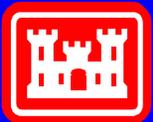


Concrete Damage at Carters Dam

January 2005



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Reregulation Dam – Downstream View



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Reregulation Dam – Downstream View



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Downstream D-2, Lifts 23, 24?



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Upstream D-2

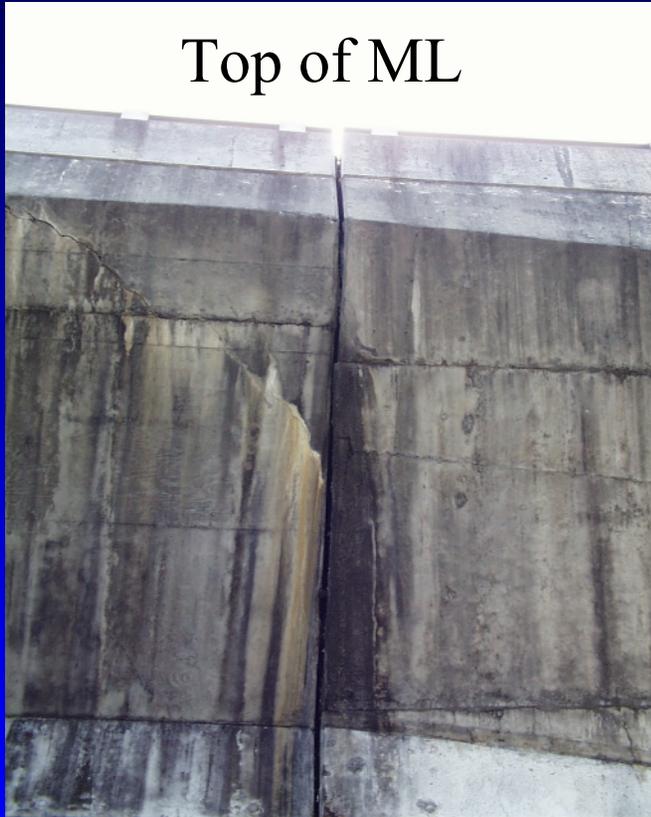


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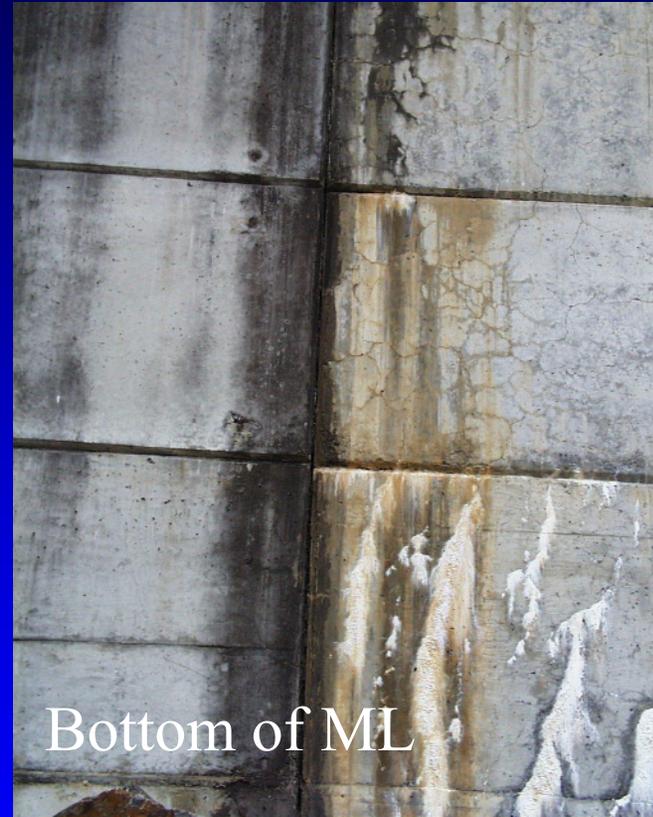
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Downstream Joint - D-8 and D-9

Top of ML



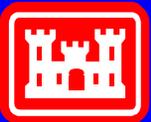
Bottom of ML



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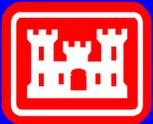
Upstream D-9



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Upstream D-1



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ment Center

Trunnion Block, ML D-8



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Emergency Spillway



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Shaft in ML 11

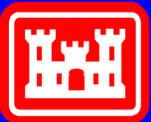


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Aggregate

- Single source – Dalton Quarry
- At least 3 distinct types in the 1.5 and 3 inch sizes
 - One suspected of ACR
 - Problems with ACR rock: Sep – Nov 71

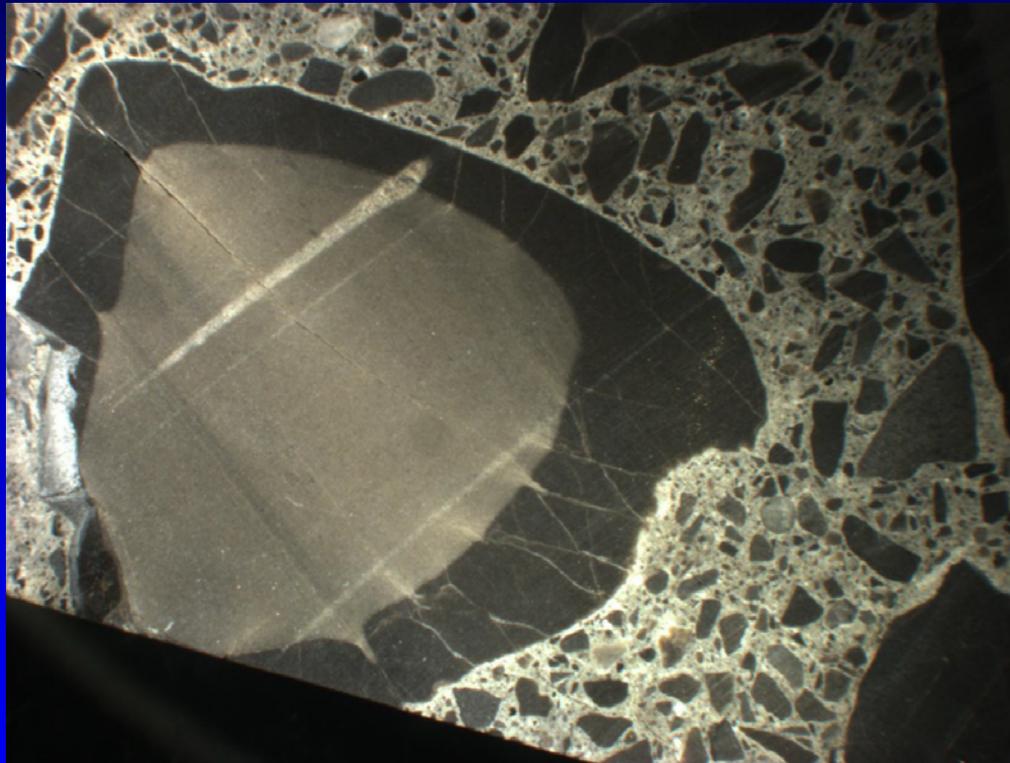


Portland Cement

- 3 sources
 - All low alkali
 - 0.45 – 0.55 $\text{Na}_2\text{O}_{\text{eq}}$
- Pozzolan
 - Probably not

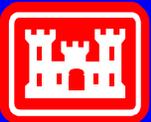
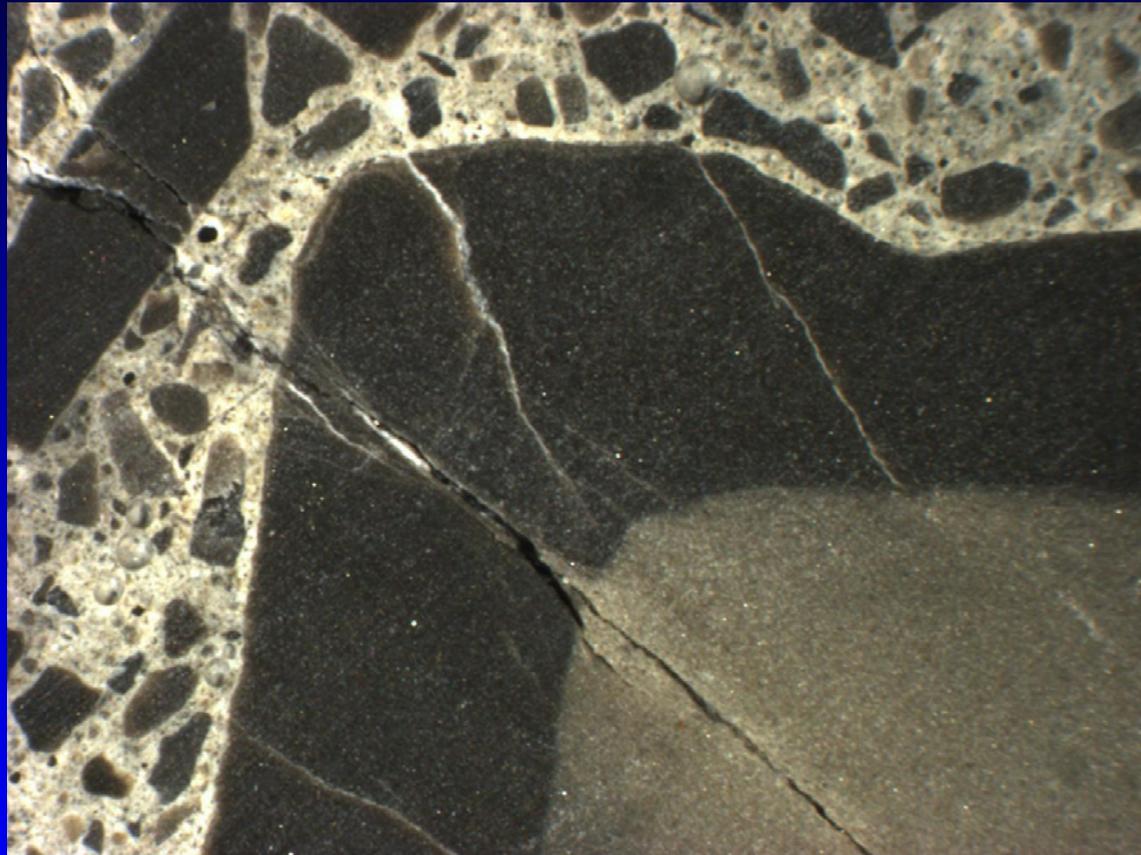


Reactive Pieces



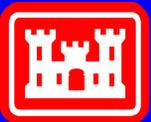
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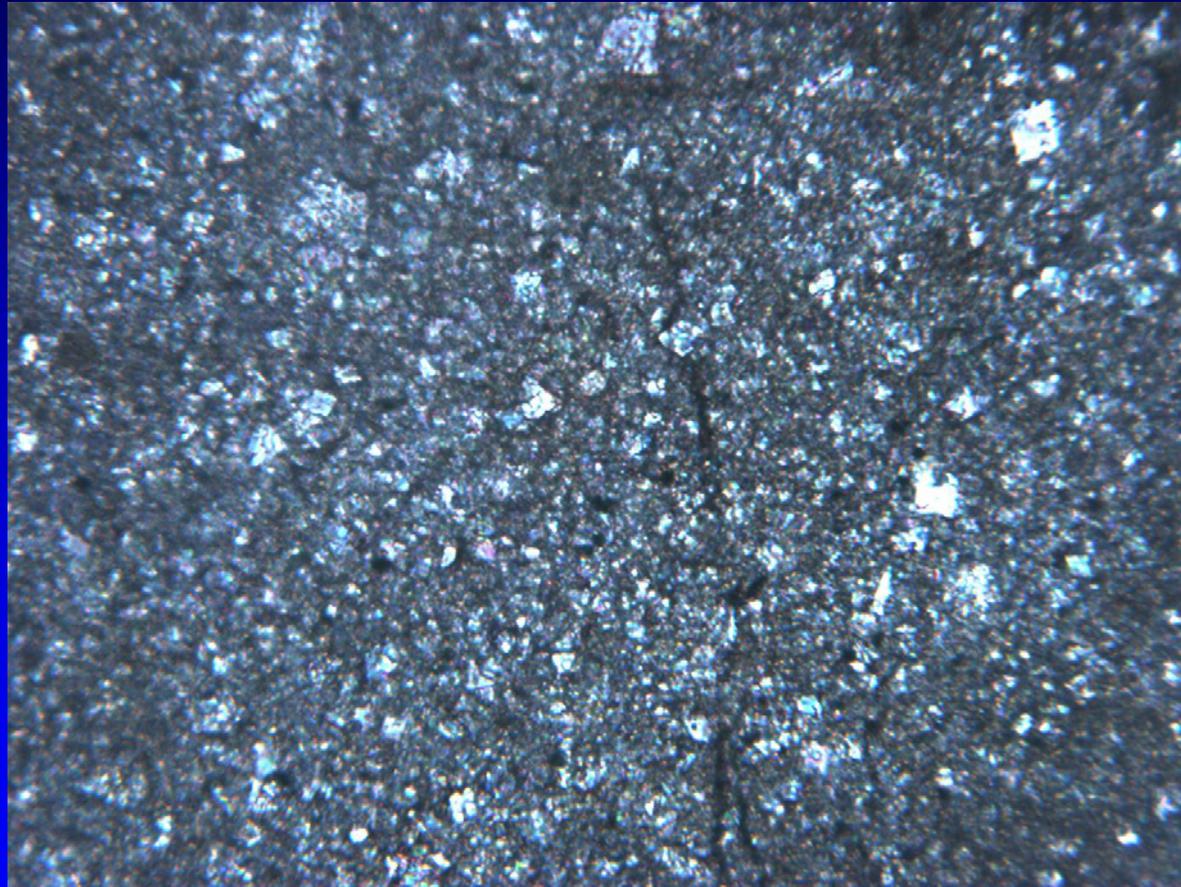
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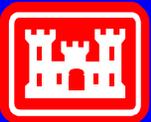
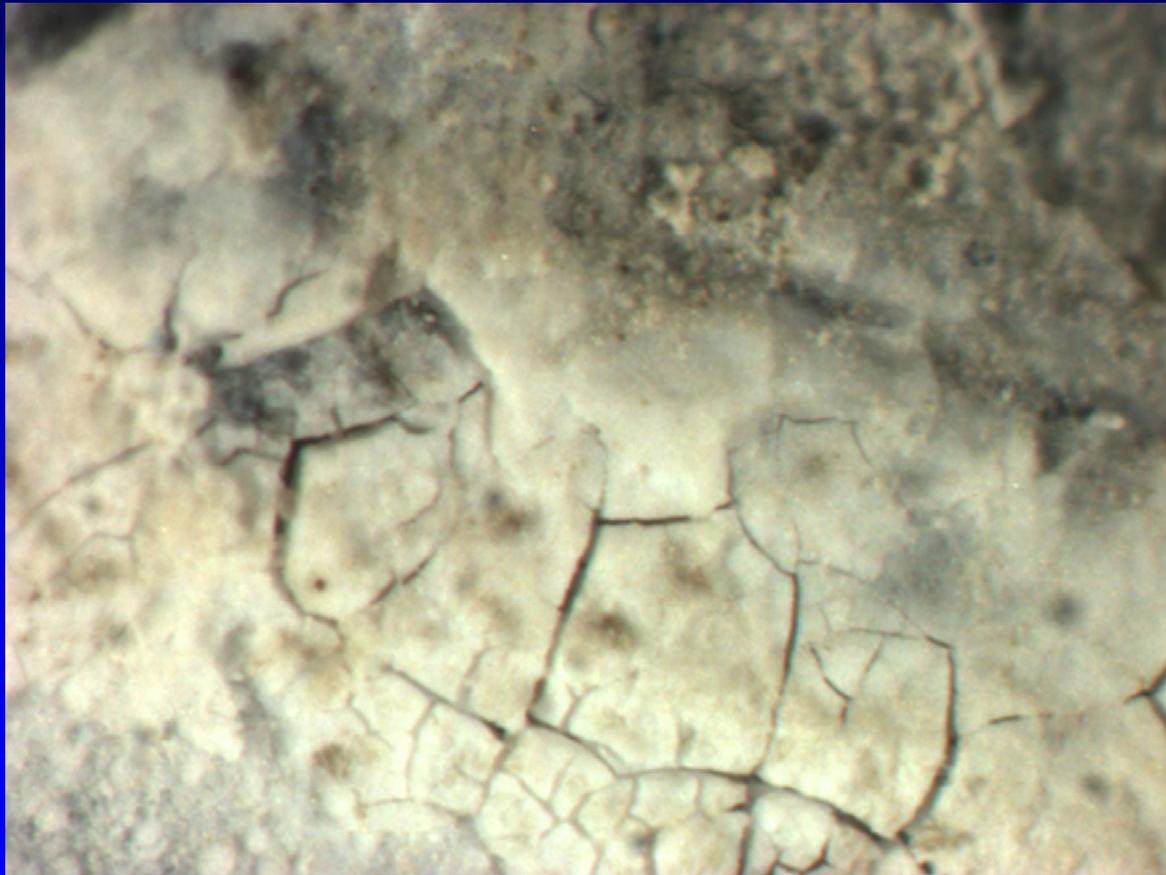
Rhombs



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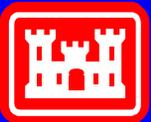
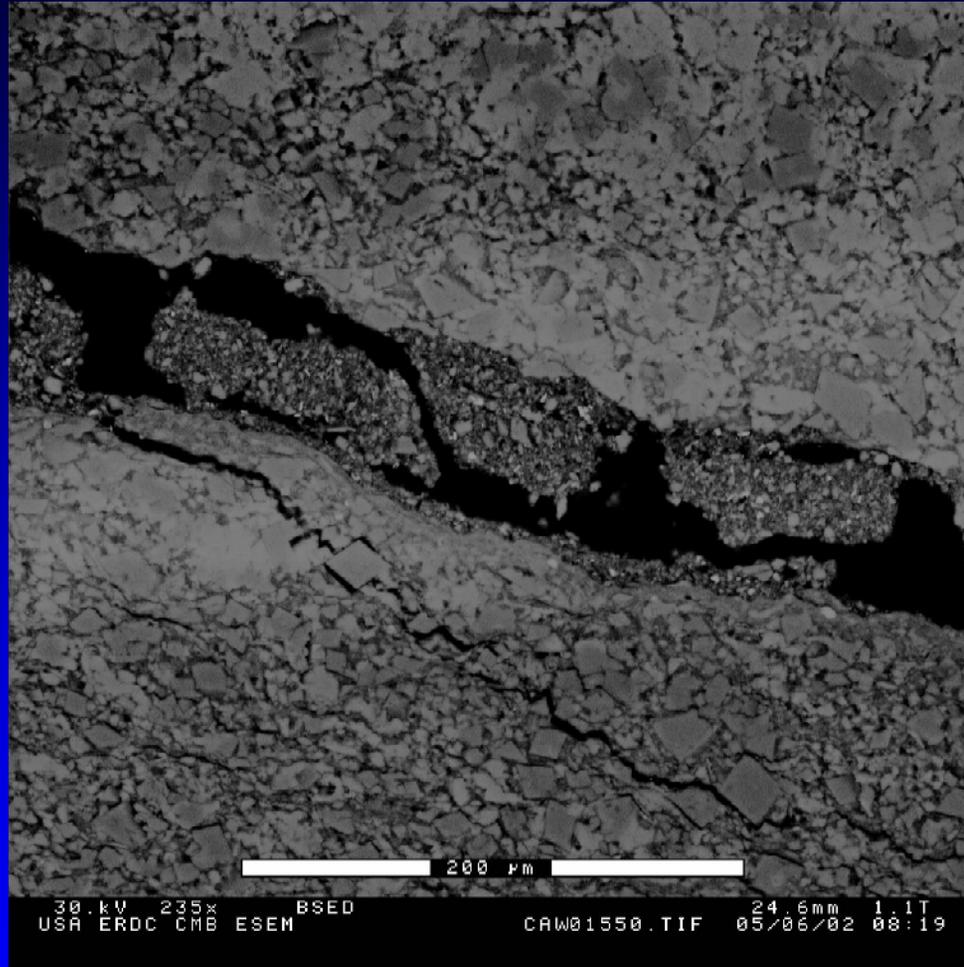
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Reaction Products



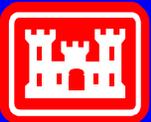
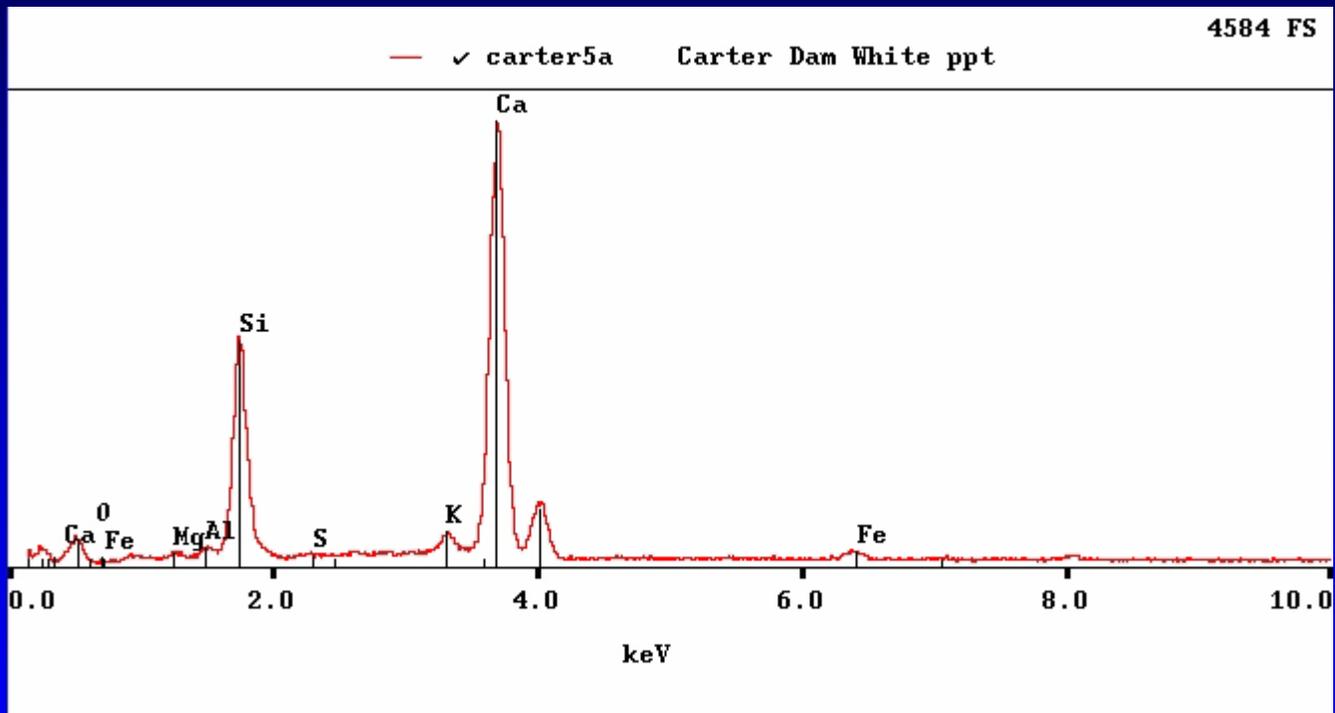
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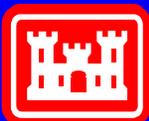
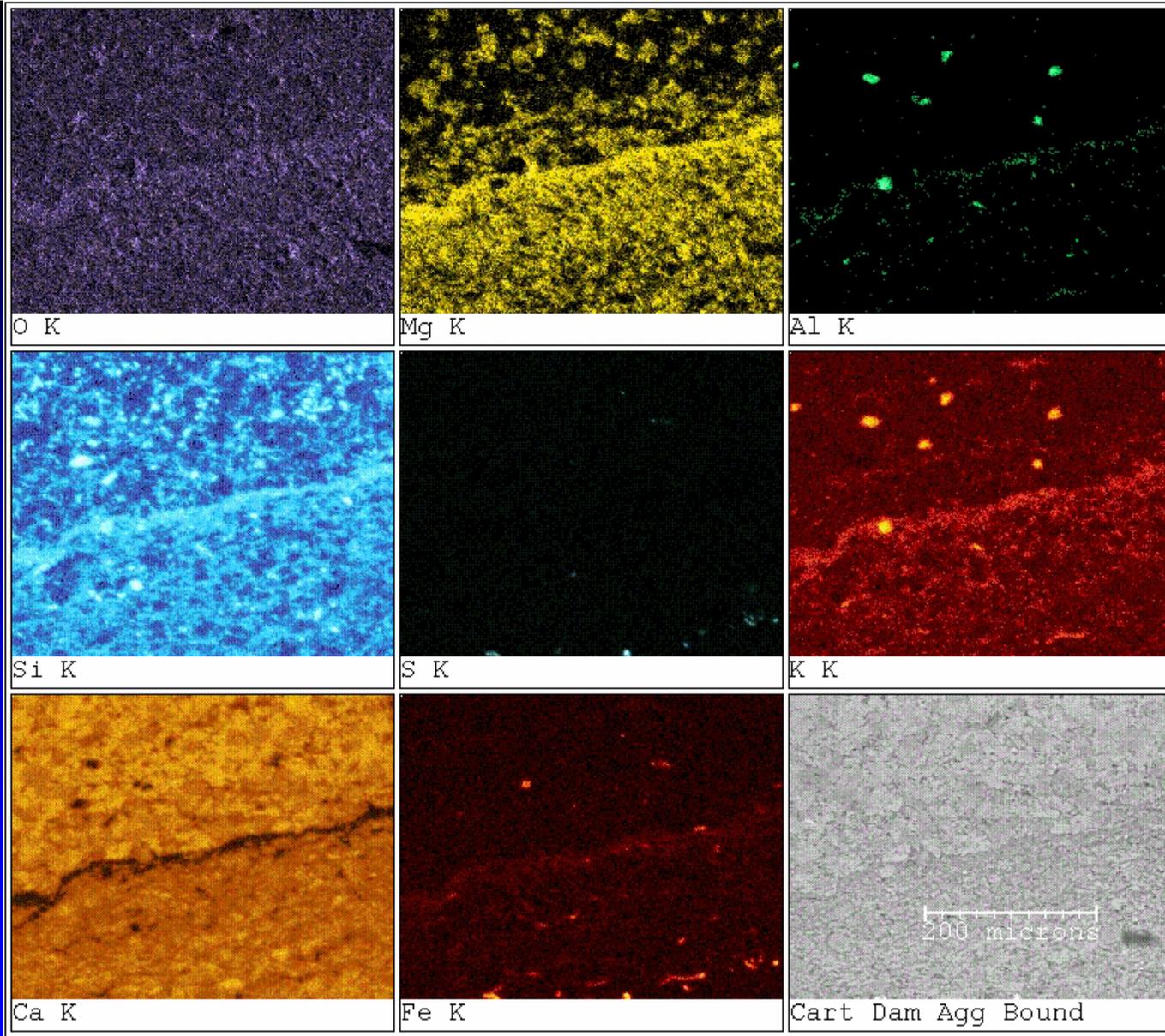
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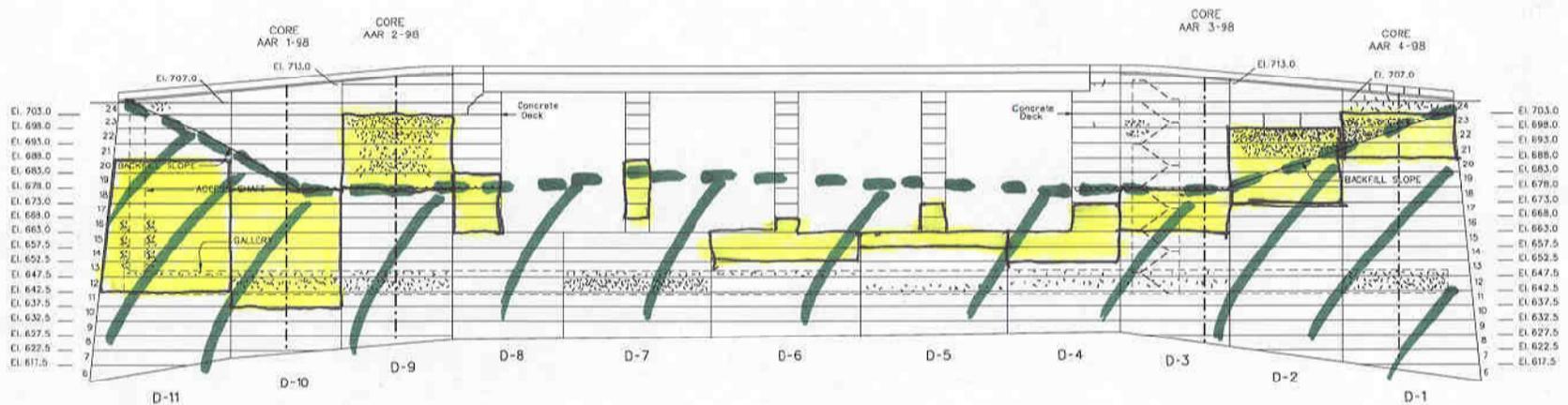


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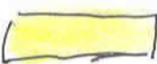
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Expected Damage – Upstream Face



CARTERS REREGULATION DAM - UPSTREAM ELEVATION

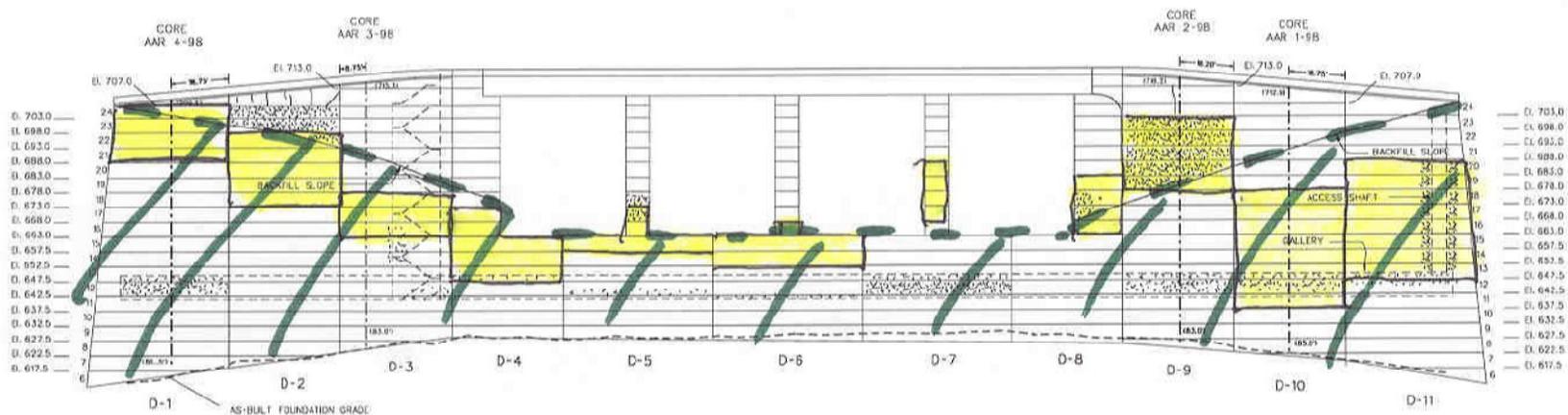
 - Not visible (back filled or water covered)
 - Expected Damage based on placing date

- LEGEND**
-  OBSERVED MAP CRACKING
 -  STRUCTURAL CRACKS
 -  PO CORE HOLE

FIGURE



Expected Damage - Downstream Face



CARTERS REREGULATION DAM - DOWNSTREAM ELEVATION

/// Not visible (back-filled)
[Yellow box] Expected damage based on placing date

- LEGEND**
- OBSERVED MAP CRACKING
 - STRUCTURAL CRACKS
 - PG CORE HOLE

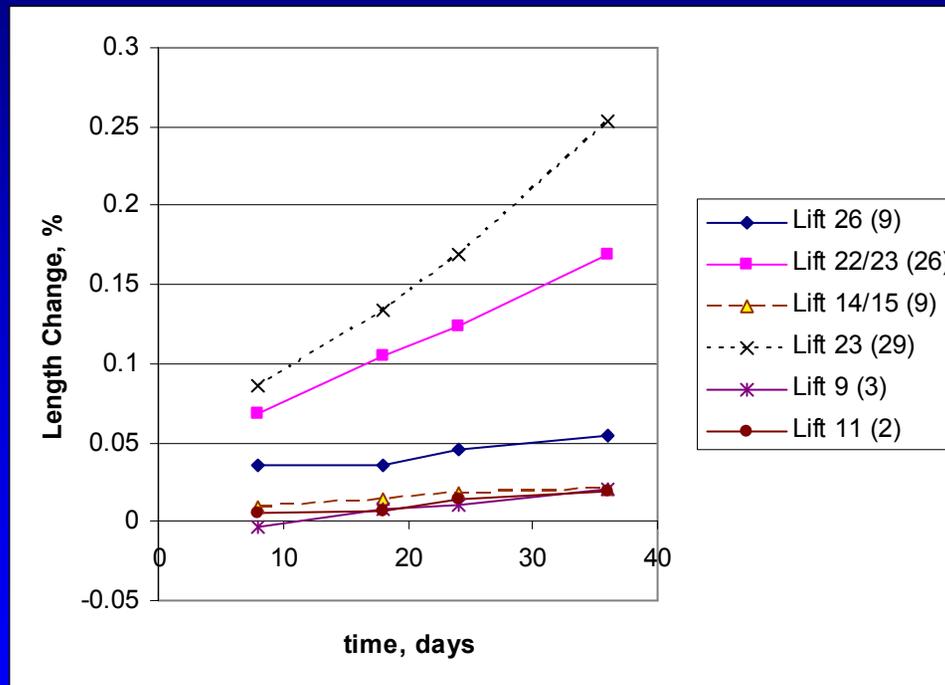


Strength

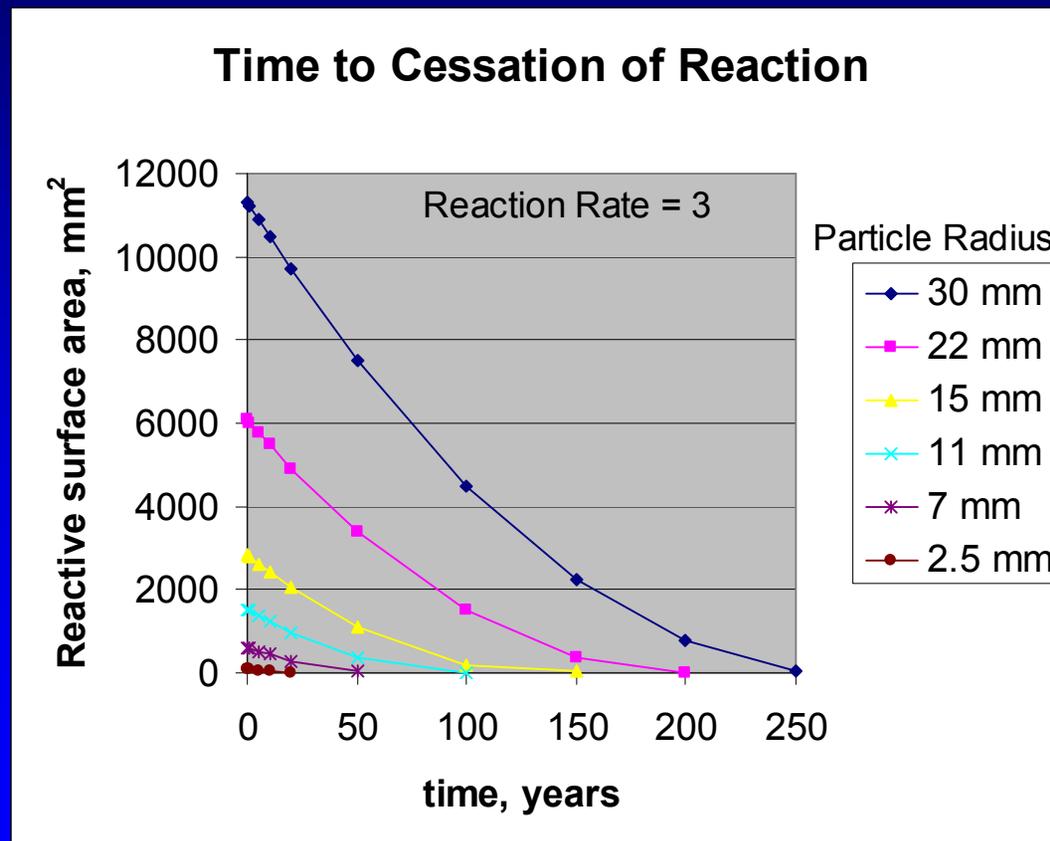
- Strength ~ number reactive particles/ft
 - Low counts: 3935 psi
 - Moderate counts: 3357 psi
 - High counts: 2884 psi (best of the worst!!)



Residual Expansion

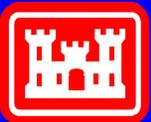


Remaining Reaction



Similar Structures

- Chickamauga
 - Lock soon to be replaced
- Center Hill



Major Materials Issue

- Aggregate QC
- Alkali Carbonate Reaction
 - First analysis suggests
 - Bad news for aggregate sources
- Alkali Silica Reaction
 - Similar in some features
 - Better news for aggregate sources
- AAR - Do we really know what we're doing?

