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Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for Maywood, New Jersey



U.S. Department of Energy

United States Government

Department of Energy

memorandum

DATE: APR 25 1994

1994 APR 23 AM 10:24

REPLY TO EM-421 (W. A. Williams, 903-8149)
ATTN OF:

SUBJECT: Uranium Guideline for the Maywood, New Jersey Site

TO: L. Price, OR

This is in response to the request for approval of the uranium guideline for the Maywood Site of the Formerly Utilized Sites Remedial Action Program (FUSRAP), pursuant to Department of Energy (DOE) Order 5400.5. The Site, located in northern New Jersey, was used by a private party for the production of thorium and rare earths from ores. In addition, tailings from the thorium production were carried to off-site locations in Maywood, Lodi, and Rochelle Park, New Jersey. Your staff requested approval of a residual uranium guideline of 100 picoCuries per gram of total uranium, based on a supporting analysis by Argonne National Laboratory (ANL). Further, your staff estimated that the waste volume from remedial action would not be affected by the choice of the guideline because of the co-location of uranium and thorium in the soils to be remediated. Under these conditions, cleanup of the thorium to its authorized guideline (5 picoCuries/gram (pCi/g) for surface soil and up to 15 pCi/g for subsurface soil) will result in a simultaneous cleanup of uranium to levels far below the requested guideline.

Basic Dose Requirement:

The Maywood Site is located in northern New Jersey, and the present land use is industrial. Vicinity properties are used for residential, commercial, governmental, and industrial purposes. Although some vicinity properties have been cleaned up, others have not. For the remediation of the site, it is necessary to determine (using site specific data) the level of uranium that would lead to an exposure of 100 millirem per year for all plausible land uses. A draft analysis was performed by ANL and was submitted with the request.

The ANL analysis calculated a maximum residual concentration of total uranium in soil of 1,400 picoCuries per gram (pCi/g) to 13,000 pCi/g, depending on future land use. These concentrations are equivalent to 100 millirem per year for various land uses. The recommended 100 pCi/g is equivalent to 1.6 millirem per year for an industrial worker (Scenario A in the ANL Report). For recreational use, the exposure is less than 1 millirem per year (Scenario B). For subsistence farming use, the recommended guideline is 7 millirem per year, assuming the use of an on-site water well (Scenario C), and 6 millirem per year, assuming that off-site water is used for drinking, livestock, and irrigation purposes (Scenario D).

Based on the ANL analysis, the recommended value of 100 pCi/g of total uranium is within DOE's dose guideline of 100 millirem per year, which

must be met under all worst case, plausible scenarios, including the assumed residential and agricultural use.

As Low As Reasonably Achievable (ALARA) Analysis:

In addition to meeting the basic radiation protection guideline, any cleanup guideline must be analyzed to keep exposures ALARA. 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 three reasons. First, in order to remove all material 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 contamination above the guideline ends. As a result, remedial personnel will remove all suspect materials to avoid repeated cleanup operations on the same property. Finally, the uranium is co-located with thorium, and the removal of thorium to meet the applicable guideline will remove uranium at the same time. For these reasons, it is likely that cleanup for uranium will be accomplished at some level lower than the approved cleanup 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 gamma ray, dust, and radon exposures. If the site were to be used for residential or agricultural use in the future, the clean fill would also reduce the projected doses by diluting the residual contamination. The ANL analysis does not assume that there is any clean fill or cover placed over the site after cleanup. For this reason, the doses calculated in the ANL report are clearly a worst case scenario. In the actual application of a cleanup guideline, it is very likely that a cleanup level substantially below the established guideline will be achieved.

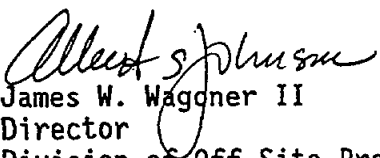
Selection of a uranium guideline significantly below 100 pCi/g would, as the request stated, negatively impact the project by reducing the utility of field measurements for confirming the cleanup of uranium. Although other measurement techniques could be used, the cost is much higher, and there is no potential benefit since the uranium is co-located with thorium-232, and remediation of thorium contaminated soils will result in residual uranium concentrations much lower than those under consideration.

Summary and Approval:

Based on the above considerations, a guideline of 100 pCi/g for total uranium above background levels is approved for use in the cleanup of the Maywood Site, pursuant to DOE Order 5400.5, Chapter IV, Section 5a. This guideline should be implemented in conjunction with the authorized guidelines for radium and thorium using the "sum-of-the-fractions" method.

In addition, please direct ANL to finalize the dose report for publication.

We also recommend that your staff discuss the site characterization data and the approved guidelines with the State and Environmental Protection Agency staff at an appropriate time.

for 
James W. Wagner II
Director
Division of Off-Site Programs
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cc:

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