

Mitigation of Alkali-Silica Reaction (ASR) of Highly Reactive Aggregates with Class C fly ash.

James K. Hicks, P.E.

Director of Technology, Mineral Resource Technologies, Inc., A CEMEX Company

KEYWORDS: ASR, Mitigation, Fly ash, Class C, Addition, Reactive Aggregates

Information is presented showing that use of Class C fly ash, with proper proportioning of concrete, can mitigate alkali silica reactivity (ASR). Test results show ASR was mitigated in concretes using highly reactive aggregates and high alkali cement. Associated information showing improvement in Rapid Chloride Permeability is included. Tests were made in certified commercial testing laboratories.

Highly reactive aggregates from various sources tested at greater than 0.2% percent expansion using the ASTM 1260 procedure, Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method). Cements used were high alkali cements according to ASTM C 114.

ASTM C 1567 tests were made with 1:1 substitutions of 30, 35, 30 and 50% Class C fly ash. Subject fly ash typically tests between 1.3 and 1.45% Water Soluble Alkalis by procedure ASTM C 311, Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete.

Additional Class C fly ash as an additive in concrete containing 25% of the cementitious as Class C substituted 1:1 with for high alkali portland cement showed to control ASR. Class C fly ash was added as a 10% additive, substituted for fine aggregate.

It can be inferred from the test data that ASR can be mitigated with a correctly proportioned mixture of highly reactive aggregates, high alkali cement and Class C fly ash having water-soluble alkalis high in the AASHTO acceptable limit.

Submitted for consideration in the 2007 World of Coal Ash Conference, May 7-10, 2007