



TECHNICAL BULLETIN 103

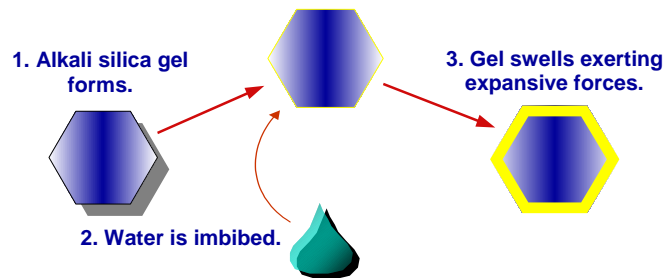
Subject: Alkali-Aggregate Reaction (AAR)

As reported in the November 2004 ICRI Repair Reporter

Concrete Problems & Prevention Strategies

Alkali-Aggregate Reaction (AAR)- Certain silica and carbonate aggregates chemically react in concrete.

The Good: When silica is present as a fine-grained material, these materials are called pozzolanic and are useful.
 The Bad: When present as an aggregate, the reaction can cause failure in the hardened concrete.
 The Ugly: This is not just localized to one area in the U.S.



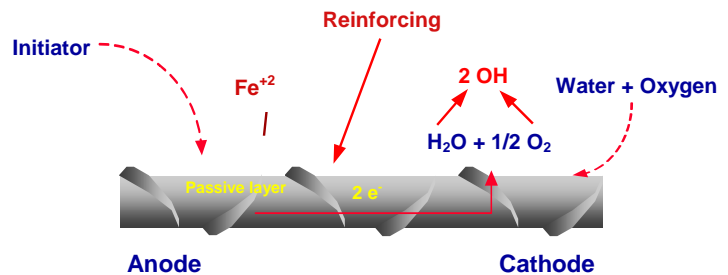
Prevention Strategies - AAR

1. Use non-reactive aggregate.
2. In hardened concrete, any means of decreasing exposure to moisture.

Corrosion Mechanism - Corrosion is complex and requires a number of constituents.

Prevention Strategies - Corrosion

1. Insulate from the environment
2. Interfere with initiation
3. Remove the anodic site from the steel
4. Combinations



Carbonation Mechanism - All the constituents of portland cement can react with carbon dioxide to produce carbonates. CO_2 enters the concrete as a gas in the atmosphere or dissolved in water. As the pH lowers the corrosion rate of iron increases.

Prevention Strategies - Carbonation

1. Dense Concrete (i.e. low water-cement ratio).
2. Minimize exposure to rain and ground water.
3. Supply proper cover for reinforcing steel.

