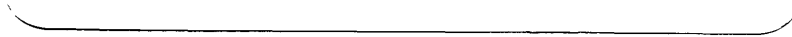




Natural Environment Research Council
Institute of Geological Sciences

Mineral Reconnaissance Programme Report



A report prepared for the Department of Industry

This report relates to work carried out by the Institute of Geological Sciences on behalf of the Department of Industry. The information contained herein must not be published without reference to the Director, Institute of Geological Sciences

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Report 44

Reconnaissance geochemical maps of parts of south Devon and Cornwall



INSTITUTE OF GEOLOGICAL SCIENCES

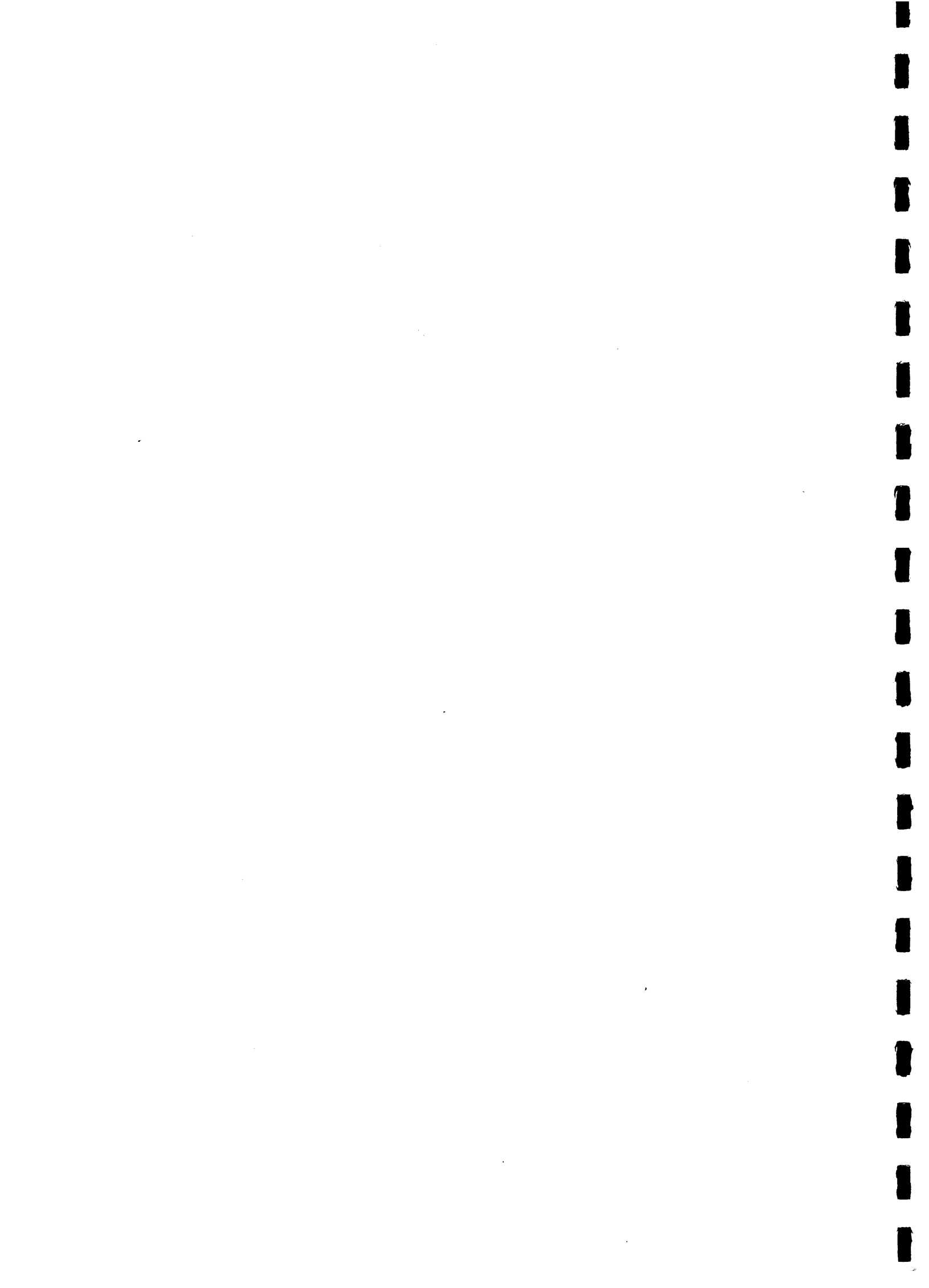
Natural Environment Research Council

Mineral Reconnaissance Programme

Report No. 44

**Reconnaissance geochemical maps
of parts of south Devon and
Cornwall**

R. C. Jones, BSc



Mineral Reconnaissance Programme Reports

- 1 The concealed granite roof in south-west Cornwall
- 2 Geochemical and geophysical investigations around Garras Mine, near Truro, Cornwall
- 3 Molybdenite mineralisation in Precambrian rocks near Lairg, Scotland
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- 27 Airborne geophysical survey of part of Anglesey, North Wales
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- 30 Porphyry style copper mineralisation at Black Stockarton Moor, south-west Scotland
- 31 Geophysical investigations in the Closehouse-Lunedale area
- 32 Investigations at Polyphant, near Launceston, Cornwall
- 33 Mineral investigations at Carrock Fell, Cumbria. Part 1—Geophysical survey
- 34 Results of a gravity survey of the south-west margin of Dartmoor, Devon
- 35 Geophysical investigation of chromite-bearing ultrabasic rocks in the Baltasound-Hagdale area, Unst, Shetland Islands
- 36 An appraisal of the VLF ground resistivity technique as an aid to mineral exploration
- 37 Compilation of stratabound mineralisation in the Scottish Caledonides
- 38 Geophysical evidence for a concealed eastern extension of the Tanygrisiau microgranite and its possible relationship to mineralisation
- 39 Copper-bearing intrusive rocks at Cairngarroch Bay, south-west Scotland
- 40 Stratabound barium-zinc mineralisation in Dalradian schist near Aberfeldy, Scotland: Final report
- 41 Metalliferous mineralisation near Lutton, Ivybridge, Devon
- 42 Mineral exploration in the area around Culvennan Fell, Kirkcowan, south-western Scotland
- 43 Disseminated copper-molybdenum mineralisation near Ballachulish, Highland Region
- 44 Reconnaissance geochemical maps of parts of south Devon and Cornwall

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Bibliographical reference

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This brief report accompanies the following 1:50 000 scale geochemical maps, which are placed on open file at the offices of the Institute of Geological Sciences at London, Keyworth, Exeter, Leeds and Edinburgh.

- 1 Chromium in stream sediments, Camelford and Padstow area*
- 2 Chromium in stream sediments, Launceston and Okehampton area*
- 3 Chromium in stream sediments, Truro, Bodmin and Liskeard area*
- 4 Chromium in stream sediments, South Devon and the Tamar Estuary area*
- 5 Manganese in stream sediments, Camelford and Padstow area
- 6 Manganese in stream sediments, Launceston and Okehampton area
- 7 Manganese in stream sediments, Truro, Bodmin and Liskeard area
- 8 Manganese in stream sediments, South Devon and the Tamar Estuary area
- 9 Iron in stream sediments, Camelford and Padstow area
- 10 Iron in stream sediments, Launceston and Okehampton area
- 11 Iron in stream sediments, Truro, Bodmin and Liskeard area
- 12 Iron in stream sediments, South Devon and the Tamar Estuary area
- 13 Cobalt in stream sediments, Camelford and Padstow area
- 14 Cobalt in stream sediments, Launceston and Okehampton area
- 15 Cobalt in stream sediments, Truro, Bodmin and Liskeard area
- 16 Cobalt in stream sediments, South Devon and the Tamar Estuary area
- 17 Nickel in stream sediments, Camelford and Padstow area
- 18 Nickel in stream sediments, Launceston and Okehampton area
- 19 Nickel in stream sediments, Truro, Bodmin and Liskeard area
- 20 Nickel in stream sediments, South Devon and the Tamar Estuary area
- 21 Copper in stream sediments, Camelford and Padstow area
- 22 Copper in stream sediments, Launceston and Okehampton area
- 23 Copper in stream sediments, Truro, Bodmin and Liskeard area
- 24 Copper in stream sediments, South Devon and the Tamar Estuary area
- 25 Zinc in stream sediments, Camelford and Padstow area
- 26 Zinc in stream sediments, Launceston and Okehampton area
- 27 Zinc in stream sediments, Truro, Bodmin and Liskeard area
- 28 Zinc in stream sediments, South Devon and the Tamar Estuary area
- 29 Zirconium in stream sediments, Camelford and Padstow area
- 30 Zirconium in stream sediments, Launceston and Okehampton area
- 31 Zirconium in stream sediments, Truro, Bodmin and Liskeard area
- 32 Zirconium in stream sediments, South Devon and the Tamar Estuary area
- 33 Molybdenum in stream sediments, Camelford and Padstow area
- 34 Molybdenum in stream sediments, Launceston and Okehampton area
- 35 Molybdenum in stream sediments, Truro, Bodmin and Liskeard area
- 36 Molybdenum in stream sediments, South Devon and the Tamar Estuary area
- 37 Tin in stream sediments, Camelford and Padstow area
- 38 Tin in stream sediments, Launceston and Okehampton area
- 39 Tin in stream sediments, Truro, Bodmin and Liskeard area
- 40 Tin in stream sediments, South Devon and the Tamar Estuary area
- 41 Barium in stream sediments, Camelford and Padstow area
- 42 Barium in stream sediments, Launceston and Okehampton area
- 43 Barium in stream sediments, Truro, Bodmin and Liskeard area
- 44 Barium in stream sediments, South Devon and the Tamar Estuary area
- 45 Lead in stream sediments, Camelford and Padstow area
- 46 Lead in stream sediments, Launceston and Okehampton area
- 47 Lead in stream sediments, Truro, Bodmin and Liskeard area
- 48 Lead in stream sediments, South Devon and the Tamar Estuary area
- 49 Uranium in stream sediments, Camelford and Padstow area.
- 50 Uranium in stream sediments, Launceston and Okehampton area.
- 51 Uranium in stream sediments, Truro, Bodmin and Liskeard area.
- 52 Uranium in stream sediments, South Devon and the Tamar Estuary area.
- 53 Titanium in panning concentrates, Camelford and Padstow area.
- 54 Titanium in panning concentrates, Launceston and Okehampton area.
- 55 Titanium in panning concentrates, Truro, Bodmin and Liskeard area.
- 56 Titanium in panning concentrates, South Devon and the Tamar Estuary area.
- 57 Manganese in panning concentrates, Camelford and Padstow area.
- 58 Manganese in panning concentrates, Launceston and Okehampton area.
- 59 Manganese in panning concentrates, Truro, Bodmin and Liskeard area.



- 60 Manganese in panning concentrates, South Devon and the Tamar Estuary area.
- 61 Iron in panning concentrates, Camelford and Padstow area.
- 62 Iron in panning concentrates, Launceston and Okehampton area.
- 63 Iron in panning concentrates, Truro, Bodmin and Liskeard area.
- 64 Iron in panning concentrates, South Devon and the Tamar Estuary area.
- 65 Nickel in panning concentrates, Camelford and Padstow area.
- 66 Nickel in panning concentrates, Launceston and Okehampton area.
- 67 Nickel in panning concentrates, Truro, Bodmin and Liskeard area.
- 68 Nickel in panning concentrates, South Devon and the Tamar Estuary area.
- 69 Copper in panning concentrates, Camelford and Padstow area.
- 70 Copper in panning concentrates, Launceston and Okehampton area.
- 71 Copper in panning concentrates, Truro, Bodmin and Liskeard area.
- 72 Copper in panning concentrates, South Devon and the Tamar Estuary area.
- 73 Zinc in panning concentrates, Camelford and Padstow area.
- 74 Zinc in panning concentrates, Launceston and Okehampton area.
- 75 Zinc in panning concentrates, Truro, Bodmin and Liskeard area.
- 76 Zinc in panning concentrates, South Devon and the Tamar Estuary area.
- 77 Tin in panning concentrates, Camelford and Padstow area.
- 78 Tin in panning concentrates, Launceston and Okehampton area.
- 79 Tin in panning concentrates, Truro, Bodmin and Liskeard area.
- 80 Tin in panning concentrates, South Devon and the Tamar Estuary area.
- 81 Antimony in panning concentrates, Camelford and Padstow area.
- 82 Antimony in panning concentrates, Launceston and Okehampton area.
- 83 Antimony in panning concentrates, Truro, Bodmin and Liskeard area.
- 84 Antimony in panning concentrates, South Devon and the Tamar Estuary area.
- 85 Barium in panning concentrates, Camelford and Padstow area.
- 86 Barium in panning concentrates, Launceston and Okehampton area.
- 87 Barium in panning concentrates, Truro, Bodmin and Liskeard area.
- 88 Barium in panning concentrates, South Devon and the Tamar Estuary area.
- 89 Cerium in panning concentrates, Camelford and Padstow area.
- 90 Cerium in panning concentrates, Launceston and Okehampton area.

- 91 Cerium in panning concentrates, Truro, Bodmin and Liskeard area.
- 92 Cerium in panning concentrates, South Devon and the Tamar Estuary area.

* The Camelford and Padstow area is bounded by National Grid lines ¹80 and ²30 E and ⁰70 and ¹00 N. The Launceston and Okehampton area is bounded by National Grid lines ²30 and ²90 E and ⁰70 and ¹00 N. The Truro, Bodmin and Liskeard area is bounded by National Grid lines ¹70 and ²30 E and ⁰40 and ⁰70 N. The South Devon and the Tamar Estuary area is bounded by National Grid lines ²30 and ²90 E and ⁰40 and ⁰70 N.

INTRODUCTION

A geochemical drainage survey of South Devon and Cornwall was conducted between 1970 and 1976. Efforts were made to maintain a consistent sampling method, but because of improvements in analytical techniques, and changes in instrumentation, there is an unavoidable variation in absolute values from area to area. For this reason the raw data are presented using an expanding polygon display which emphasises local variations in element concentration.

The results contain many anomalous concentrations of elements of potential economic value but few of these are likely to be of significance, considering the high level of contamination, from past mine workings and from refuse, which exists in the region. Efforts were made to avoid collecting samples badly contaminated by agricultural or domestic refuse, or at locations immediately downstream of roads. It was considered that, where the drainage was contaminated by mine waste, benefit could be gained from the sample analysis as a check on the records of ore components from that mine. It will be noticed that, in several cases, the presence of ore elements not mentioned in the records is thus brought to light. As one purpose of this survey was to determine if there was any significant mineralisation outside the established mining areas of South Devon and Cornwall, samples were not collected from the most intensively mined areas such as the southern edge of the St Austell Granite.

SAMPLING METHODS

Drainage sampling sites were selected, using 1:25 000-scale Ordnance Survey maps, to cover as many streams up to third order as possible, allowing for sites likely to be contaminated. The samples were collected from points in the stream profile where some natural concentration of heavy minerals was likely to have taken place, and clear of dilution by locally derived material from collapsed banks. The sediment was sieved through a 1/10-inch mesh and the fine fraction split into



two portions of approximately 2 kg each. One portion was taken as the sediment sample, for drying and further sieving through a 150 μ m mesh, and the other was washed to remove clay minerals and organic matter and then panned until about 50 g of concentrate remained. After drying, a 12 g subsample of this was mixed with 4 g of elvacite for X-ray fluorescence analysis.

and numerous voluntary workers. Most of the analyses were performed by the staff of the IGS Analytical Chemistry Unit.

ANALYTICAL METHODS

Sediment samples

Atomic absorption spectrophotometry: copper, lead, zinc (and silver).

Optical emission spectrometry: iron, manganese, nickel, cobalt, tin, barium, zirconium, chromium, molybdenum (vanadium, niobium, boron and beryllium).

Delayed neutron measurement: uranium.

Colorimetry: (tungsten and arsenic).

Concentrate samples

X-ray fluorescence spectrometry: cerium, barium, antimony, tin, copper, lead, zinc, calcium, nickel, iron, manganese, titanium (and arsenic).

Elements shown in parentheses were determined for certain samples, but are not included in the accompanying geochemical maps. Listings are available on application to the Officer in Charge, MMAGU, Institute of Geological Sciences, Keyworth, Nottingham.

PRESENTATION

The analytical and locational data were copied onto punched cards and processed on the dual IBM 360/195 computer at S.R.C. Rutherford Laboratory, using the G-EXEC program package. Summary statistics were calculated for each element, and values exceeding five times the geometric mean were truncated to a convenient round figure at about that value (with the exception of tin where partial classification was found to be necessary). The data were plotted using GPLOT software on a CIL drum plotter, and the plots superimposed on Ordnance Survey 1:50 000 base maps for copying. The limitations of accuracy of the plotter and of the determination of National Grid References by Knox Protractor combine to locate any point to within about 2 mm of its true position on the map.

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