

SeabrookLANPEm Resource

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Sent: Tuesday, June 06, 2017 8:38 AM
To: Poole, Justin
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Recipients:
"Poole, Justin" <Justin.Poole@nrc.gov>
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License Amendment Request 16-03 ASR Expansion and Structures Monitoring

June 2017

Reconciliation of CLB to account for ASR loads

The changes in LAR 16-03 include:

- Establishes limits for the allowable level of ASR concrete expansion based on the MPR/FSEL large scale test programs to ensure no adverse effects on concrete capacity
- Revises UFSAR to include ASR as a design basis load that must be evaluated with other loads on seismic Category I structures
- Defines a process to analyze loads that arise from structural deformation caused by ASR, including limits on the allowable extent of building deformation to maintain margin to design code acceptance limits in ACI 318-71 and the ASME Code
- Establishes a program to monitor structural deformation and ASR concrete expansion to ensure limits for ASR expansion and structural deformation are not exceeded

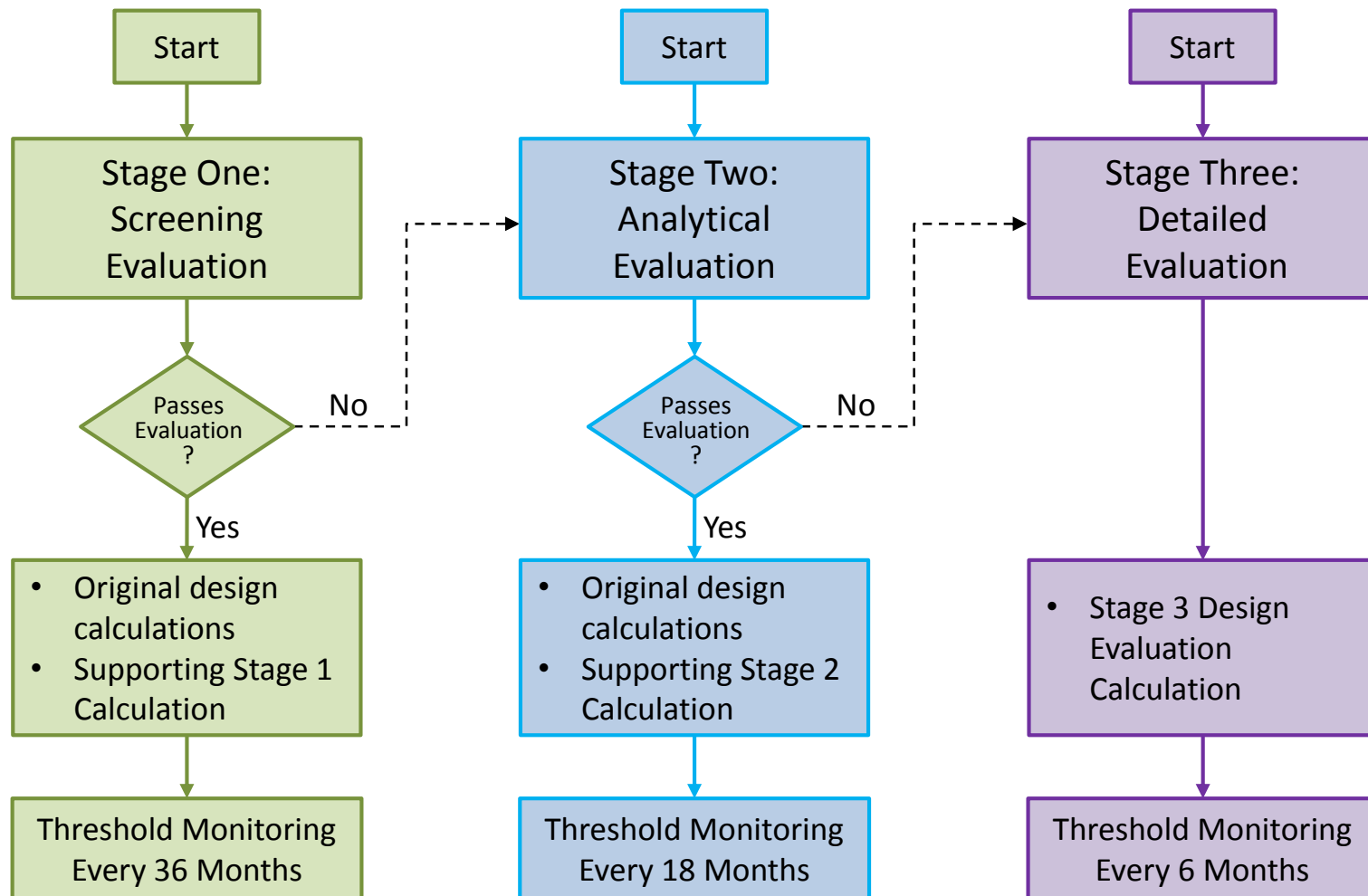
Building Deformation Analyses

- **Purpose**
 - Confirm compliance with original design codes considering
 - Impact of ASR on structural capacity and demand
 - Building deformation from ASR expansion
- **Scope**
 - All seismic Cat I and selected non-Cat I structures

Building Deformation Analysis Approach

- **ASR load factors are developed to include ASR loads in design basis load combinations**
 - ACI 318-71 and 1975 Edition of ASME B&PV Section III Division 2 does not include load factors for ASR
 - Developed load factors consistent with ACI 318-71 and ASME 1975 Edition load factor development
 - Load factors for ASR are included in Tables 3.8-1 and 3.8-16 of the UFSAR
- **Structures evaluated to demonstrate that additional ASR expansion is permissible**
 - Margin is included in the acceptance criteria for each stage to ensure that additional deformation does not challenge design limits
 - A higher level of deformation is analyzed relative to current measurements to set the threshold for monitoring

Building Deformation Analyses



Note: For more complex structures, the evaluation may start at Stage Two or Stage Three.

Building Deformation Analyses – Status Summary

Methodology Documents

- **Criteria Document for deformation analyses (160268-CD-01):**
 - Rev. 0 issued on 20 Oct. 2016
 - Rev. 1 issued on 12 Jan. 2017 (NextEra FP101083)
 - Incorporates revisions suggested during 26 Oct. 2016 audit meetings with NRC, including:
 - Adds checklist & guidelines for “parameters monitored”
 - Adds checklist for documents to review
 - Adds guidelines for selection of starting stage
 - Emphasizes use of expansion measurements rather than CI for threshold monitoring (subsequent to establishing baseline expansion) for increased accuracy
 - Clarifies procedure to compute ASR strain when some of the cracks at a Cracking Index location are caused by mechanisms other than ASR
- **Load factors for ASR expansion**
 - Rev. 0 of summary report (160268-R-01, FP101039) issued on 27 July 2016
 - Rev. 0 of basis calculation (160268-CA-01, FP101042) issued on 27 July 2016

Building Deformation Analyses (1 of 2)

Structure	Criteria	Schedule	Percent Complete
Condensate water storage tank	Rev. 0	Complete	100%
Containment enclosure building	**	Complete	100%
Containment enclosure ventilation area	Rev. 1	Complete	100%
Containment structure	Rev. 1	Complete	100%
Equipment hatch missile shield	Rev. 0	Complete	100%
Steam generator recovery blowdown bldg.	Rev. 1	Complete	100%
Control room make-up air intake	Rev. 1	2Q2017	95%
Electrical cable tunnels	Rev. 1	2Q2017	30%
Pre-action valve building	Rev. 1	2Q2017	70%
RHR equipment vault	Rev. 1	2Q2017	90%
Containment internal structures	Rev. 1	3Q2017	20%
Main steam and feed water east pipe chase Hydrogen recombiner structure	Rev. 1	3Q2017	10%
Safety-related electrical duct banks and manholes	Rev. 1	3Q2017	40%
Emergency feedwater pump building	Rev. 1	3Q2017	
Fuel storage building	Rev. 1	3Q2017	50%

Structures that are/expected to be Stage 3

** Criteria document 150252-CD-03 Rev. 0 was used for the CEB evaluation, all other calculations use criteria document 160268-CD-01.

Building Deformation Analyses (2 of 2)

Structure	Schedule
Control Building Diesel Generator Building	4Q2017
Mechanical Penetration Personnel hatch area Main steam and feed water west pipe chase	4Q2017
Primary auxiliary building	4Q2017
Intake transition structure (Non-Category I)	4Q2017
Service water cooling tower including switchgear rooms	1Q2018
Service water access (inspection) vault	1Q2018
Discharge transition structure (Non-Category I)	1Q2018
Circulating water pumphouse (below el. 21')	2Q2018
Service water pumphouse	2Q2018
Piping (RCA) Tunnels	2Q2018
Tank farm area	2Q2018
Waste processing building	2Q2018

■ Structures that are/expected to be Stage 3

Deformation Evaluations Calculations Issued Since Submittal of LAR

Structure	Calculation	Site Visit Report	Status
Containment Enclosure Building (CEB)*	150252-CA-02 Rev. 0	150252-SVR-01 Rev. 1 150252-SVR-02 Rev. 1 160268-SVR-03 Rev. 0 150252-SVR-03 Rev. 0 150252-SVR-05 Rev. 0	Complete
Containment Equipment Hatch Missile Shield	160268-CA-02 Rev. 0	160268-SVR-01 Rev. 0	Complete
Condensate Storage Tank (CST) Enclosure	160268-CA-03 Rev. 0	160268-SVR-02 Rev. 0	Complete
Containment Building	160268-CA-04 Rev. 0	160268-SVR-04 Rev. 0	Complete
Containment Enclosure Ventillation Area (CEVA)	160268-CA-05 Rev. 0	160268-SVR-05 Rev. 0	Complete
Residual Heat Removal (RHR) Equipment Vaults	160268-CA-06 Rev. A	160268-SVR-06 Rev. B	Draft
Steam Generator Blowdown Recovery Building	160268-CA-07 Rev. 0	160268-SVR-07 Rev. 0	Complete
Control Room Makeup Air Intake	160268-CA-08 Rev. A	160268-SVR-08 Rev. A	Draft

* CEB evaluation was performed prior to submittal of LAR.

Conclusions from Building Deformation Analyses

- **For all completed structural evaluations:**
 - Used consistent and repeatable methods of analysis
 - Criteria Document technical basis required no update
 - Structures shown to maintain structural integrity
 - Monitoring locations and associated threshold limits identified and incorporated into SMP
- **Completed structures have been monitored against threshold limits:**
 - CEB threshold monitoring:
 - 160268-SVR-03 Rev. 0 (for measurements in Oct. 2016)
 - 170400-SVR-03 Rev. 0 (for measurements in April 2017)
 - Equipment Hatch threshold monitoring:
 - OR18 threshold measurements performed (April 2017)