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## THESIS

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A LOGIC MODEL TO REVIEW MATERIAL NOMINATED  
FOR INCLUSION INTO PROJECT CODE PL3

by

Stephen J. Waite  
and  
William J. Powers, Jr.

December 1989

Thesis Advisor: Dan Trietsch

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A Logic Model to Review Material Nominated  
for Inclusion into Project Code PL3

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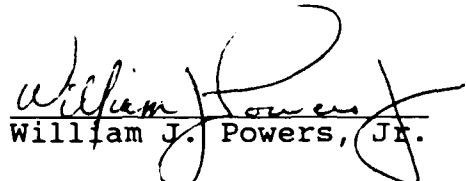
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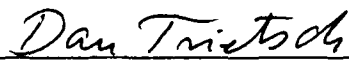
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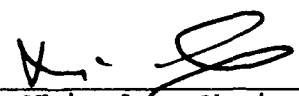
  
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ABSTRACT

The Naval Petroleum Office (NAVPETOFF) has been assigned the responsibility of reviewing and managing the PL3 Prepositioned War Reserve Material Requirements (PWRMR) program. Limited guidance and direction has been provided to better manage and coordinate this task. The objective of this thesis was to clarify the existing guidance and use it to develop a rational and functional approach to reviewing items for inclusion as a PL3 PWRMR. The result of this endeavor was the development of a decision review model. The model uses an item's criticality, shelf-life constraints, special handling requirements, substitutability, and present stock position as the key elements.

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## I. INTRODUCTION

### A. BACKGROUND

The Prepositioned War Reserve Material Requirement (PWRMR) program was designed to provide supply support for U.S. military forces, enabling them to carry out operations in support of contingency plans. This stock of supplies is intended for use to sustain these military operations until resupply and logistic support can be established. The Chief of Naval Operations (CNO) defines PWRMR as:

That portion of the War Reserve Material Requirement which approved Secretary of Defense guidance dictates be reserved and positioned at or near the point of planned use or issue to the user prior to hostilities, to reduce reaction time and to assure timely support of a specific force/project until replenishment can be effected. [Ref. 1]

Each Department of Defense (DOD) component is responsible for establishing and managing an adequate stock of war reserves (WR).

The level of the war reserves is partially determined from the Defense Guidance (DG) which is issued by the Secretary of Defense. The DG, which is updated and issued annually, establishes goals and objectives for the Department of Defense. This and other defense planning documents contribute in determining force structure composition, which directly affects WR stocking levels.

The PWRMR program is divided into two areas, Primary and Secondary War Reserve Items. The area that the authors are concerned with is the packaged petroleum products of the Secondary Item War Reserves, identified by the Navy as project code PL3. Secondary Items come under the control of OP 41 on the CNO's staff. The Navy Petroleum Office (NAVPETOFF) is tasked with the review and management of the PL3 program.

#### B. PROBLEM

Since the program's initial establishment little guidance or clarification has been issued to better manage or coordinate the PL3 program. This thesis will try to clarify the intent of this program and reestablish the reasoning behind certain procedures, while at the same time reviewing standing procedures and organizational responsibilities. Ideally, the end result should be a better managed and efficient program that positively contributes to national defense.

#### C. OBJECTIVES

The objective of this thesis is to develop a clear, functional step-by-step approach to reviewing items nominated by the area Unified Commanders (CINCPACFLT, CINCLANTFLT, AND CINCPACFLT hereinafter referred to as "CINCs") as PL3 PWRMR, for the NAVPETOFF. This will be accomplished with the development of a PL3 review model. The model, when employed,

will assist the NAVPETOFF with the task of reviewing and managing the PL3 program.

#### D. RESEARCH QUESTIONS

The authors' primary research question is:

- Can the validity of PL3 items for the PWRMR program be improved by utilizing a decision model in the initial selection and annual review of the items and their stocking levels?

The subsidiary questions are:

- What constitutes a packaged petroleum (PL3) PWRMR item?
- Where does the direction for program guidance and development come from?
- What methodology is currently used by NAVPETOFF to determine the validity of PL3 PWRMR nominations?

#### E. SCOPE

This thesis will concentrate on the current list of PL3 items included in the PWRMR. By using an arbitrarily selected sample of PL3 items, the authors will examine the validity behind the item inclusion in the WR program. The authors will also examine the stocking levels to determine how realistic those numbers are.

Our research was limited to DOD and Navy directives and instructions pertaining to the PWRMR, PL3 items, and the makeup of the general WR program.

#### F. METHODOLOGY

The existing PWRM program and the NAVPETOFF organization, as it pertains to the Packaged Petroleum (PL3) PWRMR items,

served as the baseline for the authors' analysis. This included a thorough review of all existing instructions and directives giving guidance to the program. The authors also visited the Navy Petroleum Office to gather additional data pertaining to the PL3 PWRMR program and to review the working infrastructure of NAVPETOFF and its role in the PL3 program. Fifteen items were then arbitrarily selected as a sample from the more than 170 PL3 PWRMR items, and a more thorough examination of each item's physical characteristics, stocking levels and demand histories was conducted. A review of the selection criteria for WR items was also done in order to verify the effectiveness of the items selected for the sample.

#### G. PREVIEW

Chapter II discusses the background of the PWRMR program. The chapter also gives a more detailed organizational aspect of how the Packaged Petroleum products, PL3 material, are classified as supplementary WR items. The roles and responsibilities of various DOD and Department of Navy (DON) organizations will also be discussed.

Chapter III will present the details of the PL3 program review and working model. This will entail an in-depth examination of the various model elements and their importance.

Chapter IV will analyze the proposed model for determining proper PL3 stocking levels.

Chapter V presents the authors' conclusion, recommendations, and suggestions for further research.

## II. PWRMR INVENTORY MANAGEMENT REVIEW

### A. INTRODUCTION

This chapter discusses the organization of the PWRMR and the secondary item war reserve programs. The discussion will include the administrative structure of the program, an examination of the different classifications of war reserve items, how items are determined to be a war reserve material, what constitutes project code PL3 and how the material from this project code fits into the overall PWRMR program. The authors will also introduce and discuss some existing PWRM models (FILL, TARSELL, and AVCAL) to establish a point of reference for the development of the PL3 decision model.

### B. WAR RESERVE PROGRAM

The basic objective of the DOD is to be prepared to support national policies and successfully defend the security of the United States. A primary element of military readiness must be the sound, careful, and prudent establishment and management of adequate war reserves to ensure that this defense capability is maintained and preferably enhanced at the onset of hostilities. The requirement to attain this element of preparedness led to the establishment of the DOD War Reserve Program.

The DOD has directed that each component of the military (Navy, Air Force, and Army) be responsible for establishing programs capable of computing war reserve requirements, procuring these requirements and maintaining them at proper stocking levels. The Office of the Secretary of Defense (OSD) issues the Defense Guidance (DG) annually. The DG provides the requirements that the armed services are to meet, and therefore forms the basis for the War Reserve Material Requirement (WRMR). The WRMR is simply the material required to sustain operational forces in a wartime scenario for a specified period of time. Navy WRMR are determined from the requirements established within the planning structure for mobilization. Mobilization Planning, for the Navy, encompasses the Navy War Reserve Program (NAVWARP), industrial preparedness, contingency plans, and mobilization exercises to meet the requirements established in the DG.

The NAVWARP consists of WRMR, War Reserve Stock (WRS), and other authorized war reserves. The NAVWARP was a project established by the CNO to provide authorization for material to be acquired and retained in support of specific contingency plans. [Ref. 2] In the office of the CNO, OP-41 is the responsible authority that provides program policy, guidance and direction. OP-41 also serves as the primary point of all discussion concerning NAVWARP with the resource sponsors and CNO. They insure war reserve projects receive proper funding, are represented during the Planning, Programming, and Budgeting

System (PPBS) process, and are kept up-to-date by their technical sponsors (i.e., NAVSUP, NAVAIR, etc.). [Ref. 3]

The technical sponsors, usually System Commands (i.e., NAVSEASYSKOM, NAVSUPSYSKOM, etc.), are responsible for:

- making sure allowance list and other program documentation are up-to-date.
- providing funding requirements to resource sponsors when directed by CNO via OP-41.
- compiling funding requirements submitted by resource sponsors.
- providing appropriate justification of funding requirements submitted by the resource sponsors during budget submission.

The Naval Supply Systems Command (NAVSUPSYSKOM) establishes and maintains procedures for management of WRM in the Navy Supply System. [Ref. 2] NAVSUPSYSKOM also develop and provide reports to operating and using commands, CNO, and supporting commands concerning the status of WRM projects.

WRMRs are organized into two specific categories. These categories are: Prepositioned War Reserve Material Requirements (PWRMR) and Other War Reserve Material Requirements (OWRMR). The PWRMRs and OWRMRs are further subdivided into primary end item and secondary end item requirements. The PWRMR is that part of the WRMR that is prepositioned in strategic locations worldwide in order to best support our forces in the performance of specific plans that are identified in the DG. The OWRMR make up the remainder of the WRMR without the PWRMR. [Ref. 4]

War Reserve Material Requirement items are further categorized down into project codes. The project code is characterized by an item's priority, the type of material, and the end user. Accordingly, each DOD component shall establish and maintain a positive and continuing War Reserve Material Program that reflects the policies contained in DOD Directive 4140.2. [Ref. 4] The basis for the selection of materials as a reserve includes: demand based, allowance based, Advanced Base Functional Components (ABFCs), and those directed by higher authority. [Ref. 5]

1. PWRMR

The PWRM program directly supports Navy, Marine Corps, and Military Sealift Command (MSC) contingency plans. [Ref. 1] This program was developed to allow for sustained periods of operations until required resupply and logistic support could be established. Key points of the PWRMR are: [Ref. 6]

- Established to support a prescribed period of time following mobilization.
- Prestagged material stored at a location near the site of expected use or issue.
- Rotated, but not at the expense of the predetermined stocking range.
- Established to support a depth of 90 days for overseas activities.
- Funded by Congress and/or as a result of line item stratification.

## 2. OWRMR

The remainder of the war reserve items fall into the OWRMR category. To date the program has received little if any funding. The material that is there is from excesses identified in line item stratification. Key points of the OWRMR program are: [Ref. 6]

- Established for only Fleet support.
- Used to provide the requirements to support the second prescribed period of time following mobilization.
- Not subjected to material issue restrictions.

### C. NAVY SECONDARY ITEM WAR RESERVE PROGRAM

The objective of the Navy Secondary Item War Reserve Program is to,

...maintain a credible program which will assure responsive, uninterrupted logistical support of the most essential items of supply to Navy and Marine Corps operating forces during periods of mobilization, contingency situations or war. [Ref. 7]

The Department of Defense states that their policy is to "maintain military readiness by ensuring the availability of adequate stocks to support our Military Services during wartime." [Ref. 8]

The secondary item requirements are made up of the remainder of the PWRMR less the primary end items. These secondary items normally consist of spare parts, support material and equipment. These items are managed by an Integrated Material Manager (IMM) like the Defense Logistic

Agency (DLA) or a Navy Inventory Manager (IM). Secondary Items are defined as:

...DOD-managed items not designated specifically as principle items, such as minor end items, spares, repair parts, and expendable or consumable items. Secondary items include both appropriation-funded and stock-funded items. [Ref. 9]

Elements that contribute to the make-up of secondary item reserves are Fleet Issue Load Lists (FILLs) and Tender and Repair Ship Load Lists (TARSLLs). FILL items are stored aboard combat store ships and at specifies shore activities, TARSLLs are those items stored on destroyer tenders, repair ships and submarine tenders that provide industrial support.

Examples of secondary item elements are: [Ref. 3]

<u>Project Code</u>	<u>Description</u>
PL3	Packaged POL items for the Fleet CINC shore activities which are excluded from the FILLs demand computations.
PL4	AO Deck Loads, drummed products to augment loads for fleet oiler (AO) ships. Requirements determined and directed by the Fleet CINCs.
PL5	Marine Corps Cold Weather Clothing, clothing in support of Iceland Defense Force General War Plan.
PL7	Navy Foul/Cold Weather Clothing, special clothing for Seventh Fleet ships if assigned to Northern operations.
PL8	Firefighting Material, additional quantities of fire fighting material to augment ship-board material in the event of major fires afloat.

#### D. PWR MANAGEMENT AND ADMINISTRATIVE RESPONSIBILITIES

The basic objective of DOD is to be prepared to support national policies and to defend successfully the security of the nation. A primary element of military readiness is the sound and careful establishment and management of adequate war reserves. Accordingly, each DOD Component shall establish and maintain a positive and continuing War Reserve Material Program that reflects the policies prescribed herein. [Ref. 4]

WRS shall be rotated and maintained in such ready-for-issue/use condition to effectively meet wartime requirements. The cognizant service shall identify separately all WRS on a monetary and quantitative basis for management and reporting purposes. [Ref. 4]

In the Navy, the CNO has tasked OP-41 with the responsibility of establishing policy on Petroleum war reserve requirements. The agencies and department involved and their responsibilities are listed below.

##### 1. Defense Logistics Agency (DLA)

The DLA serves as an IMM for the various DOD components. They are responsible for reviewing the war reserve data received from the services to determine that the WRMRs are adequate and accurate. These data are then used to provide information back to the responsible service for updating and verifying existing stocking levels.

## 2. Fleet Material Support Office (FMSO)

The FMSO is responsible for the following: [Ref. 1]

- Review NAVSUP implementing directives, instructions, and policy guidance. Upon review completion FMSO will forward any recommended changes or alterations to NAVSUP.
- Coordinate NAVSUP field activity participation in the development of required readiness reports for submission to NAVSUP Headquarters and to other Bureaus and Systems Commands.
- Coordinate component development responsibilities for NAVSUP dominant Advanced Base Functional Components (ABFCs).
- Coordinate the submission of component data from other dominant Bureaus/System Commands and develop the Navy's Table of ABFCs (OPNAV Pub 41P3) for promulgation.
- Maintain and coordinate submission of changes to the NAVSUP detailed Advanced Base Initial Outfitting List (ABIOL).
- Provide the appropriate data to DLA.

## 3. Inventory Managers

The Inventory Managers are responsible for: [Ref. 1]

- Determining range and depth of material required to satisfy the approved PWRMR.
- Submitting secondary item summary reports for Navy Stock Fund (NSF) material and Appropriations Purchases Account (APA) material.
- Procuring, and/or establishing Prepositioned War Reserve Material Stock (PWRMS) reservations to cover deficient requirements in accordance with relative project priorities, item selection/deferred procurement guidance, and procedures established in NAVSUP PUB 437, upon receipt of PWRM funds from the cognizant System Command.
- Submitting PWRMR to NAVPETOFF. [Ref. 2]

#### 4. Navy Petroleum Office (NAVPETOFF)

The mission of the NAVPETOFF is to:

Provide technical direction for petroleum programs within the Navy, including facilities management and storage utilization, technical operations, quality surveillance, facility automation, oily waste handling and pollution abatement, fuel reclamation and fuel facility design review; compute and promulgate bulk Petroleum, Oil, and Lubricant (POL) Prepositioned War Reserve Material Requirements (PWRMR); and determine Navy fuel supply and CONUS lubricant requirements. [Ref. 10]

The NAVPETOFF computes Navy POL PWRMR from inputs received from the various CINCs. NAVPETOFF consolidates and reviews these PWRMR and forwards them to the Defense Fuel Supply Command (DFSC) where the PWRMR are submitted for Program Objective Memorandum (POM) development and inclusion. NAVPETOFF also submits annual packaged POL requirements for Peacetime Operating Stock (POS) and OWRMRs to the Defense General Supply Center (DGSC) and NAVWARP requirements to the Navy Fleet Material Support Office (FMSO). [Ref. 10]

The NAVPETOFF is also tasked with examining POL PWRMR annually. The reasons for this requirement are: [Ref. 4]

- To ensure that the items continue to meet the criteria to be a War Reserve.
- To ensure that the criteria used are in accordance with the current Defense Guidance.
- To review the quantity on hand (depth of stockage) and Qualification (range) for stockage.

#### E. WAR RESERVE DETERMINANTS

There are several contributing factors that go into determining the make up of actual war reserves. These factors

are criterion selection, stocking level, and, once selected, where will they be stored. Each of these factors will now be addressed.

Criteria have been established for the selection of war reserve material to ensure that only those items that are required to support wartime requirements are selected as a war reserve. The only material that will be selected to the war reserve program that does not meet the established criteria will be items that are required to meet an urgent military requirement. The DOD criteria are: [Ref. 11]

- Items essential for combat forces to: Destroy the enemy or his capacity to continue war; Provide battlefield protection of personnel; Detect, locate, and maintain surveillance of the enemy; Communicate under war conditions.
- Items essential for the operational effectiveness of combat support forces and the expanded logistics system in support of combat forces.
- Items without which essential equipment or weapon systems would be inoperative or operationally ineffective.
- Items essential for the sudden mobilization and/or deployment of approved active and reserve forces.
- Items required for survival and protection of personnel.
- Items designated as operational rations.

In addition to the above, items which meet the following criteria will not be selected as war reserve items:

- Items required solely for comfort, convenience or morale.
- Items determined to be contractor/vendor supported during the early development or production phase.

- Items which can be readily fabricated in the field with available tools and material.
- Subsistence items except for those designated as operational rations.
- Items normally available from commercial sources in sufficient quantities and in the time required to meet wartime military demands. Exceptions are permitted when urgent military considerations dictate that commercial-type items must be prepositioned prior to the assumed day of mobilization (M-Day) or emergency operation initiation.
- Items possessing deteriorative or unstable characteristics to the degree that the storage time period is limited.
- Items which are limited, non-standard, obsolete or are in the process of being replaced by other items and are not required to support approved contingency programs for allies.

War Reserve Stocking levels are determined from a wide range of inputs. This can be partially attributed to the wide assortment of material that is included in the Prepositioned War Reserve Material Stock (PWRMS). The PWRMS are the items that make up the PWRMRs. Listed below are some examples of how PWRMS are determined.

1. Floating Issue Load List (FILL)

The FILLs are prepared by Ships Parts Control Center (SPCC) to support the surface ship resupply mission of combat stores ships (AFSSs). The stocking levels and types of stock are determined from active fleet demands and are computed to have an effectiveness of 85% and an endurance level of 90 days. The FILL is defined as:

...that portion of the Fleet Issue Requirement List (FIRL) that is on a particular AFS or at a designated shore base. The FILL range and depth are based on the deployed requirements of the Fleet while those of the FIRL are based on expanded requirements. [Ref. 7]

The FILL undergoes a complete revision every two years. The formula for the revision is based upon the demand criteria, the mean, the standard deviation, an estimate of the wartime average demand, and an 85% risk factor. Once the Fleet wide FILL is prepared, the designated material is appropriately distributed on the AFSs.

## 2. Tender and Repair Ship Load List (TARSLL)

A TARSLL contains the repair parts and other consumables that would be required for a tender or repair ship to fulfill its assigned mission. The make up of a TARSLL is compiled from fleet demand history and part configuration data (this is provided by SPCC).

A TARSLL for a tender is computed for the material required to support the equipment installed on board for the ships for which the tender is responsible. A TARSLL may be ship-tailored or ocean-tailored. A ship-tailored TARSLL is prepared for a specific tender to repair ship, to provide support for its assigned ships. An ocean-tailored TARSLL is a load placed on all tenders or repair ships of a certain class in a particular fleet to support specific hull types. [Ref. 7]

The mathematical computations for the TARSLL are similar to the FILL. TARSLLs for Fleet Ballistic Submarines support uses a 95% risk factor while all others use 85%. If circumstances warrant, TARSLLs can be located in a shore facility.

### 3. Aviation Consolidation Allowance Lists (AVCAL)

The AVCAL is developed by the Navy Aviation Supply Office. The purpose behind AVCAL is to:

...support assigned aircraft and support equipment. The AVCAL lists the repairable and consumable secondary items required by a ship or Marine Air Group (MAG). The AVCAL includes both demand based and non-demand based items needed to achieve self supporting capability for a prescribed period of time. [Ref. 6]

The AVCAL model is one of the more complex inventory models. The complexity is a result of the large maintenance data available. The various inputs that make up an AVCAL come from the Allowance Requirement Registers (ARR), Allowance Parts List (APL), and Allowance Equipage List (AEL). This information is provided by SPCC. The ARR contains data ranging from projections of the range and depth of spare assemblies and parts, parts lists per specific aircraft, and a listing of associated maintenance and ground support equipment. [Ref. 6]

The CINCs shall identify storage locations for Prepositioned War Reserve Material Stock (PWRMS) close to the planned area of usage to the maximum extent feasible. The exact location will be dependent on storage facilities abilities to rotate material and to meet prescribed outloading timeframes. Table 1 provides an example list of current stowage locations for PL3 PWRMR. [Ref. 12] The goal of this is to provide the least feasible delays possible by reducing the time required for the supply system to meet emergent needs

TABLE 1

PL3 PWRMR STORAGE LOCATIONS

<u>ATLANTIC FLEET</u>	<u>PACIFIC FLEET</u>	<u>NAVEUR</u>
Norfolk, VA	Oakland, CA	Rota, Spain
Roosevelt Roads, PR	Pearl Harbor, HI	Sigonella, Italy
Guantanamo Bay, Cuba	Guam	Naples, Italy
Bermuda	Yokosuka, Japan	
Lajes, Azores	Subic Bay, PI	
Keflavik, Iceland		

and to sustain forces that are already in the field until adequate resupply capabilities are established.

F. PL3 MATERIAL AND ORGANIZATION

The Packaged Petroleum POL material that is used by the CINCs shore activities and not listed in the FILL demand computations, make up the PL3 project. These items consist of material that indirectly supports fleet operations from the shore establishment. Examples of PL3 material range from alcohol required to clean communication equipment to anti-freeze required to keep the support machinery operating in places such as Iceland.

Project Code PL3, the packaged Petroleum products, require certain organizations to perform tasks that are unique to PL3 material, in addition to the requirements established in the

WRMR program. The departments and agencies along with responsibilities are discussed below.

1. Navy Petroleum Office

The NAVPETOFF is responsible for: [Ref. 12]

- Reviewing packaged lube products PWRMR for depth, range, and mission essentiality of the items.
- Ensuring visibility of critical weapons and equipment support items.
- Reduction of excessive numbers of container sizes of a single product.
- Deletion of obsolete items.
- Increasing levels of product requiring excessive procurement leadtime.
- Ensuring availability of specialty items for which no substitute exists.
- Reducing inventory requirements for readily available commercial items.

2. CINCS

The CINCS forward the nominations to NAVPETOFF. [Ref. 12]

3. FMSO

The FMSO will forward demand data received from Defense General Supply Center (DGSC) to NAVPETOFF. [Ref. 12]

G. SUMMARY

The WRM program is a very large and complicated program, highly qualified and experienced personnel are required to manage and operate it. The large investment in stock acquisition and administrative personnel cause this program

to become more and more susceptible to criticism if inefficient polices and procedures are maintained. This takes on even greater importance in light of the current budgeting situation.

The issue of PWRMS for support of urgent peacetime requirements should be minimized and stringently controlled by the responsible service. If such issue does occur, the responsible service should promptly replenish the PWRMS to a level sufficient to meet current readiness requirements.

[Ref. 4]

### III. A PROPOSED MODEL FOR REVIEW OF PL3 REQUIREMENT

#### A. INTRODUCTION

Keen and Morton define a Decision Support System (DSS) as a: "customized system that supports nonroutine decision making which tend to focus on less structured decisions for which information requirements are not always clear...." [Ref. 13] The review model presented by the authors is a type of DSS for use by the NAVPETOFF. The nomination of items under the NAVWARP program need not be based on a concise mathematical model as the FILL, TARSELL, or the retail and wholesale war reserve models. The material under PL3 is derived from a series of decisions made by the CINCs and their staffs. Likewise, it is necessary that a decision analysis approach be taken by the NAVPETOFF to properly review the nominations. A review model will be developed in conjunction with the guidance given to the NAVPETOFF for properly reviewing PL3 material. The guidance, as was previously discussed, includes insuring only critical systems are selected, reduction of the number of container sizes, maintaining the proper depth of support and cost awareness.

This chapter will present the details of the PL3 review model. The first part of the chapter will detail the key elements of the model and discuss their importance. The second half of the chapter will incorporate the elements into

a working model that will assist the NAVPETOFF in reviewing the CINCs input into the NAVWARP project.

#### B. CRITICALITY OF AN ITEM

The DGSC currently provides FMSO with demand data for over 15,000 line items that may be considered for inclusion in the PL3 project code. The criticality of the item is the key ingredient for inclusion. The successful identification of these critical items depends on the technical capabilities of the CINCS, their staffs, and their subordinate commands. The task is enormous.

The NAVPETOFF is limited in their ability to technically evaluate an item that has been nominated for inclusion into the PL3 project code. The NAVPETOFF employees do not, and cannot be expected to have a working knowledge of the numerous systems that require critical POL support. A systematic guide is necessary to help the reviewer perform this evaluation. The use of an improved item characteristic sheet would fulfill this need. The improved characteristic sheet (Appendix A), which was developed by the authors, is a modified version of the type presently in use (Appendix B). The modified characteristic sheet includes an item's military standard specification, nomenclature, physical characteristics, substitute stock numbers, PL3 PWRM allowances, principal uses and alternative uses.

The characteristic sheet also serves as an important source of information during the yearly review. The importance of the sheet is that it allows those involved in the review process some method of identifying possible users of the POL who can then be of technical assistance in determining the essentiality of the item. Additionally, it provides insight into what the other CINCs have determined to be essential in a war time situation.

The goal of the review staff should be to evaluate two pieces of information in the criticality review phase. The first evaluation to be made concerns whether the characteristic sheet contains adequate identification information. The sheet should be completed in such detail that the uninformed could make a reasonable assessment of the purpose and importance of the item.

The second evaluation reviews whether or not the material, based on the information provided, fulfills a critical need. Once again a judgmental decision is required by the individual conducting the review. Only material that is in support, directly or indirectly, of war fighting capabilities should be considered as a possible PWRM. The reviewer is assisted by the constraint of having to answer several key questions in a positive manner before he can make a determination that the item is appropriate for inclusion as a PWRM. The questions are:

- Is the item characteristic sheet provided, adequate to justify its importance to a primary piece of equipment?
- Does the item support a piece of equipment that could reasonably be expected to be important in a war time scenario?
- Can the unavailability of the POL item result in the loss of the parent equipment?

### C. SHELF-LIFE

The shelf-life of an item is an important aspect to be considered when one is making a decision to stage material for future use. Material that is given a shelf-life identification code is an item:

...possessing deteriorative or unstable characteristics to the degree that a storage time period must be assigned to assure that they will perform satisfactorily in service. [Ref. 14]

The Department of Defense states that in order for an item that is shelf-life restricted to be selected as a PWRM it must be capable of being rotated effectively through the normal issue process or considerations of overriding military effectiveness prevail. [Ref. 7] Careful consideration must be made before an item so identified is designated as a PL3 PWRM.

The rotation of the PWRM with operating stock is to ensure that material does not exceed shelf-life constraints. The ability to accomplish this task is limited by the sizes of the two stockpiles. Large quantities of PWRM stored at a site with limited requirements for operating stock could result in the loss of the material from the expired shelf-life.

The NAVPETOFF is not provided with the necessary information to determine statistically the optimum stocking policy of shelf-life affected items at individual sites. The authority to make the determination that an item should be held in reserve regardless of its shelf-life rests with the CINCs. The role of the NAVPETOFF in this endeavor should be to merely audit the shelf-life characteristics and associated justifications and provide feedback to the CINCs.

A need exists to establish a minimum shelf-life threshold. Material falling below this threshold would require a more in-depth review. The threshold that will be used in this model is any item with a shelf-life of three years or less.

Three years is the maximum ordering interval used by the Navy in their consumable inventory model. [Ref. 6] Two elements that are included within inventory models are the timeframes between procurement and reorder points. Both elements are time-limited by an item's shelf-life. The reason for the time constraints is to minimize the potential loss of material. The inventory equation could be adversely affected as a result of a large PWRM requirement. The key items that should be asked in the shelf-life portion of the review are:

- Does the POL product have a shelf-life of three years or less?
- Has the shelf-life issue been previously resolved for those items with the short shelf-life?

#### D. SPECIAL HANDLING REQUIREMENTS

Special handling requirements for an item are a major concern in any inventory stocking situation. The material may require unique storage facilities, special security, or any number of other requirements. Selection, handling and location of such items must be understood by all parties involved.

Certain POL products would reasonably be expected to require special storage facilities. Oil-based products typically require segregated storage, storage spaces with fire fighting capabilities, and, possibly, special delivery requirements. These actions are primarily taken for safety reasons. Storage sites must be capable of accommodating these needs. Special handling issues should be resolved by reviewing the responses to the following questions:

- Does the item have special handling instructions?
- Does the special handling requirement pose a problem that could reasonably preclude its storage at one of the staging sites?

The second question calls for an informed opinion from the reviewer. Handling/storage requirements that are typically found at large staging sites may preclude the necessity of referring the issue to the CINCs.

#### E. SUBSTITUTABILITY

Materials with identical physical characteristics but with different packaging specifications are given separate stock

numbers (NSNs) within DOD. The use of the materials may or may not be affected by how it is packaged. Proposed PWRM should be reviewed to reduce excessive numbers of container sizes for like items. The issue of substitutability should be addressed in the initial item nomination phase and continued throughout the reexamination phase.

The characteristic sheet should be completed with the inclusion of a list of substitute stock numbers providing reasoning for why the requirements have or have not been consolidated into one NSN. The yearly review should include an update of changes. The course of action taken is extremely important for developing demand history.

Consolidation of like requirements must include all demand history. Failure to incorporate the demand history could have dire consequences in a war time scenario. A standardized process should be established. The standardization process should define in a clear and concise manner how demand history is to be determined and incorporated into a stock requirements model. The following issues require resolution:

- Does the item have a suitable substitute(s)?
- Has the issue of substitute items been previously resolved?

#### F. COMPUTATION OF CURRENT STOCKING LEVELS

The final step in the model development is to apprise all parties concerned of what stocking levels currently exist in each of the regions. The use of regions rather than

individual CINCs was chosen because of the structure of the demand history available to the NAVPETOFF. Demand history is accumulated in four categories: continental United States (CONUS) EAST; CONUS WEST; outside continental United States (OUTCONUS) West; and OUTCONUS East. One region is based upon OUTCONUS West demand data, which equates to CINC Pacific. The second region, which includes requirements submitted by both CINC Atlantic and CINC Europe, is derived from OUTCONUS East demands. The thesis, to maintain the its unclassified nature, will identify the two regions by the letters A and B but will not indicate which letter corresponds to which general geographic location.

The mathematical equation for determining the PL3 quantities presently on hand is:

$$Pq = (WRM / \{ [1/4 Yd + (Z)(S.D.)] [1 + Mf] \}) 100$$

where:

- Pq = the percent of PL3 PWRM currently on hand
- WRM = current PL3 authorized quantities
- Yd = the mean yearly demand
- S.D. = the standard deviation of the quarterly demand
- Z = a factor based on the desired confidence level
- Mf = mobilization factor.

The use of the fraction one-fourth allows for the transformation of yearly average demand into a quarterly figure. Quarterly demand corresponds to the requirement that PL3 assets amount to a 90 day supply of material. [Ref. 12] The standard deviation (S.D.) is computed using the derived quarterly demand.

The Z value, based on a normal distribution, is used to assist in assuring that the average quarterly demand can be adjusted to a desired confidence level of support. A reasonable value for the confidence level is 85%. The 85% confidence level corresponds to the maximum levels used in other Navy inventory models and corresponds to the Navy goal for wholesale system material availability (SMA). [Ref. 6]

The mobilization factor, Mf, is a figure provided by NAVSUP. The current value is .5. [Ref. 6] The .5 value is an estimate of the level of increased tempo that forces will experience in a war time situation. Combining the Mf with a value of 1, the peacetime operating tempo, results in an expected wartime force operating schedule that is 150% of normal.

The computation of stocking levels serves the primary purpose of making all parties aware of the support available. The following actions should take place upon completion of the computations:

- Notify the CINCs when support exceeds 150% or is less than 50% of the 90 day wartime requirement.
- Document the item characteristic sheet with the findings.

#### G. MODEL DECISION TABLE

The model decision table has the singular purpose of organizing the identified questions into a format that provides the reviewer with a systematic approach to the review task. The reviewer is provided guidance throughout the table as to the actions that have to be taken. The reviewer must be equipped with the item characteristic sheet as well as the accumulated demand data.

The model decision table (Table 2) is composed of the questions poised within each section of this chapter. The questions will be answered with a simple yes or no. The next step in the table depends on the answer. Appendix C provides a systematic flow chart of the process.

The model decision table, which can be visualized, should be completed for every PL3 item during the annual review. The results of each review should then be filed for future reference.

#### H. SUMMARY

Chapter III identified five characteristics for use in the model decision table. The characteristics are:

- Criticality.
- Shelf-life constraints.

TABLE 2

THE MODEL DECISION TABLE

1. Is the item characteristic sheet provided, adequate to justify its importance to a primary piece of equipment? YES--Go to question 2. NO--Request that the applicable CINC(s) provide the necessary information.
2. Does the item support a piece of equipment that could reasonably be expected to be important in a war time scenario? YES--Go to question 3. NO--Request that the CINC(s) review criticality.
3. Can the unavailability of the POL item result in the loss of the parent equipment? YES--Go to question 4. NO--Request that the CINC(s) review criticality.
4. Does the POL product have a shelf-life of three years or less? YES--Go to question 5. NO--Go to question 6.
5. Has the shelf-life issue been previously resolved for those items with the short shelf-life? YES--Go to question 6. NO--Request that the CINC(s) review requirement.
6. Does the item have special handling instructions? YES--If the requirement is for anything other than a flammable liquid storage requirement refer the issue back to the CINC(s), otherwise go to question 7. NO--Go to question 7.
7. Does the item have a suitable substitute? YES--Go to question 8. NO--Go to question 9.
8. Has the issue of substitute items been previously resolved? YES--Go to question 9. NO--Compile a list of the suitable substitutes, identifying those that are designated as PL3 items with their allowance quantities, and forward the results to the CINC(s) for review.
9. Does the computation of support exceed 150% or is it less than 50% of the 90 day wartime requirement? YES--Report the disparity to the CINC(s). NO--Document the item characteristic sheet with the findings and annotate that the review was conducted and that no discrepancies were noted.

- Special handling limitations.
- Substitutability of the product.
- Computations of available PL3 assets.

The model is an incorporation of questions related to the characteristics. The responses to these nine questions will assist the NAVPETOFF in taking appropriate actions. Application of the model will occur in Chapter IV.

#### IV. MODEL ANALYSIS

##### A. HYPOTHESIS

Fifteen items (Appendix D) were arbitrarily selected from the list of PL3 NSNs. Each of the 15 items was examined in the context of the model decision table previously developed. The objective for the PL3 review model is two-fold. First, the model must provide the NAVPETOFF with an effective tool to analyze nominated PWMR items. Second, the model must enable the NAVPETOFF to provide beneficial feedback to the CINCs. The hypothesis is that the review model will raise valid questions concerning the validity of some number of items currently selected as PL3 PWRM and should be further reviewed by the CINCs.

##### B. RESULTS OF THE REVIEW MODEL

Table 3 provides the findings for each step in the review process. Items that have been annotated with the review marking indicate that an inconclusive decision was reached; review by the CINCs will be necessary. The table shows that every item requires some level of review.

###### 1. Criticality of Item Results

The items that fell out in the criticality review were as a result of the authors' inability to connect the item to a critical need in the wartime scenario. The items accepted

TABLE 3  
REVIEW MODEL RESULTS

ITEM	CRITICAL- ITY OF ITEM	SHELF- LIFE	SPECIAL HANDLE	SUBSTITUTE	COMPUTATION
1.	REVIEW*	REVIEW	REVIEW	REVIEW	REVIEW
2.	REVIEW	NO	REVIEW	REVIEW	REVIEW
3.	NO	REVIEW	NO	NO	NO
4.	NO	REVIEW	REVIEW	REVIEW	REVIEW
5.	NO	REVIEW	NO	REVIEW	REVIEW
6.	NO	REVIEW	REVIEW	REVIEW	REVIEW
7.	REVIEW	REVIEW	NO	REVIEW	REVIEW
8.	NO	REVIEW	NO	REVIEW	REVIEW
9.	REVIEW	NO	REVIEW	REVIEW	REVIEW
10.	NO	REVIEW	NO	NO	REVIEW
11.	NO	NO	REVIEW	REVIEW	REVIEW
12.	NO	REVIEW	NO	REVIEW	REVIEW
13.	NO	REVIEW	REVIEW	REVIEW	NO
14.	REVIEW	REVIEW	REVIEW	REVIEW	NO
15.	NO	NO	REVIEW	NO	REVIEW

\* REVIEW REQUIRED

include material whose importance has been justified by a rational analysis. The rational analysis of products, such as grease for lubricating ball joints, is simple; the grease is for keeping important vehicles operational. The preceding statement does not however, have a basis in fact since such a

purpose was never clearly identified in the available characteristic sheet. Five items, which could not be rationalized as important by the authors, were identified.

These items were:

- Hydraulic fluid for automatic transmissions.
- Cleaning material for acrylic plastics.
- A solvent for paints and vinyl resin coatings.
- Lubricating oil for refrigerant compressors.
- An ingredient used in cleaning and laundry operations.

A strong case could not be made for the inclusion of any of these items at the present time. The product characteristic sheet should have provided ample justification if in fact the items are important.

## 2. Shelf-Life Results

The review of the sample found eight of the 15 items having a shelf-life of 36 months with an additional three items having a shelf-life of 24 months or less. The 11 items identified are covered by a caveat that allows for shelf-life extensions after a recertification process. The recertification may be as simple as a visual inspection or as complex as a laboratory analysis.

The large number of shelf-life items found in the survey could be an indication that shelf-life may be a large issue. Recertification and/or relocation to improve utilization of the product are possible solutions to the situation. The cost of ensuring that shelf-life items do not

exceed their expiration dates demonstrates that the management of shelf-life items is an important and costly procedure. A conscientious decision should be of whether the stocking of shelf-life material is truly necessary.

### 3. Special Handling Results

The emphasis on the issue of special handling requirements for individual items indicates that the concern is well founded. The majority (nine) of the samples were affected by the issue. The attention that was focused on this specific characteristic can best be exemplified by one item that required dehumidified storage facilities. The material, which is corrosive, may cause storage difficulties in climates with high humidity. Dehumidified storage facilities are costly to construct and maintain, resulting in a premium being placed on their availability. The islands of the Philippines, Hawaii, Diego Garcia, or Guam, all of which are affected by high humidity, may not be able to store large quantities of the material. The capable staging sites in the Pacific may be limited. Issues such as this should be recognized and noted.

The second finding in review of the special handling requirements was the large number of NSNs that required flammable liquid storerooms. The finding is not surprising in that the PL3 project code is exclusively made up of Petroleum, Oil and Lubricants (POL) material. The sites at which all of the PL3 material is staged are extensive facilities that can be expected to carry large amounts of

operating stocks with similar requirements. The issue should be addressed and made apparent to all parties, however this is a good example where the need to seek additional review is not called for.

#### 4. Substitutability Results

The sample included 12 items that were found to have suitable substitutes. The substitutes identified were differentiated only by container size. Table 4 illustrates the complexity of the issue. Items sampled have as many as four suitable substitutes.

Assuming that each substitute item is equal to the primary in all factors except packaging, two major issues arise. The first issue is how many of each of the like items should be designated as PL3. Secondly, how much of each item should be stocked. These questions are difficult to answer.

There are legitimate situations that require the use of different container sizes. Combat troops may need to carry a cleaning fluid for their weapon that is identical to the one used on a battleship gun. Realistically one would not expect the maintenance people for each of these weapon systems to use the same container size. The objective must be then to first determine if an optimum container size exists and, if so, then to factor the usage data together.

The decision to maintain a single unit of issue is complex. The use of a single container size may require large users to adopt the role of supplier to smaller users. The

TABLE 4

## SUBSTITUTE CONTAINER SIZES

ITEM	PRIMARY	SECONDARY ITEM			
		1	2	3	4
1.	5 gal	1 gal	55 gal	-	-
2.	5 gal	1 gal	55 gal	-	-
3.	1 can	-	-	-	-
4.	15 gal	15 gal	-	-	-
5.	5 gal	1 gal	-	-	-
6.	6.5 lb	1.75 lb	35 lb	-	-
7.	5 gal	1 qt	1 gal	-	-
8.	5 lb	1 lb	-	-	-
9.	1 pt	5 pt	1 gal	-	-
10.	1 can	-	-	-	-
11.	14 oz	1.75 lb	35 lb	-	-
12.	16 oz	4 cz	1 qt	5 gal	55 gal
13.	1 qt	5 gal	-	-	-
14.	1 gal	1 qt	-	-	-
15.	1 qt	-	-	-	-

selection of smaller containers could result in a variety of different problems. The use of a single unit of issue is a major logistics policy decision. The situation where a compromise cannot be reached should be documented to avoid future questions/discussions.

## 5. Computational Results

The computations of available PL3 stock are provided in Tables 5 and 6. Region A results vary significantly. Item 9 has 2903% percent of the 90-day war requirement while item 7 has only 34%. Similar examples can be found in Region B.

### a. Region A

The availability of item 9 could be restated in this way: there is stock available, in this theatre, for roughly seven years of wartime needs or 11 years of peacetime requirements. Fortunately, item 9 is not affected by shelf-life constraints. Item 11 is not as fortunate with 2463% of a 90-day requirement, about six years of wartime stocks, and a shelf-life of 36 months.

Region A had several items that were not included in the computations. The items were not included because no PL3 requirement was identified in this particular region. Review of substitutes for these items showed that in some cases there was in fact a PL3 requirement under different NSNs.

### b. Region B

The sample indicates that Region B has a more realistic stocking level than Region A. Item 9, once again, has the largest surplus available but amounts to less than one and a half years worth of wartime requirements. One reason for the low percentages shown for a number of the other items

TABLE 5  
REGION A PL3 COMPUTATIONS

ITEM	AVE. QTRLY DEMAND	S.D.	PL3 QTY	EST. 90 DAY PERCENTAGE*
1.	23.92	5.68	100	211%
2.	67.16	36.38	810	467%
3.	NA	-	-	-
4.	NA	-	-	-
5.	NA	-	-	-
6.	95.25	81.89	274	89%
7.	85.58	45.54	50	34%
8.	126.33	75.55	800	235%
9.	2.66	2.92	285	2903%
10.	24.42	13.94	20	36%
11.	15.25	7.86	950	2463%
12.	779.5	217.63	4032	251%
13.	NA	-	-	-
14.	107.33	42.94	240	97%
15.	73.75	67.03	641	262%

\* The formula for the estimated percent of stocks available for a 90-day period is:

$$\left( \frac{WRM}{\left[ \left[ \frac{1}{4} Yd + (Z) (S.D.) \right] \left[ 1 + Mf \right] \right]} \right) 100$$

could be explained as a lack of budget authority to procure the necessary levels of stock.

TABLE 6

## REGION B PL3 COMPUTATIONS

ITEM	AVE. QTRLY DEMAND	S.D.	PL3 QTY	EST. 90 DAY PERCENTAGE*
1.	53.75	29.8	130	93%
2.	313.83	97.28	477	72%
3.	406.58	86.53	838	116%
4.	3185.75	259.98	1428	27%
5.	682.58	297.25	150	9%
6.	297.75	50.68	632	115%
7.	246.33	60.58	75	16%
8.	589.75	38.90	378	39%
9.	23.75	11.63	306	520%
10.	128.83	36.66	220	82%
11.	72.58	62.79	558	238%
12.	6868	1890.02	10552	75%
13.	29.33	21.25	66	76%
14.	1361.16	109.45	2650	117%
15.	195.41	35.95	128	35%

\* The formula for the estimated percent of stocks available for a 90-day period is:

$$\left( \frac{WRM}{\left[ \left[ \frac{1}{4} Yd + (2) (S.D.) \right] \left[ 1 + Mf \right] \right]} \right) 100$$

c. Merged Demand

The authors of the thesis took a look at the possibility that combining the demand history for primary and

substitute stock numbers may prove to be an explanation for the computations. The theory was that the combining of demand data may in fact have already taken place to determine PL3 quantities.

PL3 quantities were combined by the use of simple mathematics. The original unit container size was used as the base and substitute sizes were adjusted to correspond. Demand data was treated in a like manner.

Table 7 shows that there was not a noticeable improvement in merging the data. Five items were examined to determine if any trends appeared; none appeared. Improvements occurred in three cases (1b, 6a, 14a) but the status quo was the norm.

#### C. SUMMARY

The model performed as was originally hypothesized. The model had two purposes: to provide the NAVPETOFF with an effective tool to review PL3 items, and to be able to provide relevant feedback to the CINCs. Fifteen items were examined and all 15 required some amount of review. The review provides a baseline for inclusion of material into this project code and, perhaps more importantly, gives valuable, specific feedback to the CINCs.

TABLE 7

## COMPUTATION BASED ON MERGED DEMAND

ITEM	REGION	AVE. QTRLY DEMAND	S.D.	ADJUSTED PL3	PERCENT OF 90 RQMT*
1	A	96.1	70.25	100	35%
	B	192.15	60.95	130	32%
2	A	117.83	15.73	848	407%
	B	551.25	84.33	766.2	77%
6	A	372.94	101.29	1473.16	193%
	B	1367.38	361.58	1935.61	70%
12	A	1243.06	135.03	9480	444%
	B	8236.15	1928.11	14536	90%
14	A	165.06	48.08	1241	361%
	B	1915.58	168.50	3649	114%

\* The formula for the estimated percent of stocks available for a 90-day period is:

$$(WRM / [ [ 1/4 Yd + (Z) (S.D.) ] [ 1 + Mf ] ]) 100$$

## V. SUMMARY

### A. CONCLUSIONS

The capability of determining material needs, budgeting for them, and properly staging them prior to the outbreak of hostilities is an ambitious undertaking. Three key communities that must be represented in the decision process of PL3 selection and retention are the warriors, budgeters, and the logisticians. The points of view of each of these three communities is likely to be different and require a mediating agent.

The warriors, much like children at Christmas, want everything. The warriors would like to have all contingencies covered. The fear of not being prepared for every possible contingency could easily result in the stockpiling of massive amounts of material. The logisticians will happily support the warriors as long as resources, such as warehouses and people, are provided to support such an endeavor. The budgeters serve as the voice of caution. They must limit the warriors' desires by the resources available. These limited resources must be stretched to satisfy the greatest needs. The PL3 program is derived from the concerns and efforts of these three communities with the NAVPETOFF serving in the role as mediator. The logical method to accomplish this objective is to gather both quantitative and qualitative inputs, sort

through these inputs, and determine a course of action. The course of action, upon acceptance, is documented and filed for future information.

The shortcomings of the current procedures for nominating and endorsing items for inclusion into the PL3 project code can be traced to a single issue--documentation. The reasoning behind the item selection and stocking levels chosen cannot be determined because of this lack of documentation.

The conclusions of the thesis are summarized below:

- Information sheets for items selected as PL3 PWRM do not provide enough detail to make an adequate review of whether or not the material is essential to the PWRM program.
- Items selected as PL3 PWRM have substitutes, that also appear as PL3 PWRM items. No information is available to determine if this is a conscious decision or not.
- Items selected as PL3 PWRM have substitute items that do not appear as PL3 PWRM. The basis for such action is unknown.
- The mathematical model for the computation of levels is undefined. The result is a significant difference in the levels of support provided between line items.

## B. RECOMMENDATIONS

The value of an effective PL3 program is obvious. The key is, that with today's Defense Budget, it must also be an efficient program. The following recommendations are provided to help achieve the objective of an effective and efficient program:

- The item characteristic sheets should be restructured in a manner that would allow for the amplification of an item's characteristics, capabilities, and purposes. The

sheet should also be established as the historical record of past decisions and actions related to its inclusion into the PL3 program. The result of these changes should be an improved knowledge of an item.

- The development of a systematic review program is necessary. The review proposed by this thesis could be a possible starting point. The review process would form a basis for making sound decisions.
- Stock positions of each of the current PL3 items should be reviewed for possible excesses. Large excesses should be reduced and any recaptured funds should be funneled to identified shortfalls.

### C. FUTURE RESEARCH

The importance of valid identification of critical POL material for inclusion into the PL3 project code cannot be overstated. The five areas (criticality of an item, shelf-life, special handling requirements, substitutability, and computation of current stocking levels) proposed by the authors for conducting a decision analysis of items nominated for, or previously selected as, PL3 PWRM is not all inclusive. The thesis sought to lay the groundwork for a proactive review program, conducted with specific criteria, which would result in the compilation of the necessary facts and reasoning for specific actions taken within the PL3 program.

The review model of this thesis leaves many issues unresolved. Specifically:

- Could the decision tree of the PL3 program be structured entirely within a mathematical model?
- Should the PL3 program be based upon the Consolidated Shore Base Allowance List (COSBAL)?

- Does the PL3 program really need to exist or do the other PWRM programs, such as the FILL, TARSSL, and AVCAL provide sufficient coverage for wartime scenarios?

The identification of the majority of the areas included into the review model were provided by the NAVPETOFF. The staff provided significant insight into all aspects of their operation. The staff, like so many today, have large responsibilities with limited resources.

APPENDIX A

ITEM CHARACTERISTIC SHEET

ITEM NOMENCLATURE LUBRICANT, PETROLEUM BASED

ITEM SELECTED AS A PL3 19 NOV 1982

NSN 1111-00-999-7777 UNIT OF ISSUE 16 OZ. MIL STD A-556  
PRIMARY PURPOSE LUBRICANT IS USED IN A VARIETY OF WEAPON  
SYSTEMS. THE AVAILABILITY OF THE MATERIAL IS CONSIDERED  
CRUCIAL TO THE M-16 AND THE 9 MM. APPLIES TO APL 345 AND 435.  
SECONDARY PURPOSE MAY BE USED AS A SUBSTITUTE ON LARGER WEAPON  
SYSTEMS SUCH AS THE CIWS, HOWITZER AND MOST OF THE HEAVY GUNS  
ON FLEET COMBATANTS.

SHELF-LIFE RESTRICTIONS YES--36 MONTHS. SHELF-LIFE MAY BE  
EXTENDED UP TO 24 ADDITIONAL MONTHS AFTER VISUAL INSPECTION.

SPECIAL HANDLING REQUIREMENTS YES--MATERIAL MUST BE STORED IN  
A FLAMMABLE LIQUIDS STOREROOM.

SUB NSN(s)	UNIT OF ISSUE	PL3 PWRM
<u>2222-00-987-9876</u>	<u>55 GAL</u>	<u>YES</u>
<u>3333-01-989-9999</u>	<u>1 GAL</u>	<u>NO</u>
<u>2333-78-898-0000</u>	<u>5 GAL</u>	<u>NO</u>

DUAL PL3 REQUIREMENTS JUSTIFICATION NECESSITY FOR BOTH ITEMS  
HAVE BEEN DETERMINED BY THE APPLICABLE CINC. THE 16 OZ.

CONTAINER IS REQUIRED BY INFANTRY FORCES BECAUSE OF ITS LIGHT WEIGHT. 55 GALLON DRUMS ARE REQUIRED BY ARTILLERY FORCES AND AFLOAT UNITS. JUSTIFICATION CONTAINED IN MESSAGE DTG AUGUST 1989.

PRESENT PL3 QUANTITIES AVAILABLE:

<u>ATLANTIC</u>		<u>PACIFIC</u>		<u>EUROPE</u>	
NORFOLK	100	OAKLAND	300	ROTA	0
ROOSEVELT ROADS	200	PEARL HARBOR	50	SIGONELLA	0
GUANTANAMO BAY	450	GUAM	500	NAPLES	0
BERMUDA	800	YOKOSUKA	500		
LAJES	400	SUBIC	200		
KEFLAVIK	200				
TOTALS	2150		1550		0
120% OF REQUIREMENTS		100% OF REQUIREMENTS			NA

APPENDIX B

PREVIOUS ITEM CHARACTERISTIC SHEET

The following is an excerpt from NAVSUP Instruction  
4080.30A.

(SAMPLE-NOT FOR OFFICIAL USE)  
PACKAGED LUBES PRODUCTS FORMER (CONFIDENTIAL-NAMES FILLED IN)

PRIMARY APPLICATIONS

NOMENCLATURE

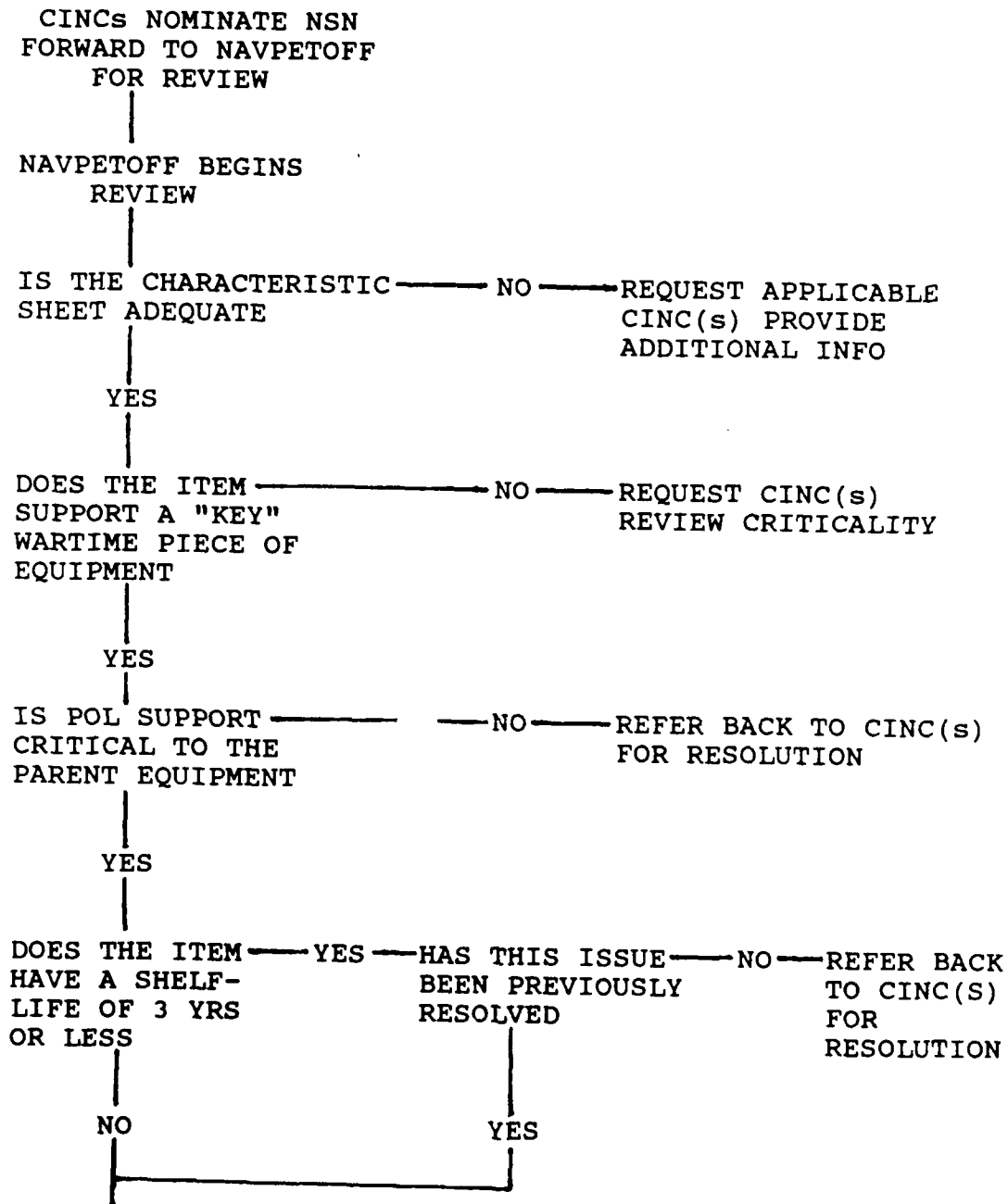
USE

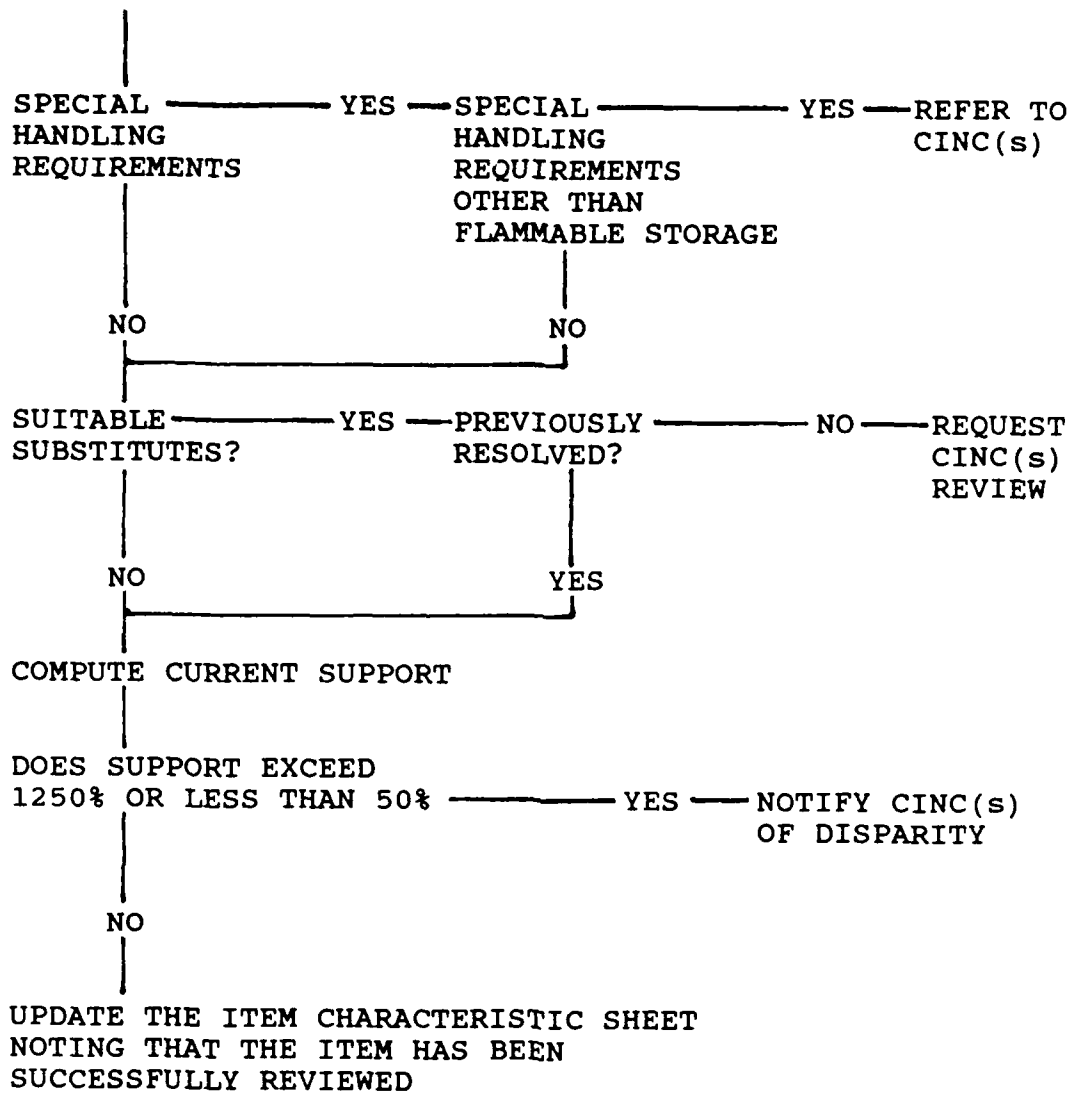
SPECIFICATION

<u>MAN</u>	<u>CONTAINER SIZE</u>	<u>GRAND TOTAL</u>	<u>LOCATION</u>	<u>TABLET</u>	<u>FORMER</u>	<u>LOCATION</u>	<u>TABLET</u>	<u>NAVIER</u>
				<u>PL3</u>			<u>PL3</u>	
			Morfolk			Oakland		Rota
			Roose. Mds			Pearl		Sigonella
			Quant. Bay			Guam		Naples
			Bermuda			Yokosuka		
			Lajes			Subic		
			Keflavik			Mak		
			TOTAL:			TOTAL:		TOTAL:
			Morfolk			Oakland		Rota
			Roose. Mds			Pearl		Sigonella
			Quant. Bay			Guam		Naples
			Bermuda			Yokosuka		
			Lajes			Subic		
			Keflavik			Mak		
			TOTAL:			TOTAL:		TOTAL:

APPENDIX C

MODEL FLOW CHART





APPENDIX D

NOMENCLATURE OF ITEMS SELECTED IN RANDOM ORDER\*

GENERAL PURPOSE GREASE  
AUTOMATIC TRANSMISSION HYDRAULIC FLUID  
VACUUM LUBRICATING OIL  
GENERAL LUBRICATING OIL  
REFRIGERANT LUBRICATING OIL  
AIRCRAFT GREASE  
AMMONIUM HYDROXIDE  
TECHNICAL XYLENE  
LUBRICATING OIL  
ALIPHATIC NAPHTHA  
DRY CLEANING SOLVENT  
SULFURIC ACID  
BALL GREASE  
LUBRICATING OIL  
METHYL ETHYL KETONE

\* The nomenclature of the items have not been correlated to a particular item number so as to maintain the unclassified nature of this thesis.

## APPENDIX E

YEARLY DEMAND DATA

ITEM	REGION A			REGION B		
	<u>87</u>	<u>88</u>	<u>89</u>	<u>87</u>	<u>88</u>	<u>89</u>
1.	77	89	121	338	207	100
2.	160	212	434	1010	1052	1704
3.	27	15	17	2026	1426	1427
4.	3510	3724	3025	13916	12379	11934
5.	901	1238	662	2644	2042	3505
6.	745	110	288	1425	1069	1079
7.	351	156	520	1197	721	1038
8.	708	650	158	2343	2212	2522
9.	24	6	2	96	48	141
10.	56	76	161	570	345	631
11.	25	75	83	185	109	577
12.	2718	2520	4117	25098	21385	35934
13.	74	0	5	43	210	99
14.	282	388	618	5945	5132	5257
15.	157	604	124	622	901	822

## APPENDIX F

### DEFINITIONS

1. Advanced Base Functional Component (ABFC). A planned grouping of personnel, material, and equipment designed to perform a specific function or accomplish a particular mission. ABFCs become PWRMR/PWRMS when a specific functional component is included in a CNO NAVWARP.
2. Advanced Base Initial Outfitting List (ABIOL). An allowance list designed to provide for initial support of a specific ABFC.
3. Approved Forces Retention Increment (AFRI). These requirements are computed to support the forces described in DoD/OPNAV logistics guidance and represent support needed, in the event of war, to sustain the designated forces until production matches usage.
4. Chief of Naval Operations (CNO) Navy War Reserve Projects (NAVWARP). Those Navy projects, established by the CNO, which provide authorization for material to be acquired and retained in support of specific contingency plans.
5. CNO Special Projects. Those Navy projects, established by the CNO, which provide authorization for material to be acquired and retained in support of specific contingency plans.
6. Component Material. Material required in support of a specific ABFC.
7. Essential Item. A support item which if not available renders a supported primary weapon or equipment inoperable, or directly affects the survival of personnel.
8. Fleet Issue Requirements List (FIRL). The computed range and depth of material needed to support the Fleet under a projected wartime environment for a designated period of time. There are two FIRLs, one for the Atlantic Fleet (LANTFIRL) and one for the Pacific Fleet (PACFIRL).

9. General Forces Retention Increment (GFRI). This represents a requirement for material not included in the DOD/OPNAV logistics guidance, but a management decision has been made to retain the material, if available, for mobilization.
10. Material Manager. The Bureau, Systems Command, or Inventory Control Point (ICP) of NMC which procures and manages items required in support of CNO Special Projects or elements. In this sense, management means direct inventory control of the material.
11. Non-Component Material. Material required in support of approved Prepositioned War Reserve Material Stock (PWRMS) not relatable to or identified to an ABFC.
12. Other War Reserve Material Requirement (OWRMR). OWRMR consists of the War Reserve Material Requirement (WRMR) less the Prepositioned War Reserve Material Requirement (PWRMR).
13. Other War Reserve Material Stock (OWRMS). The assets that are designated to satisfy the OWRMR.
14. Peacetime Operating Stock. Those stocks of material on hand to satisfy the PSO.
15. Peacetime Stockage Objectives (PSO). The maximum quantity of material authorized to be on hand to sustain current operations. PSO consists of the sum of safety level, unobtainable inventory, and economic resupply quantities.
16. Prepositioned War Reserve Interrogation and Readiness Reporting (PIRR). The PIRR system is a UICP system designed to provide reports on the material status of PWRMS held in support of CNO Special Projects. The system has the capability to provide operability and financial status of PWRMS for planning and budgetary purposes on an annual basis as well as the material readiness of selected segments of these stocks on an "as required" basis. The system includes both the ABFC portion and the non-component portion of PWRMS.
17. Prepositioned War Reserve Material Requirement (PWRMR). That portion of the WRMR which Secretary of Defense guidance dictates be reserved and positioned at or near the point of planned use or issue to the user prior to hostilities, to reduce reaction time and to assure timely support of a specific force/project until replenishment can be effected.

18. Prepositioned War Reserve Material Stock (PWRMS). The assets designated to satisfy the PWRMR.
19. Primary Weapon and Equipment. Major equipment essential to and employed directly in the accomplishment of assigned military operations, missions, and tasks.
20. Program Manager (PM). The Systems Command which funds and/or provides overall program direction to material managers (ICPs) for support of CNO Special Projects or elements.
21. Secondary Item. End items, consumables, and repairable items other than principle items.
22. Secondary Item War Reserve. Includes DOD managed items not designated specifically as principle items (i.e., minor end items, spares, repair parts, expendable and consumable items) that meet the criteria for selection as a war reserve.
23. War Material Procurement Capability (WMPC). The quantity of an item which can be acquired by orders placed on or after the day an operation commences (D-Day) from industry or from any other available source during the period prescribed for war material procurement planning purposes.
24. War Material Requirement (WMR). The quantity of an item required to equip and support the approved forces specified in the Secretary of Defence's Program Decision Memorandum (PDM) through the period prescribed for war material planning purposes.
25. War Reserve Material Requirement (WRMR). That portion of the WMR required to be on hand on D-Day. This level consists of the WMR less the sum of the peacetime assets assumed to be available on D-Day and the WMPC.
26. War Reserve Reconstitution. Reconstitution, performed in accordance with DOD instruction 4140.2, is an ongoing process triggered by the release of protectable war reserve assets to satisfy high priority peacetime requisitions. There is no change in requirements in the reconstitution process. Reconstitution is the mandatory prompt reachievement of the protected quantity of the same item issued either through procurement, repair, or redistribution.
27. War Reserve Stock (WRS). That portion of the total material assets which is designated to satisfy the WRMR.

APPENDIX G  
ABBREVIATIONS

ABFC	Advanced Base Functional Component
ABIOL	Advanced Base Initial Outfitting List
AEL	Allowance Equipage List
AFS	Combat Stores Ship
APA	Appropriations Purchases Account
APL	Allowance Parts List
AVCAL	Aviation Consolidated Allowance List
CNO	Chief of Naval Operations
CONUS	Continental United States
DFSC	Defense Fuel Supply Command
DG	Defense Guidance
DGSC	Defense General Supply Center
DLA	Defense Logistics Agency
DOD	Department of Defense
DON	Department of Navy
DSS	Decision Support System
FILL	Fleet Issue Load List
FIRL	Fleet Issue Requirements List
FMSO	Fleet Material Support Office
IM	Inventory Manager
IMM	Integrated Material Manager
MSC	Military Sealift Command

NAVPETOFF	Navy Petroleum Office
NAVWARP	Navy War Reserve Project
NSF	Navy Stock Fund
NSN	Navy Stock Number
OUTCONUS	Outside Continental United States
OWRMR	Other War Reserve Material Requirements
OWRMS	Other War Reserve Material Stock
OSD	Office Secretary of Defense
PL3	Packaged Petroleum Products designated as War Reserve Material
POL	Petroleum, Oil, and Lubricants
POM	Program Objective Memorandum
POS	Peacetime Operating Stock
PPBS	Planning, Programming, and Budgeting System
PWRM	Prepositioned War Reserve Material
PWRMR	Prepositioned War Reserve Material Requirements
PWRMS	Prepositioned War Reserve Material Stock
SMA	System Material Availability
SPCC	Ships Parts Control Center
TARSLI	Tender And Repair Ship Load List
WR	War Reserve
WRMR	War Reserve Material Requirement
WRS	War Reserve Stock

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