

ABSTRACT

Chloride ion penetration through concrete to reinforcing steel is causing the premature deterioration of numerous bridge decks in Iowa. The purpose of this research was to determine if any of several additives/alternative deicing chemicals could inhibit corrosion of reinforcing steel. The deicers tested were calcium magnesium acetate (CMA), CMA+NaCl, Quicksalt+PCI and CG-90, a polyphosphate solution being developed by Cargill.

Two tests were established. First, steel coupons were placed in a 15% solution of a deicer and distilled water to determine which alternative deicer would cause the least amount of corrosion in a solution. The coupons were weighed periodically to determine each coupon's weight loss due to corrosion. The second test involved ponding a 15% solution of each material on reinforced concrete blocks. Weekly copper-copper sulfate electrical half cell (CSE) potential readings were taken on each block to determine if corrosive activity was occurring at the steel surface. When the ponding research was concluded, concrete samples were taken from one of the three blocks ponded with each deicer. The samples were used to determine the chloride ion content at the level of the steel.

Results show all the deicers were less corrosive than NaCl. However, only pure CMA significantly inhibited the corrosion of steel imbedded in concrete.