

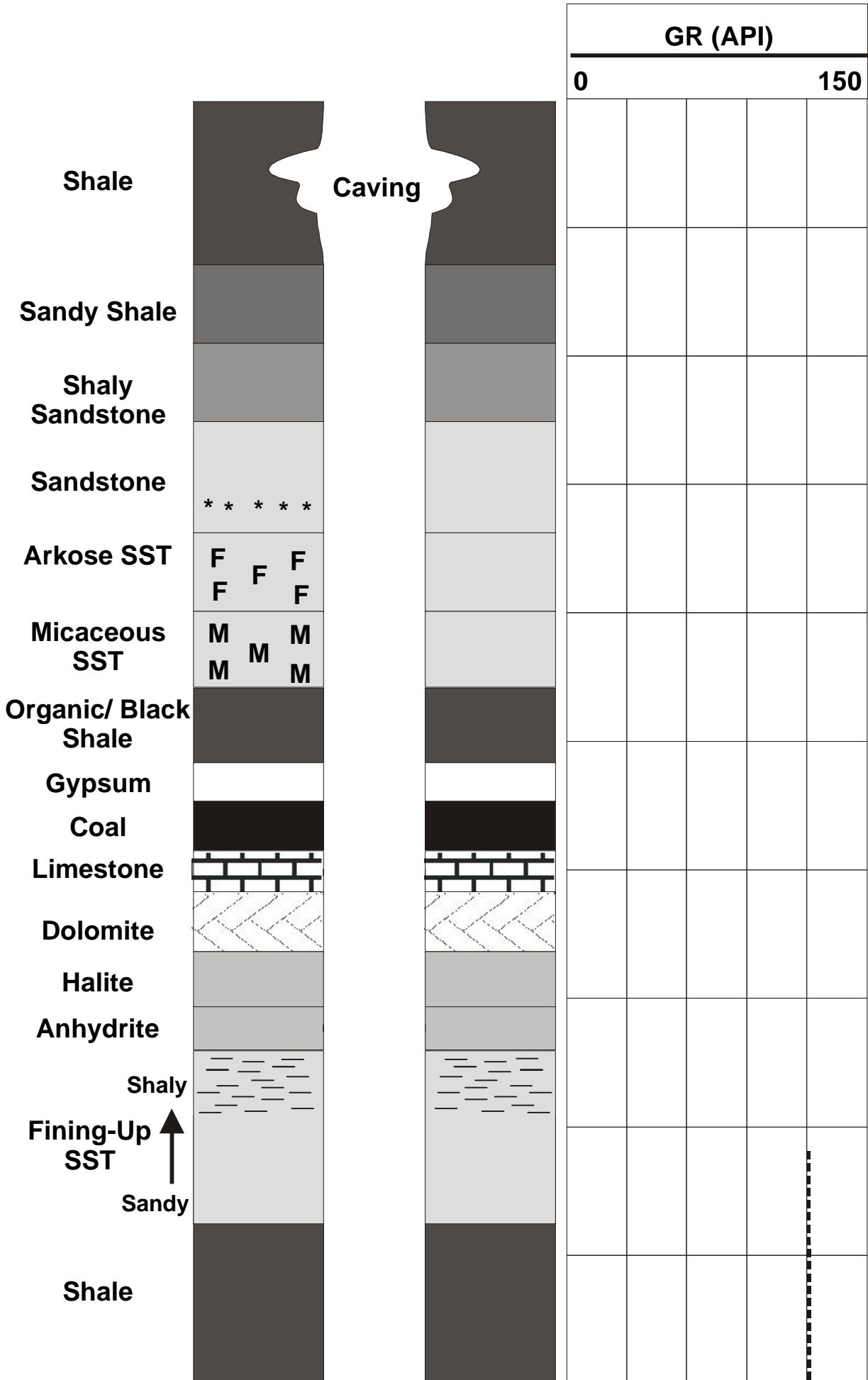
## **TOTAL GAMMA RAY LOG EXERCISE**

### **GENERAL DATA EXERCISE**

The enclosed pseudo-log sheet shows the lithologies in a pseudo-well.

- (a) Draw in the log as a schematic representation of the total gamma ray that you might expect from each of the 100% shale and clean sandstone lithologies. Assume that all 100% shales have the same GR value, which is 120 API. Make the sandstone with an API value of 40 API. These are your relative points.
- (b) Indicate the effect on the gamma ray log of the caving in the shale.
- (c) Extend the log to include the sandy shale ( $V_{sh}=0.75$ ) and shaly sandstone ( $V_{sh}=0.375$ ).
- (d) Add the additional effect that is to be expected from:
  - The heavy mineral glauconite band, that is represented by \*.
  - The presence of feldspars in the arkose sandstone.
  - The presence of significant mica in the micaceous sandstone.
- (e) Draw in the shale line and sand lines.
- (f) Extend the log to the bottom including typical values for the remaining lithologies.
- (g) Draw in a possible shape for the GR log in the fining-upwards shaly sandstone.

When complete, you should have a log that is typical of the various lithologies occurring in the exercise.



## **NORTH SEA EXAMPLE**

The next few pages show a total gamma ray log from the North Sea. It begins in the Upper Kimmeridge Clay on the 9 – 150 API scale (i.e., no wraparound). The log contains, predominantly sequences of sands and shales of varying shale volume, but also contains, in part, micaceous sandstones, carbonate cemented sandstones, a thin heavy mineral bed associated with a marine transgression, and some organic-rich shales.

The order of the formations in the log (downward) are:

- Upper Kimmeridge Clay
- Lower Kimmeridge Clay
- Heather formation?
- Tarbet formation
- Ness formation
- Etive formation
- Rannoch formation
- Dunlin formation

A literature survey may help you with this exercise.

- (a) Divide the log into large scale units that you believe to be of similar lithology, or indicate packages (i.e, a fining-up sequence).
- (b) Indicate to the right-hand side of the log, your interpretation of the likely lithology of these units.
- (c) Revisit the log at a finer scale to attempt to find areas where there are small scale disturbances to the overall pattern within the units and attempt to find a reason for these disturbances.
- (d) Analyse the log for facies and the sedimentary environment, indicating all possible fining-up and coarsening-up sequences, marine transgressions and maximum flooding surfaces etc. , if present, and mark on the log.

