WORKSHOP 8: STUDENT SHEET 1

Prospecting for Minerals by Soil Sampling

Introduction

One method of locating mineral deposits is to look for an anomaly of some kind. This depends on locating a difference in a measurable quantity, which can give an indication of the presence of a mineral deposit.

Where there are minerals beneath the surface, over a long period of time, there is some breakdown of the minerals and traces of them can be found in the soil above. If soil samples are systematically taken along a line or a grid over the ground to be investigated, chemical analysis of such samples may lead to the likely location of a mineral deposit. When the samples have been analysed, the results are plotted on a plan of the investigated area. If there appears to be a part of this area where metal concentrations are higher than the average values, this is the anomaly and further exploration may begin at this point.

Activity

Carry out the plotting activity on the sheet and answer the questions that follow

Locating an ore body by geochemical search

The map below shows an area explored by a team of geochemists. They planned a series of soil sampling points, samples being taken at places corresponding to the intersections of the grid lines on the map. They analysed the soil samples by atomic absorption spectroscopy for a number of metals of possible economic interest, and their results for copper and lead are given in the table below.

This data can be plotted as lines of equal metal concentration on the original map.

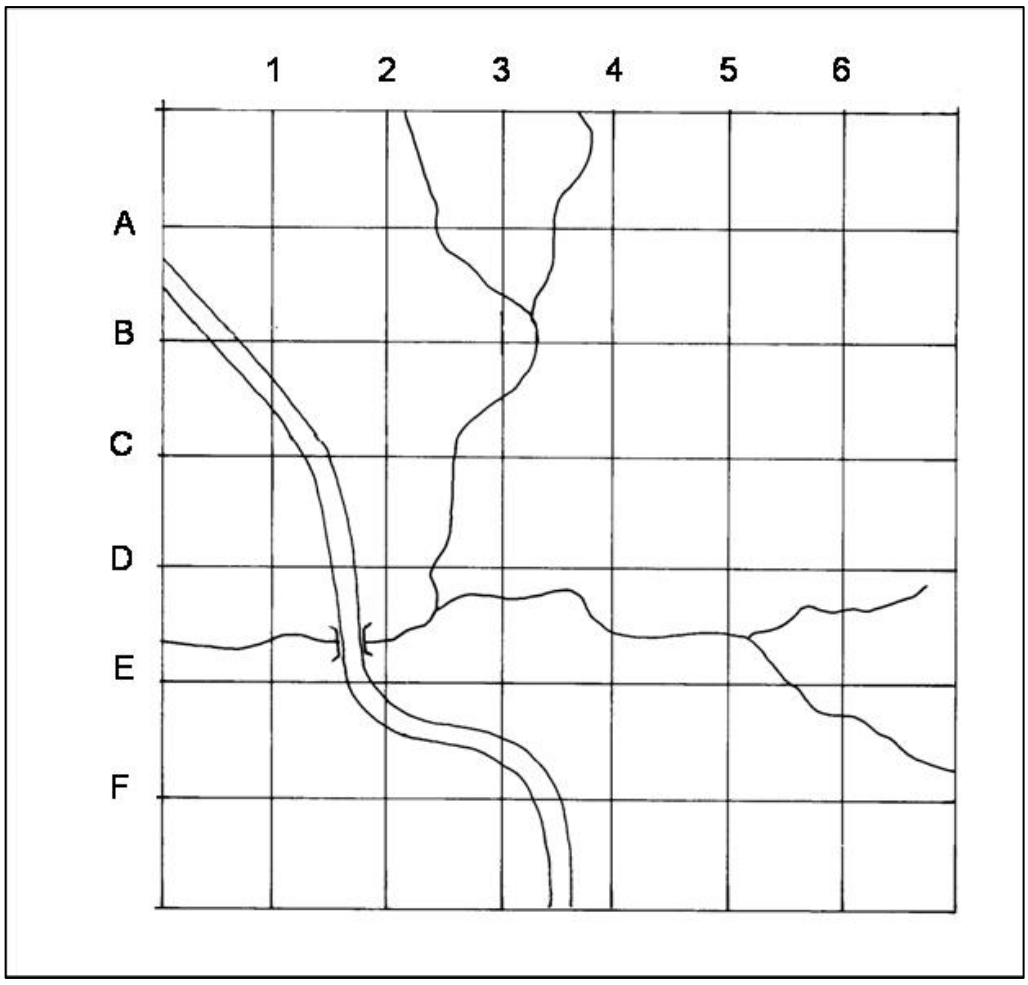

Fig 8.1 Geochemical soil survey map: sampling points were at the intersections of the grid lines.

Locating an ore body by geochemical search

Use a copy of this map to plot the data for both lead and copper. First write in the data in pencil for each metal at each intersection. Next, using a different coloured pencil for each metal, plot lines of equal concentration at intervals of 100 ppm for copper, and of 10 ppm for lead.

The following are the data for copper and lead in the soil samples. Values are in parts per million (ppm) which is the same as grams per tonne.

Cu and Pb concentrations in ppm							
		1	2	3	4	5	6
A	Cu	10	10	12	75	125	50
	Pb	9	19	42	40	21	8
B	Cu	10	12	15	125	450	200
	Pb	18	41	42	22	9	6
C	Cu	10	15	75	400	625	300
	Pb	42	41	21	9	5	5
D	Cu	10	15	75	450	600	350
	Pb	43	21	8	7	5	5
E	Cu	10	12	15	150	500	200
	Pb	22	9	5	5	5	5
F	Cu	10	10	12	75	125	150
	Pb	10	5	5	5	5	5

Question 8

What do you notice about these figures?

Question 9

What shape of lead ore body might be present in the rock beneath the soil?

Question 10

What shape of copper ore body might be present in the rock beneath the soil?

Question 11

Which of these two ore bodies might be worth further investigation - both of them, one only or none?

Question 12

What further information might you need to enable you to decide?

Question 13

How would you obtain this information?

All these decisions come under the heading of the evaluation of the ore body.