IT is reported in *Nature* that the Government of Eire has set up a small advisory body, to be known as the Emergency Scientific Research Bureau, to deal primarily with the technical problems involved in the provision of substitute processes and materials during the period of the emergency. This body, which will be attached to the Department of the Taoiseach, has the following terms of reference: (1) To give technical advice to the Government on such special problems relating to industrial processes and the use of substitute materials as may be referred to them. (2) To advise the Government generally on the use of native or other materials to meet deficiencies caused by the restriction of imported raw materials and commodities. (3) To direct or conduct special researches and inquiries connected with the above. The following have been appointed members of the bureau: Dr. J. J. Dowling (*chairman*), professor of technical physics, University College, Dublin; Dr. J. J. Drumm; Dr. M. A. Hogan, professor of mechanical engineering, University College, Dublin; Dr. J. H. J. Poole, professor of geophysics and experimental physics, Trinity College, Dublin; Dr. T. S. Wheeler, state chemist. The secretary to the Industrial Research Council, Dr. J. J. Lennon, will act as secretary to the bureau.

DISCUSSION

BOULDER DAM INVESTIGATIONS: SIGNIFICANCE OF EXPERIMENTAL DATA

ENGINEERS and scientists throughout the world have looked forward for many years to the publication of the technical reports on the researches and investigations which were carried out prior to the construction of Boulder Dam, completed in 1935. The U. S. Bureau of Reclamation has recently published their report on "Thermal Properties of Concrete." This is one of a series of 37 *Bulletins* which will cover all phases of the Boulder project; it is the first to give the results of laboratory work on concrete. The *Bulletin* gives the details of experimental studies of the conductivity and specific heat of concrete at temperatures ranging from 50 to 150° F. The purpose of these studies was to furnish information for use in designing and operating a refrigeration system for removing the heat developed by hydration of the 663,000 tons of Portland cement used in the dam.

Concrete sets and hardens as a result of chemical reactions between the compounds in the cement and the mixing water. Each gram of cement evolves 50 to 90 calories of heat during the first week. In small sections this heat is gradually dissipated to the atmosphere, hence there is no abnormal rise in temperature; however, in large masses, especially if the concrete is placed rapidly, as in concrete dams, the internal temperature will rise 50 to 75° F., unless measures are taken to remove part of the heat generated by the hydration of the cement. Abnormal rise of temperature causes a volumetric expansion of the concrete, which sometimes disrupts the mass; at best it is objectionable due to the shrinkage which occurs when the concrete finally cools.

The situation at Boulder Dam was aggravated by the high summer temperatures—mean for July 108° F. The methods adopted consisted of (a) using a low-heat-of-hydration cement and (b) embedding hundreds of miles of steel pipe in the dam through which artificially cooled water was circulated. The *Bulletin* does not give information on the larger question of how successful these measures were in solving the problem of temperature control in Boulder Dam.

An elaborate apparatus was devised for the laboratory studies of the thermal properties of concrete; many observations were made of temperature, weights and lengths, as well as in electrical units. The theoretical phases of the subject are developed by the use of differential equations and Bessel functions. The *Bulletin* is marred by numerous errors of statement and proofreading. A notable feature is the failure to recognize the limitations of experimental data. The Bureau scientists apparently missed two important principles: (1) That the results of arithmetical operations are never more precise than the least precise value which enters into the computation; (2) that an experimental value can not be more precise than the least precise data on which it is based. Item (2) is, of course, only an application of (1).

Under "Computations of Conductivity" (p. 110) 15 2-place and 19 3-place factors are introduced in dealing with the fundamental data. Needless to say, it is absurd to compute values from these data to 4, 5 or 6 significant figures, as was done by the authors.

Conversion factors, to be used with the 2- or 3-place data, are given to 8 significant figures; for example, the factor 0.256,065,03 is given (p. 41) for converting diffusivity values from English to metric units.

In spite of the appearance of great refinement, these 4-, 5- and 6-place computed quantities are only *2-place values*. These computed values wear the cloth but not the clothes of accuracy. The methods of this *Bulletin* are analogous to measuring with one's thumb, then computing the length to the nearest ten-thousandth of an inch.

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