

**UTAH RADIATION CONTROL BOARD  
STATEMENT OF BASIS FOR ADMINISTRATIVE RULEMAKING  
REGARDING DISPOSAL OF SIGNIFICANT QUANTITIES OF DEPLETED URANIUM**

December 1, 2009

This Statement of Basis for Administrative Rulemaking Regarding Disposal of Significant Quantities of Depleted Uranium (Statement of Basis) has been prepared to support the proposed rule in Part VI of this Statement of Basis. If the Radiation Control Board votes to begin rulemaking on this matter, information about how and when to comment on the rule, including information about a public hearing, will be posted at <http://www.radiationcontrol.utah.gov/>.

**I. REGULATORY AND FACTUAL BACKGROUND**

Following is background information and descriptions of some of the most significant among many actions taken by the regulatory agencies discussed below regarding depleted uranium.<sup>1</sup>

**A. What is depleted uranium and how is it similar to and different from other wastes?**

“Depleted uranium oxide contains approximately 85 percent uranium by mass. In comparison, a low-grade uranium ore common in the United States may contain 0.1 percent uranium by mass.”

...

“For mill tailings, a significant portion of the total activity at the time of disposal is associated with radium, therefore disposal or management decisions can focus on the radiological inventory at the time of disposal. For example, a barrier to attenuate the emanation of radon from mill tailings can be designed based on the concentration of the material at the time of disposal. On the other hand, DU is essentially depleted in the daughter radionuclides but concentrated (compared to natural ore or mill tailings) in the parent radionuclides. Over long periods of time, the uranium parent radionuclides have the potential to produce quantities of daughter radionuclides significantly in excess of natural ores or mill tailings because the DU source has much higher concentrations of uranium. For example, mill tailings commonly have from 0.004 to 0.02 wt percent U<sub>3</sub>O<sub>8</sub>, 26 to 400 pCi/g <sup>226</sup>Ra, and 70 to 600 pCi/g <sup>230</sup>Th at the time of disposal (Robinson, 2004). Depleted uranium (in oxide form) would have approximately 99.9 percent uranium oxide at the time of disposal and greater than 300,000 pCi/g <sup>226</sup>Ra and <sup>230</sup>Th approximately 1 million years after disposal (values cited were calculated with a simple decay/in-growth calculation).”

...

“Whereas the activity in a commercial LLW facility decreases to a few percent of the initial value over a few hundred years, the activity in a facility for DU would be expected to remain relatively constant initially, but begin increasing at around 1,000 years. Peak activity, assuming no release from the source, would not be attained until after 1 million years after disposal.”

U.S. Nuclear Regulatory Commission (NRC) Staff, SECY-08-0147.<sup>2</sup>

## B. U.S. Nuclear Regulatory Commission actions

1. 1981-82: NRC developed its waste classification system and concentration limits for land disposal of radioactive waste, now found in 10 CFR Part 61\*, based on modeling that informed what maximum levels of radioactivity would still allow 10 CFR Part 61 performance objectives to be met.<sup>3</sup> For this analysis, NRC did not evaluate environmental impacts of land disposal for significant quantities of depleted uranium. *See* Part II.B.1 of this Statement of Basis.
2. October 2000: NRC issued NUREG-1573, guidance for those conducting site-specific performance assessments for radioactive waste land disposal facilities.<sup>4</sup>
3. October 2005: The NRC Commission asked its staff to consider whether the significant quantities of depleted uranium in the waste stream, which were not anticipated in 1981, warranted reclassification of depleted uranium or other amendments to NRC's regulations.<sup>5</sup>
4. June 2006: Louisiana Energy Services was licensed as a uranium enrichment facility. The facility will create a waste stream with substantial quantities of depleted uranium.<sup>6</sup> In the course of this proceeding, depleted uranium disposal at EnergySolutions was analyzed. The Commission rejected claims by an intervenor that Envirocare's performance assessment was inadequate and that NRC had previously found that depleted uranium could not be disposed of in a near-surface facility and that NRC could not therefore find that disposal at EnergySolutions was acceptable. While expressing concern that its Staff may not have fully explored the long-term impacts from the disposal of depleted uranium "whose radiological hazard gradually *increases* over time,"<sup>7</sup> the Commission nevertheless upheld the decision by the Atomic Safety Licensing Board. However, it noted in doing so that its decision on the adequacy of an Environmental Impact Statement was not intended to take the place of a Part 61 compliance review,<sup>8</sup> and that "[p]rior to a final determination on disposal, we would expect that the pertinent regulatory authority will have considered both the characteristics of the waste and the site-specific features of the disposal site to assure that all radiological dose limits and safety regulations indeed can be met."<sup>9</sup>
5. October 2008: NRC staff, in October 2008 (SECY-08-0147) responded to the Commission's October 2005 order.<sup>10</sup> The staff:
  - (a) Evaluated a generic case to determine whether it was possible to meet 10 CFR Part 61 standards with near-surface disposal of depleted uranium, and concluded that it was.

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\* There are Utah rules equivalent to 10 CFR Part 61 found in Utah Admin. Code R. 313. As appropriate, references to 10 CFR Part 61 should also be read as referring to the equivalent state rules. *See* endnote 1 for web access information.

- (b) Prepared several regulatory options, and recommended that the Commission not change classification for depleted uranium, but add language requiring a site-specific performance assessment before significant quantities of depleted uranium are accepted for disposal.
- 6. October 2008: In the October 2008 SECY-08-0147 and in subsequent statements, NRC staff has also indicated that there are limitations to the generic case study described in Part I.B.5 of this Statement of Basis, and recommended that it should not be relied upon for any site-specific licensing action. *See* Part II.B.2 of this Statement of Basis.
- 7. March 2009: NRC agreed with the course of action recommended by the NRC staff in SECY-08-0147. The Commission made determinations:
  - (a) To keep depleted uranium as Class A waste; and
  - (b) To initiate rulemaking proposing enhanced performance assessment requirements for facilities proposing to dispose of significant quantities of depleted uranium.<sup>11</sup>
- 8. August 2009: NRC made a recommendation regarding any proposals to dispose of significant quantities of depleted uranium in the interim period before NRC's depleted uranium rulemaking process is completed.<sup>12</sup> It recommended that, prior to disposal of significant quantities of depleted uranium at a near-surface disposal facility, site-specific performance assessments should be evaluated against criteria developed in the October 2008 SECY-08-0147 staff analysis and in a Federal Register notice at 74 Fed. Reg. 30175 (June 24, 2009). *See* Part II.A. of this Statement of Basis.

### **C. Utah Division of Radiation Control actions**

- 1. March 1991: Depleted uranium was first approved for disposal at Envirocare, but disposal was limited to volumetric bulky materials or structural debris with a concentration limit of  $1.1 \text{ E}5 \text{ pCi/g}$ .<sup>13</sup>
- 2. October 1998: Envirocare's license was amended to approve an increase in the concentration limit to an average concentration per container of  $3.7\text{E}5 \text{ pCi/g}$ .
- 3. Approximately 1999: Envirocare submitted a performance assessment for a new proposed land disposal facility for Class A, B, and C wastes. The assessment showed that 10 CFR Part 61 performance standards would be met for very large quantities of depleted uranium based on the assumptions specified in that document. The performance assessment reported results from an analysis of 500 years.
- 4. October 2000: The Executive Secretary approved a license amendment for a new disposal cell for Class A waste. Disposal of depleted uranium in the new cell was not limited by concentration or quantity. Both diffuse and concentrated depleted uranium have been disposed of pursuant to this amended license; approximately 49,000 metric tons of depleted uranium have been disposed of at EnergySolutions to date.

5. September 2009: The license was changed, at EnergySolutions' request, to require that all wastes with depleted uranium concentrations greater than 5 percent (by weight) be placed a minimum of 10 feet below the top of the cover.

#### **D. Other states' actions**

1. Washington: In response to an inquiry in the course of the the NRC's Unique Waste Streams Rulemaking Worskhop held in Salt Lake City in September 2009, Washington State's representative responded as follows to this question:

"Has the NRC or any of the agreement states that have low level waste sites been approached about reviewing the performance assessment of your particular disposal facility under this process?"

"We've talked about it in good detail. I think the prudent thing we've decided is we really need to wait until this kind of works through because we could do a performance assessment that may not meet the criteria that the NRC ends up getting, and you'd end up having to do it twice. So I think from our standpoint we wait."<sup>14</sup>

2. Texas: In response to the same inquiry, the representative from Texas said:

"We do not have a new performance assessment to review for the interim in Texas."<sup>15</sup>

Texas regulations state, regarding the licensing of radioactive waste land disposal facilities:

"The specific technical and environmental information in the application shall also include the following analyses needed to demonstrate that the performance objectives of this subchapter, referenced in §336.723 of this title (relating to Performance Objectives), will be met:

(1) Pathways analyzed in demonstrating protection of the general population from releases of radioactivity shall include air, soil, groundwater, surface water, plant uptake, and exhumation by animals. The analyses shall clearly identify and differentiate between the roles performed by the natural disposal site characteristics and design features in isolating and segregating the wastes. The analyses shall clearly demonstrate that there is reasonable assurance that the exposures to humans from the release of radioactivity will not exceed the limits specified in §336.724 of this title (relating to Protection of the General Population from Releases of Radioactivity). A minimum period of 1,000 years after closure or the period where peak dose occurs, whichever is longer, is required as the period of analysis to capture the peak dose from the more mobile long-lived radionuclides and to demonstrate the relationship of site suitability to the performance objective in this section to the performance objective in §336.724 of this title."<sup>16</sup>

## **E. Standards governing the Board’s rulemaking authority**

Utah Code Ann. § 19-3-104(4):

The board may make rules:

- (a) necessary for controlling exposure to sources of radiation that constitute a significant health hazard;
- (b) to meet the requirements of federal law relating to radiation control to ensure the radiation control program under this part is qualified to maintain primacy from the federal government;
- (c) to establish:
  - (i) board accreditation requirements and procedures for mammography facilities; and
  - (ii) certification procedure and qualifications for persons who survey mammography equipment and oversee quality assurance practices at mammography facilities; and
- (d) as necessary regarding the possession, use, transfer, or delivery of source and byproduct material and the disposal of byproduct material to establish requirements for:
  - (i) the licensing, operation, decontamination, and decommissioning, including financial assurances; and
  - (ii) the reclamation of sites, structures, and equipment used in conjunction with the activities described in this Subsection (4).

## **II. SUMMARY OF PRELIMINARY BASES FOR ACTIONS**

Following is a summary of information particularly pertinent to the Board’s proposed rulemaking action, although all of the information provided in this Statement should be considered part of the Board’s basis.

### **A. NRC Recommendation.**

1. For this interim period before completion of NRC rulemaking, The NRC has explicitly recommended that agreement states conduct a new review of performance assessments, prior to disposal of significant quantities of depleted uranium.

“What is NRC’s position regarding disposal of significant amounts of depleted uranium before the rulemaking is complete?”

. . .

“If a site wishes to dispose of significant amounts of depleted uranium, it would be prudent for the site operator and State regulator to review the existing performance assessment supporting the site and determine whether the issues that were raised in the technical analyses supporting the Commission decision to initiate this potential rulemaking and in the Federal Register Notice for the NRC public workshops are adequately addressed. If not, it would be prudent to revise the performance assessment to adequately address these issues on a site-specific basis before disposal of significant quantities of depleted uranium.”

NRC’s Frequently Asked Questions in the Communication Plan.<sup>17</sup>

NRC Staff has repeated this advice in other arenas, e.g., its Unique Waste Streams Rulemaking Record.<sup>18</sup>

2. The NRC did not define the quantities of depleted uranium that would have to be land disposed before raising concerns, but it did define “small quantities,” 1 to 10 metric tons of depleted uranium that could, it concluded, be disposed of at shallow depth.<sup>19</sup>

## **B. Past environmental analysis.**

NRC has recognized that there has been no adequate analysis of the health and safety-related impacts of near-surface disposal of depleted uranium.

1. The NRC has acknowledged that at the time the initial classification system for radioactive waste was created it was not anticipated that significant quantities of depleted uranium would be disposed of in near surface facilities. It also acknowledged that environmental studies done did not address the significant quantities that are now expected.

“At the time of development of [10 CFR] Part 61, it was envisioned that [low level radioactive waste regulated in that Part] in a disposal facility would decay, in a maximum of 500 years, to activity levels that would not pose a significant risk to an inadvertent intruder, and that there would not be significant quantities of long-lived isotopes which would pose unacceptable long-term risks to the public from releases from the facility. In developing Part 61, NRC considered longer periods of institutional control in the DEIS (NRC, 1981). Assumptions about the persistence of institutional controls in the international community were considered and a series of public meetings were conducted to get input from stakeholders. The consensus among the stakeholders was that it is not appropriate to assume institutional controls will last for more than a few hundred years. The resultant regulatory framework for commercial LLW disposal assumes material that does require institutional control for much longer than 100 years to demonstrate compliance with the performance objectives would generally be determined to not be suitable for near-surface disposal as LLW .”

NRC, SECY-08-0147.<sup>20</sup>

“When NRC regulations on low-level waste disposal were developed, there were no commercial facilities generating significant quantities of depleted uranium waste. Therefore, the impacts of depleted uranium disposal were not explicitly considered.”

NRC Fact Sheet on Depleted Uranium and Other Waste Disposal.<sup>21</sup>

“Large quantities of uranium were not evaluated in the EIS for 10 CFR Part 61

- 17 Ci of 238U (in 1 million m<sup>3</sup> of waste)
- 3 Ci of 235U

The quantity of DU [now entering the waste stream] is ~ 470,000 Ci 238U.”

NRC’s Unique Waste Streams Rulemaking Record, Workshop Presentations.<sup>22</sup>

2. NRC staff has advised against using its October 2008 analysis (SECY-08-0147), which was done to support the NRC Staff's rulemaking recommendation, for site-specific licensing purposes.

“The model was developed to evaluate the radiological risk to potential future residents and intruders (acute or chronic exposures) near or on the land overlying a hypothetical disposal facility for DU. The model was designed to provide the user with flexibility to evaluate different waste forms, disposal configurations, performance periods, institutional control periods, pathways, and scenarios. The impact of these variables on projected radiological risk can be significant. Therefore, the model was developed as a first-order assessment tool to risk-inform decision making. Refinement of the model would be necessary if it was to be used for licensing decisions, and rigorous validation would be needed. Because site-specific waste management decisions or other variables can strongly influence whether performance objectives can be met, care should be taken not to take the model results out of the analysis context.”

SECY-08-147, Enclosure 1, at page 1.<sup>23</sup>

3. NRC has recognized that depleted uranium is not suitable for disposal at a near-surface facility simply because it is classified as a Class A waste.

“That the Commission has determined that DU is Class A waste merely makes that waste *eligible* for near-surface disposal. The final determination rests instead with the question of whether near-surface disposal meets the [10 CFR] Part 61, Subpart C performance objectives.”

NRC's Atomic Safety and Licensing Board.<sup>24</sup> In addition, NRC staff concluded that it was not beneficial to change the waste classification for depleted uranium, not because it was similar to other Class A waste, but because it would not allow the same amount of disposal flexibility as the site-specific performance assessments preferred by Staff:

“The primary disadvantage of Option 3 [reclassifying depleted uranium] is that the concentration limit developed could be so low for a reference site that it would unnecessarily constrain disposal options at sites with significantly different characteristics (e.g., humid vs. arid). As such, this approach would be prescriptive rather than a risk-informed approach, which would take into account the performance of the waste in a specific disposal environment. Another drawback to Option 3 is that it propagates the existing waste classification system, which was developed using often conservative assumptions based on the environment for LLW at the time the Part 61 FEIS was developed; some of these assumptions are not necessarily applicable in today's environment of limited disposal options and improved performance assessment capabilities.”

NRC, SECY-08-0147, at page 9.<sup>25</sup>

### C. Adequacy of current federal regulations.

1. As described elsewhere in this Statement of Basis, NRC has concluded both that its regulations should be changed, and that until its regulations are changed, additional analysis should be conducted on a site-specific basis before depleted uranium is accepted. These decisions constitute a recognition by NRC of the inadequacy of its current regulations.
2. NRC comment:

“Why is it necessary to update the regulations?”

“The licensing of new uranium enrichment facilities in the United States has raised depleted uranium to the forefront of low-level radioactive waste disposal issues. The depleted uranium waste stream is unique amongst LLRW streams; the relatively high concentrations and large quantities of depleted uranium that are generated by enrichment facilities were not considered in the Final Environmental Impact Statement (NUREG-0945) supporting the development of 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste." When NUREG-0945 was issued in 1982, there were no commercial facilities generating significant amounts of depleted uranium waste streams, therefore, NUREG-0945 considered only types of uranium-bearing waste streams being typically disposed of by U.S. Nuclear Regulatory Commission (NRC) licensees at that time.”

“With the existing U.S. Department of Energy enrichment facilities, and the recent NRC licensing of commercial enrichment facilities, more than one million metric tons of depleted uranium will require a disposition path. Existing disposal facilities such as the EnergySolutions' facility in Clive, Utah and the Waste Control Specialists' facility in Andrews County, Texas, have expressed interest to their Agreement State regulators in disposing of depleted uranium at their sites.”

“The NRC recognizes that the analysis supporting regulations in 10 CFR Part 61 did not address the disposal of significant quantities of depleted uranium, and that there may be a need to place additional restrictions at a specific site or deny such disposal based on unique site characteristics. Therefore, the NRC will update the regulations to specify a requirement for a site-specific analysis that demonstrates unique waste streams, including significant quantities of depleted uranium, can be disposed of safely.”

NRC’s Frequently Asked Questions about Land Disposal of Unique Waste Streams.<sup>26</sup>

3. David Esh, lead modeler for preparation of SECY-08-0147:

“As part of that EIS developmental analyses, they developed a waste classification system, and that was developed by doing intruder and various scenario analyses and basically doing an inverse calculation.

So they did the analyses. They set a dose limit that they were trying to achieve, and then they did a backwards calculation to determine what concentrations would give me those impacts. And that's what you see in the table values that are in the regulations right now.



So where we are now, if we have a waste stream that's a lot different or could be a lot different than what was analyzed. Then you have to say, well, I don't have table values for that. So what do I need to do about it?

And our opinion is we need to change the regulations and insure you could either develop new table values or you could insure that they do the analysis, but somebody has to do the analysis. You can't have an unanalyzed situation basically.”<sup>27</sup>

#### **D. Quantities of depleted uranium.**

In the absence of action by the Board, it is very likely that significant quantities of depleted uranium will be disposed of at EnergySolutions before the performance assessment recommended by NRC (as discussed in II.A of this Statement of Basis) is reviewed and approved.

1. Texas and Washington have indicated they are not allowing disposal of significant quantities of depleted uranium until completion of new performance assessments, and those have not been initiated. *See* I.D of this Statement of Basis.
2. Only EnergySolutions and Barnwell will currently accept depleted uranium for disposal. Barnwell is only available for disposal of waste within its compact.<sup>28</sup>
3. The amounts of depleted uranium awaiting disposal are significant:

“DOE has said they will need to begin disposal shipments for the DUF6 facilities in mid 2010. More than one million metric tons of depleted uranium will need to be disposed of over the next several years.”<sup>29</sup>

4. Louisiana Energy Services (LES), a uranium enrichment facility licensed in June 2006, has identified a “private near-surface disposal facility” as its preferred method for disposal of the significant quantities of depleted uranium it will create; LES offered an analysis of impacts at EnergySolutions (then Envirocare) in support of its NRC license application.<sup>30</sup>
5. Department of Energy depleted uranium

DOE's depleted uranium management policy requires disposal of depleted uranium it owns at one of its own disposal facilities or, with a waiver, allows disposal at a non-DOE facility. DOE has issued a waiver with respect to disposal of depleted uranium at EnergySolutions.<sup>31</sup>

6. EnergySolutions has acknowledged before this Board that it is marketing depleted uranium disposal and that it projects receiving significant quantities.

“Tom Magete [*sic* - Magette, with EnergySolutions] responded that EnergySolutions did have contracts with DOE, but they did not have active task orders. EnergySolutions had

the potential of disposing of waste from the Savannah River within the next year (about 10,000 tons). The next five years, he projected 46,000 tons coming from Portsmouth and Paducah.”

Utah Radiation Control Board minutes, July 2009.<sup>32</sup>

### **E. Performance period**

NRC makes the following recommendation regarding the time period for performance assessments:

“Considering the technical aspects of the problem, the performance assessment staff recommends a performance period of 10,000 years for the analysis of DU disposal. However, analyses should be performed to peak impact, and if those impacts are significantly larger than the impacts realized within 10,000 years, then the longer term impacts should be included in the site environmental evaluation.”

NRC, SECY-08-0147.<sup>33</sup>

## **III. IMPACTS OF RULEMAKING**

The Utah Administrative Rulemaking Act, at Utah Code Ann. § 63G-3-301, requires an agency proposing rules to consider the potential impact of the rule on business and on government.

### **A. Impacts to business**

If the rule is promulgated, one Utah business – EnergySolutions, L.L.C. – will be unable to dispose of depleted uranium until it has submitted a performance assessment and the performance assessment has been approved. The financial impacts on EnergySolutions are potentially substantial, but are difficult for the Board to specify because the impact depends on the following information not known to the Board at this time:

- When the requirement takes effect;
- When EnergySolutions will submit a performance assessment and when it is approved;
- When EnergySolutions would otherwise have received shipments of depleted uranium for disposal; and
- Whether receipts by EnergySolutions would simply be delayed, or whether there are competitors for depleted uranium disposal space such that EnergySolutions could lose receipts altogether.\*\*

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\*\* This rulemaking analysis does not consider the impact of any potential inability by EnergySolutions to demonstrate that it meets the requirements of 10 CFR Part 61 and the equivalent Utah rules, since that inability would not be by operation of this rule.

EnergySolutions will also bear the cost of preparing and submitting a performance assessment, but has indicated this is an action it was already taking.

No small business in Utah will be directly impacted. The only potential sources of substantial quantities of depleted uranium for disposal – the United States Department of Energy and privately-held uranium enrichment facilities – are not small businesses and are not located in Utah.

Any affected business is invited to submit information about potential costs of this proposed rule during the public comment period.

## **B. Impacts on government budget**

The State of Utah receives fees from facilities that dispose of depleted uranium at a land disposal facility. Utah Code Ann. § 19-3-104. EnergySolutions has such a land disposal facility and has stated that it would, in the absence of this rule, seek to dispose of depleted uranium. The financial impacts of this on the state’s budget are potentially substantial, particularly for FY 2010, but as described above are difficult to specify. The State of Utah receives \$0.15/cubic foot of waste disposed of, plus \$1 per curie.

## **IV. ADDITIONAL DOCUMENTATION**

The documents cited in this Statement of Basis are incorporated in their entirety by this reference. In addition, all documents linked through the NRC’s Unique Waste Streams Rulemaking website are incorporated by reference. *See:*

<http://www.nrc.gov/about-nrc/regulatory/rulemaking/potential-rulemaking/uw-streams.html>.

## **V. STATEMENT REGARDING UTAH CODE ANNOT. § 19-3-104(8) and (9).**

The Board intends to issue a determination, after the public comment period, about whether there are “corresponding federal regulations that are not adequate to protect public health and the environment of the state.”

The statute states:

- (8) (a) Except as provided in Subsection (9), the board may not adopt rules, for the purpose of the state assuming responsibilities from the United States Nuclear Regulatory Commission with respect to regulation of sources of ionizing radiation, that are more stringent than the corresponding federal regulations which address the same circumstances.
- (b) In adopting those rules, the board may incorporate corresponding federal regulations by reference.

(9) (a) The board may adopt rules more stringent than corresponding federal regulations for the purpose described in Subsection (8) only if it makes a written finding after public comment and hearing and based on evidence in the record that corresponding federal regulations are not adequate to protect public health and the environment of the state.

(b) Those findings shall be accompanied by an opinion referring to and evaluating the public health and environmental information and studies contained in the record which form the basis for the board's conclusion.

## VI. PROPOSED RULE

R313-12-3. Definitions. [No change proposed; included only for context.]

"Depleted uranium" means the source material uranium in which the isotope uranium-235 is less than 0.711 weight percent of the total uranium present. Depleted uranium does not include special nuclear material.

R313-25-8. Technical Analyses.

(1) The specific technical information shall also include the following analyses needed to demonstrate that the performance objectives of R313-25 will be met:

(1) (a) Analyses demonstrating that the general population will be protected from releases of radioactivity shall consider the pathways of air, soil, ground water, surface water, plant uptake, and exhumation by burrowing animals. The analyses shall clearly identify and differentiate between the roles performed by the natural disposal site characteristics and design features in isolating and segregating the wastes. The analyses shall clearly demonstrate a reasonable assurance that the exposures to humans from the release of radioactivity will not exceed the limits set forth in R313-25-19.

(2) (b) Analyses of the protection of inadvertent intruders shall demonstrate a reasonable assurance that the waste classification and segregation requirements will be met and that adequate barriers to inadvertent intrusion will be provided.

(3) (c) Analysis of the protection of individuals during operations shall include assessments of expected exposures due to routine operations and likely accidents during handling, storage, and disposal of waste. The analysis shall provide reasonable assurance that exposures will be controlled to meet the requirements of R313-15.

(4) (d) Analyses of the long-term stability of the disposal site shall be based upon analyses of active natural processes including erosion, mass wasting, slope failure, settlement of wastes and backfill, infiltration through covers over disposal areas and adjacent soils, and surface drainage of the disposal site. The analyses shall provide reasonable assurance that there will not be a need for ongoing active maintenance of the disposal site following closure.

(2)(a) Any facility that proposes to land dispose of significant quantities of depleted uranium (more than one metric ton in total accumulation) after [effective date of rule] shall submit for the Executive Secretary's review and approval a performance assessment that demonstrates that the performance standards specified in 10 CFR Part 61 and corresponding provisions of Utah rules will be met for the total quantities of depleted uranium and other wastes, including wastes already

disposed of and the quantities of depleted uranium the facility now proposes to dispose. Any such performance assessment shall be revised as needed to reflect ongoing guidance and rulemaking from NRC. For purposes of this performance assessment, the compliance period will be a minimum of 10,000 years. Additional simulations will be performed for a qualitative analysis for the period where peak dose occurs.

(b) No facility may dispose of significant quantities of depleted uranium prior to the approval by the Executive Secretary of the performance assessment required in R. 313-25-8(2)(a).

(c) For purposes of this R. 313-25-8(2) only, depleted uranium means waste with depleted uranium concentrations greater than 5 percent by weight.

## ENDNOTES

1. The following frequently cited documents in this Statement of Basis may be found at the indicated web locations.

### Records

NRC Communication Plan Key Messages (August 19, 2009): <http://www.nrc.gov/about-nrc/regulatory/rulemaking/potential-rulemaking/uw-streams/key-messages.html>

NRC Fact Sheet on Depleted Uranium and Other Waste Disposal (August 26, 2009): <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-du-other-waste-disposal.html>

NRC's Frequently Asked Questions about Land Disposal of Unique Waste Streams (August 4, 2009): <http://www.nrc.gov/about-nrc/regulatory/rulemaking/potential-rulemaking/uw-streams/faq.html>

NRC Frequently Asked Questions in the Communication Plan (August 19, 2009): <http://www.nrc.gov/about-nrc/regulatory/rulemaking/potential-rulemaking/uw-streams/workshop-faq.html>

NRC Staff Requirements, SECY-08-0147, Response to Commission Order CLI-05-20 Regarding Depleted Uranium (October 7, 2008) (hereinafter SECY-08-0147): <http://www.nrc.gov/reading-rm/doc-collections/commission/secys/2008/secy2008-0147/2008-0147scy.pdf>

NRC's Unique Waste Streams Rulemaking Record, Workshop 1, Day 1 Transcripts (September 2, 2009): <http://www.nrc.gov/about-nrc/regulatory/rulemaking/potential-rulemaking/uw-streams/workshop-1-transcripts-day1.pdf>

NRC's Unique Waste Streams Rulemaking Record, Workshop 2, Day 1 Transcripts (September 23, 2009): <http://www.nrc.gov/about-nrc/regulatory/rulemaking/potential-rulemaking/uw-streams/workshop-2-transcripts-day1.pdf>

NRC's Unique Waste Streams Rulemaking Record, Workshop Presentations (September 2009): <http://www.nrc.gov/about-nrc/regulatory/rulemaking/potential-rulemaking/uw-streams/du-workshop-presentations.pdf>

NRC's Unique Waste Streams Rulemaking Record Website (October 20, 2009): <http://www.nrc.gov/about-nrc/regulatory/rulemaking/potential-rulemaking/uw-streams.html>

## Rules and Statutes

NRC Rules, 10 CFR Part 61: <http://www.nrc.gov/reading-rm/doc-collections/cfr/part061/>

DRC Rules, Utah Admin. Code R.313: <http://www.rules.utah.gov/publicat/code/r313/r313.htm>

DRC Statute, Radiation Control Act, Utah Code Ann. Title 19, Chapter 3: [http://le.utah.gov/~code/TITLE19/19\\_03.htm](http://le.utah.gov/~code/TITLE19/19_03.htm)

2. [SECY-08-0147](#), Enclosure 1 at pages 2-3; see also chart at page 3.

The NRC also has descriptions of depleted uranium at a number of other web locations, *e.g.*, “[NRC Fact Sheet on Depleted Uranium and Other Waste Disposal](#),” and “[NRC Frequently Asked Questions in the Communication Plan](#).”

See also NRC’s Unique Waste Streams Rulemaking Record, [Workshop Presentations](#), Slide 78 of 115 and comment by David Esh, NRC’s lead modeler for SECY-08-0147:

“So we call it depleted uranium because it's depleted in the U-235 isotope, but chemically it's really concentrated uranium because you've made pure uranium out of the process of trying to develop fuel for reactors.”

NRC’s Unique Waste Streams Rulemaking Record, [Workshop 2, Day 1 Transcript](#) at page 92.

3. U.S. Nuclear Regulatory Commission (NRC). ‘Draft Environmental Impact Statement on 10 CFR Part 61 Licensing Requirements for Land Disposal of Radioactive Waste.’ NUREG-0782 (1981); NRC, ‘Final Environmental Impact Statement on 10 CFR Part 61 Licensing Requirements for Land Disposal of Radioactive Waste,’ NUREG-0945 (1982).

Note also NRC’s statement that “Waste class concentrations [are] based primarily on inadvertent intruder exposure.” NRC’s Unique Waste Streams Rulemaking Record, [Workshop Presentations](#), Slide 33 of 115.

4. “A Performance Assessment Methodology for Low-Level Radioactive Waste Disposal Facilities: Recommendations of NRC's Performance Assessment Working Group,” NUREG-1573. Note that among the many recommendations made by the authors of this document are a recommendation for a time period of 10,000 years for analyzing performance (*Id.* at 3-13), and a recommendation for “refraining from excessive speculation about the extremely distant future, and . . . limiting evaluations of the natural site's geologic evolution to the next 10,000 years,” based, for example, on the assumption that geological changes such as glaciation will result in conditions under which humans will not be living close enough to the waste to be exposed. *Id.* at 3-9 and 3-10.

- Web access through: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/pubs/>.
5. In the Matter of Louisiana Energy Services (National Enrichment Facility), 62 NRC 523, CLI-05-20, October 19, 2005.  
  
Web access: <http://www.nrc.gov/reading-rm/doc-collections/commission/orders/2005/2005-20cli.html>.
  6. See NRC website, Louisiana Energy Services (LES) Gas Centrifuge Facility.  
  
Web access: <http://www.nrc.gov/materials/fuel-cycle-fac/lesfacility.html>.
  7. In the Matter of Louisiana Energy Services (National Enrichment Facility), 63 NRC 687 at 690, CLI-06-15, June 2, 2006.  
  
Web access: <http://www.nrc.gov/reading-rm/doc-collections/commission/orders/2006/2006-15cli.pdf>
  8. *Id.*
  9. *Id.*, at 699. See also In the Matter of Louisiana Energy Services (National Enrichment Facility), 63 NRC 241, ASLBP 04-826-01-ML, LPB-06-08, March 3, 2006; and In the Matter of Louisiana Energy Services (National Enrichment Facility), 63 NRC 687, CLI-06-15, June 2, 2006 and Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico (NUREG-1790).  
  
Web access for EIS: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1790/>
  10. See [SECY-08-0147](#).
  11. See Commission Order in Memorandum re: Staff Requirements – SECY-08-0147 – Response to Commission Order CLI-05-20 Regarding Depleted Uranium.  
  
Web access: <http://www.nrc.gov/reading-rm/doc-collections/commission/srm/2008/2008-0147srm.pdf>.
  12. See [NRC Communication Plan Key Messages](#), and [NRC Frequently Asked Questions in the Communication Plan](#).
  13. All references in this section are to Envirocare and EnergySolutions’ license amendments and related submissions for the dates given; license amendments and related submissions are in Division of Radiation Control files. The information in numbers 1 through 3 is also described in an analysis by the U.S. Department of Energy. See Evaluation of the Acceptability of Potential Depleted Uranium Hexafluoride Conversion Products at the Envirocare Disposal Site, ORNL/TM-2000/355, December 2000.



Web access: [http://www.ornl.gov/~webworks/cpr/rpt/109279 .pdf](http://www.ornl.gov/~webworks/cpr/rpt/109279.pdf).

14. NRC's Unique Waste Streams Rulemaking Record, [Workshop 2, Day 1 Transcript](#) at page 55.
15. *Id.*
16. Texas Admin. Code, Rule § 336.709.

Web access: [http://info.sos.state.tx.us/pls/pub/readtac\\$ext.TacPage?sl=T&app=2&p\\_dir=N&p\\_rloc=106855&p\\_tloc=&p\\_ploc=1&pg=41&p\\_tac=106856&ti=30&pt=1&ch=336&rl=709&z\\_chk=1072573](http://info.sos.state.tx.us/pls/pub/readtac$ext.TacPage?sl=T&app=2&p_dir=N&p_rloc=106855&p_tloc=&p_ploc=1&pg=41&p_tac=106856&ti=30&pt=1&ch=336&rl=709&z_chk=1072573).

17. NRC's "[Frequently Asked Questions in the Communication Plan.](#)" *See also* [Communication Plan Key Messages](#).
18. NRC's Unique Waste Streams Rulemaking Record, [Workshop 2, Day 1 Transcript](#) at page 40.
19. *See, e.g.,* [SECY-08-0147](#), at page 5.
20. *See* [SECY-08-0147](#), Enclosure 1 at page 4.

*See also* comment made by David Esh, NRC's lead modeler for SECY-08-0147:

"Basically the large quantities were not evaluated in EIS [the document supporting rulemaking for Part 61]. They did something like 17 Curies of Uranium-238 and three Curies of Uranium 235, and something like a million cubic meters of waste in the analyses, and if you look at the potential waste streams that may be anticipated, you could be looking at something like 470,000 Curies of Uranium-238. So you're really outside of the box from what was done, and we recognize that, and that's why we're here today."

NRC's Unique Waste Streams Rulemaking Record, [Workshop 2, Day 1 Transcript](#) at page 90.

21. [NRC Fact Sheet on Depleted Uranium and Other Waste Disposal](#). This has also been acknowledged by NRC in many other documents, e.g., NRC, [SECY-08-0147](#), Enclosure 1 at page 1, and In the Matter of Louisiana Energy Services (National Enrichment Facility), 62 NRC 523, CLI-05-20, October 19, 2005, Part V.

Web access for CLI-05-20: <http://www.nrc.gov/reading-rm/doc-collections/commission/orders/2005/2005-20cli.html>.

22. *See* [Workshop Presentations](#), slide 40 of 115.

Note that risk is a function of quantity and concentration. *Id.* at Slide 58.

23. See [SECY-08-147](#), Enclosure 1, at page 1.

See also Slide 54 of 115 of the “[Workshop Presentations](#)” made by NRC at its NRC’s Unique Waste Streams Rulemaking Workshop:

“Analysis not intended to replace site-specific evaluations.”

24. In the Matter of Louisiana Energy Services (National Enrichment Facility), 63 N.R.C. 591, 70-3103-ML, (ASLBP 04-826-01-ML) (May 31, 2006).
25. See [SECY-08-147](#), at page 9.
26. [NRC’s Frequently Asked Questions about Land Disposal of Unique Waste Streams](#).
27. NRC’s Unique Waste Streams Rulemaking Record, [Workshop 2, Day 1 Transcript](#) at page 82.
28. See NRC’s Unique Waste Streams Rulemaking Record, “[Workshop Presentations](#),” Slide 12, “Commercial LLW Disposal Sites, and accompanying commentary at [Workshop 1, Day 1](#) at page 32 and [Workshop 2, Day 1 Transcript](#) at pages 37-38.
29. NRC’s Unique Waste Streams Rulemaking Record, [Workshop 1, Day 1 Transcript](#) (cited in note 1) at p. 25 and [Workshop 2, Day 1 Transcript](#) at p. 30.
30. See citations in notes 7 and 9.
31. See “U.S. Department of Energy Manual, Approval of Exemptions for Use of Non-DOE Facilities,” at I-7.

Web access: <https://www.directives.doe.gov/pdfs/doe/doetext/neword/435/m4351-1c1.pdf>.

Representatives of the Board have been unable to locate a copy of DOE’s exemption for disposal of depleted uranium at EnergySolutions or related documentation of DOE’s decision to dispose of its depleted uranium in Utah, but the need for an exemption is also referenced in two pre-decisional documents: “Evaluation of the Acceptability of Potential Depleted Uranium Hexafluoride Conversion Products at the Envirocare Disposal Site,” December 2000; and “Draft Supplement Analysis for Location(s) to Dispose of Depleted Uranium Oxide Conversion Product Generated from DOE’s Inventory of Depleted Uranium Hexafluoride (DOE/EIS-0359-SA1 AND DOE/EIS-0360-SA1), March 2007.”

Web access (respectively): [http://www.ornl.gov/~webworks/cpr/rpt/109279 .pdf](http://www.ornl.gov/~webworks/cpr/rpt/109279.pdf)

and

[http://gc.energy.gov/NEPA/nepa\\_documents/na/EIS-0359-SA1\\_EIS-0360-SA1.pdf](http://gc.energy.gov/NEPA/nepa_documents/na/EIS-0359-SA1_EIS-0360-SA1.pdf).

32. Web access: <http://www.radiationcontrol.utah.gov/Board/minagd/7142009.pdf>.
33. [SECY-08-0147](#), Enclosure 1 at page 21. *See also* SECY-08-0147, Enclosure 1 at pages 6-8 for a fuller discussion.