



## **Presentation to the Commission**

# **Combined License Application Review Vogtle Units 3 and 4**

**SER Panel 2**

September 27 – 28, 2011



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## **Chapter 3, Design of Structures, Systems, and Components (Continued)**

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# Seismic Design and Analysis

- **Issue:**
  - Vogtle site's Ground Motion Response Spectra (GMRS) exceed the AP1000 DCD Certified Seismic Design Response Spectra (CSDRS)
  - Applicant asked to perform site-specific analysis to demonstrate structures, systems and components (SSCs) will remain functional under design-basis demands
- **Resolution:**
  - Applicant:
    - Performed 3-D soil structure interaction (SSI) analysis for in-structure response (per AP1000 DCD)
    - Used NI 15 system for analysis of SSI

# Seismic Design and Analysis (cont'd)

- **Resolution:**
  - Staff:
    - Compared in-structure response spectra to the DCD at six (6) key locations
    - Performed comparisons which showed that:
      - Above 1 Hz, there were no exceedances
      - Below 1 Hz, minimal exceedance was in 0.55 Hz range
    - Found exceedances not to be safety significant because there are no SSCs with resonant frequencies in this range
    - Reviewed Vogtle's application of 4% damping instead of 5% damping in design of SSCs, and verified response appropriately accounted for stress and strain levels in the design
    - Confirmed Vogtle's validation of computer models used
    - Assured that concurrent changes to design and models of shield building were consistent with Vogtle model
    - Concluded design of SSCs is acceptable

# Limited Work Authorization for Foundation Base Slab (Basemat)

- **Issue:**
  - The applicant submitted LWA request, which includes rebar and embedded items (i.e., reinforced steel, piping in basemat, concrete placement, etc.) in the basemat.
- **Background**
  - Basemat design in accordance with ACI 349 (same as AP1000 DCD).
- **Resolution:**
  - Staff found that based on site-specific seismic demands and use of ACI 349, the basemat has significant strength, stiffness, and ductility.
  - As a part of the AP1000 standard design review, the staff found the detailed design of the foundation base slab and detailed construction to be acceptable.

# Squib Valves

- Squib valves used in AP1000 as follows:
  - Automatic Depressurization System to reduce reactor pressure to allow gravity-driven system to provide cooling water to reactor core
  - Passive Core Cooling System to provide reactor cooling water injection, natural recirculation from containment sump to reactor coolant system, and higher containment water level if necessary
- AP1000 DCD specifies use of ASME Standard QME-1-2007 for qualification of safety-related valves, which is accepted in Revision 3 to RG 1.100
- AP1000 DCD includes ITAAC to confirm design-basis capability of squib valves
- NRC staff is monitoring design and qualification process and development of surveillance provisions for Vogtle squib valves
- NRC staff plans to conduct inspections in support of ITAAC closure process for squib valves to be used at Vogtle Units 3 and 4
- NRC staff will review ASME OM Code improvements for new reactors (when completed) including squib valve surveillance requirements

# Squib Valves (cont'd)

- Consistent with SECY-05-0197 for COL operational programs, NRC staff reviewed description of the Vogtle IST program in COL application
- Vogtle FSAR requires that the squib valve IST program incorporate lessons learned from design and qualification process such that surveillance activities provide reasonable assurance of operational readiness of squib valves
- Based on 10 CFR 50.55a and Vogtle FSAR, NRC staff found reasonable assurance of operational readiness of squib valves to perform their safety functions
- Prior to startup, NRC staff will inspect the Vogtle IST program to confirm that squib valve surveillance activities incorporate lessons learned from design and qualification process



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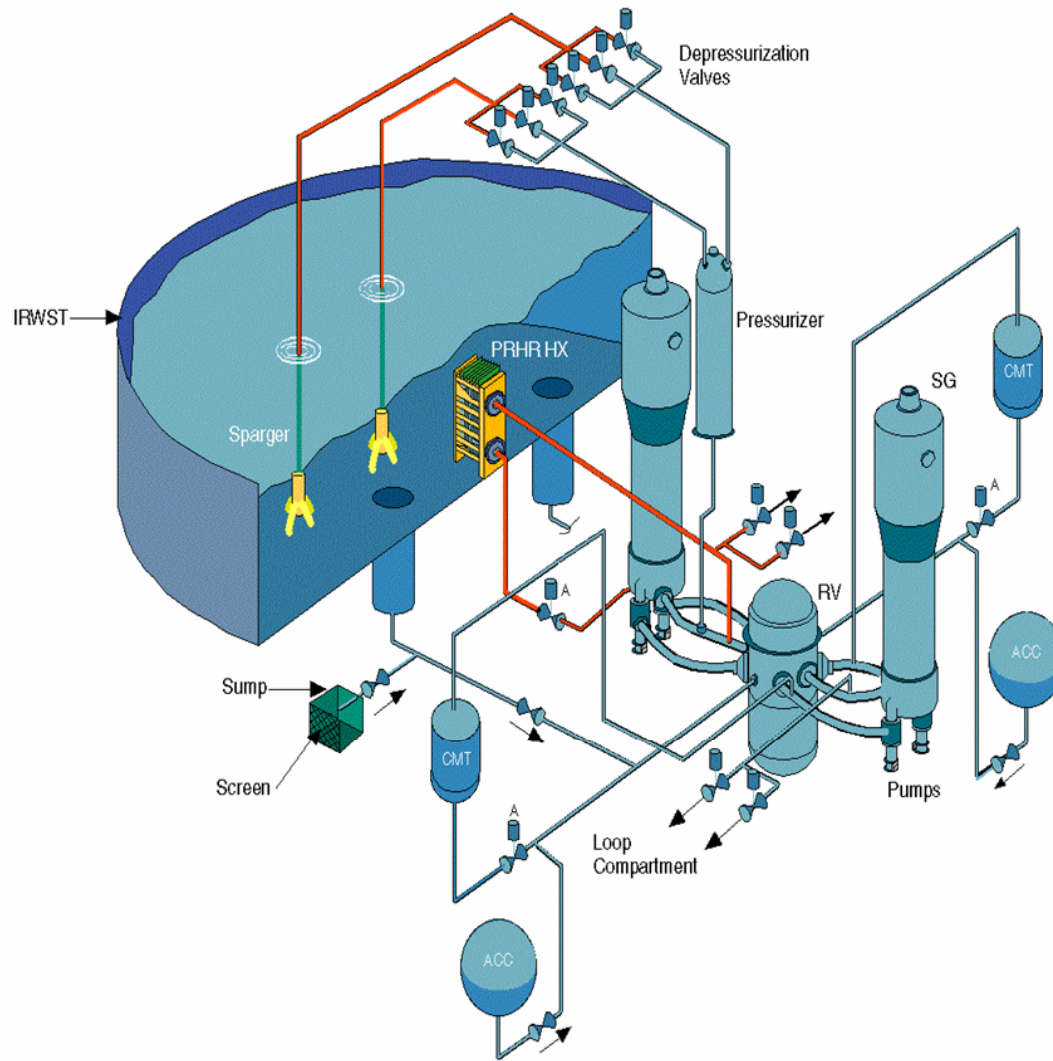
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## **Chapter 6, Engineered Safety Features**

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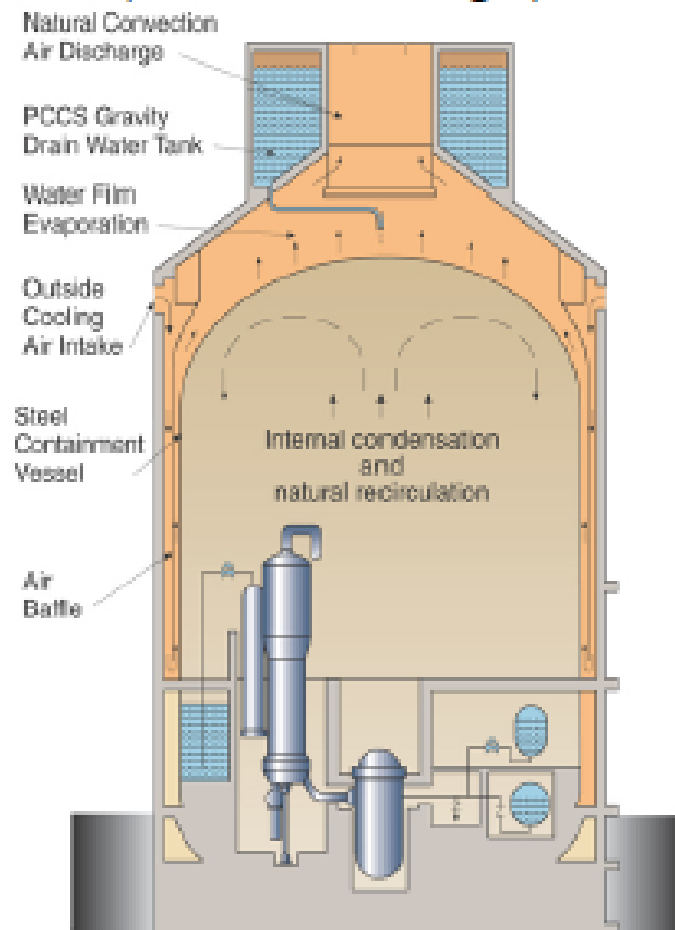


# Information Incorporated by Reference: Passive Core Cooling



# Information Incorporated by Reference: Passive Containment Cooling

## AP1000 (Passive Design)



# Information Incorporated by Reference: Containment Sumps and Pressure

- **Containment sump (GSI-191)**
  - AP1000 design attributes ensure very low debris source term
  - Key design attributes are verified through ITAAC
  - Strainer and fuel assembly head loss tests were performed to demonstrate adequate core cooling
  - Debris limits designated as Tier 2\* in AP1000 DCD
- **Containment Pressure Analysis**
  - Errors in existing Westinghouse analysis discovered after submittal of Rev. 18
  - Revised analyses submitted for staff review
  - Limited credit taken for gratings as heat sinks (Tier 2\*)

# Information Incorporated by Reference: Control Room Habitability

- **Control Room Habitability Design**
  - Design has an active non-safety ventilation system with two trains of fans, filters and chillers and requires ac power.
  - The safety-related passive system for control room habitability uses compressed air and an eductor-driven filter train to maintain a habitable environment.
  - DCD changes submitted to permit development of an achievable control room integrity program.
  - DCD changes reviewed and approved by staff.

# Chapter 6 of the Vogtle COL FSAR

- **Containment Cleanliness Program**

- Administrative procedures implement the containment cleanliness program
- Implementation of the program minimizes the amount of debris left in containment following personnel entry and exits
- Advisory Committee on Reactor Safeguards (ACRS) letter regarding the Vogtle COL included recommendation regarding containment debris limits
- As a result of ACRS letter, containment debris limits made Tier 2\* in the AP1000 Design Control Document

- **Toxic Gas Overview**

- Control room habitability reviewed to ensure toxic chemicals do not pose a threat to the operator's ability to control the plant

# Acronyms

ACI 349	– American Concrete Institute Code Requirements for Nuclear Safety-Related Concrete Structures & Commentary	RCOL	– Reference Combined License
ACRS	– Advisory Committee on Reactor Safeguards	RG	– Regulatory Guide
ASME	– American Society of Mechanical Engineers	SCOL	– Subsequent Combined License
COL	– Combined License	SER	– Safety Evaluation Report
DCD	– Design Control Document	SNC	– Southern Nuclear Operating Company
ESP	– Early Site Permit	SSC	– Structures, Systems, and Components
FSAR	– Final Safety Analysis Report	SSI	– Soil Structure Interaction
GSI-191	– Generic Safety Issue 191, “Assessment of Debris Accumulation on PWR Sump Performance”	VEGP	– Vogtle Electric Generating Plant
Hz	– unit of frequency defined as cycles per second	10 CFR	– Title 10 of the Code of Federal Regulations
IBR	– Incorporated by Reference		
IST	– in-service testing		
ITAAC	– Inspections, Tests, Analyses, and Acceptance Criteria		
LWA	– Limited Work Authorization		
QA	– Quality Assurance		