CCNPP3COLA PEmails

From: Arora, Surinder
Sent: Wednesday, October 12, 2011 7:22 AM
To: Miernicki, Michael; Ford, Tanya
Cc: CCNPP3COL Resource; Colaccino, Joseph
Subject: FW: Draft slides for November public Meeting
Attachments: image001.png; Calvert_Cliffs_Site-Specific_Seismic_Analyses_091511-OMT Comments Antonio.pptx

Importance: High

Mike and Tanya,

Here are the draft slides for the public meeting with UniStar. These slides will help you in getting the right people to participate in the meeting. We need to show these to the branches responsible for section 3.7 and 2.5 reviews. We need to decide the date (week of 10/31- proposed by UniStar) and notice the meeting. I had forwarded the UniStar proposed agenda to you previously. The staff may add any topics, they want UniStar to present.

Thanks.

SURINDER ARORA, PE
PROJECT MANAGER,
Office of New Reactors
US Nuclear Regulatory Commission

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From: Infanger, Paul [mailto:paul.infanger@unistarnuclear.com]
Sent: Tuesday, October 04, 2011 5:12 PM
To: Arora, Surinder
Subject: Draft slides for November public Meeting

These provide more detail than the agenda.

Paul Infanger
UniStar Regulatory Affairs
Calvert Cliffs Unit 3 Project Manager
410-369-1987 (New number as of 9-26-2011)
305-281-1469 (cell)

Hearing Identifier: CalvertCliffs_Unit3Cola_Public_EX
Email Number: 2747

Mail Envelope Properties (B46615B367D1144982B324704E3BCEED85D50BA818)

Subject: FW: Draft slides for November public Meeting
Sent Date: 10/12/2011 7:22:01 AM
Received Date: 10/12/2011 7:22:11 AM
From: Arora, Surinder

Created By: Surinder.Arora@nrc.gov

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"Ford, Tanya" <Tanya.Ford@nrc.gov>
Tracking Status: None

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Options
Priority: High
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
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UniStar
NUCLEAR ENERGY

UNISTAR NUCLEAR ENERGY

NRC Public Meeting
Calvert Cliffs Nuclear Power Plant Unit 3

Discussion of COLA Site-Specific Seismic Analyses

September 14, 2011 Draft

COLA Seismic Analysis Discussion Agenda

- Purpose and Background
- Seismic Update Scope
- Summary of RAI 314 and 315 Questions
- Response Process & Inputs
- Structure Specific Seismic Analysis Inputs
  - Category I Structures
  - Category II Structures

Meeting Purpose

- The purpose of this meeting is to describe AJF1 UniStar's approach, methodology, and inputs being used to address the NRC requests contained in RAI's 314 and 315 related to the seismic analysis, reconciliation, and design of CCNPP3 and;

- To obtain NRC's comments/agreement with UniStar's approach

Slide 3

AJF1 "present" rather than describe
Antonio J. Fernandez Ares, 9/22/2011

Background

- March 3, 2011 - UniStar proposes a qualitative approach to reconciling the site specific seismic characteristics to the US EPR FSAR
- March 31, 2011 - UniStar submits the results of the qualitative approach in an update of the CCNPP3 COLA
- June 23, 2011 - NRC presents the results of their review of the update and; basically states that a quantitative approach is needed to reconcile the CCNPP3 site characteristics
- August 3, 2011 - NRC issues RAI 314 and 315 documenting their request
- August 23, 2011 - UniStar submits a letter agreeing to perform a quantitative reconciliation and provides a schedule completing this effort

Slide 4

AJF2 "and stated that" instead of "basically states"
Antonio J. Fernandez Ares, 9/22/2011

Seismic Closure Scope

- Seismic Category I Structures
  - Confirmatory Analyses
    - Nuclear Island
    - Emergency Power Generation Building
    - Essential Service Water Building
  - Design Basis Analysis
    - Common Basemat Intake Structure
- Seismic Category II Seismic Stability Analyses
  - Confirmatory Analysis
    - Nuclear Auxiliary Building
  - Design Basis Analyses
    - Combined Turbine Island/Switchgear Building
    - Access Building

RAI 314 & 315 Response Precursor

- RAI 284 Response – New Madrid Influence on Ground Motion Response Spectra (GMRS)
  - Current GMRS developed in accordance with RG 1.208
  - GMRS will be modified to include the influence of the New Madrid earthquake using the same methodology
  - Methodology does not utilize EPRI CEUS data and methods currently under development and expected to be first issued in December 2011
  - CCNPP3 Safe Shutdown Earthquake (SSE) will be defined to envelope the updated GMRS
  - CCNPP3 SSE will be used for confirmatory and design basis seismic analyses

AJF3

Slide 6

AJF3 Recommend to Remove new EPRI CEUS issue.
Antonio J. Fernandez Ares, 9/22/2011

Summary of RAI 314 Requests

RAI No./Question	Structure	Requested Action	UniStar Response
314/03.07.01-16	Nuclear Island (NI)	Provide quantitative comparison of In-Structure Response Spectra (ISRS) based on embedded Finite Element Model (FEM)	Will provide ISRS comparison based on CCNPP3 site specific seismic analysis using the embedded FEM model, including the influence of the backfill beneath the NI
314/03.07.01-16	NI	Provide quantitative comparison of mat design loads	Peak basemat toe pressure from US EPR generic analysis will be compared to that obtained from CCNPP3 site specific finite element analysis
314/03.07.01-16	EPGB & ESWB	Confirm that the seismic input motion is less than the modified CSDRS used for the generic design of these buildings	Will develop EPGB and ESWB input motion from the NI Soil-Structure seismic analysis to take into account the influence of the NI on the EPGB and ESWB

Summary of RAI 314 Requests

RAI No./Question	Structure	Requested Action	UniStar Response
314/03.07.01-17	Common Basemat Intake Structure (CBIS)	Impact of backfill on building frequency response	Need to define response approach
314/03.07.01-17	Many	Provide ITAAC shear wave velocity criteria for the NI, CBIS, and Seismic Category II structures	Will provide shear wave velocity criteria for NI, CBIS, and Seismic Category II structures developed in the same manner as the existing EPGB and ESWB

Summary of RAI 315 Requests

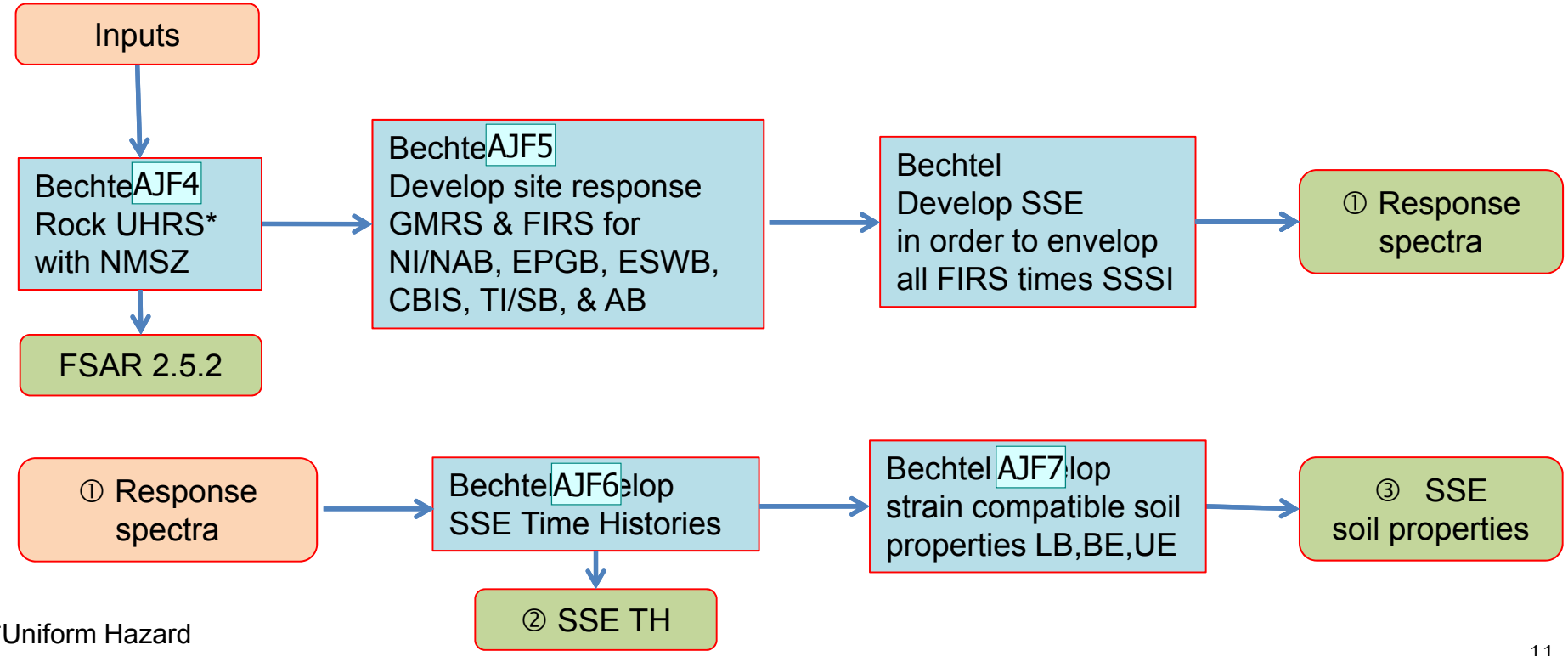
RAI No. & Question	Structure	Requested Action	UniStar Response
315/03.07.02-62	Nuclear Auxiliary Building (NAB)	Perform a complete stability analysis and provide: • Seismic Input • Model • Coefficients of friction • Consideration of sidewall pressures • Seismic capacities considered in stability evaluation • Method to determine and compare peak and allowable bearing pressure • Stability factors of safety • Net displacement between NI and NAB	Methods are presented in the following slides. Results will be provided as scheduled.
315/03.07.02-63	Turbine/ Switchgear Building & Access Building	Provide seismic analysis and stability evaluation methods similar to those listed for the NAB above and stability results as discussed for the NAB above. Provide design results ITAAC.	Methods are presented in the following slides. Results will be provided as scheduled.

Summary of RAI 315 Requests

RAI & Question	Structure	Requested Action	UniStar Response
315/03.07.02-64	EPGB & ESWB	Provide methodology, seismic input, and seismic models for stability evaluations similar to that described above for the NAB plus: • Address adhesion • Lateral soil pressure treatment	Methods are presented in the following slides. Results will be provided as scheduled.
315/03.07.02-64	NI	Provide stability evaluation information as requested for EPGB and ESWB above, including the impact of the structural backfill	Methods are presented in the following slides. Results will be provided as scheduled.
315/03.07.02-64	CBIS	Provide stability evaluation information as requested for the EPGB & ESWB above, including how side wall friction was considered	Methods are presented in the following slides. Results will be provided as scheduled.
315/03.07.02-65	ESWB	Determination of lateral soil pressures during seismic loads	Methods are presented in the following slides.
315/03.07.02-66	EPGB & ESWB	Seismic analyses should include redesign of US EPR generic structures	Analyses will be based on updated US EPR building arrangements

Seismic Analysis Process

- Confirmatory Analysis process
  - Assessment of New Madrid earthquake (NWSZ) on CCNPP3 SSE
  - Response Scheduled for August 30, 2011 (Did we respond?)



*Uniform Hazard Response Spectrum

Slide 11

AJF4 Delete contractor names
Antonio J. Fernandez Ares, 9/22/2011

AJF5 remove name
Antonio J. Fernandez Ares, 9/22/2011

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Antonio J. Fernandez Ares, 9/22/2011

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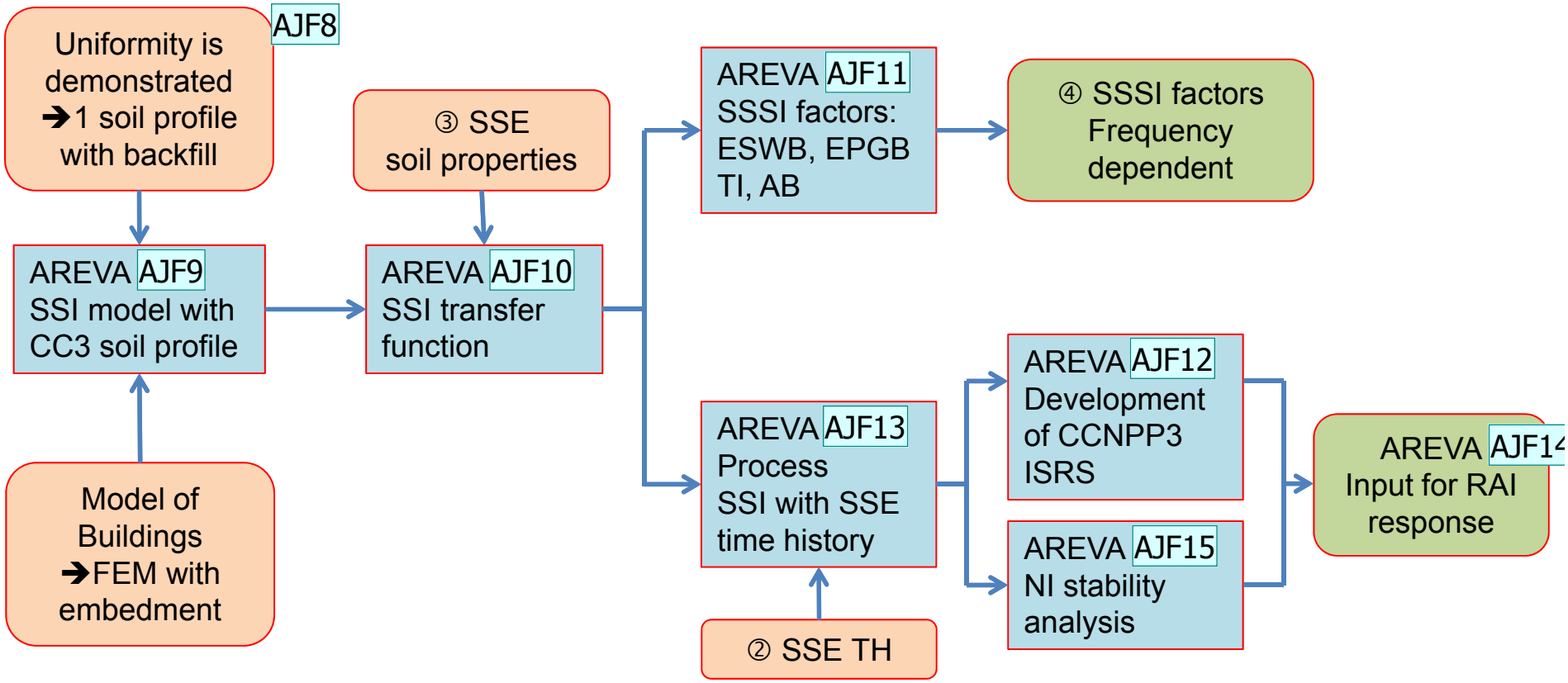
Antonio J. Fernandez Ares, 9/22/2011

Seismic Analysis Process

- Confirmatory Analysis process
  - Nuclear Island (NI) seismic response and stability
  - Response Scheduled for April 30, 2012



Slide 12

AJF8 Remove this box and save discussion for later
Antonio J. Fernandez Ares, 9/22/2011

AJF9 Remove Name
Antonio J. Fernandez Ares, 9/22/2011

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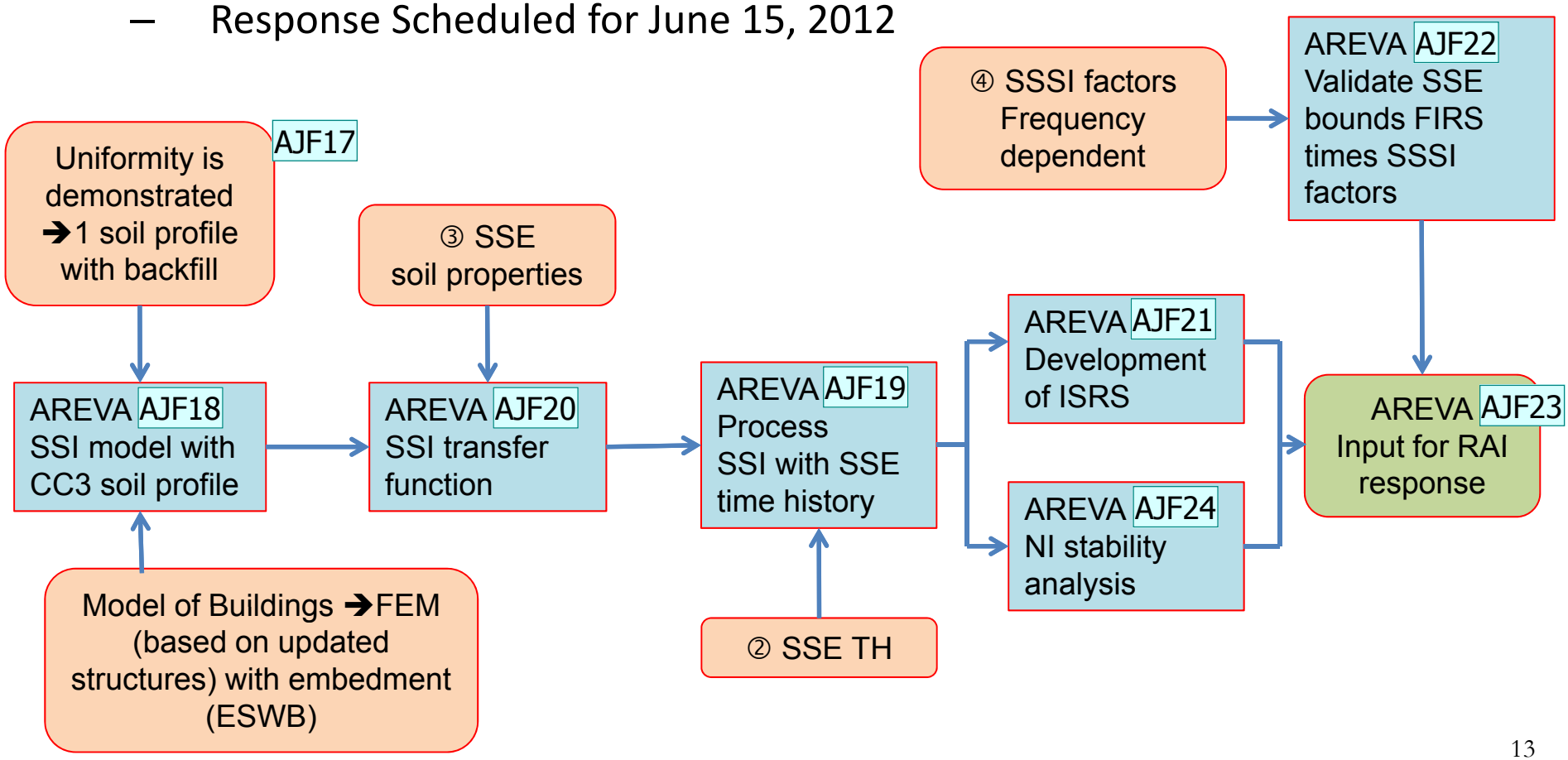
Antonio J. Fernandez Ares, 9/22/2011

Seismic Analysis Process

- Confirmatory Analysis process
  - ESWB/EPGB seismic response and stability
  - Response Scheduled for June 15, 2012



Slide 13

AJF17 Remove Box and save discussion for later
Antonio J. Fernandez Ares, 9/22/2011

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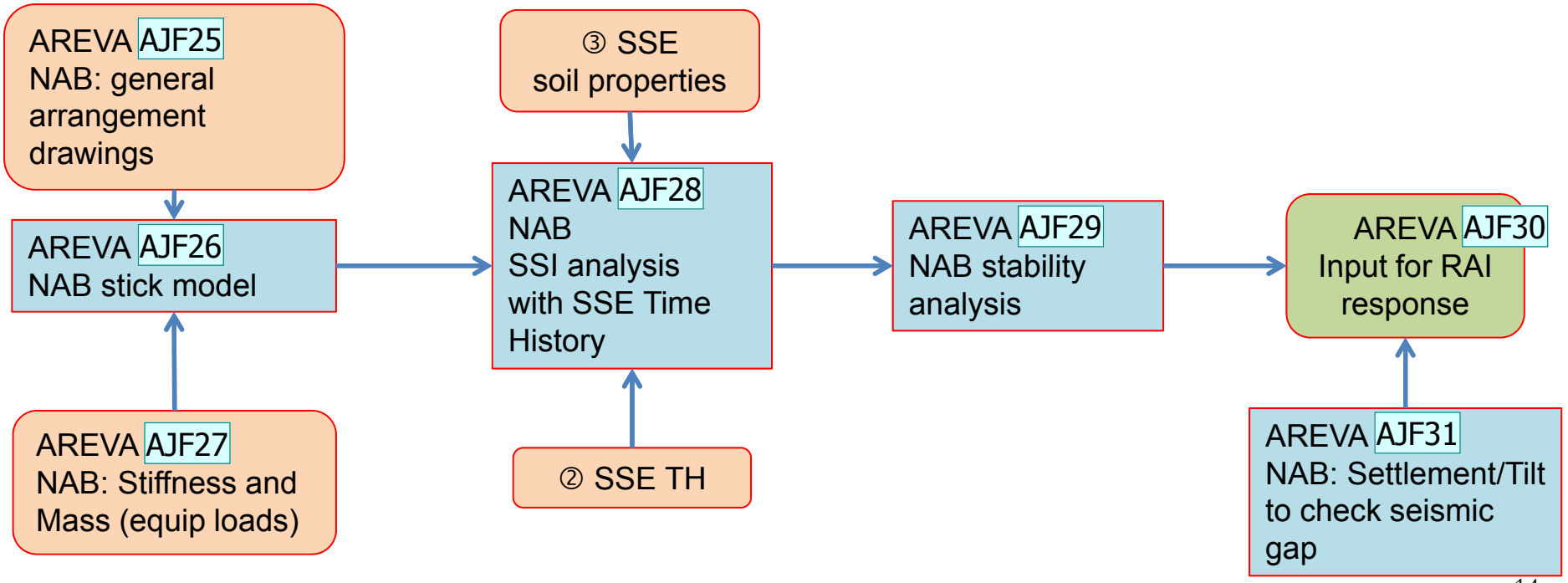
Antonio J. Fernandez Ares, 9/22/2011

AJF23 Remove name
Antonio J. Fernandez Ares, 9/22/2011

AJF24 Remove name
Antonio J. Fernandez Ares, 9/22/2011

Seismic Analysis Process

- Confirmatory Analysis process
  - Nuclear Auxiliary Building (NAB) seismic stability
  - Response Scheduled for June 15, 2012



Slide 14

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Antonio J. Fernandez Ares, 9/22/2011

AJF26 Remove name
Antonio J. Fernandez Ares, 9/22/2011

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Antonio J. Fernandez Ares, 9/22/2011

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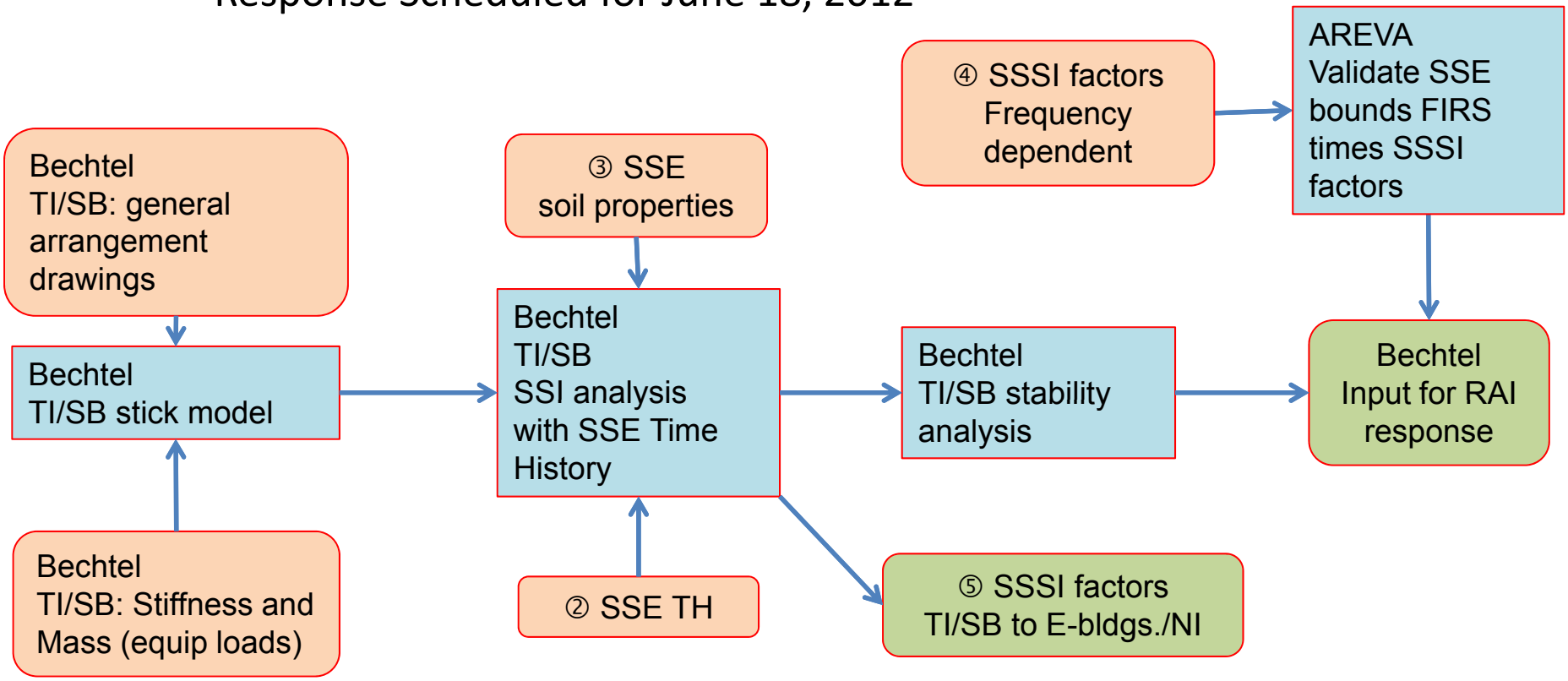
Antonio J. Fernandez Ares, 9/22/2011

AJF31 Remove name
Antonio J. Fernandez Ares, 9/22/2011

Seismic Analysis Process

AJF32

- Design Basis Analysis process
  - Turbine Island/ Switchgear Building (TI/SB) seismic stability
  - Response Scheduled for June 18, 2012



Slide 15

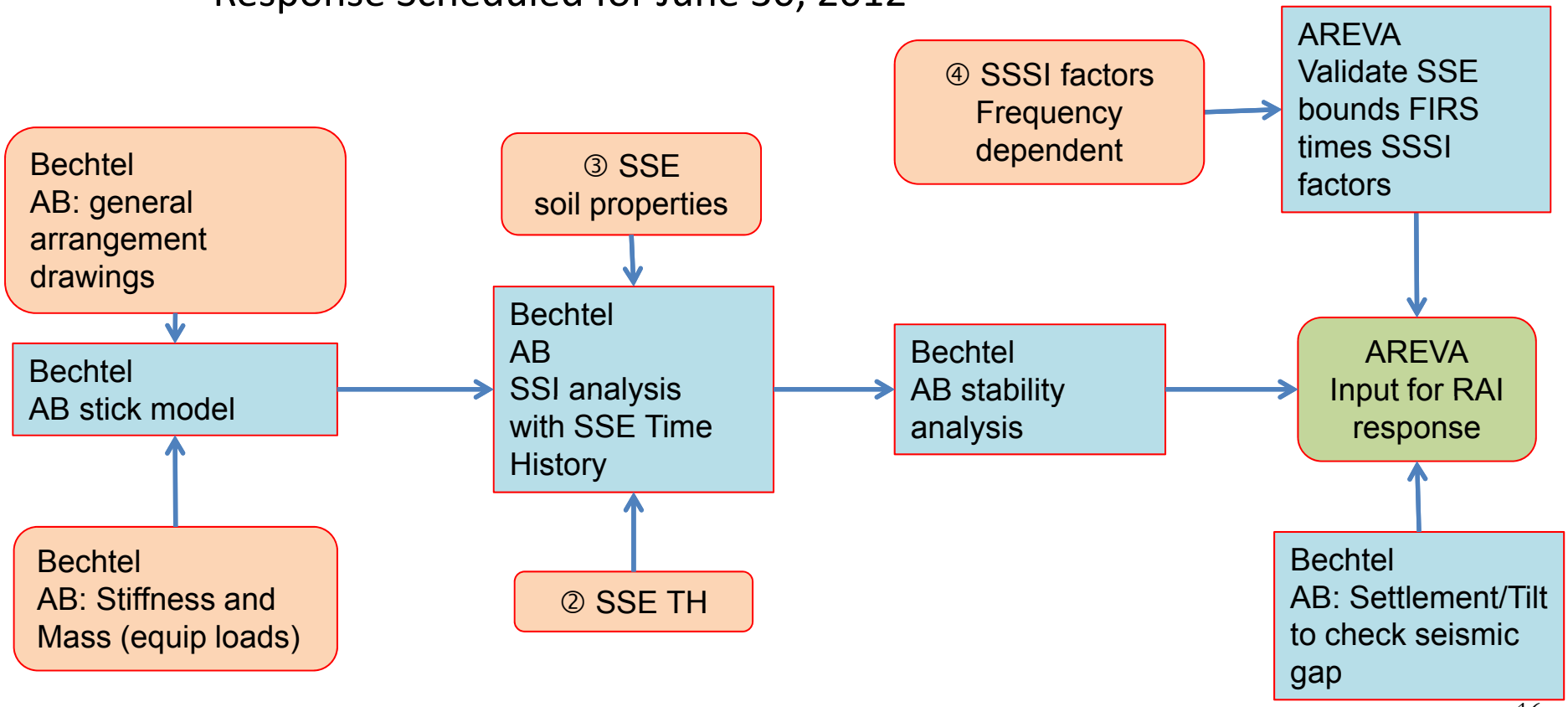
AJF32 Remove names

Antonio J. Fernandez Ares, 9/22/2011

Seismic Analysis Process

AJF33

- Design Basis Analysis process
  - Access Building (AB) seismic stability
  - Response Scheduled for June 30, 2012



Slide 16

AJF33 Remove names

Antonio J. Fernandez Ares, 9/22/2011

Structure Specific Analysis Inputs

- Seismic hazard considered
- Choice of soil columns
- Selection of OBE or SSE damping
- Summary for Category I structures
- Summary for Category II structures

Seismic Hazard Considered

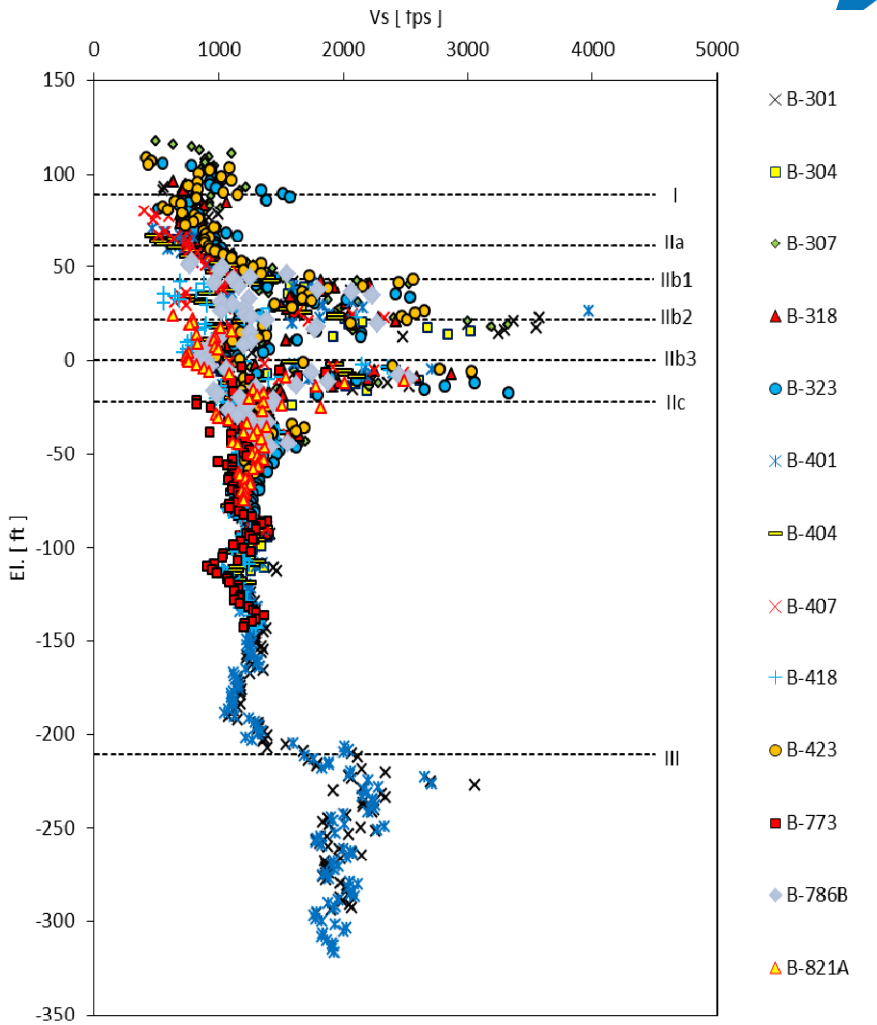
- Analysis of New Madrid influence
  - According to process presented on previous slides
- New EPRI methodology
  - Preliminary insight indicates conservatively selected SSE still bounds new EPRI methodology results
  - Verification performed at a later stage in accordance with methodology to be used for operating plants

Choice of Soil Columns

AJF34

Native Soil Uniformity

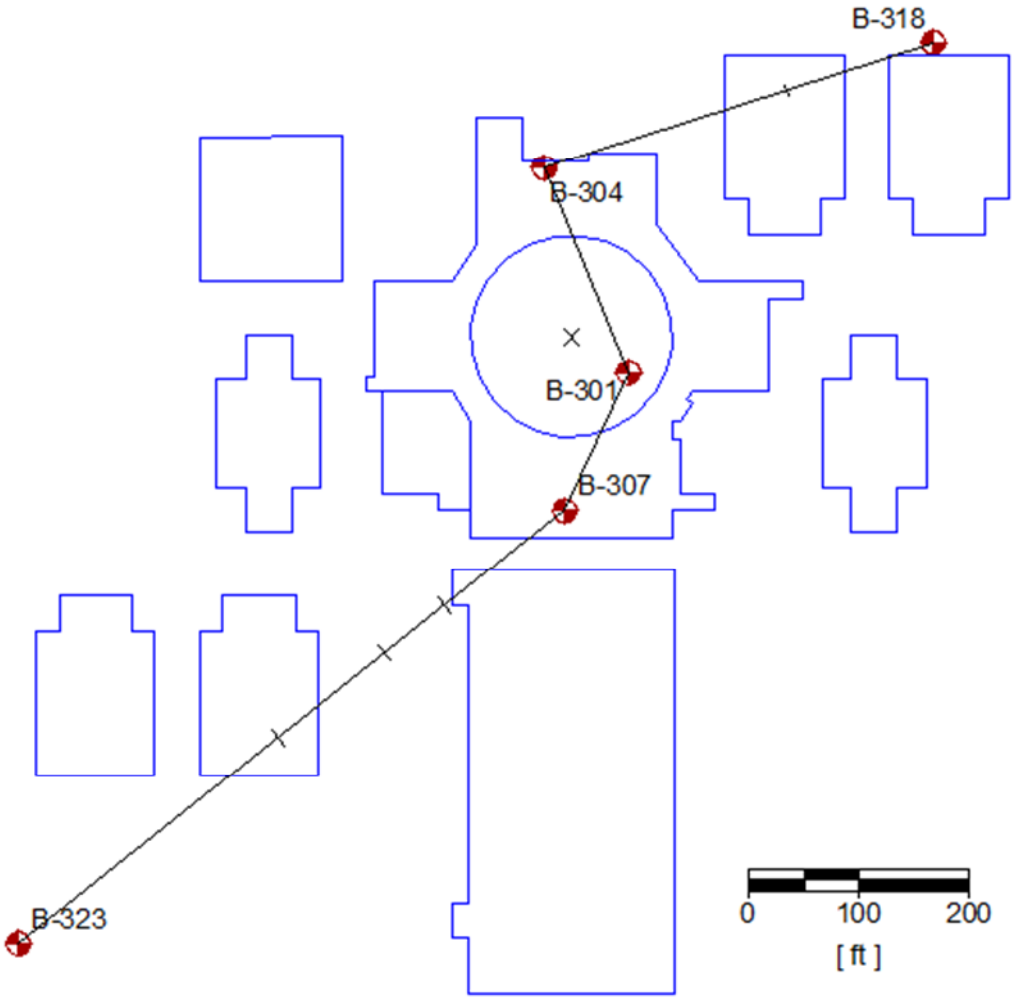
- NRC concern on SWV uniformity
- NRC specific question thru RAI xxx
- Unistar responded by xxxx dated yyyy



Slide 19

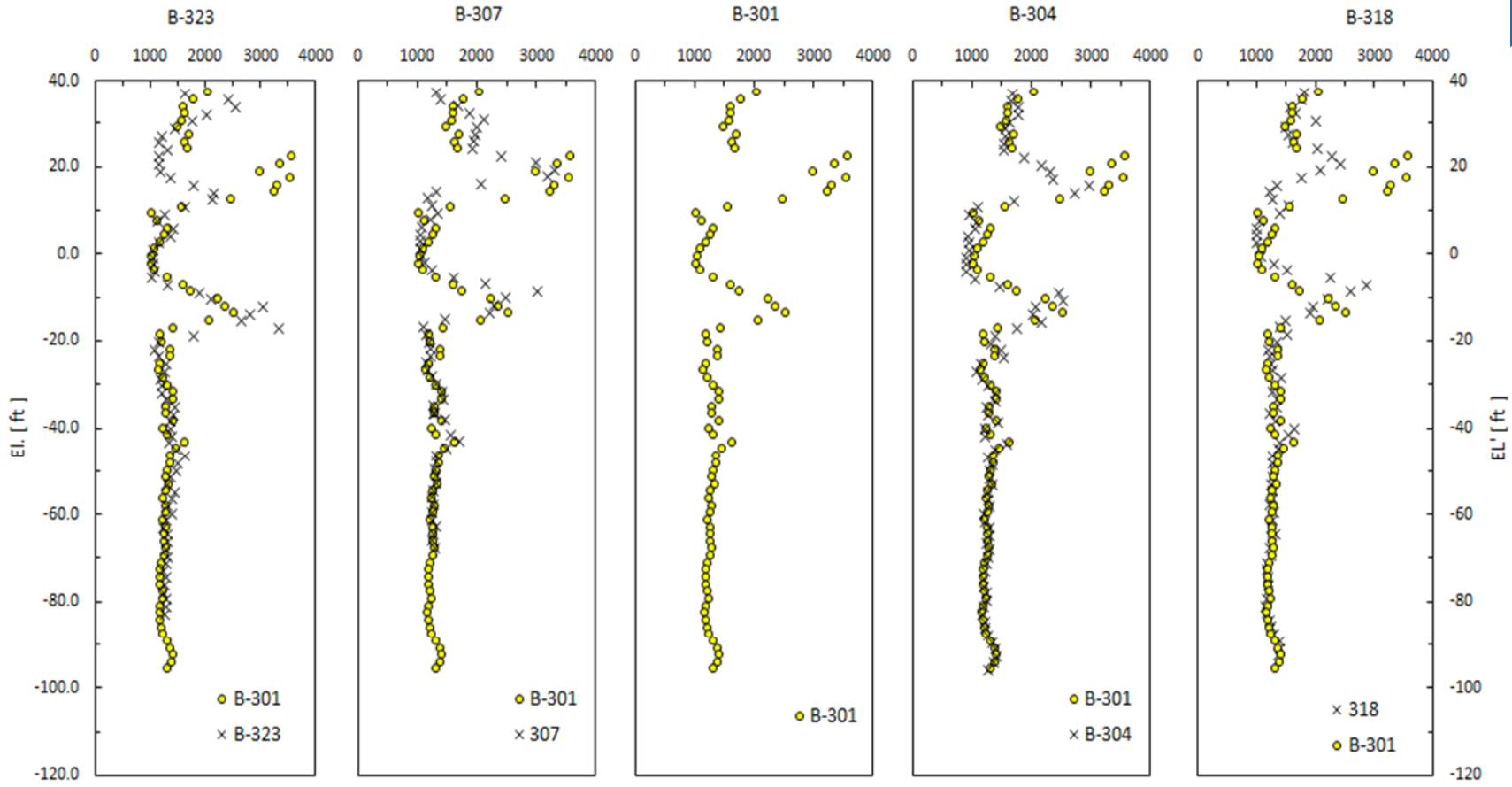
AJF34 Remove slide. This is water under the bridge
Antonio J. Fernandez Ares, 9/22/2011

Choice of Soil Columns



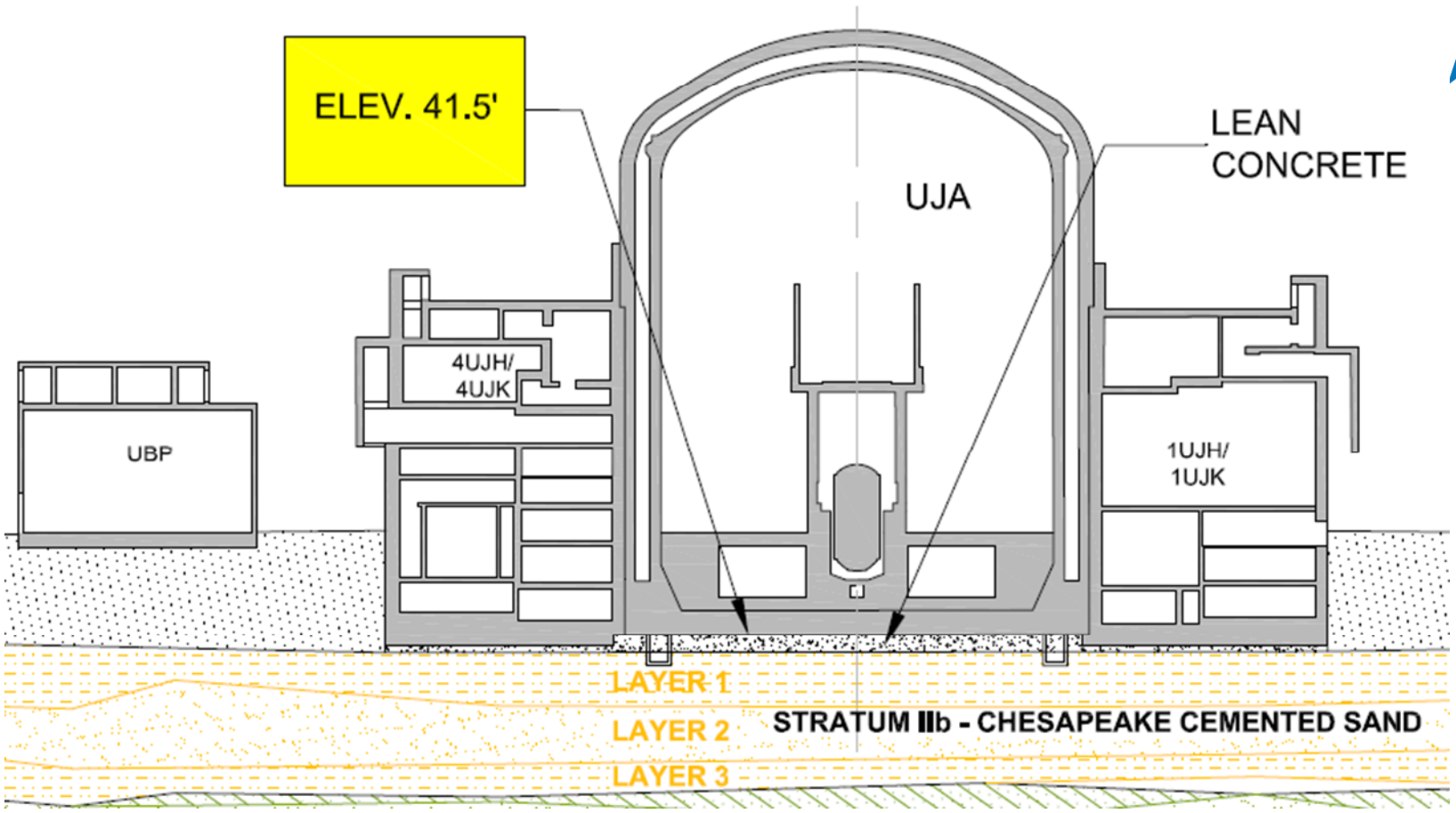
Shear Wave Velocity across Powerblock

Choice of Soil Columns



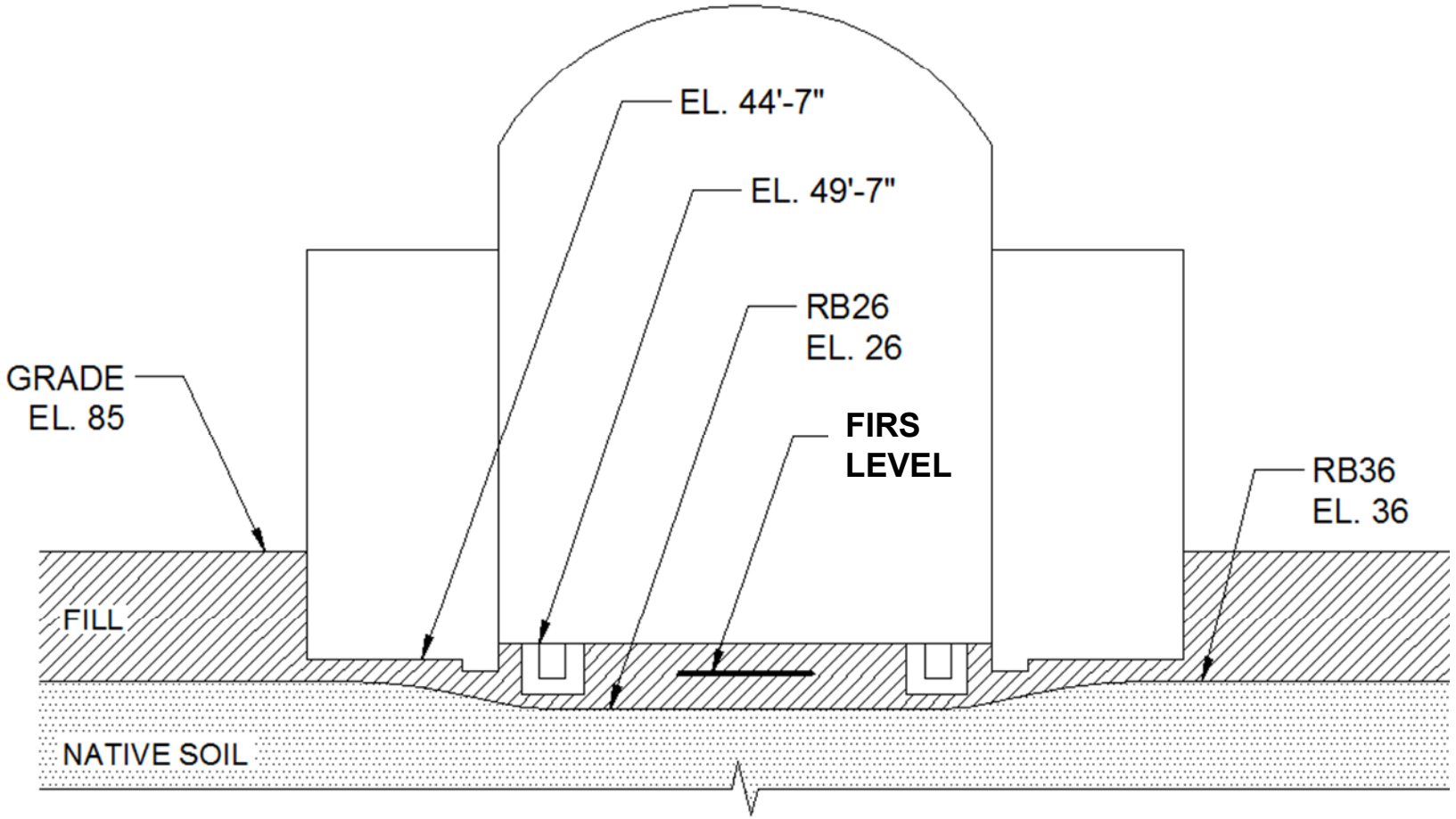
Conclusion: Demonstrates Uniform Site Shear Wave Velocity

Choice of NI Backfill Soil Column



Influence of Backfill: Previous Configuration

Choice of NI Backfill Soil Column

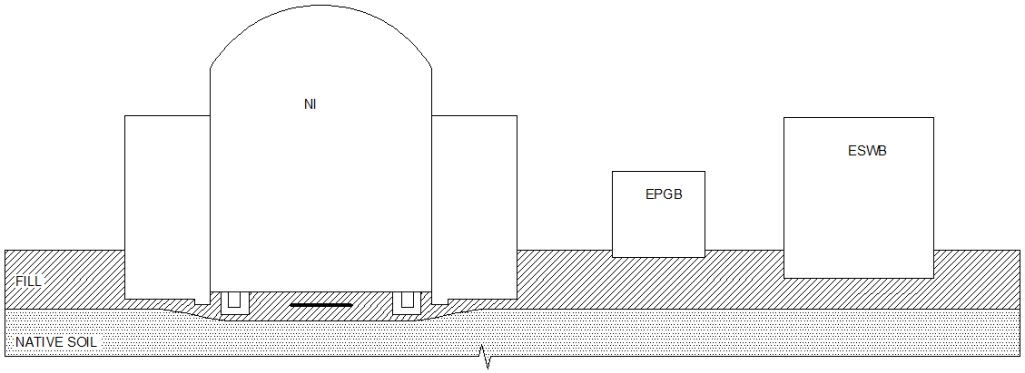


Influence of backfill: New Fill Configuration

Choice of Soil Column: Conclusion

AJF36

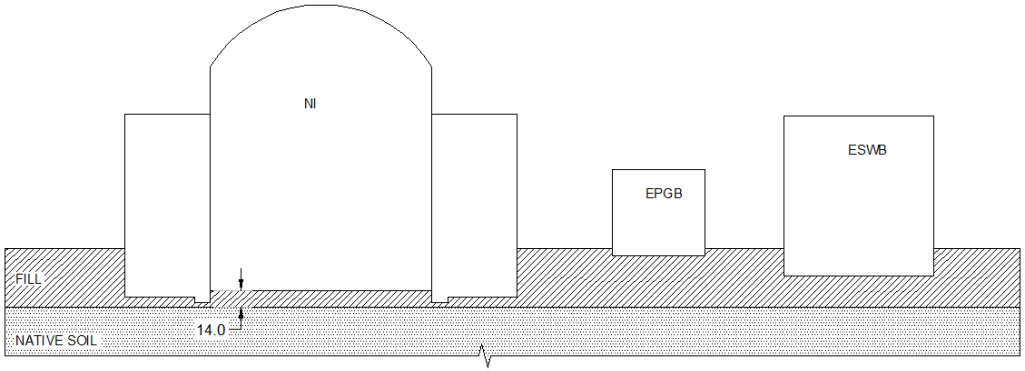
Fill-Native Soil interface elevation is uniform and shear wave velocity profile the same at all locations



One average backfill soil profile is used for each for each group of building

This approach is consistent with:

- The level of accuracy intended for a confirmatory analysis
- The technical capabilities of SASSI software AJF35



Slide 24

AJF35 and the DCD analysis
Antonio J. Fernandez Ares, 9/22/2011

AJF36 We need to include a slide that shows how we are picking the Lower Bound from RB26 and the Upper Bound from RB36.
Antonio J. Fernandez Ares, 9/22/2011

Selection of OBE or SSE Damping

- In developing CCNPP3 In-Structure Response Spectra for comparison with US EPR FSAR spectra, CCNPP3 confirmatory analyses will use OBE structural damping
- Stability analyses of Category II structures will also use OBE structural damping
- Eliminating question of level of deformation compatibility with higher damping

CCNPP3 Inputs Used for Seismic Stability Analyses

- Coefficients of Friction for each of the Seismic Category I and II structures is based on the lowest value for each of the backfill, soil, and waterproofing components (Refer to COLA Figures/Tables xxxx)
- Passive Soil Pressure resistance is conservatively neglected for each of the Seismic Category I and II structures

Structure Specific Analysis Inputs Summary: Category I Structures

Structure	No. of Building Locations/Models	Modeling Technique	Ground Motion Response Spectra*	Foundation Input Response Spectra	Structural Damping	Concrete Cracking Assumption	Backfill Depth	Embedment		No. of Shear Wave Velocity Profiles	Coefficient of Friction & Lateral Earth Pressure
Seismic Category I											
Confirmatory Analyses											
Nuclear Island	1/1	SSI FEM same as US EPR	COLA SSE with New Madrid Influence	Developed from Shake Analysis	OBE Damping	uncracked		40 feet		3 – LB, BE, UB	
Emergency Power Generating Building	2/1	SSI FEM same as US EPR	same	Factored from Shake Analysis and compared against NI SSSI Results	OBE Damping	uncracked		Surface mounted		3 – LB, BE, UB	
Essential Service Water Building	4/1	SSI FEM same as US EPR	same	Factored from Shake Analysis and compared against NI SSSI Results	OBE Damping	uncracked		X feet		3 – LB, BE, UB	
Design Basis Analysis											
Common Basemat Intake Structure	1/1	SSI FEM	same	Developed from Shake Analysis	?	cracked					

Structure Specific Analysis Inputs Summary: Category II Structures

Structure	No. of Building Locations/Models	Modeling Technique	Foundation Input Response Spectra	Structural Damping	Concrete Cracking Assumption	Backfill Depth	Embedment		No. of Shear Wave Velocity Profiles	Coefficient of Friction & Lateral Earth Pressure
Seismic Category II Stability Analyses										
Confirmatory Analyses										
Nuclear Auxiliary Building	1/1 – combined with NI Model	SSI Stick same as US EPR	Developed from Shake Analysis	SSE Damping	cracked					
Design Basis Analyses										
Combined Turbine Island/Switchgear Building	1/1	SSI FEM	Developed from NI SSSI Analysis	SSE Damping	cracked					
Access Building	1/1	SSI Stick	Developed from NI SSSI Analysis	SSE Damping	cracked					

Differences between U.S. EPR FSAR Generic Seismic Analyses and CCNPP3 Analyses

- OBE versus SSE Damping
  - US EPR FSAR uses SSE damping, CCNPP3 uses OBE damping
- Concrete Cracking
  - US EPR FSAR analyzes both cracked and uncracked concrete, CCNPP3 analyzes only uncracked
- Coefficient of Friction for Building Stability Analyses
  - US EPR FSAR uses 0.5, CCNPP3 uses lower site-specific values
  - US EPR FSAR uses 0.36 for EPGB side walls, CCNPP3 does not take benefit of side wall friction

Differences between U.S. EPR FSAR Generic Seismic Analyses and CCNPP3 Analyses

- Passive Soil Pressures for Stability Analyses
  - US EPR FSAR includes benefit of resisting pressures in stability analyses, CCNPP3 does not
- Passive Soil Pressures for the Design of Embedded Walls
  - US EPR FSAR is designed for generic values, CCNPP3 site-specific values are compatible with the generic design