

Manley, Eileen

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Sent: Thursday, August 31, 2017 3:36 PM
To: Lancaster, Thomas
Subject: [External_Sender] MEA TR
Attachments: MEA TR Replacement pages.pdf

Tom:

On June 27, 2017, CBO submitted revisions to the Marsland Expansion Area Technical Report. Please replace pages 6-25 and 6-26 with the attached pages. A minor revision has been made to page 6-26.

Regards,

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Technical Report
Marsland Expansion Area

6.4 Methodologies for Conducting Post-Reclamation and Decommissioning Radiological Surveys

As discussed in Section 6.2, survey areas will include areas expected to exhibit higher levels of contamination than surrounding areas, including diversion ditches, any surface impoundments, wellfield surfaces (particularly those areas where spills or leaks may have occurred), and structures in process and storage areas, areas around the deep disposal wells, and on-site transportation routes for contaminated material and equipment.

6.4.1 Cleanup Criteria

Surface soils will be cleaned up in accordance with the requirements of 10 CFR Part 40, Appendix A, including a consideration of ALARA goals and the chemical toxicity of uranium.

The proposed limits and ALARA goals for cleanup of soils are summarized in **Table 6.4-1** and described below.

The existing radium-226 criterion in 10 CFR Part 40, Appendix A, was used to derive a dose criterion (Benchmark Approach) for the cleanup of byproduct materials. The Benchmark Dose was modeled using the RESRAD code (Version 7.0). The RESRAD runs are shown and presented in **Appendix N**. The results show that a concentration of 600 pCi/g for natural uranium in the top 15 cm layer of soil for the resident farmer scenario is equivalent to the Benchmark Dose derived from a concentration of 5 pCi/g of radium-226.

ALARA considerations require that an effort be made to reduce contaminants to ALARA levels. The ALARA goals are normally based on a cost-benefit analysis. For the cleanup of gamma-emitting radionuclides, the cost of cleanup becomes excessively high as soil concentrations and/or gamma emission rates become indistinguishable from background.

Cleanup of uranium mill sites has demonstrated that conservatively derived gamma action levels along with appropriate field survey and sampling procedures result in near background radium-226 concentrations for the site. In addition, the presence of a mixture of radium-226 and uranium will tend to drive the cleanup to even lower radium-226 concentrations. It is therefore believed that no specific ALARA goal is required for surface radium-226.

The uranium concentration should be limited to a maximum of 230 pCi/g for all soil depths because of chemical toxicity concerns. Using the most conservative daily limit corresponding to the National Primary Drinking Water Standard, a soil limit of 230 pCi/g corresponds to the EPA intake limit from drinking water with a uranium concentration of 0.06 mg/day.

CBR desires to reduce subsurface concentrations to a maximum of two thirds of the proposed limit of 15 pCi/g radium-226. The subsurface uranium goal has not been reduced because it has not been demonstrated that these levels can be detected with readily available field instruments.

As demonstrated at the CPF the spills of process solutions are not likely to contain substantial amounts of thorium-230. CBR believes that development of soil cleanup criteria for thorium-230 is not appropriate at this time. However, thorium-230 will be radiochemically analyzed in representative soil samples. In the unlikely event that thorium-230 is present in elevated levels,



**Technical Report
Marsland Expansion Area**

clean-up criteria for thorium-230 will be developed using the radium-226 Benchmark Approach and submitted to the NRC for approval prior to final site decommissioning.

6.4.2 Surface Soil Cleanup Verification and Sampling Plan

Cleanup of surface soils will be restricted to areas where there are known spills and, potentially, small spills near wellheads. CBR commits to meeting the soil cleanup criteria established in 10 CFR 40 Appendix A, Criterion 6(6). CBR will follow survey methodology as described in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM).

An NRC-approved statistical test will be conducted to demonstrate that the survey method provides for a 95-percent confidence level that cleanup guidelines have been met, as per acceptance criteria 6.4.3 of NUREG-1569 (NRC 2003). An appropriate statistical test for analysis of the survey data as described in NUREG-1575 ("Multi-Agency Radiation Survey and Site Investigation Manual") will be utilized (NRC 2000). If the mean of the sample concentrations is lower than the criterion but the data fail the statistical test, CBR will follow procedures similar to those recommended in NUREG-1575.

6.4.3 Subsurface Soil Cleanup Verification and Sampling Plan

For subsurfaces CBR will adopt different survey and sample protocols, depending on the type and size of excavation. CBR will rely on sampling and analysis of radium-226 and natural uranium over surveying, to verify cleanup of subsurface excavations. The protocols will be submitted to the NRC for approval prior to post-reclamation and decommissioning.