Preparing for the Next Generation Nuclear Power Plants

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Business Drivers to Enable New Construction

- Maintain safety of currently licensed plants
- Enhanced safety for future plants
- Independent and credible regulator
- Meaningful public participation
- Predictable licensing process
- Support national energy policy goals
Design Certifications

- NRC review and approval of a standardized design by rulemaking

- Already certified:
  - C-E System 80+
  - General Electric Advanced Boiling Water Reactor (ABWR)
  - Westinghouse AP600

- Certification Rulemaking in progress:
  - Westinghouse AP1000-FSER/FDA Completed September 2004
  - Proposed Rule sent to the Commission Spring 2005

- Pending certification reviews:
  - General Electric Economic and Simplified Boiling Water Reactor (ESBWR)
  - European Pressurized Reactor (EPR)
  - Pebble Bed Modular Reactor (PBMR)
Current and Potential Pre-application Reviews

ESBWR
- Decay Heat HX's Above Drywell
- High Elevation Gravity Drain Pools
- All Pipes/Valves Inside Containment
- Raised Suppression Pool

ACR-700
- Reactivity Mechanism Deck
- Shield Tank Extension
- Fukushima End Shield
- Seismic Restraints
- LISS Units and Ion Chambers
- Shield Tank End Wall
- CSTA Supports

ESBWR

ACR-700

Toshiba 4S

IRIS
- Reactor Coolant Pump (1 of 8)
- Steam Generator Steam Outlet Nozzle (1 of 8)
- Steeal Generator Feedwater Inlet Nozzle (1 of 8)

PBMR

EPR
- Double wall containment with ventilation and filtering systems
- Ultimate containment heat removal system
- Water tank inside containment
- 4-train redundancy of the main safety systems

Toshiba 4S

Nuclear power for rural villages
Toshiba is developing a small scale nuclear reactor to supply power for Galena, a Yukon River town of 733. It has yet to be constructed, but would likely consist of a 70-foot tall unit with a套装-can-sized uranium core at the bottom and a liquid metal heat exchanger in the upper section. The assembly would be housed in a concrete silo, and the slow burning uranium would last 30 years, powering steam turbines to create electricity.

Conceptual drawings of the plant are below.

Toshiba 4S

IRIS

PBMR

EPR
Early Site Permit (ESP)

- Allows early resolution of siting issues and ‘banking’ of a site for 10-20 years

- Review Areas
  - Site Safety
  - Emergency Preparedness
  - Environmental Protection
COL

- Combined construction permit and conditional operating license for a nuclear power plant
- COL is the fundamental licensing process in Part 52 for reducing regulatory risk for companies building nuclear power plants
- May reference an ESP, a standard design certification, both, or neither
- Objective is to resolve all safety & environmental issues before authorizing construction
- Prior to fuel load, must verify the facility has been constructed in accordance with COL (CIP-ITAAC)
ESP & COL Applications

- **ESP Applications Received**
  - September 2003 – Dominion (North Anna)
  - September 2003 – Exelon (Clinton)
  - October 2003 – Entergy (Grand Gulf)

- **Proposed ESP Applications**
  - 2006 – Southern Company
  - 2007 – Constellation

- **Proposed COL Applications**
  - Dominion
  - NuStart
  - Duke
  - Progress Energy
Current and Upcoming New Reactor Licensing Activities

Industry Requests

Actual schedules are established when an application is received.

Based on Letters, Industry Press

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NRC Management Challenges

- Keeping the focus on safety first
- Constant change in external environment
- Infrastructure Challenges
  - Knowledge base for non-LWRs
  - Research / Testing Infrastructure
  - Programmatic Infrastructure
- Personnel
  - Anticipated losses (need for knowledge transfer)
  - Critical Skills required (fungibility)
  - Hiring and Training strategies
Strategies

- Expand NRC staff capabilities
- Expand NRC contractor utilization
- Disciplined licensing approach
Role of the RTR Community

- Long-term industry staffing issues
- Near-term NRC need for trained nuclear engineers
- Long-term NRC generational change