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Economic geological map of south-west England

C. NICHOLAS

E.C.C. Quarries Limited, Northernhay House East, Northernhay Place, Exeter EX4 3QP.

The map has been prepared to accompany the review of Developments in Economic Geology in south-west England read at Sheffield in 1979 (Nicholas 1980).

The principal reservoirs are highlighted but most other engineering geological features such as the important industrial, holiday and military constructional developments all requiring geotechnical studies can not be illustrated satisfactorily on this small scale. The main road network which was largely constructed during the 1970s is shown but the railways have been omitted because little development involving engineering geological studies has taken place. The principal operating power stations are shown, along with sites which are being considered for new stations, these being important not only for site-investigation studies but also because of the large requirements for constructional materials.

Constructional developments of all types require aggregates for building, concreting, road-making, rail ballast etc. as well as cement and brick-making materials. The main operating quarries and pits are shown, with an indication of size by a thicker outline to the square symbol for the larger quarries. In 1973, total aggregate sales from the South West Economic Region peaked at around 37.5 million tonnes, of which over 30 million tonnes was crushed rock. Since that time, output has cutback by more than 30% reflecting the overall economic decline. The region has considerable importance nationally because large tonnages of limestone are exported from Somerset and Avon largely to the south-eastern counties where gravel reserves are becoming increasingly scarce.

The distribution of the different rock-types used for aggregates is important in this industry where transport costs form a major proportion of the delivered price.

The relative scarcity of sand in Somerset and Avon has led to the development of sea-dredged materials being brought in to the Bristol area and to an exchange "trade" with Dorset where sand is plentiful but limestone for coarse aggregates is scarce.

Cornwall makes use entirely of igneous rocks - granite for bulk, low-quality uses where strength is of secondary importance, dolerite and other basic igneous rocks for high-grade usage such as road surfacing where strength and polishing resistance are important. China clay waste-sand also finds some local usage in mid-Cornwall and south Devon but because the value is low, transport costs severely limit the market area.

South Devon is well endowed with Devonian limestones and dolerites whereas north Devon is deficient in all except the Devonian and Carboniferous "gritstones" (mainly turbidite sandstones) which are difficult and costly to quarry because of high waste ratios and abrasion problems but have to be used because there is little else within economic transport range.

The Bunter Pebble Beds provide substantial supplies of sand and high-grade quartzite coarse aggregates in east Devon and this sells for some distance along the south coast into Dorset and beyond because there is little else in the way of hard rock in this direction, especially of a quality suitable for road surfacing. Somerset, Avon and Wiltshire are also deficient in supplies of polish-resistant materials.

Brick-clays and limestone for cement manufacture are shown on the map as circles along with other industrial minerals. The two cement works in the region are at Plymouth, using Devonian limestone along with locally quarried shale and some china clay sand and at Westbury, using Lower Chalk with Kimmeridge Clay. Brick-clays are dug for important local usage but in much of the region, concrete blocks and reconstituted stone are extensively used. Because of working and building problems, and therefore expense, the tonnage of natural building stone produced is negligible.

The internationally important china clay and ball clay working areas are illustrated. Other industrial minerals include limestone Which is burnt for high-grade lime at Batts Coombe Quarry in Mendip where the Carboniferous Burrington Oolite is very pure, and Chalk near Salisbury where the brightness when finely ground is

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exceptional, leading to extensive use in the paper industry.

Tertiary sands are processed for industrial usage in Dorset whilst other minerals produced or occurring as deposits with some economic potential include fluorspar, worked from old mine dumps in east Cornwall, barytes, now no longer worked in the Teign Valley area and on Exmoor, celestine in north Avon, Fullers Earth near Bath, where mining ceased recently, salt, large deposits of which are known in north Somerset, and peat which is worked on a substantial scale for horticultural purposes from the Somerset Levels.

The metalliferous mining industry is the most Widely known aspect of economic geology in the region with a long history, some localised rejuvenation in recent years and some optimism for the future. The main operating or developing mines or groups of mines are shown but the small alluvial and secondary workings have been omitted.

Amongst numerous metalliferous prospects, the most hopeful are in the Callington/Gunnislake area (South West Consolidated Minerals) and at Hemerdon, near Plymouth (Amax).

The areas of Wessex and South West Water Authorities are shown along with the important aquifers. Groundwater is a principal source of supply in the Chalk and Carboniferous Limestone areas of Wessex and in the Triassic conglomerates and sandstones in East Devon, but west of this area groundwater is only of localised value.

Another aspect of economic geology which cannot be illustrated adequately on a map of this scale is waste disposal. The majority of landfill sites are in worked-out or abandoned quarries and pits. The possibility of water supply contamination is a major factor in the location of sites. Every site is, however, unique and each has to be judged on its own geological merits.

The South West Region has historically been disappointingly short of energy sources. Small amounts of oil have been produced for many years in Dorset but much larger reserves have been discovered recently at greater depths. The potential for further discoveries, largely offshore, remains speculative.

The prospects for development of alternative energy sources in the region are encouraging with an active research programme in geothermal energy from within the granites and the obvious, ever present wind, waves and tides (sun is perhaps less obvious). As an example, the map shows three possible sites for a Severn tidal barrage with ail the implications for sedimentology, engineering geology, materials requirements, environmental geology, etc. The most feasible site would seem to be A, or similar, with B and C much more ambitious and speculative.

The widespread distribution of features of economic geological importance throughout the region illustrates the importance of geology in our community. Difficult decisions are ahead to balance what we need against what we can afford, both in the expenditure of resources and in environmental changes. The geological input is fundamental to the eventual outcome.

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Reference

Nicholas, C. 1980. Developments in economic geology in southwest England -- a review of the 1970s, *Proc. Ussher Soc., 5,* 2-6.

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