



NRC Advanced Non-LWR Licensing Experience

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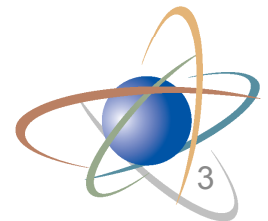
NRC Licensing Experience

- The NRC has undertaken licensing activities for non-light water reactors in the past
- This presentation covers the period beginning in the late 1980's to the present



NRC Licensing Experience

- Post Clinch River Breeder Reactor period included several advanced reactor designs
 - Sodium Advanced Fast Reactor LMR (3600 MWt)
 - GE-Hitachi PRISM Liquid Metal Reactor (LMR) (350 MWt)
 - Modular High Temperature Gas Reactor (HTGR) (471 MWt)
 - Process Inherent Ultimate Safety (PIUS) Pressurized Water Reactor (2000 MWt)
 - CANDU 3 Heavy Water Reactor (1378 MWt)



NRC Licensing Experience

- NRC staff conducted pre-application activities and provided feedback in the form of Pre-Application Safety Evaluation Reports structured to follow RG 1.70, Standard Format and Content of Safety Analysis Report for:
 - SAFR (NUREG-1369)
 - PRISM (NUREG-1368)
 - MHTGR (NUREG-1338)
- Generally no obvious impediments to licensing were identified.
- Areas where additional design, analysis, testing, and research and development was needed were noted in the Pre-Application Safety Evaluation Reports.
- NRC staff conducted pre-application activities and provided less formal feedback for CANDU 3, and PIUS.



NRC Licensing Experience

- Reviews Conducted As for Licensing
 - Hardware design and development
 - Experience data base
 - Experimental development activities
 - Design base testing data base
 - Independent analytical assessments
 - Identification of policy issues



NRC Licensing Experience

- In April 1993, NRC staff issued SECY-93-092, “Issues Pertaining to the Advanced Reactor (PRISM, MHTGR, and PIUS) and CANDU 3 Designs and Their Relationship to Current Regulatory Requirements.”
- Major Policy Issues Addressed
 - Accident Evaluation
 - Source Term
 - Containment Performance
 - Emergency Planning
 - Operator Staffing & Function
 - Residual Heat Removal
 - Positive Void Reactivity Coefficient



NRC Licensing Experience

- Containment Performance
 - Proposed use of a standard based on containment functional performance rather than prescriptive design criteria.
 - For 24 hours no greater than the limiting containment leak rate used to evaluate event categories and acceptable limits.



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- Operator Staffing and Function
 - Operator staffing may be design dependent and smaller crew size may be justifiable.
 - Adequacy shall be tested and demonstrated.



NRC Licensing Experience

- Positive Void Reactivity Coefficient
 - A positive void coefficient should not necessarily disqualify a reactor design.
 - Overall risk perspective should be taken into account.
 - Consider estimated probability of the accidents as well as severity of consequences.



NRC Licensing Experience

- Earlier pre-application efforts aided the NRC in more recent pre-application reviews:
 - Advanced CANDU Reactor 700 (700 MWe)
 - Designed out positive void coefficient
 - Pebble Bed Modular Reactor (HTGR) (120 MWe)
 - Closed cycle HTGR
 - Toshiba 4S LMR (10 MWe)
 - Similarities/differences with PRISM
 - Next Generation Nuclear Plant (NGNP)



NRC Licensing Experience

- Activities following the CRBR review have positioned NRC to move forward
 - Carryover of policy issues
 - Adaptability allowing NRC staff to consider changes in fundamental regulatory areas
 - Accident/event definition and determination
 - General Design Criteria

