Public Meeting to Present the Closure Plan for the U.S. EPR FSAR Open Items on Design Specifications

Rockville, Maryland

August 15, 2012

Agenda

Topic	Presenter
Introductions	AREVA/NRC
Purpose	R. Wells
Background	R. Wells
Closure Plan	
• Content of Design Specifications	J. Harrington
• Path Forward Activities and Schedule	R.Wells
Summary/Next Steps	R. Wells
Comments and Questions	

Purpose

- Present and obtain feedback on content of design specifications
- Present list of design specs
- Outline path forward
  - Review closure plan for U.S. EPR FSAR open items for design specifications
  - Confirm agreement with the NRC on the path to closure for U.S. EPR open items for design specifications

Background

- **ASME Code**
  - Design Specifications required by ASME Section III, Division 1, 2004 edition.
  - Code of record for the U.S. EPR is the 2004 edition of the ASME Boiler and Pressure Vessel Code (no addenda).
- **SRP 3.9.3**
  - Notes that design specifications are required for Code Class 1, 2, and 3 components and component supports, and core support structures, shall be designed to satisfy the appropriate subsections of the Code as required in 10 CFR 50.55a.
  - Design Specifications are either to be submitted to NRC or made available for review at the applicant's or vendor's office.
- **RAI 404, Question 3.9.3-24**
  - Follow-up to RAIs 178, Question 03.09.03-18 and RAI 107, Question 3.9.3-4.
  - NRC requested that AREVA provide the ASME Design Specifications for NRC audit prior to certification.
  - This is to confirm that the FSAR design methodologies and criteria are adequately reflected in the associated component ASME Design Specifications.
  - AREVA NP response to this RAI dated December 23, 2010 provided a list of design specifications. AREVA NP plans to revise this RAI response with an updated list of design specs and schedule when they will be available for NRC audit

Background

▶ SER Items related to Design Specifications

RAI	Question No.	Date of Final RAI Response	NRC Classification	Audit Topic
72	3.2.2-6	11/14/08A	Open Item	Verify that design information on quality group classification s for all important to safety systems and components within the scope of the FSAR is included in Design Specifications
107	3.9.3-1	12/1/08A	Open Item	Verify that the design of components, component supports, and core support structures, the requirements of 10 CFR 50.55a(b) will be met without exception.
107	3.9.3-10	2/20/09A	Confirmatory Item	Confirmation that design specifications contain the appropriate ASME Code, Section III service level stress criteria.
381	3.9.6-15	8/13/10A	Open Item	Confirmation that the FSAR and design specifications specify implementation of QME-1-2007 as accepted in RG 1.100, Revision 3
404	3.9.3-24	12/23/10A 8/30/13	Open Item	Availability of ASME design specifications
404	3.9.3-25	8/11/10A	Open Item	Verification that design specifications or other referenced document address treatment of functionality, including collapse and deflection limits
420	3.2.1-13	4/13/11A	Confirmatory Item	Validate that there is a process to verify the design basis for seismic classification of non-safety-related risk-significant SSCs that are important to safety
420	3.2.1-15	4/13/11A	Confirmatory Item	Availability of design information on seismic classification for all important to safety SSCs within the scope of the certified design, including structures (e.g., system description documents and P&IDs)

RAI 404 will be revised in October 2012 to provide updated list of design specs and date for NRC review

Design Specification Closure Plan

James Harrington
Engineering Supervisor

Design Specifications

- Total of 58 design specifications for ASME Class 1, 2, and 3 components will be provided for NRC audit
  - 27 component related (e.g., CRDMs)
  - 31 generic specifications (e.g., ASME Class 1 Motor Operated Gate Valve)
- 6 Attachment specifications (e.g., EQ requirements)
- List of design and attachment specifications provided at the end of the presentation

Content of Design Specifications

- **Design requirements:**
- **Code sections/requirements (10 CFR, ASME Codes, Reg Guides)**
  - **Performance requirements**
    - RCP coast down requirements during loss of power (FSAR section 5.4.1.4)
  - **Mechanical requirements**
    - RCS design transients (FSAR section 3.9.1.1)
  - **Structural requirements**
    - Dynamic analysis requirements (FSAR section 3.9.2)
    - Load combinations (FSAR section 3.9.3)
  - **Functionality requirements**
    - Safety related pump and valve functional testing requirements (FSAR section 3.9.6.1)
  - **Operability requirements including operational requirements under various conditions**
    - Main steam relief control valve positioning (FSAR section 10.3.2)
  - **Design and operational limitations**
    - Pressure-temperature limits for the RPV to meet 10 CFR Part 50 Appendix G (FSAR section 5.3.2.1)

Content of Design Specifications

- **Material requirements:**
  - **Specific material requirements**
    - Impact testing meeting ASME NB/NC/ND-2300 requirements (FSAR section 6.1.1.1)
  - **Alloy elemental content requirements/limits**
    - RPV and appurtenances materials (FSAR Table 5.3-3)
  - **Prohibited materials**
    - Controls on ferritic and austenitic stainless steel for the RPV (FSAR section 5.3.1.4)
  - **Limits on expendable materials used during fabrication, testing, and storage**
    - Controls of chlorides and fluorides and low melting point metals (FSAR section 6.1.1.1)
- **Fabrication requirements:**
  - **Require N-Stamping for all pressure boundary components fabricated to ASME B&PVC Section III**
    - 10 CFR 50.55a requirement for ASME Code N-stamps (FSAR section 3.2.2)
  - **Preferred fabrication methods/restrictions**
    - Cleaning and contamination protection (FSAR section 5.2.3.4.2)
  - **Thermal treatment requirements**
    - Preheat temperatures for carbon steel following ASME Section III Appendix D D-1000 for main steam and feedwater (FSAR section 10.3.6.2)
  - **Welding code, methods, weld repair, welding qualifications, and weld material requirements and restrictions**
    - Welding done in accordance with RG 1.31, 1.44, and 1.71 (FSAR section 6.1.1.1)

Content of Design Specifications

- **Examination and testing requirements:**
  - **Define non-destructive examination, pre-service examination, operational/performance testing, hydrostatic testing, and system flushing to be performed and invoke appropriate code/sections**
    - ASME NB-2545 or NB-2546 requirements for RPV clad surfaces (FSAR section 5.3.1.3)
    - ASME NB-5130 for full penetration welds (FSAR section 5.3.1.3)
    - Main steam and feedwater NDE requirements meet NC-5000 and ND-5000 (FSAR section 10.3.6.1)
    - Safety related pump and valve functional testing requirements (FSAR section 3.9.6.1)
  - **Visual inspection prior to final assembly for parts that are not visible afterwards without disassembly**
    - Examination and pressure testing done in accordance with Section XI of the ASME code (FSAR section 5.2.4.1.2)
- **Cleaning and preparation for shipping requirements:**
  - **Cleanliness requirements and the required cleanliness classification from NQA-1**
    - Meet RG 1.37 (FSAR section 6.1.1.3)
  - **Restrictions for detrimental materials**

Content of Design Specifications

Quality Assurance requirements:

- **Require manufacturers to be ASME "N" Certificate holders and provide requirements for their Quality Assurance programs.**
  - QA plan 10 CFR 50 Appendix B requirements and ANSI/ASME NQA-1-1994 (FSAR section 17.5)

Engineering documentation requirements:

- **Documents to be provided by the manufacturer.**
  - Quality Assurance data packages
  - Manufacturing drawings
- **ITAAC items will be reviewed to determine any documentation that must be provided by the supplier.**
  - Functional testing reports (Tier 1, Table 2.2.3-3, item 3.1)
  - Seismic qualification data packages (Tier 1 , Table 2.2.3-3, item 3.4)
  - Certified design reports (Tier 1, Table 2.2.3-3, item 3.10)

Content of Design Specifications

- Topics pertinent to numerous types of equipment are included as attachment specifications
- Design and operating requirements, size, etc., for generic components
  - This level of information is captured in a hardware data sheet (HDS)
  - HDS templates are included in the design specifications, actual data will be provided at the time of procurement
  - Template shown on following slides

Design Specifications will be consistent with NRC regulations, the ASME Code, and design requirements in the U.S. EPR FSAR

Content of Design Specifications

▶Past Precedence

- AREVA NP has reviewed audits of design specifications conducted by NRC for AP1000, ESBWR, and STP.
- Lessons learned from these audits being applied to the AREVA NP design specifications
  - Specifying related ITAAC in the design specifications
  - Confirm that the functional design, qualification, and IST programs for pumps, valves, and dynamic restraints satisfy FSAR Sections 3.9.6 and 3.11
  - Incorporation of QME-1-2007 as endorsed by RG 1.100
  - Specification of RG 1.207 for fatigue evaluation of ASME Class 1 components

Sample Data Sheet

HARDWARE DATA SHEET

SERIAL 34 - -

PREPARED BY		TITLE		DATE	
REVIEWED BY		TITLE		DATE	
APPROVED BY		TITLE		DATE	

Valve Mark Number(s): ____________

Valve TAG Number(s): ____________

Service/Safety Function: ____________

Design Requirements:

- Fluid: ____________
- Specific Gravity: ____________
- Design Pressure: ____________
- Design Temperature: ____________
- Allowable Pressure Drop through Valve (when fully open): ____________
- Rate of Flow Reversal: ____________
- Isolation Requirements (Maximum allowable leakage): ____________
- Orientation of Valve in Piping System: ____________
- Full open Cv (by Manufacturer): ____________
- Cv as a Function of Valve Position (by Manufacturer): ____________
- Body to Bonnet Bolting (By Manufacturer): ____________
- Installation Orientation: ____________
- Position Indication: ____________
- Normal Position: ____________
- Opening Time: ____________

Sample Data Sheet (cont'd)

AREVA

HARDWARE DATA SHEET

SERIAL 34 - -

Closing Time:	____________
Design Life Cycles:	____________
Flow Direction of Sealing (one way or two way sealing):	____________
Torque and Limit switch Electrical Ratings:	
Voltage:	____________
Capacity, Amps:	____________
Interfacing with Owners Control System: (Either Analog Signal or Digital Contacts)	____________
Required to Operate in Post-Accident Conditions (Y/N)	____________
Maximum emergency manual operation time limit	____________
Zero Period Acceleration (ZPA) Cutoff Frequency:	____________
Valve Body:	
Body Material:	____________
End Size:	____________
Pressure Rating:	____________
Connecting Pipe Size/Schedule	
Inlet:	____________
Outlet:	____________
Material:	____________
Inlet Preparation:	Buttweld (ASME B16.25)
Outlet Preparation:	Buttweld (ASME B16.25)
Operation Modes:	
Flow___ Inlet Pressure/Temperature____ Outlet Pressure/Temperature____ (Min)	
Flow___ Inlet Pressure/Temperature____ Outlet Pressure/Temperature____ (Max)	
Motor Operator:	
Type:	Electric
Voltage:	____________
Electrical Class:	1E
Available Power Supply:	

Sample Data Sheet (cont'd)

HARDWARE DATA SHEET

SERIAL 34 - -

<u>Motor Power Supply</u>	
Phases:	3 (w/ grounding)
Nominal System Voltage Between Phases (VAC):	480 (3 wire w/ ground)
Nominal Frequency (Hz):	60
<u>Heater power supply:</u>	
Available Nominal System Voltage Between Phases (V):	120 VAC (single phase)
Nominal Frequency (Hz):	60
Allowable Power Supply Variation	
Voltage Range	±10% of rated voltage
Frequency Range	±5% of rated frequency A frequency variation of +(LATER)% for a maximum of (LATER) minutes shall be admissible.
Load Shedding Variation	After load shedding of the main generator, an excessive frequency of (LATER) rated frequency for (LATER) seconds may occur. Simultaneously, the voltage may increase up to (LATER) of rated voltage for (LATER) seconds.

Path Forward Activities and Schedule

Russ Wells
Lead Licensing Engineer

EPR™ by AREVA

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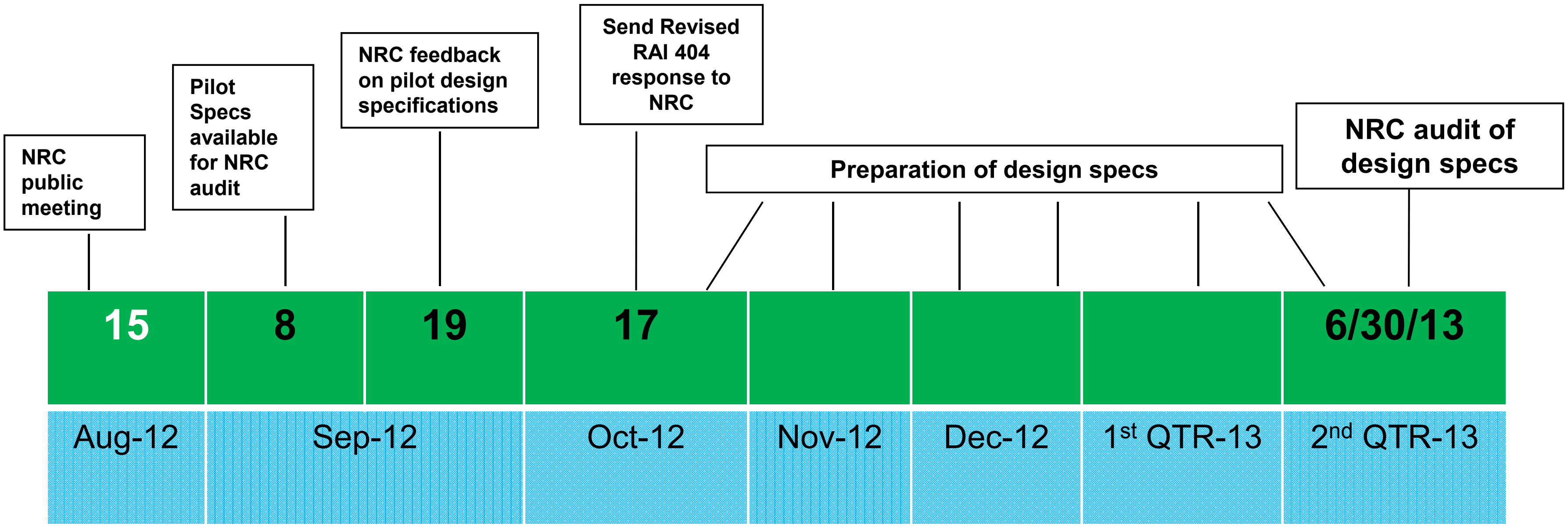
Path Forward Activities and Schedule

- **Develop pilot design specifications for NRC review**
  - 1 component spec and 1 generic specification
- **Make pilot specs available for NRC audit in the AREVA Bethesda office**
- **Based on NRC feedback commence preparation of design specs**
- **Update response to RAI 404**
  - List of design specifications
  - Date for NRC audit
- **See timeline on following slide**

Timeline for Open Item Closure



Summary/Next Steps

- Design Specifications developed for all ASME Class 1, 2, and 3 components.
- Content of specifications consistent with NRC regulations and guidance and the U.S. EPR FSAR.
- Pilot specifications to be developed for NRC audit.
- Need timely NRC feedback to ensure we “are hitting the mark.”
- Specifications will be made available in a timeframe to support NRC audit and closure of open items

List of Design Specifications

List of Design Specifications

Specification	Classification
Reactor Coolant System Components, Supports, Piping	
Control Rod Drive Mechanism	Component
Fuel Transfer Tube Assembly (Tube, Containment Isolation Valves, Supports)	Component
Main Coolant and Surge Line Piping	Component
Pressurizer	Component
Pressurizer Heater	Component
Pressurizer Safety Relief Valve	Component
Reactor Coolant Pump	Component
Reactor Pressure Vessel	Component
Reactor Pressure Vessel Internals	Component
RPV Head Equipment	Component
RPV Incore Instrumentation; Closure Hardware; (lance; yoke; fingers)	Component
Steam Generator	Component

List of Design Specifications

Specification	Classification
Reactor Coolant System Component Supports	
Reactor Pressure Vessel Support Ring	Component
RCS Supports (Except Reactor Pressure Vessel Support Ring) • Reactor Coolant Pumps (RCP) Vertical Supports • Pressurizer (PZR) Vertical Supports • PZR Horizontal Restraints • PZR Surge Line (SL) Hangers	Component
Steam Generator and Reactor Coolant Pump Snubbers	Component
SG Supports and Restraints	Component

List of Design Specifications

Specification	Classification
Non-RCS Piping, Supports, In-Line Components	
ASME Section III (Safety Related) In-line Filter	Generic
ASME Class 1 Check Valves (2-1/2" and larger)	Generic
ASME Class 1 Motor Operated Gate Valve	Generic
ASME Class 1 Motor Operated Globe Valve	Generic
Small LP Class 1 Gate, Globe & Check Valves	Generic
Small HP Class 1 Gate, Globe & Check Valves	Generic
ASME Class 1 Supports	Generic
ASME Class 1\2\3 Piping	Generic
ASME Class 2/3 Flow Restrictor	Generic
Class 1 Solenoid Operated Angle Globe Control Valve (Pressurizer Intermittent Spray Valve)	Generic

List of Design Specifications

Specification	Classification
Class 2 and 3 Pumps and Valves	
ASME Section III Pumps and Motors	Generic
Class 2 and 3 Diaphragm Valves	Generic
Class 2 and 3 Solenoid Operated Valves	Generic
Class 2 and 3 Wafer Check Valves	Generic
Feedwater Damped Check Valve	Component
High Performance Class 2 and 3 Butterfly Valves	Generic
Large HP Class 2 and 3 Gate, Globe & Check Valves	Generic
Large LP Class 2 and 3 Gate, Globe & Check Valves	Generic
Lined Class 2 and 3 Butterfly Valves	Generic
Main Feedwater Control Valve	Component
Main Steam and Full Load Feedwater Isolation Valves	Component
Main Steam Relief Control Valve	Component
Main Steam Relief Isolation Valve	Component
Main Steam Relief Train Silencer	Component

List of Design Specifications

Specification	Classification
Class 2 and 3 Pumps and Valves (cont'd)	
Main Steam Safety Valves	Component
Metal Seated Class 2 and 3 Ball Valves	Generic
Miscellaneous Class 2 and 3 Ball Valves	Generic
Miscellaneous Class 2 and 3 Plug Valves	Generic
Miscellaneous Class 2 and 3 Safety Valves	Generic
Pressurizer Continuous Spray Valves	Component
SG Blowdown Flow Control Valves	Component
Small HP Class 2 and 3 Gate, Globe & Check Valves	Generic
Small LP Class 2 and 3 Gate, Globe & Check Valves	Generic
Miscellaneous Components	
Water Cooled Chillers	Generic
Air Cooled Chillers	Generic
Air Handling Units	Generic
Packaged A/C Units	Generic
Emergency Diesel Generator	Component

List of Design Specifications

Specification	Classification
Tanks and Heat Exchangers	
Accumulator	Component
ASME Class 2\3 Plate Heat Exchanger	Generic
ASME Class 2\3 Shell and Tube Heat Exchanger	Generic
ASME Class 2\3 Vessel and Tank	Generic
Attachment Specifications	
Environmental Qualification	Generic
Environmental Qualification for Bulk Purchases	Generic
Safety Related Control Valve and Damper Actuator	Generic
Safety Related Isolation Valve and Damper Actuator	Generic
Safety Related Low Voltage Motors	Generic
Safety Related Medium Voltage Motors	Generic