PUBLIC SUBMISSION

As of: 5/13/15 1:35 PM
Received: May 04, 2015
Status: Pending_Post
Tracking No. 1jz-8io0-7j2w
Comments Due: May 04, 2015
Submission Type: Web

Docket: NRC-2014-0273
Impact of Variation in Environmental Conditions on the Thermal Performance of Dry Storage Casks

Comment On: NRC-2014-0273-0001
Impact of Variation in Environmental Conditions on the Thermal Performance of Dry Storage Casks

Document: NRC-2014-0273-DRAFT-0007
Comment on FR Doc # 2015-05098

Submitter Information

3/5/2015
80 FR 12042

(11)

Name: Donna Gilmore
Address: United States,
Email: dgilmore@cox.net

General Comment

Recommendations (see file for details)
1. Analyze partial or full blockage of air vents.
2. Address 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 HI-STORM 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 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

Maximum heat load is 37.06
Address blockage of any VVM inlet or outlet air ducts for extended period of time

4. a. Address climate change to ensure the most conservative thermal margins are used. NOAA Southwest Extremes in Maximum Temperature, Summer 1910-2014,
http://www.ncdc.noaa.gov/extremes/cei/graph/sw/1/06-08, Maximum Temperature for All States
https://sanonofresafety.files.wordpress.com/2015/05/noaamaximumtemperatures2015-05-04.pdf

4.b. Use maximum rather than average temperatures. Historical data for maximum temperature is 134F (56.7C). NOAA U.S. Climate Extremes http://www.ncdc.noaa.gov/extremes/ncec/records

4.c. Analyze maximum ground temperatures and concrete temperatures, since this could affect the peak cladding temperatures. http://earthobservatory.nasa.gov/Features/HottestSpot/page1.php

5. Include definition of long term storage. 2014 NRC decision on Continued Storage has definitions.

6. Recommend reevaluating approved and pending dry cask designs to address the potential need for lower thermal limits. The critical information provided here could create thermal conditions such that spent fuel could degrade and lead to gross rupture.

7. Recommend identifying 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? Recommend minimum time fuel should cool in the pool for lower burnup and another for higher 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 holds 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 storage requirements in environments and with canisters not designed for long term storage and are subject to corrosion and cracking? These canisters cannot be inspected for cracks, cannot be repaired or maintained. There is no early warning, prior to a radiation leak and no plan to deal with a failed canister (especially if there is no spent fuel pool, as is allowed in decommissioned plants).

11. A comparable 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 canisters are only 0.5 0.625. San Onofre has the same environment as Koeberg -- on shore winds, high surf, and daily fog most of the year. Because canisters at San Onofre are filled with spent fuel, 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 are not 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?

12. What are the environmental consequences of a microscopic through-wall crack? Dr. Singh, Holtec President, 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 in canisters. Fuel was loaded in canisters starting in 2003. If we have a similar timeline for cracking as Koeberg, we only have 8 years before one or more canisters fails. What is the plan to deal with this? Will the NRC continue to permit these higher heat loads that allows cracks to grow faster, yet with no plan for how to remediate a failed canister?

Attachments

NUREG 2174 DraftCommentsDocketNRC-2014-0273-0001DonnaGilmore2015-05-04b

May 4, 2015

To: NRC Docket NRC-2014-0273-0001
Fr: Donna Gilmore, SanOnofreSafety.org

Re: Comments for Docket NRC-2014-0273, NUREG-2174 Draft published February 2015, Impact of Variation in Environmental Conditions on the Thermal Performance of Dry Storage Casks 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. a. The issue of climate change does not appear to be addressed. Given climate change will create more extreme conditions, this should be evaluated to ensure the most conservative thermal margins are used, especially since you are considering this for long term storage. References

- NOAA Southwest Extremes in Maximum Temperature, Summer (June-August) 1910-2014. See Attachment or link http://www.ncdc.noaa.gov/extremes/cei/graph/sw/1/06-08
- NOAA Maximum Temperature for All States https://sanonofresafety.files.wordpress.com/2015/05/noaamaximumtemperatures2015-05-04.pdf

4.b. Using average temperatures does not appear to be conservative. NOAA historical data for temperature extremes shows these record extremes:

134°F (56.7°C)	July 10, 1913	Greenland Ranch, CA
-80°F (-62.2°C)	January 23, 1971	Prospect Creek, AK

NOAA Record U.S. Climate Extremes (retrieved 5/4/2015)
http://www.ncdc.noaa.gov/extremes/ncec/records

4.c. Ground temperatures and concrete temperatures are other variables that could affect the peak cladding temperatures. Recommend this be analyzed and standards recommended. For example, scientists first measured the difference in June 1915 of ground temperatures. Around the same time that the Death Valley record air temperature was measured, an analysis of the temperature conditions of air and soil was conducted in the desert near Tucson, Arizona. In the midday sun, the temperature 0.4 centimeters below the soil surface was 71.5°C (160.7°F). The air temperature, measured four feet above the ground, was 42.5°C (108.5°F)."
http://earthobservatory.nasa.gov/Features/HottestSpot/page1.php

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)?

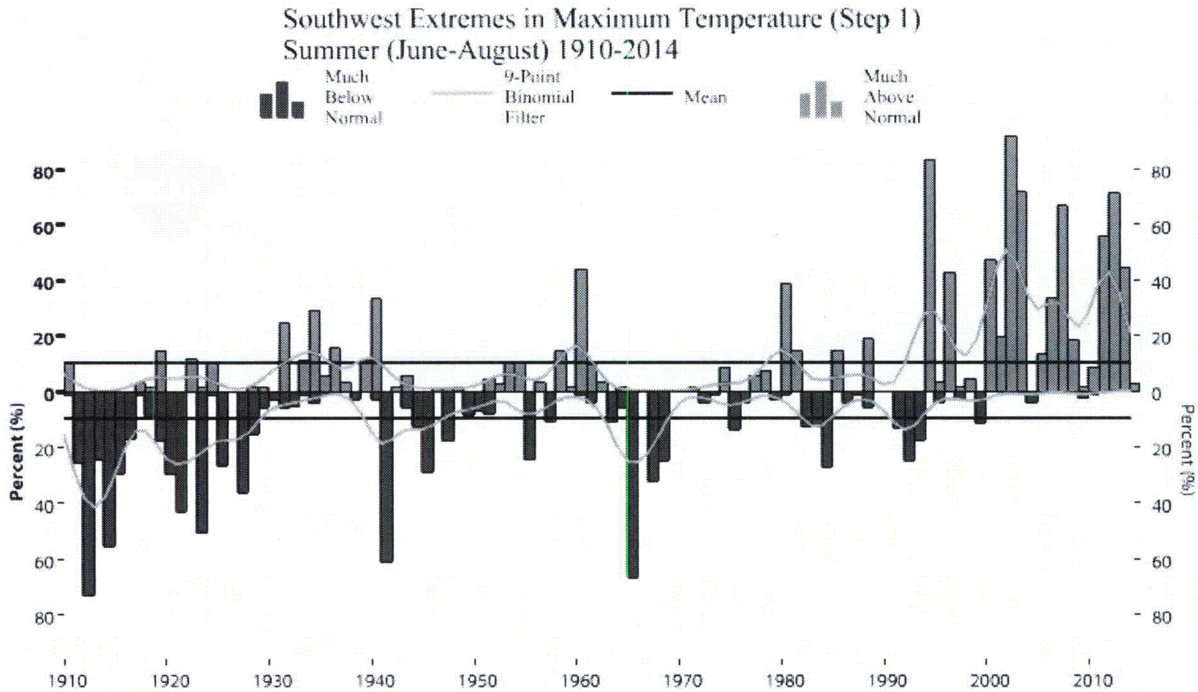
12. What are the range of environmental consequences of a microscopic through-wall crack in one of these thin canisters with gross ruptured spent fuel? Dr. Singh, Holtec President and CEO, said a microscopic crack will release millions of curies of radiation and its not feasible to repair these canisters.
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 permit these higher heat loads that just allows the cracks to grow faster, yet with no plan for how to remediate a failed canister?

Donna Gilmore
SanOnofreSafety.org
San Clemente, CA

Attachment

Attachment



Southwest Extremes in Maximum Temperature (Step 1)
Summer (June-August) 1910-2014
Much Below Normal
9-Point Binomial Filter
Mean
Much Above Normal
Percent (%)
Percent (%)
80
60
40
20
0
20
40
60
80
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010