

United States Government

Department of Energy

# Memorandum

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REPLY TO  
ATTN OF: EM-421 (W. A. Williams, FTS 233-5439)

SUBJECT: Uranium Cleanup Guidelines for St. Louis, Missouri, FUSRAP Sites

to: Lester K. Price, OR

This is in response to your request for a uranium cleanup guideline at the St. Louis FUSRAP Sites. Your staff recommended a cleanup guideline of 75 picoCuries per gram (pCi/g) of Uranium-238. This recommendation was based on the projected volumes of contaminated soil at different cleanup criteria levels for uranium and on a supporting analysis by Argonne National Laboratory (ANL).

The ANL analysis determined a maximum residual concentration of U-238 in soil of 210 to 880 pCi/g, depending on future land use. These concentrations are equivalent to 100 millirem per year for various land uses. The recommended value of 75 pCi/g for U-238 is equivalent to 8.5 millirem per year for continued industrial use and to 36 millirem per year for assumed future residential and agricultural use. In terms of health protection, the recommended value is within DOE's dose guideline of 100 millirem per year, which must be met under all worst case, plausible scenarios, such as an assumed residential and agricultural use.

In the application of ALARA, practical considerations, costs, and benefits are also taken into account. For practical considerations, it is likely that the contaminated areas will be cleaned up to a level below whatever guideline is established. This is likely for two reasons. First, in order to remove all contamination above the guideline, some soil contaminated below the guideline will be removed. This will have the practical effect of lowering the guideline as it is applied during cleanup operations. Second, during cleanup operations, it is difficult to precisely delineate the point at which the contamination above the guideline ends. As a result, remedial personnel will remove all suspect materials to avoid repeated cleanup operations on the same property. For these reasons, it is likely that cleanup will be accomplished at some level lower than the established guideline. A final practical consideration is the use of clean fill material to replace excavated materials. This will cause a shielding and covering effect on the remaining soils, reducing both gamma ray and radon exposures. If the site is used for agricultural or residential use in the future, the clean fill would also reduce the projected doses by diluting the residual contamination. Thus, in the actual application of a cleanup guideline, it is very likely that a cleanup level substantially below the established guideline will be achieved.

A review of the contaminated soil volume as a function of the cleanup guideline indicates an increasing volume of contaminated soil as the guideline becomes smaller. Since costs are related to the volume of soil handled, costs will increase proportionately.

Between the cleanup guidelines of 75 and 50 pCi/g, the volume of contaminated soil increases by 10 percent. For continued industrial use of the property, this increase in waste volume and cost is equivalent to a reduction in dose from over eight millirem per year to six, neglecting the practical considerations discussed above. A further reduction in the cleanup guideline to 35 pCi/g increases the waste volume an additional 32 percent, while only reducing the dose by two millirem per year. These are very costly reductions for a nominal benefit for continued industrial use of the property.

However, the possible residential and agricultural use of the site in the future must also be considered. While such use is not considered credible for the St. Louis downtown sites, it is credible for some of the suburban properties. For a residential and agricultural use scenario, a cleanup guideline of 75 pCi/g corresponds to an annual dose of 36 millirem to the resident. Reducing the guideline to 50 pCi/g results in an annual reduction in dose of 12 millirem, at a cost of increasing waste volume by about 10 percent. A further reduction in the cleanup guideline from 50 to 35 pCi/g results in an additional dose reduction of seven millirem per year at a cost of increasing the waste volume by another 32 percent. For residential and agricultural use, application of ALARA and cost-benefit considerations would indicate that a guideline of 50 pCi/g can be achieved at a nominal cost increase.

Based on the above considerations, a guideline of 50 pCi/g of U-238 is approved for use in the cleanup of the St. Louis Sites.



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