SITING OF NUCLEAR POWER STATIONS

IN a debate on the siting of nuclear power stations initiated in the House of Commons on December 19 by Mr. A. Blenkinsop and Mr. T. W. Jones, the Parliamentary Secretary to the Ministry of Power, Mr. D. Renton declined to comment on the project for a nuclear power station in Merioneth because the Minister had already decided to hold an inquiry; but he gave a full account of the procedure for preserving the amenities of the countryside so far as the Ministry of Power is concerned which was distinctly reassuring. Mr. Renton recognized the serious conflict and dilemma which arises, and assured the House that the limited possibilities of using land already developed or waste were not overlooked. In selecting the four sites already chosen and in choosing the remaining eight before the end of 1966, a preliminary general suggestion by the Central Electricity Authority is followed in each case by the search for a particular site by the Authority, and then by application to the Minister of Power, usually with a public inquiry before the Minister gave his decision.

Throughout the three stages there are certain limiting factors. First is the purely economic one, requiring nuclear power stations to be sited where the greatest economic benefit may be secured—in regions where the cost of coal is highest, remote from coalfields. Second are safety considerations, and the Government is adhering to the policy of avoiding built-up areas. Furthermore, such power stations require large quantities of cooling water, as much as 35 million gallons an hour for the stations now contemplated, solid foundations for the very heavy buildings and plant, and an area of about 300 acres.

It is with these considerations in mind that the Central Electricity Board—and from January 1, 1958, the Central Electricity Generating Board—make preliminary studies in each area where a power station appears to be needed. These studies include a thorough consideration of the development plans of local planning authorities, of the maps of the national parks and areas of outstanding natural beauty, both of which must be avoided if possible, and a geographical study of basic physical features, such as water supplies. On the basis of these general studies, the team of technical experts of the Authority proceed to what they call site selection. This may take three to twelve months, involving consideration of every possible site in the area of search and sometimes survey before provisional selection. Besides the local planning authority, the Ministry of Housing and Local Government, the Ministry of Agriculture, the Home Office, the Air Ministry, the Ministry of Transport and Civil Aviation, if necessary the Admiralty and the War Office, the National Parks Commission and the Nature Conservancy are consulted and, after a site has been provisionally selected, the Royal Fine Art Commission. Moreover, Mr. Renton pointed out, under Section 37 of the Electricity Act, the Board, the Electricity Council and the Minister of Power must have regard "to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest, and of protecting buildings and other objects of architectural or historical interest".

They must take into account the effect of their proposals on the natural beauty of the countryside and on any such flora, fauna, features, buildings and objects. Furthermore, it is not until these studies and consultations are completed that formal application is made to the Minister for his consent. When the Minister receives such an application he is now obliged to hold a public inquiry whenever a local planning authority objects and he may do so when there is any other objection. In such an inquiry he receives expert advice from his Ministry's inspector, who sometimes sits with an inspector of the Ministry of Housing and Local Government.

Observing that a conflict of public interests could only be resolved by a Minister or Ministers, Mr. Renton said that the aim was to provide a flexible system of planning. Each planning authority had the duty of formulating a county development plan and the Minister of Housing and Local Government has certain statutory duties in respect of development plans. He and other Ministers concerned were consulted by the Minister of Power before he gave his decision on each application, and the Minister's decision, which was that of the Government, could be questioned in Parliament. Mr. Renton said that the Minister of Housing and Local Government had overall responsibility for preserving amenities under the Planning Acts and his Ministry provided the information, maps and detailed plans which helped to prevent any avoidable desecration of the beauties of the countryside. Mr. Renton did not think that the central consultative committee of amenity associations suggested by Mr. Blenkinsop would contribute anything further, and he thought there was already sufficient frequent consultation with the National Parks Commission from the inception of any scheme.

CONCRETE ROADS

AN international congress was held in Rome in October to discuss recent technical progress and achievements in the construction of concrete roads and runways. Seventeen lectures were given by prominent engineers from ten countries and reports on the subjects to be discussed were also received from many others. About 800 delegates from 28 countries attended.

The congress enabled the practice in different countries to be compared, and it was of particular interest to note where there was general agreement and where there were differences. It was generally agreed that motorways and urban expressways were desirable on grounds of economy and safety. Most countries, and in particular Western Germany and Holland which together contain 80 per cent of the motorways existing in Western Europe, have preferred concrete construction for motorways. The slab thicknesses used in most countries were comparable and were based on experience; the thick-

nesses given were expected to give adequate service; but, when discussing concrete roads other than motorways, there was not complete agreement on the expected life of the road nor on what constituted failure. Probably for this reason there were considerable differences between countries in the change in thickness recommended for different classes of traffic, in the amount of reinforcement and in the spacing of joints. For example, in Belgium reinforcement was not considered necessary for secondary roads, whereas in Britain and Switzerland reinforcement was included in designs for housing estate and rural roads.

Because of the differences in design and in the availability of materials suitable for concrete or for other types of road construction, there were large differences in the views expressed on the economy of concrete construction. In Germany, improvements in bituminous construction resulting in enhanced durability required that there should be qualitative improvements in concrete construction on trunk roads. In Belgium, which has more secondary roads in concrete than elsewhere in Western Europe, this type of construction is claimed to have the advantages of economy in construction and maintenance and of good surface texture. For housing-estate roads in Great Britain concrete roads are considered to be particularly good for carrying builders' traffic, but to require careful supervision during construction if they are to be successful. In Switzerland, concrete roads had proved to be economical for rural roads when maintenance costs were considered as well as the prime cost. The question of the economical design of concrete roads in relation to performance and maintenance costs would obviously repay further study.

Economical design was also considered of major importance for the design of runways capable of carrying the very heavy channelized traffic which was now using heavy-duty airfields. One approach to the problem was to examine the traffic volume on various sections of an airfield and to relate the thickness of the pavement to the load and number of repetitions. If traffic was classified in this way it was possible to make the thickness of mid-sections of runways 25 per cent less than that required at the ends and on the main taxiways. Another approach was to use a prestressed pavement; the construction at Maison Blanche was described and it was estimated that the cost of the 7-in. thick prestressed slab was similar to that of 13 in. of normal concrete. This would correspond to a saving of some 10 per cent since it was considered that for comparable strength a normal pavement would need to be 14½ in. thick.

It seemed to be generally agreed that the subgrade had little effect on the stress in a concrete slab if the soil was uniform and the slab was equally supported over its whole area. In practice, however, uniform support is difficult to obtain, and, compared with twenty years ago, great emphasis is now placed in all countries on the proper compaction of the subgrade and base and, in order to avoid changes in the moisture content of the soil during the life of the road, on the protection of the soil from the weather during construction. In most countries the base thickness considered necessary was greater than that generally recommended in Great Britain; but this difference may be due more to the necessity of providing sufficient thickness of construction to avoid damage by frost than to the requirement for uniform support.

A very valuable summary of the construction practice in different countries was given. There was general agreement on what constituted good practice; but there were differences, many of which were due to the desire for economy. Thus, it was agreed that the concrete should have a high flexural strength and that for this purpose crushed stone aggregates were to be preferred, but gravels were used for reasons of economy. A dense concrete was desirable for durability but plastic concrete was sometimes used for facilitating placing in order to reduce costs. Two-course construction was often employed where cheaper concrete could be used in the lower course. The development of cheaper methods of construction was thus another subject on which a study might be made.

The development of prestressed concrete for roads was discussed. Most experimental work had been done in France and Great Britain but some work had also been carried out in Germany, Switzerland and the United States. It seemed that prestressed slabs of the individual type, that is those stressed by cables, have been preferred in Great Britain and Germany, while prestressed slabs of the continuous type, that is those stressed between abutments, seemed to be preferred in France and Switzerland. It seems probable that where the abutments can be placed a considerable distance apart the continuous method is more likely to be economical, but the problem of maintaining stability against buckling and of dealing with horizontal curves needs more consideration. With the individual type of slab the major problem is concerned with joints. With both types the question of reducing subgrade friction is also of importance. The congress felt, however, that the development of prestressed concrete for roads was of great importance because of the economies it appeared likely to achieve.

Finally, there were two papers on the surface irregularity of concrete roads. The methods of measuring the evenness were different, and a plea was made for agreement on an accepted international method so that comparisons could be made easily. Although a direct comparison could not be made, examination of the two papers suggested that the riding quality of recent Danish and recent British work was of the same order of quality but that considerably more effort was required in Britain to achieve that standard. In this connexion, however, it seems probable that the differences in the methods of construction may have some effect on the ease with which good riding quality may be obtained. For example, the Danish roads are generally unreinforced while reinforcement is generally included in British roads. The rate of progress during construction would therefore normally be slower in Britain, thus making the achievement of an even surface more difficult. It is important to remember, however, that the comparison is generally made between new roads, and it appeared from the discussion that the differences in construction might lead to differences in performance so that after some years under traffic the ultimate riding quality of roads of the two designs might be different. Further information is obviously desirable about the movements of slabs under traffic.

The congress thus enabled the present practice and experience in different countries to be compared. Although there was agreement on many points it was considered that further meetings to exchange experience, with perhaps a more limited field, would be of considerable value, particularly where new developments such as prestressed concrete were concerned.

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