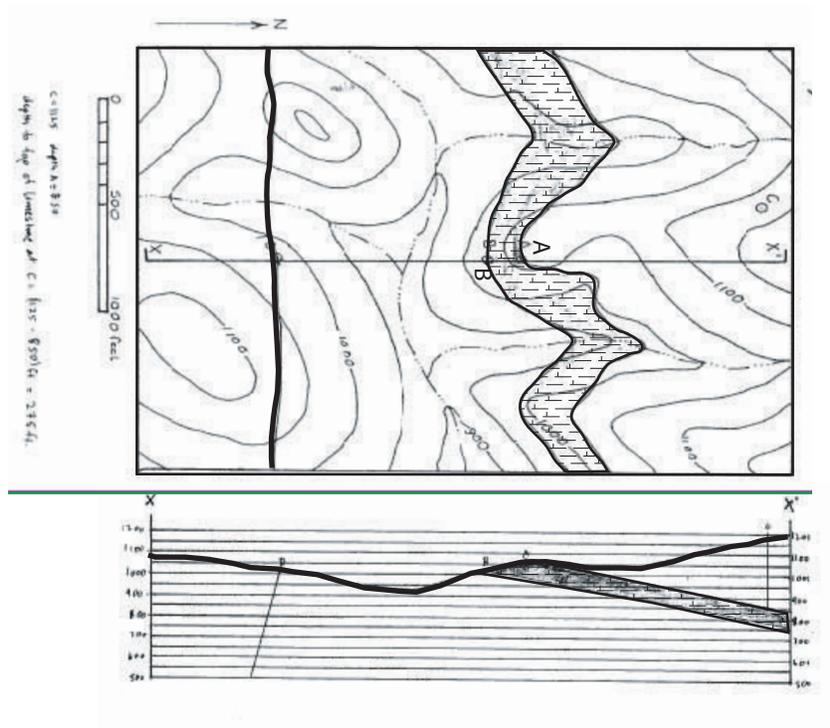


Lab 4: Cross-sections Solutions

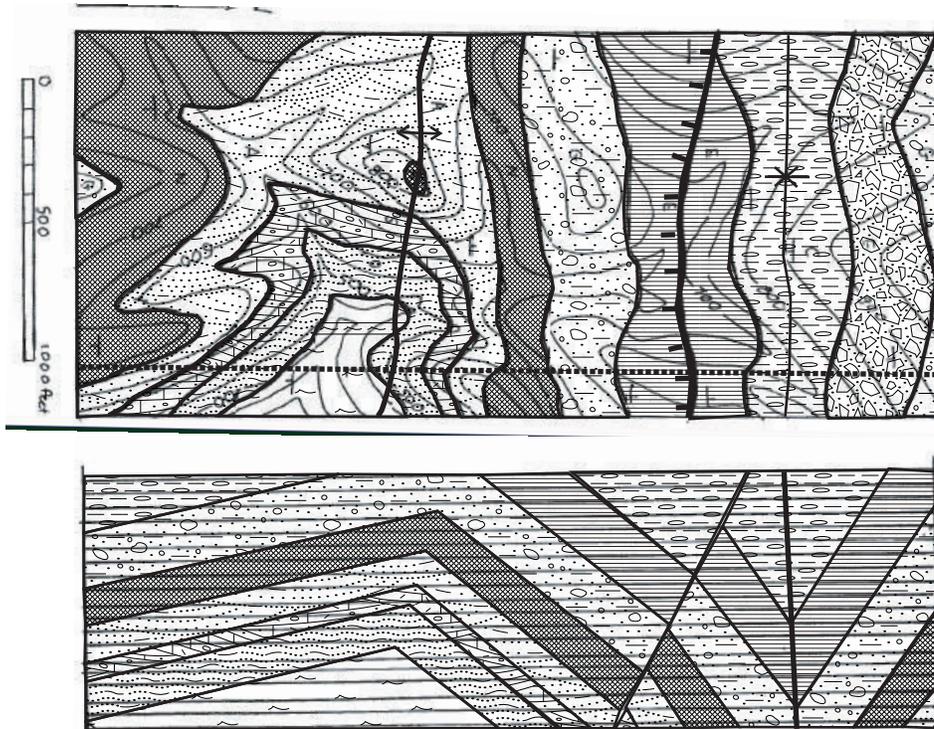
Fall 2005

1 Two beds



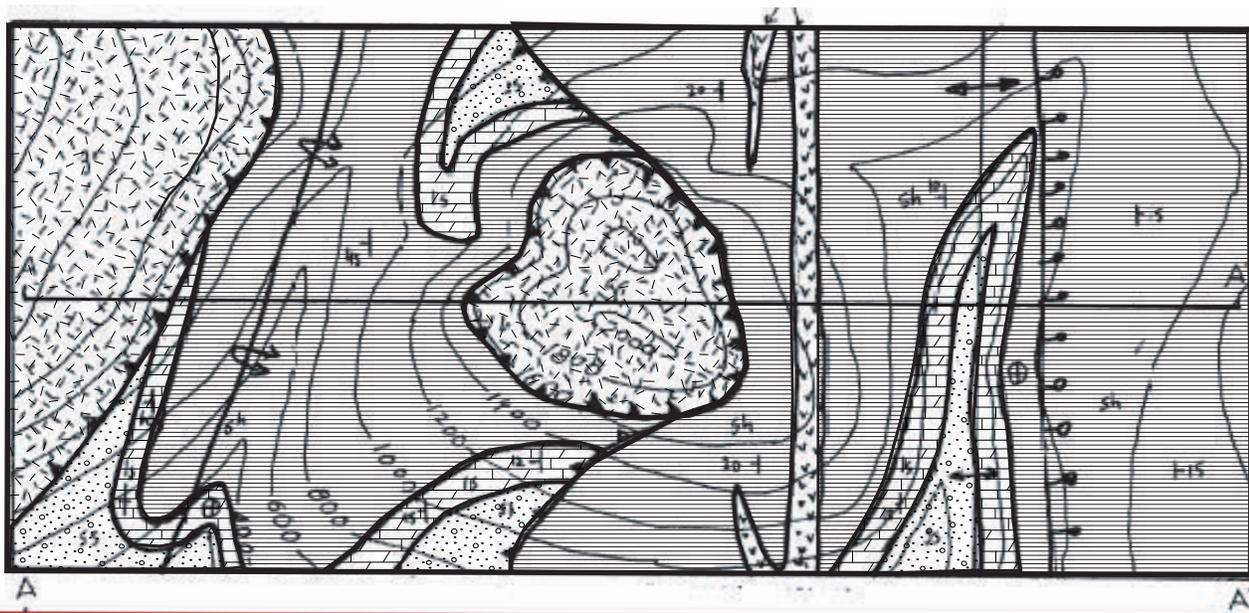
2 Groovy section

Note that the location of the cross section line may not be coincident with where you placed it. Note the consistent dips and thicknesses of the beds, the use of kink-band geometries and the deflection of the anticline trace by the topography.



3 Map from section

Here is the map. Believe!



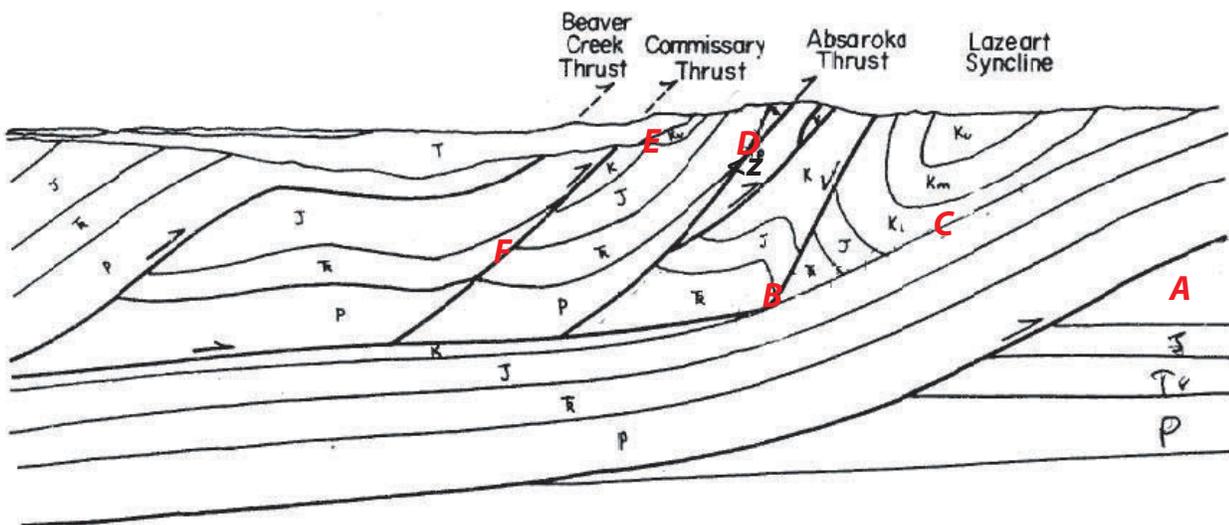
4 Bad section I

The cross-section in question is not a balanced section because it fails to meet the criterion of admissibility. That is, it fails to satisfy the basic requirement of geological plausibility. In particular: at the point B, the section shows an unlabeled fault switching its sense of slip from thrust motion to normal motion, with no other splays or transfer structures that might account for this. Quite apart from it being unlikely that normal faults are present in this area, this is geometrically impossible. At point C, there is a contact that is clearly a fault contact, since there is considerable stratigraphic separation and structural discordance across the contact, but it is not labeled as such. Even if this were fixed, the Lazeart syncline itself presents an apparent problem. The syncline has to form somewhere off the section and then be transported into its present location (because the bottom of the syncline is faulted off). This is not impossible, but it is unclear how this is accomplished.

The Absaroka thrust presents some problems: the bottom splay appears fine, but should be straightened out. The top splay has no stratigraphic separation across it, and appears to have been drawn only to somehow account for the overturned (?) section of Triassic rocks in the hangingwall of the lower splay. There is also a cryptic contact at point D, that apparently "separates" Triassic rocks from Triassic rocks. This seems unparsimonious, at the very least. The Commissary fault, too, is problematic since stratigraphic separation is inconsistent along the trace of the fault.

Finally, minor infelicities mar the section: an unlabeled region at A is sloppy (or reflects a major lack of imagination) and the contact between Cretaceous and Jurassic rocks at point E, where the contact is conformable in one place, but cuts – as a fault – down (!!) section.

The cross-section probably fails the criterion of retrodeformability, but given the problems outlined above, it hardly seems worth the bother to even try.



5 Retrodeforming a simple section

Upon retrodeforming the section, it is clear that the section is not balanced. A loose line placed on the left side of the section becomes incredibly distorted as unequal amounts of shortening affect the three contacts. Another way to look at it is to track the positions of footwall and hangingwall cut-offs before and after deformation.

