

October 20, 2011

MEMORANDUM TO: Andrew Persinko, Deputy Director
Environmental Protection and
Performance Assessment Directorate
Division of Waste Management
and Environmental Protection

Keith I. McConnell, Deputy Director
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection

FROM: Hans Arlt, Sr. Systems Performance Analyst **/RA/**
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Environmental Protection and Performance
Assessment Directorate
Division of Waste Management
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SUBJECT: LETTER REPORT DOCUMENTING THE ACTIVITES OF THE
ENGINEERED COVERS TECHNICAL GROUP (ECTG)

The Office of Nuclear Regulatory Research (RES) has completed the research project, "Effectiveness of Engineered Covers: From Modeling to Performance Monitoring," conducted by the University of Wisconsin under a NRC contract with the US Geological Service (NUREG/CR- 7028, *in print*). An important conclusion of the RES report is that compacted soil materials used in cover materials at the sites studied did not retain "as built" properties over periods of regulatory interest. The properties of these materials change to values more typical of surrounding soils within 5 to 10 years after installation. Changes in low permeable cover soils can be rapid and can result in an increase to the saturated hydraulic conductivity by three to four orders of magnitude. The RES report focuses on changes to engineering properties of soil covers, however it does not address cover elements designed for erosion protection.

The Division of Waste Management and Environmental Protection (DWMEP) established a working group designated the "Engineered Covers Technical Group" (henceforth, the ECTG) to discuss and review the implications of the RES report. This technical group consisted of Jake Philip (to coordinate with RES), Ted Johnson, Robert L. Johnson, Doug Mandeville, George Alexander, Joseph Kanney, and Mark Fuhrmann, with Hans Arlt as technical group lead. The technical group was tasked to assess the technical merits of the findings in the RES report and its potential impact on other waste disposal facilities that take credit for engineered covers in performance assessment (PA), e.g., low-level waste, uranium recovery, and decommissioning sites.

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The ECTG conducted a qualitative assessment of existing sites to identify and prioritize by risk existing and planned covers that may be impacted by the findings from the RES report. Processes contributing to risk include both radon flux from the disposal cell and effects to the groundwater due to the potential of an increased rate of water infiltration through the covers. The prioritization of sites based on risk-informed judgments is especially important for DWMEP in order to start activities at those sites deemed needing the most attention. This memorandum encloses the documentation of activities carried out by the technical group, including the site prioritization.

Although there are differences in design between the covers exhumed in the RES report and the engineered surface covers at NRC regulated sites, the RES report clearly shows that the properties of the engineered soil may degrade in relatively short times on exposure to natural conditions. Staff evaluated available information for each site, comparing the specific results of the report to the specific condition of the existing sites. From the sites qualitatively assessed for possible increased contaminated seepage into groundwater due to processes documented in NUREG/CR-7028, no sites were assessed higher than moderate/high¹. For the higher rated sites, staff would need to explore with the licensees the best way to implement the recommendations made within the current regulatory framework under 10 CFR 40, Appendix A, e.g., criterion 5B(4) and 5B(5). The ECTG qualitatively assessed seven mill tailings covers, six existing and one planned, from Title I and II sites to have a moderate/high or high potential for increased radon release due to processes described in the RES report. It is recommended that average radon release be measured (with verifiable quality assurance) over the entire engineered surface cover for the six covers for a duration of 1 year or longer. If radon flux measurements prove to be too difficult, radon concentration measurements should be performed. Also included in the enclosed report are short-term and long-term recommendations for DWMEP managers to consider as well as recommendations pertaining to future research activities and guidance.

Enclosure:
Documentation of ECTG Activities

¹Sites were classified with a five point scale and graded from either low, low/moderate, moderate, moderate/high, or high.

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