

# **Session 63: Progress in Radwaste Systems for New Nuclear Power Plants**

2009 Waste Management Symposium

Phoenix, Arizona

Panel Co-Chairs:

Jay Maisler, ENERCON

Sean Bushart, Electric Power Research Institute

# Nuclear Power Renaissance

- Power Generation to Meet Energy Demand
  - Nuclear Plants Produce 20% of U.S. Electricity
  - DOE Estimates Annual Demand to Increase by 1.8% per Year Through 2030
  - Large Base Load Capacity Needed
    - Coal
    - Nuclear
- Energy Policy Act of 2005
  - Production Tax Credits
  - Loan Guarantees and Risk Protection
  - Extends Price-Anderson Act Insurance Framework
  - Nuclear Energy Research and Development

# Nuclear Power Renaissance

- WM '08:
  - 6 Applications Received
  - 1 Partial Application Received
- WM '09:
  - 17 Applications “Accepted”
- Calendar Year 2007 Applications
  - NRG Energy: South Texas Project, Texas – ABWR (2)
  - NuStart Energy: Bellefonte, Alabama – AP1000 (2)
  - UNISTAR: Calvert Cliffs, Maryland – EPR (1)
  - Dominion: North Anna – ESBWR (1)
  - Duke: William S. Lee III, South Carolina – AP1000 (2)

# Nuclear Power Renaissance

## ■ Calendar Year 2008 Applications

- Progress Energy: Harris, North Carolina – AP1000 (2)
- NuStart Energy: Grand Gulf, Mississippi – ESBWR (1) *[Review suspended by Applicant]*
- Southern Nuclear Operating Company: Vogtle, Georgia – AP1000 (2)
- Progress Energy: Levy County, Florida – AP1000 (2)
- Exelon: Victoria County, Texas – ESBWR (2) *[Review suspended by Applicant]*
- Detroit Edison: Fermi, Michigan – ESBWR (1)
- Luminant Power: Comanche Peak – USAPWR (2)
- Entergy: River Bend, Louisiana – ESBWR (1) *[Review suspended by Applicant]*
- AmerenUE: Callaway, Missouri – EPR (1)
- UNISTAR: Nine Mile Point, New York – EPR (1)
- PPL Generation: Bell Bend, Pennsylvania – EPR (1)

# Nuclear Power Renaissance

## ■ Beyond 2008

- Florida Power & Light: Turkey Point, Florida – AP1000 (2)\*
- Amarillo Power: Vicinity of Amarillo, Texas – EPR (2)\*
- Alternate Energy Holdings: Hammett, Idaho – EPR (1)\*
- Blue Castle Project: Utah – To Be Determined\*\*
- “Unannounced”\*\*

\* CY2009

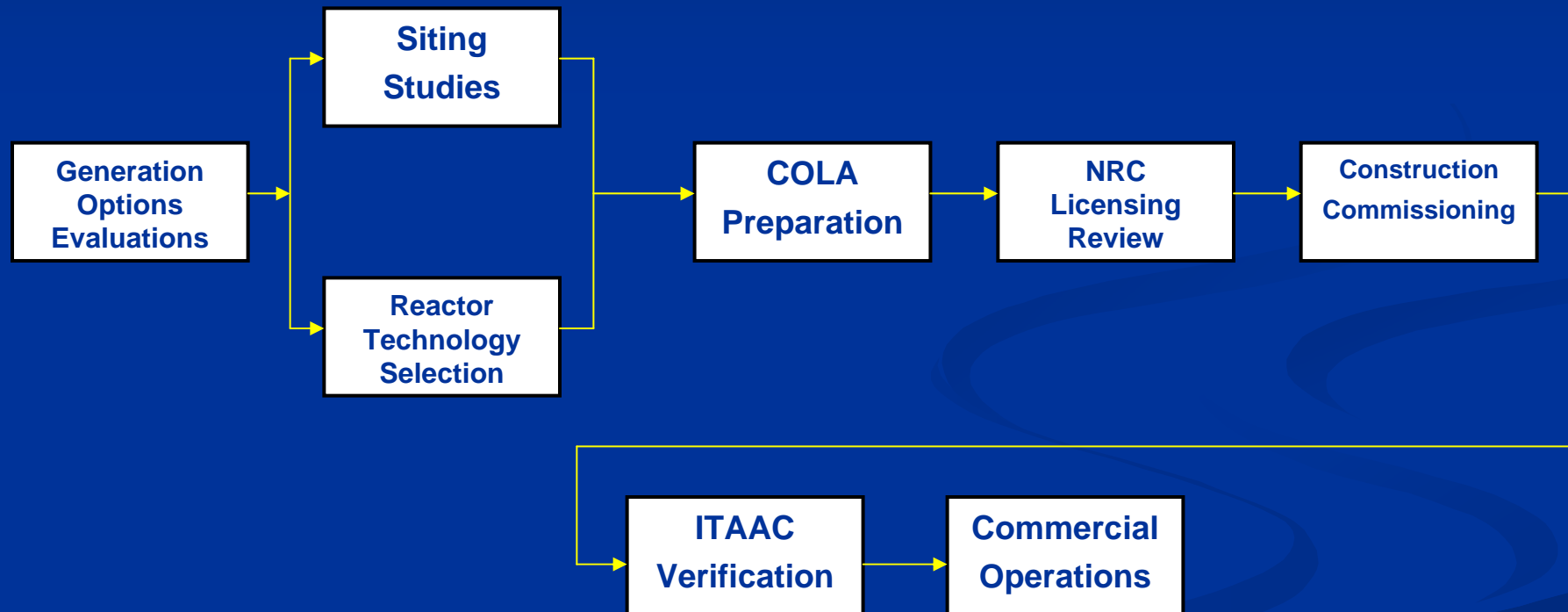
\*\* CY2010

# Licensing Nuclear Power Plants

- Current Fleet of Nuclear Plants
  - Most Were Licensed in the 1960s and 1970s
  - Two-Step Licensing Process
- New Licensing Process
  - Moves Licensing and Safety Issues to the Beginning of the Process
  - Benefits of Standardization

# New Plant Deployment Activities

## Overview



# Design Certification

- Provides Reactor Designers Advanced NRC Approval of Standard Plant Design
- Four Advanced-Plant Designs Certified
  - Advanced Boiling Water Reactor
  - Westinghouse AP1000
  - Westinghouse AP600
  - Combustion Engineering System 80
- Three Designs Under Review
  - General Electric ESBWR
  - AREVA U.S. EPR
  - Mitsubishi US-Advance Pressurized Water Reactor



# Radioactive Waste Systems

- Design Control Document (Tier 2, Chapter 11)
  - Source Terms
  - Liquid Waste Management System
  - Gaseous Waste Management System
  - Solid Waste Management System
  - Process Effluent Radiation Monitoring and Sampling Systems
- Final Safety Analysis Report (Chapter 11)
- Combined License Application Approach
  - NEI Templates for Process Control Program and Offsite Dose Calculation Manual

# NEI Templates

- NEI 07-09, Generic FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description
  - Fully describes functional level elements of the process and effluent monitoring and sampling programs required by 10 CFR 50 Appendix I and 10 CFR 52.79(a)(16)
  - COL applicants may reference the template as an alternative to providing the full programs for the ODCM and REMP at the time of application
  - NRC Safety Evaluation Report – “The NRC staff finds that for combined license (COL) applications, NEI 07-09, Revision 4, provides an acceptable template for assuring that the ODCM program meets applicable NRC regulations and guidance.”

# NEI Templates

- NEI 07-10, Generic FSAR Template Guidance for Process Control Program (PCP)
  - Addresses all aspects for nuclear plant PCP:
    - Administration
    - Approval process for suppliers
    - Requirements for vendor processes and services
    - Waste Types
    - Solidification process description
    - Dewatering process description
    - Acceptability
    - Waste classification, characterization, manifest
    - Quality Assurance

# Panel Discussion

- Sean Bushart, Electric Power Research Institute
  - Nuclear Industry Radioactive Waste Experience
- Jean-Claude Dehmel, U.S. Nuclear Regulatory Commission
  - Lead Reviewer, Radioactive Waste
- Brian McIntyre, AREVA
  - U.S. EPR