Mineral Reconnaissance Programme Report

A report prepared for the Department of Industry
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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

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Reconnaissance geochemical maps of parts of south Devon and Cornwall

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

Bibliographical reference
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.
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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 70 and 00 N. The Launceston and Okehampton area is bounded by National Grid lines 290 and 390 E and 70 and 00 N. The Truro, Bodmin, and Liskeard area is bounded by National Grid lines 170 and 230 E and 40 and 70 N. The South Devon and the Tamar Estuary area is bounded by National Grid lines 290 and 290 E and 40 and 70 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 μm 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.

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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