



Highlights of [GAO-03-833T](#), a testimony before the House Subcommittee on National Security, Emerging Threats, and International Relations, Committee on Government Reform

Why GAO Did This Study

Of the approximately 700,000 veterans of the Persian Gulf War, many have undiagnosed illnesses. The Department of Defense (DOD) and the Central Intelligence Agency (CIA) have concluded, using computer plume modeling, that no U.S. troops were exposed to hazardous substances because plumes—clouds of chemical warfare agents—could not have reached the troops. GAO was asked to assess DOD and CIA plume modeling to determine whether DOD's conclusions could be supported. GAO's final assessment will be reported at a later date.

GULF WAR ILLNESSES

PRELIMINARY ASSESSMENT OF DOD PLUME MODELING FOR U.S. TROOPS' EXPOSURE TO CHEMICAL AGENTS

What GAO Found

DOD's conclusion as to the extent of U.S. troops' exposure is highly questionable because DOD and CIA plume modeling results are not reliable. In general, modeling is never precise enough to draw definitive conclusions, and DOD did not have accurate information on source term (such as the quantity and purity—concentration—of the agent) and meteorological conditions (such as the wind and weather patterns), essential to valid modeling. In particular, the models DOD selected were not fully developed and validated for long-range environmental fallout; the source term assumptions were not accurate; the plume height was underestimated; the modeling only considered the effects on health of a single bombing; field-testing at Dugway Proving Ground did not realistically simulate the actual bombing conditions; and divergence in results among models.

DOD's conclusion, based on the findings of epidemiological studies—that there was no significant difference between rates of illness for exposed versus not exposed troops—is not valid. In the epidemiological studies, the results of DOD's flawed modeling served as a key criterion for determining the exposure classification—exposed versus not exposed to chemical agents—of the troops. Such misclassification is a serious problem that can have two types of effects: First, if misclassification affects both comparison groups equally (nondifferential classification—equally in the exposed and unexposed groups), it may water down the results so that important associations are missed. Second, if misclassification affects one group more than the other (differential misclassification), it may introduce bias that obscures important associations or creates false associations. Consequently, the misclassification in the studies resulted in confounding—that is, distorting—the results, making the conclusion invalid.

www.gao.gov/cgi-bin/getrpt?GAO-03-833T.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Keith Rhodes at (202) 512-6412 or rhodesk@gao.gov.