SUGGESTED REFERENCES

- Physicochemical Controls on Eruption Style
  http://www.geology.sdsu.edu/how_volcanoes_work/Controls.html
- Volcano World: A Higher Education, K-12, & Public Outreach project of the North Dakota Space Grant Consortium
  http://volcano.und.edu/
- Volcanoes Around the World
  http://www.volcanoes.com/
- Nova Online
  Can We Predict Eruptions?
  www.pbs.org/wgbh/nova/vesuvius/predict.html
- "How Volcanoes Work" By: Robert Roy Britt
  http://www.space.com/scienceastronomy/planetearth/volcano_science.html

NATIONAL SCIENCE EDUCATION STANDARDS

Grades K - 4
Earth and Space Science
Properties of Earth's Materials

Grades 5 - 8
Earth and Space Science
Structure of the Earth System

**Source: National Science Education Standards, 1996, National Academy Press*

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SCIENCE SCREEN REPORT FOR KIDS

VOLUME 16 ISSUE 1

PREDICTING VOLCANOES

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SYNOPSIS

Volcanoes are a fascinating part of the earth and they have intrigued people as well as scientists for hundreds of years. Scientists study the earth's plates in order to understand the complexity of volcanic activity around the world. They also study different types of lava and the gases dissolved into these rocks. In the past, studying volcanic activity was extremely dangerous for scientists. Now, they have access to tools such as global positioning systems and seismometers to help in predicting volcanic activity.

In this edition of Science Screen Report for Kids, students will see and learn first hand the extreme power and devastation these volcanoes can have on its surroundings. We will look into the most active and dangerous volcanoes on earth. You will also come along for an adventure with the scientists who study these volcanoes. They have a very important job trying to predict eruptions that could possibly save property and lives.

CURRICULUM UNITS	RUNNING TIME
■ EARTH SCIENCE	17:40
■ ENVIRONMENTAL SCIENCE	
■ GEOLOGY	
■ PHYSICAL SCIENCE	

BACKGROUND

Volcanoes are found all over the world. Most of the 500 volcanoes can be found at plate boundaries, or places where the lithosphere is broken up. Their powerful energy cannot be tamed, but scientists are working to control the risks and dangers they hold.

After a volcanic eruption, lava covers the land area and clouds of volcanic ash are sent 30 kilometers up into the sky. These ash clouds can disturb the atmosphere, affect airplane travel, and destroy surrounding crops. Scientists think that the ash and gases associated with volcanic activity might have long-term impact on the global climate.

Iceland is the primary focus of this program. This is because it is a highly active volcanic area, with one of its one hundred and fifty volcanoes erupting every four years. Volcanologists from all over the world are drawn to this area because the island has seen a dramatic increase in volcanic activity in the last few years. In the southern regions of Iceland, there are two volcanoes that have been labeled extremely dangerous. The dangers of these volcanoes not only include the ash clouds and lava, but the effects of the heat from the magma on the ice of the surrounding glaciers. It could melt several hundred meters of ice in minutes, causing an enormous flood wave.

In order to tell which direction lava might flow, and how long it might take to harden, scientists study lava viscosity, which reflects the amount of gases dissolved into the liquid rock. They use a rotation viscosimeter, which measures levels of resistance of a reheated lava sample on a turning rod to decipher the viscosity of the sample.

In Iceland, there is a meteorological institute that studies earthquakes and monitors 43 different digital seismic stations. Every year, they record about ten thousand small earthquakes. The seismometers are able to detect even the gentlest rumbles. Volcanologists are watching the frequency of the quakes, because in the days leading up to an eruption, the small quakes become more frequent.

Life can be disrupted up to thousands of kilometers away from the eruption site. Scientists all over the world are constantly finding new ways to aid in predicting volcanic activity to make it safer for everyone affected by their extraordinary power.

ADVANCED ORGANIZERS

Prior to showing this program students should have some understanding of the following Benchmarks for Science Literacy, Oxford University Press, which are excerpted and, in some cases, abbreviated below. Refer to the Benchmarks for more information.

Benchmark 1: The Nature of Science
Section B - Scientific Inquiry
Know by the end of 2nd Grade

- Tools such as thermometers, magnifiers, rulers, or balances often give more information about things than can be obtained by just observing things without their help.
- Describing things as accurately as possible is important in science because it enables people to compare their observations with those of others.

Section C - The Scientific Enterprise

- Science is an adventure that people everywhere can take part in, as they have for many centuries.
- Clear communication is an essential part of doing science. It enables scientists to inform others about their work, expose their ideas to criticism by other scientists, and stay informed about scientific discoveries around the world.

Benchmark 4: The Physical Setting
Section D - The Structure of Matter

- Objects can be described in terms of materials they are made of and their physical properties.

**Benchmarks can be found at www.project2061.org/tools/benchol/bolintro.htm*

CRITICAL THINKING EXERCISES

1. Read aloud a book about volcanoes. One example is, Volcano: Jump into Science, by Ellen Prager. Have students work in groups and work cooperatively to compile a list of five facts they learned from the book.
2. Create your very own class volcano. Watch it erupt from the chemical reaction from mixing vinegar and baking soda. One example of this science experiment can be found at Reeko's Mad Scientist Lab http://www.spartechsoftware.com/reeko/experiments/volcano.htm
3. Write a narrative story about a day you were trapped inside a volcano including facts about volcanoes.
4. Draw and label a diagram of a volcano.
5. Assign a section of the world map to different cooperative groups. Have students research volcanoes that are located in that area of the world. Chart each finding on a large class world map. Identify the largest volcano and the one that erupts the most.
6. Discuss scientific technology and the different tools scientists use to predict hurricanes, earthquakes, snow storms, etc. Compare the findings to that of volcanic prediction techniques.
7. Conduct a class experiment comparing how different liquids flow. Some flow faster than others depending on the viscosity of the liquids. Chart the findings.

VOCABULARY

Andesitic . . . . . Thick lava.

Ash . . . . . The grayish-white to black powdery residue left when something is burned.

Basaltic . . . . . A hard, dense, dark volcanic rock composed chiefly of plagioclase, pyroxene, and olivine, and often having a glassy appearance.

Dormant . . . . . Latent or inactive but capable of being activated.

Fluoride . . . . . A natural compound; a salt of hydrofluoric acid.

Lithosphere . . . . . The outer part of the earth, consisting of the crust and upper mantle, approximately 100 km (62 mi.) thick.

Seismometer . . . . . A detecting device that receives seismic impulses.

Viscosity . . . . . The property of resistance to flow in a fluid or semifluid.

Volcanologist . . . . . The scientific study of volcanoes and volcanic phenomena.

CAREER POSSIBILITIES

- CARTOGRAPHER
- EARTH SCIENTIST
- ENGINEER
- GEOLOGIST
- SEISMOLOGIST
- VOLCANOLOGIST