

October 21, 1998

FOR: The Commissioners

FROM: William D. Travers /s/
Executive Director for Operations

SUBJECT: SCREENING TABLE FOR BUILDING-SURFACE CONTAMINATION, AS GUIDANCE IN SUPPORT OF THE FINAL RULE ON RADIOLOGICAL CRITERIA FOR LICENSE TERMINATION

PURPOSE:

To inform the Commission of recent and planned staff actions related to implementing the "Final Rule on Radiological Criteria for License Termination" [(License Termination Rule (LTR), 62 FR 39058, July 21, 1997)] in accordance with the Commission's Staff Requirements Memorandum (SRM) dated July 8, 1998 [(SECY-98-051), [Attachment 1](#)], especially development of a screening table for building-surface contamination.

BACKGROUND:

On July 8, 1998, the Commission approved publication of "Guidance In Support of Final Rule on Radiological Criteria for License Termination" for interim use over a period of 2 years. The Commission directed staff to: (1) develop a more user-friendly format for the guidance; (2) maintain a dialogue with the public during the interim period; (3) address areas of excessive conservatism, particularly in the DandD screening code; and (4) develop a standard review plan (SRP) for decommissioning, and provide the Commission with the schedule for the SRP.

In response to Commission direction, the staff has taken prompt actions and made initial progress on each of the following areas:

- Staff has developed a screening table of unrestricted release values for building-surface contamination. ([Attachment 2](#)) The table would expedite the process of using the draft guidance in a more user-friendly format, during the interim period. The staff coordinated the screening values in the table with other Federal agencies, through the Interagency Steering Committee on Radiation Standards (ISCORS), on September 9, 1998.
- Staff conducted a public meeting on August 14, 1998, to discuss the format and content of future public workshops on the implementation of the draft guidance for the LTR. The meeting was attended by representatives of the Nuclear Energy Institute; Fuel Cycle Facilities Forum; Electric Power Research Institute; Department of Energy; State of New Jersey; Environmental Protection Agency; and other interested organizations. The staff will conduct a second public meeting on October 22, 1998, and an expanded workshop on December 1-2, 1998. Staff will continue to conduct such meetings and workshops to receive public input.
- A project plan and workgroup have been established (including Office of Nuclear Material Safety and Safeguards, Office of Nuclear Regulatory Research, Office of State Programs, and Regional staff) to develop the SRP. The staff transmitted the project plan for the SRP to the Commission on September 29, 1998. The workgroup is currently addressing the issue of excessive conservatism in the DandD code and developing guidance to be contained in the SRP.
- The staff briefed the Advisory Committee on Nuclear Waste on the subject of the SRP and the screening table.

DISCUSSION:

The staff plans to issue a Federal Register notice (FRN), to be published by October 30, 1998, announcing the end of the "grandfathering period," in [10 CFR 20.1401](#) (b), and the release of the DandD screening code, Version 1. The FRN will also announce: (1) a default screening table of unrestricted release values for building-surface contamination, for the interim use of the guidance; (2) a strategy for future interactions with industry and interested parties, including a combination of workshops, telephone conferences, and release of documents on the U.S. Nuclear Regulatory Commission's (NRC's) web site; and (3) a plan for developing the SRP for decommissioning within the 2-year comment period. The FRN will also address the status of old decommissioning guidance documents during NRC's transition from the Site Decommissioning Management Plan (SDMP) Action Plan to the LTR.

The screening table for surface contamination of common radionuclides will permit licensees to demonstrate compliance with the LTR as simply as possible, and is consistent with the Commission's direction to develop a more user-friendly format for the guidance. Sites with surface contamination of walls and floors would be acceptable for release for unrestricted use in accordance with [10 CFR 20.1402](#). The screening values were derived from the DandD screening code, Version 1, using default physical parameters that were selected at the 90th percentile of the dose distribution ([Attachment 2](#)).

While site-specific analyses would generally be based on the mean of the dose distribution, the 90th percentile was selected for the default values in DandD to provide high confidence that the actual dose at a site will not exceed the standard. Simple screening models, like DandD, that require a minimal amount of site-specific information are easy and inexpensive to use, but will not provide the level of realism and accuracy that is provided by more complex models that require detailed and often more costly site-specific information. The methodology in the draft NUREG-1549 (Using Decision Methods for Dose Assessment to Comply With Radiological Criteria for License Termination) provides licensees with the flexibility to perform their own evaluation of which approach is most reasonable for their specific situation. They can use the simpler screening approach with minimal requirements for site-specific information, and accept a higher level of conservatism which could result in more extensive cleanup. Alternatively, they can use modeling approaches that use site-specific information, and which support a more realistic estimate of dose.

This differs from current NRC guidance and common staff practices that use the mean of the dose as the dose value for demonstrating compliance. For example, the "Branch Technical Position for Low-Level Waste Performance Assessment," (PA), (SECY-96-103), uses the mean of the dose distribution for compliance assessment, provided that the 95th percentile of the distribution is less than 1 mSv (100 mrem). As another example, the staff uses, as the performance objective for postclosure, in the draft proposed 10 CFR Part 63, "Disposal of High-Level Radioactive Wastes In a Proposed Geological Repository at Yucca Mountain, Nevada," the mean dose (expected annual dose) to be less than 0.25 mSv/yr (25 mrem/yr) (SECY-98-225). The Commission's Final Policy Statement on the use of probabilistic risk assessment (PRA) methods in nuclear regulatory activities (60 FR 42622) required that PRA evaluations in support of regulatory decisions be as realistic as practicable. In addition, the "Final General Regulatory Guide and Standard Review Plan for Risk-Informed Regulation of Power Reactors" (SECY-98-015) contemplates use of best-estimate or mean-risk values.

For the interim period, the staff intends to use the default screening values which result in doses at the 90th percentile because:

- In screening analyses, little information is typically available about an individual site. As such, the degree of uncertainty may not be as well known as in site-specific analyses where a great deal of information is known. Therefore, as stated in the National Council on Radiation Protection and Measurements' Report Number 123, "Screening Models for Releases of Radionuclides to Atmosphere, Surface Water, and Ground," screening models are designed to ensure that there is high confidence that the dose would not be underestimated.
- The default screening levels are consistent with the current default values in the DandD code, Version 1, which already has been released on NRC's web site.
- The DandD screening values at the 90th percentile are only slightly more conservative (within a factor of 2 to 3) of the mean screening values.

The staff intends to use the 90th percentile screening values table for building-surface contamination during the interim period, while developing the SRP and testing DandD. The table will be a useful tool for routine decommissioning cases and will facilitate a smooth transition for simple cases. During the interim period, staff will continue to analyze the pros and cons of selecting the mean versus other confidence levels (e.g., the 90th percentile) in the screening analyses, and will use the mean for demonstrating compliance with the dose criterion for site-specific analyses. The staff plans to develop a new probabilistic version of the DandD code that would enable calculation of the dose based on the mean or other percentile values. If the final SRP and LTR guidance recommend using a decision point for screening or site-specific analyses, based on a percentile value other than the mean, staff will inform the Commission in advance.

The screening values for beta- and gamma-emitters, in [Attachment 2](#), are much higher than the SDMP Action Plan Criteria that staff has been using to make decisions on license terminations. For alpha-emitters, the surface screening values are generally much lower. This is because the new limit in the LTR is dose-based whereas the Action Plan Criteria are not in all cases explicitly related to dose. For radionuclides that emit beta/gamma radiation, where the new values are much higher, application of the "as low as is reasonably achievable" requirements in 10 CFR 20.1402 may result in contamination levels much lower than the screening values specified in the table. For radionuclides that emit alpha radiation, where the new values are much lower, the calculated screening values are so low that demonstrating compliance would be complex, very resource-intensive, and not practical. In such cases, refined screening, site-specific data collection, consideration of restricted release, the application of area factors, and other refinements will be employed to implement the license termination rule. The staff will continue to pursue developing more practical guidance for alpha emitters.

The staff will announce the availability of the table of screening values, showing only the 90th percentile values for beta- and gamma-emitters in an FRN. (Since the alpha values are too restrictive to be useful they will not be included.) Before release of the table to the public, the staff will inform the Organization of Agreement States.

As recognized in the June 30, 1998, SRM, the staff will be refining the regulatory guidance over the next 2 years, so the screening values may change. In the interim, if licensees meet the screening values, they would be deemed to comply with the 25 mrem dose criterion in the LTR without performing dose calculations, using DandD or some other codes.

The staff will continue to provide updates to the Commission on the progress of developing the SRP and implementing the LTR.

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Attachments: 1. [Staff Requirements Memorandum SECY-98-051, Guidance in Support of Final Rule on Radiological Criteria for License Termination](#)
 2. [Screening Values of Common Radionuclides for Building-Surface Contamination Levels](#)

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**SCREENING VALUES OF COMMON RADIONUCLIDES FOR
BUILDING-SURFACE CONTAMINATION LEVELS**

| Radionuclide | Emission α =Alpha β =Beta γ =Gamma | D&D Screening Values ⁽¹⁾ | | Action Plan Values ⁽²⁾ | Common Use ⁽³⁾ |
|--------------|---|--|---|-----------------------------------|---------------------------|
| | | 90th Percentile of the output dose distribution | Mean of the output dose distribution | | |
| H-3 | β | 1.2E+08 | 1.9E+08 | 5E+03 | R, B |
| C-14 | β | 3.7E+06 | 5.6E+06 | 5E+03 | B |
| Na-22 | β | 9.5E+04 | 9.6E+04 | 5E+03 | B |
| S-35 | β | 1.3E+07 | 2.4E+07 | 5E+03 | B |
| Cl-36 | β | 5.0E+05 | 9.8E+05 | 5E+03 | B |
| Mn-54 | β | 3.2E+04 | 3.2E+04 | 5E+03 | R |
| Fe-55 | β | 1.0E+04 | 5.8E+03 | 5E+03 | R |
| Co-60 | $\beta \gamma$ | 7.1E+03 | 7.5E+03 | 5E+03 | R, B |
| Ni-63 | β | 1.8E+06 | 3.8E+06 | 5E+03 | R, B |
| Sr-90 | β | 8.7E+03 | 1.7E+04 | 1E+03 | R, B |
| Tc-99 | β | 1.3E+06 | 2.6E+06 | 5E+03 | B, FC |
| I-129 | $\beta \gamma$ | 3.5E+04 | 4.8E+04 | 1E+02 | B |
| Cs-137 | $\beta \gamma$ | 2.8E+04 | 2.9E+04 | 5E+03 | R |
| Ir-192 | $\beta \gamma$ | 7.4E+04 | 7.6E+04 | 5E+03 | B |
| Ac-227 | $\alpha \beta \gamma$ | 1.8E+00 | 4.0E+00 | 1E+02 | FC |
| Th-228 | $\alpha \gamma$ | 4.1E+01 | 9.0E+01 | 1E+02 | FC |
| Th-232 | $\alpha \gamma$ | 7.3E+00 | 1.6E+01 | 1E+03 | FC |
| Pa-231 | $\alpha \gamma$ | 8.6E+00 | 1.9E+01 | 1E+02 | FC |
| U-235 | $\alpha \gamma$ | 9.7E+01 | 2.1E+02 | 5E+03 | FC |
| U-238 | $\alpha \gamma$ | 1.0E+02 | 2.2E+02 | 5E+03 | FC |
| Pu-239 | $\alpha \gamma$ | 2.8E+01 | 6.0E+01 | na | FC, DOE |
| Am-241 | $\alpha \gamma$ | 5.8E+01 | 2.7E+01 | na | B |

1. Screening values (dpm/100 cm²) equivalent to 25 mrem/y. Behavioral parameters are set at the mean of the distribution of the assumed critical group. The Metabolic parameters are set at Standard Man or at the mean of the distribution for an average man. The physical parameters were derived as a set to result in a point dose estimate that would be at the percentile indicated of the output dose distribution, and would not exceed 100 mrem at 95% confidence.

2. Reg. Guide 1.86 limits (dpm/100 cm²); these limits are not explicitly dose-based.

3. R: Reactor; B: Broad-Scope; FC: Fuel Cycle