



Updated Schedule for Stress Analysis

April 15, 2008
Mitsubishi Heavy Industries, LTD.

- 1. Design Completion Approach**
- 2. Updated Schedule**
- 3. Plan for Technical Report Submittals
and Stress Analysis Completion**
- 4. Outline of Technical Reports**
- 5. Summary**

➤ **DAC (Design ITTAC) for the components, piping and fuel assemblies are planned to be resolved during the design certification review process by:**

✓ **Technical reports:**

- Will contain analyses results and other information that supplement the information already provided in the DCD
- Will close DAC (Design ITAAC) for representative ASME Class CS, Class 1 and Class 2 components and piping, Fuel assemblies and RCC (Rod Control Cluster)

✓ **NRC Audit:**

- Review of activities and documents related to detailed design
- Will close DAC (Design ITAAC) for remaining designated components and piping

➤ Original Schedule:

- ✓ Submittal of Technical Report for representative examples of components, piping and fuel system **in June 2009**
- ✓ Audit for remaining **in September 2009**
- ✓ NRC Phase 2, draft SER for Chapters 3 and 4 completed by February and January 2010, respectively.

➤ Updated Schedule:

- ✓ Submittal of Technical Report for ASME Class CS, Class 1 and Class 2 components, piping and fuel system **in March 2009**
- ✓ NRC audits can also begin **in March 2009**
- ✓ An additional TR for “Summary of Seismic and Accident Load Condition for Primary Components and Piping Design” will be provided **in January 2009** to inform the NRC in advance of the analysis conditions to be used in the stress analyses

Submittal Plan for Stress Analysis Technical Reports and Stress Analysis Completion



Areas	Contents			Original Schedule	Updated Schedule
Components and piping	ASME Class CS	Reactor Internals	Stress Analyses	T/R 6/2009	T/R 3/2009
	ASME Class 1	Reactor Vessel		T/R 6/2009	T/R 3/2009
		Steam Generator		Audit 9/2009	T/R and/or Audit 3/2009
		Pressurizer		Audit 9/2009	T/R and/or Audit 3/2009
		Reactor Coolant Pump		Audit 9/2009	T/R and/or Audit 3/2009
		CRDM		Audit 9/2009	T/R and/or Audit 3/2009
		Reactor Coolant Loop Piping		Audit 9/2009	T/R and/or Audit 3/2009
		RCL Branch Piping		Audit 9/2009	T/R and/or Audit 3/2009
		Pressurizer Surge Line Piping		T/R 6/2009	T/R 3/2009
	ASME Class 2	Accumulator		Audit 9/2009	T/R and/or Audit 3/2009
		MS Piping		T/R 6/2009	T/R 3/2009
Fuel system	Fuel assemblies and RCC		structure response analysis under seismic and LOCA	T/R 6/2009	T/R 3/2009

Note) T/R: Technical Report

Outline of Technical Reports (1/5) (Input for Stress Analysis)



Summary of Design Transient (01/2009)

Outline of Technical Report	Related DCD Section/Subsection
<ul style="list-style-type: none">➤ Design transients considered in the design of ASME Class 1 components for the US-APWR.➤ Assumption of design transients analysis, such as fluid system pressure, temperature, flow transients, and frequency for Class 1 component fatigue analysis and stress analysis.➤ Conservative estimates of the magnitude and frequency of the temperature and pressure variation resulting from various events assumed in plant operation	3.9

Outline of Technical Reports (2/5) (Input for Stress Analysis)



Summary of Seismic and Accident Load Conditions
for Primary Components and Piping Design (01/2009)

Outline of Technical Report	Related DCD Section/Subsection
➤ Seismic and accident load conditions (Service Level C and D) used in the stress analysis for the primary component and piping design for the US-APWR	3.9

Outline of Technical Reports (3/5) (Stress Analysis Report)



RV, RI, CRDM, SG, Pzr, RCP (Class 1) and Acc (Class 2):
Summary of Stress Analysis Results (03/2009)

Outline of Technical Report	Related DCD Section/Subsection
<ul style="list-style-type: none">➤ ASME Code stress analysis results for the RV, CRDM, SG, Pzr, RCP (Class 1), RI (Class CS), and Acc (Class 2) of the US-APWR➤ Structural, thermal and fatigue analyses results for components	3.9

RV: Reactor Vessel

CRDM: Control Rod Drive Mechanism

SG: Steam Generator

RCP: Reactor Coolant Pump

RI: Reactor Internal

ACC: Accumulator

Outline of Technical Reports (4/5) (Stress Analysis Report)



RCL Line and M/S Line:
Summary of Stress Analysis Results (03/2009)

Outline of Technical Report	Related DCD Section/Subsection
<ul style="list-style-type: none">➤ Reactor Coolant Loops line (including Pressurizer surge line): ASME Code Class 1 stress analysis results, with environmental fatigue effect and thermal stratification effect, and Leak-Before-Break (LBB) evaluation➤ Main Steam line: ASME Code Class 2 stress analysis results with water hammer effect and Leak-Before-Break (LBB) evaluation	3.12

Outline of Technical Reports (5/5) (Stress Analysis Report)



Evaluation Results of Structural Response Analysis of US-APWR Fuel System under Seismic and LOCA Conditions (03/2009)

Outline of Technical Report	Related DCD Section/Subsection
<p>➤ This technical report will evaluate the structural response of the US-SPWR fuel system under seismic and LOCA conditions.</p> <p>The report will:</p> <p>➤ Demonstrate that the grid spacer deformation is insignificant.</p> <p>➤ Verify that the stresses for the RCC guide thimbles, nozzles, and fuel cladding are less than the allowable limit (ASME Sec. III, S.R.P.).</p> <p>➤ Examine and demonstrate no buckling of RCC guide thimbles against axial load.</p>	4.2

- **Stress analysis reports and related information for audit, originally planned for June and September 2009 respectively, will now both be available in March 2009.**
- => A review schedule 6 months shorter should be attainable for Chapters 3 and 4.**