Natural Environment Research Council

Institute of Geological Sciences

Mineral Reconnaissance Programme Report

A report prepared for the Department of Industry

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No. 64

A mineral reconnaissance of the Dent–Ingleton area of the Askrigg Block, northern England

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A mineral reconnaissance of the Dent—Ingleton area of the Askrigg Block, northern England

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London 1983

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Mineral Reconnaissance Programme Reports

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Bibliographic reference
Bateson, J. H. and Johnson, C. C. 1983.
A mineral reconnaissance of the Dent—Ingleton area of the Askrigg Block, northern England *Mineral Reconnaissance Programme Rep. Inst. Geol. Sci.*, No. 64

Printed in England for the Institute of Geological Sciences by Imediaprint

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SUMMARY

The western margin of the Askrigg Block has been investigated by regional geochemical reconnaissance. This took the form of a drainage basin survey with the collection of stream sediments (306 samples), panned concentrates (149 samples), and waters (278 samples) over an area of c.450 km^2. In addition, following an observation of a moss-like plant with tolerance to high levels of base metals, a soil survey was carried out on Tow Scar, 3 km to the northwest of Ingleton.

The drainage basin survey reveals no new major mineralisation though minor mineral shows have been located following investigation of some anomalous sites. The soil survey led to the discovery of minor mineralisation, which suggests that similar occurrences might exist adjacent to the Craven Fault system east of Ingleton.

INTRODUCTION

This report covers the western area of the Askrigg Block, namely the upper part of Wensleydale (west of Hawes), Widdale, Dentdale, Kingsdale and the upper reaches of the Ribble Valley (Figure 1). Generally flat-lying or slightly tilted coarse sandstone of Millstone Grit age caps the higher land of the area, the highest peaks of which are Ingleborough (723 m) and Whernside (736 m). Soils range from the poorly drained peats to the very thin soils of the limestone pavement areas. The drainage system occupies broad valleys in which variable amounts of glacial and alluvial material has accumulated.

This area was selected for mineral reconnaissance for a number of reasons.

(i) There are mineralised areas on the Askrigg Block (e.g. Swaledale and Littondale), and a number of mineralised localities and mines are recorded within the area itself (Figure 2).

(ii) Its margins are bounded on two sides by major fault structures both of which are associated with mineral deposits.

(iii) Recently published work by Small (1978), and Ineson and Al-Badri (1980, 1981) suggest that the area has some potential for mineralisation.

Small (1978), in a study of mineralisation controls in the North Pennines, postulates that part of this area lies close to the source of mineralising fluids which he believes were responsible for the extensive ore-field in Wharfedale and Swaledale.

The work of Ineson and Al-Badri is summarised in two publications (1980, 1981) which discuss the data obtained from hydrogeochemical and stream sediment reconnaissance surveys. They demonstrate enhanced values for Zn and Cu in waters in the general area of the present investigation. Stream sediment data also indicate anomalous values (greater than mean plus two standard deviations) for Cu, Co and Ni in the same area. However, these authors were not able to confirm the 'zonation' of Small or recognise any pattern similar to that proposed by Dunham and Stubblefield (1944) for the Greenhow area of the Block.

GEOLOGY AND MINERALISATION

Sediments of Carboniferous age up to and including the Namurian underlie most of the area covered by this investigation (Figure 1). They rest with marked unconformity on steeply folded metamorphosed Ingletonian and Lower Palaeozoic sediments up to Silurian age. These 'basement' rocks outcrop in the valleys of the River Greta near Ingleton and the Ribble at Horton-in-Ribblesdale, and in the area adjacent to the Dent Fault NE of Sedburgh.

The base of the Carboniferous sequence is represented by the Orton Group (Dakyns and others, 1891), in which is included the major part of the most massive of the limestones in the sequence, the Great Scar Limestone, and which outcrops extensively in the valley bottoms and along the lower slopes of the fells. The upper part of the Great Scar is succeeded by a sequence of regularly alternating thin limestones, calcareous shales and sandstones which together comprise the Alston Group. The limestones, although relatively thin, are persistent and traceable throughout the area and the more arenaceous units are lenticular and much less persistent laterally. Arenaceous sedimentation becomes much more significant higher in the succesion with the sandstones and grits of the Millstone Grit Series forming the capping to the mesa-like fells. Locally, minor unconformities occur at the base of this Series. The Carboniferous succession has a gentle regional dip to the NNE.

Faulting, normally of moderate throw, has been mapped throughout most of the area but there is an increase in frequency in the north. This is related to the main, approximately E-W oriented, faulting (with related mineralisation) of Swaledale some 2 km beyond the northern margin of the area of investigation. Faults mostly trend NW-NNW and have moderate displacement; disturbance in attitude of affected strata is usually minimal. The major faults that have been used to define the boundaries of the area, the Dent and Craven systems, each have considerable measurable throw and in some areas affect the adjacent rock by oversteepening and contorting of the strata.

Apart from the geochemical investigations referred to earlier, the area has not been subject to modern exploration techniques. Some geophysical data are available for the area from the published 1:625 000 scale aeromagnetic map (Institute of Geological Sciences, 1972) and also gravity data from the 1:250 000 scale Bouguer Gravity Anomaly map (Institute of Geological Sciences, 1977).

Recorded mineral locations within the area are relatively few in number. Some are known to be associated with faulting though no common regional trend is discernible. Galena, sphalerite and chalcopyrite (or the derived carbonates) are the commonly recorded minerals, with some fluorite and baryte localities also known. Gangue material is varied, calcite and quartz being the commonest minerals. Table 1 gives details of mines and mineral occurrences in the Dent - Ingleton area.

GEOCHEMICAL RECONNAISSANCE

As the area has a well-developed active drainage system, the regional geochemical investigation was undertaken using stream sediment, panned concentrate and water samples. The stream sediments, 306 in total, were obtained using the techniques described by Plant (1971),

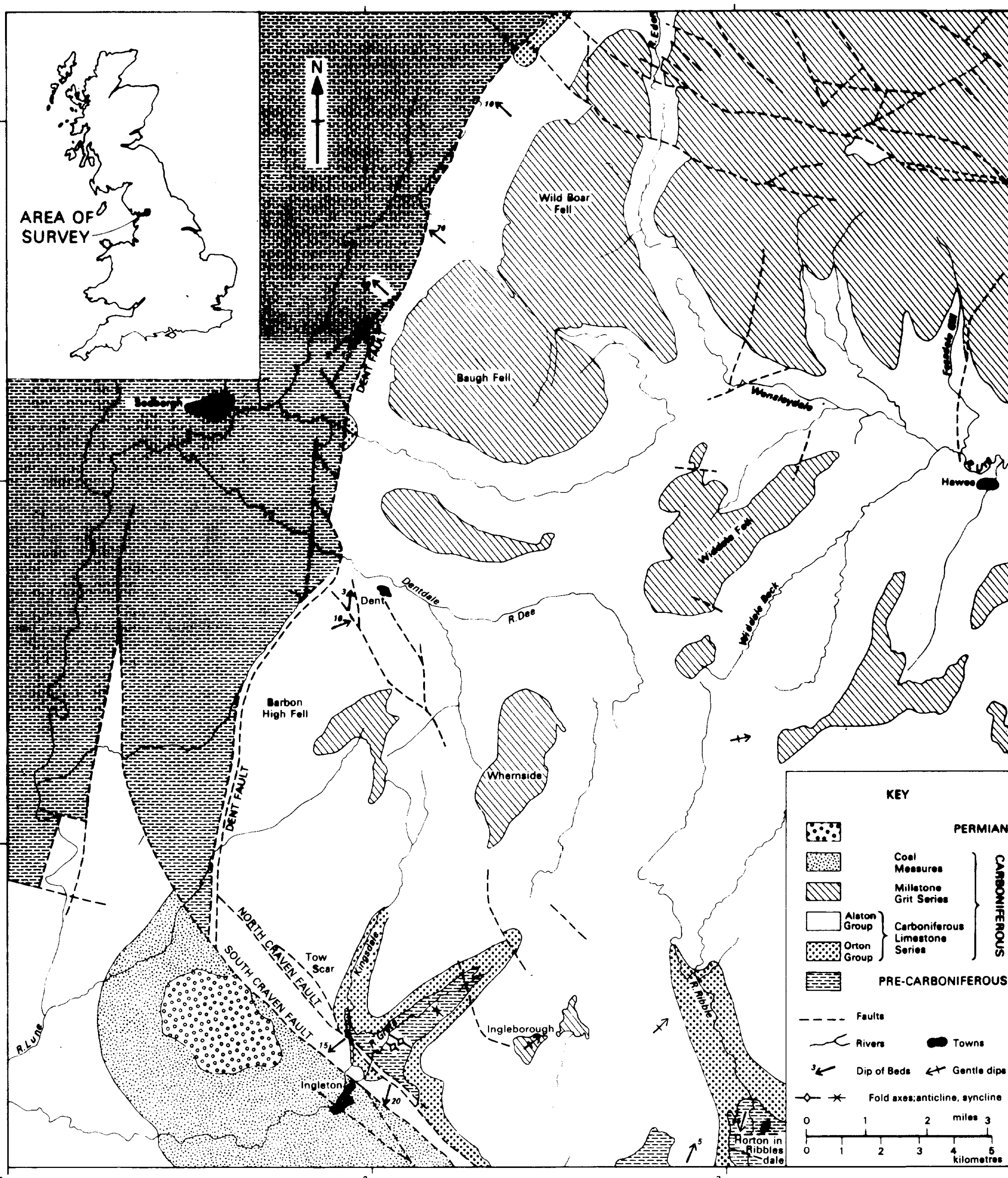

Figure 1 Geology map of the Dent - Ingleton area.

Table 1 Mines and mineral shows in the Dent - Ingleton area.

Number*	Locality	Grid Reference	Description†
1	Fossdale Gill	386 494	Disused mine. Ore from Main or Underset Limestone Gangue predominatly calcite and fluorite with rare baryte(?). Sphalerite, chalcopyrite and rare galeana.
2, 3, 4	Lover Gill	388 496	Disused mine. NNE vein with large downthrow to the NW. Barytes, calcite, fluorspar with galena.
5, 6	Turner Hill	378 493	Mineralisation found along planes (predominantly 070/66°N) in siliceous limestone (Underset Chert). Chalcopyrite in coarse quartz with secondary copper carbonates.
7, 8	Aisgill Moor	377 496	NE trending fault occupied by vein. Quartz with chalcopyrite.
9	Hazel Gill	377 499	ENE and WNW faults occupied by veins. Main gangue barytes and calcite with chalcopyrite.
10	Tow Scar	368 475	NNW trending calcite veins with chalcopyrite and copper carbonates. Associated with limestone containing siliceous nodules.
11	Blea Gill	375 489	NE trending quartz vein containing chalcopyrite in Simonstone Limestone.
12	Bardale Head	386 484	Old workings. NE vein. Chalcopyrite and galena.
13	Wether Fell	387 486	Old workings. ENE vein. Calcite and galena.
14, 15	Kingsdale Head	371 479	Veins. Calcite, baryte and chalcopyrite.
16	Mossdale Head	382 491	Sheets of well-formed, yellow fluorspar with chalcopyrite occurring along bedding planes.
17	Clouds Gill	373 499	Disused mine. Ore extracted in narrow gulleys running parallel to strike (NE) in Great Scar/ Robinson Limestone. Calcite and fluorite in veins with galena and chalcopyrite.
18	Head of Great Sled Dale	382 499	Old workings. Quartz, baryte, fluorspar, chalcopyrite and abundant malachite.
19	Hush Gutter	383 499	Disused mine. NE vein. Quartz, calcite, baryte, fluorite and chalcopyrite.
20	Hull Pot	382 474	NW fault. Traces of galena, sphalerite, chalcopyrite with calcite and baryte.
21	Beckermonds	387 480	NNE trending veins in Gayle Limestone with chalcopyrite.
22	Southwest Dodd Fell	381 482	NE trending lead vein in Main Limestone.
23	South Dodd Fell	384 484	NNE trending lead vein.
24, 25	West of Ingleborough	372 474	NW to NNW trending veins. Galena, baryte and chalcopyrite.

* Number refers to location marked on Figure 2.
† Compiled from one-inch geological map (sheets 40 & 50), Dakyns and others (1890, 1891), and observations made on location.

and the panned concentrates, 149 in all, by the classical gold panning method to produce about 30 g of concentrate. The stream sediments were analysed by AAS techniques for Cu, Pb, Zn, Ba, Mn and Co at the commercial laboratories of Mather Research Ltd, Rothbury (though Mn and Co are not discussed in this report). The panned concentrates were analysed by XRF, at the laboratories of the Institute in London, for Ce, Ba, Sn, Pb, Zn, Cu, Ca, Ni, Fe, Mn, Ti, Sr and Zr. Additionally 278 samples of surface stream waters were analysed for F by specific ion techniques. In this report only the Ba, Pb, Zn, Cu and Sn values for the panned concentrates are used. All the data from the drainage basin reconnaissance are listed in Appendix 1.

A small area underlain by Great Scar limestone adjacent to the North Craven Fault at Tow Scar [368 475], approximately 3 km to the NW of Ingleton, was selected as an area to be investigated by soil sampling. Interest in this area was stimulated by the report that two plant species (*Minuartia verna (L.) Hiern* and *Thalaspi alpestre*) which are characteristically tolerant to high heavy metal levels and are normally associated with the environment of old mine spoil heaps, had been identified from this locality (Dr W. Sledge, Leeds University, oral communication, June 1978).

Drainage basin reconnaissance

Data interpretation

Data from the drainage basin reconnaissance survey have been processed using the G-EXEC relational data base management system on an IBM 360/195 computer at the

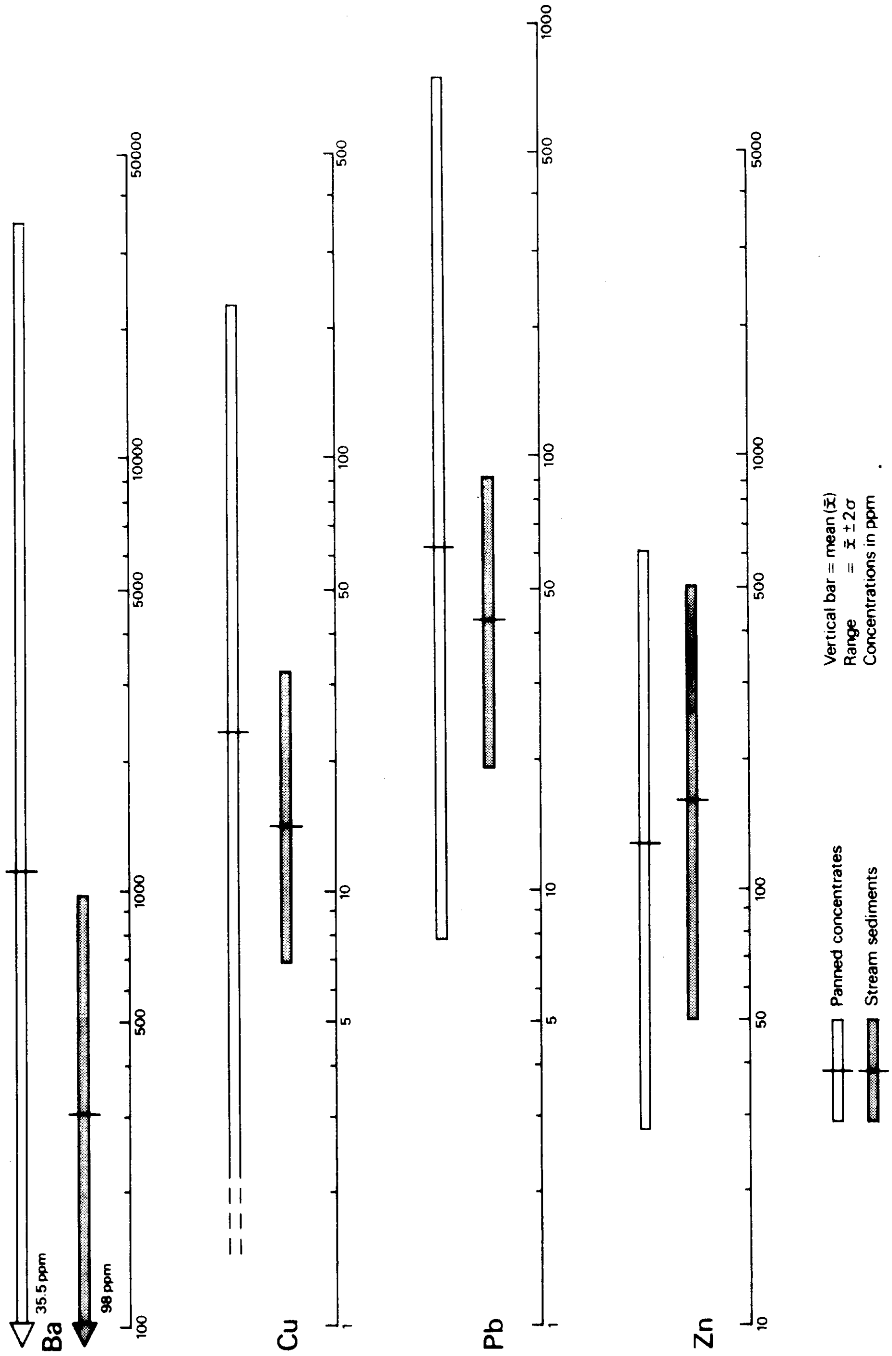

Figure 3 Element means and ranges for stream sediments and panned concentrates.

Rutherford Laboratories, Didcot. The data are presented and interpreted in the following way:-

1. Locational and analytical data are listed in Appendix 1.
2. Element logarithmic means and ranges (range is defined as logarithmic mean $\pm$ 2 standard deviations) are given in Figure 3 for the stream sediments and panned concentrates.
3. Elemental abundances are presented as class interval maps (Figures 4 - 12). Three classes are plotted - the lowest class represents the lowest 84 % of the number of samples in the data set, the middle class >84 % to <97.5%, and the highest class is the top 2.5 %. For the fluoride in water data classes were chosen arbitrarily as the majority of values were uniformly low.
4. The Sn data for the panned concentrate samples have been used to indicate artificial contamination - values in excess of 88 ppm Sn (the 92.5 % population interval) are regarded as being indicative of contamination. Having identified high Sn samples, contamination has been further investigated by optical examination of the concentrate samples. Results of such examination are indicated in Appendix 2.

Results

From the data derived from the stream sediments and panned concentates, four areas can be defined, each of which contains a number of anomalously high values (see Figure 13).

Area 1, the largest of the areas, lies astride the Dent Fault and may be considered a composite of two

adjacent drainage basins, the most northerly containing streams flowing from the known, and exploited, mineralisation at Cold Keld [3735 4995]. In the north the area is underlain by Carboniferous sediments, but to the south-west, west of the Dent Fault, there are sediments and volcanics of Ordovician and Lower Silurian age.

High barium values identify the mineralisation at Cold Keld and anomalously high levels of Ba, Cu, and Zn are found in Taythes Gill [370 495] flowing over the Lower Palaeozoic into the River Rawthey. Although available published literature does not indicate the presence of any mineralisation from this well-faulted area drained by Taythes Gill, the Dent Fault is represented by a zone of crushing which, where it crosses the Gill, is up to 10 m wide and which contains a considerable amount of baryte as a cementing material. Grains of sphalerite have also been noted and the presence of copper minerals is indicated by blue and green carbonates. Evidence of mineralisation is also seen in the predominantly shale and mudstone succession of the Ordovician Ashgill Series as calcite and quartz veining.

Area 2 which lies to the east of Area 1, includes tributaries flowing to the River Eden and is underlain by rocks of the Carboniferous succession varying from the carbonate/shales of the Alston Group to the grits and sandstones of the overlying Namurian. High copper values are common here, up to twice the calculated mean for the sediments, reflecting the presence of chalcopyrite in a pair of mineralised NE/SW faults. Anomalously high levels of barium are recorded in the panned concentrates with one value in excess of 12 % Ba (Hazel Gill 3777 4998) derived from a mineralised fault that crosses the catchment of this stream.

In Area 3 at Fossdale [386 494] high Pb, Ba and Zn levels are found in the stream sediments and panned concentrates, which are attributed to an exploited mineralised fault zone. In the stream sediments, the values for Pb, Ba and Zn are 10, 8 and 4 times the mean respectively. Values in the panned concentrates are high: barium up to 10.8 % and lead up to 1.9 %. Zinc, with values over 900 ppm, is seven times higher than the mean.

A further group of samples with anomalous values is located in streams draining from Barbon High Fell [367 482] (Area 4). Here the bedrock is composed of Carboniferous sediments, chiefly carbonates, faulted against the Upper Silurian to the west. Values for Cu in the stream sediments are generally only at the mean while lead attains levels about twice mean and zinc up to four times. Barium is also generally higher than background with a maximum of 540 ppm Ba. A maximum value of 0.7 % Ba is recorded from one of the sites in a panned concentrate [3662 4837], together with 488 ppm Pb and 1896 ppm Zn. There are no reported occurrences of mineralised veins and a more detailed examination of the outcrops revealed only minor occurrences of calcite, occupying joints and occasional bedding planes. Pyrite, both as discrete cubes and forming larger irregular patches, was observed in some of the limestones. A thin coal, stratigraphically close to the top of the Alston Group, has been worked in a number of places within this catchment.

The enhanced values for Ba, Pb and Zn in Area 4 may be accounted for by the distribution of very minor amounts of baryte, galena and sphalerite associated with the minor veining and joint fillings, or they may be due to the lithological change from mainly carbonate rocks in the Carboniferous sequence to the shales and mudstones of the Silurian which carry higher values of these elements (Levinson, 1974).

There are isolated sample anomalies which do not produce an obvious pattern outside the four areas described above. Some can be related to known minor mineralisation, and others identified fault structures. As the incidence of artificial contaminants and high content of Sn is small, it is concluded that high metal values in isolated samples reflect the presence of local minor mineralisation. A table of anomalous stream sediment sites is given in Appendix 2.

In addition to the analysis of sediments and panned concentrates 278 samples of surface waters were analysed for fluoride (Figure 12). The resulting map of the data shows that the higher fluoride values have a tendency to be associated with the recognised mineralisation at Cold Keld, River Eden, and Fossdale. Waters from two adjacent streams flowing from Rise Hill into the River Dee [370 487] also contain fluoride in the range 0.05-0.14 µg/ml as do two samples in the Gayle Beck drainage [378 480]. Neither of these very localised occurrences can be attributed to mapped geological features. The stream draining the area of Mossdale Head, where fluorite is observed in outcrop (location 16 in Table 1), contains only average amounts of fluoride.

Soil survey of Tow Scar area

In the soil survey undertaken at Tow Scar 180 samples were collected along traverse lines (Figure 14) and analysed for Cu, Pb, Zn and Ba. Organic content (loss-on-ignition) and pH values were also determined in order to examine any possible correlation with element distribution. A small number of deep samples were taken by means of a mechanical auger from the areas of peat in an attempt to obtain material from close to bedrock and to compare these analytical data with other soil data. The data are presented in the form of contoured maps (Figure 15). Soil development in the area sampled is variable, though generally poor. In a number of areas there is a thick development of peat.

Additional information was obtained from a study of panchromatic aerial photography of Tow Scar and the adjacent areas flown in 1969. Particular attention was paid to the recognition of fractures and joint patterns.

Soil geochemistry

Copper The highest values recorded (>75 ppm) are in three areas all of which lie along a NW trending zone coinciding with the Tow Scar feature and extending to Hunt's Cross in the southeast. The maximum value is 750 ppm Cu and this occurs just below the crest of Tow Scar at [36819 47601]. Values for copper tend to diminish both to the NE and to the SW, enhanced copper values seemingly being restricted to the block of Great Scar Límestone bounded by two main components of the North Craven Fault system. A distribution of values in a NE trend in the southeast end of the area probably reflects the effects of a NE fault situated south of Hunt's Cross. The distribution of low copper values (up to 15 ppm) within the generally anomalous zone coincides with the more extensive patches of peat developed on the limestone.

Lead High values of lead are rather more widespread than those of copper. The main NW trend is again apparent with some lower values possibly reflecting the variability in the thickness of the peat cover. Some high values of c.300 ppm Pb are located on the limestone pavement area to the NE. As with the copper there is no evidence of enhanced values on the downthrown side of the North Craven Fault. There are a number of results in excess of 2000 ppm Pb from sites at [36819 47624], [36824 47607] and [36838 47598].

Zinc Values in excess of 1250 ppm Zn are restricted to small areas generally coincident with those relating to the copper values. Like the distribution of the copper there is no evidence of enhanced zinc values beyond the fault bounded block of Great Scar Limestone exposed on Tow Scar. Several soils, from [36819 47624] (a site also high in barium and lead) and [36858 47593], contain >5000 ppm Zn.

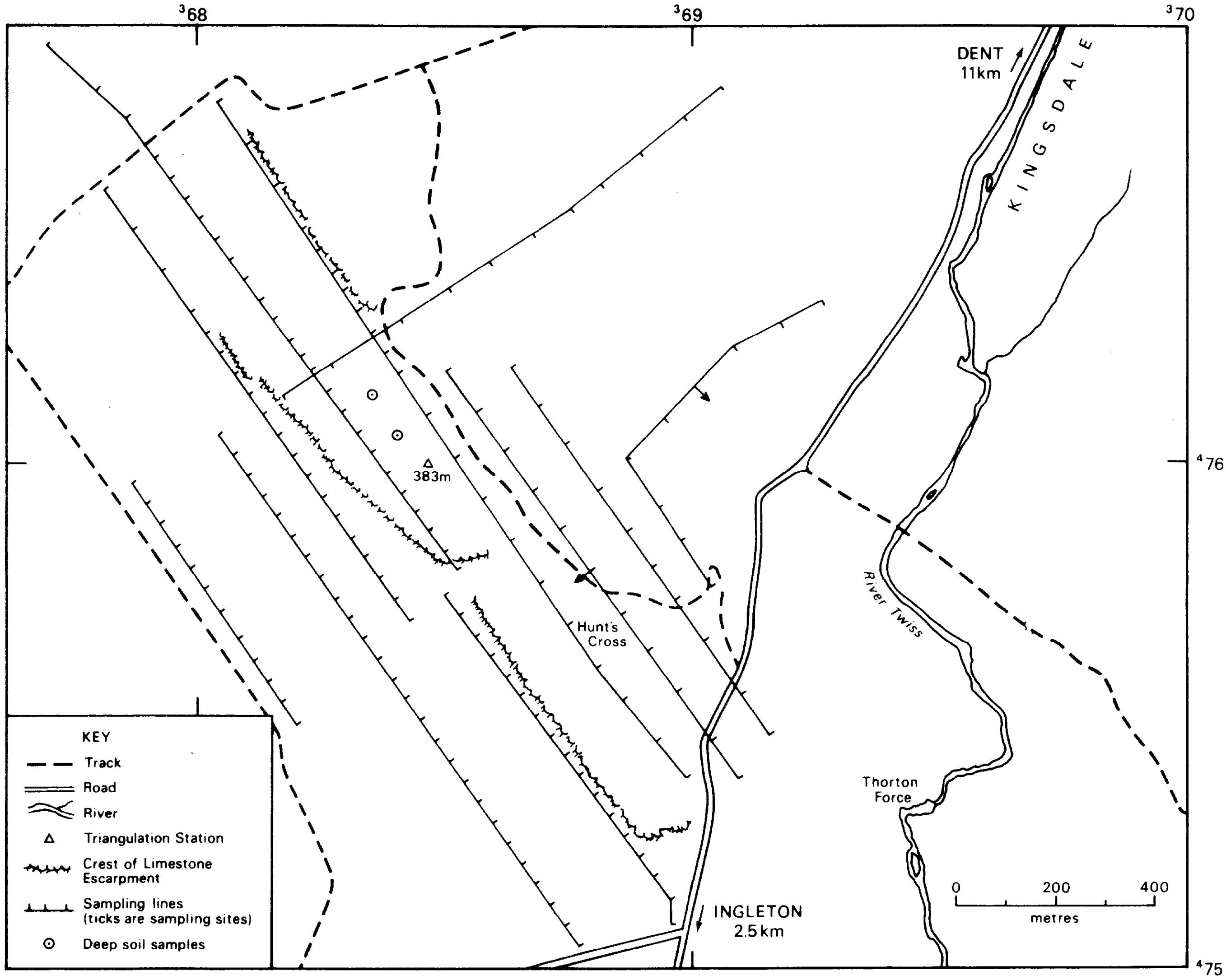

Figure 14 Soil sample sites at Tow Scar.

Barium Unlike the previous elements considered, some higher values for barium have been recorded from the topographically lower ground to the SW of Tow Scar from soils overlying rocks of Upper Carboniferous age. It is possible that these areas of high values relate to the poorly developed drainage away from Tow Scar. The maximum barium value (4400 ppm Ba) is associated with high lead and zinc at [36819 47624]. At [36824 47607] a value of 3000 ppm Ba is recorded at a site also high in lead.

pH The pH was measured in order to determine if there was any pH control on the distribution of heavy metals. A comparison of the pH contour map with the element contour maps suggests no spatial correlation. Contrary to what might be expected, the soils on the sandstone below Tow Scar are more alkaline than the soils on the limestone. This would arise from the development of peaty gleys on glacial material and the high organic content of some of the thin poorly developed soils on the limestone plateau.

Organic content The percentage loss in weight of soils baked in a furnance at 400°C for 20 hrs is used as an indication of the organic content of the soils. It was determined in order to establish if there was any significant accumulation of metals by organic-rich soils. A comparison of the organic content contour map with the element contour maps shows no clear spatial correlation. It is suggested that the high organic contents of soils on the limestone plateau is responsible for making the soils of this area less alkaline. High organic values indicated on Figure 15 do not necessarily indicate peat development as the samples analysed were normally obtained from levels below the organic-rich surface horizons.

Deep soil samples At two sites shown on Figure 14 deep soil samples were collected in addition to surface samples (i.e. <1 metre) using a Cobra power auger. These sites were located in an area of thick peat development where low Cu, Pb, Ba and Zn had been recorded in samples collected by hand auger. At the most northerly site the power auger reached a depth of 5 m, where sandstone boulders prevented deeper sampling. No significant chemical differences were found between deep and surface soils at this locality though it is not clear how far above the limestone bedrock the deep sample was collected. Bedrock was reached within 3 m at the most southerly site, and although Cu and Pb did not show variation with depth, Zn increased from 80 ppm at the surface to 340 ppm just above bedrock. Barium was not determined on these samples.

Aerial photography
Examination of the aerial photographs shows the much jointed and faulted nature of the limestone outcrop in the vicinity of Tow Scar (Figure 16). The two main components of the Craven Fault structure are easily observed together with a number of associated subsidiary

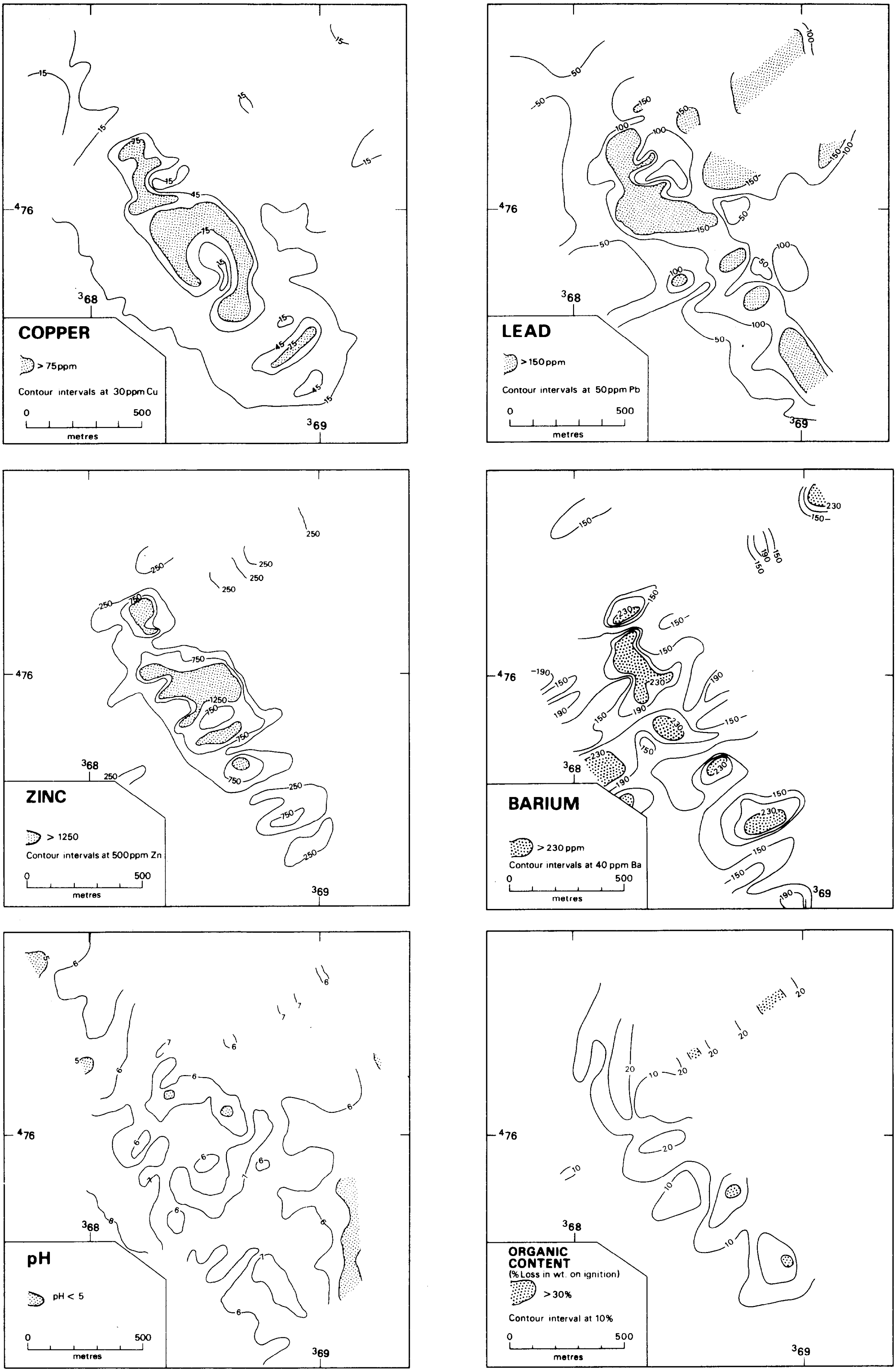

Figure 15 Contour maps of Tow Scar soil geochemistry data.

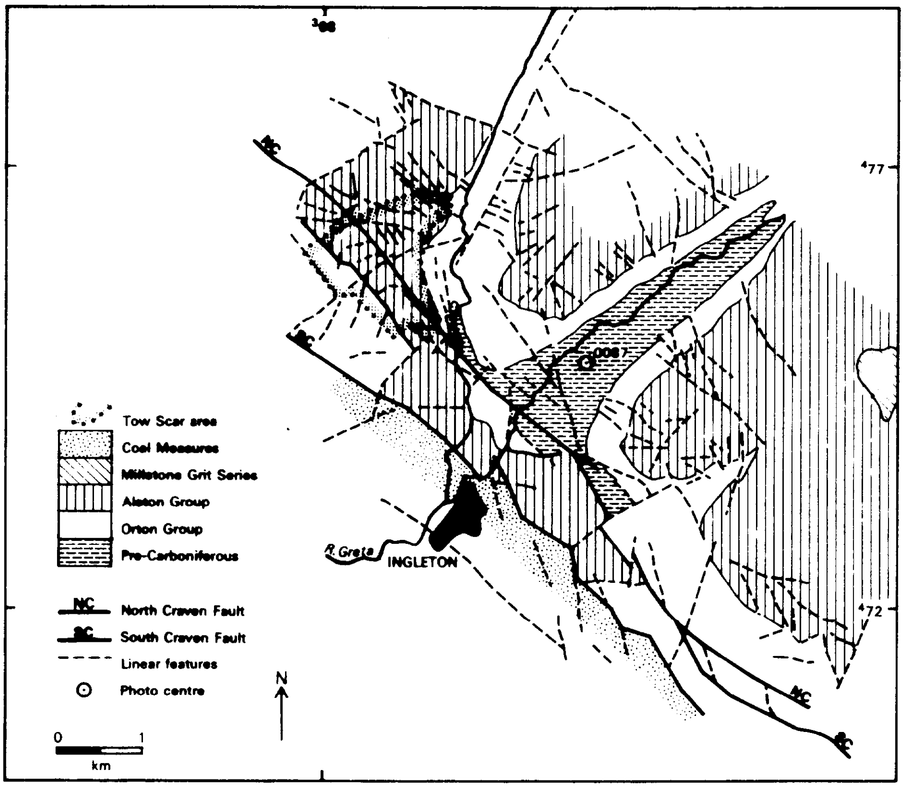

Figure 16 Geology and structure of the Tow Scar area, drawn from aerial photographs.

faults. The majority of the short linear features are undoubtedly representative of the main jointing patterns observed on the limestone pavements, their lateral extent in many instances seen to be restricted to the outcrop of the limestone. Variations in the observed density of jointing are directly related to the degree of peat development on the limestone.

Field observations and discussion of results
The soil geochemistry results indicated many sites of high base metal content in an area where no metalliferous mineralisation had been reported. An evalution of these data therefore warranted a more detailed examination of the geology of Tow Scar.

The most noticeable effect of faulting on Tow Scar is the change in the attitude of the beds of limestone from the gentle regional dip to the NNW to dips in excess of 50° towards the fault plane (i.e. to the SW). Lithologically the outcrop is reasonably uniform: massively bedded pale grey limestone with a patchily developed dolomitic facies. In one relatively small area at the northwestern end of the crop the limestone contains irregular nodules and lenses of highly siliceous material which characteristically weather to a honeycomb texture. These are aligned parallel to the lithological banding and are traceable in a zone some 45 m along strike and 5 m in width. This zone is associated with a large number of ramifying veins composed of essential calcite accompanied by chalcopyrite and copper carbonates. Elsewhere on the outcrop veining of any type is less common, but where seen it consists of calcite (frequently iron stained). The predominant direction of these veins is 330-360° but occasional other directions have been noted. A single calcite vein traceable in a NNW direction over 10-15 m attains a maximum width of 30 cm, and contains chalcopyrite. Dakyns and others (1890) refer to a fault that passes by Hunt's Cross -

"...probably without much 'throw', but marked by much dun limestone with calcite along its course".

The area of maximum observed vein occurrence 300 m NW of the triangulation station on Tow Scar coincides with high values of Cu, Pb, Zn and Ba in the soils.

The area of interest at Tow Scar, with the high soil values for Cu, Pb and Zn, is seen from the published geological map to coincide with a segment of Great Scar Limestone preserved between two main fault elements of the North Craven fault zone. The distribution of the anomalous values seems to be associated with a number of subsidiary faults which trend approximately 055°. It can also be ascertained from the aerial photography that a further area to the east, some 3 km by 1 km with similar structural controls (i.e. Great Scar Limestone bounded by major faults), can be identified and such an area presents itself as a potential target for further investigation.

CONCLUSIONS AND RECOMMENDATIONS

The drainage basin reconnaissance has not indicated any major new mineralisation. The levels of copper, lead, zinc and barium in the stream sediments and panned concentrates are similar to the values expected in such a sedimentary environment. In a reconnaissance exercise in the Lower Carboniferous area of Northumberland, the means and ranges of these elements in the stream sediments are particularly comparable (Bateson and others, 1983).

The areas showing anomalous values for one or more elements can be related in most instances to known mineralised faults. Of the exceptions, part of Area 1 (see Figure 13) may be a reflection of the more variable lithologies of the Lower Palaeozoic and the observed mineralisation associated with the Dent Fault. The anomalies in the remainder of Area 1 and Areas 2 and 3 probably represent the southern margin of the extensive mineralisation of the upper part of Swaledale. The grouping of anomalous values in Area 4 located in a largely Carboniferous environment is not explained from data indicated on any published geological map. However, in this area it is probable that the higher metal values are related to the observed minor mineralisation

and the presence of Silurian sediments in the lower part of the drainage basin.

Soil data obtained from Tow Scar indicates that part of the North Craven Fault system in this area may have acted as a passageway for mineralising fluids, the metals finding a suitable host in the Great Scar Limestone. It is of interest to note the relationship of the best developed mineralisation at Tow Scar with the limited occurrence of cherty nodules in the outcrop of the Great Scar Limestone.

The significance of the results from Tow Scar is twofold. Firstly the mineralisation was located as a result of a botanical observation and secondly it indicates a possibility of mineralisation adjacent to the North Craven Fault system to the east in areas of similar geological conditions.

The area surveyed cannot be recommended for further mineral exploration with any prospect of discovering economic deposits.

ACKNOWLEDGEMENTS

The authors thank Mr. M. McGlashan and Mr. G. Hewson, who collected most of the drainage and soil samples. The figures have been drawn by the Drawing Office, IGS Keyworth; the text prepared and formatted by Ms L. K. Waterhouse, Editorial and Publication Unit, IGS Keyworth.

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APPENDIX 1

Location and analytical data for drainage basin reconnaissance.

Table 1 Stream sediment and water samples.

Table of locational and analytical data for stream sediments and waters. For sediments the concentrations are in ppm; for waters μg/ml. Absent data are indicated by -1.00.

Sample number	Grid reference	Sediments							Waters
		Cu	Pb	Zn	Sr	Mn	Ba	Co	F
3001	37756 49652	28	45	150	110	750	280	40	0.02
3002	37734 49688	30	45	190	98	1600	920	44	0.02
3003	37720 49750	20	50	150	58	1250	240	36	0.02
3004	37735 49820	22	50	320	68	3000	700	48	0.02
3005	37820 49830	30	60	230	68	2500	560	42	0.03
3006	37843 49947	20	45	250	66	2050	540	32	0.03
3007	37852 49983	22	45	140	56	1200	440	30	0.02
3008	37775 49978	24	60	240	96	1550	1200	32	0.08
3009	37777 49785	30	45	98	62	750	200	24	0.06
3010	37828 49220	24	55	180	118	2800	560	36	-1.00
3011	37762 49703	22	50	210	72	1050	400	34	0.05
3012	37603 49412	16	55	150	84	1800	380	40	0.02
3013	37673 49386	12	40	140	64	1400	320	28	0.02
3014	37680 49392	16	35	170	56	1250	280	28	0.02
3015	37740 49347	18	40	230	74	2400	400	40	0.02
3016	37726 49307	14	40	200	56	1450	360	34	0.02
3017	37766 49245	12	30	170	38	900	280	26	0.02
3018	37734 49230	16	55	72	52	750	220	28	0.02
3019	37953 49417	16	35	120	50	650	280	22	0.02
3020	37977 49350	18	30	106	66	530	200	22	0.03
3021	37970 49230	16	35	68	50	800	220	20	0.04
3022	37915 49465	22	35	120	82	600	260	26	0.03
3023	37900 49490	22	55	210	72	1700	320	34	0.03
3024	37890 49568	26	50	230	76	1700	540	36	0.04
3025	37848 49600	18	40	190	46	1600	280	32	0.03
3026	37787 49584	18	45	180	104	650	220	28	0.02
3027	37803 49547	24	60	160	120	750	280	30	0.03
3028	37822 49498	26	45	76	130	360	240	28	0.03
3029	37859 49452	12	30	32	54	60	80	12	0.02
3030	38570 49089	12	30	90	26	460	180	16	0.02
3031	37899 49178	16	35	108	66	850	240	24	0.02
3036	38621 49277	18	165	350	86	1350	1200	28	0.10
3037	38590 49279	16	40	180	46	1200	440	28	0.03
3038	38529 49320	18	40	220	58	1550	580	36	0.03
3039	38517 49416	18	50	210	44	1350	360	34	0.02
3040	36980 49332	16	60	250	52	1600	420	28	0.03
3041	38000 49348	18	40	140	66	700	220	22	-1.00
3042	38010 49322	14	35	120	36	700	160	22	0.02
3043	37994 49290	16	40	102	62	650	200	24	0.53
3044	38086 49272	16	35	150	54	1300	220	24	0.04
3045	38109 49282	18	40	160	66	650	240	22	0.06
3046	38203 49237	14	40	170	48	1050	200	22	0.04
3047	37581 48766	14	35	90	54	530	260	20	0.03
3048	37658 48853	10	35	50	40	310	140	18	0.03
3049	37661 48866	14	30	72	62	370	240	20	0.03
3050	37741 48881	14	40	150	80	1050	320	22	0.02
3051	38470 49067	12	45	150	28	2150	240	24	0.02
3052	38369 49013	16	55	250	72	1900	760	28	0.02
3053	38375 48930	20	70	520	54	2100	480	54	0.02
3054	38434 48976	8	70	120	24	1600	240	36	0.02
3055	38464 48996	12	45	170	62	1050	800	22	0.02
3056	38520 49028	12	60	230	38	2150	340	26	0.02
3057	37272 49027	16	40	210	46	1300	680	30	0.02
3058	37238 49005	18	45	300	50	2250	260	34	0.04
3059	37297 48980	20	45	140	38	750	220	30	0.03
3060	37349 48957	14	35	210	36	1450	240	28	0.03
3061	37689 48967	12	40	70	36	420	140	18	0.03
3062	37718 49009	14	35	86	38	400	180	20	0.02
3063	37766 49044	14	55	250	40	1350	200	30	0.02
3064	37810 49089	18	35	130	62	1100	520	26	0.03
3065	37484 48950	8	20	52	14	370	100	12	0.02
3066	37555 48951	14	80	220	38	1750	240	38	0.03
3067	37531 49003	14	45	410	36	2200	260	42	0.02
3068	37572 49005	16	50	220	54	1050	220	32	0.02
3069	37622 49030	16	45	90	44	470	220	24	0.01
3070	37714 49091	16	80	110	60	1050	280	34	0.02
3071	37375 48981	10	30	72	22	460	140	16	0.02
3072	37409 48929	14	40	260	42	750	220	26	0.02
3073	37459 48930	10	35	150	30	950	180	20	0.01
3074	37443 48972	20	50	160	54	800	420	30	0.02
3075	37146 49051	20	40	92	62	600	300	26	0.03
3076	37165 49110	16	40	160	56	900	320	26	0.03
3077	37089 49099	16	45	240	40	3000	360	28	0.03
3078	37026 49127	14	65	170	42	1400	280	34	0.03
3079	38258 48480	20	80	310	120	1450	420	30	0.02
3080	38287 48568	16	50	190	82	950	400	26	0.02
3081	37790 49128	12	40	54	36	300	180	18	0.00
3082	37212 49020	16	35	94	38	340	200	20	0.01
3083	37242 49053	14	50	98	34	650	240	18	0.01
3084	37184 49094	12	30	94	26	700	160	16	0.01
3085	36713 49152	10	30	90	16	950	200	16	0.01
3086	36697 49097	12	30	170	14	2450	260	22	0.01
3087	36880 49048	14	75	220	12	6500	500	74	0.01
3088	36867 49110	18	65	550	50	11000	960	74	0.02
3089	38094 48657	14	45	330	50	1800	460	32	0.01
3090	38090 48693	16	40	170	38	800	600	24	0.01

Sample number	Grid reference	Sediments							Waters
		Cu	Pb	Zn	Sr	Mn	Ba	Co	F
3091	38290 48644	20	55	180	56	600	340	26	0.02
3092	38299 48645	18	60	170	102	1400	520	28	0.04
3093	38315 48684	20	45	130	76	750	440	30	0.02
3094	38342 48769	20	60	140	80	800	480	32	0.03
3096	37774 48584	18	45	150	54	650	420	26	0.02
3097	37770 48490	26	55	130	52	1000	340	26	0.02
3098	37788 48466	18	55	190	58	1450	340	28	0.02
3099	37787 48431	18	60	340	66	2500	340	40	0.02
3100	37768 48391	22	50	200	56	950	360	34	0.02
3101	38099 48709	20	50	210	50	1050	620	28	0.00
3102	38164 48742	16	50	180	34	850	300	28	0.00
3103	38171 48806	24	95	340	58	1350	680	40	0.04
3104	38209 48815	24	50	130	70	540	940	30	0.05
3105	38230 48794	22	50	200	60	650	980	32	0.04
3106	38328 48883	18	50	240	86	1600	560	36	0.05
3107	37710 48771	18	50	120	68	650	360	28	0.04
3108	37683 48643	22	50	190	76	900	440	32	0.04
3109	37650 48684	18	45	150	46	1250	300	28	0.04
3110	37593 48679	22	50	200	60	1000	300	32	0.04
3111	37748 48412	18	55	150	50	900	280	32	0.04
3112	37730 48500	16	85	240	70	1900	480	40	0.03
3113	37626 48510	26	65	170	64	700	380	36	0.03
3114	37702 48559	24	65	260	78	1100	460	38	0.03
3115	38259 49171	22	45	150	76	750	540	30	0.04
3116	38194 49143	16	45	130	52	700	440	24	0.04
3117	38163 49121	20	45	180	74	850	640	28	0.04
3118	38142 49097	16	35	180	60	850	500	20	0.02
3119	38096 49064	18	50	210	72	1100	500	26	0.02
3120	38071 49107	12	45	120	56	950	320	18	0.02
3121	37479 48695	24	45	150	60	900	400	32	0.03
3122	37427 48682	22	45	130	52	600	360	28	0.04
3123	37347 48647	26	50	150	46	600	500	36	0.03
3124	38330 49426	24	55	300	66	1100	640	38	0.05
3125	38319 49521	24	55	300	66	2200	580	40	0.04
3126	38240 49510	24	70	250	64	2200	540	44	0.06
3127	38274 49434	20	55	240	52	2000	400	38	0.05
3128	38269 49429	16	45	240	56	1850	400	28	0.03
3129	38303 49391	20	60	220	54	900	460	36	0.03
3130	38370 49292	16	50	200	52	1300	560	28	0.04
3131	38042 48989	10	45	180	48	750	280	18	0.03
3132	37272 48285	18	45	380	52	2200	380	40	0.02
3133	37251 48380	24	65	260	50	1350	380	32	0.02
3134	37258 48463	20	60	220	48	1350	460	28	0.03
3136	37355 48578	14	55	270	54	1350	320	28	0.02
3137	37442 48580	10	40	140	42	2000	360	18	0.02
3138	37484 48582	14	45	270	42	1600	260	28	0.02
3140	38634 49562	16	65	120	52	1450	620	28	0.02
3141	37136 48302	16	40	260	56	1300	360	26	0.03
3142	37200 48366	14	30	180	54	1150	280	22	0.03
3143	37200 48392	12	35	190	50	1350	300	26	0.03
3144	37203 48500	20	35	200	54	1300	320	26	0.03
3145	37128 48508	12	30	210	42	1850	320	26	0.03
3146	37150 48593	18	35	220	58	1200	340	24	0.03
3147	37110 48623	18	40	110	64	900	400	22	0.03
3148	36981 49313	12	35	380	68	6500	720	52	0.04
3149	37050 49218	10	40	350	42	2700	280	36	0.03
3150	36930 49185	12	35	270	54	3600	680	32	0.03
3151	38642 49470	14	75	360	62	2400	840	38	0.03
3152	38620 49370	14	450	650	108	1950	2800	24	0.09
3153	38658 49213	18	90	350	70	1600	900	28	0.15
3155	36953 49420	22	50	120	310	2350	540	28	0.04
3156	36977 49420	18	45	220	90	1300	960	26	0.03
3157	36915 49383	20	40	220	94	1500	720	26	0.03
3158	36851 49279	24	50	320	58	3000	720	32	0.04
3159	36852 49270	10	40	120	20	950	380	14	0.02
3160	37073 49598	20	70	600	68	18000	880	29	0.02
3161	36608 49270	24	35	88	14	750	360	20	0.02
3162	36700 49330	26	55	170	14	950	220	24	0.02
3163	36743 49310	18	45	140	14	750	380	20	0.01
3164	36787 49318	18	40	110	18	1450	400	24	0.01
3165	36830 49397	24	45	120	12	850	340	24	0.01
3166	36800 49454	24	55	120	12	750	300	24	0.01
3167	36740 48958	10	35	100	12	500	240	14	0.01
3168	36661 48922	14	60	380	26	2850	260	22	0.01
3169	36816 48830	8	30	92	12	340	160	10	0.01
3170	36833 48822	6	20	50	14	440	120	8	0.01
3171	37057 49569	22	45	350	102	2250	2320	34	0.01
3172	37110 49515	14	40	70	62	800	300	20	0.01
3173	36941 49488	28	70	180	140	2550	400	30	0.01
3174	36977 49568	30	45	150	68	2050	600	26	0.01
3175	36931 49578	20	45	140	16	950	340	24	0.01
3176	36913 49551	18	45	94	14	410	260	18	0.03
3177	36989 49602	14	35	260	66	1900	380	26	0.02
3178	37034 48668	20	40	130	58	800	380	22	0.03
3179	37169 48728	14	25	92	30	750	240	12	0.04
3180	37041 48773	10	35	130	46	600	240	22	0.06

Sample number	Grid reference	Sediments Cu	Pb	Zn	Sr	Mn	Ba	Co	Waters F
3181	36959 48869	14	45	310	36	2500	400	40	0.04
3182	36867 48913	12	50	400	90	6000	540	50	0.03
3184	37524 48028	10	35	150	46	800	300	16	0.02
3185	37569 48080	10	35	140	34	1350	260	18	0.02
3186	37581 48125	10	25	44	44	3500	240	12	0.02
3187	37599 48140	12	35	120	44	650	240	20	0.02
3188	37592 48195	14	45	200	54	850	260	22	0.02
3189	37627 48230	10	50	200	34	2800	280	26	0.02
3190	37733 47650	8	50	130	60	950	320	20	0.02
3191	37004 48807	4	20	80	16	600	140	12	0.05
3192	37462 47983	10	80	210	36	1950	340	22	0.03
3193	37481 47921	10	40	72	26	1000	180	16	0.03
3194	37372 47914	16	70	170	66	1500	340	24	0.04
3195	37345 47878	16	40	120	56	600	320	22	0.03
3196	37330 47828	22	45	190	76	1000	500	24	0.03
3197	37452 47850	18	40	220	34	1400	540	20	0.03
3199	37880 47630	4	20	82	14	240	140	8	0.03
3200	37910 47639	4	15	66	12	330	160	8	0.03
3201	37658 47564	10	35	38	34	90	180	12	0.03
3202	37653 47559	12	25	110	34	700	260	18	0.02
3203	37673 47441	16	35	130	38	370	300	20	0.02
3204	37730 47539	10	50	150	46	350	380	18	0.04
3206	36904 48473	14	35	66	76	490	280	20	0.02
3207	36913 48560	14	105	180	60	3900	360	48	0.02
3208	36937 48660	14	40	260	40	1900	540	30	0.02
3209	36904 48660	14	60	500	66	4600	280	44	0.02
3210	36852 48651	16	35	110	36	1400	200	24	0.02
3211	37926 47618	8	35	170	36	750	100	12	0.02
3213	37952 47533	12	30	120	48	950	260	14	0.02
3215	36622 48366	24	55	250	42	1950	440	26	0.01
3216	36708 48391	12	50	420	44	3000	340	24	0.02
3217	36713 48380	20	50	320	74	1500	280	28	0.02
3218	36799 48420	16	65	260	56	4500	440	54	0.02
3219	36730 48463	16	80	420	50	5200	400	50	0.02
3220	36690 48492	16	45	200	36	1950	300	24	0.02
3221	36769 48599	12	40	150	48	1250	340	18	0.01
3222	36723 48540	20	50	320	58	2700	440	38	0.02
3223	37395 49931	14	35	72	48	400	1360	18	0.00
3224	37299 49914	10	55	120	58	650	1360	20	0.02
3225	37217 49898	16	65	120	90	850	1360	20	0.05
3226	36929 49682	26	55	180	16	1150	300	26	0.01
3227	37000 49730	32	60	210	46	1650	440	30	0.01
3228	37074 49790	30	50	150	30	1300	340	26	0.01
3229	37137 49776	20	45	270	84	1550	340	32	0.01
3230	38085 48609	12	30	150	88	600	240	18	0.02
3231	37418 49508	32	40	150	50	700	280	22	0.01
3232	37342 49597	16	40	240	58	1150	340	32	0.01
3233	37345 49606	12	35	150	64	950	280	22	0.02
3234	37325 49653	16	40	180	64	2250	640	30	0.02
3235	37313 49695	18	40	150	84	600	540	24	0.02
3236	37251 49691	16	40	210	100	1050	460	28	0.02
3237	37230 49723	10	45	190	24	1350	260	22	0.02
3238	38030 48198	14	35	160	70	570	240	20	0.01
3239	37943 48164	14	35	200	64	1050	180	20	0.01
3240	37908 48143	16	40	190	44	850	180	24	0.02
3241	38090 48598	10	30	100	110	1000	220	14	0.02
3242	37993 48297	14	35	180	72	850	220	20	0.01
3243	37960 48228	12	40	160	62	1250	200	22	0.02
3244	37932 48214	6	30	190	28	1600	140	16	0.02
3245	38048 48523	12	40	180	80	1300	220	20	0.02
3246	37513 47677	6	25	180	20	1750	140	26	0.01
3247	37542 47720	20	40	280	96	1450	340	36	0.02
3248	37083 47492	8	20	76	20	370	80	8	0.02
3249	37002 47384	10	35	120	22	700	140	14	0.02
3250	37070 47258	10	30	74	48	900	140	16	0.02
3251	37910 48102	8	45	160	50	1450	140	20	0.06
3252	37880 48093	22	35	180	70	700	160	26	0.06
3253	37875 48025	12	45	140	48	1350	180	24	0.04
3254	37840 48035	18	40	150	64	1400	180	28	0.04
3255	37477 47640	10	30	150	110	950	240	22	0.03
3256	37401 47570	16	45	300	68	1000	200	28	0.02
3257	37259 47597	10	35	52	110	160	160	12	0.02
3258	37226 47593	12	35	52	56	340	100	14	0.03
3259	37158 47535	18	105	130	28	1150	180	16	0.02
3260	37264 47366	10	45	70	28	380	120	14	0.02
3261	37027 47190	14	25	40	44	480	140	12	0.03
3262	36672 48185	20	95	590	50	9000	320	80	0.03
3263	36691 48250	16	80	600	42	5200	300	44	0.03
3264	36751 48317	14	50	450	58	11500	540	52	-1.00
3265	36640 48273	14	60	370	56	3000	340	34	0.03
3266	36600 48229	20	60	530	40	8000	500	46	0.02
3267	36519 48252	12	40	150	14	1350	200	16	-1.00
3268	36395 49028	8	20	72	8	300	100	12	0.02
3269	36400 48877	14	40	300	14	1900	160	20	-1.00
3270	36441 48772	18	45	260	12	2000	200	22	-1.00
3271	36920 48198	12	45	90	50	280	200	14	-1.00
3272	36844 48128	12	50	220	44	800	200	22	0.02
3273	36763 48063	12	60	230	38	1100	140	24	-1.00
3274	36582 47998	14	35	150	30	1500	360	16	0.02
3275	36488 47955	50	50	390	42	17000	840	54	-1.00
3276	36358 48128	20	40	140	12	1000	180	16	0.02
3277	36272 48124	14	55	120	10	750	160	16	0.02
3278	36200 48359	18	40	130	14	1200	160	18	0.02
3279	36340 48371	20	40	190	10	1150	220	22	0.01
3280	36305 48445	10	25	84	10	420	180	18	-1.00
3281	36345 48758	16	40	180	12	1050	140	16	0.01
3282	36330 48682	14	40	180	12	1050	160	18	-1.00
3283	36320 48619	12	35	88	10	1000	160	18	-1.00
3284	37750 47920	6	15	80	16	1000	100	10	0.02
3285	37822 47885	4	20	92	28	1100	200	10	0.02
3286	37905 47923	4	30	160	40	4500	240	18	-1.00
3287	37830 47941	6	15	34	30	110	80	6	0.02
3288	36454 47882	14	40	250	14	5100	300	26	-1.00
3289	36374 47802	12	25	120	10	1450	160	16	-1.00
3290	36339 47715	14	25	76	10	750	180	18	0.02
3291	36340 48540	60	135	280	14	1200	200	26	0.01
3292	37850 47836	6	25	200	56	2250	340	20	0.02
3293	37972 47826	10	35	280	40	1850	760	20	0.02
3294	37928 47732	10	35	240	150	1550	660	18	-1.00
3295	37877 47750	6	15	120	24	900	140	14	-1.00
3296	37172 48084	14	50	360	44	1350	220	24	-1.00
3297	37156 48093	12	35	48	36	320	140	16	-1.00
3298	37110 48018	16	45	170	50	900	280	26	0.02
3299	37125 47997	26	45	260	40	3000	260	20	0.02
3300	37200 47990	10	40	52	34	320	180	14	-1.00
3301	37090 47974	12	40	230	50	1700	360	24	-1.00
3302	37036 47917	16	40	280	54	1800	360	30	0.02
3303	36988 47850	8	25	98	32	420	200	14	-1.00
3304	36963 47807	16	30	260	54	1700	280	26	-1.00
3305	36917 47790	16	55	340	50	1350	240	32	0.02
3306	37108 47896	8	50	320	30	2250	320	24	0.02
3307	36337 47832	14	40	94	14	600	220	18	-1.00
3308	37751 47075	12	45	200	32	750	240	20	0.01
3311	37125 47982	16	75	190	70	750	420	26	-1.00
3312	37120 47960	16	80	290	28	1000	440	28	0.02
3313	36758 47637	6	20	70	42	420	120	10	-1.00
3314	36646 47597	10	30	160	46	2450	240	20	0.02
3315	36689 47562	4	5	24	26	120	60	8	0.02
3316	36768 47510	14	30	60	50	570	240	18	-1.00
3317	36730 47427	10	30	46	64	550	340	16	0.02
3318	36706 47429	16	50	70	46	1850	180	20	-1.00
3319	36853 47378	6	15	40	32	210	140	8	0.03
3322	37509 47275	12	35	210	84	1200	240	22	0.02
3323	37649 47323	14	40	160	84	650	220	26	0.02

Table 2 Panned concentrates

Table of panned concentrate data for barium, lead, zinc, copper, manganese and tin. With the exception of sample numbers 3330 and 3331, for locational data refer to Table 1. Concentrations in ppm. Absent data are shown as 0 and results below the detection limit are given as 1.

Sample number	Ba	Pb	Zn	Cu	Mn	Sn
3004	11000	33	152	33	910	3
3008	120300	71	120	74	380	10
3009	586	330	75	91	370	238
3010	4239	450	50	686	320	333
3011	4057	119	272	52	1220	17
3015	1464	72	163	59	510	180
3022	749	170	157	34	490	45
3030	388	35	51	8	130	64
3031	2092	49	109	7	460	1
3037	2074	22	87	32	370	1
3039	2038	58	230	14	970	2
3040	8762	340	306	99	1910	3
3043	192	90	36	34	190	2
3046	429	133	211	57	220	12
3047	1938	45	93	48	940	1
3050	13700	142	148	31	440	2
3055	3569	13	70	5	150	1
3057	42600	16	89	20	400	1
3061	236	23	104	81	140	1
3062	294	36	235	52	390	5
3063	367	28	125	259	240	4
3064	4686	31	139	15	460	4
3067	600	9	120	2	440	6
3069	1850	27	271	7	180	4
3073	95	9	57	204	310	1
3074	5839	29	106	34	860	26
3075	555	29	69	15	1320	21
3076	952	367	93	6	300	9
3077	187	266	58	22	340	68
3079	1168	138	239	23	460	1
3082	288	27	57	8	180	10
3083	901	729	104	153	620	1213
3084	517	225	72	14	600	97
3088	2095	49	203	28	1460	25
3089	1386	16	153	6	260	4
3092	836	148	150	11	360	183
3096	618	25	93	29	310	5
3098	208	9	74	7	320	1
3105	27900	44	144	26	730	2
3106	2148	45	126	30	870	14
3107	242	39	61	13	300	3
3109	2376	48	137	26	1030	7
3117	2678	23	81	17	300	1
3120	717	21	73	12	330	2
3121	2676	237	107	42	920	13
3124	8005	54	215	23	920	1
3129	2489	48	191	127	660	1
3130	5352	60	195	40	1100	41
3131	235	8	56	2	140	1
3133	11500	1129	154	225	730	22
3136	691	20	131	11	930	1
3138	425	25	170	7	570	2
3142	6303	189	229	188	1260	3
3144	4462	132	688	91	780	2
3146	2521	329	450	41	460	192
3148	1862	38	256	10	1220	2
3150	9668	88	162	36	1540	1
3152	108700	19442	915	140	1210	4
3153	24400	2173	656	75	1690	8
3157	15800	231	576	208	1930	71
3158	13700	321	227	64	7310	287
3159	1860	222	93	33	980	88
3161	1298	95	130	94	360	4
3162	989	40	161	56	410	4
3164	334	95	117	35	680	11
3165	1411	48	166	62	410	4
3168	316	33	196	16	540	44
3170	118	86	62	17	240	16
3171	43600	103	2823	221	2940	1
3173	259	59	156	44	740	9
3174	2482	99	363	90	2520	14
3175	490	28	142	23	420	1
3178	6502	231	163	55	1230	21
3179	580	32	58	255	320	8
3180	562	258	50	10	190	48
3181	1703	267	154	20	380	262
3182	705	56	133	15	620	1
3184	1797	90	209	50	240	7
3185	552	58	206	8	190	1
3186	645	53	232	33	400	1
3187	762	18	121	12	290	5
3188	681	11	297	5	180	1
3189	364	27	172	15	320	1
3190	2818	534	230	37	200	1
3192	6113	65	343	109	370	4
3193	104	143	42	9	390	3
3194	184	18	91	7	200	9
3195	2111	30	100	17	490	1
3196	301	98	102	22	240	31
3197	2714	28	84	28	360	17
3199	49	61	42	4	100	40
3200	490	23	61	3	250	2
3204	110	10	26	2	50	1
3207	105	14	34	5	200	7
3211	121	47	169	11	650	22
3213	173	9	40	4	190	6
3215	7472	389	1896	58	1270	1
3216	1543	27	178	9	920	1
3219	478	42	222	7	1600	5
3222	603	31	281	25	1470	1
3225	21200	237	151	32	970	31
3226	532	35	152	28	550	2
3227	6881	261	380	181	1530	39
3228	1781	172	203	123	1220	75
3229	3515	25	203	13	1460	7
3230	3269	74	297	17	150	20
3232	1217	22	99	11	500	1
3235	38400	34	237	24	1880	1
3239	444	20	144	6	540	2
3240	386	46	163	10	440	50
3241	2065	165	160	30	560	7
3243	326	25	126	11	1610	1
3244	802	66	142	10	400	1
3247	12501	89	163	84	550	1
3249	196	43	77	22	220	23
3250	33	122	86	16	350	3
3251	156	15	42	1	220	1
3253	129	13	88	15	240	1
3254	148	29	67	9	600	2
3255	4243	225	118	42	300	1
3256	257	281	124	9	240	10
3257	133	22	38	6	80	6
3258	28	46	19	3	60	6
3260	808	22	50	6	110	7
3263	395	41	614	19	1980	1
3266	1482	488	671	46	5560	2
3272	498	28	126	5	350	1
3274	1134	36	82	13	740	1
3281	605	91	271	72	610	8
3284	197	35	100	29	440	46
3285	2628	23	80	5	230	1

Sample number	Ba	Pb	Zn	Cu	Mn	Sn
3290	376	16	85	13	250	4
3291	452	2369	293	156	780	503
3292	1650	31	235	8	450	1
3293	20800	39	173	41	520	42
3298	5437	31	158	30	480	1
3299	341	28	161	11	870	1
3302	678	30	243	22	810	6
3305	91	21	157	8	490	4
3306	8257	66	163	26	830	1
3308	86	15	65	18	120	8
3312	18200	40	102	296	310	1
3314	228	34	103	10	1140	7
3315	48	6	16	1	80	1
3317	175	95	40	34	1510	5
3319	86	326	77	21	160	114
3322	168	22	79	7	170	5
3223	113	19	62	10	230	4
3330*	2483	24	104	422	370	1
3331*	101200	2076	188	71	1550	1

* Grid reference for sample 3330 is [38261 49177]; for 3331 [37284 49929].

APPENDIX 2

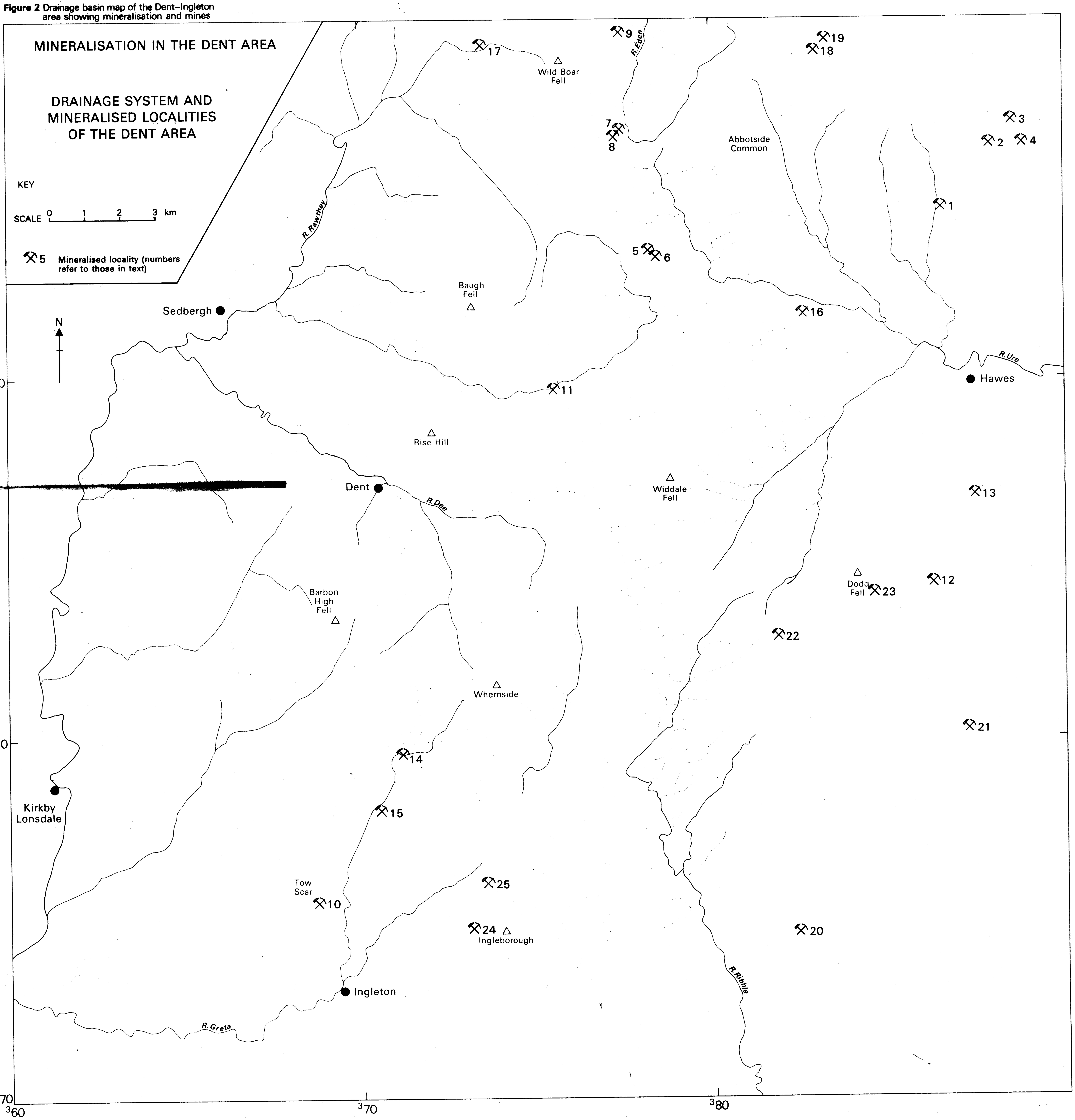
List of high anomalous stream sediment samples

Sample number	Ba	Pb	Zn	Cu	Grid reference
HBC 3152	*	*	*	-	38620 49370
HBC 3036	*	*	-	-	38621 49277
HBC 3088	*	-	*	-	36867 49110
HBC 3262	-	*	*	-	36672 48185
HBC 3263	-	*	*	-	36691 48250
HBC 3291 †	-	*	-	*	36340 48540
HBC 3001	-	-	-	*	37756 49652
HBC 3002	-	-	-	*	37734 49688
HBC 3005	-	-	-	*	37820 49830
HBC 3009 †	-	-	-	*	37777 49785
HBC 3173	-	-	-	*	36941 49488
HBC 3174	-	-	-	*	36977 49568
HBC 3227	-	-	-	*	37000 49730
HBC 3228	-	-	-	*	37074 49790
HBC 3231	-	-	-	*	37418 49508
HBC 3275	-	-	-	*	36488 47955
HBC 3066	-	*	-	-	37555 48951
HBC 3070	-	*	-	-	37714 49091
HBC 3079	-	*	-	-	38258 48480
HBC 3103	-	*	-	-	38171 48806
HBC 3112	-	*	-	-	37730 48500
HBC 3153	-	*	-	-	38658 49213
HBC 3192	-	*	-	-	37462 47983
HBC 3207	-	*	-	-	36913 48560
HBC 3219	-	*	-	-	36730 48463
HBC 3259	-	*	-	-	37158 47535
HBC 3312	-	*	-	-	37120 47960
HBC 3053	-	-	*	-	38375 48930
HBC 3160	-	-	*	-	37073 49598
HBC 3209	-	-	*	-	36904 48660
HBC 3264	-	-	*	-	36751 48317
HBC 3266	-	-	*	-	36600 48229
HBC 3008	*	-	-	-	37775 49978
HBC 3105	*	-	-	-	38230 48794
HBC 3156	*	-	-	-	36977 49420
HBC 3171	*	-	-	-	37057 49569
HBC 3224	*				37299 49914
HBC 3225	*	-	-	-	37217 49898

* in the element column indicates an anomalous level of that element present in the stream sediment sample:
Ba >950 ppm Pb >80 ppm Zn >450 ppm Cu >28 ppm

† sample suspected of being contaminated (deduced from high Sn found in panned concetrate from the same site and examination of concentrate sample)

Figure 2 Drainage basin map of the Dent–Ingleton area showing mineralisation and mines



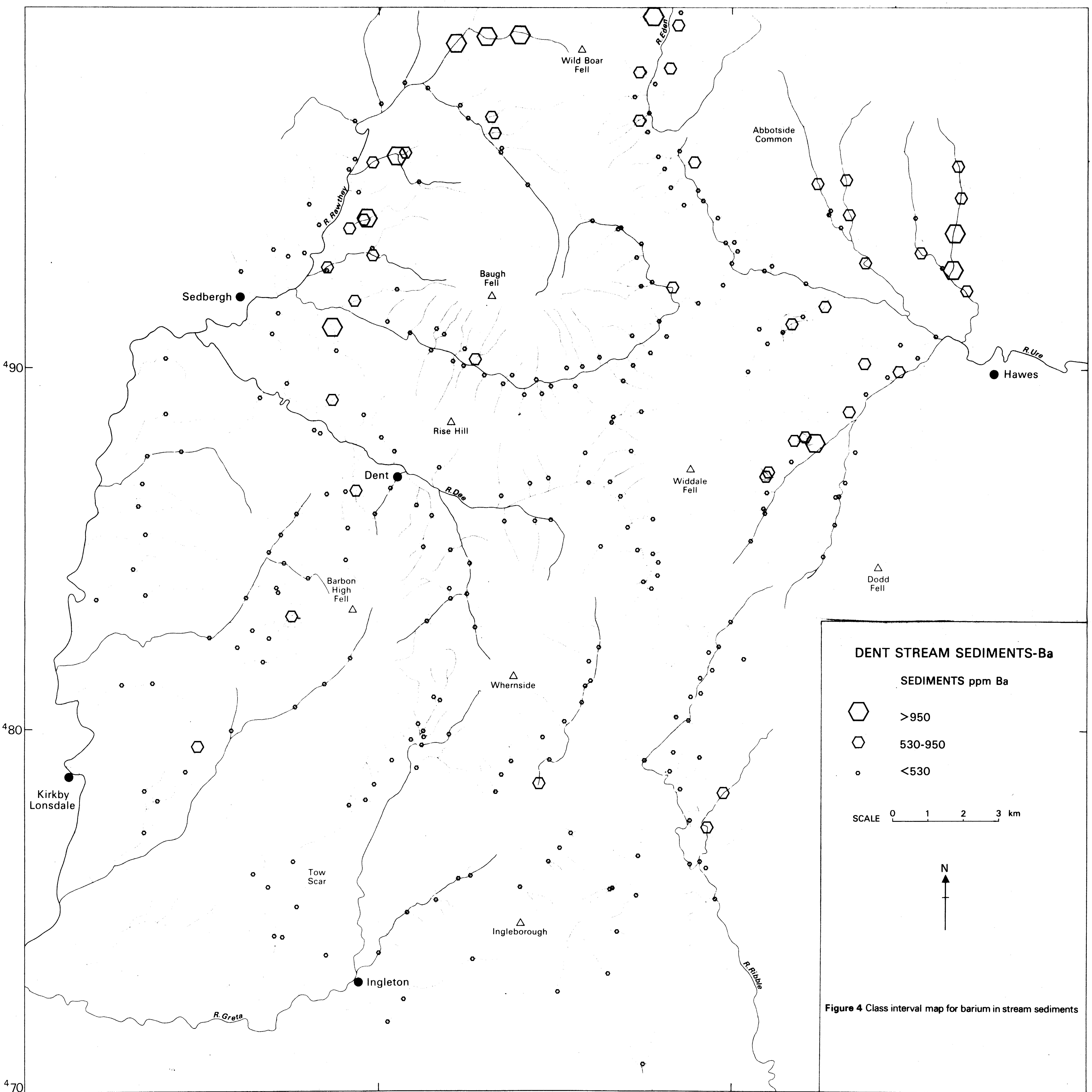


Figure 4 Class interval map for barium in stream sediments

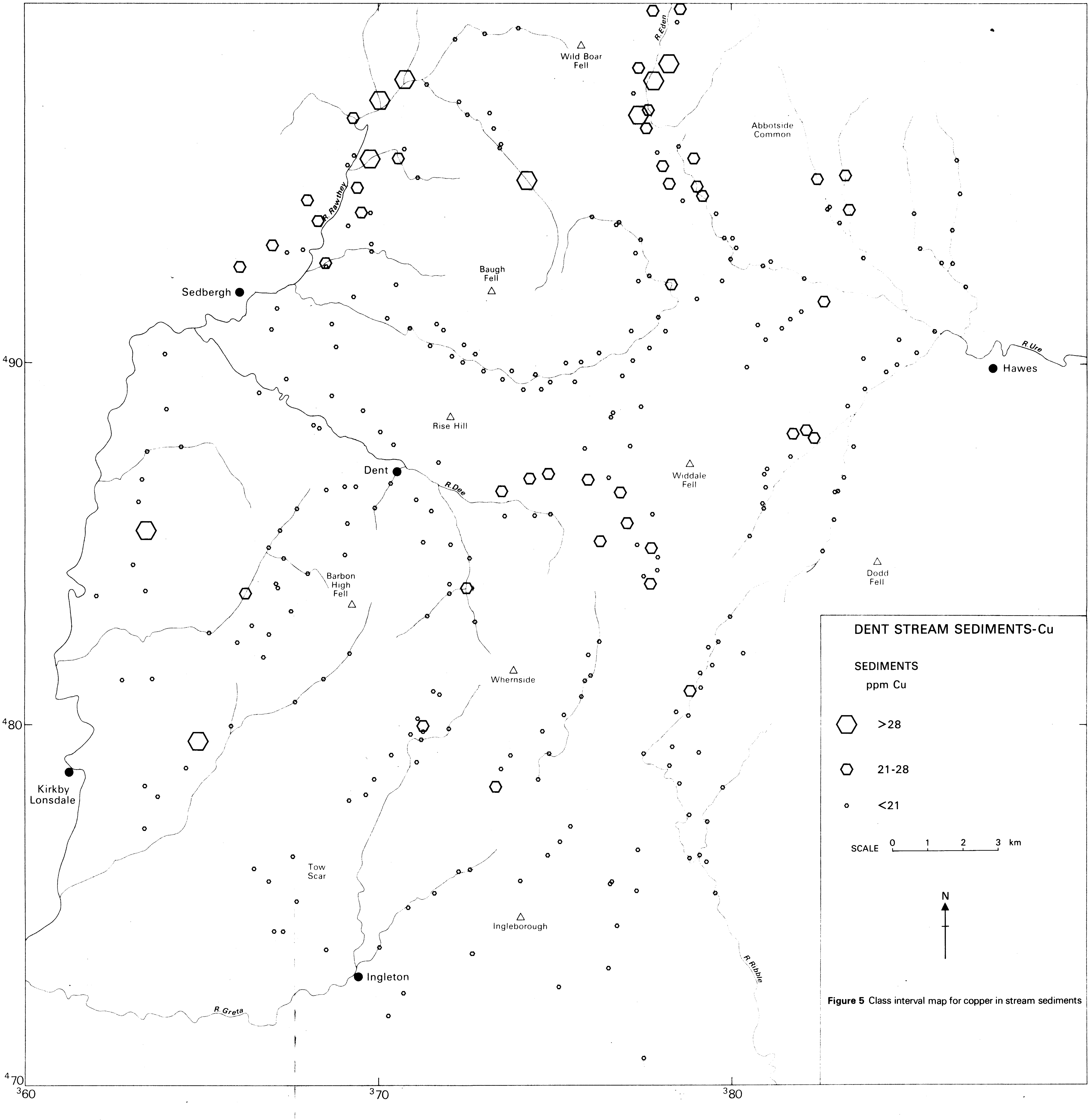


Figure 5 Class interval map for copper in stream sediments

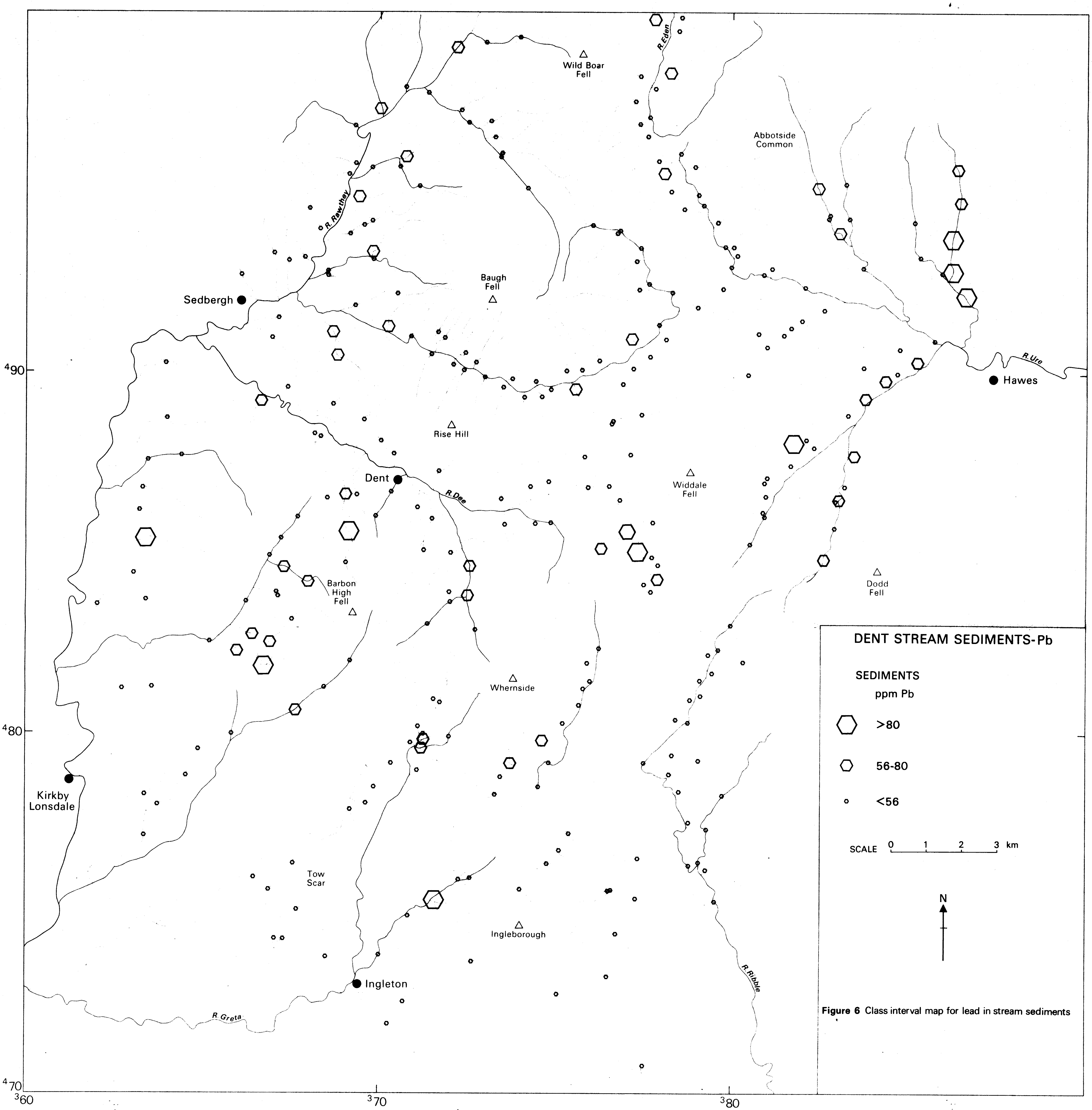


Figure 6 Class interval map for lead in stream sediments

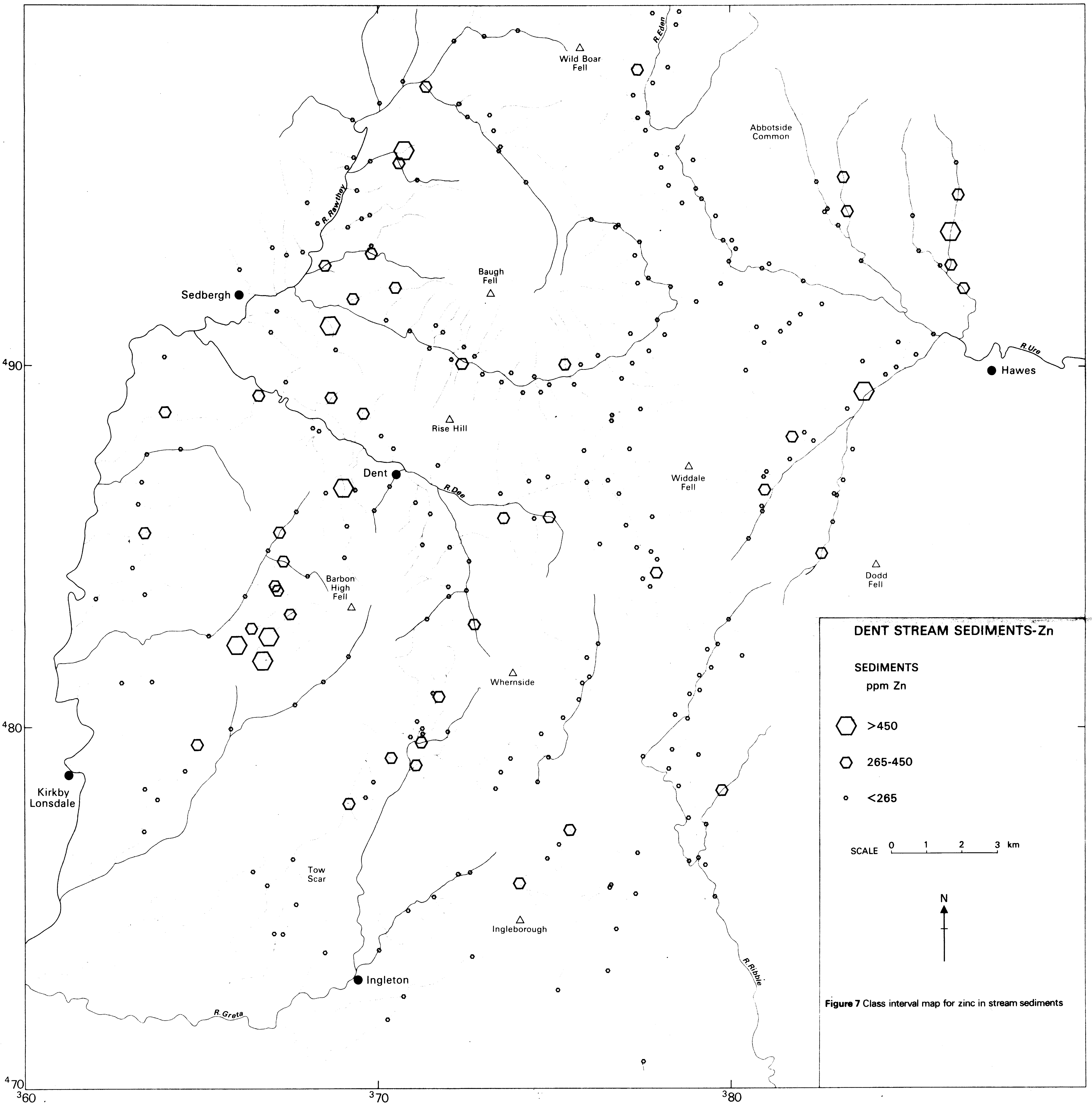


Figure 7 Class interval map for zinc in stream sediments

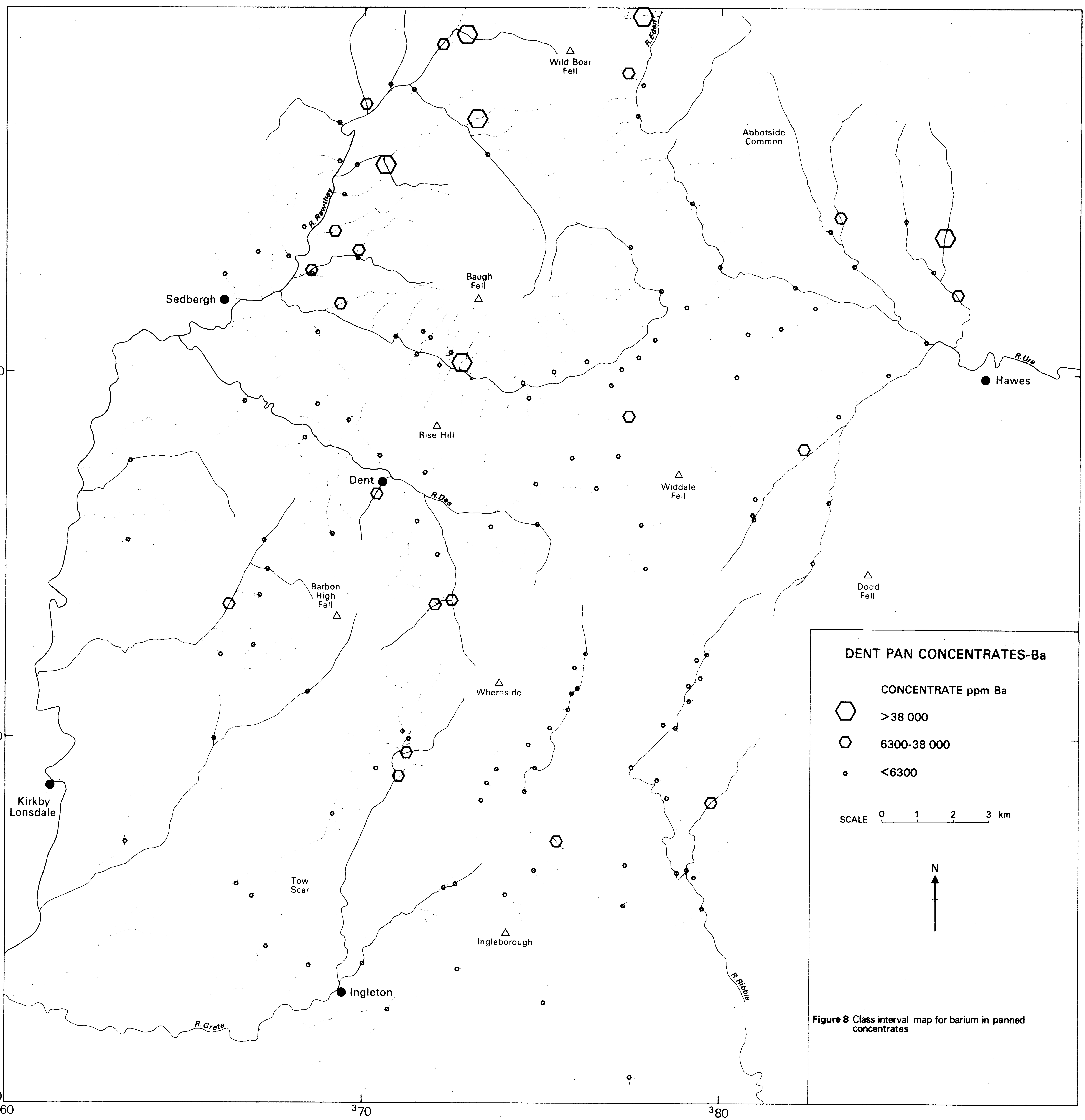


Figure 8 Class interval map for barium in panned concentrates

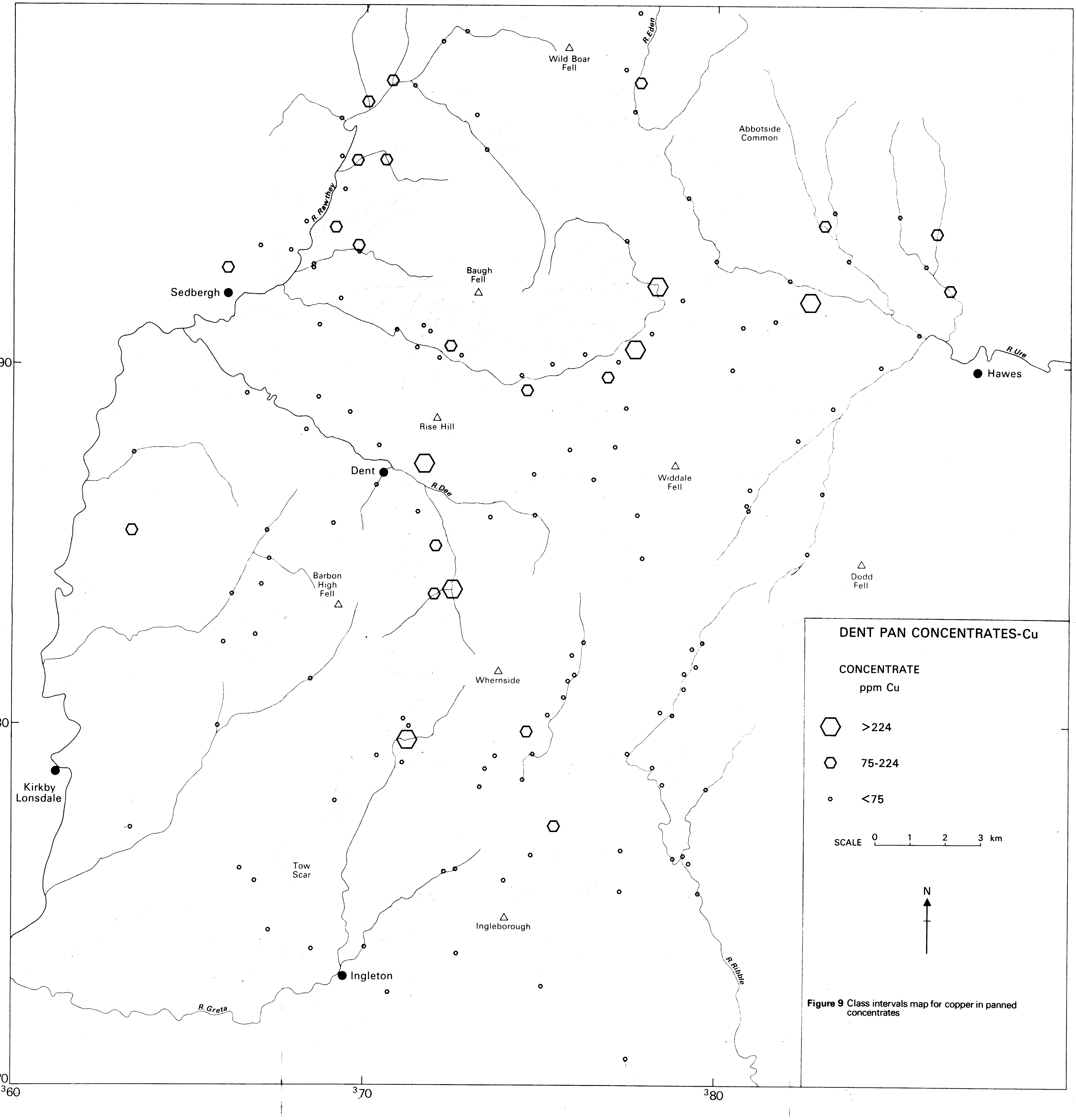


Figure 9 Class intervals map for copper in panned concentrates

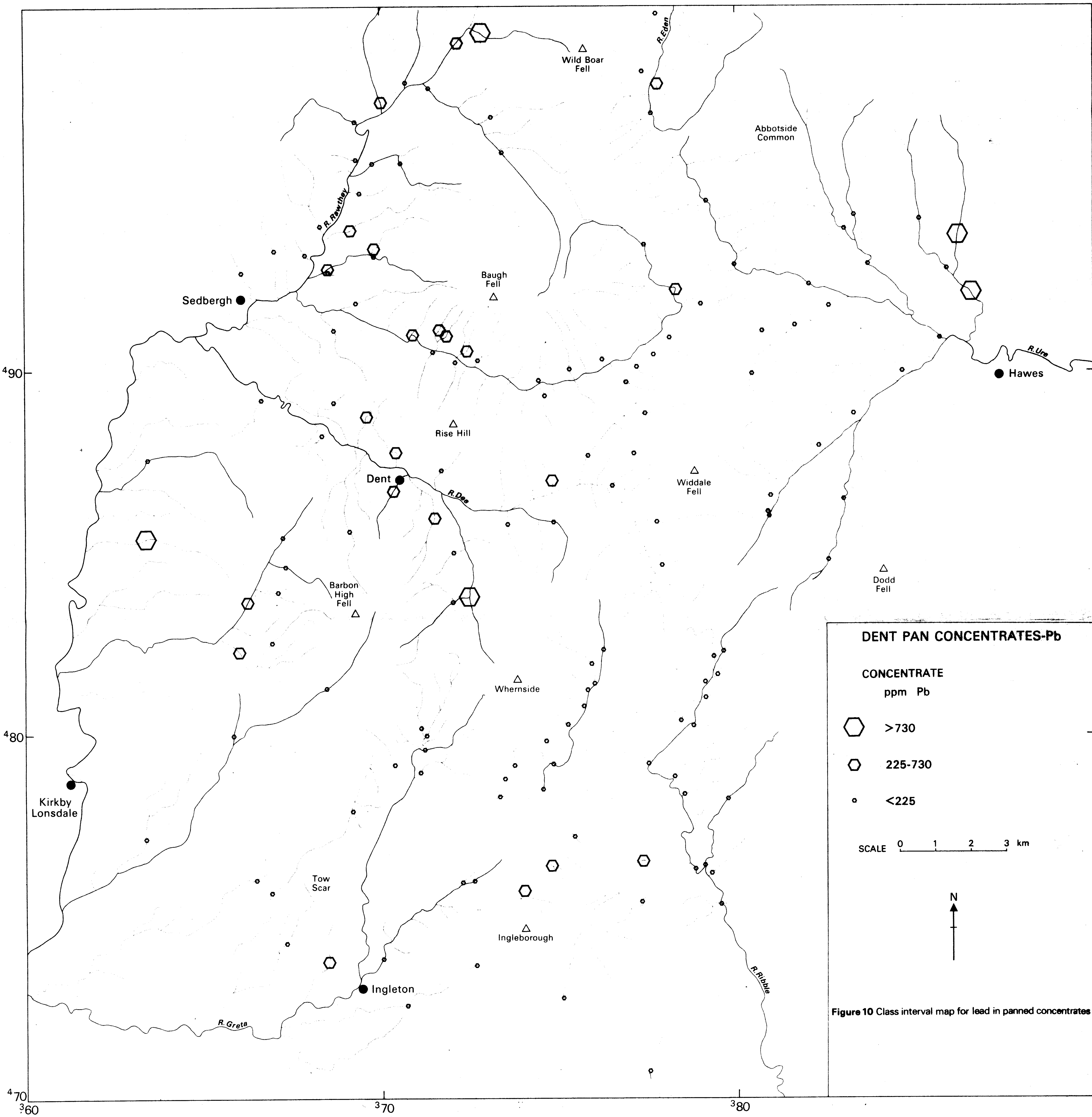


Figure 10 Class interval map for lead in panned concentrates

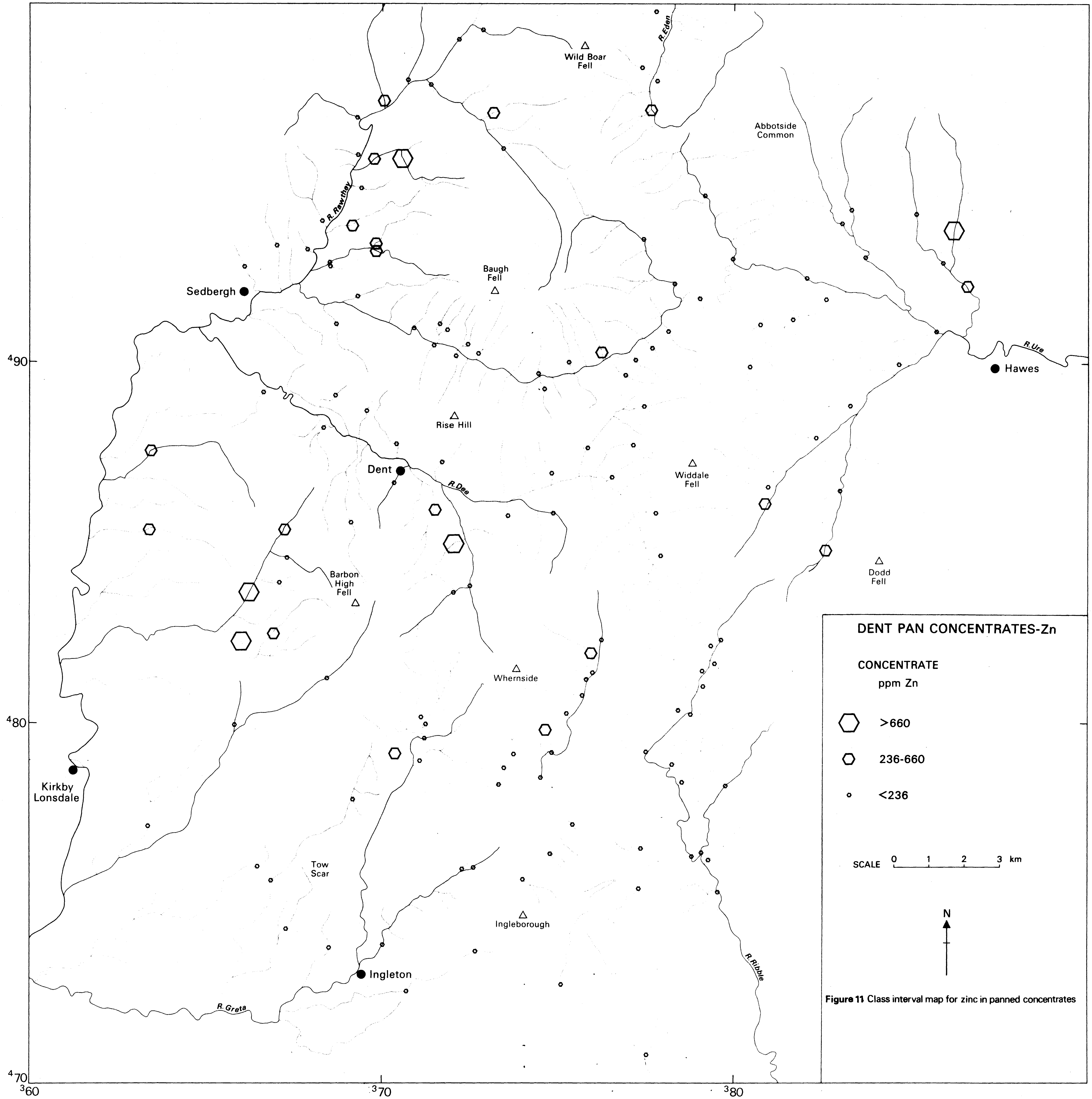


Figure 11 Class interval map for zinc in panned concentrates

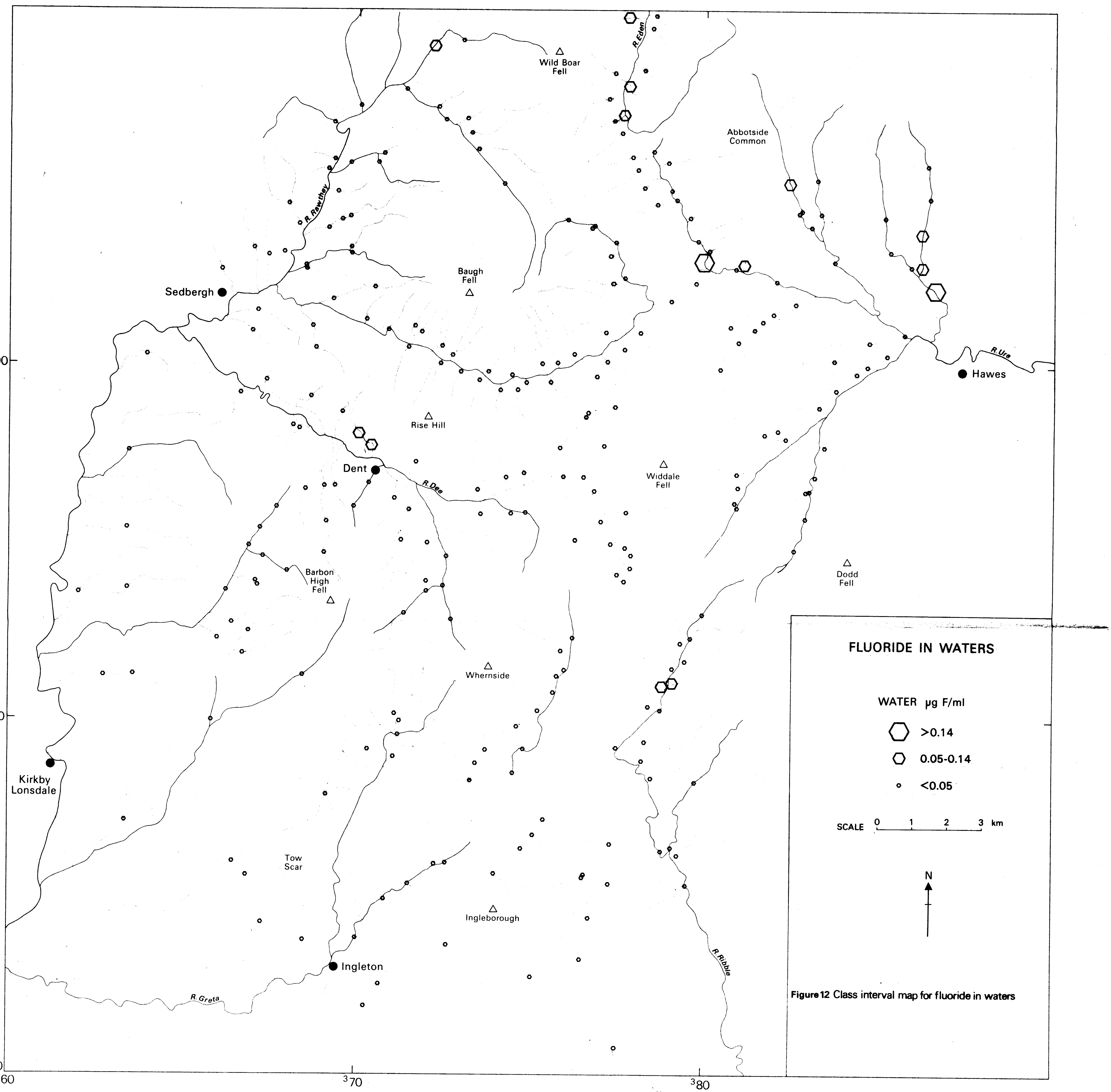


Figure 12 Class interval map for fluoride in waters

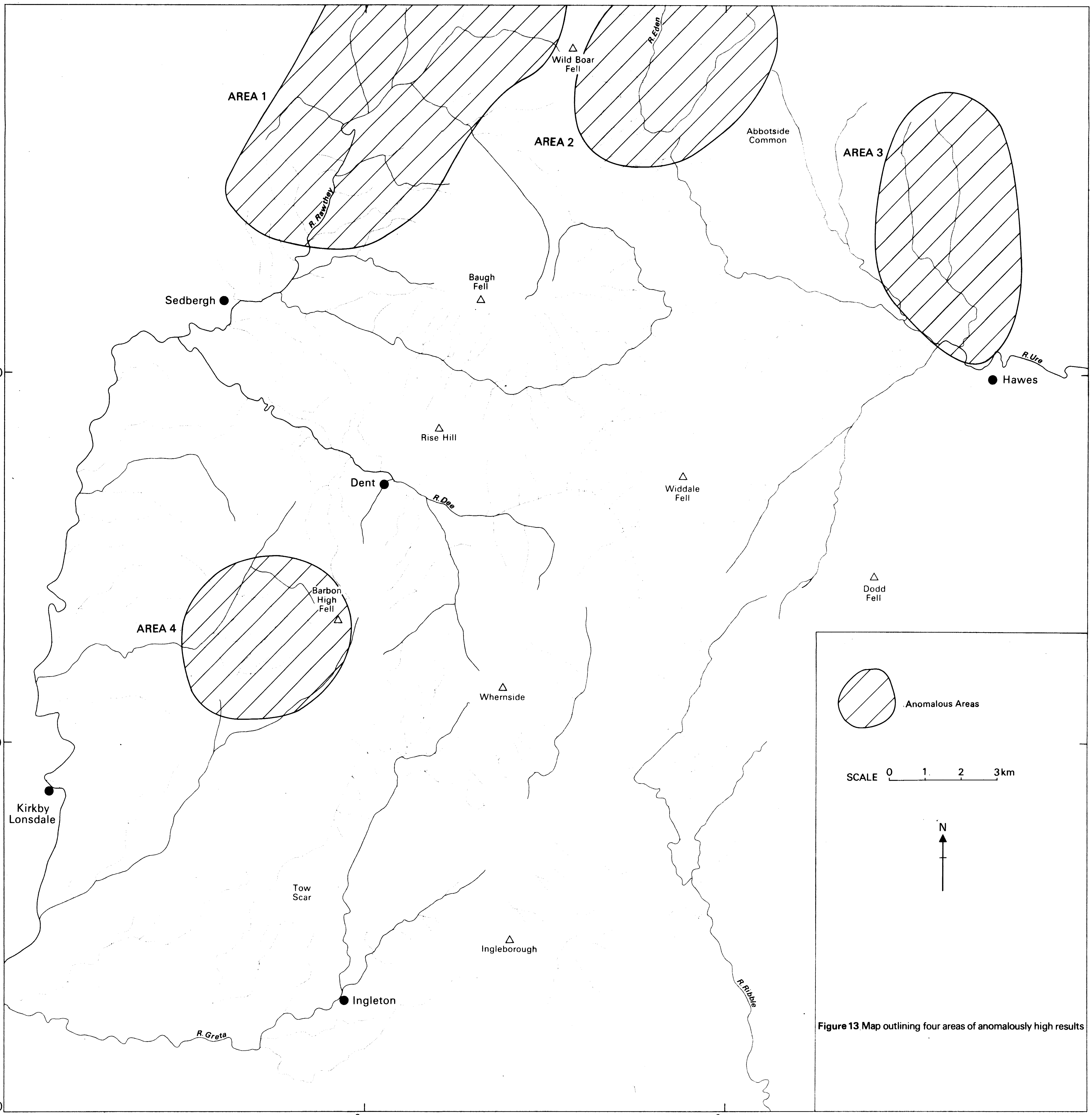


Figure 13 Map outlining four areas of anomalously high results