

Seabrook Station
Public Meeting
Safety Implications and Status of
Alkali-Silica Reaction Condition in
Safety Related Structures

Nuclear Regulatory Commission

NRC Representatives



- Christopher Miller – Director, Division of Reactor Safety
- Michele Evans Director – Division of Operating Reactor Licensing
- Richard Conte – Senior Project Manager
- William Cook – Team Leader
- William Raymond – Senior Resident Inspector

NRC Representatives

Karl Farrar



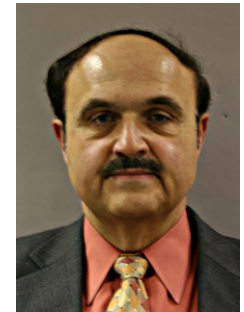
Chris Miller



Michele Evans



Rich Conte



Bill Raymond



Bill Cook



Agenda

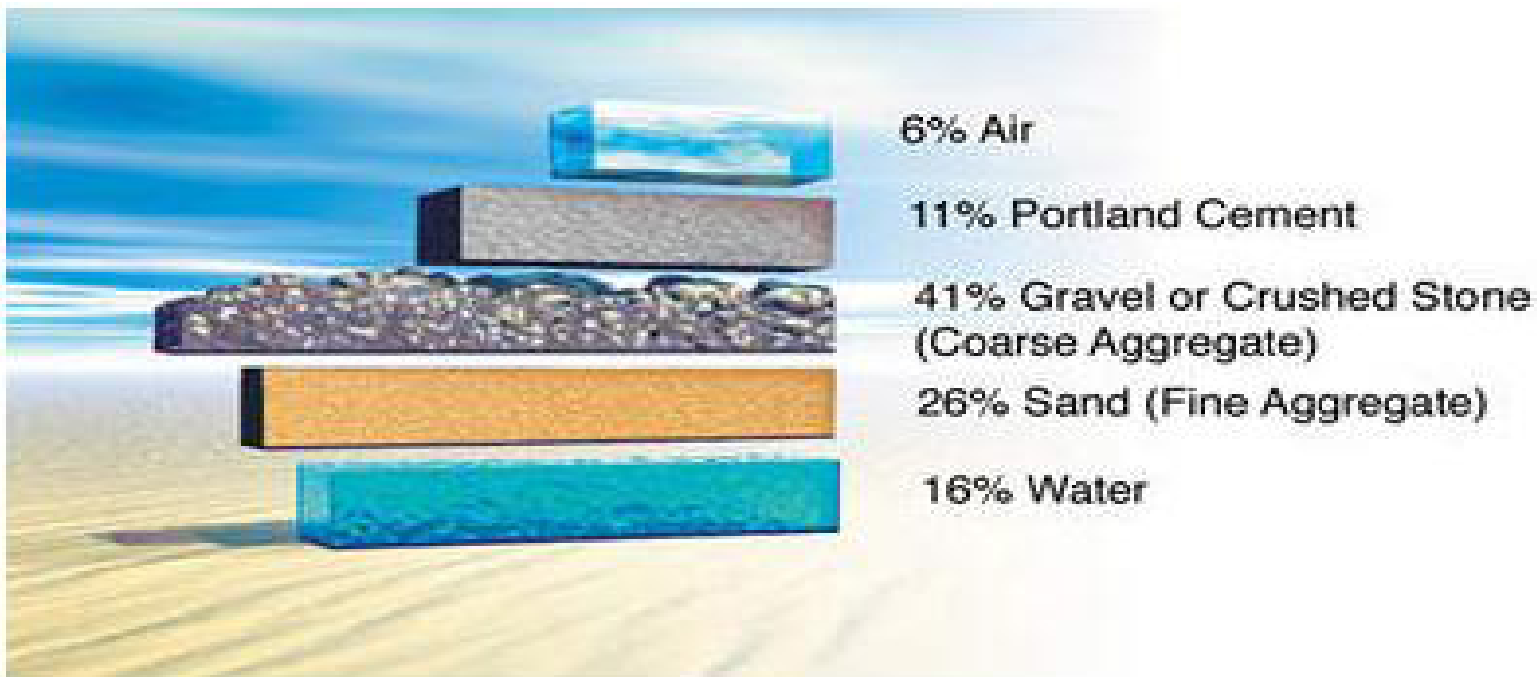
- What is Alkali-Silica Reaction (ASR)
- Virtual Tour of Plant
- Safety Implications
- Inspection Results, to date
- Future Activities
- Closing Remarks
- Respond to Questions



What is ASR?

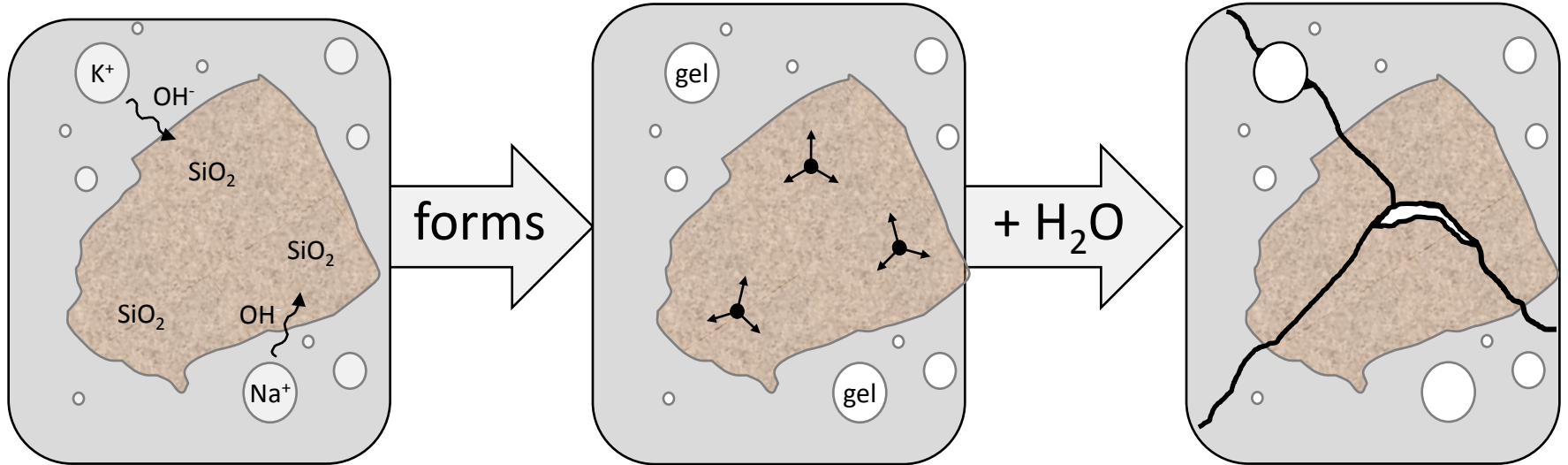
Concrete Ingredients

TYPICAL RATIO OF CONCRETE INGREDIENTS BY VOLUME



What is ASR?

Chemical Reaction



forms

+ H₂O

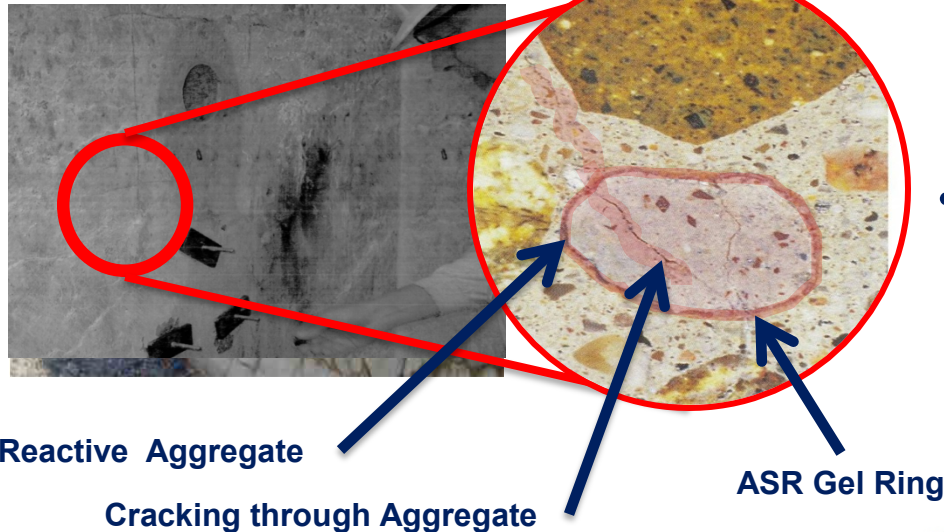
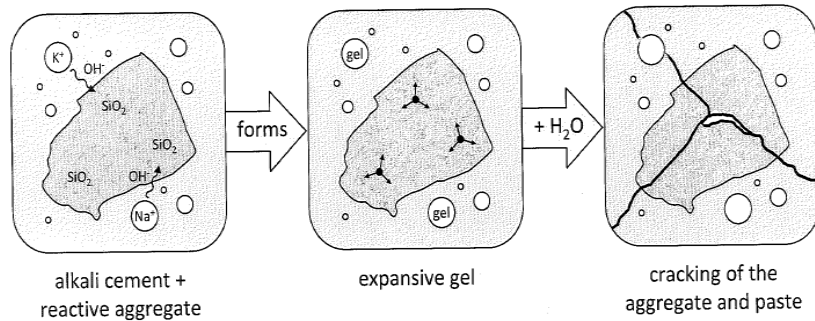
alkali (in cement)
reacts with silica (in
aggregate) and
water

silica gel forms

cracking occurs
as gel expands

What is ASR?

Indications of ASR

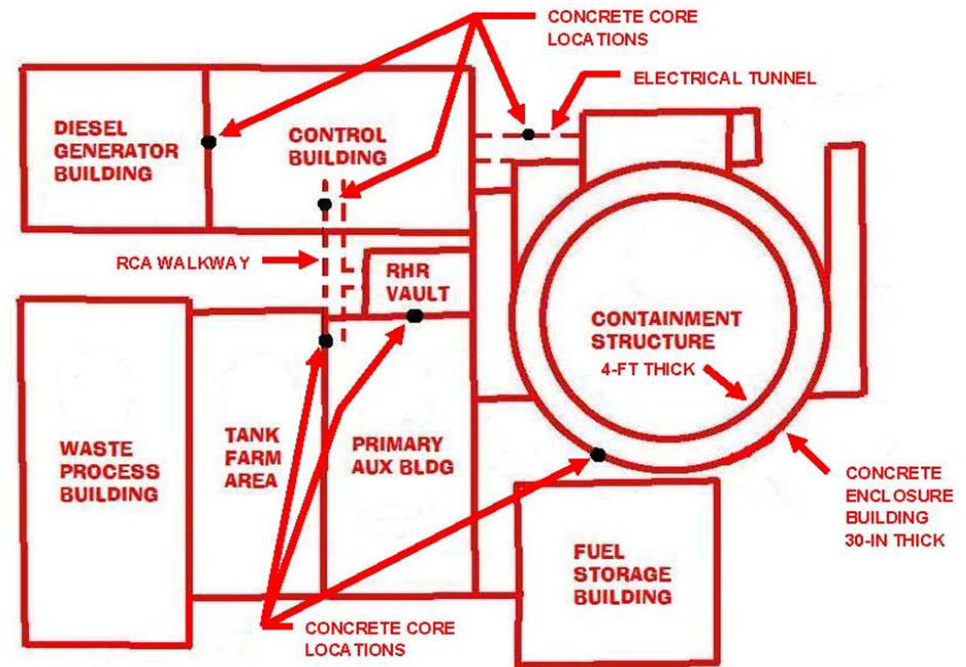


- ASR has been identified in localized areas of Seabrook concrete structures
- ASR is a chemical reaction in concrete, which occurs over time in the presence of water, between the alkaline cement and reactive silica found in some aggregates.
- ASR forms a gel that expands causing micro-cracks that effect concrete material properties

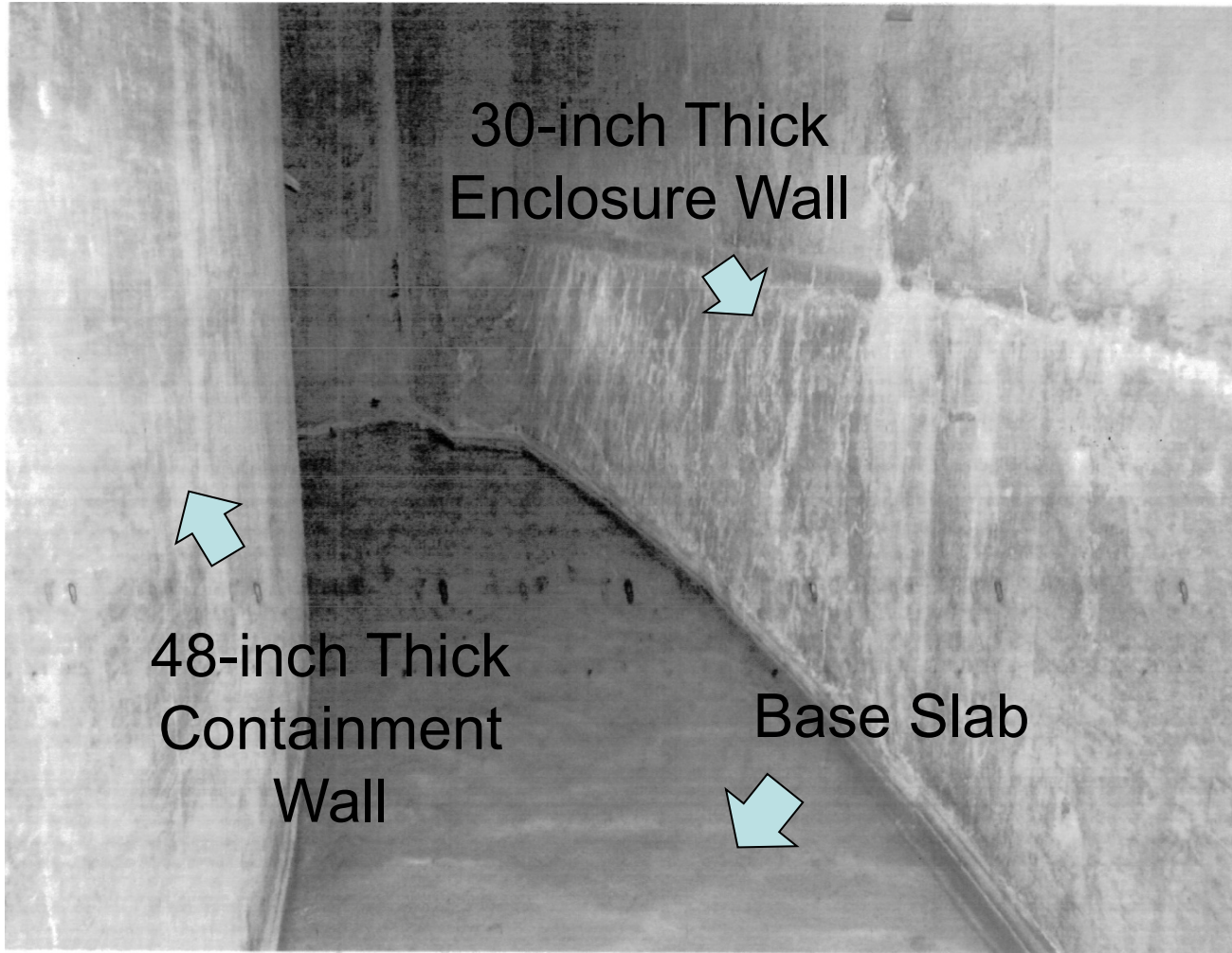
TOUR OF PLANT

Confirmed localized areas of ASR

- Effected Structures include:
 - “B” Electrical Tunnel
 - Containment Enclosure Building
 - Residual Heat Removal Vault
 - Emergency Diesel Generator Building
 - Emergency Feedwater Building



TOUR OF PLANT



Annulus area
between Primary
Containment and
Containment
Enclosure Building

TOUR OF PLANT

Other locations where ASR identified

- Primary Auxiliary Building
- Main Steam/Feedwater Pipe Chase East
- Alternate Cooling Tower
- Service Water Pump House
- Containment

VISUAL CRITERIA

Pattern cracking
Secondary deposits
Staining and discoloration
Deposits of alkali silica gel

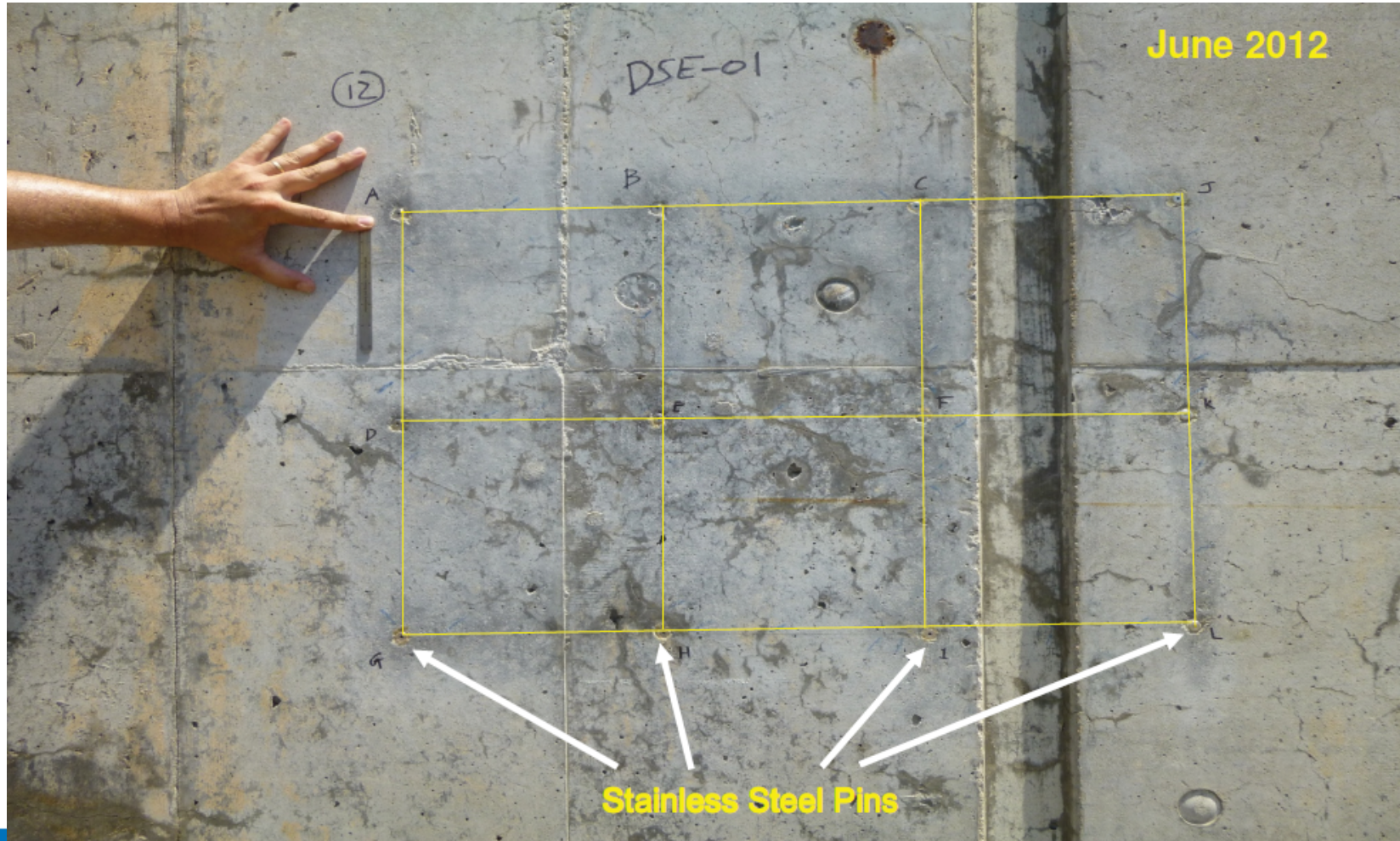
TOUR OF PLANT

Pattern Cracking (approx. 3 ft x 3 ft area)



TOUR OF PLANT

ASR Monitoring Method



SAFETY IMPLICATIONS

- NextEra engineering analysis (independently reviewed by NRC team) confirmed adequate design (safety) margin remains for ASR-affected reinforced concrete structures
- No significant visible deformations, distortions, or displacement identified in affected structures
- No indications of rebar degradation
- ASR limited to localized areas of the effected structures
- ASR degradation progressed slowly



Confirmatory Action Letter (CAL) 1-2012-002



Letter dated May 16, 2012, confirming eleven commitments made by NextEra, during a meeting with the NRC staff on April 23, 2012, associated with corrective actions to address ASR-affected reinforced concrete structures at Seabrook Station.



CAL Commitments

- Revise Prompt Operability Determination (POD) for B electrical tunnel**
- Submit root cause evaluation**
- Submit Interim Assessment**
- Submit integrated corrective action plan**
- Revise POD for buildings identified in extent-of-condition review**
- Complete short term aggregate expansion testing**
- Complete long term aggregate expansion testing**
- Submit technical details of testing plan**
- Update Structures Monitoring Program**
- Perform six-month crack measurements**
- Complete anchor testing program**

INSPECTION RESULTS

Review of Confirmatory Action Letter (CAL) Items (6 of 11 Reviewed, 5 Closed)

- Prompt Operability Determination for “B” Electrical Tunnel (CAL No. 1) - Closed
- Prompt Operability Determination for Other Effected Structures (CAL No. 5) - Closed
- Interim Structural Assessment (CAL No. 3) - Closed
- Complete Mortar Bar Test (CAL No. 6) - Closed
- Initial Six-Month Crack Measurements (CAL No. 10) - Closed



INSPECTION RESULTS

Other Areas Reviewed

- NextEra's inspection of structures for evidence of ASR, independently reviewed by NRC staff
- Primary Containment engineering evaluation and operability assessment completed for ASR indications on three areas of the containment exterior surface
- Two issues closed, related to adequacy of operability determinations and engineering analysis calculations effected by ASR



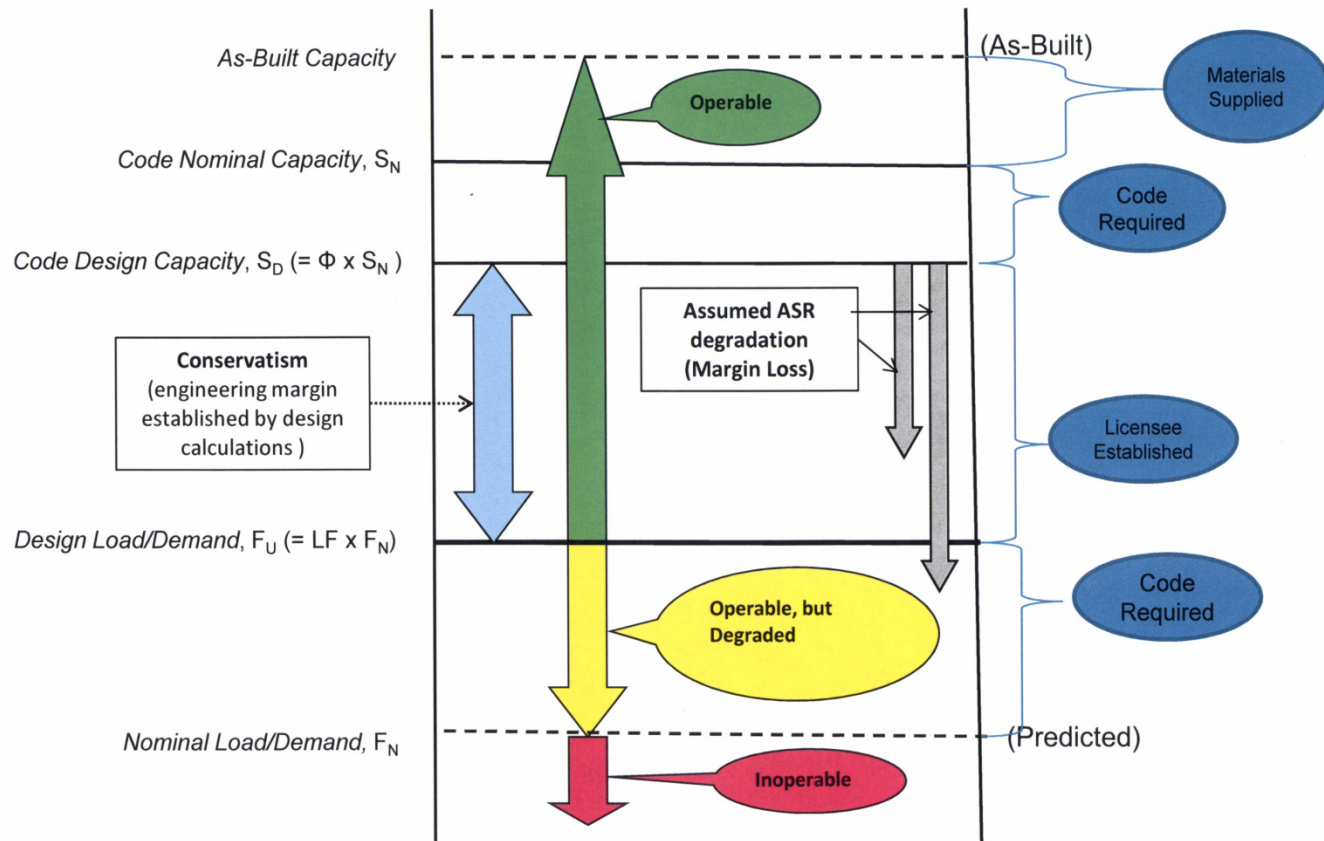
INSPECTION RESULTS

Team Conclusions

- NextEra's methods used for assessing operability of ASR-affected reinforced concrete structures - reasonable and generally comprehensive.
- NextEra's margins assessment provided a reasonable operability basis; the degraded and non-conforming condition is being addressed via a testing program, expected to be completed mid-2014
- NRC staff plans to review NextEra's monitoring and testing program to address uncertainties in evaluating the current level and progression of ASR – early 2013

INSPECTION RESULTS

Margins Assessment



THE FUTURE

What is to be addressed in Next Report?

- Remaining six CAL items:
 - Root cause evaluation
 - Integrated action plan
 - Research and development plan
 - Anchor testing
 - Prism testing
 - Structures Monitoring Program
- Follow-up of observations from first report

CLOSING REMARKS



Chris Miller
Director Division of Reactor Safety



Questions and Answers



List of Key Documents

- Confirmatory Action Letter No. 2012-002, issued May 16, 2012 (ML12125A172)
- Inspection Report No. 05000443/2012009, issued December 3, 2012 (ML12338A283)
- NextEra Letter of May 24, 2012, in response to CAL Item No. 3, provided the Interim Structural Assessment (ML12151A397)



Contacting the NRC



- Report a safety concern
 - 1-800-695-7403
 - allegation@nrc.gov

General questions

- www.nrc.gov
- Region I Public Affairs
 - Diane Screnci, 610-332-5330
diane.screnci@nrc.gov
 - Neil Sheehan, 610-332-5331 or
neil.sheehan@nrc.gov