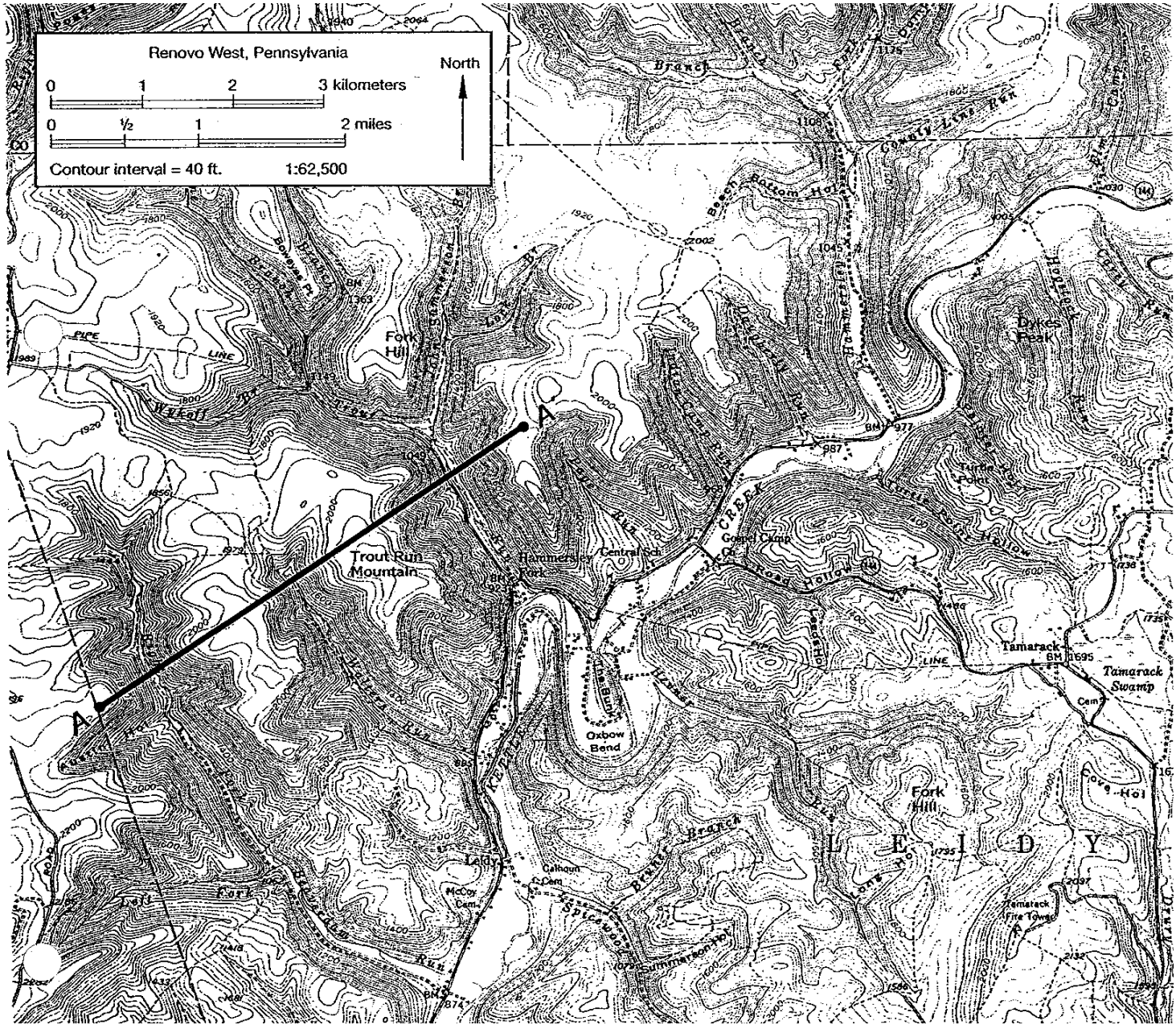
SURFACE WATER PROCESSES AND LANDSCAPES EXERCISE

Begin this exercise by reading over the accompanying handouts and examining the associated diagrams. Then answer the questions for each of the map diagrams provided.

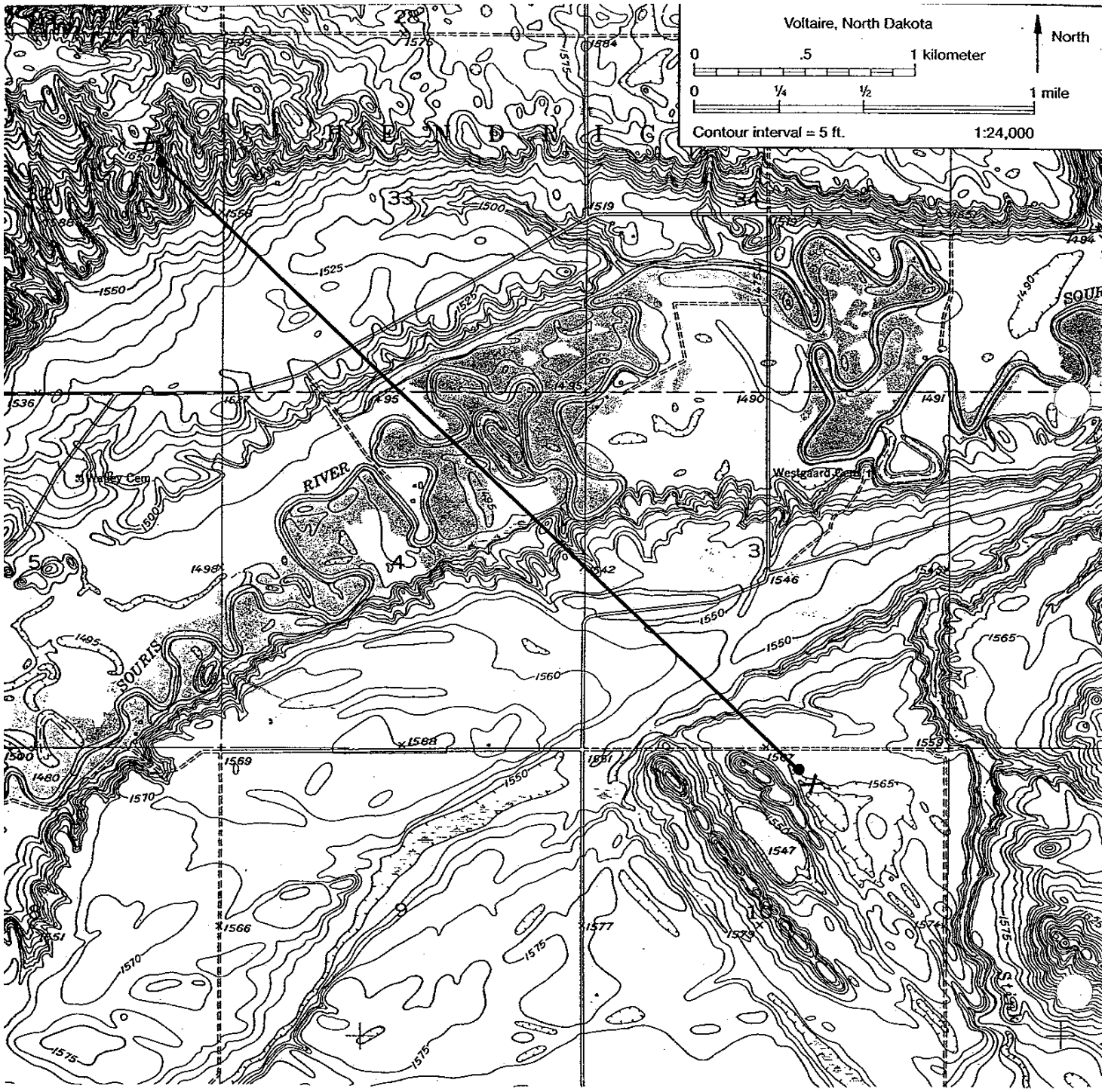
Map 1.

1. Examine the contour lines shown. Narrow spacings between the lines indicate steep slopes. What does this indicate about the gradient of most of the streams on this map?
2. Locate **Trout Run** tributary stream. Based on the contour lines surrounding this stream, describe its *cross-sectional* shape, and explain how it was created.
3. Is this area a region of deposition or erosion? Explain how you know.



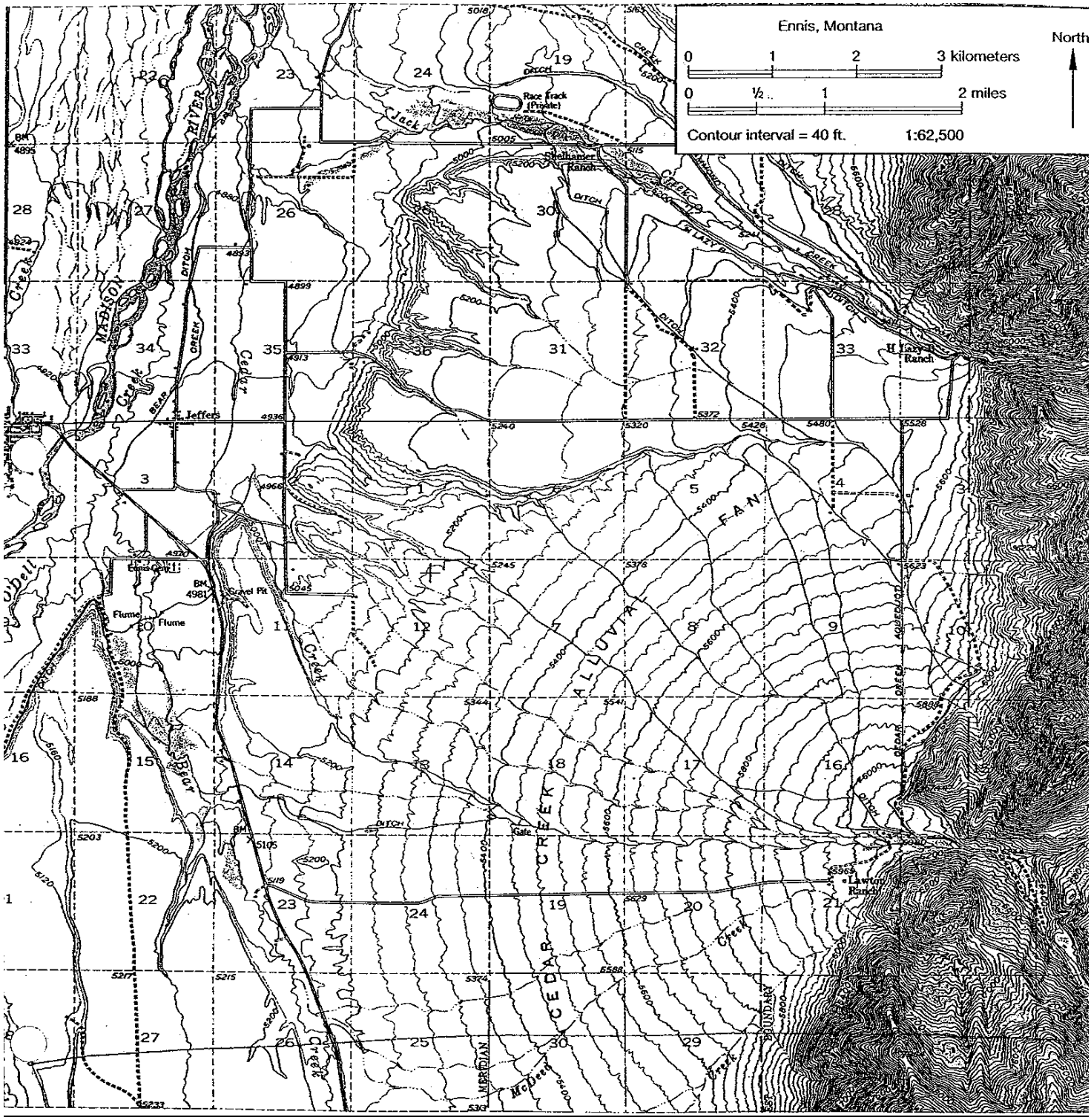
Map 2.

1. In terms of gradient and terrain, explain why the **Souris River** meanders more freely than **Kettle Creek** on Map 1.
2. Why are flat valley bottoms like those of Kettle Creek and the Souris River called **floodplains**?
3. Locate **Westgaard Cemetary** (near center). There is a horseshoe-shaped feature just to the right of this location. What is this feature and how did it form?
4. Use a red marker to clearly indicate a location where an oxbow lake might form in the not-too-distant future. Explain your reason for choosing this location.



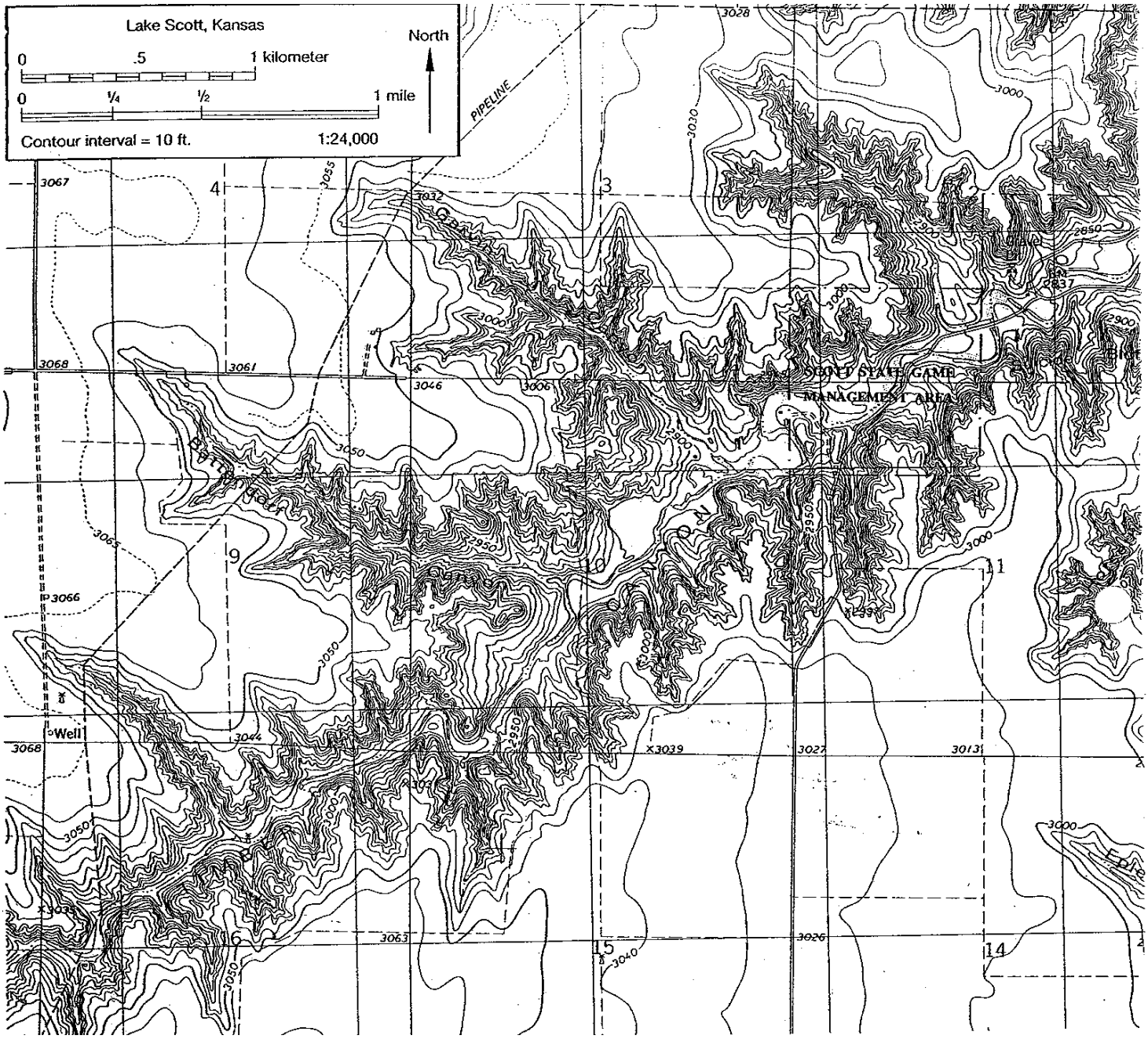
Map 3.

1. Describe the shape or pattern of **Madison River** (northwest side of the map).
2. **Cedar Creek Alluvial Fan** is a conspicuous feature on this map.
   a) What do the contour lines on this feature indicate about the gradient of the fan?
   b) Examine the tightly bunched contours on the east side of the map, the origin of Cedar Creek. How was the alluvial fan produced?



Map 4.

Note the tree-like dendritic pattern of Timber Canyon, and explain how it might have formed.



Additional Questions.

Geologic evidence indicates that the Niagara River began to cut its gorge about 11 000 years ago upon the retreat of the last continental ice sheet, producing what is now known as **Niagara Falls**. This gorge started at the Niagara Escarpment, with the falls slowly migrating backwards from that point, carving out the gorge to its present length..

1. Name the process that caused the migration of the falls (check your notes on *Stream Processes*).
2. The gorge is currently 12 km long from escarpment to falls. Using the formula

rate = distance travelled/time

calculate the average rate of falls retreat in cm/year. (100 000 cm = 1 km)