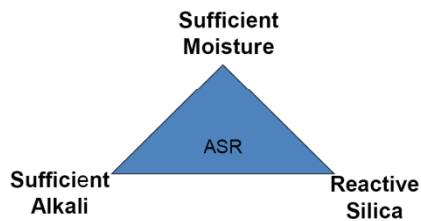
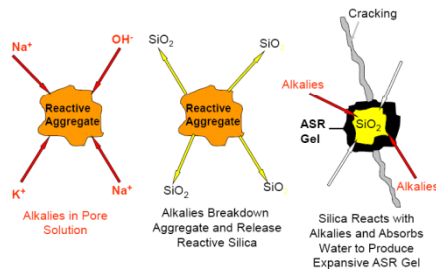


# Alkali-Silica Reaction (ASR)

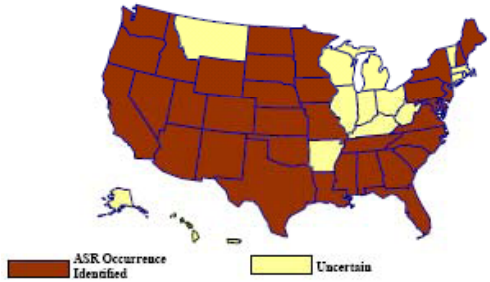
## Conditions leading to ASR



## ASR Mechanism



## Nationwide Impacts



**ASR Definition:** A Process in which silica (found in aggregate) in the presence of **moisture**, is broken down by **alkalis** (found in cement) produces an expansive gel. The expanding gel creates tensile forces, causing the concrete to crack. The cracking then allows more water to infiltrate into the concrete creating more gel, more expansion etc. Ultimately the concrete fails or disintegrates.

**Timeline:** ASR is present in **some** NDOR concrete constructed between 1985 – 1998.

### Contributing Factors:

1980s Environmental Constraints

- The Federal Highway Administration mandated the use of **Class C Fly Ash** in concrete to dispose of coal combustion by-products, make concrete more economical, and reduce permeability.
- Required reduced emissions during cement production which led to changed processes and materials resulting in higher Alkali cements

Some Natural Pozzolans (calcite clay) are no longer available for use in concrete

**National Impact:** ASR has been documented in 36 of the 50 States.

### Current State of ASR in NE:

New Concrete - National and State specific research and development has eliminated ASR concerns in today's concrete mixes through:

- Mandating use of **Class F Fly Ash**
- Prohibiting use of **Class C Fly Ash**
- Limiting Alkali Content of Cement

Existing Concrete – NE continues to resurface or rebuild affected concrete pavements

