



Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

Statement by David Lochbaum, Director – Nuclear Safety Project
Before the US Senate Energy and Water Development Appropriations Subcommittee
March 30, 2011

Among the many challenges workers faced at the Fukushima Dai-Ichi nuclear plant in Japan was the need to provide cooling for the irradiated fuel in seven onsite spent fuel pools.

Irradiated fuel is curious material. When inside the core of an operating reactor, irradiated fuel is so hazardous that the plant has a myriad of emergency systems whose sole purpose is to prevent that fuel from being damaged by overheating. Some of these emergency systems feature motor-driven pumps while others use steam-driven pumps. These emergency core cooling systems can be powered by the electrical grid, onsite emergency diesel generators or, in some cases, onsite batteries.

The diversity and redundancy of emergency cooling systems provides high, but not absolute, assurance that the irradiated fuel will be adequately cooled. However, in case the highly reliable core cooling systems fail, the irradiated fuel in the reactor core is completely encased within a containment building with reinforced concrete walls that are four to five feet thick. This structure provides additional assurance that the public is protected from the hazardous radioactivity in the irradiated fuel. Should both the highly reliable emergency core cooling systems and the robust containment barriers fail, there are still emergency response plans in which local, state, and federal authorities would shelter or evacuate the surrounding population.

After being discharged from the reactor core, the irradiated fuel awaits transfer to a federal repository, which does not yet exist. The United States has spent more than ten billion dollars on a proposed repository at Yucca Mountain in Nevada. The Department of Energy faces an immense engineering challenge siting a repository because that location must isolate irradiated fuel from the environment and inadvertent human intrusion for at least 10,000 years into the future, or merely 42 times longer than we have been the United States of America.

Between those two time periods—when irradiated fuel is treated as a highly hazardous material and nuclear plant owners and the U.S. government undertake expensive and extensive efforts to protect the American public from this material—irradiated fuel sits in temporary spent fuel pools with almost no protection. For unfathomable reasons, irradiated fuel is considered benign after it is taken out of the reactor core and before it is placed in a repository.

Today, tens of thousands of tons of irradiated fuel sits in spent fuel pools across America. At many sites, there is nearly ten times as much irradiated fuel in the spent fuel pools as in the reactor cores. The spent fuel pools are not cooled by an array of highly reliable emergency cooling systems capable of being powered from the grid, diesel generators, or batteries. Instead, the pools are cooled by one regular system sometimes backed up by an alternate makeup system.

The spent fuel pools are not housed within robust concrete containment structures designed to protect the public from the radioactivity released from damaged irradiated fuel. Instead, the pools are often housed in buildings with sheet metal siding like that in a Sears storage shed. I have nothing against the quality or utility of Sears' storage sheds, but they are not suitable for nuclear waste storage.

The irrefutable bottom line is that we have utterly failed to properly manage the risk from irradiated fuel stored at our nation's nuclear power plants. We can and must do better.

There are two readily available measures to better manage this risk: (1) accelerate the transfer of spent fuel from spent fuel pools to dry cask storage, and (2) upgrade the emergency procedures and the operator training for spent fuel pool accidents.

Currently, the spent fuel management strategy of U.S. reactor owners is to nearly fill the spent fuel pools to capacity and then to transfer fuel into dry cask storage to provide space for the new fuel discharged from the reactor core. This keeps the spent fuel pools nearly filled with irradiated fuel, thus maintaining the risk at about as high a level as possible. Added to that risk is the risk from the dry casks stored onsite, which is less than that from the spent fuel pools but not zero.

A better strategy would be to reduce the inventory of irradiated fuel in the pools to the minimum amount, which would be only the fuel discharged from the reactor core within the past five years. Reducing the spent fuel stored in the pools would lower the risk in two ways. First, less irradiated fuel in the pools would generate a lower heat load. If cooling of the spent fuel pool was interrupted or water inventory was lost from the pool, the lower heat load would give workers more time to recover cooling and/or water inventory before overheating caused fuel damage. And second, if irradiated fuel in a spent fuel pool did become damaged, the amount of radioactivity released from the smaller amount of spent fuel would be significantly less than that released from a nearly full pool. Reducing the amount of irradiated fuel in spent fuel pools would significantly reduce the safety and security risks from a nuclear power plant.

Following the 1979 accident at Three Mile Island, reactor owners significantly upgraded emergency procedures and operator training. Prior to that accident, procedures and training relied on the operators quickly and correctly diagnosing what had happened and taking steps to mitigate the consequences. If the operators mis-diagnosed the accident they faced, the guidelines could lead them to take the wrong steps for the actual accident in progress. The revamped emergency procedures and training would guide the operators' response to an abnormally high pressure or an unusually low water level without undue regard for what caused the abnormalities. The revamped emergency procedures and training represent significant improvements over the pre-TMI days. But they apply only to reactor core accidents. No comparable procedures and training would help the operators respond to a spent fuel pool accident. It is imperative that comparable emergency procedures and training be provided for spent fuel pool accidents to supplement the significant gains in addressing reactor core accidents that were made following the TMI accident.

The Nuclear Regulatory Commission has announced a two-phase response plan to Fukushima: a 90-day quick look followed by a more in-depth review. If the past three decades have demonstrated anything, it's that the NRC will likely come up with a solid action plan to address problems revealed at Fukushima, but will be glacially slow in implementing those identified safety upgrades. A comprehensive action plan does little to protect Americans until its goals are achieved. We urge the US Congress to force the NRC to not merely chart a course to a safer place, but actually reach that destination as soon as possible. The first stop along the way should be improved safety for spent fuel.