



DEPARTMENT OF THE ARMY  
U.S. Army Corps of Engineers  
WASHINGTON, D.C. 20314-1000

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REPLY TO  
ATTENTION OF:

Military Programs

OFFICE OF SECRETARY  
DOCKETING SERVICE  
BRANCH

United States Nuclear Regulatory Commission  
The Secretary of the Commission  
ATTN: Docketing and Service Branch  
Electronic Bulletin Board (800) 880-6091  
Washington, D.C. 20555

Dear Sir:

I am enclosing our review comments on the NRC draft Radiological Criteria for Decommissioning. We have also forwarded these comments to you through your Electronic Bulletin Board [at (800) 880-6091].

The review comments have been prepared by Mr. Luke McCormick, Health Physicist, from our Radiological Center of Expertise, Omaha, NE. To further discuss these comments with him, please call (402) 221-7401. For other related issues, please contact Dr. Reuben Sawdaye of my staff at (202) 272-8881.

*Patrick A. Linn Deputy, LTC*  
for Cary Jones  
Chief, Environmental Restoration  
Division  
Directorate of Military Programs

Enclosure

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9 March 1994

Draft Radiological Criteria for Decommissioning  
Corps of Engineers Review Comments

The Nuclear Regulatory Commission (NRC) requested comments from interested parties including federal agencies on the Draft Radiological Criteria for Decommissioning. The U.S. Army Corps of Engineers (USACE) welcomes the opportunity to comment on the strategy for developing clean-up regulations for radiation sites, and offers the following comments:

On the issue of statutory basis for regulation; the authority to establish cleanup standards for sites where radioactive materials were used was granted to the Environmental Protection Agency (EPA) by the Atomic Energy Act. Regulation should be consistent throughout the United States. To promote efficiency in regulation, consistency in interpretation, and economy of clean-up expenses, one regulatory agency should act as the lead in all regulation. All other interested agencies should act through the lead agency. The NRC, its Agreement States, and the Department of Energy (DOE) share the responsibility of regulating the nuclear industry. In the interest of equity throughout the nation, clean-up standards among all interested parties must be consistent.

On the issue of who should the regulation protect; regulations should protect the workers on-site, and all members of the public who may be at an increased risk from the site activities or from the future use of the site. Workers on-site must know and understand that a higher risk is attached to working on the particular site than if working on a radiologically uncontaminated site. Workers then voluntarily accept the elevation in risk. The public should be exposed to a lesser risk. Persons especially sensitive to radiation should also be protected to a lesser risk. The hierarchy used by the Nuclear Regulatory Commission, 5 Rem per year TEDE for workers, 500 millirem to the embryo/fetus of a declared pregnant female worker in the entire period of gestation, 100 millirem per year TEDE for the public, appears adequate.

On the issue of determining clean-up levels; the decision to clean up and restore a site should be based on balancing the cost of clean-up and the risk to workers and the public from the clean-up against the actual benefits to the public, including the total risk reduction. This balance should include the evaluation of the reduction of worker and public dose from the deferment of clean-up to a later time to allow radioactive decay to lessen the hazards of clean-up. The lifetime risk of fatal cancer from ionizing radiation calculated in 1990 in Publication #60 by the International Commission on Radiation Protection is  $5 \times 10^{-2}$  per 100 rem for a population. This calculation is admittedly conservative. Most experimental data for gamma and x-ray exposures indicate that the dose-effect relationship for ionizing radiation follows a concave linear-quadratic curve. The data indicates that at low doses, (doses below 10 rem in a short period of time) there is a near linear response indicating low effect increase for increase in dose, and as doses become higher the curve indicates higher increased effect for increased dose. Recent studies indicate the probable existence of a threshold dose, and evidence that cellular repair mechanisms become less effective when lower than 'normal' doses of radiation are received.

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For a regulation to be enforceable it must be measurable and verifiable. The proposed limit of 15 millirem per year above background, to any member of the public with a goal of three millirem per year above background, is neither measurable nor verifiable. Attempts to comply with these limits will necessitate the use of risk assessment based on exposure pathway modeling. Slight changes in the pathway modelling can lead to orders of magnitude differences in estimated dose. For each specific site, the issue of compliance or non-compliance will be based on which risk assessor presents the better argument, and not on the actual dose received. As each site is different, each risk assessment model will be different. Regulators will be called upon to determine which risk assessment is the more suitable to each location. This determination, by its nature, will be open to argument and interpretation, and since these dose levels will eventually be related back to the health of an individual member of the public, injury to that individual and legal redress for that injury may depend on an attorney's ability to convince a jury, which risk assessment model is more appropriate.

In the alternative, USACE suggests the determination of soil and air contaminant limits for radionuclides. These limits are measurable and verifiable. The determination of these limits should be based on the actual risk of external exposure, the actual risk of internal deposition and the dose from that exposure and deposition. Averaged, generalized estimates of the risk of exposure and internal deposition for each radionuclide in each class should be compiled by the NRC, and the contamination level for each radionuclide and form necessary to reach the determined limit should be calculated from those average risk models (similar to the Derived Air Concentration values currently in use). These numbers should be published as the 'Goal' dose to any individual member of the public. The party responsible for the Decontamination and Decommissioning (D&D) actions should be allowed to modify the general risk estimates by use of site specific risk assessment data demonstrating that proposed D&D procedures would meet or exceed the levels of protection provided by the 'general' D&D guidance criteria. The site specific modelling techniques and input parameters would require approval by the regulating agency, and should include public involvement from all stakeholders.

For the purposes of regulation, most agencies, and the Health Physics Society assume a linear, no-threshold dose-effect relationship. This assumption is conservative and protective of the citizens of the United States and the Environment. We recommend the Total Effective Dose Equivalent (TEDE), as defined in 10 CFR 20, to any member of the public, from all site-specific man-made, or humanly concentrated natural sources, be left at 100 millirem per year above background. The 10 CFR requirement for 25 mrem per year from D&D sites appears to imply that TEDE from a D&D site should be treated differently from the TEDE from any other source. 25 mrem per year above background also comes into the range of doses that is statistically difficult to differentiate from background.

On the issue of future uses of clean-up sites, cleanup of a contaminated site to the standards required to ensure optimum protection of the public may not always be the most reasonable or economically feasible goal. Future uses considered for each project should be based on a probabilistic risk assessment designed to provide the best estimates of the dose distribution and the uncertainties attributed to that dose distribution, and not provide the most conservative estimate. When dose to the public can be lowered by investing remediation funds in activities other than decontamination to the limits necessary for unrestricted use, then restricting the public's use of that site offers the best balance of the total risks and expenses of cleanup against the total benefit to the public.

For further information contact Luke McCormick, U.S. Army Corps of Engineers, Mandatory Center of Expertise, Attn: CEMRD-ED-EH, Omaha, NE, at (402) 221-7401.