other	COST	1.4	10071	.014
135	Comms Lines	LF	11.0	15840	.174
411	Liq Fuel Storage	BBL	5.0	1100606	5.503
452	Open Storage/Instl	SY	6.0	77127	.463
812	Electric/Distr Tmsn	COST	1.4	28323	.040
840	Water:Supply+Distr	COST	1.4	62476	.087
870	Drainage/Fencing	COST	1.4	132541	.186
880	Alarm Systems	COST	1.4	498	.001
890	Misc Util/Gnd Imprv	COST	1.4	28553	.040
Sub-total				*	8.425[b]
Total				**	18.760[b]

Notes:

[a] See Table C-3 for explanation.

[b] Totals may not equal sum of items due to rounding.

(U) TABLE C-8

REPLACEMENT VALUE OF NAVY PUBLIC WORKS CENTER, SUBIC BAY (U)
(costs in 1970 dollars)

Facility Code	Facility Name	Unit of Measure[a]	Cost Per Unit	No. of Units		Total Cost (Millions)
Buildings						
131	Comms Bldgs	SF	31.0	2539		.079
171	Training/Bldgs	SF	23.0	425		.010
214	Mtce:Tank Autmv	SF	23.0	125541		2.887
218	Mtce:Misc Proc	SF	27.0	4050		.109
219	Mtce:Inst Rep Opn	SF	20.0	76082		1.522
229	Pdctn/Mtce Rep Opn	SF	22.0	18245		.401
310	R+D Test/Bldgs	SF	33.0	9720		.321
442	Cov Storage/Instl	SF	9.0	118029		1.062
610	Admin Bldgs	SF	24.0	61160		1.468
711	Fam Hsg/Dwelling	SF	17.0	1430752		24.323
714	Fam Hsg/Det Facil	SF	8.0	17722		.142
724	Troop Hsg/BOQ	MEN	10500.0	83		.872
730	Pers Suppt/Svc	SF	24.0	2132		.051
740	Community/Interior	SF	23.0	20361		.468
Sub-total					*	33.715[b]
Other Facilities						
116	Other Afld Pvmt	SY	18.0	1511		.027
123	Fuel Disp/Land	COST	1.2	1717		.002
124	Oper Fuel Storage	BBL	22.0	22000		.484
125	Fuel/POL Lines	COST	1.2	9338		.011
135	Comms Lines	LF	11.0	337920		3.717
151/2	Wtrfr/Piers,Wharfs	SY	280.0	57293		16.042
154	Wtrfront/Seawall	COST	1.2	2533736		3.040
159	Waterfront/Other	COST	1.2	529313		.635
160	Harbor Prot/Cst	COST	1.2	13376		.016
452	Open Storage/Instl	SY	6.0	58540		.351
690	Admin Struc/Other	COST	1.2	2871		.003
750	Community/Exterior	COST	1.2	204228		.245
811	Electric/Source	KW	330.0	49871		16.457
812	Electric/Distr Tmsn	COST	1.2	5343669		6.412
820	Heat:Source+Transm	COST	1.2	821063		.985
830	Sewage/Waste	COST	1.2	1651023		1.981
840	Water:Supply+Distr	COST	1.2	4492633		5.391
850	Roads,Walks,Parking	SY	5.0	1943089		9.715
870	Drainage/Fencing	COST	1.2	1250065		1.500
880	Alarm Systems	COST	1.2	23077		.028
890	Misc Util/Gnd Imprv	COST	1.2	324602		.390
Sub-total					*	67.435[b]
Total					**	101.150[b]

Notes:

[a]See Table C-3 for explanation.
[b]Totals may not equal sum of items due to rounding.

(U) TABLE C-9

REPLACEMENT VALUE OF NAVAL HOSPITAL, SUBIC BAY (U)
(costs in 1970 dollars)

Facility Code	Facility Name	Unit of Measure[a]	Cost Per Unit	No. of Units		Total Cost (Millions)
Buildings						
219	Mtce:Inst Rep Opn	SF	20.0	2460		.049
442	Cov Storage/Instl	SF	9.0	5949		.054
510	Hospital Bldgs	SF	37.0	41962		1.553
530	Labs + Clinics	SF	33.0	260		.009
610	Admin Bldgs	SF	24.0	1120		.027
721/2	Trp Hsg/Enlisted	MEN	3500.0	70		.245
723	Trp Hsg/Det Facil	SF	33.0	1148		.038
724	Troop Hsg/BOQ	MEN	10500.0	24		.252
730	Pers Suppt/Svc	SF	24.0	48		.001
740	Community/Interior	SF	23.0	500		.012
Sub-total					*	2.238[b]
Other Facilities						
830	Sewage/Waste	COST	1.4	20599		.029
890	Misc Util/Gnd Imprv	COST	1.4	260437		.365
Sub-total					*	.393[b]
Total					**	2.632[b]

Notes:

[a] See Table C-3 for explanation.

[b] Totals may not equal sum of items due to rounding.

(U) TABLE C-10

REPLACEMENT VALUE OF CUBI POINT NAVAL AIR STATION (U)
(costs in 1970 dollars)

Facility Code	Facility Name	Unit of Measure[a]	Cost Per Unit	No. of Units	Total Cost (Millions)
Buildings					
131	Comms Bldgs	SF	31.0	7860	.244
133	Nav Tng Aid/Bldgs	SF	28.0	121	.003
141	Land Op/Bldgs	SF	25.0	56778	1.419
171	Training/Bldgs	SF	23.0	3254	.075
211	Mtce:Aircraft	SF	22.0	147037	3.235
212	Mtce:Guided Msls	SF	22.0	880	.019
213	Mtce:Ships	SF	27.0	5590	.151
214	Mtce:Tank Autmv	SF	23.0	22240	.512
216	Mtce:Ammunition	SF	26.0	9120	.237
217	Mtce:Electrx/Comms	SF	22.0	400	.009
218	Mtce:Misc Proc	SF	27.0	8400	.227
219	Mtce:Inst Rep Opn	SF	20.0	56	.001
422	Ammo Storage/Instl	SF	28.0	11296	.316
442	Cov Storage/Instl	SF	9.0	76236	.686
520	Infirmary Bldgs	SF	28.0	2250	.063
540	Dental Clinics	SF	40.0	2000	.080
610	Admin Bldgs	SF	24.0	38232	.918
721/2	Trp Hsg/Enlisted	MEN	3500.0	1032	3.612
723	Trp Hsg/Det Facil	SF	33.0	21866	.722
724	Troop Hsg/BOQ	MEN	10500.0	414	4.347
730	Pers Suppt/Svc	SF	24.0	2252	.054
740	Community/Interior	SF	23.0	134514	3.094
Sub-total					* 20.023[b]
Other Facilities					
111	Runways	SY	18.0	177778	3.200
112	Taxiways	SY	18.0	170870	3.076
113	Aprons	SY	18.0	499582	8.992
116	Other Afld Pvmt	SY	18.0	4330	.078
121	Fuel Disp/Acft	OL	19000.0	20	.380
122	Fuel Disp/Marine	COST	1.4	2914	.004
124	Oper Fuel Storage	BBL	22.0	16681	.367
125	Fuel/POL Lines	MI	61500.0	4	.246
132	Comms/Other	COST	1.4	69720	.098
134	Nav Tng Aid/Other	COST	1.4	115840	.162
136	Afld Pvmt Liting	LF	28.0	31657	.886
149	Land Op/Other	COST	1.4	64475	.090
159	Waterfront/Other	COST	1.4	48139	.067
179	Training/Other	COST	1.4	7197	.010
452	Open Storage/Instl	SY	6.0	52140	.313
690	Admin Struc/Other	COST	1.4	1162	.002

(U) TABLE C-10 (Continued)

Facility Code	Facility Name	Unit of Measure[a]	Cost Per Unit	No. of Units		Total Cost (Millions)
750	Community/Exterior	COST	1.4	115405		.162
812	Electric/Distr Tmsn	COST	1.4	23973		.034
830	Sewage/Waste	COST	1.4	701		.001
870	Drainage/Fencing	COST	1.4	369818		.518
880	Alarm Systems	COST	1.4	19955		.028
890	Misc Util/Gnd Imprv	COST	1.4	27733		.039
Sub-total					*	18.752[b]
Total					**	38.775[b]

Notes:

[a] See Table C-3 for explanation.

[b] Totals may not equal sum of items due to rounding.

(U) TABLE C-11

REPLACEMENT VALUE OF CLARK AIR BASE (U)
(costs in 1970 dollars)

Facility Code	Facility Name	Unit of Measure[a]	Cost Per Unit	No. of Units	Total Cost (millions)
Buildings					
131	Comms Bldgs	SF	31.0	105167	3.260
133	Nav Tng Aids/Bldgs	SF	28.0	816	.023
141	Land Op/Bldgs	SF	25.0	332448	8.311
171	Training/Bldgs	SF	23.0	39403	.906
211	Mtce:Aircraft	SF	22.0	375033	8.251
214	Mtce:Tank Automtv	SF	23.0	121894	2.804
216	Mtce:Ammunition	SF	26.0	7180	.187
217	Mtce:Electrx/Comms	SF	22.0	109689	2.413
218	Mtce:Misc Items+Eq	SF	27.0	56788	1.533
219	Mtce:Instl Rep Ops	SF	20.0	62294	1.246
229	Pactn/Mtce Rep Ops	SF	22.0	14160	.312
422	Ammo Storage/Instl	SF	28.0	385924	10.806
432	Cold Storage/Instl	SF	38.0	28922	1.099
441	Cov Storage/Depot	SF	9.0	37472	.337
442	Cov Storage/Instl	SF	9.0	1048283	9.435
510	Hospital Bldgs	SF	37.0	211259	7.817
530	Labs + Clinics	SF	33.0	4373	.144
540	Dental Clinics	SF	40.0	2364	.095
550	Dispensaries	SF	35.0	2423	.085
610	Admin/Bldgs	SF	24.0	356173	8.548
711	Fam Hsg/Dwellings	SF	17.0	2500625	42.511
714	Fam Hsg/Det Facil	SF	8.0	2700	.022
721/2	Trp Hsg/Enlisted	MEN	3500.0	6527	22.845
723	Trp Hsg/Det Facil	SF	33.0	61955	2.045
724	Troop Hsg/BOQ	MEN	10500.0	477	5.009
725	Trp Hsg/Emergency	SF	5.0	142130	.711
730	Pers Suppt/Svc	SF	24.0	313586	7.526
740	Community/Interior	SF	23.0	667301	15.348
Sub-total					* 163.625[b]
Other Facilities					
111	Runways	SY	18.0	219444	3.950
112	Taxiways	SY	18.0	502428	9.044
113	Aprons	SY	18.0	397716	7.159
116	Other Afld Pvmt	SY	18.0	219014	3.942
121	Fuel Disp/Acft	OL	19000.0	3	.053
123	Fuel Disp/Land	OL	3400.0	12	.041
7125	Fuel/POL Lines	COST	1.8	1037200	1.867
126	Fuel Disp/Other	COST	1.8	79000	.142
134	Nav Tng Aids/Other	COST	1.8	200000	.360
135	Comms Lines	LF	11.0	293391	3.227
136	Afld Pvmt Lighting	LF	28.0	69981	1.959
149	Land Op/Other	COST	1.8	5000	.009
179	Training/Other	COST	1.8	1000	.002
390	R+D Test/Other	COST	1.8	6000	.011

(U) TABLE C-11 (Continued)

Facility Code	Facility Name	Unit of Measure[a]	Cost Per Unit	No. of Units		Total Cost (millions)
411	Liq Fuel Storage	BBL	5.0	350862		1.754
452	Open Storage/Instl	SY	6.0	73313		.440
690	Admin Struc/Other	COST	1.8	60000		.108
750	Community/Exterior	SY	11.0	45674		.502
811	Electric/Source	KW	330.0	75130		24.793
812	Electric/Distr Tmsn	COST	1.8	4294000		7.729
820	Heat/Source+Transm	COST	1.8	133000		.239
830	Sewage/Waste	COST	1.8	1712000		3.082
840	Water/Supply+Distr	COST	1.8	3653000		6.575
850	Roads/Walks/Parking	SY	5.0	2091804		10.459
860	Railroads	LF	28.0	23536		.659
870	Drainage/Fencing	COST	1.8	2404000		4.327
880	Alarm Systems	COST	1.8	2000		.004
890	Misc Util/Gnd Imprv	COST	1.8	3102000		5.584
Sub-total					*	98.022[b]
Total					**	261.647[b]

Notes:

[a] See Table C-3 for key to abbreviations.

[b] Totals may not equal sum of items due to rounding.

(U) TABLE C-12

REPLACEMENT VALUE OF JOHN HAY AIR BASE (U)
(costs in 1970 dollars)

Facility Code	Facility Name	Unit of Measure[a]	Cost Per Unit	No. of Units		Total Cost (millions)
Buildings						
131	Comms Bldgs	SF	31.0	12801		.397
141	Land Op/Bldgs	SF	25.0	3605		.090
214	Mtce:Tank Automtv	SF	23.0	16788		.386
218	Mtce:Misc Items+Eq	SF	27.0	600		.016
219	Mtce:Instl Rep Ops	SF	20.0	7838		.157
422	Ammo Storage/Instl	SF	28.0	951		.027
432	Cold Storage/Instl	SF	38.0	2441		.093
442	Cov Storage/Instl	SF	9.0	18855		.170
520	Infirmary Bldgs	SF	28.0	4949		.139
610	Admin/Bldgs	SF	24.0	29856		.717
711	Fam Hsg/Dwellings	SF	17.0	19651		.334
721/2	Trp Hsg/Enlisted	MEN	3500.0	168		.588
723	Trp Hsg/Det Facil	SF	33.0	981		.032
724	Troop Hsg/BOQ	MEN	10500.0	38		.399
725	Trp Hsg/Emergency	SF	5.0	1956		.010
730	Pers Suppt/Svc	SF	24.0	12618		.303
740	Community/Interior	SF	23.0	124181		2.856
Sub-total					*	6.712[b]
Other Facilities						
123	Fuel Disp/Land	OL	3400.0	2		.007
7125	Fuel/POL Lines	COST	2.0	1000		.002
135	Comms Lines	LF	11.0	620		.007
149	Land Op/Other	COST	2.0	1000		.002
179	Training/Other	COST	2.0	1000		.002
411	Liq Fuel Storage	BBL	5.0	1399		.007
690	Admin Struc/Other	COST	2.0	5000		.010
7750	Community/Exterior	COST	2.0	114000		.228
811	Electric/Source	KW	330.0	1127		.372
812	Electric/Distr Tmsn	COST	2.0	88000		.176
820	Heat/Source+Transm	COST	2.0	13000		.026
830	Sewage/Waste	COST	2.0	48000		.096
840	Water/Supply+Distr	COST	2.0	226000		.452
850	Roads/Walks/Parking	SY	5.0	149450		.747
870	Drainage/Fencing	COST	2.0	22000		.044
890	Misc Util/Gnd Imprv	COST	2.0	11000		.022
Sub-total					*	2.200[b]
Total					**	8.912[b]

Notes:

[a] See Table C-3 for key to abbreviations.

[b] Totals may not equal sum of items due to rounding.

(U) TABLE C-13

REPLACEMENT VALUE OF NAVAL RADIO STATION, TARLAC
(costs in 1970 dollars)

Facility Code	Facility Name	Unit of Measure[a]	Cost Per Unit	No. of Units		Total Cost (Millions)
Buildings						
131	Comms Bldgs	SF	31.0	19171		.594
219	Mtce:Inst Rep Opn	SF	20.0	2400		.048
432	Cold Storage/Instl	SF	38.0	429		.016
442	Cov Storage/Instl	SF	9.0	11784		.106
721/2	Trp Hsg/Enlisted	MEN	3500.0	57		.200
724	Troop Hsg/BOQ	MEN	10500.0	2		.021
730	Pers Suppt/Svc	SF	24.0	96		.002
740	Community/Interior	SF	23.0	5316		.122
Sub-total					*	1.110[b]
Other Facilities						
123	Fuel Disp/Land	OL	3400.0	1		.003
124	Oper Fuel Storage	BBL	22.0	30		.001
132	Comms/Other	COST	1.2	1274669		1.530
135	Comms Lines	LF	11.0	26400		.290
452	Open Storage/Instl	SY	6.0	667		.004
690	Admin Struc/Other	COST	1.2	3772		.005
830	Sewage/Waste	COST	1.2	220		.000
850	Roads,Walks,Parking	SY	5.0	85767		.429
870	Drainage/Fencing	COST	1.2	33781		.041
Sub-total					*	2.302[b]
Total					**	3.412[b]

Notes:

[a] See Table C-3 for explanation.

[b] Totals may not equal sum of items due to rounding.

(U) TABLE C-14

REPLACEMENT VALUE OF NAVY COMMUNICATIONS STATION, SAN MIGUEL
(costs in 1970 dollars)

Facility Code	Facility Name	Unit of Measure[a]	Cost Per Unit	No. of Units		Total Cost (Millions)
Buildings						
131	Comms Bldgs	SF	31.0	41781		1.295
133	Nav Tng Aid/Bldgs	SF	28.0	900		.025
171	Training/Bldgs	SF	23.0	2204		.051
215	Mtce:Weapons	SF	24.0	800		.019
217	Mtce:Electrx/Comms	SF	22.0	314		.007
219	Mtce:Inst Rep Opn	SF	20.0	800		.016
431	Cold Storage/Depot	SF	38.0	2170		.082
432	Cold Storage/Instl	SF	38.0	135		.005
441	Cov Storage/Depot	SF	9.0	144		.001
442	Cov Storage/Instl	SF	9.0	6649		.060
540	Dental Clinics	SF	40.0	832		.033
550	Dispensaries	SF	35.0	4725		.165
610	Admin Bldgs	SF	24.0	14222		.341
721/2	Trp Hsg/Enlisted	MEN	3500.0	606		2.121
723	Trp Hsg/Det Facil	SF	33.0	15230		.503
724	Troop Hsg/BOQ	MEN	10500.0	36		.378
730	Pers Suppt/Svc	SF	24.0	11471		.275
740	Community/Interior	SF	23.0	71963		1.655
Sub-total					*	7.034[b]
Other Facilities						
111	Runways	SY	18.0	1964		.035
132	Comms/Other	COST	1.4	970980		1.359
179	Training/Other	COST	1.4	4369		.006
690	Admin Struc/Other	COST	1.4	900		.001
750	Community/Exterior	COST	1.4	109312		.153
830	Sewage/Waste	COST	1.4	6541		.009
850	Roads,Walks,Parking	SY	5.0	192768		.964
870	Drainage/Fencing	COST	1.4	213774		.299
890	Misc Util/Gnd Imprv	COST	1.4	12000		.017
Sub-total					*	2.844[b]
Total					**	9.878[b]

Notes:

[a] See Table C-3 for explanations.

[b] Totals may not equal sum of items due to rounding.

(U) TABLE C-15

REPLACEMENT VALUE OF WALLACE AIR STATION
(costs in 1970 dollars)

Facility Code	Facility Name	Unit of Measure[a]	Cost Per Unit	No. of Units		Total Cost (millions)
Buildings						
131	Comms Bldgs	SF	31.0	2551		.079
141	Land Op/Bldgs	SF	25.0	16707		.418
211	Mtce:Aircraft	SF	22.0	1182		.026
214	Mtce:Tank Automtv	SF	23.0	910		.021
219	Mtce:Instl Rep Ops	SF	20.0	1489		.030
610	Admin/Bldgs	SF	24.0	2863		.069
721/2	Trp Hsg/Enlisted	MEN	3500.0	71		.249
723	Trp Hsg/Det Facil	SF	33.0	3985		.132
724	Troop Hsg/BOQ	MEN	10500.0	32		.336
730	Pers Suppt/Svc	SF	24.0	195		.005
740	Community/Interior	SF	23.0	11596		.267
Sub-total					*	1.530[b]
Other Facilities						
134	Nav Tng Aids/Other	COST	1.7	9000		.015
179	Training/Other	COST	1.7	1000		.002
411	Liq Fuel Storage	BBL	5.0	357		.002
690	Admin Struc/Other	COST	1.7	2000		.003
7750	Community/Exterior	COST	1.7	2000		.003
811	Electric/Source	KW	330.0	2526		.834
812	Electric/Distr Tmsn	COST	1.7	82000		.139
830	Sewage/Waste	COST	1.7	14000		.024
840	Water/Supply+Distr	COST	1.7	73000		.124
850	Roads/Walks/Parking	SY	5.0	31941		.160
870	Drainage/Fencing	COST	1.7	19000		.032
890	Misc Util/Gnd Imprv	COST	1.7	98000		.167
Sub-total					*	1.505[b]
Total					**	3.135[b]

Notes:

[a] See Table C-3 for key to abbreviations.

[b] Totals may not equal sum of items due to rounding.

APPENDIX D

Prepositioning and Forward Deployment (U)

(U) One of the most important functions of a forward base is to reduce the time required to project personnel and materiel into a trouble area. When intelligence indicates that a certain area may become a trouble area, men and materiel are positioned in the forward base much closer to the trouble area than bases in the continental US. When trouble starts, men and materiel are moved as quickly as possible, by air, and possibly by sea, from the forward base to the trouble area. At the same time, additional men and materiel may be moved from the CONUS to the trouble area.

(U) Sealifted Men and Materiel

(U) Let Q_p be the quantity of personnel to be moved from a base to a trouble area.

(U) Let C_p be the capacity of a single ship in terms of numbers a personnel the ship can carry.

(U) Let N_p be the number of ships equipped to carry personnel.

(U) Because ships move rather slowly over the great distances of interest to US, and since we are interested in rapid deployment, it is assumed that:

$$N_p \geq Q_p/C_p$$

(U) That is, there are enough ships to carry the personnel in one trip. It is not necessary for any ships to return to base to pick up additional personnel who are to be part of the original rapid redeployment. These ships, of course, might return to base to pick up and deliver reinforcements.

(U) Let T_p be the time required to deliver all personnel from the base to the trouble area, by ship.

(U) Let D be the distance from the base to the trouble area.

(U) Let V_p be the speed of a ship carrying personnel.

(U) Let t_p be the separation in time between ships carrying personnel.

(U) It is now possible to write

$$T_p = (D/V_p) + N_p t_p \qquad (1)$$

(U) By similar reasoning for materiel it is possible to write

$$T_m = (D/V_m) + N_m t_m \qquad (2)$$

in which the subscripts stand for materiel.

(U) It should be noted that under the assumptions made for sealift, there is no tradeoff between redeployment time and number of ships.

(U) Airborne Men and Materiel

(U) Let us define variables exactly similar to those above, but let them pertain to movement of men and materiel by air.

(U) Because the speed of aircraft is high but the capacity of any one aircraft is small compared to the number of men and materiel to be moved, it will be assumed that

$$N \ll Q/C$$

in which the subscript have been removed since the relationship applies for aircraft fitted to move men and aircraft fitted to move materiel.

(U) The number of sorties required is Q/C.

(U) The number of sorties required per aircraft is Q/CN.

(U) Since several aircraft can be loaded and unloaded simultaneously, and any one aircraft can be loaded or unloaded quickly, we ignore the separation between aircraft and write

$$T_p = T_1 Q_p / C_p N_p \tag{3}$$

and

$$T_m = T_2 Q_m / C_m N_m \tag{4}$$

in which

T_1 is the time required for a round trip between a base and a trouble area for an aircraft fitted for transporting personnel,

T_2 is the time required for a round trip for an aircraft fitted for carrying materiel.

(U) That is, it is assumed that the time to redeploy is simply the time required for any one aircraft to fly its sorties. This will be a good approximation if all aircraft begin and end their flying approximately the same times.

(U) Under the assumptions that were made for airlift, it can be seen that there is a tradeoff between time to redeploy and number of aircraft. It can be seen that the time to redeploy increases with the distance between a base and a trouble area.

(U) Equations (1), (2), (3) and (4) permit us to express the value of a forward base in terms of number of days required to redeploy a large force. The smaller the number, the more valuable is the base for projecting force into a trouble area.

(U) Equations (3) and (4) permit us to determine how many aircraft are required to realize a certain redeployment time. That is, if h_1 hours are required to redeploy a large force from the Philippines to a trouble area, with N aircraft, and if h_2 is the time to redeploy a large force from an alternative base farther from the trouble area, with the same N aircraft, it is possible to make $H_2 = h_1$ by increasing N. It is evident that if the round trip time is doubled, then the number of aircraft will have to be doubled in order to keep the total redeployment time the same.

(U) In applying equations (2) and (4), it is necessary to consider two classes of materiel which affect the carrying capacity of ships and aircraft. The two classes are equipment and bulk freight. When carrying equipment, the capacity of the ships or aircraft is limited by the floor area of the ship or aircraft, not by the weight of equipment. With bulk cargo, which is packed in cases which can be stacked, weight determines how much cargo can be carried.

(U) In determining total redeployment time for a large force, it is necessary to consider at least 14 elements of the operations. That is, it is necessary to apply the equations in t is appendix to 14 different cases, each case having its own set of parameter values. Figure D-1 illustrate this. The table reflects the fact that not all personnel and equipment will have been prepositioned or forward deployed. That is, some personnel and equipment will come from the forward base and others will come from the CONUS. The table also reflects the fact that large equipment, such as steam shovels, cannot be airlifted. Also large equipment is not as likely to be prepositioned as motor vehicles and tanks, and other small pieces of equipment that are needed in the first hours of the redeployment.

(U) TABLE D-1

ELEMENTS OF RAPID REDEPLOYMENT (U)

	Forward Base to Trouble Area		From CONUS to Trouble Area		
To be Moved	Airlift	Sealift	Airlift	Sealift	Fast Sealift
Personnel	x		x		
Bulk Cargo	x	x	x	x	x
Small Equipment	x	x	x	x	x
Large Equipment				x	x

APPENDIX E

Underway Replenishment (U)

(U) Another important function of a forward base is to facilitate underway replenishment of a naval task group.

(U) Let Q_o be the quantity of oil consumed by the task group each day.

(U) Let C_o be the capacity of an oiler.

(U) Let N_o be the number of oilers required.

(U) Let T_o be the round trip time for an oiler.

(U) On the average, Q_o/C_o oilers must arrive at the task force each day. The number that will arrive is N_o/T_o. That is,

$$N_o/T_o = Q_o/C_o$$

or

$$N_o = T_oQ_o/C_o \tag{5}$$

(U) We assume the oilers carry sufficient jet fuel for the needs of the task force. That is, it is not necessary to write equations for determining the number of ships required to carry jet fuel.

(U) Similar reasoning for ammunition leads to an expression for the number of ammunition ships required:

$$N_a = T_aQ_a/C_a \tag{6}$$

(U) It can be seen that the number of oilers and ammunition ships varies directly with the time required to make a round trip between the base and the naval task group. This round trip time is a linear function of distance but is not directly proportional to distance since it includes time for loading and unloading.

(U) Equations (5) and (6) make it possible to compare the number of oilers and ammunition ships required for underway replenishment from alternative locations.

(U) A closely associated topic is the number of combatant ships required to keep one ship on station.

(U) Let T_s be the time a ship spends on station.

(U) Let T_t be the time the ship spends in transiting between the station and the base.

(U) Let T_b be the time the ship spends at the naval base.

(U) Each ship must return to port periodically and be relieved by another ship.

(U) The fraction of time the ship is on station is

$$F_s = T_s/(T_s + T_t + T_b)$$

(U) The number of ships required to keep one ship on station is the reciprocal, or,

$$N_c = (T_s + T_t + T_b)/T_s \qquad (7)$$

(U) It is assumed that T_b is determined by morale factors and the need for ship repairs. T_t is a function of the distance between the base and the area of operation of the task force. Now, if the ship is on an $\underline{n}$ day cycle, then if T_t is increased, T_s must be decreased. While $\underline{n}$ might be increased, it is assumed to be dictated also by morale factors and the need for ship maintenance.

(U) Equation (7) makes it possible to compare alternative base locations with respect to the number of combatant ships required to keep a task force on station. Using appropriate values for the times, equation (7) can be used for carriers, cruisers, and destroyers.

APPENDIX F

Aircraft Reconnaissance (U)

(U) There is a broad class of aircraft mission that is facilitated by a forward base. These missions have the property that an aircraft is required to stay on station for a fairly long time. The aircraft has a certain endurance so increasing transit time reduces time on station. This applies to the following missions:

- Visual or photo reconnaissance
- P-3 ASW missions
- ELINT missions
- Search for downed aircraft and pilots

(U) Let H_a be the number of aircraft hours required to search an area or fly along a portion of a SLOC.

(U) Let T_e be the endurance of the aircraft.

(U) Let T_t be the time spend in transit from the base to the station and return.

(U) The number of aircraft hours one aircraft can devote to the mission is T_e-T_t.

Thus, the number of aircraft required to perform the mission is

$$N_A = H_a/(T_e-T_t) \qquad (8)$$

(U) It is evident that equation (8) permits us to compare alternative base locations with respect to the number of aircraft required to perform reconnaissance and related missions.

UNCLASSIFIED

APPENDIX G

Converting 1967 and 1970 Dollars to 1981 and 1984 Dollars (U)

(U) In Appendix B, reference is made to the cost of ships in 1967 and 1970 dollars. In Appendix C, reference is made to the cost of replacing base facilities in terms of 1970 dollars. The purpose of this appendix is to derive factors for making a first order estimate of costs in terms of 1981 dollars and 1984 dollars. The year 1984 is of interest because that is the year when Philippine basing rights will be reviewed by the US and the Government of the Philippines.

(U) There is no simple way to get an accurate cost of constructing ships and base facilities, in terms of 1981 dollars. An accurate estimate would require costing each ship and base item by item. However, it is possible to make a rough estimate of these costs by simply multiplying the 1970 (or 1967) costs by a suitable factor to take into account inflation. Following is one method of arriving at the desired factors:

(U) The World Almanac for 1981, on page 88 presents a table showing the value of the dollar for each year from 1967 to 1980. The reciprocal of the value of the dollar is the consumer price index. Table G-1 shows the consumer price index for each year. These have been used to compute an inflation factor for each year. These factors are shown in the table.

(U) Table G-2 shows estimated price indices and inflation factors for the years 1981 to 1984. These are based simply on the assumption the inflation rate will be 12% during these years.

(U) Using Tables G-1 and G-2, the following factors can be computed:

To Convert	To	Multiply by
1967 Dollars	1981 Dollars	2.76
1967 Dollars	1984 Dollars	3.87
1970 Dollars	1981 Dollars	2.38
1970 Dollars	1984 Dollars	3.34

(U) TABLE G-1

CONSUMER PRICE INDEX FOR THE YEARS 1967 TO 1980 (U)

YEAR	CPI	INFLATION RATE
1967	1.00	
1968	1.04	4%
1969	1.1	6
1970	1.16	5
1971	1.21	4
1972	1.27	5
1973	1.33	4
1974	1.48	11
1975	1.61	9
1976	1.7	6
1977	1.81	6
1978	2.03	12
1979	2.17	7
1980	2.46	13

(U) TABLE G-2

ESTIMATED PRICE INDEX FOR THE YEARS 1981 TO 1984 (U)

1981	2.76	12
1982	3.09	12
1983	3.46	12
1984	3.87	12

REFERENCES

(a) J. H. Hayes, et al, Some Military Implications of the Loss of Philippines Bases, The Rand Corp., Report Number RM-5704-ISA, November 1968 SECRET

(b) Cottrell and Hanks, The Military Utility of the US Facilities in the Philippines, Significant Issue Series, Volume 2, No. 11, Georgetown University, 1980, UNCLASSIFIED

(c) L. E. Grinter, The Philippines Bases: Continuing Utility in a Changing Strategic Context, National Security Affairs Monograph Series 80-2, National Defense University February 1980, UNCLASSIFIED

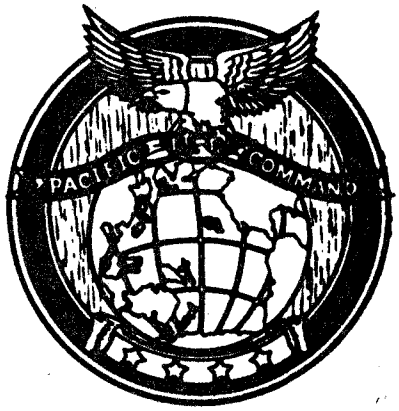
[redacted] UNCLASSIFIED

NOT RELEASABLE TO FOREIGN NATIONALS

33
SER S200
14 Apr 1982

HEADQUARTERS OF THE COMMANDER IN CHIEF PACIFIC
PLANS AND POLICY DIRECTORATE
CAMP H. M. SMITH, HAWAII 96861

[7]



PLANS AND POLICY DIRECTORATE
RESEARCH AND ANALYSIS DIVISION
REPORT NO. 8-81

A SURVEY OF REPORTS DISCUSSING THE VALUE OF U.S. OVERSEAS BASES (U)

J.E. HOAGBIN

AUGUST 1981

The views, opinions, and/or findings contained in this report are those of the study group and should not be construed as an official CINCPAC position, policy or decision unless so designated by other official documentation.

[redacted]

COPY NO 2A OF 7 COPIES

UNCLASSIFIED

[redacted]

HEADQUARTERS OF THE COMMANDER IN CHIEF PACIFIC
PLANS AND POLICY DIRECTORATE
CAMP H. M. SMITH, HAWAII 96861

PLANS AND POLICY DIRECTORATE

RESEARCH AND ANALYSIS DIVISION

REPORT NO. 8-81

A SURVEY OF REPORTS DISCUSSING THE VALUE OF U.S. OVERSEAS BASES (U)

J. E. HOAGBIN

August 1981

The views, opinions, and/or findings contained in this report are those of the author and should not be construed as an official CINCPAC position, policy or decision unless so designated by other official documentation.

PREFACE

(U) This report is the first in a series of three to be prepared for the CINCPAC Military Basing Agreement (MBA) Working Group. This working group is concerned with developing information that will be useful to US negotiators in the forthcoming 1984 negotiations with the Government of the Philippines (GOP) regarding continued US basing rights in the Philippines.

The study is to be accomplished in three stages, each of which is to be documented:

1. (U) Survey past reports to determine methods that have been used to evaluate overseas bases.

2. (U) Using information from the above survey, develop a method for evaluating US bases in the Philippines.

3. (U) Perform the actual evaluation.

(U) This report documents the first stage.

(U) It contains information abstracted from 21 past basing studies. Two types of information were abstracted:

1. (U) Results which are still useful even though many of these studies are 10 to 15 years old. For example, the comparison of redeployment times, with and without overseas bases, as reported in Reference (a) and Appendix A, is still valid even though the study was published in I966.

2. (U) Methods of evaluating overseas bases. Even though the results in some of these old studies are no longer valid, the evaluation methods are still useful.

(U) The first 18 References, (a) through (r), have abstracts which appear in corresponding Appendices A through R. There are no appendices corresponding to References (s), (t) and (u).

(U) This report does not constitute an exhaustive survey of past basing studies. Because of the pressure of time, it was necessary to confine the survey to reports that were readily available or obtainable. However, it is felt that enough reports were reviewed to make it possible to realize the objective of finding a methodology that could be adapted to evaluating the US bases in the Philippines.

(U) Certain CINCPAC staff members, those working in the area of command, control, and communications systems (C3S), have called attention to an important fact: none of the reports reviewed in this document appear to deal adequately with the cost and technical difficulty of relocating and replacing the communications systems required for command and control.

TABLE OF CONTENTS

TABLE OF CONTENTS (CONT'D)

SUMMARY

(U) Twenty-one past studies, related to acquiring, maintaining, and using overseas bases, were reviewed to determine methods that have been used to evaluate overseas bases, and can be adapted to the problem of evaluating the US bases in the Philippines.

(U) At the present time, there appears to be no way of assigning an absolute value to our bases in the Philippines. The best that can be done is to compare the cost of operation of the present bases with the cost of construction and operation of one or more new bases at one or more new locations.

(U) Several of the studies reviewed were Rand studies that contained considerable detail on the following costs:

- The cost of construction of new facilities
- The cost of moving
- The cost of operation of the new base or bases
- The cost of additional combatant ships, oilers, ammunition ships, aircraft, tankers, and personnel, if the new location or locations are farther from the area of hostilities than the Philippines
- The cost of operation of the additional ships and aircraft

(U) While the Rand studies are about 10 to 15 years old, the methods are still valid. Also, much of the cost information can be updated by applying suitable factors for inflation.

(U) One study, reference (c), was an evaluation of bases in the Philippines, but it was confined to evaluating the functions of underway replenishment and rapid redeployment. None of the studies attempted to evaluate most of the functions performed by Subic and Clark. Most of the studies considered the possibility of hostilities in NE and SE Asia, but some did not consider operations in the Indian Ocean. For these and other reasons, what is required is somewhat more than a simple updating of past studies. The methods used in the studies should be applied to an evaluation that is broader in scope than the studies reviewed.

(U) The Rand Corporation used the Rand Underway Replenishment Simulator and the Rand Deployment Simulator to evaluate the effect of new bases on underway replenishment and redeployment times. These simulators required the generation of considerable input data. These can be replaced with two simple mathematical models if it is considered adequate to compare costs using a few notional ship and aircraft types. The use of these and other simple models, would permit a broad study of Philippines bases in a somewhat shorter time than was required for the Rand studies.

(U) Soon to be issued is a report outlining a method for evaluating the bases in the Philippines.

where is this?

Survey of Basing Reports (U)

(U) Introduction

(U) The purpose of this report is to discuss methods for evaluating overseas bases revealed in past basing studies. This information is sought in connection with developing a methodology for evaluating the US bases in the Philippines. This last is of interest because of the forthcoming negotiations between the US and the Government of the Philippines (GOP) in connection with reviewing the current Military Basing Agreement (MBA) in 1984.

(U) To begin, it will be assumed there is no requirement to establish the need for overseas bases beyond what is said in Appendices F and U.

(U) It is also assumed there is no need to list the functions performed at Subic and Clark and show they are indispensable, since this has been done many times (e.g. see Reference (u)).

(U) Some Evaluation Methods

(U) None of the studies reviewed reveal a method for placing an absolute value on an overseas base. However, several of the studies discuss the "value" of the functions of forward bases.

(U) Appendix R shows the value of early arrival when redeploying troops to a trouble area. This appendix shows that a force that arrives early can be as effective as a force six times as large that arrives late.

(U) Appendix S discusses the importance of prepositioning and forward deployment, made possible by forward bases, and their relationship to airlift, fast sealift, and conventional sealift.

(U) Appendix O and References (t) and (u) discuss the importance of having a strong US presence on the soil of an ally, as a deterrent.

(U) Appendix E presents a quantitative method for determining the value of a base in terms of the probability of being able to complete a mission successfully. Consider n bases, and a mission that can be accomplished by any of the bases with a certain probability of success. If all bases undertake the mission, there is a certain combined probability of success. If one base is deleted, then there is some lower probability of success. The appendix gives the following illustration: Consider four bases, each undertaking the same mission and each having a probability of success of 0.5. If all four bases engage in the mission, the probability of success is 0.94. If one of the bases is deleted, then the probability of success is 0.88. This model might have been useful in the past when the US had many redundant bases. It is not

[redacted]

useful for evaluating bases in the Philippines because for many missions and functions the Philippines bases are unique.

(U) Appendices N and P discuss a method of determining the value of a base in terms of the effect of the base on the size of the "sphere of influence" of the US and its allies. This method is based on the following concept: Consider a point on the surface of the Earth. Measure the great circle distance from the point to the nearest communist port and the distance to the nearest non-communist port. If the point is closer to a non-communist port, then it is said to be in the sphere of influence of the non-communist world, otherwise it is considered to be in the sphere of influence of the communist world. Since great circle distances are measured, this concept would be more easy to accept if distances were measured to airbases rather than ports. Using this concept, as modified, it would be possible to determine how the loss of Clark AFB would affect the size of the sphere of influence of the US and its allies. There are many difficulties with this concept, however, not the least of which is its inability to evaluate most of the functions performed by Clark AFB and Subic Bay naval base.

(U) A Useful Method

(U) Several of the Rand studies (see Appendices A, C, D, E, and J) use an evaluation method which promises to be useful for evaluating Philippine bases today. The method is to compare the cost of operating the Philippine bases with the cost of moving them and operating them at another location. These studies are old; however, the methodology is still useful. The following costs are considered.

- The cost of construction of new facilities, including buildings, runways, streets, sidewalks, water works, and electric generating plants. The cost of construction is shown to vary depending on location. The cost of acquiring real estate in the new location is not considered.

- The cost of moving equipment, stored materiel, such as parts and ammunition, personnel, and dependents.

- The annual operating cost of the new base in the new location. This will depend, for example, on local wage rates and the availability of trained local technicians.

- The cost of additional combatant ships, oilers, ammunition ships, aircraft, and tankers required if the distance from the new base is longer than the distance from the old base to the area of hostilities.

- The cost of operating additional ships, aircraft, etc. References (a), (c), (d), (e) and (j) contain certain considerable detailed cost information. It is unfortunate they are old; however, the information can be updated.

(U) Table 1 shows all five studies did not cover the same factors. The listing of items considered is not meant to be complete. It is a sampling large enough

to show that the studies differ significantly. Any effort to evaluate the Philippines bases should include all of the important functions performed by the bases. It can be seen that what is needed is somewhat more than a simple updating of Reference (c) which is an evaluation of the bases in the Philippines.

(U) Two types of operation figure prominently in the Rand evaluations. These are underway replenishment of a naval task force and rapid redeployment of ground troops by the Air Force. To determine the number of oilers and ammunition ships required to support a naval task force, Rand used the Rand Underway Replenishment simulator described in Appendix K. To determine the number of days required for a fleet of aircraft to redeploy a large force, Rand used the Rand Deployment Simulator described in Appendix L. To evaluate the bases in the Philippines, it is not essential to use these simulators. The Rand simulators were used because they were able to handle a large number of different types of ships and aircraft. For updating these studies, it should be sufficient to consider a few types of notional ships and aircraft. For example, in comparing the number of oilers required to support a naval task force from the Philippines and alternative locations, it should be sufficient to consider notional oilers, all having the same characteristics. Appendix C shows that the number of oilers required to support a naval task force is:

$$N = TQ/C$$

in which

T = the time required for a single oiler to make a round trip from a base to the task force and return. This includes loading and unloading times.

Q = the quantity of oil required by the task force each day.

C = the capacity of a single oiler.

(U) This model can also be used for determining the number of ammunition ships required in underway replenishment operations. It can be used to determine the number of aircraft required to redeploy men and equipment. Similarly, simple models can be developed to determine the number of aircraft required for photo reconnaissance and ASW missions. Appendix C gives a simple model for determining how many combatant ships are required to keep one on station. It is the use of such simple models that makes it possible to update and expand Reference (c) with a few man-months of effort.

(U) Alternative Locations

(U) In updating and expanding Reference (c), it is necessary to update the choice of alternative locations for Philippines bases.

(U) In Conclusion

(U) A report will soon be issued which will discuss a methodology that can be used to evaluate the Philippines bases. This will be an adaptation of the method used by the Rand Corp.

(U) The evaluation procedure, once worked out, should make it possible to evaluate proposals that are related to basing, for example, the Air Force proposal to use aircraft to perform some of the functions usually performed by the Navy (Appendix M) and the proposal to use merchant ships for resupplying military units (Appendix G).

(U) TABLE 1

COMPARISON OF FIVE PAST BASING STUDIES (U)

Items Covered in the Studies	Covered in Reference: (a)	(c)	(d)	(e)	(j)
NE Asia Scenario	x	x	x	x	x
SE Asia Scenario	x	x	x	x	x
Indian Ocean Scenario		x		x	
One Scenario Involves Bases on US Soil Only	x				x
Scenarios Involve use of bases in Taiwan, Thailand	x	x	x	x	
Scenarios Involve Rapid Redeployment	x	x	x	x	
Scenarios Involve Underway Replenishment		x	x		x
Scenarios Involve Air Force Operations	x	x	x	x	
P3 ASW Operations Considered			x	x	
Intelligence Gathering Considered			x	x	x
Storage of Ammunition, Spare Parts, and the Like				x	x
Prepositioning Considered	x	x	x	x	
Corrosion Proofing Considered				x	
Typhoon Dispersal				x	
Maintenance and Repair of Ships and Aircraft				x	x
Cost of New Construction Considered		x			
Cost of Additional Ships Considered		x	x		x

APPENDICES

Appendices A-R - Each of these appendices is an abstract of information contained in the reference of the same letter (see References).

Appendix S - Quoted from Reference R

Appendix T - Abstracted from References Q, T and U

Appendix U - Abstracted from Reference

Appendix V - Abstracted from Reference C

Note: Release and distribution of documents cited as references is controlled by organization of origin.)

Major General ~~Graydon~~ G. D. Tate, V.
~~Deputy Director~~, Ops & Administration.

Lt. General R. K. Saxer,
~~Director~~,
DNA.
Washington DC 20305.

Dear Sir,

I am writing to appeal denial of the BDM report ~~requested~~ on IOC for CINCPAC TZAM-N, per letter attached.

The BDM Corporation report was identified as a major support study in DNA's appropriations justification. Presumably the report is no longer a draft report, & is now no longer denable on those grounds. We believe that ~~if~~ there ~~will be~~ is substantial segregable material in the report, & request you to direct its release.

Thankyou for your assistance,

Yours sincerely, Peter Harper.

ENERGY RESOURCES ECONOMICS, INC.
541 West 113th St., #6C
New York, New York 10025
U.S.A.
tel. (212) 666-1327

January 1983

FELLOWSHIP APPLICATION

to

MIT STS PROGRAM

SUMMARY

This research project will document the history of oil refinery automation. The project will focus on the first digital computer (a TRW RW 300) deployed in a Texas oil refinery in 1959. It will compare this experience with that in the UK in the early 1960s.

The project will then trace the technical, economic, and sociological impacts of this major technological innovation. The findings will be published for use by policy-makers

DEFENSE NUCLEAR AGENCY
WASHINGTON, D.C. 20305

(703) 325.7095

PAO

2 JAN 1985

Sue Ladd (Mrs Boyd See)

Mr. Peter Hayes
NAUTILUS
Pacific Action Research
Box 228
Leverett, Massachusetts 01054

Dear Mr. Hayes:

This is in response to your letter of November 22 requesting clarification of our November 16 letter answering your Freedom of Information Act (FOIA) request for copies of studies conducted by Science Application, Inc. and BDM Corporation on the use of ground-based anti-ship Missile Systems. Your request was referred to the Defense Nuclear Agency (DNA) for a direct response to you.

– Scope of Work –
+ Terms of Reference +

The BDM Corporation is under contract to DNA to prepare a report on the initial operational concept for CINCPAC TLAM-N. Their report was not identified during our initial search since it is currently being prepared. As a draft report, it is denied under 5 U.S.C. 552(b)(5), which protects information encompassing that of advice, recommendations, and subjective evaluations, as contrasted with factual matters, that are reflected in records pertaining to the decision-making process of an agency. Furthermore, the information is classified and, consequently, refused under 5 U.S.C. 552(b)(1) which permits withholding information that is properly and currently classified in the interest of national defense.

The Initial Denial Authority is Major General Grayson D. Tate, Jr., Deputy Director (Operations and Administration). If you disagree with this decision, you may file an appeal by submitting a written notice to Lieutenant General Richard K. Saxer, Director, DNA. The appeal should contain a concise statement of the grounds upon which it is brought and a description of the relief sought. A copy of the letter that is the subject of the appeal should also be submitted with the appeal. Both the envelope and your letter must clearly identify that a FOIA appeal is being made.

DNA waives search fees collectable under the FOIA for this particular case.

Sincerely,

DALE F. KELLER, JR.
LT COL, U. S. ARMY
Freedom of Information Officer

For
OSD,
~~For Office,~~
~~OSAF Force~~.

following items from your files:

~~RAND reports as listed:~~

~~NI: type out items (a) (b), (c) (d) (e) (g) (h) (j),~~

~~NI. type out (a) — (c)~~ (o)

~~Wave etc.~~

RAND reports as listed:

NI: type out (a) → (m).

~~Then list SC~~

Also, reports:

(n)
(o)

Wave stuff

Kern Bullock sat astride his horse early one Spring morning in May, 1953, moving his sheep from Nevada back across the state line to Utah. He was on the trial home to Cedar City about 200 miles north, "kind of watching the sheep grazing", he recalled years later.

He heard noise above and looked up to see some planes flying nearby when suddenly: "I just saw a great big flash. It just blinded me. I remeber I covered my eyes like that with my hand. I was sitting on the horse and then I seen this cloud go up, and then it just started to spread out".

Between March 17 and June 4 that year, the United States government through the Atomic Energy Commission (A.E.C.), detonated 11 atmospheric nuclear bomb tests. The series was code named "Upshot-Knothole".

In that three month period, 252 kilotons of fission products were emitted as radioactive fallout, an equivalent to exploding 252,000 tons of TNT. The Hiroshima bomb was 13 kilotons. One kiloton is the equivalent of 1,000 tons of TNT.

The largest of the "Upshot-Knothole" series was test shot "Harry", later to be known as "Dirty Harry" because of the large amount of fallout it dumped across the state of Utah. Like many tests, it was fired from a spindly 300 foot high steel tower planted in the flat and featureless Nevada

REFERENCES

Note: References (a) through (m) are RAND studies

(a) Anderson, M. E., Rapid Deployment to Mainland Asia: The Impact of Possible Denial of WESTPAC Foreign Bases, RM-4901-ISA (CONFIDENTIAL)

(b) Barbour, A. A., Estimating the Cost of Relocating Military Bases, RM-5585-ISA (FOR OFFICIAL USE ONLY)

(c) Hayes, J. H., et al., Some Military Implications of the Loss of Philippine Bases, RM-5704-ISA (SECRET)

(d) -------, Some Observations Concerning U.S. Military Base Rights in Japan, RM-6264-ISA (SECRET)

(e) Hayes, J. H., and Barbour A. A., Some Military Implications of the Reversion Issue on Okinawa, RM-5319-ISA (TOP SECRET)

(f) Hayes, J. H., Alternatives to Overseas Bases, P-5490 (UNCLASSIFIED)

(g) Miller, R. E., Response Capability of U.S. Flag Merchant Shiping for Support of Limited War in the Western Pacific and Indian Ocean, RM-3971-ISA (FOR OFFICIAL USE ONLY)

(h) Oberste-Lehn, D., Brief Survey of Potential Basing Locations in the Central and Western Pacific Theater, RM-4090-PR (CONFIDENTIAL)

(i) -------, Survey of Basing Potentials for Islands in the Indian Ocean, (SECRET)

(j) Sikes, T. W., The Role of WESTPAC Bases in Support of the Seventh Fleet, RM-5055-ISA (CONFIDENTIAL)

(k) -------, A Model for Simulating Underway Replenishment Strip Operations, RM-5517-ISA (UNCLASSIFIED)

(l) Sharpe, W. F., The Army Deployment Simulator, RM-4219-ISA (UNCLASSIFIED)

(m) Simons, W. E., Potential A. F. Contribution to Sea Control in Limited War, R-1675 (CONFIDENTIAL)

(n) Lulejian and Associates, Inc., Examination of the Influence of Basing Posture on U.S. Access to Resources in the Pacific Basin, July 1973 (UNCLASSIFIED

(o) W. M. Carpenter, et al., The Maintenance of U.S. Forces in Korea, SRI Technical Note SSC-TN-3115-12 (UNCLASSIFIED)

(p) Lulejian and Associates, The Influence of Geography on Military and Economic Development and the Implications to U.S. and USSR Planners, April 1973 (UNCLASSIFIED

REFERENCES (continued)

(q) F. J. Fleimings, Maintaining Overseas Bases, the Problems We Face, Professional Study 5906, Air War College, April 1976 (UNCLASSIFIED)

(r) Department of Defense, Congressionally Mandated Mobility Study, April 1981 (SECRET)

(s) D. F. Loveday, The Role of U.S. Military Bases in the Philippine Economy, The Rand Corporation, RM-5801-ISA, 1971 (UNCLASSIFIED)

(t) A. J. Cottrell and T. H. Moorer, U.S. Overseas Bases: Problems of Projecting American Military Power Abroad, The Center for Strategic and International Studies, Georgetown University, 1977 (UNCLASSIFIED)

(u) A. J. Cottrell and R. J. Hanks, The Military Utility of the U.S. Facilities in the Philippines, The Center for Strategic and International Studies, Georgetown University, 1980 (UNCLASSIFIED