

CHEMICAL AND BIOLOGICAL WEAPONS DEFENSE

COMMUNICATION 7735

FROM

THE PRESIDENT OF THE UNITED STATES

TRANSMITTING

A REPORT ON CHEMICAL AND BIOLOGICAL WEAPONS DEFENSE, PURSUANT TO CONDITION 11(F) OF THE RESOLUTION OF ADVICE AND CONSENT TO RATIFICATION OF THE CONVENTION ON THE PROHIBITION OF THE DEVELOPMENT, PRODUCTION, STOCKPILING AND USE OF CHEMICAL WEAPONS AND ON THEIR DESTRUCTION, ADOPTED BY THE SENATE OF THE UNITED STATES ON APRIL 24, 1997.



MARCH 5, 1998.—Referred to the Committee on International Relations and ordered to be printed

U.S. GOVERNMENT PRINTING OFFICE

THE WHITE HOUSE,
Washington, February 24, 1998.

Hon. NEWT GINGRICH,
Speaker of the House of Representatives,
Washington, DC.

DEAR MR. SPEAKER: Attached is a report to the Congress on Chemical and Biological Weapons Defense, submitted pursuant to Condition 11(F) of the resolution of advice and consent to ratification of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction, adopted by the Senate of the United States on April 24, 1997.

Sincerely,

WILLIAM J. CLINTON.

**Report to Congress
Senate Executive Resolution 75, To
Advise and Consent to the Ratification
of the Chemical Weapons Convention,
April 24, 1997,
Condition 11: Enhancements to robust
chemical and biological defenses,
Paragraph (F) annual report
requirements**



January 1998

EXECUTIVE SUMMARY

As a condition of ratification of the Chemical Weapons Convention (CWC), the United States Senate required the President to submit an annual report on chemical and biological weapons defense activities.¹ The complete text of this requirement is provided at annex A. This report contains detailed assessments that highlight the Department's approach to specific areas of chemical/biological defense concerns associated with a robust chemical and biological defense program.²

The objective of the DoD Chemical/Biological Defense Program (CBDP) is to enable our forces to survive, fight, and win in chemical and biological (CB) warfare environments. Numerous rapidly changing factors continually influence the program and its management. These factors include declining DoD resources, planning for warfighting support to numerous regional threat contingencies, the evolving geopolitical environment resulting from the breakup of the Soviet Union, entry into force of the Chemical Weapons Convention, and continuing proliferation of CB weapons. To minimize the impact of use of CB weapons on our forces, we will need the capability not only to deter their use, but also to ensure an adversary does not gain an operational advantage through the employment of CB weapons. This will require improved CB defensive capabilities. The DoD CBDP continues to work towards improved robustness by increasing the defensive capabilities of our Joint Forces to survive and continue the mission during conflicts which involve the use of CB weapons. CB defense programs are managed jointly under the oversight of a single office within the Office of the Secretary of Defense.

For our forces to survive, fight and win in an CB contaminated environment, an integrated and balanced program is essential. Our forces must have aggressive, realistic training, and defensive equipment that allows them to avoid contamination, if possible, and to protect, decontaminate, and sustain operations throughout the non-linear battlespace. We must also have the capability to provide medical casualty management. Programs, which support the three major mission areas of CB defense, *e.g.*, Contamination avoidance, protection and decontamination, are in place to equip and train our forces to accomplish their missions in an CB environment. The goal of the program is to equip U.S. forces with the finest available equipment to survive, fight and win in the face of CB threats from potential adversaries around the world.

Public Law 103-160, the National Defense Authorization Act for FY94, directs specific management and oversight roles for the CB Defense Program as well as the establishment of the Counterproliferation Review Council (CPRC). The CPRC coordinates activities and programs related to countering proliferation and NBC terrorism within the

¹ Senate Executive Resolution 75, *To advise and consent to the ratification of the Chemical Weapons Convention*, April 17, 1997, Condition 11: *Enhancements to robust chemical and biological defenses, paragraph (F)*.

² In accordance with 50 U.S.C. 1523 (Annual report on the chemical and biological defense program), DoD provides a detailed assessment of the entire DoD CBDP. The most recent report, entitled *Department of Defense Nuclear/Biological/Chemical (NBC) Defense Program: Annual Report to Congress*, was submitted in March 1997. Copies of the report are available via the internet at the following URL: <http://www.acq.osd.mil/cp/reports.htm>.

DoD, DOE, and Intelligence Community. It is chaired by the Secretary of Defense, who has designated the Deputy Secretary of Defense as CPRC chairman. Congress has recently extended its mandate for the CPRC to 2000.

The Department has an aggressive CDBP Modernization Plan which provides goals for improving our CB defense readiness over the mid-term (FY99-03) and the far term (post FY03) to complement and strengthen existing capabilities. Goals are structured for each of the CB defense mission areas as follows:

- Contamination Avoidance programs support CINC requirements for complete battlespace visualization, reconnaissance, and enhanced situational awareness. The strategy to support these requirements is to field a remote biological detector and consolidate requirements for a stand-off chemical detector by mid-term. Reconnaissance assets will improve with the addition of a lightweight NBC Recon system and the integration of a chem/bio mass spectrometer and a new lightweight stand-off chemical agent detector. Also by mid-term we plan to field a "sensor-to-warrior" communication package that will enhance real-time information flow for commanders across the battlefield. Chemical point detection requirements will be consolidated into one Joint program and fielded by mid-term. Far-term goals include plans to consolidate point and remote biological detection into one system, with advanced mapping capabilities and a consolidated chemical and biological stand-off system.
- Protection programs support CINC requirements for enhanced survivability and sustained operations. Individual protection programs focus on development and acquisition of a common protective ensemble that will provide lighter, less burdensome protective suits. Efforts are ongoing to consolidate protective masks for both ground and aviator forces. A common mask for all Services will not be available until the far term. The program goal is to integrate chemical and biological protection into the warrior's common combat ensemble.
- Collective protection programs focus on improving the size, energy efficiency, and life cycle costs of filtration systems integrated into facilities, vehicles, vans, ships, and aircraft. The far-term goal is to standardize these improvements so that they can be applied and logistically supported across a variety of Joint Service missions.
- Decontamination programs support the CINC requirement for rapid reconstitution and resupply of the force. The near-term strategy is to field a limited number of Modular Decon systems to replace an aging capability. The Services are procuring non-developmental items to provide an interim capability to decontaminate ports. Far-term goals focus on developing a replacement for the current set of caustic decontaminants and on developing a Joint fixed site decontamination capability to reduce the impact of CB warfare on theater logistics facilities.

- Medical chemical/biological defense programs address a variety of requirements, with an emphasis on preventive medicine. Development of safe, effective vaccines and pre-exposure (prophylactic) drugs will provide personnel with long lasting immunity to, or protection against, high concentrations of agents. Definitive medical diagnostics will more rapidly identify NBC exposures and provide information to augment medical and command decision making. Development of drugs, immunotherapies, or other therapeutics will provide treatments for personnel requiring medical care after exposure.

Over the past year, the Services have worked together to improve the joint orientation of CB defense requirements, and the joint community is now better prepared to address shortcomings that still exist in the U.S. CB defense posture. The established research, development, and acquisition program will resolve many shortcomings by executing current modernization and procurement plans and adapting available technologies. Based on lessons learned in Operation Desert Storm, DoD identified the following shortfalls and issues related to CB defenses:

- Biological defenses should be emphasized more fully in DoD programs.
- Inadequacies exist in CW/BW detectors, vaccines, and protective equipment.
- To ensure effective contamination avoidance on future battlefields, additional reconnaissance and standoff detection systems are required.
- Continued modernization of individual and collective protection, medical support, detection, identification, warning, and decontamination systems is required to ensure force survivability and mission accomplishment under chemical and biological warfare battlefield conditions.

Since the end of the Gulf War, significant and measurable progress has been made in addressing each of these issues. Details of selected systems are detailed within this report. Some specific examples of new and improved systems supporting the CBD mission area, that have been fielded include new protective masks, advanced chemical and biological protective clothing, standoff laser chemical detectors, and first-ever capabilities for point biological agent detection and standoff aerosol/particulate detection. Additionally, there has been significant progress in research and development initiatives, particularly in the development of miniature pocket-sized chemical agent detectors and digitally automated warning and reporting networks.

An integrated system-of-systems approach that incorporates detection systems, force protection, medical programs, and decontamination will provide the most effective means to ensure that U.S. forces will be ready to fight at the time and place of their choosing. Continued modernization of CB defenses is planned to counter an evolving threat. Robust defenses will also help deter CB threats by reducing or eliminating the perceived utility and effectiveness of CB weapons by potential adversaries.

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
Response to GAO Report.....	1
Priorities of the Executive Branch.....	3
Chemical/Biological Defense Budget/Expenditure Summaries.....	5
Vaccine Production Capabilities/RDA Program.....	12
Protection and Decontamination of Infrastructure.....	17
Lightweight Personal Protective Gear.....	22
Long-Range Standoff Detection and Identification Capabilities.....	30
Theater Missile Defenses.....	37
Chemical/Biological Defense Training/Readiness.....	38
Integration of Realism into Wargames/Exercises.....	55
Joint NBC Defense Doctrine.....	65
Protection of United States Population Centers.....	68
Annex A: Text of Senate Report Requirement.....	70
Annex B: DoD Response to the GAO Draft Report, "CHEMICAL AND BIOLOGICAL DEFENSE: Emphasis Remains Insufficient To Resolve Continuing Problems," dated February 29, 1996.....	72

RESPONSE TO GAO REPORT

Senate Resolution 75 reporting requirement

(i) proposed solutions to each of the deficiencies in chemical and biological warfare defenses identified in the March 1996 report of the General Accounting Office entitled "Chemical and Biological Defense: Emphasis Remains Insufficient to Resolve Continuing Problems", and steps being taken pursuant to subparagraph (B) to ensure that the United States Armed Forces are capable of conducting required military operations to ensure the success of United States regional contingency plans despite the threat or use of chemical or biological weapons;

The March 1996 GAO Report, "Chemical and Biological Defense: Emphasis Remains Insufficient to Resolve Continuing Problems," GAO/NSIAD 96-103, identified many readiness shortfalls among the Services. The report discussed shortfalls within the following areas; quantities and adequacy of equipment, slow research and development programs, inadequate training, lack of adequate integration of chemical/biological defense training activities in joint exercises, inadequate plans for biological agent vaccine stocks and immunization, and in summation a general lower level of priority placed on chemical/biological defense within the areas of DoD funding, staffing, mission priority, and monitoring, than other threat areas DoD must contend with.

DoD has responded to all recommendations provided in the GAO Report. A copy of the official DoD response is contained at annex B to this report. Since the publication of the GAO Report, DoD has taken significant actions to improve upon the shortcomings identified within the report. Significant accomplishments to date include:

- Complete implementation of Public Law 103-160, the National Defense Authorization Act of 1994 to include:
 - Establishment and institutionalization of a true joint organizational structure which ensures close and continuous coordination of CB warfare defense and CB medical defense programs
 - Full integration and coordination of the DoD CB defense program based on validated Service and CINC requirements generated in response to defined threats.
 - Responsibility for the CB defense program being vested in a single office in OSD and oversight and DoD senior level leadership oversight is conducted using the Defense Acquisition Board (DAB) process.
- Increased emphasis on CB defense by the Joints Chief of Staff and CINCs; the area has been designed a priority training requirement.
- Completion of a comprehensive front-end assessment of the Department's counterproliferation and chemical/biological defense program, directed by the Deputy Secretary of Defense. The OSD staff, Joint Staff and Services

participated in the review with CINC requirement input. As a result of this assessment, ~~\$224M~~ was added to the DoD Chemical/Biological Defense Program over the FYDP.

- As described in Secretary of Defense, Cohen's Report of the Quadrennial Defense Review, May 1997, the Department has made substantial progress toward full integrating the risks associated with an adversary's CB weapons use into our military planning, acquisition, intelligence, and international cooperation activities. This need was underscored in the major theater war assessment done in the QDR. Accordingly, the Secretary of Defense has increased planned future spending on counterproliferation and chemical/biological defense programs by approximately \$1 billion over the program period, particularly for protective measures against chemical weapons.

PRIORITIES OF THE EXECUTIVE BRANCH

Senate Resolution 75 reporting requirement

(ii) identification of the priorities of the executive branch of Government in the development of both active and passive chemical and biological defenses;

The President's 1997 report, *The National Security Strategy of Engagement and Enlargement*, emphasizes the three key elements of the executive branch's strategy as "(1) to enhance our security with effective diplomacy and with military forces that are ready to fight and win; (2) to bolster America's economic prosperity; (3) to promote democracy abroad." United States forces must have numerous capabilities in order to respond and deploy quickly to various worldwide needs. Counterproliferation (CP) capabilities are required by forces to meet worldwide needs. NBC defense is integral to CP capabilities. The following list identifies the priorities of counterproliferation capabilities identified by the Commanders-in-Chief. These priorities were developed by the Joint Warfighting Capability Assessment process (JWCA) an ongoing, iterative process involving the Joint Staff JWCA teams and CINC staffs. These JWCA assessments examine key relationships and interactions between joint warfighting capabilities, and identify opportunities for improving warfighting effectiveness. The continuous assessment process gives insight into issues involving requirements, readiness, and plans for recapitalizing joint military capabilities. The final assessments products are used to influence programming and budget guidance. NBC defense related items are highlighted in **bold**.

CINC CP REQUIRED CAPABILITIES

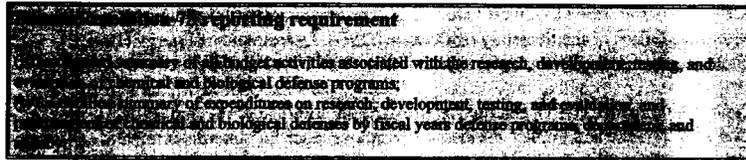
1. CP Intelligence Cycle
2. Conventional Response (Precision Munitions) with minimum collateral effects
3. SOF Response and Intel Collection/Analysis Targeting Covert/Paramilitary/Terrorist Threat
4. **Battlefield NBC Detection and Warning**
5. TMD with minimum collateral effects
6. Defeat underground targets
7. Target Planning/Analysis including Collateral Effects Prediction and Post-Strike Assessment
8. **Individual Protection**
9. Proliferation Pathway Analysis
10. CMD/Aircraft Defense with minimum collateral effects
11. **Collective Protection**
12. Mobile Target Defeat
13. Offensive Information Warfare
14. CP Consequence Logistics Capability
15. **Decontamination**
16. **NBC Medical Treatment**

In addition to the direct involvement of the CINC's and the Joint Staff in establishing warfighter priorities for chemical and biological defenses through the CP JWCA process, the Department is actively involved in the interagency process to insure that those needs are met in the most efficient and timely manner possible.

Congress directed, in the 1994 National Defense Authorization Act (NDAA), and extended in the 1997 NDAA, that the Counterproliferation Program Review Committee (CPRC) be established to review activities and programs related to countering proliferation within the Office of the Secretary of Defense (OSD), Department of Energy (DOE), U.S. Intelligence, and the Joint Chiefs of Staff (JCS). The CPRC chaired by the Secretary of Defense, and composed of the Secretary of Energy (as Vice Chairman), the Director of Central Intelligence (DCI), and the Chairman of the Joint Chiefs of Staff (CJCS). It is chartered to make and implement recommendations regarding interdepartmental activities and programs to address shortfalls in existing and programmed capabilities to counter the proliferation of nuclear, biological, and chemical (NBC) weapons of mass destruction (WMD) and their means of delivery. In the 1997 NDAA, congress broadened the CPRC's responsibilities and specified that the CPRC also review activities and programs of the CPRC-represented organizations related to countering paramilitary and terrorist NBC threats. The findings and recommendations of the CPRC's annual review for 1997 were presented in its fourth annual report to Congress in May 1997.

To guide its program review process, the CPRC established the Areas for Capability Enhancements (ACEs) to characterize those areas where progress is needed to enhance both the warfighting capabilities of the Combatant Commanders, including the Commanders-in-Chief (CINCs), and the overall ability to satisfy the demands of U.S. nonproliferation and counterproliferation policy. The ACEs define those priority areas where additional capabilities are required to meet the challenges posed by the proliferation of NBC weapons and their means of delivery (NBC/M), including paramilitary and terrorist NBC threats.

CHEMICAL/BIOLOGICAL DEFENSE BUDGET/EXPENDITURE SUMMARIES



Budget information for FY99 will be provided upon submission of the FY99 President's Budget (normally submitted late in January of each year), and will include the first programmed year of the QDR directed \$1B plus-up for Counterproliferation and the DoD Chemical/Biological Defense Program.

The FY94 National Defense Authorization Act (P.L. 103-160) directed the Secretary of Defense to coordinate and integrate a chemical and biological defense program. As part of this program, Congress directed the following:

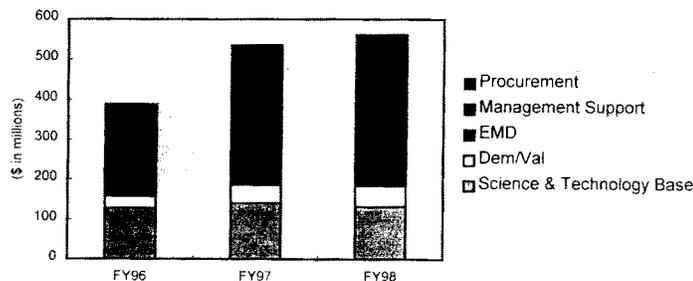
- The budget for the Department of Defense for each fiscal year after fiscal year 1994 shall reflect a coordinated and integrated chemical and biological defense program for the military departments.
- Funding requests for the program shall be set forth in the budget of the Department of Defense for each fiscal year as a separate account, with a single program element for each of the categories of research, development, test, and evaluation, acquisition, and military construction.

In accordance with this requirement, funding for the Department of Defense Chemical and Biological Defense Program (CBDP) has been consolidated into six defense-wide program element (PE) funding lines for all RDT&E efforts plus consolidated funding for CBDP procurement. Detailed funding information on all CBDP activities is provided annually to Congress in the *Joint Service Chemical and Biological Defense Program, President's Budget Submit, Descriptive Summaries of Research, Development, Test and Evaluation* (R-forms), and in the *Joint Service Chemical and Biological Defense Program, President's Budget Submit, Committee Staff Backup Book* (P-forms). These budget submissions provide a detailed account of prior year accomplishments and planned activities for the budget request period.³

Figure 1 and Table 1 provides a summary of actual appropriated funding from FY96–FY98. Table 2 provides a summary of expenditures for FY96 and FY97 as of the end of FY97. (Note: there is no military construction (MILCON) expenditure or planned MILCON funding within the CBDP.) FY96 was the first year in which all Service and Defense Agency CB defense programs were consolidated into defense-wide funding lines. Prior to FY96,

³ A summary of this information is provided in this report. Detailed information is provided in the R-forms and P-forms and is not duplicated here.

funding was included in several separate Service and Defense Agency funding lines. A summary of activities within each of the budget activities is provided following Table 2.



Note: Science and Technology Base programs are comprised of Budget Activities 1, 2, and 3.

Figure 1. Chemical and Biological Defense Program Funding Summary

Table 1. Chemical and Biological Defense Program Funding Summary
(actual Appropriations, dollars in millions)

Program Element (PE)	FY96	FY97	FY98
0601384BP - Basic Research	26.488	28.374	25.499
0602384BP - Applied Research	68.237	70.829	68.480
0603384BP - Advanced Development	33.727	41.714	38.660
0603884BP - Demonstration/Validation	29.185	45.083	51.716
0604884BP - Engineering & Manufacturing Development	87.337	96.403	122.410
0605884BP - Management Support	6.955	19.389	27.196
RDT&E Subtotal	251.929	301.792	333.961
Procurement	135.686	232.952	226.484
CB Defense Program Total	387.615	534.744	560.445

Table 2. Chemical and Biological Defense Program Expenditures

Program Element (PE)	(\\$ millions)	FY96†	FY97†
0601384BP - Basic Research		23.487	16.053
0602384BP - Applied Research		58.938	34.864
0603384BP - Advanced Development		24.094	13.987
0603884BP - Demonstration/Validation		25.053	20.816
0604884BP - Engineering & Manufacturing Development		72.667	34.052
0605884BP - Management Support		1.401	11.112
RDT&E Subtotal		205.640	130.884
Procurement		53.653	27.724
CB Defense Program Total		259.293	158.608

† Expenditures as September 30, 1997.

Note: Expenditures represent the amount of checks issued or other payments made (including advances to others), net of refunds and reimbursements. The term is frequently used interchangeably with the term "outlays" which are the measure of Government spending (*i.e.*, payments to liquidate obligations (other than the repayment of debt), net of refunds and offsetting collections.

**Summary of Activities for DoD Chemical and Biological Defense Program
Budget Activities**

0601384BP - Basic Research

Mission Description and Budget Item Justification: This program element (PE) funds the Joint Service core research program for Chemical and Biological (CB) defense. The basic research program aims to improve the operational performance of present and future DoD components by expanding knowledge in militarily relevant fields for CB defense. Moreover, basic research supports a joint force concept of a lethal, integrated, supportable, highly mobile force with enhanced performance by the individual soldier, sailor, airman or marine. Specifically, the program promotes theoretical and experimental research in the chemical, biological and medical sciences. Research areas are determined and prioritized in order to meet joint service needs as stated in mission area analyses and joint operations requirements, and to take advantage of scientific opportunities. Basic research is executed by academia, including Historically Black Colleges and Universities and Minority Institutions (HBCU/MIs), industry, and government research laboratories. Other programs include interdisciplinary research performed under the University Research Initiative (URI) program, and the in-house Laboratory Independent Research program. Funds directed to these laboratories and research organizations capitalize on scientific talent, specialized facilities and technological breakthroughs. The work in this program element is consistent with the Joint Service Research Development and Acquisition (RDA) Plan. Management of funding resources leads to expeditious transition of the resulting knowledge and technology to the appropriate applied research (PE 0602384BP) and advanced technology development (PE 0603384BP) activities. This project also covers the conduct of basic research efforts in the areas of real-time sensing and immediate biological countermeasures. The projects in this program element include basic research efforts directed toward providing fundamental knowledge for the solution of military problems and therefore are correctly placed in Budget Activity 1.

0602384BP - Applied Research

Mission Description and Budget Item Justification: The use of chemical and biological weapons in future conflicts is a steadily increasing threat. Funding under this program element sustains a robust defense which both reduces the danger of a chemical and biological (CB) attack and enables U.S. forces to survive, and continue operations in a CB environment. The medical program focuses on development of antidotes and drug treatments and on casualty diagnosis, decontamination and medical management. In the non-medical area, the emphasis is on continuing improvements in CB defense materiel, including contamination avoidance, decontamination, and protection systems. Maintaining state-of-the-art CB defensive systems is critical for force protection and CB weapons deterrence. This project also provides for conduct of applied research in the areas of real-time sensing and immediate biological countermeasures. The work in this program element is consistent with the Joint Service Research Development and Acquisition (RDA) Plan. Efforts under this program element transition to and provide risk reduction for Advanced Technology Development (PE 0603384BP), Demonstration/Validation (PE 0603884BP) and Engineering/Manufacturing Development (PE 0604384BP). This project includes non-system specific development directed toward specific military needs and therefore is appropriate to Budget Activity 2.

0603384BP - Advanced Technology Development

Mission Description and Budget Item Justification: This program element provides demonstration of technologies to enhance U.S. forces' ability to deter, defend against, and survive chemical and biological (CB) warfare. This program element funds advanced technology development for Joint Service and Service specific requirements in both medical and non-medical CB defense areas. The medical program aims to produce drugs, vaccines, and medical devices as countermeasures against CB threat agents. Specific areas of medical investigation include: prophylaxes, pretreatment, antidotes and therapeutics, personnel and patient decontamination and medical management of casualties. In the non-medical area, the focus is on demonstrations of CB defense technologies, including biological detection, chemical detection and

decontamination. These demonstrations, conducted in an operational environment with active user and developer participation, integrate diverse technologies to improve DoD Chemical Biological Warfare (CBW) defense and deterrence. These demonstrations are leveraged by the Counterproliferation Support Program and include remote biological detection. Work conducted under this program element transitions to and provides risk reduction for Demonstration/Validation (PE 0603884BP) and Engineering/Manufacturing Development (PE 0604384BP) activities. The work in this program element is consistent with the Joint Service Research Development and Acquisition (RDA) Plan. This project also provides for the conduct of advanced technology development in the areas of real-time sensing and accelerated BW operational awareness. This program is dedicated to conducting proof of principal field demonstrations and tests of system-specific technologies to meet specific military needs and is therefore correctly placed in Budget Activity 3.

0603884BP - Demonstration/Validation

Mission Description and Budget Item Justification: Operational forces have an immediate need to safely operate, survive and sustain operations in a chemical and biological (CB) agent threat environment across the continuum of global, contingency, special operations/low intensity conflict, counter-narcotics, and other high risk missions. This program element supports the Demonstration/ Validation (DEMVVAL) of CB defensive equipment, both medical and non-medical, and addresses various shortcomings identified in Conduct of the Persian Gulf War: Final Report to Congress, April 1992. These projects have been restructured to consolidate Joint and Service-unique tasks within four commodity areas: contamination avoidance, force protection (individual and collective), decontamination and medical countermeasures. The consolidation provides for development and demonstration testing of equipment for Joint Service as well as Service-unique requirements. This program is enhanced using Counterproliferation Support Program funding. This DEMVAL program funds for: collective protection equipment such as the Advanced Integrated Collective Protection System (AICPS) and Naval shipboard collective protection; an array of chemical/biological/toxin detection and warning systems to include the Lightweight Nuclear Biological and Chemical Reconnaissance System (LNBCRS), and the Joint Service Lightweight Stand-off Chemical Agent Detector (JSLSCAD); decontamination capabilities to include the sorbent technology and the Modular Decontamination System (MDS); and identification and sampling components for future Joint Biological Point Detection Block and Remote Detection Upgrades. In the medical chemical/biological defense area this DEMVAL program funds improved medical equipment, vaccines, and drugs essential to counteracting lethal and human performance degrading effects of chemical and biological agent threats. Specific items include improvements to nerve agent antidotes, topical skin protectants, anticonvulsants, biological agent diagnostics, and vaccines to protect against botulinum toxin, staphylococcal enterotoxin B, Venezuelan equine encephalitis, ricin, and anthrax. This program element focuses on efforts associated with advanced technology development used to demonstrate general military utility to include demonstration and validation in the area of chemical/biological defense equipment and is correctly placed in Budget Activity 4.

0604384BP - Engineering & Manufacturing Development

Mission Description and Budget Item Justification: Operational forces have an immediate need to safely operate, survive and sustain operations in a chemical and biological (CB) agent threat environment across the continuum of global, contingency, special operations/low intensity conflict, counter-narcotics, and other high risk missions. Operating forces have a critical need for defense against worldwide proliferation of CB warfare capabilities and for medical treatment of casualties in medical treatment facilities. Congress directed centralized management of DoD CB defense initiatives, both medical and non-medical. This program element supports the Engineering and Manufacturing Development (EMD) of CB defensive equipment, both medical and non-medical, and addresses various shortcomings identified in Conduct of the Persian Gulf War: Final Report to Congress, April 1992. These projects have been restructured to consolidate Joint and Service-unique tasks within four commodity areas: contamination avoidance, force protection (individual and collective), decontamination and medical countermeasures. The consolidation will provide for development and operational testing of equipment for Joint Service as well as Service-unique requirements. This program is enhanced using Counterproliferation Support Program funding. Contamination avoidance efforts under this EMD program will provide U.S. forces with real-time hazard assessment capabilities. They include: advanced

multi-agent point and remote chemical detection systems for ground, aircraft, and shipboard applications; automated warning and reporting systems; integrated radiation detection and monitoring equipment; and enhanced battlefield reconnaissance capabilities. Force protection efforts will increase protection levels while decreasing physical and psychological burdens imposed by protective equipment. The include improved aircrew respiratory protection, lightweight integrated suit technology, and shipboard collective protection equipment. The medical chemical defense EMD program funds improved medical equipment and drugs essential to counteracting lethal and performance-degrading effects of chemical threats, and medical equipment essential to meeting medical requirements on the integrated battlefield with emphasis on decreased size/weight and high mobility, yet supporting large numbers of combat casualties. Additionally, foreign medical materiel may be procured for exploitation of advanced technology and development to meet medical defense goals. This program element supports the full-scale development of prophylactic and therapeutic drugs and rapid identification and diagnostic systems. DoD Biological Defense mission requires the detection of validated biological threat agents to provide early warning capabilities on mobile and fixed platforms. This program element will provide theater protection through the development of point and stand-off detection systems. The detection system concept will provide detection, identification, warning and sample collection for verification that a biological agent attack has occurred. This program element also provides for the development of biological defense medical programs. DoD Biological Defense medical mission will address: (1) protective vaccines - vaccination capability against the most probable biological threat agents; (2) identification - clinical identification of biological threat agents through medical evaluation and laboratory analysis to augment early warning capabilities. The projects in this program element support research efforts in the EMD phases of the acquisition strategy and are therefore correctly placed in Budget Activity 5.

0605384BP - Management Support

Mission Description and Budget Item Justification: This program element provides support to DoD response to Chemical/ Biological (CB) terrorism, funds the Joint CB Contact Point and Test, and the management and support program. It also funds sustainment of a technical test capability at Dugway Proving Ground. Funding for anti-terrorism provides DoD with a process and means to conduct assessments of installation vulnerabilities to CB threats. The objectives of the CB Contact Point and Test program are to plan, conduct, evaluate, and report on joint tests (for other than developmental hardware) and accomplish operational research assessments in response to requirements received from the Services. This program will provide ongoing input to the Services for development of doctrine, policy, training procedures, and feedback into the RDT&E cycle. The management support program provides management support for the DoD NBC defense program to allow program overview and integration of overall medical and non-medical programs by the Assistant to the Secretary of Defense (Nuclear and Chemical and Biological Defense Programs), financial management support by the Ballistic Missile Defense Organization (BMDO), integration of Joint requirements, training and doctrine by the Joint Service Integration Group (JSIG), Joint Research, Development and Acquisition (RDA) planning, input to the annual report to Congress and Program Objective Memorandum (POM) Strategy development by the Joint Service Materiel Group (JSMG). Funding for Dugway Proving Ground provides for CB defense testing of DoD material, weapons and weapon systems from concept through production. It finances indirect test operating costs not billable to test customers, maintenance cost of test facilities, replacement of test equipment and test modernization projects to maintain current testing capabilities and improvements to safety, environmental protection, efficiency of test operations and technological advances. This program element includes research and development effort directed toward support of installations or operations required for general research and development use and therefore appropriate to Budget Activity 6.

0608384BP - Procurement

BLIN #74 - Individual Protection: **Description:** This program provides for protective masks, respiratory systems and protective clothing. The M40A1/M42A2 masks, currently in production, are replacements for the aging masks in the field. The new masks accommodate a greater portion of the current service population, thus reducing or eliminating the need for specially fitted masks. Other significant improvements have been made in field of view, communication, drinking capability and compatibility with equipment. The Protective Assessment Test System (PATS) is used to assess the fit of a mask to the individual. Interim service unique

procurements required for protection to aircrews include: the Army's Aircrew Protective Mask (ACPM), which provides protection against chemical and biological (CB) agents, is more compatible with emerging optical and weapon sighting equipment; the Navy's CB Respiratory System fills an existing need for protection of Naval and Marine aircrews against CB agents. In the area of protective clothing, the emphasis is on the Joint Service Lightweight Integrated Suit Technology (JSLIST) program, a Four-Service effort to field a common chemical protective ensemble, currently in production. **Justification:** Operational forces across the continuum of global, contingency, special operations/low intensity conflict, counter-narcotics, and other high risk missions have an immediate need to survive and sustain operations in a CB threat environment. Individual protection is provided by means of masks, protective clothing, aircrew respiratory systems and firefighters and explosive ordnance disposal ensembles. The Joint NBC Defense program includes individual protection equipment that both improves current protection levels and reduces the physiological and logistical burden on the individual soldier, sailor, airman or marine. The goal is to procure equipment which will allow for the individual to operate in a contaminated CB environment with minimal degradation in his/her performance.

BLIN #75 - Decontamination: **Description:** The goals of decontamination are to provide equipment to facilitate the removal and detoxification of contaminants from materials without inflicting injury to personnel or damage equipment or the environment. This Joint Service program facilitates the procurement of a more transportable, less labor intensive and more effective system for applying decontaminating solutions and removing gross contamination from vehicle and equipment surfaces. Contamination control techniques have been developed which minimize the extent of contamination pickup and transfer and maximize the ability of units to remove contamination both on-the-move and during dedicated decontamination operations. Lessons learned from Desert Storm validated the need for a deployable and efficient decontamination system. **Justification:** Operational forces, facilities and equipment must be decontaminated to safely operate, survive and sustain operations in a nuclear, biological and chemical agent threat environment. Key factors are reduced weight, increased transportability, decreased labor intensity, reduced water usage and a more effective system for applying decontaminating solutions to vehicle and equipment surfaces. Decontamination of facilities frequently requires a large area to be covered, but weight, water usage and labor intensity factors may not be as important as mobility and the ability to decontaminate large areas rapidly.

BLIN #81 - Joint Biological Defense Program: **Description:** The detection component of the Joint Biological Defense Program consists of (1) the land-based Biological Integrated Detection System (BIDS), (2) the airborne Long Range Biological Stand-off Detection System (LR-BSDS), (3) the se-based Interim Biological agent Detector (IBAD), (4) the land-based Joint Biological Point Detection System (JBPDS), and (5) the Critical Reagent Program (CRP). BIDS is a biological detection suite employing complementary technologies to detect a limited number of agents used in large area biological warfare (BW) attacks, installed in a S-788 Lightweight Multipurpose Shelter mounted on a dedicated vehicle (Heavy HMMWV). The LR-BSDS NDI is a helicopter mounted, long range, large area, stand-off aerosol detector, tracker and mapper system which employs Light Detection and Ranging (LIDAR) technology to detect aerosol clouds at ranges up to 30 km. The IBAD is a shipboard mounted point detection system consisting of a sampler, particle counter, and antibody/antigen tickets. The JBPDS is a detection suite consisting of complementary trigger, sampler, detector and identification technologies to detect and identify the full range of biological agents in real-time. The JBPDS will provide a common point detection capability for all Services and meet the Service requirements as outlined in the Joint Operational Requirements Document (JORD). The JBPDS is programmed to replace the BIDS and the IBAD and to provide the Marines and Air Force an initial detection capability. The CRP integrates and consolidates all DoD reagents/antibodies/DNA biological detection requirements (S&T through production). The CRP will ensure the availability of high quality reagents throughout the life cycle of all systems to include BIDS, JBPDS, Airbase/Port ACTD, JBREWS and medical diagnostic kits. The medical products component of the Joint Biological Defense Program consists of the Joint Vaccine Acquisition Program which will award a prime (systems) contract to manage all biological defense medical products. The program includes program definition and risk reduction, advanced development, licensure by the Food and Drug Administration (FDA), production, stockpiling, testing, distribution and maintenance of a comprehensive database. Medical products to be produced include a rapid diagnostic kit, anthrax vaccines, botulinum vaccines, ricin vaccine, despeciated botulinum antiserum, Staphylococcus Enterotoxin B (SEB) vaccine, Venezuelan Equine Encephalitis (VEE) vaccine, combined VEE/Eastern Equine Encephalitis (EEE)/Western

Equine Encephalitis (WEE) vaccine, plague vaccine, brucellosis vaccine, vaccinia vaccine, tularemia vaccine, and Q-fever vaccine. Current direction is to provide 1.2M Troop Equivalent Doses (TED) against the two highest BW threat agents and 0.3M TED against the other BW threat agents. **Justification:** During Operation Desert Storm, a major deficiency identified was the inability of the U.S. forces to effectively detect and identify BW agents. Current national military strategy specifies a worldwide force projection capability that requires BW detection in order to protect the force against potential threats. Operational forces across the continuum of global, contingency, special operations/low intensity conflict, counter-narcotics and other high risk missions have the immediate need to survive and sustain operations in a biological agent environment. Operating forces have a critical need for defense from worldwide proliferation of BW capabilities and medical treatment of BW related casualties. The Joint Biological Defense Program will provide a tiered strategy for detection and warning comprised of complementary detection/identification systems to provide theater protection against a large area and point attacks. The other biological defense mission requirement is to provide U.S. forces with enhanced survivability and force protection through the introduction of FDA approved vaccines to protect against current and emerging threats which could be deployed against maneuver units or stationary facilities in the theater of operations.

BLIN #82 - Collective Protection: **Description:** The objective of the Chemical/Biological (CB) Collective Protection program is to provide CB collective protection systems. The CB collective protection systems will be smaller, lighter, less costly and more easily supported logistically at the crew, unit, ship and aircraft level. Collective protection platforms include shelters, vehicles, ships, aircraft, buildings and hospitals. **Justification:** Operational forces across the continuum of global, contingency, special operations/ low intensity conflict, counter-narcotics, and other high risk missions have an immediate need to safely operate, survive and sustain operations in a nuclear, biological and chemical agent threat environment. Operating forces have a critical need for defense against worldwide proliferation of NBC warfare capabilities and for medical treatment of casualties in medical treatment facilities.

BLIN #84 - Contamination Avoidance: **Description:** In the area of chemical and radiological detection, program provides for procurement of point and remote (stand-off) detection systems. The Joint Service Point Detection Program consolidates numerous individual service projects including: the M22 Automatic Chemical Agent Alarm (ACADA) which is more sensitive and responsive than current detectors and is capable of concurrent nerve and blister agent detection; the shipboard Improved (Chemical Agent) Point Detection System (IPDS), providing an upgrade to current capability by automatically detecting low concentrations of both blister and nerve agents; the AN/UDR-13 (Pocket Radiac), a tactical radiation dosimeter and ratemeter which provides a first time capability to both detect and indicate an immediate event and residual radiation doses received by troops; the Improved Chemical Agent Monitor (ICAM), a hand-held, soldier operated device for monitoring chemical agent contamination on personnel and equipment, which provides a first time, mission essential capability for monitoring nerve and blister agents contamination; and the Shipboard Automatic Liquid Agent Detector (SALAD), an externally mounted point detector that will detect liquid forms of blister and nerve agents; the Joint Warning and Reporting Network (JWARN), which provides a first time capability to the warfighter and battlefield commanders to fully automate the NBC detection and warning process throughout the battlefield; and the NBC Reconnaissance System Block I Mod, which provides an upgrade to the current M93E1 system to meet all operational requirements, permit logistical support by the soldier rather than by contractors, and reduce crew size to three. **Justification:** Contamination avoidance is the primary objective of the Joint NBC Defense program. Operational forces have an immediate need to safely operate, survive and sustain operations in a NBC agent threat environment. Contamination avoidance is highly desirable to maintain operational efficiency and minimize the need to decontaminate vehicles, equipment and areas. Advanced chemical defensive equipment is required to enhance U.S. capability to detect and identify threat agents on the battlefield.

VACCINE PRODUCTION CAPABILITIES/RDA PROGRAM

Senate Resolution 75 reporting requirement

(v) a detailed assessment of current and projected vaccine production capabilities and vaccine stocks, including progress in researching and developing a multivalent vaccine;

On December 15, 1997, the Defense Department announced plans to start immunizing troops against anthrax. This plan will lead to the systematic vaccination of all U.S. military personnel against the biological warfare agent anthrax. The vaccinations are expected to start in the summer of 1998. The goal is to vaccinate everybody in the force so they will be ready to deploy anywhere, anytime. This is an important new dimension to overall force protection. The anthrax vaccination will join other immunizations already given to everyone in the military. The anthrax vaccine is a fully-licensed vaccine by the Food and Drug Administration. Efforts are underway to develop additional vaccines against other biological warfare agents. These vaccines may be considered for use after they are developed and licensed, consistent with the need to protect our forces against the threat.

MEDICAL BIOLOGICAL DEFENSE RESEARCH PROGRAM

The mission of the Medical Biological Defense Research Program (MBDRP) is to develop medical countermeasures to protect U.S. forces and thereby deter, constrain, and defeat the use of biological agents against them (DoD Directive 5160.5, May 1985). The program is directed against agents of biological origin that are validated military threats. A primary concern is the development of vaccines, drug therapies, diagnostic tools, and other medical products that are effective against agents of biological origin (see Table 3).

Table 3: Medical Biological Defense Countermeasures and Diagnostic Techniques

<i>VACCINES</i>
<ul style="list-style-type: none"> • <i>Killed</i> - killed or inactivated microorganism that is incapable of replicating, but stimulates immunity. • <i>Live, attenuated</i> - live organism, genetically selected not to cause disease but, able to stimulate immunity. • <i>Toxoid</i> - toxin protein treated to inactivate its toxic quality, but retains its ability to stimulate immunity. • <i>Recombinant</i> - gene coding for section of protein that stimulates specific immunity to a BW agent inserted into biological vector for protein's production. Protein section may be produced in high yields through bioengineering. • <i>Deoxyribonucleic Acid (DNA)</i> - section of DNA that codes for section of protein that stimulates specific immunity to a BW agent. DNA appears to produce the desired protein in recipient which stimulates immunity. • <i>Polyvalent</i> - mixture of antigens that protects against a number of different BW agents. • <i>Vectored</i> - carrier organism bioengineered to confer immunity against an unrelated BW agent or multiple agents.

ANTIBODY (ANTISERUM, ANTITOXIN)

- *Heterologous* – antibodies collected from animals (*i.e.*, different species than the recipient) repeatedly immunized against the BW threat. These antibodies must be treated to reduce the human immune response against them (serum sickness).
- *Homologous* – antibodies of human origin (*i.e.*, same species as the recipient) that provide protective immunity against the BW threat. These antibodies are not prone to stimulating serum sickness.
- *Monoclonal* – a cell culture technique for producing highly specific antibodies against a disease agent.
- *Bioengineered* – antigen binding site on the variable portion of an antibody elicited in a non-human system is combined with the non-variable portion of a human antibody to produce a “humanized” antibody.

DRUGS

- *Antibiotics* – very effective against bacteria but are ineffective against viruses and toxins.
- *Others* – compounds that offer new possibilities for protecting against and treating exposure to BW agents (such as antiviral compounds).

DIAGNOSTIC TECHNOLOGIES

- *Immunological technologies* – tests relying on antibodies for detecting the presence of proteins associated with the BW agent. They are easy to use, compact, rapid (minutes), and require little logistic support. These tests are currently used in out-patient clinics and doctor's offices.
- *Nucleic acid technologies* – nucleic acid tests, specifically the polymerase chain reaction (PCR), rely on segments of genes unique to BW agents to detect the presence of those agents. These tests are extremely sensitive and specific, but currently require more support to perform.

Goals

Goals of the MBDRP include the following:

- Protecting U.S. forces' war fighting capability during a biological attack.
- Reducing vulnerability to validated and novel threats by maintaining a strong technology base.
- Providing education on medical management of biological warfare casualties.

Objectives

In accomplishing the goals of the MBDRP, efforts are focused on three objectives:

- Prevent morbidity and mortality through the use of vaccines, drugs, and other medical pretreatments.
- Diagnose disease through the use of forward deployable diagnostic kits and confirmation assays.
- Treat casualties to maximize the number of warfighters that return to duty through the use of antitoxins, drugs, and other medical treatments.

The MBDRP responds to requirements from the DoD as identified in DoD Directive 6205.3, "Biological Defense Immunization Program," the Joint Service Agreement on Biological Defense, the Joint Warfighting Science and Technology (S&T) Plan, the Defense Technology Assessment Plan, and the Defense S&T Strategy.

Highly sophisticated technology base efforts for medical biological defense hold the promise of yielding important new products to protect our troops against a wide range of biological weapons. These products include multi-agent vaccines, which will reduce costs of vaccine production and simplify immunization schedules and a common diagnostic kit, a hand-held device that can be deployed at forward sites to rapidly analyze clinical samples for the presence of biological warfare. The development of these products is also being supported by the Defense Advanced Research Programs Agency.

Multi-agent vaccines are similar to the diphtheria-pertussis-tetanus vaccine administered to children. However, the technologies being explored for producing these new vaccines are more advanced, relying on bioengineering technologies such as naked DNA and the replicon-based delivery systems. In the naked DNA approach, DNA coding for protein antigens from the organism is injected with a "gene gun"; the DNA directs the synthesis of the antigens, which stimulate the development of immunity. In the replicon approach, selected genes from biological warfare agents are introduced into an attenuated virus, which cannot produce disease. The virus directs the synthesis of the foreign proteins, inducing immunity. Research in both the naked DNA and replicon approaches is advancing rapidly and transition of a multi-agent vaccine to advanced development is scheduled for FY 02.

Bioengineering techniques are also being used to prepare a variety of recombinant vaccines against single threat agents that will be produced without the need to grow the threat agent during the vaccine production process. Several recombinant vaccines are scheduled to be fielded over the next 10 years.

Development of a common diagnostic kit is proceeding with two state-of-the-art technologies. In the immunologically based system, which is scheduled to be transitioned to advanced development in FY 99, a membrane platform will detect biological warfare threat agents in biological specimens. The second system relies on detecting the DNA of a variety of biological warfare threat agents or natural infectious diseases by a hand held polymerase chain reaction (PCR) technique and is scheduled to reach advanced development in FY 02. With these tools, clinical diagnoses will be made much faster (less than 30 minutes) and farther forward than is possible now.

The MBDRP includes the following areas of research:

- Bacterial studies – Develop potential vaccines and determine the role of these vaccines in the cellular and humoral immune response. Identify virulence factors and protective antigens and the specific genes of these factors/antigens in bacterial threat agents. Determine the role of these factors in stimulating cellular and humoral immunity. Use of this knowledge will be used in the development of second

generation recombinant vaccine candidates, both traditional and second generation recombinant vaccines. Evaluate modern antibiotics for effectiveness in the treatment and/or post-exposure prophylaxis of bacterial threat agents.

- Toxin research – Basic and developmental research leading to methods of prevention and treatment against broad classes of toxins to include use of site-directed mutagenesis and protein engineering of recombinant vaccine candidates.
- Viral and Rickettsial studies – Identify and characterize threat organisms, conduct molecular antigenic analysis, develop diagnostic assays, and investigate pathogenesis, immunology, and epidemiology that will allow decisions regarding the optimal approach to disease prevention and control. Develop vaccine candidates and immunological and drug treatment strategies for viral and rickettsial threat agents.
- Diagnosis – Investigate and evaluate sensitive and specific methods for detection of infectious organisms, toxins, antigens and antibodies in biological materials including the application of nucleic acid probes or synthetic antigens. Develop rapid identification and diagnostic methods for the assay of toxins, metabolites, and analogs in clinical specimens.

Threats, Countermeasures, Technical Barriers, and Accomplishments

A biological threat agent is defined as an intentionally disseminated living microorganism or toxin that can cause disease or death in humans. Threat agents include a broad range of microorganisms (bacteria, rickettsia, and viruses) and toxins of biological origin. Biological weapons are easy to make, difficult to detect and can be very effective. Defense against this class of weapon is difficult, particularly since biological agents can produce casualties for thousands of square kilometers. Biological agents can also be combined with nuclear, chemical, or conventional weapons and used with devastating effect.

Critical elements of medical biological defense include, the ability to protect U.S. forces from BW agents, to rapidly diagnose (in biological specimens) infection or intoxication from an agent, and to treat casualties. Currently, the most effective countermeasure is pre-deployment active immunization. Future threats could involve genetically engineered biological weapons that may be easily produced, highly lethal, difficult to detect, and resistant to conventional therapies.

The current MBDRP includes the following research areas for the development of medical countermeasures:

- Characterize the biochemistry, molecular biology, physiology, and morphology of biological warfare threat agents;
- Investigate the pathogenesis and immunology of the disease;
- Determine the mechanism of action of the threat agent in an animal model system;
- Select antigen(s) for candidate vaccines;
- Develop and compare potential vaccine candidates and characterize their effects in animal models;
- Establish safety and efficacy data for candidate vaccines;

- Develop medical diagnostics (to include far forward, confirmatory, and reference lab);
- Develop chemo/immunotherapeutic agents and preparations.

Technical shortcomings in the private sector include the lack of high level biological containment (BL-3 and BL-4) laboratory facilities to support biological defense research and scientific expertise in biological defense. This has become a critical issue in light of current personnel and program downsizing initiatives and the additional emphasis that is being placed on outsourcing MBDRP work. The technological and scientific expertise for biological defense can therefore be eroded quickly.

MEDICAL BIOLOGICAL RESEARCH PROJECTION

Table 4 presents a projection of the medical biological defense programs and modernization strategy for the next 15 years.

Table 4: Medical Biological Defense Programs and Modernization Strategy

	NEAR (FY98-00)	MID (FY01-05)	FAR (FY06-12)
Medical - Biological Defense	Anthrax vaccine Relicensure	Licensed Q fever chloroform-methanol residue (CMR) vaccine Licensed Tularemia vaccine Licensed Vaccinia, cell culture derived vaccine Licensed Botulinum A/B/E/F monovalent vaccines Rapid Diagnostic Kit for Biological Warfare Threat Agents Licensed Botulinum Tetravalent vaccine Licensed Botulinum C vaccine Licensed Botulinum D vaccine Licensed Botulinum G vaccine Licensed Ricin vaccine Licensed Brucellosis vaccine Licensed new Anthrax vaccine	Licensed Staphylococcal Enterotoxin B (SEB) vaccine Licensed new Plague vaccine Licensed new Venezuelan Equine Encephalomyelitis (VEE) vaccine Licensed combined VEE, Western Equine Encephalomyelitis (WEE), & Eastern Equine Encephalomyelitis (EEE) vaccine

To implement this medical biological defense program acquisition strategy the Joint Program Office for Biological Defense awarded a prime systems contract for the Joint Vaccines Acquisition Program (JVAP) on November 7, 1997. This program establishes a single entity to develop, procure, and stockpile vaccines for protection against BW agents. The contractor will be required to obtain and maintain FDA licensure, and will also be responsible for clinical trials. The base contract requires the contractor to produce three Biological Defense vaccine products: Q fever, Tularemia, and Vaccinia, with options to develop, license and produce other vaccines based on the definition of the current threat and available funding. The contract is for 10 years.

PROTECTION AND DECONTAMINATION OF INFRASTRUCTURE

Senate Resolution 75 reporting requirement

(vi) a detailed assessment of procedures and capabilities necessary to protect and decontaminate infrastructure to reinforce United States power-projection forces, including progress in developing a nonaqueous chemical decontamination capability.

When contamination cannot be avoided, personnel and equipment must be decontaminated to reduce or eliminate hazards after NBC weapons employment. Decontamination systems provide a force regeneration capability for units that become contaminated. Modular decontamination systems are being developed to provide decontamination units with the capability to tailor their equipment to specific missions. Technology advances in sorbents, coatings, catalysis, and physical removal will reduce logistics burden, manpower requirements, and lost operational capability associated with decontamination operations. The following sections detail CB decontamination science and technology efforts, modernization strategy, and Joint Service programs.

Decontamination Science and Technology Efforts

Goals and Timeframes. The goal of decontamination research and development is to develop technologies that will eliminate toxic materials without performance degradation to the contaminated object and be environmentally safe (see Table 5). This area includes decontamination of personnel, individual equipment, tactical combat vehicles, aircraft, facilities, and fixed sites. Decontamination technologies currently being pursued include enzymes, catalysts that improve reactivity, decontaminants that are effective in both fresh and brackish water, and improved reactive sorbents. Supercritical fluid technology and non-ozone depleting fluorocarbons are being investigated for sensitive equipment decontamination, while gaseous ozone is being evaluated as a reactive decontaminant for interior spaces of vehicles such as aircraft. Contamination control involves investigating procedures that minimize the extent of contamination pickup and transfer, and maximize the ability to eliminate the contamination pickup on-the-move as well as during decontamination operations.

Table 5: Decontamination Science and Technology Strategy

By 1998	By 2003	By 2008
<ul style="list-style-type: none"> • Demo improved sorbent delivery systems • Aircraft Interior Decon procedures (non-system) 	<ul style="list-style-type: none"> • Sensitive Equipment Decon Systems • Demonstrate enzymatic decon • Fixed Site decon systems 	<ul style="list-style-type: none"> • Demonstrate environmentally safe, sensitive equipment decon materials • New self-decontaminating materials • Improved decon material to replace DS2 • Aircraft and other vehicle interior decontamination

Potential Payoffs and Transition Opportunities. The payoff from enhanced decontaminants and decontamination systems will be new non-corrosive, non-toxic, non-flammable, and environmentally safe decontamination systems suitable for a timely elimination of CB agents from all materials and surfaces. This ability will allow the forces to reconstitute personnel and equipment more quickly to increase combat efficiency and lessen the logistic burdens. In the future, reactive coatings may allow the continuation of combat operations without the need to disengage for decontamination. Dual use potential for environmental remediation, especially those dealing with pesticide contamination, is being exploited.

Major Technical Challenges. There are two principle technical difficulties associated with this effort. The first is the development of decontaminants which are reactive, non-aqueous, non-corrosive, safe to use on sensitive equipment, decontaminate a broad spectrum of chemical and biological agents, and environmentally safe. The second technical difficulty is the development of decontamination systems that effectively clean all surfaces and materials, while at the same time reduce the manpower and logistics burden. Also, new concepts or technologies for decontamination of large areas are needed.

Decontamination Modernization Strategy

Decontamination systems provide a force regeneration capability for units that become contaminated. Existing capabilities rely upon the physical application and rinse down of decontaminants on contaminated surfaces. Existing systems are effective against a wide variety of threat agents, yet are slow and labor intensive and present logistical, environmental, material, and safety burdens. To improve capabilities in this functional area, the Joint Services place emphasis upon new decontaminating technologies which reduce existing manpower and logistics requirements. They are safer on the environment, the warfighter, and equipment. Table 6 shows the roadmap for modernizing decontamination systems in DoD.

The goal of the NBC decontamination program area is to provide technology which removes and detoxifies contaminated material without damaging combat equipment, personnel, or the environment. Research and development of non-corrosive, all-agent multipurpose decontaminants and decontaminating systems for combat equipment, aircraft, personal gear, and skin remains a priority. Alternative technologies, such as sensitive equipment decontamination methods and large scale decontamination systems attract interest across the four Services. Table 7 provides an overview of Joint Service RDA efforts and Service involvement.

Table 6: Decontamination Modernization Strategy

	NEAR (FY98-01)	MID (FY02-06)	FAR (FY07-12)
Personal Equipment Decontaminants	<ul style="list-style-type: none"> • More reactive, high capacity adsorbent (M291/M295) 	<ul style="list-style-type: none"> • Non-caustic, non-corrosive decontaminant for personnel and equipment • <i>Army - Higher efficiency decon methods (Sorbent Decon)</i> 	
Bulk Decontaminants	<ul style="list-style-type: none"> • Non-caustic, non-corrosive, easy to store and manufacture multipurpose decontaminants 	<ul style="list-style-type: none"> • Decontaminants for fixed facilities • <i>Army - Environmentally acceptable replacement for DS-2</i> • <i>Army - Enzymes for chemical agent decontamination</i> • <i>Navy - Less caustic capability</i> 	<ul style="list-style-type: none"> • Mission tailored decontaminants • <i>Navy - Contamination resistant shipboard materials</i>
Expedient Delivery Systems		<ul style="list-style-type: none"> • Auto-releasing coatings; reduces skin contact hazard & labor requirements 	<ul style="list-style-type: none"> • Self-decontaminating auto releasing coatings; reduces man-power and logistic requirements eliminates skin, contact hazard
Deliberate Delivery Systems	<ul style="list-style-type: none"> • High pressure water wash; mechanical scrubber; improved decontaminate dispenser (increased vehicle throughput) • <i>Army - High pressure hot water washing and decontaminate scrubber capability; reduced water, labor, and logistic burden (M21/M22 Modular Decon System)</i> 	<ul style="list-style-type: none"> • Rapid large scale decon capability for fixed sites; reduced manpower and logistic burden • Non-aqueous capability for electronics, avionics and other sensitive equipment • <i>Air Force - Sensitive equipment decontamination system for aircraft interiors</i> 	<ul style="list-style-type: none"> • Vehicle interior decon capability • Supercritical fluid decontamination apparatus • <i>Army - Waterless decon capability for electronics and avionics</i>

1. Joint Service programs are highlighted in **BOLD** while Service unique are *italicized*.
2. Where applicable, systems which meet requirements are listed following the entry.

Table 7: Decontamination RDA Efforts

Category	Nomenclature	Status	USA	USAF	USMC	USN
Personnel	- M295 Individual Equipment Decontaminating Kit	Production	Fielded	Interest	Interest	Interest
	- M291 Skin Decontaminating Kit	Production			Fielded	
Combat Equipment, Vehicles, and Aircraft	- M17A2/A3 Lightweight Decontamination System	Production	Fielded	Interest	Fielded	Interest
	- M21/M22 Modular Decontamination System (MDS)	RDTE	Rqmt	Int-NIR	Int-NIR	Int-NIR
	- M17 Diesel Lightweight Decontamination System	RDTE		Int-NIR	Rqmt	Interest
	- Sensitive Equipment Decon	RDTE	Rqmt	Interest	Interest	Interest
Decontaminant Solutions and Coatings	- Sorbent Decontamination System	RDTE	Rqmt	Interest	Rqmt	Interest
	- Solution Decontaminants					

Rqmt = Product Requirement

Interest = Product Interest

Int-NIR = Product Interest, No Imminent Requirement

* = sub-Product(s) of a Consolidated Joint Service Project

Rqmt, Interest = Sub-Product Requirement or Interest

Joint Service Decontamination Programs

The Army has developed the M291 skin decontamination kit as a replacement to the M258A1 decontamination kit for all Services, and is currently introducing the M295 for improved personal equipment decontamination. The M295 provides the warfighter a fast and non-caustic decontamination system for personal gear. The Army will be the first Service to field the M295. A new adsorbent which is more reactive and has higher capacity is being developed to improve the performance of the M295 kit.

In the near- and mid- term, DoD continues to research new multi-purpose decontaminants as a replacement for bulk caustic Decontamination Solution 2 (DS2) and corrosive Super Tropical Bleach (STB). One decontaminant development is the Sorbent Decontamination System (SDS). This system will be used for immediate decontamination purposes. SDS will offer the advantage of being a non-aqueous, non-corrosive, and an environmentally acceptable system. Major program accomplishments in FY97 include a completion of Phase I effectiveness studies, an initiation of optimization studies, and an initiation of a Health Hazard and Environmental Assessment. Plans for FY98 include effectivity and productivity studies, a demonstration of functional suitability, and an integration of sorbent and M295 kits. Other technologies in development include enzymatic foams and reactive decontaminating systems. These new technologies may offer operational, logistics, cost, safety, and environmental advantages over current decontaminants. It should be noted that present shipboard chlorine-based decontaminant solutions pose an unacceptable corrosion risk to Naval aircraft. Current procedures require the use of fresh water and normal aircraft detergent solutions.

In the far-term, the Services are seeking non-aqueous decontamination systems to provide for sensitive equipment decontamination at mobile and fixed sites. Additionally, there is interest and research in coatings which can reduce or eliminate the necessity of manual decontamination.

Other Decontamination Programs

In the near- and mid-term, the Army is developing the Modular Decontamination System (MDS) to enhance vehicle and crew weapon decontamination. The MDS will support deliberate decontamination for ground forces and possess mechanical scrubbing and improved decontaminant dispensing capabilities. It will also offer a reduction in size, weight, logistics burden, and workload requirements over existing decontamination systems. Similarly, the Marine Corps is exploring alternative man-portable decontamination systems and is assessing the feasibility of converting the gasoline powered M17 Lightweight Decontamination System (LDS) with a lightweight diesel engine.

Restoration Operations (RESTOPS)

To ensure all Service and CINC participation to integrate improved decontamination capabilities, based on existing shortfalls, the Department proposes to conduct a Restoration Operations (RESTOPS) ACTD beginning in FY99. This goal of this ACTD is to demonstrate doctrine, tactics and materiel to quickly restore operational capability following CW/BW use at critical fixed facilities. The ACTD will focus on CW/BW detection and decontamination capabilities at Aerial Ports of Debarkation (APODS), Sea Ports of Debarkation (SPODs) and logistical nodes.

LIGHTWEIGHT PERSONAL PROTECTIVE GEAR

Senate Resolution 75 reporting requirement

(vii) a description of progress made in procuring lightweight personal protective gear and steps being taken to ensure that programmed procurement quantities are sufficient to replace expiring battledress overgarments and chemical protective overgarments to maintain required wartime inventory levels;

When early warning is not possible or units are forced to occupy or traverse contaminated environments, protection provides life sustainment and continued operational capability in the NBC environment. Individual protective equipment (IPE) provides a critical capability for survival in a contaminated environment. Collective protective equipment complements IPE to provide a full range of protection for U.S. forces. (However, the focus of this report is limited to IPE.) IPE includes protective masks and clothing. *Protective masks* that reduce respiratory stress on the user while improving compatibility with weapon sighting systems and reduce weight and cost are being developed. Technology advances are being pursued to produce mask systems that provide fully compatible vision capabilities, laser/ballistic protection, and further reduction in logistics burden. *Protective clothing* is being developed which will present less weight and heat stress burden than present equipment.

Protection Science and Technology Efforts

Goals and Timeframes. The goals of the protection subarea are to maintain a high level of protection against CB warfare agents while reducing the physiological burden associated with wearing protective equipment; to integrate CB protection with protection from environmental, ballistic and other threats (see Table 8). To achieve these goals, physiological performance requirements key to the design and evaluation of clothing and respirators are being established. New barrier and filtration materials and permeable fabrics to accommodate these performance requirements, are being developed and evaluated.

Table 8: Protection Science and Technology Strategy

By 1998	By 2003	By 2008
<ul style="list-style-type: none"> • Prototype mask with 50% reduced breathing resistance and 50% improved field of vision • Joint Service Lightweight Suit Technology (JSLIST Component) 	<ul style="list-style-type: none"> • Demonstrate advanced adsorbents to enhance or replace carbon • New chemical protective clothing, gloves and footwear materials transition to the Force XXI Land Warrior • Personal air conditioner backpack weighing less than 10 pounds 	<ul style="list-style-type: none"> • Lightweight materials available

Potential Payoffs and Transition Opportunities. Individual protection investments will result in improved respiratory and percutaneous (skin) protection with reduced physiological and psychological burden to the individual soldier.

Major Technical Challenges. Integrating CB protection into future warrior systems necessitates tradeoffs between performance requirements and limitations of materials and designs. Integral respiratory protection requires tradeoffs between physiological performance parameters such as pulmonary function, field of view, speech intelligibility and anthropometric sizing against cost, size/weight, protection time, and interfacing with other equipment. Integral CB protective clothing requires tradeoffs between minimizing thermal stress and moisture buildup against agent resistance, weight/bulk, and power requirements of cooling systems.

Protection Modernization Strategy

Forces cannot always avoid NBC hazards, therefore, individual warfighting units must be provided materiel to protect them from the effects of these lethal agents. Protection must be effective against all known threats and not measurably degrade the performance of personnel, weapons, or equipment. Total NBC protective measures allow our forces to maintain combat superiority in a contaminated environment. A summary of individual protection modernization requirements is provided in Table 9.

Table 9: Protection Modernization Strategy

	NEAR (FY98-01)	MID (FY02-06)	FAR (FY07-12)
Individual Eye/Respiratory	<ul style="list-style-type: none"> • Voice amplification; laser/ballistic eye protection; improved decontaminability, better comfort (M40A1/M42A1) • <i>Army -Aircrew mask compatible with Apache helicopter sighting systems and night vision goggles (M48/49)</i> • <i>Army -Improved compatibility with aviation sighting/night vision systems; reduced logistics burden using non-blower systems, selected for Land Warrior (M45)</i> 	<ul style="list-style-type: none"> • Reduced physiological burden, improved comfort, enhanced optical and communications, improved compatibility • New mask systems for general purpose and aviation masks (JSGPM, JSAM) • <i>Navy -Improved complete protection for all aircrews (A/P 23P-14(V)N)</i> 	<ul style="list-style-type: none"> • Advanced Integrated Individual Soldier Protection system (Future Soldier System) • Improved multiple agent protection
Individual Clothing	<ul style="list-style-type: none"> • Advanced protective suit technology; lighter, improved agent and flame protection; reduced heat stress integrated with all respiratory and micro-climatic cooling systems (JSLIST) - Improved foot protection (MULO) - Improved hand protection (Improved CB Glove) • <i>Army -Improved protection with self contained breathing capability for special purposes (STEPO-I)</i> 	<ul style="list-style-type: none"> • Improved protection, less burdensome protective suits; improved foot and hand protection/less burdensome (JSLIST P3I) 	<ul style="list-style-type: none"> • Integrated multiple threat modular protection (chemical, biological, environmental, ballistic direct energy and flame) • Improved protection for aviators (JPACE)

1. Joint Service programs are highlighted in **BOLD**, Service unique efforts are *italicized*.
 2. Where applicable, systems which meet requirements are listed following the entry.

The goal of the protection RDA area is to provide equipment which allows US forces to operate in a contaminated NBC environment with minimal degradation of the warfighters' performance. The near-, mid-, and far-term project efforts are aimed at maintaining current protection levels while reducing physiological and logistical burdens. Table 10 provides an overview of individual protection RDA efforts and Service involvement.

Table 10: Protection RDA Efforts

Category	Nomenclature	Status	USA	USAF	USMC	USN
Integrated	- Force XXI Land Warrior	RDTE	Rqmt	Interest	Interest	Interest
Eye/ Respiratory Protective Masks	- MBU-19/P Aircrew Eye/respiratory Protection (AERP) - M48/49 Aircraft Mask - CB Respiratory System (A/P 23P-14(V)N) - M45 Aircrew Protective Mask (ACPM) - M40A1/M42A1 - MCU-2A/P	Production Production RDTE Production Production Production	Interest Rqmt Rqmt Rqmt Rqmt	Fielded	Interest Rqmt Interest Rqmt	Rqmt
Ancillary Equipment	- Protection Assessment Test System (PATS) - Voice Communication Adapter	Production Production	Rqmt Rqmt	Fielding Rqmt	Fielded Fielded	Interest Fielded
Battlefield Protective Suits	- CB Protective Overgarment Saratoga - Chemical Protective Undergarment (CPU) - Aircrew Uniform Integrated Battlefield (AUIB) - Joint Service Lightweight Integrated Suit Technology (JSLIST) -- Overgarment -- Undergarment -- Duty Uniform -- Boots (MULO) -- Gloves	Fielded Fielded Production RDTE Prod.* RDTE* RDTE* MS III* RDTE*	Interest Rqmt Rqmt Rqmt Rqmt Rqmt Rqmt Rqmt Rqmt	Fielded Rqmt Fielded Rqmt	Fielded Int-NIR Int-NIR Rqmt Interest Rqmt Rqmt Rqmt	Interest Rqmt
Specialty Suits	- Suit Toxicological Environmental Protective Outfit (STEPO-I) - EOD Ensemble - Improved Toxicological Agent Protective (ITAP)	Production Production RDTE	Rqmt Rqmt Rqmt	Rqmt Rqmt Rqmt	Interest Interest Interest	Interest Interest

Rqmt = Product requirement
Interest = Product Interest

* - Sub-Product(s) of a Consolidated Joint Service Project
Int-NIR = Product Interest, No Imminent Requirement

Individual protection equipment (IPE) consists of eye/respiratory and percutaneous protection: a mask with hood and protective garments, boots, and gloves. The IPE issued to U.S. forces protects against all threat chemical and biological agents. Its chemical defense capabilities are routinely demonstrated with actual chemical agents in the Chemical Defense Training Facility (CDTF), U.S. Army Chemical School, Ft. McClellan, Alabama.

Protective masks will be improved to provide greater user comfort and to reduce the breathing resistance currently encountered. Mask systems will require increased NBC survivability and compatibility with combat or personal equipment. Future respiratory systems, such as the A/P23P-14(V)N, the M45, and the far-term Joint Service Aviator Mask (JSAM) and Joint Service General Purpose Mask (JSGPM) will require enhanced compatibility with both life support and tactical systems on fixed and rotary wing aircraft. In the future, the focus will be on integrated respiratory protective ensembles which offer optimal compatibility with personal, tactical, and crew support systems.

Future protective clothing ensembles will be required for land, sea, air, and marine forces to achieve reductions in bulk and weight without any loss of protection or durability. To satisfy these needs, the four Services have consolidated their mission specific requirements into a first truly joint evaluation program for the next generation chemical garments--the Joint Service Lightweight Integrated Suit Technology (JSLIST) program. This program will develop a collection of protective equipment that will be used for Joint Service mission needs. The JSLIST will provide enhanced CB protective ensembles with reduced physiological heat burden and will be generally lightweight and launderable. New accessories, such as gloves and footwear, are also required to execute missions and tasks which require greater tactility and traction. The Joint Protective Aircrew Ensemble (JPACE) will be developed to provide aviators the same advantages and improved protection as JSLIST provides to other warfighters. Similarly, clothing systems for Explosive Ordnance Disposal (EOD) personnel are required to enhance existing chemical protection systems without undue physiological burdens.

Joint Service Protection Programs

Joint programs are shown in Table 10 as bolded entries.

Individual Protection

Eye/Respiratory. The M40 and M42 masks (for individuals and armored vehicle crewmen, respectively) are undergoing the final stages of fielding to replace their M17 and M25 series counterparts. The new masks offer increased protection, improved fit and comfort, ease of filter change, better compatibility with weapon sights, and a second skin which is compatible with Army and Marine Corps protective ensembles. The second skin design also is being reviewed by the Navy and Air Force for potential adoption. The Army, Marines, and Air Force are also fielding the Protection Assessment Test Systems (PATS) to provide users of the M40, M42, and MCU-2/P masks with a rapid and simple means for validating the fit and function of the mask to ensure readiness. The Navy is evaluating the use of PATS with its MCU-2/P series mask.

The Navy, in coordination with the Marine Corps, is leading an effort to equip all forward deployed fixed and rotary wing aircrew with improved chemical, biological, and radiological (CBR) protection. The CBR ensembles will feature off-the-shelf items, such as the A/P23P-14(V)N respiratory system. The Army, in cooperation with the Marine Corps, recently completed a product improvement program for the M40 series mask that allows ground crew to aircrew communication. The Air Force continues to field Aircrew Eye-Respiratory Protection (AERP) systems to protect aircrews from CB hazards. This system includes a standard MBU-12/P mask, an intercom for ground communication, and a blower assembly that provides de-misting. The blower is stowed during flight operations on a bracket that is mounted inside the aircraft. The Aircrew Eye-Respiratory mask complements the recently fielded lighter weight aircrew ensemble.

Mid- and far-term research is focused on improved vapor and particulate filtration technology, as well as improved masks for light and special operations forces (SOF). Far-term plans include the Joint Service Aviation Mask and Joint Service General Purpose Mask, which will provide improved eye, respiratory, and face protection against current and future agents. It will maximize compatibility with future weapon systems, be lightweight, and offer modular facepieces to accommodate a variety of mission profiles. Protective mask efforts will focus on supporting specific needs of the Joint Services and integrated warrior programs (Land Warrior, Air Warrior, Mounted Warrior, and Force XXI).

Clothing. In the area of full body protection, the JSLIST program is underway to coordinate the selection of advanced technology chemical protective materials and prototype ensembles. The program originated as a US Marine Corps 6.2 and 6.3 demonstration of chemical protective materials and garment designs. In August 1992, the Service Project Managers for chemical protective clothing agreed to combine their programs, using the initial Marine Corps database and other R&D efforts. Requirements for chemical protection, durability, heat stress reduction, launderability, concept of use, and flame protection vary by Service and mission.

Clothing systems will utilize new material technologies from domestic and foreign sources. There will be one overgarment design, one primary garment design, and one undergarment design. The scheme will minimize the number of suits and maximize inter-Service compatibility. Merging development efforts will eliminate unnecessary duplications and allow each Service to leverage those technologies which offer the best merit and performance. Materials which meet Services' requirements will be placed on a qualified materials list to encourage multi-source competition and to provide surge capability. Variations in suit design will be minimized to gain economies of scale in production and help maintain a vital industrial base.

The Army, in coordination with the other Services, is conducting a development project for a Multipurpose Overboot to replace the current black vinyl overboot with a boot that has greater durability, better traction on all surfaces, and improved protection. A similar effort is underway for an Improved CB Protective glove which will have better tactility and protection. Both project schedules are being executed in concert with the JSLIST program.

In the mid-term, the Army in coordination with the other three Services, is developing an Improved Toxicological Agent Protective (ITAP) ensemble for EOD and depot operations in Immediate Danger to Life and Health (IDLH) contamination concentrations. The ITAP ensemble will incorporate improvements in material and design. It includes a one-hour supplied air bottle system, which can be switched to a filtered air respirator when operators exit the area of high contamination. A Personal Ice Cooling System (PICS) is being developed for use with the ITAP. The ITAP ensemble and PICS will be Joint Service programs. In addition, the Army is working with the Air Force on a chemical protective firefighter's ensemble leveraging the technology from the JSLIST program. Detailed system requirements and program plans are currently being coordinated among the Services.

In the far-term, efforts will focus on integrated protection for the Force XXI Land Warrior System. This next generation technology will be directed toward integrating CB protection into a system which will also provide environmental, ballistic, directed energy, and flame protection, as well as reduced physiological burden. A strong emphasis on supporting technologies must continue. Materials that detoxify a broad range of chemical and biological agents on contact, which can be incorporated into fibers, fabrics, and semi-permeable membranes are being developed using biotechnology, as well as more conventional approaches.

Other Protection Programs

Program supporting requirements of a single service are shown in table 9 as italicized entries.

Eye/Respiratory. The Army is developing the M48/49 protective masks to replace the M43 series masks. The M48 will be for Apache pilots and the M49 for general aviator use. They will be lighter and offer enhanced protection and compatibility with night vision and aircrew systems. In the near-term, the Army will replace the M43 mask for the general aviator with the Aircrew Protective Mask, M45. The M45 is lighter and less expensive than the M43 and features CB protection without the aid of force ventilated air.

Clothing. The Aircrew Uniform Integrated Battlefield (AUIB) and the Chemical Protective Undergarment (CPU) are approved for procurement. The AUIB is a flame resistant CB protective uniform which is lighter and less bulky than previous ensemble configurations and is one of the candidate ensembles for JPACE. The CPU, which has been adopted by armor crews, is worn under the Nomex coverall.

The Army has also completed fielding the Interim-Self-Contained Toxic Environment Protective Outfit (STEPO-I). The STEPO-I was introduced for limited EOD and depot operations in contamination concentrations which are of Immediate Danger to Life and Health. This system consists of an encapsulating suit made of butyl rubber-coated nylon with a polycarbonate visor. Respiratory protection is provided by one of two options—tethered clean air supply or a self-contained rebreather worn as a back-pack. Cooling is provided by an ice vest worn underneath the suit.

FIELDDED NBC DEFENSE ITEMS - ISSUES AND CONCERNS

NBC defense items are generally used in combination to form a system or subsystem for a particular function. Therefore, this report will address items used as a system in the area of individual protection.

Individual Protection

Currently fielded NBC defense equipment items were primarily designed for use in the European environment against a Soviet threat. Equipment in this area provides protection against all known CB threat agents. Unique service requirements in the past have led to Service-specific procurements and some duplication in capability. As a consequence, this has resulted in the procurement of six different chemical protective suits and six different masks. This has caused difficulties in meeting Service needs and exacerbated logistics planning. In FY97, the introduction of the JSLIST protective suits should begin to resolve many of these past difficulties. In addition, the recently approved QDR plus-up of \$1 billion for counterproliferation activities has added a minimum of \$55M per year to the CBDFP for increased JSLIST procurement.

The Battle Dress Overgarment (BDO) continues to pose a moderate risk as this item is reaching its maximum extended shelf life limit (14 years), and the Services plan no new production. The Joint Services Lightweight Integrated Suit Technology (JSLIST), Advanced Battle Dress Overgarment (ABDO) and Advanced Chemical Protective Garment (ACPG) began procurement in FY97.

The Services continue modernizing their chemical protective mask inventories. Different versions of the protective mask were developed to meet the requirements of different military occupational specialties (e.g., air crew, tank crew, etc.). For the Army and Marine Corps, the M40 and M42 series masks are replacing the M17 and M25 series masks. Remaining Army aviation units are still equipped with the old M24 mask, which will be replaced by the M45 mask. The M40 and M42 masks are assessed as low risk; however, funding constraints have delayed total replacement of the old masks. The M43-series mask, used in Army Apache equipped aviation units, is assessed as moderate risk, but will improve to low risk upon receipt of quantities on contract. The M43-series and M49 masks will be replaced by the M48 mask. These newer masks provide increased protection, improved fit and comfort, and compatibility with most of these Services' weapons systems' optics and sights.

The MCU-2A/P is designed to meet the needs of the Air Force ground crews and Navy shipboard and shore-based support missions.

Battle Dress Overgarment (BDO)

There are no companies currently manufacturing the BDO. The Defense Logistics Agency's largest customer, the Army, has 2.9 million suits on hand in war reserves to sustain its requirements until 1999. Beginning in FY97, the Services will buy the JSLIST suits, as a replacement for the BDO and other chemical protective suits. Related to the BDO, Duro, Inc. is the sole source for the inner layer of the charcoal slurry impregnated fabric (a key capability) used within the BDO suit. DLA presently has an industrial base maintenance contract (IBMC) with Duro to maintain this capability until JSLIST production capability can increase. This IBMC contract was renewed in September 1997.

Chemical Protective (CP) Gloves

The CP glove is made out of butyl rubber. Butyl rubber is the most cost effective material capable of withstanding all chemical agents, in addition to retaining desirable mechanical properties over a wide range of environmental conditions. There are two current producers of the CP gloves—Siebe North, Inc., Charleston, SC, and Guardian Corp., Willard, Ohio. The Services have adequate stocks on-hand for contingency use. Recent DoD surveillance tests have validated the protective qualities of the existing stocks. The status of the Services on-hand inventories has allowed DLA to pursue an IBMC with both current manufacturers to sustain the industrial base with "War Stopper" funding. The JSLIST program will replace the current glove with an improved glove.

LONG-RANGE STANDOFF DETECTION AND IDENTIFICATION CAPABILITIES

Senate Resolution 75 Reporting Requirement

(viii) a description of progress made in developing long-range standoff detection and identification capabilities and other counterforce surveillance capabilities for biological and chemical weapons, including progress on developing a multi-chemical agent detector, unmanned aerial vehicles, and unmanned ground sensors;

NBC reconnaissance, detection, identification, warning and reporting are the essential elements of contamination avoidance. Early warning is the key to avoiding NBC contamination. Sensors for the individual joint task force member and systems capable of detecting multiple agents and characterizing new agents are being developed. Advances in technology are being pursued in chemical and biological standoff, remote/early warning detection, miniaturization, lower detection limits, logistics supportability, and affordability. The following sections detail contamination avoidance science and technology efforts, modernization strategy, and Joint Service programs. This report focuses on one aspect of the contamination avoidance technology area—early warning detection and identification technologies. Related areas, including point detection, are not discussed in this report. However, the underlying technologies for some point detection systems may in the future be used for remotely deployed early warning systems.

Contamination Avoidance Science and Technology Efforts

Goals and Timeframes. The goal of contamination avoidance is to provide near real-time capability to detect, identify, locate, characterize, and warn against all CB warfare agent threats below threshold effects levels. Science and technology efforts (see Table 11) currently emphasize multi-agent sensors for biological agent detection and remote/early warning CB detection. To meet near-term needs, a number of individual sensors are being developed while detection technology matures. Far-term objective technologies will allow integration of chemical and biological point and remote/early warning detection modules into a single system. The technology focus is on detection sensitivity across the evolving spectrum of CB agents; systems size/weight, range, signature and false alarm rate; and integration of CB detectors into various platforms, individual clothing, and command, control, communication, computer, and intelligence (C⁴I) networks. Detector technologies based on olfactory-like chemical sensing and molecular approaches to optical sensors offer long term opportunities.

Table 11: Contamination Avoidance Science and Technology Strategy

By 1998	By 2003	By 2008
<ul style="list-style-type: none"> • Complete fabrication of tunable, eye safe laser for standoff biological detection • Joint Chemical Agent Detector (JCAD) downselect between Surface Acoustic Wave (SAW) and Mini-Ion Mobility Spectroscopy (Mini-IMS) • Demonstrate integrated point biodefense capability (Advanced Technology Demonstration) 	<ul style="list-style-type: none"> • Field upgrade (eye safe) Long Range Bio Stand-off Detector in FY99. Schedule may slip to FY00 depending on possible restructure after Congressional cut. • Complete development of CB water monitor • Joint Biological Remote/Early Warning System (JBREWS) ACTD with fielding of ACTD systems to selected CINC's by FY01 • Complete development of Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD) • JBREWS production in FY02, and first unit equipped (FUE) in FY02 	<ul style="list-style-type: none"> • Demonstrate integration of chemical and biological agent detection modules into a single sensor suite

Table 12: Multi-Agent Chemical Detectors

	Nerve		Blister		Blood	
	G -agents (GA, GB, GD, GF)	V -agents (VX, VX ₂)	H-agents (H, HD, HN)	L	AC	CK
Chemical Detection Systems						
Systems fielded at time of Operation Desert Storm						
M8A1 Automatic Chemical Agent Alarm	•	•				
M256A1 Chemical Agent Detector Kit	•	•	•	•	•	•
M8 paper	•	•	•			
M9 paper	•	•	•	•		
AN/KAS-A1 Chemical Warfare Directional Detector	•	•				
M18A2 Chemical Detection Kit	•	•	•	•	•	•
M272 Water Test Kit	•	•	•	•	•	
Chemical Agent Monitor (CAM)	•	•	•			
MK21 Chemical Agent Point Detection System (CAPDS)	•	•				
Systems fielded (or in production) since Operation Desert Storm						
Automatic Chemical Agent Detector Alarm (ACADA)	•	•	•	•		
Improved Chemical Agent Monitor (ICAM)	•	•	•			
M21 RSCAAL	•	•	•	•		
M90 Automatic Mustard Detector (AMAD)	•	•	•			
Automatic Liquid Agent Detector	•	•	•	•		
Improved Point Detection System (IPDS)	•	•	•	•		
Future systems (required capabilities)						
Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD)	•	•	•	•	•	•
Joint Chemical Agent Detector (JCAD)	•	•	•	•	•	•

Potential Payoffs and Transition Opportunities. Table 12 shows chemical agents detectable by selected key detection systems. All systems can detect multiple chemical systems. Future systems are planned that will detect a broader spectrum of agents and will feature other systems improvements (e.g., increased sensitivity, decreased false alarm rate, improved range.) The future CB detection system will provide the capability to detect, identify, map, and track all CB contamination in a theater of operations. This will enable commanders to avoid CB contamination or to assume the appropriate protection required to continue fighting and sustain their mission with minimal performance degradation and casualties.

Major Technical Challenges. The major technical challenges are in the areas of biological detection and identification, including remote/early warning sensing, improved agent discrimination and quantification, sampling efficiency, interferent and ambient biological background rejection, and genetic probe development. Size reduction of detectors, development of integrated biological and chemical detection systems, and the fusion of sensor data with mapping, imagery, and other data for near real-time display of events are other areas of challenge.

Contamination Avoidance Modernization Strategy

The increased lethality and heightened operational tempo of the future battlefield demand responsive NBC detection and warning capabilities in order to reduce force degradation caused by contamination. These capabilities—which also encompass NBC reconnaissance, identification, and reporting—have the strongest urgency for force readiness and will continue to be emphasized by the DoD community in the near and distant future. Table 13 shows the roadmap of DoD requirements for contamination avoidance.

Table 13: Contamination Avoidance (Early Warning) Modernization Strategy

	NEAR (FY98-01)	MID (FY 02-06)	FAR (FY 07-12)
NBC Reconnaissance and C/B Stand-off Detection (Early Warning)	<ul style="list-style-type: none"> Improved NBC Reconnaissance Vehicle with remote/early warning and data infusion capabilities (JSNBCRS) Army - Long Range Stand-off detection and mapping of aerosol clouds (LR-BSDS) 	<ul style="list-style-type: none"> Biological remote detection and early warning capabilities (JBREWS) Lightweight passive stand-off detection for chemical agent vapors (JSLSCAD) Addition of biological detection and identification capabilities (JSNBCRS F31) Light reconnaissance vehicle (JSLNBCRS) 	<ul style="list-style-type: none"> Mobile stand-off detection, ranging, and mapping of chemical vapors and aerosols (JSCWIED) Wide area detection
Warning and Reporting	<ul style="list-style-type: none"> Initial automated warning and reporting interoperable with all Services, C4I (JWARN) 	<ul style="list-style-type: none"> Integrated and automatic NBC warning and reporting; mission management (JWARN F31) 	

1. Joint Service programs are highlighted in BOLD; Service unique efforts are *italicized*.
 2. Where applicable, systems which meet requirements are listed following the entry.

Early detection and warning is the key to avoiding NBC contamination. As a result, DoD is concentrating RDA efforts on providing its warfighters real-time capabilities to detect, identify, quantify, and warn against all CB warfare threats below threshold effects levels. Real time detection of biological agents below threshold effects levels is unlikely in the near to mid-term. Current emphasis is on developing light weight, automated CB sensors capable of providing enhanced detection and early warning, capable of detecting all known biological and chemical agents. To meet the needs of the next three to five years, several stand-alone detectors and sensors are being developed. As detection technology matures, development efforts will focus on system miniaturization, improved sensitivity and range, and decreased false alarm rate. This focus will facilitate the integration of chemical detectors into personal warfighter gear, chemical and biological detectors onto various air, sea, and ground platforms, and integration of detectors into automated warning and reporting networks. Table 14 provides an overview of RDA efforts and Service involvement.

Table 14: Contamination Avoidance RDA Efforts

Category	Nomenclature	Status	USA	USAF	USMC	USN
Remote/ Early Warning	- Joint Service Lightweight Stand-off Chemical Agent Detector (JSLSCAD)	RDTE	Joint*	Joint*	Joint*	Joint*
	- Joint Service Chemical Warning and Identification LIDAR Detector (JSCWILD)	RDTE	Rqmt	Rqmt		
	- Biological Stand-off --Joint Remote Biological Early Warning System (JBREWS)	RDTE	Joint	Joint	Joint	Joint
	--Long Range Bio Stand-off Detection System-NDI (LRBDS-NDI) --LRBDS	Production RDTE	Rqmt Rqmt	Interest Interest		Interest Interest
NBC Recon	- Joint Service NBC Reconnaissance System (JSNBCRS)	RDTE				
	--M93A1 NBCRS/CB Mass spectrometer (See BIDS)	*	Rqmt		Rqmt	
	-Joint Service Light NBCRS/Lightweight Recon System (JSLNBCRS)	*	Joint*	Joint*	Joint*	Interest
Warning and Reporting	- Joint Warning and Reporting Network (JWARN) -- Multipurpose Integrated Chemical Agent Detector (MICAD)	RDTE	Joint*	Interest*	Joint*	Joint*

Joint* Joint Service requirement
 Rqmt= Service requirement
 Rqmt, Interest= sub-product requirement or interest
 Joint*=Draft Joint Service requirement
 int-NIR= Service interest, no imminent requirement
 *= Sub-product(s) of a Joint project

The management challenge involves the coordination and consolidation of several detection and warning RDA efforts across the Services. This strategy resulted in the initiation of RDA efforts which shared common technical goals, but were constrained to Service unique requirements. Management organizations, such as the Joint Program Office for Biological Defense (JPO-BD) and the Joint NBC Defense Board, are building Joint Service coordination across the mission area.

JPO-BD has managed several single service and joint biological detection programs. In early FY97, its efforts resulted in the Army's Long Range Biological Standoff Detection System (LR-BSDS), which has been type classified standard, and fielded this year to the 310th Chemical Company (3 systems). This is the first ever field biological standoff detection system.

JPO-BD is managing follow-on efforts including the LR-BSDS P3I (pre-planned product improvement) which will feature an eye-safe laser and increased sensitivity. It is also leveraging the benefits of the Advanced Concept Technology Demonstration (ACTD) program to greatly accelerate the development of the next generation of remote/early warning systems (*i.e.*, systems other than the LR-BSDS). The concept behind the ACTD has been to build an intelligent network of sensors based on the Navy's Interim Biological Agent Detector (IBAD), but add to each sensor a generic biological detector module, location and meteorology modules. The detector network is able to both detect in near real time significant changes in background aerosol concentrations, but can also (less than 10 minutes) tell the operator located in the central command post (CP) whether the aerosol is composed of likely BW agents. Site personnel are then able to retrieve samples of the aerosol from the sensors for confirmatory identification of the BW agent. This new generation of sensors is referred to as the Joint Biological Remote/Early Warning System (JBREWS). The ACTD will formally start in FY98, with fielding of ACTD systems to selected CINCs around FY01. The JBREWS objective system is expected to start fielding around FY03.

Requirements have been defined for several joint early warning programs. The Joint Programs are:

- Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD). The JSLSCAD will be capable of scanning 360° x 60°, and automatically detecting nerve or blister agents at a distance up to 5 km. The system will be light, compact, and will operate from a stationary position or on-the-move. The JSLSCAD Michelson interferometer employs a passive infrared system that will detect the presence of chemical agents by completing a spectral analysis of target vapor agent chemical clouds.
- Joint Service Chemical Warning and Identification LIDAR Detector (JSCWILD). The JSCWILD will be a lightweight, vehicle-mountable, contamination monitoring system which detects and quantifies, from a distance of 20 kilometers, all types of chemical agent contamination (including agent rain, vapors, and aerosols), in a stand-off mode. The JSCWILD will operate from fixed sites and ground vehicles. The system has distance-ranging and contamination-mapping capabilities and transmits this information to a battlefield information network.
- Joint Biological Remote Early Warning System (JBREWS). JBREWS is expected to evolve into a "system of systems". That is, we will likely have standoff LIDAR systems like the LR-BSDS and fairly dense arrays of miniaturized, rugged point detectors that possess only one or two of the functionalities that the much more robust JBPDS will have. The point detectors may be employed in a variety of ways: carried on vehicles, emplaced by hand around unit/site perimeters, remotely emplaced by aircraft, or possibly even delivered by artillery or rocket systems to project the sensors into contested or enemy controlled areas. What is becoming clearly evident from our studies is that the systems need to be networked together to provide the greatest

confidence of accurate detection and fastest warning, and that they need to be employed in fairly high numbers to ensure point releases are not missed.

- **Joint Service Light NBC Reconnaissance System (JSLNBCRS).** The JSLNBCRS will provide a premiere vehicle for accurate, rapid NBC combat hazard information by verifying the absence of finding, mapping, and marking radiological, biological, and chemical hazards. The JSLNBCRS will be an integration of advanced NBC detection and analysis equipment suited for Marine Air-Ground Team Force expeditionary operations and Army rapid deployment/light operations.
- **Joint Warning and Reporting Network (JWARN).** HAZWARN (warning and reporting) and MICAD will be consolidated to form a comprehensive upgradable NBC component to the emerging C⁴I systems in the services. The JWARN system will integrate into the global command and control system to provide automated NBC warning and NBC mission planning function.

Joint Service Contamination Avoidance Programs

The consolidation of Joint Service contamination avoidance programs has been completed. All detection programs have been restructured to meet current multi-Service needs. Bolded entries in Table 13 highlight Joint programs.

Chemical Warfare Agent Early Warning

The Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD) for passive standoff, on-the-move detection of chemical agent vapor is in Phase II (Engineering and Manufacturing Development, EMD) of the acquisition cycle. The core system of JSLSCAD will weigh approximately 13 pounds and occupy approximately 1.3 cubic feet. The system may be modified to accommodate a variety of requirements. To date, a 360° x 60° scanner was developed for Armored Systems Modernization applications (tracked and wheeled vehicles), and the system was integrated into a gimbal for Marine Corps helicopters and unmanned aerial vehicle (UAV) contamination avoidance roles. Currently, the JSLSCAD is the only system with a requirement to operate from a UAV. This system is also being considered by the Navy for shipboard use and by the Air Force for use at air bases.

The Army, Air Force, and Marine Corps have also agreed to focus upon the development of a Joint Service Light NBC Reconnaissance System (JSLNBCRS). The proposed system will consist of a suite of detectors required for a specific mission which could be easily integrated into the platform of choice. Currently two configurations are proposed: a light and a medium version, to fulfill expeditionary and armored mission profiles, respectively. The FOX NBCRS would fulfill heavy requirements. The FOX NBCRS is being upgraded to include a chemical stand-off detection capability and other electronic improvements including data fusion.

In the mid- to far-term, the Army and Air Force have agreed to a Joint Service Chemical Warning and Identification LIDAR Detector (JSCWILD). The JSCWILD is a laser-based standoff detection system being developed to meet the requirements for the detection of chemical liquids, aerosols, and vapors. Although this system is much heavier than its passive counterpart (JSLSCAD), it does provide the ability to detect chemical agents in all forms—liquids, vapors, aerosols—as well as mapping and ranging information. The Air Force’s primary use for this system will be air base defense. A requirement for an agent water monitor has been identified by the Army, Air Force, and Marines. Joint program plans are being developed.

Biological Warfare Agent Early Warning

Currently, there are two biological early warning detection efforts being conducted under the Joint Program Office for Biological Defense (JPO-BD): (1) the Long Range Biological Stand-off Detection System (LR-BSDS); and (2) the Joint Biological Remote/Early Warning System (JBREWS) ACTD.

The Joint Biological Remote Early Warning System. JBREWS is expected to evolve into a “system of systems” because it will likely possess standoff LIDAR systems like the LR-BSDS and fairly dense arrays of miniaturized, rugged point detectors that possess only one or two of the functionalities that the much more robust JBPDS will have. The point detectors may be employed in a variety of ways: carried on vehicles, emplaced by hand around unit/site perimeters, remotely emplaced by hand around unit/site perimeters, remotely emplaced by aircraft, or possibly even delivered by artillery or rocket systems to project the sensors into contested or enemy controlled areas.

In the far-term, JPO-BD’s concept for the ultimate, joint service biological detector is the Joint Biological Universal Detector (JBUD). JBUD is envisioned to be a miniaturized, multi-technology, automatic system that may be manned or unmanned, capable of detecting all BW agents, and able to automatically warn troops and report pertinent data relative to a BW attack.

THEATER MISSILE DEFENSES

Senate Resolution 75 reporting requirement

(ix) a description of progress made in developing and deploying layered theater missile defenses for deployed United States Armed Forces which will provide greater geographic coverage against current and expected ballistic missile threats and will assist in mitigating chemical and biological contamination through higher altitude intercepts and boost-phase intercepts;

While the theater missile defense systems are part of the general force structure, some of the engaged threat missiles may carry chemical or biological agent payloads. Intercepting these threats, theater missile defense will contribute to mitigation of ground effects. The Ballistic Missile Defense Organization's lethality program is conducting a multi-year investigation of the response of these agent payloads to impact, and the post-engagement ground hazards. The program-developed impact model - PEELS (Parametric Endo/Exoatmospheric Lethality Simulation) - is an efficient model to predict the mechanical response of these threats. PEELS is available, and has been provided selected Allies, and is being used widely to assess interceptor performance. Extensive tests have been conducted with the theater missile defense systems to demonstrate their performance and validate the use of the model. The Post-Engagement Ground Effects Model (PEGEM) which can model the ground effects resulting from intercepts up to 35 kilometers has been issued. The program is currently focusing on the response of agent released at very high altitudes, and exoatmospheric, to characterize agent behavior when released in near-vacuum, breakup and drop formation, and evaporation during descent. Recent impact tests at New Mexico Tech, Socorro, NM, confirmed earlier estimates of agent response, and validating tests to examine containment and velocity dependencies will be conducted in 1998. Aerodynamic breakup tests on real agents are being conducted in the UK under a contract with the UK MoD. These will be followed by ground evaporation experiments with real agents in the UK under a lethality program contract with the Netherlands Prinz Maurits Laboratory. The current test program will be concluded in 1999, with the data integrated into a very high altitude capable version of PEGEM, which will be issued to the missile defense systems, and made available to the operating forces and training elements.

CHEMICAL/BIOLOGICAL DEFENSE TRAINING/READINESS

<p>Senate Resolution 75 reporting requirement</p> <p>(x) an assessment of:</p> <p>(I) the training and readiness of the United States Armed Forces to operate in a chemically or biologically contaminated environment; and</p> <p>(II) actions taken to sustain training and readiness, including training and readiness carried out at national combat training centers;</p>

INTRODUCTION

For nuclear, biological, or chemical weapons to provide a military advantage, they must produce adverse physical or psychological effects and degrade performance of an opponent's force. Performance degradation could be achieved by causing mass casualties, damaging material, or simply forcing personnel into a protective posture which reduces their ability to perform. Even the threat of NBC weapons can have a detrimental effect on operations. If these weapons do not ultimately result in mission degradation, an adversary may be deterred from employing NBC weapons. A force trained, equipped, and demonstrating the ability to survive, fight, and win in a battlespace where NBC weapons are used, continues to be a critical element of deterrence.

The Services have done well in the exercise of their NBC defense responsibilities under Title X of the FY94 Defense Authorization Act. Our vision for Joint NBC Defense Management follows: *America's Armed Forces trained and ready for the 21st Century, protecting our nation and its forces against nuclear, biological and chemical threats.* We will build on the Service successes to develop a viable Joint orientation to NBC defense capabilities which includes Joint requirements documents; Joint doctrine and tactics, techniques, and procedures; Joint modeling, simulation and wargaming; and Joint professional training. The counterproliferation acquisition initiative has provided funding necessary to continue this process under the management of the Joint Services Integration Group (JSIG).

TRAINING AND READINESS

Each service establishes standards of proficiency and currency for NBC defense training. The U.S. Army Chemical School (USACMLS) as the DoD Executive Agent for joint NBC defense training, has initiated several actions to counter NBC threats. These include (1) assisting CINCs, MACOMS and their staffs assessing and providing reference materials regarding the NBC threat and recommend actions to reduce the NBC threat in their areas of operations; (2) providing broad-based joint NBC defense doctrine and joint doctrine development support; (3) introducing and upgrading instructional aids and training support

material for war colleges and command and staff colleges for all services; and (4) developing, evaluating, and fielding advanced distributed instructional capabilities for both resident and nonresident instruction.

Army

Army Regulation 350-41, Training and in Units, establishes Army standards for proficiency for NBC defense training. NBC defense training is conducted at schools and in units.

Individual Training

At the initial training level, NBC defense tasks are taught to students wearing Mission Oriented Protective Posture (MOPP) gear during Basic Soldier Training and Warrant Officer Candidate Training. to satisfy Military Qualifications Standards Level I. Qualification Standards Level II is achieved from NBC tasks training is also conducted during Officer (basic and advanced) and Warrant Officer (basic) training. NCOs train on leader NBC skills during Primary Leadership Development Courses (PLDC). Other Officer and NCO courses require training in NBC effects on AirLand operations. At the Combat Arms (CA) company level each unit has an NBC NCO specialist and at the battalion or higher level each unit has an NBC Officer and Senior NCO.

Unit Training

The Army is constantly challenged to improve its training of NBC battlefield hazards by integrating such training into unit mission training as well as individual and leader training. It is required that the NBC protective mask be worn during weapons qualification training up to twice a year, depending on the unit category within the Standards in Training Commission (STRAC). Additionally, essential Army civilians are trained in NBC survival skills. Because of today's battlefield complexities, the Army takes a systems approach to its training. NBC tasks for individuals are published in Soldiers' Training Publications and trained in the Army School System. Sustainment training occurs in the unit. NBC collective tasks are published in ARTEP Mission Training Plans. The highest level of NBC training recognizes NBC as a battlefield condition and units train to execute their mission-essential task list (METL) while under NBC conditions.

Mobilization Training

Fort McClellan was a major Reserve Component mobilization center for chemical units. As part of the mobilization process, these units received individual and unit NBC defense refresher training. During Operation Desert Shield/Storm, instructor personnel from the U.S. Army Chemical School trained numerous units to ensure currency in NBC tasks prior to deployment. As of 1 October 1997, Fort McClellan no longer is a mobilization center. All mobilization will be performed at Power Projection Platforms.

Medical Training

The U.S. Army Medical Department Center and School (AMEDDC&S) conducts Medical NBC Defense Professional Training at Fort Sam Houston, Texas consisting of four Soldier/Noncommissioned Officer (NCO) courses, two Officer courses and various related professional short courses.

AMEDD sergeants attend a 17 week Basic NCO Course (BNCOC) where NCOs with the MOS 91B (combat medic) are trained to be medical platoon treatment/evacuation team leaders. AMEDD BNCOC provides the NCO with the technical and tactical skills to conduct medical operations in a NBC environment, to manage and treat contaminated casualties, and to train non-medical soldiers in casualty decontamination procedures. In FY97, more than 387 junior NCOs were trained in this course.

All AMEDD officers begin training in the Officer Basic Course (OBC). This 11 week course prepares them with the fundamental knowledge to conduct medical operations in an NBC environment and to advise company, battalion, and medical treatment facility commanders in NBC contamination avoidance and the medical implication of NBC exposures. This experience includes a mixture of 39 hours of classroom instruction and 12 hours in their , field training exercises stressing and confidence building, hands-on equipment training and management of contaminated casualties. There are six courses for active Army components and five courses for Reserve/National Guard components annually. In FY97, over 1,700 officers were trained in these courses.

The AMEDD 19 week Officer Advance Course (OAC) is designed to provide advanced military education for officers with 3-9 years of time in service. Redesigned this FY to a small group format, the AMEDD officer participates in a group of 12-18 officers lead by one experienced officer. Discussions and assignments are facilitated by the small group leader with emphasis on sharing individual experiences for the collective good of the group. NBC subject matter expertise is provided when requested by the NBC contaminated environments with a capstone, Corps level, field training exercises, Medical Unit Staffs in Operations. In FY97, over 550 officers were trained in this course.

Medical NBC training emphasis is placed on supervision of medical operations in NBC contaminated environments with a capstone, Corps level, field training exercise, Medical Unit Staffs in Operations. Due to restructuring of this course for FY97, there was only one course offered to each of the active Army and Reserve/National Guard component. In FY96, more than 700 company grade officers were trained in these courses.

The Medical Management of Biological and Chemically Contaminated Casualties (M2BC3) Course provides DoD personnel, primarily physicians and nurses, with a working knowledge of the potential threat of chemical and biological weapons and the status and scope of medical defense strategies. It combines classroom instruction and a field experience to establish essential skills, install confidence and define limitations in therapeutic modalities with each type of medical setting. The course also instructs on the use of specialized

equipment and skills required for safe, long-distance evacuation. First-hand experience in triage, decontamination and medical operations on the integrated battlefield is stressed. This course is offered four times annually at the U.S. Army Medical Research Institute for Chemical Defense (MRICD), Aberdeen Proving Grounds, Maryland and the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), Ft. Detrick, Maryland. along with a shorter "road" course provided on-site for individual units or posts. . During the 36 courses taught in FY97, there were 1,405 Army, 107 Navy, 507 Air Force, 107 Civilians and 23 Foreign Nationals for a total of 2,149 personnel trained. A stand alone broadcast of the Medical Management of Biologically Contaminated Course was held on September 16, 18, 19, 1997. The training was conducted live via a Video Teleconference format to enhance the interactivity of the course with the 324 sites reaching more than 10,000 DoD, VA and Civilians.

Additionally, M2BC3 was presented to the Medical Corps specific OBC class as part of their initial training to the AMEDD. In FY96, there were 793 Army, 168 Navy, 30 Air Force, 156 DoD Civilians/National Guard/Reserve, and 650 Civilians (Atlanta fire, police, and EMT) personnel trained in this course, for a total of 1,797 personnel. A broadcast course presenting the Medical Management of Biological Casualties is being prepared and will be presented via video teleconference to multiple sites beginning September 1997.

The Medical NBC Professional Filler (PROFIS) Course is a ten-day two-week, Joint Service, course for the Medical NBC Officer (Nuclear Medical Science Officer or Preventive Medicine Officer) which stresses advanced instruction on the medical implications of NBC and directed energy environments. This year the course's theme stressed the importance of assessing the Topics range from the medical NBC threat, determining the risk of US service members, and effectively communicate the risk. of NBC to the structure of the Wartime AMEDD and are presented by subject matter experts from various DoD and Civilian agencies, such as the USACMLS, AFRRRI, Defense Intelligence Agency, and Scientific Ecology Group, Inc. Emphasis is placed on contingency operations, lessons learned from previous deployments, and domestic response exercises. and responsibilities of PROFIS Officers to their wartime units. In addition, each officer receives a "Battle Chest". This chest contains a notebook computer with modem, color printer, and digital references. The Battle Chest gives each officer the ability to perform their medical NBC duties in any deployable region. Of the 25 Battle Chests issued, three have been deployed with Preventive Medicine Officers to Bosnia in support of Operation Joint Endeavor and one was used during the anti-terrorism Exercise "Measured Response" at U.S. Army garrison, Fitzsimmons, Denver, Colorado.

Shortfalls in medical NBC simulations were addressed in FY96. There were two extensive initiatives started to train AMEDD officers in medical NBC, logistical, and operational knowledge. In the stand alone simulation, each officer will be placed in a virtual scenario in which they need to react in "real-time" to the operational tempo of the ongoing virtual battle. The long term goal of this simulation endeavor is to be incorporated, whether conceptually or entirely, into the WARSIM 2000 effort. Additionally, enhancements started

with existing simulations stressing the management of NBC contaminated casualties with an Observer/Controller on site to evaluate the thoroughness of decontamination procedures.

The Medical NBC Defense Training and Education Network provides distributed learning and digital references via the Internet. The focus of this web site is to improve the overall awareness of medical NBC issues and to enhance sustainment training capabilities. The "home page" [<http://www.nbc-med.org/>] provides doctrinal publications that are interconnected by keywords to allow for quick searches of topics. For training purposes, the user can download these documents. In addition to the internal search capability, this site has a state of the art, Internet search engine which allows the user to explore all electronic information in support of medical or NBC training. Training using multimedia technology is also being developed for use with this network. Currently, the Management of Chemical Warfare Injuries interactive training package and Medical Management of Biological Casualties Manual is accessible through the site with nuclear training to be added as they become available. The Future improvements to this network include: expanding connectivity to other military, governmental and private agencies; scheduling interactive training and education events; and adding related video, video conferences and training seminars to enhance training.

Air Force

Air Force policy is to train and equip only personnel in or deployable to NBC threat areas. The Air Force standards of proficiency are based on two international standardization agreements: NATO Standardization Agreement 2150 (NATO Standards of Proficiency for NBC Defense), and Air Standardization Coordinating Committee (ASCC) Air Standard 84/8 (Initial, Continuation and Unit NBC Standards). Both agreements are implemented through Air Force Instruction 32-4001, Disaster Preparedness Planning and Operations. The Air Force ensures proficiencies and currency of NBC warfare defense training through classroom training, unit level training, and exercises. NBC Defense Training (NBCDT) is required only for military personnel and emergency essential civilians in or deployable to areas where the use of biological or chemical weapons are threatened. Major Commands (MAJCOMs), the Air Reserve Component, and Direct Reporting Units may tailor their NBCDT programs to meet their specific mission requirements. The subjects presented in the classroom follow the three principles of NBC defense (avoidance, protection and decontamination) as identified in Joint Doctrine. The classroom training is followed by unit level training on wartime mission critical tasks. Supervisors train personnel to complete mission critical tasks while the workers are wearing their full complement of individual protective equipment. Exercises are used for training and evaluation purposes. Instructors at unit level receive their professional training through Air Force courses at Ft. McClellan, Alabama.

Individual Training

There are two types of individual training. The first is general equipment and procedures training that enables personnel to recognize and protect themselves and others from NBC hazards. The second is individual proficiency training that enables personnel to

perform their wartime tasks in a NBC contaminated environment. Detailed training comes with assignment to a threat area or to a deployable unit. Personnel receive six hours of initial equipment and procedures training to include mask confidence training within 30 to 90 days after arrival in a threat area or 90 days after assignment to a mobility position. NBC refresher training is at the discretion of the major commands, with the majority opting for annual refresher training through classroom training and exercise participation. Individual NBC proficiency training occurs through on-the-job-training and exercise participation.

Unit Training

Units in or deployable to threat areas must conduct at least two attack response exercises per year; overseas units often conduct graded attack response exercises more frequently. Air Force major commands have reported significant increases over the last three years in the number of people receiving equipment and procedures training as well as the number of hours spent for that training. The Air Force requires installations to conduct graded attack response exercises, consistent with the threat, at least:

- twice annually at installations in NBC threat areas
- once annually at installations in NBC non-threat areas
- An additional exercise for units with a mobility commitment based on the threat within the deployment area.

Navy

The Navy's standards of proficiency are contained in several publications:

NWP 62.1	Surface Ship Survivability (Series)
NSTM 470	Shipboard BW/CW Defense
NSTM 070	Radiological Recovery of Ships After Nuclear Weapons Explosion
NSTM 077	Personnel Protection Equipment
FXP-4	Mobility, Logistics, Fleet Support Operations, Non-Combat Operations and Explosive Ordinance Disposal Exercises
S 5080	US Navy Chemical/Biological Defense AA-HBK-010 Handbook

Individual Training

The Navy provides initial entry level CBR defense training to all officers and enlisted personnel in the accession programs. Enlisted personnel receive three hours of training (2 hours in the classroom; 1 hour in the lab) focused on the use of personal protection equipment and survival skills, including a CBR-D "confidence" chamber exposure. Officers receive two hours of class time focused on personal protection equipment and survival skills.

Unit Training

Proficiency training is conducted at the unit level by Navy instructors who are graduates of the NBC Defense course conducted by the Navy at Fort McClellan, Alabama. Navy units receive formal training prior to and during deployment. In addition to training, graded exercises are conducted semi-annually.

Marine Corps

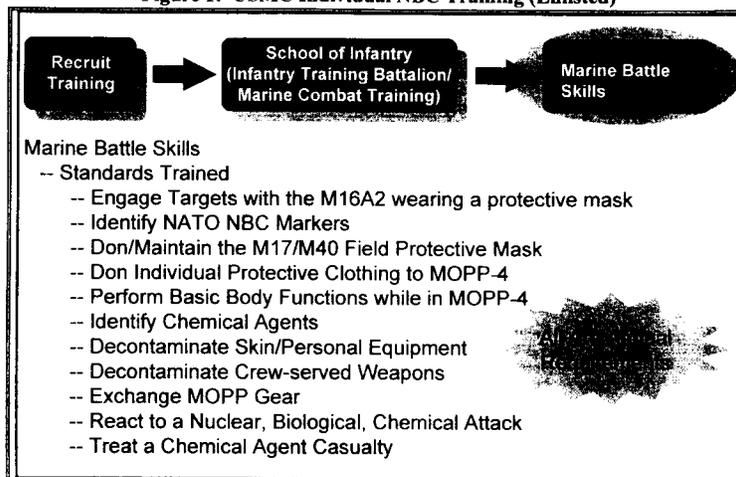
The Marine Corps' NBC training focuses on the ability to conduct operations throughout the battlespace with particular emphasis on amphibious deployment, littoral, and air/ground operations. The Marine Corps views NBC as an environment, similar to daylight/darkness, cold/heat.

Training requirements are derived from the Force Commander's Mission Essential Task Lists, Joint Universal Lessons Learned, Marine Corps Lessons Learned, Mission Need Statements and Fleet Operational Needs Statements. Once validated, the training requirements are introduced into the Systems Approach to Training (SAT) Process.

One of the results of the SAT process is the development of Training Tasks and Standards that will fulfill the training requirements. These tasks lists and standards are incorporated into Individual Training Standards (ITs) for individual Marines and Mission Performance Standards (MPS) for Marine units. These ITs and MPSs are published as Marine Corps Orders for standardization and compliance throughout the Marine Corps.

The Marine Corps breaks training down into two categories: Individual Training based on ITs and Collective (unit) Training based on MPS. Figure 1 shows the individual NBC training provided to all Marines both enlisted and officers.

Figure 1: USMC Individual NBC Training (Enlisted)



Individual Training

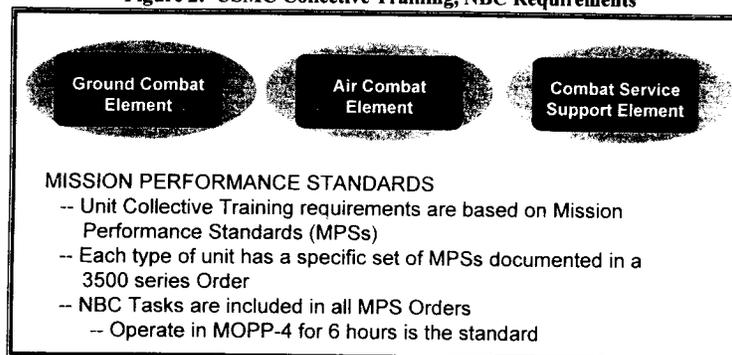
Enlisted entry level training begins at recruit training or “Boot Camp” where marines are introduced to the field protective mask and the gas chamber. All enlisted marines then proceed to the School of Infantry (SOI). NBC training is identical for all personnel. The training focus is surviving under NBC conditions. Training currently has transitioned from a classroom/academic environment to practical application/field environment to provide students more hands on experience.

Once Marines reach their units they begin the Marine Battle Skills program. Marine Battle Skills is a set of tasks which all Marines are required to be proficient in and are evaluated on annually. Marine Battle Skills NBC training focuses on providing marines the capability to survive as well as function under NBC conditions.

Unit Training

Unit level (or collective) training includes classroom and field training and is included in unit training exercises and plans. (See figure 2) Just as individuals are required to meet ITSSs, units are also required to meet very specific training standards. These requirements take the form of Mission Performance Standards (MPSs). Each type of unit in the Marine Corps has a set of MPS assigned to it. These MPSs are published as 3500 Series Marine Corps Orders.

Figure 2: USMC Collective Training, NBC Requirements



Each MPS Order includes NBC Tasks which the unit must accomplish. However, each set of requirements varies from unit to unit. For example, a Tank Battalion must be able to utilize the vehicle's NBC filtration system, decontaminate tanks, and operate tanks under NBC conditions. An Infantry Battalion on the other hand has no requirement to decontaminate tanks, but does have to decontaminate crew served weapons. Unit NBC defense training is overseen by unit NBC specialists who are graduates of the Army's Chemical Defense Training Facility at Ft. McClellan, Alabama. NBC evaluations are conducted annually for all Marine Corps units. Those units that are part of the Marine Corps' Unit Deployment Program and designated Marine Expeditionary Units are required to undergo an NBC evaluation prior to deployment.

NBC DEFENSE PROFESSIONAL TRAINING

Public Law 103-160 requires all Services to conduct NBC defense professional training at the same location. Currently, training is located at the U.S. Army Chemical School, Fort McClellan, Alabama. The Chemical School is planned for closure in FY99 and new training facilities are planned to be opened at Fort Leonard Wood, Missouri. Each Service conducts their training with their own Service instructors. The experts who graduate from the Service's technical training and the Army's Chemical Defense Training Facility become instructors for their Service's unit training.

Joint NBC Defense Professional Training

The U.S. Army Chemical School has established a Joint Training Steering Group (JTSG) as a forum to discuss issues that pertain to facilities and range scheduling and any other training issues that impact the ability of the Services to conduct effective training.

Plans are being made to exchange information on Service equipment, doctrine and employment techniques to establish a baseline for development of future Joint doctrine and professional training. The discussion concerning a Joint instructor pool is beginning. The concept is to consolidate classes that teach the same task to the Services using a Service instructor that has that skill. Conceivably, a Marine Corps instructor could teach a task to a class containing Army, Navy, Marine Corps, and Air Force students. For example, the Air Force now teaches a four-day block of instruction for the Navy concerning major accident response. This exchange will grow once the JSIG is staffed and funded to coordinate the effort.

Information exchanges between the Services were facilitated by the JSIG and plans put in place to review future doctrine and new equipment training plans. Discussion concerning a Joint instructor pool was shelved due to the planned transfer of training to Fort Leonard Wood, Missouri. The Army plans to consolidate common and shared (Chemical, Military Police, and Engineer) training. During consolidation training sessions, students from professional development courses conducted by all three schools will start at the same time, straining classroom and billeting resources. There are no further plans for migration to Joint instructional topics and/or Joint instructor pool.

Within the joint medical arena, a new course, "The Management of Chemical and Biological Casualties Course", has been established based on guidance contained in DoD Directive 6025.3, Clinical Quality Management Program in the Military Health Services (signed 20 July 1995). This directive requires that health care providers receive certification that documents preparation for assignments during military operations. This includes NBC defense training and provider courses where applicable. Certification will be reviewed by the medical commander annually. In addition, on 20 December 1995 the DoD completed a Directive "Military Medical Readiness Skill Training" (number to be assigned) which implements policy, assigns responsibility, and prescribes procedures for developing and sustaining comprehensive systems for providing, assessing, and monitoring military medical skills training essential for all military personnel, health care personnel, and medical units. NBC defense training, to include chemical and biological warfare defense measures and medical specialty training such as casualty management, are specifically articulated in the instruction.

Army NBC Defense Professional Training

US Army NBC Defense Professional Training at Fort McClellan, Alabama consists of three enlisted/noncommissioned officer courses and two officer courses. Initial entry enlisted soldiers receive training in chemical and biological agent characteristics and hazards, smoke and decontamination operations, chemical and radiological survey procedures and individual protective clothing and equipment. This one station unit training program provides 18 weeks of intensive training. It culminates with live/toxic agent training in the Chemical Defense Training Facility. Toxic agent training is an integral, mandatory component of all professional courses.

Chemical Corps sergeants attend the 15 week Chemical Basic Noncommissioned Officer Course (BNCOC) where they are trained to be an NBC company squad leader and a non-chemical company or battalion NBC NCO. Chemical BNCOC provides the NCO with the technical and tactical skills needed to advise company/battalion commanders in NBC operations and procedures, to train non-chemical soldiers in NBC avoidance, decontamination and protective measures and to lead smoke/decontamination squads.

Chemical Corps staff sergeants and sergeants first class attend the 13 week Chemical Advanced NCO Course (ANCOC) where they are trained to be an NBC platoon sergeant, an NBC NCO at brigade level, and an NBC NCO in a division or Corps level NBC element. They receive advanced technical operations, hazard estimates, logistics and maintenance management, combined arms operations, smoke and flame support, and training management.

Chemical Corps lieutenants attend a 19 week officer basic course which prepares them to serve either as a Chemical Corps smoke or decontamination platoon leader or as a non-chemical battalion chemical staff officer/assistant operations officer. This course provides them with a fundamental knowledge of NBC agent characteristics and hazards, NBC recon (non-FOX), decon and smoke operations, NBC staff functions, and individual/unit tactical operations, and biological detection operations. The course is a mixture of classroom instruction, hands-on equipment training, and field exercises. Completion of live/toxic agent training is a prerequisite for graduation.

Chemical Corps captains attend the 20 week officer advanced course where they are trained to serve as the commander of an NBC defense company and as NBC staff officers at the brigade and division level. Instruction focuses on leadership, Army operations, hazard prediction, planning and conducting NBC reconnaissance, decontamination, biological detection operations, and smoke and flame operations in support of maneuver units. Additionally, officers receive training in nuclear target analysis/vulnerability analysis, operational radiological safety, and environmental management. Extensive use is made of computer simulations to reinforce the application of NBC assets in support of tactical operations.

Specialized professional training is conducted in stand-alone courses attended by DoD, Allied, and international students. These courses include:

NBC Reconnaissance Operations (FOX)	(5 weeks)
Radiological Safety (Installation level)	(3 weeks)
Chemical Weapons Inspector/Escort (OSIA)	(1 week)
Chemical Weapons Convention Module II	(6 weeks)
Decon Procedures (Non-US) (GE, UK, NE)	(1 week)
RADIAC Calibrator Custodian	(1 week)
Biological Detection Specialist (BIDS)	(5 weeks)
Master Fox Scout	(2 weeks)
Long Range Biological Standoff Detection	(2 weeks)

Air Force NBC Defense Professional Training

The Air Force training detachment at Ft. McClellan offers seven separate in-residence courses designed to enhance the NBC proficiency of primary-duty AF Civil Engineer Readiness Flight personnel. These courses fulfill the differing needs of the total force, including Active Duty, Air National Guard, and Air Force Reserve. Further, the Air Force administers an exportable course designed to prepare people for in-residence training, a career development course taken through correspondence, and two mobile courses in airbase operability and NBC cell operations.

Each course contains a wide range of materials; covering critical aspects of Readiness Flight operations in situations ranging from peacetime, military operations other than war, through wartime. The following is a synopsis of the NBC aspects of these courses.

Training for personnel being assigned primary readiness duties includes comprehensive coverage of agent characteristics and hazards (to include determination of incapacitation/ lethality levels); nuclear weapons effects and other specific hazards associated with ionizing radiation; NBC detection and decontamination; contamination control and avoidance techniques; plotting and reporting procedures; detailed NBC persistency and duration of hazard calculations; the inter-relationship between NBC defense and other passive defense activities (e.g., camouflage, concealment, and deception, (CCD), dispersal, and hardening, etc.); and systematic analysis procedures for assessing the hazard and providing credible advice to commanders.

Air Force learning theory emphasizes hands-on training and the school makes extensive use of available training ranges and equipment. The school includes CDTF live agent training in most of their courses. Training is provided on every major piece of equipment available in the field today, including state-of-the-art items to be fielded in the near future.

The Readiness Flight Officer and 7-level Craftsman courses provide flight leaders and mid-level NCOs with the background and technical information that is necessary for effective management of the Readiness Flight and contingency response operations.

Readiness is the key to successful Air Force operations. Consequently, the various aspects of Readiness Flight operations, including NBC defense, are also topics of instruction at briefings for Air War College, Air Force Institute of Technology, or Joint Senior Leaders Courses.

Navy CBR Defense Professional Training

The Navy Training Center Detachment at Fort McClellan offers two courses of instruction for Navy Chemical, Biological and Radiological Defense (CBR-D) specialists. The courses are open to Navy, Coast Guard, Military Sealift Command and foreign

personnel, E-5 and above. Courses are designed to provide both afloat and ashore commands with individuals who can successfully perform their requisite duties in a CBR contaminated environment. In addition, the training enables CBR-D specialists to act as the primary CBR-D trainers for their respective commands.

The training capitalizes on the unique capabilities of the Army Chemical School. In addition to classroom instruction, the Navy Detachment utilizes the CDTF for live agent training and the Bradley Radiological/Laser Laboratory for training in theory and equipment operation for radiological defense. Approximately 500 students graduate annually from the Detachment's courses. In addition to being fully qualified to conduct training using the Army's facilities, the Navy Detachment actively participates as part of the Joint Training Steering Group.

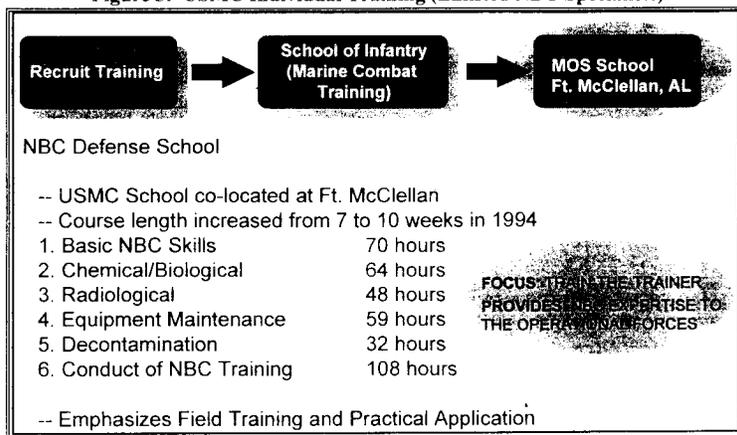
CBR-D training is incorporated into other courses such as the Senior Enlisted DC Program Management and Training, Damage Control Assistant, Repair Party Leader, and Explosive Ordnance Disposal.

Marine Corps NBC Defense Professional Training

The Marine Corps NBC Defense School at Ft. McClellan consists of an Enlisted Basic NBC Defense Course, and a newly developed Officer Basic NBC Defense Course. In addition to the courses conducted by the Marine Corps NBC Defense School, marines attend three other functional courses (Chemical Officer Advanced Course, NBC Reconnaissance Course, and the Radiological Safety Officer Course) conducted by the Army Chemical School.

The USMC Enlisted Basic NBC Defense Course trains approximately 200 NBC specialists in a comprehensive 10 week program covering all the Individual Training Standards specified in MCO 1510.71. The curriculum includes 108 hours of instruction on how to conduct NBC training. This training provides marines with the tools they will need on a daily basis as they perform their primary peacetime mission of conducting NBC Defense training to their units. The course is divided into six blocks of instruction as shown in figure 3.

Figure 3: USMC Individual Training (Enlisted NBC Specialists)



The USMC Officer Basic NBC Defense Course will be scheduled once a year to coincide with the graduation of newly selected warrant officers from the Warrant Officer Basic Course. The first iteration will be conducted was conducted in June 1997. The seven-week course will train about 24 students annually and provide instruction on all officer training standards specified in MCO 1510.71.

TRAINING IN A TOXIC CHEMICAL ENVIRONMENT

In 1987 the Army established the Chemical Defense Training Facility (CDTF) at Fort McClellan, Alabama. The CDTF allows personnel to train in a real toxic agent environment. Since its opening, the Army has utilized this valuable resource to train over 41,000 US and Allied members from all Services. Training philosophy demands that the military train the way it fights. The CDTF promotes readiness by providing realistic training in the areas of detection, identification, and decontamination of chemical agents. The training develops confidence in chemical defense tactics, techniques, procedures, and chemical defense equipment. Instructors ensure that trainees can adequately perform selected tasks on a chemically contaminated battlefield. To date, the CDTF has maintained a perfect safety and environmental record.

Enrollment at the Joint Senior Leaders Course and the Toxic Agent Leader Training Course at Fort McClellan continues to be in demand. However, due to funding constraints, both of these courses were deleted from course listings during the Training and Doctrine Command FY96 Course Review. The Joint Senior Leader Course continues as an unresourced course and units requesting Toxic Agent Training are accommodated if funding can be arranged. Over 1,200 active and reserve commanders, service leaders, and toxic agent

handlers from each of the services have attended. These experts become instructors for the Services for unit training. In addition to this training opportunity, toxic chemical environment training provides senior officers, commanders and future specialists confidence in their doctrine, warfighting techniques, and the equipment they fight with in the face of challenges presented by NBC contamination. Without this capability, training for all personnel would be theoretical, with no practical experience in a toxic environment.

There is growing international interest in CDTF training participation. Germany has been taking advantage of this training opportunity for about five years. The United Kingdom now uses this facility for training. Law enforcement agencies have also participated in the training.

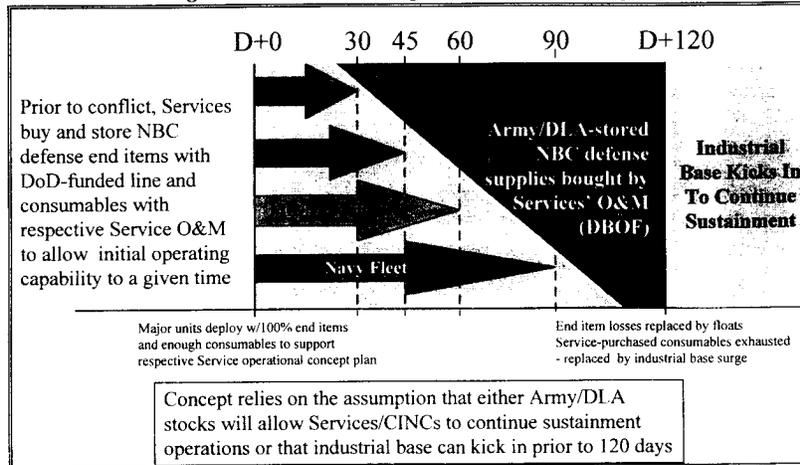
During FY95, the Base Realignment and Closure Commission (BRAC) placed Ft. McClellan on the base closure list and is planned for closure in FY99. The Chemical School and the CDTF will be closed and new training facilities are planned to be opened at Fort Leonard Wood, Missouri.

NBC DEFENSE LOGISTICS MANAGEMENT

NBC defense logistics management remains in transition. The Joint NBC Defense Board has begun to exercise full authority in this area; and the Joint Service Material Group (JSMG), which reports to the Joint NBC Defense Board, has been charged with coordinating and integrating logistics readiness. The JSMG has been instructed to limit its role to identifying current readiness and sustainment quantities in the DoD NBC logistics status, with respect to the two MTW scenario outlined in the Quadrennial Defense Review.

As currently planned, all Services retain "starter stocks" of NBC defense equipment that will support immediate deployments and initial operations. The length of time that these stocks will last each unit depends on the respective parent Service. Air Force wings deploy with 30 days of NBC defense consumables. Army divisions use a planning figure of 45 days, while Marine Corps forces and Navy shore units use 60 days as the basis for their plans. Navy ships store up to 90 days of starter stocks. In all cases, once these starter stocks are depleted, the military force turns to the NBC defense item managers for "swing stocks," also known as "sustainment stocks." (see figure 4)

Figure 4: War Reserve Requirements and Planning



DLA and the Army Materiel Command (AMC) are the inventory managers, or National Inventory Control Points (NICP) for the vast majority of NBC defense items in all four Services. They are responsible for industrial base development, acquisition, and storage of wholesale peacetime and sustainment wartime stocks. They buy (process procurement actions) and, if requested, store NBC defense materiel (swing stocks) for the Services. However, the Services must provide funding to DLA and AMC for the procurements.

Currently, only Army owned sustainment stocks are stored in DLA and AMC depots, providing only limited back-up for deployed forces during a contingency. Because of a lack of visibility of NBC defense items, unclear wartime requirements (given the post-Cold War environment), scarce Operations and Maintenance funds, and low priorities given to NBC defense stocks, the current quantity of NBC defense war reserves in DLA and AMC have been largely depleted and will not support sustainment requirements during a full two MTW scenario.

Service inventories of NBC defense items maintained at unit level use either manual records or a semi-automated tracking system. Stocks held at wholesale level are maintained using a separate automated system. Currently, there is little connectivity between the two systems. For example, the Air Force established the Mobility Automated Inventory Tracking System (MAITS) to provide a semi-automated tracking system for chemical warfare defense equipment (CDE) items. MAITS has provided for increased Air Force staff asset visibility for installation CDE stocks, but it does not provide information flow directly into the wholesale databases. This system will, however, provide an interim Air Force CDE logistics tracking net until current Air Force automated databases are linked under the DoD Total

Asset Visibility (TAV) program. While other Services' sub-automated databases have different names, their problems are similar. As a result, there is limited Service level asset visibility for NBC defense items. The Services are addressing this deficiency under the auspices of TAV, a long-term initiative which will link existing DoD logistics automated systems.

Both DLA and AMC will remain key players in the future NBC defense logistics management system. The Joint NBC Defense Board, through the JSMG, provides coordination and integration, based upon the input of all Services' and Commanders-in-Chief (CINCs'). DLA and AMC will continue to provide services such as raw data collection, inventory control, and a distribution infrastructure. With the validation of JCHEMRATES IV, the Services and DLA can immediately begin plans to improve their readiness and sustainment status.

INTEGRATION OF REALISM INTO WARGAMES/EXERCISES

Senate Resolution 75 reporting requirement

(xi) a description of progress made in incorporating chemical and biological considerations into service and joint exercises as well as simulations, models, and war games and the conclusions drawn from these efforts about the United States capability to carry out required missions, including missions with coalition partners, in military contingencies;

Simulations and Wargames

Incorporation of NBC features into relevant simulations, including portrayal of NBC weapons effects is essential. Currently, there are several engineering level models which represent the fluid dynamics of NBC contamination. However, relatively few robust representations of NBC effects have been fully implemented in wargames and analytical models used by DoD. The Concepts Evaluation Model (CEM), used by the Army Concepts Analysis Agency, captures NBC effects off-line. Corps level models such as Vector-In-Command (VIC) and Division models such as Combined Arms and Support Task Force Evaluation Model (CASTFOREM) have some NBC capabilities and are continually being improved. JANUS, a division BDE level model, also has some NBC capabilities that are being improved and updated. Force Evaluation Model (FORCEM) has been modified for theater level play. The configuration controlled version of Tactical Warfare (TACWAR) has had within it a chemical module for theater level chemical play that is under examination by the Joint Staff, and OSD for its ability to accurately model the effects of chemicals on a theater level warfight.

Incorporation of WMD features in relevant models, including faithful portrayal of CB aerosolization and electromagnetic pulse (EMP) effects is essential. The incorporation of CB weapons into the base cases of the computer wargame Louisiana Maneuvers (LAM) versions of the combat development and training model Janus-A and the ongoing iteration of the Army's Total Army Analysis (TAA) process using FORCEM, mark the first time major decisions have considered CB weapons as a part of the standard battlefield. For the LAM Janus-A (CB), the next step is to adopt the CB improvements into the Army Standard Janus-A model. This will put CB effects into a widely used training simulation and provide a Janus-A training audience the opportunity to understand the impacts of CB weapons. ACES, an Air Force Command Exercise System is a family of joint wargames which currently has robust nuclear simulations with chemical and biological planned for the near future. All existing models need to be modified in the biological area. To date, there has been limited model modification for biological play except for the current modifications ongoing to Janus.

Each of the services conducts wargames, which incorporate WMD in the scenarios, in their respective senior level service schools. The Joint Land, Aerospace, and Sea Simulation (JLAS), a joint exercise with all the senior service schools participating, hosted by the Air Force Wargaming Center at Maxwell AFB, Alabama, incorporates electronic simulation of

the NBC environment. The Navy has conducted a Naval Battle Analysis to provide a tool to analyze the effects of CB agents on Naval operations and permit the incorporation of realistic assessments of CB warfare effects into Naval wargames. As a result, the Vapor, Liquid, and Solid Tracking (VLSTRACK) Model has been integrated into selected wargames and demonstrated to participants.

The current gaming simulations (e.g., Corps Battle Simulation and Brigade/Battalion Battle Simulation) do not provide commanders and staffs with the tools that will enhance their ability to manage a battle fought under CB conditions. The fix for these legacy systems is through upgrades to the existing models, with funds provided by the proponent. The long term correction to this shortfall is the development of the future gaming simulations (Joint Simulation, Warfighter Simulation 2000 and Combined Arms Tactical Trainer). These simulations have a requirement for a very diverse synthetic environment, an absolute must in order to replicate the NBC hazards of the future battlefield. With the establishment of proper conditions, commanders and staffs can truly comprehend the management problems associated with conducting war in an NBC environment.

Current training exercise gaming simulations do not sufficiently challenge commanders and staffs to apply NBC defense training doctrine and leader-development training strategies to prepare their forces to maintain operational continuity and achieve mission success in an NBC and smoke/obscurant environment. To be an effective training mechanism, these simulations must challenge training audiences to understand threat NBC intent and capabilities. Simulations must also allow players to visualize how NBC capabilities impact the battlespace and effect friendly courses of action and operation plans. Additionally, effective simulations must allow players to apply NBC defense principles and capabilities to set conditions for mission success against NBC capable threats. The fix is to ensure development of future gaming simulations (Joint Simulation, Warfighter Simulation 2000, and Combined Arms Tactical Trainer) which accurately replicate the NBC hazards and smoke conditions of future battlefields and their effects on friendly systems. Only then can commanders and staffs train and develop required high order battlefield cognitive skills that will allow full integration of enemy intent and capabilities, NBC environment effects, and friendly force capabilities into the development of a winning plan.

There is currently no standardized instrumentation system (IS) that can realistically portray all facets of Nuclear, Biological and Chemical training to train the total force. The U.S. Army Chemical School is developing NBC Recon training devices for the detection and tracking of simulated NBC contamination at Maneuver Combat Training Centers (CTCs) and home station training areas. Proposed training IS will retrieve, process and calculate digital contamination data for maneuver units, and will also include AAR feedback in the areas of NBC casualties, change of custody, and reaction procedures during NBC attacks and operations. This IS would provide a realistic replication of NBC contamination as portrayed on the Battlefield. Resourcing will be pursued to field proposed training devices at CTCs and other locations.

Joint NBC Training/Joint and Combined Exercises

In an effort to improve and add realism to NBC training, the Joint Staff in Joint Pub 3-11, Joint NBC Defense Doctrine, formalizes the doctrine for Joint NBC training and exercises. During Positive Force (PF) 98 (Mobilization) and Positive Force (PF) 99 (Deployment), Atlantic Command (ACOM), in its role as the force provider, ensures that deploying units and personnel are certified as combat ready. The 1996 NIEX tested our nation's ability to respond to a crisis involving biological weapons.

Joint Vision 2010 provides the operational based templates for the evolution of our Armed Forces to meet WMD challenges posed by our enemies. JV.2010 serves as the Doctrine, Training, Leader-development, Organization, and Material requirements (DTLOM) benchmark for Service and Unified Command visions. The NBC defense cornerstone resource for this vision of future warfighting embodies three required operational imperatives:

First, and most important, CJCS and Service leader recognition that NBC strategic and operational level of war expertise is an essential resource requirement in the Joint Warfighting Center (JWFC) and USACOM Joint Training and Analysis Center (JTASC). Success for Joint Vision 2010, a strategy centered on capabilities-based forces, requires these organizations to successfully accomplish their respective joint NBC defense doctrine, training, and leader-development roles, and for USACOM to accomplish its NBC defense mission as force provider, force trainer, and force integrator. NBC expertise at all levels and from all Services is paramount.

Second, Unified Commands that are appropriately staffed with the right NBC expertise to meet current and future requirements to shape and respond to threat NBC challenges.

Third, doctrine, training, and leader-development training strategies that facilitate sophisticated battlefield visualization and situational awareness proficiency, allowing commanders and staffs to conduct service, joint, and combined operations in an NBC environment.

Chairman of the Joint Chiefs of Staff (CJCS) Exercise Program

Joint NBC defense training objectives have been incorporated into the CJCS Exercise Program. This program includes three different types of exercises

- (1) **Positive Force (PF)** exercises are large scale Command Post Exercises that normally consider national level issues such as mobilization and deployment. During PF 98 (Mobilization) and PF 99 (Deployment), Atlantic Command (ACOM), in its role as the force provider, ensures that deploying units and personnel are certified as combat ready. An integral part of this certification procedure is determining unit, personnel, and equipment operational readiness under NBC conditions.

- (2) **Positive Response (PR)** exercises normally consider strategic level nuclear level issues. In addition to considering command and control of nuclear forces, these exercises deploy, and backup national command and control personnel and systems annually. Capabilities of these redundant systems are equally applicable during chemical and biological scenarios as they are during nuclear scenarios.
- (3) The **No-Notice Interoperability Exercise (NIEX)** program continues to focus on our ability to interdict the proliferation of nuclear, chemical, and biological weapons. In 1995, the NIEX required the interagency process to respond to a foreign nation's request to interdict and recover three stolen nuclear weapons. National level forces were deployed in response to this crisis. The 1996 NIEX tested our nation's ability to respond to a crisis involving biological weapons.

Army

The Army emphasizes integration of NBC defense training in unit rotations at the Combat Training Centers (CTCs). These centers include the National Training Center (NTC), Joint Readiness Training Center (JRTC), the Combat Maneuver Training Center (CMTC), and the Battle Command Training Program (BCTP).

The Army continues to see positive results in training based on external evaluation of unit Army Training and Evaluation Programs (ARTEPs) conducted at the NTC, JRTC, and other training locations world-wide. These results clearly show and emphasize that through continued training, soldiers can increase their ability to perform combat missions despite degradation caused by wearing a protective ensemble. Units which (1) have the necessary command support and equipment, (2) balance NBC within their overall training requirements, and (3) execute according to approved training plans, perform their overall mission better in a simulated NBC environment. However, increasingly constrained training resources limit training to fundamentals; often this means training for operating in an NBC environment is not funded.

Air Force

NBC warfare defense preparedness is an integral part of periodic Operational Readiness Inspections conducted by Major Command Inspectors General. Realism is injected into these scenarios using a simulated wartime environment including the use of bomb simulators, smoke and attacking aircraft. Personnel are tasked to perform war skills while in their full complement of protective equipment. Additionally, Air Force units participate in major joint and combined exercises which incorporate realistic NBC situations. Following are examples from the Pacific Air Force (PACAF) which describe exercises incorporating NBC situations:

- TEAM SPIRIT - Joint/combined large scale air, sea, land exercise to demonstrate US resolve in South Korea.

- ULCHI FOCUS LENS - Joint/combined command and control exercise conducted in conjunction with the Republic of Korea's national mobilization exercise "ULCHI."
- FOAL EAGLE - Joint/combined rear area battle and special operations field training exercise.

Navy

Due to the unique nature of Naval vessels, CBR defense training is conducted similarly whether platforms are operating independently or in a group. Even in a battle group scenario, the task force would still continue with the mission while each unit would conduct NBC defense against certain attacks. Therefore, formal training is conducted by Afloat Training Groups while platforms are operating independently. Required training exercises are conducted by each unit every three months in order to maintain their readiness rating. During scheduled NBC defense training periods, realism is stressed. NBC defense equipment is used extensively. Protective masks and suits are worn by required personnel.

Inter-Deployment Training Cycle (IDTC) are notional cycles which have at least four full scale CBR-D exercises conducted prior to the predeployment readiness evaluation. Exercises incorporate all personnel and demonstrate all CBR-D equipment. Also, readiness standards require that at least two full-scale graded CBR-D exercises be conducted every six months.

Marine Corps

The Marine Corps incorporates NBC training into combined arms exercises at the Marine Corps Air Ground Combat Center in Twenty Nine Palms, California. Battalion level unit exercises are also conducted during Korea and Thailand Incremental Training Programs where units deploy and exercise various tasks. Like the Air Force and Army, the Marine Corps also participated in major joint/combined exercises. The level is determined by mission, threat, and task organization. During FY96, the Marine Corps incorporated NBC defense training into such exercises as JTF Exercise UNITED ENDEAVOR, ULCHI FOCUS LENS 96, FOAL EAGLE and IMEFEX 96. It should be noted that all Marine Corps units must also conduct quarterly NBC exercises. Evaluations include operational, administrative, and logistical functional areas. These exercises incorporate realistic NBC defense training into the exercise scenario to enhance the value of the exercise.

INITIATIVES

Joint

Modeling

The Deputy Assistant Secretary of Defense for Counterproliferation and Chemical and Biological Defense, DATSD(CP/CBDBM), and the Deputy Under Secretary of the Army

for Operations Research (DUSA-OR) have initiated a CB Modeling Process Action Team whose purpose is to “provide OSD with a consolidated and integrated CB modeling program, where possible, harmonizing individual Service and Agency work into joint programs and eliminating duplication and overlapping projects.” We initiated a system to establish configuration control and a model repository and data base through the CB Information Analysis Center. Our goal is to allow all aspects of CB defense to be performed in the Distributive Interactive Simulation (DIS) arena.

In response to a Joint Requirement Oversight Council (JROC) question concerning the impact of weapons of mass destruction (WMD) on medical force structure, the Joint Staff is currently conducting a “Joint WMD Analysis” using the models TACWAR and METRIC to evaluate the effects of chemical and biological agents on theater level warfighters. Among the many issues related to use of WMD, potential casualties of WMD will be used to review medical force structures.

Training

Army

In an effort to refine doctrine and training, the Army is quantifying the impact of NBC environments on combat operations. Two programs have been executed to achieve this goal: (1) Combined Arms in a Nuclear/Chemical Environment (CANE), and (2) Physiological and Psychological Effects of the NBC Environment and Sustained Operations on Systems in Combat (P2NBC2). These Force Development Testing and Experimentation (FDTE) evaluations have improved our understanding of individual and unit operations and performance degradation while in Mission Oriented Protective Posture (MOPP). The CANE FDTE evaluations quantified field data that commanders can use for planning, training and decision making to respond to the threat.

The Army, as proponent for CANE tests, has completed five field evaluations (mechanized infantry squad/platoon in 1983, tank company team in 1985, armor heavy battalion task force in 1988, light infantry forces in 1992, and air defense artillery in 1993). The Army has established the CANE Implementation Plan (CIP), Chemical Vision Implementation Plan (CVIP) a systematic review process to ensure identified deficiencies are addressed and corrected. The Commander of the Army’s Training and Doctrine Command (TRADOC), Commandant of the Army’s Chemical School reviews the CIP CVIP annually. Army field manuals are then revised to address deficiencies identified in CANE tests.

Before CANE FDTEs were conducted, commanders’ training in a simulated NBC environment had an indication of the degradation that MOPP places on their operations. They were aware that training could maximize proficiency, but they lacked the feedback to direct that training. Consequently, training was often sporadic and incomplete.

The Army is now implementing several training guidance improvements by:

- Providing heightened command emphasis to unit commanders on NBC threat with attention to Third World countries;
- Simulating NBC environments in training;
- Continuing emphasis and effort to integrate safe, realistic NBC defense in all training;
- Extending wear of MOPP gear in basic and annual training.

Air Force

The Air Force currently has three training and readiness initiatives underway and continues to improve its professional training.

The Civil Engineer Readiness Technical School implemented an advanced course at the CDTF. The training is scenario driven, versus lockstep, and revolves around a terrorism incident involving chemical munitions. Air Force instructors are qualified to conduct joint classes at the CDTE and are fully integrated into CDTF operations. Readiness personnel lead every Air Force class through the training and also assist the other services with their training requirements.

The school is in the process of revising its courses of instruction in order to meet the requirements of the Specialty Training Standard (STS) approved in October 1996. The new STS requires Readiness personnel be much more qualified in biological warfare operations, to include the use of emerging detection and plotting technologies.

Air Force Readiness personnel in the field who are enrolled in correspondence courses for upgrade training to the five skill level will have the opportunity to elect to receive the course on fully interactive CD-ROM with full motion-video and sound. The course is presently available only in a paperback version, which will continue to remain available after the CD-ROM release. Interactive courseware began development in fiscal year 1997.

Navy

The Navy's main initiative is integration of CBR-D requirements in the tactical training strategy. These requirements are executed via the interdeployment training cycle's aggressive training and material readiness program. Additionally, the funds made available from the FY96 National Defense Authorization bill are being utilized to upgrade existing training aids and delivery of training support ADP equipment to all units. Navy is also investigating required preparations and training associated with large area decontamination.

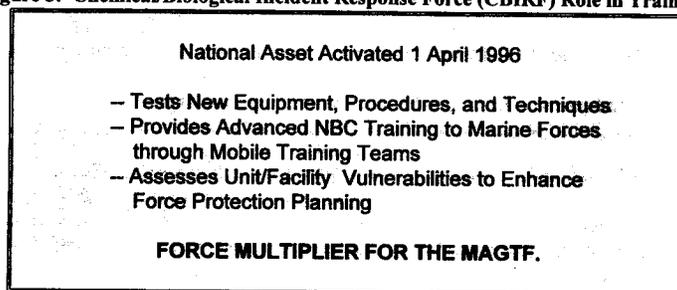
Additionally, the Navy's basic NBC defense course has been incorporated in both officer and enlisted accession training curriculums. In conjunction with this initiative, the same course taught at the fleet training centers has been restructured to improve throughput.

Marine Corps

During FY96, the Marine Corps training initiatives centered on the establishment of a Chemical and Biological Incident Response Force (CBIRF) to counter the growing biological and chemical terrorist threat. The CBIRF was activated April 1, 1996 and was deployed to the Olympics in Atlanta during the summer.

During FY97 the Marine Corps Chemical Biological Incident Response Force (CBIRF) continued to refine its tactics, techniques, and procedures to respond to the growing biological and chemical terrorist threat. The CBIRF was activated April 1, 1996 and has deployed to the Olympics in Atlanta, the Republican National Convention, the Presidential Inauguration, the Summit of Nine Conference in Denver, Colorado, and numerous other exercises to include Agile Lion, Bold Endeavor, and Ill Wind. The CBIRF was a primary participant in both the BIO-911 Advanced Concept Technology Demonstration (ACTD), and the Port and Airfield ACTD during FY-97.

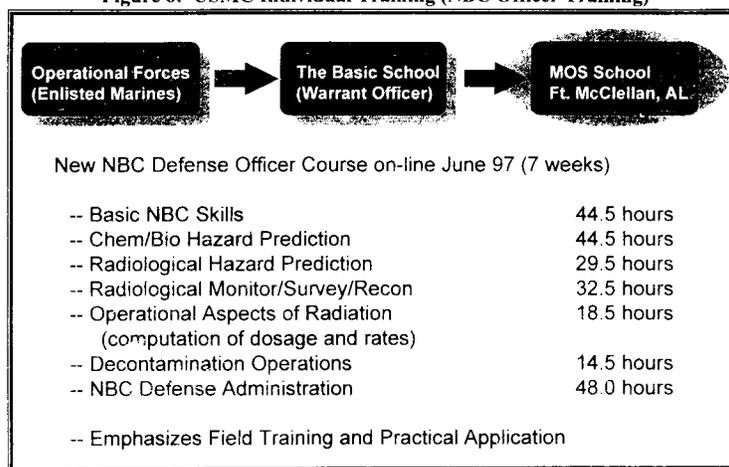
Figure 5: Chemical/Biological Incident Response Force (CBIRF) Role in Training



The CBIRF focuses on consequence management to terrorist-initiated NBC incidents. The CBIRF is a national asset, to be globally sourced to Marine Force Commanders and National Command Authority for duties as the President may direct. The CBIRF consists of 380 skilled and trained personnel, including civilian experts. The organization consists of six sections: Command (including a Reach-Back Advisory Group), Security, Service Support, NBC Reconnaissance, Decontamination, and Medical. The CBIRF is equipped with state-of-the-art detection, monitoring, and decontamination equipment and is prepared for operations in a wide range of military-civilian contingencies. The Commanding General, Marine Corps Combat Development Command will continue to develop concepts, doctrine, and tactics, techniques and procedures for this CBIRF. In addition to the CBIRF's capabilities to respond to chem/bio incidents it serves as a training asset to the operational forces. The CBIRF will provide mobile training teams to various units to provide advanced NBC training to unit NBC specialists (train-the-trainer). This will provide operational forces with the most up-to-date NBC techniques, tactics, and procedures developed by the CBIRF. CBIRF will

also conduct Unit/Facilities Vulnerability Assessments to enhance force protection. The bottom line is that the CBIRF will serve as a force multiplier to the MAGTF.

Figure 6: USMC Individual Training (NBC Officer Training)



NBC OFFICER TRAINING. Establishment of a Marine Corps Basic NBC Officer Course is complete. This course provides the requisite NBC skills to newly selected Marine Corps NBC Defense Officers. The first course began in June 1997. All Marine NBC Officers are Warrant Officers, usually selected from NBC Defense specialist enlisted ranks. As Warrant Officers, they focus entirely on technical expertise, NBC Defense training, and supervision of enlisted NBC Defense specialists. In the past, Warrant Officers relied on the training they had received as enlisted NBC Defense Specialists and on-the-job training. However, the new NBC Defense Officers Course will be geared specifically towards Warrant Officers and will build on previous training received. The NBC Officers course is geared toward Warrant Officers and builds on previous training and experience.

NBC Officers also attend the Army's Chemical Officer Advanced Course and Joint NBC courses as part of advanced Military Occupational Specialist (MOS) training.

Marine Corps initiatives for FY97-98 will include:

- Integration of NBC defense procedures in Mission Oriented Tasks (Garrison and Field).
- Review MCO 1510.71, Marine Corps NBC Specialist Individual Training Standards (ITS).

- Conduct NBC Defense Course Content Reviews based on revise ITS's and emerging NBC equipment requirements.
- Conduct Table of Equipment and Table of Organization Reviews.
- Complete implementation of an NBC Staff Planning follow-on course, a training course to prepare NBC defense officers and NCOs to assist in the staff planning process.
- Establishment of combat training package for ISMs for reserve forces and follow-on forces in the event of hostilities involving an NBC threat.
- Conduct 2d Annual Joint Marine Corps and Navy shipboard decontamination exercises with 7th Fleet.
- Continue participation in a bilateral exchange program with the Republic of Korea (ROK) Chemical Corps.

READINESS REPORTING SYSTEM

CJCS MOP 11, the policy document for the Status of Resources and Training System (SORTS) requires units from all Services to independently assess their equipment on hand and training status for operations in a chemical and biological environment. This is a change to previous SORTS reporting requirements, and provides more visibility to NBC defense related issues.

The Services individually monitor their SORTS data to determine the type of equipment and training needing attention. Units routinely report their equipment on hand and training status for operations in a chemical or biological environment. Commanders combine this information with other factors, including wartime mission, to provide an overall assessment of a unit's readiness to go to war.

Additionally, the Commanders-in-Chief (CINCs) of the Unified Commands submit readiness assessments at each Joint Monthly Readiness Review (JMRR). In the JMRR, CINCs assess the readiness and capabilities of their command to integrate and synchronize forces in executing assigned missions. As needed, CINCs address NBC defense readiness and deficiencies as part of the JMRR.

JOINT NBC DEFENSE DOCTRINE

Senate Resolution 75 reporting requirement

(xii) a description of progress made in developing and implementing service and joint doctrine for combat and non-combat operations involving adversaries armed with chemical or biological weapons, including efforts to update the range of service and joint doctrine to better address the wide range of military activities, including deployment, reinforcement, and logistics operations in support of combat operations, and for the conduct of such operations in concert with coalition forces;

The scope of Joint Pub 3-11, *Joint Doctrine for Nuclear, Biological, and Chemical (NBC) Defense*, includes providing guidelines for the planning and execution of NBC operations. Its focus is on the NBC threat; national policy; and considerations peculiar to the preparation and conduct of NBC defense. These considerations include principles of theater NBC defense, logistics support, medical support, training, and readiness. Although NBC defense doctrine is briefly addressed in 29 other joint doctrine publications further development may be required, particularly in the area of joint tactics, techniques, and procedures. The U.S. Army Chemical School has been tasked by the Joint Warfighting Center to re-write the publication. In the meantime, Joint Pub 3-11, in conjunction with CJCS CONPLAN 0400-96, provides a foundation for combatant commands to train and evaluate their forces.

Joint NBC Defense Doctrine Program Management

The NBC defense program management strategy provides the mechanism to provide assistance to the Joint Staff in the further development of Joint NBC defense doctrine program. The Joint Service Integration Group (JSIG) has begun is coordinating with the Services to ensure the program is realistic and meets the needs of the Joint community.

Joint NBC Defense Doctrine Development Program

The FY95 effort consisted of several initiatives to analyze and develop a requirements list for NBC defense doctrine programs that will be used to develop a strategy for recommending changes to the next generation of Joint NBC defense doctrine. Work began on a multi-year NBC Defense Joint Doctrine Development Action Plan (JDDAP) that will serve as a road map for these recommended changes. The draft doctrine emerging from this process will be validated using simulations and then used to recommend a revision of Joint Pub 3-11, where appropriate.

During FY96, manning of a five member U. S. Army Chemical School (USACMLS) Joint Doctrine Cell was completed. Also in FY96, a contract was awarded to perform the Service doctrine and open publication literature search, and to develop a data base and library to be used in preparing the JDDAP. This effort will identify existing doctrine, tactics, techniques and procedures used by the Services; correlate areas of commonality; identify

voids; and ultimately prepare the road map (JDDAP) for joint doctrine efforts. Reference material has been delivered to the USACMLS. An In-process Program Review (IPR) is to be scheduled at which time initial recommendations for the JDDAP will be presented to the USACMLS. Coordination with other Services is to be scheduled

Projects included the initial draft of multi-service procedures for the NBC defense of fixed sites, ports and airfields; development of operational level doctrine for biological detection and warning; revisions of decon procedures for operational decontamination; and topic outlines of proposed revisions to Joint Pub 3-11. Support was provided to exercises such as CHEMWAR 2000 and Global 97.

Army Medical Doctrine Development Program

The FY96 effort consisted of several initiatives to update AMEDD NBC defense doctrine products and develop coalition medical NBC procedures. Two AMEDD doctrine field manuals were updated. They were FM 8-9 (NATO Handbook on the Medical Aspects of NBC Defensive Operations AMedP-6(B)) and FM 8-285 (Treatment of Chemical Agent Casualties and Conventional Military Chemical Injuries). FM 8-9 and FM 8-285 are multi-service publications.

The AMEDD participated in numerous NATO medical NBC procedural products development resulting in several NATO Standardization Agreements (STANAGs). Further, the AMEDD participated in Quadripartite Working Group to develop additional medical NBC procedural product agreements (QSTAGs). STANAGs and QSTAGs are reviewed for integration of these agreements into Army-specific doctrine literature publications.

A new AMEDD doctrine literature publication provides medical management and treatment procedures for biological warfare agents is in the early planning stage. This manual will most likely become a multi-service publication.

The FY97 effort consists of initiatives to develop new AMEDD NBC defense doctrine products and provide input to multinational medical NBC procedures. One AMEDD doctrine field manual is underdevelopment and one is proposed for development. They are FM 8-284 (Treatment of Biological Warfare Agent Casualties) and FM 8-283 (Treatment of Nuclear Warfare Casualties and Low-Level Radiation Exposure). The two manuals will be developed as multiservice publications. The initial research is underway and material is being consolidated for the initial draft of the FM 8-284. Development of FM 8-283 will begin after work on FM 8-284 is in advanced stages of completion. Doctrine for nuclear, biological, and chemical-environment (NBC-E) will be developed and incorporated into current and new manuals as the technology allows. The area of NBC-E is not new, but emphases is being increased on the effects of long-term exposure to low-levels (subclinical levels) of NBC agents and industrial radiation, biological and chemical hazards.

The AMEDD participated in numerous NATO medical NBC procedural products updates and development, resulting in several NATO Standardization Agreements

(STANAGs) being updated. Further, the AMEDD participated in a Quadripartite Working Group to develop and update additional medical NBC procedural product agreements (QSTAGs). STANAGs and QSTAGs are reviewed for integration of these agreements into Army-specific doctrine literature products as well as multiservice medical doctrine products for which the AMEDD is proponent.

Air Force Medical Doctrine Development Program

HQ USAF/SGXR intends to participate with the Army in development of two doctrine field manuals that are proposed for development. These are Treatment of Biological Warfare Agent Casualties and Treatment of Nuclear Warfare Casualties and Low-level Radiation Exposure. HQ USAF/SGXR also intends to undertake development of a manual standardizing wartime medical contamination control operations. During FY97 SGXR has also participated in the review of numerous NATO Standardization Agreements that were updated during the year.

PROTECTION OF UNITED STATES POPULATION CENTERS

<p>Senate Resolution 75 reporting requirement</p> <p>(xii) a description of progress made in resolving issues relating to the protection of United States population centers from chemical and biological attack, including plans for inoculation of populations, consequence management, and a description of progress made in developing and deploying effective cruise missile defenses and a national ballistic missile defense.</p>
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Progress made in resolving issues relating to the protection of United States population centers will be addressed in two separate reports to the Congress which are currently being prepared by the Assistant Secretary of Defense (Special Operations and Low Intensity Conflict). The first report, required by the Veterans Benefit Act of 1997, titled *Presidential Report on Preparation for a National Response to Medical Emergencies Arising from the Terrorist Use of Weapons of Mass Destruction*, will describe medical response activities. This report is scheduled to be delivered to the Congress no later than 1 March 1998. The second report, required by the Weapons of Mass Destruction Act of 1996 (Nunn-Lugar-Domenici), titled *Domestic Preparedness Programs in Defense Against Weapons of Mass Destruction*, will describe progress related to consequence management involving protecting our civilian population centers. This report will be provided no later than 27 February, 1998

Defense of US population centers against ballistic or cruise missile attack with chemical or biological payloads poses different requirements than those addressed by the theater missile defense systems, though many of the studies and models developed for theater missile defense have application. A national missile defense system is in active development. Cruise missile defense is under study to establish the method of engagement and desired outcome. These studies will define the data requirements to refine the lethality performance tools. Engagement of ballistic missiles by a national defense system will be at closing velocities much higher than those present in theater defense. The Ballistic Missile Defense Organization's (BMDO) lethality program-developed intercept model - PEELS (Parametric Endo/Exoatmospheric Lethality Simulation) may be employed as developed for theater missile defense, but the high closing velocities require added validating data. The higher velocities cannot be achieved in ground testing - necessary for the collection of accurate target response. To satisfy the requirement, hydrodynamic codes were being validated under a BMDO program of investigation at the Department of Energy National Laboratories and in the UK. The hydrodynamic codes will be employed to produce high velocity "data" to benchmark PEELS in that engagement regime. That effort was conducted under the lethality program through 1997. Continuation of the effort is awaiting specific requirements from the national missile defense system. The defense against cruise missiles poses a different problem. PEELS can be employed to model target response, but the engagement velocities are not sufficiently great to ensure breakup of the agent payload, nor are the engagement altitudes sufficient to allow dispersion of released agent before it reaches the ground. Defeat of this threat may involve a form of agent neutralization through burn or other chemical reaction, or though crashing a relatively intact vehicle to contain and burn the

agent. When the engagement mode and desired outcome are identified, the lethality program can investigate and model the event. Once either threat, ballistic or cruise missile, is intercepted the lethality program's Post-Engagement Ground Effects Model (PEGEM) is available to predict the ground effect and support warning and reaction by the defensive forces.

Annex A**Text of****Senate Executive Resolution 75, To advise and consent to the ratification of the Chemical Weapons Convention, subject to certain conditions, April 17, 1997, Condition****11: Enhancements to robust chemical and biological defenses, paragraph (F)**

(F) Annual reports on chemical and biological weapons defense activities.--On January 1, 1998, and annually thereafter, the President shall submit a report to the Committees on Foreign Relations, Appropriations, and Armed Services of the Senate and the Committee on International Relations, National Security, and Appropriations of the House of Representatives, and Speaker of the House on previous, current, and planned chemical and biological weapons defense activities. The report shall contain for the previous fiscal year and for the next three fiscal years--

- (i) proposed solutions to each of the deficiencies in chemical and biological warfare defenses identified in the March 1996 report of the General Accounting Office entitled "Chemical and Biological Defense: Emphasis Remains Insufficient to Resolve Continuing Problems", and steps being taken pursuant to subparagraph (B) to ensure that the United States Armed Forces are capable of conducting required military operations to ensure the success of United States regional contingency plans despite the threat or use of chemical or biological weapons;
- (ii) identification of the priorities of the executive branch of Government in the development of both active and passive chemical and biological defenses;
- (iii) a detailed summary of all budget activities associated with the research, development, testing, and evaluation of chemical and biological defense programs;
- (iv) a detailed summary of expenditures on research, development, testing, and evaluation, and procurement of chemical and biological defenses by fiscal years defense programs, department, and agency;
- (v) a detailed assessment of current and projected vaccine production capabilities and vaccine stocks, including progress in researching and developing a multivalent vaccine;
- (vi) a detailed assessment of procedures and capabilities necessary to protect and decontaminate infrastructure to reinforce United States power-projection forces, including progress in developing a nonaqueous chemical decontamination capability;
- (vii) a description of progress made in procuring light-weight personal protective gear and steps being taken to ensure that programmed procurement quantities are sufficient to replace expiring battle-dress overgarments and chemical protective overgarments to maintain required wartime inventory levels;
- (viii) a description of progress made in developing long-range standoff detection and identification capabilities and other battlefield surveillance capabilities for biological and chemical weapons, including progress on developing a multi-chemical agent detector, unmanned aerial vehicles, and unmanned ground sensors;
- (ix) a description of progress made in developing and deploying layered theater missile defenses for deployed United States Armed Forces which will provide greater geographic

coverage against current and expected ballistic missile threats and will assist in mitigating chemical and biological contamination through higher altitude intercepts and boost-phase intercepts;

(x) an assessment of--

(I) the training and readiness of the United States Armed Forces to operate in a chemically or biologically contaminated environment; and

(II) actions taken to sustain training and readiness, including training and readiness carried out at national combat training centers;

(xi) a description of progress made in incorporating chemical and biological considerations into service and joint exercises as well as simulations, models, and war games and the conclusions drawn from these efforts about the United States capability to carry out required missions, including missions with coalition partners, in military contingencies;

(xii) a description of progress made in developing and implementing service and joint doctrine for combat and non-combat operations involving adversaries armed with chemical or biological weapons, including efforts to update the range of service and joint doctrine to better address the wide range of military activities, including deployment, reinforcement, and logistics operations in support of combat operations, and for the conduct of such operations in concert with coalition forces; and

(xiii) a description of progress made in resolving issues relating to the protection of United States population centers from chemical and biological attack, including plans for inoculation of populations, consequence management, and a description of progress made in developing and deploying effective cruise missile defenses and a national ballistic missile defense.

Annex B

**DoD Response to the GAO Draft Report, "CHEMICAL AND BIOLOGICAL
DEFENSE: Emphasis Remains Insufficient To Resolve Continuing Problems," dated
February 29, 1996**

Appendix vi

Comments From the Secretary of Defense

 <small>ATOMIC ENERGY</small>	ASSISTANT TO THE SECRETARY OF DEFENSE <small>3030 DEFENSE PENTAGON WASHINGTON, DC 20301-3030</small> MR 20 1996	
<p>Mr. Mark E. Gebicke Director, Military Operations and Capabilities Issues National Security and International Affairs Division U.S. General Accounting Office Washington, D.C. 20548</p>		
<p>Dear Mr. Gebicke:</p> <p>This is the Department of Defense (DoD) response to the General Accounting Office (GAO) Draft Report, "CHEMICAL AND BIOLOGICAL DEFENSE: Emphasis Remains Insufficient To Resolve Continuing Problems," dated February 29, 1996 (GAO Code 703082) OSD Case 1099.</p> <p>While the DoD generally concurs with the draft report, there are underway a number of initiatives as outlined in our responses that will address many of the problems identified.</p> <p>In addition, over the past two years, the Chemical and Biological Defense (CBD) program has received increased emphasis and funding within the DoD. The DoD is continuing to work diligently to integrate and coordinate all Services' CBD requirements. The current CBD program is also undergoing a detailed program assessment as part of a review of the entire Counterproliferation program. Results of the assessment are expected within the next several months, and will serve to validate existing CBD programs and identify additional program requirements.</p> <p>The DoD's detailed response to the GAO's recommendations are provided in the enclosure. Other suggestions of a technical nature to improve the accuracy and clarity of the report were provided to the GAO staff separately. The Department appreciates the opportunity to comment on the draft report.</p> <p>Sincerely,  Harold P. Smith, Jr.</p> <p>Enclosure</p>		

Appendix VI
Comments From the Secretary of Defense

GAO DRAFT REPORT DATED FEBRUARY 29, 1996
(GAO CODE 703082) OSD CODE 1099

"CHEMICAL AND BIOLOGICAL DEFENSE: EMPHASIS REMAINS
INSUFFICIENT TO RESOLVE CONTINUING PROBLEMS"

DEPARTMENT OF DEFENSE COMMENTS ON
THE GAO RECOMMENDATIONS

RECOMMENDATION 1: In view of the increasing chemical and biological warfare threat and the continuing weaknesses in U.S. chemical and biological defense capabilities noted in the GAO Report, the GAO recommended that the Secretary of Defense reevaluate the priority and emphasis given to this area throughout the Department of Defense.
(p. 20/GAO Draft Report)

DOD RESPONSE: Concur. The Department of Defense (DoD) Chemical and Biological Defense (CBD) Program is a high priority program of this administration. Over the past two years, the CBD program has received increased emphasis and funding. In addition, the Fiscal Year 1994 National Defense Authorization Act has energized and provided direction for significant oversight of the CBD program.

As with all DoD programs, the DoD is continuously analyzing and evaluating threats, mission scenarios, force structures, training requirements, and Research, Development and Acquisition (RDA) programs. The current CBD program is undergoing a detailed program assessment as part of a broader review of the Counterproliferation program. The results of this analysis may impact priority and funding levels. The detailed program assessment is scheduled to be completed on June 30, 1996.

RECOMMENDATION 2: The GAO recommended that the Secretary of Defense, in his next annual report to the Congress on Nuclear, Biological and Chemical (NBC) Warfare Defense, address (1) proposed solutions to the deficiencies identified in this report and (2) the impact that shifting additional resources to this area might have on other military priorities. The GAO suggested that if the Secretary's reevaluation of the priority and emphasis given chemical and biological defense determines that more emphasis is needed, and efforts by the Joint Service Materiel and Joint Service Integration Groups prove less effective than desired, the Secretary may wish to consider elevating the single office for program oversight to the assistant secretary level in the DoD, rather than leaving it in its present position as part

Now on p. 19.

Appendix VI
Comments From the Secretary of Defense

Now on p. 19.

of the Office of the Assistant (to the) Secretary (of Defense) for Atomic Energy. The GAO further suggested that the Secretary may also wish to consider adopting a single manager concept for the execution of the chemical and biological program. This would provide a single manager with the authority, responsibility, and accountability for directing program management and acquisition for all the services. (p. 20/GAO Draft Report)

DoD RESPONSE: Concur. The previous three Annual Reports to Congress on the CBD Program have highlighted proposed solutions to on-going deficiencies. These on-going NDA solutions are highlighted within our CBD Mission Area Modernization Strategy. In addition, proposed solutions to deficiencies are also identified in the Logistics and Training chapters of the Annual Report to Congress.

Shifting funds into the CBD area should not have a significant impact on other funding areas because the CB funding area is relatively small (less than 1% of the overall budget). However, budget cuts to the CBD area can have major impacts on the CBD program execution. An important point to emphasize here is that Congress recognized that putting additional funds into separate DoD and other department and Agency lines led to duplication and overlap of effort and that any funding increases for CB defense should be put into the single DoD line to ensure a coordinated and integrated program. Putting additional funding into diverse and uncoordinated efforts could lead to a resurgence of this problem.

The 103rd Congress recognized the importance of the CBD program, and changed the name of the Assistant to the Secretary of Defense (Atomic Energy) (ATSD(AE)) to Assistant to the Secretary of Defense (Nuclear and Chemical and Biological Defense Programs) (ATSD(MCB)).

See comment 1.

Our current management structure already focuses around a single manager. In accordance with Section 1701 of the Fiscal Year 1994 National Defense Authorization Act, that individual is the ATSD(MCB).

We also concur with the GAO recommendation that if a reevaluation of the priority and emphasis given chemical and biological defense determines that more emphasis is needed, the Secretary may wish to consider elevating the single office for program oversight to the assistant secretary level.

With continued Congressional support, adequate resources to provide oversight of the program and to implement on-going modernization strategies, the program will continue to improve.

Appendix VI
Comments From the Secretary of Defense

Now on p. 19.

RECOMMENDATION 3: The GAO further recommended that the Secretary of Defense take the following specific actions designed to improve the effectiveness of existing activities. First, the GAO recommended that the Secretary direct U.S. Army Forces Command (FORSCOM) to reevaluate current chemical defense equipment stocking requirements for early deploying active and reserve units to determine the minimal amounts required to be on hand to meet deployment requirements and to determine any additional storage facility requirements. If chemical defense equipment stocking requirements are retained, FORSCOM needs to take the actions necessary to see that early deploying units can and do maintain these stocks. (p. 20/GAO Draft Report)

DOD RESPONSE: Concur. FORSCOM is currently in the process of revising its policy concerning stocking and storing contingency Chemical Defense Equipment.

Now on p. 19.

RECOMMENDATION 4: Second, the GAO recommended that the Secretary of Defense review the practice of some Services' funding the purchase of this equipment through Operation and Maintenance funding, while others use Procurement funds. The GAO stated that this review needs to be performed because Operation and Maintenance funds intended for chemical and biological defense equipment and training are too easily and frequently diverted to other purposes, and the uses of these funds are not well recorded. The GAO concluded that a consistent DoD system for funding these activities and recording the amount of funds spent on chemical and biological defense would greatly improve oversight of the resources and emphasis directed to this area. The GAO further recommended that the DoD also consider at least temporarily earmarking Operation and Maintenance funds to relieve existing shortages of this equipment if current funding practices for purchasing this equipment are retained. (p. 20-21/GAO Draft Report)

DOD RESPONSE: Concur. The DoD is reviewing the Uniformed Equipment Acquisition Policy as directed by the Under Secretary of Defense (Acquisition and Technology) (USD(AT&T)) to identify the types of CBD equipment that should be centrally procured through the CBD program and the funding lines that need to transfer between the CBD program and Service Accounts. Recommendations from the Equipment Acquisition Integrated Product Team will be forwarded for consideration in April 1996.

RECOMMENDATION 5: Third, the GAO recommended that the Secretary of Defense consider modifying the Status of Resources and

Appendix VI
Comments From the Secretary of Defense

Now on p. 20.

Training System (SORTS) to require active Army divisions to complete and submit SORTS division summaries for chemical and biological reporting categories, and implementing changes that would require overall unit readiness assessments to be more directly affected by their chemical and biological readiness status. The GAO stated that more emphasis should be placed on accurately inventorying and reporting unit stocks of critical chemical and biological defense equipment through SORTS and other monitoring and reporting systems. In addition, the GAO recommended that SORTS reporting requirements should also be modified to more accurately reflect shortcomings in unit ability to meet existing chemical and biological training standards. (p. 21/GAO Draft Report)

See comment 2.

Now on p. 20.

DOD RESPONSE: Nonconcur. SORTS is not intended to function as a detailed management tool to report on all conceivable variables. Rather, SORTS does provides a broad band of information on selected unit status indicators and includes the commander's assessment of the unit's ability to execute its full wartime mission. Units assessed routinely report their equipment on hand and training status for operations in a chemical and biological environment. Commanders combine this information with other factors, including wartime mission to provide an overall assessment of a unit's ability to go to war.

RECOMMENDATION 6: Fourth, the GAO recommended that the Secretary of Defense determine and direct the implementation of an effective and appropriate immunization program for biological warfare defense that is consistent with existing DoD immunization policy. (p. 21/GAO Draft Report)

DOD RESPONSE: Concur. DoD is reviewing the existing DoD Immunization Policy (DoD Directive 4205.3, Dated November 26, 1993). The Army, as executive agent, is developing alternative vaccine immunization implementation plans to be coordinated with the Joint Staff and the Services leading to a decision by the Deputy Secretary Defense. This process is expected to be completed within the next several months. Funding for procurement of the vaccine stockpile has been identified. At this time, a Request For Proposal is ready for release to procure the vaccine.

RECOMMENDATION 7: Fifth, the GAO recommended that the Secretary of Defense direct that DoD medical courses of instruction regarding chemical and biological warfare treatment techniques, such as the Management of Chemical and Biological Casualties Course, be directed toward those personnel occupying positions in medical units most likely to have need of this training, and that

Appendix VI
Comments From the Secretary of Defense

Now on p. 20.

medical units assigned such personnel keep adequate records to determine whether the appropriate number and types of their personnel have attended such courses. (p. 21/GAO Draft Report)

DOD RESPONSE: Concur. The DoD agrees that greater should be placed on medically relevant NBC training. The DoD is considering increased medical NBC training as it implements a new DoD Instruction, "Military Medical Readiness Skills Training." The DoD is also considering additional NBC physician training requirements in part of DODD 6025.13, "Clinical Quality Management Program (CQMP) in the Military Health Services," dated July 20, 1995.

Now on p. 20.

RECOMMENDATION 8: Sixth, the GAO recommended that the Secretary of Defense direct the Secretary of the Army to ensure that tactical unit training addresses casualty decontamination and that the current confusion regarding responsibility for performing casualty decontamination is corrected. (p. 21/GAO Draft Report)

DOD RESPONSE: Concur. Current Army doctrinal manuals provide specific responses for patient decontamination for all units. These manuals form the basis for training exercises to reinforce these responsibilities. Army doctrine in Field Manual 3-5, NBC Decontamination, specifically assigns responsibility for patient decontamination to a nonmedical team from the supported unit. This team would operate under the supervision of medical personnel to ensure that no further injury is caused to the patient. While current Army doctrinal manuals are clear on this issue, Joint Doctrine across the Services does not yet exist. The DoD is considering an overall departmental policy on this issue.

See comment 3.

RECOMMENDATION 9: Seventh, the GAO recommended that the Secretary of Defense direct the Secretary of the Army and the Commandant of the Marine Corps to ensure that all combat training centers routinely emphasize and include chemical and biological training, and that this training is conducted in a realistic manner. The GAO further recommended that the Secretary and the Commandant should direct that units attending these centers be more effectively evaluated on their ability to meet existing chemical and biological training standards. (p. 21/GAO Draft Report)

Now on p. 20.

DOD RESPONSE: Concur. The Army and Marine Corps training guidance documents require Commanders to ensure individuals and units are trained to defend and survive in a chemical and biological environment. The Navy and Air Force have similar

Appendix VI
Comments From the Secretary of Defense

See comment 4.

Now on p. 20.

requirements. For example, the FORSCOM Commander's NBC Defense Training Guidance, dated Sept 29, 1995, requires that commanders ensure that units are fully trained to sustain operations and defend against battlefield NBC hazards. All units are required to: (1) integrate NBC individual and collective tasks into all aspects of training; (2) use the Battle Command Training Program to enhance key leader and staff NBC defense training; and (3) fully demonstrate unit proficiency in realistic battlefield NBC environments at the combat training centers. The DoD, with the Joint Staff and the Services, will review evaluation standards for the training centers, to determine their efficacy.

RECOMMENDATION 16: Finally, the GAO recommended that the Secretary of Defense direct the Commanders-in-Chief (CINCs) to routinely include joint chemical and biological training tasks in exercises conducted under the Joint Chiefs of Staff (JCS) Exercise Program and evaluate the ability of joint forces to perform chemical and biological tasks. The GAO further recommended that the Secretary should direct the CINCs to report annually on the results of this training. (p. 21/GAO Draft Report)

DOD RESPONSE: Concur. The DoD agrees with the need to improve CB training in joint exercises. This issue was commended to the CINCs by the Chairman of the JCS (CJCS) as a priority training requirement within the December 1995 Joint Training Master Plan (CJCS 1500.02). As a result, combatant commands are creating FY 97-99 joint training plans to add the CJCS commended training initiatives to their requirements. This requirement is already being evaluated by the joint exercise and training community.