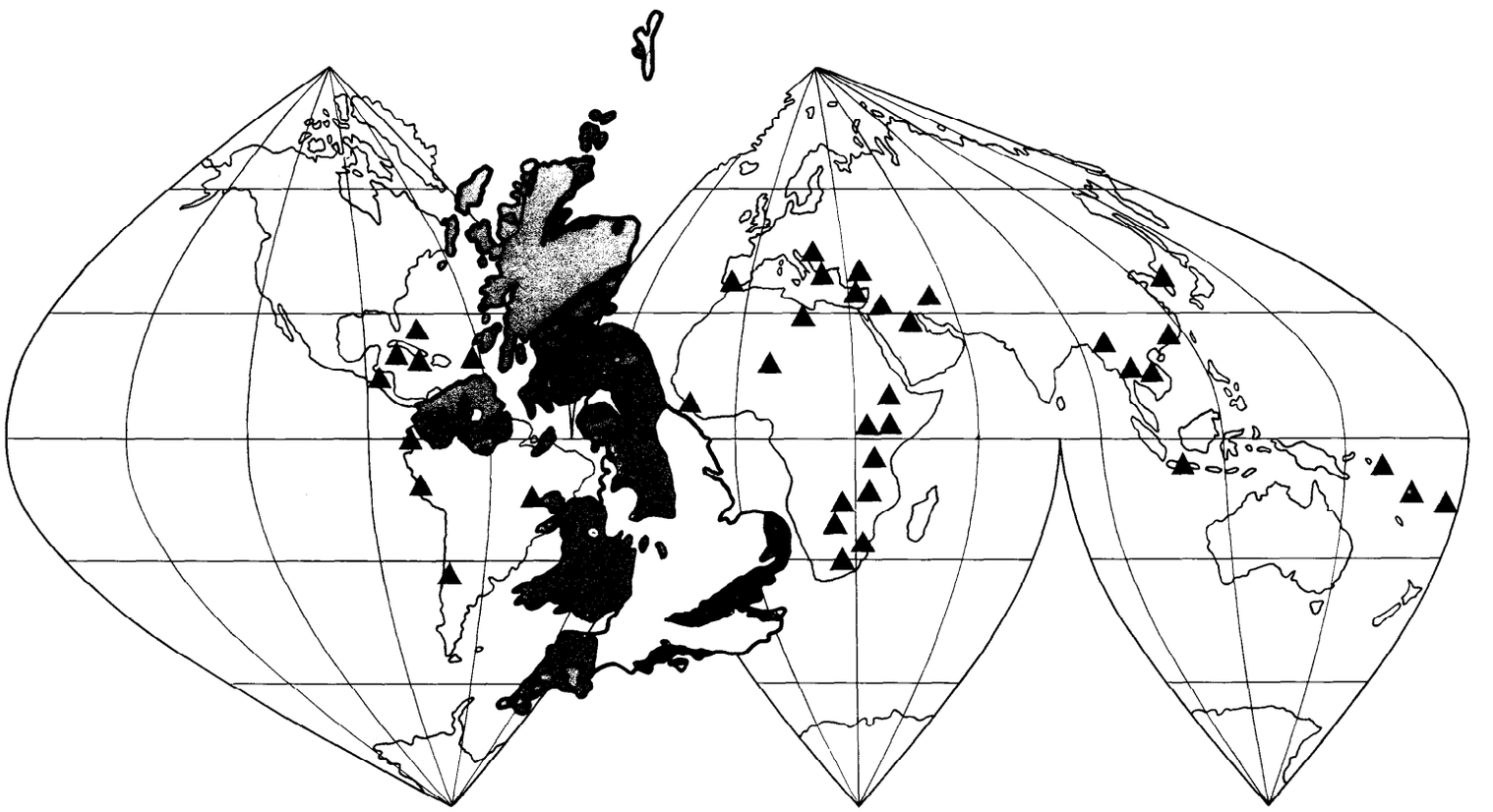
BIT

NATURAL ENVIRONMENT RESEARCH COUNCIL

INSTITUTE OF GEOLOGICAL SCIENCES

Preliminary mineral reconnaissance of Central Wales

REPORT No. 75/14



HMSO £2.85 net

The Institute of Geological Sciences is responsible both for the geological survey of Great Britain and for the programmes of British Technical Aid in geology in developing countries as arranged by the Ministry of Overseas Development and the United Nations and its agencies. This dual responsibility is illustrated by the map on the cover, the black triangles indicating the countries where technical aid has been promoted.

NATURAL ENVIRONMENT RESEARCH COUNCIL

INSTITUTE OF GEOLOGICAL SCIENCES

Report No. 75/14

Preliminary mineral reconnaissance of Central Wales

T. K. Ball, BSc, PhD and M. J. C. Nutt, BSc, PhD

London: Her Majesty's Stationery Office 1976

The Institute of Geological Sciences was formed by the incorporation of the Geological Survey of Great Britain and the Museum of Practical Geology with Overseas Geological Surveys and is a constituent body of the Natural Environment Research Council.

It is recommended that reference to this report be made in the following form:

BALL, T. K. and NUTT, M. J. C. 1976. Preliminary mineral reconnaissance of Central Wales. *Rep. Inst. Geol. Sci.*, No. 75/14, 12 pp.

ISBN 0 11 880781 1

Contents

Maps

Authors' Note

Since producing the maps it was discovered that the presence of La resulted in errors in the reported XRF values of Pb in panning concentrates. La was not determined but is found to be roughly related to the Ce content. An approximate maximum correction may be applied as follows:

True Pb value = reported Pb value –0.01 x reported Ce value.

This is only important for high Ce contents.

Preliminary Mineral Reconnaissance of Central Wales

T. K. BALL[1], BSc, PHD AND M. J. C. NUTT[2], BSc, PHD

Introduction

The following outline of the scope and results of a mineral reconnaissance of Central Wales was first published as a Technical Note in the Transactions of the Institution of Mining and Metallurgy (Ball and Nutt, 1974). The Institute of Geological Sciences is grateful to the Institution for permission to reproduce the material. This report is augmented, in the Appendix by Dr Nutt, by details of all mines identified on the accompanying geological map of the area.

Work on the reconnaissance programme, sponsored by the Department of Trade and Industry and managed by Dr S. H. U. Bowie, commenced in 1972. A geological map, on which the location of known lodes and mines are shown, has been produced from available literature and records. A total area of about 2500 km^2 was covered by a stream-water survey and vehicle-mounted scintillometer traverses, and a more comprehensive survey, including stream-sediment sampling at a density of one sample per 1.5 km^2, was carried out over some 1600 km^2 in the southern part of the area.

The studies on which this note is based were supported in the field by Dr D. C. Cooper and Mr M. Brown, and the analyses were undertaken mainly by Miss L. Hearn, Mr A. N. Morigi and Dr T. K. Smith.

Geology

The area is underlain by mudstones, shales and sandstones of Ordovician/Silurian age with a minor development of Ordovician volcanics near Llanwartyd Wells. Four lithostratigraphic formations, Van, Gwestyn, Frongoch and Cwmystwyth, are recognised (Jones 1922) north of a line from Rhayader to Tregaron. The Van is entirely Ordovician; the Gwestyn ranges from the base of the Lower Llandovery to the middle of the Middle Llandovery; the Frongoch continues the sequence through into the Upper Llandovery where the major sandstone towards the top is referred to as the Cwmystwyth formation. Marked facies changes occur in formations south of the Rhayader-Tregaron line, but the mineralisation is confined to the same general stratigraphic levels.

North of the line from Rhayader to Tregaron both major and minor fold-axes trend north-north-east, and faulting trending from east-north-east to north is important. To the south fold-axes trend north-east and faulting is of minor importance, with the exception of a few faults that trend north-east. The apparent absence of faults in the southern part of the area may, however, simply reflect the lack of modern structural studies.

Mineralisation

North of the Rhayader-Tregaron line known lodes mainly trend east-north-east and ore shoots are preferentially developed on the limbs of anticlines, especially at strike deflections. As a general rule, veins on the western limbs have been more productive than those of eastern limbs. It is also evident that lithology has played an important part in the location of ore. Lead and zinc, for example, are most common within interbedded sequences of sandstone, siltstone and mudstone (turbidites) in the Van, Frongoch and Cwmystwyth formations. Copper deposits, by contrast, are largely restricted to lodes within the dark pyritic shale of the Gwestyn formation.

Within individual lodes mineral zonation is apparent. Thus, to the west of the Plynlimon Dome lodes tend to be richer in zinc at their eastern extremities and to become progressively richer in lead to the west. Lodes to the east of the Plynlimon Dome exhibit a zonation in the opposite direction.

South of the Rhayader-Tregaron line lodes are poorly developed, but some occur trending west-north-west or east-north-east, and those mined produced lead and, to a lesser extent, zinc, with copper in at least two of the mines. Detailed structural analyses are required to establish relationships between folds, faults and mineralisation.

[1]Institute of Geological Sciences, 154 Clerkenwell Road, London EC1R 5DU
[2]Institute of Geological Sciences, Ring Road Halton, Leeds LS15 8TQ

Geochemical Reconnaissance

Stream sediments and water samples were collected over the area at an average density of one per 1.5 km^2 and, where appropriate, panned concentrates were prepared. Samples were analysed for Cu, Pb, and Zn by atomic absorption; U by neutron activation; and Be, B, Cr, Mn, Ba, V, As, Ni, Zr, Co, Mo and Sn and Fe by optical emission spectrometry. The panned concentrates were analysed for Ca, Ti, Mn, Fe, Ni, Cu, Zn, Sn, Sb, Ba and Ce by X-ray fluorescence spectrometry.

Anomalous concentrations of Cu, Pb, Zn, and Ba that could not be attributed to known mineralisation or to secondary environmental effects, such as coprecipitation with manganese and iron oxide-hydroxide, were recorded in a number of areas.

Main Results

LEAD

Moderately high values of Pb, not obviously related to mine dump material, were found on extensions of known veins, for example, east of Pontrhydfendigaid. Anomalies were also noted east of Tregaron and another grouping occurs in the Drygarn area.

ZINC

A broad zone of moderately anomalous values in stream sediments occurs in the region between Cwmystwyth and Llanfair Clydogau. A broad belt of low-amplitude anomalies extends from near Rhayader in a south-westerly direction to just north of Llandovery. A similar broad zone of anomalies, spatially related to the Orodivician-Silurian boundary, also has anomalous amounts of such metals as Cr, V and Co.

Sphalerite was noted in the tributaries of the Afon Twrch near Porth y Rhyd and near the axis of the Tywi anticline.

COPPER

The levels of copper are generally low in the area. The distribution to some extent mirrors the distribution of Pb, a group of anomalies corresponding to low-amplitude Pb anomalies occurring on the possible extension of lodes near Pontrydfendigaid.

The Ordovician and Lower Silurian sediments of the Ogofau-Mynydd Mallaen area exhibit a number of low-amplitude copper anomalies not related to the known copper mines in the area. Scattered anomalies are also located around the Drygarn Dome in association with Pb and Zn.

BARIUM

Anomalous barium is not common in the area and most of the high values in the stream sediment are matched by high values in the panned concentrate. An anomalous area near Llanwrtyd Wells is related to the axis of the Tywi anticline.

Conclusions

In the past the bulk of the output of minerals from Central Wales came from vein deposits. The highly productive 'flats' of lead and zinc in the sandstones of Van mine were not known until just before the general cessation of mining. It is, therefore, unlikely that any exploration was undertaken for 'flats' even though the conditions which gave rise to them at Van mine could occur elsewhere. There is also evidence to suggest that the restriction of copper mineralisation to the Gwestyn formation may result from an earlier copper concentration at this horizon, although, so far as is known, this has never been investigated.

Records show that in most instances veins were found at and mined from the surface and there are few examples of blind orebodies being located. The 'old miners' believed that when an orebody died in depth, which it usually did before 130m was reached, no further ore would be found by going deeper. Drifting rarely extended beyond the oreshoot and no mine in the Frongoch formation ever penetrated the Gwestyn formation into the underlying favourable Van formation. Indeed, very few mines in the Frongoch formation reached, at depth, the Gwestyn formation, which often has associated copper mineralisation. There is, therefore, a distinct possibility of blind oreshoots occurring beneath or adjacent to an old mine.

The Institute is at present mapping the area covered by the Aberystwyth (163) Sheet—an area which includes part of the northern half of that referred to here. So far, no new major veins have been found, although extensions to existing lodes have been noted. Thus, it is becoming increasingly evident that the discovery of new major lodes that outcrop in this northern area is unlikely, and that future potential, so far as such deposits are concerned, lies in the extension of known lodes. The possibility of orebodies existing along the strike of known lodes is greatest in areas covered by superficial deposits. Large drift-covered areas exist in Central Wales and the assessment of these is dependent on geochemical and geophysical exploration techniques. Work undertaken by the Geophysical Division has indicated that I.P. methods are satisfactory for the location of mineral deposits, though resistivity investigations may locate the positions of fault zones. E.M. surveys proved unsuccessful.

There is little chance of discovering significant ore deposits at surface, but the existence of blind or concealed orebodies is undoubted. These are likely to be found by the combined application of geochemistry, geophysics and structural geology; but, on present evidence, such ore deposits as are discovered are likely to be small or, at best, medium-tonnage.

References

BALL, T. K. and NUTT, M. J. C. 1974. Preliminary reconnaissance of central Wales. *Trans. Instn. Min. Metall., B*, Vol. 83, pp. 66-67.

JONES, O. T. 1922. Lead and Zinc. The mining district of North Cardiganshire and West Montgomeryshire. *Mem. Geol. Surv. Spec. Rep. Miner. Resour. G.B.*, Vol. 20.

Appendix 1: List of Named Mines by M. J. C. Nutt

BRECKNOCKSHIRE

Mine	*Alternative names*	*Grid reference*[1]	*Minerals*	*Approx. date of last working and max. depth of mining (m) below adit or surface*
Abergwessin	Nantybrain; Irfon River; Trawsnant; Newton; East Nantymwyn	832 503 843 515	Pb;	1883 (64)
Cefn Coch		840 536	Cu; Pb;	1860 (27)
Cynnant Fach		820 457 828 465		(Trial adits)
Dalrhiw		885 607	Cu; Pb;	1881 (67)
Nantygarw		874 606	Pb;	1899 (18)
Nant Gyrnant	?Castle Rock	858 474	Cu; Pb; Zn;	1875
North Nant y Cae South Nant y Cae	Nant y Car	891 618 885 609	Cu; Pb; Zn; Cu; Pb; Zn;	1883 (98)

CARDIGANSHIRE

Aberffrwd	Abernant	686 787	Cu; Pb;	
Abbey Consols	Florida; Bronberllan	744 663	Pb; Zn; Ag;	1911 (91)
Alltycrib	Talybont; North Cardigan; Tanyrallt; Llwyn Adda	653 894	Cu; Pb; Zn; Ag;	1913 (37)
Blaenceulan	Blaencellan; Blaencaelan	716 905	Cu; Pb; Zn;	1872 (adits)
Blaencennant		699 770	Pb; Zn;	1877 (37)
Bodcoll	Gertrude	759 769	Cu; Pb; Py;	1875 (adits)
Bog	Craignant Bach; Cardigan Old Bog	739 814	Pb; Zn; Ag;	1883 (92)
Brignant		752 754		1855 (adit)
Bron Caradoc		697 696	Cu; Pb;	
Bronfloyd	Bryn Llwyd; Gwaith Bronfloyd;	660 834	Cu; Pb; Ag;	1892 (191)
Bronmwyn	Caron	714 644	Pb;	1882 (84)
Brynambor		745 509	Cu; Pb; Py; Ba; F;	1874 (67)
Brynarian	Bryn yr arian	664 916	Pb; Zn;	1852
Bryndyfi	Neuaddlwyd	686 938	Pb;	1882
Brynglas		759 817	Pb;	1861 (47)
Bryn Hope	Bendigaid; Cardigan South Bog; West Florida	731 659		1865 (31)
Brynyrafr		746 878	Pb; Zn; Py; Ag;	1912 (140)
Bwadrain		712 797	Pb; Zn; Ag;	1876 (119)

[1]National Grid references are given in this form throughout. The area lies wholly within 100-km square SN.

CARDIGANSHIRE

Mine	*Alternative names*	*Grid reference*	*Minerals*	*Approx. date of last working and max. depth of mining (m) below adit or surface*
Bwadrain South	See South Bwadrain			
Bwlch	Bwlch Cwmerfin; Bwlch Consols; Bwlchrhennaid; Bwlch United; Pwllrhenaid	702 823	Pb; Ag;	1885 (204)
Bwlchglas		710 877	Pb; Zn; Ag;	1916 (64)
Bwlchgwyn	Aberystwyth; Nanteos; Nanteos Consols; Gwaith Newydd Ystum Tuen	738 788	Pb; Zn; Py; Ag;	1917 (91)
Bwlchystyllen		732 863	Pb; Mn;	1883 (24)
Caegynon	Glanrheidol	720 784	Pb; Zn; Py;	1934 (146)
Camdwrbach	Cambrian South	739 886	Zn;	1904 (55)
Camdwrmawr		752 877	Pb; Mn;	
Carregy Dwgan		692 902		
Castell	West Esgairlle; Dyffryn Castell; New Castell; Cripiau Bach; Gwaithdu	744 813	Cu; Pb; Zn; Ag;	1917 (49)
Cefngwyn	Ffynnonwaredd	679 869	Pb;	1888 (37)
Cerigyrwyn		685 835	Pb;	
Cefn-nant-yr-onen		671 781		
Ceunant	Caenant	709 827	Pb;	1850 (adits)
Clara	Clara Consols; Clara United	737 807	Pb; Zn;	1882 (105)
Clettwr	Gwar Cwm Bach	676 918		
Crown	Tynyffordd	758 799		
Cwm Brefi		695 541	Cu; Pb; Zn;	1862
Cwmbrwyno	Cefn-cwm-brwyno; Cefn-bruns; Cefnbrwyno	715 806	Pb; Zn; Ag;	1892 (191)
Cwmdaren	Level Gopor; Copper Level	683 833	Cu; Pb;	1869 (91)
Cwmerfin	Bwlch-cwm-erfin	697 829	Cu; Pb; Zn; Ag;	1889 (128)
Cwmmawr		736 672	Pb; Zn;	1917 (73)
Cwmrheidol	Ystumtuen	730 782	Pb; Zn; Py; Ag;	1970 (adits)
Cwm Robert		648 533	Pb; Zn; Ag;	(Trial adit)
Cwm y Graig Goch		718 580 720 583	Pb; Zn;	(Trial adits)
Cwmystwyth		805 747	Pb; Zn; Py; Ag;	1921 (99)
Cwmystwyth South	see South Cwmystwyth			
Cwmystwyth West	see West Cwmystwyth			
Cynnullmawr		658 873		
Dalar-wen		788 490		(Trial adit)
Daren	Great Daren; Old Daren	679 829	Cu; Pb; Ag;	1879 (128)
Daren East	see East Daren			

CARDIGANSHIRE

Mine	*Alternative names*	*Grid reference*	*Minerals*	*Approx. date of last working and max. depth of mining (m) below adit or surface*
Daren South	see South Daren			
Dolclettwr	Llainhir	660 919	Cu; Pb; Zn;	
Dolwen		781 784	Cu; Pb; Zn;	1871 (adits)
East Daren	Cwmsymlog	701 838	Pb; Ag;	1901 (238)
East Frongoch		735 749		1858 (55)
East Glogfach		756 713		
East Hafod		782 741		1865 (adit)
East Maenarthur Wood	Cyll	731 729		
East Penpontbren		667 901		
East Rhydtalg		794 524	Cu; Pb; Zn;	1873 (Trial adits)
Elgar		662 860	Pb;	1890 (55)
Erglodd	Eurglawdd; Cefn Erglodd	656 904	Pb; Zn; Py;	(20)
Esgairddu		768 697		1857 (adit)
Esgairfraith	Cambrian; Welsh Potosi; Cardigan Consolidated	741 912	Cu; Pb; Ag;	1904 (143)
Esgair Gadfach		667 538	Pb; Zn;	1859 (26)
Esgairhir	Cambrian; Welsh Potosi; Cardigan Consolidated	734 912	Pb; Ag;	1904 (55)
Esgairmwyn	Esgair-y-mwyn	755 692	Cu; Pb; Zn; Ag;	1927 (302)
Frongoch	Bron y Goch; Bryses; includes Llwynwnwcho	721 744	Pb; Zn; Ag;	1910 (282)
Gelli'reirin	Gelli; Gelieron; Dolfawr	703 796	Pb;	1864 (adits)
Geufron	West Imperial	699 784		
Glogfach		748 709	Pb; Ag;	1889 (238)
Glogfach East	See East Glogfach			
Glogfawr		747 706	Pb; Ag;	1920 (201)
Goginan	Brynpica	690 818	Cu; Pb; Ag;	1886 (259)
Goginan West	See West Goginan			
Gothic		700 792		
Great West Van	Esgairlle;	791 828	Pb; Zn; Ag;	1892 (128)
Grogwynion	Brynystwyth	714 725	Pb; Ag;	1889 (adits)
Grogwynion North	See North Grogwynion			
Gwaithgoch	Rheidol United	712 786		(adits)
Gwaithgoch		708 723	Pb; Zn; Ag;	1860 (adits)
Gwaithyrafon	Carig-yr-Oen; River-work	691 839		
Gwaithvach		639 510	Pb;	1850 (55)
Gwrda		66i 804		
Hafan		728 879	Cu; Pb; Zn;	(adits)

CARDIGANSHIRE

Mine	*Alternative names*	*Grid reference*	*Minerals*	*Approx. date of last working and max. depth of mining (m) below adit or surface*
Hafodau		690 802		1873
Hendrefelen	Ella; West Lisburne	717 696	Pb;	1873 (Trials)
Henfwlch		738 882	Cu; Pb; Zn;	
Hirnant		755 839		
Leri Valley	Penpontbren uchaf; Leri	675 884	Cu; Pb; Zn;	1910 (Trial adits)
Level Newydd	New Level	709 823	Pb;	1864 (128)
Lisburne	Cwmmawr; Level Fawr	739 722	Pb; Ag;	(adit)
Lisburne South	See South Lisburne			
Llancynfelyn	Neuadd yr Ynys	654 920	Pb;	(73)
Llaneithyr		759 777		
Llanerch		685 862	Pb;	(Trial)
Llanfair (Clydogau)		627 512	Pb; Ag;	1862 (110)
Llawrcwmbach		709 853	Pb;	(55)
Llechweddhelyg	Willow Bank	684 847	Pb;	1861 (55)
Llechweddhen	Alma	664 836	Pb;	1853
Llettyhen	Vaughan; Lletty Evanhen; Lleytty Evanhir	694 849	Pb; Zn; Mn;	1911 (95)
Llwynmalus	West Lisburne	690 678	Pb; Zn; Ag;	1884 (91)
Llywernog	Powell's United; Powell Consolidated; Llewernog; Poole's; Llewernog United	732 810	Pb; Zn; Ag;	1909 (132)
Llwyn Gwyddell		742 683		
Llwynteify	East Llwyn Teifi	746 792	Pb; Zn; Py;	
Logaulas	Log y las; Brongoch	743 718	Pb; Zn; Ag;	1891 (238)
Loveden	Penrhyngerwin	670 941	Pb; Zn; Ag;	1940 (67)
Melindwr	Melindwr Valley; Ty'nypwll; West Cwmerfin; Troed Rhiw	679 818	Pb;	1927 (91)
Moelglomen		700 874	Pb;	1865 (Trial)
Mountain Lake		703 907		
Mynach Vale	Tygwyn; Wilsons; De Broke	772 775	Cu; Pb; Zn;	1890 (91)
Mynyddgorddu	Monydd-gorddu; Burnetts; Mynydd gwawrdda	668 860	Pb; Zn; Ag;	1884 (84)
Nant Fach Ddu		625 505	Pb;	1862 (27)
Nant Ffun		757 728		
Nantglas	Rheidol United	710 784		
Nant Syddion		773 791		
Nant Nod	South Plynlimon	791 839		1873 (73)
Nant y caerhedyn		755 829		

CARDIGANSHIRE

Mine	*Alternative names*	*Grid reference*	*Minerals*	*Approx. date of last working and max. depth of mining (m) below adit or surface*
Nantycagal	Eaglebrook	734 892	Cu; Pb;	
Nantycreiau	Nant-y-cria	789 802	Cu; Pb; Zn;	1909 (adits)
Nantycreiau West	See West Nantycreiau			
Nant y nod		698 902		
Nantyrarian	Silver Stream; Blaendyffryn	705 814	Pb;	1909
Nant yr Onen		667 778		
North Grogwynion	Pantauhirion	702 728	Pb;	1882 (66)
North Hafod		762 759		
Old Esgairlle	Esgairlle	795 830	Pb; Zn; Py; Ag;	1873 (adits)
Pantmawr	Imperial; Silver Mountain Silver Bank; Silver Hill Consols; South Rheidol	703 783	Pb;	1877 (46)
Peithnant		776 855		
Pengraidgddu		713 825	Pb;	1852 (30)
Penlanfach	?Esgair Llethyr	738 701	Pb;	1885 (61)
Penpontbren		658 899	Pb; Zn;	
Penrhiw	Aberystwyth; Nanteos Consols; Nanteos; Penyberth	737 787	Pb; Zn; Py; Ag;	1919 (159)
Pensarn		667 912		
Pentre Brunant		795 740		1844 (Trial adit)
Penybanc		661 902	Pb;	
Penycefn	Court Grange; Morrison's	656 856	Pb; Zn; Ag;	1891 (137)
Penygist		745 716		
Plynlimon		795 857	Pb; Ag;	1895 (88)
Ponterwyd	California of Wales	745 808	Pb; Ag;	1863 (40)
Pont Glan-rhyd		641 514	Cu; Pb;	1800 (Trial)
Pontrhdygroes	Hafod	742 728		
Powell's	Powell Consolidated; Powell's United	728 808	Pb; Zn; Ag;	1890 (146)
Pwll Roman		657 916	Pb;	1856 (110)
Red Rock	Graiggoch	704 740	Pb; Zn; Ag;	1889 (146)
Rheidol United	includes Penclayen; Foxpath; Erwtomau; Alltddu	714 782	Pb; Zn; Ag;	1927 (95)
Rhos Goch		648 832		1873 (64)
Rhydtalog		791 521	Cu; Pb; Zn;	1873 (46)
Rhyscog		681 538	Pb;	1861 (64)
South Bwadrain		717 789	Zn;	1876 (22)
South Cwmystwyth	Ystwyth; Graiggoch; Cwmystwyth	802 742	Pb; Zn;	1886 (44)
South Daren	Cwmsebon; Thomas United	686 830	Cu; Pb; Zn; Ag;	1893 (311)

CARDIGANSHIRE

Mine	*Alternative names*	*Grid reference*	*Minerals*	*Approx. date of last working and max. depth of mining (m) below adit or surface*
South Lisburne	Llwynllwydd; Fairchance	746 686	Pb; Zn;	1878 (101)
Tan y Gaer		617 480	Pb;	1808 (Trial adit)
Tanyrallt		651 901	Pb; Ag;	1886
Temple		749 792	Pb; Zn;	1887 (adits)
Troed-rhiwruddwen		772 476	Cu;	1870 (Trial adit)
Tyllwyd	Cwm Pryf	699 797	Pb;	(18)
Tymawr		682 898		
Tynant	Esgairhir West	696 887		
Tynewydd		698 872		(Trial adits)
Tynyfron	Cwmrheidol	724 784	Pb; Zn; Py; Ag;	1908
Wemyss		714 742	Pb; Zn; Ag;	1899 (122)
West Cwmystwyth	Penshaft	788 745	Pb;	1885
West Esgairlle		779 815	Cu; Pb; Zn;	
West Frongoch		710 742	Pb; Zn; Ag;	1899 (31)
West Goginan		671 808	Pb;	1882 (88)
West Maenarthur Wood		726 723		
West Nantycreiau		782 798	Cu; Pb; Zn;	1895
West Plynlimon		770 845		
Ynystudur	Ynys	683 934	Pb;	1881 (Trial)
Ystrad Einion		706 938	Cu; Pb; Zn;	1900 (146)

CARMARTHENSHIRE

Benlan		724 381		(Trial adit)
Blaennant Melin		735 473	Cu; Pb; Zn; Py; Ag;	1873 (Trials)
Blaen Twrch		682 500 677 501		(Trial adits)
Blaen Wern		680 492		
Bwlch y Rhiw		730 462	Cu;	(Trial adit)
Cae-glas		722 377		(Trial adit)
Casara	Great Welsh Silver Lead Mine; Cwm Brane	753 275	Pb;	1865 (91)
Chwarel Ystradffin		787 461		
Cnwch y Bedw		722 418	Cu; Pb;	1862 (Trial adits)
Craig Rhosan		750 429		(Trial adit)
Creigiau Ladies		726 461		(Trial adit)
Cynnant	Treharne's Mine	805 443	Pb;	1968 (Trial adits)

CARMARTHENSHIRE

Mine	*Alternative names*	*Grid reference*	*Minerals*	*Approx. date of last working and max. depth of mining (m) below adit or surface*
Gilfach	Goreu	762 277	Pb;	1877 (66)
Mallaen Mountain		731 423 729 425	Cu; Pb;	1838
Mandinam	Glansevin	737 283	Pb; Zn;	1853 (Trial adits)
Myddfai		772 302	Pb;	1840 (Discovery)
Nant a'r Nelle		742 423	Pb;	1857
Nantymwyn	Cerrigmwyn; Rhandirmyn	787 445	Pb; Zn;	1932 (207)
North Nantymwyn		759 477 766 480 764 482 753 488	Pb; Ba;	1864 (18)
Ogofau	Roman Deep	663 403	Pb; Py; Au;	1939 (140)
Paradise Lode	Glansevin	769 332	Cu; Pb;	1855 (15)
Pen-rhiw-rhaiadr	West Nantymwyn	761 420	Pb;	1857
Rhiw		747 270		(Trial adit)
Scrach		847 394	Pb;	(Trial)
St David's		783 332	Pb;	1852
Troed y Rhiw		685 369 693 368	Cu;	1866 (Trials)
Tycerrig		675 481	Pb;	1883
Tynybedw		709 366	Pb;	1865 (Trial adits)
West Nantymwyn		773 439 777 433 772 434	Pb;	1852 (Trial adits)
Wheal Morgan	Lady Eliza	763 286 763 279	Pb;	1863

MERIONETHSHIRE

Balkan Hill		617 963	Cu;	
Bryndinas		649 999	Pb;	
Corbet Dovey	Aberdyfi Copper	612 960	Cu; Pb;	1860
Melyn Llyn Pair	Pant-y-cae; Aberdovey	618 992	Pb; Zn;	1883
Pant Eidal		662 975	Cu;	(Trial adit)
Tyddynbriddell		643 983	Cu; Pb;	

MONTGOMERYSHIRE

Aberdaunant	Aberdeunant	909 866	Pb; Zn; Ag; Ba; Wi;	1876 (adits)
Bacheiddon		838 972	Pb;	1863 (79)
Brynposteg	Llanidloes	971 823	Pb; Zn;	1878 (207)
Bryntail	Gundry's; Western; New Van Consols; Bryn-y-tail	921 871	Pb; Ag; Ba; Wi;	1941 (110)

MONTGOMERYSHIRE

Mine	*Alternative names*	*Grid reference*	*Minerals*	*Approx. date of last working and max. depth of mining (m) below adit or surface*
Brynyfedwen		856 971	Pb; Ag;	1858
Bugeilyn		819 926		
Bwlchysgellyn		761 993		1906
Cae Conroy	Tyisaf	875 979	Pb; Zn; Ag;	1873 (119)
Ceulan		858 977	Pb; Ag;	1888
Crowlwm		913 868	Pb; Zn; Ba;	
Cwmbyr		786 948	Pb; Zn; Ag;	1882
Cwmfron		970 810 973 810	Pb; Zn;	1872 (88)
Cwmfron East	See East Cwmfron			
Cwm nant ddu		847 991		
Cwmrhaiadr		757 948	Pb; Zn;	
Cwmricket	Maesnant	854 866	Pb; Zn; Ag;	1878
Dolminers	West Wye Valley	825 848	Pb; Zn; Ag;	1880 (146)
Dolwen		997 841	Ba;	(adit)
Dyfngwm	Brynyfedwen	850 933	Cu; Pb; Zn; Ag;	1935 (183)
Dylife	Esgairgaled; Llechweddu; Blaen Twymyn; Bradford	854 939	Cu; Pb; Zn; Ag;	1901 (284)
East Cwmfron	Capel Banhaglog	979 810	Pb; Zn; Ag;	1873 (66)
East Plynlimon		802 865		
East Van		950 885	Pb;	1880 (adits)
Geufron		887 858	Cu; Py;	1855
Glan Gwden	Lower Van	958 887		1877 (adit)
Glan Severn		845 818		1874
Glaslyn		812 943		(adits)
Glyn	New Van Consols	925 872	Pb; Ag; Ba;	(Trial)
Gorn		980 840	Pb; Zn; Ba; Wi;	1856 (73)
Gwestyn		895 862	Cu;	
Hirnant		875 935		
Hyddgen		784 907	Cu; Pb;	
Llanerchyraur	Tyisaf	863 980	Pb; Ag;	1947 (adits)
Llechweddmawr		781 906		
Maesnant		840 870	Pb;	
Moel Fadian		829 951	Cu;	1878 (Trial adits)
Nantddu	Cyfarthfa	833 932	Cu; Pb; Ag;	1884
Nant Gwernos		822 827		
Nantiago		824 865	Pb; Zn; Ag;	1917 (128)
Nantmelyn	Nantfelyn; Severn Water	862 876	Cu; Pb; Py;	1879

MONTGOMERYSHIRE

Mine	*Alternative names*	*Grid reference*	*Minerals*	*Approx. date of last working and max. depth of mining (m) below adit or surface*
Nanty		852 822	Pb; Ag;	1871 (37)
Nantygwrdy	West Nanty; Wye Valley	827 850	Pb; Zn; Ag;	1884 (128)
Nantyricket		867 868	Cu;	1908 (Trial adits)
New Brynposteg		982 822		1874 (91)
Newchapel	Cwm Mawr	988 828	Pb; Ba;	
North Van		944 913		
Penrallt		954 859	Pb;	1871
Penyclun	Penclyn; Van Consols; United Van Consols;	932 877	Pb; Ag; Ba; Wi;	1882 (adits)
Rhoswydol		846 977 839 976	Pb; Ag; Ba;	1877
Rhydybenwch		858 872		
Rhydymwyn		918 962		
Siglenlas		866 840	Cu; Pb; Ag;	1868 (Trial)
Snowbrook	Nantyreira	827 874	Pb; Ag;	1883
South Van		902 847		1873 (55)
Tynewydd		992 803		(Trial)
Van		938 879 941 878	Pb; Zn; Ag;	1921 (274)
Van East	See East Van			
Van United	Hafodfeddgar	874 858		
Wheal Van (Llanidloes)	Cyll	976 886		

RADNORSHIRE

Cwm Bach		944 698 949 701	Pb;	1877 (Trial adits)
Cwm Elan		901 651	Pb; Zn;	1877 (73)
Drosgol		951 738 956 740 955 742	Pb; Zn;	1902 (Trial adits)
Fedw	St Harmon	976 793	Cu; Pb; Zn;	1878 (122)
Marteg Bridge		953 715 931 735	Pb;	(Trial adits)
West Fedw		967 797 974 791	Pb;	1871 (15)

Mineral Abbreviations

Cu - Copper	Zn - Zinc	Ag - Silver	Ba- Barytes	F - Fluorspar
Pb - Lead	Py - Pyrite	Au - Gold	Wi - Witherite	Mn - Manganese

MAJOR SOURCES OF INFORMATION

BICK, D. E. 1974. *The Old Metal Mines of Mid-Wales. Pt. 1 Cardiganshire – South of Devil's Bridge* (Newent: The Pound House).

——— 1975. *The Old Metal Mines of Mid-Wales. Pt. 2 Cardiganshire – The Rheidol to Goginan* (Newent: The Pound House).

HALL, G. W. 1971. *Metal Mines of Southern Wales.* (Westbury-on-Severn: G. W. Hall).

JONES, O. T. 1922. Lead and zinc. The mining district of North Cardiganshire and West Montgomeryshire. *Mem. Geol. Surv. Spec. Rep. Miner. Resour. G.B.*, Vol. 20.

LEWIS, W. J. 1967. *Lead Mining in Wales* (Cardiff: University of Wales Press).

Mining Journal

Records in the Institute of Geological Sciences, London.

Records in the Mining Records Office, Department of Industry, London.

Records in the National Library of Wales, Aberystwyth.

INSTITUTE OF GEOLOGICAL SCIENCES
GEOLOGICAL SURVEY OF GREAT BRITAIN (ENGLAND AND WALES)
CENTRAL WALES MINING FIELD
Scale 1:100,000

Mineral Reconnaisance Programme for Department of Industry

Explanation of Geological Symbols and Colours

Not to scale

SOLID (all drift deposits omitted)

Undivided; mudstones, slates and sandstones	Wenlock	SILURIAN
Interbedded green and locally purple mudstones		
Undivided; mudstones, slates and sandstones	U.Llandovery	
Sandstones		
Undivided; mainly mudstones and slates	M.Llandovery	
Sandstones and conglomerates		
Undivided; mainly mudstones and slates	L. Llandovery	
Sandstones and conglomerates		
Undivided; mainly mudstones and slates	Ashgill / Caradoc	ORDOVICIAN
Sandstones and conglomerates		
Limestone		

IGNEOUS

Lavas and tuffs, (acid or basic) in Caradoc	EXTRUSIVE
Albitised basalt	INTRUSIVE

Geological boundary taken from source maps

Geological boundary inferred from other data

Fault at surface; crossmark indicates downthrow side

VAN *Lode*

Hyddgen *Location of abandoned mine, position approximate*

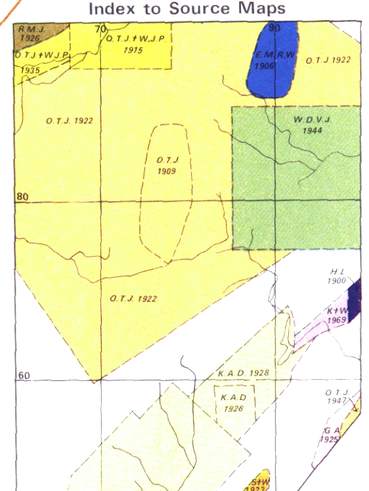
Outcrops of sandstone without boundary lines are approximate

Drawn at the Leeds Drawing Office of the Institute of Geological Sciences
Cartography Miss A. Morrice,
Cartographic Superintendent E. Tallis

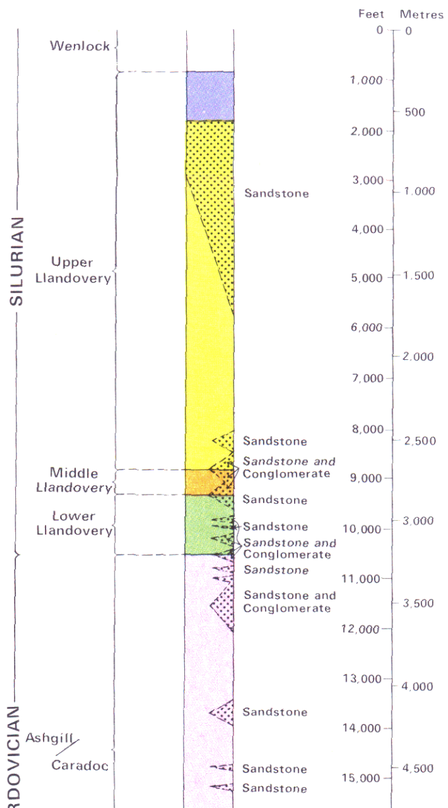
Scale: 1:100 000 or 0·633 inches to 1 mile

Miles 1 0 1 2 3 4 5 6 Miles
Metres 1000 0 1 2 3 4 5 6 7 8 9 10 Kilometres

Index to Source Maps



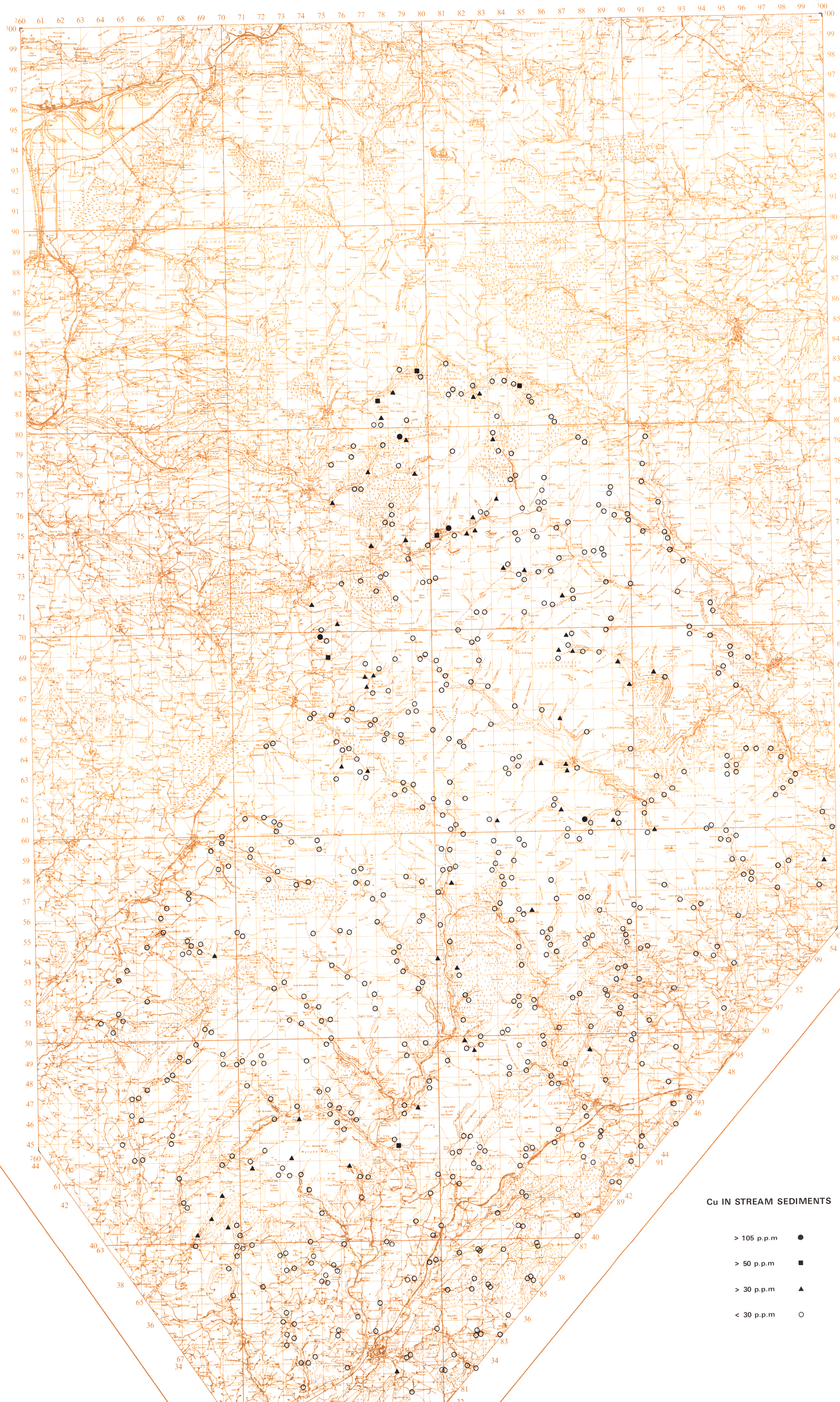
Generalized Vertical Section



Compiled at the Institute of Geological Sciences by M.J.C.Nutt
Based on the maps of: G.Andrew (G.A. 1925), K.A.Davies (K.A.D. 1926, 1928, 1933, a & b), R.M.Jehu (R.M.J. 1926), O.T.Jones (O.T.J. 1909, 1922, 1925, 1947, 1949), O.T.Jones and W.J. Pugh (O.T.J. and W.J.P. 1915, 1935), W.D.V.Jones (W.D.V.J. 1944), G.Kelling and M.A.Woollands (K and W 1969), H.Lapworth (H.L. 1900), L.D.Stamp and S.W.Wooldridge (S and W 1923), E.M.R.Wood (E.M.R.W. 1906).
Old Series One-Inch Geological Maps 41NE, 42NW, 56NW, 56SW, 57NE, 57SE, 60SW, 1:100,000 Geological Sheet published 1974
Sir Kingsley Dunham, D.Sc., F.R.S., *Director, Institute of Geological Sciences.*

INSTITUTE OF GEOLOGICAL SCIENCES
GEOCHEMICAL DIVISION
CENTRAL WALES MINING FIELD
Scale 1:100,000

Mineral Reconnaisance Programme for Department of Industry



ELEMENT DISTRIBUTION MAPS
Collection, analyses and compilation by
GEOCHEMICAL DIVISION
INSTITUTE OF GEOLOGICAL SCIENCES

Geochemical sampling and compilation of data by T.K. Ball, D.C. Cooper and M.J. Brown.

Analytical data by T.K. Smith, L. Hearn and A.N. Morigi.

Sir Kingsley Dunham, DSc, FRS, *Director, Institute of Geological Sciences.*

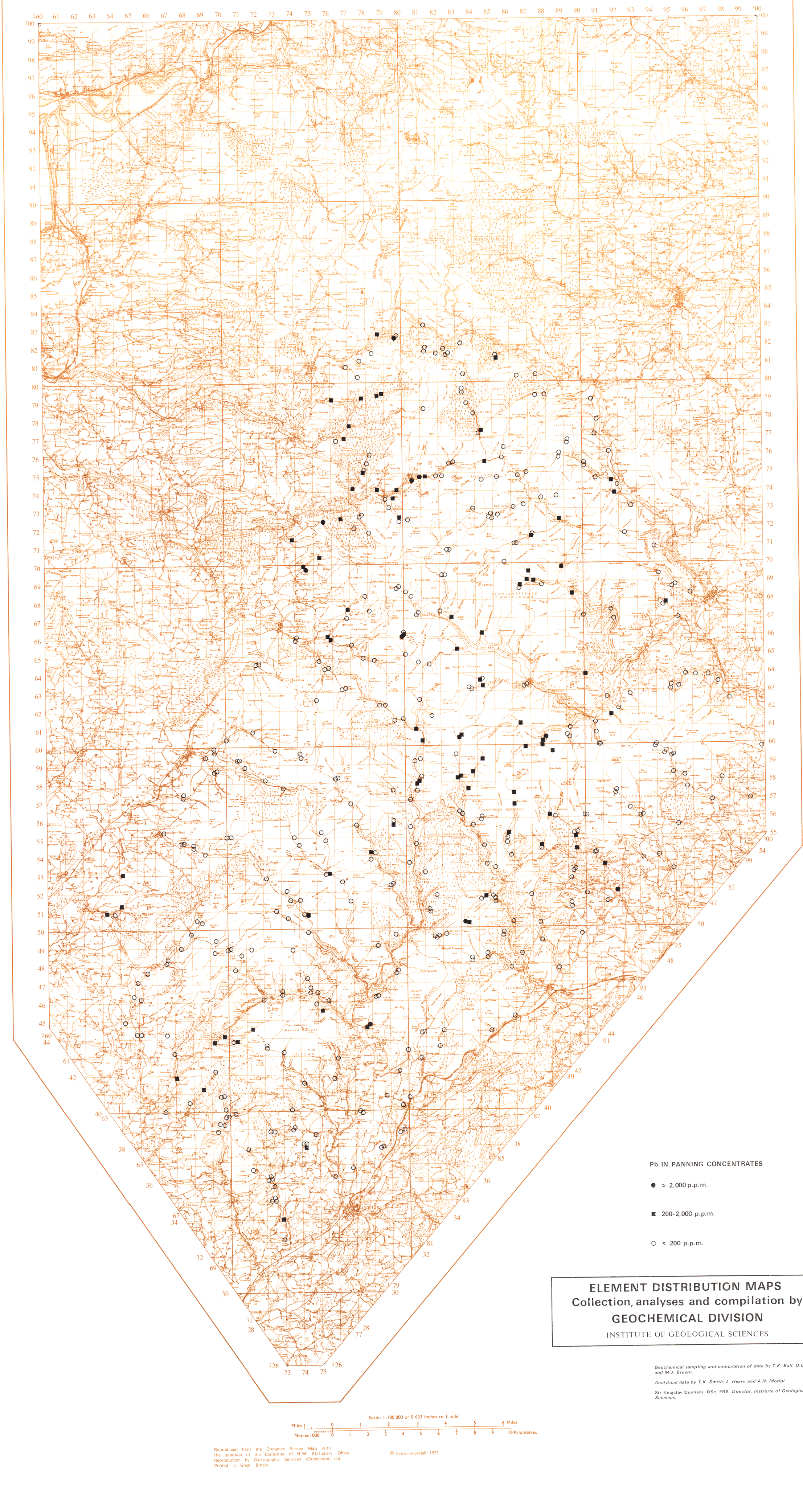
Scale: 1:100 000 or 0·633 inches to 1 mile

Miles 1 — 0 1 2 3 4 5 6 Miles

Metres 1000 — 0 1 2 3 4 5 6 7 8 9 10 Kilometres

INSTITUTE OF GEOLOGICAL SCIENCES
GEOCHEMICAL DIVISION
CENTRAL WALES MINING FIELD
Scale 1:100,000

Mineral Reconnaisance Programme for Department of Industry



Pb IN PANNING CONCENTRATES

● > 2,000 p.p.m.

■ 200-2,000 p.p.m.

○ < 200 p.p.m.

Scale: 1:100 000 or 0·633 inches to 1 mile

Miles 1 0 1 2 3 4 5 6 Miles

Metres 1000 0 1 2 3 4 5 6 7 8 9 10 Kilometres

ELEMENT DISTRIBUTION MAPS
Collection, analyses and compilation by
GEOCHEMICAL DIVISION
INSTITUTE OF GEOLOGICAL SCIENCES

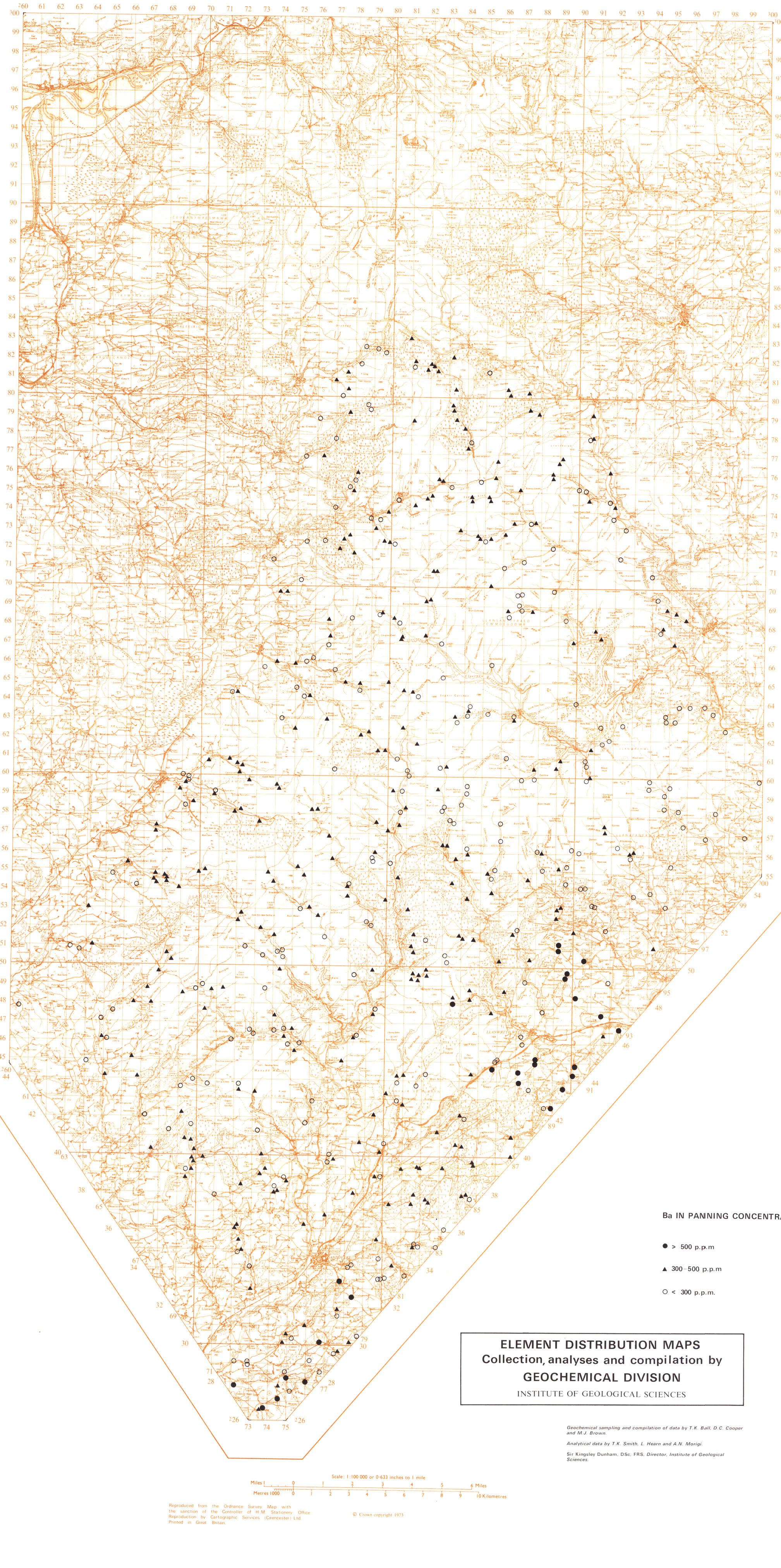
Geochemical sampling and compilation of data by T.K. Ball, D.C. Cooper and M.J. Brown.

Analytical data by T.K. Smith, L. Hearn and A.N. Morigi.

Sir Kingsley Dunham, DSc, FRS, *Director, Institute of Geological Sciences.*

INSTITUTE OF GEOLOGICAL SCIENCES
GEOCHEMICAL DIVISION
CENTRAL WALES MINING FIELD
Scale 1:100,000

Mineral Reconnaisance Programme for Department of Industry



Ba IN PANNING CONCENTRATES

- ● > 500 p.p.m
- ▲ 300–500 p.p.m
- ○ < 300 p.p.m.

ELEMENT DISTRIBUTION MAPS
Collection, analyses and compilation by
GEOCHEMICAL DIVISION
INSTITUTE OF GEOLOGICAL SCIENCES

Geochemical sampling and compilation of data by T.K. Ball, D.C. Cooper and M.J. Brown.

Analytical data by T.K. Smith, L. Hearn and A.N. Morigi.

Sir Kingsley Dunham, DSc, FRS, *Director, Institute of Geological Sciences.*

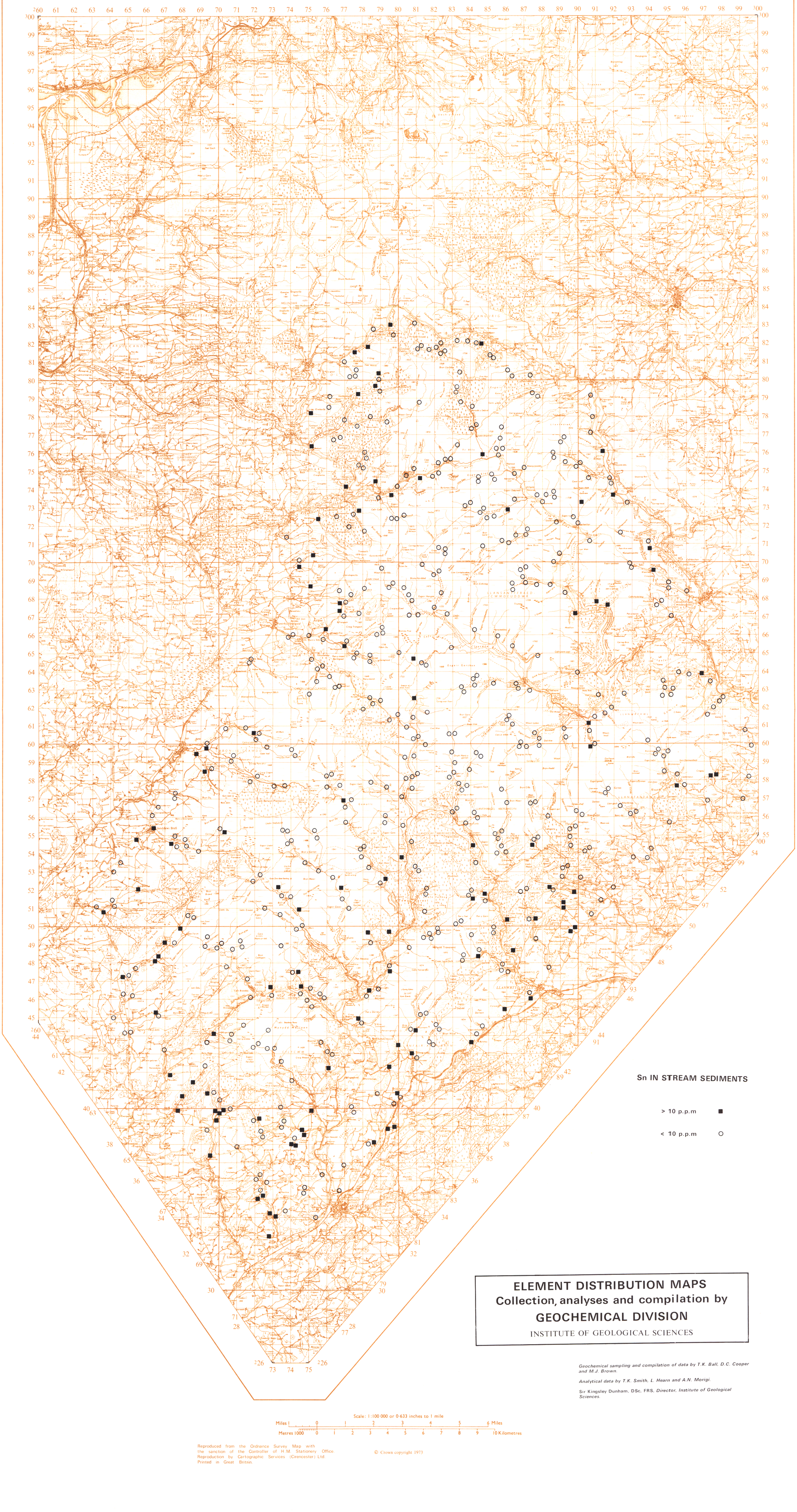
Scale: 1:100 000 or 0·633 inches to 1 mile

Miles 1 0 1 2 3 4 5 6 Miles

Metres 1000 0 1 2 3 4 5 6 7 8 9 10 Kilometres

INSTITUTE OF GEOLOGICAL SCIENCES
GEOCHEMICAL DIVISION
CENTRAL WALES MINING FIELD
Scale 1:100,000

Mineral Reconnaisance Programme for Department of Industry



ELEMENT DISTRIBUTION MAPS
Collection, analyses and compilation by
GEOCHEMICAL DIVISION
INSTITUTE OF GEOLOGICAL SCIENCES

Geochemical sampling and compilation of data by T.K. Ball, D.C. Cooper and M.J. Brown.

Analytical data by T.K. Smith, L. Hearn and A.N. Morigi.

Sir Kingsley Dunham, DSc, FRS, *Director, Institute of Geological Sciences.*

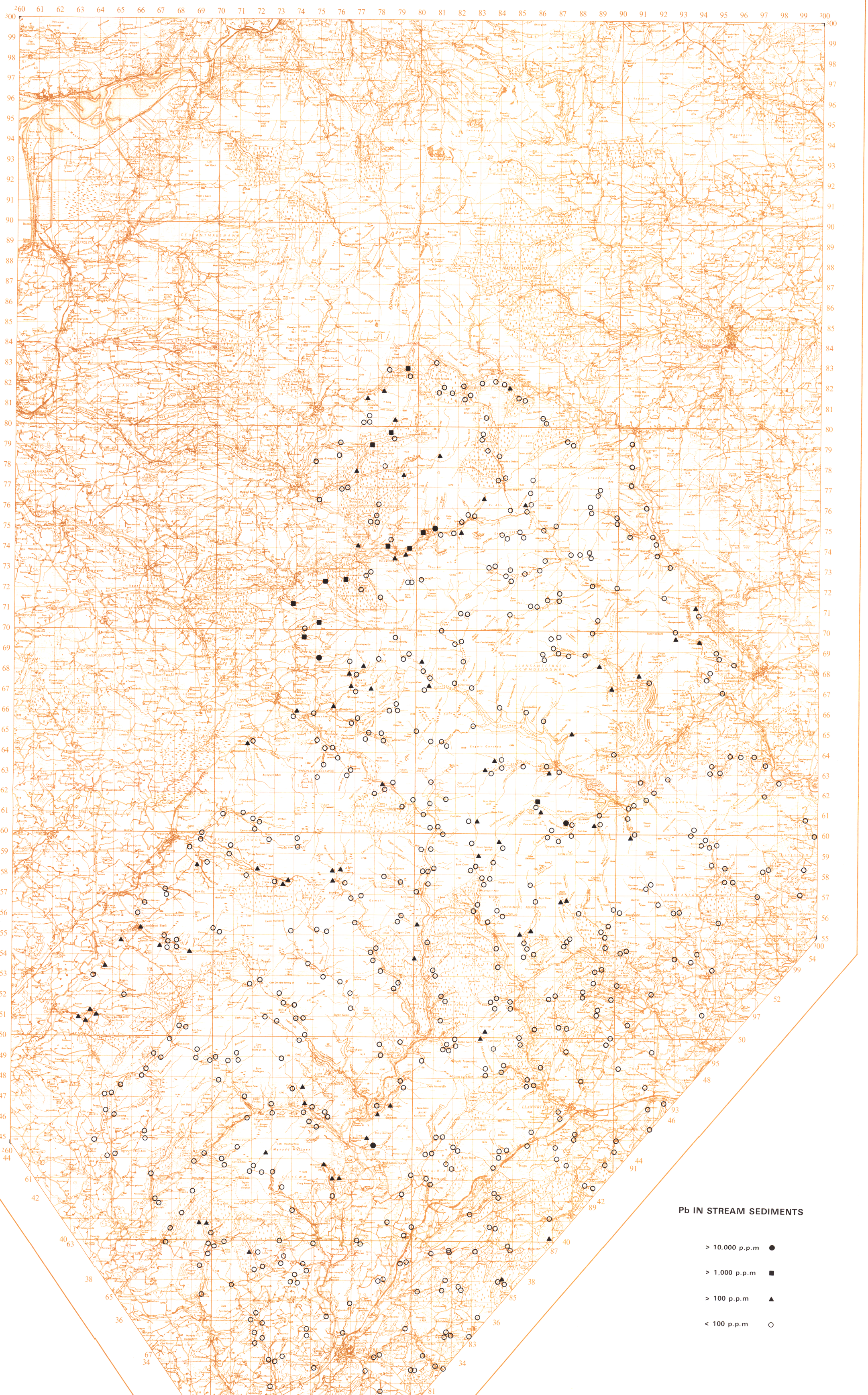
Scale: 1:100 000 or 0·633 inches to 1 mile

Miles 1 0 1 2 3 4 5 6 Miles

Metres 1000 0 1 2 3 4 5 6 7 8 9 10 Kilometres

INSTITUTE OF GEOLOGICAL SCIENCES
GEOCHEMICAL DIVISION
CENTRAL WALES MINING FIELD
Scale 1:100,000

Mineral Reconnaisance Programme for Department of Industry



ELEMENT DISTRIBUTION MAPS
Collection, analyses and compilation by
GEOCHEMICAL DIVISION
INSTITUTE OF GEOLOGICAL SCIENCES

Geochemical sampling and compilation of data by T.K. Ball, D.C. Cooper and M.J. Brown.

Analytical data by T.K. Smith, L. Hearn and A.N. Morigi.

Sir Kingsley Dunham, DSc, FRS, *Director, Institute of Geological Sciences.*

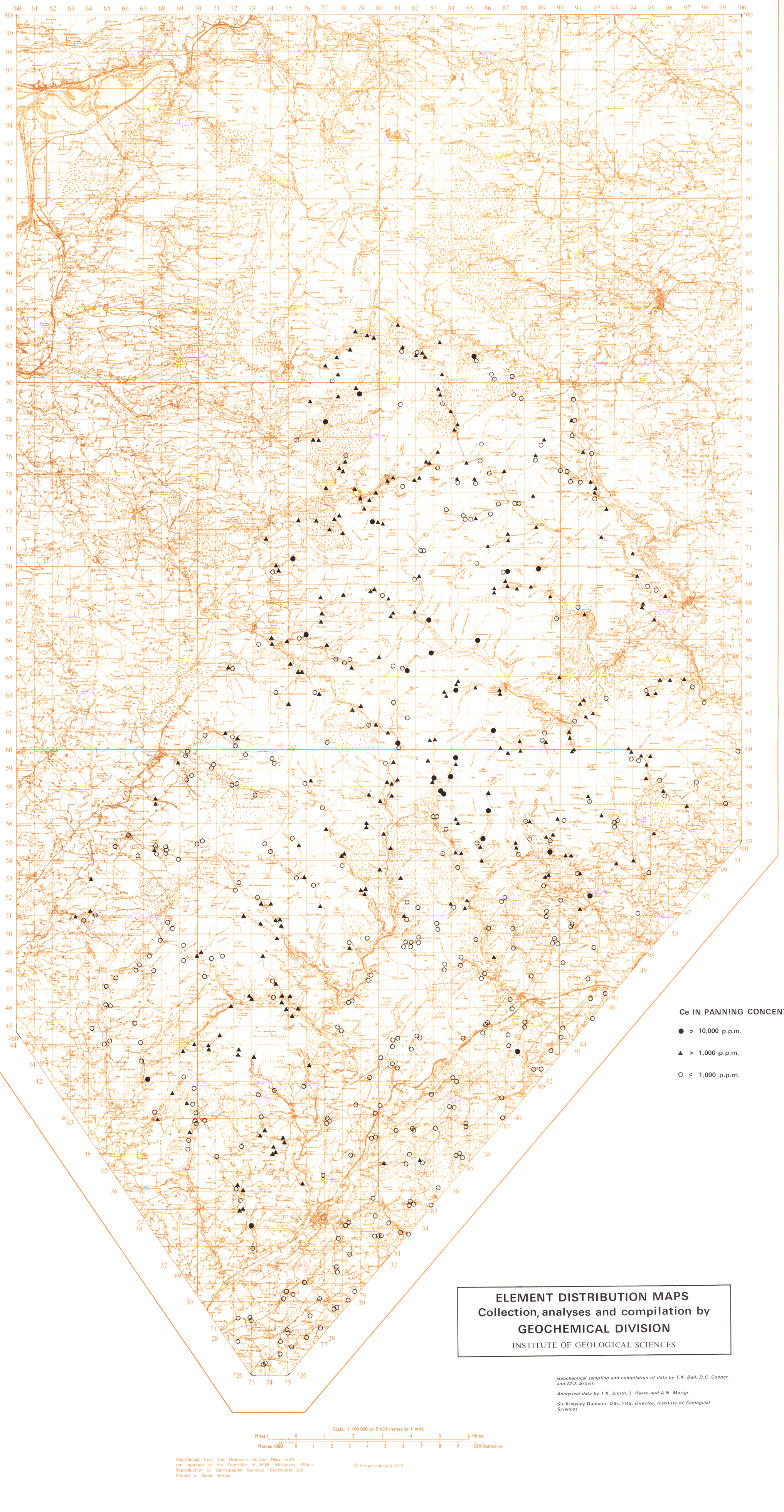
Scale: 1:100 000 or 0·633 inches to 1 mile

Miles 1 0 1 2 3 4 5 6 Miles

Metres 1000 0 1 2 3 4 5 6 7 8 9 10 Kilometres

INSTITUTE OF GEOLOGICAL SCIENCES
GEOCHEMICAL DIVISION
CENTRAL WALES MINING FIELD
Scale 1:100,000

Mineral Reconnaisance Programme for Department of Industry



ELEMENT DISTRIBUTION MAPS
Collection, analyses and compilation by
GEOCHEMICAL DIVISION
INSTITUTE OF GEOLOGICAL SCIENCES

Geochemical sampling and compilation of data by T.K. Ball, D.C. Cooper and M.J. Brown.

Analytical data by T.K. Smith, L. Hearn and A.N. Morigi.

Sir Kingsley Dunham, DSc, FRS, *Director, Institute of Geological Sciences.*

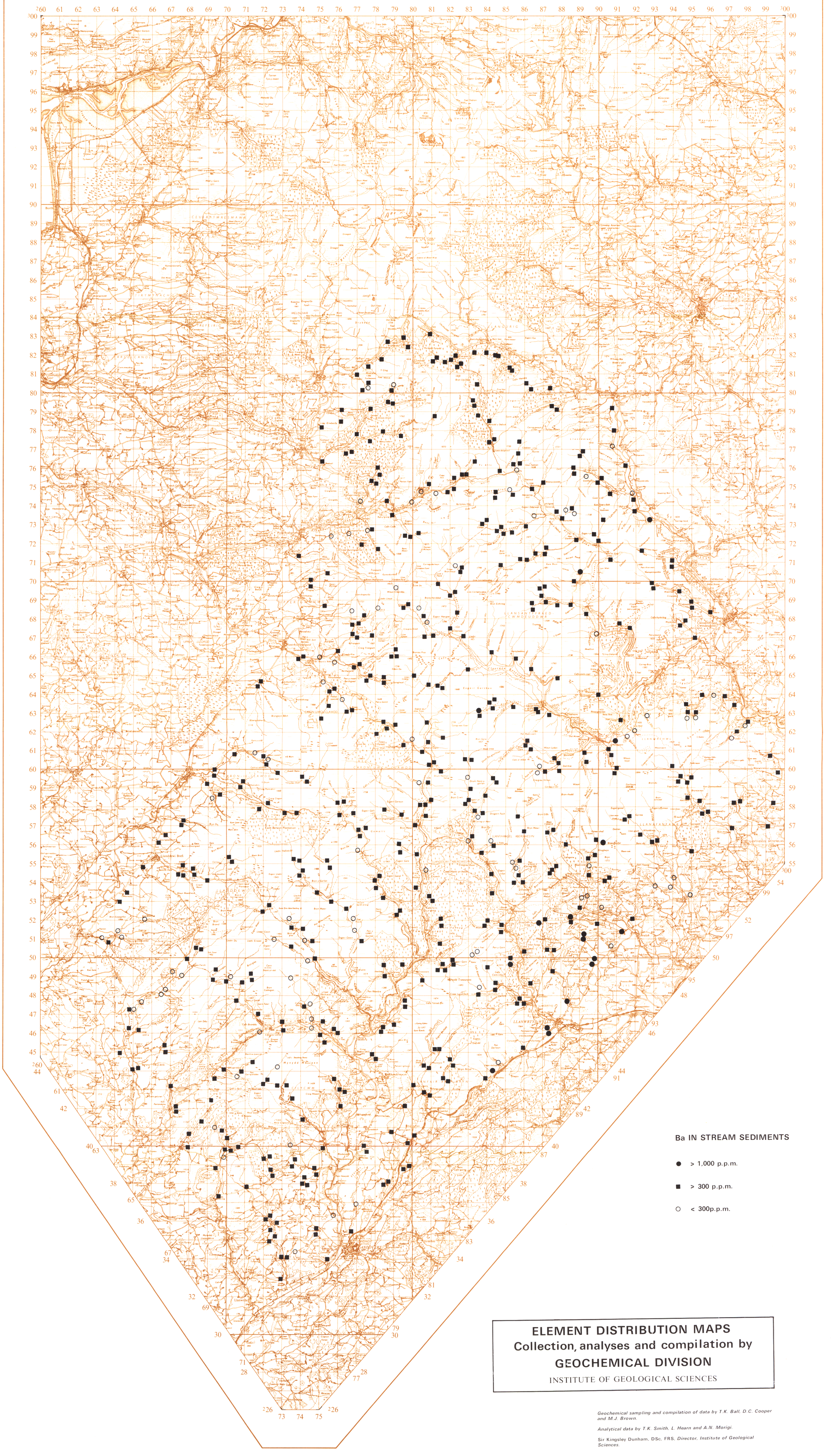
Scale: 1:100 000 or 0·633 inches to 1 mile

Miles 1 0 1 2 3 4 5 6 Miles

Metres 1000 0 1 2 3 4 5 6 7 8 9 10 Kilometres

INSTITUTE OF GEOLOGICAL SCIENCES
GEOCHEMICAL DIVISION
CENTRAL WALES MINING FIELD
Scale 1:100,000

Mineral Reconnaissance Programme for Department of Industry



ELEMENT DISTRIBUTION MAPS
Collection, analyses and compilation by
GEOCHEMICAL DIVISION
INSTITUTE OF GEOLOGICAL SCIENCES

Geochemical sampling and compilation of data by T.K. Ball, D.C. Cooper and M.J. Brown.

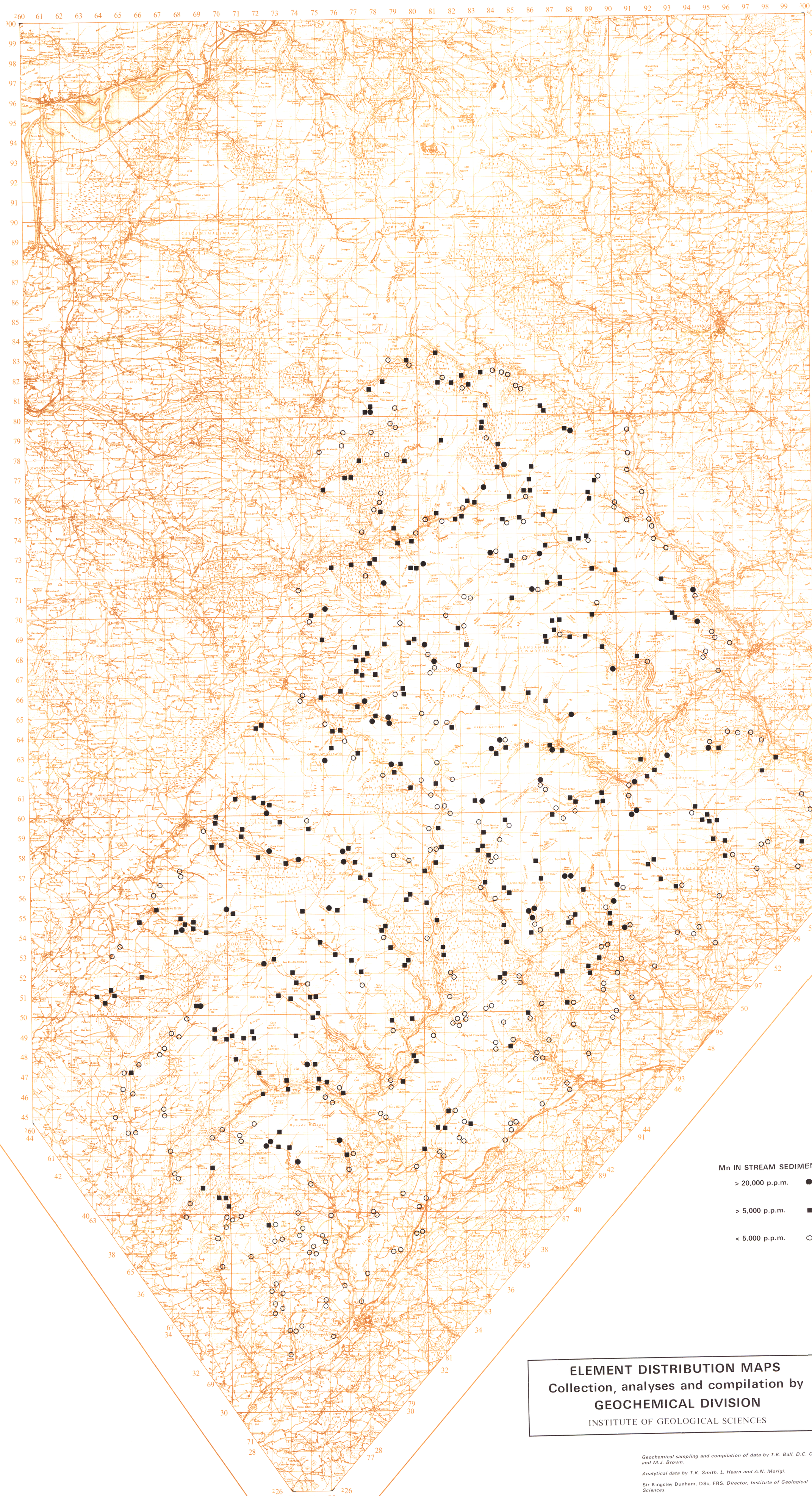
Analytical data by T.K. Smith, L. Hearn and A.N. Morigi.

Sir Kingsley Dunham, DSc, FRS, *Director, Institute of Geological Sciences.*

Reproduced from the Ordnance Survey Map with
the sanction of the Controller of H.M. Stationery Office.
Reproduction by Cartographic Services (Cirencester) Ltd.
Printed in Great Britain.

INSTITUTE OF GEOLOGICAL SCIENCES
GEOCHEMICAL DIVISION
CENTRAL WALES MINING FIELD
Scale 1:100,000

Mineral Reconnaisance Programme for Department of Industry



ELEMENT DISTRIBUTION MAPS
Collection, analyses and compilation by
GEOCHEMICAL DIVISION
INSTITUTE OF GEOLOGICAL SCIENCES

Geochemical sampling and compilation of data by T.K. Ball, D.C. Cooper and M.J. Brown.

Analytical data by T.K. Smith, L. Hearn and A.N. Morigi.

Sir Kingsley Dunham, DSc, FRS, *Director, Institute of Geological Sciences.*

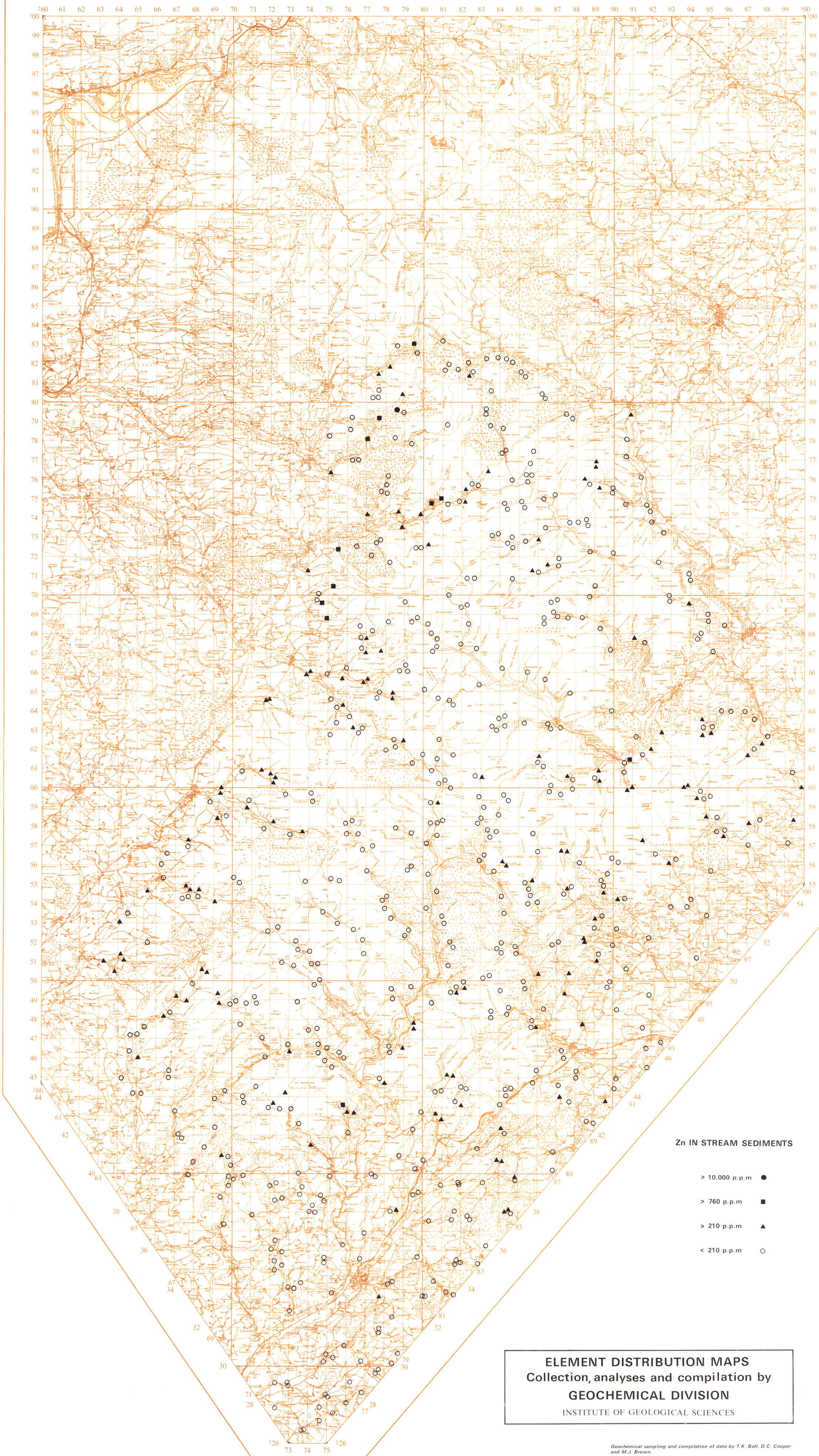
Scale: 1:100 000 or 0·633 inches to 1 mile

Miles 1 0 1 2 3 4 5 6 Miles

Metres 1000 0 1 2 3 4 5 6 7 8 9 10 Kilometres

INSTITUTE OF GEOLOGICAL SCIENCES
GEOCHEMICAL DIVISION
CENTRAL WALES MINING FIELD
Scale 1:100,000

Mineral Reconnaissance Programme for Department of Industry



ELEMENT DISTRIBUTION MAPS
Collection, analyses and compilation by
GEOCHEMICAL DIVISION
INSTITUTE OF GEOLOGICAL SCIENCES

Geochemical sampling and compilation of data by T.K. Ball, D.C. Cooper and M.J. Brown.

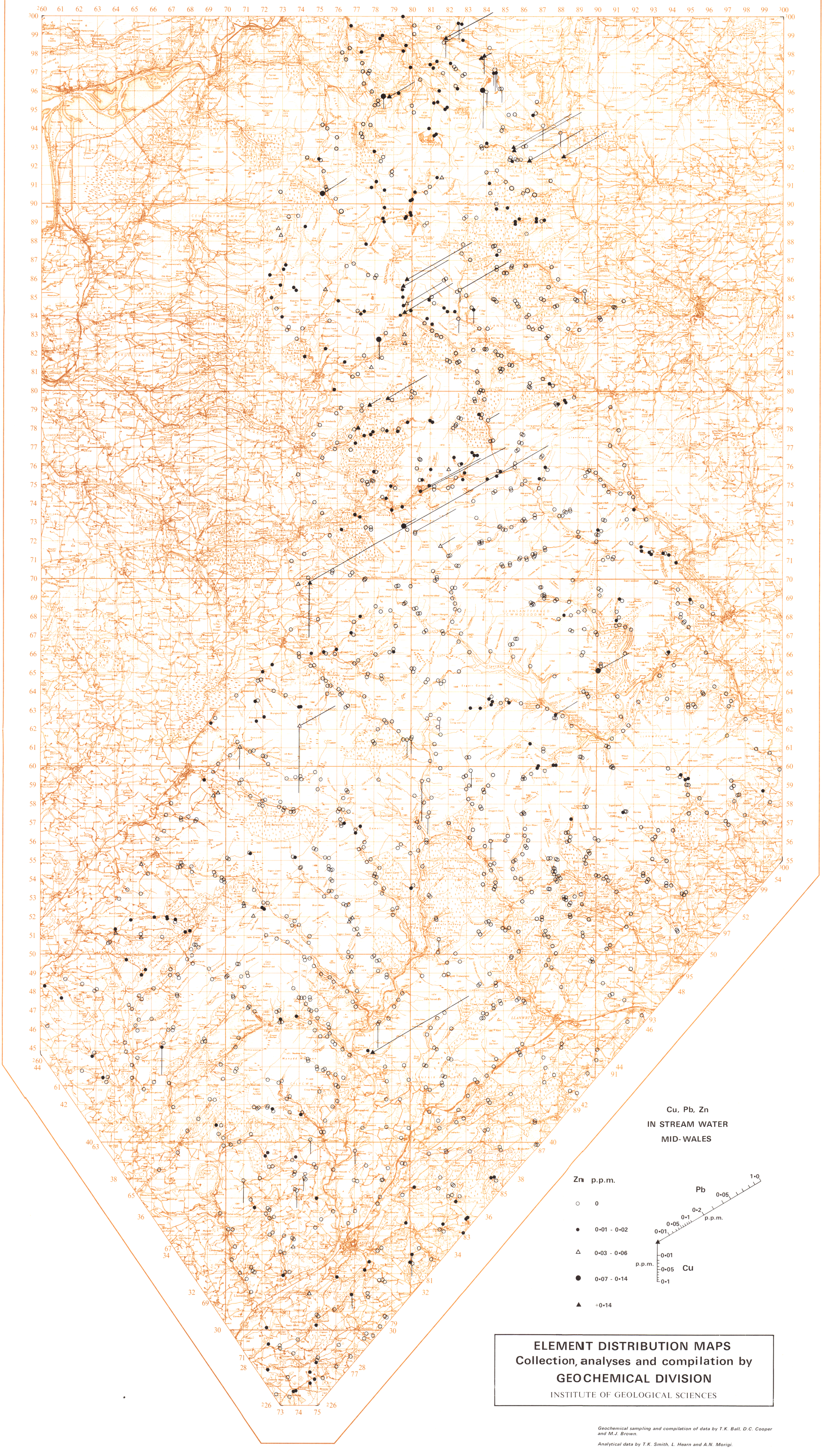
Analytical data by T.K. Smith, L. Hearn and A.N. Morigi.

Sir Kingsley Dunham, DSc, FRS, *Director, Institute of Geological Sciences.*

Reproduced from the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office.
Reproduction by Cartographic Services (Cirencester) Ltd.
Printed in Great Britain.

INSTITUTE OF GEOLOGICAL SCIENCES
GEOCHEMICAL DIVISION
CENTRAL WALES MINING FIELD
Scale 1:100,000

Mineral Reconnaisance Programme for Department of Industry



Cu, Pb, Zn
IN STREAM WATER
MID-WALES

Zn p.p.m.

- ○ 0
- ● 0·01 - 0·02
- △ 0·03 - 0·06
- ● 0·07 - 0·14
- ▲ >0·14

Pb p.p.m.: 1·0, 0·05, 0·2, 0·1, 0·05, 0·01

Cu p.p.m.: 0·01, 0·05, 0·1

ELEMENT DISTRIBUTION MAPS
Collection, analyses and compilation by
GEOCHEMICAL DIVISION
INSTITUTE OF GEOLOGICAL SCIENCES

Geochemical sampling and compilation of data by T.K. Ball, D.C. Cooper and M.J. Brown.

Analytical data by T.K. Smith, L. Hearn and A.N. Morigi.

Sir Kingsley Dunham, DSc, FRS, *Director, Institute of Geological Sciences.*

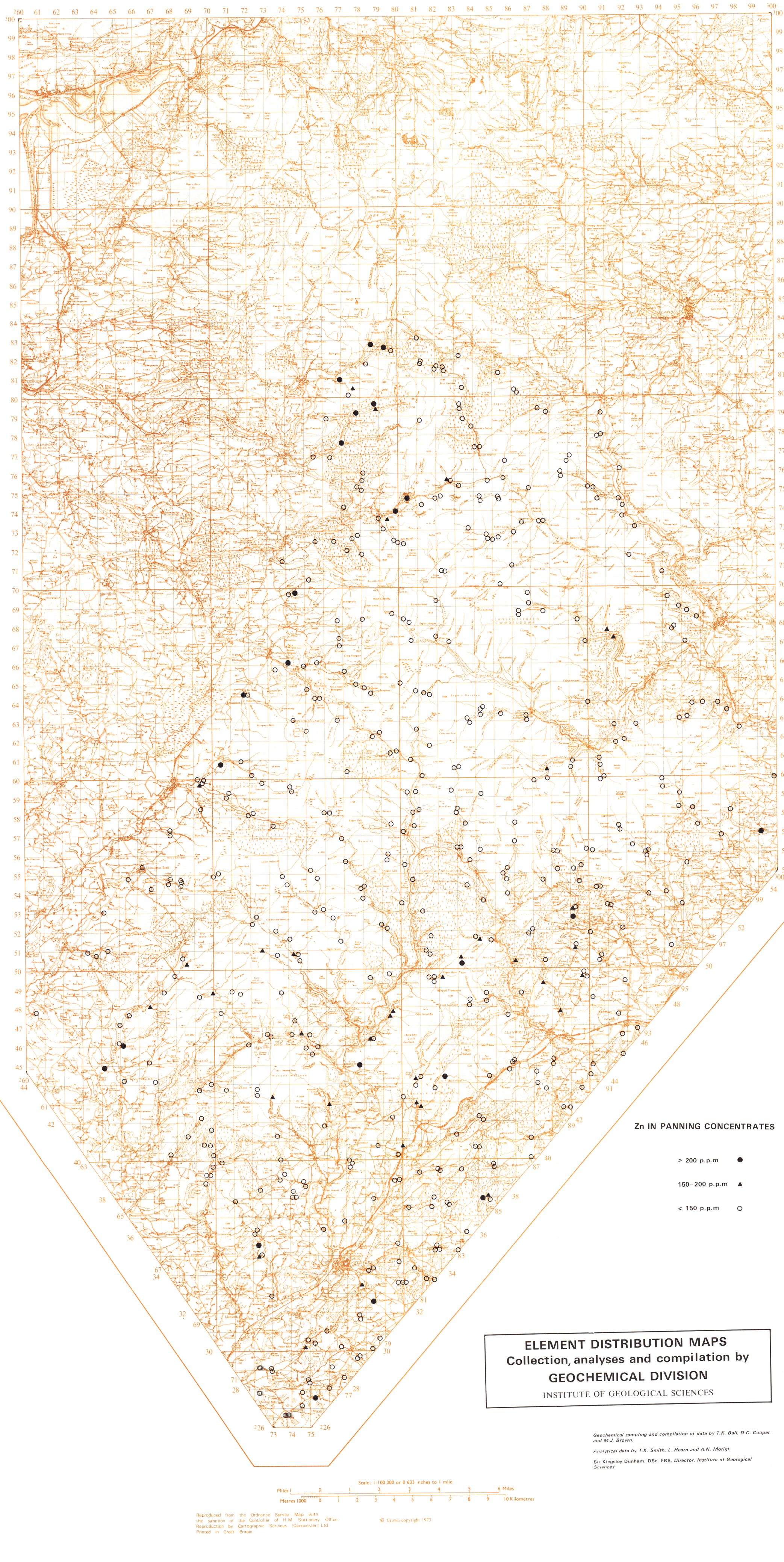
Scale: 1:100 000 or 0·633 inches to 1 mile

Miles | 0 1 2 3 4 5 6 Miles

Metres 1000 | 0 1 2 3 4 5 6 7 8 9 10 Kilometres

INSTITUTE OF GEOLOGICAL SCIENCES
GEOCHEMICAL DIVISION
CENTRAL WALES MINING FIELD
Scale 1:100,000

Mineral Reconnaisance Programme for Department of Industry



Zn IN PANNING CONCENTRATES

> 200 p.p.m	●
150–200 p.p.m	▲
< 150 p.p.m	○

Scale: 1:100 000 or 0·633 inches to 1 mile

Miles 1 0 1 2 3 4 5 6 Miles

Metres 1000 0 1 2 3 4 5 6 7 8 9 10 Kilometres

ELEMENT DISTRIBUTION MAPS
Collection, analyses and compilation by
GEOCHEMICAL DIVISION
INSTITUTE OF GEOLOGICAL SCIENCES

Geochemical sampling and compilation of data by T.K. Ball, D.C. Cooper and M.J. Brown.

Analytical data by T.K. Smith, L. Hearn and A.N. Morigi.

Sir Kingsley Dunham, DSc, FRS, *Director, Institute of Geological Sciences.*