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Weekly Online Lesson

Online Lesson Archive

Grade Level: 5-8

Subject: Science/Social Studies

Coal Mining Risks & Rewards

On Monday, August 6, 2007, a tunnel collapsed in one of central Utah's coal mines, trapping six miners. The miners were about three miles from the mine's entrance and 1,500 feet underground when the cave-in occurred.



Coal mining is a dangerous business, but it has also produced great rewards. The United States is home to the most known coal reserves of any other nation, and this has made coal the nation's primary source of energy. Burning coal generates about half of the country's electricity. Coal was also a major factor in catapulting the nation into the Industrial Age. However, over the years miners have often suffered injury—and even death—from the many hours of hard labor and dangerous working conditions.

Mining is much safer today than it used to be. The recent Utah mine collapse is certainly a tragedy, but such incidences are much less common than in previous centuries, thanks to government regulation and public pressure.

Another danger related to coal is that it is a non-renewable energy source—a fossil fuel. When it burns, it releases energy and also pollution. New technologies, called "clean coal," hold promise that some of this pollution going into our environment may be reduced. Opponents note possible problems with these clean coal technologies, with many saying coal needs to be dumped altogether.

This week's lesson will take you into the depths of the earth's surface so that you can better understand what coal is. Then, you will journey back in time to tour coal mining's history.



The Science of Coal

To understand why people are driven to mine coal, it is important to know what coal is. To do that, visit the U.S. Department of Energy site on **Fossil Energy**.

Begin your exploration of coal with the study guide's first chapter, **Introduction to Coal**. Read all of the text, explaining coal in the United States and the four different types of mined coal.

On a map of the U.S. with state boundaries, create a legend using a different color to denote each type of coal. Draw an image of a small flame next to the type that produces the least amount of energy. Draw

a larger flame next to the type that produces the most amount of energy. Fill in the

other two sizes that fall in between.

As you read the text, do your best to color in parts of the map, as appropriate. The descriptions are not necessarily exact locations, but they will give you an idea of where the different types are generally found. Some types may overlap.

Next, take a look at **How Coal is Formed**. What exactly is coal made from? Why do different types of coal exist? Why does some coal contain sulfur, and why does that cause problems when it is burned? How many feet of prehistoric plant debris are compressed in one foot of coal?

Now that you know how coal was formed, you have some idea of why burning it emits pollution. Knowing what coal contains helps scientists understand how to make it cleaner when it burns.

Explore this idea in greater depth by learning how scientists are **Cleaning Up Coal**. Read through the first page, and then continue reading the other pages in this section. As you read, think about how the majority of today's 30- to 40-year-old coal-burning energy plants have polluted the environment. How will new clean coal technologies change the way these plants burn coal, and how will they affect the output of pollution?



What are the two ways that sulfur can exist in coal? Why is one type easier to clean out of coal than the other type? What exactly is a scrubber? How does staged combustion help clean out NOx made by burning coal? Describe the differences between using a pressurized fluidized bed boiler and the process of gasifying coal. What waste products are leftover that will still need to be disposed of?

Make two lists of the pros and cons of mining and burning coal, both past and present. Compare the lists. Which items have changed between past and present? Which have stayed the same? If clean coal technologies get implemented, how will it affect your present-day list of pros and cons?

Coal-mining History



Finish up the Fossil Energy study guide with **A Brief History of Coal Use in the United States**. Make a list of some uses of coal. Draw a diagram of how you think a steam train might work, focusing on the flow of energy from the engine's primary energy source (coal) to moving the train forward on the tracks.

What are some of the **Coal Mining and Transportation** methods used?

To see what mining was like into the 1900s, visit the Mining Safety and Health **Kids Page** that features **A Pictorial Walk Through the 20th Century: Little**

Miners. This tour will show you how children, usually ages eight through 14, worked our nation's coal mines until the federal government worked to enforce child labor laws and the need for birth certificates. It also illustrates how coal was mined, transported and cleaned.

Imagine what it would have been like to have one of those jobs described in the pictorial history. Write a short, first-person essay describing what your day would be like. Share your story with classmates.

Newspaper Activities

Browse issues of **Chicago Tribune**. Read articles that relate to any type of energy

source—renewable or non-renewable. For a month or longer, summarize each news story in one paragraph. Keep a journal of your summaries, along with copies of the original news articles (for later reference, if needed). At the end of your review period, go through your summaries and choose three or more articles that relate to each other in some way. Choose a related topic and write an opinion essay about it. What does the topic mean for people today? What could it mean for people in the future? Decide on how you feel about the topic and list two or more reasons that support your opinion. Use the information from the original news articles, along with any additional information from other research sources, as supporting evidence.

Point



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