31203

STATUS OF DEPARTMENT OF DEFENSE PROGRAMS TO IMPROVE DEFENSIVE CHEMICAL WARFARE CAPABILITIES

Transmittal Letter
And
Statement of Fact

"NATIONAL SECURITY INFORMATION"
UNAUTHORIZED DISCLOSURE SUBJECT
TO CRIMINAL SANCTIONS

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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D C 20548

PROGRAM EVALUATION
AND
METHODOLOGY DIVISION

The Honorable Dante B. Fascell
Chairman, Committee on Foreign Affairs
United States House of Representatives

Dear Mr. Chairman:

As you requested on August 29, 1984, we have reviewed the Department of Defense's (DoD) program to improve its defensive chemical warfare capabilities. At this time we are submitting a Statement of Fact (Enclosure I) based on interviews (Enclosure II) and documentary evidence obtained from DoD officials and members of the private sector. As agreed between our staffs, this statement relies on information obtained in the continental U.S., while the final report will incorporate information obtained in Europe.

The statement provides factual information on each of the four topics identified in your request as questions of interest to the Committee:

- Does DoD have, or is it developing, doctrine adequate to support individual and joint military operations in a chemically contaminated environment?

- How effectively is DoD developing and procuring equipment and materiel that will enable US forces to survive chemical attacks and sustain operations in a chemically contaminated environment?

- Has DoD established force structures adequate to carry out training, reconnaissance, decontamination and other chemical defensive missions?

- What is the quality of the training received by individuals and units? Does it support the probability that their response to a chemical attack will be automatic and precise, and their discipline maintained while in a chemically contaminated environment?

The factual information presented in the statement identifies areas where progress has been made and areas where progress has been lacking. However, the facts themselves do not speak to the issues of whether the progress made is adequate and sufficient or whether that progress is commensurate with the costs incurred up to this time. As part of the second phase of

our work for the Committee, we will be analyzing the factual information presented here to determine what conclusions may or may not be validly drawn with regard to the latter issues.

The remainder of this letter is devoted to presenting information on chemical warfare defense-related activities of the Office of the Secretary of Defense (OSD) and the Joint Chiefs of Staff (JCS) as well as topics which are relevant to the four questions and were frequently raised by DoD officials, but cut across Service concerns. These topics are interservice cooperation/coordination, use of Allied technologies, the defense industrial base, and unit training and exercises.

ACTIVITIES OF OSD AND JCS

With regard to the chemical warfare defense-related activities of OSD and JCS, the Defense Science Board (1981)[1] recommended that:

- The Secretary of Defense should direct the Under Secretary of Defense for Research and Engineering (USDRE) to develop a prioritized list of research and development programs for acceleration, and review and report on the Services' chemical warfare research, development and acquisition procedures to remove needless impediments;

- As part of the Defense Systems Acquisition Review Council process, all new major weapons systems should be required to address collective protection;

- The Assistant Secretary for Military Readiness and Logistics should ascertain the Services' collective protection needs for fixed and mobile facilities and develop a plan (in conjunction with USDRE) for providing the required equipment;

- Program Analysis and Evaluation (PA&E) should provide quantitative assessments of expected casualty rates; and,

- The Secretary of Defense should direct that JCS establish a task force to develop joint doctrine for conducting operations in a contaminated environment.

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[1] DEFENSE SCIENCE BOARD. Report of the Defense Science Board Summer Study on Chemical Warfare, SECRET. Washington, DC: Office of the Under Secretary of Defense for Research and Engineering, January, 1981.

The only documentary evidence of action regarding these recommendations is an October, 1981 policy statement declaring that acquisition reviews of all tactical systems would include the identification of chemical warfare shortcomings and recommendation for improvements. JCS and PA&E officials stated that their organizations had not conducted any efforts in defensive chemical warfare.

The Office of the Deputy Assistant Secretary for Chemical Matters has recently completed an assessment of each Service's ability to sustain operations in a chemically contaminated environment. Assuming 50 percent mission degradation, OSD estimates current sustainability to be for the Army and for the Air Force and the Navy shore establishment. This compares with estimates made three years earlier of for the Army and for the Air Force. According to this assessment, to increase its sustainability, the Army will require more supply and more command and control; the Air Force and the Navy will need to make improvements in collective protection, individual protection, and supply to increase their sustainability to and beyond.

We requested either oral or written information on how the above estimates were derived. OSD officials declined to provide any additional information on the grounds that the contents of an internal document could not be released.

OSD officials brought up an additional concern regarding new and unknown Soviet chemical agents, reportedly used in Afghanistan. Since existing and forthcoming defensive equipment is designed to protect against known agents, this raises new questions of its effectivess against agents whose characteristics are not yet known.

INTERSERVICE COOPERATION/COORDINATION

Officials reported that the Services have increased their level of coordination on chemical and biological (CB) defense acquisition in recent years. There are numerous meetings and joint working groups at multiple levels, as well as more formal agreements (for example, the new Joint Service Agreement, discussed below). New liaison positions have also been established; for example, in late 1984 an Air Force liaison officer was assigned to the Army's Chemical Research and Development Center and a search is ongoing for a Navy counterpart. The former Air Force liaison to the Army's medical chemical defense research and development program is now director of that program. Nonetheless, some Air Force officials contended that the Army, as lead service, has not adequately represented their interests. For their part, Army officials contended that Air Force and Navy have not participated in coordination as much as they should have, particularly in international agreements.

JOINT SERVICE AGREEMENTS

In July, 1984, the three Services approved a new Joint Service Agreement (JSA) on research, development and acquisition. Its stated purpose was to prescribe procedures for coordination, so that the highest priority requirements of each service and the goals of the Defense Guidance could be met. The new JSA superseded a prior version from 1977. According to Army officials, the earlier JSA became outdated due to funding increases and program growth. Specific changes include:

- Services can now claim unique requirements, whereas previously, the Air Force and the Navy had to rely on Army funds and Army prioritization of programs.

- Procurement is included in addition to research, development, test and evaluation

- Information needs are included in addition to materiel needs.

- Implementation and priority setting procedures are prescribed.

JOINT LOGISTICS COMMAND

The Joint Logistics Command (JLC) is an ad hoc group headed by the top materiel flag officers from each of the four Services. In June, 1984, a JLC Action Team identified 10 principal categories of CB defense equipment where duplication existed, and recommended management initiatives to address these and other joint service issues. The areas were: aircrew respiratory protection; flight crew clothing; gloves; boots; micro-cooling equipment; mask cannisters; liquid detectors; ionization detectors; vapor detectors; and mobile shelter components. A joint panel on chemical and biological defense was then established to, among other things, evaluate and implement the Action Team's recommendations. To date, some obvious cases of duplication have been eliminated. For example, all Services had been independently developing gloves and boots, and Air Force and Navy have now terminated future developments in these areas.

USE OF ALLIED TECHNOLOGY

The services have procured numerous defensive items from our Allies in recent years. For example, the Army has bought a contamination marking kit from the Federal Republic of Germany, the Air Force has bought a nerve agent pretreatment drug from Great Britain and the Navy has bought protective suits from Great Britain. Other items are being evaluated (for example a lightweight decontamination device from Norway), and are expected to be procured within two years. The U.S. has data and/or

materiel exchange agreements with Great Britain, Canada, the Federal Republic of Germany, France, Australia, the Netherlands, the Republic of Korea, Japan, Israel, Belgium, Denmark, Sweden, and the People's Republic of China. We also exchange scientists and military liaisons with some of these countries.

Nonetheless, officials claim that there are at least three issues in foreign procurement which have hindered and continue to hinder the process: the "not invented here" syndrome, nonconformance with US requirements, and more generally, the international procurement environment.

"NOT INVENTED HERE" SYNDROME

OSD and Army officials maintain that the "not invented here" syndrome is no longer a major issue, and they point to the various foreign items in procurement or evaluation as evidence. Army contracting officials claim that they still see the syndrome in mid-level lab managers who stand to lose projects, but never at upper levels. On the other hand, the Navy's decision to procure Great Britain's Mark III suit was reportedly delayed two years due to domestic industrial lobbyist pressure.

According to a contractor, European governments engage in similar tactics. They make first purchases from the U.S. to meet a needed capability, but require that subsequent purchases be domestic.

NONCONFORMANCE WITH US REQUIREMENTS

A foreign item may fill a deficiency but fail to meet the testing standards of one or more Services. This happened in the case of the Norwegian Sanator decontamination apparatus which passed Air Force requirements but failed the Army's. Similarly, the Air Force is buying Great Britain's pyridostigmine, acknowledged to be the only available nerve agent pretreatment drug; the Army, however, was not satisfied with the original formulation of the drug and the Navy is awaiting the Army's reformulation. In the view of Army contracting officials, there is not enough consideration of the cost and time savings that could result from loosening technical requirements on foreign and other off-the-shelf buys.

Another point made by Army officials concerned design incompatibilities between foreign and US systems. Such incompatibilities preclude the Army from buying British or German overpressure systems for U.S. tanks. On a larger scale, foreign items are considered problematic if they stand out from other materiel in the unit. For example, the Army has favorably evaluated the German Fox reconnaissance vehicle's mass spectrometer, but is concerned that the vehicle itself will stick out and be quickly targeted.

INTERNATIONAL PROCUREMENT ENVIRONMENT

According to Army contracting officials, there are numerous factors in the international procurement environment which impede U.S. purchases of foreign items. First, governments frequently make what are seen as overly rigorous demands, such as specifying that royalty payments continue after the U.S. develops its own version of the item. Second, foreign contractors are concerned about U.S. grants-in-aid programs which give away their materiel, or resell it at favorable prices, to third world Allies; they would prefer to sell to those markets directly.

The worst impediment, however, appears to be legal disputes arising over licensing agreements. Army contracting officials believe the situation would be ameliorated if they were involved earlier in the process, but they recognize that this is outside their control. Other officials questioned the net savings resulting from foreign procurement, given the time and money lost in legal disputes.

THE DEFENSE INDUSTRIAL BASE

DoD officials expressed concern about the capability and willingness of the defense industrial base to meet DoD demands for CB defensive materiel. In their opinion there are two issues: the perception of market instability and the low market incentives.

PERCEIVED MARKET INSTABILITY

DoD officials frequently cited concern that the defense industry views the chemical warfare area as unstable; consequently, it is wary of involvement. According to the officials, the growth of the last five years has improved matters. To accelerate the trend, they have sponsored regular meetings with industry groups.

LOW MARKET INCENTIVES

Another concern of DoD officials is that chemical defense materiel may never offer a large enough market to be attractive to the industries needed to produce it. The problem may be particularly acute in the medical area, where CB defense drugs would comprise a very small share of a pharamaceutical company's business (Army medical officials place the estimate at less than 1 percent). For biotechnology applications (for example, decontamination), Army development officials see no hope of attracting major firms because of a non-existent investment incentive.

UNIT TRAINING AND EXERCISES

DoD officials consistently cited problems with the state of unit training and exercises. In their opinion, many of the problems stem from the tradition of local commanders' prerogative: that is, commanders set training and exercise priorities as they deem appropriate. Some commanders comply with training requirements, others do not. The most frequently cited problems include the following:

- The requirement to train for six hours in full protective posture is subverted;

- Important functions - such as eating and eliminating body waste - are not integrated into the exercises as it is difficult to accomplish these functions in a contaminated environment;

- Chemical warfare exercises are not allowed to interfere with tasks perceived to be more important, such as flight schedules, logistics supplies and communications;

- Medical participation in exercises is minimal;

- Exercises across functional areas, in an operational environment, are rarely performed; and

- Chemical warfare training is not well integrated into a conventional warfare context. Consequently, the potential for synergistic effects cannot be considered.

As I mentioned previously, the factual information presented here identifies areas where progress has been made and areas where progress has been lacking, although the information has not necessarily been categorized in that manner. It should be noted that the Statement of Fact is not all-inclusive in either category.

Sincerely yours,

Eleanor Chelimsky
Director

ENCLOSURE I

STATUS OF DEPARTMENT OF DEFENSE PROGRAM TO IMPROVE DEFENSIVE CHEMICAL WARFARE CAPABILITIES

Statement of Fact

TABLE OF CONTENTS

I. DOCTRINE

Doctrine is the foundation on which the military forces base their actions in support of national objectives. It is authoritative but requires judgment in application. The services develop requirements from, and measure performance against, doctrine. It is refined from feedback provided by peacetime training and use of equipment. Chemical warfare doctrine helps define how forces are expected to fight and how equipment is to operate in a chemical environment. As discussed below, there are differences among the services in terms of their efforts to improve and develop chemical warfare doctrine.

I-A. ARMY

DOCTRINAL LITERATURE PROGRAM

- Since 1982, all Army Nuclear, Biological and Chemical (NBC) defense doctrinal literature has been revised to support the AirLand Battle doctrine for the integrated battlefield:
  - Operational concepts for military operations were published in 1982, medical support operations in 1983; a multiservice operational concept for NBC defense of NATO is in draft.
  - Five interim doctrine manuals on military operations were published in 1983-84; the schedule calls for publishing interim doctrine on medical operations to begin in 1986.
- The emphasis of the new doctrine is to avoid contamination, but if contamination occurs, to continue the mission. Changes may be summarized as follows:

Old	New
Chemical Corps concern	Army-wide concern
Minimize chemical casualties	Minimize mission degradation
Risk-free	Take intelligent risks
Centralized	Decentralized, flexible
Complete decontamination	Partial decontamination - continue mission

- Some units are still working with old doctrinal manuals because new ones are not available.

REMAINING DOCTRINAL ISSUES

- Reliable characterizations of the NBC battlefield are not available. Information gaps and weaknesses are found in:
  - Estimating the medical and military effects of agents
  - Specifying the relationship of protective posture to mission capability
- Doctrinal deficiencies identified by Army analyses include:
  - Handling mass casualties
  - Evacuating personnel in a contaminated environment
  - Using detection equipment at night
  - Using contaminated munitions

I-B. NAVY

- o Navy doctrine is contained in guidance documents (for example, instructions, messages, manuals).

- o Existing guidance

  - OPNAV Instruction 3400.10C (1983), "Offensive Chemical Warfare and Chemical, Biological and Radiological Defense". This broadly states the Navy's training, materiel, and research and development goals and requirements. It does not address the time period of sustained operations or expected degradation effects.

  - "Interim Operational Procedures for CBR Protective Clothing and Equipment (1984): This introduces information on assuming different levels of protection and contamination avoidance and on control procedures.

  - "Naval Ships Technical Manual" and "Repair Party Manual": These give shipboard procedures for controlling chemical damage.

- o Areas lacking doctrinal guidance

  - Medical operations
  - Overseas base operations
  - Air operations

- o Doctrine-related findings

  - A joint Navy/Marine Corps chemical warfare amphibious exercise (1983/1984) was externally evaluated.

- o Marine Corps doctrine is the same as Army's, except for terminology

I-C. AIR FORCE

- Chemical Warfare is discussed in very broad terms in:
  - Air Force Manual 1-7, "Chemical Warfare Doctrine", 1979, and,
  - Air Force Regulation 355-1, "Disaster Preparedness Planning and Operations," 1983.
- The next level of specificity of doctrine - operational concepts or procedures - is provided by the major commands: Tactical Air Command (TAC), Military Airlift Command (MAC), etc., and the theatre level commands: Pacific Air Force, United States Air Force Europe, etc.
- More specific discussion of chemical warfare doctrine is provided in Annex J, "Chemical Warfare Deterrence and Chemical/Biological Defensive Operations" of the War Mobilization Plan. This speaks to issues of threat assessment; mission and execution; and operations - including capability goals; tasks for commands; equipment distribution and stockpiling; and training.
- Efforts to develop new procedures include:
  - TAC draft regulations to allow local commanders to trade off individual protection for operational capability;
  - Tactical Air Warfare Center's on-going effort to develop alternative procedures to overcome limitations on operational capabilities brought about by the need for aircrews' eye/respiratory protection; and
  - Air Force efforts to develop treatment protocols for chemical casualties.

II. RESEARCH, DEVELOPMENT AND ACQUISITION

As stated in DoD's report to Congress (1982)[2], defensive CW research, development and acquisition seeks to improve medical defenses and to reduce degradation in combat caused by employing protective equipment. The Army is the lead service for chemical warfare research and development (R&D), with the Navy and the Air Force conducting R&D only for their unique requirements. In restarting their chemical warfare programs following the shutdown in the 1970's, the services have procured some items off-the-shelf in order to meet immediate needs and have put other items through in-house R&D programs.

[2] DEPARTMENT OF DEFENSE. Report to the Congress on Chemical Warfare, SECRET. Washington, D.C. March, 1982

II-A. ARMY

MEDICAL

- o There are no prophylactics, pretreatments, nontoxic skin decontaminants, or chemical casualty care products in the field.
- o There are few biological vaccines, and no vaccination policy.
- o Atropine is the only available antidote; it is for nerve agents only, does not work against Soman, and incapacitates victims.
- o Selected research and development efforts include:
  - Pyridostigmine nerve agent pretreatment (FY87)*
  - Blister agent antidotes, blood agent pretreatments and antidotes, 2nd generation nerve agent pretreatments and antidotes (all late 80s and 90s)
  - In biological, a rapid diagnosis system (FY89), additional vaccines and therapies (late 80's and 90's)
  - Decontamination barrier creams, protective wraps, personnel/casualty decontamination system, agent dosimeter, resuscitation device, oxygen system, and vital signs monitors (all late 80s and 90s)

INDIVIDUAL PROTECTION

- o Current masks do not permit radio or telephone communication, require lengthy filter change, and lack a drinking tube in aviator and tank crew versions.
- o A recently issued suit (initial delivery 1984) has solved the

  However, it does not lower heat stress levels, and does not provide flame resistance for aviators. U.S. troops in Europe have received it; all Army is scheduled to receive it by 1986.
- o Gloves have limited tactility and are highly flammable.
- o Overboots are flammable, non-durable, require 15 minutes to don, and cannot be laced up at night.
- o Selected R&D efforts include:
  - A new mask which solves the problems of current masks noted above, but does not protect against high

* Expected Initial Operating Capability dates are in parentheses.

concentration carbon monoxide or
and is not compatible with patient resuscitation/ventilation devices (FY86).

- A new suit with functional improvements (for example, compatibility with future microcooling equipment), but which has the same materials and consequent heat stress problems as current suits (FY86). Follow-on suit to use new materials, reduce heat stress by at least 10 percent and be launderable (FY89).

- A flame resistant air crew suit (FY86).

- A new glove with increased tactility and flame resistance (FY88).

- An interim boot of existing materials (FY86-87); the Army is, however, undecided on a final boot.

COLLECTIVE PROTECTION

- o There are no fielded combat vehicles with overpressure, that is, systems providing pressurized filtered air to crew compartments, permitting crew members to operate in a contaminated environment without wearing protective gear. Current vehicles have ventilated facepiece collective protection or none.

- o There are no fielded combat vehicles with microcooling, leaving crew members seriously vulnerable to heat stress.

- o Current chemically hardened medical shelters are time-consuming to set up, have slow patient admission rates, and have no dedicated prime mover.

- o Army is pursuing a modular collective protection concept for other shelters, vans, and non-combat vehicles.

- o Selected R&D efforts include:

  - A hybrid collective protection system - overpressure, ventilated facepiece, and microcooling - for the M1A1 tank (FY85) and Sgt. York Gun (FY87); no other combat vehicles with overpressure are scheduled before FY89.

  - Overpressured inflatable liners to convert existing rooms into shelters (FY86)

  - A family of medical shelters up to the corps level hospital (FY93 for the entire system).

DETECTION/ALARMS

- o Liquid agent detection is accomplished by paper which changes color in response to agent.

- o Vapor agent detection is accomplished by a detector/alarm at the unit level and a detector kit at the squad level. Sensitivity of the detector/alarm was recently improved but the improvement made the detector radioactive. The detector kit did not meet original requirements for detection of VX; miosis could occur at agent concentrations below its sensitivity level (this will be corrected by FY86). It takes about 12 minutes to work.

- o A water testing kit was fielded in 1983.

- o There is no capability for continuous monitoring, remote detection, or detection of biological agents or toxins.

- o There are no NBC reconnaissance vehicles.

- o Selected R&D efforts and foreign product evaluations include:

  - A central liquid agent detector/alarm system to detect thickened nerve and blister agents (FY92).

  - A British vapor detector which is man-portable and detects and intermittently monitors nerve and blister agents, under evaluation since 1982 (should the Army buy, it would be FY87); also a U.S. version which adds a surface sampling probe and an alarm (FY88).

  - A remote line-of-sight detector/alarm using infrared sensor technology (FY89)

  - An integrated detector/alarm for vehicles, vans, and shelters which automatically initiates and shuts down host system collective protection (FY90).

  - A ground reconnaissance system employing detection, sampling, collection, storage, and marking (FY91).

DECONTAMINATION

- o There are no nonaqueous decontaminants, and no capability for decontaminating interior surfaces or electronic components.

- o Current aqueous decontaminants are highly corrosive and logistically problematic.

- o Existing material includes 3 decontamination apparatuses: a truck-mounted device for large areas and 2 smaller devices.

- o Selected R&D efforts and foreign product evaluations include:

- A German emulsion to replace current decontaminants, reportedly reducing the logistics burden.

- Hot air to be used in the near term, pending user approval; later possibilities are strippable coatings, freon, others.

- A Norwegian lightweight decontamination apparatus, under evaluation since 1978 (should the Army decide to buy, it would be FY85).

- A hot air apparatus for interior surfaces (FY89-90)

Table 1
Army Budget for CB Defense: FY83-FY85 (in $ millions)

	FY83[a]	FY84[b]	FY85[c]
RESEARCH, DEVELOPMENT, TESTING AND EVALUATION			
CB Defense			
Research	11.1	11.6/11.0	13.0
Exploratory Development	32.3	39.0/38.9	40.5
Advanced Development	18.6	35.2/37.2	49.0
Engineering Development	26.0	29.9/29.4	41.7
Production	1.4	1.8/ 1.8	2.4
Total	89.4	117.5/118.4	146.6
Medical Defense			
Research	18.7	19.5/20.0	18.8
Exploratory Development	44.5	36.0/41.3	42.1
Advanced Development	42.4	83.3/94.3	103.6
Total	105.6	138.8/155.6	164.5
Other Support (Dugway)	0	4.1/0	21.2
Total RDT&E	195.0	260.4/274.0	332.3
PROCUREMENT			
CB Defense	43.7	51.9/56.2	66.6
OPERATIONS & MAINTENANCE			
Modernization Program	4.3	23.8/16.0	54.6
Stock Funded CB Equip.	70.1	71.4/71.9	59.7
Other Support	5.2	13.8/20.2	24.8
Total O&M	79.6	109.0/108.1	139.1
ARMY STOCK FUND			
CB Defense War Reserves	75.5	81.0/81.0	86.0

a Received
b Received/Requested
c Requested (Received not available)

SOURCE: U.S. Army Deputy Chief of Staff for Operations and Plans

II-B. NAVY

o R&D OBJECTIVES VS. STATUS

(a) Objective: Procure new items of individual protection for forces afloat beginning FY82.
Actual: New individual protective garments were introduced to the fleet in FY 83; new protective masks procured for Naval Construction Forces in FY 83.

(b) Objective: Procure atropine in FY82
Actual: The first order for atropine was made in FY84

(c) Objective: Install a prototype collective protection system into an amphibious assault ship in FY83.
Actual: Accomplished

(d) Objective: Install collective protection systems into other existing ships beginning FY84.
Actual: To date, no retrofitting has been done

(e) Objective: Install a long-range chemical detector in fleet units in FY 82.
Actual: A long-range detection device was procured in FY 84

(f) Objective: Field an ionization point detector in FY83
Actual: To date, no such detector has been fielded

o CURRENT CAPABILITIES

- Individual protection

-- Suits: The Navy ordered British Mark III suits to replace paraffin impregnated coverall. 40,000 Mark III suits were distributed to amphibious forces in FY83. Mark III was selected for flame retardance, heat resistance, stowage properties. It provides 6 hours of protection, but not if wet. Unit cost is around $60/suit. Marine Corps: Standard issue is Chemical Protection Overgarment,

-- Masks: Standard issue for ship personnel is the Mark V, and for helicopter aircrews the M24. Both have serious problems, both are scheduled for replacement. For Naval construction forces, the Army-developed MCU-2/P is replacing the M9 and M17. Unit cost of the MCU-2/P is around $250/mask.

- Collective protection

  -- No deployed ship or overseas base possesses collective protection capability at present

- Detection

  -- A variety of detection items are purchased off-the-shelf from the national stock. The first ship device for advance warning of chemical attack is the Chemical Warfare Directional Detector (CWDD). It is designed to detect/identify larger bursts of nerve agent at long range. In FY84, Navy ordered 56 CWDD's from Texas Instruments at a unit cost of $72,000/detector.

- Decontamination

  -- Navy has no noncorrosive, nonflammable decontaminant that can be delivered at high rates. Current response would be to decontaminate shipboard structures via the water washdown system, and to decontaminate small surface areas via hypochlorite solution. The M258A1 moistened towlette would be used to decontaminate skin, masks, and gloves. Contaminated suits would be cut off and disposed overboard in plastic bags.

- Medical

  -- Navy's procurement of medical chemical defense items is off-the shelf, largely from the national stock. Navy has no medical chemical defense program in either engineering or advanced development.

o ENGINEERING DEVELOPMENT

- Marine Corps suit: The Marine Corps has developed a composite suit to meet its unique requirements in an amphibious environment. The suit has been found to compare favorably to the Army's and Navy's suits. However, buying another protective garment would be contrary to the goal of standardizing the chemical defense inventory.

- Mask for shipboard use: The MCU-2/P has been found to compare favorably to the Mark V. However, it could not be used in a shipboard fire. Date of initial operating capability (IOC) for the mask is FY86.

- Mask for helicopter aircrew: Approval for production of the AR-5 is expected in FY86. The AR-5 is designed to provide a 4-hour capability, four times longer than the M24. Nebreti & Zambra of Great Britain will be sole source producers of 702 masks during the first year at a cost of $6,504/mask.

- Shipboard collective protection system (CPS): a prototype CPS was installed and tested on an amphibious assault ship. The system is designed to operate full-time and to function continuously for 30 days in a chemical environment. Development was more expensive than anticipated. A separate effort is looking at modular CPS to protect vital shipboard spaces. Engineering development is expected to continue through FY89.

- Overseas base collective protection system: Navy has monitored development of Air Force's hardened shelters and will test them in FY85. Navy is also planning to buy 190 of the Army's modular soft shelters in FY86.

- Detection systems: (a) The Navy is working on the 360 Degree Chemical Warfare Scanning Alarm, an automatic long-range detector. (b) it is also working on the Chemical Agent Point Detector, a nerve agent detector for ships. (c) The Navy is also monitoring Army/British testing of the Chemical Agent Monitor.

- Decontamination: Mechanisms for large-scale dispensing of decontaminants are being investigated

o ADVANCED DEVELOPMENT

- Suits: The Navy is working on an advanced permeable suit to remedy deficiencies of the Mark III suit
  An impermeable suit with micro-climate cooling is also being developed (Fielding of the suit will be in the 1990's).

- Aircraft decontamination: A new R&D program is examining fresh water systems for decontaminating aircraft on ships .

o EXPLORATORY DEVELOPMENT PROGRAMS

- Decontamination: the Marine Corps is seeking to develop ambient decontaminants to ease logistics difficulties.

- Medical: Navy has investigated as potential pretreatment drugs. Exploratory work is also being done on the performance effects of low agent levels, and how to handle casualties in a chemical environment.

Table 2
Navy/Marine Corps Funding Allocations for CB Defense
(in $ thousands)

	FY82	FY83	FY84	FY85 [a]
RESEARCH AND DEVELOPMENT				
Basic Research				
Navy/Marine Corps	890	2970	4873	2827
Exploratory Research				
Navy	719	713	2269	3424
Marine Corps	144	160	770	825
Advanced Development				
Navy	0	1301	1615	2370
Marine Corps	(N/A[b])	1118	1067	1242
Engineering Development				
Navy	7740[c]	10457[d]	8610	7822
Marine Corps[e]	0	0	0	0
Total R&D	9493	16719	19204	18510
OTHER PROCUREMENTS				
Navy	0	140	4119	10718
Marine Corps	3254	4693	3315	1801
Total Procurement	3254	4833	7434	12519
OPERATIONS & MAINTENANCE[f]				
Navy	0	3106	17902	23977
Marine Corps	0	0	19200	12300
Total O&M	0	3106	37102	36277

[a] Requested
[b] Not available
[c] Figures are reportedly accurate within 10%
[d] Figures are reportedly accurate within 5%
[e] The figures in this row are zero because, administratively, engineering development in the Marine Corps is funded from advanced development funds.
[f] Does not include O&M funds given to ships for small item replenishments and outfitting. Navy does not track how much of these funds are spent on CB equipment.

SOURCE: Office of Naval Research, Office of Naval Technology, Naval Sea Systems Command, Naval Facilites Engineering Command, Naval Air Systems Command, U.S. Marine Corps Headquarters

II-C. AIR FORCE

o GOALS

Air Force R&D and acquisition activities are guided by the four goals set in Annex J of the War Mobilization Plan. They are:

1st goal — The Air Force claims to have achieved this goal.

2nd goal — The goal was to have been met in 1985 by the acquisition of collective shelters, but will not be met since shelters are not ready for fielding.

3rd goal — This goal is scheduled to be achieved in 1987 through increased fuel, food and water supplies to the shelters.

4th goal — This goal is scheduled to be achieved by 1989 through technological advances.

o CURRENT CAPABILITIES:

- Medical	pyridostigmine pretreatment, used in conjunction with atropine and 2-PAM chloride
- Individual Protection	ensembles including masks, hood, gloves, overgarments and overboots. A new ground crew mask, (MCU-2/P) is expected to provide improved comfort and visibility. Also, new long sleeved cotton inserts and thinner gloves are being distributed. Present eye/respiratory protection for aircrews limits their field of vision and restricts head movements. A seven year old engineering development effort on an improved system has been cancelled. Consequently, an additional buy will be made of the existing system.
- Collective Protection	About 160 KMU-450 shelter modification kits, which provide only a small fraction of the space needed.
- Detection, Identification and Warning	Manually operated detectors and a limited number of nerve agent automatic detector and alarms units.

- Decontamination — A limited number of aging M-12A1 and M11 units, and clothing and skin decontamination kits. The Norwegian Sanator decontamination system is being procured.

o RESEARCH AND DEVELOPMENT

- Engineering — Survivable Collective Protection System (SCPS) which provides long term rest and recuperation facilities for 84 personnel. Requests for proposals to be issued in May. The production decision on a modified version, for medical care, is scheduled for 1987.

  - Chemical defense multi-purpose mask for use by aircrews of non-fighter aircraft;

  - Fabric system that primarily provides fire and chemical agent protection;

  - Hand-held surface contaminant monitor that will detect, identify and quantify liquid/vapor agents; and,

  - Portable automatic liquid agent detector of falling liquid nerve and blister agents which provides visual and audible alarms

- Advanced Development — There are five areas of concern: individual protection; collective protection; detection, identification and warning; air base contamination control; and medical systems.

- Exploratory — Here again there are five areas of concern: personal protection; airbase operations; medical equipment and operations; biochemical warfare analysis; and protective drugs.

Table 3
Air Force Defensive Chemical-Biological Budgets
(in $ millions)

	Fiscal Year[a]			
	82	83	84	85
RESEARCH, DEVELOPMENT, TEST AND EVALUATION	8.8/8.8	16.3/16.3	15.6/15.6	18.2/18.2
OTHER PROCUREMENT[b]	16./16.0	12.8/12.8	28.1/11.8	43.0/37.9
OPERATIONS AND MAINTENANCE	5.3/9.6	2.6/2.6	16.5/16.3	24.9/24.7
MILITARY CONSTRUCTION[c]	9.2/0	0/0	7.7/0	13.4/8.5

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a. President's budget/appropriated

b. Equipment procured included:

Gas masks
Decontamination equipment
Collective shelters
Liquid agent detectors
Surface contamination monitors

c. Shelters at overseas bases

III. FORCE STRUCTURE

While making it clear that the U.S. was not attempting to match Soviet force structure, the 1982 Report to the Congress on Chemical Warfare said DoD would continue to increase the number of U.S. forces and units dedicated to chemical defense - subject to total manpower constraints. The Army's force structure goal was 24,000 chemical specialists by fiscal year 1987. The Air Force was to add - over five years - about 1,000 personnel to chemical warfare defense-related functions, beyond the 850 disaster preparedness specialists and 375 personnel in other specialties. The Navy had no plan to augment the current force structure.

CHEMICAL CORPS

- Between FY82 and FY85 the Chemical Corps increased from 6,795 to 8,963. A dramatic increase in growth rate would be needed to approach the FY87 goal of 24,000.

- There are officer shortages, but the most acute shortages are at the non-commissioned officer (NCO) level; worldwide Chemical Corps NCO positions are only 63% filled. Both lower ranking Chemical Corps soldiers and non-Chemical Corps soldiers are currently filling these openings.

- Enlisting new recruits is not considered a problem; Chemical Corps enlistees receive enlistment and re-enlistment bonuses, and re-enlistment rates are above the Army average.

- Seven chemical units needed to implement new NBC doctrine do not yet exist; 6 are scheduled for activation in FY85-91, and 1 is not programmed.

NON-CHEMICAL CORPS

- Chemical Corps force structure is supplemented by non-Chemical Corps personnel who serve as company chemical teams.

- There has been no increase in medical force structure related to NBC defense.

III-B. NAVY

- o Force Structure changes are difficult to discern because the Navy has no chemical specialists.

- o Chemical warfare is the collateral duty of
  - Damage Control Assistants (DCA's), officers aboard ships
  - Hull Technicians (HT's), enlisted personnel aboard ships
  - Disaster Preparedness Officers/Specialists, at overseas bases
  - Hospital corpsmen

- o Exposure to defensive chemical warfare training increased between FY82 and FY84 for most groups:
  - DCA school graduates increased 45 percent
  - HT school graduates increased 43 percent
  - NBC Defense Course graduates increased 35 percent

- o 1981 request for 49 Disaster Preparedness specialists on 17 European bases was not funded. Navy officials in continental U.S. did not know what the current Disaster Preparedness manpower status is of European bases.

- o Marine Corps

  - Two types of occupational specialties in chemical defense:

    -- NBC Defense Specialists, who are enlisted Marines in the ranks of Private to Master Gunnery Sergeant

    -- NBC Defense Officers, who are officers restricted to the ranks of Warrant Officer.

  - Numbers of specialists

    -- There are currently 75 NBC Defense Officers and 895 NBC Defense Specialists.

  - Distribution of specialists

    -- NBC Defense Officers and Specialists are spread throughout every Marine Corps unit at battalion level or higher.

    -- Each Marine Division, Marine Air Wing, and Force Service Support Group headquarters has an NBC Defense Platoon.

III-C. AIR FORCE

o SPECIALISTS

The Air Force, unlike the Army, does not have a core group of chemical warfare specialists; rather the chemical warfare duties fall on the Disaster Preparedness (DP) Specialists. In addition to chemical warfare; DPs are expected to be capable of responding to major nuclear and non-nuclear accidents, as well as natural disasters.

o DUTIES

Specific chemical warfare duties, which vary with skill levels, include:

- monitoring contamination;
- establishing decontamination requirements;
- coordinating exposure control; evaluating operating units' programs in defensive chemical warfare;
- ensuring defensive chemical warfare equipment and material are available and in working order; and
- developing and supervising training for operating units' defensive chemical warfare programs.

o NUMBERS

The total number of DP specialists, at this time, is approximately 900 of which 200 are officers. There are approximately 13 DP specialists at each high threat base.

o SKILLS

Due to insufficient higher-skilled enlisted men, positions which require higher skill level personnel are filled with first skill level men. For example, 50% of the Tactical Air Command (TAC) DP non-commissioned officers are at the first skill level. Conditions are claimed to be better in European bases, but TAC's less skilled personnel would augment such bases in the event of crisis.

IV. TRAINING

According to the 1982 Report to the Congress on Chemical Warfare the objective of chemical warfare training, is to train individuals to react to a chemical attack automatically and exactly, and to accustom individuals and units to the physiological and psychological stress of chemical warfare. Training is discussed below in terms of specialists, non-specialists, and group training or exercises.

IV-A. ARMY

SPECIALISTS

- All Chemical Corps officers and enlisted personnel are trained at the Army Chemical School. Chemical School course iterations and enrollment sizes have steadily increased since 1982. An internal review branch ensures that classes are consistent with lesson plans, programs of instruction, and doctrine, and tracks students after graduation.

- Non-Chemical Corps personnel serving in company chemical teams are trained in the field. Trainers are non-Chemical Corps personnel who have completed a 2-week course at the Chemical School or an area NBC school.

- Army's first live agent training facility will be completed in late FY85.

NON-SPECIALISTS

- For enlisted personnel, the nuclear, biological and chemical (NBC) module of basic training was recently increased from 4 to 11 hours, and includes integration of NBC defense tasks with other tasks.

- For officers, the basic course now includes 4 NBC tasks standardized in 1982.

- Many schools have not incorporated the new NBC doctrine, and are using new NCOs lacking field experience as instructors.

- Army has established 6 NBC unit training objectives:

  - accomplish mission in spite of NBC effects
  - perform mission in full protective posture for 6 continuous hours
  - conduct personnel and equipment decontamination
  - use smoke to enhance mission accomplishment
  - emphasize NBC defense tasks during evaluations
  - integrate realistic NBC defense situations into exercises

- Specific unit training regimens are determined by local commanders.

MEDICAL PERSONNEL

- Medical officers and enlisted personnel receive NBC training at several points in their career programs. Medical courses have increased total hours of NBC training since 1982.

- Emphasis is on chemical; no biological training packages are currently developed or projected.

- Medical personnel are expected to continue on-the-job NBC training within duty assignments, and to perform NBC tasks under field conditions during ARTEP.

- Medical participation in NBC exercises has been minimal; a new Army regulation is expected to improve this.

IV-B. NAVY

- o Chemical, Biological & Radiological (CBR) defense in the Navy is not a separate mission area. It is part of damage control, disaster preparedness, and disaster recovery

- o Individual-level classroom training in CBR-defense exists:

  - For fleet operations

    -- Damage Control Assistants (DCA's) receive approximately 6 days of CBR defense training during 47 days of DCA training;

    -- Hull Technicians (HT's) receive approximately 7 days of CBR defense training during 68 days of HT training;

  - For overseas shore operations

    -- Disaster Preparedness Officers/Specialists are trained in base defense procedures jointly with Air Force personnel;

    -- Naval Construction Force personnel receive a 12-day course in disaster recovery which is entirely devoted to chemical topics;

    -- Unit training ashore: Navy has no chemical defense training program at shore installations.

  - For air operations: Navy has no specific training program in this area.

  - For medical operations

    -- Advanced Hospital Corpsmen receive 14 hours of CBR defense training over a 46 week training period;

    -- Nuclear Submarine Medical Technicians receive 10 hours of CBR defense training over a 52 week period;

    -- Preventive Medicine Technicians receive 24 hours of CBR defense training over a 26 week period;

  - Marine Corps

    -- Marine chemical specialists are trained at Army's Chemical School at Fort McClellan.

- o Basic NBC Defense Course

  - The Navy offers one course which is entirely dedicated to NBC defense. Offered in seven locations, it is a five-day course which graduated over 1500 trainees last year, mostly enlisted men.

- Recent changes in the course resulted from the release of "Interim Operational Procedures" (see Navy Doctrine) and the introduction of the Mark III suit into the Navy;

- Instructors are not required to have prior knowledge of CBR defense nor prior teaching experience.

o Shipboard training and exercises

- Mobile Training Teams conduct on-board CBR defense training for ship personnel. Content of training varies by ship and by class of ship.

- Refresher training (REFTRA) is a shipboard exercise incorporating chemical drills. Unsatisfactory performance results in the continuation of REFTRA until improvement occurs.

- Operational Readiness Inspections are formal, graded exercises incorporating chemical play at sea. Significant deficiencies can result in a ship going into port, being assigned to training, reexamination, etc.

- Tri-service exercises with the Atlantic Fleet: Ocean Venture in the Caribbean, and Solid Shield off the East Coast of the U.S. are exercises with chemical events which are held during alternating years. The degree to which objectives are met is evaluated on the basis of the observers experience and common sense judgment.

- Findings on a chemical defense training exercise with Naval/Marine amphibious forces.

  -- The evaluation report on this full scale exercise pointed out a readiness posture that is indicative of the overall Navy and Marine Corps combat capability in a CW environment". Noting a major recommendation was to increase training in individual and organizational CW defense.

IV-C. AIR FORCE

o SPECIALISTS

The Disaster Preparedness course is intended to provide a minimum capability - lowest skill level - to the trainee. Higher skill levels are achieved through on-the-job training, which consists of supervised task performances and correspondence courses. It should be noted that trainees must have a higher skill level in another career field as a requirement for training in disaster preparedness.

The course requires 330 hours of training, with 80 hours devoted to chemical warfare. The major chemical warfare components include:

- wearing protective equipment;
- using detection and decontamination equipment;
- managing collective protection shelters, including processing stations, and
- learning general policies and procedures.

On the average 162 officers and enlisted men are trained each year. This average has remained relatively constant.

o TRAINING EQUIPMENT

When new equipment is made available to the forces, there is a time lag before it is received in the school. During that time, the technical manuals are available but not the equipment.

o EVALUATIONS

There are no evaluations of the training programs other than when Operational Readiness Inspections take place or when Air Training Command Inspector General Reports are issued. The courses are monitored through strict adherence to task performance, test results and negative feedback from commands receiving trainees.

o NON-SPECIALIST TRAINING

Individual members of the Air Force receive a basic introduction to chemical warfare - about four hours - during basic military training, then each major command has its own approach to additional training. The Tactical Air Command, for example, offers a two hour refresher course every year. Also, the individual skills are carried out in protective gear during aspects of on-the-job training. Finally, exercises are conducted at different levels: shop or work area, squadron, wing and base levels.

ENCLOSURE II

Interviews

During the course of our effort we interviewed officials of the following organizations:

Air Force

- Assistant Chief of Staff - Intelligence, Strategic Branch
- Deputy, Chief of Staff - Logistics and Engineering, Supply Policy and Systems Branch
- Deputy Chief of Staff - Research, Development and Acquisition:
  - Tactical Division; and
  - 6.2/6.3 and 6.4 Chemical Warfare Program Element Monitors
- Deputy Chief of Staff - Plans and Operations:
  - Air Base Survivability Group;
  - Disaster Preparedness Research Center, and
  - Doctrine and Concepts Division
- Logistics Command:
  - Wright Patterson Air Force Base; and
  - Kelly Air Force Base
- Surgeon General, Medical Readiness Division
- Systems Command:
  - Aeronautical System Division, Life Support System Program Office;
  - Armaments Division, Air Base Survivability
  - Aerospace Medicine Division, 6.2 Chemical Warfare Research and Development
- Tactical Air Command
  - Disaster Preparedness Office
  - Tactical Air Warfare Center, Chemical Warfare Division
- 3460 Technical Training Group, Disaster Preparedness Branch

Army

- Armament, Munitions, and Chemical Command:
  - Chemical Research & Development Center
  - Army Materiel Command, Headquarters
  - Chemical Division
  - NBC Materials Branch
- Assistant Chief of Staff, Intelligence:
  - Foreign Intelligence Directorate
- Aviation Systems Command:
  - Aviation Life Support Equipment Office

- Deputy Chief of Staff, Operations and Plans:
  - Nuclear and Chemical Directorate, Chemical and NBC Division

- Deputy Chief of Staff, Personnel:
  - Military Personnel Management, Combat Support

- Deputy Chief of Staff, Research, Development and Acquisition:
  - Support Systems Divison, Coordinating Office for Chemical Matters

- Forces Command:
  - Nuclear Chemical Division, Chemical Branch
  - III Corps (Ft. Hood)

- Health Systems Command:
  - Academy of Health Sciences

- Medical Research & Development Command:
  - Medical Chemical Defense Research Program
  - Military Diseases, Hazards Research Program

- Military Personnel Center:
  - Office of Personnel Management, Chemical Branch

- Surgeon General:
  - Assistant Surgeon General for Research & Development, Director, Research Programs

- Tank and Automotive Command:
  - Project Office for Vehicle NBC Protection

- Test and Evaluation Command:
  - Dugway Proving Ground

- Training and Doctrine Command:
  - Army Chemical School
  - NBC and Tactical Nuclear Warfare Directorate

- Troop Support Command:
  - Natick Research & Development Center

Joint Chief of Staff

- Director J-5 (Plans and Policy), Assistant Deputy Director for Force Development and Strategic Planning, Nuclear/Chemical Division, Chemical Warfare Branch

Navy/Marine Corps

- Chief of Naval Education and Training
  - Surface Warfare Training
  - Training Effectiveness Branch

- Commander-in-Chief, U.S. Atlantic Fleet
  - Combat Readiness and Tactical Development
- Commander of Training, Atlantic Fleet
  - Fleet Training Center, Damage Control School
- Deputy Chief of Naval Operations, Air Warfare
  - Aircraft Requirements Branch
- Deputy Chief of Naval Operations, Surface Warfare
  - Ship Characteristics & Improvement Board Staff
  - Surface Training Branch
- Headquarters, U.S. Marine Corps
  - Plans, Policies, Operations Division
- Marine Corps Development and Education Center
  - Doctrine Department
  - Firepower Division
- Naval Air Systems Command
  - Combat Survivability Branch
- Naval Facilities Engineering Command
  - Readiness Planning Division
  - Assistant Commander of Research, Development, Testing and Evaluation Division
- Naval Material Command
  - Theater Nuclear Warfare Office
- Naval Medical Command
  - Deputy Commander for Fleet Readiness & Support
  - Health Sciences Education & Training Command
  - Military Professional Training Branch
  - Navy Medical Research & Development Command
- Naval Sea Systems Command
  - Manpower Personnel and Training Support Branch
  - Research and Development Technology Office
  - Collective Protective System Project Office
  - Ship Survivability Subgroup
- Naval Surface Weapons Center
  - Chemical Systems Branch
  - Survivability Office
- Naval Training Equipment Center
  - Human Factors Laboratory
- Office of Naval Research
  - Chemistry Division
  - Naval Research Laboratory
- Office of Naval Technology

- Office of Naval Warfare
  - Strike and Amphibious Warfare Division

Office of the Secretary of Defense

- Assistant to the Secretary (Atomic Matters) Deputy Assistant (Chemical Matters)
- Director, Program Analysis and Evaluation
- Under Secretary - Research and Engineering

Non-Defense Department

- Harvard University, Cambridge, Massachusetts, Biochemistry Department, Matthew Meselson

- Honeywell Inc., Clearwater, Florida
  - Chemical Defense Center

- Illinois Institute of Technology, Chicago, Illinois
  - Chemistry Research Section

- Southern Research Institute, Birmingham, Alabama
  - Chemical Defense Division

- Southwest Research Institute, San Antonio, Texas
  - Division of Chemistry and Chemical Engineering

- Rice University, Houston, Texas
  - President, Norman Hackerman