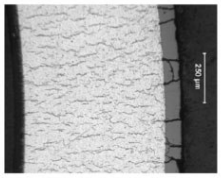
STOP the High Burnup Nuclear Experiment

For about 16 years, the Nuclear Regulatory Commission (NRC) has approved high burnup fuel, which increases nuclear industry profits. *High burnup fuel is low-enriched uranium that has burned in the reactor for* ***more than 45 GWd/MTU*** *(GigaWatt days per Metric Ton of Uranium).*[1]

High burnup fuel has unresolved serious waste storage issues. A June 2013 Department of Energy report[2] states "…***cladding performance issues need to be addressed before this fuel can be loaded into dry casks and transportation systems***." And "…*burnup rates* ***as low as 30 GWd/MTU*** *can present performance issues including* ***cladding embrittlement*** *under accident conditions as well as normal operations*."

The NRC should stop approval of high burnup fuel and make solving high burnup fuel storage problems one of its highest priorities.


Microscopic View of Fuel Clad Hydrides

High burnup fuel problems

- **Dangerously unpredictable and unstable in storage – even short-term.**
- **Over twice as radioactive and over twice as hot.** *The higher the burnup rate and the higher the uranium enrichment, the more radioactive, hotter and unstable.*
- **Requires a minimum of 7 to 20 years of cooling in spent fuel pools.** San Onofre's 1123 high burnup fuel assemblies require at least **15 years** to cool in the pools. *Years of cooling depend on burnup rate, percent of uranium enrichment and other factors as defined in the dry cask system's technical specifications.*[3] *Lower burnup fuel requires a minimum of 5 years.*
- **Requires more storage space between fuel assemblies** due to the higher heat, higher radioactivity, and instability,[4] yet the NRC approves higher densities of fuel assemblies in dry casks systems. **San Onofre** requested use of a new dry cask system that crowds 32 fuel assemblies into the same space that currently holds 24.[5] This new system will increases the risks of dangerous radiation releases into the environment. **The NRC should NOT approve the NUHOMS® 32PTH2 cask system** for high burnup, but is considering doing so this year. **Diablo Canyon** now uses a 32 fuel assembly cask system.
- **No transportation casks for high burnup are approved by the NRC,**[6] so the waste cannot be relocated.
- **Approved for only 20 years in dry cask storage** and assumptions about how high burnup fuel reacts in the first 20 years of storage are proving incorrect. [7]
- **Insufficient data to approve dry casks for over 20 years**, *per Dr. Robert Einziger, Senior Materials Scientist, NRC Division of Spent Fuel Storage and Transportation.*[8]

---

[1] **GAO-12-797** SPENT NUCLEAR FUEL Accumulating Quantities at Commercial Reactors Present Storage & Other Challenges, August 2012 http://www.gao.gov/assets/600/593745.pdf Low-enriched uranium = up to 5% of U^{235}

2 **DOE** FCRD-NFST-2013-000132, Rev. 1; Fuel Cycle Research & Development-Nuclear Fuel Storage and Transportation-2013-000132, Rev. 1, 6/15/13 http://www.hsdl.org/?abstract&did=739345

[3] ***CoC No. 1029*** *Technical Specifications for Advanced NUHOMS® System Operating Controls and Limits*, Appendix A Tables 2-9 to 2-16 http://pbadupws.nrc.gov/docs/ML0515/ML051520131.pdf

[4] **RWMA Marvin Resnikoff**, PhD: *The Hazards of Generation III Reactor Fuel Wastes* May 2010 http://bit.ly/19dVRsY

[5] **Edison request for NUHOMS® 32PTH2** http://pbadupws.nrc.gov/docs/ML1204/ML12046A013.pdf

[6] **SFPO Interim Staff Guidance 11**, Rev 3 *Cladding Considerations for the Transportation and Storage of Spent Fuel* 11/17/2003 http://www.nrc.gov/reading-rm/doc-collections/isg/isg-11R3.pdf

[7] **NWTRB Douglas B. Rigby, PhD:** The NRC approved the initial 20 year dry cask storage based on assumptions. However, no information was found on inspections conducted on high burnup fuels to confirm the predictions that were made. U.S. Nuclear Waste Technical Review Board December 2010 report http://www.nwtrb.gov/reports/eds_rpt.pdf

[8] **NRC Robert E. Einziger, PhD:** *insufficient data* to support licensing dry casks for >20 years, March 13, 2013. http://1.usa.gov/15E8gX5