Enclosure 1

Slide Deck from the Public Meeting

UniStar NUCLEAR ENERGY

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NRC Public Meeting
Calvert Cliffs Nuclear Power Plant Unit 3
Topics Related to FSAR Sections 3.7 and 3.8

Discussions on the approach to perform reconciliation between Site Conditions and Generic Design

March 3, 2011

Agenda

- Purpose of the presentation, Summary of main conclusions
- What is reconciliation
- Comparison of seismic inputs: ➔Earthquake acceleration, ➔ Shear wave velocity profile
- Confirmatory analysis
- Assessment of Rev 3 updates
- Summary of the technical assessment
- Reconciliation guidelines: ➔ Description, ➔ Applicability to CC3
- Unistar COLA Revisions
- Status of RAI's
- Questions

Purpose of the Presentation

To provide the NRC with a status on current seismic related analyses performed in support of the Calvert Cliffs Nuclear Power Plant Unit 3 (CCNPP Unit 3) COLA

- Describe UniStar's approach to reconciling the Seismic Site Characteristics
- Describe conforming changes to the CCNPP Unit 3 COLA
  - Chapter 2.5.2.6
  - Chapter 3.7
  - Chapter 3.8
- Provide a status of outstanding RAIs
  - RAI 252
  - RAI 253

Summary of UniStar's Technical Conclusion

Based on:

- The extensive analytical work already performed
- The large margin between the U.S. EPR™ FSAR generic seismic input parameters and the CCNPP Unit 3 site and,
- The even larger margins between the U.S. EPR™ FSAR seismic analysis results and CCNPP Unit 3 site-specific seismic results,

UniStar's technical conclusion is that the confirmatory seismic analysis included in Section 3.7 of the CCNPP Unit 3 COLA does not need to be updated to reflect seismic analysis changes expected in Revision 3 of the U.S. EPR™ FSAR.

Summary of UniStar's Proposed Implementation

Proposed Changes to COLA (Scheduled for March 31, 2011)

- Section 2.5.2.6: Will include demonstration that CCNPP Unit 3 is bounded by U.S. EPR™ FSAR analysis (Utilizing guidance in U.S. EPR™ FSAR Section 2.5.2.6).
- Section 3.7 and 3.8: Confirmatory seismic analysis of generic structures (NI, EPGB, ESWB, etc.) will be removed and incorporated into Section 2.5.2.6.
- Conforming changes will be made throughout the COLA

Reconciliation of Future Changes

- Consequences of future changes will be assessed in the Section 2.5.2.6 analysis.
- If a determination is made that the generic design is no longer bounding, a detailed site-specific confirmatory seismic analysis will be provided.
- First application of this approach: Revision 3 of the U.S. EPR™ FSAR when issued. Present assessment is that the Revision 3 changes will not alter the conclusion that the generic design is bounding.

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CCNPP Unit 3 COLA – U.S. EPR™ FSAR

Site Characteristics Reconciliation

COLA Revision 7 Reconciliation

The COLA - U.S. EPR™ FSAR Reconciliation consists of two parts:

1. A comparison of the seismic analysis inputs (Described in COLA Section 2.5.2.6)
   - Earthquake Acceleration
   - Shear Wave Velocity Profiles

2. A confirmatory site-specific seismic analysis of the U.S. EPR™ FSAR structures (Described in COLA Section 3.7)

COLA versus U.S. EPR™ FSAR Seismic Analysis Purposes

- The purpose of the U.S. EPR™ FSAR analysis is to obtain seismic results to design the buildings and associated equipment within the U.S. EPR™ FSAR Scope. The resulting designs are being used for the CCNPP Unit 3 site.
- The purpose of the COLA analysis is to confirm that the seismic results used in the U.S. EPR™ FSAR designs are bounding for the CCNPP Unit 3 site.
- **The CCNPP Unit 3 results are not used for design.**

COLA Revision 7
Reconciliation Results

The U.S. EPR™ FSAR Seismic Analysis Inputs, Analysis, and Design Bound the CCNPP Unit 3 Site by a Large Margin.

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COLA- U.S. EPR™ FSAR Comparison of Seismic Inputs

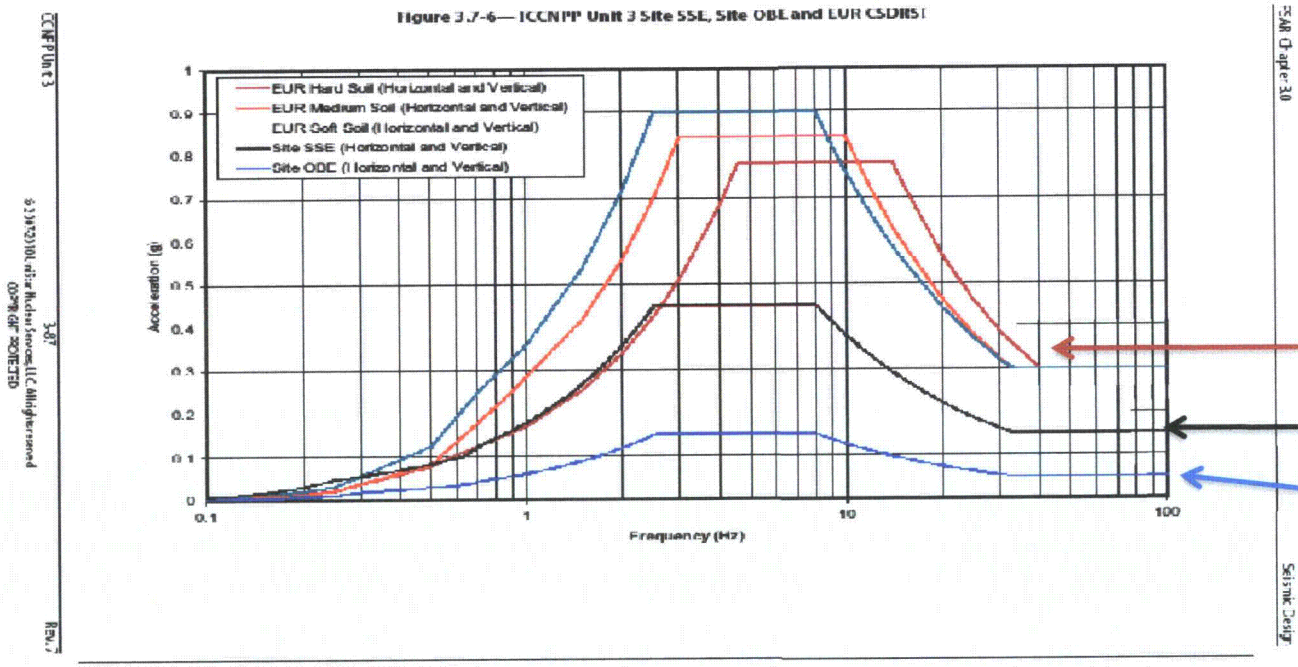
Primary Input – Earthquake Acceleration

Earthquake Acceleration

	U.S. EPR™ FSAR	CCNPP Unit 3		
		COLA SSE Table 3.7-1	Regulatory Guidance SSE	COLA GMRS Table 2.5-22
Zero Period Acceleration (ZPA)	0.30g	0.15g	0.10g	0.076g
Peak Acceleration	0.90g	0.45g	0.31g	0.18g

Lower input accelerations result in lower design demand

U.S. EPR™ FSAR Design Spectra versus CCNPP Unit 3 SSE Spectra



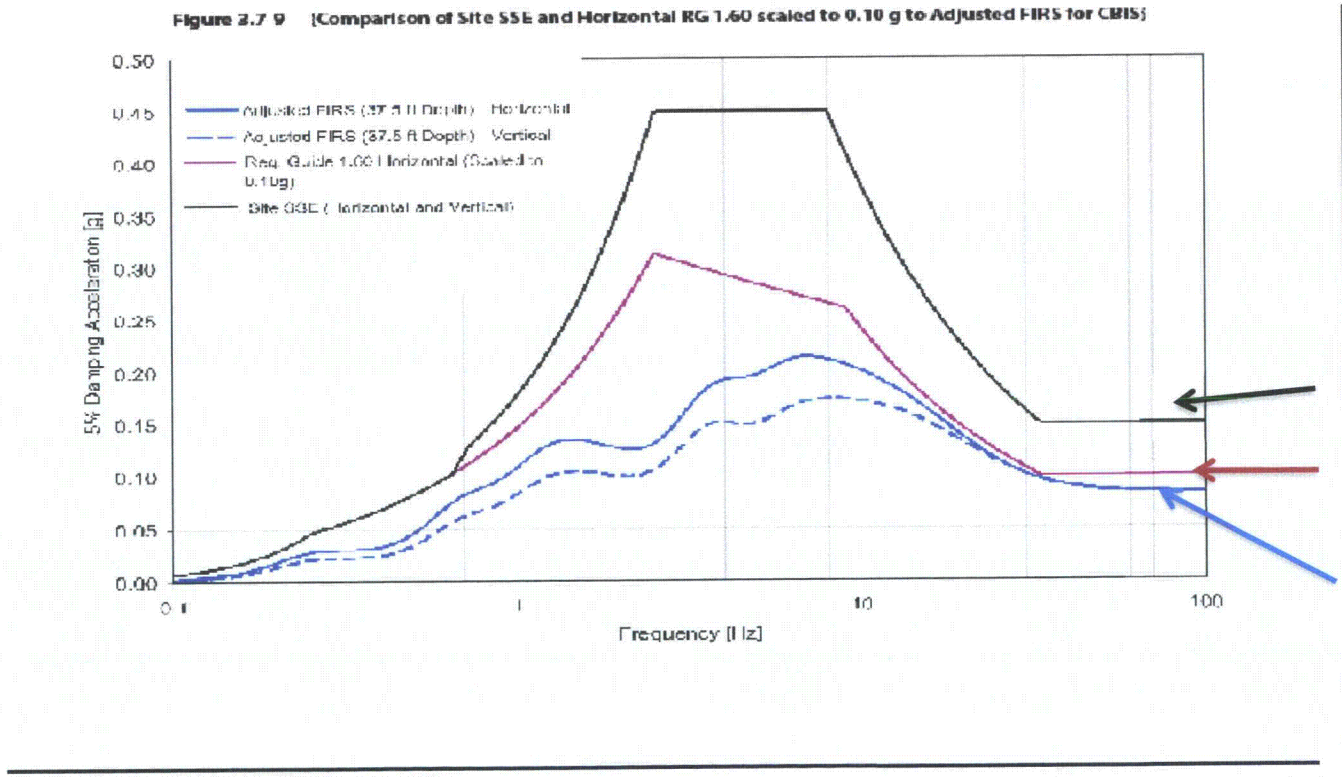
Generic Spectra

Site SSE

Site OBE

- The **Site SSE is much smaller than CSDRS** except for the small exceedance below 0.3 Hz
- The small exceedance comes from adopting a conservative enveloping spectra approach:
  - RG 1.60 in the low frequencies
  - EUR in higher frequencies
- The low frequency exceedance has no influence on the design

CCNPP Unit 3 SSE versus Site-Specific Structure FIRS



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COLA - U.S. EPR™ FSAR Comparison of Seismic Inputs

Secondary Input – Shear Wave Velocity Profile

Shear Wave Velocity

Nuclear Island

U.S. EPR™ FSAR

Based on a family of velocity profiles

- Shallow
  - 700 fps Minimum
  - 13,123* fps Maximum
- Deep
  - 700 fps Minimum
  - 13,123* fps Maximum

*4,000 mps

CCNPP Unit 3

Based on BE values

- Shallow (< 250 ft)
  - 1,089 fps Minimum at 40 ft
- Deep (> 250 ft)
  - 2,200 fps Maximum at 400 ft

COLA values acceptable because U.S. EPR™ FSAR bounds COLA Values

Shear Wave Velocity

EPGB and ESWB

U.S. EPR™ FSAR

Based on a family of velocity profiles

- Shallow
  - 700 fps Minimum
  - 13,123 fps Maximum
- Deep
  - 700 fps Minimum
  - 13,123 fps Maximum

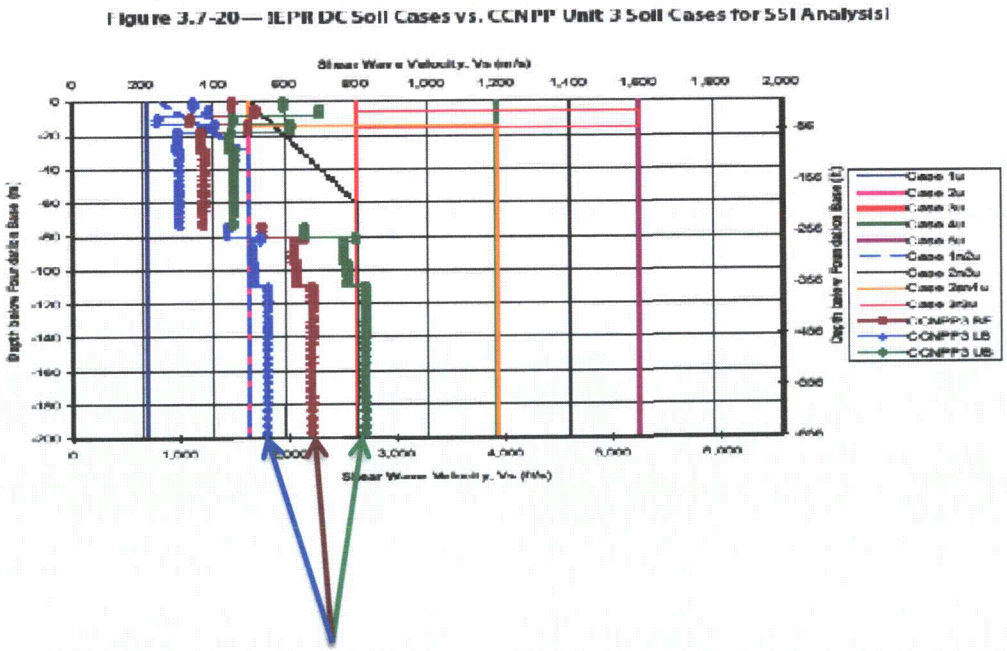
CCNPP Unit 3

Based on BE values

- Shallow (< 40 ft)
  - 650 fps Minimum at 40 ft
- Deep (> 40 ft)
  - 1,630 fps Maximum at 300 ft

Slightly lower minimum value has been shown to be acceptable through confirmatory analysis.

U.S. EPR™ FSAR versus CCNPP Unit 3 Nuclear Island Shear Wave Velocity Profiles

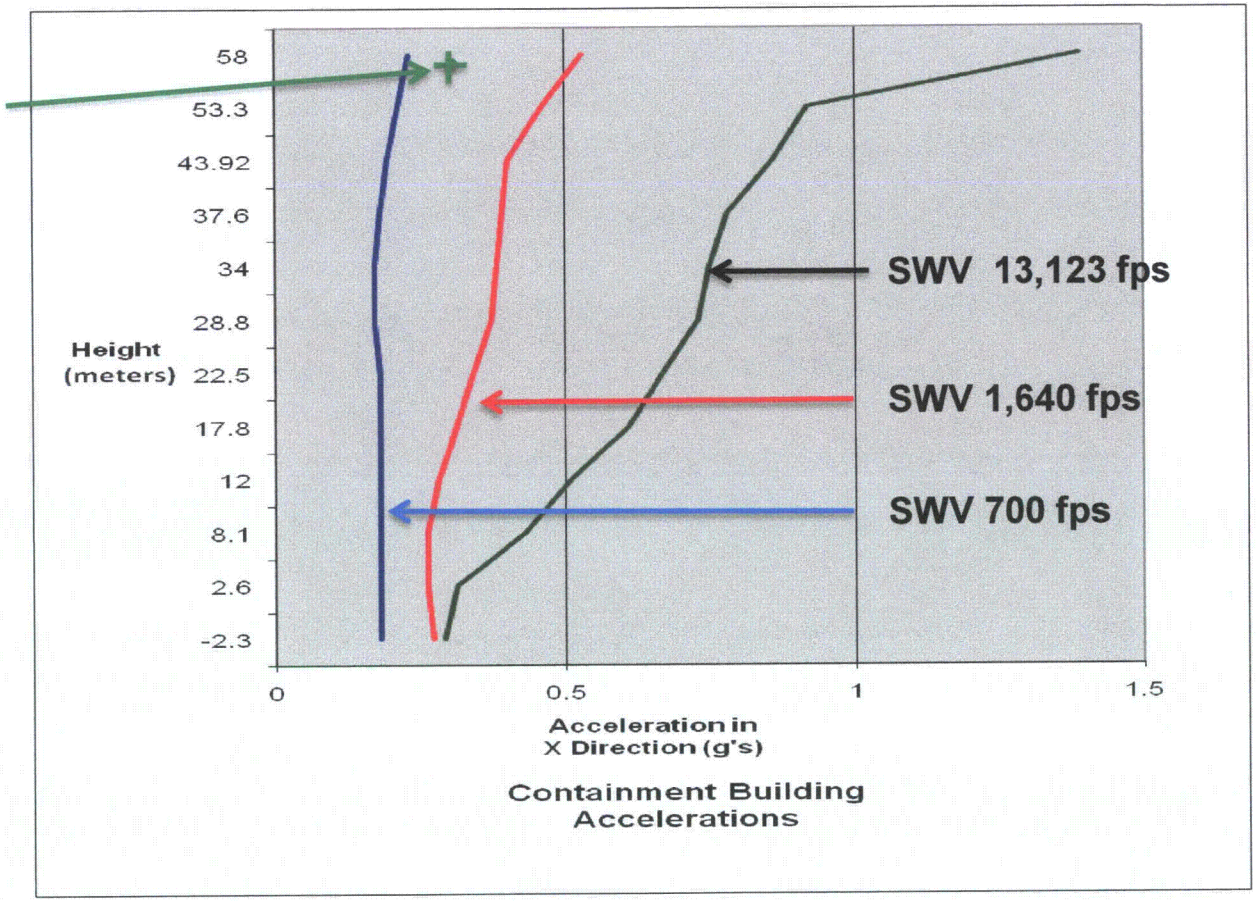


Site SWV, LB, BE, UB

Shear Wave Velocities for CCNPP Unit 3 site are on the low end of the range analyzed in the U.S. EPR™ FSAR

Containment Building Accelerations

CCNPP3 Confirmatory Analysis, Acceleration 0.3g at 58.0 m elevation



Data obtained from U.S. EPR™ FSAR Table 3.7.2-10

High Shear Wave Velocities (rock site - Case 5a) control the design of the structures and equipment.

COLA - U.S. EPR™ FSAR Site
Results of Characteristics Comparison

The CCNPP Unit 3 Site Characteristic inputs to the Seismic Analysis are bounded by the inputs used in the U.S. EPR™ FSAR seismic analysis.

- The CCNPP Unit 3 SSE acceleration is 1/2 of U.S. EPR™ FSAR acceleration.
- The Shear Wave Velocity Profile (based on Best Estimate) is essentially within the U.S. EPR™ FSAR range.

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COLA - U.S. EPR™ FSAR Comparison of Confirmatory Seismic Analysis

Methodology and Results

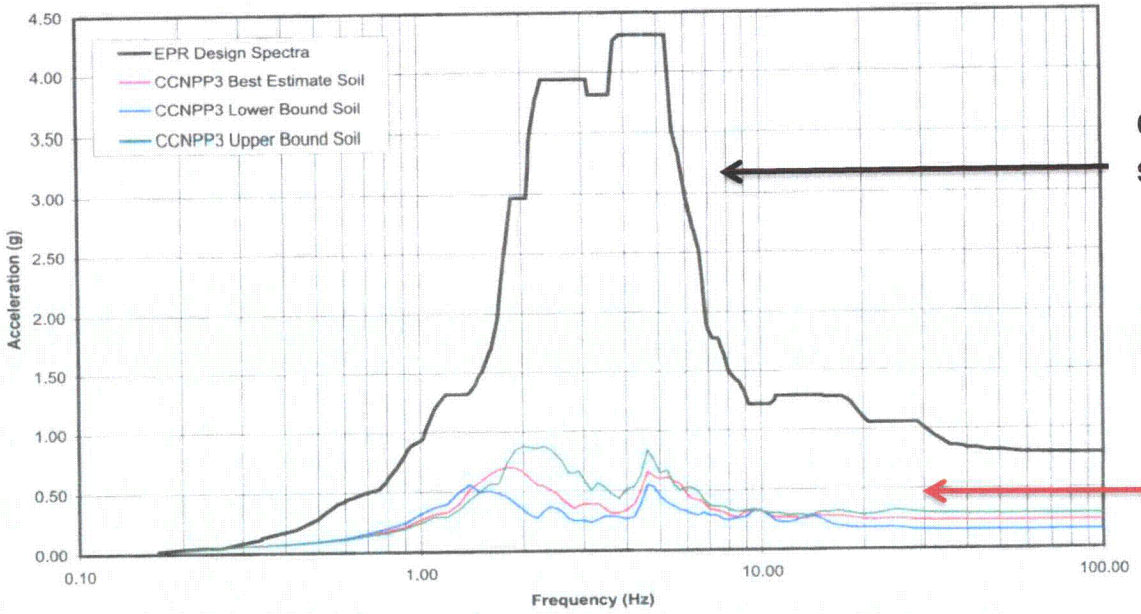
Confirmatory Seismic Analysis Methodology

The CCNPP Unit 3 confirmatory seismic analysis documented in Revision 7 of the COLA utilizes the same seismic models and analysis techniques as Revision 1 of the U.S. EPR™ FSAR.

- The only variables are the site characteristic inputs.
- This provides insights for understanding the impact of the site characteristics.

Typical Seismic Results Comparison (In-Structure Response Spectra)

Figure 3.7-49—(Containment Building, Elev. 37.6 m, X(E-W) Direction, 5% Damping)



Generic Design spectrum

CCNPP 3 Spectra Results from a range of lower SWV - 796 fps to 1,454 fps

- The margin between the CCNPP Unit 3 COLA and U.S. EPR™ FSAR is increased when the seismic analysis results are compared.
- Refinements to the CCNPP Unit 3 confirmatory analysis inputs and modeling impact the lower curves by a relatively small amount.

Results of the Confirmatory Seismic Analysis

From the typical comparison figure shown on the previous slide (and from all the comparison figures in COLA Revision 7):

The CCNPP Unit 3 Seismic Analysis results are bounded by the U.S. EPR™ FSAR seismic results by a significant margin (a factor of 3 or 4) because:

- The CCNPP Unit 3 earthquake accelerations are 1/2 of the U.S. EPR™ FSAR, and
- The CCNPP Unit 3 soils are similar to the U.S. EPR™ FSAR "soft soil" cases which do not generally control the U.S. EPR™ FSAR design

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Assessment of U.S. EPR™ FSAR Revision 3 Planned Updates

U.S.EPR™ FSAR Revision 3 Seismic Analysis Update Assessment

U.S. EPR™ FSAR Input Updates:

- Earthquake Acceleration is more conservative by the addition of high frequency spectra
- Refined soil profiles

Reconciliation Impact:

- None
- None

U.S. EPR™ FSAR Revision 3 Seismic Analysis Update Assessment

U.S. EPR™ FSAR Seismic Model Updates:

- Finite Element versus Stick Model
- Embedded NI
- Backfill Properties

  Either extends the SWV of the foundation material or decreases the SWV from that of the foundation material

CCNPP Unit 3 Reconciliation Impact:

- These seismic model refinements have the same relative (i.e. increasing or decreasing response) impact on the site-specific analysis of the CCNPP Unit 3 plant and the U.S. EPR™ FSAR.
- Impact relatively minor
  - Competent backfill is selected
  - Backfill SWV similar to that used in U.S. EPR™ FSAR

U.S. EPR™ FSAR Revision 3 Seismic Analysis Update Assessment

U.S. EPR™ FSAR Physical Building Updates such as:

- Shear Key Grid for EPGB Foundation Mat
- NI Tendon Galleries embedded and used as Shear Key
- Minor changes to other concrete building elements

Reconciliation Impact:

- These physical plant changes are relatively minor and are adopted for the CCNPP Unit 3 site.
- The changes have the same relative impact on a site-specific analysis of the CCNPP Unit 3 plant and the U.S. EPR™ FSAR.

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Summary of the Technical Assessment

Summary of the Technical Assessment

CCNPP Unit 3 Seismic Reconciliation - Inputs

- The purpose of the seismic reconciliation is to confirm that the CCNPP Unit 3 site-specific characteristics are bounded by the U.S. EPR™ FSAR site parameters.
- This purpose has been met through a comparison of the seismic analysis inputs of earthquake acceleration and shear wave velocities.
- Inputs to the U.S. EPR™ FSAR bounds the CCNPP Unit 3 site (by a large margin for earthquake acceleration, and reasonably well for SWV).

Summary of the Technical Assessment

Output of the confirmatory analysis

- A CCNPP Unit 3 site-specific seismic analysis documents the site-specific seismic results.
- The purpose of performing a site-specific seismic analysis was to support the seismic input comparison with a seismic results comparison.
- As expected, the conclusion obtained from the site-specific seismic analysis is that the U.S. EPR™ FSAR results bound the CCNPP Unit 3 results by a significant margin.

Summary of the Technical Assessment

Impact of expected updates

- Updates expected to be included in U.S. EPR™ FSAR, Revision 3 will not impact the conclusion that the U.S. EPR™ FSAR seismic design bounds the CCNPP Unit 3 site characteristics by a significant margin.
- The U.S. EPR™ FSAR design continues to be adequate for CCNPP Unit 3 primarily because:
  - **The CCNPP Unit 3 site characteristics are much less demanding than the U.S. EPR™ FSAR generic design site parameters.**

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U.S. EPR™ FSAR Reconciliation Guidelines

U.S. EPR™ FSAR Section 2.5.2.6

9 Step Reconciliation - Steps 1 to 6

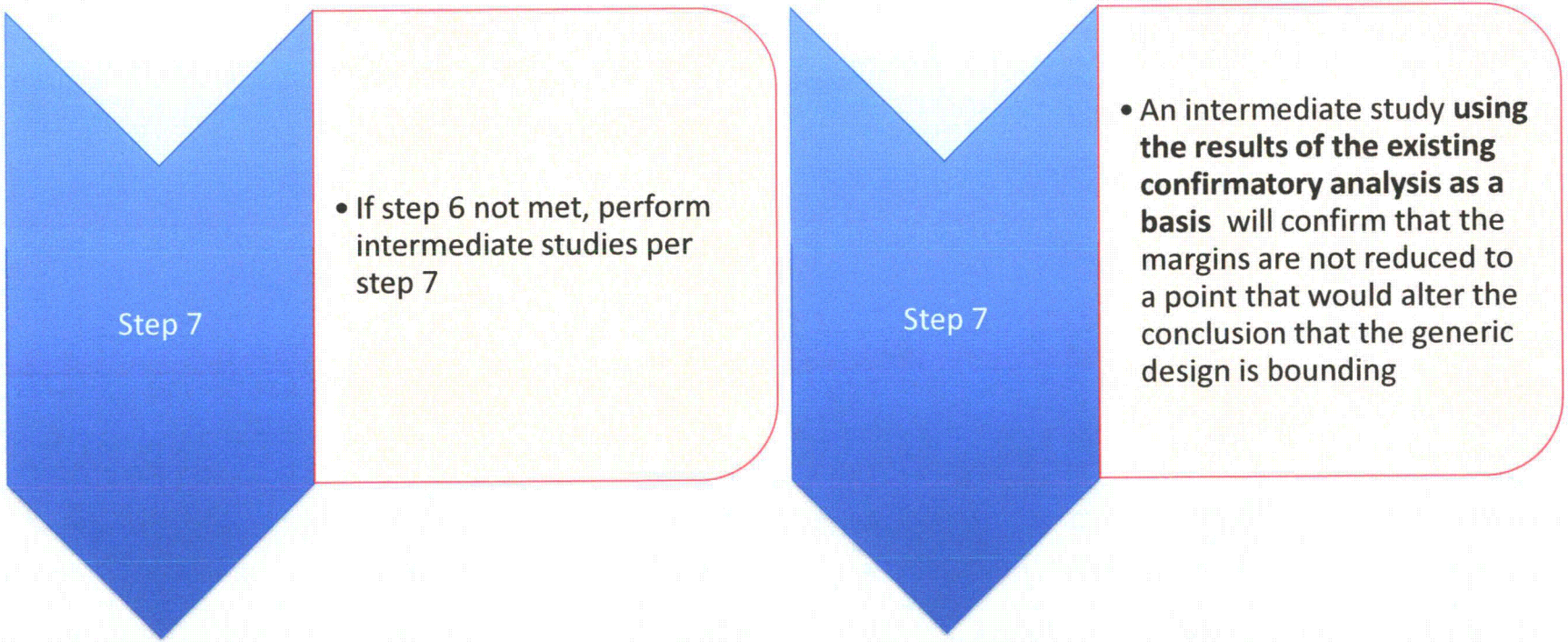
	U.S. EPR™ FSAR Guideline	CCNPP Unit 3 Compliance
Step 1	• Ground Acceleration less than 0.3g	• Yes, ground acceleration 0.15g
Step 2	• SWV more than 1,000 fps under building foundations	• Yes for NI, no for EPGB & ESWB
Step 3	• FIRS enveloped by CSDRS	• Yes, except for frequencies less than 0.3 Hz
Step 4	• Soil layers dip less than 20 degrees	• Yes
Step 5	• EPR FSAR Soil profiles bound site-specific	• Yes
Step 6	• If first 5 steps are met, reconciliation is complete	• reconciliation is essentially complete

9 Step Reconciliation - Steps 7 to 9

U.S. EPR™ FSAR Guideline	CCNPP Unit 3 Compliance
Step 7 • If step 6 not met, perform intermediate studies per step 7	**Step 7** • **Conservatively,** no intermediate simplified studies were developed
Step 8 • If intermediate studies are not sufficient, perform a detailed site-specific seismic analysis per step 8	**Step 8** • Detailed site-specific confirmatory seismic analysis was performed for Calvert Cliffs
Step 9 • If the COLA site-specific analysis results in EPR FSAR exceedances, justify exceedances	**Step 9** • Minor exceedances in low frequency range have no impact on plant design.

Reconciliation of Future Changes

- Impact of future changes (such as U.S. EPR™ Revision 3) will be assessed in conformance with step 7



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UniStar CCNPP Unit 3 COLA Revision

CCNPP Unit 3 COLA Revision

The COLA documentation will consist of:

- Responses to outstanding RAI's related to the confirmatory analysis
- An update to the site characteristics reconciliation in Section 2.5.2.6, consistent with the U.S. EPR™ FSAR Guidelines, as discussed on the next slide.

COLA mark-ups to be provided to the NRC on March 31, 2011.

Detailed Description of Modifications to CCNPP Unit 3 COLA chapters

Chapter	Planned Updates
2.5.2.6	1. Follow the U.S. EPR™ FSAR Guidelines described previously, specifically: the 9 step reconciliation process to demonstrate that the generic design is bounding and, 2. Utilize the available results of the confirmatory analysis to provide supporting evidence of the significant margin between the U.S. EPR™ FSAR and COLA
3.7	1. Transfer all seismic analysis information related to the confirmatory analysis of generic structures to Section 2.5.2.6 and show large margin. 2. Keep all seismic analysis of site-specific structures in Section 3.7
3.8	1. Transfer all seismic design information related to generic structures to Section 2.5.2.6 and show large margin. 2. Keep all seismic design of site-specific structures in Section 3.8

UniStar Actions to Reconcile CCNPP Unit 3 COLA with Future Revisions of U.S. EPR™ FSAR (Rev 3)

1. A description of the U.S. EPR™ FSAR updates included in U.S. EPR™ FSAR Revision 3
2. An explanation as to why the CCNPP Unit 3 confirmatory seismic analysis model is still adequate to support the overall conclusion that the U.S. EPR™ FSAR seismic design is adequate for CCNPP Unit 3 based on:
   - No changes to the site characteristics inputs
   - Relatively minor updates to the seismic model and physical buildings not affecting the site characteristics comparison
   - The large margin between the U.S. EPR™ FSAR seismic results and CCNPP Unit 3 site-specific analysis results

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CCNPP Unit 3 COLA
Status of Outstanding RAIs

RAI 252 – Section 3.7.1

Expected submittal - March 15

	Question Summary	Answer Summary
3.7.1-15 Bullet 1	Discuss effect of lateral extent of backfills on soil column and SSI results. Also what is the source of low strain properties and where is a Backfill ITAAC.	• Assumption of uniform horizontal layers of infinite lateral extent is acceptable. • Backfill properties described in FSAR Section 2.5.4 • Backfill ITAAC in Table 2.4-1.
3.7.1-15 Bullet 2	Provide a quantitative comparison of the SSSI effects on the EPGB and ESWB based on new embedded NI model.	Site Specific SSI for ESWB and EPGB will be removed from FSAR 3.7 and addressed by site reconciliation process.
3.7.1-15 Bullet 3	Discuss shape of Upper Bound profile for EPGB/ESWB.	Calculated for each step using logarithmic standard deviation (σ_{ln}). SWV is not constant throughout the depth of the profile.

RAI 252 – Section 3.7.1 (cont.)

Expected submittal - March 15

	Question Summary	Answer Summary
3.7.1-15 Bullet 4	Equation incorrect in FSAR text. Confirm tables in 3F have been calculated correctly.	Incorrect equation shown in FSAR will be replaced. The data tables are correct.
3.7.1-15 Bullet 5	Describe the structural fill and confirm that the value of the unit weight of 0.145k/ft^3.	Backfill selection and characteristics discussed in Section 2.5.4 of FSAR rev 7. The unit weight is correct.
3.7.1-15 Last Para	Describe and discuss sensitivity studies for EPGB/ESWB SSI and describe how SRP criterion is meet	The SSI analyses used 3 soil cases, best estimate (BE), lower bound (LB), and upper bound (UB). Discussion of sensitivity prepared.

RAI 253 – Section 3.7.2

Expected submittal - March 31

Question #	Question Summary	Answer Summary
3.7.2-45	Provide information on seismic methods and acceptance criteria for Cat II-SSE structures.	**The Cat II-SSE classification is being eliminated.** Fire Protection Structures will be conventional seismic.
	Describe the design and analysis for the Turbine Building, Switchgear Building and Access Building.	This information is being added to FSAR Section 3.7.2.8
3.7.2-46	Describe the influence of the Circulating Water pump house on the Cat I UHS MWIS and Forebay during a seismic event.	Not expected to alter conclusions of acceptability.

RAI 253 – Section 3.7.2 (cont.)

Expected submittal - March 31

Question #	Question Summary	Answer Summary
3.7.2-49	Provide details on sliding and overturning analysis methodology for the EPGB and ESWB.	Information describing the methodology drafted. No change to FSAR expected.
3.7.2-49	Provide details on sliding and overturning analysis methodology for the Common Basemat Intake Structures	These questions were on the Seismic analysis of the separate Intake Structure and electrical building. Responses will address how current analysis prepared.
3.7.2-50	Address effect of hydrodynamic loads on walls of the UHS MWIS	
3.7.2-51	Address use of thick and thin Shell elements in the SSI calculations for the UHS MWIS	

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