

2:15 Tues. - May 24
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Seabrook Concrete Degradation – Alkali Silica Reaction

May 24, 2011

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Lead: Ed

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2 1

Alkali-Silica Reaction (ASR)

- Occurs over time in concrete between alkaline cement paste and reactive non-crystalline silica found in common coarse aggregates
- Requires susceptible aggregate and adequate moisture
- Forms a gel that expands and causes microcrack network
- Changes strength of reinforced concrete; reduces stiffness

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Lead: Bryce/Abdul

Provide Pictures Of ASR Examples

Melanie Galloway opened
Working together various offices

License Renewal shed light on important
spring management issue

Unigis design aspect?

Reverge Rep - Canada

Other plants - monitoring, need to know what looking
for

Background

- June 2009 - Licensee begins walkdowns as part of license renewal application preparation; groundwater leakage and extensive cracking of concrete in different plant areas
- April to June 2010 - Licensee tests concrete including penetration resistance testing and 12 concrete cores from affected areas in 'B' Electric Tunnel which showed significant reduction in compressive strength and modulus of elasticity
- August 2010 - Petrographic examination of concrete cores confirms presence of ASR
- September 2010 - Licensee completes prompt operability determination concluding structures are operable

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Lead: Ed

Provide Remaining Pictures

Background (Cont.)

- September 2010 - Licensee issues a design change package to reflect the reduction in strength and modulus of elasticity in the plant licensing basis
- October 2010 – During license renewal audit, NRC staff identified 6 feet of water in containment annulus region
 - When water removed, patterned cracking indicative of ASR identified on both primary containment and containment enclosure building
- May 2011 - Licensee takes concrete cores from 5 additional areas
 - Results of core testing are pending

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Lead: Ed

Problem Summary

- Below-grade concrete structures experiencing groundwater infiltration
- Aging management review found degraded conditions in below-grade areas for several structures
- Degradation mechanism identified as or suspected to be ASR
- First nuclear plant in U.S. to experience ASR

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Lead: Ed

Current Status

- Licensee continuing to develop final operability determination
- NRC overseeing licensee actions and engaging in development of the final operability determination
- Quarterly resident report issued May 12, 2011
 - NCV (green) on failure to adequately monitor the control building for the recent degradation
 - NCV (green) on failure to include transition buildings as in-scope structures in Maintenance Rule monitoring program
 - Design basis not exceeded based on licensee operability determination
- License Renewal Inspection report issued May 23, 2011
 - Report noted that the aging management review for the ASR issue is incomplete
- DE, DLR, DORL and Region I are working together to successfully resolve this issue with respect to Parts 50 and 54

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Lead: Meena

*Meena: Region I doing outstanding job in
communication*

Licensee's Prompt Operability Determination

- Structural integrity of the Control Building was intact
- All systems and components housed within the building were operable and capable of performing their design function
- ASR has resulted in reduction of elastic modulus of concrete and compressive strength in portions of below grade walls
- Developing a comprehensive test and evaluation plan to manage ASR

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Lead: Meena

Licensee Ongoing Actions

- Extent of Condition and Root Cause Review
 - Operability determination on buildings associated with extent of condition review
 - Apparent root cause review for the 10 CFR 50.65 violations
 - Continuing root cause evaluation related to ASR issue
 - Periodic operability assessments as information is developed for the aging management review will be completed

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Lead: Meena

NRC Staff Ongoing Actions (Seabrook Specific)

- Region I preparing a Task Interface Agreement (TIA) to request support from NRR
 - Design change
 - Final Operability determination
- DE, DLR, DORL and Region I continue to work together to address this issue with respect to both Parts 50 and 54
- This issue is currently tracked as an Open Item in the upcoming license renewal SER

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Lead: Ed

While we don't disagree with the supporting information provided by the licensee

*Time of cont.-known phenomenon
Very interested in final Open Rel.
Mitigation*

NRC Staff Ongoing Actions (Generic)

- Preparing generic communication (IN) to inform other licensees about the ASR potential in plants with groundwater leakage; expected issuance next quarter
- Operating Experience group has issued an internal communication and continues to follow the issue for generic applicability

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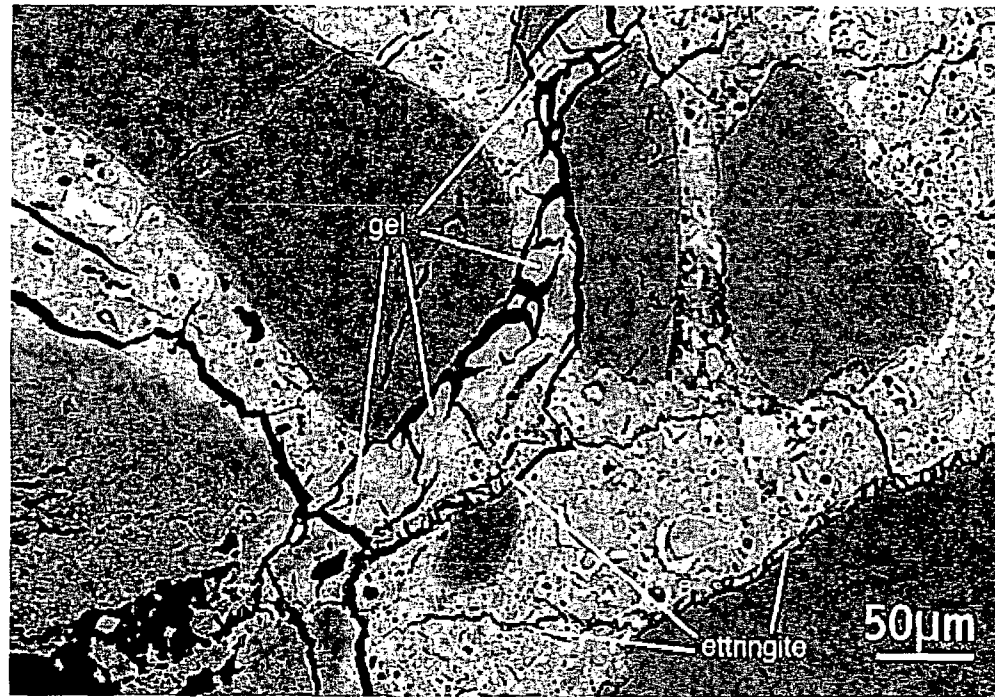
Lead: Ed

ASR on One of the Walls

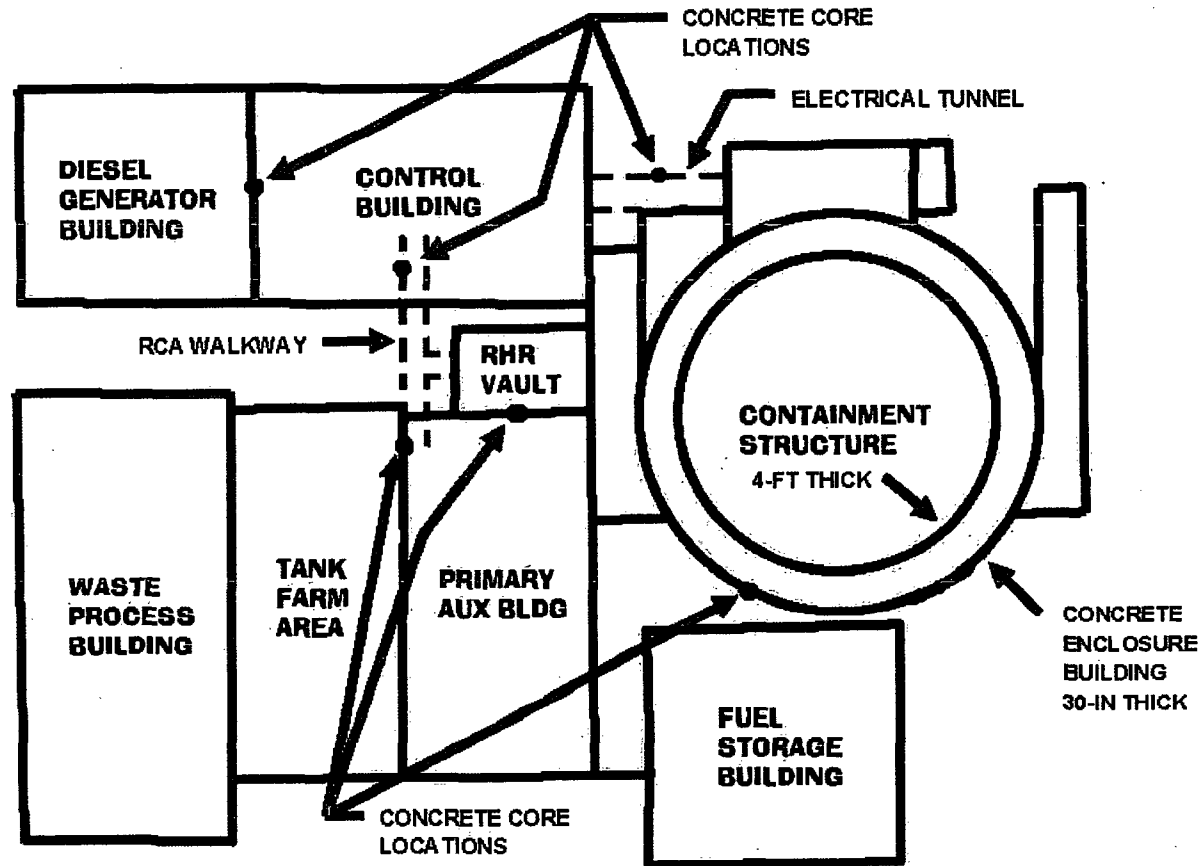


clarified
(in well)
This is Cal.
Carbonate &
Hydroxide

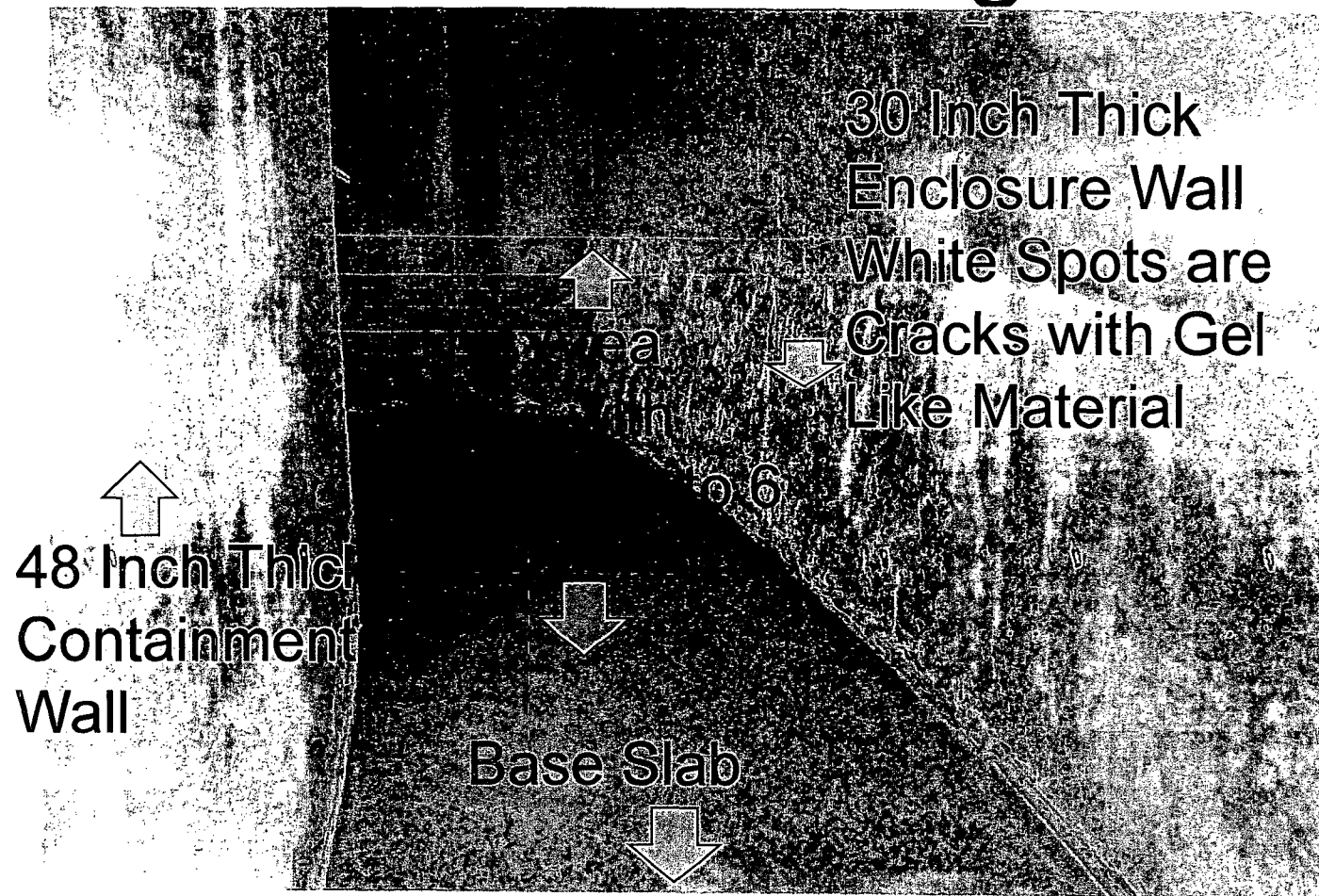
Microscopic Example of ASR



Seabrook Station Plan



Seabrook Containment and Enclosure Building Cracking



Seabrook Electrical Tunnel

