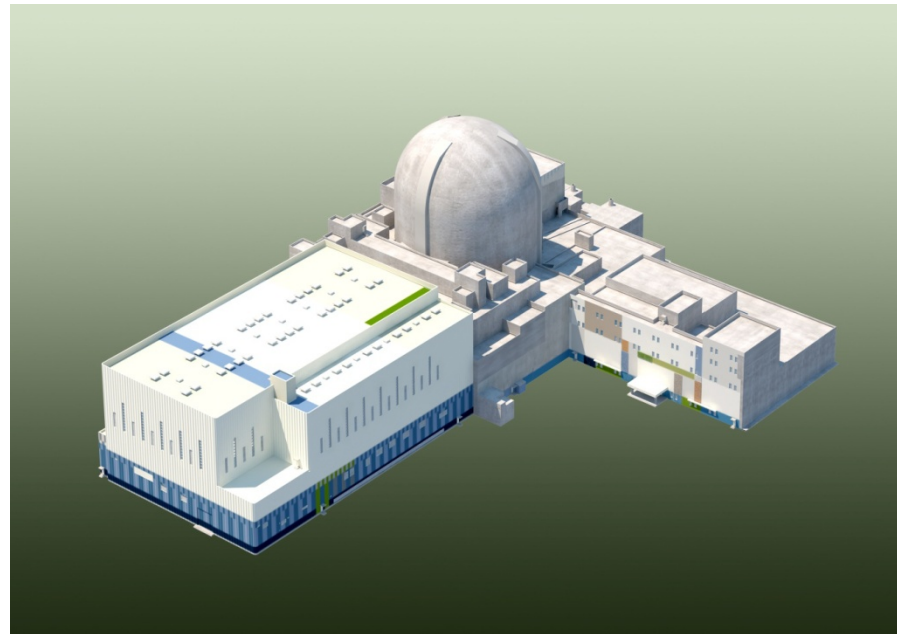


Boron Dilution During Inadvertent Dilution Events



KEPCO/KHNP

April 29, 2015

Public Meeting

Contents

- **Design Margin of the System**
- **Complete Mixing when all RCPs are Idle**
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1. Design Margin of the System

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- **Acceptance Criteria in SRP**
 - ✓ **Mode 1 ~ 5 : 15 minutes of operator action time**
 - ✓ **Mode 6 : 30 minutes of operator action time**
 - ✓ **But we applied 30 minutes of operator action time for all Modes**

- **BDAS setpoint**
 - ✓ **Calculated minimum setpoint of the BDAS is 2.67**
 - ✓ **We reduced 25% from this calculated value to accommodate a non-linear response of the ex-core detector (2.00)**
 - ✓ **Final setpoint of the BDAS is 1.80 to reserve the proper margin and compensate the impact due to the reload core design change**

2. Complete Mixing when all RCPs are Idle

2. Complete Mixing when all RCPs are Idle

- **Comparison of the LOFT experiment L6-6 with APR1400**
 - ✓ **This experimental conditions were similar to those experienced during a PWR refueling outage where the RCS is drained and the shutdown cooling system(SCS) is operating**
 - ✓ **During this experiment, the fluid velocity in the reactor core was approximately 0.066 ft/s (0.02 m/s) and this fluid velocity ensured that a well-mixed reactor vessel volume was achieved**
 - ✓ **Based on APR1400 Technical Specification Surveillance Requirement 3.9.4.1, the minimum SCS reactor coolant circulation flow rate is more than 4,800 gpm (18,170 L/min). This corresponds to a core velocity of 0.165 ft/s (0.05 m/s)**



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Conclusions

Conclusions

- **APR1400 has a enough design margin for an inadvertent boron dilution events**
- **Complete mixing assumption, when all RCPs are idle, is reasonable to apply during the shutdown cooling system operation**

Thank you for your attention.

Acronyms

- APR** – Advanced Power Reactor
- BDAS** – Boron Dilution Alarm System
- LOFT** – Loss of Fluid Test
- SCS** – Shutdown Cooling System