

# Constructing New Nuclear Power Plants

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Jerry N. Wilson, New Reactor Section, DRIP

Mary Ann M. Ashley, Reactor Inspection Section, DIPM

# Agenda

- Construction History
- Plant Construction under 10 CFR Part 50
- New Plant Construction 10 CFR Part 52
- Summary

# Construction History

- Over 100 plants licensed using the construction permit/operating license process (10 CFR 50)
- Wide Range of Outcomes under this process
- NRC proposed AEA amendment to congress
- AEA amended in 1992

# Licensing Under 10 CFR Part 50

- Preliminary design at construction permit stage
- Construction rework because of design and regulatory changes
- Final safety decisions not made until plant is nearly complete
- Public participation challenging with two mandatory hearings

# Inspections Under 10 CFR Part 50

- Limited inspections during design
- Inspection orientation towards documentation and records review rather than on work-in-progress
- Inspections based on opportunity rather than defined prioritization

# Inspection Program Components

- **Inspection manual chapter (IMC)** – A statement of the scope and policy for different phases of the inspection program.
- **Inspection procedure (IP)** – A statement of the requirements and guidance for conducting inspection activities – implements the IMC.

# Goals for Licensing under Part 52

- Predictable licensing process
- Resolve safety and environmental issues before authorizing construction
- Reduce financial risk to licensees (COL)
- Encourage standardization of nuclear plant designs

# Goals for Inspection under Part 52

- Conform to the requirements of Part 52
- Target inspections to work-in-progress
- Predictable NRC response to issues identified during inspections

# 10 CFR Part 52

- Design Certifications
- Early Site Permits
- Combined Licenses
- Appendices M, N, O, & Q

# What is Design Certification?

- Allows an applicant to obtain pre-approval of a standard nuclear plant design
- Reduces licensing uncertainty by resolving design issues
- Facilitates standardization
- Higher degree of regulatory finality with design certification

# Design Certification Review

- Essentially complete design
- Final design information
- Site design parameters
- Interface requirements
- Inspections, Tests, Analyses, and Acceptance Criteria
- Severe Accident resolutions

# Areas Not Reviewed

- Site safety
- Environmental protection
- Operational programs
- Site-specific design features
- Selected design areas (DAC)

# Standard Design Certifications

- Advanced Boiling Water Reactor - GE Nuclear Energy Design Certification approved May 2, 1997
- System 80+ Standard Plant Design - Westinghouse Design Certification approved May 7, 1997
- AP600 Standard Plant Design - Westinghouse Design Certification approved December 16, 1999
- AP1000 Standard Plant Design - Westinghouse FSER/FDA-September 13, 2004, Rulemaking in progress

# What are Early Site Permits?

- Allows an applicant to “bank” a site
- 10-20 year duration
- Reduces licensing uncertainty by resolving site-related issues

# Early Site Permit Review

## ■ Site Safety Review

- ◆ Seismology
- ◆ Geology
- ◆ Hydrology
- ◆ Meteorology
- ◆ Geography
- ◆ Demography (population distribution)
- ◆ Site Hazards Evaluation

## ■ Emergency Preparedness Review

- ◆ Evaluate proposed emergency plan, or emergency preparedness information
- ◆ Evaluate physical impediments, population distribution, & transportation routes
- ◆ Federal Emergency Management Agency (FEMA)

# Early Site Permit Review

- Environmental Protection Review
  - ◆ Surface water quality, hydrology, & use
  - ◆ Aquatic ecology
  - ◆ Ground-water use & quality
  - ◆ Threatened or endangered species
  - ◆ Air quality
  - ◆ Land use
  - ◆ Uranium fuel cycle & waste management
  - ◆ Human health
  - ◆ Socioeconomics
  - ◆ Postulated accidents
  - ◆ Decommissioning
  - ◆ Environmental justice
  - ◆ Alternative sites

# Early Site Permit Inspections: IMC 2501

- **Purpose** – describe the scope of NRC inspection activities in support of the review and issuance of an early site permit
- **Inspection focus** – verification of the quality and accuracy of data collected and the analysis and evaluation of information used in support of the ESP application
- **Status** – issued May 2003, with 5 supporting inspection procedures, in use for ESP reviews

# What is a Combined License?

- Combined License (COL) = a combined construction permit and operating license with conditions for a nuclear power plant
- A COL is the fundamental licensing process in Part 52 for reducing the financial risks for electric companies building nuclear power plants
- COL can reference ESP, DCR, both, or neither
- 40 year duration

# Combined License Review

- Design, Environmental Protection, Site Safety, Qualifications, and Operational Programs
- ITAAC verifies conformance with applicable regulations
- SRP + SECY/SRM

# Pre-COL Inspections: IMC 2502

- **Purpose** – describe NRC inspection activities in support of the mandatory hearing before the ASLB and the Commission decision on issuing a combined license
- **Inspection focus** – verification of:
  - ◆ the quality and accuracy of data collection, analysis and evaluation used in the COL application;
  - ◆ first-of-a-kind engineering;
  - ◆ translation of design information into construction documents,
  - ◆ environmental protection
- **Status** – Manual Chapter and nine supporting inspection procedures to be issued June 2005

# ITAAC Inspections: IMC 2503

- **Purpose** – describe the scope of NRC inspection activities in support of Commission finding that all ITAAC are met [10 CFR 52.103(g)]
- **Inspection focus** – verification that fabrication and construction activities are being performed in accordance with NRC regulations and in a manner that will result in the ITAAC acceptance criteria being met
- **Status** – drafted, manual chapter expected to be issued in late 2005, inspection procedures to follow in 2006 and 2007

# Non-ITAAC Inspections: IMC 2504

- **Purpose** – describe the NRC inspection activities related to programs, including testing and transition to operation
- **Inspection focus** –
  - ◆ Pre-fuel load: implementation of programs to support operation and overall operational readiness
  - ◆ Post-fuel load: startup testing and transition to operation, transition to ROP
- **Status** – drafted, expected to be issued in late 2005, inspection procedures to follow in 2006 and 2007

# CIP Challenges

- **Adapting our inspection approach to aggressive construction schedules**
  - ◆ Location of construction activities
  - ◆ Timing of inspections to support ITAAC conclusions
  
- **Developing the necessary infrastructure to support Commission finding required by 10 CFR 52.103g**
  - ◆ Monitoring our progress in completing the inspection plan
  - ◆ Construction Inspection Program Information Management System (CIPIMS)
  - ◆ Sign-as-you-go (SAYGO)
  - ◆ Informed sampling
  
- **Knowing timing of key construction activities**
  - ◆ Documenting any relationships between activities and ITAAC
  - ◆ Use of Primavera scheduling tool

# CIP Challenges

- **Capturing the knowledge of experienced construction inspectors**
  - ◆ No current construction workforce
  - ◆ Strategic workforce planning only helps us to identify workers with a history in construction
- **Making progress but not getting too far ahead of anticipated need**
  - ◆ Program development
  - ◆ Staff development

# Work for 2006 and 2007

- **Define all processes needed to support CIPIMS development**
  - ◆ Link inspection findings and ITAAC-related work
  - ◆ Establish criteria for opening and closing items in inspection reports
  - ◆ Link families of activities to support sign-as-you-go (SAYGO)
  - ◆ Design process for final verification of ITAAC
- **With OE, develop an enforcement approach for construction and obtain Commission approval**
- **Develop IMC-0613 to guide documentation of inspection findings**
- **Complete development of inspection sampling methodology and integrate into overall inspection program**
- **Revise/develop inspection guidance to support specific reactor design**

# Summary

- New reactor licensing processes are ready
- Construction inspection program development is on schedule
- NRC is preparing for new applications