EAI CORPORATION

- OPERATION RESEARCH
- SYSTEMS ANALYSIS

FINAL REPORT
ON
REVIEW OF CBW DEFENSE RESEARCH INFORMATION SYSTEM NEEDS OF THE NAVY PROGRAM ELEMENT MANAGER

JANUARY 29, 1983

TR-83-001-EAI

Submitted To:

Naval Medical Research And Development Command
National Naval Medical Center
Bethesda, Maryland 20814

Contract Number N00014-82-C-0453

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CHAPTER I

INTRODUCTION

A. BACKGROUND

For the first time in a decade the chemical warfare and biological defense program (CBW) is achieving stability. Recognition of the need for an adequate response to the CBW threat posed by the Soviet military has resulted in the initiation of a significant CBW program by all the U.S. military services. However, there are a number of factors that currently impact upon the planning and actual implementation of a long-range CBW program.

Over the past two decades the U.S. CBW program has been cyclic. Not only have broad swings in funding levels occurred, but the entire program was literally halted during the 1970's. After President Nixon's 1969 policy declaration that the U.S. renounced the use of all biological warfare and first use of chemical warfare the CBW program came to a virtual standstill. The biological warfare research and development (R&D) capability of the U.S. was dismantled, including the destruction of a large segment of accumulated research results. Less dramatic, but still significant in terms of continuity, the CW program was cut to essentially a caretaker program.

When it became apparent in the latter third of the 1970's that the Soviets were making significant strides in enhancing their CBW activities, the need for a revived U.S. chemical and biological warfare defense program became clear.* All the military services increased the resources allocated to CBW defense programs over the five year planning, programming and budget system (PPBS) cycle.

The Navy 6.2 Program Element Manager (PEM) for CBW defense programs recognized the problems inherent in the disruption of program continuity that had occurred in the 1970's as well as those associated with rapid expansion of the program necessitated by emerging requirements for CBW de-

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*The U.S. policy of renunciation of any use of biological warfare and of first use of chemical warfare has resulted in a CBW program that focuses on defensive measures.

fense in the Fleet. The previous fragmentation of the program, both within the Navy and across the other services, resulted in information gaps relative to past R&D efforts.

These circumstances generated a need for the Navy PEM to examine current, proposed (FY83 and forward), and previous projects in the CBW defense program. The purpose of this assessment was to identify programs, within the Navy and in the other services, that have relevance to current and projected Navy CBW defense program R&D. The primary thrust of the effort undertaken in this project was to initially determine the information needs of the Navy CBW PEM, develop a baseline of technical information to meet those needs, and establish a system for monitoring program progress.

B. PROJECT OBJECTIVE AND SCOPE

The objective of this research project was to broaden the capabilities of the Office of Naval Technology CBW Defense Programs PEM to develop and monitor an integrated 6.2 research program. Initially intended to encompass tri-service R&D over the past 10-15 years, it became apparent early in the project that the critical elements for the PEM were the clear delineation of that position's information needs to support program decisions and the PEM's ability to subsequently monitor program actions throughout the PPBS cycle.

Thus, the focus of the project changed from the identification of CB warfare defense program R&D results to the definition of a viable system to support the PEM in review and evaluation of Program Objective Memorandum (POM) submissions for the Navy 6.2 CBW defense program. While not an alternation to the work statement, the emphasis of the research was placed on a system for meeting the future needs of the PEM in allocating resources and tracking the progress of the 6.2 programs. An additional element that emerged as significant was the PEM's ability to monitor research relative to transition to 6.3 as well as early identification of 6.1 programs that are candidates for transition to the 6.2 program.

C. APPROACH TO THE PROJECT

Early in the project the PEM determined that the best method to define and establish a working system for the

assessment of program priorities, allocation of resources over the five year POM period, and subsequent monitoring of the 6.2 research program was to accomplish the project tasks in conjunction with the FY83-FY87 POM period activities. Thus, the structure of the project followed two parallel lines.

First, the project team worked closely with the PEM during the POM cycle. This effort directly contributed to the development of PEM information needs, allowing the project team to ascertain these needs in the context that the PEM will generate them and sources will fulfill them. Equally as important, the continuing interface between the PEM and the project team provided valuable insights into the way the PEM would use information. Based on these insights the system for monitoring the 6.2 program was developed. Without question, the direct interaction with the PEM was the most significant factor in the project.

The second line pursued by the project team was the collection and compilation of CBW defense program research. This effort was oriented toward the identification and documentation of programs that would directly impact upon the POM cycle and the prioritization of resource allocation to budget year (FY83), plan year (FY84), and out-year (FY85-FY87) programs. Previous research programs that did not directly bear on the POM cycle received less attention. The planned expansion of the 6.2 CBW program from approximately $.75 million in FY82 and FY83 to over $3 million in FY84 and subsequent years argued strongly for focusing the project research on those programs with relevance for the POM cycle.

The final phase of the approach encompassed the design and development of a management information system to support the PEM in subsequent years. While the PEM management information needs wee minimal for FY82 and FY83, the structuring and operation of the system will provide a basis for the future. In light of the planned expansion of the 6.2 program in FY84 and the following fiscal years, the early establishment, test, and refinement of a management information system will significantly contribute to program management.

The approach to system design emphasized the structuring of a system that was functional for the PEM. The system has been designed to meet the PEM information needs in a straightforward manner that builds on the way the PEM and the 6.2 R&D program system operates. A critical factor was the integration of existing documentation formats and sources

into a system that the PEM could easily access and maintain. Another primary consideration was a structure that would lend itself initially to manual operation, but with the built-in flexibility for future automation into a simple data base management system.

Overall, the approach to the accomplishment of the project objective was based on three tasks.

- Task 1: Determination of PEM Information Needs and Structure
- Task 2: Review of Navy and Other Services' CB Warfare Defense Programs Research
- Task 3: Design and Development of a CB Warfare Defense Programs Research Management Information System

The remaining chapters in this report specifically address the results of project research for each of these tasks.

CHAPTER II

ROLE OF THE CBW DEFENSE PROGRAMS PEM

A. OVERVIEW OF THE ROLE OF THE CBW PEM

The definition of information requirements for the Navy 6.2 Program Element Manager for CBW Defense Programs is limited to the exploratory development program and the two associated categories -- basic research (6.1) and advanced development (6.3). (See Table 1) The PEM must be aware of basic research in the CBW area so that transition to the exploratory development program can be planned as part of the PPBS cycle. Similarly, knowledge of the advanced development program is important for planning transition from exploratory development. The overall transition process links program and budget planning of these three initial funding categories. This linkage represents a major factor in the overall R&D program and is critical for both effective program management and the timely availability of products for the Fleet. Figure 1 portrays the funding categories and linkages.

The Chief of Naval Development/Deputy Chief of Naval Materiel for Technology is responsible for the direction of the exploratory development (6.2) within the Navy and the technology base it forms. To accomplish the management of the Navy technology base the Deputy Chief of Naval Materiel for Technology is supported by twenty-two functional program element managers (PEM) in his command (Office of Naval Technology -- ONT). Each of these PEMs is a specialist in his respective technology field, including the CBW Defense Programs PEM. The billet description of the CBR PEM*, outlining responsibilities, clearly delineates in abbreviated terms the role of this particular position.

> Planning, appraisal, corporate management, and oversight of the execution of Exploratory Development Program efforts in support technology, including development of new/improved technologies in personnel protective clothing and equipment; injury and disease prevention; casualty care; CBR performance enhancement; and CBR defense.

*This project is limited to the chemical and biological aspects of the CBR PEM. However, the general information needs will be similar for the radiological defense program.

TABLE 1. RDT&E FUNDING CATEGORIES

- 6.1 BASIC RESEARCH - PROVIDES FUNDAMENTAL KNOWLEDGE FOR THE SOLUTION OF IDENTIFIED MILITARY PROBLEMS

- 6.2 EXPLORATORY DEVELOPMENT - DEVELOPING AND EVALUATING THE FEASIBILITY AND PRACTICABILITY OF PROPOSED SOLUTIONS AND DETERMINING THEIR PARAMETERS.

- 6.3 ADVANCED DEVELOPMENT - DEVELOPMENT OF HARDWARE FOR EXPERIMENTAL OR OPERATIONAL TEST

- 6.4 ENGINEERING DEVELOPMENT - ENGINEERING FOR SERVICE USE PRIOR TO PROCUREMENT

- 6.5 MANAGEMENT AND SUPPORT - LABORATORY OPERATIONS (INSTALLATION AND SUPPORT)

- 6.6 OPERATIONAL SYSTEMS DEVELOPMENT - MAJOR LINE ITEM PROJECTS; NOT A PROGRAM ELEMENT

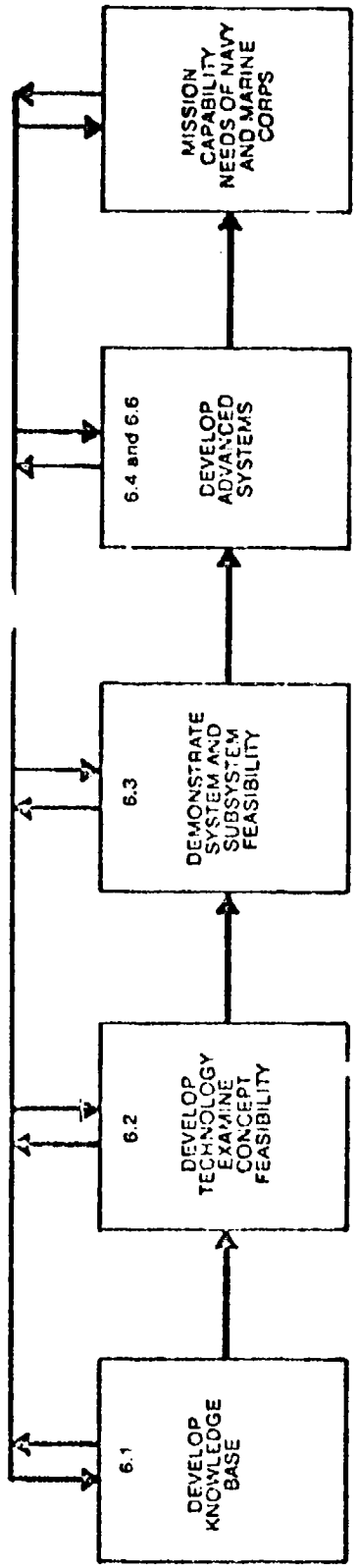

FIGURE 1. Functional View of the Defense RDT&E Process

Like the other PEMs, the CBW Defense Program PEM is responsible to the Deputy Chief of Naval Materiel for Technology for the structure and oversight of that particular exploratory development program. Essentially, the PEM manages the CBW defense technology base for the Deputy Chief of Naval Materiel for Technology and assists him in accomplishing the mission of Navy technology management. Also called the CBW technology base manager, the PEM has a different role than the product oriented program managers. The latter have a particular design or product, supported by technology, that will, when fielded, counter a specific threat. The PEM has responsibility for managing and coordinating the development of technology to support the overall objectives of the CBW exploratory development program.

The difference between the PEM and product/project managers is significant in defining information requirements. The respective project managers are responsible for their particular products in terms of technical progress, schedule and budget. These are the managers that guide specific projects, requesting funds and determining the appropriateness of transition to the next phase in the acquisition cycle.

The PEM represents the Deputy Chief of Naval Materiel for Technology on matters associated with overall program direction, prioritization of projects within the CBW exploratory development program (6.2), determination of funding, and program planning and budgeting within the context of the PPBS cycle. The principal interface between ONT and the 6.2 CBW project managers, the PEM represents the CBW program in the technology base decision process within ONT.

More specifically, the role of the PEM consists of a number of planning and management functions that contribute to the success of the 6.2 CBW program. These include the functions shown in Table 2 and described below.

B. STRUCTURING OF THE NAVY 6.2 CBW DEFENSE PROGRAM

The most important and time consuming function of the PEM is involvement in the PPBS cycle. It is in this role that the PEM determines technology base requirements and options for the CBW exploratory development program as well as draws on information derived from the other general planning and management functions. Information inputs and

TABLE 2. ROLE OF THE PEM

- REVIEW/PRIORITIZE 6.28 CLAIMANT PROGRAMS
- ASSESSES STATUS AND PROGRESS OF PROGRAMS
- CORPORATE OVERSIGHT OF PROGRAM EXECUTION
- PREPARES PROGRAM DOCUMENTATION FOR REVIEW BY CNO, ASN (RE&S), AND CONGRESS
- INTER-SERVICE COORDINATION OF 6.2 PROGRAMS
- COLLATERAL DUTIES
  - TRI-SERVICE LSE STEERING COMMITTEE
  - NAVY REPRESENTATIVE TO NATO NAVAL SUBPANEL

outputs of the PPBS cycle play a major part in the program management and program formulation processes of the PEM. The initial sources of PPBS information are two documents issued by the Chief of Naval Development, the Technology Policy and Planning Guidance (TPPG) and the Technology Programming and Fiscal Guidance (TPFG). (See Table 3) The purpose of these

TABLE 3. 6.2 PPBS DOCUMENTATION

- TECHNOLOGY POLICY AND PLANNING GUIDANCE (TPPG)
  - ANNUALLY PROMULGATED IN JANUARY
  - PROVIDES FOCUS AND THRUST OF THE EXPLORATORY DEVELOPMENT POM
- TECHNOLOGY PROGRAMMING AND FISCAL GUIDANCE (TPFG)
  - ANNUALLY PROMULGATED IN JANUARY
  - SPECIFIES FISCAL CONSTRAINTS FOR EACH MAJOR CLAIMANT
  - REVISED AS REQUIRED

two documents and supplementary guidance is to provide the commands the required guidance from which to construct their 6.2 program for budget, plan, and out-years. The contents of these guidance documents reflect Chief of Naval Operations (CNO) goals, technology thrusts, and fiscal guidance.

Issuance of the TPPG begins the process of program formulation and documentation at the Command level. (See Table 4) Based on the TPPG the Commands prepare and submit to the Office of Naval Technology the Claimant Program Proposal (CPP). The CPP contains that claimant's exploratory development (6.2) program objects, tasks (projects), milestones, and funding requirements for the next POM cycle. The CPP is divided into those projects that are considered essential to accomplish overall program goals and those that

TABLE 4. 6.2 CLAIMANT DOCUMENTATION

- CLAIMANT PROGRAM PROPOSAL (CPP)
  - CONSTITUTES PROGRAM PROPOSALS FOR POM RESPONSIVE TO CND GUIDANCE (TPPG)
- SUB-PROJECT PROGRAM PLAN (SPP)
  - EXPANDS AND REFINES CPP TO SUPPORT PROGRAM EXECUTION FOR BUDGET YEAR
  - REFLECT CND GUIDANCE (TPFG)
- DETAILED DISCUSSION IN NAVMATINST 3910.20A

would significantly enhance the existing program. The former are considered part of the technology base and are generally priority projects for funding. The latter are technology options which are less important to the overall program success and, consequently, have a lower priority.

The PEM reviews each claimant's CPP submission to ensure that the TPPG has been adhered to, that overall program and projects are structured to meet the prescribed objectives, that redundancy among claimants is reconciled and that each meets a defined Navy need. It is at this point that the PEM also draws on information relative to other services' programs and prior CBW research as an input to the review. These other information sources are particularly important in evaluating the technology options.

In the CPP process the technology base programs are usually designated for funding, while the technology options receive special evaluation to determine funding. Often "new starts", the technology options for all exploratory development programs are considered together. First, each technology option is reviewed and prioritized within those submitted for the CBW program. The PEM then submits the CBW options to an ONT Functional Area Review Team. This team reviews all technology options submitted by the respective

PEMs, rank ordering all of them.

The result of the technology option review is a prioritized list of approved options for inclusion in subsequent POM submissions. Claimants are informed of the approved options and instructed to include them at specific funding levels in budget year submissions. Disapproved options -- those below "the-line" for funding -- are held pending changes in the budget that might permit allocation of monies to them.

The next step in the process is the issuance of the TPFG, which provides guidance for the claimants to develop their respective Sub-Project Plans (SPP) and Special Focus Program (SFP). In conjunction with direction from ONT (PEM), direction based on review and comment of the CPP and technology option decisions, the claimant draws on the TPFG to refine the CPP in preparation of the budget year program. The previously approved technology options are incorporated into the SPP as funded special focus programs.

The CBW PEM has responsibility for the review of the SPP/SFP submissions of each claimant. As in the CPP review, the PEM evaluates the submission in terms of program objectives, adequacy of documentation for tasking, milestones and funding, compatibility with other programs, identification and definition of supportable Navy needs, and redundancy with other programs. Based on this review, the PEM forwards the individual SPP/SFP to the Deputy Chief of Naval Materiel for Technology for approval.

When approved, the SPP and the included SFP become the budget year CBW defense exploratory development program for each claimant. In aggregate, the approved SPPs of all the claimants become the 6.2 program for CBW defense. While subsequent budget changes may alter the funding level of all or selected programs, the PEM will primarily rely on information used in the CPP and SPP process, factoring in new information that might be relevant, to recommend these subsequent adjustments.

In summary, the PEM's review of claimant CPP and SPP submissions for the exploratory development CBW defense program focuses on the items shown in Table 5. These questions comprise the essential elements of the review framework used by the PEM for evaluation and recommendations to the Deputy Chief of Naval Materiel for Technology. However, overall the process is less formal than this discussion portrays.

TABLE 5. MAJOR PEM REVIEW POINTS

- DOES THE FORMAT AND CONTENT CONFORM TO THE NAVMAT INST 3910.20A?
- DO THE PROGRAMS CONFORM TO THE CND GUIDANCE?
- ARE THE PROGRAM OBJECTIVES CLEARLY STATED?
- DO THE TASKS SUPPORT THE PROGRAM OBJECTIVES?
- ARE THE MILESTONES ATTAINABLE?
- DOES THE SPP PROGRAM REFLECT THE APPROVED PREVIOUS YEAR CPP?
- DOES THE WORK DEFINED IN THE TASKS DESCRIPTION SUPPORT 6.2 TECHNICAL DEVELOPMENT?
- IN THE CASE OF A JOINT SERVICE AGREEMENT, ARE THE TASKS SUPPORTING NAVY "UNIQUE" OBJECTIVES?
- DO ANY OF THE PROGRAMS APPEAR TO BE DUPLICATION OF EFFORT BEING PERFOMED BY OTHER SERVICES OR NATO?

Exchanges of information between the PEM and claimants are on-going, usually through telephone calls and face-to-face meeting. Informal in nature, discussions with claimants prior to submission, during the review process, and at other times resolve the majority of the issues that arise in conjunction with individual projects. Appreciation of this informal mechanism is an important factor in understanding the role of the PEM and the administration of the CBW defense program.

C. PROJECT REVIEW RESPONSIBILITY OF THE PEM

The PEM has the responsibility of reviewing and monitoring on-going CBW defense exploratory development projects. In this role the PEM provides written reports to the Deputy Chief of Naval Materiel for Technology in which an assessment of the project is made. The focus of these reviews is on the stated technical objectives of the individual projects and the actual technical results achieved. While overall schedule, milestones, and funding are of interest, the primary concern is the technical contribution of the project to the technology base and the meeting of specifically defined Navy requirements.

Another critical element in the project review and monitoring process is the identification of the transition point from exploratory development (6.2) to advanced development (6.3) for each project. Each review includes a discussion of the transition question. Three alternatives are considered for each project:

(1) Transition to advanced development

(2) Continue in exploratory development

(3) Discontinue

Shown in Table 6 below, the considerations in assessing the 6.2 programs focus on establishing the technical progress necessary to permit transition to 6.3 and the probability that the technology will be able to meet defined Navy requirements in a timely manner.

Transition is the critical factor in project reviews. Given the uncertainty inherent in many of the technologies explored in the 6.2 program, the PEM and project manager often agree to a point at which progress will permit initial

TABLE 6. TRANSITION REVIEW CONSIDERATIONS

- CURRENT AND PROJECTED NAVY NEEDS
- REQUIRED OPERATIONAL DATE AND THE PROBABILITY OF SUCCESSFULLY MEETING THAT DATE WITH THE TECHNOLOGY
- TECHNICAL RESULTS TO DATE VS. MILESTONES
- RISKS ACCOMPANYING THE TECHNOLOGY
- OTHER PROGRAMS THAT MIGHT SUPPORT THE TECHNOLOGY (NAVY AND OTHER MILITARY SERVICES)
- PROGRAMMED TRANSITION DATE AND RISK AND UNCERTAINTIES THAT MIGHT IMPACT

determination of a realistic transition date. The objectives of transition decision milestone are to provide a standard against which progress can be measured and a point at which the project should be reevaluated for transition or discontinuance.

Determination of 6.2 project transition in advance is significant for the PPBS process for both the 6.2 and 6.3 managers. The 6.3 manger can plan for and allocate funds, permitting projects to continue without interruption. The 6.2 manager can plan to phase out the projet, freeing resources for other projects.

Similarly, the 6.2 PEM for the CBW defense program coordinates with the 6.1 element manager to ascertain planned transitions from basic research to exploratory development. This provides a basis for POM submissions, ensuring that 6.2 funds are available as projects are ready to transition into the exploratory development phase.

D. INTER-SERVICE EXPLORATORY DEVELOPMENT PROGRAM COORDINATION

The U.S. Army has been assigned as the proponent (lead) agency for the chemical and biological warfare defense

program. As the lead agency, the Army is a primary source of information concerning exploratory development activities that might contribute to meeting the Navy needs. Coordination with the Army, in particular the Chemical Systems Laboratory and Natick Laboratories, where most exploratory development is accomplished, by the CBW defense program PEM is important for two primary reasons.

First, the charter of the lead agency requires that the needs of the other services be addressed, as appropriate, in the context of both planned and existing programs. Knowledge of the planned programs will permit the PEM to request consideration and inclusion of Navy requirements by the Army organization involved or generate a requirement for a joint effort. For work in-progress the PEM will be able to ascertain any projects that might have relevance to Navy needs and provide a basis for assessing potential duplication among planned Navy projects.

Second, an appreciation for the Army program will provide indications of research gaps relative to Navy needs. The Army is not responsible for supporting the unique needs of the other services. For these needs, each service must initiate their own independent program. Within the Navy the principal unique requirements focus on:

- Salt water environment
- Navy equipment
- Fire resistance (shipboard)
- Exposure to petroleum vapors (carrier operations in particular)

Coordination with the Air Force is not as significant as close Army liaison because of the nature of the Air Force's program -- structured to respond to Air Force unique needs. However, similarities in some environments, including aircraft operations, may create needs common to both services.

E. OTHER ROLES OF THE PEM

The CBW defense programs PEM also has a number of other functions that necessitate the development of specific information or serve as sources of information. Most importantly, the PEM must prepare documentation and briefings

in support of the program. The PEM develops recommendations to accompany the CPP and SPP submissions for approval by the Chief of Naval Technology. Related to the CPP, the PEM documents all project reviews for the Deputy Chief of Naval Materiel for Technology. Additionally, the PEM is responsible for preparation of the Program Element Descriptions for presentation to Congress.

The PEM also develops and presents formal and informal briefings on the CBW defense program as well as takes part on a number of boards and committees associated with CB warfare. Participation in these latter activities often serves as a source of information in addition to the presentation of the CBW defense program. Activities with allies, especially Great Britain, West Germany, and Canada, either through NATO, the CW Tri-partite council, or bilateral arrangements, provides access to other programs that might contribute to the Navy's exploratory development effort.

Two other activities of the PEM warrant mention -- the interface with Fleet CINC's and participation in academic, scientific, industrial, and U.S. Government forums. Fleet CINC's provide the PEM with information, derived from exercises and equipment performance, that highlight problem areas and indicate technology needs. This information is a critical element, when it is present, in shaping the technology base program since it represents the most direct identification of Navy needs. Attendance at various forums provides access to a broad spectrum of technical information that might contribute ideas and new technology to the Navy CBW program.

F. SUMMARY OF PEM ROLE IN NAVY 6.2 CBW DEFENSE PROGRAMS

The Navy Exploratory Development CBW Defense Programs PEM is essentially a technology base executive manager. As the CBW defense programs representative of the Deputy Chief of Naval Materiel for Technology, the PEM must combine technical knowledge of CBW defense programs with the managerial skills necessary to organize, control, and monitor a diverse set of exploratory development programs supporting a variety of claimants. While not involved in the actual management of projects, the PEM must develop and maintain a sufficient grasp of technical results, progress, and costs to meet the PEM's responsibilities to the Deputy Chief of Naval Materiel for Technology.

In addition to monitoring on-going projects, the PEM

must structure the overall Navy exploratory development CBW defense program to meet Navy needs. Within the context of the PPBS, the PEM must be able to determine future program content in relation to policy and fiscal guidance, identified Navy needs, programs of other services, and the technology base that is presently available.

A critical linkage between on-going projects and those for the budget, plan and out-years is the transition of projects from basic research to exploratory development and from exploratory development to advanced development. The management and oversight of the process associated with monitoring technical results and arriving at transition decisions is a key element of the PEM's role.

A final primary function of the PEM is coordination with the other services and allies on programmatic issues. Given the ever present fiscal constraints and the goal of maximizing the resources allocated to the CBW defense program, the PEM must develop and mainatin a working knowledge of these programs in order to avoid duplication by the Navy.

Information to support the PEM is a significant factor in the planning and execution of the exploratory development CBW defense program. The next chapter addresses in specific terms the information required by PEM, the sources of that information and the shortfalls.

CHAPTER III

PEM INFORMATION REQUIREMENTS

A. APPROACH TO IDENTIFICATION OF INFORMATION REQUIREMENTS

The approach taken to identify and define the information requirements of the exploratory development CBW defense programs PEM has focused on the roles of that manager and specific information needed to support them. Built on the assessment of the PEM's roles presented in the previous chapter, an analysis of information and its flow was conducted. For each PEM function the information inputs and outputs were ascertained and the processes associated with them at the PEM position determined. The crucial point examined in each case was the ability of inputs to fully support the individual process and the required outputs.

A second key consideration in the approach was the determination of information requirements that are not currently being met. This particular element in the analysis relied heavily on the insights derived from working with the PEM in the accomplishment of primary and secondary functions. Over the course of the contract the project team participated in:

- CPP review and evaluation
- SPP review and evaluation
- Project review and report preparation
- Preparation of Program Element Descriptions
- Response to CINC Fleet issues
- Coordination with other services
- Conferences with other services
- Informal coordination with claimants
- Preparation of NATO working paper

- Preparation and presentation of 6.2 program briefings to Navy senior staff and 6.1 and 6.3 element managers.

This participation enabled the project team to gain an appreciation for not only information requirements, but provided a perspective of the context within which the information is generated and used. Equally as important, the effort expended in learning the PEM's various functions has brought to the analysis a thorough understanding of the overall billet and the components of which it is comprised.

B. INFORMATION FLOW AND PEM'S NEEDS

1. System Overview

An overview of the current flow of information and its relationship to the PEM's functions are outlined in Figure 2. This schematic highlights the major function of the PEM -- involvement in the PPBS. Most significantly, the PEM has a need to draw on a broad spectrum of information to support the CPP and SPP process. From these two major PPBS activities the PEM derives, in a large measure, the information necessary to support other functions. Similarly, the principal outputs of the PEM deal with CBW defense programs planning or the technical results of programs. These outputs provide key information for the development of other outputs.

2. Inputs Required By The PEM

Table 7 defines the full range of information inputs required to support the CBW defense programs PEM. These inputs are generated by a number of diverse sources and are in most instances not formal documentation to the PEM. Rather, the inputs often represent documentation in the form of technical reports, program synopses, and other memoranda/working papers/briefings that are of an informal nature.

a. Navy Needs Definition

The cornerstone of the exploratory development CBW defense programs is the identification and delineation of Navy needs. Since the entire program and each individual project is based on the premise of a Navy need, these data are the critical factor for accomplishing the PEM's primary functions. Each project has as its justification a defined

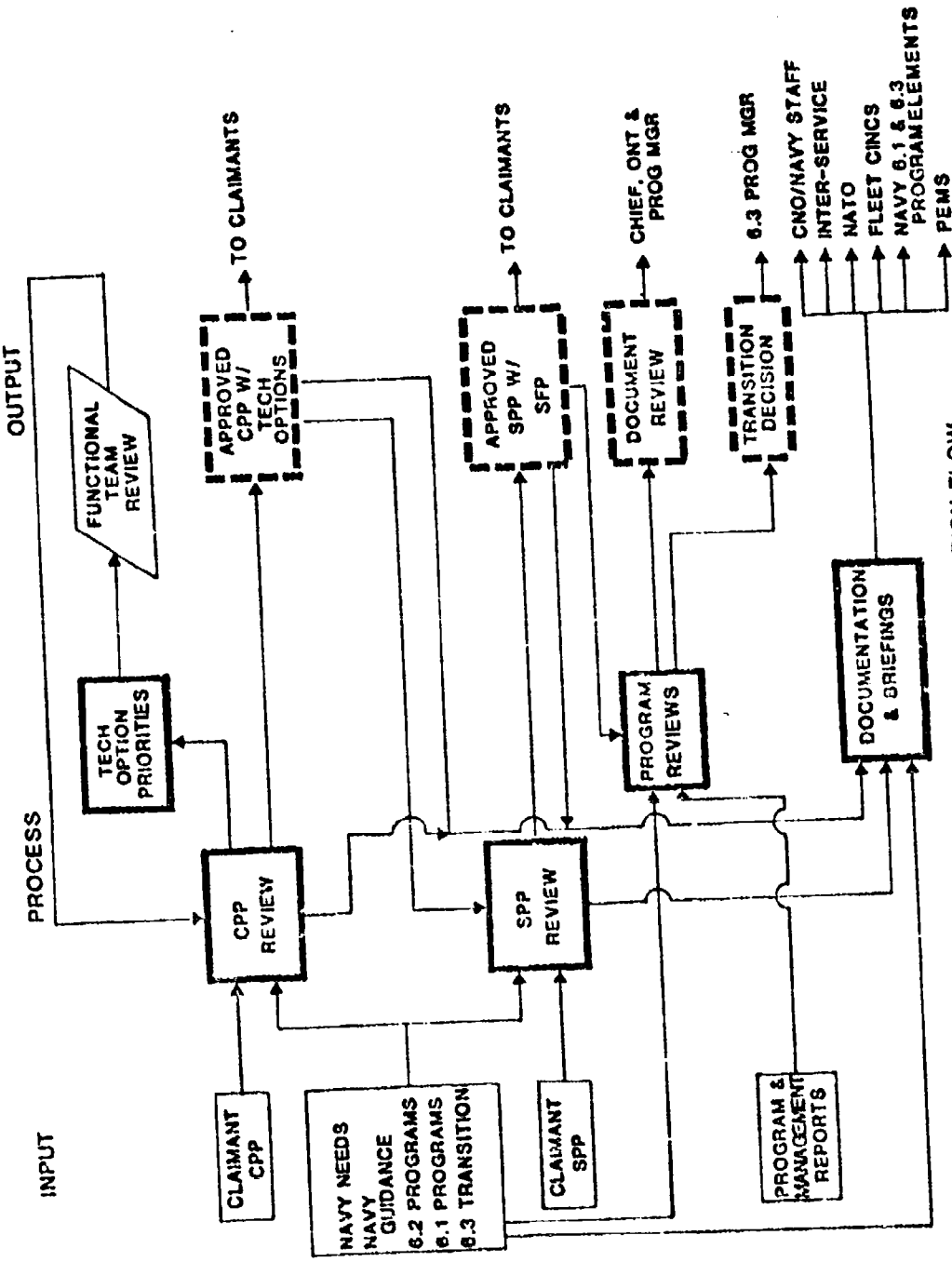

FIGURE 2. PEM INFORMATION FLOW

TABLE 7. PEM INFORMATION NEEDS

INFORMATION REQUIREMENT	DATA NEEDED	SOURCE	REMARKS
NAVY NEEDS	OPERATIONAL REQUIREMENTS	OP-981 OP-095 OP-954 PM-23 ONR NAVSEASYSCOM NAVAIRSYSCOM NAVFACCOM NMRDC MCDEC FLEET CINCS	
PREVIOUS NAVY 6.2 RESEARCH	CBW PROGRAM AREA PROJECT TITLE & NUMBER NAVY SPONSOR RESEARCH CONDUCTED BY PROJECT OBJECTIVE TECHNICAL APPROACH ACCOMPLISHMENTS (TECHNICAL RESULTS) FUNDING BY FY DISPOSITION (TRANSITION OR DISCONTINUED DATE)	NAVSEASYSCOM ONR NMRDC MCDEC NAVY LABORATORIES OTHER NAVY FAC OTHER GOVT FAC PRIVATE CONTRACTORS UNIVERSITIES	
ON-GOING NAVY 6.2 RESEARCH	CBW PROGRAM AREA PROJECT TITLE & NUMBER NAVY SPONSOR POINT OF CONTACT RESEARCH CONDUCTED BY PRINCIPLE INVESTIGATOR	NAVSEASYSCOM ONR NMRDC MCDEC	

TABLE 7. PEM INFORMATION NEEDS (CONT'D)

INFORMATION REQUIREMENT	DATA NEEDED	SOURCE	REMARKS
ON-GOING NAVY 6.2 RESEARCH (Cont'd)	PROJECT OBJECTIVE TECHNICAL APPROACH ACCOMPLISHMENTS TO DATE (TECHNICAL RESULTS) FUNDING BY FY MAJOR MANAGEMENT MILESTONES MAJOR TECHNICAL MILESTONES		
PREVIOUS OTHER SERVICES 6.2 PROGRAMS	CBW PROGRAM AREA PROJECT TITLE & NUMBER SERVICE SERVICE SPONSOR POINT OF CONTACT RESEARCH CONDUCTED BY PROJECT OBJECTIVE TECHNICAL APPROACH ACCOMPLISHMENTS (TECHNICAL RESULTS) FUNDING BY FY DISPOSITION (TRANSITION OR DISCONTINUED DATE)	U.S. ARMY CHEMICAL SYSTEMS LABORATORY U.S. ARMY NATICK LABORATORIES U.S. AIR FORCE AEROSPACE DIVISION NATO	
ON-GOING OTHER SERVICES 6.2 PROGRAMS	CBW PROGRAM AREA PROJECT TITLE & NUMBER SERVICE SERVICE SPONSOR POINT OF CONTACT RESEARCH CONDUCTED BY PROJECT OBJECTIVE TECHNICAL APPROACH	U.S. ARMY CHEMICAL SYSTEMS LABORATORY U.S. ARMY NATICK LABORATORIES U.S. AIR FORCE AEROSPACE DIVISION NATO	

TABLE 7. PEM INFORMATION NEEDS (CONT'D)

INFORMATION REQUIREMENT	DATA NEEDED	SOURCE	REMARKS
ON-GOING OTHER SERVICES 6.2 PROGRAMS (Cont'd)	ACCOMPLISHMENTS TO DATE (TECHNICAL RESULTS) FUNDING BY FY TRANSITION DATE NAVY PARTICIPATION NAVY NEED IDENTIFICATION		
ON-GOING NAVY 6.1 RESEARCH	CBW PROGRAM AREA PROJECT TITLE & NUMBER NAVY SPONSOR PROJECT OBJECTIVE ACCOMPLISHMENTS TO DATE (TECHNICAL RESULTS) TRANSITION DATE NAVY NEED REQUIRED 6.2 FUNDING	ONR	
CURRENT & PLANNED NAVY 6.3 PROGRAMS	PROJECT INTERFACE TRANSITION DATE PLANNED FUNDING LEVEL	PM-23	
CLAIMANTS' CPP & SPP	DATA AS REQUIRED BY FORMAT	NAVSEASYSCOM ONR NMRDC MCDEC NAVAIRSYSCOM* NAVFACCOM*	
NAVY POLICY & OTHER GUIDANCE	FISCAL GUIDANCE POM GUIDANCE PROGRAM GUIDANCE	CNO CHNAVMAT CHNAVDEC	

*POTENTIAL FUTURE CLAIMANTS (FY 84)

TABLE 7. PEM INFORMATION NEEDS (CONT'D)

INFORMATION REQUIREMENT	DATA NEEDED	SOURCE	REMARKS
NAVY POLICY & OTHER GUIDANCE (Cont'd)	FOCUS/THRUST OF EXPLORATORY DEVELOPMENT CONSTRAINTS REVISIONS	ONT ONR	
PROGRAM AND OTHER MANAGEMENT REPORTS	PROGRAM STATUS - FISCAL - TECHNICAL - PROBLEMS/ISSUES	ONT NAVCOMPT SYSCOMS ONR	

need. Equally as important for the PEM is the Navy unique nature of these needs. If the need is not Navy unique, then the PEM is obligated to task the U.S. Army, as the proponent agency, to include that requirement in the overall Army CBW program.

At this juncture there is not a formal Navy CBW defense systems need document. There has not been any process to identify and define Navy unique needs and have these needs approved as requirements for program planning and execution. Presently, Navy needs are generated by three primary sources:

(1) Fleet CINC's

(2) System Commands

(3) Navy Staff

Fleet CINC's either directly address ONT with CBW defense system needs or submit them through the system commands. These are documented in messages. The system commands generate needs based on their analysis and incorporate them into the CPP as the basis for the exploratory development requirement.

The PEM must base his evaluation of needs on the inputs of the CINC's, the system commands, and the Navy staff. However, the absence of formal documentation and prioritization of needs forces the PEM to make an independent assessment relative to his understanding of the overall program. In addition, the lack of more definitive information forces the PEM to decide which needs are Navy unique and those that might be supported by the on-going Army program.

In summary, identification and definition of Navy needs is informal and fragmented at this time. The PEM must rely on the inputs of the system commands and CINC's, in combination with his priority judgments, in arriving at a general sense of Navy needs.

b. Previous Navy 6.2 Research

Previous Navy exploratory development CBW defense programs provide the Navy PEM with a baseline of historical data. These data are helpful in evaluating the proposed programs from the standpoint of eliminating duplication, providing a base to build on, and, possible,

determining the utility of the research based on previous research. Critical to the PEM are project technical results, duration, and cost. Additionally, information on prior research is useful in assessing the transition potential for particular programs.

As the program element manager for the Navy's CBW defense programs exploratory development efforts the PEM has direct access to previous Navy research. Over the past several years this research has been limited by the funding constraints on the overall CBW defense program. However, in spite of the limited nature of the research program, the availability of information on these efforts is varied. In general, formal documentation has been restricted to the technical project reports themselves and the DD Form 1498, which reports project activities. The reports have not been collected and are not readily accessible by the PEM. The DD Form 1498 are available, but the technical information is not adequate in terms of detail or breadth to be useful to the PEM in his activities.

Another drawback to documentation is the nature of the reporting itself. Inconsistencies in completing the DD Form 1498 and in technical reporting result in difficulties ascertaining the duration and costs of projects. One project may run for years with intermittent technical reports. A compounding factor is the lack of records for previous FPBS cycles, information that overall would assist the PEM in constructing a program history.

Although information on previous Navy research would be helpful in program planning and evaluation, the lack of documentation prior to FY78 significantly reduces the availability of a coherent data set. Without these data the PEM risks program duplication or the extension of programs beyond the point at which transition/discontinuance decisions should be made. However, the small size of the previous overall CBW defense program (less than $750,000 per year) minimizes these risks.

For this information requirement the PEM should use existing material from the files, DD Form 1498, and available technical reports. It is neither efficient nor necessary for the PEm to have complete files on all research. More importantly, the PEm should have information available that is adequate to simply identify the need for further information. In turn, this information could be obtained from the primary sponsor. Emphasis should be placed on current and projected programs, as CBW defense program growth

will place an additional management burden on the PEM. To successfully manage this growth greater focus should be placed on acquiring and maintaining directly relevant information that will contribute to meeting Navy needs as well as program effectiveness.

c. On-Going Navy 6.2 Research

A critical set of data for the PEM is that related to the on-going Navy 6.2 defense program. With planning, assessment and management responsibility of the program elements in the exploratory development program, the PEM requires a range of readily available information on each project. These data needs, outlined in Table 7, are currently not completely met by submissions from the claimants.

The most important data elements focus on the project objective technical accomplishments, funding by fiscal year, and transition from 6.2 to 6.3. Funding by fiscal year and the project objective are available from the CPP and SPP submissions, as are other data needs, including:

(1) CBW Program Area

(2) Project Title and Number

(3) Navy Sponsor

(4) Point of Contact

(5) Research Conducted By (dependent on planned resource)

(6) Milestones

The technical approach and accomplishments to date must be provided subsequent to project start. Presently, these are not available to the PEM in a timely manner, with technical results given at program reviews and on DD Form 1498. Milestones are part of the SPP submission, but require refinement during the course of the project. A formal approach to obtaining these data elements is required.

d. Other Services 6.2 Research (Previous and On-going)

Information on the 6.2 programs for the Army and Air Force are important inputs for the PEM from the

standpoint of avoiding duplication and building on existing research. The data on previous and on-going programs provide the PEM with one basis for evaluating CPP and SPP submissions and developing recommendations on program direction and funding levels. The PEM will primarily use data on other services' research to give indications of those programs for which greater detail should be obtained in order to fully define actual duplication or those instances where integration of research is warranted. Additionally, information relative to research in Army programs that support Navy needs are necessary for planning and integrating research.

The most significant data on other services' programs are the project objective, technical results, transition plans, and points of contact. The first data elements will provide the capsule view of the programs necessary to determine if further information is required to support the planning and review process. It appears that claimants and program managers often are not aware of other services' programs. Thus, it is incumbent upon the PEM to maintain an awareness of these programs.

Principal sources of information for this data are the various Army and Air Force organizations involved in the CBW defense exploratory development. In particular, the U.S. Army Chemical Systems Laboratory and Natick Laboratories and the U.S. Air Force Aerospace Division are major sponsors of 6.2 research for their respective services. Periodic liaison with these sources, on a continuing basis, is necessary to ensure that information is current relative to on-going research. Also, the PEM can obtain information on planned programs at these exchanges, allowing the identification of future efforts that might contribute to or impact upon the Navy's program. Direct interface with program managers is necessary to acquire technical results in a timely fashion.

e. Navy 6.1 and 6.3 Programs

The Navy 6.1 and 6.3 programs are of interest to the PEM for transition purposes as described in Chapter II. Currently, formal transition and technical results documentation for these programs does not exist. With respect to the 6.3 program, the CBW defense program has not had any 6.3 funding. For the 6.1 program, the level of funding and resultant research ovwer the past several years has yielded a minimal number of programs for transition.

A requirement for technical results and transition information is evident as the overall Navy CBW defense program grows. While this information was less critical when the 6.2 program was under $1 million, the projected budget of over $3 million beginning in FY84, an expanded 6.1 budget, and the introduction of significant 6.3 funds increases the importance of transition data. For the 6.3 program the PEM should interact with that program element manager during the cycle to make 6.2 transition requirements known, coordinate transition dates, and establish funding levels.

With respect to the 6.1 program, the PEM should coordinate with ONR to generate information needed for claimant CPP submissions. In this case, the PEM should serve the 6.2 claimants by tracking 6.1 programs, ascertaining transitions opportunities, and establishing necessary 6.1 - 6.2 program interfaces for transition planning. The claimants should be responsible for subsequent detailed 6.2 program planning and development of CPP and SPP submission data. The critical data elements for the PEM are the transition date and the funding levels, with other data necessary to support overall CBW defense program exploratory development planning and evaluation.

f. Claimants' CPP and SPP

The CPP and SPP submissions are the primary inputs to the PEM in the planning and management of the CBW defense program. These submissions provide all funding, milestone, technical objective, accomplishment, and rationale (identified Navy needs) data to support technology base and technology option programs. As shown previously in Figure 2 (PEM Information Flow) and as discussed both in Chapter II and in earlier sections of this chapter, the CPP and SPP review process involve not only the CPP and SPP submissions, but also a majority of the other data required by the PEM. In FY83 there are four claimants, with six claimants in FY84.

g. Navy Policy and Other Guidance

The primary sources of guidance for the PEM are the:

(1) Technology Policy and Planning Guidance (TPPG)

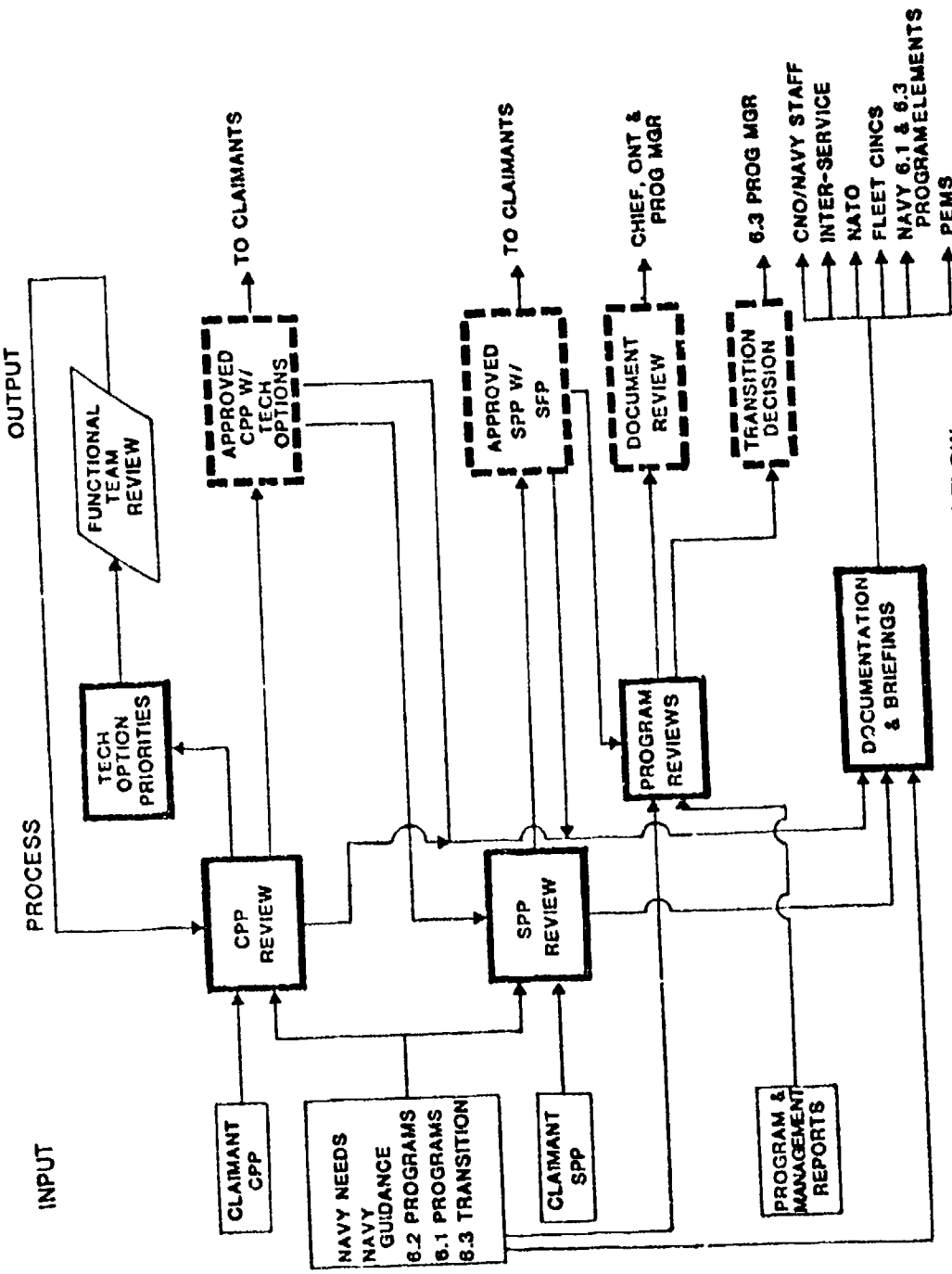

FIGURE 2. PEM INFORMATION FLOW

(2) Technology Programming and Fiscal Guidance (TPFG)

(3) Memoranda from the Chief of Naval Development

(4) Memoranda from the Chief of Naval Materiel/Deputy Chief of Naval Materiel

(5) Internal Memoranda

The TPPG and TPFG have been previously discussed in detail. As the guidance documents for the CPP and SPP, respectively, these are formal inputs to the PEM and claimants.

Memoranda provide both the general and specific guidance to the PEM. For the most part, these are periodic and in aggregate address a wide range of subjects. Since these cover such a broad spectrum of topics, information requirements per se cannot be detailed. These become inputs to specific segments of the information flow and individual processes.

Included in these are memoranda on approved technology options. Originating with the functional review teams, the approved technology options list becomes an input to the subsequent SPP and is incorporated into the approved CPP. For the PEM this list becomes guidance on the Special Focus Programs that are to be part of the overall CBW defense programs SPP. The PEM uses the list to ensure claimants have included only approved SFPs in their respective submissions.

h. Programs and their Management Reports

The PEM receives a number of 6.2 CBW defense programs and other management reports on the overall exploratory development program. These reports support the planning and execution of the CBW defense program as well as keep the PEM informed of the technology base and technology option projects across the twenty-two program element technology areas. The most direct application for these management reports is in the review of current CBW defense programs. Basic information, such as fiscal expenditures and milestones, are provided to the PEM to assist in program management.

i. Miscellaneous Documentation

A wide range of CBW defense related information comes to the PEM from a variety of sources. Some of these are for information purposes, including general administrative topics, correspondence, technical reports, Tri-Service Steering Committee and Ad Hoc Committee data, proceedings from meeting and symposia, and NATO Naval Subpanel material. Other inputs necessitate development and submission of a response.

For example, requests from Fleet CINC's for assistance or advise on CBW defense related issues require the PEM to draft and submit, through the Deputy Chief of Naval Materiel for Technology, an appropriate reply. Or, requests for briefings or submission of documentation to support the 6.2 CBW defense program, such as the Program Element Description for Congress, must be responsed to with some written documentation or presentation material. In a large measure the data for these are available from the CPP, SPP, and program reviews as well as other primary inputs.

j. Outputs Required By The PEM

The principal outputs of the PEM, in terms of importance to the CBW defense program, are those associated with the CPP and SPP recommendations to the Deputy Chief of Naval Materiel for Technology. Shown in Figure 2, repeated on the next page, most data inputs to the PEM support the review and recommendations for CPP and SPP submissions. Similarly, the majority of the outputs from the PEM are directly related to the CPP and SPP, either in terms of approved initial programs or subsequent fiscal direction, briefings on the 6.2 CBW defense program for informational or decisions purposes, and program reports, such as the rogram program for informational or decision purposes, and program reports, such as the Program Element Descriptions.

With respect to briefings, the PEM frequently presents the CBW defense program to:

(1) Senior Naval staff,

(2) Other Naval staff,

(3) 6.1 and 6.3 Navy CBW defense program managers,

(4) Other services and joint-service committees,

(5) Naval Commands and Fleet staffs,

(6) Naval laboratories and research centers, and

(7) Other interested parties, such as industrial and academic forums.

Another significant output is the documentation of program reviews with the associated transition decisions from 6.2 to 6.3. As mentioned previously, the PEM is the CBW defense program manager for the Deputy Chief of Naval Materiel for Technology. Beyond planning, the PEM is responsible for program oversight, particularly with respect to technical results in relation to the investment and progress in technology development. To be held annually, the program review focuses on providing sufficient information to enable the PEM to report to the Deputy Chief of Naval Materiel for Technology.

The program review report is oriented toward documentation of technical achievements and progress. Other key elements in the report are the fiscal profile, transition plans, the PEM's assessment of the program relative to Navy needs, the project objective and milestone accomplishments.

Transition decisions, made in coordination with the 6.2 project manager, the sponsor, and the 6.3 program manager, result directly from the program reviews or through subsequent discussions. The PEM has the responsibility for oversight of project progress, on schedule, through exploratory development to advanced development. The primary mechanism for accomplishing this function is the establishment of transition dates and periodic reviews to monitor progress.

The PEM is responsible for a number of miscellaneous outputs that are derived from the general responsibility of 6.2 CBW defense program corporate management. As the focal point for 6.2 research, the PEM is tasked to develop papers and briefings on special topics for a number of purposes. Illustratively, among the twenty miscellaneous outputs in FY82, the PEM presented a paper to the NATO Naval Subpanel; responded to a specific information request from a Fleet CINC; and prepared a topical briefing for a Navy senior officer.

C. SUMMARY OF PEM INFORMATION REQUIREMENTS

Critical for the exploratory development CBW defense program PEM is that information which supports program planning, control and monitoring responsibilities. Five general categories of information are required by the PEM--Navy program guidance, claimant submissios (CPP and SPP), previous and on-going CBW defense 6.2 research, program progress, and identified Navy needs. Across these five categories information availability varies.

Navy program guidance and claimant submissions are readily available to the PEM elements in the PPBS cycle. While these two categories of information provide the formal basis for fiscal and project planning, neither offers the data necessary to evaluate planned projects and make resource allocation decisions. Accomplishment of the PEM primary responsibilities require information from the other three categories.

At this point there is not a formal mechanism, aside from the infrequent program reviews, through which the PEM can acquire information on Navy needs, research, and program progress. Thus, a significant aspect of the PEM's approach to managing the 6.2 CBW defense program and acquiring needed data is the informal contacts with sources. These contacts, a part of the PEM's day-to-day activities, provide the entre to information not available in any formal sense.

A critical data shortcoming is the lack of defined and documented Navy needs. Although the PEM does collect this information informally and does make independent evaluations, the absence of a formal set of needs that is agreed to and approved directly impacts upon the ability of the PEM to ensure future Navy requirements are being adequately addressed at the technology base level.

Previous Navy research results are fragmented. A compilation of data to fully meet the PEM's information needs relative to CPP and SPP evaluation as well as resource allocation recommendations is not available. A preliminary list of projects and objectives has been developed during the course of this effort. But the necessary data on technical results and other project detail can only be developed by researching and examining each project. For current and subsequent projects an approach to data collection that will meet the PEM's needs is offered in Chapter IV.

Research results of the other services is even more fragmented than that of the Navy. Records of previous research are located only with the activity responsible for the project. There are at least six major organizations and over fifteen project oriented divisions within them responsible for exploratory development CBW defense programs. No formal mechanism, aside from the untimely DD Form 1498, is in operation to distribute research data. Neither are there any central repositories of research projects from which data might be sought. Hence, the PEM must rely on liaison and informal contacts to develop even limited data for the other services.

Resource limitations of the PEM and the difficulty associated with research data collection directly impact upon the PEM's ability to develop material on all previous research and on-going programs within the Army, Air Force and NATO. Although the data is not currently accessible by the PEM, these requirements have been structured for inclusion in the PEM management information system.

Most importantly for the PEM are identification of research and maintenance of the basic data defined as needs in Table 7. The same resource constraint that inhibits data collection, limits the PEM's ability to review and extract information from research progress and technical reports. Thus, the crux of a responsive management information system for the PEM is the ability to initially identify potentially relevant research. Based on this initial identification, the PEM can then seek out further information to support assessments and program management. The management information system presented in Chapter IV provides the necessary data and flexibility to implement this approach.

CHAPTER IV

MANAGEMENT INFORMATION SYSTEM FOR THE PEM

A. INTRODUCTION

Based on the information requirements and the availability of information identified in Chapter III, a management information system for the exploratory development CBW defense program PEM has been designed and developed. A second significant basis for the system design was the actual day-to-day functioning of the PEM. From this detailed review of the PEM's activities insights were derived that directly contributed to making the system workable. Emphasis in the system design focused on providing a structure the PEM could implement and maintain within the resource constraints of that position. At the same time, the structure is flexible enough to meet the anticipated expansion of the program in FY84 and allows for either manual or automated implementation.

B. STRUCTURE OF THE SYSTEM

The approach to system design emphasized the major element of the PEM's information needs--data on research projects. Given the limited availability of previous research results and the constrained resources of the PEM, the design gave priority to fully meeting current and future research project data needs. This approach to design provides a structure that enables the PEM to readily expand the system as the CBW defense program grows from an established baseline.

An initial element in system design was the structuring of the files. Identification of files was accomplished with the definition of four major sets:

(1) CBR Defense Technology Reference File

(2) Biomedical Technology Reference File*

(3) PPBS File

(4) General Administration File

* The CBR PEM also serves as the Biomedical PEM

1. CBR Defense Technology Reference File

The CBR Defense Technology File contains information on all research that is of interest to the PEM, including Navy projects, other services research, NATO, and directly related reference material. This single file, the largest in the CBR portion of the system, represents the basic data base of 6.2 research for the PEM. The file is first organized by service -- Navy, Army, Air Force, and NATO. Within these service categories the research projects are classified by CBW defense program areas:

- Collective Protection (includes all filtration projects)
- Decontamination
- Detection and Warning
- Individual Protection
- Medical

Under each CBW defense program area the files are organized by on-going and previous research by project title. Within the individual project files there is a primary data sheet (described below) and other documentation associated with that particular project. The primary data sheet and specific project file content for Navy 6.2 research is different than that of other services/NATO research.

a. Navy CBW Defense Project File

The Navy CBW Defense Project Summary is the principal source of data on projects for the PEM. This sheet contains a capsule summary of project information required by the PEM in accomplishing his position functions relative to program planning, control, and monitoring. Shown in Figure 3, the first six sections of the project summary are self explanatory.

The objective section should briefly state what the exploratory development effort is to accomplish. It also should relate the application of the work to a specific Navy need. The technical approach identifies the technology that will be employed to achieve the objective. It should also be stated how the technology is envisioned to impact the Navy need. The accomplishment section reflects the major findings of the R&D and how they impact the achievement of

DEFENSE AREA:

PROJECT TITLE:

PROJECT NUMBER:

MAJOR CLAIMANT:

NAVY SPONSOR POINT OF CONTACT:

RESEARCH CONDUCTED BY:

PROJECT OBJECTIVE:

TECHNICAL APPROACH:

ACCOMPLISHMENTS:

FIGURE 3. NAVY CBW DEFENSE PROJECT SUMMARY

FUNDING BY FY:	83	84	85	86	87
6.2 $ (000's)					

MAJOR MANAGEMENT MILESTONES:

MAJOR TECHNICAL MILESTONES:

DISPOSITION:

REMARKS:

INFORMATION DATE:

FIGURE 3. NAVY CBW DEFENSE PROJECT SUMMARY Cont'd.

the stated goal. The accomplishments of the current fiscal year should relate to the planned technical milestones for that year.

The funding section can be expanded beyond five years for previous work that is on-going and may continue beyond the POM cycle. Two milestone schedule descriptions are provided for in the summary, management and technical. The purpose of these are to provide the PEM the opportunity to review the technical milestones proposed by the laboratory and determine and schedule the management emphasis that will best support the project. There is a requirement to have at least one management milestone. This decision point should be scheduled when the technology has progressed to a point where its application is readily apparent. At this point a decision should be reached by 6.2 claimant manager, the acquisition manager and PEM as to the future direction of the project.

Disposition is used to indicate any transition, discontinuance or continuance in 6.2 decisions as well as accompanying notes on any future decisions that affect transition. The remarks section is provided for stating significant problems, funding shortfalls and other information relating to the accomplishment of the stated objective. Finally, the information date provides a space of annotating the last time data was reviewed or changed.

In addition to the project summary, the Navy section of the defense technology file contains program reviews and other project specific documentation, including memoranda and correspondence. Projects should be maintained in the active portion of the file until the end of the fiscal year in which they were actually completed.

b. Other Services CBW Defense Project File

Other services, including NATO, on-going and previous research is organized first by service and then by defense program area. Previous and on-going projects are integrated within defense program area, filed by fiscal year. The Other Services CBW Defense Project Summary, Figure 4, has been designed for use by the PEM as the primary resource tool for initially researching other services' projects. Also incorporated into this file are other documentation to support individual projects. Service summaries should be filed at the beginning of each service's section.

EA CORPORATION

DEFENSE AREA:

PROJECT TITLE:

SERVICE & SERVICE SPONSOR:

POINT OF CONTACT:

RESEARCH CONDUCTED BY:

PROJECT OBJECTIVE:

TECHNICAL APPROACH:

ACCOMPLISHMENTS:

FUNDING BY FY:	80	81	82	83	84
6.2 $ (000's)					

MAJOR TECHNICAL MILESTONES:

DISPOSITION:

REMARKS:

INFORMATION DATE:

FIGURE 4. OTHER SERVICES CBW DEFENSE PROJECT SUMMARY

The project summary for other services is less detailed than that of the Navy projects. Decreased detail on technical approach and accomplishments is seen; no management milestones are required; and disposition will simply reflect whether the program was transitioned to 6.3 or discontinued. One major point is to be included in remarks, identification of any relationship of the project to a Navy need. This remark should include a comment concerning the source of the identified need, such as Navy tasking to Army, joint project (indicate Navy funds), or planned integration to a particular Navy program.

c. Navy 6.1 CBW Defense Research Project File

The CBR Defense Technology Reference File contains a section for Navy 6.1 CBW defense research. This portion of the file will contain information related to programs that are to transition to 6.2 during the POM cycle. The purpose of the file is to provide a positive means of tracking 6.1 Navy research that will impact on 6.2 program planning. In addition, the data on each project will give the PEM a summary of technology and technical aspects.

Similar to the other file elements, this segment is organized by defense areas. Within defense areas the files are organized first by planned transition fiscal year and then by project file.

The Navy 6.1 Research Project Summary, Figure 5, has the same basic initial information as the other summaries, but is not as extensive. The critical items are the transition date, Navy need and required funding, which give the PEM essential data for planning. Remarks should include any technology related comments that might be helpful in technology base or technology option evaluations and linking the 6.1 project to on-going or previous research.

d. Miscellaneous CBW Defense Program Reference Information

A final section in this file is for miscellaneous CBW defense program reference information. Included in this portion of the file are technical references that are not project specific, bibliographies, and other technical information related to CBW defense. Organized by defense area and incorporating a general reference category, the miscellaneous file provides a means of cataloging the numerous pieces of technical information that the PEM accumulates.

DEFENSE AREA:

PROJECT TITLE:

PROJECT NUMBER:

NAVY SPONSOR:

POINT OF CONTACT:

RESEARCH CONDUCTED BY:

PROJECT OBJECTIVE:

ACCOMPLISHMENTS TO DATE:

TRANSITION DATE:

NAVY NEED:

REQUIRED 6.2 FUNDING BY FY: 83 84 85 86 87

REMARKS:

FIGURE 5. NAVY 6.1 RESEARCH PROJECT SUMMARY

2. Planning, Programming and Budget System File

The PPBS file includes all material related to the PPBS cycle. Included in this file is all policy and guidance, claimant submissions, PEM evaluations and recommendations, technology base and option decisions, and other decision memoranda relative to the cycle. The file is organized by specific type of material by fiscal year. For example, the CPP for FY84 and out years is an individual file. Decision memoranda and other material directly related to a particular major individual file, such as a FY CPP, are filed with that primary documentation.

Principal files include:

(1) Technology Policy and Planning Guidance

(2) Technology Programming and Fiscal Guidance

(3) CPP submissions

(4) SPP submissions

(5) POM

(6) Program Element Descriptions

These files have been structured for a manual system. The nature of the material and its volume does not lend itself to automation, particularly in view of its limited use versus the resources that would be necessary to input, update, and maintain an automated data system.

3. General Administration File

The General Administration File contains correspondence, memoranda, briefings, committee notes, program management reports, and other material of a general nature. This file is organized by topic using standard functional file system codes, as do the other files in the system. Illustratively, there is a file for the Joint-Service CBW Steering Committee and one for the NATO Naval Subpanel. Briefings and other presentations are filed in a single section sequentially by date and title.

4. Biomedical Technology Reference File

While the project was restricted to the CBW defense

program, it should be noted that a brief review of the larger biomedical program indicated that the same system could be implemented. In fact, many of the program management and PPBS documents include both CBR and biomedical material. The PEM should consider extending the file system to the biomedical program area.

C. IMPLEMENTATION

During the course of the project the file structure necessary to support the PEM CBW defense programs information system was established in that office. Organized as a manual system, the CBW defense technology file has been designed and the project summaries developed for automation. Implementation of a data base system on a microcomputer to support the PEM would provide the mechanism for automation of the project summaries. Once the summaries are automated, the PEM would have greatly expanded flexibility, with less required resources, to conduct searches, project correlations, funding profiles and other program management related activities to support recommendations and decisions. As mentioned earlier, the other CBW defense program files and intended to remain in a manual format.

Two other implementation points warrant mention. First, the files for program elements have been color coded, red for CBR Defense Technology and blue for Biomedical Technology. Second, a "Follow-Up Action" File has been established for each file, providing a suspense file mechanism.

The project summaries for the FY83 Navy 6.2 CBW defense program, incorporated into Chapter V of the report, have been prepared. Neither time nor resources permitted the completion of project summaries for the other projects in the file system, but the research results provided in Chapter V offer a baseline for the PEM to implement that part of the system in the future.

CHAPTER V

CBW DEFENSE RESEARCH

A. APPROACH TO CBW DEFENSE RESEARCH

The initial scope of the CBW defense research encompassed determination of the data needs, identified and defined as PEM information requirements, for previous and on-going 6.2 CBW defense programs in all three services. Emphasis in the research was to be on Navy programs, with an orientation toward current and planned research. Based on the findings and recommendations relative to PEM information needs, a final research data element structure would be developed.

Two factors became apparent in the earliest phase of the project. First, the broad range of PEM activities necessitated a much more structured and extensive analysis to determine information requirements than originally envisioned. Second, the availability of research program information, even within the Navy, is limited. Data availability problems are caused by the fragmented nature of the research across numerous sponsors and investigating organizations as well as the absence of any central reporting systems within the services.

The impact of these upon the review of research programs was to limit the scope to providing a baseline with minimal information. Application of this approach provides the PEM with an initial program data base upon which further information can be built. It was felt that capturing the breadth of research projects was more important than expending resources to develop detailed information on a project for project basis. Given the fragmented nature of research reporting, each project would have to be researched simply to determine availability of any project information. The research detailed in the following sections reflects this approach.

B. CURRENT NAVY RESEARCH

The research program information for FY83 Navy CBW defense program exploratory development reflects the project emphasis on current Navy programs. For on-going and projected FY84 projects data needs as outlined as PEM

information requirements have been developed. Reporting of these data has been accomplished using the Navy CBW defense project summary. Identified as Table 8, these individual project summaries are directly convertible to the PEM management information system that was established.

C. PREVIOUS NAVY 6.2 CBW DEFENSE PROGRAMS

For previous Navy 6.2 CBW defense programs data on cost and technical objectives has been developed for projects from FY79 through FY82. (See Table 9) Since these projects have either been completed/terminated or continue into FY83 research on data was limited to those areas. For those brought forward, the FY83 project summaries contain technical results and associated information.

Research on these previous Navy projects illustrated the problems in acquiring the data needs defined for the PEM. It was conclusively demonstrated that no single source offers the range of data required by PEM. Rather, the project sponsor has certain fiscal, administrative, and management information while technical staff must provide data on accomplishments and technical results. The greatest degree of difficulty arises when it is necessary to reconcile information provided by management and technical staff.

From this research experience the importance of establishing a formal set of data needs and a system to obtain them for current projects is clear. A primary conclusion drawn from all the research on previous programs in this effort is that information must be captured as each project is initiated and as it progresses. Attempts to acquire data after the fact is both difficult and costly.

D. ON-GOING AND PREVIOUS OTHER SERVICES 6.2 CBW DEFENSE PROGRAMS

For on-going and previous other services 6.2 CBW defense programs emphasis was placed on identification of the projects and objectives. The difficulties in data element availability described previously were even more acute in dealing with the other services. Thus, research was limited to projects and objectives, providing the PEM with a basis for determining those projects that are relevant to Navy needs and projects. From this basis, in conjunction with existing inter-service coordination, the PEM can develop and objectives for other services research programs.

TABLE 8. ON-GOING AND PLANNED NAVY 6.2 RESEARCH

EAI CORPORATION

DEFENSE AREA: Individual Protection

PROJECT TITLE: Improved Mask Filter and Communicator

PROJECT NUMBER:

MAJOR CLAIMANT: Naval Sea Systems Command

NAVY SPONSOR POINT OF CONTACT: Mr. John Guarino

RESEARCH CONDUCTED BY:

PROJECT OBJECTIVE: Develop advanced filter and communication concepts for improvement of CBR protective mask deficiencies.

TECHNICAL APPROACH:

ACCOMPLISHMENTS:

FAI CORPORATION

FUNDING BY FY:	83	84	85	86	87
6.2 $ (000's)		150	300	200	150

MAJOR MANAGEMENT MILESTONES: FY84 New start

MAJOR TECHNICAL MILESTONES:

DISPOSITION:

REMARKS:

INFORMATION DATE: 10/31/82

EAI CORPORATION

DEFENSE AREA: Detection

PROJECT TITLE: Agent Trapping Coatings for Detectors

PROJECT NUMBER:

MAJOR CLAIMANT: Naval Sea Systems Command

NAVY SPONSOR POINT OF CONTACT:

RESEARCH CONDUCTED BY:

PROJECT OBJECTIVE: Develop and demonstrate feasibility of improved micro chemical sensor coatings which entrap and respond to specific CW agents.

TECHNICAL APPROACH: Determine applicability of silicones for agent entrapping.

ACCOMPLISHMENTS:

FUNDING BY FY:	83	84	85	86	87
6.2 $ (000's)		150	250	450	400

MAJOR MANAGEMENT MILESTONES: FY84 new start

MAJOR TECHNICAL MILESTONES:

DISPOSITION:

REMARKS:

INFORMATION DATE: 10/31/82

DEFENSE AREA: Detection

PROJECT TITLE: Laser-Based Instrumentation for the Detection of Chemical Agents

PROJECT NUMBER:

MAJOR CLAIMANT: MCDEC

NAVY SPONSOR POINT OF CONTACT: Mr. J.R. McGillicuddy (Code D-090)

RESEARCH CONDUCTED BY: Los Almos National Laboratory

PROJECT OBJECTIVE: Develop laser-based techniques for point detection, remote detection and surface contamination detection of chemical warfare agents

TECHNICAL APPROACH: Laser induced breakdown spectroscopy (LIBS) - From the region of a laser-generated plasma monitor atomic emission lines arising from the characteristic elements present in chemical agents.

ACCOMPLISHMENTS: In FY82 it was determined that LIBS can be used directly in air or on surfaces and levels of detection were established. A concept for discriminating between simulant and agent was demonstrated. Hardware was assembled for a field deployable unit.

FUNDING BY FY:	83	84	85	86	87
6.2 $ (000's)	90	55	150	150	275

MAJOR MANAGEMENT MILESTONES:

Transition to 6.3 FY84

Program Review/Decision Date NOV FY84

MAJOR TECHNICAL MILESTONES:

Complete Agent Testing JAN FY83

Complete Fabrication of Improved Portable System (IPS) SEPT FY83

DISPOSITION:

REMARKS:

INFORMATION DATE: 10/31/83

DEFENSE AREA: Detection

PROJECT TITLE: Piesoelectric Crystals (PZX) and Surface Acoustic Wave (SAW) Detection Devices

PROJECT NUMBER:

MAJOR CLAIMANT: Naval Sea Systems Command

NAVY SPONSOR POINT OF CONTACT: Mr. John Guarino

RESEARCH CONDUCTED BY: Naval Weapons Center, China Lake, CA

PROJECT OBJECTIVE: To develop PZX and SAW technology into systems that will detect phosphonate esters.

TECHNICAL APPROACH: Determine optimum crystal coating and demonstrate feasibility of the technique for point detection.

ACCOMPLISHMENTS: The point detection technique has been demonstrated.

EA CORPORATION

FUNDING BY FY:	83	84	85	86	87
6.2 $ (000's)	110				

MAJOR MANAGEMENT MILESTONES: Transition Decision Review SEPT FY83

MAJOR TECHNICAL MILESTONES: Design and build prototype portable point detection system 8/83

Perform feasibility experiments of point detection using outside simulant and live agents. 9/83

DISPOSITION:

REMARKS:

INFORMATION DATE: 10/31/83

DEFENSE AREA: Collective Protection

PROJECT TITLE: Collective Protection System (CPS) Over Pressure Reference

PROJECT NUMBER:

MAJOR CLAIMANT: Naval Sea Systems Command

NAVY SPONSOR POINT OF CONTACT: Mr. John Guarino

RESEARCH CONDUCTED BY: Naval Surface Weapons Center, Dahlgren, VA

PROJECT OBJECTIVE: To provide external pressure reference design guidelines for shipboard collective protection systems.

TECHNICAL APPROACH: Employing computer modeling techniques, construct of air flow model of the superstructure of an LHA class ship to predict pressure reference points.

ACCOMPLISHMENTS: A modest initial effort in FY82 has identified the location of the external pressure reference to be a critical design parameter due to significant relative air velocity of moving shipsl modeling techniques were established for Amphib/Transport-type configurations and optimum pressure reference locations were predicted. These findings are being transitioned for direct support of initial CPS design on the LHA-1 class of amphibious ships.

FUNDING BY FY:	83	84	85	86	87
6.2 $ (000's)	50				

MAJOR MANAGEMENT MILESTONES: Program Review MAY FY83

MAJOR TECHNICAL MILESTONES: Complete validation on LHA Carrier Ship MAY FY83

DISPOSITION:

REMARKS:

INFORMATION DATE: 10/31/82

DEFENSE AREA: Collective Protection

PROJECT TITLE: Moisture Resistant Absorbants

PROJECT NUMBER:

MAJOR CLAIMANT: Naval Sea Systems Command

NAVY SPONSOR POINT OF CONTACT: Mr. John Guarino

RESEARCH CONDUCTED BY: Naval Research Laboratory

PROJECT OBJECTIVE: To select and demonstrate feasibility of synthetic absorbants that are insensitive to water vapor for application to collective/ individual protective system filtration.

TECHNICAL APPROACH: Examine and evaluate polymeric absorbants (ambersorbs) to determine static and dynamic absorption performance, surface chemical properties, and suitability for CW agent removal in a high humdity environment.

ACCOMPLISHMENTS: The relative performance of a variety of absorbants has been screened for the purpose of determing the relative performance of the absorbants against organic vapors over a range of relative humidities.

FUNDING BY FY:	83	84	85	86	87
6.2 $ (000's)	80				

MAJOR MANAGEMENT MILESTONES: Program Review JAN FY83

MAJOR TECHNICAL MILESTONES: Conduct initial CW Filtering evaluation MAR FY83

DISPOSITION:

REMARKS:

INFORMATION DATE:

EA CORPORATION

DEFENSE AREA: Collective Protection

PROJECT TITLE: Neutralizing Filters

PROJECT NUMBER:

MAJOR CLAIMANT: Naval Sea Systems Command

NAVY SPONSOR POINT OF CONTACT: Mr. John Guarino

RESEARCH CONDUCTED BY:

PROJECT OBJECTIVE: To develop and demonstrate the feasibility of a high capacity CW/BW filtration technique which neutralizes toxi agents, provides minimum pressure drop and superior particulate removal.

TECHNICAL APPROACH: The proposed filtration technique will be based on hydrolytic principles which neutralizes toxic agents.

ACCOMPLISHMENTS:

FUNDING BY FY:	83	84	85	86	87
6.2 $ (000's)		400	600	1000	800

MAJOR MANAGEMENT MILESTONES: FY84 New Start

MAJOR TECHNICAL MILESTONES:

DISPOSITION:

REMARKS:

INFORMATION DATE:

DEFENSE AREA: **Collective Protection**

PROJECT TITLE: Portable Electrostatic Collective Protection System (PECPS) and Chemical Agent Electrostatic Filtration System (CAEFS)

PROJECT NUMBER:

MAJOR CLAIMANT: MCDEC

NAVY SPONSOR POINT OF CONTACT: Mr. J.R. McGillicuddy (Code D-090)

RESEARCH CONDUCTED BY: University of Arizona

PROJECT OBJECTIVE: Develop technology for collective protection against CB hazards. Systems developed from this technology must be compatible with existing shelters, combat vehicles, be energy efficient, light-weight, inexpensive, of low power consumption, reliable, as maintenance free as possible, and most important, be logistically supportable by the operating forces and transportation available.

TECHNICAL APPROACH: Employ electrostatic/corona discharge techniques to destroy toxic chemical and biological agents.

ACCOMPLISHMENTS: During 1981, laboratory prototypes were constructed and challenged with simulants. Improved designs were made in FY82, including a system prototype CAEFS. PECS electric fence panels were used in laboratory testing to determine chemical agent breakdown compositions.

FUNDING BY FY:	83	84	85	86	87
6.2 $ (000's)	45	600*	457*	747*	806*

* Special Focus Program

MAJOR MANAGEMENT MILESTONES: Project review/decision date DEC FY84

MAJOR TECHNICAL MILESTONES: Test improved designs with agent SEPT FY83

DISPOSITION:

REMARKS:

INFORMATION DATE: 10/31/82

DEFENSE AREA: Collective Protection

PROJECT TITLE: Protective Air Filtration Systems For Shipboard Environment

PROJECT NUMBER:

MAJOR CLAIMANT: Office of Naval Research

NAVY SPONSOR POINT OF CONTACT: CDR P.M. Curran (ONR-270)

RESEARCH CONDUCTED BY: Duke University

PROJECT OBJECTIVE: To develop air filtration systems capable of the detection and deactivation of CBW agents and will be coupled with carbon fiber electrodes for agent detection.

TECHNICAL APPROACH: The system will incorporate immobilized enzymes for the deactivation of CBW agents and will be coupled with carbon fiber electrodes for agent detection

ACCOMPLISHMENTS: FY83 new start

FUNDING BY FY:	83	84	85	86	87
6.2 $ (000's)	350	400			

MAJOR MANAGEMENT MILESTONES: Progress Review OCT FY84

MAJOR TECHNICAL MILESTONES: Develop model filter system using hemoglobinas immobilized protein DEC 82.

Expand development of model filter system by incorporating carbon filter electrodes for detection of inactivated product MAY 83.

Test model filtration system for ability to remove and detect CW simulant (cyanide gas) SEP 83.

DISPOSITION:

REMARKS:

INFORMATION DATE: 10/31/82

DEFENSE AREA: Decontamination

PROJECT TITLE: Surfactant - Enhanced Decontaminants

PROJECT NUMBER:

MAJOR CLAIMANT: Naval Sea Systems Command

NAVY SPONSOR POINT OF CONTACT: Mr. John Guarino

RESEARCH CONDUCTED BY:

PROJECT OBJECTIVE: To develop a surface treatment that will function as a decontaminate for CW/BW agents.

TECHNICAL APPROACH: Employ advanced surface chemistry concepts and ph controlled active chlorine compounds as decontamination agents on surfaces.

ACCOMPLISHMENTS:

FUNDING BY FY:	83	84	85	86	87
6.2 $ (000's)		300	450	550	350

MAJOR MANAGEMENT MILESTONES: FY84 New Start

MAJOR TECHNICAL MILESTONES:

DISPOSITION:

REMARKS:

INFORMATION DATE: 10/31/82

DEFENSE AREA: Medical

PROJECT TITLE: Detection and Identification of BW Agent with Enzyme-Linked Immunosorbant Assay (ELISA) Systems

PROJECT NUMBER:

MAJOR CLAIMANT: Office of Naval Research

NAVY SPONSOR POINT OF CONTACT: CDR P.M. Curran (ONR-270)

RESEARCH CONDUCTED BY: Navy Biosciences Laboratory, Oakland, CA

PROJECT OBJECTIVE: Develop a BW detection and identification capability for shipboard use.

TECHNICAL APPROACH: Through the production and linkage of monoclonal antibodies to specific BW agents and employ to develop an ELISA system for the rapid detection and identification of BW agents.

ACCOMPLISHMENTS: Material needed to produce monoclonal antibodies to specific BW agents has begun development.

FUNDING BY FY:	83	84	85	86	87
6.2 $ (000's)	175	250	279	300	327

MAJOR MANAGEMENT MILESTONES: Project Progress Review JULY FY83

MAJOR TECHNICAL MILESTONES:

DISPOSITION:

REMARKS:

INFORMATION DATE: 10/31/82

TABLE 9. PREVIOUS NAVY 6.2 CBW DEFENSE PROGRAMS

PROJECT	FUNDING LEVEL ($K)				OBJECTIVE
	FY 79	FY 80	FY 81	FY 82	
Chemical Defense Investigations of Gas Separation Membranes	26.0	50.0	115.0		To further develop gas separation membranes that have shown the capability to reject GB (hydrophilic membranes) and concentrate GB (hydrophobic membranes)
High Pressure Fans For Shipboard CPS	38.0	30.0	35.0		To develop a standard family of high pressure fans which will meet the needs of small pressure zones as well as larger volumes such as machinery spaces
Protective Gas Masks/Canisters		80.0	25.0		To provide an adequate supply of low resistance canisters for the NB MARK V Mask and to equip this mask with a nose cup and spray shields as add-on items to the existing masks and as procurement modifications on future contracts
Study of DSK/Canadian/UK Ship Citadel Filter Systems		50.0			To provide information for ship designers on the pros and cons of the three foreign citadel filter systems, and their main components, for possible application to the USN in new construction and backfit
Chemical Warfare/Biological Research Countermeasures: Test & Evaluation Master Plan Preparation		50.0			To establish a test and evaluation program for assessing the technical capability and then evaluating the operational adaptability of CB defense systems in the at sea environment leading to a recommendation for approval for service use
Methods of Sealing Compartments for Shipboard Collective Protection		35.0	40.0		To provide a reliable air-tight method of sealing the ship's NBC envelope

TABLE 9. PREVIOUS NAVY 6.2 CBW DEFENSE PROGRAMS (CONT'D)

PROJECT	FUNDING LEVEL ($K)				OBJECTIVE
	FY 79	FY 80	FY 81	FY 82	
Evaluation and Modification to Shipboard Washdown System for Agent Removal		20.0	68.0		To provide measurements of ships washdown system in terms of area spread and volume. To evaluate several ship types in this aspect and to determine a method of assigning a degree of relative effectiveness to each ship type. To select, evaluate and recommend improved hardware for shipboard washdown systems that could incorporate decon agents for improved effectiveness
Investigation of New Technologies For the Citadel Concept		15.0			To select gas separation membranes that will reject CO_2 and water vapor from a collective protection area to lower fresh air, filter, and air conditioning requirements
Decontamination Station Design Criteria		45.0			To develop and specify materials, methods, hardware and the necessary design criteria for an effective shipboard decontamination station/system for backfit or application to new construction
An Analysis To Determine U.S. Navy Doctrine and Cost Implications For a Balanced CB Defense Program	35.5				To develop a doctrinal base for CW operations for Naval ships subjected to CW weapons and to determine associated training requirements

TABLE 9. PREVIOUS NAVY 6.2 CBW DEFENSE PROGRAMS (CONT'D)

PROJECT	FUNDING LEVEL (SK)				OBJECTIVE
	FY 79	FY 80	FY 81	FY 82	
Synthetic Chemical Agent Absorbents				90.0	To develop alternative technology to charcoal filters
In Situ Absorbent Life Indicator				40.0	To develop a test methodology/procedure for the non-destructive testing of collective protection elements with a goal of testing the elements without disassembly of the system
Chemical Agent Detection				110.0	To advance CW agent detection technology
Enzyme Linked Immunosorbent Assays For Detection and Identification of Infectious Agents				106.0	To develop enzyme linked immunosorbent assay (ELISA) systems for detection of specific antigens utilizing monoclonal antibodies, for rapid and specific diagnosis of BW agent caused disease
Review of Techniques For Rapid Detection and Identification of Airborne Microorganisms				60.0	To perform a critical review and analysis of available information regarding detection and identification of airborne BW agents and recommend the most promising technologies for future development
Chemical Casualty Workloads in an Amphibious Warfare Environment				120.0	To forecast and evaluate the impact of chemical warfare on casualty generation, transport and care during amphibious operations
Ship Collective Protection Systems			110.0	60.0	To develop design criteria and guidelines for maintaining a positive overpressure in CPS spaces

TABLE 10. PREVIOUS AND ON-GOING OTHER SERVICES RESEARCH

U.S. ARMY

PROJECT	OBJECTIVE
INDIVIDUAL PROTECTION	
Mask, Chemical-Biological, Multipurpose, XM30	To provide respiratory, eye, and face protection against chemical and biological agents
DETECTION AND WARNING	
Chemical Alarm Simulator, XM 31	To develop a training simulator set to enable training in the use of the M8 alarm system
Chemical Attack Warning Transmission System (CAWTS)	To develop a ground signal which would alert military personnel to the presence of toxic agents by an audible signal (pyrotechnic whistle) and/or by a visible signal (a three star cluster-2 white and 1 red)
Biological Detection and Warning System, XM19/XM2	To provide an array of Biological Detector and Warning Stations
Alarm Unit, Chemical Agent Automatic Alarm: Liquid XM85 Detector Unit, Chemical Agent Automatic Alarm: Liquid XM86	To provide an automatic liquid chemical agent detector that detects a single droplet (200 micro meter diameter) of threat agents such as thickened GD, VX, H, and Lewisite
XM272, Water Testing Kit, Chemical Agent	To develop a lightweight, compact, expendable, and easy to use water testing kit which detects hazardous levels of nerve, mustard, lewisite, and blood agents in $32^{0}F$-$125^{0}F$ raw and treated water

TABLE 10. PREVIOUS AND ON-GOING OTHER SERVICES RESEARCH (CONTINUED)

U.S. ARMY

PROJECT	OBJECTIVE
XM21 Remote Sensing Chemical Agent Alarm Sci-Reach	To develop an automatic scanning passive infrared sensor which detects nerve agent clouds based on changes in the infrared from remote objects/sky caused by the cloud
XM22 Automatic Chemical Agent Alarm (ACADA)	To develop an advanced man-portable point sampling field alarm system based on the concept of Ion Mobility Spectrometry (IMS) in which ion-molecule products formed by the c-agent, and in an electric field, are separated and identified by their speeds of travel (mobilities)
Training Simulator Set Form 256 Kit	To develop a training simulator set to enable train-in the use of the M256 Chemical Agent Detector Kit during full scale chemical operations
Chemical Agent Monitor (CAM)	To develop a hand held, man-operated device for monitoring chemical agent contamination on personnel and equipment
DECONTAMINATION	
Decon Apparatus, Portable, XM13	To design portable decontaminating apparatus to dispense standard chemical agent decontaminating solution
Decontaminating Apparatus, Diesel Powered, Skid Mounted, XM18	To design decontaminating apparatus comprised of an oval stainless steel storage tank, a hybrid steam generator/water heater and a 100 gal/min main

TABLE 10. PREVIOUS AND ON-GOING OTHER SERVICES RESEARCH (CONTINUED)

U.S. ARMY

PROJECT	OBJECTIVE
Decontaminating Apparatus, Diesel Powered, Skid Mounted, XM18 (Continued)	pump unit to be used for equipment, personnel and limited terrain operations
Decon Apparatus, Truck-Mounted, Jet Exhaust, XM16	To develop decon apparatus for decontaminating large-scale equipment (trucks, tanks, vans, self-propelled artillery, etc.) contaminated with NBC agents by directing a high velocity stream of hot exhaust gases from a jet/turbine engine onto their outer surfaces.
Live Agent Testing of Jet Exhaust Decon/Smoke System	To validate the efficacy of the Jet Exhaust Decon/Smoke System as a decontaminating system using actual toxic chemical agents
Decon Apparatus, Interior Surface, XM15 (Formerly ISDS)	To develop a decontaminating system to be positioned inside Army vehicles, vans, aircraft, and shelters and used by crews to decontaminate interior surfaces to such levels that the crews may reduce its MOPP
IME/Norwegian NBC Sanator (Lightweight Decon System), XM17	To design a portable, lightweight, compact, gasoline engine-driven pump and water heating unit to draw water from any source and deliver it at controlled temperatures up to 120^{0}C and pressures up to 100 psig.
COLLECTIVE PROTECTION	

TABLE 10. PREVIOUS AND ON-GOING OTHER SERVICES RESEARCH (CONTINUED)

U.S. ARMY

PROJECT	OBJECTIVE
MCPE for TACFIRE (First Production)	To provide CB protection against known CB threats for vehicles, vans, and shelters by providing standard items of supply
MCPE for AN/TSQ-73 (First Production)	To provide CB protection against known CB threats for vehicles, and shelters by providing standard items of supply
NBC Hybrid Collective Protection Equipment	To provide positive pressure collective protection and/or individual ventilated facepiece collective protection for a wide variety of present and future combat vehicles and related systems
M51 Shelter System Production	To provide a 10-man portable shelter for collective protection against chemical and biological agents.
Collective Protection Equipment: NBC, Simplified, XM20	To design a system which will be used to convert an interior room of an existing building into a positive pressure CB collective protection shelter where individuals can perform assigned missions in a CB environment without the encumbrance of the protective mask and CB overgarment.
MCPE Applications (Vehicles, Vans, and Shelters)	To provide NBC protection by providing filtered air under positive pressure to a variety of vans, vehicles, and shelters (WVS) to prevent the infiltration of toxic chemicals, biological agents and radioactive aerosols.

TABLE 10. PREVIOUS AND ON-GOING OTHER SERVICES RESEARCH (CONTINUED)

U.S. ARMY

PROJECT	OBJECTIVE
TRAINING	
Simulator, Projectile Airburst, Liquid, XM11	To design a training airburst device which will simulate an artillery chemical agent attack
Launcher, Projectile, Liquid, Airburst, XM267	To design a launcher for five XM11 SPAL airburst devices
Non-explosive Dissemination Device For Thickened Liquid Simulant Agents	To develop a device for use on a low-flying helicopter or a moving ground vehicle to disperse thickened liquid simulant agents for training the individual soldier and units of the Army to survive in a chemical warfare environment