PR-20, 61
80FR16081 50

PUBLIC SUBMISSION

As of: 7/23/15 9:19 AM
Received: July 22, 2015
Status: Pending_Post
Tracking No. 1jz-8k4o-v4pw
Comments Due: July 24, 2015
Submission Type: Web

Docket: NRC-2011-0012
Low-Level Radioactive Waste Disposal

Comment On: NRC-2011-0012-0077
Low-Level Radioactive Waste Disposal

Document: NRC-2011-0012-DRAFT-0119
Comment on FR Doc # 2015-06429

Submitter Information

Name: Kurt Harris

General Comment

See attached file(s)

Attachments

ANS USU Statement

American Nuclear Society Student Chapter – Utah State University

After reviewing the NRC's proposed rule changes to 10 CFR Parts 20 and 61, we have concluded that the NRC's proposed rules are sufficient to safely regulate the disposal of low-level radioactive waste (LLRW), and, furthermore, the costs to industry, Agreement States, and the NRC are not overly-burdensome. Site-specific analyses will allow for safe disposal of large amounts of long-lived LLRW like depleted uranium (DU), which was not considered during the development of the previous regulations.

The site-specific approach for licensees and license applicants is thorough. First, they must complete a performance assessment to protect the general population. Second, they perform an intruder assessment to protect inadvertent intruders. Third, they analyze the performance period to mitigate long-term risk, followed by a demonstration of defense-in-depth, which shows layers of overlapping provisions that compensate for each other should one failure occur. Finally, they demonstrate site-stability, focusing on stability of the wasteform, stability of the facility, and geologic stability.

EnergySolutions' Clive facility in Utah (located over 60 miles west of Salt Lake City) is one of only four LLRW disposal facilities in the United States. The company plans to ship over half of the 750,000 tons of DU stored in Kentucky, Ohio, and South Carolina to Clive for disposal. [1] The NRC reports that the total amount of DU LLRW requiring disposal is 10^9 kg, or roughly 1 million tons.

The quantity of DU LLRW to be disposed of in Utah is relatively small. 1 million tons pales in comparison to the 1.6 billion tons of CO_2 emitted by coal plants in the U.S. in 2014 alone. These carbon dioxide emissions do far more harm to human health and the environment than this small amount of DU. Furthermore, even if all 10^9 kg were deposited in Utah, given the high density of DU (19.1 g/cm^3), the waste would only occupy a volume of 52,000 m^3, or a cube about 37 meters on each side. [2]

DU is about 60% as radioactive as the same mass of natural uranium. The high concentration of DU at disposal sites creates the problem. DU is weakly radioactive because of its long half-life of about 4.5 billion years. It emits alpha radiation which cannot penetrate the skin and only travels about 4 cm in air, though it is harmful if ingested. Decay products include gaseous radon-222, an alpha emitter that is more mobile than the parent radionuclides. However, with a half-life of 3.8 days, site-specific analyses will place disposal sites a sufficient distance from large populations that any leaking gas would decay to negligible amounts before reaching anyone that could inhale it long-term.

After over one million years of DU storage, secular equilibrium is reached, where daughter product production rates roughly equals their respective decay rates. It is at this point that peak radioactivity occurs, at levels roughly 14 times that initially used for waste classification. Concentrations of the decay product radium-226, an alpha emitter with a half-life of 1,600 years, may increase beyond Class A and Class C. [3] This would be a problem if Utah law does not allow for the disposal of anything except Class A LLRW. The potential change of LLRW classifications over long periods of time does not seem to be addressed well in the NRC's proposed rules, but is particularly important in Utah given our restrictions. However, we would prefer that Utah take the lead on disposing of nuclear waste of all classifications, so that clean nuclear power can expand here in the United States. It is not reasonable to expect the NRC to promise to never change the classification of DU, though their definition of long-lived waste is clear, under which DU would definitely fall. This clarity in rulemaking will allow for clear distinctions between waste types and ensure safe disposal. We also hope that as research is done on the health effects of low doses of radiation, updates can be made to the limits specified, as small doses may not cause any adverse health effects if our bodies may be able to repair themselves faster than the damage caused.

Many people in Utah are concerned that the location of EnergySolutions' Clive facility is above an aquifer and in the path of Lake Bonneville as it returns and recedes over time. The risks are that

groundwater could be contaminated, and that above-ground storage containers of LLRW could be washed away. Fortunately, a performance assessment – required by the NRC – will address the potential contamination of groundwater, and analysis of the performance period should address concerns such as Lake Bonneville's return. Disposal of DU will be safe as long as EnergySolutions and other companies can perform the analyses proposed by the NRC with sufficient thoroughness to satisfy federal and state regulators. If EnergySolutions can demonstrate that Clive is safe, according to the NRC's standards, then Utah should follow the science and allow them to dispose of DU there.

Realistically, we don't expect DU to sit unused forever. It is valuable as fuel in breeder reactors, which are likely to be used again in the United States or for re-enrichment. A 2008 estimate valued only a third of the U.S. DU inventory at $7.6 billion. [4] Breeder technology was been proven safe and effective in the Integral Fast Reactor in 1986 at Idaho National Lab, and in many other locations. With Utah's coal plants aging, we believe our state is ideal for the eventual construction of such nuclear power plants.

Utah stands to benefit greatly from the expansion of nuclear power. In 2005, there were 16 aging coal-fired generating stations, with 5,080 MW of capacity, representing 74% of the state's total electric generating capacity. In 2006, Utah's coal-fired power plants released approximately 41 million tons of CO_2 – 66% of the state's total CO2 emissions – as well as 34,000 tons of sulfur dioxide and 68,000 tons of nitrogen oxide. Although emissions controls have lowered these figures slightly, nuclear power could make substantial reductions to Utah's pollution. Furthermore, the aging power infrastructure already has water allocations from the state, and so could be replaced with small modular reactors – all while retaining and likely increasing the local employment opportunities.

In conclusion, we believe the NRC's proposed rules will provide for safe disposal of long-lived LLRW like DU without overly-burdening the nuclear energy industry. Long-term analyses should be performed for storage, but DU will likely be used as fuel in future reactors, providing great benefits to the states storing it, and potentially eliminating the risks associated with daughter products of U-238. EnergySolutions will perform the analyses required, and should find storage of DU in Utah to be feasible and profitable. Though there is a lot of misinformation spread regarding nuclear waste (for example, images of green glowing barrels of waste), we feel it is important that good policies be made by the NRC and by Utah according to sound science and engineering principles. Doing so will allow for cleaner energy production in Utah and nation-wide, and a brighter future for everyone.

Kurt Harris
PhD Candidate, Mechanical Engineering

Landon Hillyard
President, ANS at USU

[1] B. Maffly, "EnergySolutions pauses plan to dispose of nation's depleted uranium in Utah landfill," *The Salt Lake Tribune*, 13 April 2015.

[2] "U.S. Energy Information Administration," [Online]. Available: http://www.eia.gov/tools/faqs/faq.cfm?id=77&t=11. [Accessed 28 May 2015].

[3] U. DEQ, "Depleted Uranium (DU) Waste," May 2015. [Online]. Available: http://www.deq.utah.gov/businesses/E/EnSolutions/depleteduranium/performassess/docs/2015/05May/DUWaste.pdf.

[4] "Depleted Uranium," [Online]. Available: http://en.wikipedia.org/wiki/Depleted_uranium#Uranium_hexafluoride. [Accessed 29 May 2015].