DOE F 1325.8
(8-89)
EFG (07-90)

TN.9-4

United States Government

Weston
Department of Energy

memorandum

FUSRAP
8118
TN.9

DATE: FEB 6 1991

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

SUBJECT: Uranium Cleanup Guidelines for the Elza Gate, Tennessee, FUSRAP Site

TO: Lester K. Price, Director
Former Sites Restoration Division
Oak Ridge Operations Office

This is in response to your request for uranium cleanup guidelines for the Elza Gate site. Your staff recommended a cleanup guideline of 35 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 draft supporting analysis by Argonne National Laboratory (ANL).

The ANL analysis determined a maximum residual concentration of U-238 in soil of 59 to 2000 pCi/g, depending on future land use. These concentrations are equivalent to 100 millirem per year for various land uses. The recommended value of 35 pCi/g for U-238 is equivalent to 4 millirem per year for the current industrial use of the land and as much as 60 millirem per year for assumed future residential and agricultural use. 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 100 and 35 pCi/g, the volume of contaminated soil increases by 36 percent. For the current industrial use of the property, this increase in waste volume and cost is equivalent to a reduction in dose from 12 millirem per year to 4, neglecting any practical considerations. A further reduction in the cleanup guideline to 25 pCi/g increases the waste volume an additional 41 percent, while slightly reducing the already small annual dose. This is a costly reduction for a nominal benefit for the current use of the property.

The possible residential and agricultural use of the site in the future must also be considered. Two such scenarios are examined in the ANL Report. Scenario C assumes a resident farmer will:

(1) use on-site pond for drinking water supply,
(2) eat plant foods grown on the site,
(3) eat meat and milk from livestock grown on the site,
(4) eat fish from the pond, and
(5) obtain all needed water from the pond.

Scenario D is similar to Scenario C except that the resident farmer is assumed to draw all water from a well down gradient side of the decontaminated zone. For this site, Scenario C represents the most plausible case because the use of a well as a sole water supply is not likely for a site so near the Clinch River.

For Scenario C, a guideline of 35 pCi/g corresponds to an annual dose of 15 millirem to the resident farmer. A reduction in the cleanup level to 25 pCi/g results in a dose reduction of 4 millirem per year and a 41 percent increase in waste volume and cost. This is a small benefit for such a large increase.

Based on the above considerations, a guideline of 35 pCi/g of U-238 is approved for use in the cleanup of the Elza Gate Site.

James W. Wagoner II
Acting Chief
Off-Site Branch
Division of Eastern Area Programs
Office of Environmental Restoration

bcc:
Weston
EM-40 (3)
EM-42 reader
Williams reader

EM-421:AWilliams:353-5439:1/9/91:egate

EM-421
Williams
1/29/91

EM-421
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DOE F 1325.8
(5-83)

United States Government **Department of Energy**

memorandum

Oak Ridge Operations

1990 DEC 18 AM 11:22

DATE: December 13, 1990

REPLY TO ATTN OF: EW-93

SUBJECT: **URANIUM CLEANUP GUIDELINE FOR THE ELZA GATE SITE**

TO: James W. Wagoner, II, FUSRAP Program Manager, Off-Site Remediation Branch, Eastern Area Programs, EM-421, DOE-GTN

The attached ANL report on residual uranium guidelines proposes a guideline based on an allowable nonoccupational exposure level of 100 mrem/yr. The recommended maximum residual concentrations identified in this report for uranium-238 in soil are 59 to 2000 pCi/g, depending on the assumed future land use. The attached bar chart indicates the effect of lowering the uranium cleanup guideline on the resulting volume of contaminated soil at the Elza Gate Site. Based on these figures and in consideration of the ALARA concept, we would recommend a uranium guideline of approximately 35 pCi/g.

If you have any questions, please contact me.

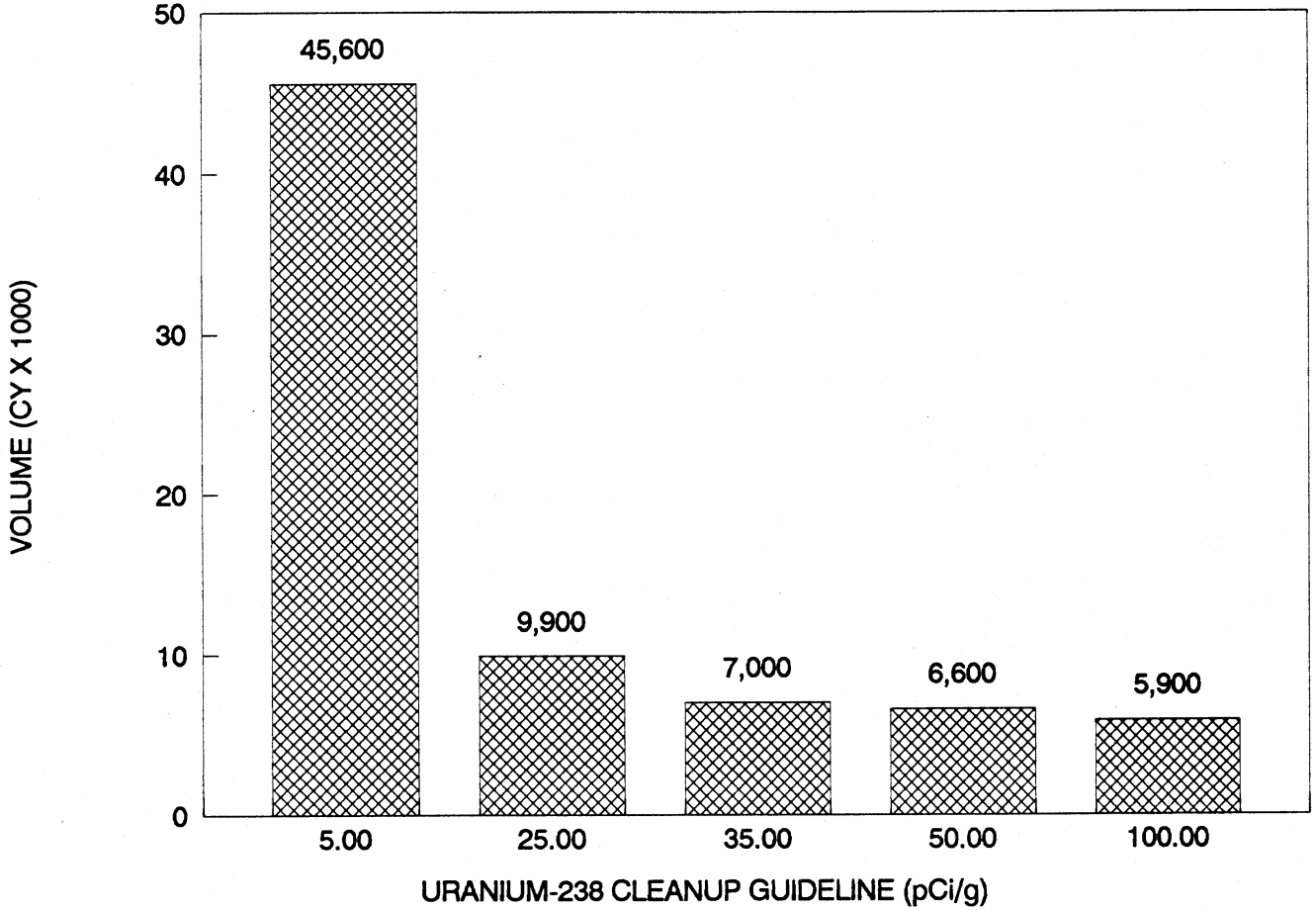
David G. Adler, Site Manager
Former Sites Restoration Division

Attachment

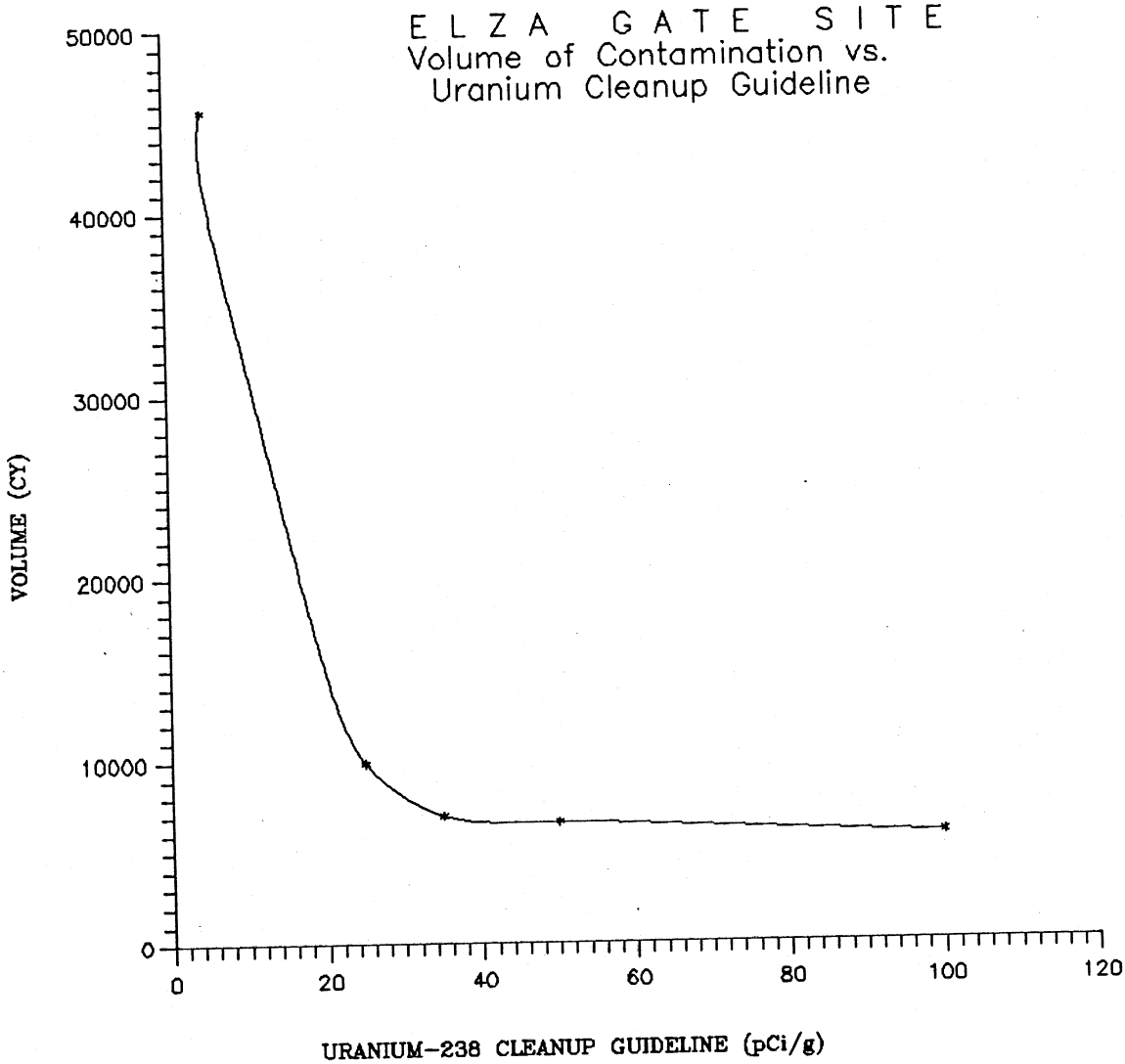
cc: S. D. Liedle, BNI

ELZA GATE SITE

VOLUME OF RADIOLOGICALLY CONTAMINATED SOIL VS. URANIUM CLEANUP GUIDELINE



Note: Volume estimate based on DOEs residual contamination guidelines for a Ra-226, Ra-228, Th-230, Th-232 and a variable U-238 guideline.


ELZA GATE SITE
Volume of Contamination vs.
Uranium Cleanup Guideline
VOLUME (CY)
50000
40000
30000
20000
10000
0
0
20
40
60
80
100
120
URANIUM-238 CLEANUP GUIDELINE (pCi/g)