ABSTRACT

Transport and Storage Considerations for Used Fuel

Robert Grubb
Chief Operating Officer
Transnuclear, Inc. (AREVA Company)

Nuclear Power Plants find themselves in a situation where the original designed fuel pools at the nuclear reactor sites are being filled to capacity. There are a number of options available to manage the used fuel as the pools reach capacity. Among these options are continuing wet storage by adding higher density racks to the pool (re-racking), removing the used fuel from the pools and placing the fuel into dry storage at the site, removing the used fuel from the pool and transporting the used fuel to a central location for storage or even transporting the fuel directly from the pool for recycling at a recycling facility. A future scenario at some locations is to eventually dispose of the used fuel.

Each of the fuel management options presented comes with some level of complexity and challenges. The challenges associated with these used fuel management options can be grouped into three areas:

1. Transport now
2. Storage
3. Transport later

The used fuel in Storage can be further sub-grouped into Wet Storage and Dry Storage with Dry Storage further divided as “short to intermediate duration” and “extended duration”.

The numerous challenges associated with management of used fuel require a broad range of technical, regulatory, social and political considerations. In general, these considerations are reasonably well known for the short term and can be subjected to current design, analysis, decision making, licensing and risk control measures. This fact makes the challenges associated with a near term Transport or Dual Purpose Cask/canister system manageable. This is termed as “Transport Now” and “Storage”. However, as the duration of storage is lengthened, the challenges associated with eventual Transport of the stored fuel can be substantially complex. This is due to a number of factors that include items such as regulation differences between storage and transport, regulation evolution, evolution of knowledge and political or social considerations.

Risk management of the challenges associated with options selected for used fuel management can be achieved by minimizing the length of time in storage, upgrading dual purpose systems to current transport requirements if possible or practical and the use of separate over-packs for storage and transportation. It should be noted, that to the extent possible, providing flexibility and versatility in the initial design phase will help ensure that future risks are minimized.

The relatively short history with used fuel storage and transportation provides the industry with some basic information toward the future. Increases in knowledge and changes in security requirements will occur which has the potential to impact regulations. Additionally, political and social pressures also have the potential to modify the current regulations both locally and globally. Along with the changes in regulations, the evolution of analysis methods and analytical and computational capabilities will cause evolution of the rigor required for qualification of packages. All of the changes noted will have a significant impact on the economics of design, licensing, fabrication and operation of used fuel management systems. The economics may drive the industry toward a more risk based approach for the management of used fuel.