ENCLOSURE 3

AP1000 Design Control Document Amended Design –
Section 3.7 – Seismic Design Presentation (November 17, 2010) – (Non-Proprietary)

AP1000 Design Control Document Amended Design

Section 3.7

Seismic Design

Westinghouse

Section 3.7 Overview

- 3.7.1 Seismic Input
  - Design Response Spectra
  - Supporting media
- 3.7.2 Seismic System Analysis (Structures)
  - Seismic analysis methods
  - Soil-Structure interaction
  - Floor response spectra
  - Combination of modal responses
  - Seismic interactions

Section 3.7 Overview

- 3.7.3 Seismic Subsystem Analysis (Mechanical Systems and Components)
  - Seismic analysis methods
  - Combination of modal responses
  - Analytical procedure for piping
- 3.7.4 Seismic Instrumentation – No Changes
- Combined License Information
  - Timing clarification

Section 3.7 Changes

- Extension of hard-rock sites to soil sites
- Utilization of 3D finite element shell models
- Effect of High Frequency Ground Motion
- Use of the coherency function
- Classification of adjacent buildings

Open Items

- 15 Open Items in 3.7 SER
  - These open items are a result of NRC staff questions about changes to the DCD
  - Most of the questions are due to the addition of soil cases
- These open items have all been resolved

3.7 Open Items

- OI-SRP3.7.1-SEB1-19 – Justify the concrete cracking and damping value used in the analysis
- OI-TR03-005 – Justify 0.8 stiffness reduction factor for concrete cracking used for the SB analysis
- Resolution:
  - Additional nonlinear time history analysis supported the original analysis assumptions

3.7 Open Items

- OI-TR03-032 – Description of the proposed method using more detailed NI05 model to evaluate flexible regions.
- OI-SRP3.7.1-SEB1-06 – NI20 model for flexible regions up to 50 Hz
- Resolution:
  - The NI05 model has been reviewed for flexible regions where the out-of-plane response is considered flexible
  - The FRS for all "flexible nodes" is included in the design floor response spectra document as a separate table for area-specific spectra for use in local analyses.

3.7 Open Items

- OI-SRP3.7.1-SEB1-17 – Justify the treatment of missing mass in mode superposition
- Resolution:
  - The superposition time history analysis provides sufficient solution accuracy because the modes, which respond beyond cutoff frequency, have no significant contribution to the in-structure amplified response spectra.
  - A time history analysis at cutoff frequency was compared to an identical time history analysis with significantly more modes and the results were comparable.

3.7 Open Items

- OI-SRP3.7.1-SEB1-15 – Include methodology for structure-soil-structure interaction analyses of buildings adjacent to the NI
- Resolution:
  - Methodology included in the DCD
  - The seismic analysis performed for the adjacent Seismic Category II structures is a simulated 3D analysis.
  - Seismic Category II buildings are designed using envelope foundation input response spectra

3.7 Open Items

- OI-TR03-007 – Changes in the Shield Building dimensions required WEC to update sloshing analysis of the PCS tank
- Resolution:
  - NRC Audited WEC calculations and agreed with the conclusions

Questions?