
ASR- A National Perspective

**FHWA's ASR Development and
Deployment Program**

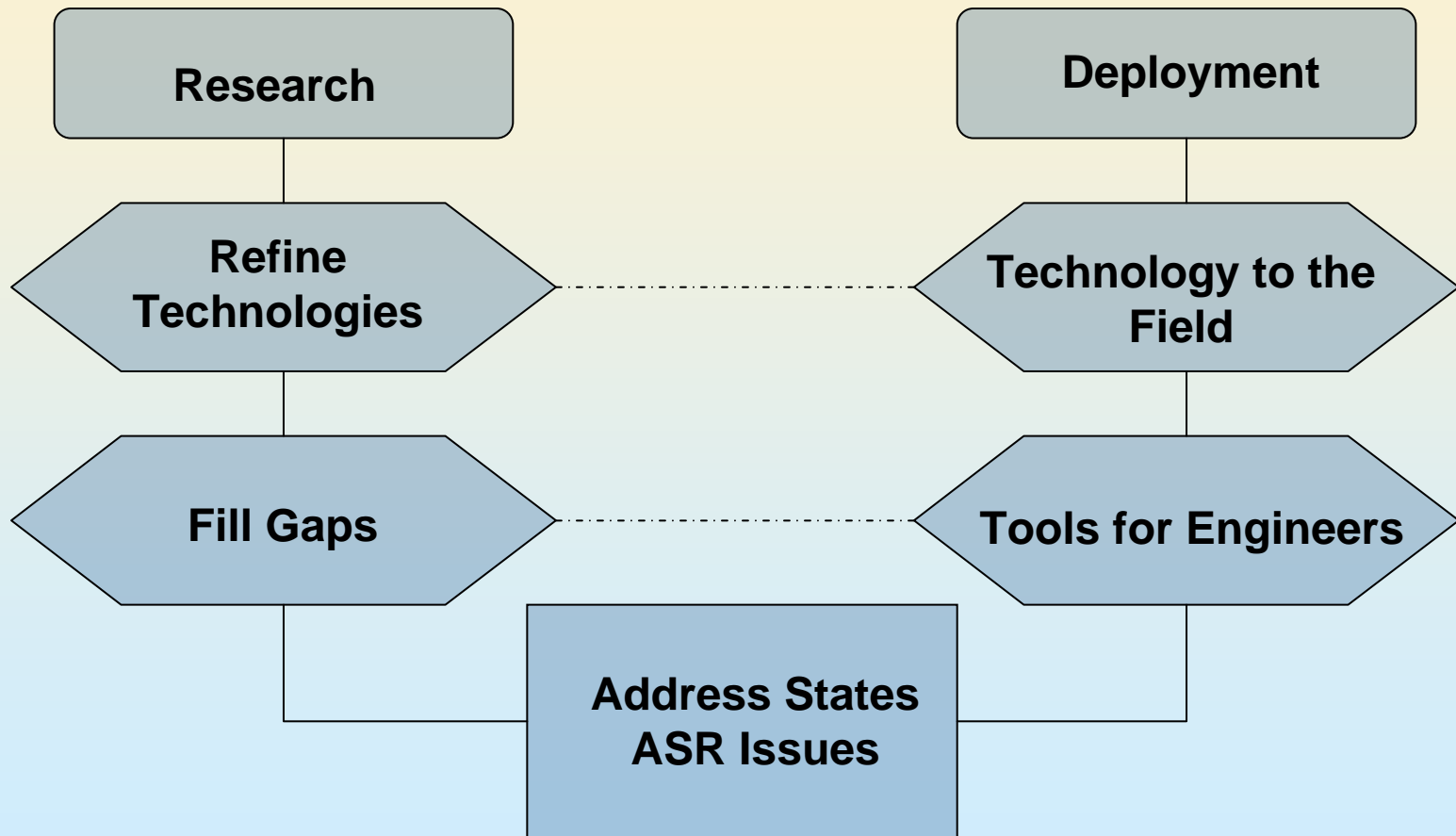
National Concrete Consortium Meeting

March 31, 2009

SAFETEA-LU Legislation

- Sec. 5203. (e) Demonstration Projects and Studies
 - (3) **Alkali Silica Reactivity**. Of the funds made available by 5101(a)(1) of this Act, \$2,450,000 shall be made available by the Secretary for each of fiscal years 2006 through 2009 for further development and deployment of techniques to prevent and mitigate alkali silica reactivity.

ASR Development and Deployment Program



Research

- Contracts awarded to begin work on:
 - Objective 1-Understanding the ASR mechanism
 - Objective 2-Rapid lab test to predict field performance
 - Objective 3-NDT methods to asses ASR in the field
 - Objective 4-Rehabilitation methods
 - In-house research at TFHRC is being finalized
-

Development of Testing and Evaluation Protocols

- “Report on Determining the Reactivity of Concrete Aggregates and Selecting the Appropriate Measures for Preventing Deleterious Expansion in New Concrete Construction”
 - FHWA-HIF-09-001
 - Download for free at:
www.fhwa.dot.gov/pavement/concrete/asr/hif09001/
-

Development of Testing and Evaluation Protocols

- “Report on the Diagnosis, Prognosis, and Mitigation of of Alkali-Silica Reactivity (ASR) in Transportation Structures”
 - Anticipated publication in summer 2009
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Selection, Implementation, and Maintenance of Field Application and Demo Projects

- Gather long-term data on the effectiveness and service life of methods and techniques to prevent ASR in new concrete and mitigate ASR in existing concrete
- First field trial with the topical application of lithium on US 113 in Delaware
- Interested States should contact FWHA

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Assist States in Inventorying Existing Structures for ASR

- “Assist States in inventorying existing structures for ASR” per SAFETEA-LU
 - Track ASR affected structures utilizing States Pavement Management and Bridge Management Systems
 - Development of a severity rating system
 - Training
-

Deployment and Technology Transfer of Activities

- The FHWA newsletter “Reactive Solutions”
- Provides information related to ASR
- Distributed quarterly
- www.fhwa.dot.gov/pavement/concrete/asr.cfm

Fall 2008 Volume 1, Issue 3

Reactive Solutions

An FHWA Alkali-Silica Reactivity News Publication

Got ASR?

Mitigation Options for Concrete Structures Affected by ASR

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three components will effectively halt the progression of ASR.

The most feasible and commonly employed approach for field structures is to attempt to remove water from within the concrete through improved drainage or the application of claddings, coatings, or sealers. The application of silane (or siloxane) compounds has been found to be particularly effective in field applications – these products work by preventing water from entering the concrete while still allowing internal water vapor to escape, thereby reducing the internal relative humidity within the concrete. If the relative humidity within concrete can be reduced below about 80 percent, ASR-induced expansion can be halted. Although it is not possible to remove reactive aggregates or alkalis from the concrete (components 2 and 3 from above), it has been shown that lithium compounds can be used to treat existing concrete by altering the nature of the ASR gel and hence rendering it non-expansive. Laboratory research has shown that it is possible to reduce expansion by treating small laboratory specimens by immersing them in lithium nitrate solution; however, there is little, if any data, from field trials showing similar beneficial effects. The largest impediment to translating this technology to real-world applications has been the general lack of penetration of lithium when applied topically to pavements and other transportation structures; however, significant lithium penetration has been measured when electrochemically driving lithium into concrete. Because lithium has shown promise in laboratory studies, work is underway, funded by FHWA, that is focusing on methods of driving lithium into concrete through electrochemical means. (cont. on pg.4)

Ever since alkali-silica reaction (ASR) was discovered by Thomas Stanton in the 1940's, it has become a problem that has plagued concrete structures throughout the world, and highway pavements and structures in the United States have not escaped this plight. Although great progress has been made in developing and implementing preventive measures for new concrete construction (i.e., use of supplementary cementing materials (SCMs), low-alkali concrete, etc.), there are many existing structures already suffering from ASR. Unfortunately, options for extending the service life of ASR-affected structures have not been studied, implemented, or monitored to the extent that preventive measures for new concrete construction have, and as such, there is no clear consensus on how best to deal with these afflicted structures. Research funded by FHWA is aiming to fill in these missing gaps through several ongoing and planned field trials. This article briefly summarizes some of the candidate methods that may be considered for ASR-affected concrete structures.

When attempting to extend the service life of ASR-affected concrete, one can attempt to address the causes of this reaction or the symptoms of the reaction. To address or counteract the underlying causes of ASR, it is important to note that the three necessary components of ASR include (1) availability of moisture, (2) presence of reactive aggregates, and (3) availability of sufficient alkalis to drive and sustain the reaction. Removing or eliminating any of these

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Deployment and Technology Transfer of Activities

- Creation of an ASR Reference Center on FHWA's website
 - Reports and specifications
 - Links to other ASR related websites
 - Information on past field trials
 - Available early April 2009
-

ASR Technical Working Group

States ☆ Academia ☆ Industry ☆ Federal Agencies

- Information Sharing
 - Technical Input on the Program
 - Monitor Program Implementation
-

Other Activities

- AASHTO ASR Task Force
 - Established to evaluate current specifications related to ASR
 - AASHTO charged the group with developing a draft specification for the August 2009 meeting

 - PCA Ad Hock Task Force on Potassium Acetate Deicers Effect on Concrete Durability
 - Sharing research to address concerns with material contributing to ASR
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<http://www.fhwa.dot.gov/pavement/concrete/asr.cfm>

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