

**THINKING CRITICALLY****● Depositional Environments**

Members of a geologic expedition examining an outcrop recorded the following observations:

The outcrop appears to be undisturbed. The base layer in the outcrop is gray and black granite. The surface of the granite is obviously eroded, and pieces of quartz and feldspar from the granite are imbedded in the overlying sandstone. The sandstone is coarse, contains few fossils, and contains crossbedding and ripple marks that indicate a current that flowed continuously in only one direction. The sandstone layer also contains several lens-shaped channel deposits of coarser sand and pebbles, which indicate a braided river system with intertwining channels. The upper contact of the sandstone smoothly blends into a series of alternating sandstone, shale, and coal deposits. The upper contact of the uppermost shale layer is eroded, and the layer above that shale layer is a pure quartz sandstone. The grains of quartz are very rounded and frosted, which suggests that they were transported and deposited by wind. The quartz sandstone also displays large crossbeds up to 1 m thick, which appear to have formed from sand dunes migrating in various directions. The upper contact of the quartz sandstone is flat because of erosion. The uppermost layer of the outcrop is a welded tuff, which forms from the deposition of hot ash.

**Your Turn to Think**

1. One of the members of the geologic exploration team thinks that part of this formation was produced by the activity of a river. What evidence supports this hypothesis?
2. Another member of the team thinks that at some time, the river became a stagnant swamp. Do you agree or disagree? Explain your answer.
3. In what type of environment did the deposition of the quartz sandstone take place? Use examples from the paragraph to describe the environment in which this layer was deposited.
4. How did the geologists determine that the outcrop was undisturbed?
5. On a separate sheet of paper, write a short history about the area and include the sequence of events that led to the formation of the different rock layers. Use the conclusions you made in the questions above.