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Ms. Jane Marshall
Director, Division of Decommissioning, Uranium Recovery, and Waste Programs
Office of Nuclear Materials Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Response to NRC Request for Additional Information - NEI 22-01, Revision1, License Termination Process (EPID L-2025-NFO-0004)

Project Number: 689

Dear Ms. Marshall:

The Nuclear Energy Institute (NEI)[1], on behalf of its members, is pleased to respond to NRC's request for additional information dated July 3, 2025, in support of your continuing review of NEI 22-01, License Termination Process. Our response is provided in the attachment to this letter. As indicated in our response, NEI will revise NEI 22-01 to provide additional information and to clarify guidance in the document as discussed during the public meeting held on July 2, 2025. These changes will be submitted to NRC as Revision 2 to NEI 22-01 by September 30, 2025.

If you have any questions on this matter, please contact me at bsm@nei.org.

Sincerely,

Bruce Montgomery, Director, Decommissioning & Used Fuel

Attachment

Cc: Mr. Shaun Anderson, NMSS/DUWP
Ms. Tanya Hood, NMSS/DUWP
NRC Document Control Desk

[1] The Nuclear Energy Institute (NEI) is the organization responsible for establishing unified industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel cycle facilities, nuclear materials licensees, and other organizations and entities involved in the nuclear energy industry.

NEI Responses to NRC RAIs on NEI 22-01, Revision 1

RAI 1 Determining Dose Contributions from Backfill

Issue:

During the March 6, 2025, public meeting NEI disagreed with the concept of assigning dose to radionuclides of concern (ROCs) that are below detection limits for impacted materials. NEI pointed to NUREG-1575, "Multi-Agency Radiological Survey and Site Investigation Manual" (MARSSIM)," Section 2.3.5, which provides guidance to 'Report the actual result of the analysis. Do not report data as "less than the detection limit.' Even negative results and results with large uncertainties can be used in the statistical tests to demonstrate compliance."

The NRC staff notes that there is some confusion around the idea of "detection limits" and related terminology such as the critical level (Lc), MDC, and lower limit of detection (LLD). Detailed information on this topic can be found in MARLAP, Chapter 20, "Detection and Quantification Capabilities," and Attachment 3B, "Analyte Detection." MARLAP recommends that when a detection decision is required, it should be made by comparing the measured value to its critical value, which is a measure of detection limit, and not to the MDC or LLD. As pointed out by NEI, MARSSIM Section 2.3.5 recommends reporting the actual results of analysis, even negative results. NRC agrees that, ideally, initial reporting should include actual results and not zero out any negative values. However, while negative values may be appropriate to use for MARSSIM statistical tests or summary statistics, negative results should not be used when determining compliance doses, because a negative dose is not a realistic concept. When conducting any sort of dose estimate, negative results could either be zeroed out on an individual basis or zeroed out after all sample results are averaged. Zeroing out negative averages is a method that is most likely to minimize bias in the results.

In either scenario, if the analytical result is between the critical level and MDC (a posteriori), the result should not be set to zero. If results are reported as "<MDC," then the MDC should be used for a dose estimate. If actual result values are reported, then those results or MDC value could be used for dose estimates. If an individual sample measurement result is below the defined critical level, the value should still be reported, but the result can be noted as a nondetect and can be zeroed out for dose estimated purposes. However, if results were below MDC (a posteriori), but above the critical level, samples could not be considered non-detectable, and the value could not be zeroed out.

When assessing potential dose from backfill, some traditional sampling of fines (small concrete debris) may be a more practical way of assessing the potential dose from using impacted materials as backfill. It may be worth considering the backfill a class 3 well mixed survey unit with samples taken at various intervals of backfill.

Request:

Further discussions between NEI and the NRC staff are warranted on the topic of assessing potential dose from backfill. Based on these discussions, NEI should add specific language to Section 5.2.8 stating

that reporting of actual results is recommended along with a discussion regarding the use of negative values for summary statistics and statistical tests vs. dose estimation as outlined above.

NEI Response:

The following paragraph will be added to Section 5.2.8 of NEI 22-01:

"For the backfill samples either actual values and/or critical values should be used for characterization of the backfill material. For dose estimation purposes a sum-of-fractions of actual values for each sample can be used and if the average of the sum-of-fractions for all the samples taken is negative, the dose may be zeroed. When doing sum-of-fractions for individual samples, results less than critical level may be zeroed and remaining sample results that are greater than critical values used to determine dose."

RAI 2 Reporting Groundwater Radionuclide Results

Issue:

In the March 6, 2025, public meeting between the NRC staff and NEI, it was stated that continued discussion of the detection decision and use of analytical results in the range between the critical level and MDC may be needed.

Section 2.2 of NEI 22-01 describes analytical results relevant to laboratory analyses of samples in a framework consistent to MARLAP. However, Section 2.2 did not provide a statement of what should be reported. The NRC staff notes that the use of analytical results for estimates of groundwater contamination or dose should not follow a MARSSIM-type statistical treatment. The NRC staff additionally acknowledge that there are some site and LTP dependencies for treatment and use of analytical results for groundwater. Dependencies include magnitude of the allotment of dose for existing groundwater contamination, magnitude of contamination, claim of zero contamination, and groundwater quality. An NRC review would focus on potential underestimation of dose.

For results between the Lc and MDC, reporting of results should include the critical level, the analytical result, and the MDC (*a posteriori*). For results above the MDC, only the analytical results need to be reported. Any result below the Lc value can be treated as zero radioactivity. MARLAP guidance indicated that the results in the range between the Lc and MDC are unreliable (and if reliability is needed, a more refined analytical approach should be used) but that any value above the critical level is statistically interpreted as a detection of radioactivity. Staff acknowledges that results close to the Lc value are potentially false positives from a statistical standpoint. Support for a false positive conclusion may include reanalysis or resampling and preponderance of results. Therefore, if the analytical result falls between the critical level and MDC (*a posteriori*), the result should not be set to zero. If results are reported as <MDC, then the MDC should be used for a dose estimate. If actual analytical result values are reported, then either those results or the MDC value can be used for dose estimates.

If an alternative approach for reporting analytical results is provided, then the licensee should provide supporting information on how that alternative approach meets the intent of the MARLAP guidance.

Most commonly, sites that retain the usage of lower limits of detection terminology should provide information on their detection decision such that dose is not underestimated.

Request:

Clarify in NEI 22-01 the treatment and reporting of analytical results that fall between the critical level and the MDC for estimating residual radioactivity and dose due to residual radioactivity in groundwater. Clarify the interpretation of laboratory analytical results between the critical level and MDC. Discussions between NEI and the NRC staff are warranted to ensure agreement on the clarifications.

NEI Response:

A discussion similar to the following will be added to NEI 22-01:

"The MDC is a statistical metric that defines the sensitivity of a measurement result in terms of a hypothetical distribution of results at a particular concentration above a blank or background. Its use as a minimum value, above which results are considered positive, is not consistent with the underlying statistical derivation.

If no contamination above background is present:

- The critical level, Lc, is a value below the MDC where a fraction of the population of results would be expected to exceed. Typically, users apply a fraction equivalent to 5% but other values can be used consistent with the derivation and definition of the Lc.
- In other words, if Lc is used as a criterion for determining "positive" results, approximately 5% of the results should exceed Lc.

This type of testing can and should be used to determine if the population of analytical data represents positive detections. On a similar comparison, if a large population of data are substantially above Lc, then further statistical analysis should be considered to better understand the distribution of data to evaluate the frequency of positive detection results.

In summary, a small number of detections above the Lc should not automatically be interpreted as "positive" detections without consideration of the expectations and may warrant a robust statistical evaluation of data. This approach will help to ensure that the appropriate resources are applied when interpreting analytical data."

RAI 3 Sorption Coefficient (Kd) Estimates

Issue:

In the March 6, 2025, public meeting, a discussion was held regarding the text in Section 6.1.2, which appears to emphasize the use of measurements to support the Kd values and does not provide a lot of detail on alternate approaches or the treatment of uncertainty with respect to potentially

underestimating dose. DUWP-ISG-02 provides several methods and considerations for estimating Kd values for a site with the suggestion that a graded approach should be selected based on site conditions, data availability, dose modeling approach, and treatment of Kd inputs in RESRAD (e.g., site-based uncertainty versus selection 25/75 percentile based on generic tables).

Request:

Clarify in the NEI 22-01 guidance that measurements of sorption coefficients are not required at sites based on NRC's guidance in DUWP-ISG-02. Further discussions between NEI and the NRC staff are warranted on what is meant by site-dependent information and representativeness of site information to the appropriate media (e.g., contaminated zone or groundwater flow pathways).

NEI Response:

NEI will add discussion to NEI 22-01 concerning Kd from DUWP-ISG-02, Section 3.3.2, *Determining if a Parameter Value is Risk-Significant*. In particular, the following statement from DUWP-ISG-02 will be used to describe a graded approach to the selection of Kd values for use in dose modeling:

"Therefore, as a starting point, only Kd values for radionuclides that have a potential to lead to doses greater than 0.025 mSv/yr may require additional support, and only if they are found to be risk-significant. For example, if there is little uncertainty in the Kd value, additional support is likely unneeded."

Additionally, NEI will add an appendix to NEI 22-01 that describes nuclear power plant experiences that show the impact of Kd on the calculation of DCGLs and how these types of experiences could be used along with the graded approach described in the last paragraph to select Kd values for use in dose modeling.