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Impact of Variation in Environmental Conditions on the Thermal Performance of Dry Storage Casks

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Name: Susan Shapiro
Submitter's Representative: Susan Shapiro & Michel Lee
Organization: IPSEC, PHASE and CIECP

General Comment

Comments for Docket NRC-2014-0273, Impact of Variation in Environmental Conditions on the Thermal Performance of Dry Storage Casks: NUREG 2174 DRAFT DOCKET ID NRC-2014-0273

Please see uploaded file for comments submitted by
Indian Point Safe Energy Coalition
Council on Intelligent Energy & Conservation Policy (CIECP)
Public Health and Sustainable Energy (PHASE)

Attachments

ISPEC Comments for Docket NRC-3-4

SUNSI Review Complete
Template = ADM – 013
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Add= Jorge Solis (JXS5)

Comments for Docket NRC-2014-0273, Impact of Variation in Environmental Conditions on the Thermal Performance of Dry Storage Casks: NUREG 2174 DRAFT – DOCKET ID NRC-2014-0273

THANK YOU for looking at low wind speed as an environmental factor needing consideration with respect to the thermal performance of dry cask canister systems. We hope this represents a new commitment to consideration of factors improperly characterized or ignored by many prior analyses of spent fuel systems.

These comments aim to broadly identify significant categories of environmental and engineered system variables which warrant evaluation. Should these variables fall outside the scope of your inquiry, we nevertheless urge you to clearly identify them as factors requiring evaluation in ongoing or future studies.

Climate Change

Climate change will undoubtedly stress dry cask systems and all infrastructures that support their operation. These stresses include: drought; severe and extended heat waves; storm surges; extreme precipitation events; increased precipitation; flooding; altered chemical environments; and changing geological and hydrological conditions. In coastal and low-lying areas, risks include sea level rise.

Climate change conditions will also impact regional systems, which can drastically alter site locations and compromise the integrity of foundations and other cask system structures – potentially in ways that prevent mitigation of problems. An example would be the catastrophic failure of a dam or levy.

Sea level rise and increases in the frequency and severity of major storm events can also lead to changes in the forcing of groundwater flow beneath dry cask structures. This can, in turn, impact the integrity of the dry cask system foundations. Forcing events include diurnal tides, storms, and periods of high rainfall. (The impact of forcing is evident at the damaged Fukushima and Runit Dome sites.)

Another significant stressor tied to climate is the likely increase of the intensity and number of freeze-thaw cycles.

Impacts of warming, water source depletion and prolonged droughts, particularly in the Southwestern United States, will also substantially raise the risk of large long-lasting forest fires.

Notably the effects and impacts of climate change will interact. Just as more extreme weather will increasingly stress engineered systems, the consequences of engineered system failures will increasingly stress the environment. Even small mechanistic failures (e.g., radiation leaks) might have large scale impacts. This is particularly true of regions already burdened by decades of radioactive pollutant releases from uranium mining, milling, and enrichment operations (e.g., Navajo lands). Minor additional alteration or degradation of aquifers in those lands could have enormous negative consequences for those environments and regional populations. Due to the growing pressure on clean drinking water supplies it is imperative that all dry casks contain radiation leaks from groundwater, as groundwater is future drinking water.

The impact of dry cask storage systems upon the climate itself is another factor mandating analysis. These systems will place a very long term thermal load upon the environment (again, a problem particularly serious in areas afflicted by drought). The continuous C02 and methane emissions of new produced Carbon-14 is an additional factor requiring assessment and continuous realtime monitoring and reporting.

Anthropogenic Environmental Factors

Anthropogenic environmental conditions also require assessment. Such factors include infrastructure risks which could significantly impact cask behavior. One example is nearby gas pipelines. Pipeline ruptures are a well recognized cause of gas explosions and fires which can burn for extended periods. The Algonquin Incremental Market Project (AIM) includes a two-mile section of 42 inch pipe, which will be carrying gas under extremely high pressure. A segment of this pipeline is planned to be situated in close proximity to the Indian Point nuclear power plant and dry cask storage installation in Buchanan, New York, 24 miles from New York City. The Indian Point plant is already identified as vulnerable to seismic activity and has degraded fire protection standards. Dry casks at this site are therefore obviously at risk should a catastrophic pipeline rupture occur. A second example of man-made hazard is increased seismic activity in regions with fracking wells. A third is the possibility of malicious activity aimed at exploiting weaknesses in cask structures.

Damaged Fuel Rods and Assemblies

Specific engineering considerations which need to be addressed are the behaviors of already materially compromised spent fuel rods and/or assemblies, as well as increased amounts of high burnup fuel which must be stored as damaged fuel requiring additional engineered barriers to prevent radiation leaks into the environment.

The Effects of Time

It is important to include in modeling the likely combined realities that adverse ambient conditions may exist for very prolonged periods and engineered systems will deteriorate.

Modeling should not assume cask structures many decades from now will conform to design basis. In other words, design basis conditions are a false starting point when the timeline is a century or more. A system which may be robust over a period of 20 years is likely to be far less robust in 120 years. Real world conditions are likely to deliver many decades of low level stressors likely to result in many incremental decreases in the integrity of *all* structures. This must either be considered in the analysis, or – at the very least – clearly identified as an uncertainty.

Complex Interactions of all Variables

Modeling must incorporate the many feedback loops between climate change, infrastructure, weathering and deterioration of engineered systems. Risk can spread in a cascading manner. While no model can incorporate all risks, the excluded variables need to be clearly identified as unexamined.

Funding Mechanisms for Replacement Cask Structures

Modelling must assume future generations which will not benefit from the storage nuclear fuel and may not require continued funding for replacement of cask structures every 100 or so years, for the next 2400 years. Given that the United States is only 239 years old and that no one predict the future, it cannot be assumed that the current legislative and administrative system will remain functional in the future to require such replacement of nuclear fuel waste storage systems.

Acceptance of subpar systems for currently existing nuclear waste, cannot be used to justified additional production of nuclear waste. No more production of nuclear waste should be enabled until there is full assurance that such nuclear waste streams will be contained from the environment for the many centuries it remains toxic and mutagenic to human and reproductive health.

Use of Best Technology Available

High quality dry cask storage systems are currently available in use in Germany and Japan, yet the NRC has failed to require the use of these safer casks and has not required the use of the Best Technology Available in the dry cask systems. The current systems approved by the NRC do not meet the Best Technology Available and therefore do not meet the regulatory environmental protection standards required by the Clean Water Act.

Sincerely yours,

Susan Hito Shapiro, Esq.
Michel Lee, Esq.
On Behalf of
Indian Point Safe Energy Coalition
Council on Intelligent Energy & Conservation Policy (CIECP)
Public Health and Sustainable Energy (PHASE)