

Consequence Sensitivity Analyses for a Risk-Informed Review of a Preclosure Safety Analysis

The U.S. Department of Energy (DOE) is preparing a license application for a potential geologic repository to dispose high-level radioactive waste. A preclosure safety analysis will be submitted as part of a potential license application for review by the U.S. Nuclear Regulatory Commission (NRC). The preclosure period includes the geologic repository operations prior to permanent closure of the potential repository, including receipt, transfer, and emplacement of high-level waste. NRC will conduct a risk-informed and performance-based review, where in-depth technical evaluations will be focused on technical areas that are significant with respect to demonstration of compliance with the performance objectives specified by the governing regulations.

The paper will discuss the results of sensitivity analyses for potential onsite and offsite radiological doses from the potential high-level waste repository. A description of specific analytical techniques used to estimate doses and perform sensitivity analyses will be presented in the paper along with some example results.

The Center for Nuclear Waste Regulatory Analyses (CNWRA) developed the Preclosure Safety Analysis (PCSA) Tool software to aid in the regulatory review of the DOE preclosure safety analysis. One feature of the PCSA Tool is its capability for performing independent dose assessments for potential spent nuclear fuel release scenarios that could result in onsite or offsite exposures during repository operations. Dose sensitivity analyses are being conducted for potential release scenarios and site conditions at the geologic repository. These analyses include probabilistic consideration of the variability and uncertainty in modeling parameters that influence calculated doses. These sensitivity analyses are intended to identify significant dose modeling parameters and associated technical areas, including uncertainties, that may be focused on in a risk-informed review.

In conclusion, sensitivity studies are being conducted to identify modeling parameters and associated technical areas that contribute significantly to dose performance estimates and key sources of uncertainty. This information is important because it can be used to further risk inform the regulatory review of the preclosure design and operations that may be proposed in a potential DOE license application.

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