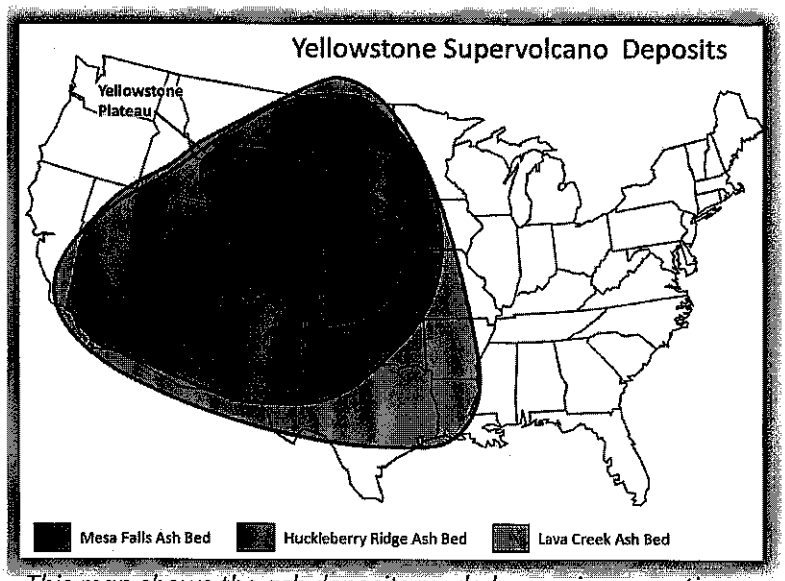
SUPERVOLCANO:

lurking Beneath Yellowstone Park

Have you ever visited Yellowstone National Park? Wyoming's majestic natural attraction is visited by 3.6 million people each year. It was the very first national park in the United States. It was named by President Ulysses S. Grant on March 1, 1872. It is home to lots of wildlife, such as bears, elk, bison, wolves, and other predators.

Yellowstone is famous for its geysers and hot springs, including Old Faithful, a geyser that faithfully erupts every 35 to 120 minutes.

However, just beneath the surface of Yellowstone National Park lies the largest supervolcano in the world. This supervolcano, the Yellowstone Caldera, last erupted 640,000 years ago. It likely spewed volcanic rock, lava, and ash over half of present-day U.S. According to the United States Geological Survey (USGS), wind probably carried light ash particles and sulfur aerosol, tiny particles containing sulfuric acid and water, around the planet.



This map shows the ash deposits made by previous eruptions of the Yellowstone Supervolcano over 600,000 years ago.

The Yellowstone Caldera

The Yellowstone Caldera sits on a hot spot in the Earth right in the center of Yellowstone National Park. It measures about 30 miles long and 45 miles wide. A caldera is a large volcanic crater formed when the mouth of the volcano collapses after a major eruption. A caldera of this size would have devastating effects if it were to erupt.

This supervolcano occurs from the hot, liquid magma that rises to the Earth's crust. Since the boiling magma is unable to escape, it continues to build more and more pressure. Fortunately, a lot of the boiling pressure is emitted, or released, as hot water through geysers. This release of pressure can be compared to a teapot that whistles once the water is done boiling.

Yellowstone has about 500 geysers, more than any other place in the world. The pressure is also released through thousands of hot springs, or naturally heated bodies of water, throughout the park. Due to the extreme heat of these springs, recorded as high as 456 degrees Fahrenheit, the park has strict rules for visitors.

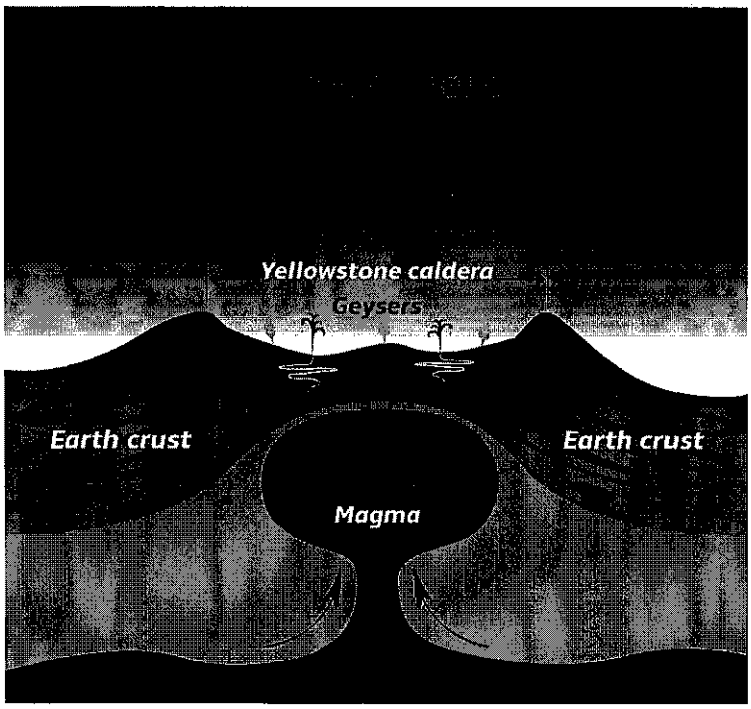
Supervolcano Activity

Luckily, supervolcanoes do not erupt often. Scientists estimate that eruptions in volcanoes this size occur every 10,000 to 100,000 years.

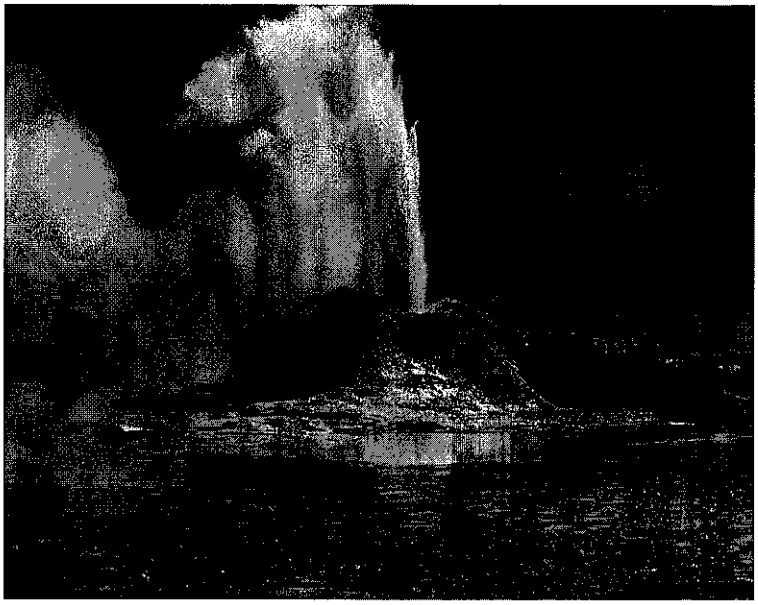
Yellowstone is closely monitored by the Yellowstone Volcano Observatory. Hank Heasler, a Yellowstone geologist, says that there are several signs that tell them if the volcano might erupt. One of the most telling signs is an occurrence of small earthquakes in the area. This tells geologists that large plates below the surface of the Earth are shifting. Another sign is any change in the ground such as rising or falling. In addition, the geysers and hot springs may have an increase in their activity and temperatures due to rising magma pressure.

Dangerous Gases

Certain gases are typically released when a supervolcano has increased activity. According to the USGS, gases are released from the magma as pressure builds up. These gases include carbon dioxide, sulfur dioxide,



The Yellowstone Caldera sits on a hotspot in the middle of Yellowstone Park.



Castle Geyser Eruption at Yellowstone; Yellowstone Park has many geysers and hot springs.

hydrogen sulfide, and hydrogen halides. The USGS also places some blame on these gases for the depletion of the ozone layer.

According to the Yellowstone Volcano Observatory, if another eruption were to occur, the effects could be long lasting. In addition to volcanic ash, many gases would be released. Volcanic ash released during an eruption can shade sunlight. This can cause temporary cooling. The tiniest dust particles can travel far distances thereby affecting large areas. Sulfur dioxide, specifically, moves into the stratosphere and forms sulfuric acid aerosols. It creates a haze that reflects incoming sun rays. These effects can last for years.

Sulfur dioxide can also create health problems, such as respiratory issues, headaches, and dizziness. A large eruption could also bring acid rain and air pollution. This could poison the water supplies, agricultural crops, and farm lands. In high enough concentrations, these gases can be harmful to the health and vegetation of Earth's population.

Comprehension Quiz

Answer each question according to the article.

1. How many people visit Yellowstone each year?

_____

2. When was the last supervolcano eruption?

_____

3. How does the supervolcano release pressure on a daily basis?

_____

4. What are hot springs?

_____

5. Who monitors the supervolcano?

_____

6. What is a sign that a volcano may erupt?

_____

7. When are gases released by the supervolcano?

_____

8. What does sulfur dioxide form after it moves into the stratosphere?

_____

Finding Text Evidence

Find each piece of text evidence in the article and highlight OR underline it with the color specified.

For items 1-4, you'll be citing textual evidence to support what the text says explicitly.

1. Find the sentence that tells which president named Yellowstone National Park. Highlight it in **blue**.
2. Find the sentence that defines the word *caldera*. Highlight it in **gray**.
3. Find the sentence that identifies the gases released when a supervolcano has increased activity. Highlight it in **purple**.
4. Find the sentence that explains the meaning behind the name "Old Faithful." Highlight it in **green**.

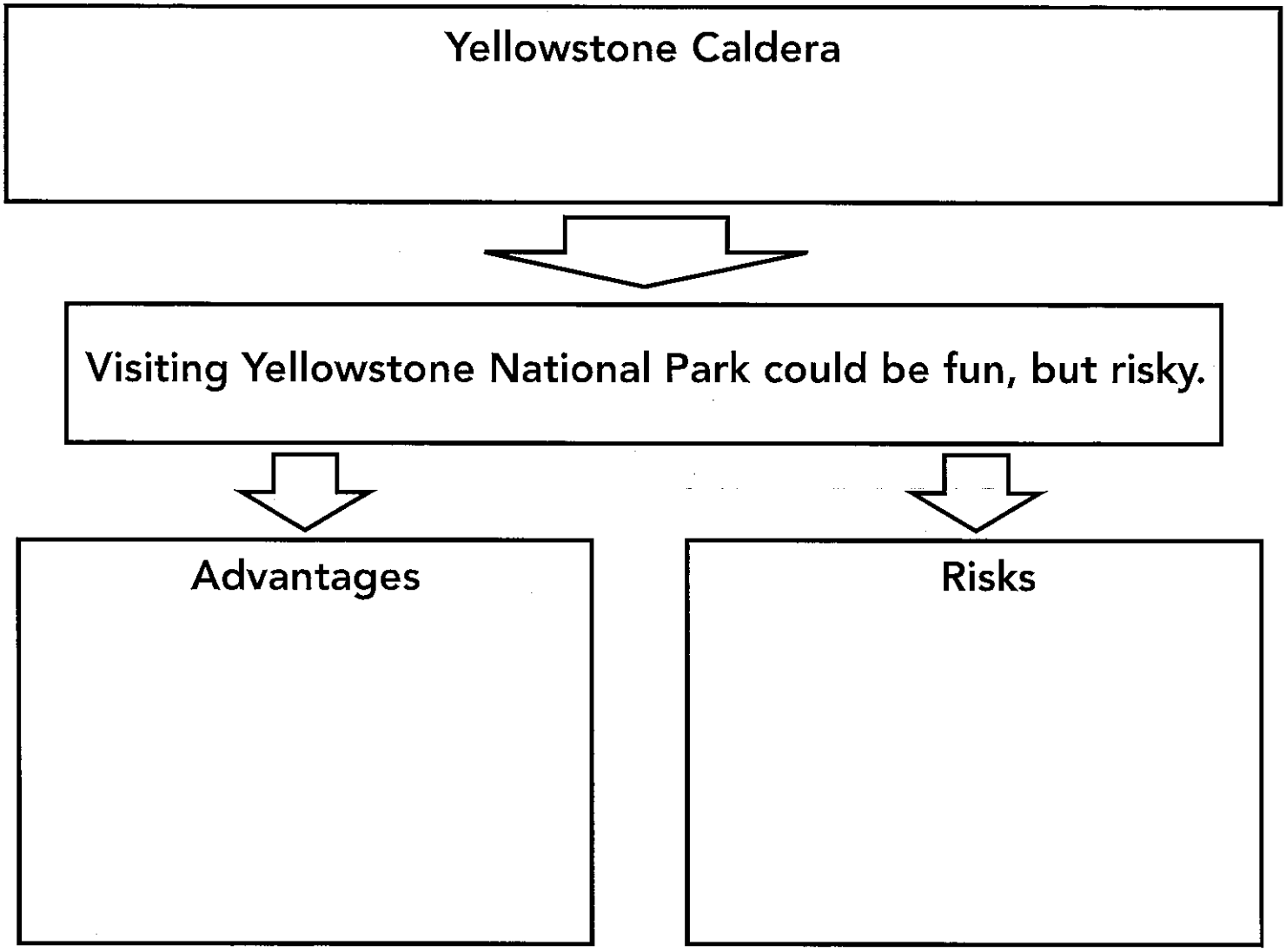
For items 5-8, you'll be citing one piece or multiple pieces of textual evidence to support inferences drawn from the text.

5. Find one piece of evidence in the article that supports the idea that it is important to follow the rules when visiting Yellowstone. Highlight it in **orange**.
6. Find one piece of evidence in the article that supports the idea that Yellowstone probably will not erupt anytime soon. Highlight it in **pink**.
7. Find one piece of text evidence that tells you that an eruption could affect our climate in the US. Highlight it in **yellow.**
8. Find two pieces of text evidence that support the idea that an eruption could cause major pollution. Highlight them in **red.**

A. Analyzing Details

Use the article to answer the questions and complete the graphic organizers.

1. The Yellowstone Caldera is in the middle of a famous tourist site. Describe this tourist attraction.
2. List two advantages to visiting Yellowstone National Park.
3. List two risks when visiting Yellowstone National Park.



4. Based on what you read, do you think Yellowstone National Park is a place you would like to visit one day? Explain your answer using at least one detail from the article.

B. Elaboration of Ideas in a Text

In the spaces below, show how details are used to elaborate each central idea from the text. Be sure to use examples and anecdotes given by the author when possible. The first one is done for you.

5. *The Yellowstone Supervolcano could be dangerous if it erupted.*

   It could spew ash and volcanic rock over half of the United States.

   The gases released could harm people, animals, and plants.

   The lava flow could destroy the park and the animals that live there.

← central idea

← Give 2 or more details to elaborate.

6. *Toxic gases are released during increased volcanic activity and can be dangerous.*

7. *Regardless of the danger, Yellowstone Park is a top spot for tourists each year.*

8. According to the article, why would a volcanic eruption cause cooling in our climate?

Integrate Information

View the video clip, "Why Yellowstone Supervolcano Could Be Huge." Then, answer these questions.

1. List as many details as you can that are stated in the video, sorted into these two categories.

Details mentioned in the article	Details NOT mentioned in the article

2. In the beginning of the video, the magma chamber is discussed. What is the currently magma made of and what are the dangers associated with this chamber?