



ACQUISITION RESEARCH PROGRAM SPONSORED REPORT SERIES

A Cost-Based Analysis on Using DOD Civilian Workforce to Perform Ordnance Support in Pearl Harbor

December 2017

LT Thanh-Nhunancy T. Tran, USN

Thesis Advisors: Dr. Simona Tick, Lecturer
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Graduate School of Business & Public Policy

Naval Postgraduate School

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ABSTRACT

This study conducts a cost-based analysis to determine the feasibility of insourcing the ordnance handling at Navy Munitions Command Pacific East Asia Division Detachment Pearl Harbor (NMCPAC EAD DET PH). Contractors have provided the service for over 30 years, after an Office of Management and Budget A-76 study in the 1980s determined it was more economical for the private sector to do the work previously done by military service members. This study examines whether using the government civilian workforce to perform ordnance handling generates cost savings when compared with contracting. Using a cost-based analysis, this study reviews all the associated costs of converting to a government civilian workforce and compares them with the cost of contracting out these services. Based on the methodology and data used in this study, the findings show savings from using government civilian workforce over contracting starting with year seven. The recommendation is for NMCPAC EAD DET PH to revert to insourcing the labor and purchasing/leasing the material for ordnance handling operations in order to provide the service in-house instead of continuing to contract out. This can generate monetary savings and other intangible benefits, such as better command and control.



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Disclaimer: The views represented in this report are those of the author and do not reflect the official policy position of the Navy, the Department of Defense, or the federal government.



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TABLE OF CONTENTS

I.	INTRODUCTION	1
A.	PURPOSE OF THE STUDY	1
B.	ORGANIZATION	2
II.	BACKGROUND	3
A.	INTRODUCTION	3
B.	NMCPAC EAD DET PH.....	3
C.	ORDNANCE HANDLING	7
D.	CONTRACTOR REQUIREMENTS.....	10
E.	NMCPAC CWD DET INDIAN ISLAND.....	10
	LITERATURE REVIEW	13
III.	METHODOLOGY	17
A.	BACKGROUND	17
B.	ASSUMPTIONS.....	18
C.	COST-BASED ANALYSIS FOR USING CIVILIAN WORKFORCE FOR ORDNANCE SUPPORT AT PEARL HARBOR	23
1.	Assumptions.....	24
2.	Specify the Set of Alternative Projects	25
3.	Decide Whose Benefits and Costs Count	26
4.	Impact Categories	26
5.	Discount benefits and costs to obtain present values.....	27
6.	Compute the net present value of each alternative	27
7.	Perform sensitivity analysis	27
8.	Make a recommendation.....	28
IV.	RESULTS	29
A.	BASELINE COST-BASED ANALYSIS.....	29
B.	SENSITIVITY ANALYSIS	29
C.	10-YEAR ANALYSIS.....	30
D.	BREAK EVEN POINT.....	31
V.	CONCLUSION.....	33
A.	RECOMMENDATION	33
B.	REASONS TO INSOURCE	33
1.	Tangible Factors.....	33
2.	Intangible Factors.....	34



C.	REASONS TO CONTRACT	34
D.	POTENTIAL AREAS FOR FURTHER RESEARCH.....	35
APPENDIX. SCOPE OF WORK.....		37
LIST OF REFERENCES		41



LIST OF FIGURES

Figure 1.	Ammunition Magazine. Source: B. E. McCorkell, personal communication, June 15, 2017.	4
Figure 2.	Side View of Ammunition Magazine. Source: B. E. McCorkell, personal communication, June 15, 2017.	4
Figure 3.	NMCPAC CWD DET Indian Island Organizational Chart. Adapted from B.E. McCorkell, personal communication, June 15, 2017.....	11
Figure 4.	NMCPAC EAD DET Pearl Harbor Organization Chart. Adapted from B. E. McCorkell, personal communication, June 13, 2017.	20
Figure 5.	Major Steps in a CBA. Source: Boardman et al. (2011, p. 6).....	24
Figure 6.	Assumptions Used for the Analysis.....	25
Figure 7.	NPV Sensitivity Analysis of the Difference between Insourcing and Outsourcing over 5 Years.	30
Figure 8.	NPV Sensitivity Analysis of the Difference between Insourcing and Outsourcing Over 10 Years.	31
Figure 9.	NPV Sensitivity Analysis of the Difference between Insourcing and Outsourcing Over Seven Years.....	31



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LIST OF TABLES

Table 1.	Allowable Lift for 10,000-Pound Payload at 55-Foot Radius on Whiskey Berths 1 through 5. Adapted from NAVSUP Fleet Logistics Center Pearl Harbor (2017, Tech Exhibit 12).	9
Table 2.	Allowable Forklift Payload on Whiskey Berths 1 through 5. Adapted from NAVSUP Fleet Logistics Center Pearl harbor (2017, Tech Exhibit 12).	9
Table 3.	Labor breakdown for additional personnel, in FY2017 dollars.	22
Table 4.	Price/Inflation/Escalation Annual Rates (Percent Increase Over Previous Year). Source: K. Russell, personal communication, June 13, 2017.	22
Table 5.	Annual Payroll Cost After Factoring in Pay Raises.	23
Table 6.	Contract Value for NMCPAC EAD DET PH. Adapted from email from K. Russell, December 2, 2016.	26
Table 7.	Nominal Treasury Interest Rates for Different Maturities 30-Year History. Adapted from Appendix C of OMB Circular No. A-94 (2016). .	28
Table 8.	FY 2018–2022 Base Analysis Values.	29
Table 9.	10-Year Base Analysis Values.	30



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LIST OF ACRONYMS AND ABBREVIATIONS

AA&E	arms, ammunition & explosives
AD&C	ammunition distribution and control
CBA	cost-benefit analysis
COA	course of action
COLA	cost of living allowance
COMPACFLT	commander, U.S. Pacific Fleet
COR	contracting officer's representative
CULT	common user land transportation
DCPAS	Defense Civilian Personnel Advisory Service
DD 1348-1	Issue Release/Receipt Document
DOD	Department of Defense
FLIPL	Financial Liability Investigation of Property Loss
FOS	Fleet Ordnance Support
FWS	Federal Wage System
FY	fiscal year
GS	General Schedule
HC	helicopter combat
MHE	material handling equipment
MHI	Materials Handling Inspector
MLSR	missing, lost, stolen, or recovered
MSC	Military Sealift Command
NARs	notices of ammunition reclassifications
NAVFAC	Naval Facilities Engineering Command
NAVSEA	Naval Sea Systems Command
NAVSUP	Naval Supply Systems Command
NMCPAC EAD DET PH	Navy Munitions Command Pacific East Asia Division Detachment Pearl Harbor



NPV	net present value
OIS-R	Ordnance Information Systems – Retail
OIS-W	Ordnance Information System – Wholesale
OMB	Office of Management and Budget
OPM	Office of Personnel Management
OPNAVINST	Chief of Naval Operations Instruction
POM	Program Objective Memorandum
PV	present value
PWS	performance work statement
QA	quality assurance
QC	quality control
RORO	roll-on/roll-off
RSSI	receipt, segregation, storage, and issue
SOW	statement of work
T-AKE	dry cargo/ammunition ship
T-AOE	fast combat support ship



I. INTRODUCTION

The Department of Defense (DOD) is constantly trying to do more with less. The Budget Control Act of 2011 established statutory limits on defense budget authority provided for national defense, as well as required downward adjustments (or reductions) to the statutory limit on defense spending each year through FY2021 (Williams, 2016). This has caused the military's budget to be scrutinized every year; military support elements are asked to cut their budgets so funds can be used for the operational units.

In 1966, the Office of Management and Budget (OMB) issued Circular No. A-76 which provided policy regarding the performance of commercial activities and whether they should be performed under contract with commercial sources or in-house, using government personnel. Circular No. A-76 states that – “whenever commercial sector performance of a Government operated activity is permissible ... comparison of the cost of contracting and the cost of in-house performance shall be performed to determine who will do the work” (Office of Management and Budget, 1999). In the 1980s, an A-76 study reviewed fleet ordnance support for Pearl Harbor and, as a result, the work was transferred from military personnel to contractor support. (K. Russell, phone call, December 2, 2016). For over 30 years, contractors provided the ordnance handling support with no further evaluation of cost savings.

Navy Munitions Command Pacific East Asia Division Detachment Pearl Harbor (NMCPAC EAD DET PH) is an Echelon 4 command that reports directly to Commander, U.S. Pacific Fleet (COMPACFLT; Chief of Naval Operations, 2017). COMPACFLT included a potential cost-savings initiative in its Program Objective Memorandum (POM) that proposed government employee “insourcing” whereby all contractor support could be replaced by civilian service employees at a potential cost savings.

A. PURPOSE OF THE STUDY

The purpose of this research is to determine whether insourcing would provide a cost savings to the government for ordnance support services in Pearl Harbor. This study examines the existing labor structure of another munitions command to develop a model simulation for the workforce for NMCPAC EAD DET PH. The workforce model is at the



core of the systematic cost-benefit analysis (CBA) which identifies the relative strengths and weaknesses of insourcing versus contracting ordnance support services. Based on the findings from the CBA, this thesis will provide recommendations on whether to insource the labor or continue contracting out the ordnance support service for Pearl Harbor.

B. ORGANIZATION

This study is organized into five chapters. Chapter II provides background information on Navy Munitions Command and ordnance handling. Chapter III presents a review of prior studies on CBAs and comparing insourcing versus outsourcing services. Chapter IV explains the data used in this study and discusses the methodology of the study. Chapter V presents the results of the CBA on insourcing versus contracting services. Chapter VI summarizes the results of the study and presents the conclusions and recommendations.



II. BACKGROUND

A. INTRODUCTION

This chapter presents relevant background information on the role of Navy Munitions Command Pacific East Asia Division Detachment Pearl Harbor (NMCPAC EAD DET PH) and ordnance handling. In addition, this chapter describes the requirements for any contractor bidding on the contract to provide service to NMCPAC EAD DET PH and briefly describes NMCPAC CWD DET Indian Island.

B. NMCPAC EAD DET PH

Headquartered in Ewa Beach, HI, on the island of Oahu, NMCPAC EAD DET PH consists of two branches: the Lualualei Branch on the western side of Oahu 35 miles northwest of Honolulu, and the West Loch Branch (West Loch and Waipio Point) located about 20 miles west of Honolulu. Combined, these facilities contain 386 magazines—large, earth covered storage facilities—with a storage capacity of approximately 98,830 short tons (NAVSUP Fleet Logistics Center Pearl Harbor, 2017). Figures 1 and 2 present some of the storage magazines located on Lualualei and West Loch. The Command safely and effectively receives, stores, segregates, and issues ammunition stock for the military and other government entities.





Figure 1. Ammunition Magazine. Source: B. E. McCorkell, personal communication, June 15, 2017.¹



Figure 2. Side View of Ammunition Magazine. Source: B. E. McCorkell, personal communication, June 15, 2017.²

During ammunition receiving, contractors verify that the Issue Release/Receipt Document (DD 1348–1) is prepared by the shipping activity, and verify the accuracy of the

¹ Information provided via CD during site visit to NMCPAC EAD DET PH.

² Ibid.

load against the DD 1348–1. After verification, contractors sign and date the DD 1348–1, then off-load and stow the material. Every movement is scanned and uploaded at the end of the same day into the Ordnance Information Systems-Retail (OIS-R), the integrated system of application software designed to locally manage ammunition inventory and report to Ordnance Information System-Wholesale (OIS-W), the single repository for worldwide status of Navy expendable non-nuclear ordnance. For missiles, training missiles/weapons, mines, and torpedoes, the contractor will notify the appropriate work center (Tomahawk Cruise Missile IMA, Lightweight Torpedo S&I [MK46] and Heavyweight Torpedo IMA [MK48]) to conduct those receipt inspections prior to the contractor taking custody and stowing the material.

The ammunition storage function consists of maintaining all magazine and building storage operations, including the periodic visual inspection of material in storage. All material is stored in an orderly, explosively compatible, and approved manner to ensure that the bottom pallet/container's maximum weight is not exceeded. The contractors affix the appropriate labels to all material, ensuring that accurate and complete data cards are also present. They maintain adequate aisles to allow safe, unhindered personnel or vehicle movement between materials stows, with minimum shifting of material necessary to carry out operations. Partially filled containers or pallets are plainly marked. Serviceable and unserviceable materials are stored separately. There is at least six inches of airflow space between the stacks and all walls and ceiling. Inert material is not stored with explosives or other hazardous materials. The contractors must inspect each magazine or building at least semi-annually, checking for signs of exterior/interior damage, deterioration, or other conditions requiring repair. They ensure firebreaks are maintained around all magazines and buildings, and all required portable fire protection equipment is in place and serviceable.

Segregation pertains to the material returned from ships, shore activities, and roll back cargo that cannot be completely identified and material returned from users awaiting correct condition classification. This material is temporarily stowed in an appropriate magazine/holding building. From there, the material is visually inspected to ensure it is not restricted by the NAVSUP P-801, active notices of ammunition reclassifications (NARs), or other shelf/service life restrictions as directed by higher authority. The contractors reject restricted items and do not process them any further; the material is properly tagged and



returned to the designated location pending disposition request. Those items that are not restricted will go through further inspection. Hermetically sealed containers should not be opened for examination unless other conditions, like a broken seal or cracks, indicate possible damage or deterioration. Properly and securely palletized items will not require further inspection and processing unless they show signs of damage, deterioration, or improper identification, packaging, or palletizing. For ammunition and explosives not packaged/palletized in their original shipping containers, contractors individually inspect all ammunition looking for damage, deterioration, broken seals, and incorrect/incomplete markings and identification. All segregation needs to be complete within 45 days of receipt of the material.

Issuing ammunition includes the entire process from receiving a request for materials to having the receiving activity sign for the material. After receiving the request, the material is located/selected according to the DD 1348-1, and then pulled from the respective magazine(s). The material is packaged, palletized, labeled, tagged, and marked and certified for surface/air shipments. The woodshop fabricates the pallet/package as needed. The material is labeled with the identity, count, and condition. A separate person from the initial picker verifies that material is properly marked, labeled, and tagged for identity, and inspects the prepared material to ensure it matches the request on the DD 1348-1 and verify that the paperwork is filled out properly. From there, the material is loaded onto the transportation vehicle. Prior to dispatch, the vehicle is inspected, and then the driver will deliver the material to the designated area and return with the properly signed forms from the receiving activity. The paperwork is then processed in the OIS-R database.

NMCPAC EAD DET PH also provides pier-side ordnance handling in the Pearl Harbor area for military and commercial vessels of all types, foreign and domestic, as well as services to other military commands at their respective sites. Pier-side ordnance handling involves the craning of the ordnance from the pier onto the vessels. A crane crew consists of the crane, a crane operator, the rigger in charge, two riggers, and a forklift. The labor and crane services are provided by Naval Facilities Engineering Command (NAVFAC) Hawaii. Material handlers are also on station to assist the riggers and ship's crew once the material has left their pier. At a minimum, a safety observer and two handlers must be present.



Approximately 25 active duty service members are at NMCPAC EAD DET PH. They service the torpedoes, standard missiles, and Tomahawk missiles in the region. They also liaison with the other commands to arrange for ordnance support (loading/unloading, transportation) and provide oversight to the government contractors who run the day-to-day operations. The current contractor is BAE Systems Technology Solutions & Services Inc.

C. ORDNANCE HANDLING

Ordnance handling involves the labor, materials, transportation, and management of all types of ammunition, explosives, expendable and technical ordnance material, and weapons. The types of ordnance handled include munitions for small arms, countermeasures, standard missiles, Tomahawks, and torpedoes.

Ordnance handing includes all the necessary people to oversee the paperwork for shipping and receiving ordnance, including workers with a security clearance to access the Navy ordnance database OIS-R. The contractor should employ enough material handlers to work at both magazine locations. Their duties include receiving, stowing, and issuing material from the different magazines; maintaining the facilities; properly packaging ordnance for shipment (including building the boxes and containers); staging ordnance for pick up; and loading transport vehicles. In accordance with NAVSEA OP 5 Volume I, personnel who handle or physically interact with ammunition and explosives must be qualified to do so. OPNAVINST 8023.24C further delineates the qualification and certification levels, as well as the physical qualification and medical examination requirements. All personnel who handle ordnance need to be physically qualified and have the requisite knowledge of the material they are handling for safe operations. Also, truck drivers must have their commercial license to transport the material from the different magazine locations to the warehouses and staging areas to prepare the material for shipment on government property. Due to state regulations, ammunition and other ordnance material movements over public highways must be provided by the Common User Land Transportation (CULT) services run by the U.S. Army Support Command. CULT services need to be coordinated prior to ordnance leaving the two branches to other delivery destinations, such as Hickam Airfield, Schofield Barracks, Pearl Harbor piers. Also, material handlers must be available on the pier to assist ships with on/off-loading their ordnance



material. At any time, up to four separate operations could be going on at once, so personnel need to be able to support the requirements. Each crew is required to have a supervisor/safety observer and at least two handlers.

Key personnel are also required for a seamless operation. Branch supervisors coordinate work on their respective job sites. Quality assurance/control specialists verify all the material is labeled in accordance with regulations and ensure the correct material is sent out. Mechanics are needed to maintain the vehicles and forklifts.

Material is on/off-loaded onto a variety of ships at various locations on and around Pearl Harbor. The West Loch wharves, Pearl Harbor piers, and Ford Island are common locations for on- and off-loading material. Types of ships include various combatant ships, small boats and submarines; Navy cargo and supply ships (T-AKE and T-AOE); chartered vessels; and U.S. Army and U.S. Marine Corps roll-on/roll-off (RORO) vessels. Crane operations are required for loading ordnance onto sea-going vessels. If the contractor requires crane services from NAVFAC, the rented crane crew consists of the crane, the crane operator, rigger-in-charge, two crane riggers, and a forklift. NMCPAC EAD DET PH operations also require a safety observer and at least two material handlers, depending on the material and quantity being transferred. At any given time, there can be up to four pier operations going on simultaneously. Due to the design and age of the wharves at West Loch, there are maximum loads and operating radius requirements. NAVFAC cranes have a capacity between 30 to 300 tons. Forklifts provided by NAVFAC range from three ton to 10 ton. Their equipment conforms to the weight allowances of the most restrictive wharf as shown in Tables 1 and 2.



Table 1. Allowable Lift for 10,000-Pound Payload at 55-Foot Radius on Whiskey Berths 1 through 5. Adapted from NAVSUP Fleet Logistics Center Pearl Harbor (2017, Tech Exhibit 12).

MOBILE CRANE MODELS	ALLOWABLE LIFT OPERATION, 10,000-POUND PAYLOAD (55-foot Boom Radius, 0 to 90 Degree Boom Rotation Cycle)				
	WHISKEY BERTHS SECTIONS				
	W1	W2	W3	W4	W5
GMK 4100	N/A ²	N/A ²	N/A ²	N/A ²	N/A ²
GMK 3055	OK	N/A ²	OK	OK	OK
GMK 3050	OK	N/A ²	OK	OK	OK
TMS 800E	OK	N/A ²	OK	OK	OK
HTC 8670	OK	N/A ²	OK	OK	OK
HTC 8660	OK	N/A ²	OK	OK	OK
TMS 540	N/A ¹	N/A ²	N/A ¹	N/A ¹	N/A ¹
RT 880	N/A ²	N/A ²	N/A ²	N/A ²	N/A ²
RT 870	N/A ²	N/A ²	N/A ²	N/A ²	N/A ²
RT 765E	N/A ²	N/A ²	N/A ²	N/A ²	N/A ²

Notes:

1. N/A = Not Applicable, crane cannot safely conduct lift
2. N/A = Not Applicable, crane travel not allowed on berth section

Table 2. Allowable Forklift Payload on Whiskey Berths 1 through 5. Adapted from NAVSUP Fleet Logistics Center Pearl harbor (2017, Tech Exhibit 12).

MFG.	MODEL	RATED CAP. (TONS)	MAXIMUM ALLOWABLE PAYLOAD (TONS)				
			W1	W2	W3	W4	W5
Hyster	H60XL	3	No Restrictions	No Restrictions	No Restrictions	No Restrictions	No Restrictions
Hyster	H60XL MIL	3	No Restrictions	No Restrictions	No Restrictions	No Restrictions	No Restrictions
Hyster	H60XM	3	No Restrictions	No Restrictions	No Restrictions	No Restrictions	No Restrictions
Clark	CGP55	5	No Restrictions	4	No Restrictions	No Restrictions	No Restrictions
Hyster	H120XM	5	No Restrictions	4	No Restrictions	No Restrictions	No Restrictions
Yale	GDP120	5.75	No Restrictions	4	No Restrictions	No Restrictions	No Restrictions
Yale	GDP175	8.75	No Restrictions	3	No Restrictions	No Restrictions	No Restrictions
Hyster	H230	10	7	0.9	7	7	7
Hyster	H300XL	10	4	Not Allowed	4	4	4



D. CONTRACTOR REQUIREMENTS

In accordance with the Performance Work Statement (PWS) set forth in the ammunition handling and ordnance management services contract (N00604-17-R-3009), the contractor will provide a full range of services including “labor, materials, equipment, inventory management, transportation, supervision and management to safely and effectively receive, store, segregate, issue, inspect, transport, load, and manage various types of ammunition, explosives, expendable and technical ordnance material and weapons” (NAVSUP Fleet Logistics Center Pearl Harbor, 2017). The contractor will have sufficient capabilities to schedule and service loading/off-loading a mix of ordnance inventory at the wharves at West Loch (two vessels), Pearl Harbor pier (one vessel), and Waipio Point (RORO operations) simultaneously, per day. The work that the contractor is responsible for is listed under the Statement of Work (SOW) in Section 1.3.3 of the PWS. Appendix 1 provides the scope of work. While the contract details the work required by the contractor, it does not specify how to do the work, for example, mandating what the workforce composition should be or listing mandatory equipment and resources. That is at the contractor’s discretion.

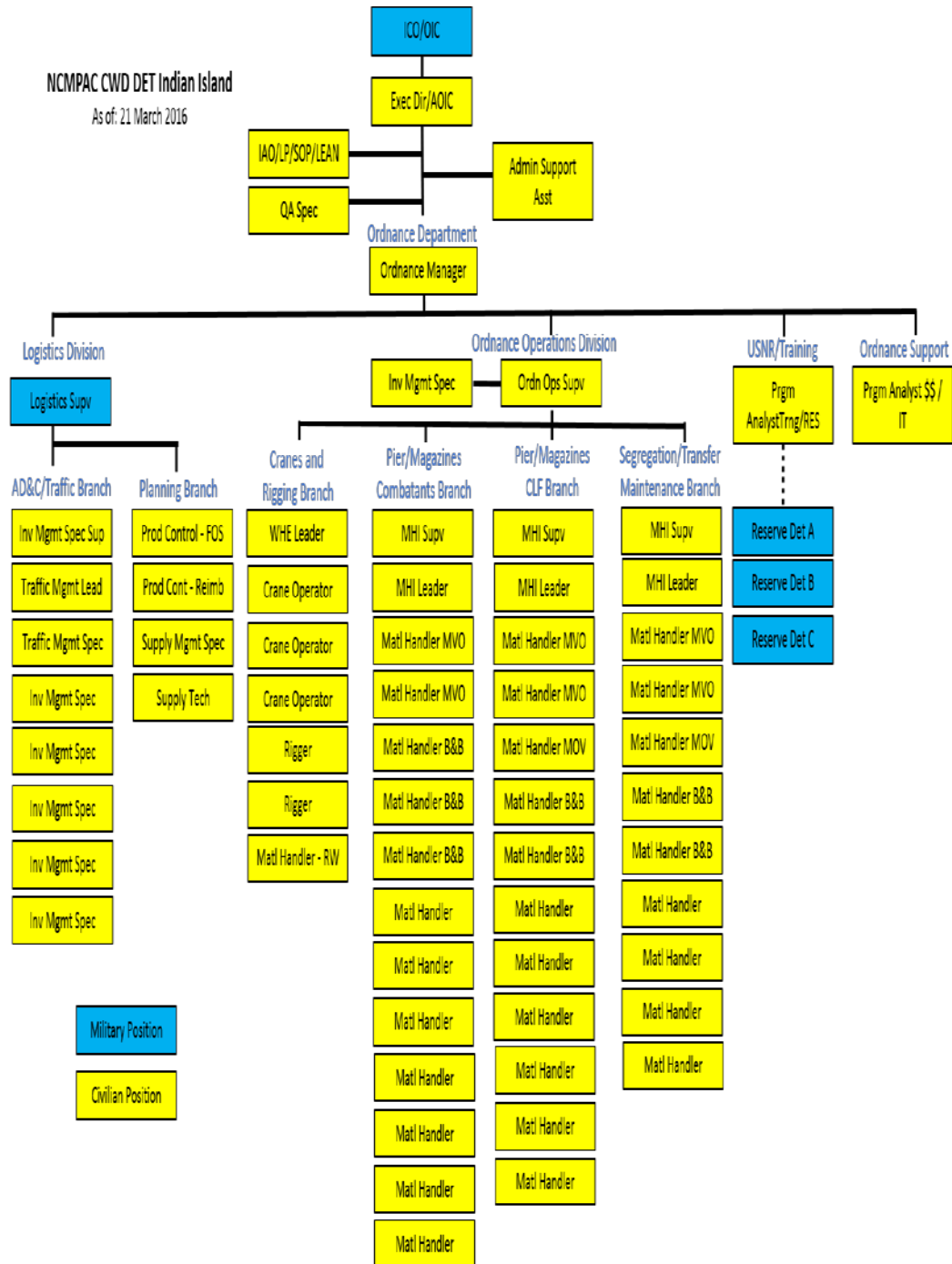
E. NMCPAC CWD DET INDIAN ISLAND

Indian Island is a command located in the Pacific Northwest that has the same roles and responsibility as NMCPAC EAD DET PH. The island itself is 2,700 acres and serves as the Navy’s only deep water port on the West Coast of the United States with the capability of loading munitions for all U.S. military branches. Indian Island is also the U.S. military’s largest ordnance storage site on the West Coast, handling small arms ammunition, artillery shells and missiles (P. Guerrero, 2016). Although Indian Island does not have the same volume of vessels as Pearl Harbor, their ordnance tonnage is very similar. Indian Island comprises active-duty military and government civilians who handle all the ammunition and explosives. According to the FLT MPS Activity Manpower Document for the command dated February 6 2016, there are 86 civil service employee positions authorized. NMCPAC CWD DET Indian Island’s staff organization chart is shown in Figure 3. The government civilian workforce include both federal wage (WG/WL/WS) and general schedule (GS) classification



positions. I simulate an insourced work force for NMCPAC EAD DET PH similar to that used at Indian Island for the cost-benefit analysis.

Figure 3. NMCPAC CWD DET Indian Island Organizational Chart. Adapted from B.E. McCorkell, personal communication, June 15, 2017.



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LITERATURE REVIEW

The 2000 Kneisler study looked at the cost comparison of outsourcing the helicopter combat (HC) support mission aboard Military Sealift Command (MSC) ships. One of the main questions addressed in the Kneisler study is similar to what this project aims to do. While the objective of Kneisler's paper was to determine the cost of conducting these missions, the study also examined whether the in-house costs exceeded the current outsource contract costs. When comparing the in-house and outsourcing costs, the methodology used took into account the OMB Circular A-76 guidelines to calculate capital expenses, military personnel costs, and operating expenses for an HC squadron and to derive a cost for a detachment. This derived cost was then compared to the actual contract cost. In addition, the statement of work (SOW) from the contract was considered, comparing the difference in services provided and determining the generated savings for the Navy at 13.77% through outsourcing. Similar to the methodology that will be used in this project, the Kneisler study looked at differences in capabilities and trade-offs, including increased operation tempos and possible personnel shortfalls.

Drake (2003) followed Boardman's nine steps in his CBA study that looked at the different refueling options for ships in Pearl Harbor. The Drake study focused on alternative methods of refueling, either maintaining the status quo of using barges and pipeline services, exclusively using pipeline, or exclusively using barges. In his study, multiple entities had standing and the impacts were numerous. After monetizing the impacts and discounting to obtain present values, his study provided a ranking of the three possible alternatives with a combined pipeline and barge refueling serving as the best result. While standing and impact were important for his study, they do not play an important role in this study.

In a study by Cummins et al. (2009), a CBA is used to determine the best course of action in regards to the Department of the Navy aircraft selection for logistics support operations. The Cummings et al. (2009) study followed a similar methodology as the Boardman's nine steps in performing a CBA, from identifying the alternatives, determining standing, cataloging the relevant impacts, predicting impacts over the life of the project, monetizing the impacts, discounting the benefits to obtain present value, computing the net present value of each alternative, and conducting sensitivity analysis to validate findings and



to formulate conclusions and recommendations. The Navy was in a transition phase from the C-9 to the C-40A when the program was put on hold due to budget constraints. With the support provided by the CBA, Cummins et al. was able to make a recommendation, based on cost estimates, to immediately resume the transition from C-9B to C-40A aircrafts.

Stacey (2006) looked at the cost and benefits for contracting already licensed and trained endodontists versus recruiting a general dentist and training them to that point to fill the shortage of this specialized dentist in the U.S. Navy. He looked at the two different alternatives. He then gathered the different pay structures and analyzed them over a 10-year period, taking into account specialty pays and other incentives. After conducting the CBA, he gave his recommendation that contracting endodontists as a complement at shore-based military treatment facilities could help fill the personnel gap. While his intent was to determine whether outsourcing was more efficient for the government, his methodology can still be used to determine whether insourcing is a better option—the “make or buy” determination does not change simply by rephrasing the question.

Given that costs are the major impact in this study, I follow Stacey’s methodology for my study. I identify the different alternatives. Then, I compare the cost of a federal civilian workforce versus the total cost of the contract paid to the contractor. The costs of the civilian workforce include factors such as fringe benefits, cost of living allowance (COLA), locality pay, and hazard pay. I use Kneisler’s comparison of the SOW versus in-house capabilities to look at intangible factors. Finally, the findings are presented over five years, since a contract is base year plus four one-year options, and a recommendation is provided.

There have been no published studies that I know of, specifically comparing the contracting of services versus providing them in-house by government civilians for federal government. A few studies have been conducted at the local government level. In one such study, Warner and Hefetz (2011) conducted an empirical examination of the dynamics of privatization among U.S. municipalities. The researchers used survey data to explore the differences in contracting patterns and found that a lack of cost savings drives a previously contracted service to be reversed (insourced). The level of monitoring for efficiency led to a higher rate of insourcing from the previous method of contracting.



As the federal government shifted a lot of work from in-house to contracting with the A-76 studies, there has been minimal follow-up to ensure the efficiency (cost savings) by contractors. This study looks at determining whether there are cost savings with reverting the current work at NMCPAC EAD DET PH from contractors to federal civilian employees. Further research should look at studying efficiency gains from A-76 studies and the outsourcing efforts that followed from those findings.



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III. METHODOLOGY

A. BACKGROUND

The Office of Management and Budget (OMB) Circular A-76 (A-76), first issued in 1966, defines federal guideline for determining whether recurring commercial activities should be outsourced to the private sector or insourced with federal employees. The goal was to achieve savings and enhance productivity by relying on the commercial sector if the product or service could be procured more economically from the private sector.

The DOD conducted an A-76 study in the 1980s that reviewed the fleet ordnance support for Pearl Harbor (K. Russell, personal communication, December 2, 2016). At that time, the government transferred the workload from military personnel to contract support. For over thirty years, contractors provided the ordnance handling support with no further evaluation of cost savings. As there have been issues with the tracking of cost data related to the conduct of A-76 competitions, it is difficult to determine the overall savings (Grasso, 2013). There is currently a moratorium on conducting further A-76 studies on public-private competition (Weiler, 2016). While an A-76 only studies the commercial functions performed by federal employees, we can use a cost-benefit analysis (CBA) to compare contracted services against an insourced labor make-up – looking at cost differences after a service has been sourced out.

A CBA is a policy assessment that quantifies, in monetary terms, the value of all impacts of a policy (Boardman et al., 2011). The objective of a CBA is to identify the course of action that allocates resources more efficiently. CBA's have been used to aid in decision-making processes.

The steps of a CBA include the following: specify the alternative projects, determine standing, develop impact categories, monetize all impacts, discount the values to obtain present values, compute the net present value of each alternative, perform sensitivity analysis, and make a recommendation. The alternative projects are the different courses of action (COA) that are being compared. Determining standing looks at whose benefits and costs should be included in the analysis. The impact categories are the costs or benefits (cost savings) being looked at and they need to have a dollar value associated with them. For



projects that have impacts over years, the “future benefits and costs are discounted relative to the present benefits and cost in order to obtain their present value (PV)” (Boardman, et al., 2011, p. 12). The net present value is determined for each COA by taking the difference between the PV of the benefits and the PV of the costs. Sensitivity analysis takes into consideration uncertainties from the assumptions made and tests the robustness of the results. Finally, a recommendation can be made for the best alternative.

B. ASSUMPTIONS

To create a labor force to replace the one provided through the services contracted, NMCPAC CWD DET Indian Island’s organization chart provided a template, which was augmented by additional information provided from NMCPAC EAD DET PH. The NMCPAC CWD DET Indian Island’s organization chart provides guidance for the organization chart and tasks in Pearl Harbor. Similarities between the two organizations include the Ordnance Manager having overarching responsibility over the separate divisions and departments, a segregation branch under ordnance operations, AD&C being separate from ordnance operations, and MHI supervisors at each branch below the ordnance operations. Differences include a lack of a crane and rigging branch in Pearl Harbor, three divisions under the ordnance manager in Pearl Harbor versus two in Indian Island, the inclusion of carpenters, motor vehicle operators separate from material handlers, mechanics, and dispatchers in Pearl Harbor, and designated material handling crews at Pearl Harbor.

Given that all operations using the civilian labor force are taking place at a single location, the material handlers at Indian Island perform all tasks, from selecting and loading the material at the magazine, transporting it to the pier, and loading the material onboard vessels. However, due to the separate locations of the magazines and the pier/wharfs, the manning structure differs slightly in Pearl Harbor. Also, Pearl Harbor does not need a Cranes and Rigging Branch since those services are provided by NAVFAC. Eighty additional personnel are added to the staff of NMCPAC EAD DET PH to fill the roles that the contractor performs under the ordnance-handling contract.

At Pearl Harbor, the ammunition distribution and control (AD&C) department consists of traffic management and inventory management. The technical department is made up of the quality assurance (QA) division and supply management. Ordnance operations are

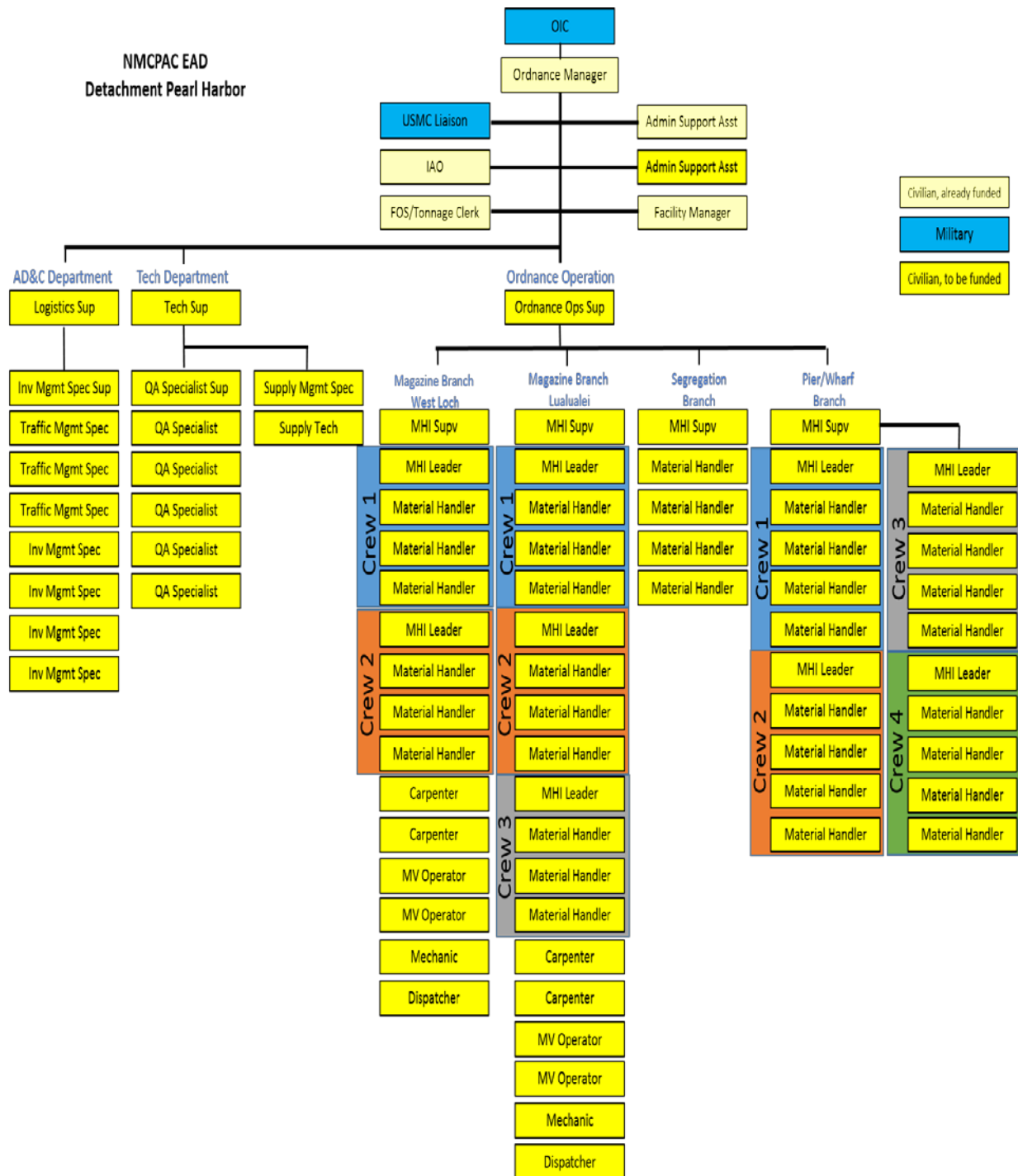


overall in charge of magazines, pier/wharfs, and segregation branches. Each branch has its own supervisor who reports to the ordnance operations supervisor. This differs from Indian Island where there is a Logistics Division that oversees the AD&C/traffic branch and the planning branch, and there is no branch of QA specialists.

Due to the size of Lualualei, the workforce model assumes three crews are needed, as compared to the two crews at the West Loch branch. Four handling crews are assigned to the pier/wharf since there is a maximum of four operations going on at any given time. In terms of pay, the magazine branches were established at wage grade 8. The crews handling ordnance on the pier/wharfs were upgraded to a wage grade 9 due to additional training and certifications required. Figure 4 shows the organization chart for NMCPAC EAD DET PH under a civil service work force, as modeled for use in this analysis.



Figure 4. NMCPAC EAD DET Pearl Harbor Organization Chart. Adapted from B. E. McCorkell, personal communication, June 13, 2017.



General schedule (GS) pay was determined using the annual Base Salary Table effective January 2017 located on the Office of Personnel Management's (OPM) website. Federal Wage System (FWS) wage schedules were determined using the Defense Civilian Personnel Advisory Service (DCPAS) appropriated fund hourly wage schedule for Hawaii issued on August 16, 2016 and multiplying those wages by 2080 hours to calculate an annual salary. In line with OMB A-76, cost estimates used a rate of step 5 for GS and step 4 for FWS and fringe benefits of 36.25%. For GS personnel, they are authorized an additional 11.32% cost of living allowance (COLA) and 17.92% for locality pay (Office of Personnel Management, 2017). FWS personnel are given a 4% hazard pay. Table 3 provides the pay breakdown for the additional position under a civil service work force. Positions already funded were not included since those positions do not go towards the overall contract cost paid to the contractor. For simplicity, there were no step increases factored into the payroll rates.

To calculate annual payroll costs, annual salaries are increased in accordance with the pay raise factor shown in Table 4. Then, fringe benefits, locality, COLA, and hazard pay are calculated off the new annual salary. Table 5 shows the annual payroll total cost for each year from 2017 until 2022. A one-time buy figure of \$3,100,000 is used to purchase MHE,³ and annual vehicle leases from NAVFAC cost \$550,968.⁴ As the purchase and lease were not executed in FY17, we will apply the inflation factor listed in Table 4. The general inflation factor will also be applied to the FY17 cost of the contract so we have a basis to compare our costs to.

The contract cost stayed at the 2017 rate with inflation added every year. Even though the cost has risen historically, this study used a flat rate to negate any cost creep with the in-house scenario. It also provided for a worst-case scenario in determining when the NPV for insourcing would catch up to contracting.

³ Data provided by B.E. McCorkell, personal communication, November 6, 2017.

⁴ Data provided by B.E. McCorkell, personal communication, June 13, 2017.



Table 3. Labor breakdown for additional personnel, in FY2017 dollars.

	Job Title	# of Personnel	Grades	Hourly	Salary (GS Step 5, FWS Step 4)	Fringe Benefits 36.25%	Locality 17.92%	COLA 11.32%	Hazard Pay 4%	TOTAL FOR ONE FTE	TOTAL FOR POSITION
						36.25%	17.92%	11.32%	4%		
AD&C Department	Admin Support Asst	1	GS-08		\$44,379.00	\$16,087.39	\$7,952.72	\$5,023.70		\$73,442.81	\$73,442.81
	Logistics Supervisor	1	GS-12		\$71,086.00	\$25,768.68	\$12,738.61	\$8,046.94		\$117,640.22	\$117,640.22
	Inv Mgmt Spec Supervisor	1	GS-11		\$59,305.00	\$21,498.06	\$10,627.46	\$6,713.33		\$98,143.84	\$98,143.84
	Traffic Mgmt Specialist	3	GS-09		\$49,019.00	\$17,769.39	\$8,784.20	\$5,548.95		\$81,121.54	\$243,364.63
	Inv Mgmt Specialist	4	GS-09		\$49,019.00	\$17,769.39	\$8,784.20	\$5,548.95		\$81,121.54	\$324,486.17
Tech Department	Tech Supervisor	1	GS-12		\$71,086.00	\$25,768.68	\$12,738.61	\$8,046.94		\$117,640.22	\$117,640.22
	QA Specialist Supervisor	1	GS-11		\$59,305.00	\$21,498.06	\$10,627.46	\$6,713.33		\$98,143.84	\$98,143.84
	QA Specialist	5	GS-09		\$49,019.00	\$17,769.39	\$8,784.20	\$5,548.95		\$81,121.54	\$405,607.72
	Supply Mgmt Specialist	1	GS-09		\$49,019.00	\$17,769.39	\$8,784.20	\$5,548.95		\$81,121.54	\$81,121.54
	Supply Technician	1	GS-07		\$40,075.00	\$14,527.19	\$7,181.44	\$4,536.49		\$66,320.12	\$66,320.12
West Loch Branch	Ordinance Ops Supervisor	1	GS-12	34.06	\$71,086.00	\$25,768.68	\$12,738.61	\$8,046.94		\$117,640.22	\$117,640.22
	MHI Supervisor	1	WS-08	39.18	\$81,494.40	\$29,541.72			\$3,259.78	\$114,295.90	\$114,295.90
	MHI Leader	2	WL-08	32.14	\$66,851.20	\$24,233.56			\$2,674.05	\$93,758.81	\$187,517.62
	Material Handler	6	WG-08	29.22	\$60,777.60	\$22,031.88			\$2,431.10	\$85,240.58	\$511,443.50
	Carpenter	2	WG-07	27.19	\$56,555.20	\$20,501.26			\$2,262.21	\$79,318.67	\$158,637.34
	Motor Vehicle Operator	2	WG-07	27.19	\$56,555.20	\$20,501.26			\$2,262.21	\$79,318.67	\$158,637.34
	Motor Vehicle Dispatcher	1	GS-06		\$36,063.00	\$13,072.84	\$6,462.49	\$4,082.33		\$59,680.66	\$59,680.66
	Motor Vehicle Mechanic	1	WG-08	29.22	\$60,777.60	\$22,031.88			\$2,431.10	\$85,240.58	\$85,240.58
	MHI Supervisor	1	WS-08	39.18	\$81,494.40	\$29,541.72			\$3,259.78	\$114,295.90	\$114,295.90
	MHI Leader	3	WL-08	32.14	\$66,851.20	\$24,233.56			\$2,674.05	\$93,758.81	\$281,276.42
Lualualei Branch	Material Handler	9	WG-08	29.22	\$60,777.60	\$22,031.88			\$2,431.10	\$85,240.58	\$767,165.26
	Carpenter	2	WG-07	27.19	\$56,555.20	\$20,501.26			\$2,262.21	\$79,318.67	\$158,637.34
	Motor Vehicle Operator	2	WG-07	27.19	\$56,555.20	\$20,501.26			\$2,262.21	\$79,318.67	\$158,637.34
	Motor Vehicle Dispatcher	1	GS-06		\$36,063.00	\$13,072.84	\$6,462.49	\$4,082.33		\$59,680.66	\$59,680.66
	Motor Vehicle Mechanic	1	WG-08	29.22	\$60,777.60	\$22,031.88			\$2,431.10	\$85,240.58	\$85,240.58
	MHI Leader	1	WL-08	32.14	\$66,851.20	\$24,233.56			\$2,674.05	\$93,758.81	\$93,758.81
Segr Branch	Material Handler	4	WG-08	29.22	\$60,777.60	\$22,031.88			\$2,431.10	\$85,240.58	\$340,962.34
	MHI Supervisor	1	WS-10	43.24	\$89,939.20	\$32,602.96			\$3,597.57	\$126,139.73	\$126,139.73
Pier/Wharf Branch	MHI Leader	4	WL-09	34.36	\$71,468.80	\$25,907.44			\$2,858.75	\$100,234.99	\$400,939.97
	Material Handler	16	WG-09	31.24	\$64,979.20	\$23,554.96			\$2,599.17	\$91,133.33	\$1,458,133.25
	TOTAL Personnel	80			Total Labor	\$654,153.87	\$122,666.70	\$77,488.12	\$44,801.54	\$2,703,672.62	\$7,063,871.85

Table 4. Price/Inflation/Escalation Annual Rates (Percent Increase Over Previous Year). Source: K. Russell, personal communication, June 13, 2017.

	FY18	FY19	FY20	FY21	FY22	FY23
Civilian Pay Raise	1.90%	1.90%	1.90%	2.10%	2.10%	2.10%
General Inflation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%

Table 5. Annual Payroll Cost After Factoring in Pay Raises.

Job Title	FY17	FY18	FY19	FY20	FY21	FY22
Admin Support Asst	\$73,442.81	\$74,838.22	\$76,260.15	\$77,709.09	\$79,340.98	\$81,007.14
Logistics Supervisor	\$117,640.22	\$119,875.39	\$122,153.02	\$124,473.93	\$127,087.88	\$129,756.72
Inv Mgmt Spec Supervisor	\$98,143.84	\$100,008.58	\$101,908.74	\$103,845.01	\$106,025.75	\$108,252.29
Traffic Mgmt Specialist	\$243,364.63	\$247,988.56	\$252,700.34	\$257,501.65	\$262,909.18	\$268,430.27
Inv Mgmt Specialist	\$324,486.17	\$330,651.41	\$336,933.79	\$343,335.53	\$350,545.57	\$357,907.03
Tech Supervisor	\$117,640.22	\$119,875.39	\$122,153.02	\$124,473.93	\$127,087.88	\$129,756.72
QA Specialist Supervisor	\$98,143.84	\$100,008.58	\$101,908.74	\$103,845.01	\$106,025.75	\$108,252.29
QA Specialist	\$405,607.72	\$413,314.26	\$421,167.23	\$429,169.41	\$438,181.97	\$447,383.79
Supply Mgmt Specialist	\$81,121.54	\$82,662.85	\$84,233.45	\$85,833.88	\$87,636.39	\$89,476.76
Supply Technician	\$66,320.12	\$67,580.20	\$68,864.22	\$70,172.64	\$71,646.27	\$73,150.84
Ordinance Ops Supervisor	\$117,640.22	\$119,875.39	\$122,153.02	\$124,473.93	\$127,087.88	\$129,756.72
MHI Supervisor	\$114,295.90	\$116,467.52	\$118,680.40	\$120,935.33	\$123,474.97	\$126,067.94
MHI Leader	\$187,517.62	\$191,080.45	\$194,710.98	\$198,410.49	\$202,577.11	\$206,831.23
Material Handler	\$511,443.50	\$521,160.93	\$531,062.99	\$541,153.19	\$552,517.40	\$564,120.27
Carpenter	\$158,637.34	\$161,651.45	\$164,722.82	\$167,852.56	\$171,377.46	\$174,976.39
Motor Vehicle Operator	\$158,637.34	\$161,651.45	\$164,722.82	\$167,852.56	\$171,377.46	\$174,976.39
Motor Vehicle Dispatcher	\$59,680.66	\$60,814.59	\$61,970.07	\$63,147.50	\$64,473.60	\$65,827.54
Motor Vehicle Mechanic	\$85,240.58	\$86,860.16	\$88,510.50	\$90,192.20	\$92,086.23	\$94,020.04
MHI Supervisor	\$114,295.90	\$116,467.52	\$118,680.40	\$120,935.33	\$123,474.97	\$126,067.94
MHI Leader	\$281,276.42	\$286,620.68	\$292,066.47	\$297,615.73	\$303,865.66	\$310,246.84
Material Handler	\$767,165.26	\$781,741.40	\$796,594.48	\$811,729.78	\$828,776.10	\$846,180.40
Carpenter	\$158,637.34	\$161,651.45	\$164,722.82	\$167,852.56	\$171,377.46	\$174,976.39
Motor Vehicle Operator	\$158,637.34	\$161,651.45	\$164,722.82	\$167,852.56	\$171,377.46	\$174,976.39
Motor Vehicle Dispatcher	\$59,680.66	\$60,814.59	\$61,970.07	\$63,147.50	\$64,473.60	\$65,827.54
Motor Vehicle Mechanic	\$85,240.58	\$86,860.16	\$88,510.50	\$90,192.20	\$92,086.23	\$94,020.04
MHI Leader	\$93,758.81	\$95,540.23	\$97,355.49	\$99,205.24	\$101,288.55	\$103,415.61
Material Handler	\$340,962.34	\$347,440.62	\$354,041.99	\$360,768.79	\$368,344.93	\$376,080.18
MHI Supervisor	\$126,139.73	\$128,536.38	\$130,978.57	\$133,467.17	\$136,269.98	\$139,131.65
MHI Leader	\$400,939.97	\$408,557.83	\$416,320.43	\$424,230.51	\$433,139.36	\$442,235.28
Material Handler	\$1,458,133.25	\$1,485,837.78	\$1,514,068.70	\$1,542,836.00	\$1,575,235.56	\$1,608,315.51
Annual Total Cost	\$7,063,871.85	\$7,198,085.41	\$7,334,849.04	\$7,474,211.17	\$7,631,169.60	\$7,791,424.16

C. COST-BASED ANALYSIS FOR USING CIVILIAN WORKFORCE FOR ORDNANCE SUPPORT AT PEARL HARBOR

This study uses the main steps of a typical cost benefit analysis, as presented by Boardman et al. (2011) and as shown in Figure 5. Because NMCPAC EAD DET PH is the only standing relevant to this analysis and because the main consideration were costs and costs savings, while benefits are assumed to be the same across alternate courses of action, the study's methodology is best described as cost-based analysis.



Figure 5. Major Steps in a CBA. Source: Boardman et al. (2011, p. 6).

1. Specify the set of alternative projects.
2. Decide whose benefits and costs count (standing).
3. Identify the impact categories, catalogue them, and select measurement indicators.
4. Predict the impacts quantitatively over the life of the project.
5. Monetize (attach dollar values to) all impacts.
6. Discount benefits and costs to obtain present values.
7. Compute the net present value of each alternative.
8. Perform sensitivity analysis.
9. Make a recommendation.

1. Assumptions

To calculate the NPV for insourcing versus contracting, this study uses the guidelines set forth in OMB A-76. The discount rate in this analysis is 7%, while inflation is 2%. Payroll figures used Step 4 for FWS and Step 5 for GS employees with an annual pay increase factored in. For 2018, only two-thirds of the total payroll figure was used since no actual hiring has occurred to date. The cost of MHE is \$3.1M for 2018, and vehicle rental costs was inflated using a base cost of \$550,968 from 2017. A one-time contract extension cost of \$4,463,269.26 is added to 2018 to cover the contractor assuming the duties until a civilian workforce is in place. First year consumables cost \$500,000, and each year afterwards is \$150,000. Figure 6 summarizes the assumptions used for this study.



Figure 6. Assumptions Used for the Analysis.

Assumptions					
Annual Discount Rate	7%				
Inflation Rate	2%				
One-Time MHE Cost	\$3,100,000.00				
Annual Vehicle Rental	\$550,968.00 (2017 figure)				
Contract Extension Cost	\$4,463,269.26				
Consumable Cost	\$500,000.00	\$150,000.00	\$150,000.00	\$150,000.00	\$150,000.00
Annual Payroll Cost	\$7,198,085.41	\$7,334,849.04	\$7,474,211.17	\$7,631,169.60	\$7,791,424.16

2. Specify the Set of Alternative Projects

This analysis compares two alternatives for handling the munitions for NMCPAC EAD DET PH. The alternatives examined in this study, or courses of action (COA), are as follows:

- COA 1: Continue providing the services through contracting.
- COA 2: Hire a DOD civilian workforce and procure all the necessary material and equipment to handle ordnance and munitions in-house.

COA 1 is the status quo. NMCPAC EAD DET PH is currently contracting the service out on a firm fixed price contract with four one-year options. The FY 2017 option cost \$8,927,000. Table 6 shows the full contract award from the last solicitation in 2012. According to the contract award, the cost of the contract covers a

full range of ordnance handling and management services including labor, materials, equipment, inventory management, transportation, supervision and management to receive inspect, store, issue, transport, load, and manage all types of ammunition, explosives, expendable and technical ordnance material and weapons. Additionally, the contractor shall perform all tasks related to peacetime and wartime munitions operations (Department of Defense, 2012).

A new contract has not been awarded and a six-month extension has been provided from October 2017 through March 2018 at an additional value of \$4,463,269.26 (NAVSUP Fleet Logistics Center Pearl Harbor, 2017).



Table 6. Contract Value for NMCPAC EAD DET PH. Adapted from email from K. Russell, December 2, 2016.

	<u>Fiscal Year</u>	<u>Contract Amount</u>
Base	2013	\$7,920,000.00*
Option 1	2014	\$8,592,000.00
Option 2	2015	\$8,749,000.00
Option 3	2016	\$8,822,000.00
Option 4	2017	\$8,927,000.00
		Total: \$43,010,000.00

*Contract amount did not cover a full fiscal year. Contract was awarded in November 2012.

COA 2 consists of a civilian workforce of 80 FTE, a one-time contract extension, a one-time buy for the Material Handling Equipment, an annual consumable budget, and the annual cost of leasing vehicles. All aspects of ordnance handling will be done by the civilian workforce using command procured and leased equipment.

3. Decide Whose Benefits and Costs Count

Also known as standing, this determines whose benefits and costs should be included. This study looks only at the standing for NMCPAC EAD DET PH. Furthermore, benefits were not giving a financial aspect so cost (or cost saving) is the only factor to evaluate.

4. Impact Categories

Some of the impact categories that can be looked at in future studies include lead time for ordering MHE and vehicles, training requirements for new hires, managerial control effects, accountability in the chain of command, and scheduling flexibilities. These impacts are not considered in the present study due to data availability issues and time constraints. The current study focuses on MHE cost, vehicle lease cost, contract extension cost, payroll cost, consumable cost, and contract cost.



5. Discount benefits and costs to obtain present values

Given that this study examines the costs over time, it is necessary to aggregate the costs that arise over different years. To calculate the present value (PV), this analysis uses the discount rate of 7% as dictated in OPM Circ. A-94. “This rate approximates the marginal pre-tax rate of return on an average investment in the private sector” (Office of Management and Budget, 1992). The formula used is for the PV of cost, PV(C), is:

$$PV(C) = \sum_{t=0}^n \frac{C_t}{(1 + s)^t}$$

where C_t is the cost in year t and s is the social discount rate (7%). Because a contract is usually the base plus four one-year options, the value calculated will cover a 5-year period. For this study, we used FY 2018 to FY 2022.

6. Compute the net present value of each alternative

The net present value (NPV) is the difference between the PV of the benefits and costs. As this study only looks at costs, the $NPV = -PV(C)$.

7. Perform sensitivity analysis

Because there are assumptions when conducting CBAs, sensitivity analyses acknowledge those uncertainties. Partial sensitivity analysis varies only one assumption at a time, whereas extreme sensitivity analysis chooses the best case or worst case in terms of NPV. This study uses Oracle Crystal Ball to run simulation based forecasts using different assumptions. The discount rate varied between 3% and 8% to reflect the OMB A-94 Appendix C average values in Table 7. Inflation varied between 1% and 3% to reflect the ten-year average CPI rate (Bureau of Labor Statistics, 2017). The payroll figures have a 2% increase variable. This could mean an additional four FTE or account for fluctuations in salary for step increases.



Table 7. Nominal Treasury Interest Rates for Different Maturities 30-Year History.
Adapted from Appendix C of OMB Circular No. A-94 (2016).

CY	3-year	5-year	7-year	10-year	20-year	30-year	Average
1988	7.3	7.7	7.8	8.0	#N/A	8.1	8
1989	7.8	8.1	8.2	8.3	#N/A	8.2	8
1990	7.4	7.5	7.6	7.7	#N/A	7.8	8
1991	7.2	7.4	7.4	7.5	#N/A	7.7	7
1992	6.1	6.5	6.7	7.0	#N/A	7.1	7
1993	5.6	6.0	6.3	6.7	#N/A	6.8	6
1994	5.0	5.3	5.5	5.7	#N/A	5.8	5
1995	7.3	7.6	7.7	7.9	#N/A	8.1	8
1996	5.4	5.5	5.5	5.6	#N/A	5.7	6
1997	5.8	5.9	6.0	6.1	#N/A	6.3	6
1998	5.6	5.7	5.8	5.9	#N/A	6.1	6
1999	4.7	4.8	4.9	4.9	#N/A	5.0	5
2000	5.9	6.0	6.0	6.1	#N/A	6.3	6
2001	5.4	5.4	5.4	5.4	#N/A	5.3	5
2002	4.1	4.5	4.8	5.1	#N/A	5.8	5
2003	3.1	3.6	3.9	4.2	#N/A	5.1	4
2004	3.0	3.7	4.2	4.6	5.4	5.5	4
2005	3.7	4.1	4.4	4.6	5.2	5.2	5
2006	4.7	4.8	4.9	5.0	5.3	5.2	5
2007	4.9	4.9	4.9	5.0	5.1	5.1	5
2008	4.1	4.3	4.4	4.6	4.9	4.9	5
2009	2.7	3.3	3.7	4.2	4.7	4.5	4
2010	2.3	3.1	3.5	3.9	4.4	4.5	4
2011	1.4	1.9	2.4	3.0	3.9	4.2	3
2012	1.6	2.1	2.5	2.8	3.5	3.8	3
2013	0.5	1.1	1.5	2.0	2.7	3.0	2
2014	1.0	1.9	2.5	3.0	3.6	3.9	3
2015	1.7	2.2	2.5	2.8	3.1	3.4	3
2016	2.0	2.4	2.7	2.9	3.2	3.5	3
2017	1.4	1.7	1.9	2.1	2.5	2.8	2

8. Make a recommendation

The final step of this study will make a recommendation on the best way forward for NMCPAC EAD DET PH. After reviewing the different alternatives and the sensitivity analysis, the recommendation will be for the alternative with the largest NPV.



IV. RESULTS

A. BASELINE COST-BASED ANALYSIS

COA 1 is providing the ordnance handling service through contracting. To determine the five-year cost of contracting, this study used the FY2017 contract cost as a starting point and added a 2% inflation rate for each year between 2018 and 2022. COA 2 used the MHE cost, vehicle rental cost, contract extension, consumable cost, and payroll figures to determine a five-year cost of operation with a DOD civilian workforce. Because vehicle rental cost was from 2017, a 2% inflation rate was added for each year. For the consumable cost, the inflation factor started in 2019. Table 5 shows the payroll figures used for this study. A discount rate of 7% was used to calculate the net present value (NPV). Table 8 shows the five-year values of each alternative. For the base analysis, the results show that the total cost is cheaper for COA 2, but the NPV is more negative; this means that for the base analysis, insourcing cost \$51,108.30 more than contracting in present dollars.

Table 8. FY 2018–2022 Base Analysis Values.

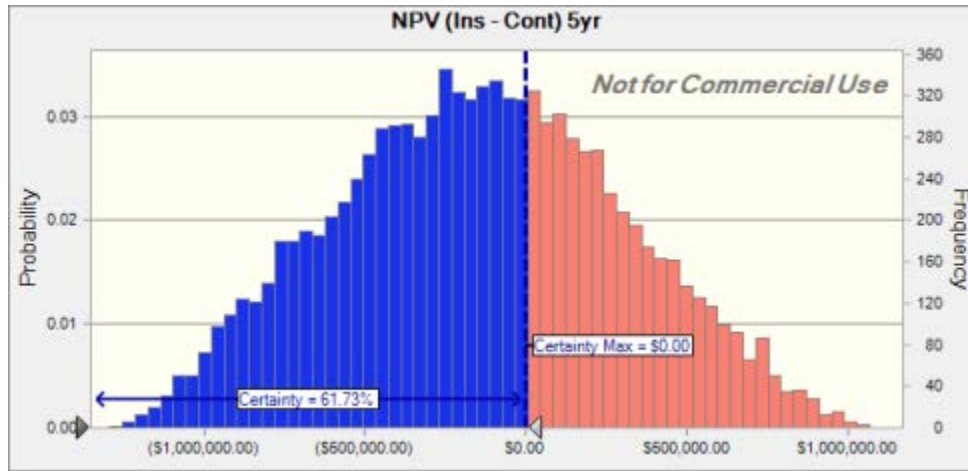
	Total Cost	NPV
COA 1	\$47,385,595.84	-\$38,754,206.49
COA 2	\$46,661,469.77	-\$38,805,314.79

B. SENSITIVITY ANALYSIS

Using the Oracle Crystal Ball add-in for Microsoft Excel, the study evaluated the sensitivity analysis by varying the input data. The discount rate ranged from 3% to 8%, inflation rate ranged from 1% to 3%, and the payroll cost could increase up to 2%. Looking at the difference in NPV between insourcing and contracting out, the entire range is from -\$1,316,202.76 to \$1,169,383.34 with a median of -\$138,808.27. Crystal Ball generated a graph showing a 61.73% certainty that the difference between the NPV of insourcing and contracting will present a larger negative NPV. Figure 6 shows the forecasted distribution for the 10,000 trials run in the sensitivity analysis.



Figure 7. NPV Sensitivity Analysis of the Difference between Insourcing and Outsourcing over 5 Years.



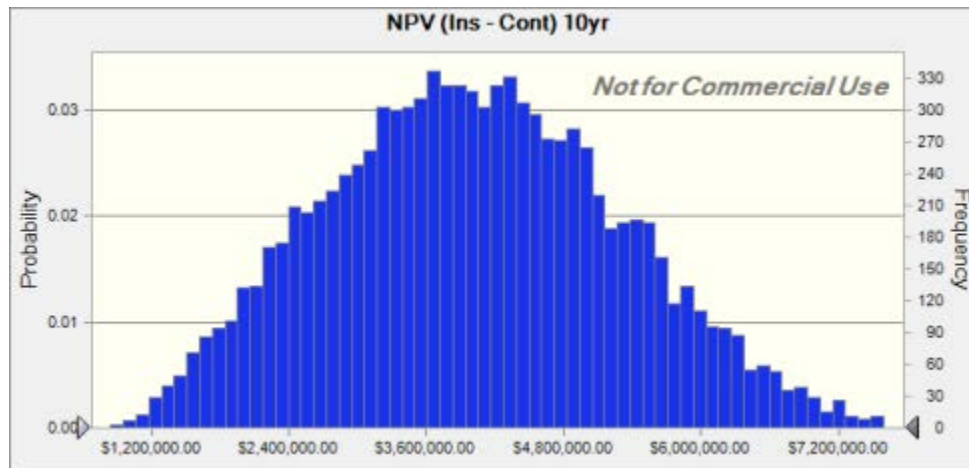
C. 10-YEAR ANALYSIS

Given the service life of Navy MHE as 8 to 10 years (Gutmann, 1980), this study also looked at the 10-year costs of contracting versus insourcing. Maintaining all numbers the same as the 5-year analysis and extending the value out to 10 years using the same inflation and discount rates, the study finds that the total cost of COA 2 is \$7,535,194.79 less than COA 1, and the NPV is also a smaller negative number. Table 9 presents these findings. The base analysis over 10-years shows a NPV savings of \$3,920,522.56 for insourcing the ordnance handling operation over contracting the service out. When factoring in the sensitivity study, all values are positive for the difference between insourcing and contracting. Figure 7 depicts the possible savings at ten years between COA 1 and COA 2. The savings range from \$846,764.85 to \$8,336,313.14.

Table 9. 10-Year Base Analysis Values.

	Total Cost	NPV
COA 1	\$99,703,122.55	-\$69,261,299.02
COA 2	\$92,167,927.76	-\$65,340,776.46

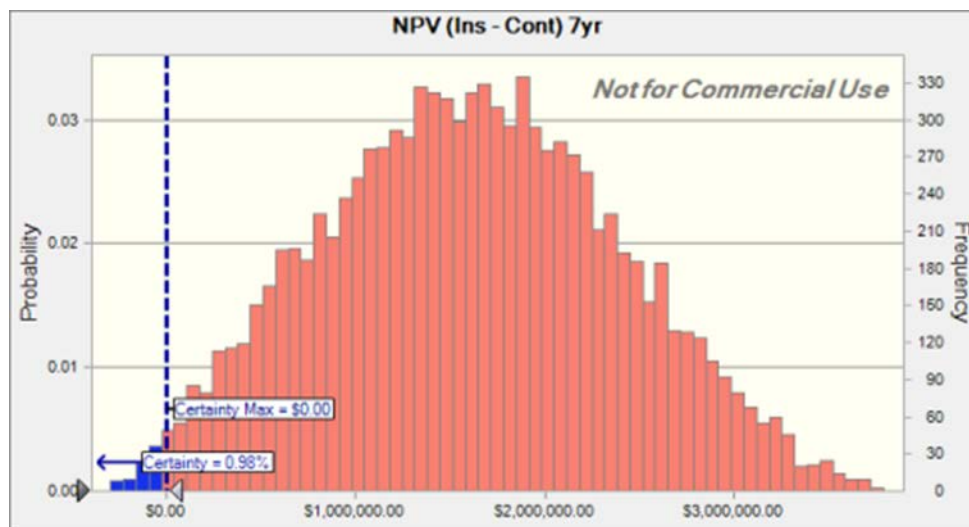
Figure 8. NPV Sensitivity Analysis of the Difference between Insourcing and Outsourcing Over 10 Years.



D. BREAK EVEN POINT

This study also found when the NPV of insourcing the ordnance handling would be the same or less as contracting the services out. This helps determine when insourcing would be more cost beneficial than outsourcing in the long run. At seven years, Figure 9 shows the sensitivity analysis shows where there is less than a 1% certainty that the difference between insourcing and contracting would provide a negative NPV. Accounting for all variances in assumptions, insourcing would become the less expensive option at this time.

Figure 9. NPV Sensitivity Analysis of the Difference between Insourcing and Outsourcing Over Seven Years.



To provide further decision support for insourcing versus contracting decisions, the model developed in this study can be adjusted to incorporate additional or relevant updated data, as they become available.



V. CONCLUSION

The main goal of this study was to conduct a cost-based analysis to determine whether insourcing can provide cost savings for NMCPAC EAD DET PH over the contracting of ordnance handling operations.

A cost-based analysis approach was used, along with a workforce planning model developed in this study to examine potential cost-savings from insourcing over outsourcing ordnance handling operations at Pearl Harbor.

For an initial five-year period, the baseline analysis showed that contracting was the more economical route. The findings were tested for robustness by using a simulation-based sensitivity analysis. The findings show that insourcing exceeds the cost of contracting with a 61.73% certainty for this five-year period. For the 10-year analysis, the baseline analysis shows insourcing saving over \$7.5 million dollars over contracting, given the data and assumptions used in this study. When conducting the sensitivity analysis to test the results, the findings show positive savings for insourcing, ranging from \$846,764.85 to \$8,336,313.14. The breakeven point was at seven years, when there was less than a 1% chance that the cost of insourcing would be greater than contracting.

A. RECOMMENDATION

Given all the factors considered in this analysis, and given the findings, this study recommends NPCPAC EAD DET PH acquire their own workforce and materiel and provide the services in-house instead of contracting out.

B. REASONS TO INSOURCE

1. Tangible Factors

The biggest reason to insource the ordnance handling at NMCPAC EAD DET PH is the monetary cost savings provided over contracting. While the initial base analysis over a 5-year period shows insourcing being the slightly more expensive option in terms of net present value, the 10-year period shows greater savings, with over seven million dollars cost savings. Another factor is the time available to do other things besides contract administration. Currently, the ordnance manager is also the contracting officer representative (COR) for the



contract. His time is better spent doing his primary job than reviewing the projected daily schedule provided from the contractor on a daily basis, as specified in the PWS.

2. Intangible Factors

Providing ordnance handling in-house has many intangible benefits. Because there is no break in the chain of command, managers and supervisors can better provide for customer needs through open communication lines. Emergent requirements can be handled more efficiently because supervisors can directly communicate with their workers, bypassing the COR/contract manager relationship of contracted services.

The command would also have more direct oversight over the work being done. This could lead to process improvements that could increase productivity and efficiency, further translating to a reduction in cost. Control is another factor. Service contracts leave it up to the contractor to determine how they want to reach the end state. Management can control the actions of an internal workforce when there are specific procedures that they want followed.

Finally, with ordnance handling provided in-house, there is not a need to re-solicit and re-award the service contract every five years. This provides continuity of service and no lapse in service if a new company wins the awards. There are no contracting issues to contend with such as solicitations, negotiations, or award protests. There are no learning curve issues if a new contractor brings in a new team of personnel.

C. REASONS TO CONTRACT

An outside vendor has provided the ordnance handling service for over 30 years. The contractors already have the personnel with the requisite knowledge and certification as well as the necessary equipment to do the job. NCMPAC EAD DET PH does not currently have a civilian workforce in place. The end-to-end hiring process takes 80 days at a minimum (Office of Personnel Management, 2008). When the government does hire its workforce, the personnel may not be fully certified to complete the job right away so the command would need to provide training. Also, the procurement of MHE is not instantaneous. Lead times are nine to fourteen months to get the equipment on station. These issues will provide challenges initially, but will become nil after the workforce has been established and the MHE is delivered.



D. POTENTIAL AREAS FOR FURTHER RESEARCH

The following are potential areas for further research recommendations:

1. Extend this analysis to other service contracts. Based on the results of this analysis, it appears there are potential savings in insourcing other services rather than contracting out.
2. Expand this study and go further in detail with the labor mix. Could it be possible that a federal civilian/contractor labor mix results in better cost savings?



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APPENDIX. SCOPE OF WORK

As adapted from Section 1.3.3 of the Performance Work Statement for Solicitation N00604-17-R-3009, the following lists all the included, but not limited, work performed by the contractor.

1. Manage, control, and maintain accountability for the receipt, storage, re-stow, segregation, and issue of all types of ammunition.
2. Perform QA/Quality Control (QC) Inspections.
3. Be available for the preparation and handling of all shipments, including the loading and off-loading of various types of cargo from ocean going vessels and barges, all ammunition, ammunition components, ammunition details and inert material.
4. Maintain the facilities in accordance with NAVSEA Ordnance Publication OP 5 for which they hold the magazine keys and determine the proper magazine space utilization and capacity planning.
5. Process and complete documentation for all material received, downloaded, transferred, stored, re-stowed, segregated, reclassified and issued/shipped to include movements to and from magazines within the NMCPAC EAD DET PH branches and on station movements at Joint Base Pearl Harbor.
6. Maintain and replenish ammunition stocks as required in accordance with established COMPACFLT Load Plan guidance and business rules. The Load Plan Compliance Tool will be the main vehicle to determine stock levels.
7. Operate and maintain current Ordnance Information Systems Retail (OIS-R) website which incorporates inventory control, identification of stock condition codes, adjustments of records and updates locations of all U.S. Navy/USMC stocks and all materials in purpose codes dictated by NAVSUP P-724. The Contractor shall provide the capability to manage all inventories, location surveys, location audits, and inventory quality control programs for all stocks, through adjustments, reclassifications, re-identifications, catalog changes, and file maintenance actions. All personnel accessing this website shall have a Secret Clearance.
 - a. Maintenance of the OIS-R website refers to data only. It does not include maintaining the application software.
8. Perform minor exterior maintenance on ordnance. Minor exterior maintenance shall be performed in accordance with applicable directives and Contractor's approved Standard Operating Procedures (SOPs). Requirements include, but are not limited to, proper preservation, packaging, marking, and modification to return items to a serviceable condition.



9. Conduct statistical estimation sampling inventories of USN/USMC ordnance in accordance with NAVSUP P-724. The Contractor shall be held accountable and liable for all ammunition and ordnance material under the Contractor's control.
 - a. For Security Risk Category (SRC) I, II, V, and VI, the Contractor shall be held liable to reimburse the Government for the cost of any missing, damaged, lost, or stolen ammunition and explosives with these categories. SRC I, II, V and VI are described in OPNAVINST 8015.2 and 5530.13.
 - b. The Contractor shall report to the Contracting Officer's Representative (COR), Ordnance Manager (OM), and Officer-in-Charge (OIC) any suspected loss or theft of ordnance.
10. Prepare excess ordnance material for retrograde or sale to foreign Governments upon request from the OM.
11. Make provisions for the disposal of unserviceable, damaged, excess, or dangerous ammunition upon request from the OM, in accordance with NAVSUP P-724.
12. Download/re-stow magazine/building contents as described in PWS Section 5.6.2.3 herein in support of Maintenance of Real Property (MRP). Upgrade and grid magazines as described in PWS Section 5.6.2.4.
13. Process break-bulk and MILVAN container shipments. MILVAN and non-MILVAN workload includes receipts, issues, re-stows, Fleet/Field returns, break-bulk, container evolutions (empty and full—includes receipts, un-loading, processing, loading and backloading) and opportune lifts.
14. Record, report, and file all prior to use/post-use inspections of Naval Air Systems Command (NAVAIR) and Cruise Missile Project (CMP) to include Packaging, Handling, Storage, and Transportation (PHS&T) Equipment.
15. Demonstrate proficiency in weapons handling by conducting training and certification using handling manuals and Government Furnished Equipment (GFE) training aids.
16. Maintain an integrated QA program for inspection of ammunition, explosives, and associated components for all phases of work performed under the Contractor's QA/QI cognizance.
17. Be capable of handling evolutions on piers, wharves, and magazines, as required. Handling tonnage is expected to be no more than 40,000 short tons (S/Ts) per 12-month period. This figure includes receipts, issues, re-stows, downloading/transfers, Fleet/Field returns, International Organization for Standardization (ISO) Vans, and opportune lifts. Internal re-stow tonnage does not count as part of the 40,000 S/Ts. Tonnage shall be documented and counted as one short ton in accordance with NMCPACEADDETPHINST 8010.1A.



- a. Although the handling tonnage is expected to be no more than 40,000 S/Ts, changes to NMCPAC EAD DET PH's mission and support may require the Contractor to handle tonnage in excess of 40,000 S/Ts. As such, any such increase will be considered with-in scope of this PWS.
 - b. The Contractor shall immediately notify the COR once the actual handling tonnage reach 30,000 S/Ts to ensure sufficient lead time to process a with-in scope modification, if justified.
18. Missing, Lost, Stolen, or Recovered (MLSR) reports and Financial Liability Investigation of Property Loss (FLIPL) DD Form 200 reports shall be provided for Arms, Ammunition & Explosives (AA&E) as applicable with NAVSUP P-724, OPNAVINST 5530.13, MCO 4340.1, and formats in OPNAVINST 3100.6.
19. Provide statistical tonnage data workload reporting for Fleet Ordnance Support (FOS)/Receipt, Segregation, Storage, and Issue (RSSI) of ammunition, components, and accessories at NMCPAC EAD DET PH in accordance with NMCPACEADDETPHINST 8010.1A.



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