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**CHEMICAL AND BIOLOGICAL COLLECTIVE PROTECTION  
AND DECONTAMINATION DEFENSE READINESS**

Report No. 99-042

November 30, 1998

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### **Acronyms**

CB	Chemical and Biological
CINC	Commander in Chief
DS-2	Decontamination Solution-2
JSIG	Joint Service Integration Group
JSMG	Joint Service Materiel Group
NBC	Nuclear, Biological, and Chemical
ORD	Operational Requirements Document
OSD	Office of the Secretary of Defense



INSPECTOR GENERAL  
DEPARTMENT OF DEFENSE  
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November 30, 1998

MEMORANDUM FOR COMMANDANT OF THE MARINE CORPS  
ASSISTANT SECRETARY OF THE NAVY (FINANCIAL  
MANAGEMENT AND COMPTROLLER)  
ASSISTANT SECRETARY OF THE AIR FORCE  
(FINANCIAL MANAGEMENT AND COMPTROLLER)  
DEPUTY ASSISTANT TO THE SECRETARY OF DEFENSE  
FOR COUNTERPROLIFERATION AND  
CHEMICAL/BIOLOGICAL DEFENSE  
DIRECTOR, JOINT STAFF  
AUDITOR GENERAL, DEPARTMENT OF THE ARMY

SUBJECT: Audit Report on Chemical and Biological Collective Protection and  
Decontamination Defense Readiness (Report No. 99-042)

We are providing this report for information and use. We conducted the audit at the request of the Deputy Assistant to the Secretary of Defense for Counterproliferation and Chemical/Biological Defense. This report is the third in a series of reports on chemical and biological readiness. We considered management comments on a draft of this report in preparing the final report.

Management comments conformed to the requirements of DoD Directive 7650.3.

We appreciate the courtesies extended to the audit staff. Questions on the audit should be directed to Mr. Harlan M. Geyer at (703) 604-9593 (DSN 664-9593) (email [hgeyer@dodig.osd.mil](mailto:hgeyer@dodig.osd.mil)) or Ms. Geraldine M. Edwards at (703) 604-9489 (DSN 664-9489) (email [gedwards@dodig.osd.mil](mailto:gedwards@dodig.osd.mil)). See Appendix C for the report distribution. The audit team members are listed inside the back cover.

A handwritten signature in black ink that reads "Robert J. Lieberman".

Robert J. Lieberman  
Assistant Inspector General  
for Auditing

## Office of the Inspector General, DoD

Report No. 99-042  
(Project No 6RA-5041.02)

November 30, 1998

### Chemical and Biological Collective Protection and Decontamination Defense Readiness

#### Executive Summary

**Introduction.** We conducted this audit at the request of the Deputy Assistant to the Secretary of Defense for Counterproliferation and Chemical/Biological Defense. This report is the third in a series of reports on the readiness of U.S. forces to operate in a chemical and biological warfare environment. Previous reports discussed chemical and biological survivability of mission-essential equipment and unit chemical and biological defense readiness training.

**Audit Objectives.** Our objective was to evaluate joint and Service-unique collective protection programs to determine how requirements had been identified and whether the Services were developing common collective protection against chemical and biological hazards that did not duplicate existing requirements. We also evaluated whether the decontamination modernization program was on schedule and used a strategy that exploited existing technology. Finally, we evaluated the management control program related to the overall audit objective.

**Audit Results.** Continued improvement and funding are needed for the collective protection program. Although DoD had established effective procedures for identifying and validating protection requirements, materiel solutions and adequate funding remained as challenges. As a result, DoD and the Services were identifying common requirements without duplication; however, additional funds of \$192 million are needed to satisfy near-term, validated requirements and to develop materiel solutions (Finding A).

While a materiel solution is years away, DoD had taken action to resolve long-standing problems with decontamination. As a result, the DoD decontamination modernization program was receiving higher priority (Finding B).

The management controls we reviewed were effective in that no material management control weaknesses were identified. See Appendix A for details on the management control program.

**Management Comments.** Although no comments were required, the Joint Staff suggested incorporating changes to the report to reflect the most recent information on collective protection and decontamination.

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## Background

We conducted this audit at the request of the Deputy Assistant to the Secretary of Defense for Counterproliferation and Chemical/Biological Defense. This report is the third in a series of reports on the readiness of U.S. forces to operate in a chemical and biological (CB) warfare environment. Previous reports discussed CB survivability of mission-essential equipment and unit CB defense readiness training.

**CB Threat.** With the demise of the Soviet Union and the Warsaw Pact, the United States today stands as the world's only superpower, and it is expected to remain so throughout the 1998 to 2015 period. However, this in no way portends that the United States will not face significant security challenges during this period. U.S. dominance in the conventional military arena may encourage potential adversaries to use asymmetrical means to attack our forces and interests in the future. Foremost among those asymmetrical means is the CB warfare threat.

CB warfare agents are very potent weapons, capable of causing considerable effects over large areas. CB weapons could easily be used to delay or deny our forces access to critical areas, facilities, or installations; incapacitate forward-based U.S. forces throughout a conflict; disrupt our command and control networks; deter allies and potential coalition partners from supporting U.S. intervention; or inflict higher than expected U.S. casualties in an attempt to weaken our national resolve.

Of particular concern is the spread of CB weapons, sometimes referred to as "the poor man's atomic arsenal." Recent technology has made CB agents, and the means to deliver them, accessible to any country seeking those capabilities. The proliferation of CB warfare capabilities has significantly increased the probability that U.S. forces will face CB attack in a future conflict. Therefore, the United States must prepare its forces to confront this type of threat by ensuring that U.S. forces are prepared to defend against a CB attack, to quickly recover from the attack, and to continue mission-critical operations. The strategy to defend against CB weapons requires that U.S. forces have equipment to protect them from the effects of CB weapons and that essential equipment can be decontaminated to stop the erosion of combat power and to reduce the risk of further contamination.

**Defense Against CB Weapons.** Joint doctrine requires U.S. forces to be prepared to conduct operations in a chemically or biologically contaminated environment with minimal degradation of capability. U.S. forces may have to rely on collective protection and decontamination as defensive measures to reduce casualties and continue essential operations. Collective protection is used to protect personnel and sensitive equipment from exposure to CB contamination. There are two general categories of collective protection: stand-alone shelters and integrated systems. Integrated collective protection is component equipment designed to provide protection against CB agents through

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the use of filtered air under positive pressure to a variety of aircraft, facilities, ships, vans, and vehicles. Decontamination is performed to prevent casualties, increase unit and individual effectiveness, and limit the spread of contamination.

**Need for Collective Protection and Decontamination.** The goal of collective protection is to provide joint forces with an uncontaminated environment that allows completion of their assigned missions. Specifically, collective protection allows joint forces to safely operate for extended periods at near-normal levels of effectiveness while under nuclear, biological, and chemical (NBC) threat or in contaminated areas.

Decontamination is the process of making any person, object, or area safe by absorbing, destroying, neutralizing, or removing chemical or biological agents clinging to it or around it. The primary purposes of decontamination are to stop erosion of combat power and to reduce casualties that may result from inadvertent exposure or failure of protection. Forces can reconstitute personnel and equipment that has been contaminated through the use of decontaminants and decontamination systems. The goal of the CB decontamination program is to provide the technology to remove and detoxify contaminants from material without inflicting injury on personnel or damage to equipment or the environment and to reduce the maintenance, storage, transportation, and manpower burdens of existing decontaminants.

**Joint Oversight.** The Deputy Assistant to the Secretary of Defense for Counterproliferation and CB Defense is responsible for the overall coordination and integration of all CB defense research, development, and acquisition efforts, and retains approval authority for all planning, programming, and budgeting documents. Further, the Deputy Assistant provides the overall guidance for planning, programming, budgeting, and executing the CB Defense Program.

The Secretary of the Army is the executive agent responsible for coordinating, integrating, and reviewing all Service CB defense requirements. The Secretary delegated the responsibility to the Assistant Secretary of the Army for Research, Development and Acquisition, who, along with the Vice Chief of Staff of the Army, co-chairs the Joint NBC Defense Board.

The Joint NBC Defense Board approves joint requirements to include collective protection and decontamination. Membership on the Joint NBC Defense Board includes the Service Operational Deputies;<sup>1</sup> the Program Manager, Joint Program Office for Biological Defense; and representatives from the Defense Logistics Agency, the Joint Staff, the medical community, and the Special Operations Command. Only the Service Operational Deputies are voting members, and each Service has a single vote on issues.

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<sup>1</sup>Services' senior-level operations staff. For example, the Army's Operational Deputy is the Assistant Deputy Chief of Staff for Operations and Plans, Force Development.

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In addition to the Joint NBC Defense Board, each Service is represented on the following CB defense groups, which report to the Joint NBC Defense Board:

- o the Joint Service Integration Group (JSIG), which coordinates and integrates NBC defense requirements; reviews NBC doctrine and training initiatives; and develops the Joint Service NBC Defense Modernization Plan, the Joint NBC Defense Priority List, and the Joint Requirements List; and

- o the Joint Service Materiel Group (JSMG), which coordinates and integrates NBC research, development, and acquisition; provides technology base oversight; and develops the Joint Service NBC Defense Research, Development, and Acquisition Plan and the Joint Logistics Support Plan.

## **Objectives**

Our objective was to evaluate joint and Service-unique collective protection programs to determine how requirements had been identified and whether the Services were developing common collective protection against CB hazards that did not duplicate existing requirements. We also evaluated whether the decontamination modernization program was on schedule and used a strategy that exploited existing technology. Finally, we evaluated the management control program related to the overall audit objective. See Appendix A for the audit scope and methodology, the review of the management control program, and a summary of prior coverage related to the audit objectives.

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## **A. Identifying and Validating Collective Protection Requirements**

Continued improvement and funding are needed for the collective protection program. Although DoD had established effective procedures for identifying and validating protection requirements, materiel solutions and adequate funding remained as challenges. DoD addressed the requirements process through implementing an improved management structure for the CB Defense Program and through joint management and consolidation of funding at the Office of the Secretary of Defense (OSD) level. As a result, DoD and the Services were identifying common requirements without duplication; however, additional funds of \$192 million are needed to satisfy near-term, validated requirements and to develop materiel solutions.

### **CB Defense Guidance**

Public Law 103-160, "National Defense Authorization Act for FY 1994," Section 1701, requires the Secretary of Defense to coordinate and integrate research, development, test, evaluation, and acquisition requirements of the Services for CB warfare defense programs. The Public Law also requires consolidation of CB defense funding at the OSD level and submission of an Annual Report to Congress on the status of the DoD CB Defense Program.

Defense against CB warfare agents is an operational capability required to support the FY 1999-2003 DoD Defense Planning Guidance, which provides guidance to the unified commanders in chief (CINCs) and the Services. The guidance highlights the requirements for joint forces to be able to survive, fight, and win in a CB environment. In response to the Defense Planning Guidance, the CINCs produce regional plans and strategies tasking the Services with specific objectives to ensure unity of effort.

### **Identification of Requirements and Validation**

**Background.** Before FY 1995, each Service prepared its own requirements documents for CB defense equipment, conducted the research, development, test, and evaluation to produce that equipment, and procured the equipment with funds provided as part of each Service's Total Obligation Authority. That process led to duplication among Services, with more than one Service funding the same (or similar) items, and, most significantly, different items of equipment

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requiring different doctrine and tactics, techniques, and procedures, thereby reducing interoperability. That all changed in August 1994 with the signing of the Joint Service Agreement on NBC Defense.

**Joint Requirements and Validation Process.** DoD implemented an improved management structure through the Joint Services Agreement on NBC Defense. That agreement established policies and mechanisms for identifying joint and Service-unique collective protection requirements. Although CB defense requirements are identified through various sources, the Services identify most CB operational requirements through their own requirements process. The Services' requirements processes vary, but all the Services submit their requirements to the JSIG for validation.

The JSIG validates Service collective protection requirements by ensuring that all requirements are staffed for potential jointness, that the requirements do not duplicate existing requirements or programs, and that the requirements are reviewed against joint doctrine. When a requirement is deemed to have joint potential, the JSIG will appoint a lead Service to write an operational requirements document (ORD) using comments received from all Services. The Services have 60 days to comment on the draft ORD. Services may "concur," "concur with comments," or "nonconcur" on the ORD. The lead Service then has an additional 30 days to approve the ORD and provide the JSIG with a copy of the approval letter and approved ORD. The JSIG is responsible for coordination and integration of the Services' requirements into the Joint Requirements List, the Joint NBC Defense Priority List, and the Joint Service NBC Defense Modernization Plan. The JSIG also notifies the JSMG of the joint potential designation and requests that it identify a lead Service for materiel development. The JSIG relies on the commodity area manager for collective protection to provide technical advice on research, development, test, evaluation, acquisition, and logistics efforts. See Appendix B for details on the joint requirements process.

**Commodity Area Managers.** Commodity area managers are empowered in support of the JSMG Executive Office to task project managers and team leaders across the four Services with a variety of research, development, test, evaluation, acquisition, and logistics efforts. Commodity area managers are responsible for Service coordination and integration of all efforts, from technology base through development, fielding, and logistics sustainment, across the five CB commodity areas: individual protection, collective protection, contamination avoidance, decontamination, and medical systems. The responsibilities of commodity area managers include maintaining cognizance over the efforts within their assigned commodity areas; identifying any duplication; and serving as technical advisors to the JSMG by recommending project efforts for potential acceleration, consolidation, or elimination.

**Joint Funding.** The Deputy Assistant to the Secretary of Defense for Counterproliferation and CB Defense has funding approval authority for joint CB defense requirements. Public Law 103-160 consolidated the Services' CB Defense Program funding into a separate account at the OSD level for each fiscal

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year after FY 1994. Congress was concerned that the Services were not adequately funding CB defense projects. The Public Law states that funding requests for the program shall be set forth in the OSD budget with a single program element for each of the categories of research, development, test and evaluation, acquisition, and military construction. The Public Law also states that those funding requests may not be included in the budgeted accounts of the Services. Prior to the funding consolidation, funding was included in several separate Service and Defense agency funding lines. Consolidated funding is another way to ensure that redundant projects are not funded.

## Matériel Solutions

Collective protection capabilities require matériel solutions for operations in a mobile CB environment. The Services face challenges, such as the ability to provide collective protection for:

- o forces operating in a CB environment,
- o weapon systems and equipment needing some form of collective protection, and
- o critical fixed sites, such as airfields, hospitals, and ports.

As of September 1998, collective protection was limited and did not provide integrated protection against all CB threats. Also, deployable collective protection is labor intensive for transport, setup, and takedown. Power and other requirements, as well as size, result in considerable logistics burdens. Further, fixed collective protection is not easily relocated or repaired. Changes in doctrine, force structure, procedures, tactics, techniques, and training were proposed but can provide only marginal improvements to CB defense capabilities unless those changes are supported by matériel solutions that facilitate their successful implementation. To this end, collective protection development efforts were focused on CB protection systems at the crew, unit, and platform level. New collective protection systems, as required by the Services, must be smaller, lighter, and more easily supported logistically.

**Assigning Higher Priority to Collective Protection.** Although DoD assigned a higher priority to collective protection to ensure that critical activities could be conducted during and after a CB attack, near-term funding shortfalls remained. General Accounting Office and Inspector General, DoD, reports and studies identified collective protection as receiving low priority on the Services' list of CB defense equipment needs. The Services had limited information available on the collective protection capabilities and needs of their weapon systems and equipment, including protection logistics facilities. Lessons learned from the Gulf War indicated that U.S. forces were inadequately prepared for surviving and operating in a CB environment. As a result, CB defense programs such as collective protection gained the attention of Congress, DoD, and the Services. In order to

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ensure the most critical CB defense requirements are addressed and funded, CB defense programs are prioritized in the Joint NBC Defense Priority List. JSIG action officers prioritize the list of CB defense programs based on the requirements of each Service. In the past, the Services focused on contamination avoidance, with emphasis on chemical stand-off and biological point detection and early warning programs. However, the Services' focus has shifted to collective protection as one of the most critical battlespace deficiencies. In addition, the Geographic Combatant Command Prioritized Counterproliferation Requirements List identifies collective protection as the third priority-out of 19.

**Funding Limitations.** Additional funds of \$192 million are needed to satisfy near-term, validated requirements and develop materiel solutions. Collective protection is one of five competing commodity areas funded under the DoD CB Defense Program. The DoD CB Defense Program outlines a strategy to satisfy requirements of the CINCs. The Joint Service NBC Defense Modernization Plan and the Research, Development, and Acquisition Plan were developed by the JSMG to chart the future of the DoD CB Defense Program for the next 15 years (FYs 2000 to 2015). Inadequate funding resources for collective protection resulted in a Red<sup>2</sup> status for the near-term (FYs 1998 to 2001) through the mid-term (FYs 2002 to 2006) materiel solution. Also, technology base support efforts toward collective protection systems resulted in an Amber<sup>3</sup> status for the mid-term through the far-term (FYs 2007 to 2015) materiel solution.

Both Congress and DoD have acted to provide greater protection for U.S. forces. Those actions resulted in increased funding for the CB Defense Program. The funding level for collective protection in the FY 2000 to FY 2005 Program Objective Memorandum was \$284.4 million of the \$4.6 billion CB Defense Program funding. As a result of a Joint Staff-led study on weapons of mass destruction, \$732 million was added to the CB Defense Program in the FY 1999 to FY 2003 Program Objective Memorandum. Of the \$732 million, \$150 million was identified as procurement funds for three collective protection programs and \$16 million was identified as FY 1999 operation and maintenance funds for repairs to fixed collective protection sites at overseas air bases supporting the Air Force. However, shortfalls for collective protection programs still remain. The JSIG and the JSMG recommended the submission of 12 Over-Guidance-Issue CB Programs totaling \$1.4 billion for the FY 2000 to FY 2005 Program Objective Memorandum Strategy. Of the 12 issues, 2 are collective protection programs having procurement funding shortfalls totaling \$192 million.

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<sup>2</sup>Red - Fiscally Constrained – Inadequate funding or industrial base to meet CINC requirements in two Major Theater Wars through fielded systems.

<sup>3</sup>Amber - Technology Constrained – Reduced technology base to support modernization of commodity area objectives.

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**Summary.** Positive actions taken by Congress and DoD led to improvements in identifying collective protection requirements. Collective protection efforts continue toward integrating smaller, lighter, less costly, and more easily supported protection systems. The requirements identification process ensures that the needs of the CINCs are considered in the fielding of collective protection systems that enhance personnel and equipment survivability while operating jointly in a contaminated environment.

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## **B. Status of Chemical and Biological Decontamination Program**

While a materiel solution is years away, DoD had taken action to resolve long-standing problems with decontamination. Increased emphasis and funding provided the impetus to seriously consider the importance of decontamination to the overall ability of forces to operate in a CB environment. As a result, the DoD decontamination modernization program was receiving higher priority.

### **CB Decontamination Guidance**

Where protection against CB contamination is not assured, CB defense policy calls for decontamination of critical items of equipment and personnel to ensure that all combat operations that must continue will be able to. The broad outline of the CB Defense Program is found in Public Law 103-160, Title XVII. Existing planning guidelines on DoD CB decontamination modernization are in the Joint Service NBC Defense Research, Development, and Acquisition Plan (the Plan), April 1998. The Plan contains a roadmap and sets timelines that chart both current and planned decontamination solutions and systems. The Plan calls for reducing the enormous logistics burden of existing decontamination procedures.

### **Materiel Solutions to Decontamination**

**CB Decontamination Program.** While a materiel solution to decontamination requirements is years away, DoD had taken action to address the issue of decontamination. DoD must still overcome technological hurdles to achieve its goal of a decontaminant that is not logistically burdensome and is not harmful to equipment, personnel, or the environment, yet still meets acceptable standards for agent exposure. The standard decontaminants currently effective against all CB agents are decontamination solution-2 (DS-2), super tropical bleach, calcium hypochlorite, general-purpose soaps and detergents, and 5 percent sodium hypochlorite (bleach).

**Existing Problems.** While the existing decontamination systems are effective against a wide variety of threat agents, they are also slow and labor intensive, and present environmental, logistical, materiel, and safety burdens. Current decontamination operations can place excessive demands on personnel and the water supply system. A typical military vehicle could require up to 500 gallons of water for decontamination operations. In a desert environment, where water assets are critical, that requirement is a major concern. Further,

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decontaminants are corrosive and hazardous, and they require restrictive maintenance, storage, and transportation procedures. Testing showed that DS-2, a liquid decontaminant effective against all known toxic chemical agents and most biological agents, is also extremely corrosive and ignites spontaneously on contact with super tropical bleach or calcium hypochlorite. DS-2 can severely damage electronics, fabrics, metals, plastics, rubber, and sealants, which can affect the readiness of military equipment such as tanks. Both the Navy and the Air Force determined that DS-2 is too corrosive, and they do not plan to use it during their decontamination operations. Super tropical bleach, which can be applied as either a dry powder or wet formula, is effective against one blister agent (Lewisite), persistent and non-persistent nerve agents, and biological agents. While not as harmful as DS-2, super tropical bleach is still caustic and corrodes metals. It also has the additional hazard of spontaneously igniting when it comes in contact with liquid blister agents or DS-2. Calcium hypochlorite, a decontaminant normally used if super tropical bleach is not available, is effective against Lewisite, persistent and non-persistent nerve agents, and biological agents. Calcium hypochlorite is somewhat more corrosive than super tropical bleach and will ignite on contact with DS-2, sulfur, mustard blister agent, or one type of persistent nerve agent.

Other decontaminants in inventory, such as soaps and detergents, are not as effective as DS-2 against all of the known CB agents. While soaps and detergents can be used to effectively remove contamination from a surface, casualty-producing levels of contamination may remain in runoff. Bleach is effective against blister and nerve agents, as well as all biological agents. However, bleach can be harmful to skin and clothing, and it is corrosive to metals unless the metal is rinsed, dried, and lubricated after decontamination.

**Acceptable Decontamination Standards.** While each Service has established standards for unmasking following decontamination, DoD has not established a single standard. DoD policy on acceptable decontamination standards for agent exposure will have a significant impact on the development of decontaminants. Any policy must address the question of "how clean is clean." Determining acceptable decontamination standards will affect nearly every facet of decontamination, covering the spectrum from the operational commander's ability to properly direct a reduction in personal protection, to the unit commander's ability to make a determination on the retrograde of decontaminated equipment. Policy must be firmly based upon scientific evidence of agent effects for the expected exposures in a post-CB attack environment. No data exist on long-term, low-concentration effects. There was also no benchmark to determine the effectiveness of decontamination systems on overall mission accomplishment.

Without a clear policy, time and effort could be wasted attempting to develop decontaminants that do not meet the operational needs of the force. The CB defense community began to develop a policy. The Joint Staff, Director for Strategic Plans and Policy (J-5), Decontamination Integrated Process Team, is writing a policy that will determine the proper unmasking procedures after a CB attack and after decontamination. That effort will provide the joint force

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commanders with interim guidance for minimizing risks to U.S. forces during combat operations. The guidance, to be approved in December 1998, will serve as the first step in developing a final set of standards. Concurrently, DoD will coordinate scientific research to assist in refining those standards. That research is expected to be complete in FY 2003. Further, in June 1998, DoD sponsored a decontamination conference to discuss future decontamination solutions and technology pursuits. The decontamination conference was a step in the right direction. The conference was the first time that DoD, other Federal agencies, and interested private sector organizations came together to work on resolving the challenges faced with the existing CB decontamination program.

**Technology Hurdles.** Some technology hurdles that the decontamination community is facing are trying to find methods to deal with all agent classes; determining how decontaminants will act in varying temperatures; trying to develop materials that do not require vigorous scrubbing; and making the decontaminants more compact and portable.

**DoD Actions.** DoD had taken action to address the phaseout and replacement of DS-2 and super tropical bleach and had established initiatives to address the development of acceptable decontamination standards.

**Phaseout of Existing Decontaminants.** Near- and mid-term efforts focus on potential replacements for DS-2 and super tropical bleach. Plans call for the replacement of DS-2 and super tropical bleach with a solution decontaminant in FY 2007, to coincide with the phaseout of existing decontaminants. The JSMG is overseeing the research and development of environmentally safe technologies that will eliminate toxic materials without degrading the performance of the contaminated object. Technologies being pursued include decontaminants for sensitive equipment and for interior spaces of aircraft and vehicles. The solution decontaminant will include an interior aircraft decontamination solution and a "superior decontamination solution." The superior decontamination solution is to be less toxic than current decontaminants and usable in application systems to provide a safe, effective decontamination capability to our forces. In addition, a sorbent decontaminant is under development with planned fielding in the FY 2002 time frame to replace M11 and M13 decontamination apparatuses that are filled with DS-2. That sorbent decontaminant is also a candidate to replace XE555 decontaminant in the M295 individual decontamination kit, with incorporation into the kit scheduled for FY 2002. The use of various enzymes as decontaminants is also being researched. It is important to note that while the research into those technologies has been promising, most are still unproven, with many hurdles remaining. There is no assurance that any of the technologies will result in either a single replacement decontamination solution or a variety of decontaminants that will be ready and available by FY 2007, when existing decontaminants will be phased out.

**Special Projects and Conference.** Recognizing a need for decontamination standards, the JSIG sponsored a special decontamination project to address the effects on humans subjected to long-term, low concentrations of

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decontaminants. DoD estimated that it will take 3 to 5 years to appropriately address the issue. The JSIG also sponsored a special decontamination project involving all four Services, which is studying the effects of chemical agents. In addition, the JSIG has a "Man in Simulant Test" project, which will go beyond FY 1998 for 5 years (outyears not funded). The Man in Simulant Test looks at various models to determine the dosage effects of CB agents on humans.

**Resolving Decontamination Doctrinal Issues.** While a technology solution will go a long way to address the concerns with existing decontaminants, a technology solution alone will not solve the Services' problems with the larger issue of decontamination as it relates to the ability of forces to continue to operate in a CB environment. Decontamination doctrinal issues are evolving and continued effort will be needed. The larger issue involves a serious look at tactics, techniques, and procedures for joint operations. A U.S. Army Chemical School study, "The Way Ahead," August 1996, states that substantial shortfalls exist in joint CB defense tactics, techniques, and procedures. As a result, existing joint and Service tactics, techniques, and procedures may not properly prepare units to operate in a CB environment. The results of that study were still a concern in DoD. DoD officials expressed concern that additional funding for decontamination was being used almost exclusively toward technology and acquisition efforts. Those officials indicated that finding a replacement for DS-2 may not be the only solution to shortfalls in decontamination operations and, therefore, doctrinal issues must still be considered in the overall solution to improving DoD decontamination strategy. Currently, Joint Publication 3-11, "Joint Doctrine for Nuclear, Biological and Chemical (NBC) Defense," is undergoing revision. Included in the revision will be development of joint doctrine for decontamination operations in the joint rear area, especially at strategic air and sea ports.

## Decontamination Funding

**Increased Funding on Research and Development Decontamination Efforts.** In the past year, Congress and DoD placed increased emphasis and funding on decontamination modernization efforts, as demonstrated by the following actions:

- o providing an additional \$5 million in FY 1998 for the development of advanced technologies in decontamination and

- o providing an additional \$18 million, as a result of the Quadrennial Defense Review, allocated over the next 5 years for two research and development programs.

**FY 1998 Congressional Funding Increases for Decontamination Programs.** Additional congressional funding was approved for FY 1998 to assist DoD in its efforts to have a more effective CB Defense Program. In

addition, DoD requested an increase in the FY 1998 CB defense budget for various high-priority research and development programs. Congressional members indicated that past efforts by DoD in decontamination were not sufficient; however, they were encouraged by the new emphasis being given to countering the threat of CB warfare and additional funding commitments in the Quadrennial Defense Review. Congress added \$81.3 million to the budget for CB defense in FY 1998. Of the \$81.3 million, \$5 million was for engineering and manufacturing of advanced technology efforts in decontamination. Allocation of the \$5 million was consistent with the goals of the DoD—modernization plan for decontamination and Service decontamination requirements, as stated in the ORDs. The \$5 million was primarily applied to projects and studies to determine which advanced decontamination technologies would best suit the needs of the Services.

**Quadrennial Defense Review Funding Adjustments.** The Quadrennial Defense Review underscored the need for substantial progress toward fully integrating into our military planning and acquisition activities the risks associated with adversaries' CB weapons use. As a result of the Quadrennial Defense Review, research and development programs for interior decontamination and fixed-site decontamination are expected to receive additional funding over the next 5 years. The additional funding for those two programs is shown in the following table.

**Quadrennial Defense Review Funding Increases for Decontamination  
Research and Development Programs  
(in millions)**

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	Total
Interior Decontamination	\$1.0	\$2.0	\$1.0	\$1.0	\$1.0	\$ 6.0
Fixed Site Decontamination	4.0	4.0	4.0	0.0	0.0	12.0
<b>Total QDR<sup>1</sup> Adjustment for Decontamination RDT&amp;E<sup>2</sup></b>	<b>\$5.0</b>	<b>\$6.0</b>	<b>\$5.0</b>	<b>\$1.0</b>	<b>\$1.0</b>	<b>\$18.0</b>

<sup>1</sup>Quadrennial Defense Review.

<sup>2</sup>Research, Development, Test, and Evaluation.

**Schedule of Decontamination Modernization Program.** Additional funding commitments resulted in progress in decontamination research and development efforts. Progress in the program for interior decontamination of sensitive equipment had accelerated the program's expected fielding date. In addition, promising research in the areas of enzymes and sorbents indicated that the DoD decontamination modernization strategy was on schedule to meet the near- to far-term goals outlined in the Joint Service NBC Defense Research, Development, and Acquisition Plan.

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**Summary.** Additional congressional and OSD funding will go a long way to resolving the long-standing problems that exist in the CB decontamination program. Since funding was consolidated at the OSD level, the CB decontamination program has made great strides. CB decontamination was last on the list of joint priorities prior to FY 1998, but it has moved up in priority as the CINCs and the Services recognize the importance of decontamination to countering the emerging CB threat. Additional funding will not necessarily solve the technology challenges if policies and standards are not implemented to reflect reasonable and achievable measures. However, the additional funding-- provided the impetus for actions being taken in the CB decontamination program.

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## Appendix A. Audit Process

### Scope and Methodology

We reviewed and evaluated DoD and Service policies, processes, and regulations, as well as public laws, dated from 1993 through 1997, that relate to CB defense requirements. We visited the offices of the Deputy Assistant to the Secretary of Defense for Counterproliferation and CB Defense, the JSIG, and the JSMG, the Secretariat of the Joint NBC Defense Board, and the Services' respective requirements offices. We interviewed DoD managers who control and manage CB defense requirements and who plan, program, budget, fund, and execute CB defense research, development, and acquisition. We compared Service legacy programs and joint operational requirements processes to determine if any redundant efforts existed on either the part of the Services or other DoD organizations.

We focused our review of joint and Service-unique collective protection on how the Services identified, integrated, and validated their requirements. To determine how the Services identified their requirements for collective protection, we met with Service CB defense requirements offices and reviewed their respective requirements criteria and processes. We reviewed data calls and input from the various functional organizations. We evaluated the Service processes by reviewing requirements procedures and the validation process for those requirements. We also looked at funding requirements and level of funding for collective protection and decontamination.

We assessed the progress of the DoD decontamination modernization program by examining the requirements published in the April 1998 Annual Report to Congress. We also determined which decontaminants were being used and their limitations, and we reviewed the process by which potential decontaminants were identified. We evaluated the efforts to develop less caustic, less logistically burdensome, and more environmentally friendly replacements for DS-2 and super tropical bleach. We reviewed the funding and timetable for decontamination improvements through the planned budgetary process and determined if the planned improvements in decontamination were on schedule as listed in the Joint Service NBC Defense Research, Development, and Acquisition Plan.

**DoD-Wide Corporate Level Goals.** In response to the Government Performance and Results Act, DoD has established 6 DoD-wide corporate level performance objectives and 14 goals for meeting those objectives. This report pertains to achievement of the following objective and goal.

**Objective:** Maintain highly ready joint forces to perform the full spectrum of military activities. **Goal:** Maintain high military personnel and unit readiness. (DoD-5.1)

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**Audit Type, Dates, and Standards.** We performed this program audit from May through September 1998 in accordance with auditing standards issued by the Comptroller General of the United States, as implemented by the Inspector General, DoD. We included tests of management controls considered necessary. We did not use computer-processed data or statistical sampling techniques for this audit.

**Contacts During the Audit.** We visited or contacted individuals and organizations within DoD. Further details are available upon request.

## **Management Control Program**

DoD Directive 5010.38, "Management Control (MC) Program," August 26, 1996, requires DoD organizations to implement a comprehensive system of management controls that provides reasonable assurance that programs are operating as intended and to evaluate the adequacy of the controls.

**Scope of Review of the Management Control Program.** We reviewed the adequacy of DoD management controls over the CB Defense Program in respect to the audit objectives. We did not assess management's self-evaluation of those controls.

**Adequacy of Management Controls.** DoD management controls were adequate in that we identified no material management control weaknesses over the two commodity areas, collective protection and decontamination, we reviewed.

## **Summary of Prior Coverage**

During the last 5 years, the General Accounting Office and the Inspector General, DoD, each issued reports that specifically discussed CB defense readiness.

### **General Accounting Office**

General Accounting Office Report No. NSIAD-98-214 (OSD Case No. 1649), "Chemical and Biological Defense: DoD's Evaluation of Improved Garment Materials," August 18, 1998.

General Accounting Office Report No. T-NSIAD-98-83, "Chemical and Biological Defense: Observations on DoD's Plans to Protect U.S. Forces," March 17, 1998.

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General Accounting Office Report No. NSIAD-96-103 (OSD Case No. 1099),  
"Chemical and Biological Defense: Emphasis Remains Insufficient to Resolve  
Continuing Problems," March 29, 1996.

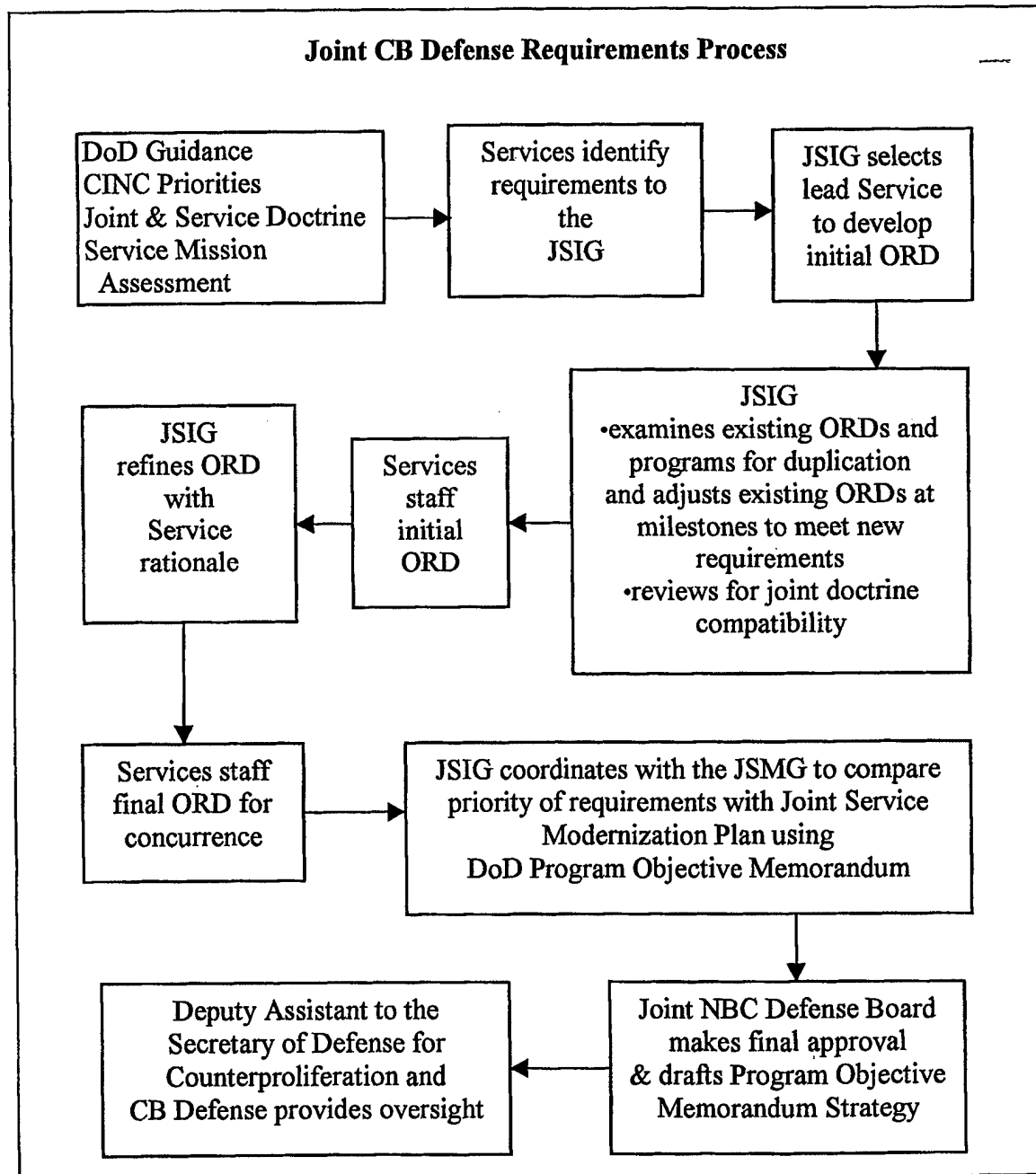
**Inspector General, DoD**

Inspector General, DoD, Report No. 98-174, "Unit Chemical and Biological  
Defense Readiness Training," July 17, 1998.

Inspector General, DoD, Report No. 97-217, "Chemical and Biological Defense  
Readiness," September 19, 1997.

## Appendix B. Joint Requirements Process

The figure below shows the process for identifying and fulfilling joint CB defense requirements.



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## **Appendix C. Report Distribution**

### **Office of the Secretary of Defense**

Under Secretary of Defense (Comptroller)  
Deputy Chief Financial Officer  
Deputy Comptroller (Program/Budget)  
Under Secretary of Defense for Personnel and Readiness  
Assistant Secretary of Defense (Public Affairs)  
Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense Programs  
Deputy Assistant to the Secretary of Defense for Counterproliferation and Chemical/Biological Defense

### **Joint Staff**

Director, Joint Staff  
Director for Strategic Plans and Policy (J-5)

### **Department of the Army**

Deputy Chief of Staff, Operations and Plans  
Commander, Training and Doctrine Command  
Commander, U.S. Army Chemical School  
Auditor General, Department of the Army

### **Department of the Navy**

Commander in Chief, U.S. Atlantic Fleet  
Commander in Chief, U.S. Pacific Fleet  
Assistant Secretary of the Navy (Financial Management and Comptroller)  
Auditor General, Department of the Navy

### **Marine Corps**

Commandant of the Marine Corps  
Commanding General, Marine Corps Combat Development Command

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## **Department of the Air Force**

Assistant Secretary of the Air Force (Financial Management and Comptroller)  
Deputy Chief of Staff, Air and Space Operations  
Chief, Office of the Civil Engineer  
Auditor General, Department of the Air Force

## **Unified Commands**

Commander in Chief, U.S. European Command  
Commander in Chief, U.S. Pacific Command  
Commander in Chief, U.S. Central Command

## **Other Defense Organizations**

Director, Defense Contract Audit Agency  
Director, Defense Logistics Agency  
Director, National Security Agency  
Inspector General, National Security Agency  
Inspector General, Defense Intelligence Agency

## **Non-Defense Federal Organizations and Individuals**

Office of Management and Budget  
General Accounting Office  
National Security and International Affairs Division  
Technical Information Center

## **Congressional Committees and Subcommittees, Chairman and Ranking Minority Member**

Senate Committee on Appropriations  
Senate Subcommittee on Defense, Committee on Appropriations  
Senate Committee on Armed Services  
Senate Committee on Governmental Affairs  
House Committee on Appropriations  
House Subcommittee on National Security, Committee on Appropriations  
House Committee on Government Reform and Oversight  
House Subcommittee on Government Management, Information, and Technology,  
Committee on Government Reform and Oversight  
House Subcommittee on National Security, International Affairs, and Criminal Justice,  
Committee on Government Reform and Oversight  
House Committee on National Security

# Joint Staff Comments



**UNCLASSIFIED**

**THE JOINT STAFF  
WASHINGTON, DC**

Reply ZIP Code:  
20318-0300

19 November 1998

**MEMORANDUM FOR THE INSPECTOR GENERAL, DEPARTMENT OF  
DEFENSE**

**Subject: Audit Report on Chemical and Biological Collective Protection and  
Decontamination Defense Readiness (Project No. 6RA-5041.02)**

1. Thank you for the opportunity to provide comments regarding the draft Audit Report on Chemical and Biological Collective Protection and Decontamination Defense Readiness.<sup>1</sup>
2. The Joint Staff has reviewed and concurs in the findings of this draft report. Recommend you incorporate the enclosed changes to reflect the most recent information regarding this important topic.
3. The Joint Staff point of contact is Major Patrick J. Sharon, Nuclear and Counterproliferation Division, J-5, (703) 696-6187.

Approved & Secured with Approval  
By: STEPHEN T. RIPPE:19 Nov98

**STEPHEN T. RIPPE**  
Major General, USA  
Vice Director, Joint Staff

Enclosure

**UNCLASSIFIED**

Final Report  
Reference

ENCLOSURE

Joint Staff Recommended Changes to DODIG Draft Audit Report on Chemical and Biological Collective Protection and Decontamination Defense Readiness (Project No. 6RA-5041.02)

1. Page 7, line 1.

Change "The Counterproliferation Program Capabilities List, prioritized by the CINCs, identifies collective protection as the 11<sup>th</sup> priority out of 16."

Revised

To "In addition, the Geographic Combatant Command Prioritized Counterproliferation Requirements List identifies collective protection as 3<sup>rd</sup> priority out of 19."

**Rationale:** Based on recently published (Oct 98) report, this change correctly titles the CINC prioritized list and accurately reflects the priority of collective protection in the CINCs overall Counterproliferation requirements.

2. Page 9, 2<sup>nd</sup> paragraph (Acceptable Decontamination Standards), 1<sup>st</sup> sentence.

Change "DoD did not have decontamination standards."

Page 10  
Revised

To "While each Service has established standards for unmasking following decontamination, DOD has not established a single standard."

**Rationale:** Accuracy. Each Service has standard. Problem lies in a department-wide standard for use in situations where several Services are operating in the same area (such as ports and airfields).

Page 10  
Deleted

3. Page 9, 2<sup>nd</sup> paragraph, 3<sup>rd</sup> sentence. Delete "The DoD community...complete assigned missions."

**Rationale:** Services are capable of conducting decontamination during tactical operations/conflict. Personnel can successfully complete missions given the current standards. Difficulty lies with measuring the long-term effects of exposure to chemical warfare agents at below measurable levels on the battlefield. Current detectors are capable of detecting well below acute physical effects. Current detectors are not capable of detecting cumulative effects over extended period.

4. Page 9, 3<sup>rd</sup> paragraph, 3<sup>rd</sup> sentence.

After "...and after decontamination."

Page 10  
Revised

Insert "This effort will provide the joint force commanders with interim guidance for minimizing risks to US forces during combat operations. This

Enclosure

## **Audit Team Members**

The Readiness and Logistics Support Directorate, Office of the Assistant Inspector General for Auditing, DoD, produced this report.

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