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Document Information

Originator Name: Dr. Sam J. Armijo

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Addressee: Chairman Macfarlane

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OEDO POC: Jack Foster

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001

July 22, 2013

The Honorable Allison M. Macfarlane
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: REVISIONS TO LOW-LEVEL RADIOACTIVE WASTE DISPOSAL
REQUIREMENTS (10 CFR PART 61)

Dear Chairman Macfarlane:

During the 606th meeting of the Advisory Committee on Reactor Safeguards (ACRS), July 9 – 12, 2013, we reviewed the staff's proposed draft rule to revise NRC low-level waste (LLW) regulation (10 CFR Part 61) and the associated draft implementation guidance. The draft SECY rulemaking package was still in staff concurrence at the time of our meeting. Our Subcommittee on Radiation Protection and Nuclear Materials also discussed this matter during its meetings of April 9, and June 18, 2013. During these reviews, we had the benefit of discussions with representatives of the NRC staff and the documents referenced.

CONCLUSIONS AND RECOMMENDATION

1. The proposed rule significantly expands the regulatory requirements for the licensing of low-level waste facilities and increases regulatory burden without sufficient justification.
2. Our primary concerns about the proposed changes to 10 CFR Part 61 are the requirements to demonstrate compliance for 10,000 years and protection of the inadvertent intruder.
3. We plan to hold additional meetings to better understand the technical justification for the elements of concern in the proposed rule.
4. Previously disposed wastes should not be subjected to additional compliance evaluations as proposed by the staff.

BACKGROUND

We were first briefed on proposed amendments to Part 61 that addressed the disposal of depleted uranium waste during our 570th Meeting on March 4 – 6, 2010. We issued a report on March 18, 2010.

During our 585th meeting, July 13-15, 2011, we were briefed on the staff's proposed Part 61 rulemaking. That proposed rulemaking introduced both an explicit site-specific performance assessment as well as an inadvertent intruder analysis requirement. We reviewed the proposed rulemaking during our 586th meeting, September 8 – 10, 2011, and issued a report dated September 22, 2011. Our recommendations were:

1. *10 CFR 61 should not be amended in accordance with the staff's recommendations. Rather, the staff should develop a risk informed, performance based LLW site assessment methodology using realistic characterizations of disposed radioactive materials; the features, events, and processes that can disrupt disposed waste; natural and engineered barriers; environmental transport mechanisms; and subsequent human exposure scenarios.*
2. *Implementation guidance for Part 61 should not specify an a priori period of performance. Rather, the performance assessment should develop a period of performance based on the features, events and processes specific to the geohydrological features of a candidate site, the technologies used to isolate wastes, and the controls used to isolate wastes from the environment and humans.*
3. *The approaches in recommendations 1 and 2 are equally applicable to the disposal of depleted uranium as well as other low-level waste.*
4. *Compliance with performance objectives of the disposal system after the institutional control period ends, as well as the possible doses to hypothetical intruders, should be evaluated considering the natural features, events, and processes for a given site for a period of time commensurate with the risk for a specific facility and site.*

The Commission issued a Staff Requirements Memorandum on January 19, 2012, providing direction to the staff to revise the proposed rulemaking and supporting regulatory basis. The SRM included the following issues for the staff to address in revising the performance assessment and intruder analysis requirements:

1. *Allowing licensees the flexibility to use ICRP dose methodologies in a site-specific performance assessment for the disposal of all radioactive waste.*
2. *A two tiered approach that establishes a compliance period that covers the reasonably foreseeable future and a longer period of performance that is not a priori and is established to evaluate the performance of the site over longer timeframes. The period of performance is developed based on the candidate site characteristics (waste package, waste form, disposal technology, cover technology and geo-hydrology) and the peak dose to a designated receptor.*
3. *Flexibility for disposal facilities to establish site-specific waste acceptance criteria based on the results of the site's performance assessment and intruder assessment.*

The SRM also included a fourth direction requiring the staff to address the Agreement State compatibility categories for the revised requirements. We have not reviewed the information addressing Agreement State compatibility.

DISCUSSION

Our current conclusions and recommendations are supported by our previous reports on this subject (March 18, 2010, and September 22, 2011) and by the following points:

- 1) We agree with the need for requirements and strategies to protect from inadvertent intrusion. However, there are very large uncertainties about human intrusion scenarios for periods long after the cessation of institutional controls. Analysis of the durability of the measures chosen to provide intrusion protection (i.e., depth of disposal, barriers, waste form stability), as well as long-term stability of the site, should be considered sufficient to demonstrate compliance with the 10 CFR 61.42 performance objective for protection from inadvertent intrusion.
- 2) Introducing significant uncertainties to the performance analyses through speculation on human activities, waste and site performance, and earth processes for millenia is unlikely to improve either our decision making process or our understanding of the safety decisions regarding near surface LLW disposal.

- 3) Current regulations permit disposal of limited quantities and concentrations of long-lived radionuclides in near surface land disposal facilities. For example, three types of licensing decisions in the records of the NRC address disposal of uranium. These are uranium mill tailing remedial actions under 10 CFR Part 40¹, disposals approved under 10 CFR 20.2002², and license terminations under 10 CFR 20, Subpart E³. The analyses supporting these decisions used a period of 1000 years regarding the protection of individuals from the radioactive material. Additionally, the U.S. Department of Energy evaluates the disposal of uranium and other low-level wastes using similar evaluation methodologies (a performance assessment and intruder analysis) for a time of compliance of 1000 years.
- 4) The staff stated that the four Performance Objectives, 10 CFR 61.41 through 61.44, have been consistently applied since promulgation of Part 61, and there are now 30 years of LLW disposal approved under these current Performance Objectives. Previously disposed wastes should not be subjected to additional compliance evaluations.

We look forward to continued interaction with the staff to resolve our concerns.

Additional comments by ACRS Member, J. S. Armijo are presented below.

Sincerely,

/RA/

J. Sam Armijo
Chairman

¹ 10 CFR Part 40, Appendix A, I. Technical Criteria, Criterion 6.

² Safety Evaluation Report, Request for Alternate Disposal Approval and Exemptions for Specific Hematite Decommissioning Project Waste at US Ecology's Idaho Facility.

³ Safety Evaluation Report on Westinghouse Amendment Request for Approval of Hematite Decommissioning Plan and Associated Supporting Documents.

Additional comments by ACRS Member J.S. Armijo

I agree with the conclusions and recommendations of my colleagues. However, an additional matter should be considered in the current rulemaking. I believe that the root cause of the major issues discussed in our letter is the language in § 61.42, "Protection of individuals from inadvertent intrusion," of the existing rule:

"Design, operation, and closure of the land disposal facility must ensure protection of any individual inadvertently intruding into the disposal site and occupying the site or contacting the waste at any time after active institutional controls over the disposal site are removed."

This broad and open ended language creates uncertainty regarding the intent of the NRC and requires clarification. When the rule was issued in 1982, the staff estimated the quantities and concentrations of the low level radioactive waste streams then contemplated for disposal, and provided the needed clarification in § 61.7(b)(5), "Concepts":

"Waste that will not decay to levels which present an acceptable hazard to an intruder within 100 years is designated as Class C waste. This waste is disposed of at a greater depth than the other classes of waste so that subsequent surface activities by an intruder will not disturb the waste. Where site conditions prevent deeper disposal, intruder barriers such as concrete covers may be used. The effective life of these intruder barriers should be 500 years. Waste with concentrations above these limits is generally unacceptable for near-surface disposal. There may be some instances where waste with concentrations greater than permitted for Class C would be acceptable for near-surface disposal with special processing or design. These will be evaluated on a case-by-case basis. Class C waste must also be stable."

The clarifications provided in the existing rule resolved these uncertainties and allowed for safe and stable disposal for several decades.

In the current rulemaking the staff now contemplates the disposal of larger quantities of depleted uranium, is interpreting the language of § 61.42 much differently, and proposes the major changes discussed in our report. As interpreted and revised by the staff, § 61.42 can create a reasonable expectation by the public that class C waste such as uranium must be treated in a manner similar to high-level waste, and obligate licensees to demonstrate, and perhaps defend in court, that the protection of inadvertent intruders in near-perpetuity is assured. This is a requirement that is impossible to achieve by a technically defensible analysis or a near-surface disposal facility design. The language in § 61.42 should be modified to be consistent with the clarifications in the existing rule and not as proposed by the staff.

REFERENCES

1. U.S. Nuclear Regulatory Commission, "*Preliminary Document For Discussion Purposes at the 606th ACRS Meeting, Nuclear Regulatory Commission, 10 CFR Parts 20 and 61, RIN 3150-AI92, [NRC-2011-0012], Low-Level Radioactive Waste Disposal,*" June 28, 2013 (ML13179A321)
2. U.S. Nuclear Regulatory Commission, 10 Code of Federal Regulations, Part 61, "*Licensing Requirements for Land Disposal of Radioactive Waste,*" 1982
3. U.S. Nuclear Regulatory Commission, "*Site Specific Analyses for Demonstrating Compliance with Subpart C, Performance Objectives,*" 76FR24831, dated May 3, 2011
4. U.S. Nuclear Regulatory Commission, "*Part 61: Site Specific Analyses for Demonstrating Compliance with Subpart C, Performance Objectives: Preliminary Proposed Rule Language,*" May 18, 2011 (ML111380658)
5. U.S. Nuclear Regulatory Commission, "*Technical Basis for Proposed Rule to Amend 10 CFR Part 61 to Specify Requirements for the Disposal of Unique Waste Streams, Including Large Quantities of Depleted Uranium,*" April 28, 2011 (ML111040419)
6. Letter Report, Abdel-Khalik, Chairman, ACRS to G.B. Jaczko, Chairman, NRC, "*Status of Staff Rulemaking Efforts for Depleted Uranium and Other Unique Waste Streams,*" March 18, 2010 (ML100760264)
7. Letter Report, Abdel-Khalik, Chairman, ACRS to G.B. Jaczko, Chairman, NRC, "*Proposed Rulemaking to Introduce a Site-Specific Performance Assessment and Human Intrusion Analysis Requirement to 10 CFR Part 61,*" September 22, 2011. (ML11256A191)
8. Staff Requirements – COMWDM-11-0002/COMGEA-11-0002, "*Revision to 10 CFR Part 61,*" January 19, 2012. (ML1210190360)
9. U.S. Nuclear Regulatory Commission, 10 Code of Federal Regulations, Part 40, Appendix A, "*Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from Ores Process Primarily for Their Source Material Content,*" 1985
10. U.S. Nuclear Regulatory Commission, "*Safety Evaluation Report, Request for Alternate Disposal Approval and Exemptions for Specific Hematite Decommissioning Project Waste at US Ecology's Idaho Facility,*" April 11, 2013 (ML13030A208)
11. U.S. Nuclear Regulatory Commission, "*U.S. NRC Safety Evaluation Report On Westinghouse Amendment Request for Approval of Hematite Decommissioning Plan and Associated Supporting Documents,*" October 2011 (ML112101630)

12. U.S. Department of Energy, DOE Manual 435.1-1, "*Radioactive Waste Management Manual, Chapter IV, Low-Level Waste Requirements*," 1999
13. Letter, Marcinowski, F., U.S. Department of Energy, enclosing, "*U.S. Department of Energy, Office of Environmental Management Comments on the U.S. Nuclear Regulatory Commission's Preliminary Proposed Rule Language and Regulatory Analysis for Proposed Revisions to the Low-Level Waste Disposal Requirements, 10 CFR Part 61*," January 18, 2013 (ML13039A080)