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AREVA



MarcoPolo

the New PWR Fuel Assembly Package

From AREVA

NRC Meeting – June 28, 2005

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- ▶ **Inform NRC of intent to design, test, and license a New PWR container**
- ▶ **Identify schedule of activities including submittal and requested approval dates to NRC**
- ▶ **Testing based on calculations and prior experience including calculations and tests of similar containers**
- ▶ **Identify future activities involving NRC**
 - ✦ **Meet with NRC to present the preliminary design/test plan review**
 - ✦ **New Pellet package in 2007**
 - ✦ **Amendment to the 51032-1 - LTA's for Palo Verde**
 - ✦ **Amendment to RAJ-II for resolution of non-safety related weld thickness for bottom lifting attachment**

- ▶ **Through Rulemaking, the NRC has set timelines on existing licensed fissile packages**
 - ✦ **Packages approved by NRC prior to September 6, 1983 and fabricated before August 31, 1986 [10CFR71.19a]**
 - **Model B (PWR) USA/6206/AF**
 - **51032-1 (PWR) USA/6581/AF**
 - ✦ **Packages approved by NRC after September 6, 1983 and fabricated before April 1, 1999 [10CFR71.19b]**
 - **51032-2 (PWR) USA/9252/AF**
- ▶ **Phase-out Model B and 51032-1 packages by October 1, 2008**

▶ **Key dates:**

- ✦ **Initial Meeting with NRC:** Jun. 2005
- ✦ **Concept Review with NRC/DGSNR:** Sep. 2005
- ✦ **Design Completion:** Dec. 2005
- ✦ **Test Plan Review with NRC/DGSNR:** Dec. 2005
- ✦ **License Package Testing:** Apr. 2006
- ✦ **SAR Submittal to NRC/DGSNR:** Aug. 2006
- ✦ **SAR Approval:** Aug. 2007

- ▶ **FANP must design, test, license and fabricate a new PWR package to replace the Model B and 51032-1 packages**
- ▶ **Consider AREVA global market needs**
- ▶ **Develop a suitable PWR container technology**
 - **Global design team and licensing effort (France, Germany, and US)**
 - **Accommodate variety of PWR designs including EPR and XL for Global use**
 - **Consider Type B [ERU] materials**

- ▶ **Licensing in both US (NRC) and France (DGSNR) by SAR submittal**
- ▶ **Design and test 14' fuel assembly package**
 - ◊ **14' fuel assembly package is the limiting case due to weight**
 - ◊ **License package designs for 14' and 12' fuel**
- ▶ **Two assemblies per container**

- ▶ **Testing in accordance with 10CFR71**
- ▶ **Testing planned to be performed at Oak Ridge**
- ▶ **Most damaging configuration(s) – considering thermal test, rod damage producing leak, and most reactive condition for criticality**
 - ✦ **Based on conceptual designs, criticality is the primary concern and confinement is the secondary concern**

- ▶ **Package testing based on calculations and similar analyses including prior testing experience**
 - ◊ **End drop – Select most vulnerable fuel type considering all designs (bottom appears to be most damaging as opposed to top)**
 - **Damage to fuel and package breach**
 - ◊ **Slap down – Most likely at 15 degrees**
 - **Package breach**
 - ◊ **Pin test – Most likely at 25 degrees**
 - **Damage to fuel and package breach**
- ▶ **Internal moderator is potential limiting condition for thermal test as opposed to fuel cladding failure**
 - ◊ **Thermal acceptance based on calculations or by testing based on container complexity**

▶ **Criticality considerations**

‣ **Selective or differential flooding**

• **Neutron Moderator and Absorber**

- 90% B¹⁰ credit – attenuation studies
- 90% H credit – package testing

• **MCNP and KENO VI**

- Validated in accordance with NRC requirements (NUREG/CR-6361)

▶ **Confinement considerations**

‣ **Leak test sensitivity based of A₂ values**

- ▶ **Project: MarcoPolo**
- ▶ **Container Model No: MAP-1 (14' active fuel lengths) and MAP-2 (12' active fuel lengths)**
- ▶ **A design to be licensed in both US (NRC) and France (DGSNR)**
- ▶ **Review test plan with both NRC and DGSNR when completed**
 - **Drop test orientations – determined by calculation with similarity to prior tests of other designs (long beam)**
- ▶ **FANP to keep both US (NRC) and France (DGSNR) informed of the project status through regular meetings, phone discussions, and electronic information exchange**