Savannah River Site
Citizens Advisory Board

Recommendation 325
Functional Definition of Spent and Used Nuclear Fuel

Background

By the early 1940s, physicists were conducting advanced atomic research in all the major universities and institutes of the free world, where they sought to describe, understand, explain and control the behavior of the atom by splitting it and controlling a fission energy chain reaction. Scientists who had been eligible to remain in Germany were conducting similar work. Understanding the dangerous implications of their work, and given the political climate of Germany and fear of a German atomic bomb, some of the scientists who had escaped to the free world banded together. In doing so they consolidated a plan to seek out a democratic government and explain the terrible secret behind the veil of their work. In 1939, the secret was taken to the American President, Franklin D. Roosevelt.

The secret was revealed in three documents from leading scientists who had made their way to America. The documents were combined in a dossier that set in motion the machinery which first produced atomic weaponry. Dr. Alexander Sachs, the renowned economist, delivered the dossier to President Roosevelt on October 11, 1939.

Einstein's letter advised President Roosevelt that the physicists' research had resulted in the possibility of setting up a nuclear chain reaction in a large mass of uranium, by which vast amounts of power and large quantities of new radium-like elements would be generated. The radium-like elements were radioactive and those documents spawned the Manhattan Project which produced the atomic bomb, lead to the nuclear arsenal buildup during the Cold War era, subsequent super bombs, and massive inventories of both defense and commercial nuclear waste. The Manhattan Project (1939-1946) was the forerunner of the Atomic Energy Commission (1946-1954).

The Atomic Energy Commission (AEC) made the development of commercial nuclear power possible for the first time through encouraging its use and regulating its safety without imposing requirements which would inhibit the nuclear industry growth. That industrial pass included the responsibility for developing technologies to dispose of the spent fuel resulting from nuclear energy production.

In time, the AEC's policies and practices resulted in considerable controversy. In a 1949 operation known as the "Green Run" the agency released iodine-131 and xenon-133 into the atmosphere from the Hanford, WA site. The release contaminated an area 500,000 acres in size and containing three small towns. An irreversible public image ensued which associates nuclear power with the development of nuclear weapons and such experiments.

As a result of increasing disapproval and distrust by the public, the AEC was later transformed into the U.S. Department of Energy (1977 to present). The Department of Energy

(DOE) has been left with the enormous task of cleaning up nuclear waste from the atomic and nuclear weapons production programs. DOE has also been tasked with providing a repository for both defense waste and the spent nuclear fuel produced from commercial nuclear reactors.

Until 2010, fuel assemblies removed from defense and commercial nuclear reactors were referred to as spent nuclear fuel. The term "spent fuel" implied that there was no further use, and this residual of energy production was waste.

In 2010 the Department of Energy issued a directive to use the term "used nuclear fuel" rather that "spent nuclear fuel", indicating that the residual material contained potential radioactivity which could be further utilized. The re-designation also implies the possibility of reprocessing.

Discussion

In the month of September, 2014, the SRS CAB was told that both terms, "spent nuclear fuel" and "used nuclear fuel", are the official designation to be used for referring to post-irradiated residual material that has been removed from nuclear reactors and placed in wet and/or dry storage. As indicated above, the two terms are functionally and mutually exclusive with the designation, "spent nuclear fuel" indicating that disposal can proceed without prospects of retrieval and the designation, "used nuclear fuel" indicating that the material can continue to serve a useful purpose and should therefore be stored in an environment with retrieval capability.

Recommendation

Given the mutually exclusive and functionally different designations currently used by varying DOE operations the SRS CAB recommends that DOE:

1. Provide a definition of Spent-Nuclear Fuel and Used Nuclear Fuel and indicate the context and usage of when each definition should be utilized.
2. Inform the Site-Specific Advisory Boards of the decision on utilization, as well as the official designation for post-irradiated residual material from defense and commercial reactors.
3. Publicize the plan for public consumption.