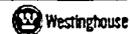

AP1000 Structural Design NRC Meeting December 15 - 17, 2003

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Open Items from October Meeting

DSER OI and Subject	Action Item
3.8.2.1-1 Containment vessel design	External pressure plus SSE, as discussed in October, transmitted to NRC (12/12/03) Design Specification APP-MV50-Z0-001, Rev 1 issued <ul style="list-style-type: none">• seismic design loads using reduced concrete stiffness• miscellaneous masses defined as dead loads as well as mass Spacing between stiffeners defined as Tier 2* in DCD Rev 8 Design calculation APP-MV50-S2C-006, Rev 1 issued <ul style="list-style-type: none">• Justifies that loads and load combinations evaluated envelope all specified cases.• Evaluates and reconciles new seismic loads.
3.8.3.5-2 Containment Internal Structures Summary Report	CIS Summary report and DCD reviewed for consistency CIS Summary report APP-1100-S3R-001, Rev 1 issued <ul style="list-style-type: none">• IRWST steel wall summary clarified (AISC versus ASME for thermal evaluation)• Added reference to reconciliation report DCD Rev 8 includes corrections Reconciliation report APP-1000-S3R-001, Rev 1 issued <ul style="list-style-type: none">• IRWST steel wall and Operating floor column reconciled
3.8.4.5-2 Reinforcement design macro	Implementation of guidance on use of macro documented in APP-1000-S3R-001, Rev 1

Note: Documents in bold are available for audit



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Open Items from October Meeting (continued)

DSEI OI and Subject	Action Item
19A.2-8 Seismic Margins – Effect of Uplift	<p>Calculation APP-1000-S2C-064, Rev 2 issued</p> <ul style="list-style-type: none"> • Footprint revised from equivalent rectangle to actual plan • Damping increased for RLE • Parametric analysis to justify treatment of soil mass <p>Double lift off of CIS/SCV and NI basemat</p> <p>Shear studs added in DCD Rev 8 on outside of containment vessel</p> <p>Calculation APP-1100-S2C-101, Rev 1 issued showing response of CIS alone</p> <p>Calculation APP-PRA-GSR-002, Rev 1 issued</p> <ul style="list-style-type: none"> • Effect on HCLPFs of high frequency response due to impact.

Note: Documents in bold are available for audit



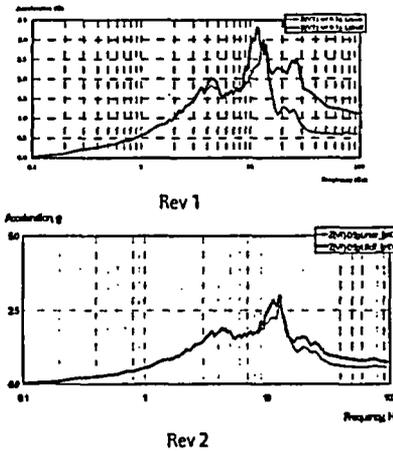
Slide 3



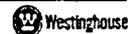
Open Item 19A.2.8 Nuclear island uplift

- Analyses updated since October meeting
- Actual footprint with increased width relative to equivalent rectangle
- Damping increased for RLE

Vertical Floor Response Spectra of ASB Node at EL. 116.50'



Slide 4



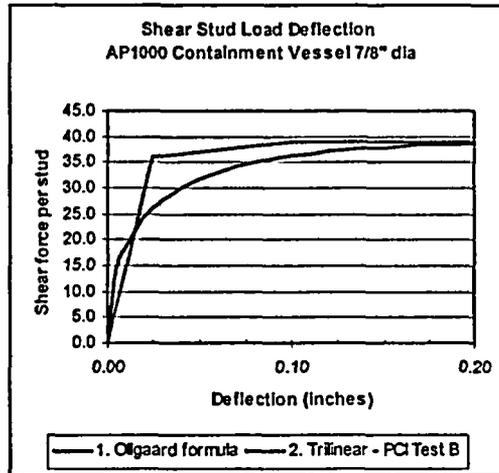
Containment Vessel Shear Studs

- Shear studs added on outside of vessel to resist seismic overturning and sliding at the review level earthquake of 0.5g.
- Shear studs must function after containment pressurization to test pressure
- CIS lift off from SCV demonstrated to be negligible at review level earthquake (RLE)

Load transfer from containment vessel to concrete

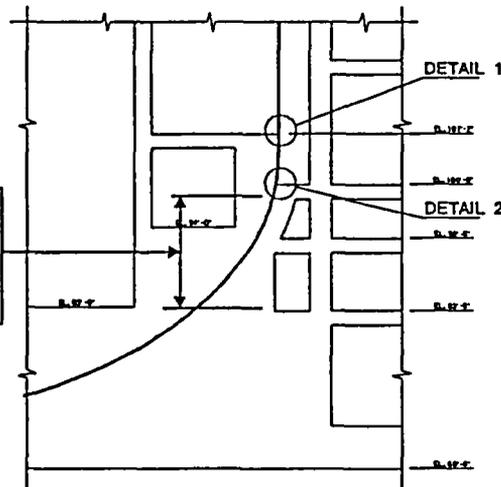
- **Load transfer mechanisms**
 - Friction due to dead load and pressure normal forces
 - Bond
 - Shear studs
- Shear studs sized initially to resist RLE overturning
- Shear studs must function after containment pressurization. This controls the design of the studs with conservative assumptions on bond and friction.

Shear stud load deflection



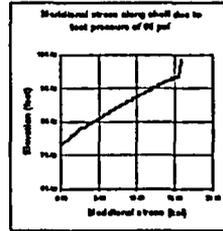
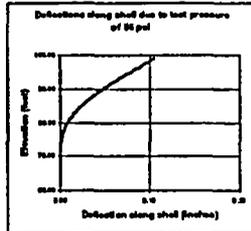
Containment Vessel Shear Studs

16 rows of studs welded on outside at 1.5 degrees and 1' 0" vertical spacing (elevations 83' 6" to 98' 6")

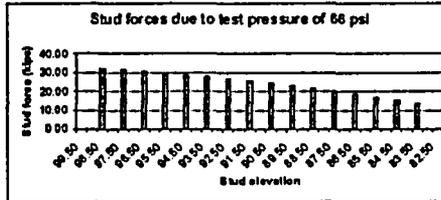


Response to test pressure with shear studs

No bond between steel and concrete
 Coefficient of friction equals 0.4
 Dead load distributed over 55' radius
 Stud deflection per Ollgaard



$\mu = 0.40$ Max defl = 0.105 inches Max stud deflection 0.0538 inches



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