EDO Principal Correspondence Control

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FINAL REPLY:

David Lochbaum
Union of Concerned Scientists

TO:

Chairman Jaczko

FOR SIGNATURE OF : ** PRI ** CRC NO: 12-0196

Chairman Jaczko

DESC:

Nuclear Regulatory Commission's Spent Fuel Pool Scoping Study (EDATS: SECY-2012-0248)

ROUTING:

Borchardt
Weber
Johnson
Ash
Mamish
OGC/GC
Leeds,NRR
Zobler, OGC
Bowman,OEDO
Chen,OEDO

DATE: 05/17/12

ASSIGNED TO: CONTACT:

NRR Leeds

SPECIAL INSTRUCTIONS OR REMARKS:

Ref. G20120294. NRR to coordinate with RES as appropriate.

EDATS

Electronic Document and Action Tracking System

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General Information

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Other Assignees:
Subject: Nuclear Regulatory Commission's Spent Fuel Pool Scoping Study
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Other Information

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OCA Concurrence: NO
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Originating Organization: Union of Concerned Scientists
Addressee: Chairman Jaczko
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AUTHOR:	David Lochbaum		
AFFILIATION:	UCS		
ADDRESSEE:	Gregory Jaczko		
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EDO --G20120339

Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

May 7, 2012

The Honorable Gregory B. Jaczko
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Reference: Letter dated April 25, 2012, from Chairman J. Sam Armijo of the Advisory Committee on Reactor Safeguards (ADAMS ML12108A216) on the NRC's Spent Fuel Pool Scoping Study

Dear Chairman Jaczko:

In the referenced letter, the ACRS conveyed its conclusions regarding the NRC's ongoing spent fuel pool scoping study. We have concerns that are not explicitly addressed by the ACRS. We are not concerned about what the NRC is doing, but rather about what it does not seem to be doing in the study. As a result, we are concerned that the study's results will either misinform regulatory decisions or delay them as the gaps are addressed.

The NRC's study, as we understand it, examines the consequences from a loss of spent fuel pool water inventory or cooling as might occur following a seismic event. But the storage of irradiated fuel in spent fuel pools entails additional issues other than seismic-induced loss of inventory/cooling that do not seem to be covered by the study. These additional issues, which we believe must be factored into the study, are:

- **Criticality**: The current industry practice of high density storage in the spent fuel pools shifted protection against criticality in the pools from geometry to neutron absorbers and administrative controls. The low density storage racks maintained subcritical configurations largely through geometry—the spacing between fuel assemblies guarded against criticality. High density storage racks substituted neutron absorbers and administrative controls for geometry. Operating experience has shown neither to be as reliable as geometry.

  Just a few examples from the recent past include:

  (a) Workers at Indian Point Unit 2 placed 11 new fuel assemblies adjacent to spent fuel assemblies on January 23-24, 2012, violating technical specification requirements for criticality prevention (ADAMS ML12115A050).

  (b) The NRC issued a green finding for a November 2011 incident at Fermi Unit 2 where workers placed a spent fuel bundle into the wrong storage location in the spent fuel pool.

  (c) The NRC proposed a $70,000 civil penalty on the Turkey Point licensee on June 21 2010, (ADAMS ML101730313) after boron depletion from spent fuel storage racks challenged the required criticality margins in the Unit 3 spent fuel pool.

  (d) The NRC's Office of Nuclear Reactor Regulation initiated an action plan in March 2012 (ADAMS ML12103A215) to examine the spent fuel pool criticality problem because, "In some cases, the degradation is so extensive that the permanently installed neutron absorber can no longer be credited in the criticality analysis. To accommodate these factors both the SFP [spent fuel pool] criticality analyses and the storage requirements have become more complex."

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- **Design and Licensing Bases Accidents**: Last month, the NRC issued Revision 4 to the standard technical specifications for the different reactor types. Section 3.7.8 in the General Electric BWR/4 version (ADAMS ML12104A192) requires that at least 23 feet of water be maintained above the top of irradiated fuel in the spent fuel pool. But that requirement is only applicable when irradiated fuel is being moved inside the pools. Otherwise, no water at all is required in the spent fuel pools. If the water level drops below 23 feet while irradiated fuel is being moved, all the operator has to do is stop moving the irradiated fuel. There's no technical specification requirement to recover the water level or to preclude draining the remainder of the water from the pool. And this problem is not only hypothetical—section 3.7.6 of the Browns Ferry Unit 1 technical specifications (ADAMS ML052780019) matches the standard technical specifications as do many other reactors' technical specifications.

  Similarly, the technical specifications do not require secondary containment integrity except when the reactor is in MODES 1, 2, and 3, during movement of irradiated fuel, and during operations with the potential to drain the reactor vessel. And onsite power is only required during refueling outages when irradiated fuel is being moved; otherwise, neither the offsite grid nor backup emergency diesel generators are required.

  Our concern is not that licensees may drain their spent fuel pools or fail to refill a partially drained pool. Instead, our concern is that the design and licenses bases for spent fuel pools is woefully inadequate, with the adverse consequence that the spent fuel pool risk is not being properly managed. The only design and licensing bases accident involving spent fuel pools at the majority of, if not all, reactors is a fuel handling accident in which an irradiated fuel bundle is dropped onto other irradiated fuel bundles in storage racks. Hence, this formally analyzed event is the reason for the technical specifications requiring water in the pools when irradiated fuel is being moved. Other accident sequences of equal or greater risk are not considered in design and licensing space. The NRC documented spent fuel pool drain down and loss of cooling events at a fairly high frequency in NUREG-1275 Vol. 12 (ADAMS ML010670175). If the design and licensing basis reflected the full spectrum of potential hazards, rather than focused on only fuel handling accidents, the technical specifications would be rational and coherent. In other words, the standard technical specifications would require sufficient water to be in spent fuel pools whenever irradiated fuel is stored there, not merely when it is being moved.

  The importance of getting the design and licensing bases right and having the technical specifications properly address the corrected bases is illustrated by this example. The standard technical specifications cited above do not require water level to be maintained in the spent fuel pool except when irradiated fuel is being moved. When fuel is not being moved, this means that the spent fuel pool water level instrumentation is not required to be operable. Conceivably, if a licensee had no plans to move irradiated fuel in the spent fuel pool for a year until the next refueling outage, the spent fuel pool water level instrumentation could legally be out of service that entire time. The safety reason for having sufficient water level in the spent fuel pool is not limited to when irradiated fuel is being moved, but the inadequate design and licensing bases result in the technical specifications not providing adequate protection.

- **Operations with the Potential to Drain the Spent Fuel Pool**: For several years, the NRC and the nuclear industry have been working to reach a common understanding regarding proper risk management of Operations with the Potential to Drain the Reactor Vessel (OPDRV, see ADAMS ML112510424 for example). The risk needs to be managed. Just last month, the NRC staff held an

enforcement conference with the Surry licensee regarding problems encountered as a reactor entered mid-loop operation (ADAMS ML12115A073).

But the aforementioned inadequacies in the design and licensing bases create this untenable position—when irradiated fuel is in the reactor vessel, OPDRV must be controlled to prevent damage from overheating. But if all the irradiated fuel is offloaded to the spent fuel pool and gates installed to physically separate it from the reactor vessel, OPDRV no longer applies and there is not an OPDSFP (Operations with the Potential to Drain the Spent Fuel Pool) to take over risk management. And as outlined above, once the entire reactor core is offloaded into the spent fuel pool and those movements have stopped, safety features such as water, level instrumentation, secondary containment, ac power, and dc power are no longer required at many reactors. Risk management goes from numerous technical specification requirements supported by longstanding discussions regarding OPDRV to no technical specification requirements and no OPDSFP protection. That's simply not proper risk management.

The accelerated transfer of irradiated fuel from spent fuel pools to dry storage would not only have implications for pool water inventory and cooling, but also for criticality. The irradiated fuel remaining in the thinned out pools could be stored further apart, re-introducing geometry as a criticality prevention barrier.

Correcting the deficient design and licensing bases would help proper management of the risk by imposing requirements commensurate with the associated hazards, not to some arbitrary subset of the time and conditions when those hazards are present.

Just as one cannot balance a checkbook without knowing all the deposits and withdrawals, the NRC's spent fuel scoping study cannot balance the relative risks of spent fuel vs. dry storage of irradiated fuel. If the study does not account for the spent fuel pool hazards outlined above, additional work will be necessary before the NRC can draw meaningful conclusions from this incomplete effort.

Sincerely,

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