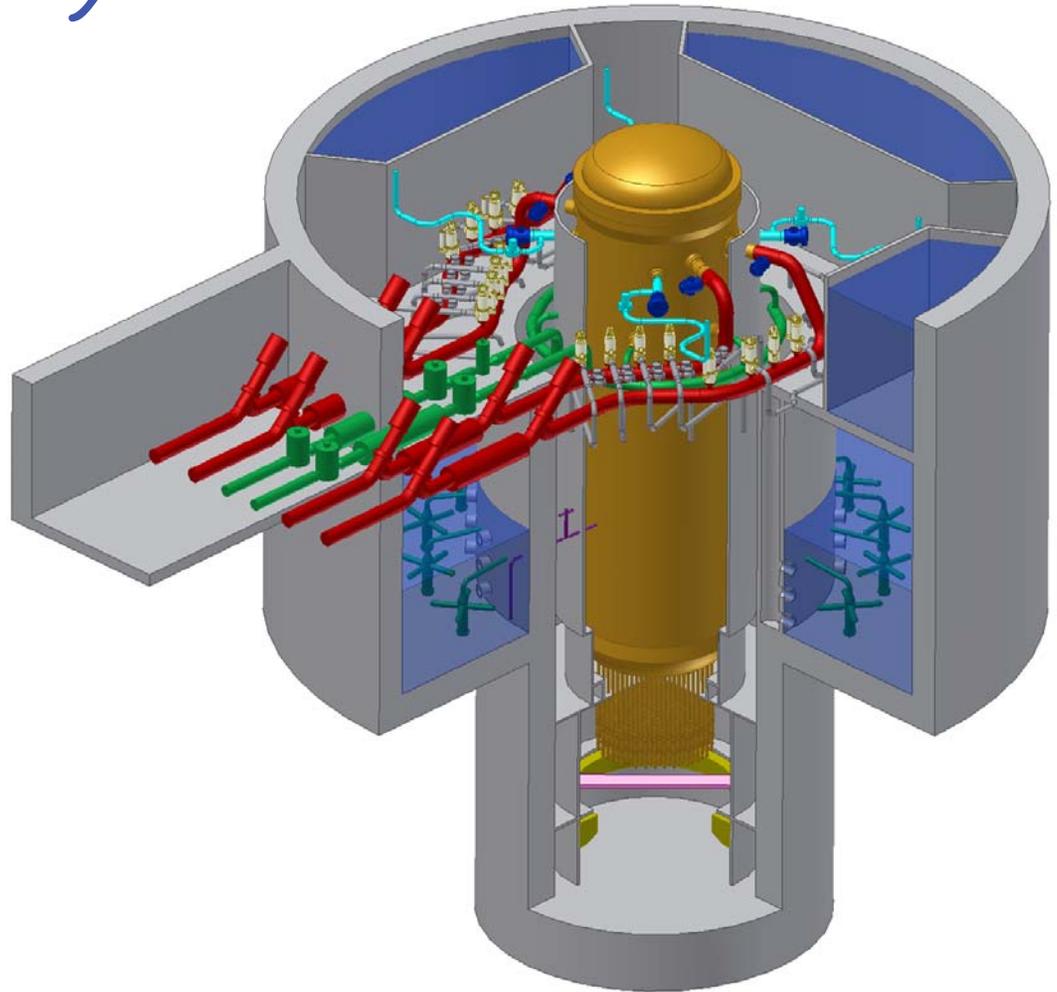


Regulatory Treatment Of Non-Safety Systems

Strategy for the
ESBWR Standard
Design



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GE Presentation Agenda

Overview of ESBWR RTNSS

- > Our understanding of the issue
- > Methodology for determining equipment set
- > Treatment

Integrated Plant Response

- > Station Blackout
- > Loss of Coolant Accidents
- > Anticipated Transient Without SCRAM

Current ESBWR Results

Q & A

GE Expectations For This Meeting

Confirmation of the GE Approach to RTNSS

General Agreement on Equipment Selection
Methods & Criteria

General Agreement on Treatment

Regulatory Treatment of Non-Safety Systems - Requirements -

Only Required for Passive LWR Designs

Regulatory Guidance Contained In:

- > SECY-94-084
- > SECY-95-132
- > Associated SRM's
- > Precedent

Deterministic Equipment Selection

Probabilistic Equipment Selection

Regulatory Treatment of Non-Safety Systems - Equipment Selection Requirements -

Functions Needed to Address ATWS (10 CFR 50.62)

Functions Needed to Address SBO (10 CFR 50.63)

Functions Needed for Post 72 Hour Safety

Functions Needed for Seismic Events

Functions Needed to Prevent Significant Adverse
Systems Interactions

Functions Needed to Meet the Probabilistic Safety Goals

ATWS Mitigation - 10 CFR 50.62

Functions Required:

(c)(3) Each boiling water reactor must have an alternate rod injection (ARI) system that is diverse (from the reactor trip system) from sensor output to the final actuation device

(c)(4) Each boiling water reactor must have a standby liquid control system (SLCS) with the capability of injecting into the reactor pressure vessel a borated water solution

ARI is Non-Safety in ESBWR

SLCS is Safety-Related in ESBWR

Success Using SLCS Requires Successful Feedwater Runback

ARI is RTNSS

Feedwater Controller is RTNSS

Station Blackout – 10 CFR 50.63

ESBWR Has a 72 Hour Coping Period
Nothing More Should Be Required

SECY-94-084

- > Diesels or offsite AC power connection can be RTNSS based on other RTNSS criteria

Seismic

Seismic Response Provided By Safety Related Components

- > Including seismic margins analysis

Only Issue is Post 72 Hour Safety Following Seismic Event

Long Term Safety

All Initiating Events Are Considered

Required Functions

- > Core Cooling
- > Decay Heat Removal
- > Post Accident Monitoring
- > Control Room Habitability

There Must Be A Strategy For All Contingencies

PRA Used to Determine Risk Significance

Long Term Safety - Phases

0 – 72 Hours	Safety Related, No Operators
3 – 7 Days	Resources Must Be On Site
7 + Days	Off Site Commodity Replacement

More Time Until Needed Results In Less Stringent Requirements

Repair Is OK If Backup Is Available (3 + Days)

All Required Functions Must Be Sustained

RTNSS Based On PRA Results

Systems Needed to Meet Safety Goals

- $CDF \leq 10^{-4}$
- $LRF \leq 10^{-6}$ (and containment performance goal)
- These may be risk significant systems
- Simple Technical Specification treatment

Systems Needed to Address Uncertainty

- These are not risk significant systems
- Maintenance Rule treatment

RTNSS Based on Initiating Events

Three Conditions Must Be Satisfied

- > Does non-safety system failure cause initiator?
- > Is that initiator risk significant?
 - Contributes approximately 10% to CDF
- > Can availability controls reduce initiator frequency?

RTNSS Based on Adverse Systems Interactions

Systematic Approach Used

Failure of Non-Safety Systems That Affect Safety Systems

Actuation of Non-Safety Systems That Affect Safety Systems

Detailed Design Expected to Eliminate All Interactions

Integrated Plant Response

Proposed RTNSS Functions

ARI and Feedwater Runback for ATWS

IC/PCC Pool Makeup Via Fire Water

- > Diesel pump for 3 – 7 days
- > External connection for 7 + Days

Parts of Diverse Protection System

Post Accident Monitoring

- > Detailed list in development
- > Based on RG 1.97

Additional RTNSS Functions to Address Uncertainty

BiMAC Device

Some Functions of FAPCS

Treatment - Background

DG-1145 Meetings

- > Risk significant SSCs
 - Tier 1 & 2 has same level of detail as safety-related
 - ITAAC
- > Non-Risk significant SSCs
 - Described in Tier 2
 - Listed in Tier 1

10 CFR 50.36, SECY-93-087, and Precedent (AP1000 FSER)

- > Risk significant SSCs need simple technical specifications
- > All others have TRM specifications
- > All RTNSS included in D-RAP

Commercial Grade QA

Treatment - Background

continued

Maintenance Rule Monitoring for Reliability & Availability

SECY-94-084

- > Important pipes, pumps and valves require ASME Section XI testing

AP1000 FSER

- > “Post 72 hour only” functions inherently not risk significant
- > Post 72 hour functions are
 - Seismic Cat II
 - Hurricane Cat 5
 - Flood Protected

Treatment – Proposed

Functions and Equipment Described in Tier 2

Functions and Equipment Listed in Tier 1

ITAAC for RTNSS Functions Consistent with Significance

Included in D-RAP and Maintenance Rule with Reliability and Availability Targets

Availability Controlled via TRM

QA Meets SRP 17.5.Y (Commercial Grade High Quality)

Post 72 Hour Capability Functions and Equipment:

- > ASCE/SEI 43-05 "Seismic Design Criteria for SSC's in Nuclear Facilities." SDB-5A
- > Withstand Hurricane Cat 5 Missiles
- > Protected from Floods

In Addition, Risk Significant Functions and Equipment:

- > Described in Tier I
- > Availability Controlled via Simple Technical Specifications