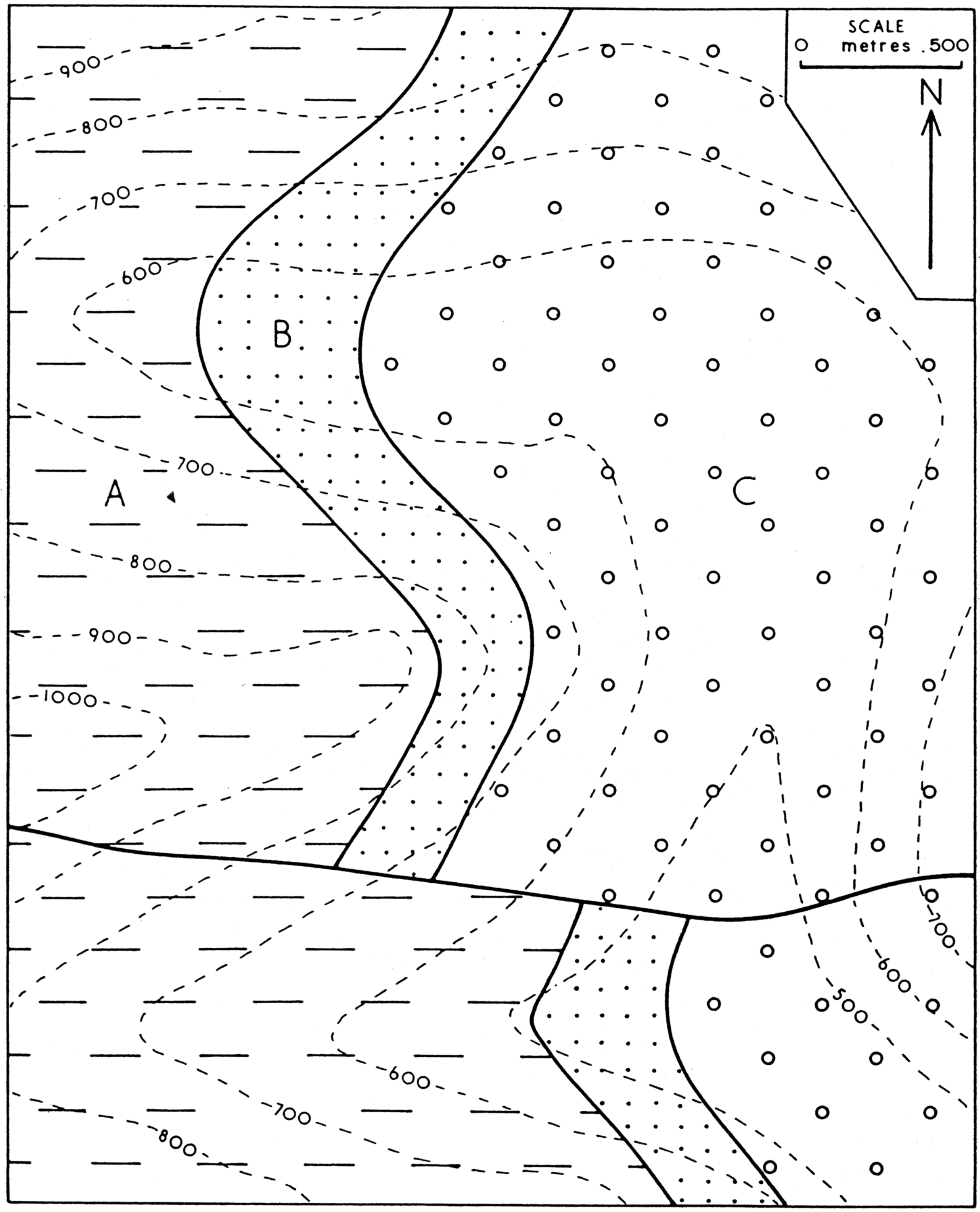
**Miscellaneous practice map exercises**

1. Fault and separation:

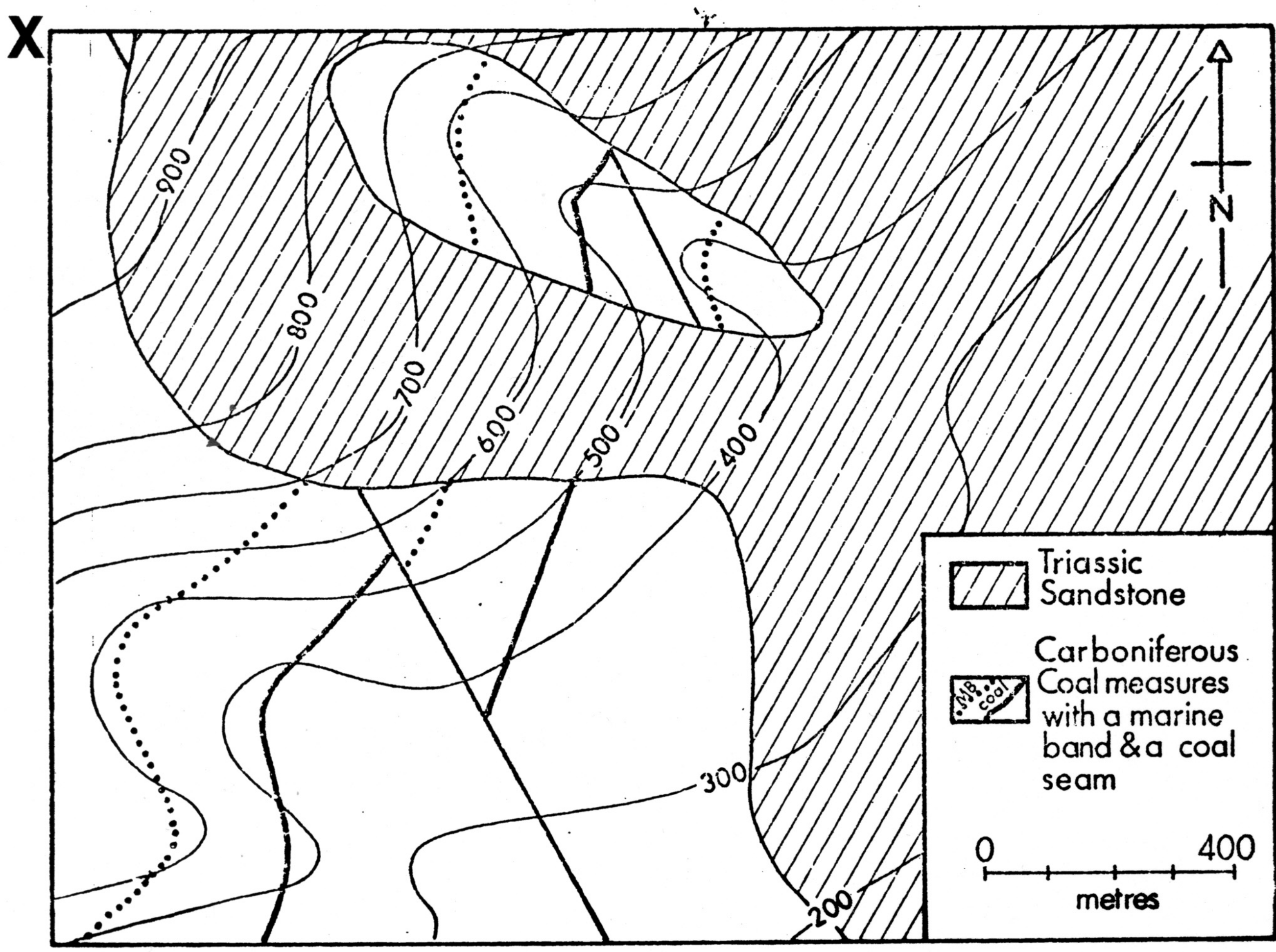
With respect to Map 1, what are (a) the orientation of the fault, and (b) the orientation of bedding in the units cut by the fault. (c) Mark on your map the cutoff lines for the base of unit B. Determine the strike separation and the dip separation, and the throw and heave of the fault. Why can you not determine the slip?



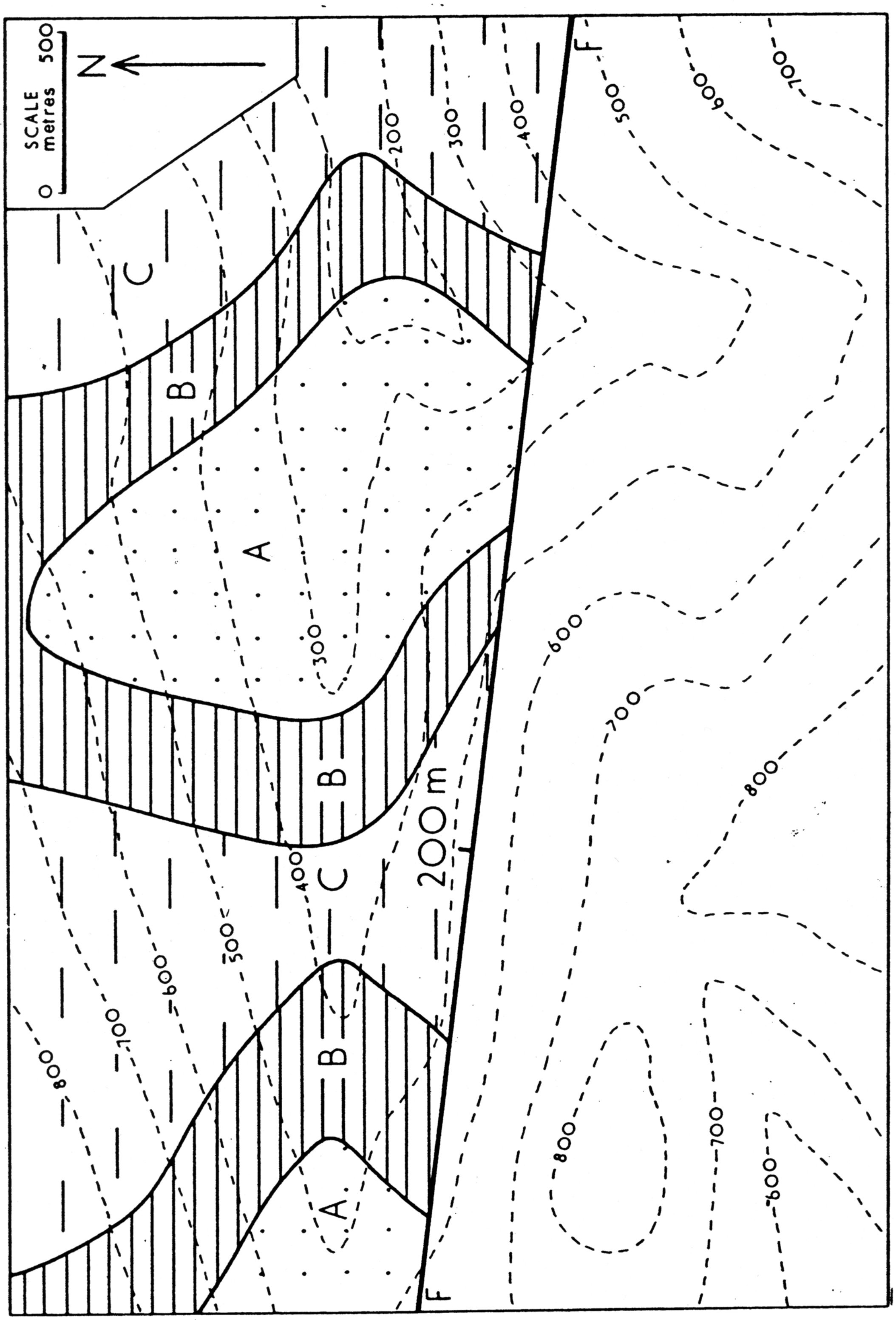

Contour interval: 100 m

Map 4.1

2. Describe the geology of the area represented by Map 2. Illustrate your account with a geologic cross-section along the line XY. On the map show the area underlain by coal.



3. With respect to Map 3, complete the outcrop pattern south of the dip-slip fault FF. Assume that the structure on both sides of the fault is identical and that the net-slip of the fault is 200 m with the N wall having moved down relative to the S.



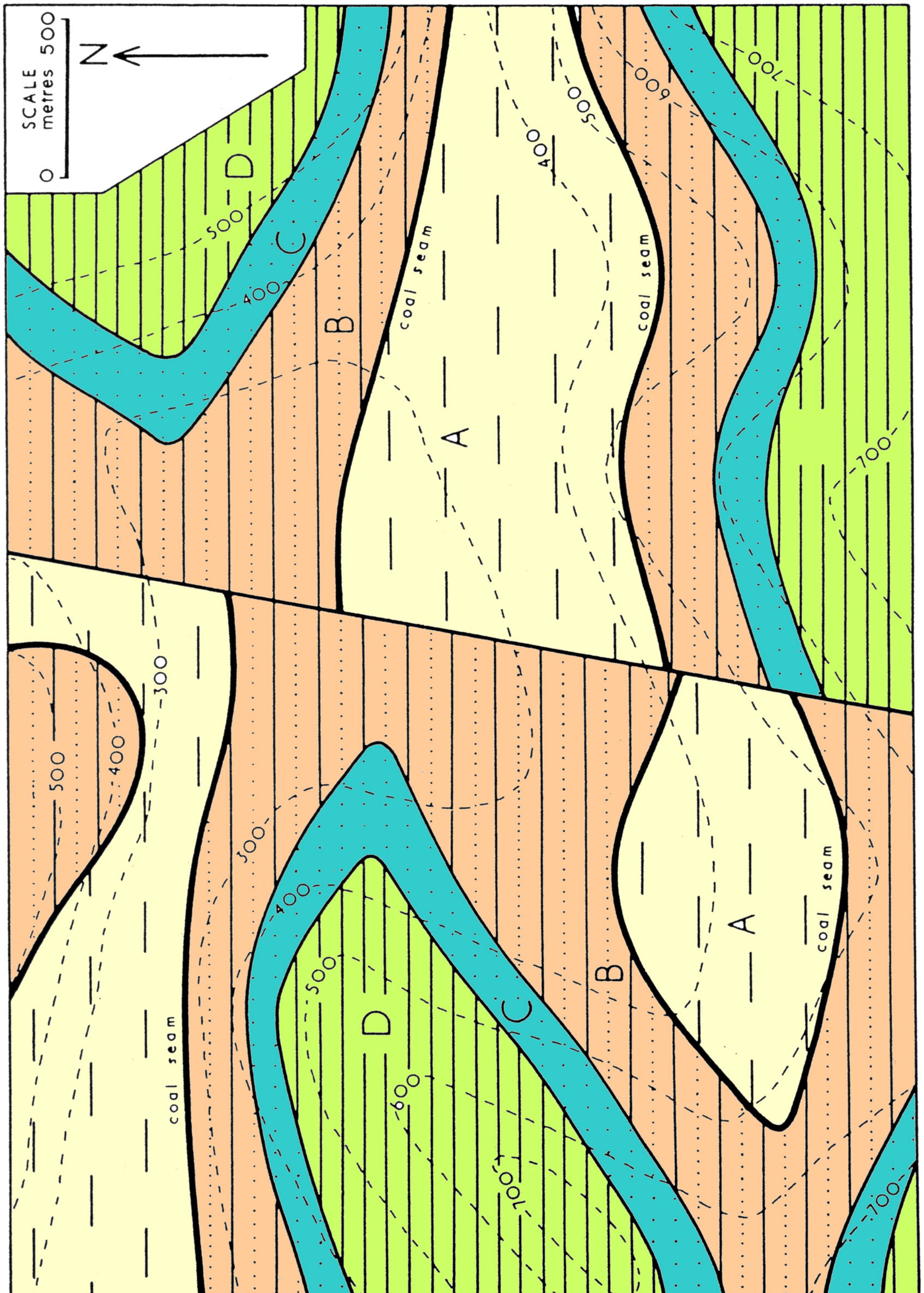
4. In connection with Map 4:

**(a)** draw the axial trace of the folds (assume the folds to be symmetrical)

**(b)** determine the displacement vector for the fault

**(c)** construct a geologic cross-section along an E-W line through the center of the map

**(d)** on the map shade the area where a vertical drillhole would intersect the coal seam.

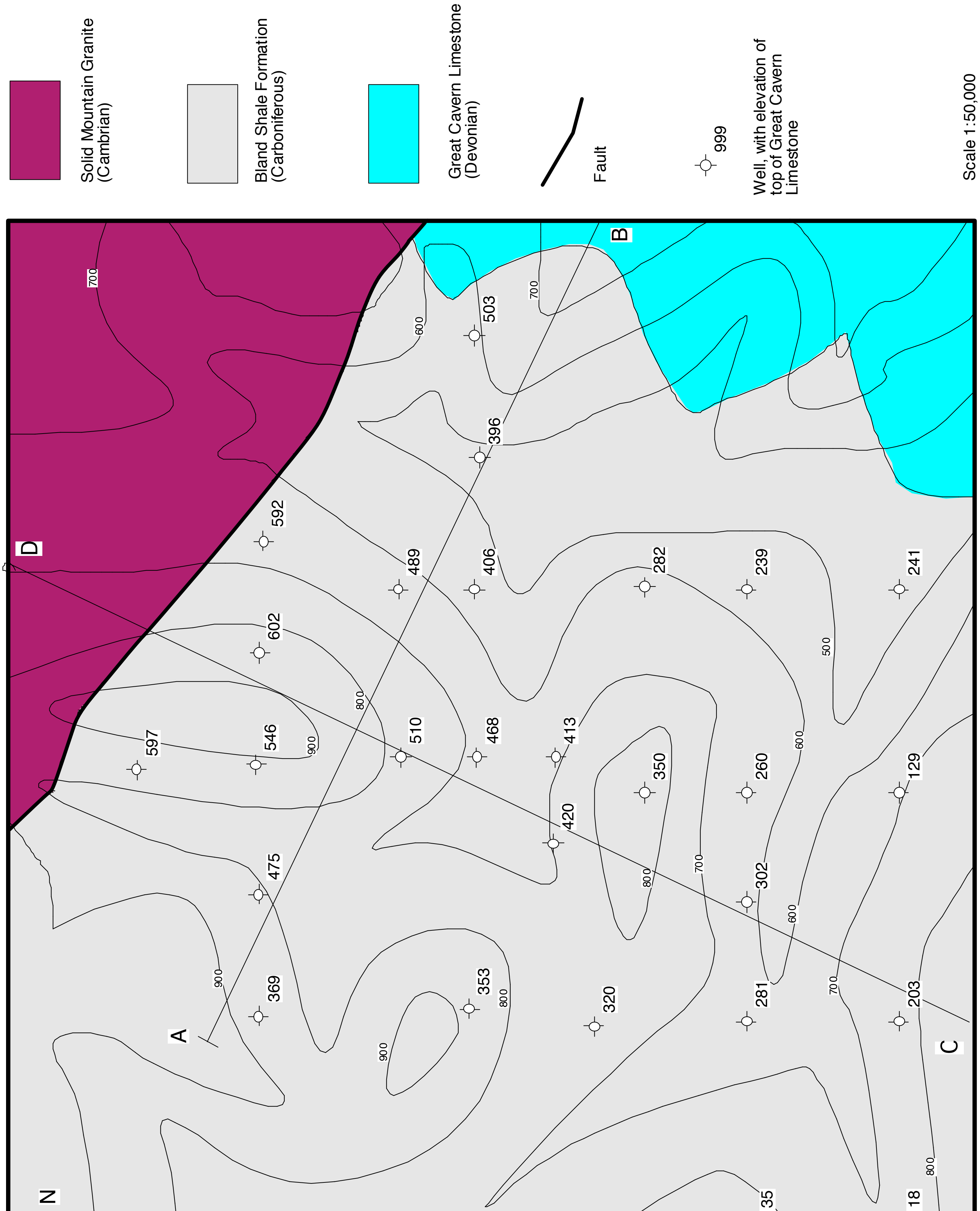


5. Great Cavern Petroleum Prospect

Examine the map of the Great Cavern Petroleum prospect in which 26 dry holes have been drilled! Contour the top surface of the Great Cavern Limestone, using both the contour intersections in the southeast of the map, and the elevations marked against each of the dry wells. Mark the position of any fold hinges, and construct both cross-sections. On cross-section C-D, show the potential maximum size of an oil reservoir that might have been missed by the existing wells. (Note that in porous units like the Great Cavern Limestone, oil usually rises to the highest point in the reservoir rock; the base of an oil reservoir is typically a horizontal oil-water contact.) Draw the maximum extent of the potential reservoir on the map. Suggest a spot for well 27 which would maximize the chance for an oil discovery.

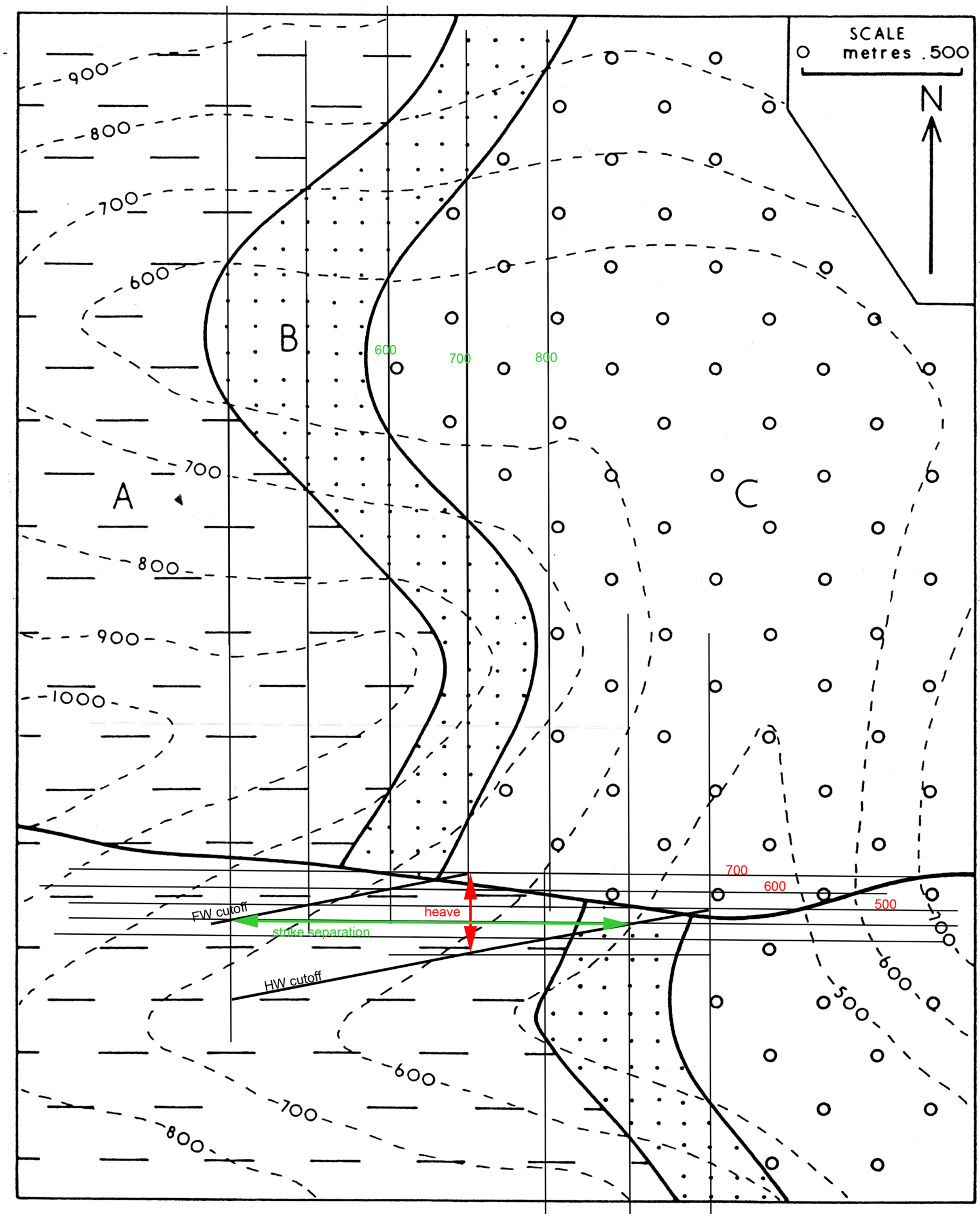
Estimate the potential volume of petroleum in the reservoir, if the Great Cavern Limestone has 10% porosity. To do this, estimate the maximum possible area of the reservoir in square metres. Also calculate its maximum vertical thickness. By approximating the shape of the reservoir as a cone, use the equation for the volume of a cone (one third base area times height) to figure out the volume of the reservoir, and from this, the amount of petroleum it might contain.

As an additional optional exercise, express your answer in barrels!


Solid Mountain Granite (Cambrian)
Bland Shale Formation (Carboniferous)
Great Cavern Limestone (Devonian)
Fault
999
Well, with elevation of top of Great Cavern Limestone
Scale 1:50,000
A
B
C
D
N
503
396
592
489
406
282
239
241
602
597
546
510
468
413
350
260
129
420
475
302
369
353
320
281
203
135
118
700
600
800
900
500

**Answers to questions 1-3.**

1. **(a)** 090° 63°. **(b)** 180° 21° (c) Strike separation 1250 m sinistral; dip separation 561 m; heave 250 m; throw 500 m



2.

The area represented by Map 2 is underlain by strata grouped into two units separated by an angular unconformity: **(i)** Carboniferous coal measures within which are a coal seam and marine band 300 m apart and **(ii)** Triassic sandstones. The Triassic is not transected by faults and everywhere has an orientation of $020^{o}$ $27^{o}$. The Carboniferous is cut by two faults whose orientation is $153^{o}$ $90^{o}$ and whose dip separations are 325 and 580 m. Within each of the three fault blocks the Carboniferous everywhere has an orientation of $183^{o}$ $45^{o}$. The geologic history comprised the following events: **(a)** deposition of the Carboniferous; **(b)** tilting, faulting, uplift and erosion; **(c)** deposition of the Triassic; **(d)** tilting, uplift and erosion.

3.