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THE CONVENTIONAL AMMUNITION REQUIREMENTS
DETERMINATION PROCESS OF THE U.S. NAVY

by

John Mawson III

December 1985

Thesis Advisor: Alan W. McMasters

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The Conventional Ammunition
Requirements Determination Process
of the U.S. Navy

by

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Submitted in partial fulfillment of the
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The objective of this thesis is to analyze the Requirements Determination procedures in the Navy's Conventional Gun Ammunition System in an attempt to identify areas for potential improvement. The Conventional Gun Ammunition System involves a logical progression of steps initiated on an annual basis. The Secretary of Defense begins the process by issuing broad guidance for the development of documentation to support budget submissions for combat and non-combat ordnance. The methods and procedures which are then used for determining procurement and renovation requirements involve extensive interactions between the Naval Sea Systems Command, the Ships Parts Control Center, and the Naval Ammunition Production Engineering Center. These interactions are being facilitated by a move toward a real time information system. Finally, areas for Navy concentration such as linking the procurement and renovation budget programs and minimizing delays in inspection and disposal are recommended to help make the future Requirements Determination system more efficient than the present one.

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I. INTRODUCTION

A. BACKGROUND

Because of its essentiality to operational capabilities, its high cost and its often limited availability, ammunition asset status receives intensive review at the highest levels of the defense establishment as well as by Navy operational and logistics commands. Ordnance procurements must support fleet requirements. This thesis will present the atypical course of events leading up to procurement.

The Navy supply system's primary goal is to sustain the operating forces in a state of material readiness. When it comes to conventional gun ammunition, the accomplishment of this goal rests on the shoulders of the Naval Sea Systems Command (NAVSEA). The term "conventional" refers to non-nuclear ordnance such as ship gun ammunition, bombs, rockets, missiles, mines, torpedoes, demolition materials, pyrotechnics and small arms ammunition and related components [Ref. 1:p. 19].

NAVSEA, under the direction of the Chief of Naval Operations (CNO), is the program manager for 2T cognizance conventional ammunition. In this capacity, NAVSEA is responsible for the research, design, development, test, acquisition, quality, evaluation and logistics support of conventional ammunition. This thesis will focus on how the acquisition quantities for 2T Cog material (ship gun ammunition,

pyrotechnics, demolition and small arms) are determined. As will be seen, the steps in making procurement decisions differ from the usual approach to inventory control problems, that being cost minimization subject to a performance goal.

B. AMMUNITION CHARACTERISTICS

Ammunition material consists primarily of expendable principal end items in contrast to secondary items (a definition of a principal and secondary item is provided in Appendix A); that is, there are few items which could be equated to repair parts. While renovation might imply repair parts, a significant amount of renovation includes exterior maintenance, overhaul and screening which do not involve component replacement.

When described within a planning or requirements determination context, ammunition end items are referred to as having a level of effort orientation. By this, it is meant that requirements determination takes into consideration the number and location of users, type of armament employed, and the anticipated rate of use. These factors, plus the maintenance pipeline, are used in arriving at a prescribed stockage objective.

The principal item characteristics and level of effort orientation of ammunition has resulted in unique management characteristics and processes. For example, past demand is not a basic consideration in computing stock replenishment, whereas in most other commodity areas it is the driving factor.

Procurement of ammunition is based upon an annual CNO-approved objective derived from computed War Reserve Material Requirements (WRMR) and Non-Combat Expenditure Requirements (NCER).

C. DISTINGUISHING PRINCIPLES

To understand the requirements determination process for conventional ammunition, it is useful to bear in mind the following distinguishing characteristics and principles

[Ref. 2:pp. 2-6,2-9]:

- (1) The operating fleet units (represented by CNO) stand in relation to NAVSEA as the customer to producer. As the customer, CNO and the fleet define their respective needs in terms of the specific items, their quantities, the time frame within which they are needed, and their general distribution. As producer, NAVSEA responds by providing the required items in a timely manner and ensuring their suitability and reliability for meeting intended needs.
- (2) Requirements for conventional ammunition are calculated on a principal item basis in accordance with CNO prescribed inventory objectives expressed in terms of the number of days support based on projected combat usage, or as the actual quantities needed to counter or eliminate a specific threat. This is in contrast to requirements computation in other commodity areas where support levels are not directly prescribed, but computed by an Inventory Control Point (ICP) on a secondary item basis considering past demand, or the relationship of the end item.
- (3) Planning, budgeting and procurement requirements are usually calculated in terms of principal line items which for convenience are organized and summarized under control numbers to group interchangeable Navy Ammunition Logistics Codes (NALCs).

A simplified example of grouping by control numbers is presented as follows for 5"/38VT projectiles [Ref. 2:p. 3-33]:

<u>Control Number</u>	<u>Applicable NALCs</u>
ZPL1	D226,D228,D232,D233
ZPML	D226,D232
ZPN1	D228,D233

In the above illustration, control number ZPL1 groups all NALCs which apply to the VT 5"/38 projectiles. Control numbers ZPML and ZPN1 provide further differentiation by grouping the same NALCs as to "self-destructing" and non self-destructing," respectively. Control numbers are assigned by the Ships Part Control Center (SPCC, the Navy's Inventory Control Point for ship gun ammunition) and incorporated into the Conventional Ammunition Integrated Management System (CAIMS) for retrieval and use.

Requirements for secondary items (related sub-assemblies, piece parts, etc.) are aggregated and included in the requirements for the principal item to which they relate.

Unlike its use in other commodity areas, the UICP process known as stratification does not have a significant role in computing individual item requirements for conventional ammunition. Its primary use in conventional ammunition is in comparing assets to requirements in order to isolate candidates for disposal.

The determination of the Navy's requirements for non-nuclear ordnance end items is based on the Secretary of Defense (SECDEF) consolidated logistics guidance which sets forth the broad inventory/planning objectives in terms of wartime planning and mobilization scenarios. The non-combat expenditure allocation (NCEA) specifies the support requirements

for peacetime operations. In addition, SECDEF prescribes the overall fiscal policy and constraints governing the operational and logistics environment. In interpretation of this policy, the Navy's Non-Nuclear Ordnance Requirements Study (NNORS) is developed by CNO (OP-954, Navy Ordnance Requirements Office) and coordinated with the operational plans of the respective Fleet Commanders-in-Chief (FLTCINCs) and with the hardware systems commands. The NNOR, when approved and issued by CNO, constitutes the Navy's basic planning guidance for developing the Program Objective Memorandum (POM) and for programming the planned support requirements. The NNOR essentially displays, by geographic area, the forces, planning factors, and requirements for selected items.

The objectives of the non-nuclear ordnance requirements process [Ref. 2:pp. 2-10,2-11] are to determine ordnance requirements for (1) combat and (2) non-combat expenditures and to provide for the allocation and positioning of assets Navy-wide in accordance with fleet plans. Combat ordnance requirements are based on a specific number of days of combat support for various combat scenarios formulated by higher authority. Non-combat expenditure requirements (NCER) represent the total conventional ammunition necessary to provide for peacetime operations, such as, training and firepower demonstrations.

In contrast to combat requirements which are derived from higher level scenarios, non-combat NCER requirements are annually submitted to CNO by the FLTCINCs and other

claimants for analysis of past expenditures and current asset availability. When the NCER/NCEA requirements are approved by CNO they represent the ordnance needed for fleet training and other peacetime operations and are included in the POM statement along with the combat requirements. As can be seen from the above, requirements development for Navy surface ammunition requires interaction and coordination across the echelons of CNO, FLTCINCs, NAVSEA and SPCC.

D. OBJECTIVE

This thesis presents the results of follow-on research motivated by LCDR H.D. Covert's thesis, titled "An Analysis of the Navy Conventional Gun Ammunition Inventory Management System" [Ref. 3]. Specific focus will be on the requirements determination and acquisition process of the ammunition Planning, Programming and Budgeting system (PPBS). The purpose is to attempt to describe the system in an integrated way and recommend improvements for further consideration by NAVSEA.

E. APPROACH

Information on how the system is designed to operate was obtained from visits with key management personnel at NAVSEA, SPCC and at Naval Weapon Stations. In addition, telephone interviews were also conducted with CNO, the Naval Ammunition Production Engineering Center (NAPEC) and other managers in the system. Concurrently, a thorough review of applicable literature regarding conventional ammunition management was made.

Chapter II discusses details of the requirements planning cycle, organizational responsibilities and data flow, in connection with both procurement and renovation requirements determination.

Chapter III addresses requirements programming, primarily from the three documents which prove most useful to management and higher level funding authorities.

In Chapter IV, requirements implementation is presented by looking at the procurement strategy when funds are dear.

Chapter V analyzes the periodic nature of the present system based on literature review and discussions with ammunition managers throughout the Navy. Present initiatives are discussed in regard to the requirements determination move toward a real time system. Suggestions are presented concerning the need for an automated interface between the procurement and renovation models and the impact inspection and disposal operations have on procurement/renovation decisions.

In Chapter VI, a summary of findings is presented along with suggested areas for further study.

II. REQUIREMENTS PLANNING

A. EXISTING METHODS AND PROCEDURES

This chapter describes the existing methods and procedures for determining the requirements data needed for determining procurement and renovation quantities. In the ammunition arena, a requirement is "an established need justifying the timely allocation of resources to achieve a capability to accomplish objectives, missions, or tasks" [Ref. 1:p. 19]. The annual requirements process is part of the Planning, Programming and Budgeting System (PPBS) which essentially begins with the promulgation of Defense Guidance by SECDEF.

Responsibility for requirements determination is directed by the Chief of Naval Operations (CNO) and carried out by the Hardware Systems Commands (HSC'S), NAVSEA, Naval Air Systems Command (NAVAIR), Space and Naval Warfare Systems Command (SPAWAR) and the Joint Cruise Missile Project Office (JCMPO). In the Non-Nuclear Ordnance Requirements (NNOR) document CNO defines the parameters to be used in determining planning and programming objectives for level-of-effort and threat weapons. Planning and Programming Objectives are analogous to Peacetime/Mobilization (War Reserve) Requirements. They are based on DOD Guidance and are an expression of days of supply. Programming, the more near term of the two objectives, drives the acquisition, while the planning objective reflects the need

for the ammunition in the out years. Out years is a term generally used to refer to the third, fourth and fifth year of the POM and beyond.

The HSC's, in some cases, further delegate responsibility for development of Requirements Determination and Budget Preparation documentation to individual inventory managers located at SPCC, the Naval Mine Engineering Facility, the Marine Corps, etc. This delegation has resulted in the evolution and maintenance of a number of systems that support requirements planning for categories of expendable ordnance such as Air Launched Missiles (8E Cog), Surface Launched Missiles (8T Cog), torpedoes (4T Cog), conventional ammunition (2T and 2E Cog), mines (6T Cog) and Cartridge Actuated Devices (2T and 2E Cog). These systems are operated at geographically dispersed locations. They differ somewhat in their specifications in the sense that "unique" requirements are built into each in response to the peculiarities of individual weapon types or the needs and preferences of inventory managers.

The requirements cycle phase of planning and programming for non-nuclear expendable Navy ammunition is completed in approximately fifteen to eighteen months, with a three to six month overlap between the beginning of a cycle for one fiscal year and the ending of the cycle for the preceding fiscal year.

The functional sequence is as follows with items one through six discussed in this chapter [Ref. 4:pp. 3-2,3-3]:

- (1) Extract data base information.
- (2) Assemble external (non data base file) data.

- (3) Roll quantities into control number totals.
- (4) Compute requirements (Planning Objectives and Programming Objectives).
- (5) Compute fleet allocations.
- (6) Compute surge/mobilization data.
- (7) Compute P-20 data.
- (8) Compute MP&I data.
- (9) Perform sensitivity analysis (defined in Appendix A).
- (10) Repeat MP&I processing using sensitivity output data.
- (11) Compute MPS data.
- (12) Consolidate all requirements data in the Requirements records.
- (13) Print records.

The cycle begins with the assembly of various policies, programs, studies, schedules and reports, all pertinent to expendable ammunition item requirements. Next, the documents are analyzed, interpreted and, finally, converted into Planning and Programming Objectives; projected inventory status, losses and gains; mobilization reserves and retention levels. The objectives, gains, losses, status, reserves and levels are all shown on a single document, the Military Planning Study (MPS). An example is contained in Appendix B. The MPS, in turn, becomes a source document for various management and status reports to the Secretary of Defense (SECDEF) and Secretary of the Navy (SECNAV) for requirements and readiness exhibits in the congressional budget and for the retention levels used in the stratification/disposal process [Ref. 4:pp.2-4,

2-5]. Because NNOR guidance tends to change from year to year, the system is designed to accommodate new policies and procedures without extensive reprogramming and recompilations.

B. BASIC DATA

The foundation of Requirements Determination is data collection which assembles data from a variety of sources. This data must be input, loaded, and maintained in order to support the various logical operations and outputs. In conformance with integrated data base management concepts, Requirements Determination does not duplicate data already resident in records created by other applications.

The Naval Ammunition Production Engineering Center (NAPEC) receives allowance data off-line from CAIMS. As a field activity under NAVSEA (SEA-64), one of the many functions NAPEC performs is to provide inventory modeling support for NAVSEA ammunition requirements. NAPEC reviews and modifies the information to suit their programming needs. NAVSEA/NAPEC review allowance data before it is used in requirements processing. If information is found to be missing or incorrect, NAPEC, with the approval of NAVSEA 642, makes the necessary changes. The allowance analysis [Ref. 4:pp. 3-6,3-7] addresses the following issues and questions:

- (1) Identification of Approved Basic Stock Level Ammunition (ABSLA) Units. These stock point allowances have to be excluded in the determination of ammunition requirements but are used in renovation, e.g., to identify ABLSA deficiencies.

- (2) Identification of Special Forces Active Units.
- (3) Identification of Shipfill Allowances (defined in Appendix A). All active ships must be included and allowances within ship class consistent.
- (4) Identification of Mission and Cargo Loads (defined in Appendix A). These like the ABSLA quantities, must be excluded so as not to duplicate requirements.
- (5) Comparison of Expenditure and Allocation units. Appropriate allocation quantities by Unit Identification Code (UIC) must be provided.
- (6) Identification of Military Sealift Command (MSC) Ships and Service Craft Allowances.

C. ORGANIZATIONAL/PERSONNEL RESPONSIBILITIES

In the case of 2T Cog items, NAVSEA Code 642, with the assistance of NAPEC Code 904, is responsible for performing the following functions which for the most part reflect data entries made to update working files [Ref. 4:pp. 2-5,2-6]:

- (1) Interpretation of NNOR letters and entry of combat consumption, shipping losses and related data contained in DOD/OPNAV guidance.
- (2) Analysis of allowances and entry of allowance quantities not reflected in the CAIMS Allowance File.
- (3) Analysis of Non-combat Expenditure Allocation (NCEA)/ Non-combat Expenditure Requirements (NCER) data and entry of adjustments.
- (4) Analysis of the OPNAV Force Level Tape and entry of additions, deletions or modifications for out years that are not reflected on the tape.
- (5) Determination of barrel rates (annual firing rates per barrel) needed for computation of combat consumption and resupply reserve.
- (6) Entry of additions to, or adjustments of, data base quantities that are used in the requirements process.
- (7) Analysis of system products to determine if they correctly reflect the intention of management

guidance and conform to known or anticipated constraints.

- (8) Entry of control dollars to force recomputation of procurement and renovation requirements to bring them in line with budget allocations.

D. PROCUREMENT REQUIREMENTS DETERMINATION

The principal products of this segment are the Requirements Determination Output Data File and the Requirements Determination Report. The first of these is used in programs to determine procurement quantities; namely, the Munitions Procurement and Inventories Study (MP&IS), the P-20 program and the MPS program.

The hardware equipment currently utilized is situated in the Naval Weapons Support Center, Crane, Indiana and consists of a UNIVAC 1100 computer and a Honeywell 360 computer. The requirements application at Naval Weapons Support Center, Crane, is comprised of approximately one hundred and eight programs with approximately one hundred and thirty output products. Figure 2.1 is a conceptual representation of the data flow. Disk files are kept up-to-date based on change data provided by CNO, Single Manager for Conventional Ammunition (SMCA) and NAVSEA. Also involved are disk files containing force levels and barrel populations (the number of gun barrels that must be supported throughout the fleet) along with 25mm, 76mm and Close-In Weapons System (CIWS) shipfill (allowance of ammunition for the ship's own permanently installed armament) and consumption data. The program then computes combat consumption and

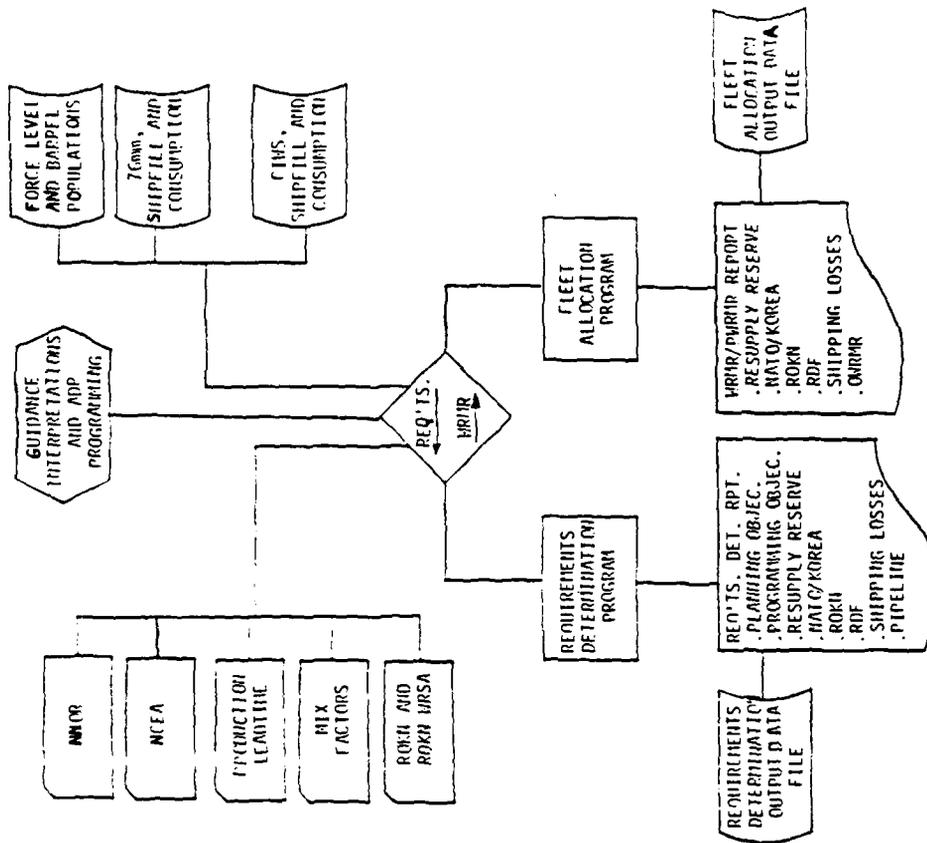


Figure 2.1. Requirements Determination for Ship Gun Ammunition

resupply reserve for the budget year, the five years of the POM and for two additional out years. This data is sent to OPNAV to assist in the preparation of the annual NNOR letter. The computation is performed for each control number in the eight groups of ship gun ammunition. When the NNOR is received by NAVSEA it contains scenario quantities and specifies the number of days of supply which must be available during the POM period. Using this guidance, NAPEC computes the Planning Objective which considers the scenario quantities with no funding constraints. The Programming Objective is an alternative strategy based on a lesser number of days. The programming objective is constrained to a lesser number of days due to asset availability, production shortfalls, changes in forces and, most often, fiscal limitations. Therefore, the programming objective does consider affordability even though attainment of the objective may be two or three years in the future. When assets are applied to these objectives a deficiency may exist, particularly in the out years. A procurement program aimed at eliminating this deficiency is computed for each year.

Requirements (combat consumption, operational requirements and training requirements) are computed on the basis of seven categories of forces and the 30,000 series allowances associated with these forces. The NAVSEA ammunition allowance lists (30,000 series) are defined in Appendix A. The seven categories are [Ref. 4:pp. 2-10,2-11]: fleet active and fleet reserve units (both include service craft), special forces active,

special forces reserve, submarines, Marine Air Wings and Naval Mobile Construction Battalions (NMCBs). When allowances have been determined, the direction contained in Defense Guidance is used to compute combat consumption per scenario, shipping losses, training/pipeline requirements, a Planning Objective and multiple Programming for each group of NALCs contained in a control number (referred to as a Building Block by 2T Cog program managers).

E. RENOVATION REQUIREMENTS DETERMINATION

Historically, renovation workload was handled on the basis of the field activity submitting lists of items such as small arms, ship gun ammunition and demolition material that required maintenance. If there were sufficient funds, the activity usually performed the submitted workload. With limited funds, they performed only a portion of the submitted workload. There was no assurance that items renovated were those with serviceable asset shortfalls. Therefore, it became necessary to develop and implement a budget model to compute budget year and program objective memorandum (POM) maintenance submissions.

The Renovation Requirements Model computes the present readiness posture of a given asset (control group) and determines its readiness deficit in relation to CNO directed asset readiness objectives (ARO). Quantities and costs of renovation work necessary to eliminate the asset readiness deficit are then calculated and categorized as to class of maintenance/repair (E or F), and facility (single manager or Navy).

The present model processes approximately 450 specific ammunition items. Two basic reports [Ref. 5] are products of the computer model; the "POM renovation budget," which displays the budget and the quantity to be renovated for each fiscal year of the FYDP, and the "asset readiness apportionment," which displays the budget for the current and operating budget years and provides sensitivity analysis of readiness based on various budget assumptions or constraints.

The Renovation Requirements operation [Ref. 4:p. 2-12] determines budget dollars (unconstrained funding) and maintenance requirements based on fleet readiness levels for the FYDP. It also computes renovation requirements under a control budget (constrained funding) to determine renovation quantities and costs required to bring asset posture up to a CNO determined level of readiness for a designated budget year. In addition to providing initial and alternative budget submissions, the model develops detailed backup data to support each submission.

Initial assets, both serviceable (SVC) and those needing repair are adjusted according to anticipated receipts from procurement, degradation factors and expenditures in order to arrive at an end-of-fiscal-year asset posture. CNO guidance for Asset Readiness Objective (ARO), the number of repairable items to be renovated, the capacity and turn around time of workload sites, and the minimum renovation quantities required to sustain a renovation/repair capability are factors used in computing renovation/repair requirements and their associated costs.

The Renovation Requirements Model may be run in the following modes [Ref. 4:pp. 3-60,3-61]:

- (1) Enhanced Mode (Unconstrained). This model computes renovation quantities and costs required to bring the asset posture up to 100% asset readiness for all items.
- (2) Basic Mode (Constrained). This mode determines renovation quantities and costs required to bring asset posture up to a CNO determined level of readiness. This is the basic "asset readiness apportionment" report.
- (3) Decremental Mode (Budgetary Constraints). This mode shows the impact of successive budget cuts (fixed dollar decrements) on control number asset posture. With a given budget dollar constraint, funds are expended in renovating those control numbers with the greatest asset readiness deficit. These items are worked until their asset readiness posture has been brought up to the level of readiness of the control groups with the next lower readiness deficit. Then those control numbers are worked together until their asset readiness is equal to that of the control number with the next lower level of deficiency. The process is repeated until the assumed budget dollars have been exhausted. A new budget level is then assumed, e.g., one that is \$250,000 less than the previous budget, and the whole cycle is repeated. The iteration continues until the accumulated dollar decrements reach a given value. A summary to the Asset Readiness Apportionment report shows the effect of successive budget cuts on the asset readiness posture of each control number.
- (4) Minimum Mode. This mode determines the renovation quantities required to maintain a certain minimum level of asset readiness; e.g., 65 percent. At present, the minimum level is defined as the level of asset readiness necessary to sustain NCEA projected usage/losses and maintain PWRMR.

The model uses straightforward calculations from the relevant equations for budget determinations and uses iterative techniques to maximize the minimum asset readiness for any line item within available dollars. The exception to this is when item priorities are pre-established and those items get first draw from a constrained budget. Figure 2.2 [Ref. 6] provides a flowchart of basic inputs for the model.

RENOVATION BUDGET MODELS

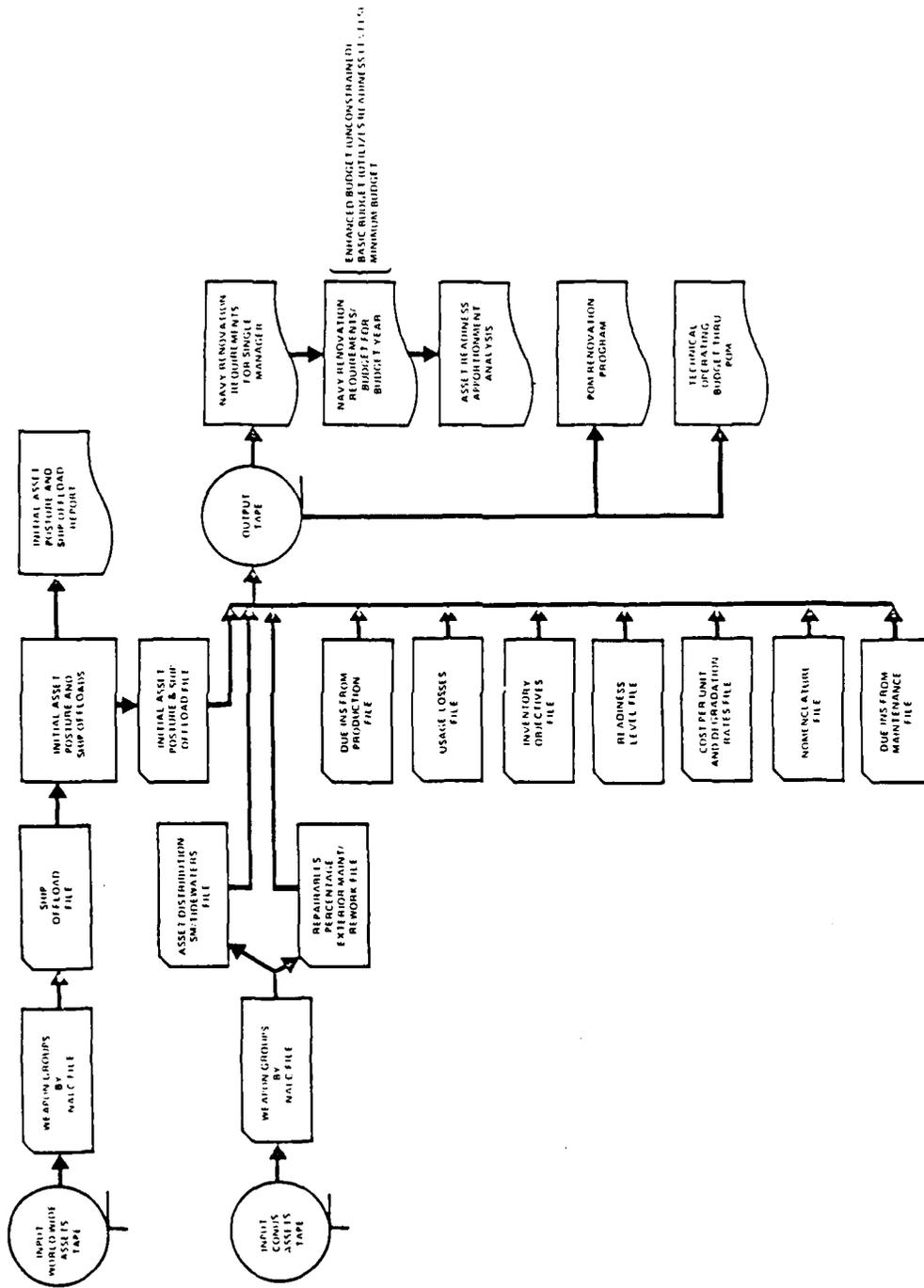


Figure 2.2. Renovation Budget Model

The renovation model is independent of the procurement model. In practice, it is run after the latter, though the sequence is not material. The renovation series of reports is produced quarterly, semi-annually or annually.

Future enhancements include the addition of a capacity/capability file to provide an upper constraint on the enhanced mode. Similarly, the minimum renovation quantities to sustain a maintenance capability are reflected in a lower limit on the apportionment budget.

F. SEGREGATION OF REQUIREMENTS

DOD guidance is general in its scope. For threat weapons it prescribes ordnance requirements in terms of peacetime missions or combat scenarios at a specified protection level. For level-of-effort ammunition it either provides scenario quantities or else states how requirements are to be based on allowances and days of supply. In neither instance does it identify the requirements of specific control numbers, but only the requirements for groups of ordnance, for example, 16", or 5"/54 gun ammunition.

Users of the system are provided with an on-line capability to override designated variables [Ref. 4:p. 2-17], e.g., assets, allowances, expenditures, failure rates, degradation factors, plant production/renovation capabilities, due-ins, scenarios, force levels, days of supply, and funds. The current NAPEC system utilizes CAIMS tapes containing assets and allowances data. More than one hundred reports are

produced by the NAPEC system. Authorized system users have access to secure terminals for file update and data retrieval purposes with large-volume reports printed remotely.

G. INPUTS AND OUTPUTS

The following data is needed by the requirements determination process; that is, requirements computation, procurement processing, renovation requirements computation, sensitivity analysis and report production [Ref. 4:pp. 3-68-3-73]:

- (1) Non-combat Expenditure Allocation (NCEA) for Budget Year. This data is provided by CNO.
- (2) Non-combat Expenditure Requirements (NCER) for the Out Years. This data is provided by CNO and developed by the major claimants.
- (3) Non-nuclear Ordnance Requirements (NNOR). This data is specified in terms of days of supply for certain ammunition groups and in quantitative terms by fiscal year and fleet for others; submitted on line by NAVSEA.
- (4) Rapid Deployment Force (RDF) Requirements. These quantities are provided in DOD Guidance. Days of supply are entered on line by NAVSEA.
- (5) Pricing Data. This data comes from the Single Manager for Conventional Ammunition (SMCA) via NAVSEA.
- (6) Price Escalation Indices. This data is provided by OPNAV and stored in a Cost Escalation Matrix table.
- (7) Production Due-Ins. This data is extracted from Due In/Due Out Records in the data base, subject to override by NAVSEA.
- (8) Ship Population Data. This data is extracted from the Ship Population Record in the data base and updated by NAVSEA based on construction and decommissioning data provided by OPNAV via the Force Level Tape.
- (9) Barrel Population by Ship Type. This data is extracted from the Barrel Population Record and updated by NAVSEA/NAPEC based on ship/weapon modifications.

- (10) Station Stabilized Rate Data. This data is available from NAPEC and kept up to date by NAVSEA.
- (11) Barrel Rates. This data reflects annual firing rates per barrel; updated by NAVSEA/NAPEC based on new allowance data or engineering/tactical planning analyses.
- (12) SMCA Maximum/Minimum Production Rate Data. This data reflects production base data input by NAVSEA.
- (13) Navy Activity Capability Data. This data is supplied by NAPEC, stored in a Capability Matrix table and kept current by NAVSEA.
- (14) Ship Offload Schedule Data. This data is provided quarterly on tape from the Loadout and Offload Quarterly Projection Guide provided by Port Hueneme.
- (15) Degradation Factors. These factors are failure rates developed by NAPEC engineers and input by NAVSEA for storage as technical attributes of the Item Identification records involved.
- (16) Mix Factors. These factors are percentages provided by CNO/NAVSEA to be used in distributing requirements, computed or given, for an ammunition group among the control numbers of that group.
- (17) Guidance. This information is sometimes expressed in specific quantitative terms by fiscal year, e.g., the monthly combat requirements by fleet for 16"/50 naval gun ammunition. It may be stated in more general terms, e.g., that combat consumption for 3"/50 ammunition is to be set equal to the shipfill allowance.
- (18) Reuse Factors. This data represents the number of times an item can be used before it needs to be replaced.
- (19) Procurement Parameters. This data includes control dollars and item priorities entered by NAVSEA.
- (20) Requirements Formulae. These formulae will be algebraic statements entered by NAPEC/NAVAIR to define the rules of requirements computations.
- (21) SMCA Lead Times. These times include administrative, production and load assembly/pack time for SMCA procurement items.

- (22) Number of Days of Support. The number of days for a guidance-specified objective or the number of days of NCEA to be available as a training pipeline will be entered by NAVSEA.
- (23) Ultimate Quantity. This is an Army-determined quantity (entered by NAVSEA) that equates to the quantity of assets that should be available in order to support the Navy's consumption needs between D-day and P-day (the day when production will offset consumption).
- (24) Repairable Percentages. These factors are determined by NWSC engineers which, when applied to unserviceable assets, will provide an estimate of the quantity of such assets that will prove to be repairable; entered by NAPEC.
- (25) Ship/Weapon Phase-Ins/Phase-Outs. This data includes commissioning, decommissioning and modification plans that affect ammunition requirements. It will be entered on-line by NAVSEA/NAPEC as ship population, barrel population or barrel rate updates.

The output data generated quarterly consist of hard-copy reports, CRT displays and updated records for use by various operations. The majority of the reports and displays are classified confidential. In general, they are prepared many times during a budget cycle because overrides of data base quantities, or changes to program parameters, are often entered in order to produce budget data that are more responsive to DOD Guidance or to management's procurement plans.

H. REQUIREMENTS DETERMINATION COMPUTATIONAL STEPS

The detail steps described in the following paragraphs are used to develop fiscal year requirements for 2T Cog items. Cog 2T requirements are computed at the Control Number level for:

- (1) Major Caliber Ammunition--16"/50 naval gun ammunition, 5"/54 guided projectiles, 5"/54 ballistic gun ammunition, 5"/38 naval gun ammunition, 3"/50 (RF), 3"/50 (SF), 76mm, 40mm, and 20mm close-in weapons systems (CIWS).
- (2) Pyrotechnics, demolition material, small arms, and other gun ammunition.
- (3) Renovation.

The Non-Nuclear Ordnance Requirements (NNOR) document provides actual quantities for 5" and 16" ammunition combat consumption. These requirements must be distributed among the control numbers of each group based on mix ratios contained in the guidance. The following rationale is used to determine individual control number quantities assuming FY85 is the first year of the POM [Ref. 3:pp. 3-14,3-16]:

- (1) Combat Consumption. The procedure is as follows:
 - (a) Extract LANT, EUR, PAC and total quantities (D+1, D+2, D+3, D+4, D+5, and D+6) for each of the given fiscal years covered by the NNOR document. The D+1 quantity may be broken down into two quantities representing requirements for attack and anti-aircraft defense, respectively. D here refers to the day when combat begins; D+1 is the first period after that event. The length of the periods is constant, being equal to a stated or implied number of days, for example, 30 days. This days-of-supply concept lends itself to simulation, which allows NAVSEA to simulate support over any number of days that CNO specifies.
 - (b) From CNO guidance extract ammunition group mix factors at a control number level.
 - (c) Multiply each 5" ammunition D quantity by the mix factors for that ammunition group. Each product represents the corresponding D quantity (for LANT, EUR and PAC) for a Control Number in that ammunition group.
 - (d) Sum these respective D-period quantities to obtain the fiscal year combat consumption by

control number for LANT, EUR and PAC. The sum of the LANT, EUR and PAC quantities will equal the total combat consumption for that control number for that fiscal year.

- (e) If NAVSEA specifies that the control number quantity is to be reduced, multiply the results obtained above by the specified multiplier.
 - (f) Repeat the process for each fiscal year.
- (2) Shipping Losses. Such losses are based on loss ratios (expressed as percentages in the NNOR letter) applied to combat consumption.
- (a) Extract the loss percentages for all reasons from guidance provided.
 - (b) Multiply each control number's budget year D-period consumptions by the appropriate loss percentages for that fiscal year. The result is the shipping loss scenario for that Control Group for that fiscal year.
- (3) Pipeline/Training. This scenario is a function of NCEA/NCER and a guidance quantity expressed as the number of days of supply that should be in the pipeline to provide a steady flow of material. It applies only to training (non-service) rounds.
- (a) For each control number, extract budget year data for member NALCs in CAIMS NCEA. For the same NALCs extract POM 1 through POM 5 values of NCER.
 - (b) Compute the pipeline/training percentage (PT) which is equal to the guidance specified number of days divided by 365.
 - (c) Multiply the budget year NCEA value for each NALC by the PT.
 - (d) Sum the NALC values into a control number total.
 - (e) Repeat the process for all reportable control number training rounds.
 - (f) Repeat the procedure stated above for each fiscal year after the budget year, but use NCER in place of NCEA.
- (4) Rapid Deployment Force (RDF). Guidance provides a variable number of fiscal years of requirements data for this scenario for one or more theaters.

In the case of 3"/50, 76mm, 40mm and 20mm ammunition, requirements may be specified quantitatively in guidance. If not so specified, they will be computed on the basis of either barrel population or shipfill allowances.

- (1) Combat Consumption. If exact quantities for 3"/50, 76mm, 40mm and 20mm ammunition are given, the procedure described for 5" ammunition will be followed. If not given, the following steps will be programmed [Ref. 4:pp. 3-16,3-17]:
 - (a) Use total barrel population by fiscal year for the specific ammunition type.
 - (b) Extract the barrel rate computed on the basis of fleet allowances.
 - (c) Multiply the barrel population for the budget year by the barrel rate to obtain total consumption for the budget year.
 - (d) Prorate combat consumption by using guidance-provided fractions to obtain D+1, D+2, D+3, D+4, D+5 and D+6 quantities.
 - (e) Extract group/line item mix factors and multiply the various D quantities to obtain control number quantities.
 - (f) Repeat the procedure stated above for the next and succeeding fiscal years.

Shipping Losses and Pipeline/Training for 3"/50, 76mm, 40mm and 20mm are the same as the 5" and 16" requirements.

Requirements for pyrotechnics, demolition devices, small arms and other ship gun ammunition are not computed for all scenarios. When they are required, the computation is based on shipfill allowances, special forces allowances and miscellaneous NNOR data.

I. SUMMARY

This chapter has detailed the conventional ammunition requirements determination planning process with emphasis on the terms unique to the system. The next chapter will describe how these requirements are used to determine procurement and renovation quantities (requirements programming).

III. REQUIREMENTS PROGRAMMING

A. DATA GATHERING AND SUPPORTING DOCUMENTATION

In this chapter, emphasis is on the three documents which prove most useful to management and higher level funding authorities in the determination of procurement quantities. The remaining steps of the functional sequence shown in Chapter II (with the exception of sensitivity analysis discussed in the next chapter) are addressed in this chapter. As described in the last chapter, NAVSEA translates the NNOR guidance and fleet NCER requirements into specific principal item procurement and renovation requirements for the POM presentation and budget submittal. In the process, information is gathered by NAPEC from a wide range of management studies, data banks, and reports. These variables are analyzed, interpreted and used to develop the planning and programming objectives. The planned and programmed inventory objectives frequently do not coincide since the programming of planned quantities is constrained by factors such as asset availability, production shortfalls, changes in force levels and priorities, resource and fiscal limitations, and other factors.

At the outset of the programming process, allowance and item consumption data from SPCC's CAIMS records are used in conjunction with the NNOR guidance, the NCER/NCEA requirements

and other source data to develop the overall fleet requirements for the budget year, the five years of the POM, and for two additional out years. Two programs are developed: (1) the fleet allocation program for mobilization (which will be ignored for security reasons), and (2) the requirements determination program which generates the P-20, MP&I and MPS, all key documents used in budget formulation, and procurement and renovation determination. [Ref. 2: pp. 2-15, 2-16,2-19]

B. P-20 EXHIBIT

Exhibit P-20 displays worldwide assets, undelivered resources, consumption requirements (NCER) and historical usage. Both planned (long-range) and programmed objectives (constrained) are set forth. It is designed to provide program managers with detailed justification for new procurements of ammunition components required for support of major weapon systems. The P-20 computations also provide input to portions of the MPS and the MP&I [Ref. 2:p. 2-19].

Appendix C [Ref. 4:p. App. B-2] illustrates the format of a P-20 Exhibit as submitted to the Comptroller of the Navy. Each of six columns contains one year of data for all components in the weapon being reported. The following paragraphs highlight the data and source of the information appearing on the report. The assets on hand reflect the sum of serviceable (SVC) and unserviceable (UNSV) assets worldwide at the inventory cut-off date. The initial source for this data is the

Asset Record. If the inventory manager (IM) wishes to adjust SVC or UNSVC assets, this may be achieved by applying override percentages.

Due-in quantities represent the difference between production contract quantities and the production shipped-to-date quantities. Since contracts are let by NIIN and the P-20 is based on control numbers, the latter will be cross-referenced, via their appropriate NALCs, to the corresponding NIIN(s). The NIIN(s) will be used to access the CAIMS records. Again, the IM has override capability.

Usage rates are based on the item's procurement lead time and NCEA. Usage through the FY82 Buy is from 1 October 1981 through the item's total lead time. Thus, if the item's lead time is 18 months, "Usage through FY82 Buy" will be calculated as (NCEA for FY82) + $\frac{1}{2}$ (NCEA for FY83). Comparable formulae will provide usage quantities for other Buy periods.

The Planning Objective for all years of the POM is computed in the Requirements program. The Program Objective quantities are also computed in the same program and passed on to the P-20 program.

Two procurement quantities are reflected for each year of the POM. The first is equal to the Planning Objective minus the Net Assets. The second is equal to the Program Objective minus the Net Assets.

The Procurement Program quantities are developed by NAVSEA and input to the P-20 Exhibit. They are also used as the

Required Procurement Quantities on the Munitions Procurement and Inventories Report for the first year of the POM.

Elements of Planning/Program Objective vary in accordance with DOD Guidance. In the bottom half of Appendix C the elements shown are geared to major caliber ammunition. In this example, the elements consist of resupply reserve, shipping losses, pipeline training, NATO requirements, Republic of Korea, Navy requirements and Rapid Deployment Force requirements.

Actual expenditure rates are obtained from Historical Usage records which are input to the P-20 program.

The three elements of procurement lead time (administrative, production and loading, assembly and packing (LAP)) are obtained from SMCA via NAVSEA. NAVSEA has the option of adjusting any of the values prior to a P-20 program run.

In summary, the P-20 exhibit is generated from the planning and programming objectives developed during requirements determination and from the asset status information. An exhibit is prepared for selected item control numbers and used to support the current year budget submission.

C. MUNITIONS PROCUREMENT AND INVENTORIES (MP&I)

Appendix D [Ref. 4:p. App. B-3] illustrates the format of the Munitions Procurement and Inventories report. The main purpose of this report is to identify the item quantities that should be procured to conform to the programming guidance provided by CNO. It extends the coverage contained in the P-20

through the funding delivery period (e.g., for POM 85, this would encompass Fiscal Years 84-89).

This subsection explains the data content and source of information that appears on each line of the report. The Planning Objective quantity (line 1) was formerly referred to as the Inventory Objective (IO). The quantity shown in each column is computed in the Requirements program. The cost of any year's Planning Objective is equal to the product of the Planning Objective and the Unit Cost; the latter reflects the inflation rate for that year. The Programming Objective (line 2) is also computed in the Requirements program.

The initial allowance (line 3) is reported only for threat weapons, hence it is not relevant for 2T Cog material.

The FYDP dollars (line 4) are allocated through the Priority Processing procedural program outlined in Chapter IV.

Peacetime Consumption (line 5) reflects the usage values of the P-20 report through the budget year. The POM year quantities equal those in the NCER record. The assets (line 6) at the end of each fiscal year are equal to the net of: prior end-of-year assets (line 6), plus current year procurement (line 4), less current year consumption (line 5).

Two procurement options are identified. Alternative 1 specifies the fiscal year (FY87) in which the Programming Objective is to be achieved. It also states the authorized procurement program for subsequent years. Under Alternative 2 the Planning Objective is to be achieved by a specified

later year (FY89). Typical constraints that must be recognized in the computational process are [Ref. 4:p. 3-30]:

- (1) Peacetime consumption must be satisfied, in addition to achieving the Planning Objective and Programming Objective by the specified fiscal years.
- (2) No year's procurement quantity may be less than that year's minimum production base quantity.
- (3) No year's procurement quantity may be greater than that year's maximum production base quantity.
- (4) The quantity procured in any year in the process of achieving the Planning Objective must not be less than the quantity required to be procured that year in order to attain the Programming Objective.
- (5) If the item is new, so that volume procurement is not feasible until after the first year of the POM, achievement of the Programming Objective may be delayed as specified in guidance after volume production begins.

Reference to Figure 3-1 [Ref. 4:p. App. E-1] will facilitate an understanding of the methodology employed in computing Alternative 1 and Alternative 2 procurements.

Alternative 1. The example below assumes that guidance specifies attainment of the Programming Objective by FY87. The following steps are required in achieving the Programming Objective:

- (1) Compute Annual Procurement Limit.

FY87 Prog. Objective	848
FY85 Consumption	548
FY86 Consumption	548
FY87 Consumption	<u>548</u>
Total Requirements	2492
FY84 Assets	<u>719</u>
Total Alternative 1 Procurement	1773
Annual Procurement Limit 1/3(1773)	= 591

		FY84	FY85	FY86	FY87
Beginning Assets	A		719	762	805
Consumption	B		548	548	548
Net Assets	A-B		171	214	257
PO	C		1861	1543	848(4)
Net Assets > PO?			No	No	No
FY Procurement Req.	D=C-(A-B)		1690	1329	591
Annual Procurement Limit	E		591(1)	591(2)	591(2)
D > E					
Buy Quantity	F		591(3)	591(3)	591(3)
Ending Assets	A-B+F	719	762	805	848(4)

NOTES:

- (1) Procurement Limit for FY85 = $1/3(\text{FY87 PO} + \text{FY85 thru FY87 Consumption} - \text{FY84 Assets})$
= $1/3(848 + (3 \times 548) - 719)$
= 591
- (2) Procurement Limit for FY86 and FY87 = $1/2(\text{FY87 PO} + \text{FY86 thru FY87 Consumption} - \text{FY85 Assets})$
= $1/2(848 + (2 \times 548) - 762)$
= 591
- (3) Buy = Procurement Limit
- (4) FY87 Assets = FY87 PO

Figure 3.1. Procurement Program Chart #1

The factor 1/3 is used because the objective is to be attained three years after the budget year (FY84).

(2) Compute FY85 Procurement.

FY85 Prog. Objective	1861
FY85 Consumption	<u>548</u>
FY85 Requirement	2409
FY84 Assets	<u>719</u>
Net FY85 Requirement	1690

Because 1690 > 591 (Annual Procurement Limit), buy 591.

(3) Compute FY85 Assets (after buy).

FY84 Assets	719
FY85 Buy	<u>591</u>
Total	1310
FY85 Consumption	<u>548</u>
Net FY85 Assets	762

(4) Compute FY86 Procurement.

FY86 Prog. Objective	1543
FY86 Consumption	<u>548</u>
FY86 Requirement	2091
FY85 Assets	<u>762</u>
Net FY85 Requirement	1329

Because 1329 > 591, buy 591.

(5) Compute FY86 Assets (after buy).

FY85 Assets	762
FY86 Buy	<u>591</u>
Total	1353
FY86 Consumption	<u>548</u>
Net FY86 Assets	805

(6) Compute FY87 Procurement.

FY87 Prog. Objective	848
FY87 Consumption	<u>548</u>
FY87 Requirement	1396
FY86 Assets	<u>805</u>
Net FY87 Requirement	591

Because 591 does not exceed the Annual Procurement Limit, buy 591.

- (7) Verify that FY87 Programming Objective has been achieved. $FY84 \text{ Assets} + \text{Procurement} - \text{Consumption} = \text{FY87 Programming Objective}$. $719 + 3 \times 591 - 3 \times 548 = 848$

The example shown above illustrates the need for procurements in FY85, FY86 and FY87. Other items with different objectives, asset positions, and consumption rates may not require procurements in any or all of these years. Figure 3-2 [Ref. 4:App. E-2] illustrates a procurement program that does not require a buy in FY85. Because of that fact, the annual procurement limit must be recomputed. Note that whereas it was 50 in FY85, it changed to 75 in FY86. The annual limit must be recomputed for future years if the FY buy quantity is less than the procurement limit applicable to that year. The example also illustrates that, because of low consumption in FY85 and high consumption in FY87, the required procurement quantity is only 10 in FY86 although the annual procurement limit is 75. In this instance management can decide to buy 75 in both FY86 and FY87. However, if only 10 are procured in FY86, the buy limit for FY87 becomes 140. This quantity must be bought to meet the FY87 Programming Objective.

DOD Guidance, via OPNAV, specifies the procurement rule(s) to be used in computing Alternative 1 buys after the Programming Objective has been attained. These rules can vary from year to year. Typical situations to be preprogrammed might include [Ref. 4:p. 3-35]:

- (1) Buy to attain and maintain fleet consumption, or shipping losses or both.
- (2) Buy a given percentage of the Programming Objective for that fiscal year.

		FY84	FY85	FY86	FY87
Beginning Assets	A		300	290	250
Consumption	B		107	50	307
Net Assets	A-B		290	240	160
PO	C		250	250	300
Net Assets ≥ PO?			Yes	No	No
FY Procurement Req.	D=C-(A-B)		0	10	140
Annual Procurement Limit	E		307	257	160
D > E	F		No	No	No
Buy Quantity	F	300	0	10	140
Ending Assets	A-B+F	300	290	250	300

Figure 3.2. Procurement Program Chart #2

In Alternative 2 the Planning Objective is to be achieved by a specified year (later than the year in which the Programming Objective is attained as directed by Defense Guidance). For purposes of illustration, Appendix D assumes that the specified year is FY89. The procedural steps are similar to those used in Alternative 1 with the additional constraint that an Alternative 2 procurement for any FY should not be less than the Alternative 1 procurement for that year. [Ref. 4:pp. 3-36,3-37]

(1) Compute Annual Procurement Limit.

FY89 Plan Objective	226
Consumption 5 × 548	<u>2740</u>
Total Requirement	2966
FY84 Assets	<u>719</u>
Total Alternative 2 Procurement	2247

Annual Procurement Limit $1/5(2247) = 449.4$.

(2) Compute FY85 Procurement.

FY85 Plan Objective	3330
FY85 Consumption	<u>548</u>
FY85 Requirement	3878
FY84 Assets	<u>719</u>
Net FY85 Requirement	3159

Because $3159 > 519 > 449.4$, buy 591, i.e., buy the Alternative 1 quantity.

(3) Compute FY86 and FY87 Procurement. Reasoning similar to that used for FY85 shows that the buy for FY86 and FY87 should again be 591.

(4) Recompute Annual Procurement Limit.

FY89 Plan Objective	226
FY88 Consumption	548
FY89 Consumption	<u>548</u>
Total Requirements	1322
FY87 Assets	<u>848</u>
Total Required Procurement	474

Annual Procurement Limit = $1/2(474) = 237$

(5) Compute FY88 Procurement.

FY88 Plan Objective	835
FY88 Consumption	<u>548</u>
FY88 Requirement	1383
FY87 Assets	<u>848</u>
Net FY87 Procurement	535

Because $535 > 237$ (Annual Procurement Limit), buy 237.

(6) Compute FY88 Assets (after buy).

FY87 Assets	848
FY88 Buy	<u>237</u>
Total	1085
FY88 Consumption	<u>548</u>
Net FY88 Assets	537

(7) Compute FY89 Procurement.

FY89 Plan. Objective	226
FY89 Consumption	<u>548</u>
FY89 Requirements	774
FY88 Assets	<u>537</u>
Net FY89 Requirement	237

Because $237 =$ Annual Procurement Limit, buy 237.

The Minimum Economic Production (line 9) of 150 is provided by the Army and NAVSEA is responsible for maintaining it. The purpose of this line is to ensure that the procurement quantity is not less than the Army's economic production base. The Maximum Economic Production (line 10) of 600 is also provided by the Army and must be kept up to date by NAVSEA. Its purpose is to ensure that the Alternative 2 procurement quantity is not greater than the Army's maximum production base.

The unit cost (line 11) appearing under the respective fiscal year columns are provided by SMCA. If a procurement

is not required for a given year, SMCA may not provide the unit cost for that year. However, it can be determined by applying that year's inflation factor to the item's base year cost.

The Ultimate D-P quantity (quantity that should be available between D-day (outbreak of hostilities) and P-day (the day when production will equal consumption)) in the upper right hand corner of Appendix D is determined by the Army based on its production build up rate and Navy consumption. It represents the stockpile that must be available at the beginning or procurement lead time in order to support requirements until (cold start) production catches up with consumption. It provides a measure of the reliance being placed on the production base, but it is not actually used in budget determination. Thus, if an item has a monthly consumption rate of 200, a procurement lead time of 24 months, and if 100 can be produced in the 25th month, 150 in the 26th month, and 200 in each month thereafter, the Ultimate D-P Quantity is equal to [Ref. 4:p. 3-39]:

$$200 \times 26 - (100 + 150) = 4950 .$$

D. MATERIAL PLANNING STUDIES (MPS)

One of the primary documents required by CNO (OP-04) in the planning, programming and budget requirements process is the Material Planning Study (MPS). This comprehensive study reflects projected peacetime and mobilization requirements, assets, production, deficiencies, etc., for each end item of conventional ammunition.

An MPS identified to each principal item is prepared annually by 15 February and as significant changes occur. It provides budget and program backup data, specifies inventory objectives, serves as a basis for detailed procurement and production analysis and planning, provides a means of exchanging requirements and production information with the SMCA, and generally presents a detailed overview of an item's readiness posture. The MPS covers a period including the prior fiscal year, the current budget year and five succeeding fiscal years.

The MPS as shown in Appendix B [Ref. 7:pp. Encl 3] tabulates and summarizes the following:

- (1) Item identification and unit cost
- (2) Logistic factors (unit of issue, procurement objective by budget year)
- (3) Procurement leadtime
- (4) Annual gains and losses
- (5) Production costs for the item for each budget year
- (6) Current and forecast material status
- (7) Assets of the item on hand (as of report cut-off date) and asset location
- (8) Stock usage for the past two years
- (8) Item retention level

Inventory status of stocks on hand and inventory gains and losses are incorporated into the MPS from monthly World-Wide Asset and Experience Reports compiled by SPCC. Information and status concerning deliveries and forecasted receipts from contractors are obtained from Acceptance Reports (e.g., DD-250). As can be seen from the standard form, the above information is classified which prohibited use of real examples in this study.

In the NAPEC system the Requirements Determination operation feeds the P-20 and MP&I processes. These, in turn, pass requirements and procurement data to the MPS operation.

Section I of the MPS (Appendix B) provides various item identification data which includes the different lead time figures expressed in months. Section II of the Study indicates the material status in terms of budget and funding periods and delineates the inventory objective, procurement objectives, gains and losses, and inventory in units of 1,000 and in terms of budget periods. It provides management with data for financial analysis, budget review purposes and with a ready reference to the current and projected summary status of the item for each funding period. Budget years as used here, covers the period of normally 12 months between the point in time when deliveries from one year's budget can begin until deliveries from the subsequent year's budget can begin.

In Section III Planning Objectives are computed for each fiscal year based on the level of support for each scenario as defined in Defense Guidance. Gains from procurement and assets from other sources along with losses through estimated consumption and transfers are recorded. The planned inventory is computed by taking the on-hand quantity as of the cut-off date of the study and adding total gains and subtracting total losses. The difference between the planned inventory and the total planning objective results in the planned inventory status.

Section IV indicates the location of stocks on hand and in transit, serviceable and repairable. Section V is included to balance the stock transactions occurring during the two fiscal years preceding the cut-off data of the study. Section VI indicates the retention level, which consists of the quantity of material authorized for acquisition to equip and sustain U.S. Forces, Allied Forces and other U.S. Government Departments and Agencies.

The type of information entered in the remarks block (Section VII) include a brief description of the item, the basic source documents used in preparing the data and explanations of entries which deviate from data normally included.

Material Planning Studies are prepared during the POM and Budget cycles and form the basis for the preparation of supporting exhibits and other management studies. Peacetime/mobilization deficiencies, facilities, justification and a basis for overhaul schedules are just a few of the uses.

E. SUMMARY

This chapter has illustrated how various data are analyzed, interpreted and used to develop the planning and programming objectives, and how their presentation is formally structured by NAPEC within key working documents. Collectively, these three documents provide an assessment of current and projected levels of WRMR and NCER asset readiness, help identify assets and deficiencies, provide detailed backup documentation for POM and budget submittals, and present information useful to

management and to higher level planning and funding authorities. The next chapter will look at the procurement strategy employed when funds are insufficient to procure full requirements.

IV. REQUIREMENTS IMPLEMENTATION

A. PROCUREMENT STRATEGY

Asset and expenditure information from CAIMS together with program requirements prepared by CNO from OSD logistics guidance form the basis for computing replenishment requirements. These data and computations are continually updated and refined throughout the budget process until final submission to Congress. When funds are appropriated, allotments are provided to the inventory managers for procurement, renovation and assembly of the total fiscal year's requirements.

Because funds are rarely sufficient to procure the full requirements of training and service rounds, a procedure (sensitivity processing) exists to effect constrained dollar buys in accordance with certain priority rules. In general, these rules are [Ref. 4:pp. 2-11,2-12]:

- (1) If assets are insufficient to satisfy NCEA for any round, buy enough to eliminate the deficiency.
- (2) In effecting step 1, start with the round that has the greatest deficiency.
- (3) Next, buy to support the training pipeline. For all training items, buy each, according to its deficiency, up to a support level where its assets (on hand + due-ins + buys - consumption) are equal to its Programming Objective.
- (4) Next, make service round buys beginning with the round that has the greatest asset deficiency based on its Programming Objective. Continue buying until all rounds are fully supported or until funds are exhausted.

- (5) Continue the buy process for service rounds until Planning Objective requirements are satisfied or until funds are expended.
- (6) If funds remain after step 5, continue buying service rounds equitably across the range of items within the ammunition group (line item) to which the control dollars apply.
- (7) If funds still remain, buys will be made for those control numbers specifically identified by NAVSEA as having priority.

B. COMPUTATION PROCEDURE

The steps required to implement the procurement strategy are as follows [Ref. 4:pp. 3-54,3-56]:

- (1) Extract total on-hand assets at the end of the budget year for all control numbers in the first ammunition group.
- (2) Identify control numbers that will have a negative position at the end of POM1, i.e., projected usage (NCEA) exceeds assets at the beginning of POM1.
- (3) Starting with the item that has the greatest shortfall, buy enough to bring that item up to the level of the item with the next higher shortfall. Then buy both simultaneously to raise them to the level of the next higher item, and so on.
- (4) Compute the cost of the buy, add it to the Line Item Procurement Dollars Spent field for that ammunition group, and reduce the Line Item Dollars Available.
- (5) Increase the items' assets by the buy quantities.
- (6) Perform steps (3) through (5) for all negative position control numbers. When two or more items have the same shortfall, buy the one with the lowest cost first.
- (7) Compute the Programming Objective Support Percent for each control number in the group, where:

$$\% = \frac{\text{Assets (plus planned buys)}}{\text{Programming Objective}}$$
- (8) Identify training rounds in the group; select the round (R_1) with the lowest support % (S_1). Select the round (R_2) with the next higher support % (S_2).

- (9) Let the Programming Objective for R_1 and R_2 be P_1 and P_2 , respectively.
- (10) Compute the buy required to bring R_1 up to a support % equal to S_2 :
- $$\text{Buy} = P_1(S_2 - S_1)$$
- (11) Compute the cost of the buy where C_1 is the unit cost of R_1 :
- $$\text{Cost} = P_1(S_2 - S_1)C_1$$
- (12) Add the cost to the Line Item Procurement Dollars spent and reduce the Line Item Dollars Available.
- (13) Increase the assets of R_1 by the amount of the buy.
- (14) Identify the round (R_3) with the next higher support % (S_3).
- (15) Compute the buys required to bring R_1 and R_2 up to a support % equal to S_3 :
- $$R_1 \text{ Buy} = P_1(S_3 - S_2)$$
- $$R_2 \text{ Buy} = P_2(S_3 - S_2)$$
- (16) Compute the cost of the buys:
- $$R_1 \text{ Buy} = P_1(S_3 - S_2)C_1$$
- $$R_2 \text{ Buy} = P_2(S_3 - S_2)C_2$$
- (17) Increase the Line Item Procurement Dollars Spent and reduce the Line Item Dollars Available by the costs of these buys.
- (18) Increase the assets of R_1 and R_2 by the amount of the buys.
- (19) Repeat the process above for R_3 , R_4 , etc., subject to the following constraints:
- Do not make buys for control numbers with a support percent > 100 .
 - Do not make a buy that would raise a control number's support percent above 100; buy only enough to make 100.
 - If the Line Item Dollars Available funds are greater than zero but not enough to buy one more of a control number, buy one of the

item, i.e., exceed the dollar constraint, even if this action raises the control number's support percent above 100.

- (d) Stop the process if the Line Item Dollars Available are exhausted.
- (20) If funds remain for any line item, all training control numbers in that group will have a support percent ≥ 100 . In this case repeat steps (8) through (20) for service rounds in place of training rounds.
- (21) If funds remain after step (20), repeat steps (7) through (20) for service rounds, but for each such use a support % based on the item's Planning Objective.
- (22) If funds still remain, all service rounds in the line item will have a support percent > 100 . Use the funds to buy more service rounds starting with the control number that has the lowest support percent. If two or more items have the same support, buy one of that item that has the lowest unit cost, then one of the item with the next higher cost and so on. Repeat this process for other control numbers until the Line Item Dollars Available are exhausted.
- (23) Repeat steps (1) through (22) for the next line item and so on until all classes have been processed.
- (24) Move to the next POM year and repeat the full process using the control numbers opening asset positions (after the buys of the previous POM year), the projected usages for the next year, and the control dollars available for the new POM year. When completed, go to the next POM year, and so on until the last year of the POM.

C. PRIORITY PROCESSING

In order to accommodate priorities, the following additional considerations are incorporated in the general procedure

[Ref. 4:pp. 3-57,3-58]:

- (1) NAVSEA will determine the number of priority codes required, i.e., P_1, P_2, \dots, P_n .
- (2) In each line item, NAVSEA will identify priority control numbers and will assign a priority code to each.

- (3) These codes will be maintained by NAVSEA in a priority table.
- (4) The program will make three priority options available. NAVSEA can invoke any one of them for a given class of ammunition:
 - (a) Bring priority items to a support percentage of the Programming Objective or Planning Objective specified on line by NAVSEA, i.e., buy for P_1 , then P_2 , etc., before balancing the buys of P_1 non-priority control numbers.
 - (b) Recognize priority only when buying to bring two or more control numbers up to the level of the next higher supported control number.
 - (c) For one or more specified line items disregard previously established codes in the priority table and execute buys according to the simplified procedure described earlier.

D. SUMMARY

The annual budget is subjected to an analysis by the Navy which results in financial decisions to set an upper limit on the dollars available for each ammunition line item and procurement priorities within the line item. The procedures above described, in general terms, how this function is implemented. The next chapter will look at the periodic nature of the present system and the initiatives underway which will provide a more real time data base.

V. ANALYSIS OF REQUIREMENTS DETERMINATION/ACQUISITION

A. INTRODUCTION

The conventional ammunition logistic life cycle is a progression from initial planning and requirements determination, through procurement, renovation, and use or ultimate disposal of unused rounds. The associated requirements determination process is not designed to be run in a routine manner like the Cyclic Levels and Forecasting, Supply Demand Review and Repair Scheduling applications used in repair parts requirements determination. Instead, its processing originates in a set of guidelines that require interpretation by various players. These guidelines were described in the earlier chapters. Nonetheless, non-routine does not mean non-real time. And it is in this area where improvements can and are being made. This chapter will focus on the periodic nature of the ammunition requirements determination process along with its move towards a real time system. Also discussed is the need for an automated interface between the procurement and renovation models and the impact inspection and disposal operations have on procurement/renovation decisions.

B. PERIODIC REVIEW

The requirements determination process and procurement strategy details from the preceding chapters make it clear that key actions occur on a periodic basis. For example,

guidance from on high in the form of inventory objectives occurs annually and so does the majority of ammunition procurements. In the terminology of inventory models, conventional ammunition is managed by a periodic review operating doctrine. This section considers this operating doctrine and whether it should be changed to a continuous review operating doctrine.

The requirements determination process is not hampered because a periodic review operating doctrine is in place. The requirements determination decisions to be made are not numerous enough to necessitate complete automation and are varied and complex to the degree that a continuous review system would preclude the judgments ammunition managers must make in carrying out the direction from higher authority. The nature of the requirements determination system, that being a planning system as opposed to a pure operating system, is reason enough to buck the current trend in the public and private sector of moving from a periodic review system to a continuous review system simply because computers can do things faster.

However, provisions for the identification at the earliest moment of ammunition items whose stocks will no longer be able to support upcoming needs is becoming more and more necessary because of closer scrutiny of munitions programs by higher authority such as Congress and SECDEF [Ref. 4:pp. 2-9]. Increasing demands are being made for special calculations for the development of total procurement programs not based on any

of the budget steps delineated at the beginning of Chapter II. Therefore, although the requirements cycle may seem conceptually straightforward, frequent recomputations are necessary as part of PPBS and make the system substantially more complex than it would at first appear. The answer to the closer scrutiny from above lies more in the need for real time data than a mandate for a continuous review operating doctrine.

C. REAL TIME DATA

Chapter I stated that the supply system's primary goal was to sustain the operating forces in a state of material readiness. The accomplishment of this goal requires that a wide array of supply, technical, and financial information be accessible for use by inventory managers. Information needing to be processed includes data base information maintained by other CAIMS operations, external data provided by non-CAIMS systems, and on-line inputs provided by application users. Procurement lead times, barrel firing rates, and SMCA pricing data are examples of this type of information in the ammunition arena. And, to be effective, the logistics intelligence recorded in central and local files must be complete, accurate and timely. Otherwise, the Navy ammunition program is vulnerable to attack by organizations such as the United States General Accounting Office (GAO), which recently questioned the Navy's fiscal year 1986 ammunition budget request. GAO

recommended that \$139.4 million or 15 percent of the original request be reduced for the following reasons [Ref. 8:p. 45]:

- \$24.2 million for two types of practice bombs is not needed since the inventory would exceed requirements. Procurement lead times were overstated.
- \$5.7 million for two budget line items is not needed because the items were incorrectly priced.
- \$57.9 million for the GATOR weapon and two machine gun ammunition items is not needed because the items were incorrectly priced.
- \$12.8 million for two line items is not needed because they cannot be produced within the funded delivery period.
- \$17.3 million for 76mm ammunition is not needed because unneeded funding and components from prior years can be used to produce this item.
- \$21.5 million for the BIGEYE bomb is unnecessary because of unresolved technical problems.

The absence of real time data management information to program managers was a contributing factor in the above findings. Up to the present, the ammunition management information system has not operated in a real time mode. However, in an effort to keep abreast of modern concepts and technology, the ammunition supply system (SYSCOMs, ICPs, stock points) is currently undergoing a retooling and streamlining which promises improvements and innovations, such as the critical item review initiative (Section E), which should improve the information available to inventory managers and, therefore, improve customer support, both afloat and ashore [Ref. 2: pp. 4-1,4-2].

Real time data is equally important in the renovation of ammunition. Ammunition stocks should be maintained at the

maximum level of serviceability obtainable within fund availability [Ref. 9]. In order to accomplish this objective, un-serviceable ammunition should be analyzed as expeditiously as possible to identify what it is, and determine its condition. Inspection and component testing of items should be performed expeditiously when those items have been selected for inclusion in a fiscal year renovation program. Unfortunately, as indicated in Chapter II, funds are generally insufficient to maintain stocks of all ammunition in a fully serviceable and ready-for-issue status.

D. NAPEC FUNCTIONS TRANSFERRED TO CAIMS

Within the next few years, the requirements program will directly access the CAIMS data base for asset data, procurement/renovation/production data, allowance data and control number data [Ref. 4:p. 2-19].

A current proposal calls for the requirements determination operation that NAPEC processes in support of NAVSEA budget preparation to be transferred to CAIMS. This would have equipment, software, organizational and operational impacts. Because of the geographic distance between the inventory managers at SPCC and NAPEC, lack of a secure network to provide near real time response, lack of state-of-the-art ADP equipment as well as a saturated data base at NAPEC, transfer of the NAPEC system to CAIMS is expected to enhance current processing needs. As discussed earlier, the current NAPEC system utilizes tapes containing assets and allowance data. Many of these tapes

are shipped from SPCC and other activities to NAPEC at NWSC Crane, Indiana. This new requirements determination operation will have direct access to the CAIMS data base via the ICP's new resolicitation hardware (Resolicitation is NAVSUP's program to develop an ADP System for the future). Therefore, instead of reading hard copy reports produced from tapes, the inventory managers will utilize their CRT terminals to display data that they want to analyze. They will also be able to key in corrections and adjustments, as needed, to update the requirement determination data base files. In this manner there should be less need for the inventory manager to develop allowances or for entry of overrides due to non-current information. However, for the next several years, it is likely that the requirements determination application/operation will continue to be indirectly linked with non-CAIMS systems through physical tape transfers. Eventually, when the new Resolicitation hardware/software environment is in place and existing non-CAIMS systems are enhanced, it may be feasible to effect a direct secure interface.

Response time enhancements by an on-line system would also reduce the delay time between report preparation and user receipt. Data maintenance and on-line entry of parameter changes should streamline the processing cycle. For example, the Loadout and Offload Quarterly Projection Guide, currently compiled at Naval Ship Weapons Engineering Station (NSWES) at Port Hueneme, provides the NWSC Crane Receipt Segregation

Storage and Issue (RSS&I) System with ship offload data. NAPEC uses this information in the Renovation Model. The new CAIMS requirements determination operation will be able to extract offload schedules directly containing the projection data (i.e., maintenance due dates) included in the guide.

Operationally, the computer work load would shift from NAPEC to SPCC. The personnel work load is expected to be adjusted between NAPEC, SPCC and NAVSEA. For example, an analyst at NAPEC spends almost all his time in support of requirements processing. Three programmers devote an estimated one man-year between them to program maintenance. SPCC's personnel will need to be increased for these very same reasons. NAVSEA will require a person to operate a high-speed printer and make on-line updates and retrievals from the CRT terminal. The operational dialog between NAVSEA (inventory managers/budget planners) and NAPEC would still be necessary since NAPEC would still retain the role as design agent, reviewing system products for acceptability.

The NAPEC system FORTRAN programs which are currently used at NWSC Crane must be transferred to SPCC. NAPEC's requirements determination procedure is based on a large number of different files, each of which is used by one or more programs, whereas the new requirements determination application/operation at SPCC will be supported by an integrated data base in COBOL. Because of the numerous patches that have been made to the programs over the years, it is imperative that the existing

programs be analyzed and documented to ensure logic is fully understood prior to the development of program specifications for the CAIMS system.

E. CRITICAL ITEM REVIEW

Another initiative to improve overall inventory management is the Critical Item Review Application/Operation (A/O). It will provide for the early identification of ammunition items whose stocks are not able to support upcoming needs as determined by the comparison of consumption and degradation quantities with on-hand asset quantities plus scheduled due-ins resulting from procurement, procurement and renovation [Ref. 10: p. 6]. The proposed system will utilize automated forecasting techniques in order to determine which ammunition items are in or near a critical stock status and then notify the inventory manager automatically so the appropriate corrective action can be initiated [Ref. 10:p. 13]. The Critical Item Review Operation will operate real time thus allowing for on-demand, monthly or quarterly review of all ammunition items, with the inventory manager selecting the frequency at which each item will be processed by the operation. As a result, this automated effort provides a review of ammunition items by control number or NIIN with accompanying recommended supply actions. The primary impacts of this operation are that all computational functions will be completed automatically and the information provided the inventory manager will be current [Ref. 10:p. 9].

F. MECHANIZED DOCUMENTATION

Chapter III discussed the importance of the P-20, MP&I and MPS documents in the PPBS process. To date these documents are not entirely mechanized, again contributing to the less than real time data available to management and other users. For example, the P-20 budget exhibit, is an official budget justification document prepared by the inventory manager, reviewed by the appropriate system command and ultimately presented to Congress for budget approval. The P-20 exhibits must be produced several times a year due to parameter changes and POM requirements.

The present system requires extensive manual effort. Inventory objectives, which are the basis of the P-20 reports, should also be computed automatically based on allowances, assets, maintenance pipeline data, and program requirements parameters rather than being computed manually.

G. PROCUREMENT/RENOVATION BUDGET LINK

The main thrust behind most decisions to renovate ammunition is that it is cheaper to repair an item than buy a new one. Therefore, one would expect renovation decisions to drive procurement decisions. Also, an underlying principle would seem to be that a shortfall in the budget for renovation would necessitate an increase in the procurement budget. Likewise, a procurement budget shortfall could be made up through a bigger pot of renovation dollars. Currently, there is no interface or link between the two processes. In discussing the

budget process for procurement (Other Procurement, Navy) and budget process for renovation (Operations and Maintenance, Navy) it was stated that the two are independent and, in fact, are funded out of two different "pots" of money.

Procurement budgeting does assume a certain amount of renovation under current programming procedures. However, data from the procurement program, such as usage, new procurements and planning/programming objectives, is manually input to the renovation program which not only results in "built in" delays in processing, but also human errors which accompany most manual systems. Even though personal judgments tend to be used in making procurement and renovation decisions, the two programs (procurement and renovation) should be linked together in some fashion to provide more timely data for analysis by NAVSEA.

H. INSPECTION/DISPOSAL IMPACTS ON PROCUREMENT/RENOVATION

Although ammunition inspection and disposal were not discussed in describing the requirements determination process, the efficiency in which these two activities are performed can impact on procurement and renovation decisions.

Any ammunition turned in to a retail activity from a fleet unit is automatically reclassified to condition code K and set aside for inspection and, as a consequence, is unavailable for issue. This is a common occurrence since ships are required to offload all ammunition prior to entering overhaul or prolonged maintenance availability, and ships returning from

deployment often turn in excess materials. CAIMS data indicates that approximately fifteen percent of conventional gun ammunition is in condition code K at any one time. Although NAVSEA requires that ammunition in this condition code be inspected within thirty days, it is generally acknowledged that this does not always happen. [Ref. 3:pp. 48-49]

The major factor creating a large condition code K backlog is a lack of funding for manpower to do the inspections. Inspection costs are requested and funded as part of the Operations and Maintenance, Navy appropriation. However, inspection requirements are only one small segment of personnel costs. Manpower is devoted to inspections when it can be spared from direct customer support. Therefore, whenever there is less than full funding, reprogramming of funds can be expected and the man-hours available for inspection will decrease accordingly.

Disposal of conventional ammunition is required when an item is unserviceable and inappropriate for renovation, or is found to be in excess of projected requirements. Excess material is identified through the process of stratification, or the application of assets to requirements to determine deficiencies, sufficiencies, or excesses [Ref. 3:p. 27]. This is generally accomplished in conjunction with Material Planning Studies (MPS), described earlier.

An investigation by SPCC in 1985 showed that the backlog of ammunition awaiting disposal has been as much as 50 percent of total stocks at some retail activities. This is an extremely

high percentage, especially because these assets are generating enormous costs in occupied magazine space, inventory administration, and security requirements.

Unfortunately, when budget cuts occur, disposal operations are the primary choice to eliminate. At the NAVSEA level, managers would rather cut disposal than procurement. At the weapons station level, disposal operations are cut rather than reducing direct customer support.

I. SUMMARY

NAVSEA as program manager has demonstrated progressive initiatives in moving towards the goal of achieving a real time ammunition management information support system in which computers "talk to" computers concerning processing details. However, lack of funding for manpower in the case of ammunition inspection, and budget shortfalls in the area of disposal (some a result of internal reprogramming) are causing inefficiencies resulting in higher costs.

VI. SUMMARY OF FINDINGS AND CONCLUSIONS

A. SUMMARY

The Navy's ammunition supply system is a large complex organization that is managed differently than the rest of the Navy supply system. Record keeping, for example, is comprehensive with asset visibility being maintained throughout the life of an item. Requirements determinations also differ in that they are not based on past demand history but rather on program objectives. Replenishment is done annually instead of through the frequent Supply Demand Reviews common to the repair parts supply system. Renovation determinations are also done annually. The renovation model determines budget dollars and maintenance requirements based on fleet readiness levels for FYDP or POM programming submissions. The data is updated periodically and the model generates a prioritized listing of renovation requirements based on end item asset readiness. The results are then forwarded quarterly to all stock points, specifying the order in which unserviceable assets are to be renovated [Ref. 3:p. 27].

Each year, beginning with the POM process, SECDEF issues broad guidance that specifies categories and sizes of Navy forces, peacetime and mobilization plans, types of war plans, acquisition plans and fiscal policy. This general guidance is further refined by CNO, the Fleet Commanders-in-Chief and the

Non-Nuclear Ordnance Planning Board and promulgated to the SYSCOMs for planning and implementation.

The Planning and Analysis Branch of the Ammunition Management Division of NAVSEA (SEA-642) is responsible for determining requirements and planning and directing procurement of 2T Cog conventional ammunition. NAVSEA provides guidance, direction and data requirements to NAPEC at NWS Crane, Indiana, who provides inventory modeling support. The NAPEC system is based on a large number of separate data files, each of which is used by one or more programs. A requirements determination and acquisition planning data processing system at NAPEC computes requirements and planning objectives through the Five Year Defense Plan, determines procurement/renovation requirements and provides alternative acquisition strategies consistent with CNO guidance. The acquisition planning module assists NAVSEA with supportive information for each of the budget submissions.

Ammunition asset and usage data obtained from CAIMS must be accurate and timely to be effectively used in the program, planning and budget process and in the development of procurements needed to properly support the fleet and other claimants. The timely receipt of valid asset data also enhances the inventory manager's ability to respond to the various demands and inquiries from higher authority.

The effectiveness of conventional ammunition management within the Navy requires complete coordination of data.

Substantial progress has been made but, as in most systems, improvements are still needed.

B. CONCLUSIONS

NAVSEA is striving to make the present system more efficient through redesign of the CAIMS portion of the requirements determination program (functions which NAPEC performs for 2T Cog material on behalf of NAVSEA). Ideally, the program manager should be able to define policy and strategy at a remote terminal and influence program output immediately. Until such time as this is possible (dependent on the speed of NAVSUP Resystemization) NAVSEA should continue to explore other alternatives in providing system managers with direct access to a secure data base.

Areas where NAVSEA should concentrate its efforts are:

- (1) A complete review of existing FORTRAN programs at NAPEC to ensure logic is fully understood before integration with CAIMS at SPCC.
- (2) Complete mechanization of all the key documents (P-20, MP&I and MPS) used in the requirements determination process.
- (3) Retraining of personnel to effectively utilize output of the new operation.
- (4) Determining whether the continuous critical review system that is proposed for use by inventory managers has other applications in the requirements determination process.
- (5) Explore the feasibility of linking the procurement and renovation budget programs in some manner which would provide data more timely and in a format more suitable for analysis than is presently the case; with the end result being better procurement and renovation decisions.

- (6) Enumerate the underlying reasons for the delays in ammunition inspection and disposal and evaluate the cost savings that would be achieved through full funding of both activities.

C. AREAS FOR FURTHER RESEARCH

Continued analysis of the ammunition life cycle procedures would seem appropriate especially in light of the many initiatives NAVSEA already has underway to improve real time ammunition management information. Many of these initiatives such as the Ordnance Management System (OMS), Optical Scanning (OPSCAN) and Fleet Optical Scanning Ammunition Marking System (FOSAMS) have not been discussed in this thesis, but contribute markedly toward the ultimate real time system.

During the course of research, the following topics surfaced as important areas for further study.

- (1) The thought process behind mobilization planning should be explored in detail. Are we planning for a short war or a long war and what are the logical steps in arriving at the final requirement numbers? Are current "forecasting" techniques based on scenarios the logical approach?

- (2) Disposal efforts should increase so that much needed space for newly procured ammunition is available. There should be a long range program to ensure this low priority activity does not adversely impact costs and readiness.

- (3) A post Resolicitation/Resystemization look at the Requirements Determination process is appropriate to see if the movement towards real time data has improved the ammunition system.

APPENDIX A

DEFINITIONS

A. Principal Items - items of supply designated by CNO and characterized by the following management and material considerations [Ref. 11]:

- (1) Requirements determined on a planned basis by the cognizant hardware system command;
- (2) Requirements based solely on planned end-use allowances and planned reserve/retention requirements;
- (3) Separate budget formulations through Material Planning Studies and Principal Item Stratifications;
- (4) Procurements financed exclusively with appropriated/investment funds;
- (5) Attrition based solely on major/total destruction, intended destructive use, or planned retirement;
- (6) Issues to end-use strictly limited to HSC established allowances or special HSC approved authorization.

B. Secondary Items - those items not classified as principle items and exhibiting the following characteristics [Ref. 11]:

- (1) Requirements determined by the cognizant ICP;
- (2) Requirements based either on estimated/observed demands or non-demand based insurance levels;
- (3) Budget formulations based upon standard levels-setting techniques and standard Secondary Item Stratification projections;

- (4) Procurements financed either with investment funds or stock funds, as governed by such factors as unit price and recoverability;
- (5) Attrition based primarily on normal in-service wear out or consumption;
- (6) Issues to end-use subject to limitation on the basis of established allowances but more typically limited only on the basis of quantitative validations.

C. Sensitivity Processing - a procedure to effect constrained dollar buys in accordance with certain priority rules. Financial decisions are made to set an upper limit on the dollars available, to increase or decrease the dollars assigned to a particular ammunition group/line item, and/or to assign procurement priorities to control numbers within the line item. The iteration continues until the accumulated dollar decrements reach a given value. [Ref. 4]

D. NAVSEA Ammunition Allowance Lists (30,000 Series) [Ref. 2]

- (1) Shipfill Allowances - NAVSEA Lists 30000 through 33999, and 39900 through 39999 Series: A listing of non-nuclear expendable ordnance required to support (a) ship's own installed armament, (b) ship's authorized small arms weapons, and (c) ship's distress and signalling pyrotechnic requirements.
- (2) Cargo Load Allowance Lists - NAVSEA Lists 34000 through 34500 Series: A listing of non-nuclear expendable

ordnance carried as cargo for Underway Replenishment (UNREP) issue to support other fleet units. Cargo Load Allowances are for Mobile Logistics Support Force (MLSF) ships, i.e., AEs, AOE's, and AORs and are issued as a separate additional list to the MLSF ships' own ammunition service allowances.

- (3) Mission Load Allowances - NAVSEA Lists 34000 through 34500 Series: A listing of non-nuclear expendable ordnance to be carried in support of specific forces, e.g., by CVs for aircraft squadrons based aboard and by ADs and ASs for ships and submarines assigned. Mission Load Allowances are issued for CVs, ADs, ASs, LHAs, and LPHs as separate and additional lists to their service allowance lists.
- (4) Service Ammunition Allowances for Fleet Groups, Detachments, Teams, etc., and for Miscellaneous Activities - NAVSEA Lists 38000 through 39599 Series: A listing of service ammunition required to support the assigned missions of deployed or deployable fleet elements and for miscellaneous shore activities. Typical fleet elements and activities with service allowance lists are:
- Explosive Ordnance Disposal Groups (EODGRUs)
 - Underwater Demolition T-ams (UDTs)
 - Mobile Construction Battalions (MCBs)
 - Naval Security Group Activities (NSGAs)
 - Naval Communications Stations (NAVCOMMSTAs).

CUMULATIVE FLEET UNIT
 FACILITIES DATA
 REQUIREMENTS DETERMINATION
 777777-7301

DEPARTMENT OF THE NAVY MATERIAL PLANNING STUDY
 TIME: UNCLASSIFIED
 DATE: MM/DD/YY
 PAGE: 2

ELEMENTS OF STUDY	SECTION-III CURRENT AND FORECAST MATERIAL STATUS																			
	PU	1	APR	83	FY	83	FY	84	FY	85	FY	86	FY	87	FY	88	FY	89	FY	90
16 PROGRAMMING INCLUSIVE	EP				56.3	54.1	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3
17 COMBAT RESERVE	EP				13.6	12.0	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
18 WATN	EP				33.6	32.0	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5
19 SHIPPING-LUSSES	EP				2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
20 AREA	EP				-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
21 RDN	EP				-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
22 RDN	EP				-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4
23 MATO/KIR/ROK/ROF	EP				-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
24 PIPELINE	EP				-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
25 TOTAL PLANNING COLLECTIVE	EP				70.4	65.9	65.9	65.9	65.9	65.9	65.9	65.9	65.9	65.9	65.9	65.9	65.9	65.9	65.9	65.9
GAINS	P																			
26 PHOTON YEARS FUNDED FY 82	P				-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
27 CURRENT YR FUNDED FY 83	P				-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
28 FY 85 THRU FY 89	P				-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
29 RECEIPTS CHIEFS	P				-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
30 TOTAL GAINS	P																			
LOSSES	P																			
31 LOSSES S/C CONSUMPTION	P																			
32 LOSSES S/C CONSUMPTION	P																			
33 LOSSES S/C CONSUMPTION	P																			
34 TRANSFERS	P																			
35 TOTAL -LOSSES	P				12.1	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
36 PLANNED INVENTORY	LP				105.2	99.1	87.0	61.9	16.5	16.5	61.9	36.8	36.8	36.8	36.8	36.8	36.8	36.8	36.8	36.8
37 PLANNED INVENTORY STAFFS	EP				-0	-0	16.6	7.4	7.4	7.4	-4.0	-29.1	-29.1	-29.1	-29.1	-29.1	-29.1	-29.1	-29.1	-29.1



LOW IDENTIAL (WHEN FILLED IN)

CONFIDENTIAL (WHEN FILLED IN)
 FACILITIES DATA

REQUIREMENTS DETERMINATION
 777777-0001

DEPARTMENT OF THE NAVY MATERIAL PLANNING STUDY

FORM 100/100/100
 DATE: MM/DD/YY

PAGE 3

SECTION IV - STOCK-IN-HAND (05/01/83)		SECTION V - STOCK-EXPERIENCE		SECTION VI - ALIENATION-LEVEL	
ACTA	SERVICABLE	REPAIRABLE	1 INVENTORY	111791	PLACETIME-USAGE FROM
LAMP-IN-HAND	24664	0	A. SERV.	94011	04/01/83 THRU FY 84 PLI
IN-TANSET	0	0	B. WPH.	16375	PLANNING OBJECTIVE (FY-84)
TOTAL	24664	0	C. GAINS	0	APPROVED FORLES
EUR-ON-HAND	7082	0	A. ACQS.	0	ACQUISITION OBJ
IN-TANSET	0	0	B. OTHER	0	ECONOMIC RETENTION LEVEL
TOTAL	7082	0	3 LOSSES	6017	ALLIED FORCES
PAC-IN-HAND	28938	115	A. COMBAT	4376	CONTINGENCY LEVEL
IN-TANSET	0	115	B. TRAINING	398	U.S. FORCES
TOTAL	28938	115	C. TEST	1093	CONTINGENCY LEVEL
COMUS-ON-HAND	37527	12274	D. TRANSFERS	29	TOTAL RETENTION LEVEL
IN-TANSET	0	12274	E. DISPOSAL	18	***ALL ASSETS IN EXCESS OF ABOVE
TOTAL	37527	12274	F. OPERATIONAL	903	REQUIREMENTS STRATA SHOULD BE RETAINED
HW---IN-HAND	94011	12309	G. LOSS-BY-IN	1426	FOR CONTINGENCY LEVELS TO SUPPORT
IN-TANSET	0	12309	4. STOCK-ADJ	106400	RESERVE FLEET SHIPS IN THE EVENT OF
TOTAL	94011	12309	5 TOTAL-INV	111791	MOBILIZATION
ISB. REPAIRABLES		11150			

SECTION-VII - REMARKS

ITEM NOMENCLATURE

DATE PREPARED
 106/28/83

SECTION VIII - APPROVAL
 SIGNATURE

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APPENDIX D

FOR US
 MUNITIONS PROCUREMENT AND INVENTORIES
 LEVEL OF EFFORT OR THREAT ITEMS
 (SODD)

UNIT-QUANTITY D-P COST
 XXXX
 BUDGET YEAR UNIT COST XXX
 UNIT-MEASURE XXXX

L.I. # BB #	L.I. TITLE BB TITLE	MONTHLY LEAD TIME (MSE): (A) 4 (P) 10 (U) 4												
		FY85 QTY	FY85 COST	FY86 QTY	FY86 COST	FY87 QTY	FY87 COST	FY88 QTY	FY88 COST	FY89 QTY	FY89 COST	FY90 QTY	FY90 COST	
PLAN OBJ	3541.00	30349.99	3330.00	29832.48	3053.00	28652.89	2091.00	20569.17	815.00	8570.44	2228.00	2319.66		
PRNG OBJ	1541.00	16636.31	1861.00	16667.12	1563.00	15528.89	868.00	8341.78	429.00	4403.26				
INITIAL AVAILABLE	1785.00	15300.00	1753.00	15700.00	1540.00	14500.00	1576.00	15700.00	643.00	6600.00	643.00	6600.00		
FYDP PROCUREMENT	1066.00	9446.69	548.00	4907.89	548.00	5159.97	548.00	5290.88	548.00	5624.67	548.00	5624.67		
PEACEFIRE CONSUMPT	719.00	6162.55	1924.00	17231.34	2416.00	27457.06	3564.00	38993.87	4059.00	41661.58	4154.00	42836.66		
ASSETS														
REQUIRED PROCUREMENT:														
ALT 1:			591.00	5223.00	541.00	5564.86	591.00	5813.67	158.50	1626.84	158.50	1626.84		
ALT 2:			591.00	5243.00	591.00	5564.86	591.00	5813.67	217.00	2432.57	237.00	2632.57		
CAPABILITY LIMIT:														
MIN ECON PRIO:			150.00											
MAX ECON PRIO:			600.00											
UNIT COST			0.57			0.56								
PROGRAM ELEMENT DISTRIBUTION														
PL#														
PL#														
PL#														
PL#														

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