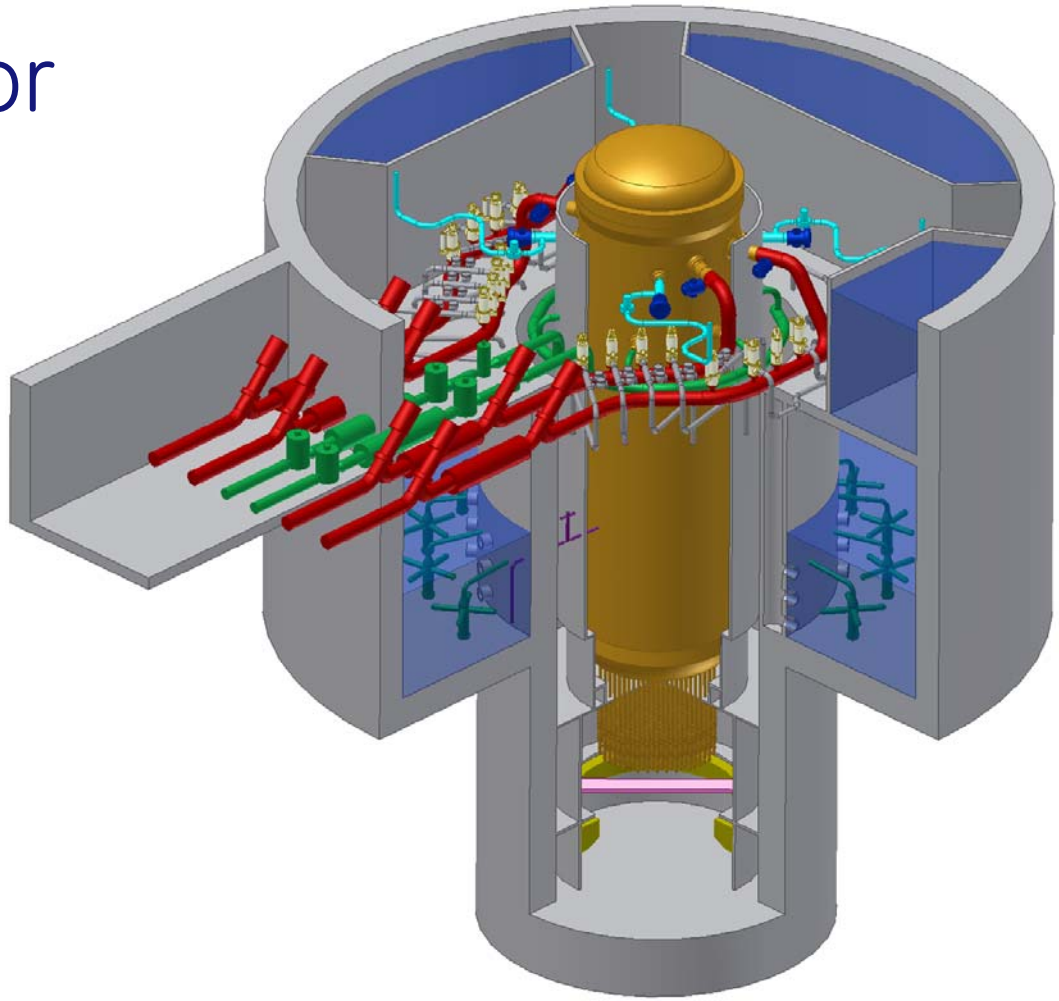
ESBWR

Tier 1 Requests for Additional Information



NRC Meeting
April 22, 2008

GE Hitachi Nuclear Energy

Introductions

James Kinsey, VP ESBWR Licensing

Richard Wachowiak, Tier 1 Engineering Lead

Patricia Campbell, VP Washington Reg. Affairs

George Honma, Tier 1 Regulatory Affairs Lead

Mike Herron, Sr. Software Engineer

Opening Remarks

- ESBWR Design Control Document, Rev. 4
  - Tier 1 upgrade to address lessons learned from NRC ITAAC Workshop, revised regulatory guidance, and previous certification reviews
- 10/18/2007 Meeting with NRC to discuss ESBWR Tier 1/ITAAC
  - Discussed enhancements and reformatting of Tier 1, specific examples, and lessons learned from ITAAC workshop
- 02/14/2008 Meeting with NRC to discuss ESBWR Tier 1/ITAAC
  - Discussed specific RAIs related to Tier 1/ITAAC
- To date, GEH has submitted ~200 Tier 1 RAI responses

Opening Remarks (cont)

- Today's meeting is to cover ~10 RAIs that need further clarification or discussion
- Discussion of changes to Tier 1 that may not relate to specific RAIs
- Discussion of Design Acceptance Criteria ITAAC

Specific RAIs

- Today's meeting is to cover ~10 RAIs that need further clarification or discussion

RAI Number 14.3-68

Validation of Local Core Flow Characteristics

- Flow testing cannot be performed until after fuel is in core
- Not appropriate for ITAAC
  - Testing conducted as typical BWR testing of core flow methods
  - Will be done as part of startup testing (see Tier 2, Section 14.2.8.2.7)

RAI Number 14.3-204

Relates to RAI 14.3-189

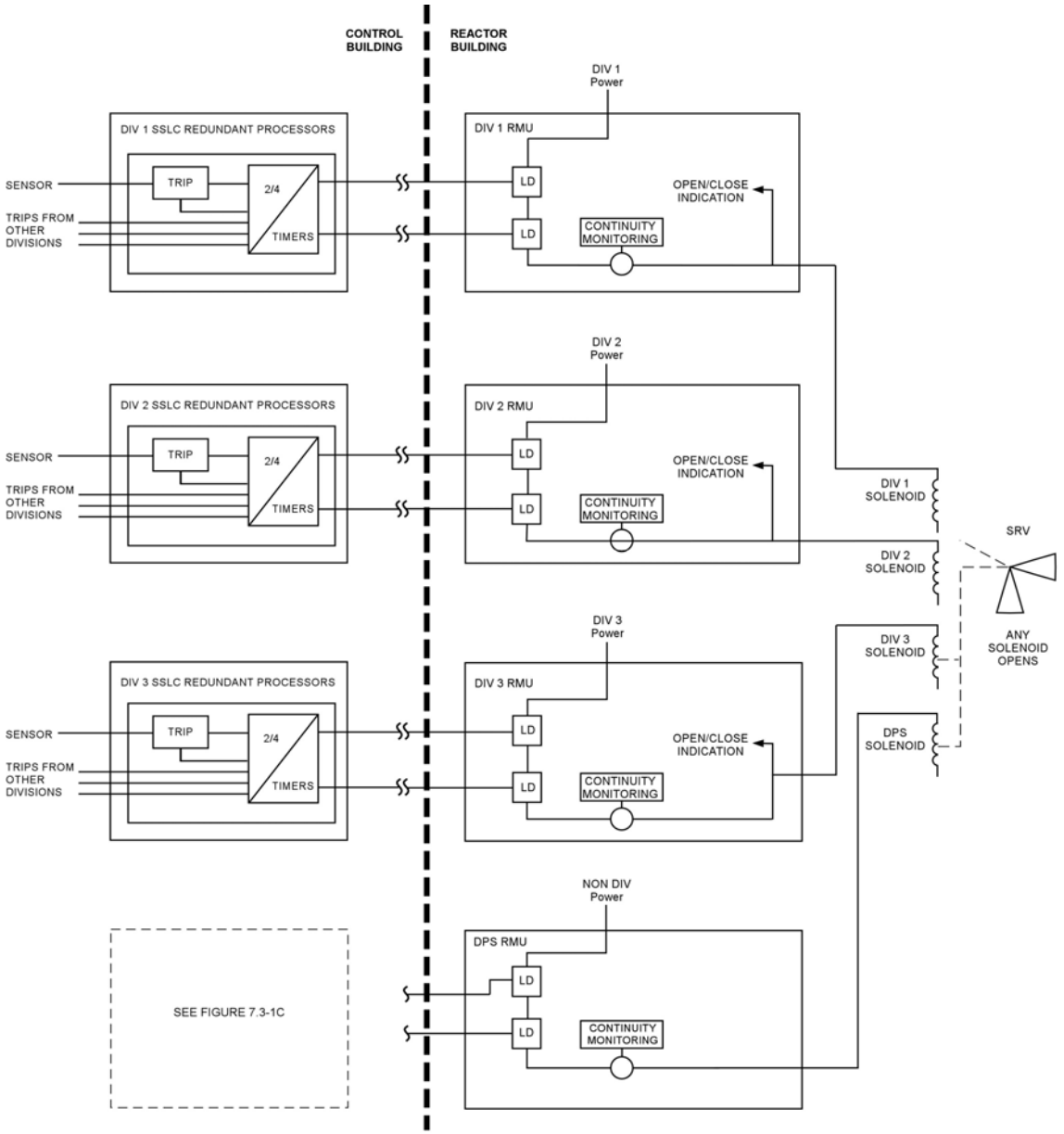
- These RAIs relate to testing of reactor internals
- Verification of assumptions for TRACG
  - Reactor internals pressure drops
  - Fuel bundle pressure drops

RAI Number 14.3-352S01, 353, 354, and 384

- Functional capability column in ITAAC Table was intended for identifying functional requirement of piping system (i.e., seismic requirement)
- The functional capability column will be deleted since the seismic capability column identifies the seismic requirement for piping.
- ITAAC will be revised as appropriate.

RAI Number 14.3-379

- Relates to Divisional Separation
- ITAAC Table 2.15.1-2 provides power division for safety-related components
- See Tier 2, Figure 7.3-1A, for SRV Initiation Logics as an example


CONTROL BUILDING
REACTOR BUILDING
DIV 1 Power
DIV 1 SSLC REDUNDANT PROCESSORS
DIV 1 RMU
SENSOR
TRIP
2/4
TIMERS
TRIPS FROM OTHER DIVISIONS
LD
LD
OPEN/CLOSE INDICATION
CONTINUITY MONITORING
DIV 2 Power
DIV 2 SSLC REDUNDANT PROCESSORS
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SENSOR
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LD
LD
OPEN/CLOSE INDICATION
CONTINUITY MONITORING
DIV 1 SOLENOID
DIV 2 SOLENOID
SRV
ANY SOLENOID OPENS
DIV 3 Power
DIV 3 SSLC REDUNDANT PROCESSORS
DIV 3 RMU
SENSOR
TRIP
2/4
TIMERS
TRIPS FROM OTHER DIVISIONS
LD
LD
OPEN/CLOSE INDICATION
CONTINUITY MONITORING
DIV 3 SOLENOID
DPS SOLENOID
NON DIV Power
DPS RMU
LD
LD
CONTINUITY MONITORING
SEE FIGURE 7.3-1C

RAI Number 14.3-284, 304, 305

- RAIs 284 and 305 relate to pneumatic operated valve
  - GEH will reinstate ITAAC # 10 to be consistent with SRP 14.3, Appendix D, with appropriate reference to the equipment table
- RAI 304 relates to pre-operational testing of repositionable valves
  - ITAAC Table 2.1.2-3, ITAAC #9 is consistent with standard ITAAC in SRP 14.3
  - Pre-operational testing conditions are addressed in Tier 2, Section 14.2, through reference to RG 1.68

Tier 1 Changes Unrelated to RAIs

- Discussion of changes to Tier 1 that may not relate to specific RAIs

Topic – Definition of "As-Built"

- Definition of "as-built" to reflect performance of certain ITAAC prior to installation
- Use definition included in NEI 08-01, Industry Guideline for the ITAAC Closure Process Under 10 CFR Part 52," Draft 4/2/08
  - > "As-built" means the physical properties of the structure, system or component, either: (1) following the completion of its installation or construction activities at its final location at the plant site; or (2) prior to installation, when as-installed verification cannot be performed (e.g., measurement of internal dimensions), or when it is more practical to perform the verification prior to installation (e.g., in the factory), of a structure or component for which physical properties would not be affected by installation or construction at its final location at the plant.

Topic – Removal of Bracketed Values

- Removal of Tier 1 bracketed values to reflect actual values
  - > Brackets were used for Rev. 4 where values could potentially change prior to Rev. 5
  - > Final values will be reflected in Rev. 5

Topic – ITAAC Regarding ASME Code Requirements

- ITAAC are being revised to include ASME Code requirements in applicable systems
  - Ensure consistency from one system to another
- Tier 1 is being revised to include ASME Code requirements for piping and components DAC ITAAC and construction verification ITAAC in each applicable system versus Section 3.1
  - Pipe break ITAAC will remain in Section 3.1
  - Allows for ITAAC closure directly on system-by-system basis throughout construction
  - Will discuss specific examples with NRC

Topic – Development of New Tier 2 Sections and ITAAC in Tier 1

- Ancillary Diesels
  - > Will include new ITAAC in electrical section of Tier 1
  - > Post 72-hours power for Passive Containment Cooling system (PCCS)
- Drywell Gas Recirculation System
  - > Will include new ITAAC in PCCS section of Tier 1
  - > Supplements PCCS
  - > Purpose is to reduce containment pressure post-72 hours

Topic – Reordering IEEE-603 Items

- IEEE 603 Criteria are specified in Tier 1, Section 2.2.15
  - ITAAC address additional criteria in IEEE-603
  - Because sections do not refer to specific criteria, the reordering will not create problems with the consistency of Tier 1

Design Acceptance Criteria ITAAC Discussion

- Discussion of Design Acceptance Criteria ITAAC

Software

- RAI 14.3-170 Requested that Software Development ITAAC Table in Tier 1, Section 3.2, be labeled {{Design Acceptance Criteria}}

  > GEH review determined that DAC ITAAC should be based on activities up to the life cycles that establish hardware/software specifications (i.e., “requirements” phase)

  > Beyond the requirements phase, the ITAAC are construction ITAAC

Software (cont)

- Software DAC ITAAC (for Safety-Related Systems)
  - Software Management Plan Results Analysis Summary Report
  - Software Development Plan Results Analysis Summary Report
  - Software Quality Assurance Plan Results Analysis Summary Report
  - Software Integration Plan Results Analysis Summary Report
  - Software Installation Plan Results Analysis Summary Report
  - Software Operations and Maintenance Plan Results Analysis Summary Report
  - Software Training Plan Results Analysis Summary Report
  - Software Safety Plan Results Analysis Summary Report
  - Software Verification and Validation Plan Results Analysis Summary Report
  - Software Configuration Management Plan Results Analysis Summary Report
  - Cyber Security Program Plan Results Analysis Summary Report
  - Software Safety Analysis Summary Reports
  - V&V Analysis Summary Reports
  - Configuration Management Summary Reports
  - Requirements Traceability Matrix Summary Reports

Software (cont.)

- Software Construction Verification ITAAC (for Safety-Related Systems)
  - I&C Systems Software Requirements Specifications
  - I&C Systems Software Design Description
  - I&C Systems Software Design Specifications
  - I&C Systems Code Listings
  - I&C Systems System Build Documents
  - I&C Systems Installation Configuration Tables
  - I&C Systems Software Operations Manuals
  - I&C Software Training Manuals
  - I&C Systems Safety Related Software Applications
  - I&C Systems Software Validation Tests
  - Software Management Plan (plant-specific application)
  - Software Development Plan (plant-specific application)
  - Software Quality Assurance Plan (plant-specific application)
  - Software Integration Plan (plant-specific application)
  - Software Installation Plan (plant-specific application)
  - Software Operations and Maintenance Plan (plant-specific application)
  - Software Training Plan (plant-specific application)
  - Software Safety Plan (plant-specific application)
  - Software Verification and Validation Plan (plant-specific application)
  - Software Configuration Management Plan (plant-specific application)
  - Cyber Security Program Plan (plant-specific application)

Human Factors Engineering

- RAI 14.3-171 Requested that HFE ITAAC Table in Tier 1, Section 3.3, be labeled {{Design Acceptance Criteria}}

  > GEH review determined that DAC ITAAC should cover OER, FRA, AOF, and TA

  > Beyond these, the ITAAC are construction ITAAC

Human Factors Engineering (cont)

- Human Factors Engineering DAC ITAAC (for Safety-Related Systems)
  - > Operating Experience Report Results Summary Report
  - > Functional Requirements Analysis Implementation Plan and Allocation of Functions Results Summary Report
  - > Task Analysis Results Summary Report

Human Factors Engineering (cont)

- Human Factors Engineering Construction and Verification ITAAC (for Safety-Related Systems)
  - > Staffing and Qualifications Results Summary Report
  - > Human Reliability Analysis Results Summary Report
  - > Human System Interface Results Summary Report
  - > Procedure Development Results Summary Report (plant procedures available for inspection)
  - > Training Development Results Summary Report
  - > HF Verification and Validation Results Summary Report
  - > Design Implementation Results Summary Report
  - > Human Performance Monitoring Results Summary Report

Digital Instrumentation and Controls

- Digital Instrumentation and Controls DAC ITAAC will be labeled in Tier 1, Section 2, system-based instrumentation and control as {{Design Acceptance Criteria}}
- Simplified Logic Diagrams and Block FMEAs are the end point for DAC ITAAC
- Implementation ITAAC will follow

Questions