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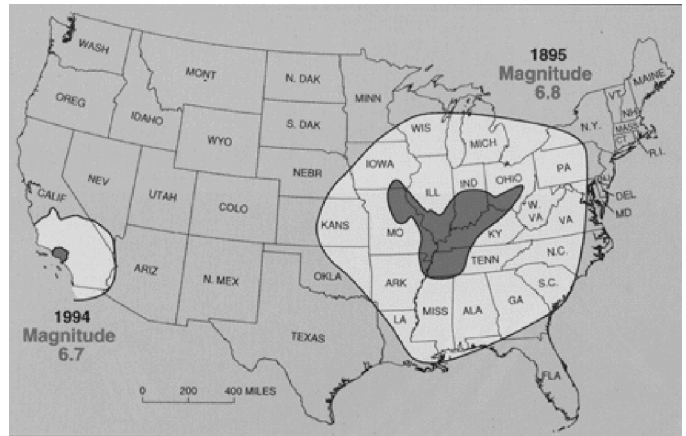
# Skill Sheet 29-A Interpreting Geologic Hazard Maps



Plate tectonics and the weather are often the cause of geologic hazards such as earthquakes, volcanic eruptions, and flooding. Geologic hazard events are important to understand because they often cause loss of life and property damage. Geologic hazard maps are used to help prevent loss of life and property damage should these events occur. On this skill sheet, you will practice interpreting geologic hazard maps.

## 1. Earthquakes

This map illustrates the areas that were affected by two major earthquakes -- one in 1895 and one in 1994. Study this map and then answer the questions. *Graphic courtesy of the USGS.*



- a. The darker shade of gray represents significant damage to buildings in the area. The lighter shade indicates that shaking was felt but very little damage occurred. Why do you think the affected area for the 1895 quake is so much larger than the area affected by the 1994 earthquake even though the two quakes had similar magnitude?

- b. Why is the area affected by each earthquake circular or nearly circular? Where is the epicenter of each quake located?

- c. Use the scale at the bottom of the map to determine the approximate the *radius* of the area affected by each quake.

- d. In which location might earthquakes be more frequent? Justify your answer.

- e. In which location might earthquakes be more damaging? Justify your answer.

f. The Richter scale was developed in 1935. How do you think scientists figured out the Richter scale value for the 1895 quake long after the earthquakes occurred?

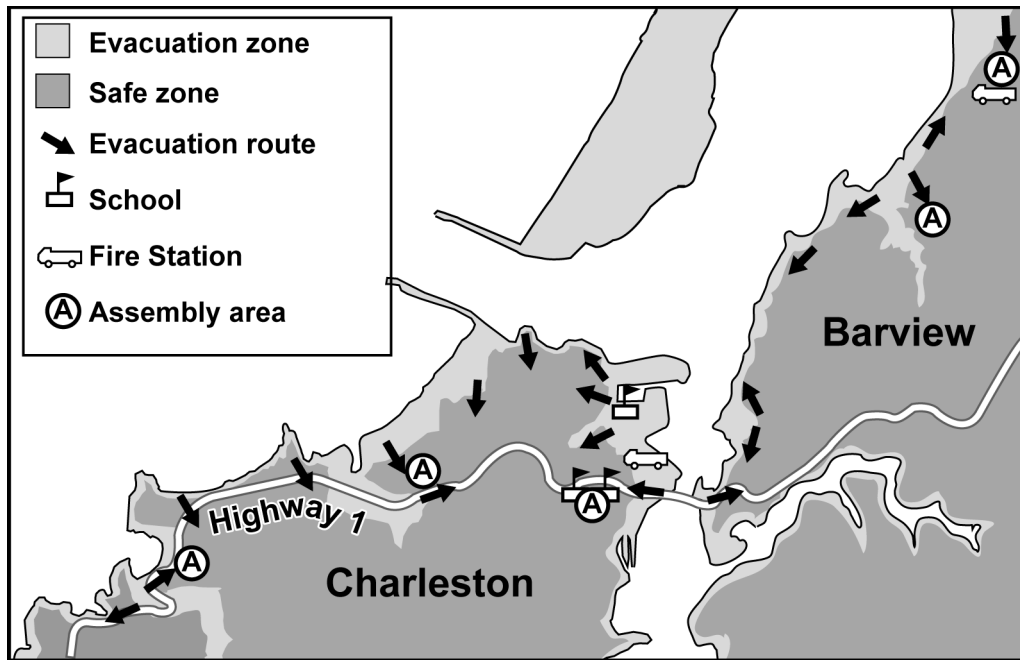
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## 2. Tsunamis

This map shows the evacuation route for a community in the event of a tsunami. Study the map and then answer the questions. The white area of the map represents water.



a. What do you think the term “evacuation zone” means?

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b. In the event of a tsunami, would the schools be a useful building for people to gather? Explain your answer.

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c. In the event of a tsunami, would it be safe to travel on highway 1? Explain your answer.

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d. Evaluate the effectiveness of this map. If you lived in this region, would you feel like you knew all that you needed to know to keep safe if a tsunami occurred? Explain your answer.

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e. If you lived in this community, how would you help citizens know that they were in an evacuation zone or a safe zone?

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### 3. Flooding

Here is a map of the amount of stream flow for the month of October. Study the map and then answer the questions.

a. How might this map look in January? Justify your answer.

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b. How might this map look in July? Justify your answer.

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c. Where on this map might flooding be a problem? Why?

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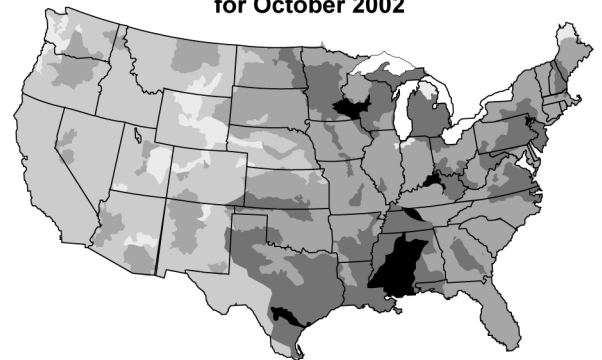
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d. What geographical feature is associated with the high stream flow region in Mississippi and Alabama?

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Map of Monthly-Average Streamflow for October 2002

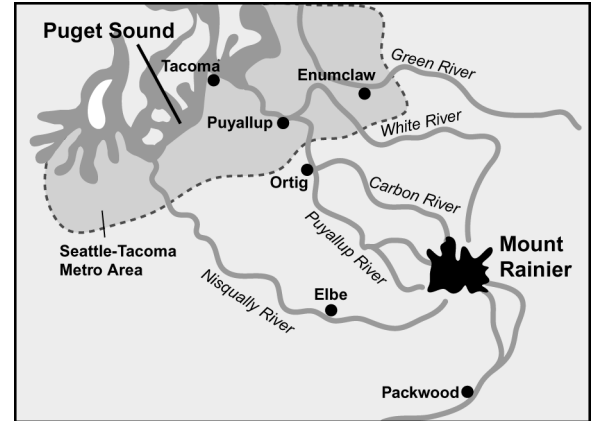


WET		NORMAL		DRY
>90	76 - 90	25 - 75	10 - 24	<10

## 4. Volcanoes

In this exercise, you will turn the map at right into a geologic hazard map by following a series of steps. Features on the map include Mount Rainier and neighboring cities and rivers in a region of Washington State.

- Step 1:** It is likely that earthquakes would occur prior to an eruption of Mount Rainier. Earthquakes are one of the geologic hazards for this area. Draw a symbol on the map that indicates that this region experiences earthquakes.
- Step 2:** In the event that Mount Rainier erupted, ash and pyroclastic material would possibly spread out from the volcano. The most threatened area would be within 50 km of Mount Rainier. The town of Puyallup is about 50 km from Mount Rainier. Draw a circle around Mount Rainier that illustrates the threat of ash and pyroclastic flow. Shade in this circle.
- Step 3:** Mudflows would probably follow an eruption. Based on the past (ancient) history of eruptions of Mount Rainier, scientists predict that these mudflows would travel down the White River and Puyallup River after an eruption. Indicate on the map that these mudflows may occur and affect regions near these rivers.
- Step 4:** Now that you have completed steps 1 - 3, the graphic is a geologic hazard map. To make the map easier to interpret, add a legend that explains the symbols or shading you added.
- Step 5:** The chances that these events may occur range from once in 1,000 years to once in 100,000 years. In terms of percentage, there is a 0.1% to 0.001% chance that Mount Rainier could erupt this year. Therefore, the likelihood of an eruption is very low but possible. If you were a public official, how would you help citizens be prepared for but not scared of an eruption? Write your answer as a short paragraph below.



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## 5. Sinkholes and Karst Topography

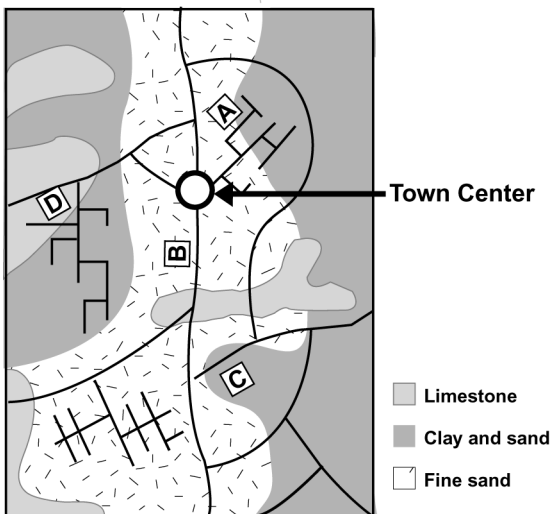
Karst topography happens when underground limestone beds are eroded by acidic water or when water in an aquifer becomes depleted. The loss of limestone or water results in underground gaps, tunnels, and caves. The surface of the ground in these regions may become bumpy. Sinkholes occur when the ground above the gaps and tunnels collapses. In regions where there is a lot of underground limestone, karst topography and sinkholes are common.

Imagine you are a member of the school board for your town, a place known for its karst topography. At the next meeting, the board needs to select the site where it will build a new high school. There are four possible locations where the school board could build the school.

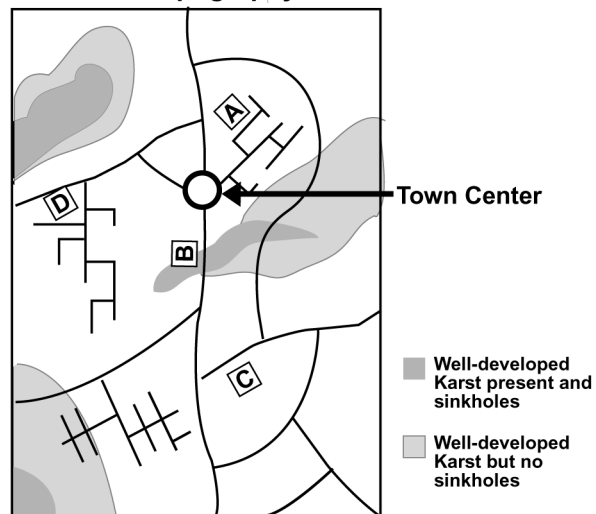
To prepare for the meeting, you have a couple of maps to review. One map indicates the sites of karst topography. The other map indicates the type of sediment and rock that is in the area (A - D). Each map shows a general road map of the town and the four possible locations for the school. It is very important that the school be built in a location that allows for traffic flow.

Study each of these maps and select the best location for the school. Write a short paragraph justifying your selection.

**Town Map Showing Type of Sediment and Rock**



**Town Map Showing Karst Topography**



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