



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



United States Nuclear Regulatory Commission

Protecting People and the Environment

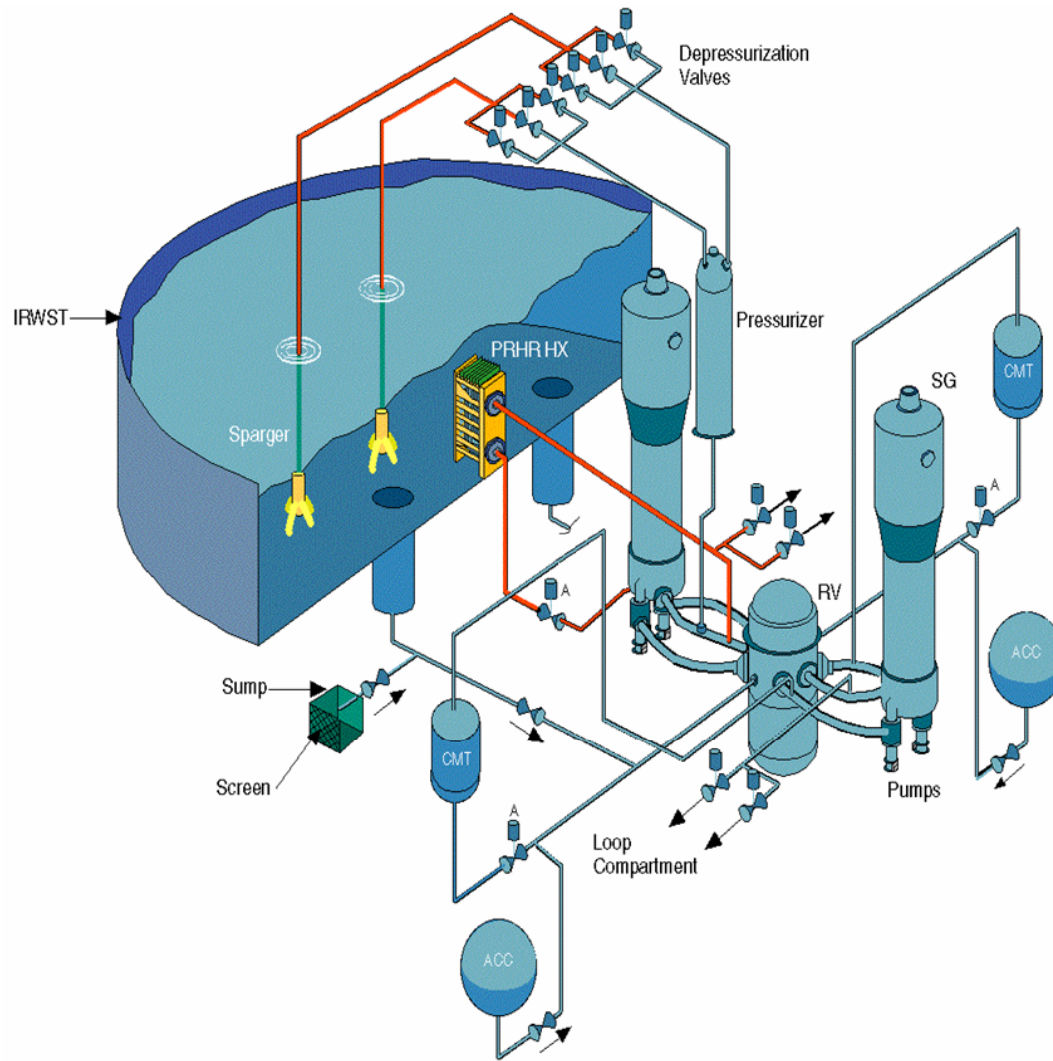
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Chapter 6, Engineered Safety Features

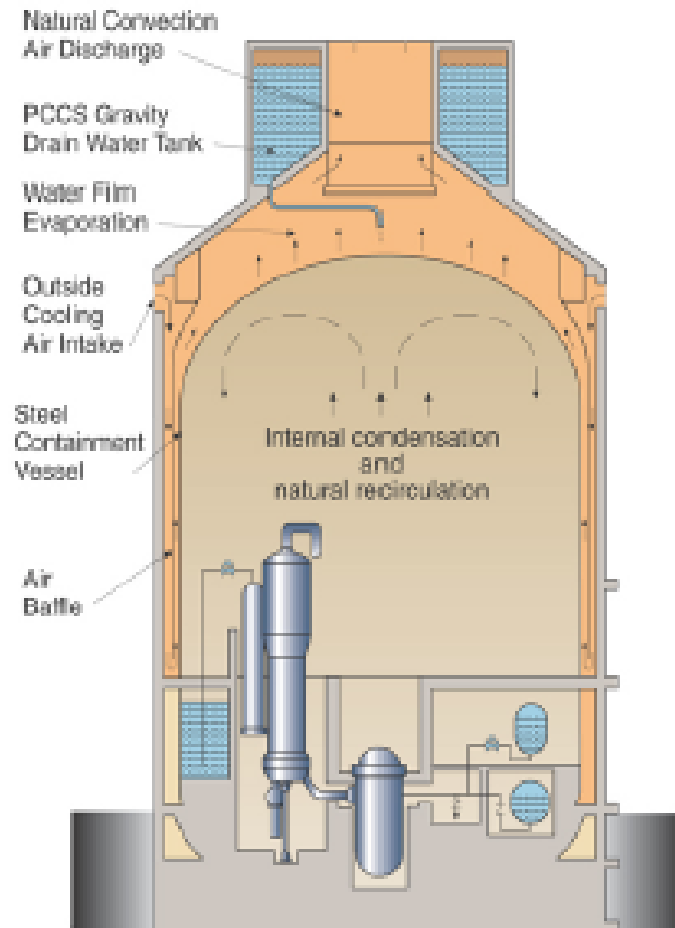
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Information Incorporated by Reference: Passive Core Cooling



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		