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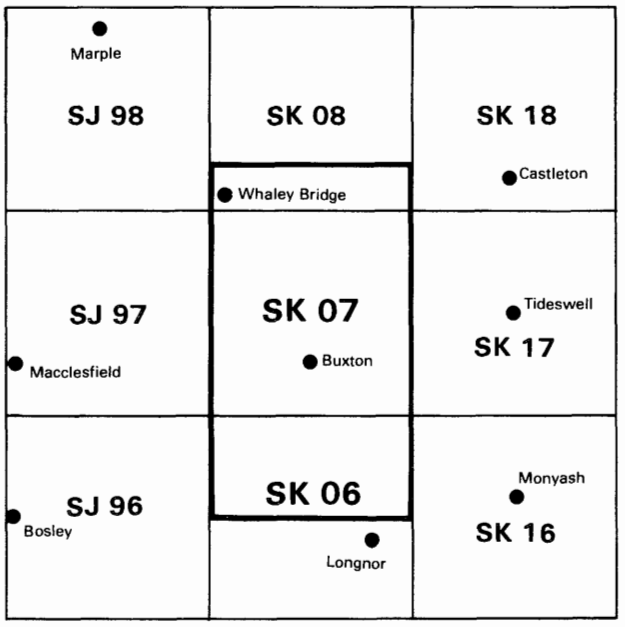

The limestone and dolomite resources of the country around Buxton, Derbyshire

Description of 1:25 000 sheet SK 07 and parts of SK 06 and 08

D. J. Harrison

Contributor
N. Aitkenhead

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The first twelve reports on the assessment of British mineral resources appeared in the Report series of the Institute of Geological Sciences as a subseries. Report 13 and subsequent reports appear as Mineral Assessment Reports of the Institute.

Report 30 describes the procedure for assessment of limestone resources, and reports 26 and 47 describe the limestone resources of particular areas.

Details of published reports appear at the end of this report.

Any enquiries concerning this report may be addressed to Head, Industrial Minerals Assessment Unit, Institute of Geological Sciences, Keyworth, Nottingham NG12 5GG.

The asterisk on the cover indicates that part of sheets adjacent to the one cited are described in this report.

PREFACE

National resources of many industrial minerals may seem so large that stocktaking appears unnecessary, but the demand for minerals and for land for all purposes is intensifying and it has become increasingly clear in recent years that regional assessments of resources of these minerals should be undertaken. The publication of information about the quantity and quality of deposits over large areas is intended to provide a comprehensive factual background against which planning decisions can be made.

The interdepartmental Mineral Resources Consultative Committee recommended that limestone should be investigated, and, following a feasibility study initiated in 1970 by the Institute and funded by the Department of Education and Science, the Industrial Minerals Assessment Unit (formerly the Mineral Assessment Unit) began systematic surveys in 1972. The work is now financed by the Department of the Environment and is being undertaken with the cooperation of members of the British Quarrying and Slag Federation.

This report describes the limestone and dolomite resources of some 50 km^2 of country around Buxton, Derbyshire, shown on the accompanying 1:25 000 resource map. The assessment was conducted by D. J. Harrison with the assistance of F. C. Cox, J. R. Gozzard, D. McC. Bridge, R. W. Gatliff, J. T. Dove, H. Mathers, T. W. Waterhouse, Mrs S. P. Grant and Mrs M. E. Hill.

The assessment is based on a geological survey at the 1:10 560 scale by I. P. Stevenson and N. Aitkenhead (for dates of survey, see map in pocket). Dr Aitkenhead also contributed the account of the geology. Chemical analyses were carried out by A. E. Davis and A. N. Morigi of the Institute's Analytical Chemistry Unit. The G-EXEC data-base management system was used to obtain most of the statistical data and support for this was provided by G. G. Baxter of the Computer Unit. K. S. Siddiqui of the Petrology Unit carried out X-ray diffraction analyses of the insoluble residues, while M. Mitchell of the Palaeontology Unit identified key fossils.

J. W. Gardner, CBE, (Land Agent) was responsible for negotiating access to land for drilling. The ready cooperation of land owners, tenants and quarrying companies in this work is gratefully acknowledged.

G. M. Brown
Director

Institute of Geological Sciences
Exhibition Road
London SW7 2DE

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The limestone and dolomite resources of the country around Buxton, Derbyshire *In pocket*

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The limestone and dolomite resources of the country around Buxton, Derbyshire

Description of 1:25 000 sheet SK 07 and parts of SK 06 and 08

D. J. HARRISON

SUMMARY

The study of borehole cores and samples from quarries and natural exposures, together with information from the records and geological maps of the Institute of Geological Sciences, forms the basis of the assessment of limestone and dolomite resources near Buxton, Derbyshire.

The limestones are classified on their calcium carbonate content, and the accompanying 1:25 000 resource map shows the distribution of the categories of limestone recognised at outcrop. Horizontal sections, constructed from the borehole data and from a knowledge of the regional geology, indicate the categories likely to be encountered at depth. As limestone purity in this district is stratigraphically controlled, most of the boundaries between categories coincide with geological boundaries. Accordingly, the geology, the carbonate resources, and the chemical and mechanical character of each formation is described in turn.

Bibliographical reference

HARRISON, D. J. 1981. The limestone and dolomite resources of the country around Buxton, Derbyshire. Description of 1:25 000 sheet SK 07 and parts of SK 06 and 08. *Miner. Assess. Rep. Inst. Geol. Sci.*, No. 77.

If it is desired to refer to the part of the report written by the contributor, the citation in the text should be in the form 'Aitkenhead, pp. 3 – *in* Harrison, 1981'; the bibliographical reference shown above should appear in the list of references.

Author and contributor

D. J. Harrison, MSc, MIMM
Institute of Geological Sciences,
Keyworth, Nottingham NG12 5GG

N. Aitkenhead, BSc, PhD
Institute of Geological Sciences,
Ring Road Halton, Leeds LS15 8TQ

INTRODUCTION

The demand for raw materials has lead to growth in the limestone quarrying industry and, although production has fallen slightly in recent years, national production in 1978 was 66.4 million tonnes (Institute of Geological Sciences, 1980) and 23 per cent of this output was from the Carboniferous Limestone in Derbyshire. However, these rocks also give rise to impressive scenery and, in consequence, a large part of their outcrop is included within the Peak District National Park. If the amenity value of the region is to be preserved and it is also to continue to supply industry with essential raw materials, then detailed information on the nature of the limestone resources is needed to ensure that land-use and mineral planning is carried out against a factual geological background. The provision of such information relating to the physical and chemical characteristics of the limestones is the objective of the present survey.

The methods of assessment were developed from a feasibility study and embody the most cost-effective procedures for assessing limestone resources on a regional scale (Cox and others, 1977). The materials for study have been obtained from cored boreholes, natural sections and quarry faces. In addition the survey has benefited from the cooperation of members of the minerals industry who have made available numerous borehole logs and chemical data.

Most boreholes were drilled to a depth of at least 100 m and the petrological, mineralogical, chemical and certain of the physical properties of all samples have been determined in the laboratory. Conventional geological nomenclature (see Table 15) has been used

Table 1 Classification of limestones by purity with some possible industrial uses

Catogory	$CaCO_3$ percentage	Equivalent CaO	Possible uses
1 Very high purity	>98.5	>55.2	Steel, glass, rubber, plastics, paint, whiting
2 High purity	>97 to <98.5	>54.3 to <55.2	Iron, ceramics, Portland cement, sugar
3 Medium purity	>93.5 to <97	>52.4 to <54.3	Paper, animal feeding stuffs, agriculture
4 Low purity	>85 to <93.5	>47.6 to <52.4	Aggregates
5 Impure	<85	<47.6	Natural cement, mineral wool

Note $CaCO_3$ content is only one of several chemical specifications governing end-use; silica, iron, sulphur, and certain trace elements may be as important in some applications.

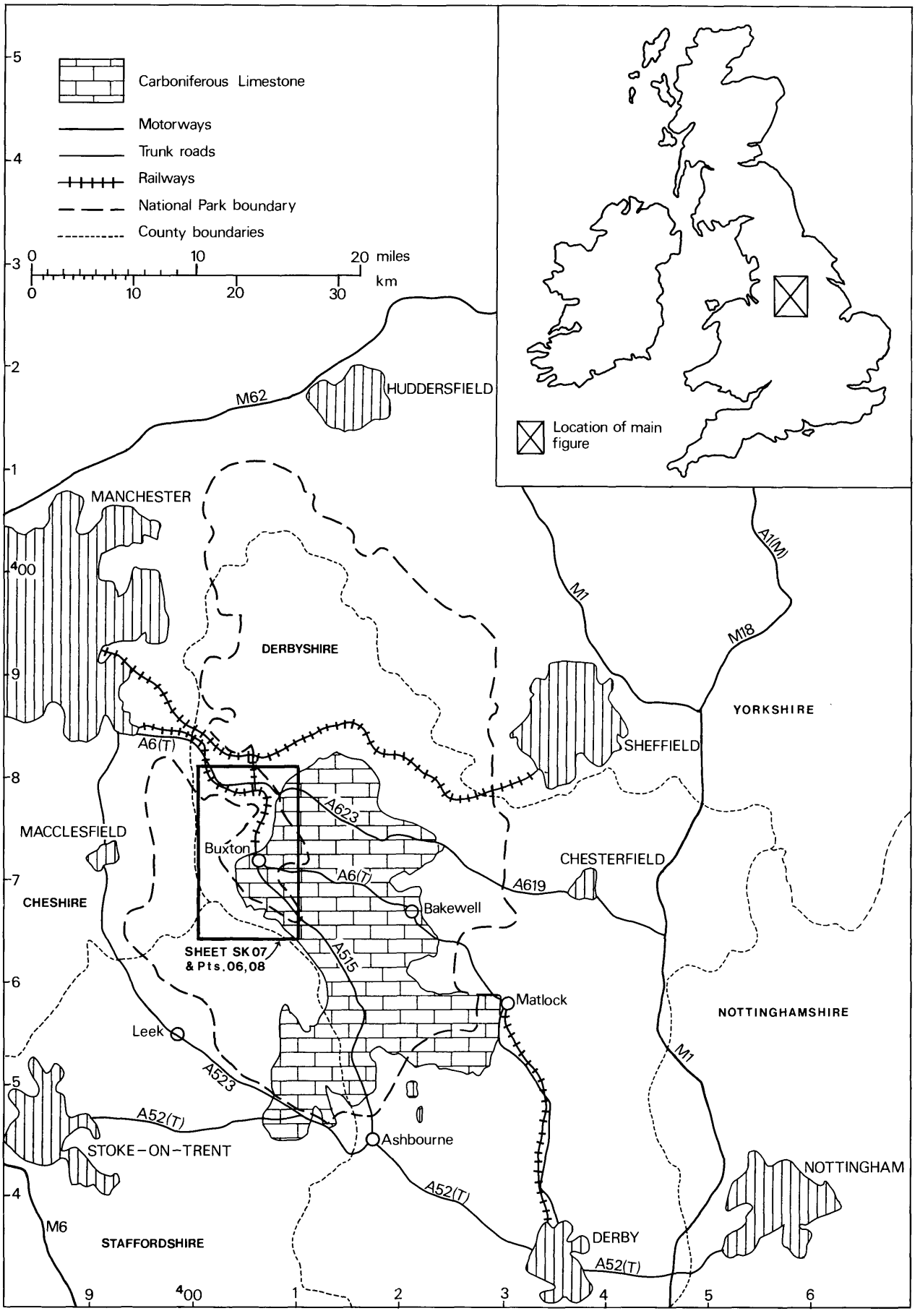


Figure 1 Map showing the location of the district.

for technical descriptions, ensuring compatibility between this report and the geological literature; a glossary is appended. The rocks are classified in terms of their calcium carbonate ($CaCO_3$) content so that the relation between limestone category and possible end use may be deduced (Table 1).

Detailed results are set out in this report and its appendices, but the accompanying resource map is more generalised. In the horizontal sections, the vertical distribution of the limestone categories is inferred by extrapolation from a knowledge of the surface geology augmented by the results from the boreholes.

DESCRIPTION OF THE DISTRICT

Most of the district*, including the limestone outcrop, is situated in Derbyshire, but small areas of Staffordshire and Cheshire are also included; it also lies partly within the Peak District National Park (Figure 1). Road and rail communications with the surrounding conurbations, especially Manchester, are good. The population is scattered through several towns and villages, but Buxton is the commercial, administrative, social and tourist centre of the area. Chapel en le Frith is the home of the large Ferodo works. However, the local economy is based largely on pastoral farming and on the mineral extractive and manufacturing industries. Formerly, limestones were worked in small quarries for local use in building, walling and lime-burning, but in recent years larger quarries (Figure 2), have been developed to produce raw materials for the construction, chemical, glass-making and metallurgical industries. In one quarry dolerite is quarried for use as a crushed-rock aggregate.

TOPOGRAPHY

In the east of the district limestones and associated igneous rocks form an undulating plateau which ranges in elevation from 1100 ft (335 m) to over 1400 ft (427 m) south of Buxton and is characterised by pale-coloured drystone walls, treeless pastures and karst features. The plateau is dissected deeply by the gorge of the River Wye and its tributary dry valleys of Cunning Dale, Woo Dale and Deep Dale (Figure 3). Between Earl Sterndale and Harpur Hill the plateau is marked by several limestone escarpments, whereas the southern margin is characterised by apron-reef limestones forming steep outward-dipping slopes and the serrated peaks of Chrome Hill and Parkhouse Hill (Plate 1). Locally the quarrying of limestone and dolerite has modified the scenery.

To the north, west and south of the limestone plateau the country is underlain by sandstones and shales of Namurian ('Millstone Grit') and Wesphalian ('Lower Coal Measures') age, producing marked dip- and scarp-slope topography. The scarps rise to over 1800 ft (549 m) above OD and are drained by numerous brooks which flow in deeply incised valleys. The escarpments are locally wooded; the highest moorlands are peat-covered and gritstone walls are characteristic. The headwaters of the rivers Dove and Manifold, draining the slopes below Axe Edge Moor, flow in a south-easterly direction, the Dove producing a broad, symmetrical valley.

* In this report, the word 'district' is used to denote the area depicted on the accompanying resource map.

GEOLOGY

This general account is based mainly on geological investigations which are to be detailed in the forthcoming Buxton Memoir (Aitkenhead and others, *in preparation*).

Most of the district is underlain by sedimentary rocks of Carboniferous age but pre-Carboniferous rocks are probably represented by altered volcanic rocks, possibly of Precambrian age, encountered in a borehole [0987 7247] at Woo Dale between a depth of 243.2 m and its base at 312.0 m (Cope, 1973). Gravity anomalies suggest that basement rock may lie at broadly comparable depths throughout the district.

The Carboniferous sequence begins with a thick limestone succession of Dinantian age, popularly referred to as the 'Carboniferous Limestone'. The limestones are interbedded with a few volcanic deposits and are overlain by mudstones and sandstones of Namurian age.

The geological structure, which controls the distribution of the different rock outcrops in the district, is largely the result of earth movements that were in part contemporaneous with sedimentation, but which took place mainly towards the end of the Carboniferous period. Lead-zinc mineralisation, which is extensively developed in these rocks elsewhere in Derbyshire, is of only minor importance in this district.

Drift deposits are largely restricted to alluvial deposits in the bottoms of a few narrow valleys and to brown clayey silt (head) that occurs as small patches in a few of the deeper hollows. Head is also thinly spread over many of the more gentle slopes and also tends to fill solution-widened joints and fissures in the limestones.

Dinantian Rocks

The limestones of the district consist mainly of the calcareous skeletons of marine animals and plants, broken and comminuted by wave and current action, mixed in varying proportions with lime mud, and later cemented by calcite spar. Sedimentation took place in a shallow tropical sea, the products of which are now referred to as the limestones of the Derbyshire 'shelf' province. However, beyond the margins of the present Dinantian outcrop deeper-water conditions prevailed, at least when the upper part of the sequence was being deposited. The resultant lateral transition of limestone types is especially evident in the south-west of the outcrop, where the shelf-limestones pass into an apron-reef complex that marks the top part of a former steep submarine slope leading down to the 'off-shelf' or 'basin' province, now hidden beneath an unconformable cover of Namurian sediments. Volcanism was most active during the later part of the Dinantian, and resulted in the presence of extensive clays, tuffs and lavas interbedded with the higher limestones.

The sequence in the district is about 690 m thick, but the lowest 274 m is known only from boreholes. Local unconformities occur in the sequence, particularly in the higher limestones where they lie near the margins of the shelf and where considerable thickness variations result. These variations may reflect localised minor earth movements during deposition, possibly associated with volcanic activity, and possibly also widespread changes in sea level.

The limestones are subdivided into faunal zones (Figure 4) on the basis of either their coral-brachiopod or their goniatite-bivalve fossil assemblages. The zonal

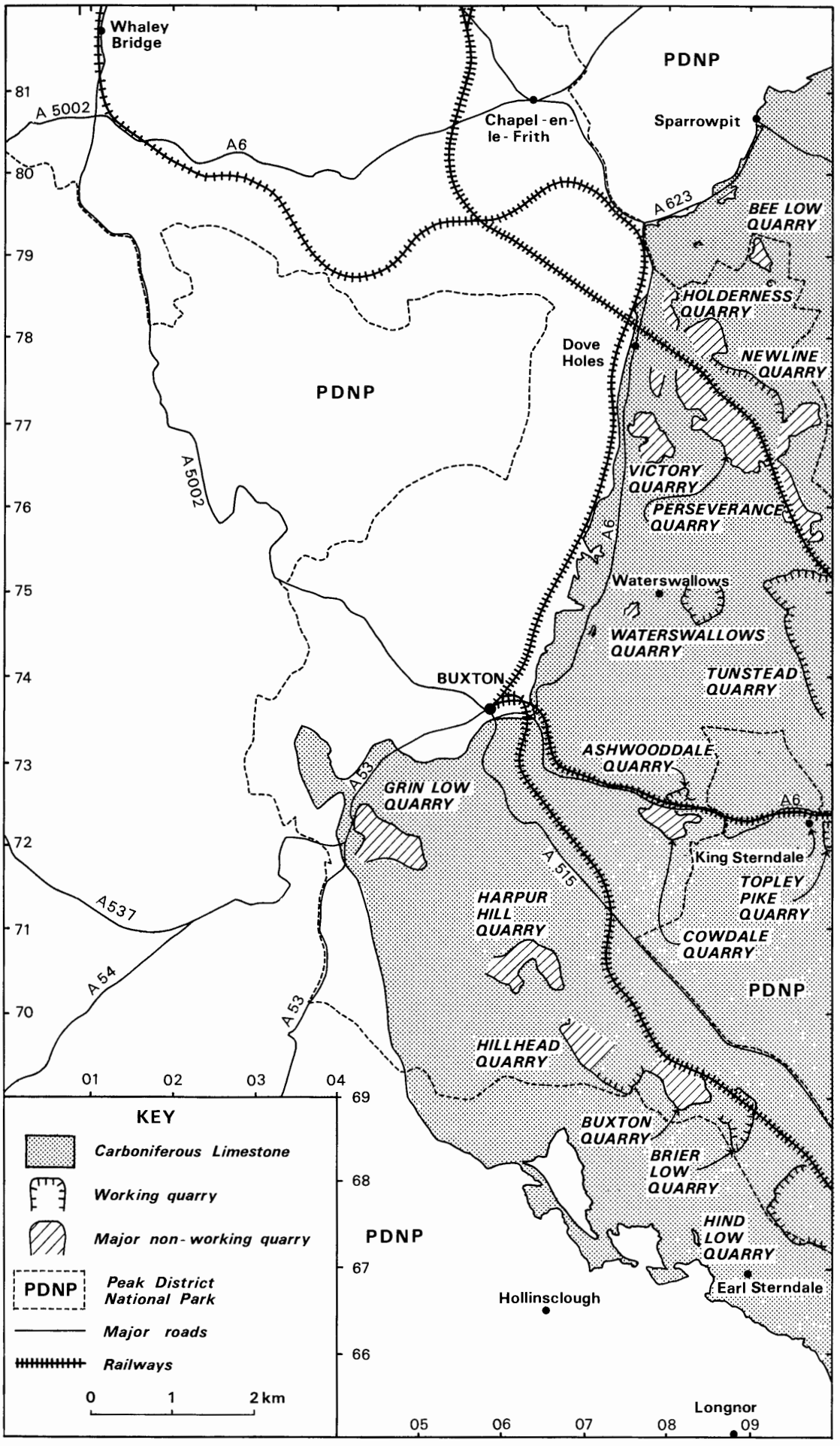


Figure 2 Distribution of the major quarries at the time of the survey.

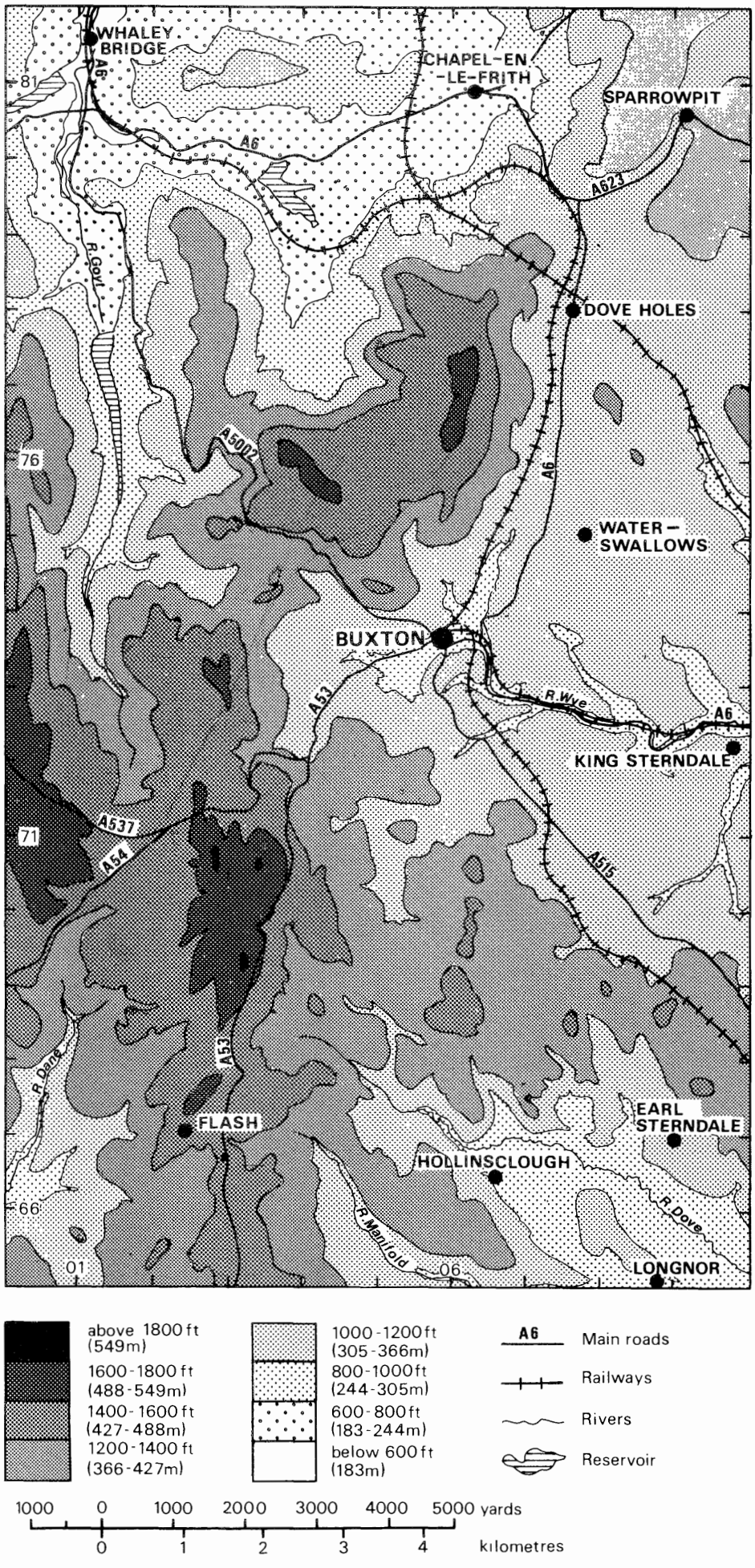


Figure 3 Topography.

Plate 1 Steep-sided hills associated with the apron-reef limestone at the south-western margin of the Dinantian outcrop, Earl Sterndale.

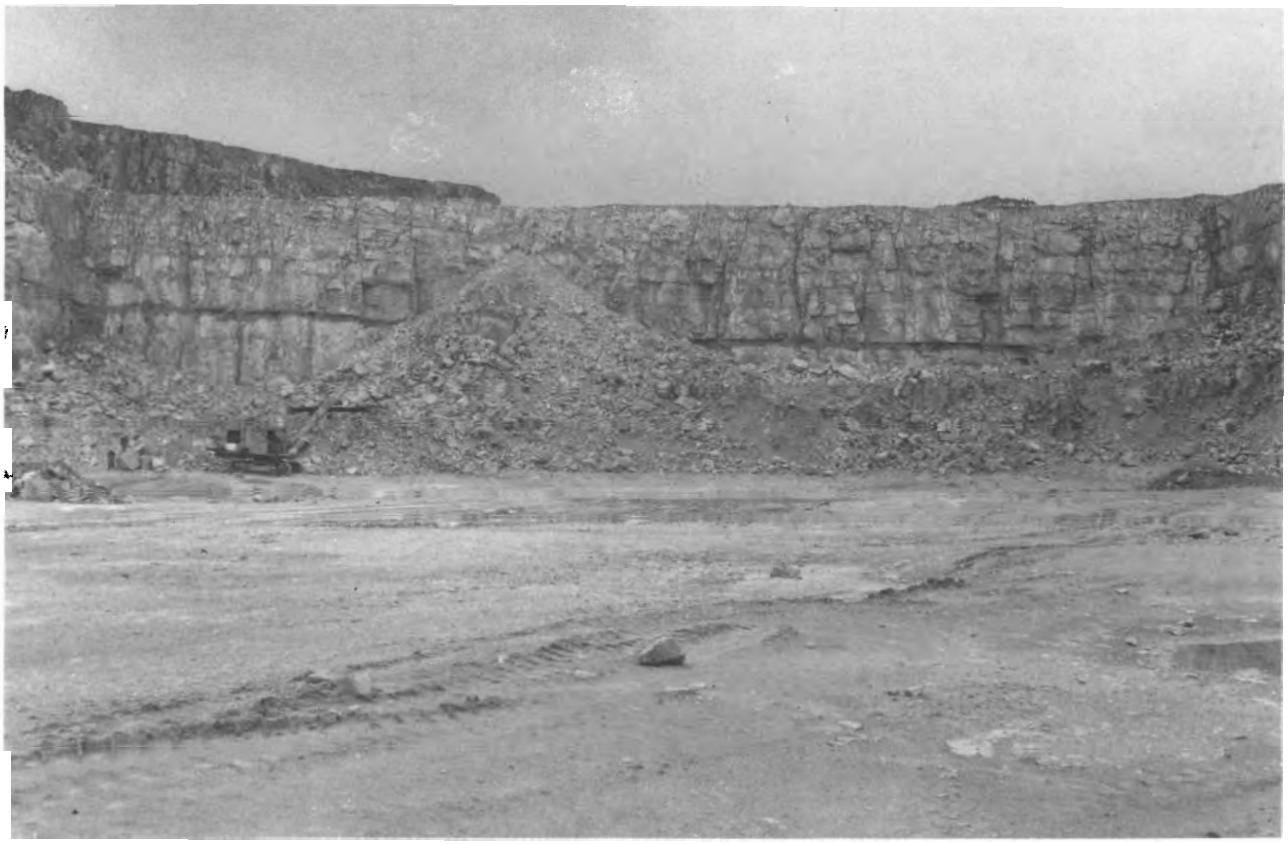


Plate 2 Thick-bedded Bee Low Limestones with clay wayboards, Hillhead Quarry.

Plate 3 Miller's Dale Limestones with Dove Holes Tuff, Holderness Quarry.

Plate 4 Dark, thin-bedded Monsal Dale Limestones overlying pale, thick-bedded Bee Low Limestones, Buxton Quarry.

Plate 5 Dolerite intrusion, Waterswallows Quarry.

boundaries are subject to minor revision as more fossils are discovered, and they do not exactly coincide with the boundaries of named formations. However, current stratigraphic practice (George and others, 1976; Ramsbottom and Mitchell, 1980) divides the Dinantian rocks into seven stages; of these only the Holkerian, Asbian and Brigantian are represented in this district.

Woo Dale Limestones The *Holkerian* Stage is represented in this district by the Woo Dale Limestones (S_2) which crop out in three anticlinal inliers: in and around Woo Dale; in the dry valleys west of Harpur Hill; and in the area north-west of High Edge and south-west of Harpur Hill. The characteristic Woo Dale Limestone lithofacies consists of thinly bedded, dark brown and dark grey fine-grained limestones with some buff-grey and pale grey beds. The lithologies are similar to those found elsewhere in Derbyshire in shelf limestones of the same age, but the beds are generally darker than corresponding limestones exposed in the Via Gellia [262 564], Cromford (Cox and Harrison, 1980). The limestones are chert-free but many of the darker beds contain thin mudstone partings; locally they are dolomitised. Approximately 100 m of the Woo Dale Limestones is exposed, of which the lowest 30 m is dolomitised and is so lithologically distinct in Woo Dale [097 725] that it forms a mappable unit known as the *Woo Dale Dolomites*. A further 272 m of these dolomites with bands of dolomitised limestone was proved in the Woo Dale Borehole; the basal beds have been assigned to the earliest Viséan but may even be of late Tournaisian age (Cope, 1979).

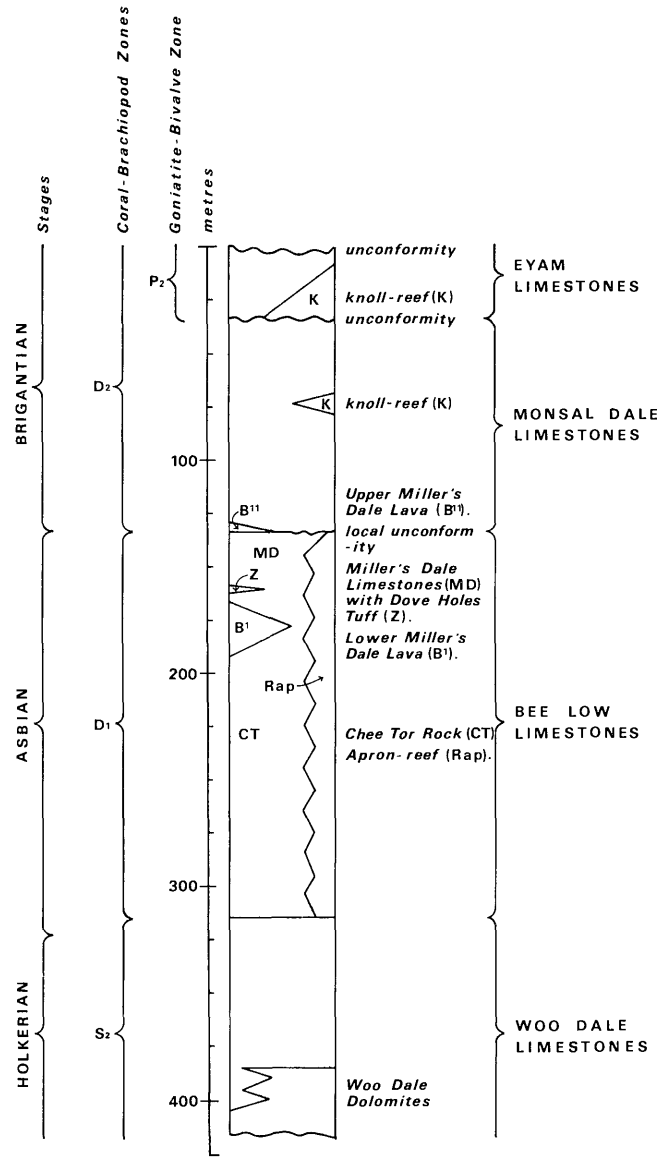


Figure 4 Generalised section of the exposed Dinantian rocks.

Bee Low Limestones The top beds of the Woo Dale Limestones are included, on faunal grounds, in the *Asbian* Stage, to which the Bee Low Limestones (D_1) also belong. The Bee Low Limestones (Plate 2) are mainly pale grey, massive, chert-free limestones, with beds up to 10 m thick in the middle and lower parts of the formation (Stevenson and Gaunt, 1971). Dispersed throughout the sequence are a number of beds, up to about 0.5 m in thickness, of reddish brown to greenish grey clay, probably representing intermittent widespread falls of volcanic ash.

Between Dove Holes, Harpur Hill and Hindlow Station the Bee Low Limestones contain the *Lower Miller's Dale Lava*, the beds below being termed the *Chee Tor Rock* and those above the *Miller's Dale Limestones.*

No single borehole or natural section has proved the full thickness of the Bee Low Limestones in the district but they are estimated to be about 183 m thick in the north and between 168 and 192 m in the south. The Chee Tor Rock is estimated to range from about 115 to 122 m, and the Miller's Dale Limestones from 19 m in the south to 43 m near Dove Holes.

The Lower Miller's Dale Lava and the *Dove Holes Tuff* (Plate 3) are the two major units of volanic rock in the Bee Low Limestones. The former has a long outcrop, and probably extends at depth to the western margin of the limestone outcrop between Buxton and Dove Holes (Figure 5); its maximum proved thickness is 29.9 m south-east of Peak Dale [093 767]. The Dove Holes Tuff has a narrow outcrop extending for about 2 km in the vicinity of Dove Holes. It lies about 15 m above the base of the Miller's Dale Limestone and has a maximum thickness of about 1.8 m.

Along the south-west margin of the outcrop of the Bee Low Limestones there is a lateral passage of these beds first into a narrow discontinuous algal reef and then into steeply dipping fore-reef limestones which together constitute an apron-reef.

Monsal Dale Limestones The *Brigantian* Stage is represented in the district by the Monsal Dale Limestones (D_2) and Eyam Limestones (P_2). The Monsal Dale Limestones crop out discontinuously around the western periphery of the limestone outcrop and also in a few small outliers west of Hindlow. The discontinuous and incomplete nature of the outcrop results from the combined effects of an apparently localised unconformity at the base of the overlying Eyam Limestones and a more general unconformity at the base of the Namurian shales. It is estimated that about 90 m of Monsal Dale Limestones is present south of Dove Holes and about 110 m in the south-west near Turncliff [047 698]. The *Upper Miller's Dale Lava*, which is extensively developed at or near the base of the formation in adjacent districts to the east, occurs only in one small outlier at Fox Low [067 712].

The Monsal Dale Limestones (Plate 4) are more variable in colour, bedding and texture than the Bee

Low Limestones, and contain chert at some levels. The lowest beds in the succession usually consist of dark, clay-rich, pyritous and thinly bedded limestones ranging in thickness from about 6.1 m around Dove Holes to 10.1 m at Stoop Farm [064 681] in the south. A few knoll-reefs are present in the upper part of these dark limestones and in the lower part of the succeeding sequence which is predominantly pale in this area. The knolls consist of mainly pale grey massive micritic to granular limestone associated in some cases with coarsely crinoidal limestone.

Eyam Limestones The Eyam Limestones have a narrow outcrop about 2.4 km long in the vicinity of Brook House, north of Buxton, and hereabouts lie, apparently with strong unconformity, on Miller's Dale Limestones. They are about 35 m thick and have similar lithological characteristics to the basal dark limestones of the Monsal Dale Limestones; small knoll-reefs are present west of Fairfield Common.

The lavas, tuffs, and clay wayboards already mentioned are the products of volcanic activity that continued intermittently over much of the shelf and surrounding basin province during late Dinantian times. In the shelf province, the volcanic rocks were erupted onto a limestone surface that lay close to sea level.

The locations of the eruptive centres are uncertain; a vent for the Dove Holes Tuff may well lie near its outcrop, but beneath younger rocks. Another eruptive centre probably lay not far to the east of the area of Monk's Dale. Two basalt dykes exposed in Great Rocks Dale [0974 7565 and 0995 7506] may have acted as feeders during the fissure eruptions that were probably responsible for the Upper and Lower Miller's Dale lavas.

The only other intrusive igneous rock in the area is the dolerite forming the Waterswallows Sill (Plate 5), which reaches a thickness of about 24 m in Waterswallows Quarry. It appears, on the basis of radiometric dating, to have been intruded in later Carboniferous times, and is thus appreciably younger than, and not directly related to, the extrusive igneous rocks (Stevenson and others, 1970).

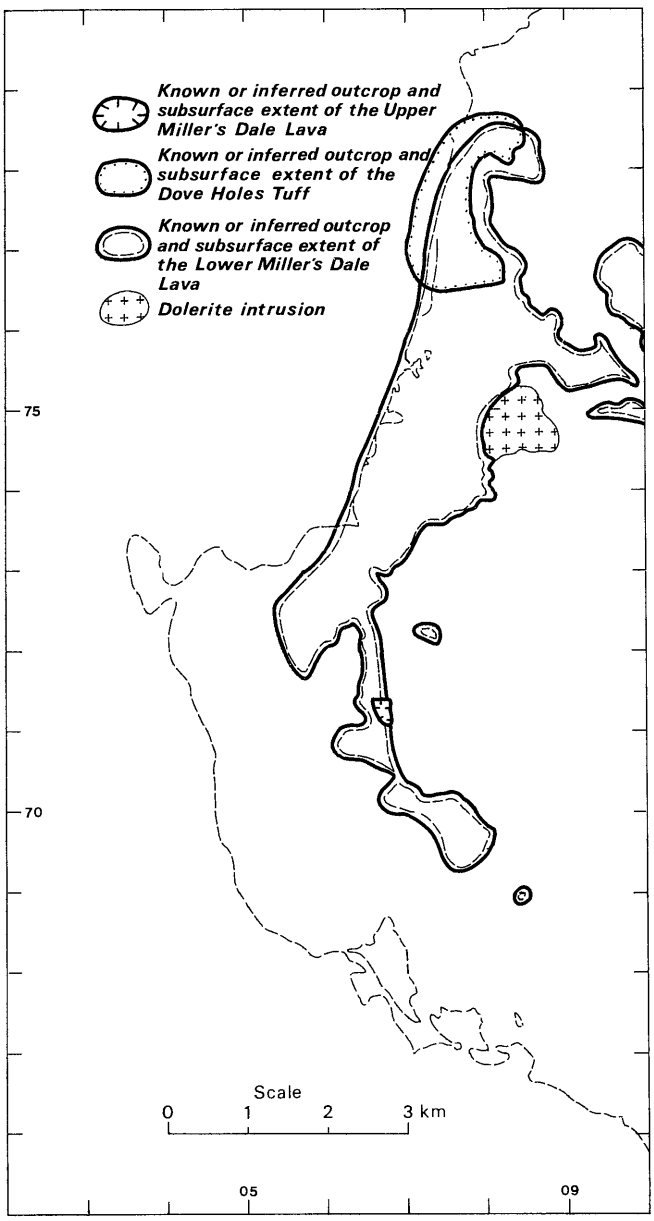


Figure 5 Distribution of volcanic rocks.

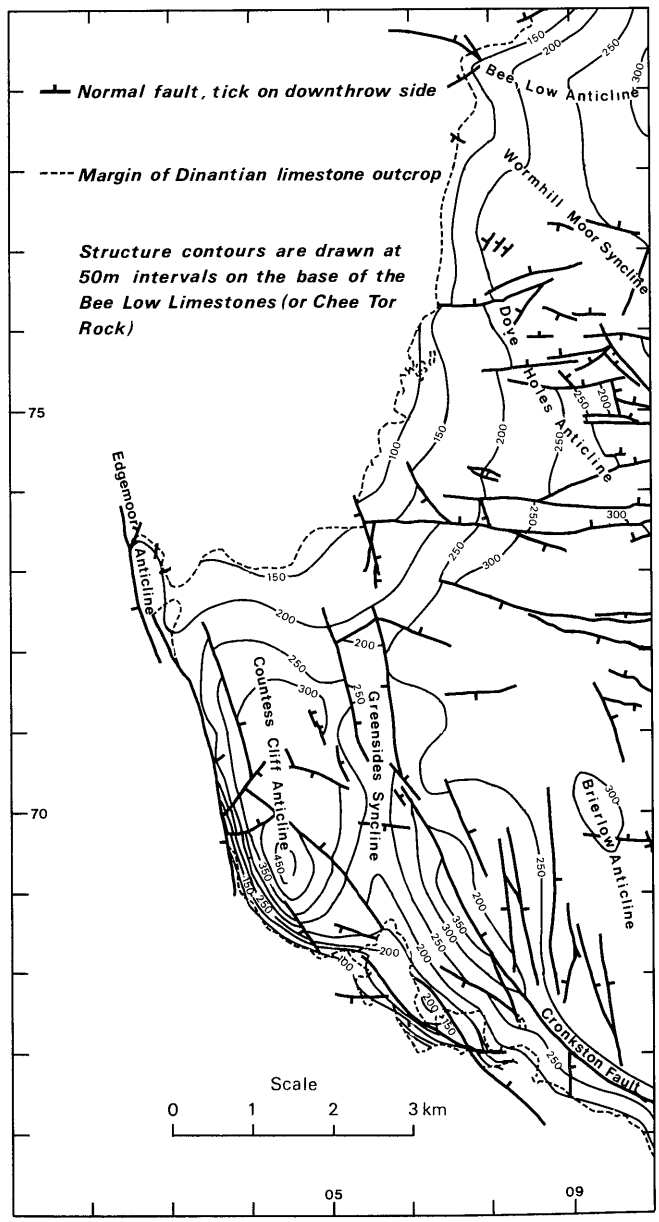


Figure 6 Structure of the Dinantian rocks.

Structure

The Dinantian limestones were folded and faulted by earth movements which took place intermittently over a long period of time, but most intensely at the end of the Carboniferous Period. Viewed regionally, the area lies along the crest of the Derbyshire Dome, the broad uplift that produced the limestone outcrop of the Peak District. In detail, however, there is no single anticlinal culmination.

The structure contours shown in Figure 6 indicate the presence of three separate gentle anticlines trending between NNW – SSE and WNW – ESE. Flanking dips are generally less then 10°, except near the western margin of the limestone outcrop where they are rather steeper. To the south-west of these structures, two tighter north – south anticlines lie south of Buxton and dips are steeper, generally between 10° and 20° on the flanks of the Greensides Syncline and up to 50° on the western flank of the Countess Cliff Anticline.

Fault trends are predominantly west – east in the east of the district and NNW – SSE in the south-west, the largest individual throw being along the Cronkston Fault which has a maximum vertical displacement of about 213 m. Many of the small fractures, however, have displacements that are large enough to have an effect on quarrying.

Lead-zinc mineralisation

At various times after the end of the Carboniferous Period certain faults, fractures and cavity systems in the Derbyshire/Staffordshire limestone outcrop became the host for sulphide ores and associated calcite-baryte-fluorite gangue minerals.

The present district falls outside the main orefield, which lies to the east, and the few minor veins and scrins (see Glossary) near the northern and south-western borders of the district which have been worked in the past are economically insignificant. However, it is common to find considerable amounts of calcite associated with fault breccias and minor quantities of other gangue minerals and sulphides are also present locally.

ASSESSMENT OF RESOURCES

The assessment is based on a field survey which provided samples for study in the laboratory and the data for interpretation. The procedures adopted are similar to those used in other reports on the assessment of resources (Cox and others, 1977).

PROCEDURES

Field survey

The number of boreholes required to assess the limestones of the district was determined with the aid of up-to-date 1:10 560 geological maps, and with reference to natural exposures and quarry sections. Core from a borehole drilled in 1971 at the feasibility stage of the project was available and a further five boreholes were drilled to complete the survey. The initial borehole was drilled to a depth of 60 m and continuous cores of at least 74 mm diameter were obtained. The remaining five boreholes were drilled to depths ranging from 100 to 130 m and provided continuous cores of 47 mm diameter. These boreholes were drilled by contractors using trailer-mounted rigs and waterflush techniques. The recovery of cores exceeded 95 per cent, but some difficulties were encountered with clay bands. Cores from three commercial boreholes were also made available and additional material was obtained by use of a portable Minuteman drill and a MK 8 Edeco Stratadrill operated by Institute staff. These drills recovered small-diameter core from eight boreholes drilled to a maximum depth of 15 m. Samples were collected at one-metre intervals from quarries and natural exposures and these were supplemented by an extensive collection of spot samples.

Laboratory programme

Lithological, petrological and mineralogical determinations of the limestones were made using a combination of microscopical and staining techniques applied to sawn and etched rock surfaces and thin sections. Additional data on the non-carbonate mineralogy of the limestones were determined by X-ray diffraction analysis of the acid-insoluble residues. The method suffered from problems of mineral grain orientation and grain size, and positive mineral identification was, in some cases, difficult. However, 142 residues were selected for X-ray diffraction analysis, and the mineralogical data obtained are shown in Table 7.

Table 2 Rock colours defined by limiting reflectance percentages with reference to three filters and a $MgCO_3$ standard.

Colour	Reflectance percentage		
	Wavelength 660 nm	Wavelength 530 nm	Wavelength 470 nm
Pale grey	>35	>26	>24
Mid-grey	35–15	26–12	24–11
Dark grey	<15	<12	<11

In order to measure the colour of the rocks objectively, tri-colour reflectance values were obtained using an EEL reflectance spectrophotometer. The measurements were taken on sawn, acid-etched rock surfaces and the values recorded have been used in correlating boreholes and sections. Three colours, pale grey, mid-grey and dark grey, are defined by reference to three filters (wavelengths 660, 520, and 470 nm respectively) and a $MgCO_3$ standard (Table 2). The colour of a rock powder is important if it is to be used as a whitening agent, or, in an end-use where the colour of the manufactured product is important. Hence, tri-colour reflectance values were determined for powdered samples (<63 micrometres particle size) of the very high purity limestones in each formation.

Chemical analyses for major and trace elements were performed by the Analytical Chemistry Unit of the Institute on samples from borehole cores and exposures. Analyses were made using direct electron excitation X-ray spectrophotometry for Ca, Mg, Si, Al, Na, K, S, Sr, P, F and Fe; other elements were determined by atomic absorption spectrophotometry and As by colorimetry (Roberts and Davis, 1977).

A primary classification of the rocks, based on carbonate content, was achieved by measuring the amount of the acid-insoluble residue (Cox and others, 1977).

In order to assess the likely performance of the rocks as aggregates all samples were subjected to the Aggregate Impact Value (AIV) test, BS 812 (British Standards Institution, 1975).

Classification

The two methods of classification chosen for use in this report are based on petrology and on calcium carbonate ($CaCO_3$) content. The former is used to describe the rocks in lithological terms, but the latter is preferred to depict them on the assessment map and for use in the description of resources. The relationship between the five categories adopted, their $CaCO_3$ contents and possible end uses are shown in Table 1.

RESULTS

The results are here described by reference to the geological formations, rather than under headings relating to chemical or physical properties which were appropriate for other surveys (Cox and Bridge, 1977; Cox and Harrison, 1980).

WOO DALE LIMESTONES

These rocks occur in three anticlinal inliers totalling 2.52 km² of outcrop. Normally this formation consists of limestones with minor dolomitisation.

Petrography The limestones are biomicrites, biopelsparites and pelsparites, with comparatively rare

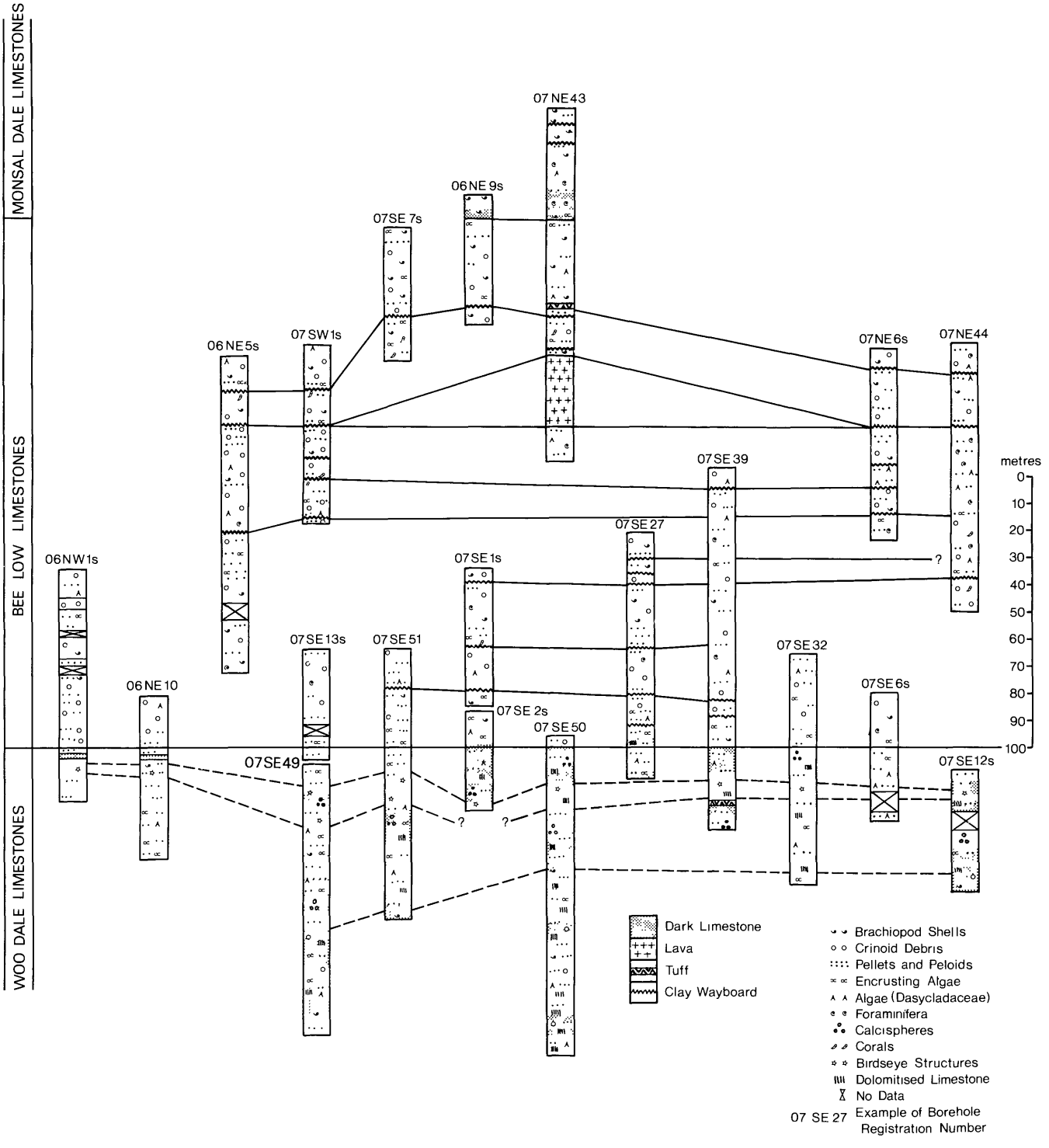


Figure 7 Vertical sections of the Dinantian rocks.

biosparites. Fossil clasts are usually finely comminuted to lutite or fine to medium arenite size, are well sorted, and are commonly encrusted by algae. The facies varies from very fine, poorly fossiliferous biomicrites and micrites, to biopelsparites. The former contain calcispheres and foraminifera as the dominant allochems, whereas the latter contain algae, algae-encrusted bioclasts, brachiopod debris and foraminifera. Laminated beds and cross-bedding have been recorded. A band of micritic rocks with birdseye structures occurs between 10 and 20 m below the top of the formation (Figure 7).

Dolomitisation The available data show that the degree of dolomitisation of the Woo Dale Limestones is variable throughout the district. The amount of dolomitisation is usually minor but in Woo Dale [097 725] the lowest 30 m seen is extensively dolomitised and has been mapped as the Woo Dale Dolomites. A 24.60 m section (07 SE4S) in Woo Dale reveals a mixed sequence of dolomite and dolomitised limestone with rare limestone beds; the proportions of dolomite and dolomitised limestone are about equal. In contrast to the secondary dolomites of the Wirksworth – Monyash districts of Derbyshire, the dolomitisation of the Woo Dale Limestones of the Buxton district is stratigraphically controlled and took place at an early diagenetic stage. Where the alteration is extreme, the original textures are destroyed and the dolomite is buff-grey in colour, with a granular and vuggy texture. In thin section, the original limestone features are replaced by an interlocking mosaic of dolomite crystals.

Insoluble residues The Woo Dale Limestones give insoluble residue values which are generally less than 1.5% and the rocks are therefore classified as very high purity carbonates. The mean insoluble residue value (Table 3) from 562 samples of Woo Dale Limestones is 0.88%; exceptionally a value of 74.60% was recorded from a sample containing tuffaceous material at 124 m depth in borehole 07 SE 39.

Chemical analyses The high-grade character of the Woo Dale Limestones is confirmed by their chemical analyses (Table 3). Calcium oxide values are generally greater than 55.0%, except when the limestones are significantly dolomitised. Table 4 illustrates the variation in CaO, MgO and Fe_2O_3 content in analyses of Woo Dale Limestones from borehole and section samples. Magnesium values are shown to be variable and usually less than 0.6%, but they are higher than those for the other formations. Pure dolomite contains 21.85% MgO, and most commercial dolomites have between 20.75 and 21.70% MgO. One sample from a natural section (07 SE 4S) in Woo Dale was within these limits, but three others from the same section contained only 1.18, 17.40 and 0.90% MgO, respectively. In a correlation matrix produced for the Woo Dale Limestones, MgO shows a positive correlation with Fe_2O_3, suggesting that the dolomite contains some iron in the lattice. The iron values are generally high with a maximum value of 1.18% in the Woo Dale Dolomites of 07 SE 4S.

Table 3 Chemistry of the Woo Dale Limestones (including Woo Dale Dolomites)

	Maximum value	Minimum value	Mean	Standard deviation
	wt %	wt %	wt %	wt%
Insoluble residue	74.60	0.10	0.88	3.41
CaO	56.00	32.00	53.71	4.70
MgO	21.00	0.27	1.70	4.00
SiO_2	2.20	0.00	0.21	0.35
Al_2O_3	0.64	0.00	0.08	0.11
Na_2O	0.03	0.00	0.01	0.01
K_2O	0.16	0.00	0.03	0.03
SO_3	0.62	0.00	0.17	0.19
P_2O_5	0.04	0.00	0.01	0.01
Loss at 1050°C	47.51	43.23	44.12	0.74
F	0.03	0.00	0.01	0.01
SrO	0.13	0.00	0.03	0.03
	ppm	ppm	ppm	ppm
MnO	2500	10	343	486
Cu	15	0	3	3
Pb	15	0	2	4
Zn	1000	0	36	130
Fe_2O_3	11800	60	1117	1945
As	2	0	1	1

Note The insoluble residue data were obtained from 562 samples. The chemical data were obtained from 58 analyses, except for those for As which were obtained from 12 analyses.

Table 4 Variation in major oxides in the Woo Dale Limestones (including Woo Dale Dolomites)

Borehole/ Section number	Number of analyses	percentage by weight								parts per million			
		CaO				MgO				Fe_2O_3			
		Max value	Min value	Mean	Standard deviation	Max value	Min value	Mean	Standard deviation	Max value	Min value	Mean	Standard deviation
06 NE 10	9	55.80	55.50	55.70	0.13	0.42	0.29	0.35	0.05	400	100	244	133
06 NW 1S	1	55.10	55.10	55.10	–	0.27	0.27	0.27	–	200	200	200	–
07 SE 2S	4	55.50	54.50	55.20	0.45	0.54	0.32	0.45	0.09	3900	80	1253	1777
07 SE 4S	4	54.60	32.00	43.76	11.86	21.00	0.90	10.12	10.59	11800	600	3675	5423
07 SE 6S	3	55.20	55.00	55.10	0.12	0.42	0.33	0.37	0.05	240	100	193	81
07 SE 9S	2	54.40	54.40	54.40	0.00	0.48	0.48	0.48	0.00	2500	540	1520	1386
07 SE 12S	7	55.90	54.50	55.10	0.53	0.84	0.37	0.61	0.19	1500	150	559	553
07 SE 13S	1	55.30	55.30	55.30	–	0.37	0.37	0.37	–	200	200	200	–
07 SE 27	1	55.80	55.80	55.80	–	0.44	0.44	0.44	–	1000	1000	1000	–
07 SE 32	4	56.30	54.10	55.70	1.04	2.29	0.37	0.94	0.91	3000	400	1150	1237
07 SE 49	9	55.80	52.20	54.90	1.07	1.65	0.36	0.58	0.41	2400	60	748	740
07 SE 50	8	55.40	39.60	50.50	5.79	14.40	0.45	4.33	4.88	8100	260	2441	2624
07 SE 51	5	55.10	54.10	54.50	0.39	0.61	0.33	0.45	0.11	1300	400	620	390

Silica has a low mean relative to the other formations, confirming the absence of widespread silicification within these beds. Alumina values are low but values as high as 0.64% are recorded in clay-rich limestones. Sodium and potassium are virtually absent in these rocks, but K_2O has a very strong positive correlation with alumina, indicating the presence of K-rich clay minerals in some limestones. Sulphur is present in minor amounts in limestones from all formations and the mean value of 0.17% from the Woo Dale Limestones is similar to that for the others. The sulphur is commonly associated with lead in galena, which occurs as a localised hydrothermal mineralisation. Phosphorus, fluorine, strontium, copper, zinc and arsenic and virtually absent, although an anomalous maximum value of 1000 ppm zinc was recorded from a sample of the Woo Dale Dolomites at 2 m depth in section 07 SE 4S. The sample yielded an insoluble residue of 2.70% and the maximum MnO value for the formation, of 2500 ppm. Clearly the sample is mineralised and optical examination of the insoluble residue revealed a major proportion of an unidentified ore mineral. Manganese oxide, with a relatively high mean value of 343 ppm, and usually occurring in pyrolusite, has been recorded petrologically throughout these limestones. The loss-on-ignition values (at 1050°C) are at their highest in analyses of the Woo Dale Limestones, and the strong positive correlation of loss-on-ignition with MgO indicates that the high loss values occur in dolomitised samples.

Colour The limestones are predominantly mid-grey (Table 5) but contain a considerable proportion of dark grey and a limited number of pale grey beds. The dark colour of these limestones is characteristic of this formation in the Buxton district, but is unlike that of limestones of equivalent age and similar facies found in districts of the east (Cox and Bridge, 1977; Cox and Harrison, 1980) which are predominantly pale grey in colour.

Table 5 Colour distribution by formation

Formations and subdivisions	percentages		
	Pale grey*	Mid-grey*	Dark grey*
EYAM LIMESTONES			
Knoll-reef facies	8	92	0
MONSAL DALE LIMESTONES	2	77	21
BEE LOW LIMESTONES			
Apron-reef facies	2	90	8
Miller's Dale Limestones	6	93	1
Chee Tor Rock	34	62	1
Bee Low Limestones (undivided)	37	61	2
WOO DALE LIMESTONES	11	61	28

* See Table 2 for definition

The colours of powders prepared from the Woo Dale Limestones are relatively dark with a mean reflectance value of 73% at a wavelength of 660 nm (Table 6). They are also variable, as shown by the high standard deviation, and range from 48% to 93% reflectance at 660 nm. This is in marked contrast to the mean reflectance values obtained for the Woo Dale Limestones in the Wirksworth district (Cox and Harrison, 1980), and the Monyash district (Cox and Bridge, 1977) where mean values of 86% and 81% respectively, were recorded.

Table 6 Summary of powder reflectance results for very high purity rocks ($CaCO_3$ exceeds 98.5 per cent)

Formations and subdivisions	Mean reflectance percentages (and standard deviations)		
	660 nm	520 nm	470 nm
EYAM LIMESTONES			
Knoll-reef facies	84 (7)	80 (9)	78 (9)
MONSAL DALE LIMESTONES	77 (6)	69 (6)	67 (6)
BEE LOW LIMESTONES			
Apron-reef facies	81 (5)	76 (6)	75 (6)
Miller's Dale Limestones	79 (4)	73 (5)	71 (5)
Chee Tor Rock	83 (4)	79 (5)	77 (5)
Bee Low Limestones (undivided)	86 (5)	81 (5)	80 (6)
WOO DALE LIMESTONES	73 (8)	66 (9)	64 (9)

The darker limestones contain minor amounts of clay, occurring as thin partings, stylolitic coatings, as streaks or in disseminated form. A 1.66 m bed of tuff recorded in commercial borehole 07 SE 39 [0904 7483] at a depth of 123.10 m is estimated to be 19.75 m below the base of the Bee Low Limestones. This tuff is not seen at outcrop or in any other section or borehole across the district, but traces of blue and ochreous clay approximately 23 m below the base of the Bee Low Limestones in borehole 07 SE 50 [0854 7328], and traces of pyrite at similar levels in borehole 07 SE 51 [0822 7136] and natural section 06 NW 1S [0492 6972], may be manifestations of this localised volcanic event. The major non-carbonate minerals in the Woo Dale Limestones are clay minerals and, secondarily, quartz. The quartz occurs as euhedral crystals which are usually

Table 7 Insoluble residue mineralogy determined by X-ray diffractometry

Mineral	Number of samples in which mineral was identified		
	Monsal Dale and Eyam Limestones (9)*	Bee Low Limestones (90)*	Woo Dale Limestones (43)*
Quartz	9	84	29
Muscovite	4	50	25
Mixed-layer clay	6	38	9
Illite	4	18	20
Kaolinite	2	30	4
Smectite	0	4	1
Chlorite	1	7	1
Goethite	0	0	3
Feldspar	1	3	2
Pyrite	1	1	0
Baryte	0	0	1
Fluorite	0	4	1

* Number of samples analysed.

widely scattered throughout the beds, although local concentrations tend to increase the insoluble residue value. X-ray diffraction analysis of the acid-insoluble residues reveals a varied mineralogy (Table 7). Some boreholes and sections contain veinlets of baryte, calcite and pyrite, but the contamination of the limestone is restricted.

Fracture spacing and aggregate impact value Details for most boreholes and natural sections are shown graphically in Appendix C. The Woo Dale Limestones are characteristically well bedded with fracture-spacing values (as defined by Franklin and others, 1971) of 200 to 1000 mm. The mean aggregate impact value of 22 (Table 8), with a range of values from 17 to 26, is similar to the results obtained from limestones of the other formations. However, the values for a limited number of Woo Dale Dolomite samples are significantly higher, which suggests that they are not as suitable for use as aggregates.

Table 8 Variation of aggregate impact value within each formation

Formation (and number of samples tested)	Aggregate Impact Value			
	Maximum value	Minimum value	Mean	Standard deviation
Monsal Dale and Eyam Limestones (8)	24	20	22	1.2
Bee Low Limestones (160)	29	16	22	2.2
Woo Dale Limestones (54)	26	17	22	2.1
Woo Dale Dolomites (3)	34	25	29	4.2

BEE LOW LIMESTONES (including Chee Tor Rock and Miller's Dale Limestones)

These rocks, with a surface outcrop of 45 km², form about 90% of the limestone outcrop. The formation is of considerable economic importance as it provides most of the limestone quarried in the district. The beds are lithologically uniform and the lithofacies developed are typical of those of an open-marine shelf depositional environment.

CHEE TOR ROCK

Petrography The Chee Tor Rock and equivalent beds occuring below the horizon of the Lower Miller's Dale Lava are typically pale grey, massively bedded, calcarenites. Bioclastic and peloidal limestones containing a well sorted, spar-cemented, allochemical framework, make up much of the sequence. Crinoids, brachiopods, pellets and peloids, and dasycladacean algae are the dominant allochems, but corals, oncolites and algal-encrusted bioclasts are common at some horizons. Bioturbated and mottled beds are recorded. The lowest beds, some 10 m thick, are usually relatively thinly bedded and fine-grained, and contain darker, micritic beds similar to those in the underlying Woo Dale Limestones. Clay wayboards (see Glossary) occur throughout the sequence and are valuable aids in correlating the many natural, quarry and borehole sections studied (Figure 7).

Insoluble residues Euhedral authigenic quartz crystals predominate among the non-carbonate minerals; at certain horizons they are concentrated and form a significant source of impurity. This is particularly evident in the limestones immediately below the Lower Miller's Dale Lava which are seen in borehole 07 NE 43 [0751 7677] to be enriched in quartz euhedra within a 3-m bed. This enrichment is also seen in a 5-m bed of limestone beneath the lava in a quarry section (07 NE 5S) at Smalldale [0959 7700] and beneath clay wayboards, which are taken to represent the lateral equivalent of the lava (Figure 7) at Hillhead Quarry [0701 6956], Grinlow Quarry [0458 7233] and Bee Low Quarry [0910 7929]. Pyrite enrichment is also commonly recorded in the beds immediately below the volcanic horizons. The other non-carbonate minerals recorded from the formation are shown in Table 7.

Colour The limestones of the Chee Tor Rock are much paler in colour than the underlying Woo Dale Limestones and they are commonly described as uniformly pale grey. However, only about one third of the samples tested are pale grey; in fact mid-grey colours predominate (Table 5). Dark grey limestones are recorded locally from samples of the lowest beds.

LOWER MILLER'S DALE LAVA

The Lower Miller's Dale Lava is an olivine-basalt, which is usually amygdaloidal, with vesicles filled with calcite and chlorite. It is commonly weathered to clay at its upper surface.

MILLER'S DALE LIMESTONES

The Miller's Dale Limestones and equivalent beds occurring above the horizon of the Lower Miller's Dale Lava are lithologically similar to the Chee Tor Rock. Minor differences are a general reduction in pelletal and peloidal material with a corresponding increase in comminuted shell and crinoid debris, a generally less massive character and a predominantly mid-grey colour (Table 5). The lower 10 to 15 m of strata are richly fossiliferous with a coral/brachiopod fauna. The beds between the Lower Miller's Dale Lava and the Dove Holes Tuff were intersected by borehole 07 NE 43 and are exposed in Holderness Quarry [0834 7816]. These beds contain abundant quartz euhedra and the limestones immediately adjacent to the volcanics are mineralised with pyrite and silicified calcite veinlets. The Miller's Dale Limestones overlying the tuff also contain authigenic quartz as the dominant non-carbonate mineral, but pyritisation and silicification, in the form of silicified veinlets, silicified bioclasts and euhedral quartz crystals, are particularly prevalent in the 8 m of strata above the tuff.

APRON-REEF COMPLEX

The Bee Low Limestones pass laterally at the south-west margin and at the extreme northern margin of the limestone outcrop into an apron-reef complex of limestones. The fore-reef limestones sampled in sections 06 NE 14S [0837 6715] and 08 SE 1S [0990 8126] are mid-grey, unbedded or poorly bedded, sparsely fossiliferous, micritic limestones. Communities of brachiopods occur in situ, and bryozoan colonies and geopetal cavities are common. The reef limestones are characteristically very fine grained but bands of crinoid debris of rudite grade occur within the fore-reef limestones at Tor Top [0990 8126]. Apron-reef limestones

contain a small proportion of dark grey beds (Table 5) similar to those recorded in the Wirksworth district (Cox and Harrison, 1980). A section (06 NE 8S) at Aldery Cliff shows the gradual transition from reef to shelf facies in the Bee Low Limestones. The clay wayboards of the shelf rocks are not seen in the equivalent marginal reef facies. In the apron-reef limestones, clay is the dominant non-carbonate mineral and euhedral quartz crystals are relatively rare.

Insoluble residues Insoluble residue values are generally less than 1% for samples of all limestones of Asbian age, except for samples from silicified or pyritised beds. Accordingly, the Bee Low Limestones formation and its members contain uniformly high-grade limestones with the exception of those beds associated with the volcanic horizons in the Dove Holes area.

Chemistry The chemistry of the Bee Low Limestones is summarised in Tables 9 to 12 which show that, overall, the formation is chemically uniform, although, in detail, there is some variation between the Chee Tor Rock (Table 9) and the Miller's Dale Limestones (Table 10).

The Chee Tor Rock has a mean CaO value of 55.05%, an insoluble residue of 0.78% and silica 0.53%. In contrast, the Miller's Dale Limestones have a mean CaO value of 54.21% but residue and silica mean values are 2.63% and 1.93% respectively. There is also some variation in chemistry within these members, although sodium, potassium, phosphorus, fluorine, strontium, copper, lead, zinc and arsenic are virtually absent in both the Chee Tor Rock and Miller's Dale Limestones.

Chemical analyses of the *Chee Tor Rock* (see Appendix C) typically show high CaO values; the anomalously low CaO values recorded at 50 m depth in borehole 07 SE 39, at 19 m depth in borehole 07 SE 27 and at 35 m depth in borehole 07 SE 39 are from samples contaminated by clay wayboard material. Each of these three samples yield insoluble residue, silica, alumina, Fe_2O_3, SO_3 and K_2O values that are much higher than those typical of the Chee Tor Rock. All other samples from the Chee Tor Rock have CaO values which lie between 54 and 56%, Al_2O_3 values up to 0.2%, and Fe_2O_3 values which are generally less than 0.05%. Silica is present in variable amounts depending on the concentration of authigenic quartz crystals, but it is only rarely that the SiO_2 content is as high as 1.0 or 1.5%. SO_3 values are usually less than 0.05%, but higher values in the range 0.30% to 0.50% are recorded. Sulphur shows an affinity with iron, copper, lead, and zinc although the trace element values are always low. The Chee Tor Rock is uniformly low in MgO throughout the district, unlike the underlying Woo Dale Limestones. The mean MgO value is 0.29%, but in one sample, at 31 m depth in section 07 SE 1S, the MgO value reaches 1.27%. Manganese occurs in small but variable amounts, having a maximum of 700 ppm and a mean value of 140 ppm.

Thirteen analyses of *Miller's Dale Limestones* indicate that these beds are less chemically pure than the Chee Tor Rock, being marginally poorer in CaO and richer in silica. The silicification, though patchy, is most intense in the beds between the Dove Holes Tuff and Lower Miller's Dale Lava, and a sample taken from these rocks at 89 m depth in borehole 07 NE 43 had a very high insoluble residue content (8.90%), and a silica value of 7.02%. The CaO value of 51.60% in the same sample was the minimum for these beds. The same sample gave the maximum Fe_2O_3 value of 0.29%, due to the presence of pyrite, weathered to limonite, in the strata immediately above the Lower Miller's Dale Lava. Of the 13 samples analysed, only 3 contained more than 2.5% silica and more than half of the remaining analyses contained less than 1% silica.

Table 9 Chemistry of the Chee Tor Rock

	Maximum value	Minimum value	Mean	Standard deviation
	wt %	wt %	wt %	wt%
Insoluble residue	20.30	0.00	0.78	1.17
CaO	56.00	52.10	55.05	0.85
MgO	1.27	0.16	0.29	0.15
SiO_2	3.69	0.00	0.53	0.67
Al_2O_3	2.26	0.00	0.13	0.35
Na_2O	0.04	0.00	0.01	0.01
K_2O	0.44	0.02	0.05	0.07
SO_3	0.83	0.00	0.18	0.21
P_2O_5	0.04	0.00	0.01	0.01
Loss at 1050°C	44.01	41.48	43.64	0.44
F	0.08	0.00	0.01	0.01
SrO	0.16	0.00	0.04	0.04
	ppm	ppm	ppm	ppm
MnO	700	30	140	126
Cu	15	0	3	3
Pb	20	0	2	5
Zn	40	0	10	6
Fe_2O_3	4400	90	435	764
As	2	0	1	1

Note The insoluble residue data were obtained from 449 samples. The chemical data were obtained from 50 analyses, except for those for As which were obtained from 10 analyses.

Table 10 Chemistry of the Miller's Dale Limestones

	Maximum value	Minimum value	Mean	Standard deviation
	wt %	wt %	wt %	wt%
Insoluble residue	11.60	0.40	2.63	2.53
CaO	55.50	51.60	54.21	1.10
MgO	0.30	0.19	0.26	0.04
SiO_2	7.02	0.31	1.93	2.04
Al_2O_3	0.10	0.00	0.06	0.02
Na_2O	0.02	0.00	0.01	0.01
K_2O	0.04	0.02	0.03	0.01
SO_3	0.29	0.03	0.13	0.09
P_2O_5	0.06	0.01	0.02	0.01
Loss at 1050°C	44.60	40.55	42.75	1.24
F	0.02	0.00	0.00	0.01
SrO	0.15	0.00	0.04	0.06
	ppm	ppm	ppm	ppm
MnO	850	90	294	227
Cu	10	0	5	2
Pb	50	0	13	21
Zn	100	10	24	24
Fe_2O_3	2900	100	594	721
As	6	6	6	–

Note The insoluble residue data were obtained from 102 samples. The chemical data were obtained from 13 analyses, except for those for As which were obtained from one analysis.

MgO and Al_2O_3 values are consistenly low, as are the remaining major and trace elements, although the Miller's Dale Limestones sampled are marginally richer in iron, manganese, copper, lead and zinc than the Chee Tor Rock.

For the areas where the lava is absent and the *Bee Low Limestones* have not been subdivided, the rock chemistry has been determined from 115 samples (Table 11). Most of the analyses are of samples from beds that are laterally equivalent to the Chee Tor Rock, and not surprisingly, their chemistry is very similar. The formation typically contains limestones with high CaO values and only small proportions of magnesia, silica, alumina, SO_3 and Fe_2O_3. Sodium, potassium, phosphorus, fluorine, strontium, manganese, copper, lead, zinc and arsenic are virtually absent. The rocks are also chemically uniform across the district and only minor variations are found in the major- and trace-element chemistry.

Relatively low CaO values are associated with limestones that are enriched in silica, for example at 12 m depth in section 07 NE 6S, where values of 52.40% CaO and 3.42% SiO_2 reflect the presence of abundant quartz crystals in the beds beneath a clay wayboard. The lowest CaO values recorded are from the section 06 NE 9S in Buxton Quarry [084 690], where 39 m of Bee Low Limestones is exposed beneath the base of the Monsal Dale Limestones. Five analyses from these beds give mean values of 54.10% CaO, 1.15% SiO_2 and 0.07% Fe_2O_3. The Bee Low Limestones exposed in Buxton Quarry are the lateral equivalent of the Miller's Dale Limestones. The maximum alumina value of 1.16% is recorded at 34 m in section 07 SE 7S at Harpur Hill Quarry [064 706] where the strata are also laterally equivalent to the Miller's Dale Limestones. The same sample also gives the maximum K_2O value indicating the presence of K-rich clay minerals, and further, gives a high Fe_2O_3 value of 0.43%, which corresponds with the lithological description of hematite-stained fissures at this level; this is probably equivalent to the horizon of the Dove Holes Tuff. Two analyses from the section 06 NE 10S at Tor Rock [066 680] contained anomalously high phosphorus concentrations of 0.19% and 0.33%, and the same samples contained relatively high fluorine contents of 0.04% and 0.06%, suggesting the occurrence of fluorapatite, $Ca_5F(PO_4)_3$, within the limestones.

The chemistry of the *apron-reef limestones* is shown separately in Table 12 and is very similar to that of the equivalent shelf limestones. A sample at 10 m depth in the section 08 SE 1S gave the maximum phosphorus value of 0.23% and the maximum fluorine value of 0.02%, which again suggests the presence of fluorapatite, possibly occurring in fish teeth, bones or scales.

Powder colour The whitest limestone powders in the district are produced from the Chee Tor Rock and from the equivalent beds of the Bee Low Limestones, which give mean reflectance values for a wavelength of 660 nm, of 83% and 86% respectively, with only small variations in powder colour. The highest reflectance values (see Appendix C) of very high purity Bee Low Limestones are given by the limestone powders from Hillhead Quarry [070 696], Hindlow Quarry [095 678] and Grinlow Quarry [046 723]. High reflectance values were also recorded from limestone powders of the Chee Tor Rock in borehole 07 SE 39 [090 748], and Cowdale Quarry [080 722]. Powders of Miller's Dale Limestones are noticeably darker (Table 6) than those of the Chee Tor Rock. Measurements of the powder colour of the apron-reef facies of the Bee Low Limestones gave reflectance values which, for a wavelength of 660 nm, varied between 89% and 68% with a mean of 81%. These values are similar to those given by the apron-reef limestones of the Wirksworth district (Cox and Harrison, 1980).

Table 11 Chemistry of the Bee Low Limestones (undivided)

	Maximum value	Minimum value	Mean	Standard deviation
	wt %	wt %	wt %	wt%
Insoluble residue	5.80	0.10	0.70	0.53
CaO	56.10	52.40	55.41	0.83
MgO	0.63	0.15	0.27	0.09
SiO_2	3.51	0.00	0.43	0.59
Al_2O_3	1.16	0.00	0.09	0.14
Na_2O	0.25	0.00	0.01	0.02
K_2O	0.16	0.00	0.03	0.02
SO_3	0.67	0.00	0.18	0.17
P_2O_5	0.33	0.00	0.02	0.04
Loss at 1050°C	44.95	41.80	43.59	0.45
F	0.06	0.00	0.01	0.01
SrO	0.14	0.00	0.02	0.03
	ppm	ppm	ppm	ppm
MnO	700	40	119	93
Cu	35	0	5	4
Pb	90	0	6	10
Zn	40	0	11	7
Fe_2O_3	31100	70	713	2937
As	6	0	1	2

Note The insoluble residue data were obtained from 895 samples. The chemical data were obtained from 115 analyses, except for those for As which were obtained from 20 analyses.

Table 12 Chemistry of the apron-reef limestone

	Maximum value	Minimum value	Mean	Standard deviation
	wt %	wt %	wt %	wt%
Insoluble residue	2.20	0.40	1.03	0.42
CaO	55.60	54.30	55.02	0.52
MgO	0.50	0.27	0.36	0.10
SiO_2	1.51	0.05	0.72	0.62
Al_2O_3	0.11	0.00	0.04	0.05
Na_2O	0.03	0.00	0.01	0.01
K_2O	0.04	0.02	0.03	0.01
SO_3	0.13	0.04	0.09	0.04
P_2O_5	0.23	0.01	0.08	0.09
Loss at 1050°C	43.96	43.10	43.54	0.35
F	0.02	0.00	0.01	0.01
SrO	0.08	0.00	0.03	0.03
	ppm	ppm	ppm	ppm
MnO	550	150	262	165
Cu	5	0	2	2
Pb	10	10	2	4
Zn	20	0	14	5
Fe_2O_3	1300	90	495	476
As	0	0	0	–

Note The insoluble residue data were obtained from 35 samples. The chemical data were obtained from 5 analyses, except for those for As which were obtained from one analysis.

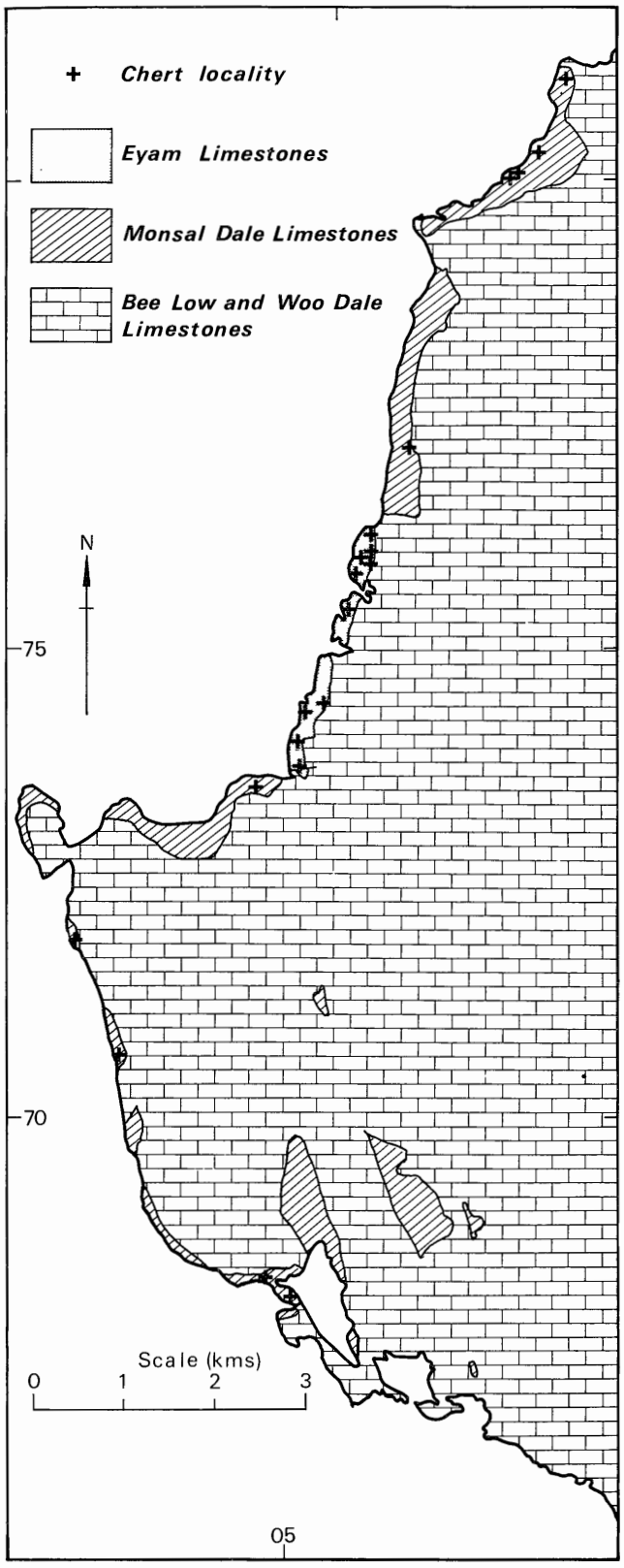


Figure 8 Distribution of chert at outcrop.

Fracture spacing values The massively bedded Bee Low Limestones give fracture spacing values of between 500 and 3500 mm, but values less than 500 mm are associated with the lower beds above the Woo Dale Limestones. The apron-reef limestones are also massively bedded or unbedded, and fracture spacing commonly falls between 800 and 2000 mm.

Aggregate impact values The aggregate impact values for the Bee Low Limestones (Table 8) are closely similar

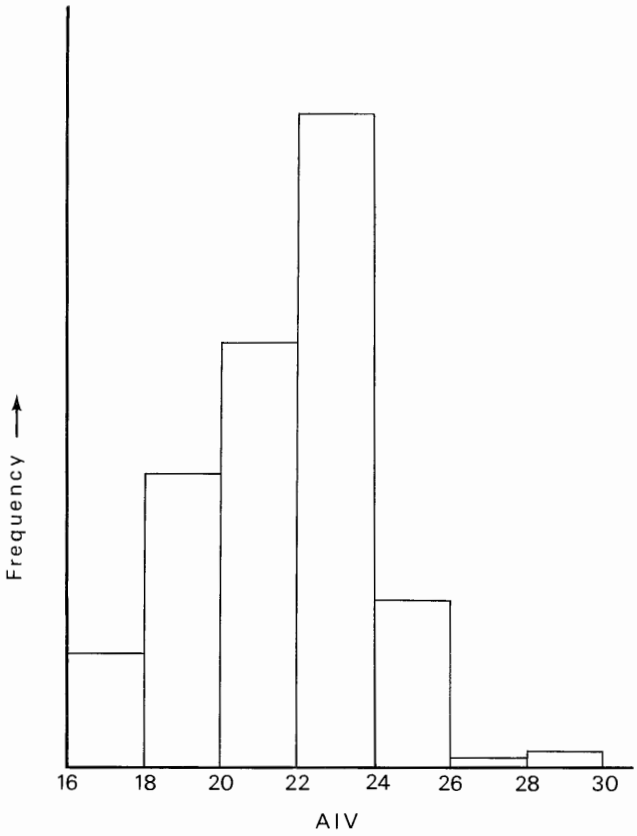


Figure 9 Histogram showing the distribution of aggregate impact values for limestones.

to those of the Woo Dale and Monsal Dale limestones, suggesting that they are equally competent, irrespective of age and lithofacies. Samples of dolerite from the Waterswallows Sill [085 748] give an aggregate impact value of 19, indicating the suitability of the dolerite for use as roadstone.

MONSAL DALE LIMESTONES

These limestones occupy a relatively small area of 3.0 km² in narrow, marginal outcrops and in several outliers south of Buxton. The full thickness of this formation has not been proved but the lowest 40 m was sampled in borehole 07 NE 43 [0751 7677]. Information from this borehole and from natural and quarry sections (06 NE 9S, 07 NE 1S, 07 NE 7S, 07 SW S) and shallow boreholes (06 NE M1, 07 NE E3, 07 SW E1) shows the Monsal Dale Limestones to be highly variable.

The lowest 10.56 m of the formation proved in borehole 07 NE 43 is thinly bedded and predominantly dark grey or mid-grey in colour, clay-rich and pyritous, and forms a distinctive basal subdivision to the formation. Some chert (Figure 8) has been recorded from these rocks which are mainly biosparites of variable grain size. They include beds rich in foraminifera, including *Saccamminopsis,* together with a basal unit, containing abundant algae-encrusted bioclasts, representing the Lower *Girvanella* Band. Knoll-reefs of mid-grey, coarsely bioclastic micritic and spar-rich limestones are developed locally within, and just above, the dark limestones.

The dark limestones are succeeded by predominantly mid-grey, more thickly bedded limestones which are highly fossiliferous, with bioclasts of variable grain size supported in a spar or micritic matrix. Brachiopods and

foraminifera are the dominant allochems, but crinoid, peloid, algal and bryozoan debris is common.

The *Upper Miller's Dale Lava*, petrographically similar to the Lower Miller's Dale Lava, lies at or near the base of this formation in adjacent districts, but is absent over much of the district except for a small outlier [066 713] near Harpur Hill.

Insoluble residue values The content of insoluble residues is more variable in the Monsal Dale Limestones than in the Bee Low and Woo Dale Limestones. Residue values of over 8% are recorded from the basal strata, but values in the range 2% to 3% are more common. The overlying limestones give low, but variable, insoluble residue values except where the localised occurrence of chert increases the residue content.

Clay wayboards are recorded and the darker limestones also contain disseminated clay, but the most commonly occurring impurities are silicified bioclasts and euhedral quartz crystals.

Chemistry The chemical data on the Monsal Dale Limestones are derived from the analysis of 11 samples taken from sections 06 NE 9S, 07 NE 1S, and 07 NE 7S, and from borehole 07 NE 43 (Table 13). These data are not fully representative because they come only from the lowest 40 m of the formation. The basal, dark-coloured, clay-rich limestones have higher silica, alumina, magnesia, potash and manganese values, and lower CaO values than are typical of the overlying beds of the Monsal Dale Limestones. Phosphorus and fluorine are relatively high in the basal strata, but the maximum values are found in samples from section 07 NE 1S at Barmoor Quarry [088 799], where stratigraphically higher beds give mean values of 0.33% phosphorus and 0.05% fluorine. This suggests that the local accumulation of fluorapatite is similar to that found in the rocks of Asbian age exposed in sections 06 NE 10S and 08 SE S.

Trace elements are present at very low background levels, supporting the observation of the unmineralised nature of the limestones in this part of Derbyshire. The maximum iron value of 0.30% is recorded from the basal dark limestones which contain small amounts of pyrite and limonite.

Powder colour The powder colour of the very high purity samples of the Monsal Dale Limestones is slightly darker than those typical of the Bee Low Limestones (Table 6).

Fracture spacings and aggregate impact values The Monsal Dale Limestones and the overlying Eyam Limestones are more thinly bedded than the Woo Dale and Bee Low Limestones, with fracture spacings of 150 to 400 mm. However, the localised knoll-reefs are more massive, with fracture spacing values in excess of 1000 mm. The aggregate impact values are similar to those for the other formations (Table 8 and Figure 9).

EYAM LIMESTONES

The Eyam Limestones occupy a total area of 0.4 km² and have a maximum exposed thickness of some 35 m, but the total thickness present has not been proved. A shallow borehole (07 NE E2) at Brookhouse Farm [0697 7518] proved nearly 15 m of these beds and a natural section 07 SE 3S [0673 7484] south of Brookhouse Farm exposes a total of 13.29 m of Eyam Limestones, of which the basal 11 m is knoll-reef limestone. The knoll-reef limestones are massive, mid-grey, micritic limestones which are highly fossiliferous with brachiopod, crinoid, algal and bryozoan bioclasts of variable grain size. However, the greater part of the Eyam Limestones consists of dark grey, thinly-bedded, cherty and clay-rich limestones which include biopelsparites and biomicrites; crinoid, brachiopod and coral debris of coarse arenite to medium rudite grain size is abundant in some beds, and bioclasts are commonly silicified.

Table 13 Chemistry of the Monsal Dale Limestones

	Maximum value	Minimum value	Mean	Standard deviation
	wt %	wt %	wt %	wt%
Insoluble residue	8.40	0.50	1.72	1.18
CaO	55.30	53.50	54.37	0.62
MgO	0.61	0.30	0.41	0.09
SiO_2	2.32	0.36	1.11	0.68
Al_2O_3	0.36	0.02	0.16	0.12
Na_2O	0.02	0.00	0.01	0.01
K_2O	0.09	0.02	0.05	0.02
SO_3	0.33	0.04	0.16	0.09
P_2O_5	0.54	0.01	0.15	0.16
Loss at 1050°C	43.63	42.18	43.08	0.49
F	0.09	0.00	0.03	0.03
SrO	0.14	0.00	0.05	0.05
	ppm	ppm	ppm	ppm
MnO	730	30	250	210
Cu	5	0	3	2
Pb	20	0	8	7
Zn	30	10	14	6
Fe_2O_3	3000	200	915	892
As	1	1	1	–

Note The insoluble residue data were obtained from 66 samples. The chemical data were obtained from 11 analyses, except for those for As which were obtained from one analysis.

Table 14 Chemistry of the Eyam knoll-reef Limestones

	Maximum value	Minimum value
	wt %	wt %
Insoluble residue	1.80	0.30
CaO	55.30	54.80
MgO	0.41	0.30
SiO_2	0.68	0.26
Al_2O_3	0.05	0.04
Na_2O	0.02	0.01
K_2O	0.03	0.03
SO_3	0.14	0.13
P_2O_5	0.05	0.03
Loss at 1050°C	43.90	43.77
F	0.04	0.01
SrO	0.05	0.00
	ppm	ppm
MnO	290	280
Cu	0	0
Pb	0	0
Zn	10	10
Fe_2O_3	600	230
As	–	–

Note The insoluble residue data were obtained from 13 samples. The chemical data were obtained from two analyses.

The Eyam Limestones produce high *insoluble residue values* due to the presence within the beds of nodular and bedded chert, clay minerals, silicified bioclasts and authigenic quartz. However, the residue values are variable and some beds, particularly the chert-free knoll-reefs, contain less than 1.5% non-carbonate minerals. *Chemical analyses* of the high-grade knoll-reef limestones of section 07 SE 3s (Table 14) show the limestones to contain high values of CaO and small amounts of silica, magnesia, sulphur and iron. Alumina, sodium, potassium, phosphorus, fluorine, strontium and the trace elements are virtually absent.

A limited number of *limestone powders* were prepared from the knoll-reef limestones and these gave a mean reflectance value, at a wavelength of 660 nm, of 84%, which is similar to the values obtained from equivalent knoll-reefs in the Wirksworth district (Cox and Harrison, 1980).

THE MAP

The resource assessment map is folded into the pocket at the end of this report. The base map is the Ordnance Survey 1:25 000 outline edition in grey. Geological data are restricted to those most likely to have a bearing on the working of limestone and dolomite: these include faults and other structural information which are shown in red and major geological boundaries in green. An alternation of red and black dashes indicates the line of a mineral deposit. Drift is shown by black ornament.

The purity of limestone is indicated on the resource map by shades of blue which demonstrate the average purity at the surface. Purity values were determined at the sample points by calculation of the mean, standard deviation and confidence limits for the 95% probability level, assuming the Student's t distribution for each ten metres represented. The mean and positive confidence limit were summed to give a value which when subtracted from one hundred, gave a conservative (worst) estimate of the calcium carbonate content for each thickness increment. This value was used to determine the category of limestone according to the classification in Table 1. This information was then combined with carbonate data from spot samples and any additional field observations (for example, presence or absence of chert), thus indicating the mean composition of the surface limestone in a regional fashion.

Areas of dolomite and of partial dolomitisation are indicated in green and by green dots respectively.

IMAU site data

At the site of each borehole or extensive natural section, the purity and other properties of the limestone are indicated in a tablet. The right half of the tablet shows the insoluble residue value to a maximum of 10% for each metre of strata. Where natural sections are recorded Ordnance Datum is given for the highest stratigraphical horizon collected.

Horizontal sections

Sections have been drawn to show the relationships of the various limestone categories. These sections are based directly upon borehole information, the structure as determined from field evidence, and the relationship of the various categories of limestone to the known stratigraphy. They are therefore an interpretation using all the available data and should be treated only as a guide to the likely distribution of purity at depth. In particular, there is insufficient evidence to permit illustration of the depth of dolomitisation.

Zigzag lines have been used diagrammatically to indicate the approximate position of a lateral passage between limestone units and do not necessarily indicate precise boundaries.

NOTES ON CARBONATE RESOURCES

The Dinantian rocks of the district occupy an area of 52.08 km², comprising 49.10 km² of limestone, 0.22 km² of dolomite and 2.76 km² of basalt, dolerite and tuff. The carbonate resources comprise: 39.05 km² of very high purity limestone, 3.14 km² of high purity limestone, 0.22 km² of medium purity limestone, 2.93 km² of undivided very high purity to medium purity limestone and 1.07 km² of low purity limestone; additionally 2.69 km² of very high purity limestones are identified as limestones affected by dolomitisation and there are 0.22 km² of dolomite.

Over most of the district carbonate purity is directly related to stratigraphic formation, the Woo Dale Limestones and Bee Low Limestones being characteristically very high purity mineral, whereas the Monsal Dale Limestones and Eyam Limestones are generally of a lower and more variable purity. Exceptionally the Miller's Dale Limestones of the Dove Holes–Batham Gate area are affected by their proximity to the Lower Millers' Dale Lava and Dove Holes Tuff (Figure 10), and are, therefore downgraded to the low purity category.

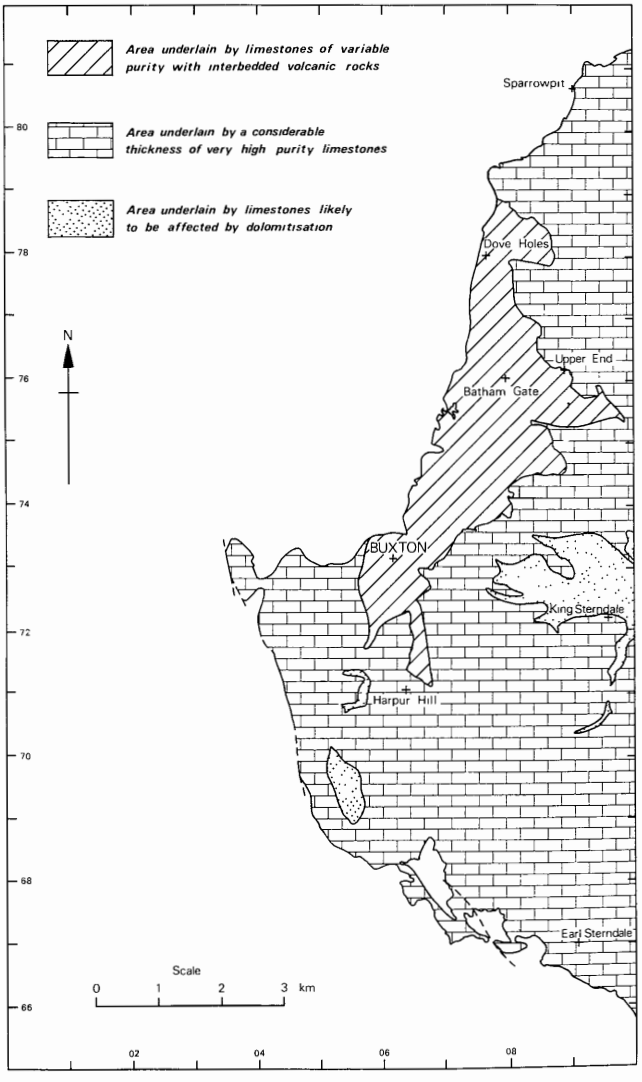


Figure 10 Summary of limestone resources.

The *Woo Dale Limestones*, both at outcrop and in borehole cores, are affected by dolomitisation but significant thicknesses of dolomite are found only in the vicinity of Woo Dale. These Woo Dale Dolomites contain as much limestone and dolomitised limestone as dolomite with the result that the MgO values vary between 0.90 and 21.00%. Beds of dolomite and dolomitised limestone and, more commonly, incipient dolomitisation and patchy dolomitisation adjacent to fractures and fissures, are found throughout the Woo Dale Limestones of the district, resulting in the relatively high MgO values which are characteristic of the limestones of this formation. The Woo Dale Limestones containing high MgO concentrations are shown on the map. The overall effects of dolomitisation are, however, at a minor level and the Woo Dale Limestones are everywhere a uniform deposit of very high purity limestone. The chief impurities are clay minerals, occurring mainly in disseminated form, and euhedral quartz crystals, although the latter are more common in the overlying Bee Low Limestones. Impurities rarely total more than 1% of the rock. The thin bed of tuff in borehole 07 SE 39 is the sole record of igneous rock in the Woo Dale Limestones of this district.

The overlying *Bee Low Limestones*, however, contain two units of volcanic rock, the Lower Miller's Dale Lava and Dove Holes Tuff. Additionally, the formation is intruded by a dolerite mass which forms the Waterswallows Sill. These igneous rocks occur in a sequence of predominantly very high purity limestones of uniform chemistry which rarely contain more than 1% of non–carbonate minerals. Consequently the Bee Low Limestones are of great commercial importance, as evidenced by the number of large quarries which work the formation. The highest-grade limestones are found throughout the Chee Tor Rock and equivalent strata; the beds above the Lower Miller's Dale Lava contain more impurities in the form of quartz euhedra, silicified bioclasts and clay and the limestone category commonly varies between very high purity and medium purity. In the type area for the Dove Holes Tuff, however, the Miller's Dale Limestones are extensively silicified both above and below the tuff (Figure 10), so that the limestones are downgraded to the low purity category. This alteration is most intense in the strata immediately above the tuff where the limestones contain over 8% silica and pyrite. The area of Miller's Dale Limestones between Batham Gate and Buxton is poorly exposed and borehole information is restricted to one shallow hole at Batham Gate, but, from the limited information available, purity is variable, although in most cases the limestones contain more than 98.5% $CaCO_3$. The upper beds of the Bee Low Limestones equivalent to the Miller's Dale Limestones are of variable purity but are predominantly very high purity limestones.

Clay wayboards occur throughout the limestones of Asbian age but are not considered a significant source of impurity as they are readily removed during the quarrying process. The limestones immediately below such clay wayboards are, however, commonly enriched in euhedral quartz crystals and, more rarely, pyrite, but alteration is usually localised and rarely totals more than 3% of the rock. Similar silicification and pyritisation affect the limestones to a maximum depth of 5 m below the Lower Miller's Dale Lava in the Dove Holes–Upper End area. Few mineral veins occur in this district and the limestones are therefore largely uncontaminated by lead, copper, zinc and associated elements.

The *Monsal Dale Limestones* are generally less pure and more lithologically and chemically variable than the underlying beds, although the limestones usually contain more than 97% $CaCO_3$ and commonly more than 98.5% $CaCO_3$. A considerable area of very high purity Monsal Dale Limestones is indicated in the syncline between High Edge and Hillhead Quarry though this is affected by contamination from clay in sink-holes and joints. The basal strata are usually dark in colour and clay-rich and exceptionally these limestones contain over 8% non-carbonate minerals although insoluble residues of 2 to 3% are more common; consequently the beds are categorised as high or medium purity limestones. A little chert is recorded locally and phosphorus and fluorine values are marginally higher in these argillaceous beds. The succeeding beds are generally high purity limestones although chert is recorded (Figure 8) at the shelf margin north of Barmoor [086 797]. Silicified bioclasts and quartz euhedra are the major impurities. Locally, small areas of knoll-reef limestone, developed near the base of the formation, are very pure, containing over 98.5% $CaCO_3$, but they are restricted to a maximum thickness of about 20 m.

The overlying *Eyam Limestones*, which rest unconformably on Miller's Dale Limestones in narrow, marginal outcrops just to the north of Buxton, are usually cherty and contain argillaceous beds and beds rich in silicified bioclastic debris. The overall content of non-carbonate minerals in the limestones is therefore high, averaging over 8% of the rock, but it is variable and some beds contain less than 1.5% non-carbonate material. The knoll-reefs developed at the base of the formation are chert-free and are uniformly very high purity limestones, but they do not exceed some 15 m in thickness.

Irrespective of formation, the limestones have similar *aggregate impact values* and the mean values obtained fall within the range of values yielded by limestones used as aggregates. However, the dolomites and dolomitised limestones of the Woo Dale Dolomites are softer and porous, and have aggregate impact values high enough to preclude most aggregate usages.

The whitest *limestones powders* are given by the Chee Tor Rock and equivalent strata, and the limestone powders from the Bee Low Limestones at Hillhead Quarry, Hindlow Quarry and Grinlow Quarry gave particularly high tricolour reflectance values.

The Dinantian rocks of the district are folded into gentle anticlines and synclines although the folds are sharper south of Buxton. The dips at the western margins of the outcrop are relatively steep but those on the limestone plateau around Green Fairfield and King Sterndale average 5°. The resulting outcrop pattern is further complicated by normal faulting which predominantly trends E-W north of Buxton and NNW–SSE south of Buxton. The displacement on the faults is liable to be significant to quarrying operations, whereas the affects of folding are likely to be minimal.

Overburden is usually less than a few metres thick, but fairly large areas of head conceal the limestones at the western margin near Burbage, and on the limestone plateau south of Buxton. Thin deposits of alluvium occur in the valleys of Brook Bottom, Wye Dale, Deep Dale, Back Dale, Horseshoe Dale, Dove Holes Dale and Peak Dale.

The *water table* in limestone terrain is controlled by jointing, fissuring, old workings and by the distribution of impervious interbedded clays and igneous rocks. Standing water was proved at 265 m above OD in boreholes 07 SE 50 and 07 SE 51 above the slopes flanking Wye Dale, and at 332 m in borehole 07 NE 43 on the limestone plateau south of Dove Holes; it was at 325 m in borehole 07 SE 49 in the dry valley of Ferny Bottom.

APPENDIX A

CLASSIFICATION, TERMINOLOGY AND GLOSSARY

CLASSIFICATION

The petrographic classification of limestone by Folk (1959; 1962) is widely accepted and is used in this report in a slightly modified form. The classification is summarised in Table 15.

Clastic limestones consist of two basic components, namely allochem grains and matrix. Allochem grains are discrete bodies that have been subjected to some degree of transportation: they include fossils and fossil fragments, oolites, intraclasts and pellets. The matrix is subdivided on grain size into: microcrystalline ooze (less than 4 micrometres*) termed micrite, a slightly coarser crystalline fabric (4 to 16 micrometres) termed microspar, and crystalline calcite cement or spar (greater than 16 micrometres).

Limestones are also classified by reference to the mean grain size of the allochems into calcirudites (greater than 1 mm), calcarenites (1 to 0.062 mm) and calcilutites (less than 0.062 mm). A grain size term may be incorporated into the main rock as a suffix, for example biosparrudite.

The pure mineral dolomite, $CaMg(CO_3)_2$, contains 21.9% MgO and 30.4% CaO (or 54.3% $CaCO_3$). Rocks containing dolomite are classified as follows:

10 to 49.9% Dolomitic limestone
50 to 89.9% Calcitic dolomite
90% and above Dolomite

In the first category, the use of Folk terminology is not precluded, for example, Biosparite Dolomitic.

TERMINOLOGY

The nomenclature of the major rock types is set out in Table 15. If a rock contains more than 25% of allochems which are not mentioned in the main rock name, these are used to qualify the rock name and have an initial capital letter, for example, Crinoid biosparite. Subordinate diagnostic allochems may also qualify the main rock name; these are differentiated by the use of a small initial letter, for example, algae Crinoid biosparite. In the records which follow, however, a more formal version of the nomenclature is used, the qualifiers following the grain-size name in descending order of abundance. The example above is thus cited as Biosparite Crinoid algae.

GLOSSARY

Allochem A collective term for one of several varieties of discrete and organised carbonate aggregates, such as fossil fragments, oolites and pellets that serve as the coarser framework grains in most mechanically deposited limestones.

Anticline An arch fold, the core of which contains the stratigraphically older rocks.

Argillaceous rocks Detrital sedimentary rocks that contain clay- or silt-grade material.

Authigenic Referring to those constituents that came into existence with or after the formation of the host rock.

Bioclasts Broken fragments of organic skeletal material.

Calcarenite A limestone consisting predominantly (more than 50 per cent) of detrital calcite particles of sand size (0.062 to 1 mm).

Calcilutite A limestone consisting predominantly (more than 50 per cent) of detrital particles of silt and/or clay size (less than 0.062 mm).

Calcirudite A limestone consisting predominantly (more than 50 per cent) of detrital calcite particles larger than sand size (greater than 1 mm).

Euhedral A term applied to grains displaying fully developed crystal form.

Facies The sum of all the primary lithological and palaeontological characteristics exhibited by a sedimentary rock, from which its origin and environment of formation may be inferred.

Gangue A mineral in a vein other than an ore mineral.

Geopetal Pertaining to any rock feature that indicates the relation of top to bottom during, or shortly after, sedimentation; particularly horizontally bedded infillings in the bottom of a cavity.

Hydrothermal Pertaining to heated water, to the action of heated water or to the products of the action of heated water.

Table 15 Classification of limestones (based on Folk, 1959).

				LIMESTONES			
				>10% Allochems Allochemical Rocks		<10% Allochems Microcrystalline Rocks	
				Sparry calcite cement> microcrystalline ooze	Microcrystalline ooze> sparry calcite cement	1-10% allochems	<1% allochems
Volumetric Allochem Composition	>25% Intraclasts			Intrasparite	Intramicrite (rare)	Most abundant allochem: Intraclasts: Intraclastic micrite (rare)	Micrite
	<25% Intraclasts	>25% oolites		Oosparite	Oomicrite (rare)	Most abundant allochem: Oolites: Oolitic micrite (rare)	Micrite
		<25% oolites	Volume ratio of Fossils: Pellets >3:1	Biosparite	Biomicrite	Most abundant allochem: Fossils: Fossiliferous Micrite	Micrite
			Volume ratio of Fossils: Pellets 3:1 to 1:3	Biopelsparite	Biopelmicrite	Most abundant allochem: Pellets: Pelletiferous Micrite	Micrite
			Volume ratio of Fossils: Pellets <1:3	Pelsparite	Pelmicrite		

* 1 micrometre is 10^{-6} metres; the term micrometre replaces micron.

Inlier A limited area of older rocks completely surrounded by younger rocks.
Intraclast Material created by penecontemporaneous erosion within a basin of deposition.
Intraformational A term applied to rocks or structural features which occur between two sets of defined strata. It implies temporary change in the condition of sedimentation.
Micrite Semi-opaque crystalline matrix component of limestones consisting of carbonate mud whose crystals have diameters of less than 4 micrometres.
Outlier A limited area of younger rocks surrounded by older rocks.
Pellet A ovoid grain composed of micrite. Many, but not all, pellets are of faecal origin.
Peloid A grain composed of micrite or microspar. This term does not imply any particular mode of origin.
Rake A body of ore and gangue minerals disposed vertically between two walls of rock. The main type of mineral vein in the Peak District.
Reverse fault A fault with a major dip-slip component in which the hanging wall is on the upthrow side.
Scrin A mineralised joint.
Sparite Transparent crystalline matrix component of limestones consisting of calcite having diameters that exceed 10 micrometres.
Strike The direction of trend that a structural surface takes as it intersects the horizontal.
Stylolite An irregular suture-like boundary developed in some limestones.
Syncline A trough fold, the core of which contains stratigraphically younger rocks.
Unconformable Describes strata that are separated from underlying rocks by a surface that represents a significant break in sedimentation.
Vug A cavity in a rock.
Wayboard An old mining term used commonly in Derbyshire to describe a discrete and deleterious thin rock bed, usually of clay.

APPENDIX B

EXPLANATION OF FORMAT FOR BOREHOLE LOGS

The following list is arranged in the same order as data on the borehole records. The numbered paragraphs below also correspond with the annotations on the first record (Appendix C).

1 The Registration Number

This consists of two statements:

1. The number of the 1:25 000 sheet on which the borehole lies, for example SK 07
2. The quarter of the 1:25 000 sheet on which the borehole lies and its number in a series for that quarter, for example NE 43. Thus the full Registration Number is SK 07 NE 43.

Collected sections are registered in a similar manner using a separate series of numbers, suffixed by the letter S, for example SK 07 NE 1S. This is abbreviated to 07 NE 1S in the text.

2 The National Grid reference

All National Grid references in this publication lie within the 100-km square SK unless otherwise stated. Grid references for borehole sites and section limits are given to eight figures (that is, accurate to within 10 m). In the text, six-figure grid references are used for more approximate locations.

3 Location

Borehole and section locations are referred to the nearest named locality on the 1:25 000 base map.

4 Surface level

The surface level at the borehole site is given in metres above Ordnance Datum. For collected sections surface level is taken to be the stratigraphical top of the sampled sequence.

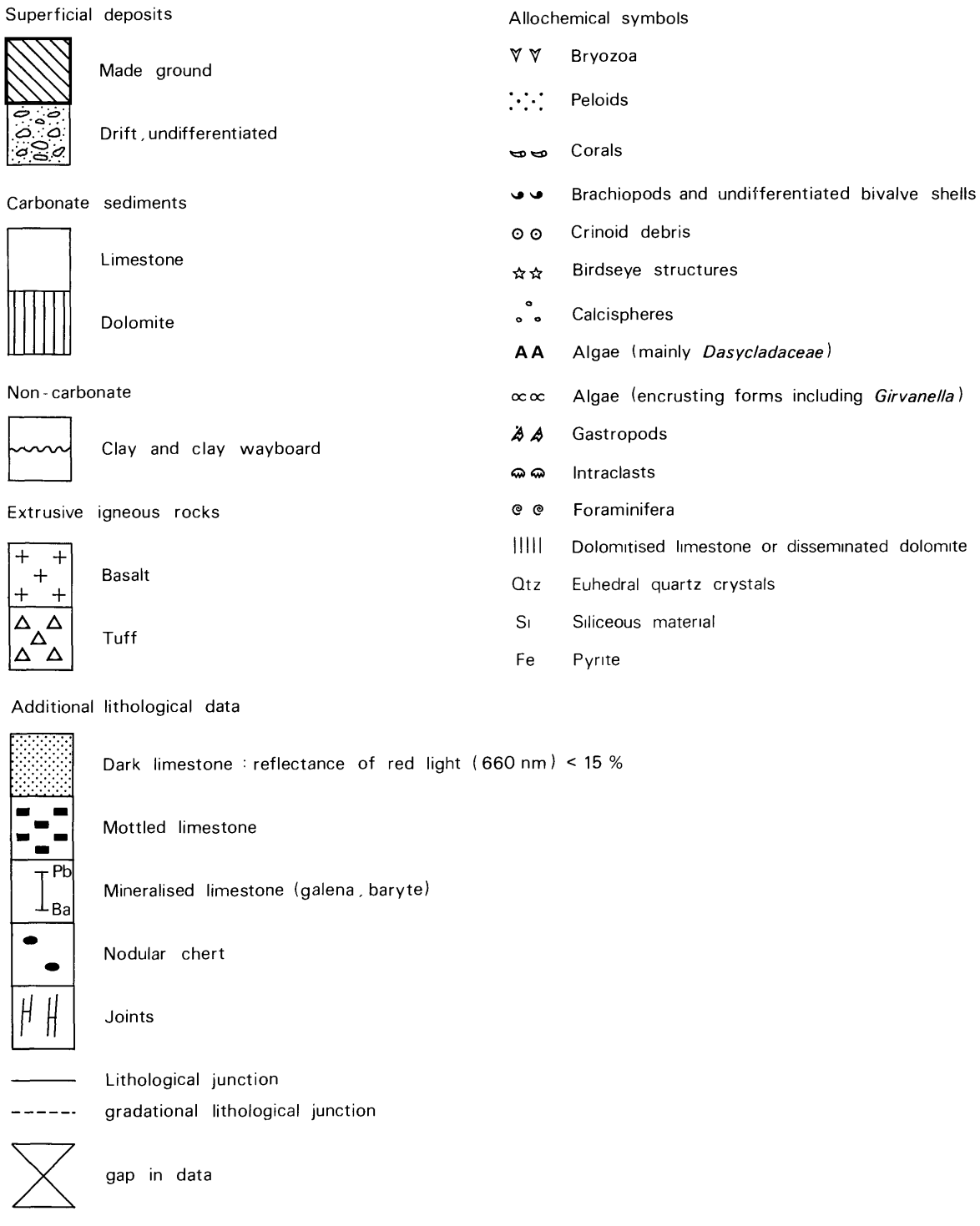


Figure 11 Explanation of symbols used on the graphical logs.

5 Type of drill and date of drilling
The drilling machines which have been used in this survey are listed below:

Flushing agent	*Type of rig*
Water	Edeco Stratadrill 36
Water	Edeco Stratadrill Mk8—portable drill
Water	Minute-man—portable drill

The type of machine, diameter of core produced and the month and year of the completion of the borehole are given.

Descriptive borehole log
6 The limestone formational names are listed.

7 Each major rock type is subdivided, where possible, using the rock classification and nomenclature explained in Appendix A, and followed by a brief description.

8 Depth
The figures given relate to depths to the base of the lithologies described in the log.

Graphical borehole log
9 Major rock types are represented on a graphical log and diagnostic lithologies are shown using an ornamental overprint. A complete list of symbols is given in Figure 11.

10 Energy (sorting) index (Plumley and others, 1962)
In the column representing energy (sorting) index the shaded intervals highlight carbonate lithologies which exhibit textural and compositional properties characteristic of moderate to strongly agitated water conditions at the time of deposition.

11 Colour
The percentage reflectance of red light (peak wavelength of 660 nm) from the flat, acid-etched rock surface and from powder pellet samples are shown graphically. A white magnesium carbonate standard with a reflectance value of 100% was used to calibrate the spectrophotometer.

Mechanical properties
12 For most boreholes and sections, the fracture spacing index (If) is measured in millimetres and plotted on a logarithmic scale.

13 For most boreholes and sections, the aggregate impact value (AIV) is determined for 10-m aggregated samples, and plotted on a linear scale.

14 Insoluble residue data
Residue values are expressed as weight percentages.
Classification into categories by carbonate content.
The overall purity of a limestone, averaged over consecutive 10-m intervals of depth, is stated using the following system (see also Table 1):

Category	*Composition* (% $CaCO_3$)
1 Very high purity	>98.5
2 High purity	97.0–98.5
3 Medium purity	93.5–97.0
4 Low purity	85.0–93.5
5 Impure	<85.0

15 Chemical data
Where available, chemical data are shown in tabular form for each borehole on the pages following the borehole logs.
Rapid instrumental and chemical methods of analysis were used. The table below shows estimated 95 per cent confidence limits for results on the very high, high and medium purity (>93.5% $CaCO_3$) limestones, together with the determination limits below which the accuracy is uncertain. The detection limits, which are also shown are the concentrations of each element reproducibly measurable above the instrumental background signal. For impure limestones, the accuracy is uncertain because of inter-element interference effects. Some results may therefore lie outside the tolerances obtainable using standard or referee chemical methods of analysis.

	Estimated confidence limits at the 95% probability level (±%)	Lower limit of accurate determination (%)	Detection limit (%)
CaO	0.8	50	–
SO_3	0.10	0.01	0.01
Na_2O	0.02	0.02	0.02
F	0.10	0.05	0.03
SiO_2	0.10	0.10	0.02
MgO	0.14	0.10	0.02
Al_2O_3	0.10	0.10	0.01
K_2O	0.02	0.02	0.01
Fe_2O_3	0.12	0.10	0.05
SrO	0.04	0.20	0.10
P_2O_5	0.02	0.05	0.02
Loss at 1050°C	0.15	–	–
	ppm	ppm	ppm
Cu	10	3	1
Pb	10	3	1
Zn	20	5	2
MnO	20	10	3
Fe_2O_3*	20	10	3
As	2	2	1

* Acid-insoluble.

APPENDIX C

RECORDS OF BOREHOLES AND SECTIONS

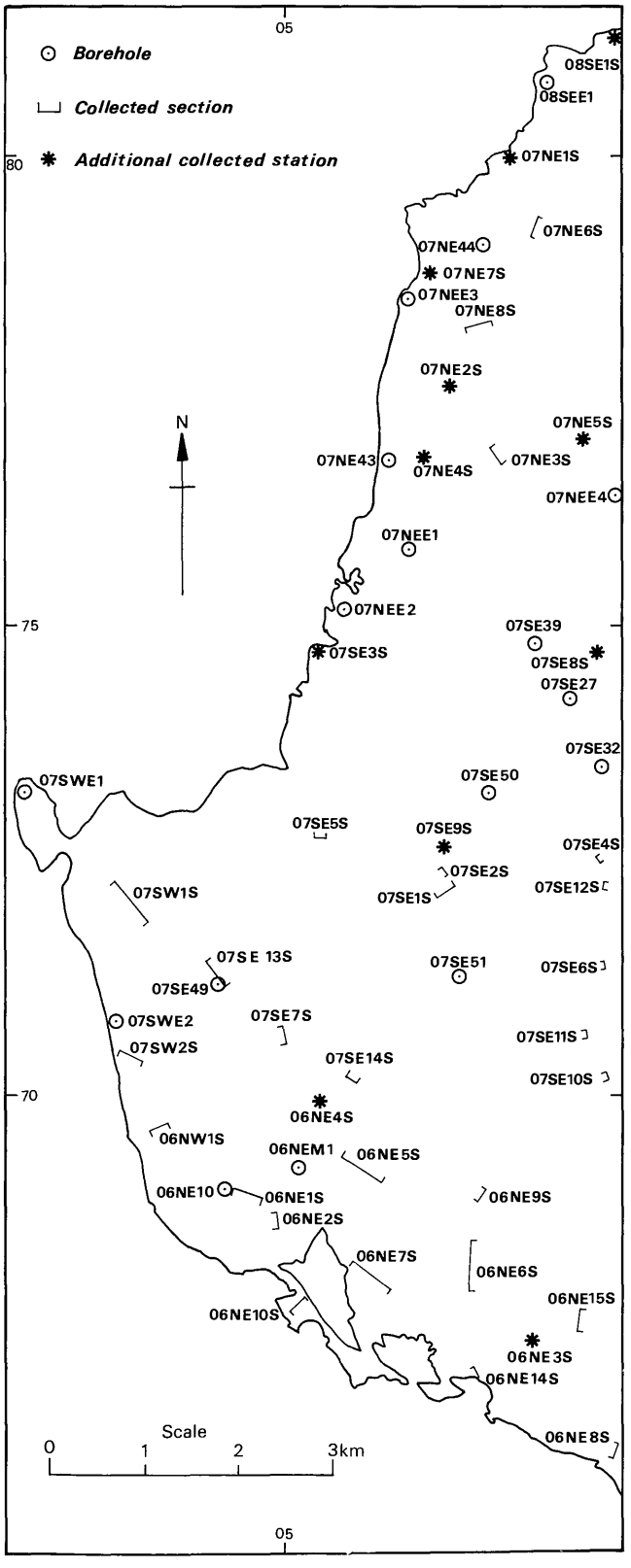


Figure 12 Distribution of data points.

Registration number	Grid reference
IMAU BOREHOLES*	
06 NE 10	0575 6910
07 NE 43	0751 7677
07 NE 44	0854 7904
07 SE 49	0562 7123
07 SE 50	0854 7328
07 SE 51	0822 7136
OTHER BOREHOLES	
07 SE 27	0942 7427
07 SE 32	0981 7352
07 SE 39	0904 7483
MAJOR SECTIONS USED IN THE ASSESSMENT	
06 NW 1s	0492 6972
06 NE 1s	0611 6900
06 NE 2s	0628 6869
06 NE 3s	0901 6748
06 NE 4s	0675 6997
06 NE 5s	0701 6956
06 NE 6s	0835 6857
06 NE 7s	0708 6835
06 NE 8s	0987 6621
06 NE 9s	0841 6897
06 NE 10s	0656 6797
06 NE 14s	0837 6715
06 NE 15s	0953 6781
07 NE 1s	0880 7990
07 NE 2s	0816 7751
07 NE 3s	0859 7690
07 NE 4s	0789 7677
07 NE 5s	0959 7700
07 NE 6s	0910 7929
07 NE 8s	0834 7816
07 SW 1s	0458 7233
07 SW 2s	0459 7058
07 SE 1s	0801 7217
07 SE 2s	0811 7240
07 SE 3s	0673 7484
07 SE 4s	0970 7259
07 SE 5s	0670 7283
07 SE 6s	0980 7139
07 SE 7s	0638 7064
07 SE 8s	0975 7477
07 SE 9s	0810 7267
07 SE 10s	0983 7022
07 SE 11s	0960 7068
07 SE 12s	0976 7224
07 SE 13s	0553 7149
07 SE 14s	0702 7027
08 SE 1s	0990 8126

* Drilled by contractor.

CHEMICAL ANALYSES

Depth* (m)	percentages											parts per million					
	CaO	SO_3	Na_2O	F	SiO_2	MgO	Al_2O_3	K_2O	SrO	P_2O_5	Loss at 1050°C	Cu	Pb	Zn	MnO	As	Fe_2O_3
SK 06 NW 1s 0492 6972 The Frith, Harpur Hill																	
7.00	55.00	0.42	0.00	0.00	0.01	0.17	0.06	0.03	0.00	0.01	43.87	5	10	10	80	–	200
29.00	55.00	0.67	0.00	0.01	0.70	0.51	0.09	0.04	0.02	0.02	44.95	5	10	10	70	–	200
55.00	55.10	0.67	0.00	0.00	0.09	0.34	0.05	0.03	0.01	0.02	44.00	5	10	10	90	–	400
71.00	55.10	0.62	0.00	0.00	0.32	0.27	0.13	0.05	0.01	0.01	43.65	5	10	10	100	–	200
SK 06 NE 10 0575 6910 High Edge, Buxton																	
1.00	56.10	0.05	0.02	0.00	0.02	0.27	0.01	0.01	0.02	0.01	43.90	5	0	10	90	–	200
5.00	56.20	0.05	0.00	0.00	0.03	0.28	0.00	0.01	0.04	0.01	43.95	30	15	20	90	–	300
10.00	55.60	0.04	0.00	0.00	0.00	0.25	0.00	0.01	0.00	0.00	43.91	5	0	10	90	1	200
14.00	55.40	0.04	0.00	0.00	0.00	0.28	0.00	0.00	0.03	0.00	44.28	5	0	10	100	–	300
20.00	55.60	0.06	0.00	0.01	0.00	0.42	0.00	0.01	0.03	0.00	44.08	10	15	10	90	–	400
25.00	55.80	0.08	0.01	0.01	0.00	0.38	0.01	0.01	0.02	0.00	43.99	5	0	10	110	–	400
30.00	55.80	0.08	0.00	0.01	0.03	0.42	0.04	0.01	0.00	0.00	43.93	5	0	10	80	–	200
33.00	55.70	0.06	0.00	0.01	0.00	0.33	0.00	0.01	0.01	0.00	43.93	5	0	10	110	0	200
39.00	55.50	0.07	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00	43.95	5	0	10	110	–	300
44.00	55.50	0.06	0.00	0.00	0.09	0.29	0.07	0.01	0.01	0.00	43.86	15	0	10	160	–	400
50.00	55.80	0.07	0.00	0.00	0.00	0.33	0.00	0.00	0.01	0.00	44.00	5	0	10	90	–	100
54.00	55.80	0.07	0.01	0.00	0.00	0.31	0.00	0.01	0.00	0.00	43.98	5	15	10	170	–	100
60.00	55.70	0.05	0.00	0.01	0.00	0.35	0.00	0.00	0.01	0.00	43.98	5	0	10	110	0	100
SK 06 NE 1s 0611 6900 High Edge, Buxton																	
3.00	55.20	0.08	0.01	0.00	0.31	0.23	0.03	0.01	0.00	0.00	43.77	5	0	10	90	0	300
5.00	55.30	0.07	0.00	0.00	0.05	0.23	0.01	0.01	0.00	0.00	43.89	5	0	15	70	–	200
6.00	55.60	0.07	0.00	0.00	0.23	0.23	0.10	0.01	0.00	0.00	43.81	5	0	15	70	–	200
10.00	55.70	0.08	0.00	0.00	0.14	0.22	0.01	0.01	0.00	0.00	43.86	5	10	15	70	–	200
13.00	55.90	0.06	0.00	0.00	0.11	0.20	0.00	0.00	0.00	0.00	43.85	5	10	10	70	–	100
15.00	55.30	0.06	0.00	0.00	0.12	0.30	0.08	0.04	0.01	0.00	43.90	5	0	10	50	0	200
16.00	56.00	0.06	0.00	0.00	0.05	0.30	0.03	0.01	0.03	0.00	43.97	5	10	10	50	–	100
18.00	55.60	0.05	0.00	0.00	0.06	0.25	0.02	0.01	0.00	0.00	43.69	5	0	10	50	–	100
21.00	55.80	0.05	0.00	0.00	0.06	0.23	0.04	0.01	0.00	0.00	43.68	5	10	10	50	–	200
23.00	55.90	0.07	0.00	0.00	0.05	0.27	0.04	0.01	0.00	0.00	43.75	5	10	10	50	–	100
30.00	55.70	0.07	0.00	0.00	0.03	0.31	0.04	0.01	0.00	0.00	43.75	5	0	10	60	–	200
31.00	55.80	0.07	0.00	0.00	0.03	0.27	0.00	0.00	0.00	0.00	43.75	5	0	10	70	–	100
33.00	55.30	0.05	0.00	0.00	0.50	0.27	0.00	0.01	0.00	0.00	43.52	5	0	10	50	–	100
34.00	55.90	0.07	0.00	0.00	0.02	0.29	0.00	0.01	0.01	0.00	44.02	5	10	10	60	–	200
35.00	55.90	0.06	0.00	0.00	0.01	0.29	0.01	0.01	0.00	0.00	43.93	5	10	10	60	–	200
39.00	55.30	0.03	0.25	0.00	0.02	0.24	0.00	0.01	0.00	0.00	43.95	5	10	10	70	0	100
SK 06 NE 2s 0628 6869 High Edge, Buxton																	
5.00	55.50	0.08	0.01	0.00	0.25	0.20	0.01	0.02	0.00	0.01	43.82	0	0	10	50	–	120
9.00	55.40	0.10	0.01	0.01	0.07	0.21	0.04	0.03	0.02	0.01	43.97	0	0	10	70	0	290
19.00	55.60	0.10	0.01	0.00	0.34	0.20	0.24	0.06	0.03	0.01	43.72	0	10	20	60	–	320
SK 06 NE 3s 0901 6748 Jericho Quarry, Earl Sterndale																	
2.00	55.50	0.05	0.02	0.01	0.04	0.18	0.03	0.03	0.08	0.03	44.10	0	0	0	60	–	80
5.00	55.60	0.07	0.01	0.01	0.10	0.19	0.01	0.03	0.06	0.03	43.85	0	0	0	50	–	110
9.00	55.50	0.08	0.01	0.00	0.02	0.18	0.02	0.03	0.03	0.02	43.88	5	0	10	70	4	150
13.00	55.40	0.10	0.04	0.01	0.08	0.27	0.11	0.06	0.03	0.02	43.91	0	0	0	40	–	200
SK 06 NE 4s 0675 6997 Hill head Quarry																	
4.00	54.10	0.02	0.00	0.00	0.05	0.25	0.06	0.02	0.00	0.02	43.84	5	10	10	120	–	200
10.00	56.10	0.00	0.00	0.00	0.12	0.27	0.04	0.02	0.01	0.01	43.89	5	0	0	80	–	200
19.00	54.40	0.22	0.00	0.00	0.13	0.26	0.04	0.02	0.00	0.01	43.68	5	10	10	120	–	200
SK 06 NE 5s 0701 6956 Hill head Quarry																	
3.00	55.80	0.08	0.02	0.00	0.00	0.16	0.00	0.02	0.06	0.02	43.64	0	0	10	60	–	80
11.00	55.80	0.10	0.02	0.00	0.06	0.21	0.01	0.03	0.13	0.02	43.72	5	0	10	70	–	70
19.00	55.50	0.08	0.01	0.00	0.25	0.17	0.01	0.02	0.06	0.02	43.72	0	0	10	80	–	100
24.00	55.30	0.08	0.02	0.00	0.46	0.16	0.13	0.04	0.08	0.02	43.69	5	10	50	120	–	420
29.00	55.00	0.08	0.01	0.00	0.96	0.18	0.38	0.03	0.03	0.02	43.75	0	0	10	70	6	120
39.00	55.70	0.09	0.02	0.00	0.34	0.15	0.01	0.03	0.04	0.02	43.56	0	0	10	80	–	80
53.00	55.60	0.11	0.01	0.00	0.24	0.16	0.01	0.02	0.05	0.02	43.76	0	0	10	80	–	280
65.00	55.60	0.11	0.04	0.00	0.39	0.21	0.02	0.04	0.04	0.02	43.70	0	0	0	60	–	120
76.00	55.60	0.10	0.01	0.00	0.21	0.16	0.01	0.02	0.03	0.02	43.28	0	0	0	80	–	170
89.00	56.10	0.13	0.01	0.01	0.14	0.22	0.01	0.02	0.06	0.03	44.00	0	10	40	120	1	800
103.00	55.80	0.12	0.04	0.00	0.24	0.23	0.06	0.05	0.14	0.02	43.83	0	0	10	40	–	130
113.00	55.60	0.08	0.01	0.00	0.11	0.21	0.05	0.03	0.07	0.02	43.94	0	0	0	40	–	80
SK 06 NE 6s 0835 6857 Harley																	
2.00	55.30	0.13	0.02	0.02	0.15	0.34	0.07	0.04	0.05	0.01	43.97	0	0	20	160	–	210
27.00	55.50	0.10	0.01	0.00	0.15	0.20	0.04	0.03	0.01	0.00	43.80	0	0	10	50	–	220
35.00	55.50	0.09	0.02	0.00	0.08	0.19	0.03	0.03	0.04	0.00	43.85	5	0	10	40	2	150
54.00	55.30	0.00	0.00	0.00	0.11	0.20	0.08	0.03	0.00	0.01	43.95	35	0	10	40	–	310
69.00	55.40	0.05	0.02	0.02	0.10	0.26	0.01	0.03	0.00	0.01	43.91	5	0	40	300	–	2500

CHEMICAL ANALYSES

Depth* (m)	percentages											parts per million					
	CaO	SO_3	Na_2O	F	SiO_2	MgO	Al_2O_3	K_2O	SrO	P_2O_5	Loss at 1050°C	Cu	Pb	Zn	MnO	As	Fe_2O_3
SK 06 NE 7s 0708 6835 Dowel Dale																	
1.00	56.40	0.30	0.00	0.01	1.26	0.30	0.11	0.04	0.00	0.01	43.20	5	10	10	570	–	570
12.00	56.90	0.38	0.00	0.02	0.65	0.26	0.06	0.03	0.00	0.01	43.25	5	10	10	150	–	150
21.00	57.10	0.28	0.00	0.02	0.17	0.19	0.05	0.02	0.00	0.10	43.16	5	0	10	140	–	140
32.00	57.10	0.29	0.00	0.00	0.15	0.21	0.08	0.03	0.00	0.01	43.19	5	10	10	130	–	130
43.00	57.10	0.30	0.00	0.03	0.72	0.31	0.07	0.03	0.01	0.02	43.34	5	10	10	110	–	110
46.00	57.00	0.17	0.00	0.00	0.07	0.21	0.06	0.03	0.00	0.03	43.53	5	10	10	110	–	110
61.00	56.30	0.16	0.00	0.00	0.75	0.39	0.47	0.11	0.00	0.02	43.32	5	10	20	140	–	140
70.00	56.20	0.34	0.00	0.02	0.33	0.34	0.08	0.03	0.00	0.06	43.51	5	10	10	120	–	120
77.00	56.40	0.21	0.00	0.00	0.90	0.35	0.10	0.03	0.00	0.06	43.19	5	10	20	110	–	110
SK 06 NE 8s 0987 6621 Aldery Cliff, Earl Sterndale																	
4.00	55.30	0.04	0.01	0.00	0.33	0.27	0.00	0.02	0.04	0.03	43.80	0	0	10	210	–	90
12.00	55.60	0.07	0.01	0.01	0.49	0.50	0.00	0.02	0.08	0.01	43.96	0	10	20	160	–	210
21.00	56.00	0.07	0.01	0.01	0.20	0.44	0.00	0.02	0.08	0.01	43.92	0	10	0	170	0	140
33.00	55.10	0.09	0.01	0.01	0.37	0.58	0.07	0.03	0.06	0.01	43.92	0	0	10	140	–	140
47.00	55.60	0.05	0.00	0.00	0.03	0.39	0.00	0.02	0.07	0.01	43.92	0	0	10	160	–	70
SK 06 NE 9s 0841 6897 Buxton Quarry																	
2.00	54.20	0.08	0.01	0.03	1.44	0.42	0.18	0.05	0.04	0.01	43.32	0	0	10	80	–	320
7.00	53.50	0.11	0.02	0.04	2.08	0.61	0.36	0.09	0.05	0.13	42.92	5	10	20	120	1	400
12.00	53.50	0.04	0.01	0.01	3.51	0.37	0.06	0.03	0.03	0.02	42.17	0	0	10	140	–	200
19.00	54.00	0.06	0.02	0.01	0.13	0.27	0.01	0.03	0.01	0.01	43.95	0	0	10	100	–	270
30.00	54.80	0.04	0.01	0.00	0.70	0.30	0.03	0.03	0.02	0.01	43.63	5	0	20	110	0	500
40.00	54.50	0.03	0.00	0.00	1.00	0.48	0.08	0.03	0.00	0.01	43.46	5	0	20	130	–	800
47.00	53.60	0.04	0.00	0.00	2.10	0.38	0.06	0.03	0.03	0.00	42.86	0	0	20	280	–	1300
SK 07 NE 43																	
3.00	53.60	0.33	0.00	0.02	1.08	0.40	0.25	0.06	0.02	0.22	42.37	5	10	10	350	–	1000
12.00	54.20	0.23	0.00	0.00	0.52	0.32	0.05	0.02	0.03	0.02	43.39	5	0	10	200	–	200
21.00	53.80	0.20	0.00	0.01	1.20	0.43	0.20	0.05	0.04	0.02	43.23	5	20	30	530	–	2100
30.00	54.20	0.17	0.00	0.00	0.57	0.36	0.08	0.03	0.03	0.02	43.44	5	10	10	120	–	200
39.00	54.50	0.19	0.00	0.03	1.54	0.40	0.32	0.08	0.02	0.24	42.76	5	10	20	730	–	3000
42.00	54.20	0.17	0.00	0.00	0.31	0.29	0.05	0.02	0.01	0.01	43.53	5	0	10	190	–	200
54.00	54.10	0.29	0.00	0.01	1.19	0.30	0.06	0.02	0.04	0.02	43.18	5	50	30	430	–	300
61.00	53.80	0.20	0.00	0.00	1.37	0.26	0.05	0.03	0.02	0.01	44.60	5	50	30	480	–	700
71.00	53.80	0.10	0.00	0.00	0.83	0.28	0.05	0.02	0.00	0.01	43.34	5	10	30	500	–	400
83.00	53.70	0.17	0.00	0.00	1.26	0.28	0.10	0.04	0.01	0.01	43.13	5	10	20	400	–	300
89.00	51.60	0.14	0.00	0.01	7.02	0.19	0.09	0.03	0.04	0.01	40.55	10	50	100	850	–	2900
119.00	53.70	0.05	0.00	0.00	1.53	0.23	0.12	0.04	0.00	0.04	42.91	5	0	10	700	–	200
125.00	54.40	0.00	0.00	0.00	0.05	0.26	0.06	0.02	0.01	0.02	43.98	5	10	10	340	–	200
SK 07 NE 44																	
6.00	55.80	0.04	0.01	0.00	0.35	0.31	0.06	0.03	0.07	0.00	43.76	0	0	10	80	–	300
25.00	55.70	0.04	0.01	0.01	0.14	0.30	0.04	0.02	0.11	0.01	43.86	5	90	20	150	–	900
39.00	55.00	0.09	0.01	0.01	0.96	0.43	0.48	0.11	0.06	0.00	43.59	5	0	0	80	–	700
47.00	55.30	0.03	0.00	0.00	0.49	0.34	0.08	0.03	0.07	0.00	43.73	5	20	20	170	0	500
67.00	55.80	0.04	0.01	0.01	0.25	0.37	0.06	0.03	0.08	0.00	43.74	5	10	10	150	–	600
87.00	55.50	0.05	0.00	0.00	0.18	0.30	0.02	0.02	0.06	0.00	43.71	5	20	20	130	–	1000
95.00	55.70	0.04	0.01	0.01	0.43	0.32	0.01	0.02	0.07	0.00	43.68	5	10	10	150	–	500
100.00	55.40	0.03	0.01	0.00	1.04	0.31	0.01	0.02	0.09	0.00	43.33	5	40	20	210	–	700
SK 06 NE 10s 0656 6797 Tor Rock, Hollinsclough																	
4.00	54.80	0.14	0.00	0.04	0.22	0.35	0.13	0.05	0.02	0.19	43.68	5	0	20	110	–	470
9.00	54.80	0.15	0.01	0.02	1.07	0.32	0.10	0.04	0.02	0.04	43.48	5	0	10	100	–	330
16.00	55.40	0.15	0.01	0.06	0.34	0.32	0.16	0.06	0.05	0.33	43.56	5	0	30	100	–	600
SK 06 NE 14s 0837 6715 Glutton Dale, Glutton																	
5.00	54.70	0.13	0.01	0.00	1.22	0.29	0.06	0.04	0.02	0.06	43.29	5	0	10	240	–	370
15.00	54.30	0.11	0.00	0.01	1.51	0.29	0.11	0.04	0.00	0.07	43.10	0	0	10	150	0	240
26.00	55.00	0.11	0.01	0.01	0.64	0.32	0.03	0.03	0.00	0.04	43.67	0	0	10	180	–	300
SK 06 NE 15s 0953 6781 Hindlow Quarry																	
9.00	55.10	0.44	0.00	0.00	0.20	0.23	0.06	0.03	0.00	0.01	43.78	5	10	10	90	–	200
23.00	54.70	0.39	0.00	0.01	0.64	0.21	0.51	0.04	0.00	0.02	43.49	5	10	10	100	–	400
42.00	54.80	0.30	0.00	0.00	0.47	0.22	0.07	0.03	0.00	0.01	43.62	5	40	10	160	–	500
57.00	55.40	0.41	0.00	0.00	0.15	0.22	0.07	0.04	0.00	0.02	43.78	5	10	10	80	–	200
61.00	55.10	0.50	0.00	0.03	0.70	0.23	0.07	0.04	0.00	0.02	43.53	5	10	10	80	–	200
SK 07 NE 1s 0880 7990 Barmoor Quarry, Sparrowpit																	
3.00	55.30	0.07	0.02	0.04	0.36	0.39	0.02	0.03	0.14	0.21	43.63	0	20	20	200	–	570
7.00	55.30	0.04	0.02	0.03	0.37	0.37	0.02	0.03	0.10	0.23	43.63	0	10	10	300	–	610
10.00	54.80	0.15	0.02	0.09	0.75	0.50	0.16	0.04	0.12	0.54	42.98	0	0	0	200	–	590
SK 07 NE 2s 0816 7751 Perseverance Quarry, Doveholes																	
2.00	55.30	0.05	0.01	0.01	0.24	0.22	0.01	0.02	0.07	0.01	43.86	0	0	10	220	–	160
8.00	55.20	0.04	0.01	0.01	0.56	0.23	0.02	0.03	0.06	0.00	43.67	0	0	10	170	–	200
SK 07 NE 3s 0859 7690 Perseverance Quarry, Doveholes																	
7.00	55.60	0.05	0.01	0.03	1.00	0.22	0.02	0.02	0.06	0.01	43.48	5	10	10	270	–	330
14.00	55.20	0.05	0.01	1.01	1.13	0.21	0.01	0.02	0.06	0.00	43.32	0	0	10	130	–	410

CHEMICAL ANALYSES

Depth* (m)	percentages											parts per million					
	CaO	SO_3	Na_2O	F	SiO_2	MgO	Al_2O_3	K_2O	SrO	P_2O_5	Loss at 1050°C	Cu	Pb	Zn	MnO	As	Fe_2O_3
SK 07 NE 4s		**0789 7677**		**Victory Quarry, Lower Bibbington**													
1.00	54.80	0.03	0.02	0.02	2.45	0.29	0.08	0.04	0.15	0.06	42.83	5	0	20	140	–	410
8.00	55.50	0.04	0.02	0.01	0.64	0.20	0.00	0.02	0.14	0.01	43.68	0	0	10	90	6	100
11.00	55.20	0.05	0.02	0.01	0.86	0.26	0.04	0.03	0.13	0.02	43.61	5	0	20	280	–	820
SK 07 NE 5s		**0959 7700**		**Smalldale Quarry, Smalldale**													
1.00	55.00	0.04	0.01	0.02	1.74	0.16	0.00	0.02	0.05	0.01	43.10	0	0	10	390	–	110
8.00	55.20	0.04	0.00	0.00	0.35	0.21	0.00	0.02	0.05	0.00	43.81	0	0	10	160	–	90
20.00	55.20	0.03	0.00	0.00	0.40	0.18	0.07	0.03	0.05	0.00	43.74	0	0	10	100	0	110
SK 07 NE 6s		**0910 7929**		**Bee Low Quarry, Dove Holes**													
12.00	52.40	0.46	0.00	0.00	3.42	0.24	0.07	0.03	0.03	0.02	42.19	5	10	10	140	–	300
20.00	55.30	0.56	0.00	0.00	0.17	0.23	0.05	0.03	0.00	0.02	43.78	5	10	10	130	–	200
30.00	55.10	0.56	0.00	0.00	0.09	0.23	0.06	0.03	0.00	0.02	43.87	5	20	10	190	–	300
40.00	54.80	0.51	0.00	0.00	0.46	0.25	0.13	0.06	0.01	0.01	43.65	5	10	10	90	–	300
50.00	55.10	0.50	0.00	0.00	0.00	0.20	0.05	0.03	0.00	0.01	43.88	5	0	10	100	–	200
60.00	55.30	0.51	0.00	0.00	0.00	0.23	0.05	0.03	0.00	0.01	43.94	5	0	10	100	–	200
70.00	54.80	0.45	0.00	0.01	0.31	0.44	0.22	0.07	0.03	0.01	43.85	5	10	10	90	–	500
SK 07 NE 7s		**0791 7871**		**Railway Cutting, Dove Holes**													
4.00	54.70		0.01	0.01	2.32	0.30	0.08	0.03	0.00	0.05	42.18	5	0	10	190	–	200
SK 07 NE 8s		**0834 7816**		**Holderness Quarry, Dove Holes**													
3.00	55.20		0.01	0.00	0.30	0.28	0.05	0.03	0.00	0.03	42.99	5	0	10	170	–	600
14.00	53.60		0.02	0.00	3.82	0.25	0.06	0.03	0.00	0.03	41.04	5	10	20	100	–	400
30.00	55.70		0.01	0.00	0.41	0.25	0.07	0.03	0.00	0.03	42.60	5	0	10	90	–	200
40.00	53.50		0.02	0.00	4.64	0.21	0.06	0.03	0.00	0.03	40.67	5	0	10	100	–	400
SK 07 SW 1s		**0458 7233**		**Grinlow Quarry, Buxton**													
2.00	53.70	0.25	0.00	0.01	1.61	0.30	0.09	0.03	0.02	0.01	42.65	5	10	10	120	–	500
12.00	55.10	0.15	0.00	0.00	0.37	0.28	0.06	0.02	0.01	0.01	43.21	5	10	10	120	–	400
17.00	53.70	0.05	0.00	0.00	1.53	0.23	0.12	0.04	0.00	0.04	42.97	5	0	10	700	–	200
29.00	56.00	0.25	0.00	0.00	0.13	0.20	0.07	0.03	0.00	0.01	43.25	5	0	10	180	–	1700
42.00	54.20	0.20	0.00	0.00	0.63	0.17	0.08	0.03	0.00	0.01	43.01	5	30	10	140	–	300
49.00	56.10	0.32	0.00	0.03	0.11	0.20	0.07	0.03	0.00	0.01	43.52	5	20	10	150	–	400
63.00	56.70	0.20	0.00	0.01	0.09	0.19	0.11	0.03	0.00	0.01	43.20	5	10	10	160	–	400
SK 07 SW 2s		**0459 7058**		**Anthony Hill, Harpur Hill**													
10.00	54.00		0.01	0.01	1.09	0.43	0.39	0.08	0.00	0.11	43.14	5	0	10	120	–	600
20.00	55.40		0.02	0.01	0.20	0.40	0.12	0.04	0.00	0.04	43.35	5	0	10	100	–	200
30.00	54.60		0.00	0.00	1.05	0.29	0.10	0.03	0.00	0.04	42.86	5	0	10	110	–	200
40.00	55.70		0.01	0.00	0.31	0.31	0.07	0.03	0.00	0.03	43.26	5	0	10	70	–	200
51.00	55.20		0.02	0.01	0.33	0.34	0.09	0.04	0.00	0.03	43.21	5	10	10	50	3	200
60.00	55.10		0.03	0.02	0.53	0.63	0.16	0.04	0.00	0.03	43.28	5	0	10	120	–	300
70.00	55.20		0.01	0.01	0.45	0.33	0.05	0.03	0.00	0.03	43.08	5	0	10	70	–	300
SK 07 SE 27		**0942 7427**		**Orient Lodge, Cowlow, Green Fairfield**													
10.00	55.20	0.34	0.00	0.01	0.72	0.27	0.11	0.04	0.00	0.01	43.44	15	10	20	280	–	700
19.00	52.40	0.44	0.00	0.01	1.98	0.32	0.95	0.16	0.03	0.02	42.58	5	0	10	180	–	600
30.00	54.50	0.41	0.00	0.03	0.29	0.21	0.11	0.05	0.00	0.02	43.68	10	20	40	500	–	500
42.00	54.40	0.45	0.00	0.00	0.33	0.28	0.19	0.06	0.01	0.02	43.73	5	0	10	120	–	400
55.00	56.30	0.37	0.01	0.00	0.00	0.27	0.06	0.03	0.01	0.01	43.84	5	0	10	130	–	200
65.00	56.10	0.36	0.00	0.00	0.06	0.28	0.06	0.03	0.00	0.01	43.90	15	0	30	330	–	300
77.00	55.80	0.34	0.01	0.00	0.37	0.44	0.16	0.06	0.00	0.01	43.75	5	0	20	220	–	1000
SK 07 SE 32		**0981 7352**		**Tunstead Quarry, Green Fairfield**													
10.00	56.00	0.42	0.01	0.00	0.00	0.35	0.07	0.03	0.02	0.01	43.97	5	10	10	110	–	200
20.00	56.10	0.28	0.00	0.00	0.00	0.32	0.08	0.03	0.01	0.01	43.94	5	0	10	100	–	400
30.00	56.30	0.40	0.03	0.00	0.00	0.35	0.06	0.04	0.03	0.01	43.94	5	20	10	130	–	300
40.00	56.00	0.44	0.00	0.01	0.01	0.66	0.07	0.03	0.03	0.01	44.09	5	0	20	160	–	400
50.00	56.30	0.46	0.00	0.01	0.01	0.43	0.09	0.04	0.02	0.01	43.96	5	0	20	390	–	600
62.00	54.10	0.47	0.01	0.01	0.18	2.29	0.09	0.03	0.02	0.01	44.29	5	10	20	960	–	3000
80.00	56.20	0.36	0.01	0.01	0.00	0.37	0.05	0.03	0.02	0.01	44.02	5	0	10	330	–	600
SK 07 SE 39		**0904 7483**		**Green Bank, Green Fairfield**													
15.00	55.10	0.52	0.00	0.00	0.57	0.22	0.08	0.03	0.01	0.01	43.55	5	0	10	150	–	200
24.00	54.90	0.46	0.00	0.00	0.33	0.24	0.07	0.04	0.00	0.01	43.69	5	10	10	150	–	200
35.00	52.50	0.59	0.00	0.01	1.75	0.32	0.65	0.15	0.04	0.02	42.85	5	10	20	150	–	3500
50.00	52.10	0.83	0.00	0.05	3.69	0.43	2.26	0.44	0.04	0.02	41.48	5	10	20	90	–	4400
60.00	55.00	0.69	0.00	0.00	0.19	0.29	0.13	0.05	0.01	0.01	43.83	5	0	10	110	–	300
80.00	54.70	0.44	0.00	0.00	0.19	0.29	0.08	0.04	0.03	0.01	43.83	5	0	10	100	–	300
107.00	55.00	0.60	0.00	0.00	0.01	0.50	0.05	0.03	0.02	0.02	44.08	5	10	20	130	–	400
115.00	52.20	0.62	0.00	0.01	0.43	1.65	0.27	0.08	0.03	0.02	44.08	5	10	50	440	–	2400
130.00	54.50	0.44	0.00	0.00	0.11	0.59	0.11	0.04	0.02	0.02	43.97	5	10	40	320	–	700

CHEMICAL ANALYSES

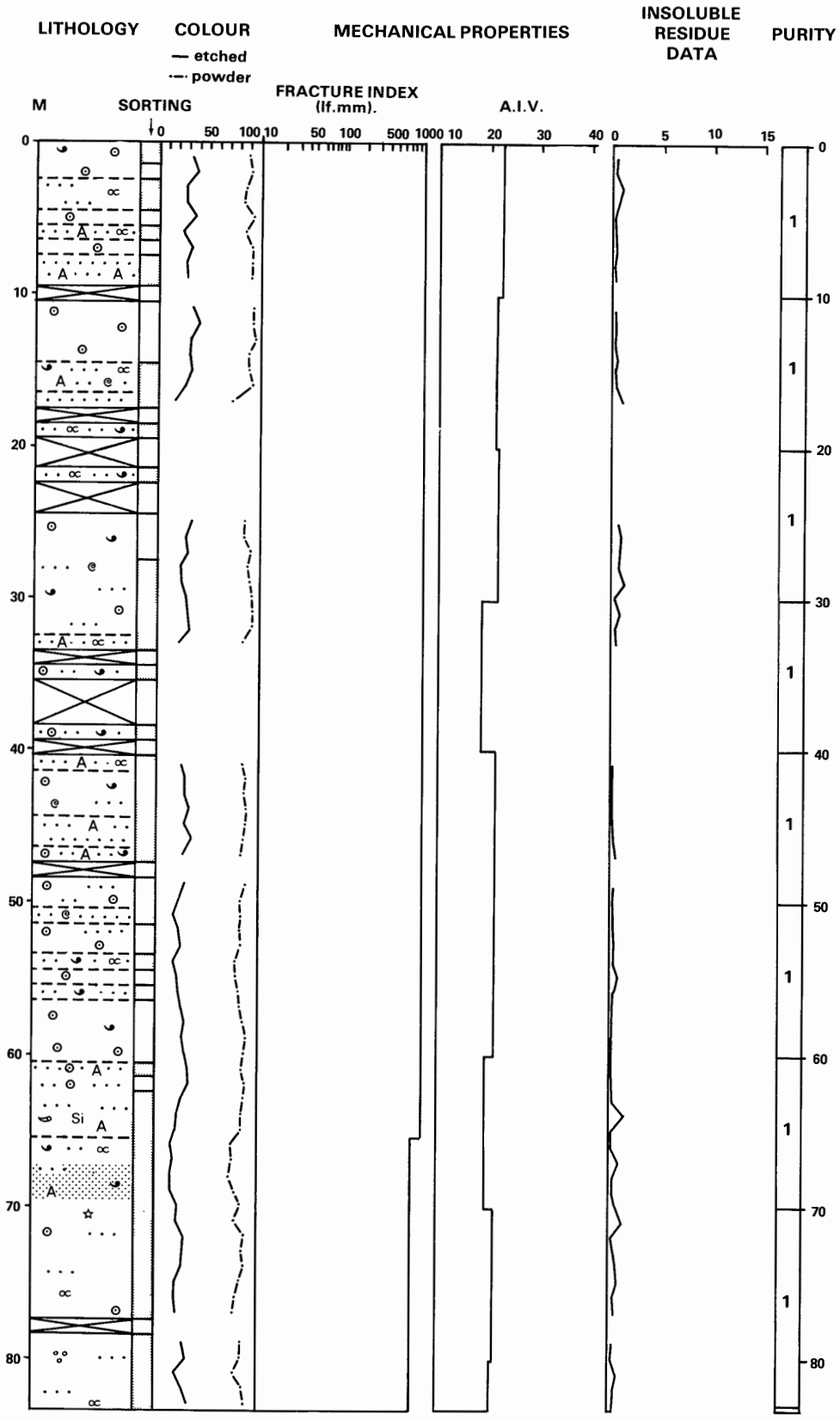
Depth* (m)	percentages											parts per million					
	CaO	SO_3	Na_2O	F	SiO_2	MgO	Al_2O_3	K_2O	SrO	P_2O_5	Loss at 1050°C	Cu	Pb	Zn	MnO	As	Fe_2O_3
SK 07 SE 49	**0562 7123**		**Ferny Bottom, Harpur Hill**														
11.00	55.00	0.08	0.00	0.00	0.29	0.49	0.04	0.03	0.03	0.00	43.87	5	0	0	120	–	240
29.00	55.00	0.08	0.01	0.02	0.78	0.51	0.36	0.11	0.04	0.00	43.51	5	0	20	310	–	810
51.00	55.10	0.10	0.01	0.01	0.68	0.53	0.15	0.05	0.05	0.00	43.72	5	0	0	410	–	530
62.00	55.20	0.03	0.00	0.00	0.34	0.37	0.15	0.03	0.08	0.01	43.84	5	10	20	130	1	810
81.00	55.50	0.04	0.01	0.00	0.01	0.39	0.00	0.02	0.10	0.00	44.02	0	0	0	70	–	130
93.00	55.80	0.03	0.01	0.00	0.00	0.36	0.00	0.02	0.07	0.01	43.86	0	0	0	70	–	100
100.00	55.50	0.05	0.01	0.01	0.02	0.38	0.00	0.02	0.09	0.01	43.86	0	0	0	70	–	60
SK 07 SE 50	**0854 7328**		**Bailey Flat, Green Fairfield**														
2.00	55.80	0.01	0.00	0.00	0.24	0.25	0.00	0.02	0.08	0.01	43.62	0	0	10	80	–	140
11.00	55.40	0.08	0.01	0.01	0.20	0.45	0.07	0.03	0.09	0.01	43.93	5	10	10	110	0	260
20.00	53.50	0.11	0.02	0.00	0.22	1.81	0.11	0.04	0.04	0.02	44.25	5	0	20	210	–	770
38.00	50.10	0.05	0.02	0.00	0.16	4.69	0.07	0.03		0.01	44.71	5	0	70	1600	–	4600
51.00	54.80	0.01	0.00	0.00	0.05	0.74	0.01	0.02	0.07	0.00	44.05	0	0	20	410	–	1300
76.00	43.70	0.00	0.02	0.00	2.20	8.70	0.00	0.01		0.00	44.34	0	0	90	2500	–	12000
93.00	52.40	0.01	0.00	0.00	0.00	2.37	0.00	0.02	0.00	0.01	44.47	0	0	20	640	–	1700
109.00	54.30	0.00	0.01	0.01	0.07	1.48	0.00	0.03	0.07	0.00	44.25	5	0	20	400	0	960
115.00	39.60	0.00	0.02	0.00	0.05	14.40	0.01	0.01		0.00	46.59	0	0	40	1700	–	1700
SK 07 SE 51	**0822 7136**		**King Sterndale, Buxton**														
7.00	54.90	0.09	0.00	0.00	0.27	0.28	0.08	0.03	0.00	0.01	43.40	5	0	0	60	–	200
15.00	54.80	0.17	0.00	0.00	0.45	0.37	0.24	0.04	0.03	0.01	43.62	5	0	0	80	–	400
32.00	55.10	0.30	0.00	0.01	0.70	0.32	0.07	0.03	0.01	0.01	43.34	5	10	10	110	–	300
38.00	55.10	0.14	0.00	0.02	0.44	0.39	0.10	0.03	0.02	0.01	43.63	5	10	10	90	–	400
51.00	54.50	0.05	0.00	0.00	0.27	0.43	0.08	0.02	0.01	0.01	43.78	5	0	0	210	–	400
64.00	54.20	0.19	0.00	0.00	0.13	0.50	0.10	0.03	0.01	0.01	43.85	5	10	10	120	–	1300
80.00	54.40	0.34	0.00	0.00	0.06	0.33	0.04	0.02	0.00	0.01	43.69	5	0	0	330	–	400
95.00	54.10	0.29	0.00	0.01	0.10	0.61	0.12	0.03	0.02	0.01	44.08	0	0	0	330	–	600
SK 07 SE 1s	**0801 7217**		**Cowdale Quarry, King Sterndale**														
2.00	55.80	0.00	0.01	0.01	0.27	0.18	0.00	0.03	0.06	0.02	43.83	0	0	10	30	–	100
10.00	55.00	0.01	0.01	0.01	0.37	0.22	0.00	0.03	0.03	0.02	43.75	0	0	10	30	1	100
17.00	55.60	0.02	0.01	0.00	0.07	0.24	0.03	0.03	0.08	0.02	43.93	0	0	10	40	–	90
23.00	55.20	0.03	0.01	0.00	0.00	0.21	0.01	0.02	0.10	0.02	43.90	0	0	10	40	–	90
28.00	55.70	0.02	0.01	0.00	0.08	0.23	0.02	0.03	0.04	0.01	43.68	0	0	10	50	0	90
31.00	54.50	0.03	0.04	0.00	1.07	1.27	0.21	0.30	0.04	0.02	43.54	0	0	10	120	–	430
40.00	55.10	0.02	0.01	0.00	0.02	0.34	0.00	0.02	0.11	0.02	43.95	0	0	0	60	–	120
45.00	55.10	0.03	0.01	0.00	0.32	0.31	0.01	0.02	0.11	0.02	43.95	0	0	10	50	–	120
50.00	55.70	0.01	0.01	0.00	0.03	0.30	0.02	0.03	0.08	0.02	43.96	0	0	10	40	–	140
SK 07 SE 2s	**0811 7240**		**Cowdale Quarry, Wye Dale**														
2.00	55.40	0.01	0.02	0.01	0.01	0.21	0.01	0.02	0.10	0.02	44.01	0	0	10	60	–	120
12.00	55.20	0.04	0.01	0.01	0.00	0.28	0.01	0.02	0.08	0.01	44.01	0	0	10	90	–	400
16.00	55.40	0.03	0.01	0.00	0.00	0.32	0.01	0.02	0.10	0.01	43.95	0	0	10	60	–	80
25.00	54.50	0.06	0.02	0.03	1.09	0.51	0.64	0.16	0.06	0.01	43.23	0	0	60	770	0	3200
30.00	55.40	0.09	0.02	0.01	0.27	0.54	0.15	0.06	0.13	0.01	43.90	0	0	20	120	–	460
35.00	55.50	0.07	0.01	0.01	0.10	0.42	0.03	0.03	0.13	0.01	44.08	0	0	30	210	–	570
SK 07 SE 3s	**0673 7484**		**Brook House**														
3.00	54.80	0.14	0.02	0.04	0.68	0.41	0.05	0.03	0.05	0.03	43.77	0	0	10	280	–	230
10.00	55.30	0.13	0.01	0.01	0.26	0.30	0.04	0.03	0.00	0.05	43.90	0	0	10	290	–	600
SK 07 SE 4s	**0970 7259**		**Woo Dale, King Sterndale**														
2.00	53.20	0.02	0.01	0.00	0.02	1.18	0.01	0.02	0.00	0.02	43.73	5	0	1000	2500	–	11800
12.00	35.00	0.00	0.01	0.00	0.00	17.40	0.01	0.01	0.03	0.00	47.12	0	0	50	660	–	1700
19.00	32.00	0.00	0.01	0.00	0.01	21.00	0.01	0.01	0.00	0.02	47.51	0	0	30	340	–	1200
22.00	54.60	0.04	0.01	0.00	0.01	0.90	0.01	0.02	0.01	0.00	44.11	0	0	20	350	1	600
SK 07 SE 5s	**0670 7283**		**Gas Works, Buxton**														
3.00	55.0	0.03	0.00	0.00	0.99	0.27	0.03	0.03	0.00	0.00	43.51	5	0	10	150	–	200
6.00	55.1	0.02	0.00	0.00	1.18	0.25	0.02	0.04	0.00	0.00	43.49	0	0	10	130	0	300
13.00	55.3	0.03	0.01	0.00	0.17	0.26	0.11	0.04	0.02	0.00	43.94	5	0	20	110	–	280
SK 07 SE 6s	**0980 7139**		**Deep Dale, Chelmorton**														
2.00	55.30	0.13	0.02	0.02	0.15	0.34	0.07	0.04	0.05	0.01	43.97	0	0	20	160	–	210
27.00	55.50	0.10	0.01	0.00	0.15	0.20	0.04	0.03	0.01	0.00	43.80	0	0	10	50	–	220
35.00	55.50	0.09	0.02	0.00	0.08	0.19	0.03	0.03	0.04	0.00	43.85	5	0	10	40	2	150
54.00	55.30	0.00	0.00	0.00	0.11	0.20	0.08	0.03	0.00	0.01	43.95	35	0	10	40	–	310
69.00	55.40	0.05	0.02	0.02	0.10	0.26	0.01	0.03	0.00	0.01	43.91	0	0	40	300	–	2500
SK 07 SE 7s	**0638 7064**		**Harpur Hill Quarry, Buxton**														
5.00	56.20	0.24	0.00	0.01	0.72	0.20	0.06	0.03	0.00	0.01	43.05	5	10	10	140	–	600
7.00	54.10	0.44	0.02	0.01	0.56	0.28	0.09	0.04	0.00	0.02	43.31	5	0	10	130	–	600
21.00	56.00	0.45	0.01	0.02	1.33	0.29	0.08	0.03	0.01	0.01	42.98	5	10	10	210	–	400
29.00	56.30	0.33	0.00	0.00	0.36	0.30	0.08	0.03	0.00	0.01	43.76	5	0	10	530	–	800
34.00	53.80	0.36	0.00	0.03	1.73	0.39	1.16	0.16	0.01	0.01	42.97	5	0	10	200	–	4300
45.00	56.70	0.31	0.00	0.00	0.53	0.21	0.09	0.03	0.00	0.01	43.15	5	10	10	190	–	1500
50.00	57.00	0.23	0.00	0.01	0.32	0.23	0.12	0.04	0.00	0.02	43.19	5	10	10	170	–	500

CHEMICAL ANALYSES

Depth* (m)	percentages											parts per million					
	CaO	SO_3	Na_2O	F	SiO_2	MgO	Al_2O_3	K_2O	SrO	P_2O_5	Loss at 1050°C	Cu	Pb	Zn	MnO	As	Fe_2O_3
SK 07 SE 8s	**0975 7477**		**Tunstead Quarry**														
3.00	55.40	0.04	0.01	0.01	0.29	0.25	0.03	0.03	0.07	0.01	43.84	0	0	0	130	–	240
6.00	55.60	0.03	0.01	0.01	0.55	0.22	0.02	0.02	0.07	0.01	43.65	0	0	10	90	–	300
16.00	55.40	0.05	0.01	0.00	0.20	0.25	0.06	0.03	0.07	0.01	43.92	5	0	10	100	0	190
SK 07 SE 9s	**0810 7267**		**Ashwooddale Quarry, King Sterndale**														
2.00	54.40	0.15	0.02	0.00	0.48	0.48	0.24	0.07	0.02	0.04	43.77	0	0	20	420	–	2500
12.00	54.40	0.13	0.02	0.02	0.48	0.48	0.24	0.08	0.01	0.02	44.46	0	0	10	280	–	540
SK 07 SE 10s	**0983 7022**		**Horseshoe Dale, King Sterndale**														
2.00	55.40	0.09	0.01	0.00	0.55	0.31	0.05	0.03	0.07	0.01	43.70	0	0	10	70	–	190
14.00	55.10	0.10	0.01	0.00	0.27	0.33	0.06	0.04	0.03	0.01	43.90	0	0	10	50	0	270
18.00	54.90	0.10	0.02	0.08	0.80	0.33	0.04	0.03	0.01	0.01	43.70	5	0	10	40	–	130
SK 07 SE 11s	**0960 7068**		**Back Dale, King Sterndale**														
5.00	54.50	0.51	0.00	0.01	0.38	0.54	0.11	0.05	0.02	0.01	43.83	10	10	10	320	–	400
11.00	54.60	0.52	0.03	0.02	0.55	0.60	0.09	0.04	0.02	0.02	43.73	5	10	10	10	–	200
SK 07 SE 12s	**0976 7224**		**Topley Pike Quarry**														
8.00	55.20	0.12	0.02	0.00	0.13	0.79	0.04	0.03	0.06	0.00	44.06	0	0	20	60	–	240
12.00	55.10	0.12	0.02	0.03	0.72	0.74	0.36	0.11	0.06	0.00	43.60	0	0	70	230	–	1300
28.00	55.70	0.05	0.01	0.00	0.05	0.39	0.00	0.02	0.04	0.00	43.97	0	0	10	240	1	220
37.00	55.90	0.05	0.01	0.01	0.09	0.37	0.00	0.02	0.08	0.00	43.98	0	0	10	130	–	150
40.00	54.80	0.10	0.01	0.00	0.54	0.84	0.11	0.05	0.03	0.00	43.83	0	5	40	280	–	1100
SK 07 SE 13s	**0553 7149**		**Grinlow Plantation, Harpur Hill**														
10.00	54.80	0.48	0.00	0.00	0.31	0.26	0.23	0.06	0.02	0.01	43.63	5	10	20	110	–	300
20.00	55.20	0.50	0.00	0.00	0.00	0.25	0.06	0.03	0.01	0.02	43.86	5	0	10	80	–	200
39.00	55.30	0.60	0.00	0.01	0.06	0.37	0.09	0.04	0.02	0.02	43.86	5	0	10	70	–	200
SK 07 SE 14s	**0702 7027**		**Railway Cutting, Harpur Hill**														
5.00	55.60		0.01	0.01	0.17	0.26	0.15	0.04	0.00	0.03	43.15	5	10	20	200	–	800
15.00	54.80		0.01	0.00	2.07	0.20	0.06	0.03	0.00	0.03	41.80	5	0	10	130	–	200
SK 08 SE1s	**0990 8126**		**Tor Top, Sparrowpit**														
10.00	55.20		0.03	0.02	0.05	0.43	0.05	0.03	0.00	0.23	43.56	5	0	20	550	–	500

*Represents the depth below the surface of the mid-point of the sample.

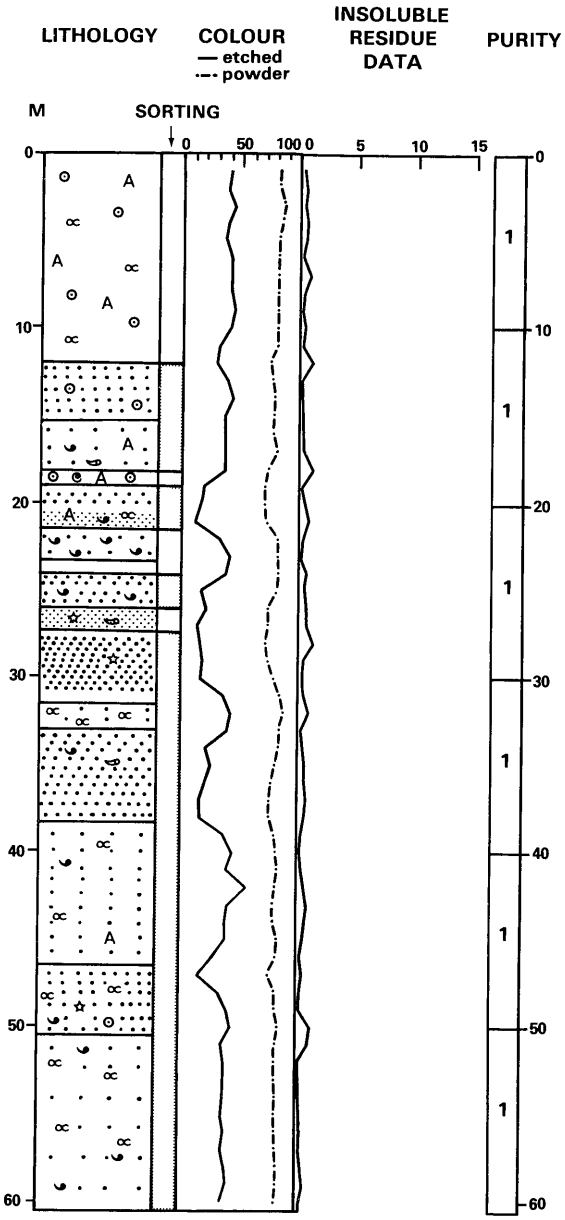
06 NW 1S


LITHOLOGY
COLOUR
— etched
·— powder
MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
M
SORTING
FRACTURE INDEX (lf.mm).
A.I.V.
0 50 100 10 50 100 500 1000 10 20 30 40 0 5 10 15
0
10
20
30
40
50
60
70
80
Si
A
1

SK 06 NW 1s[1] **0492 6972**[2] **The Frith**[3]
Surface level +400.80 m[4]
May 1977[5]

	Thickness m	*Depth*[8] m
D_1 (Bee Low Limestones)[6]		
Biosparite Crinoid[7], buff-grey, coarse arenite, well sorted	2.50	2.50
Pelsparite, buff-grey; medium arenite algae-corroded bioclasts and pelletal debris, well sorted, scattered quartz euhedra	2.00	4.50
Biosparite Crinoid, coarse arenite, moderate sorting	1.00	5.50
Biopelsparite algae, grey, fine arenite, well sorted	1.00	6.50
Biosparite Crinoid, buff-grey, coarse arenite, moderate sorting	1.00	7.50
Biopelsparite Algae, buff-grey; fine arenite pelletal and finely comminuted bioclasts, locally common dasycladacean algae, well sorted	2.00	9.50
Gap	1.00	10.50
Biosparite Crinoid, buff grey, coarse arenite, occasional quartz euhedra	4.00	14.50
Biopelsparite algae; fine arenite to fine rudite crinoid, algae encrusted shell debris, *Koninckopora,* foraminifera and pelletal material, well sorted	2.00	16.50
Pelsparite, buff-grey mottled, very fine arenite, well sorted, sporadic quartz euhedra	1.00	17.50
Gap	1.00	18.50
Biopelsparite algae, medium arenite, well sorted, scattered quartz euhedra	1.00	19.50
Gap	2.00	21.50
Biopelsparite algae, medium arenite, well sorted	1.00	22.50
Gap	2.00	24.50
Biosparite, buff-grey; fine arenite to medium rudite crinoid, shell, foraminifera and pelletal material, moderate to good sorting, scattered quartz euhedra	8.00	32.50
Pelsparite Algae, mid-grey, coarse arenite, well sorted	1.00	33.50
Gap	1.00	34.50
Biosparite Pellet, pale grey, fine arenite, well sorted, scattered quartz euhedra	1.00	35.50
Gap	3.00	38.50
Biosparite Pellet, pale grey, fine arenite, well sorted	1.00	39.50
Gap	1.00	40.50
Pelsparite Algae, grey, coarse arenite, moderate to good sorting	1.00	41.50
Biosparite, pale grey, fine arenite, sporadic rudite crinoid and brachiopod debris, moderate to good sorting	3.00	44.50
Pelsparlutite, buff-grey, lutite and very fine arenite bioclasts, sporadic coarser algae-like structures and calcispheres, patchy limonite staining	2.00	46.50
Biopelsparite, buff-grey, fine arenite, well sorted	1.00	47.50
Gap	1.00	48.50
Biosparite Crinoid Pellet, buff-grey, fine arenite to fine rudite, moderate sorting, scattered quartz euhedra	2.00	50.50
Biopelsparite Foraminifera, grey, fine arenite, well sorted	1.00	51.50
Biosparite Crinoid Pellet, buff-grey, medium arenite, moderate sorting, patchily silicified bioclasts	2.00	53.50
Biopelsparite, grey, fine arenite, well sorted, rare quartz euhedra, patchy limonite staining	1.00	54.50
Biosparite Crinoid, mid-grey, fine arenite to coarse rudite bioclasts, poorly sorted	1.00	55.50
Biopelsparite, grey, fine arenite, well sorted	1.00	56.50
Biosparite Crinoid, mid-grey, fine arenite to coarse rudite bioclasts, poorly sorted	4.00	60.50
Pelsparite Crinoid algae, pale grey, fine arenite, well sorted, silicified colonial coral 64 m	5.00	65.50
S_2 (Woo Dale Limestones)		
Pelsparite, grey; very fine arenite, occasional fine rudite algae-encrusted shell debris, crinoid and dasycladacean algal debris, well sorted, some quartz euhedra, rare silicified biclasts	19.00	84.50
Section completed at 84.50 m		

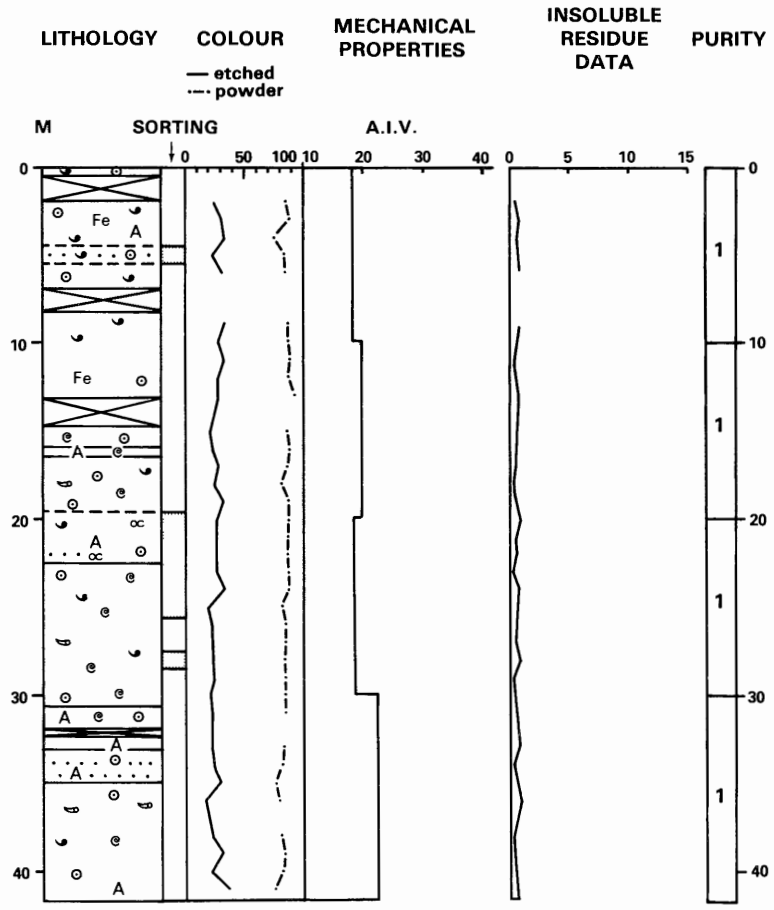
06 NE 10


LITHOLOGY
COLOUR
— etched
-·- powder
INSOLUBLE RESIDUE DATA
PURITY
M
SORTING
0
50
100
0
5
10
15
0
10
20
30
40
50
60
A
1

SK 06 NE 10 0575 6910 High Edge
Surface level +418.80 m
March 1971

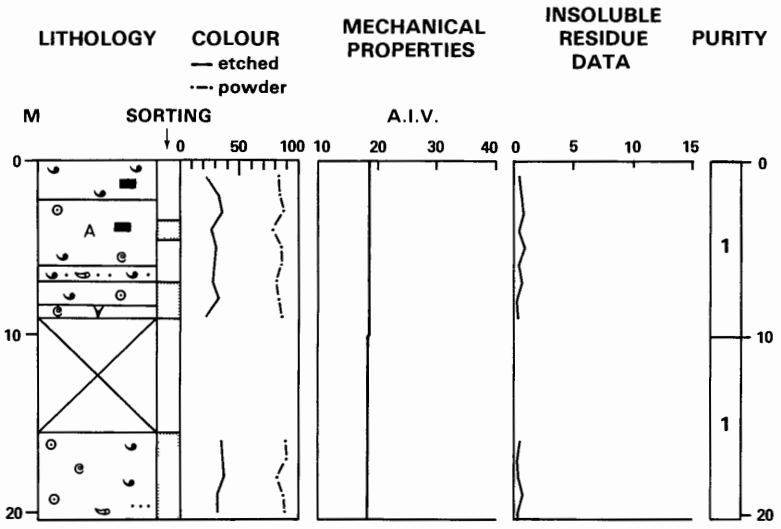
	Thickness m	*Depth* m
D_1 (Bee Low Limestones)		
Openhole, lime silt soil	1.00	1.00
Biosparite, pale grey; medium arenite crinoid, *Koninckopora,* foraminifera and encrusting algal debris, fractured and jointed 5.96–6.95 m	11.73	12.73
Pelsparite, fine arenite, sporadic medium and coarse arenite foraminifera and crinoid debris, well sorted	2.59	15.32
Biopelsparite; fine arenite crinoid, shell and *Koninckopora* debris, locally laminated	2.84	18.16
Biosparite Crinoid Algae, medium grey, medium arenite	0.93	19.09
S_2 (Woo Dale Limestones)		
Pelsparite, fine arenite, well sorted. Mid-grey 20.10–21.20 m. Locally laminated with abundant algae-corroded and encrusted bioclasts	2.47	21.56
Biopelsparite Brachiopod, mid-grey, medium arenite	1.83	23.39
Biosparite, fine arenite, well sorted	0.61	24.00
Pelsparite, fine arenite, laminated, well sorted	2.03	26.03
Micrite, dark grey, occasional birdseye structures	1.37	27.40
Pelsparite, dark grey; fine arenite algae-encrusted pelletal and shell debris, well sorted	4.05	31.45
Biosparite Pellet Algae; very fine arenite algae-encrusted bioclasts, sporadic oncolites, well sorted	1.55	33.00
Pelsparite, mid to dark grey, fine to medium arenite, locally laminated, well sorted	5.37	38.37
Biopelsparite; fine arenite algae-encrusted bioclasts, oncolites, foraminifera and rare brachiopod and dasycladacean algal debris, well sorted	8.13	46.50
Pelsparite, mid to dark grey, fine arenite locally laminated, well sorted	4.6	51.66
Biosparite Algae Pellet, pale grey; fine arenite oncolite, algae-encrusted bioclasts, pellet and brachiopod debris, well sorted. Dolomitised 55.35–57.60 m	9.34	60.50

Borehole complete 60.50 m



SK 06 NE 1S **0611 6900** **High Edge**
Surface level +462 m
July 1974

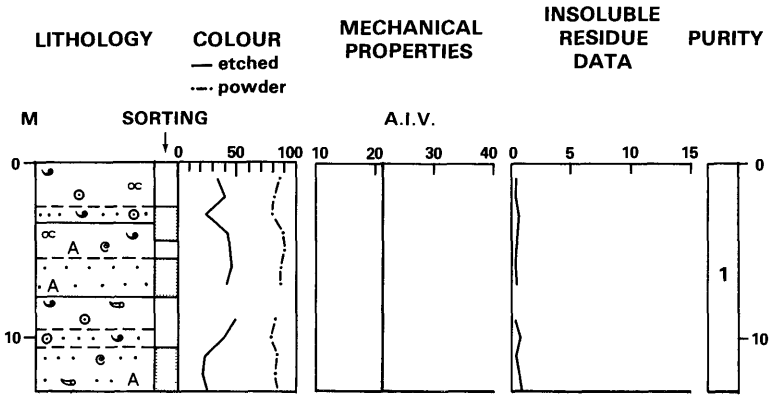
	Thickness m	*Depth* m
D_1 (Bee Low Limestones)		
Biosparite, pale grey, medium arenite, patchy hematite staining	0.40	0.40
Gap	1.60	2.00
Biosparite, buff-grey, fine arenite, moderate sorting, patchy hematite staining	2.50	4.50
Biopelsparite, buff-grey, fine arenite, well sorted	1.00	5.50
Biosparite, buff-grey; medium arenite to fine rudite brachiopod and crinoid debris, poorly sorted. Patchy hematite staining	1.50	7.00
Gap	1.22	8.22
Biosparite, medium arenite, some rudite crinoid and brachiopod debris, trace hematite staining	4.98	13.20
Gap	1.60	14.80
Biosparite foraminifera, buff-grey; medium arenite foraminifera and comminuted bioclasts, poorly sorted	0.70	15.50
Biosparite algae foraminfera, buff-grey, medium arenite, well sorted. Trace hematite staining	1.00	16.50
Biosparite, buff-grey; fine arenite shell and crinoid, debris, well sorted	3.00	19.50
Biosparite Algae, buff-grey, medium arenite, common dasycladacean algae and algae-encrusted bioclasts. Well sorted	3.00	22.50
Biosparite Foraminifera, buff-grey; medium arenite foraminifera, crinoid, coral and brachiopod debris, moderate to good sorting. Patchy hematite staining adjacent to fractures and fissures	8.00	30.50
Biosparite Crinoid algae, pale grey, medium arenite, well sorted	1.40	31.90
Gap	0.40	32.30
Biosparite Algae, buff-grey, very fine arenite, common *Koninckopora,* moderate sorting. Scattered small quartz euhedra	1.20	33.50
Biopelsparite crinoid algae, buff-grey, coarse arenite, poorly sorted	1.00	34.50
Biosparite, pale grey medium arenite, moderate sorting	1.00	35.50
Biosparite, grey-brown; medium arenite crinoid, foraminifera, shell and dasycladacean algae debris, moderate to good sorting	6.10	41.60
Base of section 41.60 m		



SK 06 NE 2S **0628 6869** **High Edge**
Surface level +442.55 m
July 1974

	Thickness m	*Depth* m
D_1 (Bee Low Limestones)		
Biosparite Brachiopod, medium grey mottled; medium arenite shell, crinoid, foraminifera and coral debris. Moderate sorting. Patchy hematite staining	2.50	2.50
Biosparite, pale grey; medium arenite, sporadic rudite crinoid debris, moderate sorting	1.00	3.50
Biosparite, buff-grey, mottled, medium arenite, well sorted	1.00	4.50
Biosparite, pale grey; medium arenite comminuted crinoid, brachiopod, foraminifera and gastropod debris, moderate to good sorting	2.00	6.50
Pelsparite brachiopod, buff-grey; coarse arenite intraclasts, well sorted	1.00	7.50
Biosparite, pale grey, medium arenite, well sorted	1.00	8.50
Biosparite Foraminifera bryozoa, grey-brown coarse arenite, locally cross-bedded, well sorted	0.55	9.05
Gap	6.49	15.54
Biosparite, buff-grey; fine arenite shell, crinoid, foraminifera, bryozoan and coral debris, well sorted. Trace hematite staining	4.90	20.44

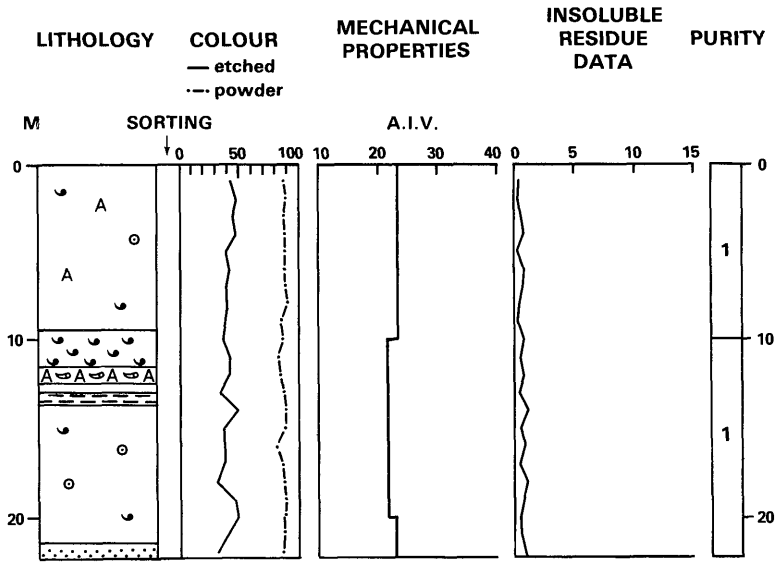
Section completed at 20.44 m



SK 06 NE 3S 0901 6748 Jericho Quarry
Surface level +364.01 m
September 1974

	Thickness m	*Depth* m
D_1 (Bee Low Limestones)		
Biosparite algae, pale grey; abundant fine arenite comminuted bioclastic debris, commonly algae-encrusted. Moderate sorting	2.50	2.50
Pelsparite, grey-brown mottled, fine arenite, very well sorted	1.07	3.57
Biosparite Algae, pale grey; fine to medium arenite algae-encrusted bioclasts, moderate sorting. Locally common *Koninckopora*	1.93	5.50
Pelsparite, buff-grey, fine arenite, very well sorted. Irregular, eroded base	2.20	7.70
Biosparite, pale grey; coarse arenite brachiopod and crinoid debris, rare coral. Moderate sorting	1.00	9.50
Biopelsparite, pale grey, coarse arenite, moderate sorting	1.00	10.50
Biopelsparite Foraminifera algae, grey-brown; fine arenite pellet, foraminifera and *Koninckopora* debris. Well sorted. Locally common colonial coral	2.51	13.01

Section completed at 13.01 m

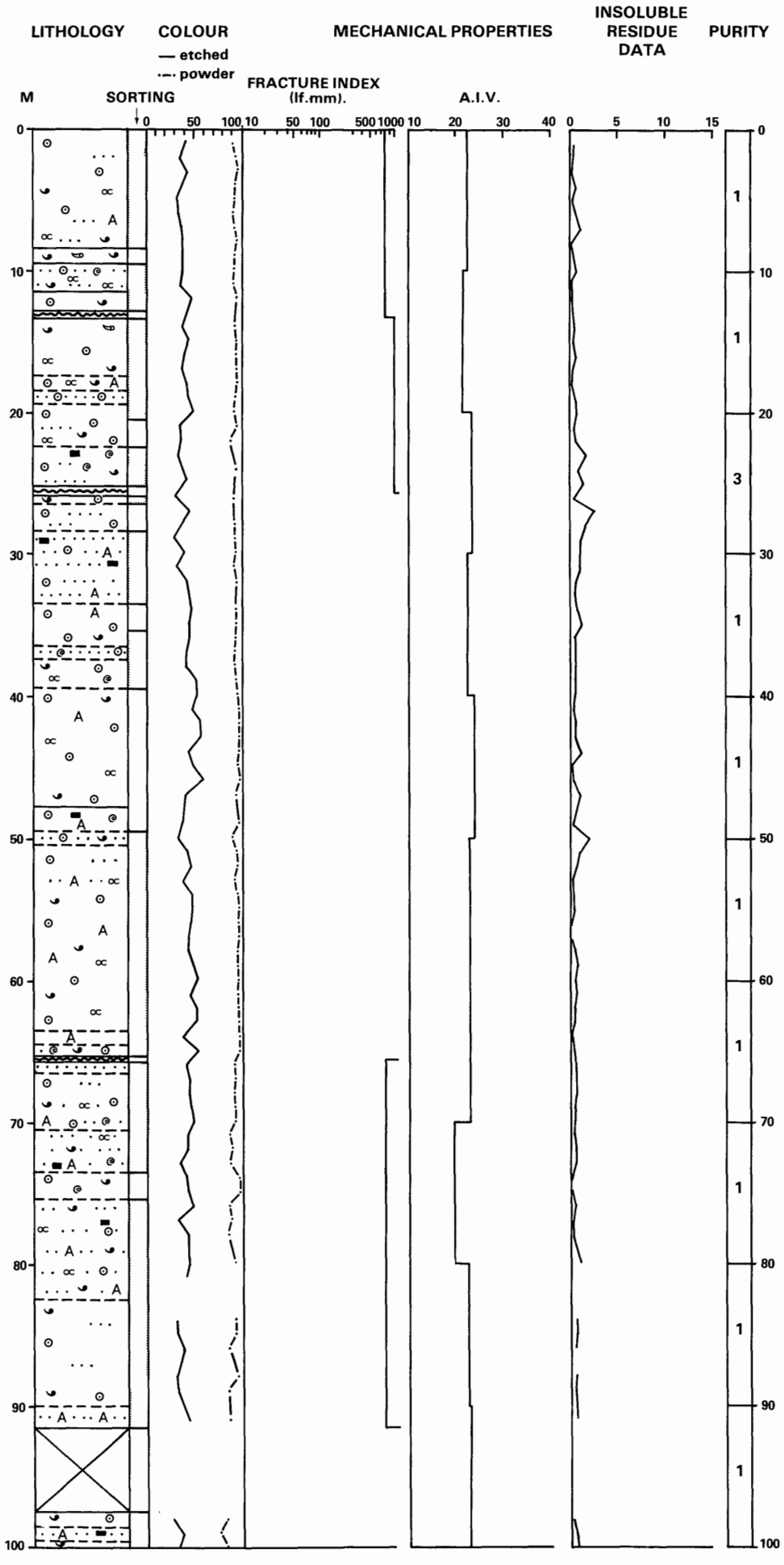


SK 06 NE 4S 0675 6997 Hillhead Quarry
Surface level + 441.96 m
September 1974

	Thickness m	*Depth* m
D_1 (Bee Low Limestones)		
Biosparite, pale grey; fine to medium arenite brachiopod, crinoid, foraminifera and *Koninckopora* debris, sporadic algae-encrusted bioclasts, well sorted	9.50	9.50
Biopelsparrudite Brachiopod, pale grey; coarse rudite brachiopod debris, poor sorting	1.00	10.50
Biosparite Brachiopod, pale grey, coarse arenite	1.00	11.50
Biosparite Coral Algae, grey, medium arenite, abundant algae-corroded bioclasts, common colonial coral. Poorly sorted	1.00	12.50
Biomicrosparite, pale grey, fine arenite, moderate to good sorting	0.50	13.00
Clay, ochreous-blue, variable thickness	0.70	13.70
Biosparite, pale grey; medium arenite brachiopod, crinoid and foraminiferal debris, locally mottled. Moderate sorting	7.80	21.50
Biopelsparite, grey, medium arenite, well sorted	0.70	22.20

Section completed at 22.20 m

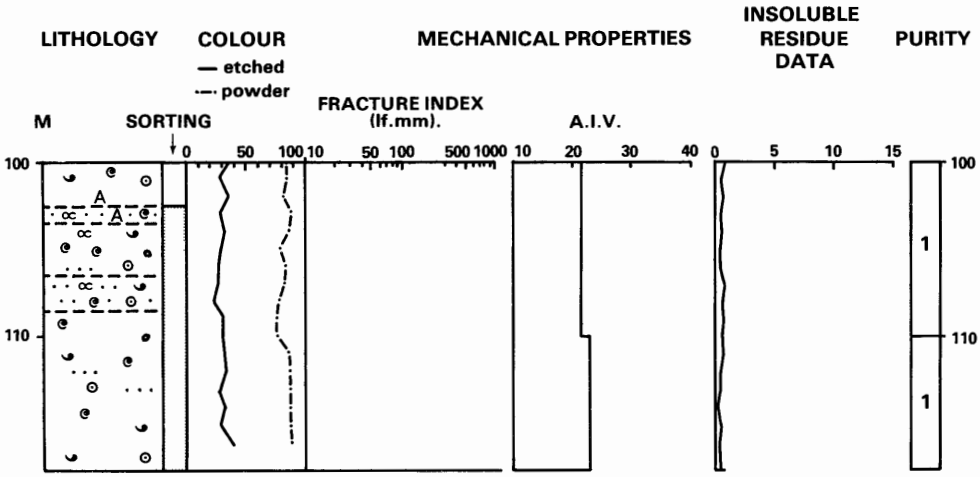
06 NE 5S


LITHOLOGY
COLOUR
— etched
·—· powder
MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
M
SORTING
FRACTURE INDEX (lf.mm).
A.I.V.
0 50 100 10 50 100 500 1000 10 20 30 40 0 5 10 15
0 10 20 30 40 50 60 70 80 90 100
1 1 3 1 1 1 1 1 1

SK 06 NE 5S 0701 6956 Hillhead Quarry
Surface level +415.75 m
Autumn 1975

	Thickness m	Depth m
D_1 (Bee Low Limestones)		
Biosparite, pale buff-grey; fine arenite to fine rudite crinoid, brachiopod and pelletal debris. Moderate sorting	3.50	3.50
Biosparite Crinoid Brachiopod algae, pale buff-grey; fine arenite to medium rudite bioclasts, common *Girvanella* encrusted brachiopod debris, poorly sorted	1.00	4.50
Biosparite Algae, buff-grey; coarse arenite shell, crinoid, pellet, *Koninckopora* and algae-encrusted bioclasts. Moderate to good sorting	4.00	8.50
Biosparrudite Brachiopod Coral, pale grey; fine to coarse rudite thick-shelled brachiopod and coral debris, poorly sorted	1.00	9.50
Biopelsparite Algae coral, buff-grey; fine arenite to medium rudite algae-encrusted brachiopod and coral debris, moderate to good sorting	2.00	11.50
Biosparite, pale buff-grey, coarse arenite, moderate sorting	1.50	13.00
Clay, grey	0.40	13.40
Biosparite, pale grey; fine arenite to fine rudite crinoid, brachiopod and foraminiferal debris, moderate sorting	4.10	17.50
Biosparite algae, buff-grey; medium arenite algae-encrusted bioclasts, moderate, to good sorting	1.00	18.50
Biopelsparite Crinoid, buff-grey, coarse arenite, well sorted	1.00	19.50
Biosparite Crinoid, buff-grey, coarse arenite, occasional algae-encrusted bioclasts, spar matrix admixed with some micrite, moderate sorting	3.00	22.50
Biosparite Foraminifera, pale grey, locally mottled; fine arenite comminuted shell, foraminifera, crinoid and pelletal debris, well sorted. Common quartz euhedra	3.00	25.30
Clay, grey-brown	0.60	25.90
Biosparite, grey, fine arenite, well sorted	0.60	26.50
Biosparite Crinoid Pellet, buff-grey, medium arenite, moderate sorting	2.00	28.50
Biopelsparite Crinoid Algae, grey-brown, fine arenite, well sorted. Locally common *Koninckopora,* algae-encrusted bioclasts and coarse arenite crinoid debris		
Biosparite Crinoid algae, fine to coarse arenite, moderate sorting	3.00	36.50
Biopelsparite Crinoid foraminifera, buff-grey, fine arenite to fine rudite, well sorted	1.00	37.50
Biosparite Algae, buff-grey; fine arenite algae-encrusted bioclasts, well sorted, common euhedral quartz	2.00	39.50
Biosparite Crinoid Brachiopod algae; fine arenite to coarse arenite crinoid, brachiopod, pellet, *Koninckopora* and algae-encrusted bioclastic debris, moderate sorting. Common euhedral quartz	8.40	47.90
Biosparite Crinoid Foraminifera algae, grey mottled, medium arenite	1.60	49.50
Biopelsparite, grey-brown, coarse arenite, well sorted. Common quartz euhedra	1.00	50.50
Biosparite Crinoid algae, buff-grey; fine to medium arenite crinoid, shell, *Koninckopora,* foraminifera, pellet and algae-encrusted bioclasts. Well sorted, scattered quartz euhedra	13.00	63.50
Biosparite Algae, buff-grey, abundant *Koninckopora*	1.00	64.50
Biosparite, pale grey, fine arenite, well sorted	0.90	65.40
Clay	0.30	65.70
Pelsparite algae, buff-grey, fine arenite, well sorted	0.80	66.50
Biosparite Crinoid Pellet algae, pale grey; fine to coarse arenite, well sorted, common tiny quartz euhedra	4.00	70.50
Biopelsparite algae, grey-brown; fine to medium arenite comminuted bioclasts, commonly algae-encrusted, well sorted	3.00	73.50
Biosparite, pale grey, fine to medium arenite, moderate sorting	2.00	75.50
Biopelsparite algae, pale grey; fine to medium arenite comminuted crinoid, brachiopod, *Koninckopora,* and algae-encrusted bioclasts. Well sorted	7.00	82.50
Biosparite, grey-brown, medium arenite, scattered euhedral quartz	7.50	90.00
Biopelsparite Algae, pale grey, well sorted	1.50	91.50
Gap	6.00	97.50
Biosparite, grey, medium arenite, well sorted	1.00	98.50
Pelsparite algae, buff-grey, medium arenite, well sorted	1.00	99.50

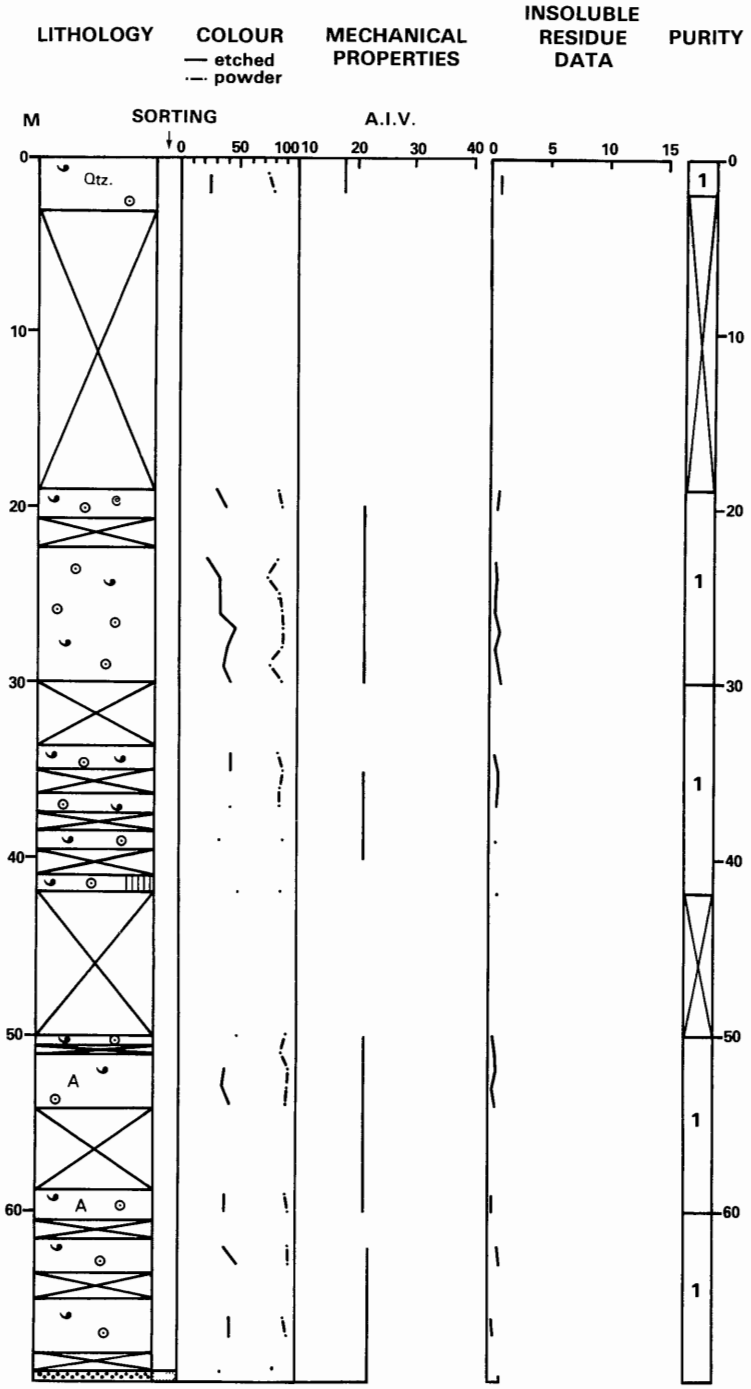
06 NE 5S
CONTINUED



Biosparite, buff-grey, fine arenite to fine rudite, moderate sorting	3.00	102.50
Biopelsparite Algae, buff-grey, fine arenite, well sorted	1.00	103.50
Biosparite, buff-grey, finely comminuted bioclasts, well sorted	3.00	106.50
Biopelsparite, grey; fine arenite pellet and comminuted bioclastic debris, well sorted. Frequent black clay coated stylolites		
Biosparite, buff-grey; fine arenite comminuted foraminifera, shell, spine, crinoid and pelletal debris. Well sorted	9.00	117.50

Section completed at 117.50 m

06 NE 6S

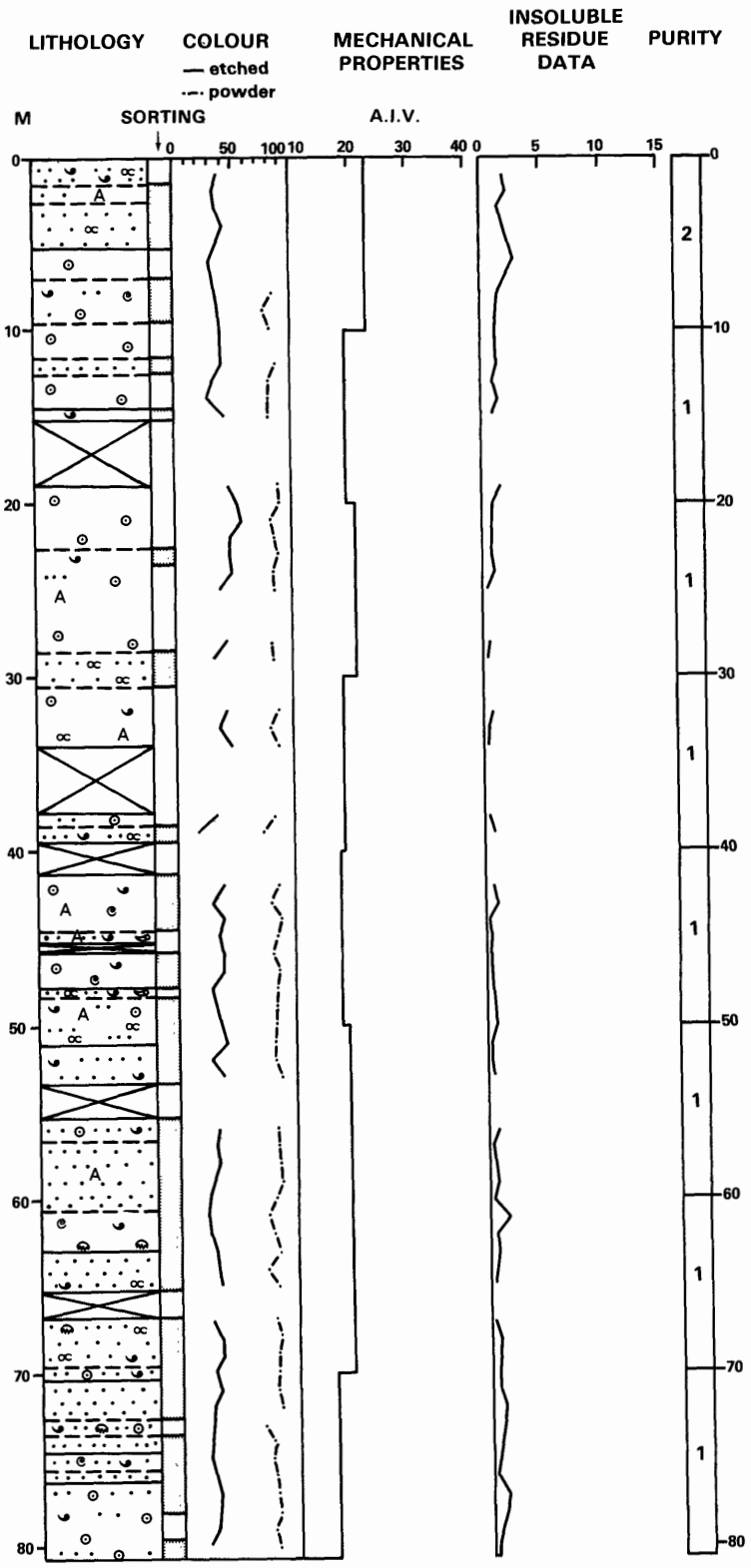

LITHOLOGY
COLOUR
— etched
·— powder
MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
M
SORTING
A.I.V.
0
50
100
10
20
30
40
0
5
10
15
Qtz.
A
A
1
1
1
1
0
10
20
30
40
50
60

SK 06 NE 6S 0835 6857 Harley
Surface level +413.90 m
September 1974

	Thickness m	*Depth* m
D_1 (Bee Low Limestones)		
Biomicrosparite, grey, mottled; medium arenite comminuted brachiopod and crinoid debris	2.86	2.86
Gap	16.14	19.00
Biomicrosparite, pale grey, mottled, medium arenite	1.60	20.60
Gap	1.70	22.30
Biomicrosparite, pale grey, medium arenite	1.20	23.50
Biosparite, buff-grey; medium arenite brachiopod and crinoid clasts, moderate sorting	5.00	28.50
Biomicrite, buff-grey, mottled; medium arenite brachiopod, crinoid and foraminifera debris	1.50	30.00
Gap	3.71	33.71
Biomicrosparite, buff-grey, medium arenite	1.29	35.00
Gap	1.17	36.17
Biomicrosparite, buff-grey, medium arenite	1.30	37.47
Gap	1.03	38.50
Biosparite, buff-grey, medium arenite	1.00	39.50
Gap	1.56	41.06
Biosparite, buff-grey; coarse arenite brachiopod and crinoid debris, moderate to good sorting	0.94	42.00
Gap	7.75	49.85
Biomicrosparite, buff-grey, medium arenite, locally common *Koninckopora*	4.30	54.15
Gap	4.10	58.25
Biosparite, pale buff-grey; medium arenite crinoid, foraminifera, dasycladacean algae and shell debris, moderate sorting	2.20	60.45
Biomicrosparite, buff-grey, medium to coarse arenite bioclasts	3.10	63.55
Gap	1.60	65.15
Biomicrosparite, buff-grey; medium to coarse arenite crinoid and comminuted bioclastic debris, moderate sorting	1.75	67.90
Gap	1.00	68.90
Biopelsparite, buff-grey, medium to coarse arenite, very well sorted, patchy limonite staining	0.80	69.70

Section completed at 69.70 m

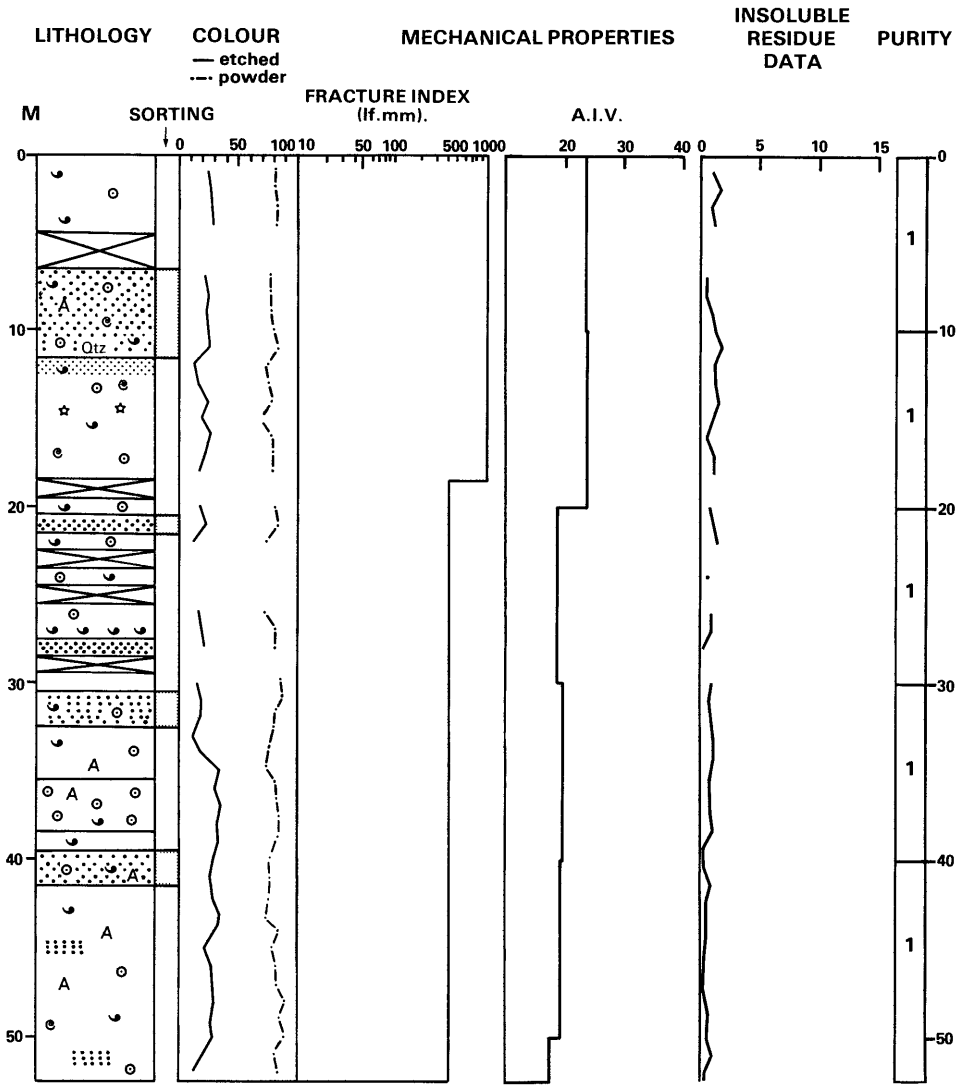
06 NE 7S


LITHOLOGY
COLOUR
— etched
·–· powder
MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
M
SORTING
A.I.V.
0
50
100
10
20
30
40
0
5
10
15
0
2
1
1
1
1
1
1
10
20
30
40
50
60
70
80

SK 06 NE 7S 0708 6835
Surface level + 386.5 m
September 1974

	Thickness m	*Depth* m
D_1 (Bee Low Limestones)		
Biopelsparite Brachiopod, buff-grey; fine arenite pelletal and comminuted bioclastic debris, common rudite brachiopods *(D.septosa),* common silicified stylolites	1.50	1.50
Biosparite Pellet, buff-grey, fine arenite, patchy limonite staining	1.00	2.50
Pelsparite, buff-grey; fine arenite algae-corroded bioclasts, well sorted	2.80	5.30
Biosparite Crinoid, buff-grey, fine to medium arenite, patchy silicification	1.70	7.00
Biosparite, buff-grey, fine arenite, well sorted	2.50	9.50
Biomicrite crinoid, buff-grey; common fine rudite crinoid debris, moderate sorting	2.00	11.50
Pelsparite, fine arenite, very well sorted	1.00	12.50
Biosparite Crinoid, buff-grey, locally mottled, coarse arenite	2.00	14.50
Biosparite, pale grey; fine arenite comminuted bioclasts, well sorted	0.70	15.20
Gap	3.80	19.00
Biosparite Crinoid, buff-grey; fine arenite to fine rudite bioclasts, spar matrix admixed with micrite, patchy limonite staining	3.50	22.50
Biosparite, pale grey; fine arenite comminuted shell, crinoid, spine, dasycladacean algae, foraminifera and pelletal debris. Patchy limonite and pyrolusite staining	6.00	28.50
Pelsparite, buff-grey, fine to medium arenite, well sorted	2.00	30.50
Biosparite, pale buff-grey; fine arenite comminuted bioclasts, occasional coarse arenite crinoid and algae-corroded brachiopod debris. Occasional limonite stained fractures and clay coated stylolites	8.00	38.50
Pelsparite brachiopod, mid-grey; fine arenite pelletal debris, scattered rudite algae-encrusted brachiopod debris, well sorted	1.00	39.50
Gap	1.80	41.30
Biosparite algae, pale buff-grey, fine arenite, moderate to good sorting, some quartz euhedra	3.20	44.50
Biopelsparite Algae Brachiopod coral, buff-grey, mottled, fine arenite to medium rudite, clay coated stylolites, moderate sorting	0.80	45.30
Gap	0.50	45.80
Biosparite, pale buff-grey, fine arenite, sporadic rudite brachiopods *(D. septosa),* patchy limonite staining	2.00	47.80
Biopelsparite Algae Brachiopod Coral, mid grey, fine arenite, common rudite oncolites and algae-encrusted brachiopod debris	0.45	48.25
Biosparite Pellet, buff-grey, fine arenite, well sorted	2.87	51.12
Biopelsparite Brachiopod, fine arenite, occasional rudite brachiopod *(D. septosa)* and crinoid debris, moderate to good sorting	5.38	56.50
Pelsparite, fine arenite, very well sorted, sporadic quartz euhedra	4.00	60.50
Biosparite, buff-grey; very fine arenite comminuted bioclasts, rare oncolites, well sorted. Common tiny quartz euhedra	2.39	62.89
Pelsparite, buff-grey; fine arenite corroded pellets and brachiopod debris, well sorted	2.31	65.20
Gap	1.66	66.86
Pelsparite, buff-grey; coarse arenite algae encrusted bioclasts and pelletal material, well sorted. Common quartz euhedra	2.64	69.50
Biopelsparite, medium arenite, rare *Koninckopora,* well sorted	0.86	70.36
Pelsparite, fine arenite, well sorted. Sporadic quartz euhedra	2.14	72.50
Biopelsparite Intraclast Crinoid Brachiopod, buff-grey; coarse arenite pelsparite intraclasts, crinoid and brachiopod debris, fine arenite pelletal and finely comminuted algae-corroded bioclasts, poorly sorted	1.00	73.50
Pelsparite, fine arenite, well sorted, occasional quartz euhedra	1.06	74.56
Biopelsparite, medium arenite, well sorted	0.94	75.50
Pelsparite, fine arenite, well sorted	0.70	76.20
Biopelsparite Crinoid, grey-brown, medium arenite, well sorted. Siliceous stylolites	1.80	78.00
Biosparite Crinoid Pellet, grey-brown, coarse arenite, well sorted	2.60	80.60

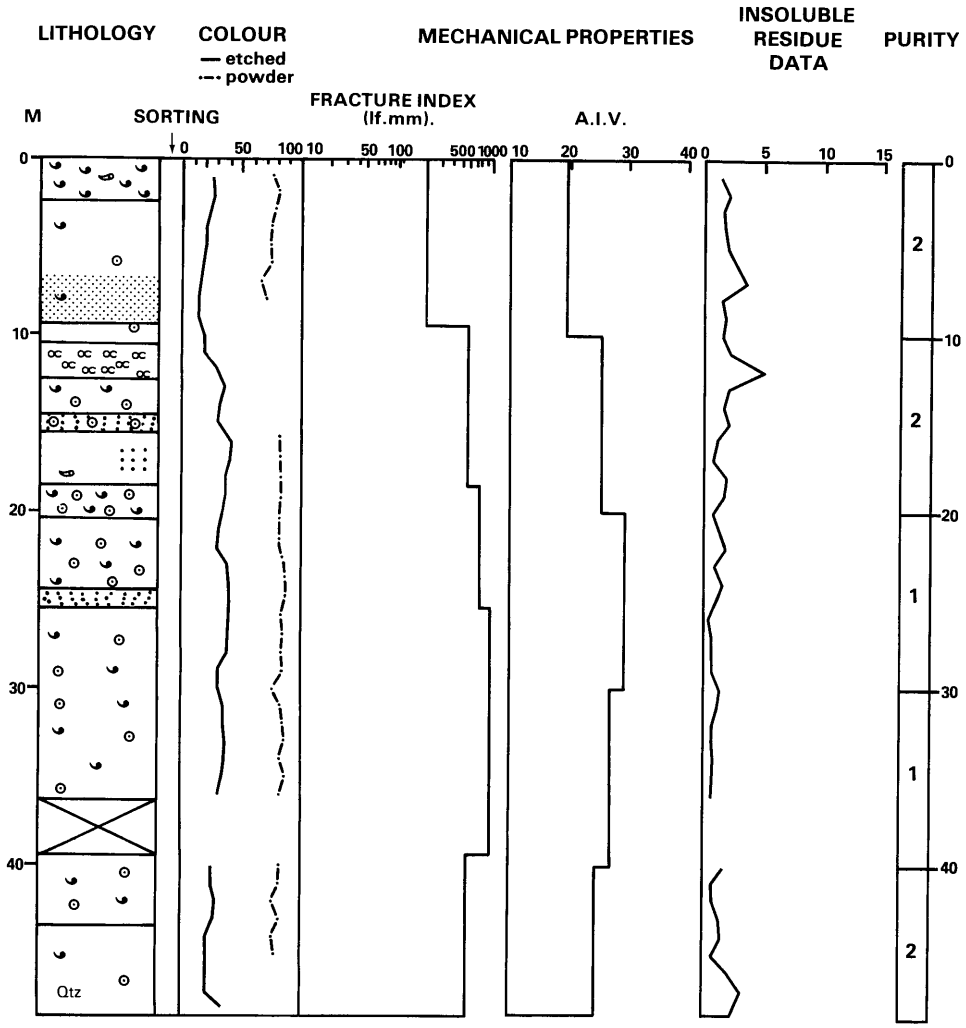
Section completed at 80.60 m


LITHOLOGY
COLOUR
— etched
-·- powder
MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
M
SORTING
FRACTURE INDEX (lf.mm).
A.I.V.
0 50 100 10 50 100 500 1000
20 30 40
0 5 10 15
Qtz
A
0
10
20
30
40
50
1

SK 06 NE 8S 0987 6621 Aldery Cliff
Surface level + 324.9 m
October 1976

	Thickness m	*Depth* m
D_1 (Bee Low Limestones, Apron-reef)		
Biosparite, mid-grey; medium arenite brachiopod, crinoid and foraminiferal debris	1.50	1.50
Biomicrosparite, mid-grey, medium arenite, moderate sorting	1.00	2.50
Biosparite, mid-grey, medium arenite comminuted bioclasts	2.00	4.50
Gap	2.00	6.50
Biopelsparite, grey; medium arenite pellet, foraminifera, brachiopod, crinoid and dasycladacean algae debris. Well sorted. Locally abundant quartz euhedra	5.00	11.50
Biomicrosparite, dark grey; medium arenite brachiopod, crinoid and foraminiferal debris	2.00	13.50
Biosparite, buff-grey, medium arenite, sporadic spar filled vugs. Poorly sorted	1.00	14.50
Biomicrosparite, grey, medium arenite, poorly sorted	1.00	15.50
Biosparite, grey, medium arenite comminuted bioclasts, poorly sorted	3.00	18.50
Gap	1.00	19.50
Biosparite, grey, medium arenite, sporadic geopetal cavities	1.00	20.50
Biopelsparite, mid-grey; medium arenite pellet, brachiopod, crinoid and foraminifera debris, well sorted	1.00	21.50
Biomicrosparite, dark grey; fine to medium arenite foraminifera, crinoid and brachiopod debris, moderate sorting	1.00	22.50
Gap	1.00	23.50
Biomicrosparite, mid-grey, medium arenite	1.00	24.50
Gap	1.00	25.50
Biomicrosparite, mid-grey, fine arenite, some *Koninckopora*	1.00	26.50
Biosparrudite Brachiopod, mid-grey, common rudite thin-shelled brachiopod debris	1.00	27.50
Biosparite Pellet, mid-grey, medium arenite, well sorted	1.00	28.50
Gap	1.00	29.50
Biosparite, mid-grey, medium arenite, moderate sorting	1.00	30.50
Biopelsparite, buff-grey, medium arenite, well sorted	1.00	31.50
Biosparite Pellet, buff-grey, medium arenite, well sorted	1.00	32.50
Biosparite, mid-grey, medium arenite brachiopod, crinoid, foraminifera and *Koninckopora* debris, poorly sorted. Scattered quartz euhedra	3.00	35.50
Biosparite Crinoid, buff-grey, medium arenite, poorly sorted	4.00	39.50
Biopelsparite, buff-grey, abundant medium arenite pelletal debris, subordinate brachiopod, crinoid and *Koninckopora*, well sorted	2.00	41.50
Biosparite, buff-grey, medium arenite comminuted crinoid, shell, foraminifera, *Koninckopora* and pelletal debris, moderate to good sorting	10.00	51.50
Biomicrosparite, mid-grey, medium arenite, moderate sorting	1.00	52.50

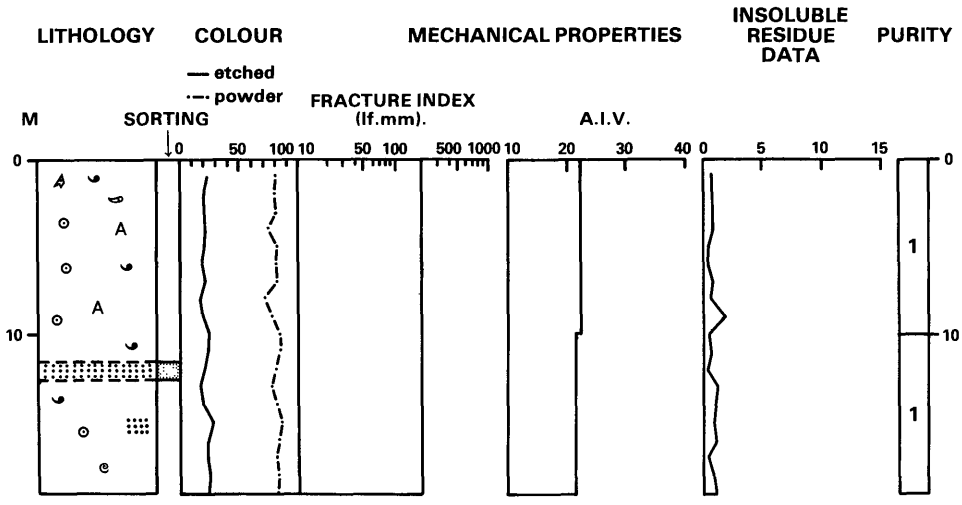
Section completed at 52.50 m



SK 06 NE 9S 0841 6897 Buxton Quarry
Surface level +407.5 m
October 1976

	Thickness m	*Depth* m
D_2 (Monsal Dale Limestones)		
Biosparrudite Brachiopod, mid-grey, common patchily silicified rudite brachiopod debris, subordinate medium arenite brachiopod and crinoid debris. Poorly sorted	2.50	2.50
Biomicrosparite, mid grey; medium arenite brachiopod and crinoid debris, poorly sorted	6.80	9.30
D_1 (Bee Low Limestones)		
Biosparite, grey, medium arenite, moderate sorting	1.20	10.50
Biosparite Algae, medium arenite, common algae-encrusted bioclasts	2.00	12.50
Biosparite Crinoid Brachiopod, pale grey, abundant coarse arenite crinoid and brachiopod debris, well sorted	2.00	14.50
Biopelsparite Crinoid, buff-grey, fine to medium arenite, moderate sorting	1.00	15.50
Biosparite, pale buff-grey, fine to medium arenite, moderate sorting	1.80	17.30
Biomicrosparite Crinoid Brachiopod, pale buff grey; medium to coarse arenite crinoid, brachiopod, *Koninckopora* and foraminifera debris, moderate to good sorting. Locally common fine arenite pelletal debris. Locally common quartz euhedra	31.20	48.50
? Lower Miller's Dale Lava		
Clay, bluish-ochreous clay, weathered lava		

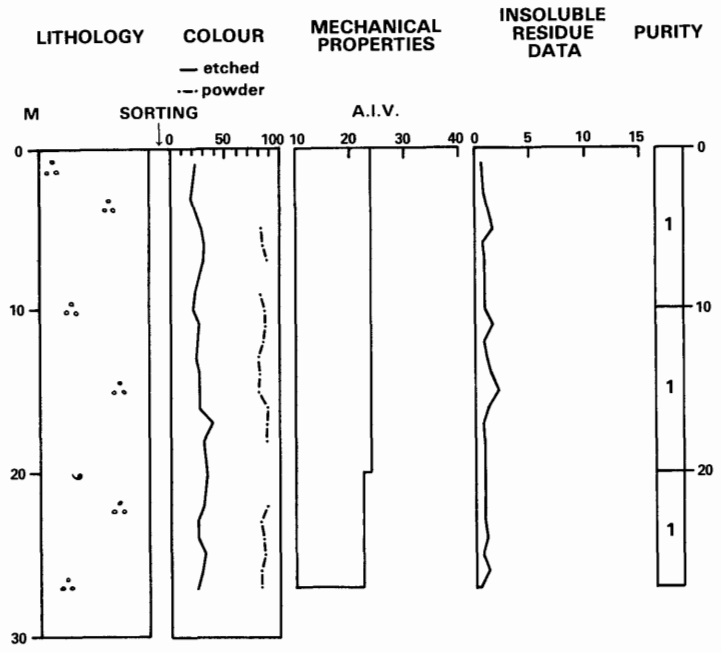
Section completed at 48.50 m



SK 06 NE 10S **0656 6797** **Tor Rock**
Surface level + 403.9 m
October 1976

	Thickness m	*Depth* m
D_1 (Bee Low Limestones)		
Biosparite, grey, locally mottled; medium arenite brachiopod, crinoid, foraminifera and rare dasycladacean algae, coral and gastropod debris. Moderate sorting	11.50	11.50
Biopelsparite, grey, medium arenite, well sorted	1.00	12.50
Biosparite, grey; medium arenite crinoid, brachiopod, foraminifera and sporadic pelletal and calcisphere debris. Moderate sorting	6.50	19.00

Section completed at 19.00 m

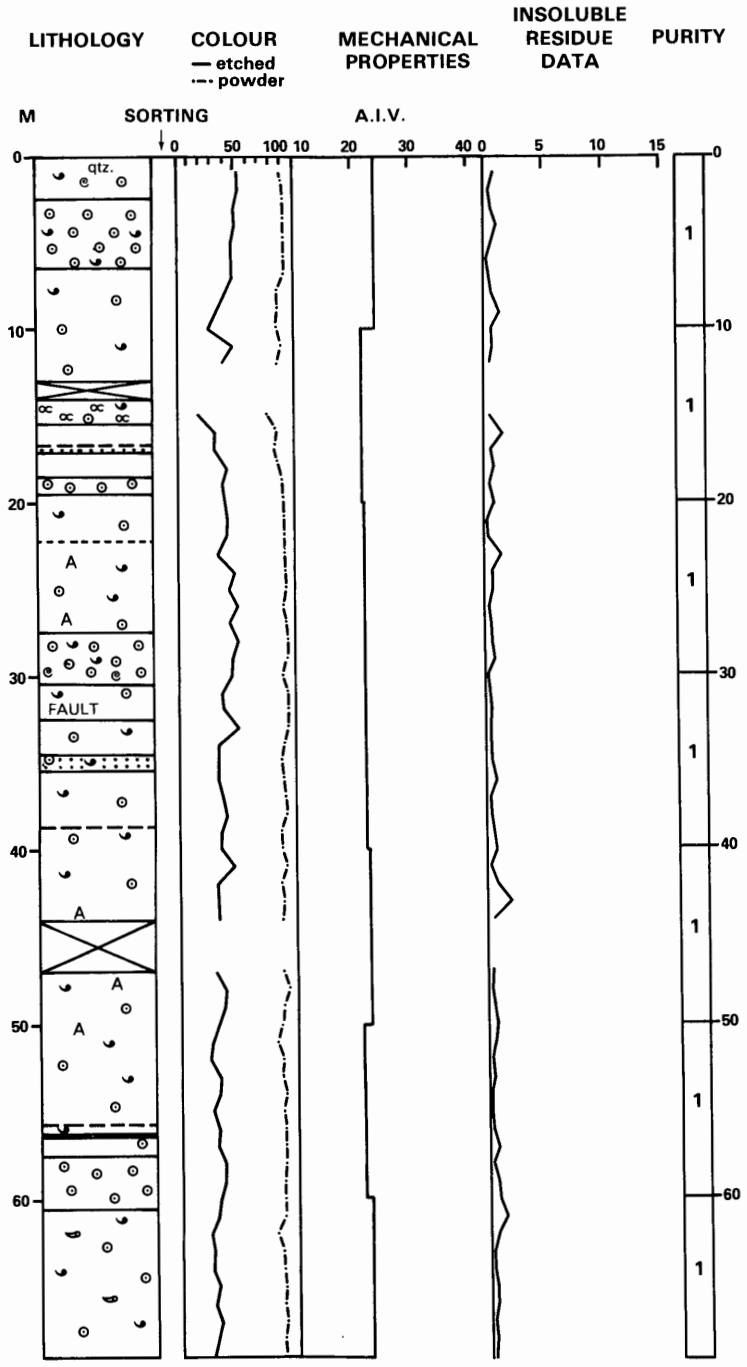


SK 06 NE 14S 0837 6715 Glutton Dale
Surface level +286.5 m
October 1976

	Thickness m	*Depth* m
D_1 (Bee Low Limestones–Apron-reef)		
Micrite, grey, rare calcispheres, foraminifera and spines, matrix predominantly micrite with patchy spar, rare 'reef' brachiopods and geopetal cavities	30.00	30.00

Section completed at 30.00 m

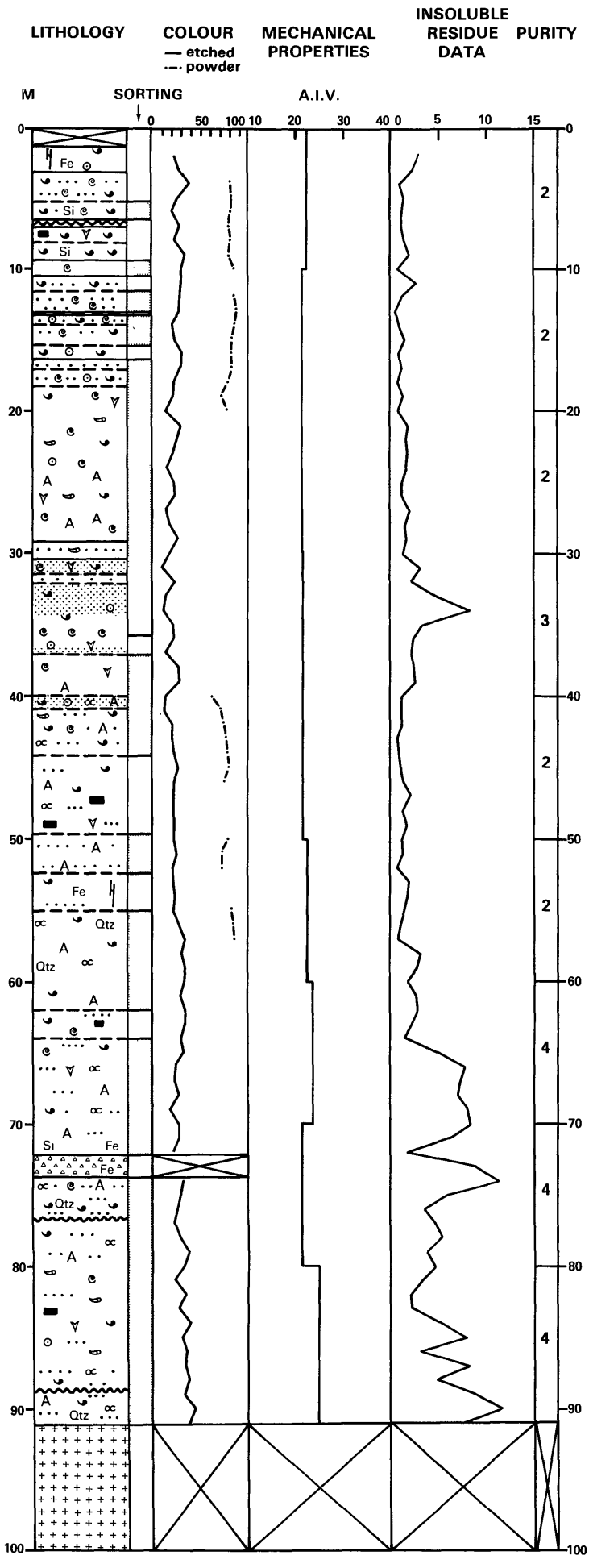
06 NE 15S


LITHOLOGY
COLOUR
— etched
·–· powder
MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
M
SORTING
A.I.V.
0
50
100
10
20
30
40
0
5
10
15
qtz.
FAULT
A
1

SK 06 NE 15S 0953 6781
Surface level +409.7 m
October 1976

	Thickness m	*Depth* m
D_1 (Bee Low Limestones)		
Biosparite, buff-grey; medium arenite brachiopod, crinoid and foraminiferal debris, moderate sorting, scattered quartz euhedra	2.50	2.50
Biosparite Crinoid, buff-grey, frequent coarse arenite crinoid debris	4.00	6.50
Biosparite, pale grey; medium to coarse arenite crinoid and brachiopod debris, some foraminifera, moderate sorting	8.30	14.80
Clay, grey	0.08	14.88
Biosparite Algae, grey, abundant algae-encrusted bioclasts, moderate to good sorting	0.62	15.50
Biosparite, pale grey, medium arenite, rare rudite brachiopods	1.00	16.50
Biopelsparite, pale grey, fine to coarse arenite, good sorting	1.00	17.50
Biosparite, pale grey, medium arenite, patchy pyrolusite staining	1.00	18.50
Biosparrudite Crinoid, buff-grey; medium arenite to medium rudite bioclasts, poorly sorted	1.00	19.50
Biosparite, pale grey; medium arenite brachiopod, crinoid, foraminifera and *Koninckopora*, well sorted	8.00	27.50
Biosparite Crinoid, pale grey, medium to coarse arenite, poor sorting	3.00	30.50
Biomicrosparite, grey, mottled, medium arenite	3.00	33.50
Biosparite, grey, fine to medium arenite, poor sorting	1.00	34.50
Biopelsparite, grey, fine to coarse arenite, well sorted	1.00	35.50
Biosparite, grey mottled, medium arenite, poor sorting. Bioclasts predominantly brachiopod, crinoid, foraminifera and dasycladacean algae debris. Thin ochreous clay 38.8 m, 55.8 m and 56.3 m	22.00	57.50
Biosparite Crinoid, grey, medium arenite, moderate sorting	3.00	60.50
Biomicrosparite, grey; fine to medium arenite bioclasts, sporadic colonial coral, moderate to good sorting	8.50	69.00

Section completed at 69.00 m


LITHOLOGY
COLOUR
— etched
-·- powder
MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
M
SORTING
A.I.V.
0 50 100
10 20 30 40
0 5 10 15
Fe
Si
Qtz
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100
2
2
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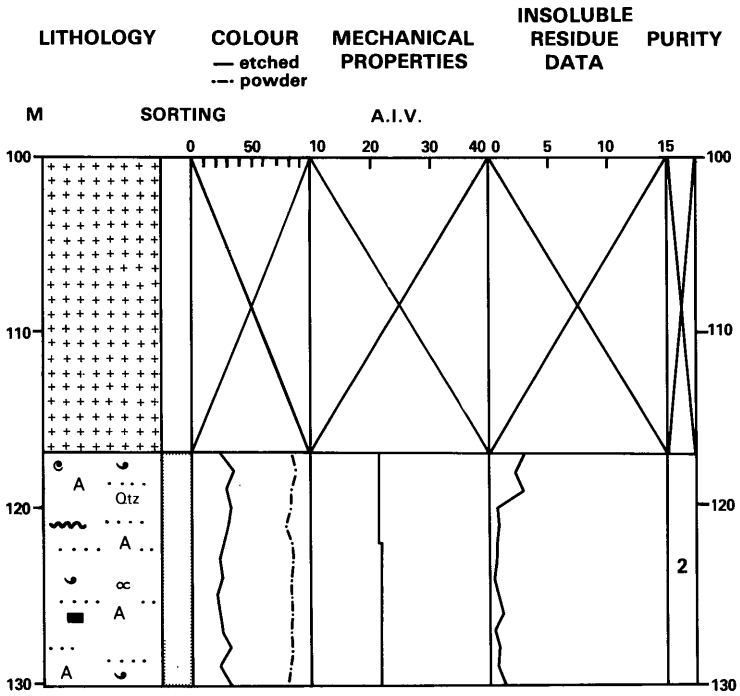
4

SK 07 NE 43 0751 7677 Peak House

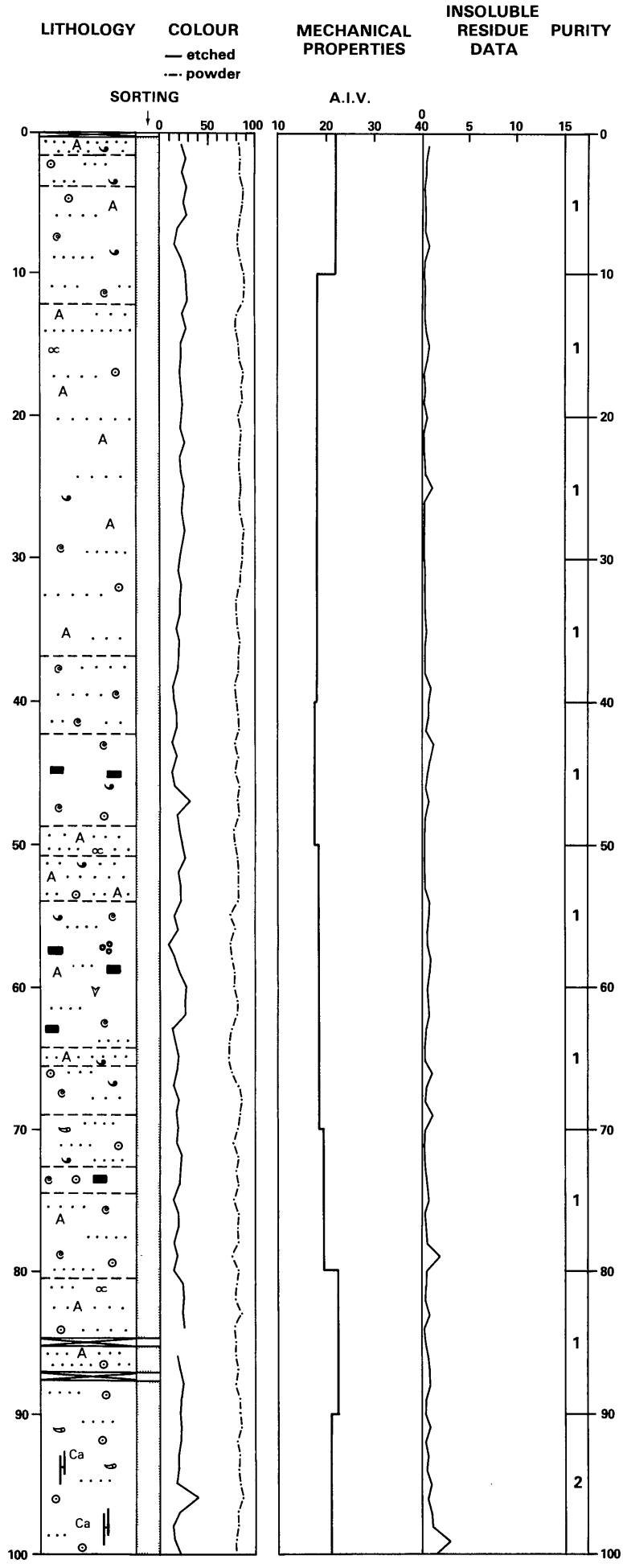
Surface level +355.22 m
Edeco Stratadrill 36, waterflush, 47 mm diameter
January 1977

	Thickness m	*Depth* m
D_2 (Monsal Dale Limestones)		
Openhole	1.40	1.40
Biosparite, mid-grey; fine arenite to fine rudite, frequent silicified bioclasts, common flecks of pyrite weathered to limonite	1.75	3.15
Biopelsparite Brachiopod foraminifera, pale grey, medium arenite, poorly sorted; patchily silicified shell debris	2.05	5.20
Biosparite Brachiopod , medium arenite, moderate to good sorting	1.30	6.50
Clay, ochreous-brown	0.55	7.05
Biosparite Brachiopod, buff-grey, common patchily silicified rudite brachiopods, abundant fine arenite comminuted bioclasts	1.15	8.20
Biosparrudite Brachiopod, grey-brown, poorly sorted	0.30	8.50
Biomicrudite Brachiopod, common silicified brachiopod debris	0.93	9.43
Biosparite Pellet Foraminifera, grey-brown, medium arenite, well sorted	1.13	10.54
Biosparrudite Brachiopod Pellet, grey-brown, common quartz euhedra	1.01	11.55
Biosparite Pellet, grey-brown; medium to coarse arenite crinoid and brachiopod debris, patchily silicified, moderate to good sorting	1.52	13.07
Clay, ochreous-brown	0.04	13.11
Biopelsparite, grey-brown, fine to medium arenite, well sorted	0.89	14.00
Biosparite, grey-brown; fine arenite to coarse rudite bioclasts and pelletal debris, moderate to good sorting	1.45	15.45
Biomicrite Brachiopod, buff-grey, fine arenite to coarse rudite, poorly sorted	0.95	16.40
Pelsparite, buff-grey, fine arenite, very well sorted	0.70	17.10
Biosparite Pellet Foraminifera, buff-grey; medium arenite patchily silicified bioclasts, moderate to good sorting	1.23	18.33
Biosparite Foraminifera bryozoa, grey-brown locally mottled to mid grey; fine arenite foraminifera, crinoid and brachiopod debris, sporadic fragments of bryozoa and coral; common *Coelosporella* 24.90–25.10 m, 27.74–29.20m; scattered ostracods and *Saccaminopsis*. Moderate to good sorting	10.87	29.20
Some silicified bioclasts; patchy disseminated black clay	10.87	29.20
Pelsparite, grey-brown, fine arenite, very well sorted, occasional silicified bioclasts and flecks of pyrite	1.20	30.40
Biosparite Foraminifera bryozoa, medium grey-brown; fine to coarse arenite patchily silicified bioclasts, locally abundant disseminated clay	1.10	31.50
Biopelsparite, mid-grey, very fine arenite, scattered quartz euhedra	0.62	32.12
Biosparite, grey-brown to dark grey, fine arenite, sporadic coarse arenite crinoid and brachiopod debris, common quartz euhedra, some silicified bioclasts, occasional patchy disseminated clay, pyrite and limonite. Abundant *Saccammopsis* 35.55–35.75m, rare fragments of bryozoa	4.99	37.11
Biosparite Foraminifera Bryozoa, mid-grey, fine arenite, occasional flecks of pyrite, patchy bioclastic silicification. Well sorted	2.90	40.01
Biosparite Algae Pellet, grey-brown; fine arenite to fine rudite shell, crinoid, *Coelosporella,* foraminifera and pelletal debris, commonly encrusted with *Girvanella.* Well sorted	0.95	40.96
D_1 (Miller's Dale Limestones)		
Pelsparite Algae Brachiopod, grey-brown to buff-grey, fine arenite, sporadic algae encrusted rudite brachiopod debris. Well sorted	3.24	44.20
Biosparite Brachiopod Pellet, buff-grey, coarse arenite, locally common *Coelosporella,* scattered quartz euhedra, poorly sorted	5.41	49.61
Biopelsparite, locally common *Coelosporella,* moderate to good sorting	2.79	52.40
Biosparite, calcite mineralised, limonite and pyrolusite stained	2.62	55.02
Biopelsparite Brachiopod algae, buff-grey; fine arenite pelletal debris, fine arenite to medium rudite brachiopod and crinoid debris, locally algae-encrusted, rare *Koninckopora.* Common quartz euhedra, some patchily silicified brachiopod debris and silicified calcite veinlets	6.98	62.00
Biosparite Brachiopod Pellet, coarse arenite, common quartz euhedra	1.98	63.98
Biopelsparite Brachiopod algae, medium buff-grey; medium arenite bioclasts, occasionally algae-encrusted, scattered *Coelosporella* and *Koninckopora*, well sorted. Frequent quartz euhedra, some silicified calcite veins. Common flecks of pyrite and limonite and silicified stylolites 71.80–72.16	8.18	72.16
(Dove Holes Tuff)		
Tuff, blue-grey, large angular fragments of limestone and weathered igneous rock, pyritous	1.59	73.75
(Miller's Dale Limestones)		
Biopelsparite algae, medium buff-grey, fine to medium arenite, well sorted, frequent quartz euhedra and silicified calcite veinlets and limonite staining in upper 0.15 m. Sporadic large patches of quartz euhedra	2.90	76.65
Clay, ochreous	0.09	76.74

07 NE 43
CONTINUED



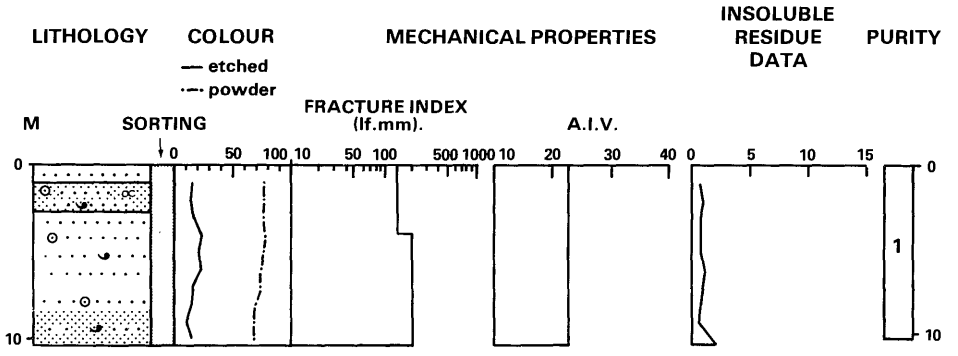
Biopelsparite, buff-grey, fine to medium arenite, well sorted, lithology variable between biopelsparite and biosparite, colonial coral 80.40 m, 82.65–82.77m, rare fragments of bryozoa	11.98	88.72
Clay, ochreous	0.12	88.90
Biopelsparite, grey-brown; coarse arenite shell, crinoid, foraminifera, and pelletal debris commonly *Girvanella* encrusted, sporadic *Koninckopora*, well sorted. Common large patches of quartz euhedra, sporadic cubes of pyrite, weathered to limonite	2.19	91.09
(Lower Miller's Dale Lava)		
Clay, ochreous with fragments of weathered lava	0.41	91.50
Basalt, dark grey-green, amygdaloidal, weathered in upper 1.8 m	25.30	116.80
(Chee Tor Rock)		
Biopelsparite algae, buff-grey; fine to medium arenite pellet, foraminifera, shell and *Koninckopora* debris, well sorted	13.30	130.10
Mottled 126.26–126.55 m. Common quartz euhedra, some pyrite in upper 0.05 m. Sporadic, locally common, black clay and silicified stylolites		
Borehole complete at 130.10 m		


LITHOLOGY
COLOUR
— etched
·— powder
SORTING
MECHANICAL PROPERTIES
A.I.V.
INSOLUBLE RESIDUE DATA
PURITY
0 50 100
10 20 30
0 40
5 10 15
Ca
Ca

SK 07 NE 44 0854 7904 Bee Low Quarry
Surface level + 354.40 m
Edeco Stratadrill 36, waterflush, 47 mm diameter
January 1977

	Thickness m	*Depth* m
D_1 (Bee Low Limestones)		
Openhole, topsoil	0.35	0.35
Biosparite, pale grey, fine arenite, well sorted	0.10	0.45
Biopelsparite Algae, buff-grey; medium arenite comminuted bioclasts, *Koninckopora* and algae-encrusted bioclasts. Well sorted. Scattered quartz euhedra	1.30	1.75
Biosparite Pellet. buff-grey, locally mottled, medium arenite	2.21	3.96
Biopelsparite Algae; coarse arenite *Koninckopora* algae-encrusted bioclasts and pelletal material, sporadic rudite crinoid debris, locally common foraminifera. Stylolitic 6.98–9.47 m. Locally hematite and limonite stained, scattered quartz euhedra	8.29	12.25
Biopelsparite Algae, grey-brown; fine to coarse arenite pellet, dasycladacean algal, shell, foraminifera and crinoid debris. Variable lithology biosparite-biopelsparite-pelsparite. Well sorted. Scattered quartz euhedra, patchy limonite and pyrolusite staining. Sporadic rudite crinoid and brachiopod debris	24.67	36.92
Biopelsparite Foraminifera, medium arenite, some clay coated and silicified stylolites, well sorted	6.42	42.34
Biosparite Foraminifera, grey, mottled 44.18–48.72, sporadic quartz euhedra, clay coated stylolites and limonite staining	6.38	48.72
Pelsparite Algae, grey, fine arenite, locally abundant *Koninckopora*, locally laminated, sporadic algae-encrusted brachiopod debris	2.13	50.85
Biopelsparite Algae; fine arenite comminuted bioclastic and peloidal debris, sporadic rudite crinoid and brachiopod debris	3.19	54.04
Biosparite Pellet Foraminifera algae, grey, locally mottled, fine arenite, some calcispheres, ostracods and fragments of bryozoa, well sorted. Sporadic clay-coated stylolites and flecks of pyrite and limonite. Locally common quartz euhedra	10.22	64.26
Pelsparite Algae, grey, medium arenite, very well sorted. Bioclasts and pellets commonly algae-encrusted	1.41	65.67
Biosparite Pellet Foraminifiera, grey; medium arenite comminuted crinoid, brachiopod, foraminifera, pellet and spine debris, well sorted	3.33	69.00
Biopelsparite, buff grey; fine arenite to fine rudite clasts, well sorted, colonial coral 69.58–70.08 m. Scattered quartz euhedra	3.64	72.64
Biosparite, grey, mottled 72.89–73.30 m, medium arenite, well sorted, sporadic quartz euhedra, patchy limonite staining	1.81	74.45
Biopelsparite Foraminifera, grey, medium arenite, well sorted. Locally common crinoid and dasycladacean algal debris. Clay-infilled fissures 79.09–79.52 m	6.07	80.52
Biopelsparite Algae Crinoid, sporadic algae-encrusted bioclasts, well sorted, scattered quartz euhedra	4.13	84.65
Gap	0.52	85.17
Biopelsparite Algae Crinoid, coarse arenite, some flecks of ore mineral, patchy limonite staining	1.94	87.11
Gap	0.51	87.62
Biosparite Crinoid Pellet algae, coarse arenite, moderate to good sorting. Colonial coral 91.10m, 93.70–93.90 m. Calcite mineralised, fractured and fissured 92.78 m–100.00 m. Some silicified calcite veinlets and stylolites. Patchy limonite staining	12.38	100.00
Borehole complete at 100.00 m		

07 NE 1S

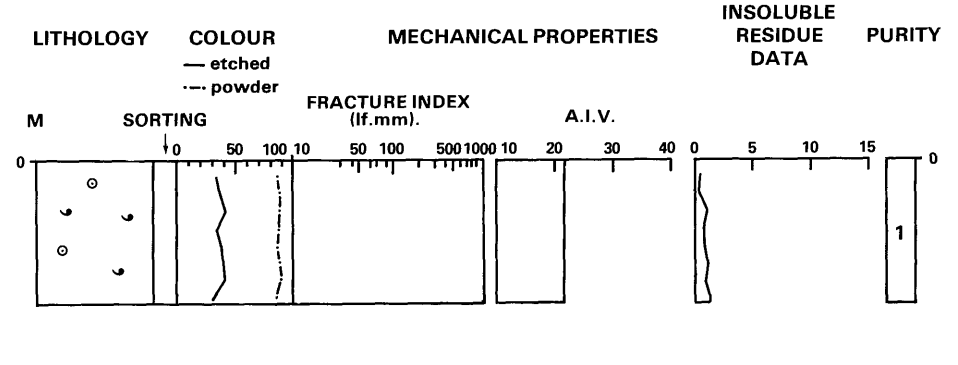


SK 07 NE 1S 0880 7990 Barmoor Quarry
Surface level +353.51 m
September 1974

	Thickness m	*Depth* m
D_2 (Monsal Dale Limestones)		
Pelsparite, grey-brown, thinly-bedded, fine arenite, very well sorted. Patchily silicified bioclasts	0.90	0.90
Biopelsparite, grey-brown; medium arenite crinoid, algae-corroded shell and pelletal debris. Well sorted. Patchily silicified bioclasts, scattered quartz euhedra	1.70	2.60
Pelsparite, grey-brown, fine arenite, laminated. Well sorted. Sporadic influxes of medium arenite crinoid and brachiopod debris. Scattered quartz euhedra	7.60	10.20

Section completed at 10.20 m

07 NE 2S

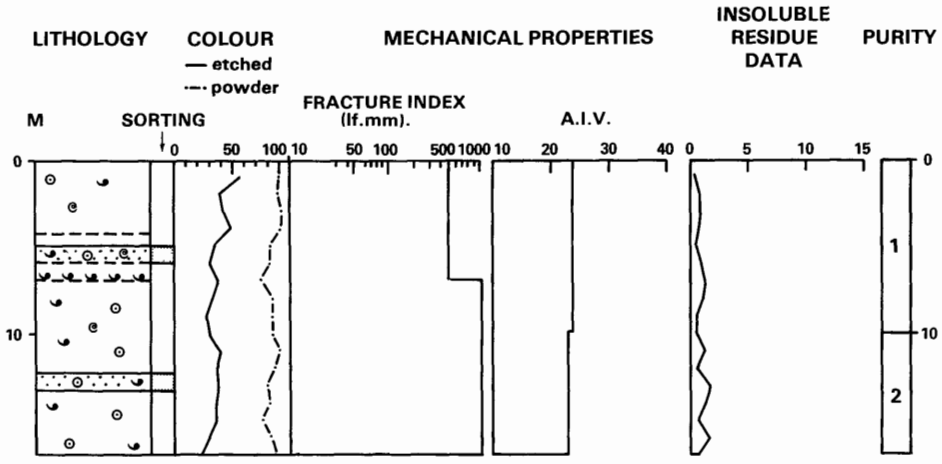


SK 07 NE 2S 0816 7751 Perseverance Quarry
Surface level +339.05 m
October 1976

	Thickness m	*Depth* m
D_1 (Chee Tor Rock)		
Biosparite, pale grey; medium arenite brachiopod, crinoid and foraminiferal debris, moderate sorting. Some pyrolusite staining	8.00	8.00

Section completed at 8.00 m

07 NE 3S

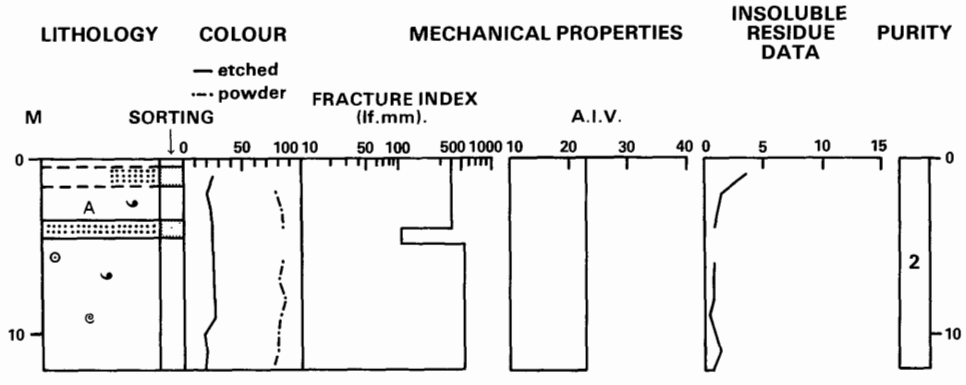


SK 07 NE 3S **0859 7690** **Perseverance Quarry**
Surface level +330.77 m
October 1976

	Thickness m	*Depth* m
D_1 (Chee Tor Rock)		
Biosparite, pale grey; fine to coarse arenite crinoid, brachiopod, foraminifera and dasycladacean algae, moderate sorting. Sporadic quartz euhedra and pyrolusite staining.		
Thin ochreous clay 4.20–4.40 m variable thickness), 5.57–5.90 m. Common rudite brachiopods *(D. septosa)* and corals 6.57 m	6.85	6.95
Clay	0.10	6.95
Biopelsparite, pale grey; medium arenite crinoid, brachiopod and pelletal debris. Well sorted	0.55	7.50
Biosparite, grey, medium arenite, moderate sorting. Scattered quartz euhedra	5.00	12.50
Biosparite Pellet, grey, mottled; medium arenite brachiopod, crinoid and pelletal material, moderate to good sorting	1.00	13.50
Biosparite, pale grey; medium arenite crinoid, brachiopod, foraminifera and pelletal debris, moderate sorting. Scattered quartz euhedra	3.55	17.05

Section completed at 17.05 m

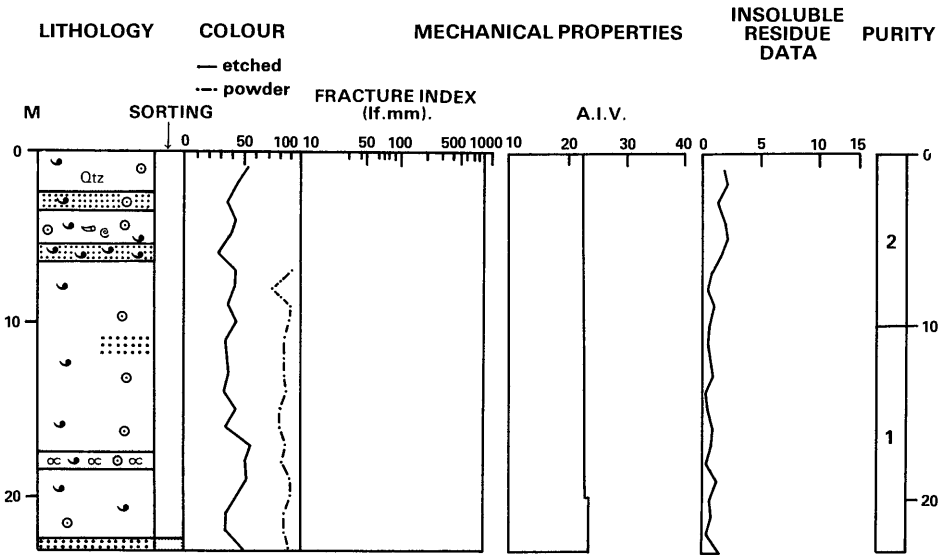
07 NE 4 S



SK 07 NE 4S **0789 7677** **Victory Quarry**
Surface level +362.4 m
October 1976

	Thickness m	*Depth* m
D_1 (Miller's Dale Limestones)		
Biosparite, buff-grey, mottled; medium arenite brachiopod crinoid and foraminiferal debris, moderate sorting	0.50	0.50
Biosparite Pellet, buff-grey, medium arenite bioclastic and pelletal material, frequent quartz euhedra	1.00	1.50
Biosparite, buff-grey, mottled, medium arenite. Thin clay 2.80 m	2.00	3.50
Biopelsparite, grey, medium arenite, well sorted. Common rudite brachiopods 4.0 to 4.70 m	2.00	5.50
Biosparite, grey; fine to medium arenite brachiopod, crinoid and foraminiferal debris	6.50	12.00

Section completed at 12.0 m

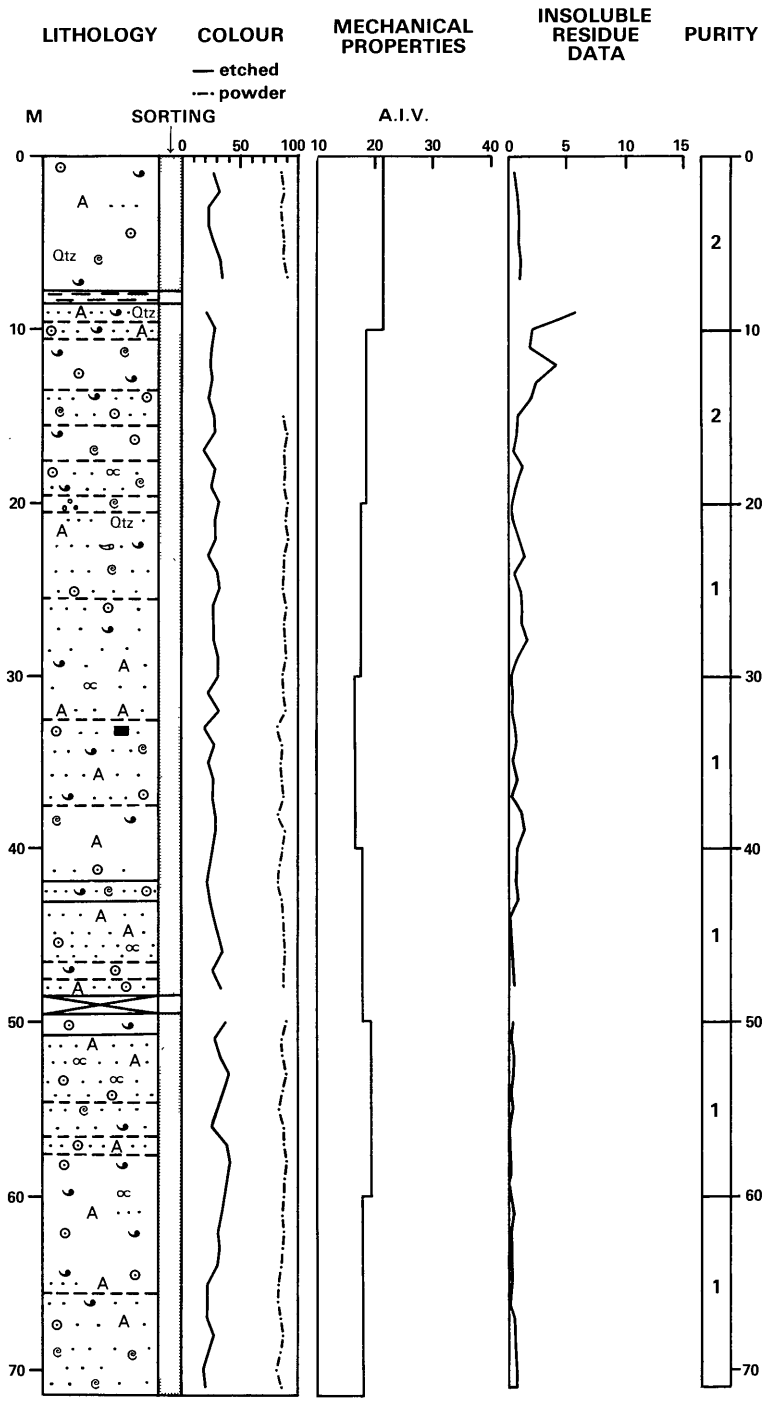


SK 07 NE 5S 0959 7700 Smalldale Quarry
Surface level +322.20 m
October 1976

	Thickness m	*Depth* m
D_1 (Chee Tor Rock)		
Biosparite, pale grey, medium arenite, moderate to good sorting. Common quartz euhedra	2.50	2.50
Biopelsparite, pale grey; coarse arenite crinoid brachiopod, foraminiferal and pelletal debris. Moderate to good sorting	1.00	3.50
Biosparite, pale grey, medium arenite, common quartz euhedra	2.00	5.50
Biopelsparite Brachiopod, buff-grey, medium arenite, moderate sorting	1.00	6.50
Biosparite, pale grey, medium arenite, moderate sorting	11.00	17.50
Biosparite algae, pale grey; medium arenite bioclasts, occasional algae-corroded shell debris, well sorted	1.00	18.50
Biosparite, pale grey, medium arenite, moderate sorting	1.00	19.50
Biomicrosparite, pale grey, mottled, medium arenite	1.00	20.50
Biosparite, grey; fine arenite comminuted bioclasts, well sorted	2.00	22.50
Biopelsparite, pale grey; medium arenite brachiopod, crinoid and foraminiferal debris, well sorted	0.50	23.00

Section completed at 23.00 m

07 NE 6 S


LITHOLOGY
COLOUR
— etched
·—· powder
MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
M
SORTING
A.I.V.
0
50
100
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Qtz
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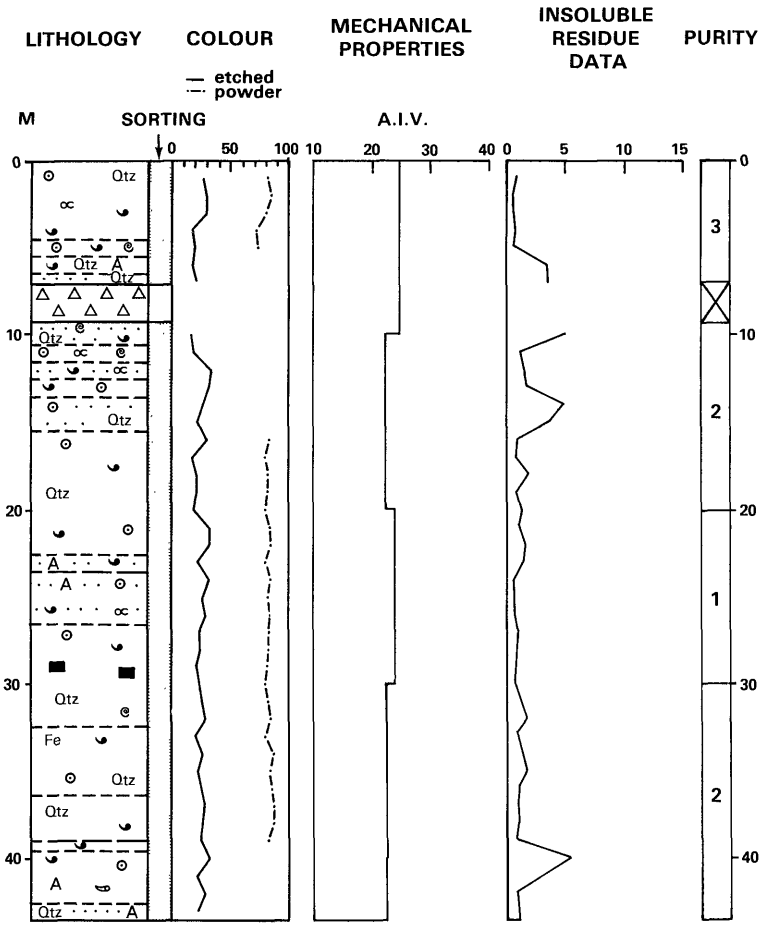
1
70

SK 07 NE 6S 0910 7929 Bee Low Quarry
Surface level +404.23 m
May 1977

	Thickness m	*Depth* m
D_1 (Bee Low Limestones)		
Biosparite, pale grey; fine to medium arenite comminuted crinoid, foraminifera and occasional *Koninckopora* and pelletal debris. Well sorted. Common quartz euhedra	7.80	7.80
Clay, bluish-grey on potholed surface. Variable thickness	0.70	8.50
Pelsparite Brachiopod algae, grey-brown, fine arenite, sporadic rudite brachiopods, well sorted. Abundant quartz euhedra	1.00	9.50
Biopelsparite, buff-grey, fine arenite, well sorted	1.00	10.50
Biosparite, buff-grey, fine arenite, well sorted, common quartz euhedra	3.00	13.50
Biopelsparite, pale grey, fine arenite, well sorted, common quartz euhedra	2.00	15.50
Biosparite, pale grey, fine arenite, well sorted	2.00	17.50
Biopelsparite, buff-grey; medium arenite algae-encrusted bioclasts and pelletal material, well sorted. Scattered quartz euhedra	2.00	19.50
Biosparite, buff-grey, common foraminifera and calcispheres	1.00	20.50
Biopelsparite, pale grey; fine to medium arenite comminuted bioclasts and pelletal debris, well sorted. Common quartz euhedra	5.00	25.50
Biosparite, pale grey; very fine to coarse arenite bioclasts, well sorted, sporadic *Koninckopora*, common quartz euhedra	7.00	32.50
Biopelsparite, grey-brown; fine arenite comminuted crinoid, shell, *Koninckopora*, foraminifera and pelletal debris, well sorted. Scattered quartz euhedra	5.00	37.50
Biosparite; medium arenite bioclastic and subordinate pelletal debris, rare quartz euhedra	4.40	41.90
Biopelsparite, fine arenite, well sorted, scattered quartz euhedra	1.20	43.10
Biopelsparite Algae, buff-grey; coarse arenite pellet and dasycladacean algae debris, well sorted	3.40	46.50
Biosparite, pale grey, very fine arenite, well sorted	1.00	47.50
Biopelsparite Algae Crinoid, buff-grey, coarse arenite, well sorted	1.00	48.50
Gap	1.00	49.50
Biosparite, pale grey, very fine arenite, well sorted	1.30	50.80
Biopelsparite Algae Crinoid, pale grey, fine arenite, well sorted	3.70	54.50
Biosparite, pale grey, fine arenite, well sorted. Rare quartz euhedra	2.00	56.50
Biopelsparite Algae Crinoid, pale, fine arenite, well sorted	1.00	57.50
Biosparite, pale grey; fine to coarse arenite crinoid and brachiopod debris, subordinate *Koninckopora*, algae-encrusted bioclasts and pelletal material, well sorted	8.00	65.50
Biopelsparite, buff-grey; fine arenite comminuted shell, foraminifera, dasycladacean algae, calcisphere and pelletal debris, well sorted, some quartz euhedra	5.80	71.30

Section completed at 71.30 m

07 NE 8S


LITHOLOGY
COLOUR
— etched
··· powder
MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
M
SORTING
A.I.V.
0
50
100
10
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40
0
5
10
15
Qtz
Fe
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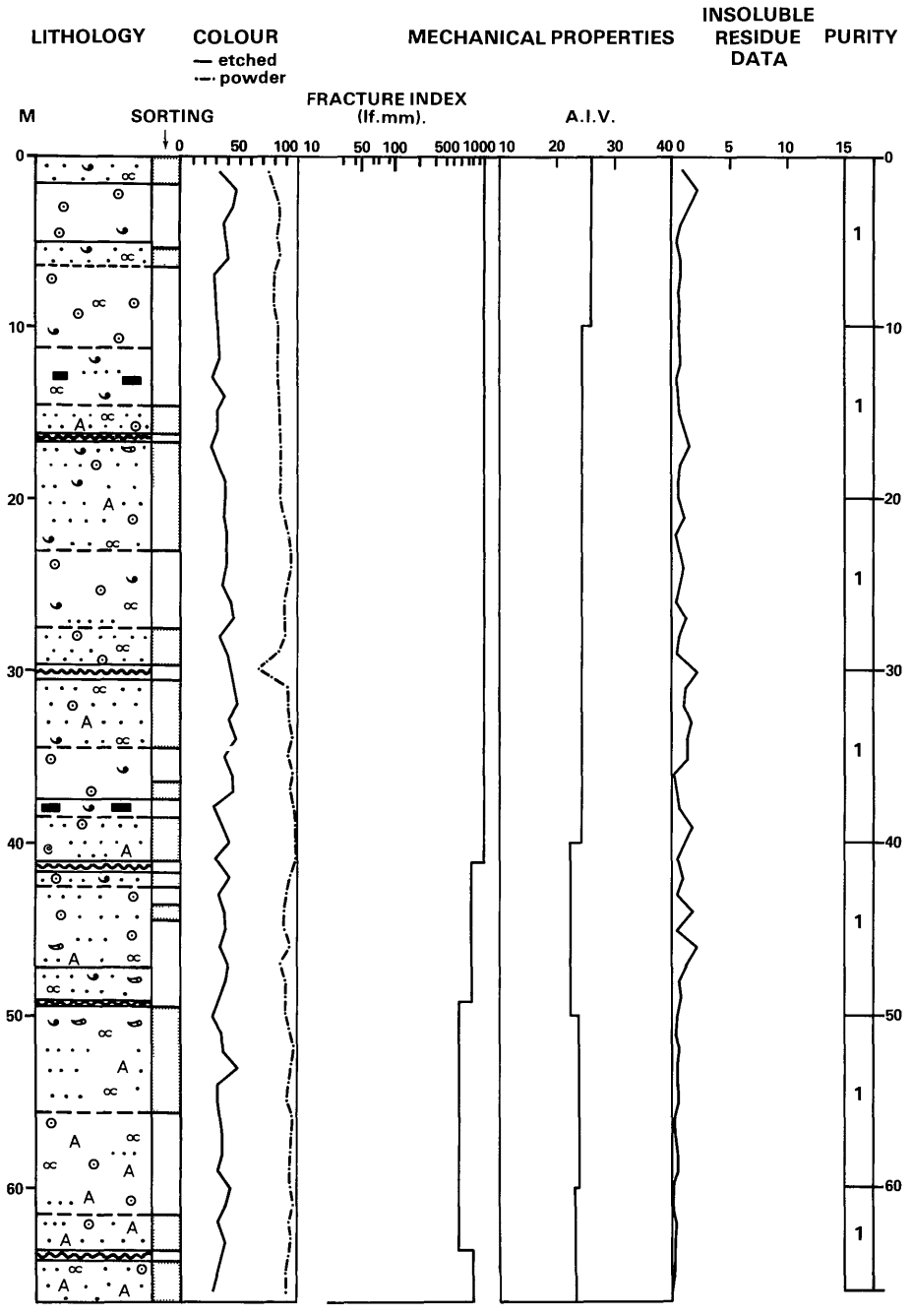
2
1
2

SK 07 NE 8S 0834 7816 Holderness Quarry
Surface level +353.67 m
May 1977

	Thickness m	*Depth* m
D_1 (Miller's Dale Limestones)		
Biosparite, grey, fine to medium arenite bioclasts, well sorted, scattered quartz euhedra	4.50	4.50
Biomicrite, mid-grey; medium arenite brachiopod, foraminifera and crinoid debris	1.00	5.50
Biosparite Algae, grey-brown, fine arenite, well sorted. Common quartz euhedra	1.00	6.50
Biopelsparite, grey, medium arenite, well sorted. Abundant quartz euhedra	0.60	7.10
(Dove Holes Tuff)		
Tuff	2.10	9.20
(Miller's Dale Limestones)		
Biopelsparite, medium arenite, well sorted, abundant quartz euhedra	1.30	10.50
Biomicrite, medium arenite, moderate to good sorting	1.00	11.50
Biopelsparite Brachiopod algae, pale grey; coarse arenite algae-corroded shell and crinoid debris, well sorted. Common quartz euhedra	1.00	12.50
Biosparite Brachiopod Crinoid algae, pale grey, medium arenite, well sorted, common quartz euhedra	1.00	13.50
Biopelsparite, medium arenite, well sorted, common quartz euhedra	2.00	15.50
Biosparite Crinoid Brachiopod, grey; coarse arenite brachiopod and crinoid debris, well sorted. Common quartz euhedra	7.00	22.50
Biopelsparite Algae, grey; medium arenite pellet, dasycladacean algae, crinoid and brachiopod debris, well sorted. Rare quartz euhedra. Thin clay at 23.50 m	4.00	26.50
Biosparite, grey; medium arenite comminuted bioclasts, well sorted, common quartz euhedra. Mottled 28.50–29.50 m	5.90	32.40
Biopelsparite, mid-grey; fine arenite pelletal and comminuted shell, crinoid, foraminiferal debris. Well sorted. Patchy limonite staining common quartz euhedra	2.10	34.50
Biosparite, grey; fine arenite bioclasts, well sorted, patchy limonite staining, common quartz euhedra. Thin clay 36.30–38.90 m	5.00	39.50
Biosparite Algae, buff-grey; coarse arenite algae-encrusted brachiopod, crinoid, pellet and dasycladacean algal debris, well sorted, frequent quartz euhedra	3.00	42.50
Biopelsparite Algae, buff-grey; coarse arenite pellet and algae-corroded shell and crinoid debris, subordinate *Koninckopora* and foraminifera, well sorted. Scattered quartz euhedra, patchy limonite staining	1.00	43.50

Section completed at 43.50 m

07 SW 1S


LITHOLOGY
COLOUR
— etched
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MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
M
SORTING
FRACTURE INDEX (lf.mm).
A.I.V.
0
50
100
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500
1000
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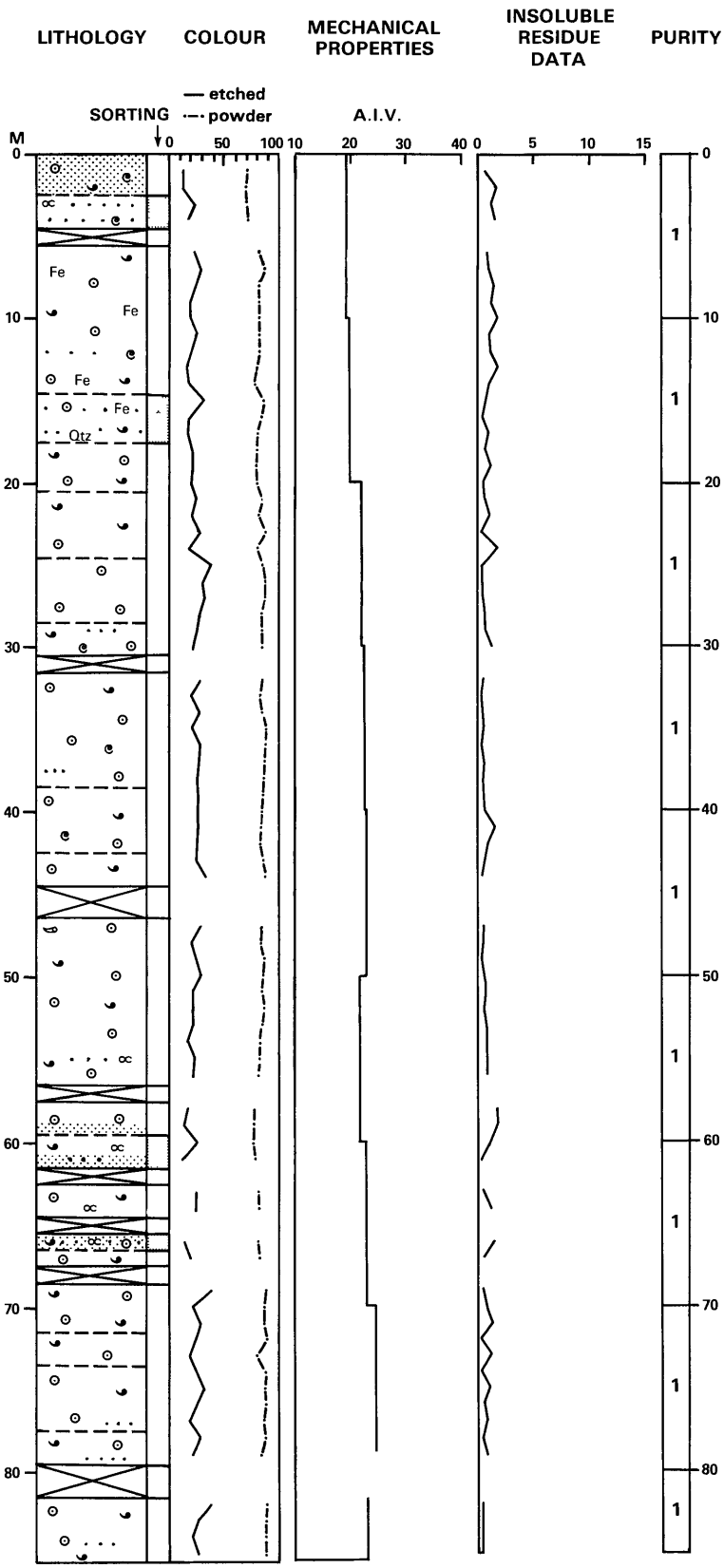
60
1

SK 07 SW 1S 0458 7233 Grinlow Quarry
Surface level +412.56 m
September 1974

	Thickness m	*Depth* m
D_1 (Bee Low Limestones)		
Biopelsparite Brachiopod algae, buff-grey, fine to coarse arenite, sporadic quartz euhedra, well sorted	1.60	1.60
Biosparite Crinoid, grey; coarse arenite crinoid and brachiopod debris, poorly sorted, common quartz euhedra	3.50	5.10
Biopelsparite Brachiopod algae; fine arenite to coarse rudite bioclasts, common algae-encrusted bioclasts, moderate sorting	1.40	6.50
Biosparite Crinoid, mid-buff-grey, coarse arenite to fine rudite, poorly sorted	4.75	11.25
Biosparite; very fine arenite to coarse arenite crinoid, brachiopod, foraminifera, spine and pellet debris, moderate sorting	3.25	14.50
Biopelspraite algae, buff-grey, fine arenite, well sorted, scattered quartz euhedra	1.70	16.20
Clay, wayboard resting on potholed surface	0.50	16.70
Biopelsparite, grey; fine to medium arenite brachiopod, pellet, foraminifera, *Koninckopora* and coral debris, well sorted	6.30	23.00
Biosparite, buff-grey; medium arenite to fine rudite crinoid and brachiopod debris, moderate sorting.	5.50	28.50
Biopelsparite Crinoid, pale grey, fine arenite to fine rudite, moderate to good sorting, sporadic quartz euhedra	1.20	29.70
Clay, ochreous, blue	0.80	30.50
Biosparite, mid-grey, paleokarst textures	0.10	30.60
Biopelsparite algae, pale buff-grey, fine to coarse arenite algae-encrusted brachiopod and finely comminuted bioclastic and pelletal debris, well sorted, common quartz euhedra	3.90	34.50
Biosparite Crinoid Pellet, buff-grey, coarse arenite, moderate to good sorting, common quartz euhedra	3.00	37.50
Biosparite Brachiopod, buff-grey mottled to dark grey, coarse arenite, poorly sorted	1.00	38.50
Biopelsparite, buff-grey, fine arenite, moderate to good sorting, locally common quartz euhedra	2.60	41.10
Clay, ochreous and blue	0.60	41.70
Biopelsparite, buff-grey, fine to medium arenite, well sorted	0.80	42.50
Biosparite Crinoid Pellet, buff-grey, fine arenite to fine rudite, well sorted, locally common quartz euhedra	4.70	47.20
Biopelsparite Algae Coral, fine arenite, sporadic algae-encrusted brachiopod and coral debris, moderate sorting, scattered quartz euhedra	1.90	49.10
Clay, ochreous and blue, variable thickness	0.30	49.40
Biopelsparite Algae, buff-grey; fine to coarse arenite algae-encrusted bioclasts, well sorted, sporadic quartz euhedra. Abundant coral 49.40–50.70m	6.10	55.50
Biosparite Crinoid, pale grey, fine arenite to fine rudite, poor to moderate sorting	6.00	61.50
Biopelsparite Algae, pale grey, medium arenite, common *Koninckopora*, well sorted, patchy limonite staining	2.10	63.60
Clay, ochreous	0.60	64.20
Biopelsparite Crinoid Algae, grey-brown; fine arenite *Koninckopora*, crinoid and algae-corroded bioclasts, well sorted	2.40	66.60

Section completed at 66.60 m

07 SW 2S


LITHOLOGY
COLOUR
MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
SORTING
— etched
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A.I.V.
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60
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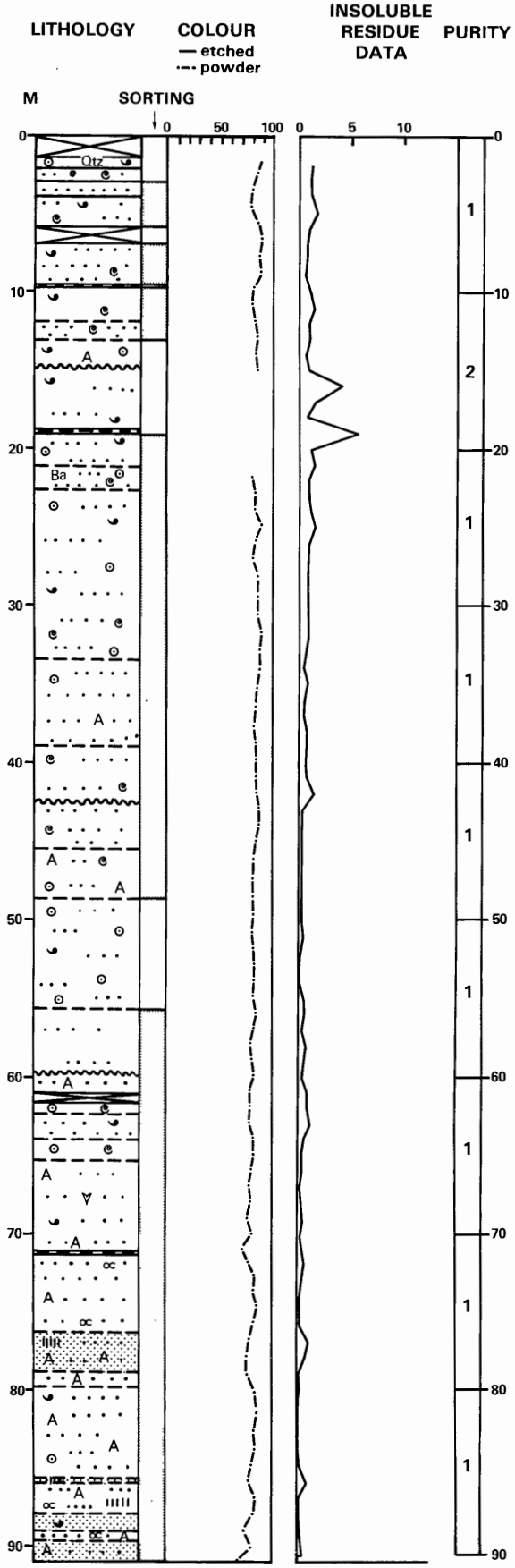
80

SK 07 SW 2S 0459 7058 Anthony Hill
Surface level +398.77 m
May 1977

	Thickness m	*Depth* m
D_2 (Monsal Dale Limestones)		
Biosparite, dark grey; fine to coarse arenite crinoid, shell and foraminiferal debris, moderate sorting, some quartz euhedra	2.50	2.50
D_1 (Bee Low Limestones)		
Pelsparite Algae, buff-grey; very fine arenite oncolite, foraminifera, calcisphere and pelletal debris, well sorted, scattered quartz euhedra	2.00	4.50
Gap	1.00	5.50
Biosparite, buff-grey; fine to coarse arenite shell, crinoid and spine debris, moderate sorting. Patchy hematite staining	9.00	14.50
Biopelsparite, mid-grey, fine arenite, well sorted, sporadic quartz euhedra, patchy hematite staining	3.00	17.50
Biosparrudite Brachiopod Crinoid, mid-grey; rudite crinoid and brachiopod debris, subordinate arenite pelletal and finely comminuted bioclastic debris, poorly sorted	3.00	20.50
Biomicrudite Brachiopod, buff-grey, poorly sorted, scattered quartz euhedra	4.00	24.50
Biosparrudite Crinoid, pale grey, fine to medium rudite, poorly sorted	4.00	28.50
Biosparite, coarse arenite, moderate sorting, sporadic quartz euhedra and silicified stylolites	2.00	30.50
Gap	1.00	31.50
Biosparrudite Crinoid, grey-brown; fine rudite crinoid, shell, foraminifera and pelletal debris poorly sorted	7.00	38.50
Biosparite, grey, sporadic quartz euhedra	4.00	42.50
Biosparrudite Crinoid Brachiopod, grey, fine rudite, scattered quartz euhedra	2.00	44.50
Gap	2.00	46.50
Biosparrudite Crinoid Brachiopod, grey, coarse rudite, rare coral, shell debris occasionally algae-encrusted, poorly sorted. Scattered quartz euhedra, shells patchily silicified	10.00	56.50
Gap	1.00	57.50
Biosparrudite Crinoid Brachiopod, mid-grey, locally common foraminifera, shell debris patchily silicified	2.00	59.50
Biopelsparite, mid-grey, fine arenite, well sorted	2.00	61.50
Gap	1.00	62.50
Biosparrudite Crinoid Brachiopod, grey, poorly sorted, scattered quartz euhedra	2.00	64.50
Gap	1.00	65.50
Biopelsparite, mid-grey, medium arenite, well sorted, scattered quartz euhedra	1.00	66.50
Biosparrudite Crinoid Brachiopod, grey, poorly sorted	1.00	67.50
Gap	1.00	68.50
Biosparrudite Crinoid Brachiopod, pale grey, some patchily silicified bioclasts	3.00	73.50
Biosparite Brachiopod Crinoid, coarse arenite, moderate sorting, common quartz euhedra, patchily silicified bioclasts	2.00	73.50
Biosparrudite Crinoid Brachiopod, fine rudite, sporadic quartz euhedra, bioclasts patchily silicified	4.00	77.50
Biosparite Crinoid Brachiopod, coarse arenite, moderate sorting, scattered quartz euhedra and silicified bioclasts	2.00	79.50
Gap	2.00	81.50
Biosparrudite Crinoid Brachiopod, grey, fine rudite, moderate sorting	4.00	85.50

Section completed at 85.50 m

07 SE 27


LITHOLOGY
COLOUR
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INSOLUBLE RESIDUE DATA
PURITY
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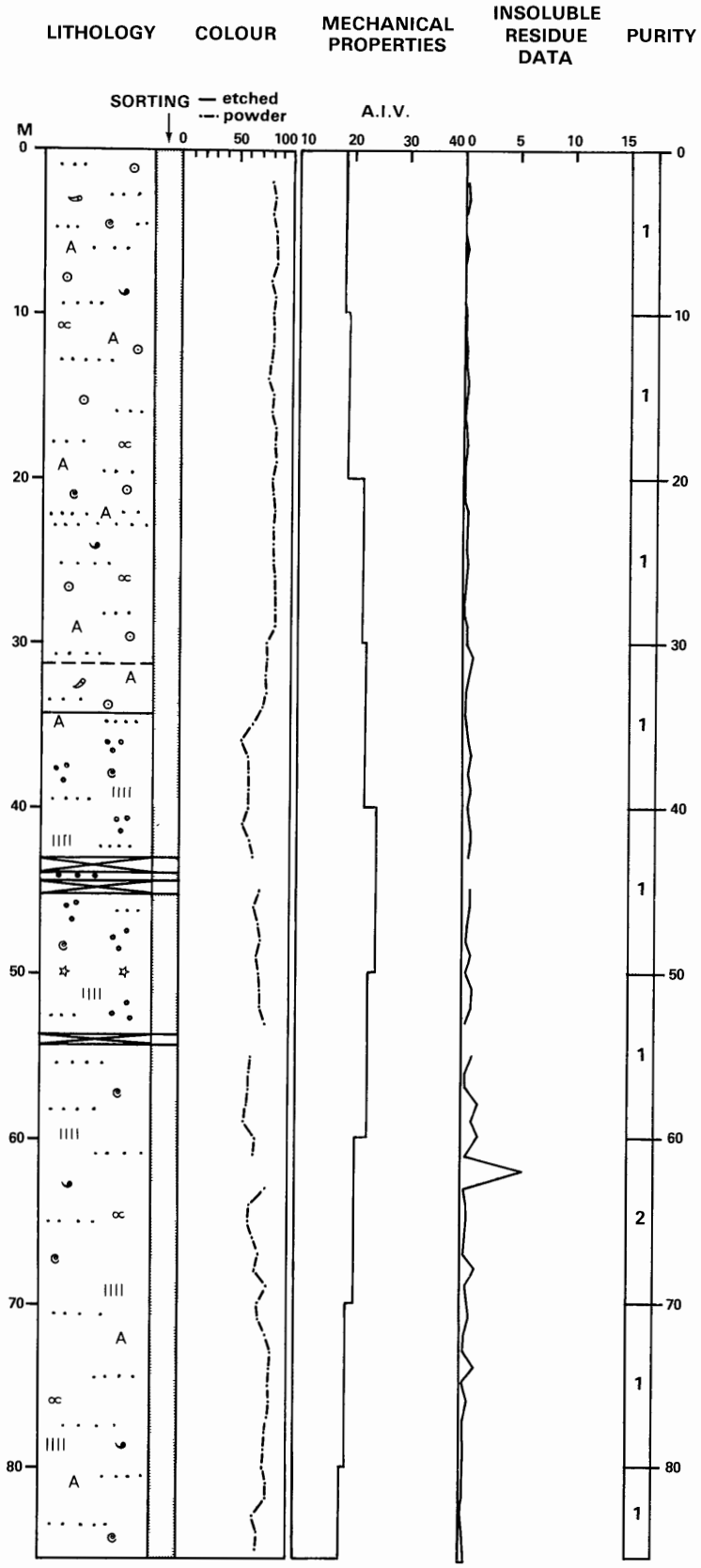
SK 07 SE 27 0942 7427 Orient Lodge
Surface level + 348.42 m
ICI Tunstead Prospecting
August 1954

	Thickness m	*Depth* m
D_1 (Chee Tor Rock)		
Openhole	1.50	1.50
Biosparite, pale grey, medium arenite, scattered quartz euhedra	0.70	2.20
Biosparite, grey, fine arenite, scattered quartz euhedra	1.70	3.90
Pelsparite, pale grey, fine arenite, sporadic quart euhedra	0.30	4.20
Biosparite, pale grey, fine arenite, well sorted	1.70	5.90
Gap	1.10	7.00
Pelsparite, pale grey, fine arenite, well sorted sporadic quartz euhedra	2.60	9.60
Clay, tuffaceous	0.10	9.70
Biosparite, pale grey, fine arenite, well sorted	2.20	11.90
Biosparite Pellet; fine arenite pelletal, spine and foraminiferal debris	1.20	13.10
Biosparite, pale grey; fine arenite brachiopod, crinoid and *Koninckopora* debris	1.80	14.90
Clay	0.10	15.00
Biosparite, pale grey, medium arenite	3.90	18.90
Clay	0.20	19.10
Biopelsparite, pale grey, fine arenite, well sorted	2.05	21.15
Biopelsparite, grey; fine arenite crinoid, foraminifera, brachiopod and pelletal debris, scattered quartz euhedra	0.60	21.75
Biomicrite, pale grey, fine arenite	0.95	22.70
Biosparite Brachiopod, pale grey to grey; fine arenite brachiopod, crinoid, foraminifera, pelletal debris, some quartz euhedra	10.80	33.50
Pelsparite, pale grey, fine arenite, laminated well sorted. Sporadic *Koninckopora* and crinoid debris	5.50	39.00
Biopelsparite, pale grey, fine arenite, common foraminifera	3.50	42.50
Clay	0.10	42.60
Biopelsparite, pale grey, fine arenite	2.90	45.50
Biosparite Foraminifera, grey; medium arenite foraminifera, pellets, spines, crinoid and *Koninckopora*. Well sorted	3.10	48.60
Biosparite Crinoid, pale grey, medium arenite	7.00	55.60
Biomicrite, buff-grey, very fine arenite, pelletal, well sorted	4.20	59.80
Clay	0.10	59.90
Pelsparite, pale grey, fine arenite, common dasycladacean algae	1.10	61.00
Gap	0.75	61.75
Biosparite Crinoid Foraminifera, pale grey, fine arenite	0.60	62.35
Pelsparite, pale grey, fine arenite, becoming darker at 62.90 m	1.65	64.00
Biosparite Crinoid Foraminifera, grey, medium arenite	1.29	65.29
Biosparite Pellet, fine arenite, medium grey	0.06	65.35
Pelsparite, pale grey, fine arenite, sporadic *Koninckopora* and bryozoa, locally common quartz euhedra	5.85	71.20
Mudstone	0.10	71.30
S_2 (Woo Dale Limestones)		
Pelsparite, pale grey, fine arenite, sporadic dasycladacean algae and encrusting algae, well sorted	5.00	76.30
Pelsparite Algae, dark grey, common algae, medium arenite, well sorted, patchily dolomitised 76.30–76.90 m	2.60	78.90
Micrite, medium grey	0.10	79.00
Pelsparite Algae, pale grey, medium arenite, well sorted	0.80	79.80
Biosparite Pellet, pale grey; fine and very fine arenite pellet and comminuted shell, crinoid and dasycladacean algal debris, well sorted	5.80	85.60
Pelsparite, dark grey, well sorted, patchily dolomitised	0.30	85.90
Pelsparite Algae, pale grey, fine arenite, well sorted, trace dolomitisation	2.00	87.90
Biosparite, dark grey, fine arenite, well sorted	1.20	89.10
Pelsparite Algae, pale grey, fine arenite, common encrusting-algae and dasycladacean algae	0.50	89.60
Biomicrosparite Pellet, dark grey, fine arenite, locally containing streaks and disseminations of clay	1.40	91.00

Borehole completed at 91.00 m

07 SE 32


LITHOLOGY
COLOUR
MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
SORTING
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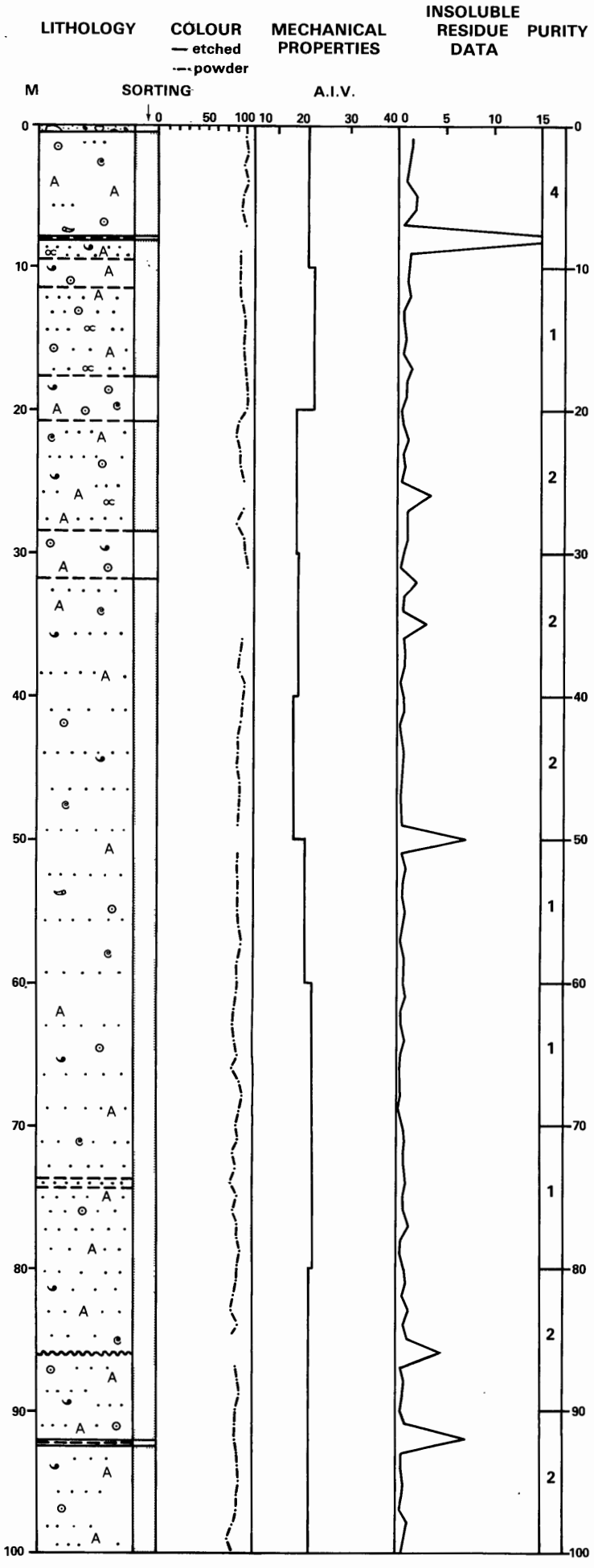
SK 07 SE 32 0981 7352 Tunstead Quarry
Surface level +342.58 m
ICI Tunstead Prospecting
July 1954

	Thickness m	*Depth* m
D_1 (Chee Tor Rock)		
Biopelsparite Algae crinoid, pale grey, fine to medium arenite, some fine rudite crinoid debris, scattered *Koninckopora* and *Girvanella*-encrusted bioclasts, sporadic very fine arenite spines and calcispheres. Well sorted. Rare quartz euhedra, some clay-coated stylolites and limonite staining. Thin parting of grey muddy limestone 31.38–32.43 m. Rare coral 32.06 m, 32,27 m. Becoming darker towards base	34.30	34.30
S_2 (Woo Dale Limestones)		
Biomicrite Calcisphere, mid grey-brown and buff-grey, very fine arenite, well sorted. Patchily dolomitised in beds up to 1m in thickness	8.65	43.05
Cavity	0.90	43.95
Biomicrite Calcisphere	0.43	44.38
Cavity	0.71	45.19
Biomicrite Calcisphere, mid grey-brown and buff-grey, very fine arenite, calcisphere, pellets and foraminifera, well sorted. Frequent birdseye structures 49.85–50.33 m. Dolomitic 50.68–51.80 m. Darker limestones contain minor amounts of black disseminated clay	8.44	53.63
Cavity	0.65	54.28
Biopelsparite, mid grey-brown, very fine and fine arenite, sporadic algae-encrusted shell debris, oncolites, foraminifera, and rare *Koninckopora*, well sorted. Dolomitic, 59.47–60.30 m, and locally below	31.18	85.46

Borehole complete at 85.46 m


LITHOLOGY
COLOUR
— etched
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MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
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A.I.V.
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SK 07 SE 39 0904 7483 Green Bank
Surface level +358.90 m
ICI Tunstead Prospecting
September 1947

	Thickness m	*Depth* m
D_1 (Chee Tor Rock)		
Topsoil	0.20	0.20
Clay, brown	0.36	0.56
Biosparite Algae, pale grey to buff-grey; fine arenite, comminuted crinoid, *Koninckopora*, foraminifera, spine, shell and pelletal debris, occasional rudite crinoid debris, moderate to good sorting. Common quartz euhedra	7.36	7.92
Clay, ochreous	0.14	8.06
Biopelsparite Algae, grey-brown to buff-grey; fine arenite comminuted bioclasts, sporadic *Koninckopora* and algae-encrusted bioclasts. Well sorted, common quartz euhedra	1.48	9.54
Biosparite, buff-grey, fine to coarse arenite, moderate to good sorting	1.94	11.48
Biopelsparite Algae Crinoid, buff-grey; fine arenite pelletal, and comminuted crinoid, brachiopod and *Koninckopora* debris, bioclasts commonly algae-corroded and encrusted, well sorted. Frequent quartz euhedra	6.19	17.67
Biosparite Crinoid Algae, pale buff-grey, fine arenite to fine rudite, moderate sorting	3.05	20.72
Biopelsparite, grey-brown to buff-grey; fine arenite foraminifera, *Koninckopora*, spine, crinoid and brachiopod debris, sporadically *Girvanella* encrusted, very well sorted Some clay lined and patchily silicified stylolites	7.79	28.51
Biosparite Algae Pellet, buff-grey, medium arenite, moderate sorting	3.33	31.54
Biopelsparite, buff-grey, fine arenite, sporadic rudite brachiopod and crinoid debris, well sorted. Common quartz euhedra, some silicified stylolites and black clay coated stylolites	41.89	73.73
Pelsparite Algae, grey-brown, medium arenite, very well sorted	0.60	74.33
Biopelsparite, buff-grey, fine arenite, well sorted. Scattered quartz euhedra, some silicified stylolites	11.70	86.03
Clay, ochreous with blue-grey streaks	0.10	86.13
Biopelsparite Crinoid, buff-grey, fine to medium arenite, well sorted, patchy limonite staining, scattered quartz euhedra	5.94	92.07
Clay, ochreous with limestone fragments	0.36	92.43

07 SE 39
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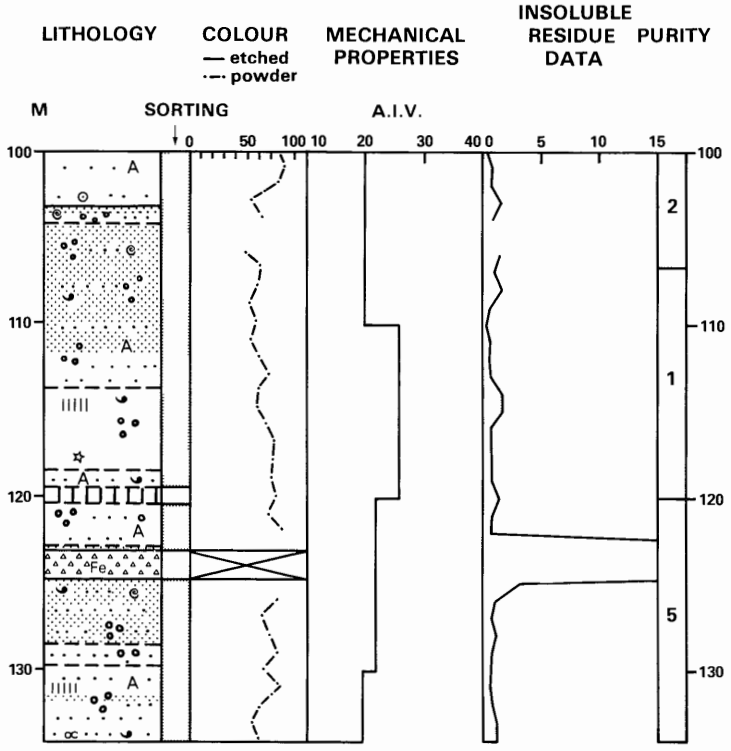
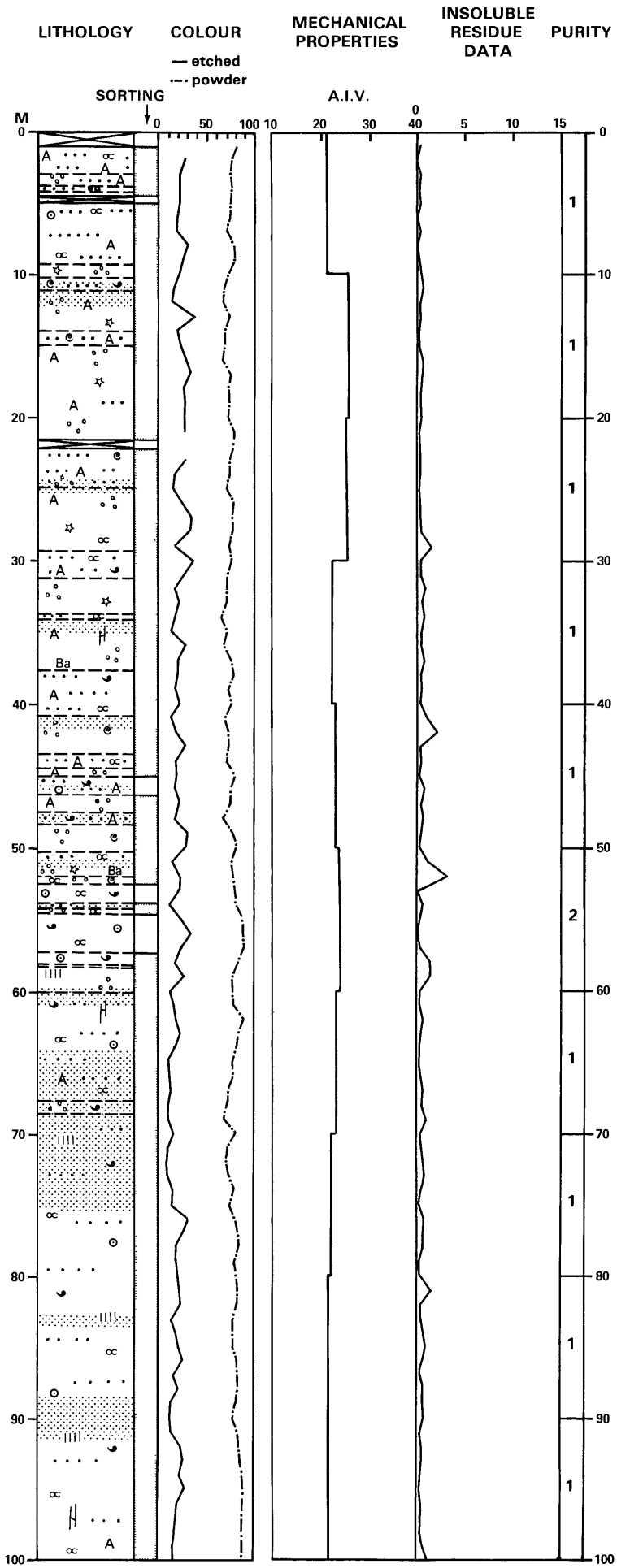


Biopelsparite Crinoid Algae, buff-grey; fine to medium arenite, occasional rudite brachiopod debris, bioclasts commonly algae-encrusted, sporadic oncolites	10.92	103.35
S_2 (Woo Dale Limestones)		
Biosparite, dark grey, very fine arenite, frequent streaks and disseminated black clay	0.14	103.49
Biopelsparite calcisphere, grey-brown and buff-grey; very fine arenite foraminifera, calcispheres and pelletal material. Well sorted	0.79	104.28
Biopelsparite calcisphere, dark grey, very fine arenite, some black disseminated clay, locally common algal structures	9.50	113.78
Biomicrite calcisphere, buff-grey to grey-brown, very fine arenite, well sorted. Locally dark grey, sparry, patchily dolomitised from 114.18–114.38 m. Frequent birdseyes in lower 2.5 m	4.67	118.45
Biopelsparite, grey-brown, fine to coarse arenite, well sorted	0.99	119.44
Dolomite, yellow-grey, fine grained, vuggy	0.91	120.35
Biopelsparite, grey brown, fine to coarse arenite calcispheres, spines, oncolites, foraminifera and shell and crinoid debris, sporadic quartz euhedra	2.51	122.86
Biosparite, dark grey, arenite bioclasts, abundant disseminated clay	0.24	123.10
Tuff, pale grey, fine grained, weathered, pyritous	1.66	124.76
Biopelsparite, dark grey to mid-grey, fine arenite, well sorted. Sporadic quartz euhedra and streaks of black clay	3.69	128.45
Pelsparite calcisphere, mid-grey, very fine arenite, well sorted	1.27	129.72
Biopelsparite calcisphere, mid-grey, fine arenite, well sorted, local patchy dolomitisation. Locally dark grey, disseminated black clay 131.95–132.29 m, 133.41–133.65 m	4.45	134.17
Borehole complete at 134.17 m		


LITHOLOGY
COLOUR
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MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
SORTING
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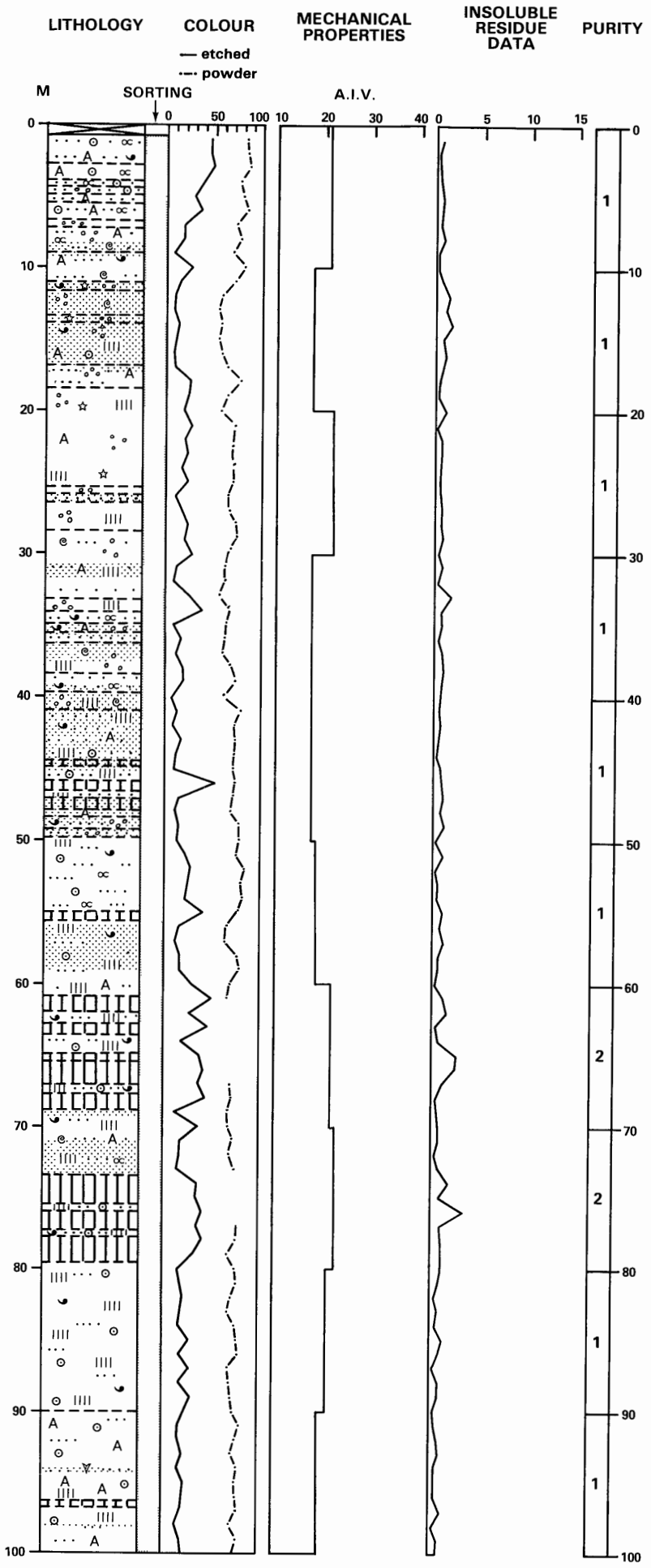
SK 07 SE 49 0562 7123 Ferny Bottom
Surface level +327.57 m
Edeco Stratadrill 36, waterflush, 47 mm diameter
November 1976

	Thickness m	*Depth* m
S_2 (Woo Dale Limestones)		
Openhole	1.10	1.10
Biopelsparite Algae; fine arenite to fine rudite pelletal and comminuted bioclastic debris, commonly *Girvanella*-encrusted. Moderate to good sorting	1.90	3.00
Biomicrite calcisphere, buff-grey, very fine arenite, well sorted	0.09	3.09
Biopelsparite Algae, buff-grey, fine to medium arenite, common *Koninckopora*, well sorted	0.71	3.80
Biomicrite Calcisphere, buff-grey, very fine arenite, well sorted	0.20	4.00
Biopelsparite Algae, buff-grey, fine arenite, well sorted	0.16	4.16
Biomicrite Calcisphere, buff-grey, very fine arenite, common quartz euhedra, well sorted	0.32	4.48
Gap—no core recovery	0.52	5.00
Biopelsparite Algae, pale buff-grey to grey-brown; fine arenite foraminifera, crinoid, pelletal, brachiopod, and *Koninckopora* debris, commonly *Girvanella*-encrusted. Well sorted	4.33	9.39
Biomicrite calcisphere, pale grey, very fine arenite, sporadic birdseye structures	0.81	10.20
Biopelsparite, medium buff-grey, fine arenite, well sorted	0.92	11.12
Biomicrite Calcisphere Algae, buff grey to mid-grey, fine arenite, sporadic birdseye structures and algae, well sorted	2.88	14.00
Biopelsparite Algae, buff-grey, fine arenite, well sorted	0.98	14.98
Biomicrite Calcisphere Algae, pale grey, very fine arenite, some fine rudite algal structures, sporadic birdseye structures, locally laminated. Well sorted. Pisolitic 18.98–19.56 m	6.56	21.54
Gap—probably clay-infilled fissure	0.60	22.14
Biomicrite, buff-grey, abundant birdseye structures, well sorted	0.10	22.24
Pelsparite, buff-grey, fine arenite, sporadic *Koninckopora*, very well sorted	2.66	24.90
Biomicrite Calcisphere, buff-grey; very fine arenite calcispheres, pellets and foraminifera, sporadic birdseye structures and algal structures, well sorted. Frequent blue grey clay partings 28.60–29.35 m	4.48	29.38
Biopelsparite Algae Brachiopod, buff-grey; fine arenite to fine rudite algae-encrusted bioclasts, well sorted	1.82	31.20
Biomicrite Calcisphere, mid-grey, very fine arenite, well sorted, some birdseye structures	2.41	33.61
Biopelsparite, buff-grey to grey-brown, sporadic *Koninckopora*, bioclasts commonly *Girvanella*-encrusted, well sorted	0.50	34.11
Biomicrite Calcisphere, buff-grey, very fine arenite, some birdseye structures and algal structures, well sorted; fractured, clay-infilled fissure 35.67–36.22 m, baryte/calcite vein 37.09–37.58 m	3.55	37.66
Biopelsparite Brachiopod Algae, grey-brown, fine arenite to fine rudite, moderate to good sorting	3.20	40.86
Biomicrite Calcisphere, grey-brown; very fine arenite calcispheres and foraminifera, frequent quartz euhedra. Well sorted	2.54	43.40
Biopelsparite Algae, grey, well sorted	1.02	44.42
Biomicrite Algae Calcisphere, well sorted	0.52	44.94
Biopelsparite Brachiopod Algae, grey-brown fine arenite to medium rudite, moderate sorting	1.34	46.28
Biomicrite Algae Calcisphere, grey-brown, very fine arenite, common algae, common quartz euhedra, well sorted	1.22	47.50
Biopelsparite Algae Brachiopod, mid-dark grey, well sorted, some clay partings	0.80	48.30
Biomicrite Calcisphere, dark grey, well sorted	0.46	48.76
Biosparite Calcisphere, buff-grey, well sorted	1.42	50.18
Biopelsparite Calcisphere Algae, grey brown, well sorted	0.39	50.57
Biomicrite Calcisphere, sporadic birdseye structures, thin calcite, baryte and pyrite veinlets	1.41	51.98
Biosparite Calcisphere Foraminifera, buff-grey, well sorted	0.52	52.50
Biomicrite Brachiopod Crinoid Algae, buff-grey; fine arenite to fine rudite algae-encrusted bioclasts, poor sorting	1.25	53.75
Biopelsparite, mid-grey, well sorted	0.21	53.96
Biomicrite, mid-grey, very fine arenite, well sorted	0.19	54.15
Biosparite Calcisphere, buff-grey, fine arenite, well sorted	0.35	54.50
Biomicrite Crinoid Brachiopod Algae, buff-grey; fine arenite to medium rudite *Girvanella*-encrusted bioclasts, poor sorting	2.70	57.20
Biosparite Crinoid, coarse arenite, good sorting	0.90	58.10
Clay, black	0.10	58.20
Biomicrite, buff-grey; very fine arenite calcispheres, foraminifera and pelletal debris, well sorted. Patchily dolomitised	1.85	60.05
Biopelsparite Algae, buff grey to mid grey; fine arenite to fine rudite brachiopod, crinoid, calcisphere, foraminifera and *Koninckopora* debris, locally thickly-encrusted with algae; good sorting. Some black clay partings	7.58	67.63
Biomicrite Calcisphere, grey-brown, very fine arenite, well sorted	0.94	68.57
Biopelsparite Algae Brachiopod Crinoid, dark grey to grey-brown; medium arenite algae-encrusted bioclasts, well sorted. Patchy dolomitisiation mainly restricted to fissures and fractures; some clay partings. Fissured core, ochreous clay infill 96.70–98.60 m	31.43	100.00
Borehole complete at 100.00 m		


LITHOLOGY
COLOUR
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MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
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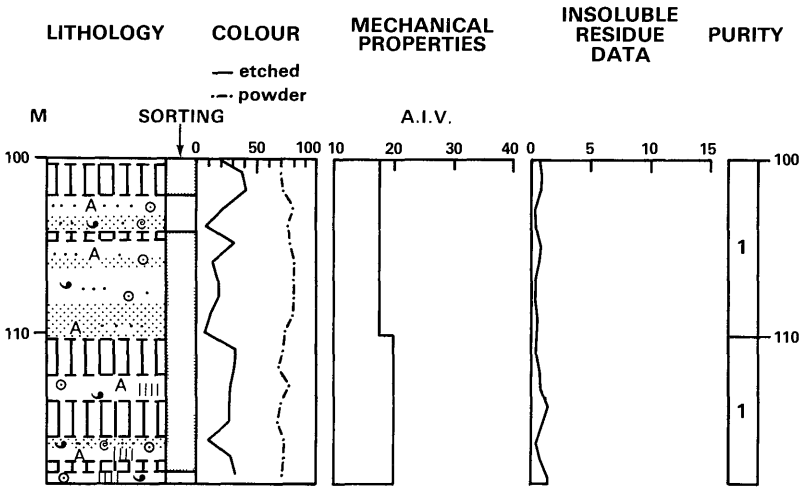
SK 07 SE 50 0854 7328 Bailey Flat, Green Fairfield
Surface level +337.69 m
Edeco Stratadrill 36, waterflush, 47 mm diameter
December 1976

	Thickness m	*Depth* m
Openhole, topsoil	0.70	0.70
D_1 (Chee Tor Rock)		
Biopelsparite Crinoid algae; medium arenite crinoid, brachiopod, pelletal and *Koninckopora*, debris, well sorted	2.05	2.75
Biosparite Crinoid Algae, medium arenite, moderate to good sorting	1.15	3.90
Biopelsparite Algae Crinoid, medium arenite, well sorted	0.40	4.30
S_2 (Woo Dale Limestones)		
Biopelsparite Crinoid Calcisphere, buff-grey, fine arenite, well sorted	0.57	4.87
Pelsparite Algae calcisphere, fine arenite, laminated, very well sorted	0.58	5.45
Biopelsparite Crinoid Algae, buff-grey, laminated; fine arenite to fine rudite crinoid, foraminifera calcisphere, *Koninckopora* and algae encrusted bioclasts, well sorted	1.24	6.69
Biomicrite Calcisphere, well sorted, occasional birdseye structures	0.52	7.21
Biopelsparite Algae calcisphere, mid-grey to buff-grey, fine arenite, some disseminated black clay 8.75–9.01 m	1.80	9.01
Micrite, buff-grey, abundant birdseye structures	0.11	9.12
Biopelsparite Algae Crinoid, pale buff-grey, medium arenite, well sorted. Rare colonial and encrusting coral	1.98	11.10
Biomicrite, mid-grey, abundant birdseye structures	0.60	11.70
Biosparite Calcisphere Foraminifera, mid-grey, fine arenite, common quartz euhedra, some disseminated black clay	1.70	13.40
Biomicrite, buff-grey, frequent quartz euhedra, common clay and limonite stained fissures, some birdseye structures	0.40	13.80
Biopelsparite Calcisphere, grey, abundant very fine arenite calcispheres, rare rudite brachiopod debris, bioclasts locally algae encrusted. Well sorted, common quartz euhedra, common disseminated clay 14.61–16.83 m, common dolomite rhombs 15.10–15.7 m, 16.31–16.83 m	3.03	16.83
Biopelsparite, mid-grey, fine arenite, well sorted	1.57	18.40
Biomicrite calcisphere, buff-grey, fine arenite, well sorted. Frequent birdseye structures 19.57–20.00 m, locally common rudite brachiopod debris 20.15–21.25 m, common algal structures 20.26–20.40 m. Abundant dolomite rhombs 19.70–20.00 m, 24.68-25.35 m	6.95	25.35
Biopelsparite, grey-brown, fine arenite, well sorted	0.15	25.50
Biomicrite, mid-grey, fine arenite, common disseminated clay	0.32	25.82
Pelsparite, mid-grey, very fine arenite, very well sorted	0.62	26.44
Biomicrite Calcisphere, buff-grey, fine arenite, patchy dolomitisation	1.96	28.40
Biopelsparite, buff-grey; fine arenite calcispheres, foraminifera, pelletal debris and *Koninckopora*, well sorted. Patchy dolomitisation, rare streaks of clay	4.85	33.25
Biomicrite Calcisphere, buff-grey, very fine arenite, patchily dolomitised	0.83	34.08
Biopelsparite, mid-grey, fine arenite, well sorted	0.79	34.87
Biomicrite Calcisphere, dark grey, very fine arenite, well sorted, sporadic streaks of clay, scattered quartz euhedra	0.65	35.52
Pelsparite, dark grey, very fine arenite, very well sorted	0.73	36.25
Biomicrite Calcisphere foraminifera, mid-grey, fine arenite, well sorted. Common streaks of clay, patchily dolomitised	2.15	38.40
Biopelsparite, grey, very fine arenite, well sorted, patchily dolomitised	1.25	39.65
Biomicrite Calcisphere, dark grey, fine arenite, common streaks and disseminated black clay, patchy dolomitisation. Dolomite, 40.10–40.30 m, 40.56–40.91 m	1.26	40.91
Biopelsparite, mid-grey, very fine arenite, locally laminated, patchily dolomitised	3.55	44.46
Dolomite, buff-grey, finely granular, vuggy	0.27	44.73
Biopelsparite, mid-grey, fine arenite, common dolomite rhombs	1.14	45.87
Dolomite, yellow-grey, granular, vuggy	0.69	46.56
Biopelsparite, mid-grey, fine arenite, common dolomite rhombs	0.48	47.04
Dolomite, yellow-grey, granular, vuggy	0.86	47.90
Biopelsparite, mid-grey, fine arenite, common dolomite rhombs	0.20	48.10
Biomicrite Algae, buff-grey, fine arenite, well sorted	0.23	48.33
Biopelsparite, grey-brown, fine arenite, occasional rudite brachiopod debris	0.87	49.20
Biomicrite, buff-grey, occasional bands of coarse arenite pellets	0.53	49.73
Dolomite, grey, granular, vuggy	0.15	49.88
Biopelsparite Brachiopod Algae Crinoid, grey, coarse arenite, scattered dolomite rhombs in upper 0.4 m, patchy limonite staining	5.08	54.96
Dolomite, grey, granular, vuggy	0.63	55.59
Biopelsparite Brachiopod Crinoid Algae, dark grey, very fine arenite, well sorted. Frequent dolomite rhombs, vuggy porosity locally developed	5.24	60.83
Dolomite, yellow-brown, vuggy, granular	1.17	62.00
Biopelsparite, dark grey, dolomitised	0.72	62.72
Dolomite, yellow-brown, vuggy, granular	0.81	63.53
Biopelsparite, dark grey, fine arenite, well sorted. Frequent dolomite rhombs, some black clay partings and disseminated clay	1.33	64.86
Dolomite, buff-grey, granular, vuggy	0.45	65.31
Biopelsparite, dark grey, fine arenite, dolomitised	0.17	65.48
Dolomite, grey, granular, vuggy	1.62	67.10
Biopelsparite, dark grey, medium arenite, frequent dolomite rhombs	0.57	67.67
Dolomite, grey, granular, vuggy	1.18	68.85

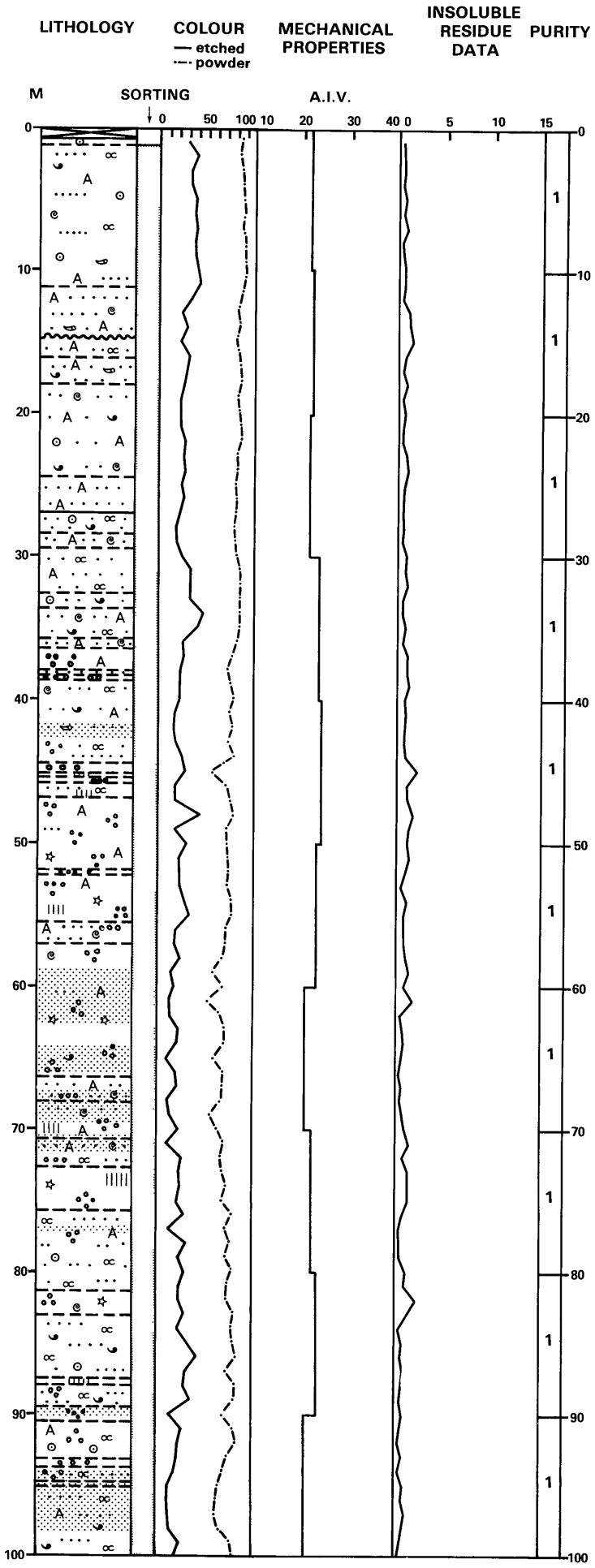
07 SE 50 (cont.)



Biopelsparite, dark grey; fine arenite shell, crinoid, *Koninckopora*, foraminifera and algae-encrusted bioclastic and pelletal debris; patchily dolomitised	4.55	73.40
Dolomite, yellow-brown, granular, vuggy	2.10	75.50
Biopelsparite, dark grey, abundant dolomite rhombs	0.43	75.93
Dolomite, yellow-brown, granular, vuggy	1.37	77.30
Biopelsparite, dark grey, fine arenite, patchily dolomitised	0.40	77.70
Dolomite, yellow-grey, vuggy, granular	1.82	79.52
Biopelsparite Crinoid, dark grey, fine arenite, locally common rudite crinoid and brachiopod debris, abundant dolomite rhombs	10.54	90.06
Biopelsparite Algae Crinoid Bryozoa, buff-brown, fine arenite to medium rudite, scattered dolomite rhombs	6.26	96.32
Dolomite, grey-yellow, granular, vuggy	0.41	96.73
Biopelsparite Algae Crinoid, mid-grey, abundant dolomite rhombs, common clay-lined stylolites 98.30–98.40 m, 100.30–100.40 m	3.76	100.49
Dolomite, grey-brown, granular, vuggy	1.79	102.28
Biopelsparite Algae Crinoid Brachiopod, mid-grey, fine arenite to coarse rudite, moderate sorting, patchily dolomitised	2.02	104.30
Dolomite, grey, vuggy, granular	0.43	104.73
Biopelsparite Algae Crinoid Brachiopod, mid-grey, patchily dolomitised	5.67	110.40
Dolomite, grey, vuggy, granular	1.91	112.31
Biosparite Crinoid Algae Brachiopod, dark grey to mid-grey, fine arenite to coarse rudite, patchily dolomitised	1.55	113.86
Dolomite, grey, vuggy, granular	1.96	115.82
Biopelsparite, fine arenite to coarse rudite, some clay-coated stylolites, common dolomite rhombs	1.38	117.20
Dolomite, grey, vuggy, granular	0.49	117.69
Biosparite, mid-grey; fine arenite to fine rudite crinoid and brachiopod debris, moderate sorting; patchy dolomitisation	0.71	118.40

Borehole complete at 118.40 m

07 SE 51

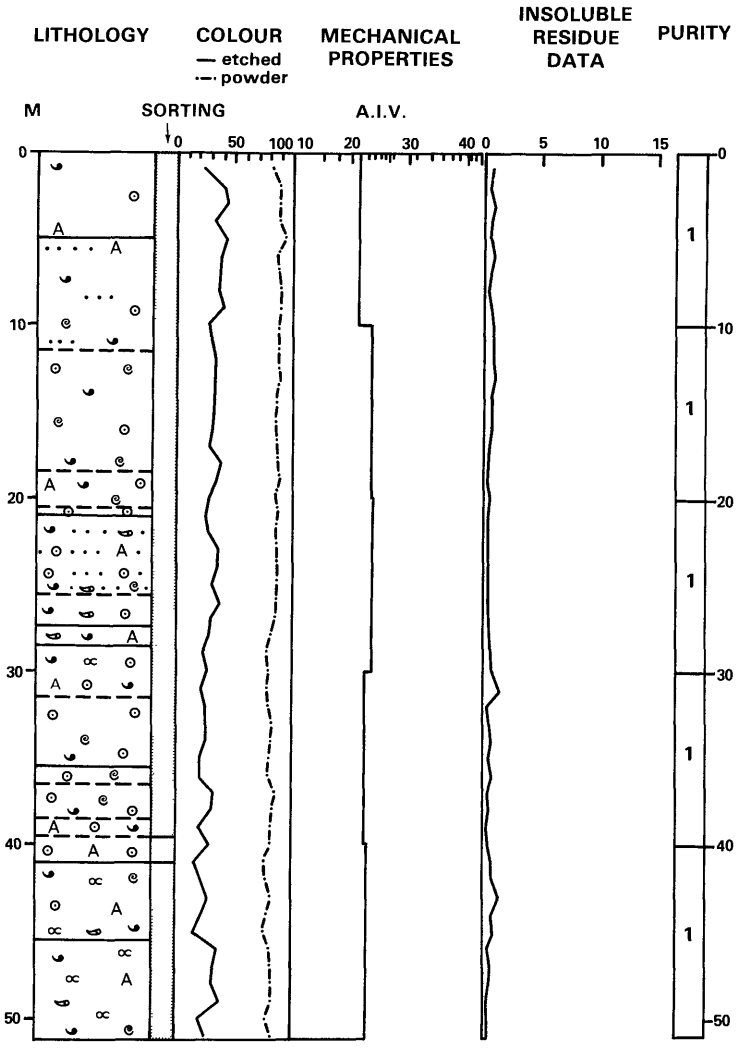

LITHOLOGY
COLOUR
— etched
·-· powder
MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
M
SORTING
A.I.V.
0
50
100
10
20
30
40
5
10
15
1

SK 07 SE 51 0822 7136 King Sterndale
Surface level +344.07 m
Edeco Stratadrill 36, waterflush, 47 mm diameter
November 1976

	Thickness m	*Depth* m
Openhole—topsoil	0.80	0.80
D_1 (Chee Tor Rock)		
Biosparite crinoid, pale grey, coarse arenite, moderate sorting	0.41	1.21
Biopelsparite Algae, pale grey; medium arenite pellets and algae encrusted brachiopod, crinoid, foraminifera and *Koninckopora* debris, well sorted. Locally common fine rudite crinoid and brachiopod debris 2.82–5.36 m, 7.82–9.81 m. Some coral	9.99	11.20
Pelsparite Algae, buff-grey, fine arenite, common *Koninckopora* and algae-encrusted bioclasts, very well sorted. Sporadic quartz euhedra	3.56	14.76
Mudstone, ochreous	0.02	14.78
Biopelsparite Algae, grey; fine arenite bioclasts, sporadic rudite thick-shelled brachiopod debris encrusted with algae, moderate to good sorting. Patchily silicified bioclasts 14.78–15.16 m. Clay-coated stylolite 15.02 m	1.41	16.19
Biosparite Pellet, pale to mid-grey; coarse arenite crinoid, brachiopod, foraminifera, spine, pellet and *Koninckopora* debris. Well sorted. Locally patchily silicified bioclasts adjacent to black clay-coated stylolites	1.81	18.00
Biopelsparite, pale grey, medium arenite, scattered quartz euhedra and patchily silicified bioclasts. Well sorted	6.00	24.50
Pelsparite Algae, grey, fine arenite, frequent *Koninckopora*, well sorted, rare flecks of limonite after pyrite	2.50	27.00
Biopelsparite Algae, grey-brown; fine arenite to fine rudite bioclasts, moderate to good sorting	1.40	28.40
Biopelsparite Algae Spine Foraminifera, grey-brown, fine arenite, well sorted	1.10	29.50
Biopelsparite Algae, buff-grey; coarse arenite *Girvanella*-encrusted bioclasts, moderate to good sorting. Common quartz euhedra, patchily limonite stained	3.09	32.59
Biosparite Pellet Algae, buff-grey, coarse arenite, well sorted	1.01	33.60
Biopelsparite Algae, buff-grey, medium arenite, well sorted, fissured, iron-stained	2.14	35.74
Pelsparite Algae, buff-grey, very fine arenite, well sorted	0.75	36.49
S_2 (Woo Dale Limestones)		
Biomicrite Spine Calcisphere, buff-grey, very fine arenite, well sorted	1.45	37.94
Pelsparite, grey to grey-brown, very fine arenite, well sorted	0.39	38.33
Biomicrite Calcisphere Spine, buff-grey, very fine arenite, well sorted	0.33	38.66
Pelsparite Algae, grey to mid-grey; very fine arenite pelletal and foraminifera and calcisphere debris, sporadic oncolites and *Koninckopora*, common fine rudite crinoid debris 41.05–42.50 m. Well sorted	5.80	44.46
Biomicrite calcisphere, dark grey, very fine arenite, well sorted. Black clay-coated stylolites and fissures, common quartz euhedra	0.68	45.14
Biopelsparite, dark grey, well sorted, locally common dolomite rhombs	0.24	45.38
Biomicrite, buff-grey, very fine arenite, well sorted	0.50	45.88
Pelsparite algae calcisphere, buff-grey to dark grey, very fine arenite, well sorted, common euhedra and dolomite rhombs	1.00	46.88
Biomicrite Calcisphere, grey, very fine arenite, occasional birdseye structures and algal structures, some black clay-coated stylolites, rare flecks of pyrite	5.00	51.88
Biosparite Calcisphere, grey-brown, very fine arenite, well sorted	0.33	52.21
Biomicrite Calcisphere, buff-grey, sporadic birdseyes and algal structures, some dolomite rhombs and black-coated fissures	3.27	55.48
Biopelsparite Calcisphere, buff-grey, very fine arenite, well sorted	1.55	57.03
Biomicrite Calcisphere, buff-grey, very fine arenite, well sorted, some quartz euhedra and black clay-coated stylolites. Dark grey, disseminated black clay 58.70-58.96 m, 61.32–61.78 m, 64.88–65.08 m. Abundant birdseye structures 61.69–61.88 m, 62.46–62.62 m	9.37	66.40
Pelsparite, buff-grey to mid-grey, fine arenite, well sorted	1.65	68.05
Biomicrite calcisphere, dark grey; very fine arenite pellet, calcisphere and foraminiferal debris, well sorted. Abundant dolomite rhombs 70.22–70.46 m	2.65	70.70
Biopelsparite, mid-grey, very fine arenite, well sorted, dark grey with disseminated clay and clay partings in lower 0.24 m	1.99	72.69
Biomicrite, buff-grey, very fine arenite, well sorted, patchy dolomitisation, some clay-coated fissures	3.15	75.84
Biopelsparite Algae, buff-grey, very fine arenite pellet, *Koninckopora* and *Girvanella* encrusted bioclasts, very well sorted. Sporadic dolomite rhombs. Thin clay (0.03 m) at base	5.60	81.44
Biomicrite Calcisphere, buff-grey, very fine arenite, well sorted, common quartz euhedra, some mudstone partings	1.66	83.10
Biopelsparite Algae, buff-grey, fine to coarse arenite, well sorted	4.40	87.50
Biomicrite, buff-grey, very fine arenite, frequent quartz euhedra, common black clay partings, limonite staining and weathered dolomite	0.46	87.96
Biopelsparite, buff-grey, fine arenite, well sorted	1.61	89.57
Biomicrite Calcisphere, mid-grey, very fine arenite, well sorted	0.97	90.54
Biopelsparite Calcisphere, mid-grey, coarse arenite, well sorted. Common rudite crinoid debris 91.48–92.57 m	2.61	93.15
Biomicrite Calcisphere, mid-grey, very fine arenite, well sorted	0.58	93.73
Biopelsparite, grey-brown, very fine and coarse arenite, well sorted	0.99	94.72

Biomicrite, dark-grey, very fine arenite, well sorted; common black clay streaks and partings	0.38	95.10
Biopelsparite, dark-grey to mid-grey, fine arenite locally common algae-encrusted rudite brachiopod and crinoid debris, moderate to good sorting	4.90	100.00

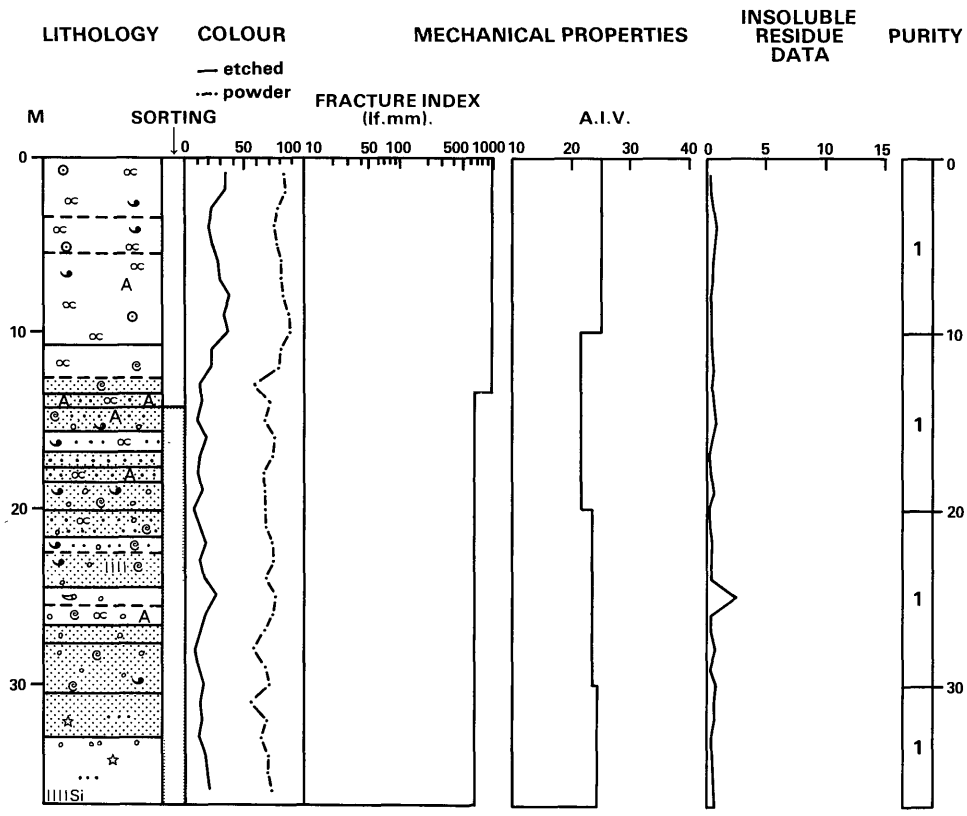
Borehole complete at 100.00 m



SK 07 SE 1S 0801 7217 Cowdale Quarry
Surface level +314.35 m
September 1974

	Thickness m	*Depth* m
D_1 (Chee Tor Rock)		
Biosparite, buff-grey; fine to medium arenite comminuted brachiopod, crinoid, foraminifera and dasycladacean algae debris, subordinate peloidal material, well sorted. Sporadic quartz euhedra	11.50	11.50
Biosparite Foraminifera, buff-grey; medium arenite comminuted bioclasts, common foraminifera, well sorted	7.00	18.50
Biosparite algae, buff-grey, medium arenite, some *Koninckopora*	2.00	20.50
Biosparite Crinoid, buff-grey, coarse arenite	0.50	21.00
Biopelsparite, buff-grey; fine to coarse arenite brachiopod, crinoid, coral, foraminifera, *Koninckopora* and pelletal debris, well sorted	4.50	25.50
Biosparite, buff-grey, medium arenite, moderate sorting	1.80	27.30
Biosparlutite, buff-grey; very fine arenite and lutite bioclasts, very well sorted, occasional rudite corals	1.20	28.50
Biosparite algae, grey-brown, fine arenite bioclasts, sporadic *Koninckopora* and algae encrusted shell debris, well sorted	3.00	31.50
Biosparite Crinoid, medium arenite, moderate sorting	4.00	35.50
Biosparite foraminifera, fine arenite, well sorted	1.00	36.50
Biosparite Crinoid, buff-grey; coarse arenite crinoid, foraminifera, shell, *Koninckopora*, pellet and bryozoan debris, well sorted	4.45	40.95
Biosparite Algae; fine arenite algae-encrusted bioclasts, *Koninckopora*, crinoid, shell, foraminifera, coral and pelletal debris. Well sorted	10.20	51.15

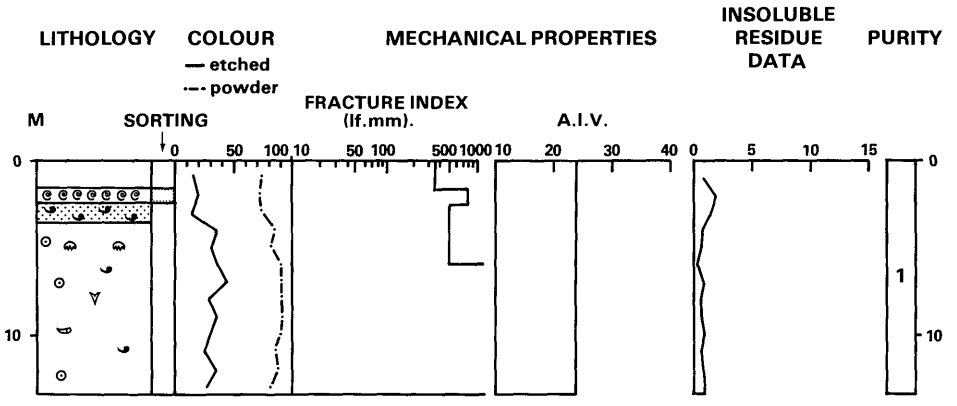
Section complete at 51.15 m



SK 07 SE 2S 0811 7240 Cowdale Quarry/Wye Dale
Surface level +306.87 m
September 1974

	Thickness m	*Depth* m
D_1 (Chee Tor Rock)		
Biosparite algae, pale grey; medium arenite crinoid and algae encrusted brachiopod debris, locally current sorted	3.50	3.50
Bimicrosparite algae, pale grey, very fine arenite, some algal nodules and laminations	2.00	5.50
Biosparite algae, pale grey, medium arenite, bioclasts commonly algae-encrusted, sporadic *Koninckopora*, moderate to good sorting	5.00	10.50
Biomicrosparite, mid-grey; fine arenite oncolitic debris, crinoid, dasycladacean algae and foraminiferal material, laminated, well sorted	2.00	12.50
Biomicrite, fine arenite, common foraminifera, well sorted	1.00	13.50
S_2 (Woo Dale Limestones)		
Biosparite algae, mid-grey; medium arenite bioclasts, moderate sorting	0.73	14.23
Biopelsparite, dark grey, very fine arenite, well sorted	1.40	15.63
Biopelsparite algae, buff-grey; medium arenite algae-encrusted bioclasts, moderate to good sorting	1.25	16.88
Pelsparite, mid-grey, very fine arenite, well sorted	0.90	17.78
Biopelsparite algae, mid-grey; fine arenite algae-encrusted bioclasts, *Koninckopora* and pelletal material, well sorted	0.73	18.51
Biosparite Brachiopod Calcisphere, mid-grey, fine arenite to fine rudite bioclasts, moderate sorting	0.99	19.50
Biosparite Calcisphere Foraminifera, dark grey, fine to medium arenite bioclasts, well sorted	0.61	20.11
Biopelsparite Calcisphere Algae, buff-grey; lutite to fine arenite pellet and bioclastic debris, well sorted	1.65	21.76
Biomicrite, buff-grey, fine to medium arenite, well sorted	0.74	22.50
Biosparite Dolomitised, mid-grey; fine to medium arenite bioclasts, abundant dolomite rhombs	1.00	23.50
Biosparite, mid-grey; fine arenite calcisphere, brachiopod and foraminifera debris	1.03	24.53
Micrite, pale buff-grey, patchy limonite staining	0.97	25.50
Biosparite Calcisphere Algae, mid-grey; very fine arenite to fine rudite bioclasts, moderate to good sorting	0.58	26.08
Biomicrite Calcisphere, mid-grey; fine arenite calcisphere, foraminifera and finely comminuted shell debris, locally patchily dolomitised and sporadic black clay partings in darker beds, well sorted	4.42	31.50
Micrite, grey-brown, frequent birdseye structures, well sorted	1.00	32.50
Biomicrite, mid grey-brown; abundant lutite and very fine arenite calcispheres and indeterminate comminuted bioclasts, well sorted	1.00	33.50
Micrite, buff-grey, locally common birdseye structures, some patchily silicified dolomite rhombs	3.40	36.90

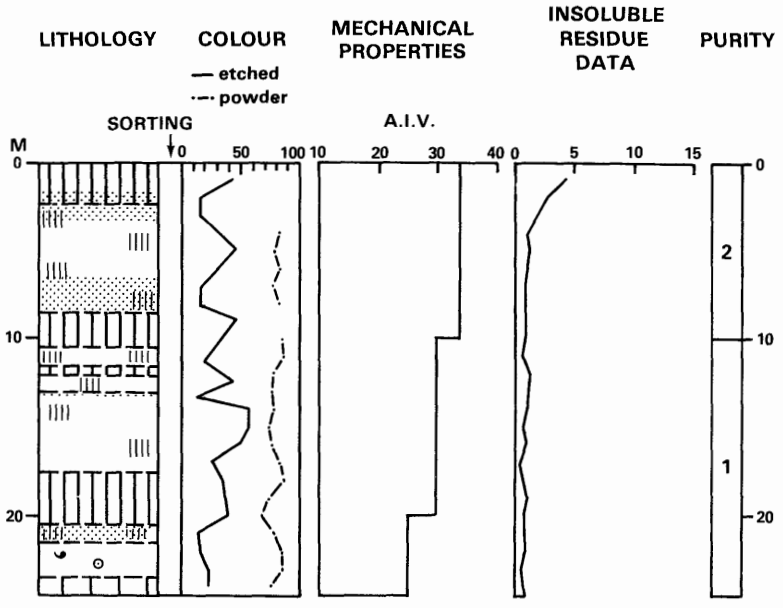
Section complete at 36.90 m



SK 07 SE 3S **0673 7484** **Brook House**
Surface level + 328.89 m
September 1974

	Thickness m	*Depth* m
P_2 (Eyam Limestones)		
Biosparite, dark grey-brown; coarse arenite brachiopod and crinoid debris, rare coral, moderate sorting, common disseminated clay	1.68	1.68
Biomicrite Foraminifera, dark grey, very abundant medium arenite *Saccaminopsis,* very well sorted	0.34	2.02
(Eyam Limestone–Knoll-reef)		
Biomicrosparrudite Brachiopod, mid-grey; coarse arenite to coarse rudite brachiopod and crinoid debris, poorly sorted	1.58	3.60
Biomicrite, pale grey, medium arenite, moderate to good sorting. Occasional coarse arenite crinoid and brachiopod debris, sporadic rudite laminated and convoluted algal structures	1.90	5.50
Biomicrite, pale grey, medium to coarse arenite brachiopod and crinoid debris, sporadic bryozoa rare coral. Massive	7.79	13.29

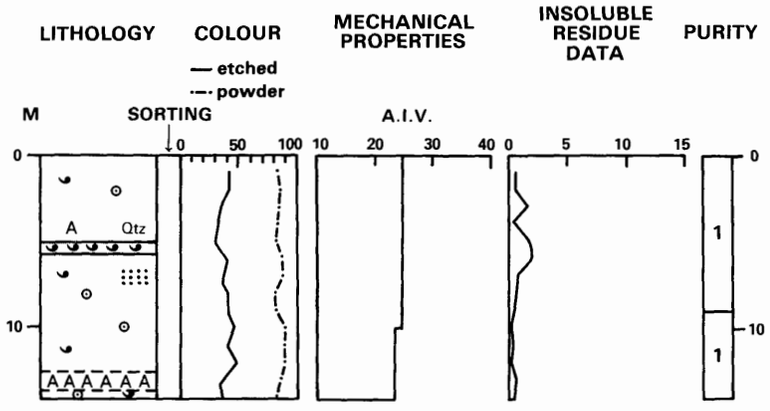
Section complete at 13.29 m



SK 07 SE 4S **0970 7259**
Surface level +241.64 m
September 1974

	Thickness m	*Depth* m
S_2 (Woo Dale Dolomite)		
Dolomite, buff-grey, granular, vuggy, original texture destroyed	2.75	2.75
Biomicrite Dolomitised, dark grey; medium arenite brachiopod, crinoid and foraminiferal debris, abundant dolomite rhombs	1.50	4.25
Dolomite, buff-grey, granular, sporadic spar filled vugs	2.25	6.50
Biomicrite Dolomitised, dark grey; medium arenite brachiopod and crinoid debris, abundant dolomite rhombs	2.25	8.75
Dolomite, pale grey, granular	1.50	10.25
Biomicrite Dolomite, dark grey, medium arenite	1.50	11.75
Dolomite, pale grey, granular	1.00	12.75
Biomicrite Dolomite, dark grey, medium arenite	0.75	13.50
Dolomite, grey, sporadic spar filled vugs	3.00	16.50
Biomicrite Dolomitised, dark grey, occasional arenite brachiopod and crinoid debris, abundant dolomite rhombs	1.00	17.50
Dolomite, pale buff-grey, rare medium arenite crinoid moulds	3.00	20.50
Biomicrite Dolomitised, dark grey, some arenite bioclasts	1.00	21.50
Biomicrite, mid-grey; medium arenite brachiopod, crinoid and foraminiferal debris, moderate to good sorting	2.00	23.50
Biomicrite Dolomitised, dark grey, sporadic arenite bioclasts, abundant dolomite rhombs	1.10	24.60

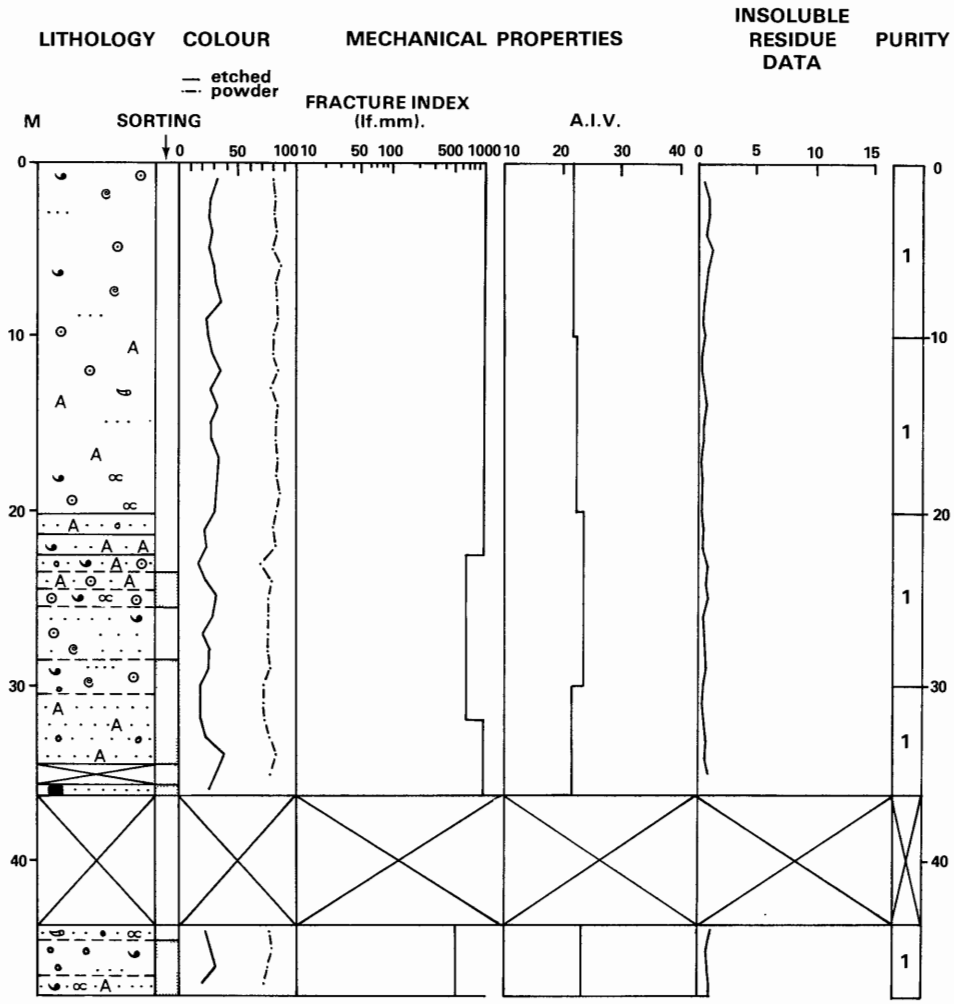
Section complete at 24.60 m



SK 07 SE 5S 0607 7283 Gas Works, Buxton
Surface level +293.72 m
September 1974

	Thickness m	*Depth* m
D_1 (Chee Tor Rock)		
Biosparite, pale grey; medium arenite brachiopod, crinoid, *Koninckopora*; subordinate peloid debris, moderate sorting. Sporadic quartz euhedra	12.50	12.50
Biosparite Algae, pale grey, medium arenite, abundant *Koninckopora*	1.00	13.50
Biosparite, pale grey, medium arenite, moderate sorting	0.40	13.90

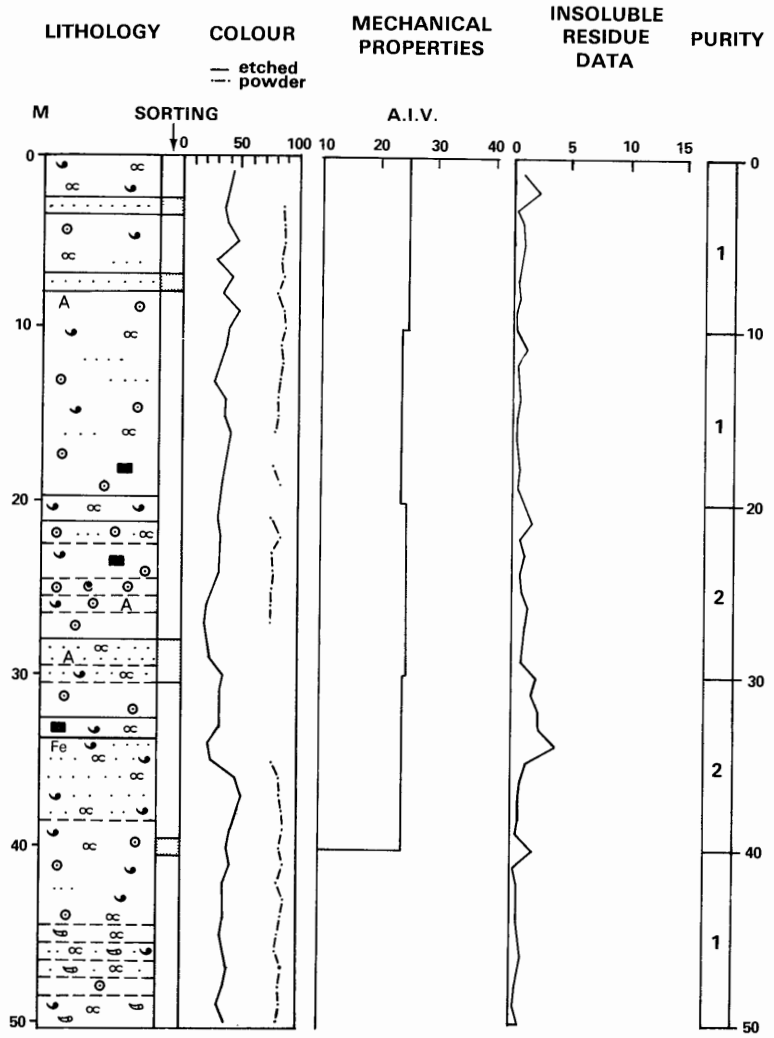
Section complete at 13.90 m



SK 07 SE 6S **0980 7139** **Deep Dale**
Surface level +301 m
September 1974

	Thickness m	*Depth* m
D_1 (Chee Tor Rock)		
Biosparite, buff-grey, lightly mottled; fine arenite comminuted crinoid, shell, foraminifera and occasional *Koninckopora*, well sorted. Rare rudite bioclasts and coral; sporadic algae-encrusted bioclasts. Some quartz euhedra	20.17	20.17
S_2 (Woo Dale Limestones)		
Biopelsparite, mid buff-grey, fine arenite, sporadic *Koninckopora* and calcispheres, well sorted. Some quartz euhedra	1.33	21.50
Biosparite Algae Pellet, mid-buff-grey; fine arenite dasycladacean pellet, calcisphere and finely comminuted bioclastic debris, sporadic fine rudite brachiopod and crinoid debris, well sorted	1.04	22.54
Biopelsparite, mid-grey, fine arenite, well sorted, some quartz euhedra	0.96	23.50
Biosparite Algae Pellet, grey-brown, fine to coarse arenite, moderate sorting	1.00	24.50
Biosparite Crinoid Brachiopod, buff-grey; coarse arenite crinoid and algae-corroded brachiopod debris, poorly sorted	1.00	25.50
Biopelsparite, buff-grey; fine to coarse arenite brachiopod, crinoid, pellet, foraminifera, and encrusting algal debris. Well sorted	3.00	28.50
Biosparite, buff-grey, medium to coarse arenite crinoid, brachiopod, foraminifera, spine, pellet and calcisphere debris, moderate to good sorting	2.00	30.50
Pelsparite Algae, mid-buff-grey; fine to medium arenite, pelletal debris, frequent *Koninckopora*, well sorted. Sporadic quartz euhedra	4.00	34.50
Gap	1.26	37.56
Pelsparite Algae, mid-grey, lightly mottled, frequent quartz euhedra	0.50	36.26
Gap	7.44	43.70
Pelsparite Algae, mid-grey, medium arenite, sporadic oncolites, calcispheres and coral, poorly sorted	0.80	44.50
Biosparite calcisphere, buff-grey, fine arenite, frequent calcispheres, well sorted	2.00	46.50
Pelsparite Algae, mid-buff-grey, fine arenite algae-encrusted bioclasts, *Koninckopora* and pelletal debris, well sorted, common quartz euhedra	1.10	47.60
Section complete at 47.60 m		

07 SE 7S


LITHOLOGY
COLOUR
— etched
··· powder
MECHANICAL PROPERTIES
INSOLUBLE RESIDUE DATA
PURITY
M
SORTING
A.I.V.
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50
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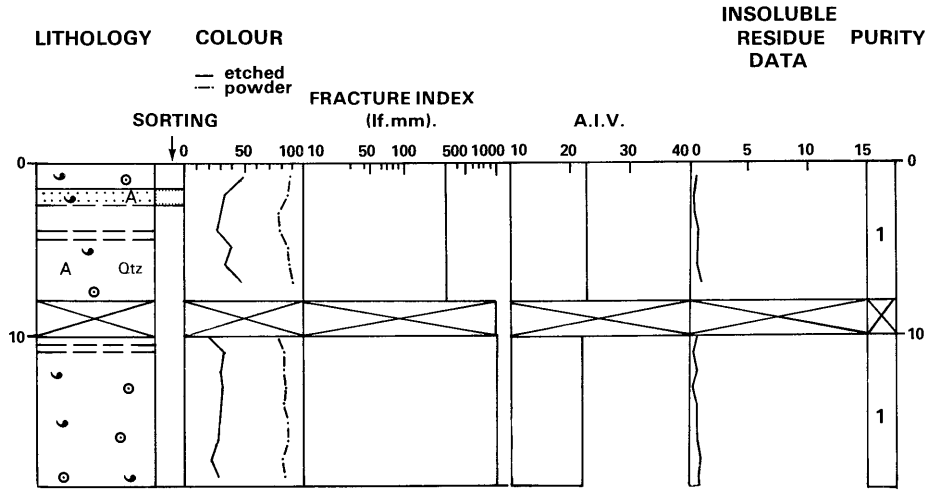
40
50

SK 07 SE 7S 0638 7064 Harpur Hill Quarry
Surface level +434.6 m
September 1974

	Thickness m	*Depth* m
D_1 (Bee Low Limestones)		
Biosparite Brachiopod algae, buff-grey; fine arenite to fine rudite algae-encrusted brachiopod debris, crinoid, foraminifera, spine and pelletal material, poorly sorted	2.50	2.50
Pelsparite, pale buff-grey, fine to medium arenite, very well sorted	1.00	3.50
Biosparite, buff-grey; coarse arenite, moderate sorting	3.40	6.90
Pelsparite, pale buff-grey, fine to medium arenite, well sorted	1.00	7.90
Biosparite Crinoid Brachiopod, grey-brown; fine arenite to fine rudite crinoid, brachiopod, *Koninckopora*, pelletal and algae-encrusted bioclasts, poor to moderate sorting	11.90	19.80
Biosparrudite Brachiopod Algae, pale buff-grey; fine arenite to medium rudite algae-encrusted brachiopod debris, poorly sorted. Sporadic coral. Locally laminated	1.40	21.20
Biosparite Crinoid, buff-grey; very fine arenite to medium rudite bioclasts, moderate sorting	1.30	22.50
Biomicrite Crinoid Brachiopod, buff-grey, mottled to mid-grey, fine arenite to fine rudite, poorly sorted. Scattered quartz euhedra	2.00	24.50
Biosparite Crinoid Foraminifera, buff-grey, coarse arenite	1.00	25.50
Biosparite Crinoid Brachiopod algae, mid-grey, fine arenite to medium rudite, poorly sorted	2.50	28.00
Pelsparite Algae, buff-grey, fine arenite, well sorted	1.50	29.50
Biosparite Pellet algae, buff-grey, fine arenite, well sorted	1.00	30.50
Biosparite Crinoid, mid-grey, coarse arenite, moderate sorting	2.00	32.50
Biosparite, buff-grey mottled, fine to coarse arenite, moderate sorting	1.32	33.82
Biosparite Pellet algae, grey-brown; fine arenite to fine rudite algae-encrusted brachiopod debris, subordinate crinoid debris, moderate to good sorting, patchy hematite staining	4.68	38.50
Biosparite Brachiopod Crinoid algae, buff-grey, fine arenite to fine rudite, variable sorting	6.00	44.50
Biosparite Coral, algae, buff-grey, fine arenite, moderate sorting	1.00	45.50
Biopelsparite Algae Coral Brachiopod, buff-grey, fine arenite bioclasts thickly encrusted with algae	1.00	46.50
Biosparite Coral Algae Pellet, buff-grey, fine arenite to medium rudite, poor sorting	1.00	47.50
Biomicrite Crinoid, buff-grey, fine arenite to fine rudite, moderate sorting	1.00	48.50
Biosparite Brachiopod Algae Coral, buff-grey very fine arenite to coarse rudite, poorly sorted	1.92	50.42

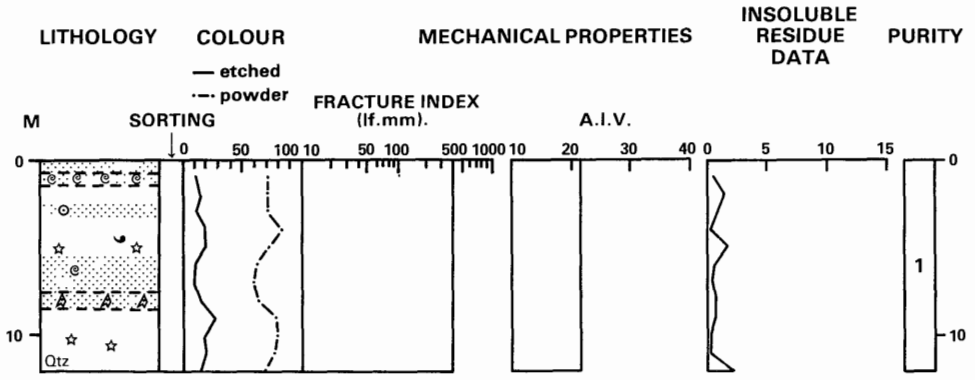
Base of section 50.42 m



SK 07 SE 8S 0975 7477
Surface level + 354.42 m
October 1976

	Thickness m	*Depth* m
D_1 (Chee Tor Rock)		
Biosparite, pale grey; medium arenite crinoid and brachiopod debris, moderate to good sorting	1.50	1.50
Biopelsparite, pale grey, fine to medium arenite, well sorted	1.00	2.50
Biosparite, grey mottled, medium arenite, moderate sorting	3.00	5.50
Biosparite, pale grey; medium arenite brachiopod, crinoid, foraminifera and *Koninckopora* debris, moderate sorting, scattered quartz euhedra	2.00	7.50
Gap	2.00	9.50
Biosparite, grey; fine to medium arenite bioclastic debris, moderate to good sorting	9.00	18.50

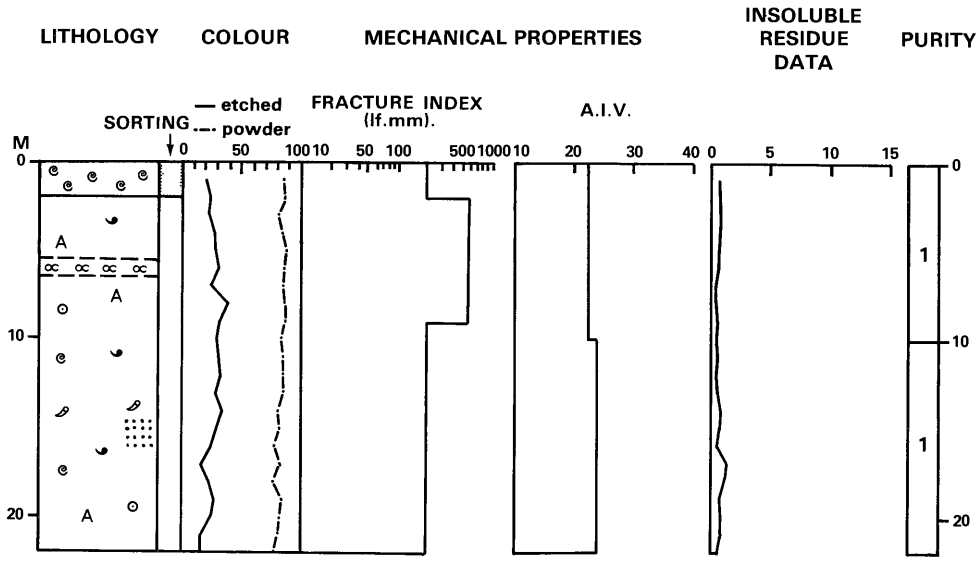
Section completed at 18.50 m



SK 07 SE 9S 0810 7267 Ashwooddale Quarry
Surface level +263.3 m

	Thickness m	*Depth* m
S_2 (Woo Dale Limestones)		
Biosparite, dark grey, medium arenite crinoid, brachiopod, foraminifera and calcisphere debris, well sorted	1.50	1.50
Biomicrite, grey, rare fine arenite bioclasts, occasional birdseye structures, common quartz euhedra	1.00	2.50
Biosparite, mid-grey, medium arenite, moderate to good sorting	2.00	4.50
Micrite, grey, occasional birdseye structures, common quartz euhedra	1.00	5.50
Biomicrite, dark grey; fine arenite foraminifera and calcispheres	2.00	7.50
Biomicrite gastropod, mid-grey occasional gastropod debris	1.00	8.50
Biosparite, buff-grey, medium arenite, common calcisphere debris, scattered quartz euhedra	3.50	12.00

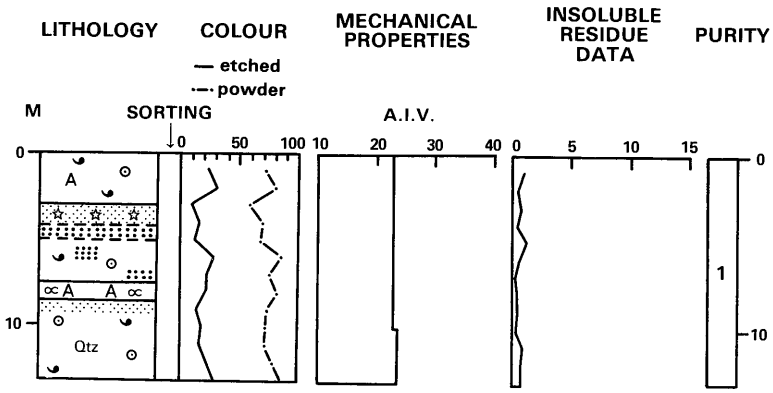
Section complete at 12.00 m



SK 07 SE 10S 0983 7022 Horseshoe Dale
Surface level + 313.05 m
October 1976

	Thickness m	*Depth* m
D_1 (Chee Tor Rock)		
Biosparite Foraminifera, pale grey; fine to medium arenite foraminifera, crinoid and brachiopod debris, well sorted	2.20	2.20
Biosparite, grey; medium arenite foraminifera, shell, crinoid, and *Koninckopora* debris, moderate sorting	3.30	5.50
Biosparite algae, grey, common algae-encrusted shell debris	1.00	6.50
Biosparite, grey; medium arenite brachiopod, crinoid, foraminifera and *Koninckopora* debris, well sorted	8.00	14.50
Biosparite, buff-grey; fine arenite bioclasts, moderate sorting	7.50	22.00

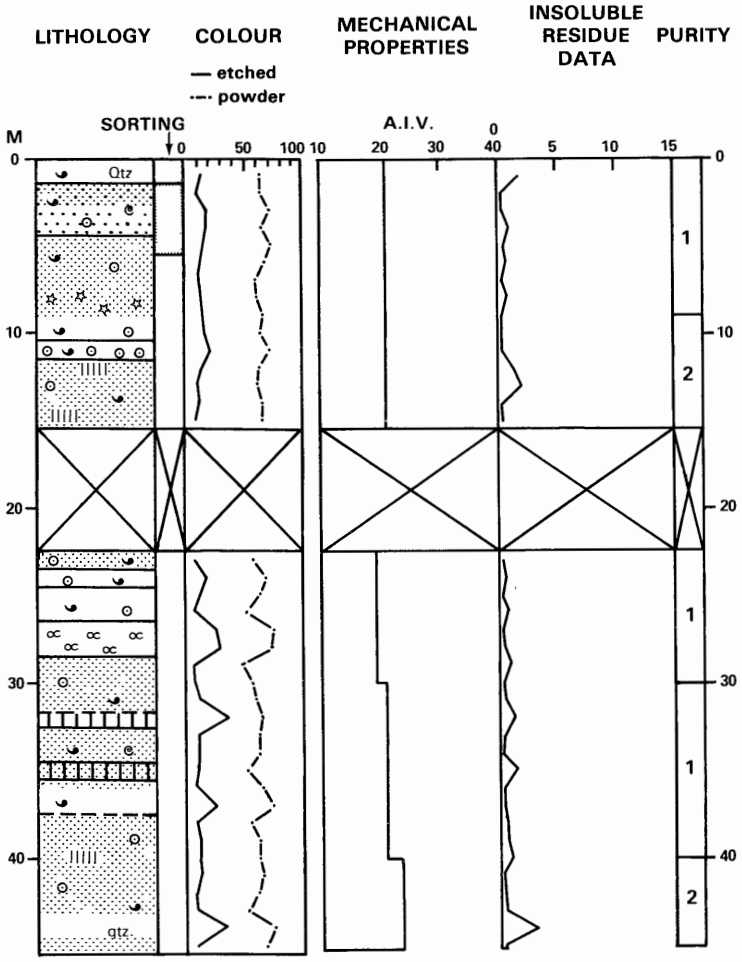
Section complete at 22.00 m



SK 07 SE 11S **0960 7068** **Back Dale**
Surface level +276.93 m
October 1976

	Thickness m	*Depth* m
D_1 (Chee Tor Rock)		
Biosparite, grey; medium arenite brachiopod, crinoid, *Koninckopora* and foraminifera debris, moderate sorting, scattered, quartz euhedra	2.90	2.90
S_2 (Woo Dale Limestones)		
Biomicrite, dark grey, fine to medium arenite, common birdseye structures, moderate sorting	0.60	3.50
Biopelsparite, mid-grey, fine to medium arenite, well sorted	1.00	4.50
Biomicrite, dark grey, moderate sorting	1.00	5.50
Biosparite, grey, fine to medium arenite, poorly sorted	2.00	7.50
Biosparite Algae, mid-grey, common algae-encrusted bioclasts	1.00	8.50
Biomicrite, dark grey; medium arenite brachiopod, crinoid, foraminifera and calcisphere debris	4.50	13.00

Section complete at 13.00 m

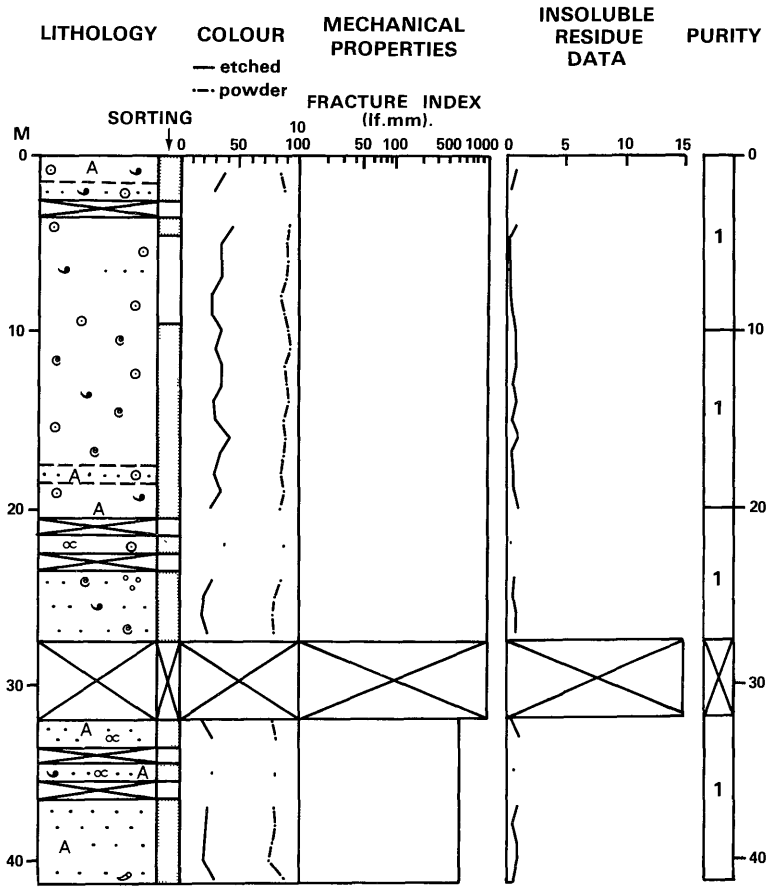


SK 07 SE 12S **0976 7224** **Topley Pike Quarry**
Surface level +310.47 m
October 1976

	Thickness m	*Depth* m
S_2 (Woo Dale Limestones)		
Biomicrosparite, dark grey, fine to medium arenite, scattered quartz euhedra, well sorted	1.50	1.50
Biopelsparite, dark grey; fine to medium arenite pelletal and bioclastic debris, well sorted	2.00	3.50
Biosparite, mid-grey, medium arenite, well sorted	4.00	7.50
Biomicrite, dark grey, locally common calcispheres, common birdseye structures	3.00	10.50
Biomicrosparite Calcisphere, mid-grey, fine arenite, well sorted	1.00	11.50
Biomicrite, dark grey, medium arenite, patchily dolomitised	2.00	13.50
Biomicrosparite, dark grey, medium arenite, well sorted	2.00	15.50
Gap	7.00	22.50
Biomicrosparite, dark grey; fine to medium arenite calcisphere and foraminifera debris	1.00	23.50
Biomicrite calcisphere, mid-grey, fine to medium arenite, well sorted, sporadic dolomite rhombs	3.00	26.70
Biosparite Algae, grey; fine to medium arenite oncolites and comminuted bioclasts, moderate sorting	2.10	28.80
Biomicrite, dark grey, fine arenite, common disseminated clay	2.70	31.50
Biomicrite Dolomitised, dark grey, common dolomite rhombs	1.00	32.50
Biomicrosparite, dark grey, fine arenite, well sorted	2.00	34.50
Biomicrite Dolomitised, dark grey, common dolomite rhombs	1.00	35.50
Biomicrosparite, dark grey, fine arenite	1.00	36.50
Biosparite, pale grey, fine to medium arenite, moderate sorting	1.00	37.50
Biomicrosparite, dark grey, fine to medium arenite, locally disseminated clay	2.00	39.50
Biosparite, dark grey, abundant coral, gastropod, pellet and shell debris 39.80–40.80 m, moderate sorting. Patchily dolomitised, locally disseminated clay	4.00	43.50
Biomicrosparite, pale grey, medium arenite, sporadic quartz euhedra	1.00	44.50
Biosparite, dark grey; medium arenite bioclastic and foraminiferal debris	1.00	45.50

Section complete at 45.50 m

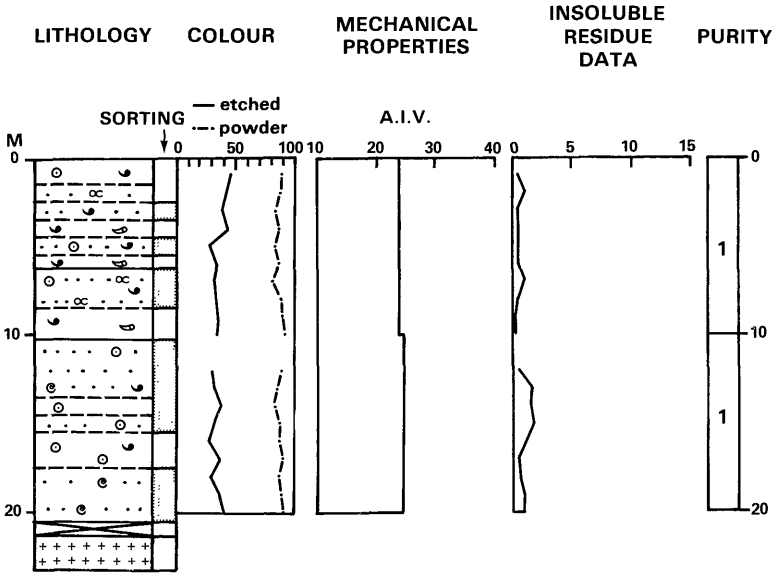
07 SE 13S



SK 07 SE 13S 0553 7149 Grinlow Plantation
Surface level + 368.86 m
May 1977

	Thickness m	*Depth* m
D_1 (Bee Low Limestones)		
Biosparite, pale grey, fine arenite, well sorted	1.50	1.50
Biopelsparite, pale grey, fine arenite, well sorted	1.00	2.50
Gap	1.00	3.50
Biosparite Crinoid, medium arenite, occasional rudite crinoid debris, common arenite comminuted shell, foraminifera, pellet, crinoid and dasycladacean algae debris. Moderate to good sorting	6.00	9.50
Biosparite Foraminifera, fine arenite, well sorted, locally common quartz euhedra	8.00	17.50
Biopelsparite, buff-grey, coarse arenite, well sorted	1.00	18.50
Biosparite Crinoid; coarse arenite crinoid, brachiopod, dasycladacean algae and foraminiferal debris, moderate to good sorting	1.00	20.50
Gap	1.00	21.50
Biosparite Crinoid, occasional algae-encrusted and corroded bioclasts	1.00	22.50
Gap	1.00	23.50
Biopelsparite; fine arenite comminuted foraminifera, crinoid, shell and calcisphere debris, well sorted	4.00	27.50
Gap	4.40	31.90
Biosparite, fine arenite, well sorted	0.60	32.50
Pelsparite algae; medium arenite pellet and algae-encrusted bioclasts, well sorted, common quartz euhedra	1.00	33.50
Gap	1.00	34.50
Biopelsparite algae, coarse arenite, locally common *Koninckopora*, moderate sorting	1.00	35.50
Gap	1.00	36.50
S_2 (Woo Dale Limestones)		
Pelsparite, mid-grey, fine arenite, locally algae-laminated, sporadic coral, calcispheres and *Koninckopora*, well sorted	4.80	41.30

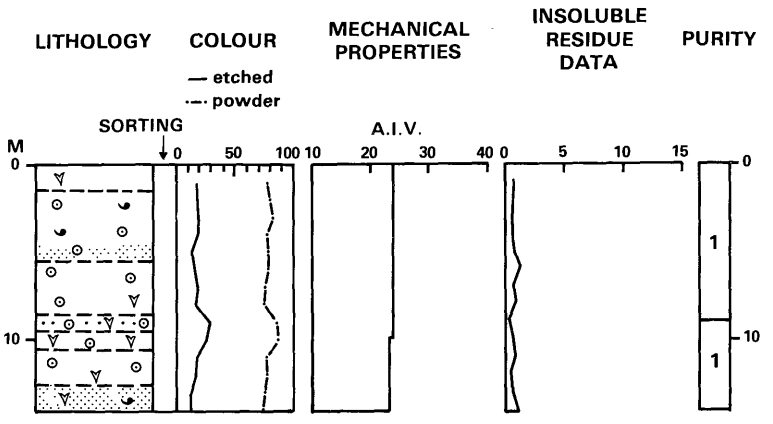
Section complete at 41.30 m



SK 07 SE 14S 0702 7027 Railway cutting, Hillhead
Surface level + 371.08 m
May 1977

	Thickness m	*Depth* m
D_1 (Miller's Dale Limestones)		
Biosparite, pale grey, fine arenite, moderate sorting	1.50	1.50
Biopelsparite Algae, coarse arenite, frequent oncolites, common quartz euhedra	1.00	2.50
Biopelsparite, medium arenite, well sorted	1.00	3.50
Biosparite Coral, pale grey, fine arenite, common rudite coral	1.00	4.50
Biopelsparite, buff-grey, medium arenite, moderate to good sorting	1.00	5.50
Biosparite, fine arenite	0.70	6.20
Biopelsparite Algae, buff-grey, fine arenite, common oncolites, well sorted	2.30	8.50
Biosparite Coral, pale grey, coarse arenite, poorly sorted	1.70	10.20
Biopelsparite, buff-grey, fine arenite, well sorted, some quartz euhedra	3.20	13.50
Biosparite Crinoid, medium arenite, well sorted. Common quartz euhedra	1.00	14.50
Biopelsparite Crinoid, coarse arenite, common quartz euhedra, well sorted	1.00	15.50
Biosparite Crinoid, coarse arenite, sporadic quartz euhedra	2.00	17.50
Biopelsparite Foraminifera, pale grey, medium to coarse arenite, sporadic quartz euhedra, well sorted	3.00	20.50
Gap	0.90	21.40
(Lower Miller's Dale Lava)		
Basalt, weathered, amygdaloidal		

Section complete at 21.40 m



SK 08 SE 1S **0575 6910** **Tor Top**
Surface level + 327.03 m
June 1977

	Thickness m	*Depth* m
D1 (Bee Low Limestones, Apron-reef)		
Biomicrite Bryozoa, grey; arenite bryozoa, rare calcispheres, sporadic geopetal cavities, moderate sorting	1.50	1.50
Biosparrudite Crinoid Brachiopod, grey, medium rudite, rare fragments of bryozoa, poor sorting, some clay partings	4.00	5.50
Biomicrudite Crinoid, grey, medium rudite, rare coral and bryozoa, poorly sorted, rare patchy silicification, rare flecks of bitumen	3.00	8.50
Biopelsparite Crinoid bryozoa, buff-grey; arenite and rudite crinoid, comminuted bioclastic and pelletal debris, poorly sorted	1.00	9.50
Biosparudite Bryozoa, buff-grey, common rudite bryozoa and crinoid debris, occasional geoptal cavities, poorly sorted	1.00	10.50
Biomicrudite Crinoid bryozoa, grey, rudite-sized bioclasts, poorly sorted, patchy limonite staining	2.00	12.50
Biomicrite Bryozoa, grey, sporadic bryozoan debris, rare bivalves, poorly sorted, patchy limonite staining	1.60	14.10

Section complete at 14.10 m

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INSTITUTE OF GEOLOGICAL SCIENCES

INDUSTRIAL MINERALS ASSESSMENT UNIT

THE LIMESTONE AND DOLOMITE RESOURCES OF SHEET SK07 AND PARTS OF SK06 AND SK08 (BUXTON)

77

GENERALISED VERTICAL SECTION AND EXPLANATION OF STRATIGRAPHICAL SYMBOLS

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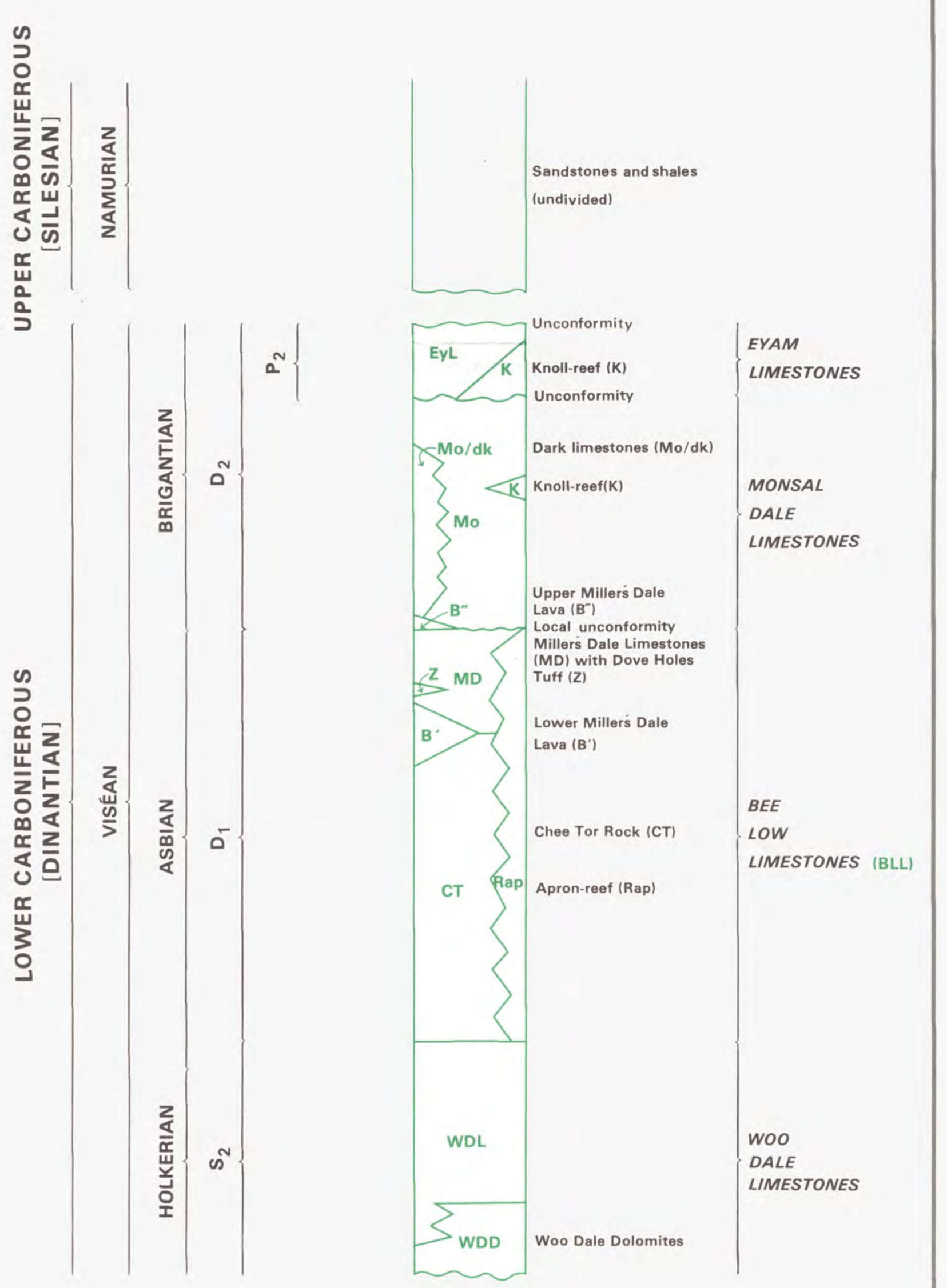

HORIZONTAL SECTIONS SHOWING GENERALISED LIMESTONE CATEGORIES AT DEPTH

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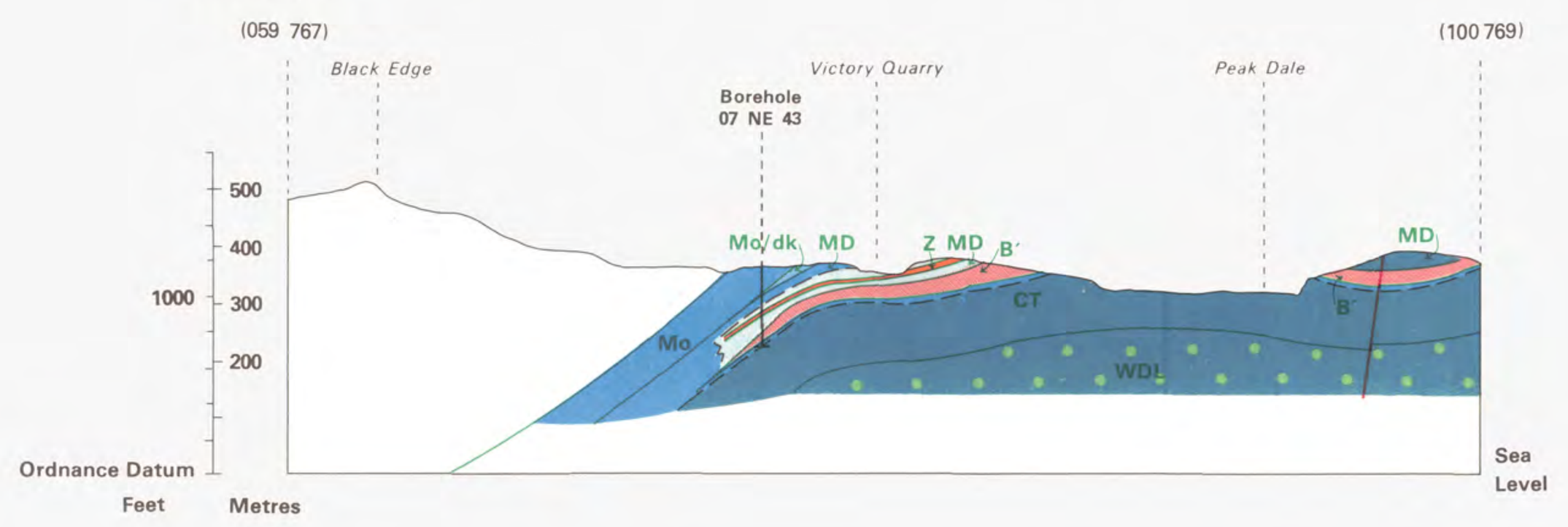

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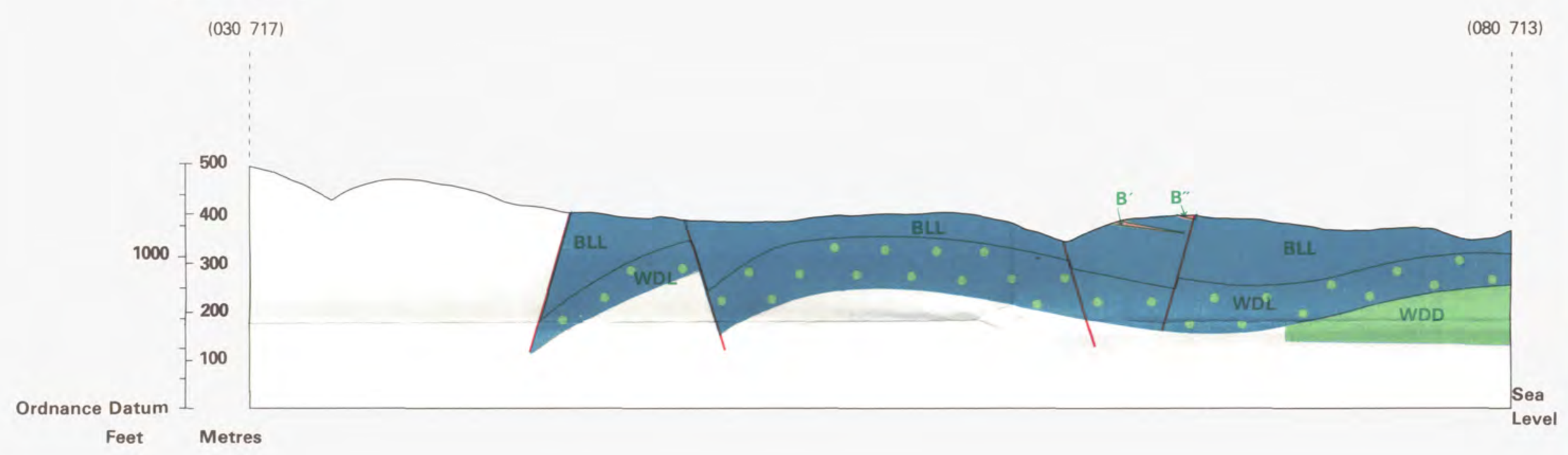

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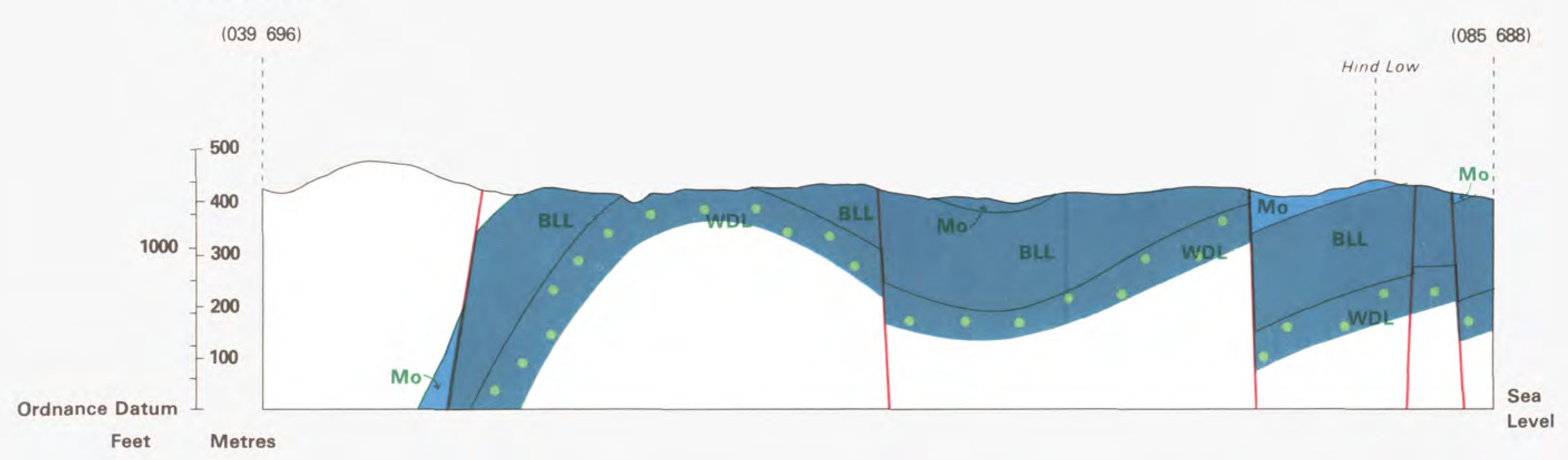

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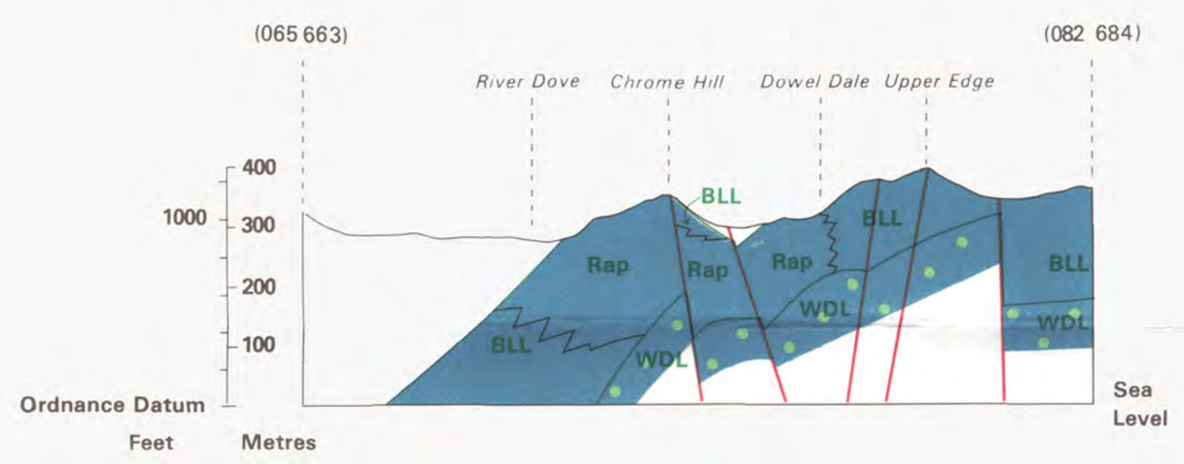


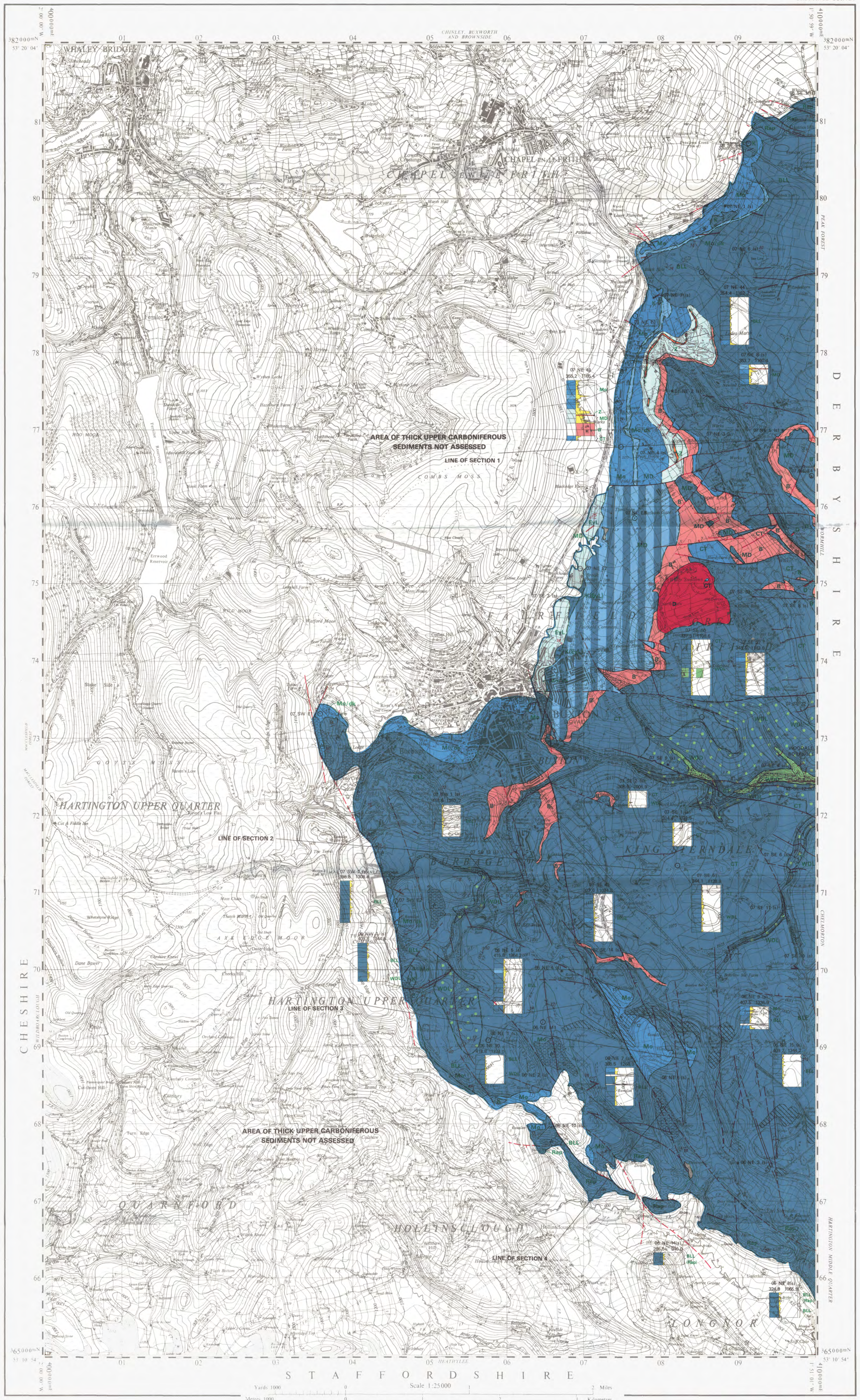
Horizontal Scale 1:25 000
Vertical Exaggeration 2×

PROVISIONAL EDITION

Scale 1:25 000 or about 2½ Inches to 1 Mile

SHEET SK 07 & Pts of 06,08

ORDNANCE SURVEY



This map should be read in conjunction with the accompanying Report which contains details of the assessment of resources.

EXPLANATION OF SYMBOLS AND ABBREVIATIONS

CATEGORIES OF LIMESTONE

	Category	Composition (%CaCo₃)
CAT-L1	Very high purity	> 98.5
CAT-L2	High purity	97.0-98.5
CAT-L19	Medium purity	93.5-97.0
CAT-L20	Low purity	85.0-93.5

UNDIVIDED VERY HIGH PURITY TO MEDIUM PURITY LIMESTONES — CAT-L33

LIMESTONES LIKELY TO BE AFFECTED BY DOLOMITISATION — CAT-L34

DOLOMITE — DOL-5

MUDSTONE (NAMURIAN) — MUD-3

IGNEOUS ROCKS

- IGR-6 — B Basalt lava
- IGR-4 — D Dolerite
- IGR-3 — Z Tuff

DRIFT

- Alluvium
- Head

MADE GROUND — MG-2

LANDSLIP — L-1 (If it exists at all!)

BOUNDARY LINES — CAPTURE where ✓

- ✓ Boundary between categories
- ✓ Boundary of assessed area
- Geological boundary, Drift
- ✓ Geological boundary, Solid (ONLY WHERE CO-INCIDENT WITH CATEGORY BOUNDARIES)

STRUCTURAL LINES

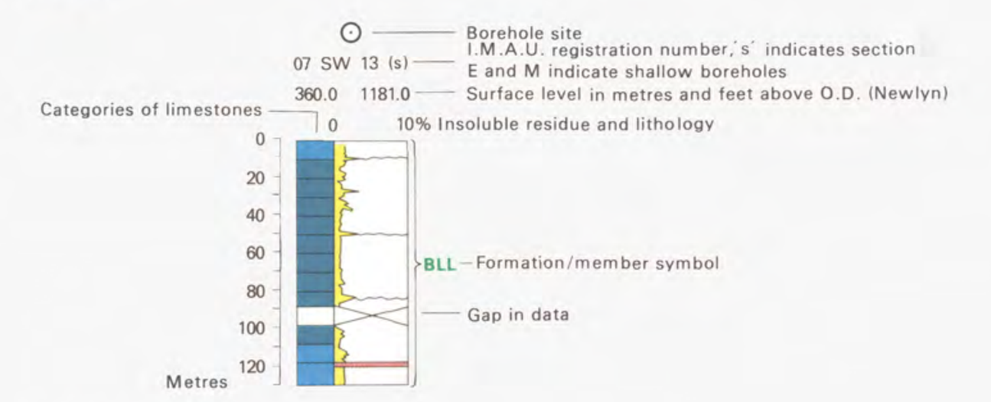
- Inclined strata, dip in degrees
- Gently inclined strata
- Anticlinal axis
- Synclinal axis
- ✓ Fault at surface, crossmark indicates downthrow side
- ✓ Mineral vein; where veins are also faults crossmark indicates downthrow side

BOREHOLE AND SECTION DATA

SITE LOCATIONS

- Industrial Mineral Assessment Unit Boreholes
- Other boreholes
- Collected section (brackets indicate limits)
- Additional collected section

FORMAT

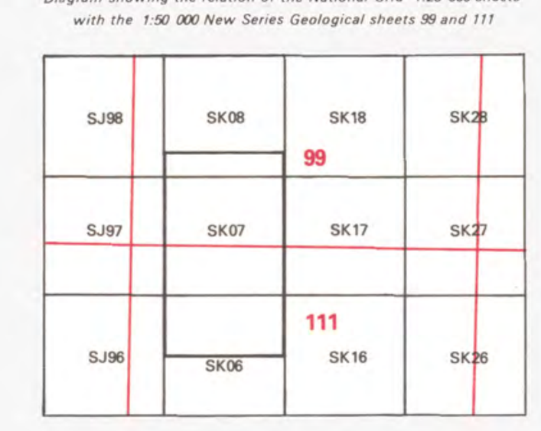


LITHOLOGICAL SYMBOLS

- Clay wayboard
- Dolomitised limestones
- Basalt lava
- Tuff

Detailed records may be consulted on application to the Head of the Industrial Minerals Assessment Unit at the Keyworth office of the Institute of Geological Sciences.

Diagram showing the relation of the National Grid 1:25 000 sheets with the 1:50 000 New Series Geological sheets 99 and 111



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