Docket Optical System - Comment for docket No. 11-IEP-1J

From: Robert Alvarez <kitbob@erols.com>
To: <docket@energy.state.ca.us>
Date: 8/1/2011 8:39 AM
Subject: Comment for docket No. 11-IEP-1J
CC: Rochelle Becker <beckers@thegrid.net>
Attachments: 1021049Supco EPRI.pdf

Greetings:

Here are my comments for your consideration. I've also attached the following studies that are relevant to my comments including:

- A report I authored in May 24th regarding the hazards of spent power reactor spent fuel storage in the United States and what should be done to reduce these dangers. http://www.ips-dc.org/reports/spent_nuclear_fuel_pools_in_the_us_reducing_the_deadly_risks_of_storage
- A study my colleagues and I published in 2003 in the peer-review journal Science and Global Security at Princeton University about the hazards of spent power reactor spent fuel pool storage and how these risks can be reduced. http://www.irss-usa.org/pages/documents/11_1Alvarez.pdf
- A report by the National Research Council of the National Academy of Sciences issued in 2004, which was requested by the U.S. Congress in response to our 2003 study The NRC/NAS report confirmed our basic findings. http://www.nap.edu/catalog.php?record_id=11263#toc
- A report authored for the Electric Power Research Institute (EPIRI) by regarding the impacts of placing spent power reactor fuel older than five years into dry cask storage.The EPRI report, prepared as a critique of our 2003 study, indicates that the costs of our recommendation to end the practice of high-density spent fuel pool storage and to place spent fuel older than five years in dry, hardened storage casks is approximately $3.5 billion -- less by a factor of two than our high estimate. It was recently removed from the internet, so I've attached a copy.

Comments of Robert Alvarez
Senior Scholar,
Institute for Policy Studies
Before the California Energy Commission
Regarding the Future of Nuclear Power
June 29, 2011

U.S. reactors have generated about 65,000 metric tons of spent fuel, of which 75 percent is stored in pools, according to Nuclear Energy Institute data. Spent fuel rods give off about 1 million rems (10,00Sv) of radiation per hour at a distance of one foot — enough radiation to kill people in a matter of seconds. There are more than 30 million such rods in U.S. spent fuel pools. No other nation has generated this much radioactivity from either nuclear power or nuclear weapons production.

Nearly 40 percent of the radioactivity in U.S. spent fuel is cesium-137 (4.5 billion curies) — roughly 20 times more than released from all atmospheric nuclear weapons tests. U.S. spent pools hold about 15-30 times more cesium-137 than the Chernobyl accident released. For instance, the pool at the Vermont Yankee reactor, a BWR Mark I, currently holds nearly three times the amount of spent fuel stored at Dai-Ichi's crippled Unit 4 reactor. The Vermont Yankee reactor also holds about seven percent more

radioactivity than the combined total in the pools at the four troubled reactors at the Fukushima site. Even though they contain some of the largest concentrations of radioactivity on the planet, U.S. spent nuclear fuel pools are mostly contained in ordinary industrial structures designed to merely protect them against the elements. Some are made from materials commonly used to house big-box stores and car dealerships.

The United States has 31 boiling water reactors (BWR) with pools elevated several stories above ground, similar to those at the Fukushima Dai-Ichi station. As in Japan, all spent fuel pools at nuclear power plants do *not* have steel-lined, concrete barriers that cover reactor vessels to prevent the escape of radioactivity. They are *not* required to have back-up generators to keep used fuel rods cool, if offsite power is lost. The 69 Pressurized Water (PWR) reactors operating in the U.S. do *not* have elevated pools, and also lack proper containment and several have large cavities beneath them which could exacerbate leakage.

For nearly 30 years, Nuclear Regulatory Commission (NRC) waste-storage requirements have remained contingent on the opening of a permanent waste repository that has yet to materialize. Now that the Obama administration has cancelled plans to build a permanent, deep disposal site at Yucca Mountain in Nevada, spent fuel at the nation's 104 nuclear reactors will continue to accumulate and are likely remain onsite or decades to come.

According to Energy Department data:

• The spent fuel stored at 28 reactor sites have between 200-450 million curies of long-lived radioactivity;

• 19 reactor sites have generated between 100-200 million curies in spent fuel; and,

• 24 reactor sites have generated about 10-100 million curies.

Over the past 30 years, there have been at least 66 incidents at U.S. reactors in which there was a significant loss of spent fuel water. Ten have occurred since the September 11 terrorist attacks, after which the government pledged that it would reinforce nuclear safety measures. Over several decades, significant corrosion has occurred of the barriers that prevent a nuclear chain reaction in a spent fuel pool — some to the point where they can no longer be credited with preventing a nuclear chain reaction. For example, in June 2010, the NRC fined Florida Power and Light $70,000 for failing to report that it had been exceeding its spent fuel pool criticality safety margin for five years at the Turkey Point reactor near Miami. Because of NRC's dependency on the industry self-reporting problems, it failed to find out that there was extensive deterioration of neutron absorbers in the Turkey Point pools and lengthy delays in having them replaced.

There are other strains being placed on crowded spent fuel pools. Systems required to keep pools cool and clean are being overtaxed, as reactor operators generate hotter, more radioactive, and more reactive spent rods. Reactor operators have increased the level of uranium-235, a key fissionable material in nuclear fuel to allow for longer operating periods. This, in turn, can cause the cladding, the protective envelope around a spent fuel rod, to thin and become brittle. It also builds higher pressure from hydrogen and other radioactive gases within the cladding, all of which adds to the risk of failure. The cladding is less than one millimeter thick (thinner than a credit card) and is one of the most important barriers preventing the escape of radioactive materials.

The April 26, 1986 nuclear catastrophe at Chernobyl in Ukraine illustrated the damage cesium-137 can wreak. Nearly 200,000 residents from 187 settlements were permanently evacuated because of contamination by cesium-137. The total area of this radiation-control zone is huge. At more than 6,000 square miles, it is equal to about two-thirds the area of the State of New Jersey. During the following decade, the population of this area declined by almost half because of migration to areas of lower contamination.

I co-authored a report in 2003 that explained how a spent fuel pool fire in the United States could render an area uninhabitable that would be as much as 60 times larger than that created by the Chernobyl accident. If this were to happen at one of the Indian Point nuclear reactors located 25 miles from New York City, it could result in as many as 5,600 cancer deaths and $461 billion in damages.

The U.S. government should promptly take steps to reduce these risks by placing all spent nuclear fuel older than five years in dry, hardened storage casks — something Germany did 25 years ago. It would take about 10 years at a cost between $3.5 and $7 billion to accomplish. If the cost were transferred to energy consumers, the expenditure would result in a marginal increase of less than 0.4 cents per kilowatt hour for consumers of nuclear-generated electricity.

Another payment option is available for securing spent nuclear fuel. Money could be allocated from $18.1 billion in unexpended funds already collected from consumers of nuclear-generated electricity under the Nuclear Waste Policy Act to establish a disposal site for high-level radioactive wastes.

After more than 50 years, the quest for permanent nuclear waste disposal remains illusory. One thing, however, is clear, whether we like
it or not: the largest concentrations of radioactivity on the planet will remain in storage at U.S. reactor sites for the indefinite future. In protecting America from nuclear catastrophe, safely securing the spent fuel by eliminating highly radioactive, crowded pools should
be a public safety priority of the highest degree. With a price tag of as much as $7 billion, the cost of fixing America’s nuclear vulnerabilities may sound high, especially given the heated budget debate occurring in Washington. But the price of doing too little is incalculable.