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Rationale and Objectives for Examining Risks to Deployed Forces

A number of factors and trends were examined to determine what the military can and should do to protect the health and safety of deployed forces. These include factors relating to the nature of the deployment environment, the degree and nature of nontactical and tactical threats, including increased threats from chemical and biological warfare agents, changes in the nature of deployment and warfare, and the increasing responsibility that the military is expected to take in examining and protecting against the health and safety risks of its troops. This chapter attempts to review some of these factors and recommends objectives that should be considered in designing a program for the protection of the health of deployed forces.

DEPLOYMENT ENVIRONMENT

Deployment of forces in hostile or unfamiliar environments is inherently risky. In the garrison, the environment is chosen to be well protected, well known, and well controlled, and the activities of garrisoned personnel follow familiar practices that can be designed with a high premium on safety. In contrast, the deployment environment is, in large measure, imposed by the military mission. Each deployment can display a novel array of military and nonmilitary threats, known and unknown, with mission objectives dictating that these be dealt with as they come. Many activities carried out in this environment are not routine; tasks must be accomplished with the means at hand, despite potential dangers, in a setting where time, materiel, and attention are at a premium and

where excessive precautions might engender their own risks or jeopardize the military mission. In short, during deployment, threats to the health and safety of troops might be multiplied or magnified, while the means to ameliorate or avoid them might be circumscribed.

DEGREE AND NATURE OF THE THREAT

The roles of U.S. military forces are changing and expanding. The world is becoming more multipolar, yet the United States has emerged as its principal military power. Increasingly, U.S. troops are deployed for operations other than war, including a variety of peacekeeping, humanitarian, and nation-building missions of varying scope and duration. Accordingly, deployments differ markedly in the degree and nature of tactical risk (i.e., risk due to the presence of an enemy or adversary). U.S. forces must be prepared for a spectrum of direct opposition, from essentially no opposition to various degrees of political opposition, civil unrest, thuggery and lawlessness, terrorism, insurgency, and low- or high-intensity combat.

With or without such tactical threats, however, there are risks of accidents, disease, and ill health that might be attributable to deployment. These might arise from contaminated local environments, from the intensive activities of the deployed forces, from exposures to hazards associated with mission tasks from such intentional exposures as use of pesticides and prophylactic agents, and from the rigors of exposure to climatic extremes. Troops might also be under considerable psychological stress owing to separation from family and familiar settings. This might be complicated by fatigue and a rapid operational tempo in which every task has heightened importance yet reduced margins for completion and error. Troops in hostile settings also have an understandable concern about their personal safety, and might show adverse effects from the stress of contemplating potential dangers and uncertainty about what the future might hold.

CHEMICAL AND BIOLOGICAL WARFARE AGENTS

Although most major military powers, including the United States, have formally renounced development and maintenance of chemical and biological warfare capabilities, the relatively modest technological challenges and costs for producing such agents has led to increasing concern about proliferation to rogue states and terrorist groups. As with all weapons of mass destruction, even when unused, the credible threat of their use can give considerable leverage, even against a superior force. The very isolation, economic pressure, and overwhelming military power with

which the world community attempts to contain embattled and desperate factions might tempt them to seek influence through the leverage that chemical and biological weapons appear to provide. Despite the irrationality of using such weapons, the mere possibility of using them results in the deployment of expensive and cumbersome countermeasures and prompts caution about engaging such an adversary in any way that might expose large numbers of troops or civilians to a possibility of attack.

CHANGING NATURE OF DEPLOYMENT AND WARFARE

Large advances in technological capabilities, the shifting spectrum of missions, and the evolving nature of military threats have led to pronounced changes in the nature of deployment and of warfare itself. (See Appendix A.) Deployment of U.S. ground forces is increasingly characterized by an array of smaller, highly mobile units coordinated by a technically sophisticated communications system. Technology is also the key to the systems that give such units great capabilities for detection of tactical threats, direction of fire, and rapidly updated information about the state of the battlefield. There is an ever-developing ability to carry out remote sensing and real-time environmental monitoring for agents that might pose health threats. These current and emerging capabilities, and the flexibility and rapid response they enable, are critical to the military effectiveness of modern force deployment. (See NRC 1999a for a detailed assessment.)

To be effective, this strategy depends on the smooth functioning of its technological basis. To maintain flexibility and mobility, operational overhead must be limited as much as possible. Yet to maintain operational independence, each unit must be equipped with the means to detect and respond to threats—including environmental monitoring and sensing technology—and must bear the logistic burden of the equipment's transportation, operation, and maintenance, as well as the risks of its failure. Smaller, more-specialized units lead to lower redundancy of special skills and specialties, and loss of key personnel can put whole units at increased risk. Moreover, individual units can become somewhat isolated from central support and supply services, including medical services. There is a tension, therefore, between the provision of means to detect, protect against, and treat the consequences of exposures to potentially harmful agents in the deployment environment and the burdens this places on the units that must carry them out.

Three major changes stand out in the nature of deployment. First, increasing numbers of women are deployed, including missions of a widening variety of hazards. Analyses that might in the past have concentrated on male vulnerabilities and physiology will have to be broadened

in scope. Second, the use of reserves in deployment situations is becoming increasingly frequent. Reserve troops have a different and more diverse set of experiences than regular forces, and the opportunity to use records of their recent activities or to prepare them for protection against threats might be circumscribed. Third, there is a pronounced trend toward operations in conjunction with allies, raising concerns about coordination of practices and the ability to form and adhere to standard operating procedures that allow planning and command structures to have the flexibility to accommodate harmonization with forces of other nations.

CHANGING EXPECTATIONS AND ESTABLISHING TRUST

The increasing technological sophistication of modern U.S. weaponry, both offensive and defensive, and the growing gap between U.S. and other forces, has created a remarkable ability of U.S. and allied forces to deliver destructive force with pinpoint accuracy while troops are deployed in relative safety far from the immediate zone of engagement. In recent engagements, air supremacy has been readily achieved, and the combination of such dominance, stealth technology, and precisely guided munitions has led to the perception that overwhelming military force can be brought to bear on an adversary with minimal risk of U.S. casualties, with reduced risks of casualties and collateral damage among the adversaries. A notion has developed that, at least in some military situations, one can employ "surgical" strikes and to a degree achieve "clean" warfare without undue and unnecessary carnage and destruction. Despite recent successes (albeit qualified ones) in this regard, there are clear limits to this ability, chiefly when the control of territory demands the use of ground troops and close engagement. Nevertheless, expectations about the ability of U.S. forces to avoid significant casualties have markedly increased in recent years, both in the military itself and in the minds of the general public and its governmental representatives.

This expectation of safety for deployed troops extends to risks of nonbattle casualties. It applies particularly to the variety of missions for operations other than war, in which tactical risks are much reduced and there is less of a public perception that troops are being put in harm's way. This increasing expectation of low risk from noncombat military service can be seen as part of a larger social trend in which large institutions, perceived as having power over people's lives, are increasingly held responsible for any impact on the safety and well-being of those who might come under their influence. This notion of responsibility has come to include matters that were once deemed unavoidable hazards of life or matters in which people were expected to look out for their own safety. Concomitantly, there has been a progressive erosion in recent years in the

public's trust that large institutions will indeed attend to the needs of individuals rather than sacrificing them to institutional ends.

This distrust of large institutions affects the discourse about environmental protection and public health among the public, governmental regulatory authorities, and industry. In particular, public concerns about exposures to low levels of environmental contaminants are affected precisely because of the difficulty of establishing (or refuting) causal pathways on health effects suffered by individual citizens; many of the concerns are for health effects with multiple and complex causal pathways that might be well separated in space and time from the appearance of indicators of ill health. The associations between exposure and disease are statistical and the analyses are conducted on whole populations, but individual instances of tumors, birth defects, and autoimmune diseases are rarely directly attributable to particular causes or separable from the "spontaneous" cases of such health effects. The institutions that conduct the population-level analyses, if mistrusted, might be seen as using the ambiguity to dodge or misdirect responsibility for individual cases.

A deeper discussion of the issues surrounding risk communication and the public trust in risk assessment and management can be found in recent reports of national blue-ribbon panels: *Understanding Risk: Informing Decisions in a Democratic Society* (NRC 1996) and the two-volume 1997 report of the Presidential/Congressional Commission on Risk Assessment and Risk Management, *Framework for Environmental Health Risk Management*, and *Risk Assessment and Risk Management in Regulatory Decision-Making* (PCCRARM 1997a,b).

Although these factors have been discussed in the setting of civilian environmental protection, they also affect perceptions of the military's execution of its responsibilities for the health and safety of its troops, perhaps all the more so because of the degree of control the military exerts over the actions and exposures of its personnel, its need for secrecy in many matters, and its need to call for individual sacrifice for the sake of the institutional mission and the national interest.

Establishing and maintaining trust in such situations requires demonstrable diligence and success in several areas: (1) acknowledging and actively addressing responsibilities for the welfare of those under one's influence; (2) exhibiting competence, objectivity, and thoroughness in recognizing, investigating, and analyzing potential threats; (3) implementing forthright communication of risks to those subject to them; and (4) establishing a history and reputation of doing all these things openly, consistently, and well. This includes acknowledging past failures and taking appropriate responsibility for consequences. Owing to the causal ambiguity mentioned above, technical blame for specific health outcomes is often difficult to establish, but responsibility can be shown by taking a

constructive role in finding public solutions to public health problems, even controversial ones, rather than seeking mere technical absolution.

The military must seek to establish trust in its program to attend to the health and safety of troops in the face of some public questioning prompted by some recent controversies, including the exposure of troops to radiation from early atmospheric testing of nuclear weapons, the controversy over health effects among Vietnam veterans exposed to the herbicide Agent Orange, and the ongoing debate about illnesses reported by Gulf War veterans. These matters have been much studied and debated, and no stand is taken here on either the underlying scientific questions or the actions of the military establishment. What is clear, however, is that these controversies have been exacerbated by instances where military institutions did not fully take the opportunity to be proactive about potential dangers from exposures during military activities, to collect appropriate data before, during, or after these exposures, or to manage the aftermath in a way that bolsters public confidence that the military establishment is meeting its institutional responsibilities.

NEED FOR OPENNESS

The public expects the military to accept increasing levels of responsibility for all aspects of the health and safety of troops, while having that responsibility executed in public view. With the increasing interest in the environmental causes of disease, especially chronic disease, with the increasingly broad availability of scientific information, and with the burgeoning ability of interested parties to exchange information, trade concerns, and organize themselves using the internet, all decisions regarding health and safety are subject to considerable independent scrutiny.

More important, there is considerable scope for retrospective criticism and post hoc construction of hypothetical links between emerging symptoms or syndromes and past exposures resulting from deployment of forces, especially in view of the latency inherent between exposures and subsequent manifestations of chronic health effects. To the degree that potential threats, or questions about potential threats, have not been anticipated, it is difficult either to support or refute post hoc hypotheses, because the necessary information about toxic properties, interactions, and exposures is generally lacking.

OBJECTIVES FOR A PROGRAM OF ASSESSING RISK TO DEPLOYED FORCES

A central precept of public health is that prevention is preferable to treatment, and so emphasis should be put on prior recognition and char-

acterization of potential threats. It is impossible, however, to examine every possible exposure scenario for every possible level of every agent in every conceivable combination. A program is therefore necessary to set priorities to determine which potential risk issues should receive more intense scrutiny, analysis, and/or data-collection efforts. This program should aim not only at characterizing known threats, but also at identifying exposures for which the threat potential is inadequately established. Such a program must acknowledge that certain hazards will nonetheless go unrecognized and that other hazards will not be altogether avoidable, although risky exposures might be reduced.

Thus, a program of vigilance for the emergence of unanticipated hazards during deployment is needed to supplement monitoring for detection and characterization of known threats and their impacts. Finally, personnel conducting ongoing and retrospective surveillance of troops' (and veterans') health status must be alert for effects that arise despite efforts at protection; these effects should be used to provide lessons for reducing risks in future deployments.

The exercise of assessing risk to deployed forces is not simply technical; it necessarily includes an analysis of the military's responsibilities—what it has a duty to find out about, and what it might later be held accountable for doing or failing to do. The critical goal of the DOD program to protect the health of deployed U.S. forces should be to articulate and fulfill these responsibilities. The technical procedures for doing so (the focus of this report) are merely a means to this end. For the program to succeed, these procedures must be executed competently and efficiently. But simply carrying out the technical tasks, however well this might be done, will not achieve the overarching goal. The results must be thoughtfully and vigorously applied to the achievement of the articulated objectives and the fulfillment of the military's responsibilities for the health and safety of its troops.

The program should have the following specific goals:

- to minimize the impact of disease and non-battle injuries;
- to develop a system to address risks and to execute the program efficiently;
- to establish DOD's reputation as willing to forthrightly address health and safety issues;
- to integrate risk awareness and the appropriate weighing of risks and benefits into decision-making, thereby eliminating unnecessary risk and controlling, or at least recognizing and understanding, those risks that cannot be eliminated, and ensuring informed decision-making concerning potential impacts on the health and safety of troops in the short- and long-term;

- to establish that the U.S. military is prepared to detect and to defend against threats;
- to characterize risks that might have arisen due to past exposures;
- to conduct present actions to minimize the degree to which they can be questioned in retrospect; and
- to do all the above without undue burden of cost or effect on military capability and effectiveness.

A unique aspect of risk assessment for deployed troops is the degree to which it might be necessary for commanders to weigh tradeoffs between risks to the military mission and risks to the health and well-being of the troops under their command. Questions regarding how such tradeoffs should be made and how much peril the troops should be subjected to in fulfillment of military objectives are key, but they are also beyond the scope of this report.

SUMMARY AND CONCLUSIONS

A number of factors and trends were evaluated to determine what the military can and should do protect the health and safety of deployed forces. The growing gap in capabilities between the U.S. and other nations or groups allows the possibility, and prompts the expectation, that deployment of U.S. troops even in hostile situations can entail risks that are far below historical levels. At the same time, the increasing threat from chemical and biological weapons with its looming possibility of significant casualties is changing the spectrum of tactical threats against which protection is required. Changes in missions and increasing use of U.S. forces around the globe in operations other than war focuses attention on threats of disease and non-battle injuries that differ from the concerns of avoidance and treatment of combat casualties. There is increasing recognition of the role of physical and psychological stress in prompting physiological changes that might have health consequences on their own or through interaction with other agents.

At the same time, the military is expected to take increasing responsibility for examining the potential health and safety risks to its troops, and the spectrum of concerns is broadening from acute illness and injury as a result of disease exposures, mishaps, and accidents to possible influences of low-level chemical and physical exposures on chronic diseases that might manifest themselves years later, perhaps long after cessation of military service. Some well-publicized cases have raised questions about both the military's procedures for identifying potential hazards before they manifest themselves, and in its collection of the information on toxic-

ity, exposure, and health-status surveillance necessary to detect and monitor threats to the health and welfare of troops.

In view of all of these trends and changes, an examination of the military's program for the protection of health and safety of deployed troops is in order. There is a need for a process that is open and encourages scrutiny of DOD actions and the incorporation of health and safety concerns into all aspects of decision-making. Emphasis should be placed on the prior recognition of potential threats, and characterizing and setting priorities for them; monitoring for detection and characterization of known threats and their impacts; and ongoing and retrospective surveillance of troops' (and veterans') health status for effects that arise despite protective efforts. Such a system must acknowledge the military's responsibility for the health and safety of its troops.