VII. CONCLUSION

To provide veterans with the most current information on the possible health effects of DU's use in the Gulf War, this report updates the first "Environmental Exposure Report: Depleted Uranium in the Gulf," published in August 1998, with additional information on the incidents and scenarios; Level I, II and III health risk estimates; reviews of recent scientific reports on health effects of uranium and depleted uranium; and a review of the medical testing on veterans through 1997.

The investigation found documented evidence and data showing that some of our soldiers were exposed to DU during the Gulf War. After firmly establishing the facts and circumstances surrounding each DU exposure incident and placing each in one of 13 categories, divided into three exposure levels, our investigators asked the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) to estimate the DU intakes and radiation doses soldiers may have received and what health risks these exposures might pose.

USACHPPM produced intake, dose, and risk estimates for Level II and III participants indicating their exposures were orders of magnitude below any applicable chemical or radiological guidelines. The General Accounting Office questioned the reliability of USACHPPM's 1998 Level I exposure estimates, saying the data used were indefensible and the exposures could be higher or lower. USACHPPM revised its Level I assessment, developing statistically-based, estimated lower and upper limits of DU intake and radiation doses. The magnitude and uncertainty of these estimates support DoD's and the VA's earlier decision to establish medical surveillance of those involved. We believe this medical follow-up best assesses these veterans' health. Recognizing an important need for better data, we funded a US Army testing program dedicated to fully characterizing DU and its health and safety issues in combat vehicles struck by DU munitions. That testing is ongoing; the Army expects to complete it in Fiscal Year 2002.

Meanwhile, it is important to note that to date the VA DU Medical Follow-up Program has not detected adverse clinical outcomes associated with DU's chemical or radiological toxicity in any participants. Since 1993, the Baltimore VA Medical Center has monitored 33 Level I veterans seriously injured in friendly-fire DU incidents; about half the group retains DU metal fragments in their bodies. While these veterans have definite medical problems from their wartime wounds, they do not have medical problems due to DU's chemical or radiological toxicity. Since monitoring began in 1993, the veterans retaining DU fragments consistently have had higher-than-normal amounts of uranium in their urine. The VA therefore is following them very carefully, administering a broad battery of medical tests to determine whether the depleted uranium fragments are causing any health problems. The last testing reported (1997) shows no adverse clinical outcomes from DU. The friendly-fire veterans without DU fragments have not had higher-than-normal uranium concentrations in their urine or any medical effects from DU. The VA continues to expand its Level I monitoring program. To date, VA physicians have examined more than 60 of the 104 friendly-fire survivors at least once. This report outlines the expanded medical follow-up program aimed at identifying and evaluating those personnel likely to have incurred the highest DU exposures.

This investigation identified significant shortcomings in how the military trained US personnel to operate in DU-contaminated environments -- particularly past inconsistencies in applying peacetime guidance, which is excessive for wartime practices -- and identifies lessons learned DoD can apply to future operational deployments. Our report highlights ongoing improvements in DU training.

The report consolidates the results of numerous DoD environmental assessments conducted in Persian Gulf areas where US military personnel have operated since the Gulf War. These assessments found no cause for health concern about soldiers training in authorized training areas.
The investigation presents the findings of past and continuing DU medical research on embedded DU by the Armed Forces Radiobiology Research Institute and Lovelace Respiratory Research Institute. These studies, conducted on laboratory rats and tissue cultures, have identified several areas of concern, justifying the need for further study. While it is too soon to say if the research findings have human health implications, the findings support the need for continued medical follow-up of those Level I soldiers with embedded fragments.

The Agency for Toxic Substances and Disease Registry's and RAND Corporation's reviews of the medical and scientific literature on uranium's and DU's effects support the conclusion that the exposures Gulf War veterans experienced are unlikely to cause illnesses. The recent Institute of Medicine (IOM) study further supports these reviews by concluding that there was "limited/suggestive evidence of no association" between uranium exposure and renal dysfunction or lung cancer at cumulative exposures of less than 20 rem, an amount roughly four times the highest Gulf War estimates. The IOM report also stated there were inadequate or insufficient data to determine whether an association exists between exposure to uranium and a variety of health conditions, including bone cancer, lung cancer (at cumulative exposures greater than 20 rem), lymphatic cancer, nervous system disease, nonmalignant respiratory disease, and other various health outcomes.[193]

Taken together, the USACHPPM assessments, the medical follow-up findings, and the recent scientific reviews form an increasingly solid body of medical and scientific evidence that DU is not causing Gulf War veterans' illnesses. Based on data developed to date, we believe that while DU could pose a chemical hazard at high doses, Gulf War veterans did not experience intakes high enough to affect their health. Furthermore, the available evidence indicates that due to DU's low-level radioactivity, adverse radiological health effects are not expected. The available scientific and medical evidence to date does not support claims that DU caused or is causing Gulf War veterans' illnesses. Nevertheless, medical research to date has suggested several areas of concern for soldiers with embedded DU fragments that warrant further medical follow-up which DoD and the VA are committed to perform. This investigation is ongoing, and we will continue to apply the lessons learned to safeguard the health of our servicemembers.

This information topic remains open. Should additional information become available, we will incorporate it. If you have records, photographs, or recollections or find errors in the details reported, please call 1-800-497-6261.