Follow-up Activities

- Provide mineral samples for students to observe. Students should consider the color, shape, weight, hardness, luster and texture of the minerals. Magnifying glasses, rulers and scales should be made available to students throughout their investigation. Based on their observations, students can create mineral information cards that record information about the properties of the minerals. These cards can be bound together into a class mineral guide.
- Challenge students to research the minerals called gemstones (i.e., diamonds, rubies, sapphires, emeralds), reporting on their various properties, including monetary value. Invite a gemologist to the class to show samples and share criteria used to rate the quality of gemstones.
- Have students analyze the nutrition labels of various foods and vitamin supplements. Based on the information contained on the labels, create a list of minerals that are important to our health. As a class, research these minerals to determine why they are important for the human body.

Suggested Internet Resources

Periodically, Internet Resources are updated on our Web site at www.libraryvideo.com

- **www.bsu.edu/teachers/academy/gems/index.html**
  "A Gem of a Story" is a Web page that offers a virtual field trip through the gem and mineral exhibits of the National Museum of Natural History. In addition to describing these exhibits, activities for the classroom and Web resources are provided.
- **www.mii.org**
  The Mineral Information Institute is dedicated to educating students about minerals and other natural resources from the Earth. This Web site presents a great deal of information for teachers about minerals, including lesson plans and activities. A homework help section also provides photographs of many minerals, facts about common minerals and their uses, and details about the minerals found in specific states.
- **educate.si.edu/resources/lessons/siyc/gems/start.html**
  "Minerals, Crystals and Gems: Stepping-Stones to Inquiry," a Smithsonian Education Web page, offers excellent lesson plans that reflect educational standards and emphasize inquiry-based learning.

Suggested Print Resources

- Barrow, Lloyd H. *Adventures With Rocks and Minerals, Book II: Geology Experiments for Young People.* Enslow, Springfield, NJ; 1995.

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- Curtis, Neil. *Rocks and Minerals.* Oxford University Press, New York, NY; 1998.
- Kittinger, Jo S. *A Look at Minerals: From Galena to Gold.* Franklin Watts, New York, NY; 1998.
- Pellant, Chris. *Collecting Gems & Minerals: Hold the Treasures of the Earth in the Palm of Your Hand.* Sterling Publishing Company, New York, NY; 1997.
- Staedter, Tracy. *Rocks and Minerals.* Reader's Digest Children's Books, Pleasantville, NY; 1999.

TEACHER'S GUIDE CONSULTANT

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Earth Science IN ACTION™

Minerals

Grades 5–8

Students in grade 5-8 classrooms possess a wide range of background knowledge. Student response to this video program is sure to be varied, so the teachers at these grades need all the help they can get! This guide has been designed to help the 5-8 science teacher by providing a brief synopsis of the program, previewing and follow-up questions, activities, vocabulary and additional resources.

Before Viewing: Extensive research tells how important it is for the teacher to discover what the students know — or think they know — about a topic, before actually starting a new unit. Therefore, after prompting discussion with the pre-viewing questions, lead your class to create an "Everything We Think We Know About…" list. You may also wish to preview key vocabulary words, and have students raise additional questions they hope will be answered.

After Viewing: Have your students share video excerpts that fascinated or surprised them, then challenge your students to prove or disprove the accuracy of the facts they put on their "Everything We Think We Know About…" list. Discuss what else they learned and use the follow-up questions and activities to inspire further discussion. Encourage students to research the topic further with the Internet and reading resources provided.

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Program Summary

There are almost 3,000 different kinds of minerals that make up most of the Earth's crust. All minerals have five basic characteristics: they are solid, inorganic and naturally occurring, with a repeating crystalline structure and a unique chemical make-up. Each mineral consists of only one substance, and that substance is the same in all samples of the mineral. Rocks differ from minerals in that they may be comprised of many minerals and may also contain organic matter. Minerals are formed when magma cools into solid form under the Earth's surface. They can also form when water evaporates from solutions containing dissolved minerals. Scientists and miners work together to extract important mineral deposits from the Earth. It is important that people recycle products made of minerals to help conserve our natural resources.

Minerals can be consistently identified by their numerous properties, including hardness, luster, cleavage, streak, color and density. The hardness of a mineral refers to its ability to resist being scratched. A German scientist, Friedrich Mohs, created a ten-point hardness scale, ranking samples of minerals by their relative ability to scratch or be scratched by another mineral. Talc, the softest mineral, receives a one on the Mohs scale and can be scratched easily by all other mineral samples. Diamond is determined to be the hardest mineral and ranks a ten on the scale. Diamonds cannot be scratched by any other mineral. For this reason, diamonds are often used in tools like saws and drills. Luster describes the shine of the mineral; some minerals, like silver, have a metallic shine while others, like diamond, sparkle. Some minerals, like talc, have no luster at all. The cleavage of the mineral describes how it breaks, and each mineral breaks in a specific way. Some minerals, like mica, break along one flat side, peeling in layers; others break along two or more surfaces. Streak is the distinctive color left behind when a mineral is rubbed across a surface. Each mineral also has a characteristic color. For example, halite is white and sulfur is yellow. Density, another characteristic of minerals, is the amount of matter in a given space. The density of minerals is often compared to that of water — some minerals are less dense and can float; most are heavier and will sink. By analyzing these properties, one can accurately identify samples of minerals.

Minerals are integral to the functioning of life on Earth. Plants depend upon the minerals that are present in the soil. Humans and other animals require specific amounts of many minerals to survive. Minerals are the gems used in jewelry and are the metals used in constructing vehicles and buildings. Minerals are found in medicines, computers and cosmetics. Minerals are all around us!

Vocabulary

The following words are included for teacher reference or for use with students. They are listed in the order in which they appear in the video.

(Continued)

mineral — A naturally occurring, inorganic solid that has a definite chemical composition and crystal structure.

inorganic — Not containing any plant or animal material, dead or alive.

crystals — Solids that have molecules arranged in repeating patterns, forming particular geometric shapes.

properties — Specific characteristics or qualities. Each mineral has six properties by which it can be identified.

hardness — The ability of a mineral to resist being scratched. The Mohs scale measures the hardness of a mineral.

Mohs scale — The ten-point hardness scale created by Friedrich Mohs, a German mineralogist, which ranks samples of minerals according to the degree to which they can scratch or be scratched by other minerals.

luster — The shine of the surface of a mineral and how this surface reflects light. Minerals can have a metallic or nonmetallic luster.

cleavage — The way a mineral breaks. Minerals can break along smooth or jagged surfaces.

streak — The color left behind when a mineral is rubbed across a surface.

color — A mineral's external hue.

density — The amount of matter that is packed into a given space.

mining — The process of extracting minerals from the Earth.

ore — Rock that contains deposits of one or more important mineral.

Pre-viewing Discussion

Before students generate their list of "Everything We Think We Know About..." for this topic, stimulate and focus their thinking by raising these questions so that their list will better reflect the key ideas in this show:

- What are minerals? How are they formed?
- How do minerals differ from rocks?
- How are minerals used in our daily lives?

After the class has completed their "Everything We Think We Know About..." list, ask them what other questions they have that they hope will be answered during this program. Have students listen closely to learn if everything on their class list is accurate and to hear if any of their own questions are answered.

Focus Questions

1. What percent of the Earth is made of minerals?
2. What are the five defining characteristics of all minerals?
3. What are crystals? How are they formed?
4. What is the most common mineral on Earth?

(Continued)

5. What are the two main ways that minerals are formed?
6. How do minerals differ from rocks?
7. What are the six properties used to identify minerals?
8. What was Friedrich Mohs' contribution in helping us to identify minerals?
9. How could you use the Mohs scale to compare three mineral samples?
10. Which is the hardest mineral? How is that substance used?
11. Describe the luster of talc versus diamond.
12. How does the cleavage of graphite differ from that of mica?
13. Describe a mineral's streak. Is the color of the streak always the same as the color of the mineral?
14. How have the colors of minerals been used throughout history?
15. If a mineral can float in water, what does that tell you about its density?
16. Where can minerals be found on the Earth?
17. Why can the oceans of the world be described as "a gigantic mineral soup"?
18. Where do humans get the minerals they need to keep their bodies healthy?
19. Describe the process of mining.
20. What are some common uses of minerals?

Follow-up Discussion

Research indicates that students will retain their previous misconceptions about a topic, in preference to new information, until they actively recognize and correct their own errors. Therefore, it is important to have your students re-examine the facts/beliefs they put on their "Everything We Think We Know About..." list. It might also be helpful to review the list by marking each entry with a "+" or "-" to show which facts were correct and which were incorrect.

Thought-provoking discussions provide a good way to assess the overall depth of student understanding. The following are some suggested discussion topics.

- Explain how knowledge of a mineral's properties help determine its function.
- Discuss how many common household items are made from minerals.
- Have students explain why recycling cans and bottles will help conserve mineral resources.