UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

3/5/2015
80FR 12042

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Gallagher, Carol

From: Donna Gilmore <dgilmore@cox.net>
Sent: Monday, April 27, 2015 12:03 AM
To: jorge.solisl@nrc.gov; Gallagher, Carol
Cc: CHAIRMAN Resource; Kevin Barker - CEC; Joseph Street; Eric Greene; Shane, Raeann; Ken Alex; Michal Freedhoff
Subject: Comments for Docket NRC-2014-0273 Impact of Variation in Environmental Conditions on the Thermal Performance of Dry Storage Casks, Draft Report

Comments for Docket NRC-2014-0273, Impact of Variation in Environmental Conditions on the Thermal Performance of Dry Storage Casks Docket, February 2015 http://www.regulations.gov/#!documentDetail;D=NRC-2014-0273-0001
NUREG-2174 Draft, February 2015 http://pbadupws.nrc.gov/docs/ML1505/ML15054A207.pdf

Thank you for addressing this critical issue where you identified low-speed wind as an environmental factor that may affect the thermal performance of the Holtec underground canister system as well as other systems, and for cases with small thermal margin, these adverse ambient conditions could result in peak cladding temperatures (PCTs) being higher than the SRP-recommended limits, which **could create thermal conditions such that spent fuel could degrade and lead to gross rupture**.

1. I recommend you address another environmental factor -- partial or full blockage of air vents. It would seem this should be analyzed in combination with the wind variables. It could inform how frequently the vents need to be inspected and how long they could be blocked without exceeding the maximum thermal limits. This may result in calculating more conservative thermal limits to avoid spent fuel degradation and gross rupture.

2. It would be useful to include in this NUREG the underground system that is actually being used in the U.S., especially since the underground system has thermal challenges and is a new experimental system, never used anywhere in the world. The underground system you chose for analysis, the HI-STORM 100U, has not been used. The HI-STORM UMAX system may be the replacement system the HI-STORM 100U. The UMAX system was recently installed at Callaway and has been proposed for San Onofre, although it is not yet approved for high seismic areas, such as San Onofre. Here is link to UMAX technical documents for easy reference: Holtec Intl, Certificate of Compliance No. 1040 for the HI-STORM UMAX Cask Storage System (TAC No. L24664) Docket No. 72-1040 http://pbadupws.nrc.gov/docs/ML1509/ML15093A498.html

3. Following is information from HI-STORM UMAX CoC Appendix B that would be useful to address in NUREG 2174, since it identifies additional environmental variables that would be affected by the wind variables you analyzed. See CoC Appendix B, Approved Contents and Design, HI-STORM UMAX Canister System, April 6, 2015 http://pbadupws.nrc.gov/docs/ML1509/ML15093A514.pdf
a. Page 2-16 Max heat load Table 2.3-1 MPC-37
Maximum heat loads vary from 33.46 (short fuel) to 37.06 (long fuel)

> b. Page 3-11 For those users whose site-specific design basis includes an event or events (e.g., flood) that result in the blockage of any VVM inlet or outlet air ducts for an extended period of time (i.e., longer than the total Completion Time of LCO 3.1.2), an analysis or evaluation may be performed to demonstrate adequate heat removal is available for the duration of the event. Adequate heat removal is defined as fuel cladding temperatures remaining below the short term temperature limit. If the analysis or evaluation is not performed, or if fuel cladding temperature limits are unable to be demonstrated by analysis or evaluation to remain below the short term temperature limit for the duration of the event, provisions shall be established to provide alternate means of cooling to accomplish this objective.

4. The issue of climate change does not appear to be addressed. Using historical data is important. However, given climate change will create more extreme conditions, this should be considered to ensure the most conservative thermal margins are used, especially since you are considering this for long term storage.

5. Please include the definition of "long term storage" as used in this NUREG. The 2014 NRC decision on Continued Storage has some specific definitions of time periods. It is not clear how these relate to this NUREG. The NRC Continued Storage decision referred to short term as being about 100 years (60 years after end of operating license). Or maybe 120 years, if it includes a 20-year license extension.

6. Should there be a recommendation in this NUREG to consider reevaluating approved and pending dry cask designs to address the potential need for lower thermal limits, since the critical information you are providing here **could create thermal conditions such that spent fuel could degrade and lead to gross rupture**?

7. Should there be a recommendation in this NUREG to identify existing loaded canisters that may have **thermal conditions such that spent fuel could degrade and lead to gross rupture**?

8. Is there any remediation that should or could be done if any existing loaded canisters may have **thermal conditions such that spent fuel could degrade and lead to gross rupture**?

9. What is the range of additional time the fuel would need to remain in the pools to minimize or avoid this problem? I realize this is a challenging one to answer. However, as the NRC has approved higher and higher heat loads for the canisters in order to reduce pool cooling time, it appears we may be creating another problem. Maybe there should at least be a recommended minimum time fuel should cool in the pool for lower burnup and another for high burnup fuel. The high burnup fuel at San Onofre in existing NUHOMS-24PTH2 canisters requires 9 to 15 years to cool. The newer model NUHOMS-32PTH2 which hold more fuel assemblies requires just a few years.

10. Are we pushing the thermal limits on what is safe, especially since we're dealing with climate change and longer on-site storage requirements in environments and with canisters that were not intended for long term storage and are subject to corrosion and cracking and other degradation mechanisms? These thin canisters cannot be inspected for cracks and cannot be repaired or maintained. There is no early warning, prior to a radiation leak and no plan in place to deal with a failed canister (especially if there is no spent fuel pool, as is allowed in decommissioned plants).

11. A comparible stainless steel welded container at the Koeberg nuclear power plant, had a 0.6" deep crack in 17 years from chloride-induced stress corrosion cracking. Most of our canisters are thinner than this crack (1/2" to 5/8"). San Onofre has the same environment as Koeberg -- on shore winds, high surf and daily morning or evening fog most of the year. And because the canisters at San Onofre are filled with spent nuclear fuel, the crack growth rate will be higher from higher heat. The Koeberg container was at ambient temperatures. We don't know when a crack may initiate, but we know we have all the conditions for cracking. We don't appear to be prepared for this. If a canister has cracks, how will this affect your heat load calculations and do we run a higher risk of faster crack growth with these higher temperatures (once the temperature is below 85 degrees C)?

12. What are the range of environmental consequences of a microscopic through-wall crack in one of these thin canisters with gross ruptured spent fuel? Dr. Singh, Holtec President and CEO, said a microscopic crack will release millions of curies of radiation and its not feasible to repair these canisters. https://www.youtube.com/watch?v=euaFZt0YPi4&feature=youtu.be

13. San Onofre has over 95 damaged fuel assemblies already in canisters. Fuel was loaded in canisters starting in 2003. 50 canisters have spent fuel, most high burnup or close to high burnup. One canister has GTCC waste. If we have a similar timeline for cracking as Koeberg, it means we only have 8 years before one or more

of these canisters fails. What is the plan to deal with this at San Onofre? Will the NRC continue to allow these higher heat loads that just allows the cracks to grow faster, yet with no plan for how to remediate a failed canister?

Thank you for doing this important work.

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