

Alkali-Aggregate Reaction in the Los Angeles Area

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●THE deterioration of concrete which results from the alkali-aggregate reaction was well known in Los Angeles prior to the exposition of the reason for it, which was published by T. E. Stanton in 1942. A viaduct over the Los Angeles River at 6th Street had been constructed about 1931 by the Department of Public Works. A reactive type of aggregate from Piru, Calif., was used for the reinforced concrete construction.

At the time Stanton propounded his explanation of the reaction, this large and expensive structure was in distress. Deterioration has been progressive, and the city has spent about \$150,000 for repairs and waterproofing during the past two years. It is hoped, by waterproofing the areas exposed to moisture, to partially inhibit the reaction and to prolong the useful life of the viaduct.

Other examples of reaction have appeared in many structures, such as the Ventura sea-wall, the Santa Barbara Mission, and several smaller buildings in the San Pedro-Long Beach areas.

The work which has been done by Sub-Committee III-d of Committee C-9 ASTM has been followed with much interest. The contributions of the many engineers and scientists who have worked on this problem are unquestionably of great value. Some of the means of identification of reactive aggregate which have been developed, although they are useful and reliable, are not suited to the needs of the Department of Public Works and Harbor Department of the City of Los Angeles. The ASTM Test for Potential Reactivity of Aggregates, C 289-54 T, has been found most useful and serviceable.

This viewpoint has been adopted for the following reasons:

1. Initiation and completion of numerous small construction contracts cannot await the results of expansion bar tests.
2. Petrographic examination requires the services of a trained petrographer and the reliability of the findings depends upon his training and skill. The judgment of the petrographer and the engineer are primary factors in the application of the petrographic study. This method therefore, does not lend itself to precise specification in contract documents.
3. The ASTM method (Test C 289-54 T) readily detects the reactive minerals which are common in this district, such as the opal and chalcedony of the Monterey formation. No special personnel is required. The procedure can be carried out by chemists who do other departmental testing. The test results are quantitative and can be made the subject of specification.

Though realizing the limitations of the Tentative Test for Potential Reactivity of Aggregates, C 289-54 T, the Public Works Department has chosen to rely upon it for exactly what it is intended to be: a potential indication of possibly reactive material.

4. Millions of tons per year of suitable materials are mined from the alluvial deposits of the Big Tujunga and San Gabriel Rivers. They all have a ratio, when tested by the C 289-54 T method, of approximately 0.25 to 0.35. They are used with normal alkali-content cement. No reactivity attributable to this aggregate has been observed.

Experience over many years has shown that aggregates from sources in the coastal range may contain reactive material. Aggregate from such sources, although indicated safe by the test for potential reactivity, is nevertheless limited to use in surface work and, in such use, low-alkali cement is required.

The foregoing limitations provide a satisfactory criterion that enables a prompt decision in regard to any aggregates proposed for use. Repetition of damage due to the alkali-aggregate is not anticipated. The Director of the Harbor Department Laboratories has banned the use of aggregates from areas in the Monterey formation where past use has indicated deleterious reaction.