Overview

This symposium was organized to provide information on the impact of ASTM Method for Evaluation of Cement Strength Uniformity From a Single Source (C 917-82). This method is ". . . intended for use where the purchaser desires information on the strength uniformity of a hydraulic cement produced at a single source. It is intended that this method normally be used for the predominant cement manufactured at a cement plant."

The development of ASTM C 917 was the first step in an effort to improve the uniformity of concrete produced at a single source. Obviously, improvements in the uniformity (or, as might be stated, a decrease in the variability of the components used in concrete: cement, aggregates, and admixtures) would significantly aid in the concrete production process. Other production factors, of course, also play a role; concrete mixers, ambient conditions, weighing and batching equipment, etc. will continue to exert their influence and must also be considered.

The papers presented at this symposium provided the first approach to record in the literature the results achieved by the use of this relatively new ASTM standard, which was adopted in 1979 under the jurisdiction of ASTM Subcommittee C01.98 on Evaluating Cements for Uniformity. The use of this standard has been growing rather slowly since its adoption. It is hoped that the experiences described in this special technical publication will provide a stimulus for increased use so that further confirmation of the usefulness of this approach to one aspect of uniformity can be achieved.

As a result of the development of ASTM C 917 and its successful application, and despite its somewhat limited use to date, ASTM Committee C-1 on Cement and C-9 on Concrete and Concrete Aggregates have appointed a C-1/C-9 Task Group on Uniformity of Concrete-Making Materials. The Task Group will address the uniformity of aggregates, chemical admixtures, and materials such as fly ash in a manner similar to that for cement. The experiences described in this symposium should provide a useful example for this Task Group's activities.

While there is no substitute for a detailed reading of these reports, it may be helpful to describe each briefly. Oglesby reported on the development of a cement strength-testing program, based on ASTM C 917, adopted by the Illinois Department of Transportation. The major conclusion from efforts to date was that cement manufacturers are capable of furnishing cements which the user can be confident will vary in strength between known limits in the long run. Poole of the U.S. Army Waterways Experiment Station described experience with their Cement Quality Management System (CQMS), sufficiently similar to ASTM C 917 so that results can be evaluated by both methods. Their evaluation of 95 different portland cement sources indicated variability similar to that shown in the Appendix to ASTM C 917 and pointed to the importance of the type of sampling—24-h composite samples showed significantly less variation than grab samples. Al-Badr and Kilpadikar of the Saudi Kuwaiti Cement Manufacturing Co. presented a description of a modern and highly sophisticated cement plant in Saudi Arabia and attested to the use of ASTM C 917 as a "... suitable yard stick to assess whether the quality control procedures exercised are effective." Pielert and Spring of the Cement and Concrete Reference Laboratory (CCRL) at the U.S. National Bureau of Standards described the activities of CCRL with respect to cement testing, noting their efforts to increase the proficiency of testing by their proficiency sample programs, thus enhancing the reliability of test results obtained by the use of standards such as ASTM C 917. Taerwe of the Magnel Laboratory for Reinforced Concrete, Ghent State University in Belgium, described an approach to detect cement strength variations in a different manner than that proposed in ASTM C 917. The statistical approach used is a

segmentation technique, that is, changes in mean strength level indicate a step-wise variation with time, rather than variation represented by a continuous curve. The objective, greater uniformity, is the same. Visvesvaraya and Mullick of the National Council for Cement and Building Materials, New Delhi, described the results of a 30-year survey of cement quality in India. Despite serious depletion of adequate raw materials and fuel supply problems, the monitoring of strength results has been a significant factor in maintaining the quality of production during this period.

In the final paper, Taryal and Chowdhury of the Saudi Arabian Standards Organization reported on studies of the variability of cement strengths in the eight companies in Saudi Arabia, using the Saudi standard test method, rather than ASTM C 917. Most of their report presented interesting data on changes in the test procedure and the resulting influence on strength variability measurements. The report concludes that the level of quality control is acceptable in all plants, although different among the eight plants.

The symposium was well attended and generated numerous questions directed to the speakers, testifying to the timeliness of the subject. It is hoped that continued use of ASTM C 917, in concert with activities of the C-1/C-9 Task Group on Uniformity of Concrete-Making Materials, will lead to a better understanding of the factors of importance to the production of uniform concrete.

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