

Joosten, Sandy

From: Adam H Levin <adamhlevin@aol.com>
Sent: Sunday, July 20, 2014 2:55 PM
To: CHAIRMAN Resource; CMRSVINICKI Resource; CMRMAGWOOD Resource;
CMROSTENDORFF Resource
Subject: July 15 Commission Briefing on Decommissioning

Dear Chairman MacFarlane, Commissioners Svinicki, Magwood, and Ostendorff –

Thank you for hosting the Subject meeting, which by its attendance, seems to have been timely and of great interest to the nuclear industry community.

I am quite familiar with the matters discussed at last Tuesday's meeting. My professional career spans nearly 37 years dedicated to decommissioning and spent nuclear fuel management, having recently retired from the position of Director, Spent Fuel and Decommissioning for Exelon Generation's fleet of nuclear plants. As the briefing did not afford the opportunity for public comment, I am writing today to offer some observations on the briefing and comments made, by presenters and NRC Staff. I offer these comments for your consideration, and thank you in advance for finding the time in your busy schedules to reflect upon comments such as mine, from members of the public.

Cordially,

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1. *Timeliness of a Regulatory Structure for Decommissioning*

NRC Staff opined that their evaluation of the need for development of a regulatory framework for decommissioning, has resulted in binning the promulgation of such regulations as a medium priority. I respectfully disagree, and offer these thoughts for your consideration. While it is true that the four major decommissioning projects (Zion, Kewaunee, Crystal River 3 and San Onofre), and the upcoming, previously-announced retirements of Vermont Yankee and Oyster Creek would not benefit from new the new regulatory structure (as it may take five to seven years to promulgate regulations), other plant retirements will be in the offering in the mid-2020 timeframe.

Plants that have already received license renewal (for a total of 60 years of operation) will begin reaching their retirement dates in 2029, beginning with Dresden. As these plants approach retirement and the end of their 60-year license, the probability of them retiring prematurely increases. Short-loading (lower enrichment) fuel in the last two operating cycles in order to terminate operations at the end of life results in somewhat inefficient operations. Operators may be inclined to retire the units, before they purchase the last cycle or two of fuel, as they may find the units uneconomical to operate.

Given that we are rapidly approaching 2015, ten years to establish and test a regulatory framework for decommissioning is reasonable. Beginning the process of developing a regulatory framework in the next one to two years, would be prudent.

2. *Kewaunee's Decision to Accelerate Dry Cask Storage and to Pursue SAFSTOR Decommissioning*

In my prior role as Director, Spent Fuel and Decommissioning at Exelon, and my roles as a Decommissioning Advisor/Project Oversight at a number of currently decommissioning sites, I have personally developed and reviewed, licensee's plans to manage spent nuclear fuel (SNF). I can tell you from my experience, the decision to accelerate the movement of SNF into dry storage is primarily a financial decision - although of late, negative public perception of wet fuel storage has had some influence in the decision. From the licensee's point of view, both wet fuel storage and dry fuel storage offer reasonable assurance to protection of public health and safety, and the transfer decision is not predicated on which method of SNF storage is "safer".

Licensees must be good stewards of decommissioning trust funds, and projects to off-load spent fuel into dry cask storage can have a severe negative impact upon the health of the funds. Completely off-loading a full spent fuel pool into dry cask storage may cost over \$100 million, and can cost in excess of \$200 million for dual-unit sites. A withdrawal of this magnitude early in the decommissioning process, puts at risk the ability of the remaining assets to grow to levels needed in order to complete decommissioning within 60 years.

The decision to offload fuel from the pools at LaCrosse, Big Rock Point, the Yankee Rowe, Haddam Neck, Rancho Seco and Humboldt Bay were easy to make. In each of those cases, a less-than-full spent fuel pool was offloaded, with resulting upfront costs far less than a dry cask storage project of this nature at Kewaunee, Crystal River, San Onofre, or Vermont Yankee. For the larger fuel inventories at these larger facilities, even though there remains a choice for SNF storage, both of which provide reasonable assurance of public health and safety, the licensees have been leaning towards moving fuel into dry cask storage. And the DOE's continuing failure to perform is the driver.

A sample evaluation follows. To store spent fuel in spent fuel pools, due to recent enhanced security requirements, the operations and maintenance costs are approximately \$30 million/year. With all fuel moved into dry cask storage, the costs drop to approximately \$10 million/year for operations and maintenance. As an example, assuming Crystal River must offload 41 casks of spent nuclear fuel and high level waste, the casks (\$62 million) plus the ISFSI infrastructure (\$94 million), the enormous financial impact to the fund assets is \$156 million. If Crystal River believes all SNF will leave the site by 2036, the projected costs for wet vs. dry storage are as follows (assuming the plant has offloaded the spent fuel pool by 2020):

- Dry Storage – $\$156 \text{ M} + (16 \text{ years}) * (\$10 \text{ M/yr}) = \$316 \text{ million}$ for dry cask storage until DOE removes it from the site
- Wet Storage – $(16 \text{ years}) * (\$30 \text{ M/yr}) = \480 million for wet storage until DOE removes it from the site

To elaborate on this further, financial planning for decommissioning is strongly impacted by the estimate of when the Department of Energy (DOE) is likely to completely remove (more important to the equation than when DOE starts) SNF and greater-than-Class C waste from a licensee's site. As a result, licensees constantly review the funding status against the existing liabilities. I will use Zion Station for this example.

Zion Station SNF remained in wet storage for 12 years after the station's retirement in 1998. The original decision to leave it in wet storage was based upon assessments at the time, that the DOE would completely remove SNF from the Zion site by no later than 2022. In this lowest cost decommissioning scenario, Exelon would begin decommissioning in 2014, utilizing less trust fund assets maintaining the fuel in wet storage until the DOE removed all SNF from the site by 2022, which would be less costly than moving SNF into dry storage, maintaining dry storage until 2022, and completing decommissioning after the DOE completed its mission.

In 2004, Exelon concluded that DOE would not be able to meet the 2022 date, and SNF would remain on site beyond 2030. In 2006, Exelon made the business decision to pursue moving SNF into dry cask storage, coupled with the negotiation of a license transfer to ES, to immediately dismantle the plant. During the project evaluations, I spent much of my time determining whether or not, a substantive withdrawal from the trust funds early in the process would still allow ES to complete the work with the remaining trust fund assets. In fact, Exelon was ready to complete the ES transaction in 2008, but decided against doing so, as the financial markets had reduced trust fund

assets to the point that I was no longer able to demonstrate with reasonable assurance, that funds would be available to complete decommissioning. Only after improvement in the financial markets by late 2010 was I able to demonstrate to Exelon executive management sufficient assets would remain after the dry storage campaign, for decommissioning to be completed safely. In this instance, Exelon concluded that moving SNF into dry storage, immediate dismantlement and storage on site of SNF in dry storage until the DOE removed the last assembly, was the lowest cost scenario for long-term management of SNF at Zion.

Regarding the desire to pursue a SAFSTOR decommissioning scenario, it is instructive to look at radiation worker dose impacts. Most of the radiation dose to workers transferring spent fuel into dry storage results from the activities to vacuum dry and weld canister-based dry cask storage systems. The dose impact for these activities is highest five years after shutdown (approximately the earliest spent fuel is moved to dry cask storage), and they will only fall slowly over the five to 60 year period after shutdown. From a radiation worker dose perspective, waiting to move fuel into dry cask storage is not a significant driver.

However, the decommissioning of plant systems and components is markedly different. The majority of radioactive contamination in plant systems and components post shutdown is roughly split between Co-60 and Cs-137. While Cs-137, with its approximately 30-year half-life, will decay by roughly a factor of four between shutdown and 60 years, Co-60 with its 5.27 year half-life will be found only in small increments 60 years out. Assuming that Co-60 and Cs-137 have the same contamination levels per square centimeter at retirement (a reasonable estimate), the decay of these two gamma emitters (Co-60 virtually to nothing, and Cs-137 to 25% of what it was to start out with) will result in a substantial reduction (75%) of worker dose during the decommissioning process 60 years down the road. This number could be even smaller if Cs-137 levels are less than Co-60 levels. The original NRC decommissioning studies touted the benefits of waiting 60 years due to the dose reductions to workers from the decay of Co-60.

As I understood Mr. Dan Stoddard's presentation, Kewaunee has decided to accelerate dry cask storage, and move all SNF from the spent fuel pool by 2016. While I cannot speak for Dominion, based upon my knowledge of financial analyses associated with managing SNF, I understand and agree with Dominion's decision to accelerate dry cask storage. Given continuing improvements in decommissioning trust fund assets over the past two years and continuing stories of DOE performance delay, Kewaunee would easily have concluded that sufficient funding was now available to bring forward in time, the large expenses of moving SNF into dry cask storage (from 2020 to 2016). Kewaunee would have then concluded that after 2016, sufficient time remained in its regulatory 60-year window for SAFSTOR, for trust fund assets to grow such that sufficient funding would remain to safely complete the decommissioning process.

Mr. Stoddard opined that Kewaunee's approach was less cost – and that is true when the problem is fully understood. It is not possible to categorically state that dry cask storage up front upon shutdown is always the lesser cost scenario; one needs to look beyond the near-term savings (health, security and cost) before such a position should be advocated. In Kewaunee's situation, the decision to move as soon as practicable appears prudent. While both wet and dry storage of SNF provide reasonable assurance of public health and safety, for Kewaunee, the health of the decommissioning trust fund assets and Dominion's responsibility as good stewards of these assets, drive the decision.