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NUREG 1757 comments - from Steve Tarlton, Colorado Radiation Management Program.

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December 28, 2005

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Comments on NUREG 1757, Supplement 1, draft

Dear Sir:

The Colorado Department of Public Health and Environment Radiation Management Unit appreciates the opportunity to comment on the proposed changes to NUREG 1757. We have included both general comments and specific comments below:

General Comments

1. While many of these proposals individually appear to be feasible, taken together, there may be relief for licensees at the cost of a reduction of protection of the environment. If one were to combine the practices of scenario relief based on short term land use, invoke intentional mixing of soil, and then reburying that material on site, the original source term that would otherwise be required to be remediated and sent offsite will still be present, but without assurance that groundwater or biota are adequately protected. The "diluted" values from mixing would possibly be used as inputs to a model that doesn't address sufficient pathways due to scenario picking, resulting in source terms being left on the site, possibly no longer under a license.

   It appears that some of these proposals actually run counter to the lessons-learned outlined in SECY-03-069, particularly with trying to avoid legacy sites. Allowing the resurgence of on-site burial of radioactive waste and intentional mixing of waste and burying it onsite with the possibility of having to readdress the materials at closure is not consistent with avoiding legacy sites.

   It is not clear that on-site burial and intentional mixing are consistent with State requirements, or those of the other Federal agencies. This would not be consistent with the intent of harmonization of standards so long sought by the agencies through the ISCORS.

While guidance isn't mandatory, incorporating these practices into guidance is defacto approval and may lead to unintended consequences such as additional legacy sites. This reviewer believes the LTC license, intentional mixing, and onsite burial of radioactive wastes should not be included in the final document, and should be subject to rulemaking.

2. On-site disposal of radioactive wastes should not be routinely allowed. It may lead to a proliferation of sites, and may do little to mitigate the number of future legacy sites. On-site disposal of radioactive waste is not approved in Colorado, based on past experiences that have not borne out well over time (i.e., Colorado State University, Shattuck Chemical Superfund Site). This is a significant action, and should be considered through the rulemaking process rather than guidance.

   A review of the status of decommissioning sites in NUREG-1814 shows that a majority of the non-reactor sites are contaminated with long-lived isotopes from legacy operations, with little or no surety, some of them as a result of on-site burials. That legacy alone should be enough to not allow on site burials and accumulation of wastes on site for ongoing operations.

   It may also be inferred from the NUREG-1814 list of sites that practices proposed in NUREG-1757 are driven by a lack of funding over anything else, since the affected sites appear to not have a responsible party or available funds for cleanup or surety. It may be better in the long run to go for an appropriation to clean these sites up properly (or turn them over to EPA) rather than adopt practices that are atypical, such as onsite burial and intentional mixing.

3. Intentional mixing of soil to meet waste acceptance criteria at an off-site facility or to meet LTR criteria should be subject to NEPA review, may not be consistent with State requirements, or those of other agencies, and should not be encouraged. Intentional mixing of waste is counter to decades of environmental policy in this country, and should have a more thorough vetting, particularly with other Agencies. This is a significant action, and should be considered through the rulemaking process rather than guidance.

   It appears that the concept of intentional mixing includes the following logic: the generator liable for the pollution at the site can downblend it with clean soil, put it back in the ground, and terminate the license, possibly absolving themselves of future liability. Perhaps this should be evaluated from the taxpayer's standpoint instead of the generator's.

4. Since the LTC license is not terminated in the usual sense, would this require NEPA review or a rulemaking instead of just incorporating it in guidance? This would appear to be a significant change, and should be reflected in the regulations, rather than guidance.

5. Section 17.7.1 discusses LA/RC for NRC use, however, many states now have effective environmental covenant mechanisms available. These can be more effective than the NRC LA/RC and should be mentioned as allowable, at the state's discretion.

6. Section 17.7.2.2.1 presents a very valuable discussion of considerations for evaluating long-term care needs.

7. Section 3.5. It appears that this draft guidance promotes the same concepts for design of final covers that have been advocated in the past. Newer information based on relatively recent research and "lessons learned" from completed sites do not appear to be included in this draft guidance. It would be advantageous for this guidance to critically evaluate and include relevant design and construction information from landfills under other regulatory programs, such as CERCLA, RCRA C (hazardous waste) and RCRA D (solid waste).

8. Section 4, Appendices D, E, I, Sections 2.1 and 2.8. Using the MARSSIM and MARLAP guidance documents to help generate data is appropriate. The necessary assessment and characterization goal-setting processes that involve stakeholders and public acceptance are missing. One may implement the guidance perfectly and not achieve closure because of political and public relations missteps.

9. Section 5 and Appendices I and M describe application of a hundred year rule (and the peak dose during that period), which is insufficient for most of the applications of the Decommissioning Rule in Colorado. In nearly every instance where such a rule could be applied in Colorado over the next 10 or 20 years, we will need to consider 1600-year radium-226 (^{226}Ra) or 4½ billion-year uranium-238 (^{238}U) as radioactive contaminants of concern. Consideration of multiple time frames, radionuclide groups, and scenarios would benefit from guidance that states that there are site conditions for which "Reasonably Foreseeable land uses" cannot be predicted. Those site conditions would include situations where the contaminants are very long-lived relative to the rate of change in land-use patterns, such as ^{226}Ra near an urban or even an intensively-farmed agricultural setting.

10. If land use planning is only good for 100 years, then a prudent and precautionary approach should be taken for any LTC or IC approach. It is unacceptable to use 100 years as a risk assessment planning tool for wastes that are long-lived.

Specific Comments

p. II-8 describes lower hazard level as above 25 mrem/yr, but less than 100 mrem/yr; and higher hazard level as above 100 mrem/yr, but below 500 mrem/yr. It should also clarify that decommissioning is not complete unless the site hazard has been reduced to a level below 500 mrem/yr in the event that any institutional or engineered controls fail.

p. II-17 Section A discusses the enforceability mechanisms of institutional controls. Due to the remoteness of the NRC offices from most licensed sites, it may be securable to delegate in some way the enforceability responsibilities to Agreement states, who would likely have a greater local presence.

p. II-39 While it is certainly appropriate for a licensee to create a public involvement process as decommissioning approaches, it may also be beneficial to have created such a process at the beginning or during the facility life. An established public group is educated on the issues at the facility and is more likely to understand the difficult issues to be addressed in closure.

p. II-48 Item 5 describes the requirements for sites where uncontrolled access could result in public exposures greater than 500 mrem/yr; however, it is not clear that these criteria are materially

different than those required for 100 mrem/yr. Furthermore, decommissioning is not complete unless the site hazard has been reduced to a level below 500 mrem/yr in the event that any institutional or engineered controls fail, and such sites would not be addressed in this guidance.

Section 3.5 The "Engineered Barrier" concept discussed in this draft guidance appears to continually promote and support similar concepts that were used about 20 years ago for generic design of the UMTRA disposal cells. It appears that site-specific, as well as "lessons learned" information developed over the last 20 years or so with respect to actual performance of UMTRA disposal cell covers has not been applied to this proposed updated guidance. In addition, other significant, relatively recent information obtained on landfill cover design through the Environmental Protection Agency's (EPA) Alternative Cover Assessment Program (ACAP), the Department of Energy's (DOE) Alternative Landfill Cover Demonstration (ALCD), or recent alternative landfill cover guidance published by the Interstate Technology & Regulatory Council (ITRC), have apparently not been considered in preparation of this document.

One example of an optimistic view with respect to UMTRA cover performance relates to the discussion concerning the process to be used for an engineered barrier analysis. The statement is made that for covers designed in accordance with uranium mill tailings guidance NUREG–1623, no degradation of the cover is assumed. Therefore, active maintenance is not relied upon for assurance that the design objectives are achieved. It is our understanding that this is not really the case at many UMTRA disposal cells. Problems have developed at the disposal cells that were not anticipated during design, such as deep-rooted vegetation encroaching the cell, thereby requiring active maintenance.

Conversely, features that were rejected for UMTRA cell cover design by the NRC, such as incorporating geosynthetic materials into a low permeable barrier cover system, continues to be discouraged. It has been conclusively demonstrated by rigorous academic research as well as side-by-side field tests, that the use of a composite cover (compacted clay liner [CCL] or geosynthetic clay liner [GCL] *and* geomembrane together) is a more effective barrier system than using a CCL, GCL, or geomembrane individually. However, this document promotes the outdated UMTRA design philosophy, claiming that a composite cover performance is only acceptable for the timeframes of available field studies (10+ years). Noted experts in the geosynthetic field, such as Robert M. Koerner, Director of the Geosynthetics Research Institute, argues for extremely long service lifetimes, provided the material is installed properly. Koerner and others suggest that 250 to 700 years is not unreasonable for geomembrane service life.

From an overall concept, it is our opinion that an even better cover system for long-term considerations, particularly in arid or semi-arid climates, is an evapotranspiration (ET) cover. This draft guidance, however, does not discuss an ET cap as a potential "engineered barrier". In fact, the references provided in Table 3.1 that relate to a "soil cover system" are outdated (written in 1991) and obviously do not include the most recent protocol for design and construction of ET cover systems. In addition, any reference to constructing CCLs from the 1991 guidance would also be outdated. The most currently accepted method of placing CCLs is through the use of an Acceptable Zone based on the "Lines of Optimums" concept. The Lines of Optimums concept was developed after 1991. It is curious that this draft guidance dismisses geosynthetics as an appropriate cover system due to potential long-term concerns, yet the ET

cover, which is the most time-durable cover system because it emulates the natural environment better than the other cover concepts, is not discussed in detail.

Another theme promoted throughout this guidance is the conclusion that actual field procedures, no matter how much quality effort is provided, cannot overcome theoretical concerns that have been determined in the "office". For example, it is stated that one cause of degradation of geomembranes used in composite soil caps is due to long-term exposure to UV light. This concern appears to be overstated. While this concern is theoretically correct, construction specifications for utilizing geomembranes should specify a maximum UV light exposure time period, as recommended by the geomembrane vendor, thus rendering this issue moot. An adequate Quality Control/Quality Assurance (QC/QA) Plan would also assure that the maximum time exposure to UV light required by the specifications is adhered to.

Removal of Material After License Termination: The dose-based approach on a site-by-site basis will result in a plethora of release limits that will be used around the Country. Release of solid materials or volumetric should either follow ANSI N13.12, or stay with RG 1.86 and FC 83-23. This reviewer believes in this instance that conservative, table listed values should be used unilaterally in order to achieve consistency in release rather than allowing calculated release limits from each site. A risk assessment from facility A will yield DCGLs different from facility B, both of which may end up sending contaminated materials to facility C. This clearly is not consistent, and is not protective of the public, although it may provide relief to the licensees. The risks from material released from any site should be consistent in practice, not theory.

Section 15.12, On-site disposal of Radioactive Materials

a. If the NRC staff were actually considering these disposal activities as interim storage prior to license termination that would require excavation and off-site disposal prior to termination, then a different nomenclature should be considered (e.g., interim storage in on-site impoundments). The term disposal has connotations of permanence, and should not be used.
b. The fact the timeliness rule applies may not be significant if the licensee has already left the site. That is one way NRC has ended up with legacy sites.
c. Giving approval for on-site burial may only defer decommissioning costs that may as well be avoided by the licensee by requiring they ship the waste as they generate the waste.
d. The sentence "The onsite disposal options provide alternatives for dealing with radioactive waste generated during operations, and will allow flexibility for the management of radioactive waste or allow the licensee to defer offsite disposal until decommissioning for license termination." sounds more like a description of why we have this problem rather than a reason to consider it.
e. Do not allow licensees to defer offsite disposal until decommissioning for license termination. Get it out of there while the licensee is solvent. A review of surety for Colorado licensees showed that lowering possession limits to the minimum needed to operate is the best way to encourage timely waste disposition, and avoid increased surety. Surety is very expensive, and may not be affordable in the long-term.
f. NRC states that "it will continue the current practice of approving onsite disposal based on a dose criterion of a "few millirem" a year" but does not list here or in SECY-03-069 any examples of these approvals. Has NRC approved onsite disposal since the LTR? What is the status of those sites?

g. Onsite disposal that only meets the dose criterion for decommissioning (or a few millirem a year for that matter) does nothing to demonstrate impacts to biota or groundwater. The requirements in the guidance relative to dose modeling are vague at best, and only geared to a human receptor. This is not consistent with the proposed ICRP recommendations.
h. Since onsite disposal should be discouraged, any onsite disposal must include adequate surety, not just those sites that will exceed the 100 mrem/y projection. The surety should be fully funded by another instrument if a sinking fund is used.

Section 15.13 Use of Intentional Mixing of Contaminated Soil

a. The statement contained in footnote #1 is quite important and perhaps should be moved back into the text in the opening paragraph.
b. The draft guidance that this final draft is based included a review of other agencies' regulations and policies relative to intentional mixing. It is unclear whether the NRC review of the other agencies' regulations and policies in the supporting documentation included input from the agencies on the NRC interpretation. This is important to support the ongoing efforts to harmonize regulations and practices across agencies.
c. The practice of dilution, including clean soils from outside the footprint (which was NOT advocated in the evaluations) to meet onsite cleanup levels, does not reduce the source term. It lowers the average concentration, which makes the dose go down in the models. It does not actually clean up the source term, and may actually increase the cross-section of contamination water may infiltrate through, potentially contaminating groundwater.
d. If the material is excavated and blended, it should be considered "treatment," and require stabilization or other processes to immobilize any remaining contamination prior to replacement. Relying on engineered barriers alone may not be consistent with RCRA. Consider making these requirements consistent with RCRA treatment requirements. Exemption from RCRA was meant to avoid dual regulation, not less protection.
e. Not changing the classification of the waste in 10 CFR 61.55 is appropriate, but perhaps should also include not changing the classification of any waste. For example, non-11e.(2) materials may be found at sites not formally included in the UMTRA program (we have had some of these sites in Colorado), and dilution of those materials to meet WAC at a local landfill has been proposed. Recognizing that NRC has abdicated its authority over pre-1978 byproduct material means that non-11e.(2) materials that are byproduct material (but in name) is being remediated at sites under State or EPA authority. These agencies may be looking to this guidance to be considered in its reviews. Consider expanding the scope of the requirement beyond 10 CFR 61.55 only.
f. What about mixed waste? Would this intentional mixing be considered to change the classification to hazardous only (if the radiological component is sufficiently reduced)? What about 11e.(2) at mill tailings sites? Would this be used to downblend the activity so the material can be used in the random fill zone of the cap design, or not sent to the impoundment at all? Again, this practice must be considered in the realm of "treatment."
g. Since NRC has previously changed classifications of waste to suit individual licensees' needs (e.g., Sequoyah Fuels), it is unclear why this practice should be considered or approved.
h. With respect to small rubble that may be included, it is recommended that there be a limit to organic material content (roots, trees) so as to not cause void spaces during settling. There should also be geotechnical parameters specified (e.g, compaction rates).

Section 4, Confirmatory Survey discussion, second new paragraph: There is a basic assumption in this paragraph that the goals of the sampling program are well defined. This is not always a reasonable assumption. The licensed facility will always choose the least costly and most uncertain sampling plan. The public in the area of the regulated facility will always choose the least uncertain sampling plan without regard to cost. Both approaches can be considered "technically sound". Consideration must be given to the public information and involvement aspects of closure. That part of the paragraph dealing with side-by-side surveys is acceptable.

Appendix D Section 2.1 That part of the planning phase dealing with setting the cleanup goals is missing.

Appendix D Section 2.2 The validity of this process is dependent on obtaining good reliable samples from the field. If this cannot be done all the rest of this document is meaningless.

Appendix 1.2 Volume 2 Source Term Abstraction. The rationale for using the arithmetic mean only, when doing dose modeling is not convincing. More justification is needed to accept these assumptions to achieve uniformity. The use of a weighted average technique would resolve this issue; if the initial assumptions described are true, then the weighted average becomes the arithmetic mean.

Should you have questions regarding these comments, please contact me at 303-692-3423 or steve.tarlton@state.co.us.

Sincerely,

Steve Tarlton, Unit Leader
Radiation Management Unit