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Features of Lednock Dam, including the use of fly ash†

by

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Discussion

Mr W. E. Perrott (The Cementation Company Limited) referred to the cementation of the foundation rock, with which he was associated during the construction. He observed that during recent years considerable advances had been made in obtaining a better understanding of various techniques available. However, on most sites foreknowledge of underground conditions was limited. This factor, together with the considerable variations in rock structure—variations even within a short distance on any site—made the success of any grouting project ultimately dependent upon the skill and experience of the field operative. He must be competent to adjust his technique to suit the minor as well as the major alterations in the strata as they were revealed during the course of the work.

73. Lednock Dam had been no exception in this respect. Frequent variations had been found over short distances, and although the grouting had been carried out in accordance with the general specification described in the Paper, frequent minor modifications were necessary, particularly because a considerable proportion of the joints had been partially filled with clay. That condition called for particular care on the part of the field personnel. Where clay existed in continuous layers interbedded with the rock it could be removed and replaced with grout by a systematic technique utilizing high-pressure water and air jets, as had been used on a number of sites, including Errochty Dam. While consideration had been given to the use of this technique at Lednock, it had been found that the clay did not form uniform or continuous layers of sufficient thickness to lend itself to this method. It had, therefore, been decided that the problem could best be dealt with by partial removal and compaction of the clay assisted by veining by injection without pre-jetting.

74. By the careful manipulation of injection pressures and grout consistencies it was possible to obtain travel of grout through such partially filled joints and fissures. Frequent indications of this were obtained at Lednock by sudden decreases in the resistance to flow, as indicated by the injection pressure, showing that a local blockage of clay within the immediate vicinity of the hole had been cleared. On occasions the clay removed by injection had been forced to a neighbouring open hole and had been seen to emerge from the top of that hole as a compact mass for several minutes. By this means a proportion of the clay had been forced from the area of treatment, and that remaining had been compacted and reinforced by veins of grout. On the completion of the treatment of each section a series of tests had been carried out to ensure that all joints and fissures were adequately sealed, and that no potential weakness existed which might subsequently provide a path of leakage when the reservoir was filled.

The Author, in reply, said that Mr Perrott stated that a considerable proportion of the joints had been partially filled with clay. Foundation grouting had been undertaken around all thirteen buttresses of the dam and the events which Mr Perrott described occurred in an area downstream of some of the central buttresses, at the east side of the stilling basin, where extra holes had been drilled, as indicated in § 15.

76. These holes, as all the holes in foundation grouting, had been treated and tested primarily to ensure the stability of the rock supporting the buttresses.

† Proc. Instn civ. Engrs, vol. 13, p. 179 (June 1959).