

February 2, 2001

Ms. Ruth E. McBurney, Director  
Division of Licensing, Registration, and Standards  
Bureau of Radiation Control  
Texas Department of Health  
1100 West 49th Street  
Austin, Texas 78756-3189

Dear Ms. McBurney:

Enclosed is our response to your letter dated October 25, 2000 regarding the use of soil homogenization as an alternative method for reclamation of an in-situ uranium facility in Texas. The response was prepared by the Fuel Cycle Licensing Branch in the Office of Nuclear Material Safety and Safeguards of the U.S. Nuclear Regulatory Commission.

If you have any questions on the enclosed response, please contact Ms. Elaine Brummett at 301-415-6606 or by Internet at [ESB@NRC.GOV](mailto:ESB@NRC.GOV).

Sincerely,

***/RA By Frederick Combs, Acting for/***  
Paul H. Lohaus, Director  
Office of State and Tribal Programs

Enclosure:  
As stated

Ruth E. McBurney

February 2, 2001

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STP-AG-27

January 16, 2001

MEMORANDUM TO: Paul H. Lohaus, Director  
Office of State and Tribal Programs

FROM: Philip Ting, Chief **/RA/**  
Fuel Cycle Licensing Branch  
FCSS/NMSS

SUBJECT: COMMENTS ON THE USE OF SOIL HOMOGENIZATION FOR  
RECLAMATION OF A TEXAS URANIUM FACILITY

My staff has reviewed the Texas Department of Health letter of October 25, 2000, that you forwarded to us for comment by your memorandum of November 20, 2000. The letter requests conditional concurrence from the U.S. Nuclear Regulatory Commission (NRC) on the implementation of soil mixing (homogenization) at an In-Situ Leach facility to a depth of 18 inches in order to meet the soil surface radium criterion (5 pCi/g above background). While we agree with you that this is not a request for an alternative standard as allowed by Appendix A to 10 CFR Part 40 for uranium recovery facilities, according to the NRC letter of May 5, 1998 (Holonich to McBurney, Texas Department of Health), the NRC would treat such a request similar to an alternate criteria request and would evaluate it on that basis, i.e., economic benefit and equivalent protection. In addition, NRC staff indicated in the attachment to the September 16, 1999, letter to the New Jersey Department of Environmental Protection from then-acting Chairman Dicus, that while NRC does not explicitly prohibit soil mixing and dilution, the NRC staff generally does not permit soil mixing as a means of reducing radionuclide concentrations in soil. The NRC staff views the use of dilution within the context of an overall approach to the site cleanup, which includes application of the as low as is reasonably achievable (ALARA) principle, and considers only those cases which demonstrate that removal of the soil would not be reasonably achievable.

During our review, we noted that the Texas letter discussed the substantial cost difference in the two remediation methods to meet the radium criteria, but did not provide details on the comparative health or environmental protection aspects of the proposed method and conventional soil removal. The letter did mention the increased hazards during transport if the material was excavated and taken to a disposal facility. However, there was no comparison of the on-site potential exposures (e.g., inhalation dose of remediation workers) from the two methods of remediation. Therefore, equivalent protection has not been addressed completely for this site.

While the soil radium concentrations resulting from mixing would have to meet release criteria, the mixing approach would result in a larger volume of contaminated soil (i.e., source term not reduced) for this site than would soil removal. Mixing could preclude the application of the ALARA principle in the manner used by NRC uranium recovery (mill) licensees, i.e., by reducing the surface and subsurface radium level well below the release criteria. Without some additional measures or assurance, the long-term potential health risks resulting from the soil

mixing method could be considered higher than the soil removal method, for this site. Also, the Texas letter was not clear that the uranium limit of 30 pCi/g was meant to apply in the absence of elevated radium (i.e., background radium) as indicated in the NRC Branch Technical Position (Disposal or Storage of Thorium and Uranium Wastes) of 1981. For individual 100-square-meter areas, the unity rule (sum of ratios) should be considered if either elevated (greater than 5 pCi/g above background) uranium or thorium exists with residual radium.

Before the NRC staff could concur on the acceptability of the soil homogenization method of complying with the soil radium standard at this site, the staff would need the following information: (1) description of ALARA efforts; and (2) how the short-term and long-term protection resulting from the mixing method provides protection equivalent to the contaminated soil removal method at this site. The consideration of long-term protection appears appropriate given the long half-lives of the radionuclides involved. However, the requested site-specific comparison of protection between the two remediation methods might be questioned, because sites performing soil removal could leave levels of residual radionuclides similar to those resulting from mixing. In any case, the demonstration of ALARA would still be of concern. The State should also provide assurance that the cost savings of the proposed method (over four million dollars) is realistic and therefore soil removal and disposal is not reasonably achievable.

For your information, a request for soil mixing to the NRC staff would require case-by-case evaluation and none have been submitted to the uranium recovery staff. If you have any questions regarding this response, please contact Elaine Brummett at 415-6606.