Coal Mining & Mountaintop Removal
By Jess Eliot Myhre

INTRODUCTION:

This lesson will inform students about Mountaintop Removal coal mining in Appalachia and its connection to environmental issues, economic issues, and public health. Students will also conduct research and give presentations to the class in groups.

LESSON OVERVIEW:

Grade Level & Subject: 9-12: Science & Social Studies

Length: Two 90-minute class periods

Objectives:
After completing this lesson, students will be able to:

• understand the process of Mountaintop Removal coal mining.
• name the environmental, economic and public health implications of Mountaintop Removal.
• recognize the region of Appalachia its ties to coal mining geographically, culturally and historically.
• explain the concept of environmental justice.
• conduct research and give presentations in groups.

National Standards Addressed:
This lesson addresses the following National Education Standards.¹

• Content Standard: NS.9-12.5 SCIENCE AND TECHNOLOGY
  As a result of activities in grades 9-12, all students should develop
  o Abilities of technological design
  o Understandings about science and technology

• Content Standard: NS.9-12.6 PERSONAL AND SOCIAL PERSPECTIVES
  As a result of activities in grades 9-12, students should develop an understanding of
  o Personal and community health
  o Population growth
  o Natural Resources

¹ www.education-world.com/standards.
• Environmental quality
• Natural and human-induced hazards
• Science and technology in local, national, and global challenges

• Content Standard: **NSS-G.K-12.5 ENVIRONMENT AND SOCIETY**
  As a result of activities in grades K-12, all students should
  o Understand how human actions modify the physical environment
  o Understand how physical systems affect human systems
  o Understand the changes that occur in the meaning, use, distribution, and
    importance of resources

• Content Standard: **NSS-G.K-12.2 PLACES AND REGIONS**
  As a result of activities in grades K-12, all students should
  o Understand the physical and human characteristics of places
  o Understand that people create regions to interpret Earth’s complexity
  o Understand how culture and experience influence people’s perceptions of
    places and regions

**Materials Needed:**
• Reproducible #1 – Boundaries of Appalachia
• Reproducible #2 – The Anatomy of a Coal Mountain and Mining Techniques
• Reproducible #3 – Directed Questions for Presentation
• Reproducible #4 – Directed Questions for Presentation – ANSWER KEY
• Reproducible #5 – Questions on Mountaintop Removal Issues
• Reproducible #6 – Questions on Mountaintop Removal Issues – ANSWER KEY
• Computers with internet access available for each student for research (at home or at
  school).

**Assessment:** Students will be assessed through the following activities:
• Contribution and participation during class discussion
• Completion of Reproducible #5 – Questions on Mountaintop Removal Issues
• Content, organization and delivery of their presentations

**LESSON BACKGROUND:**

**Relevant Vocabulary:**
• **Appalachia** – a mountainous region of the eastern United States with a cultural and
  industrial history including coal mining and logging. Appalachia stretches from New
  York to Mississippi, with its “heartland” in the central and Southern states.
• **Asthma** – a chronic inflammation of the lungs; it can be caused by environmental
  and genetic factors.
• **Carbon dioxide (CO₂)** – a greenhouse gas emitted mainly by the burning of fossil
  fuels; the main gas contributing to climate change.
- **Coal** – a fossil fuel (formed from the compressed remains of organisms living millions of years ago) found as a hard, black substance between rock layers of the Earth.
- **Coal Dust** – the fine, powdered form of coal, which is created when coal is crushed or exploded. Coal dust travels miles from coal mining sites, causing low air quality and respiratory problems in neighboring communities.
- **Coal-Fired Power Generation** – a centuries-old process for producing electricity, involving the burning of harvested coal.
- **Coal Seam** – a horizontal deposit of coal within a mountain.
- **Environmental Justice** – “The fair treatment and meaningful involvement of people of all races, cultures, incomes and educational levels with respect to the development and enforcement of environmental laws, regulations, and policies” – Environmental Protection Agency.
- **Extraction** – the act of removing an object from a certain place; often used in the context of natural resources, which cannot be put back.
- **Fossil Fuel** – a type of energy source formed from the compressed remains of organisms living millions of years ago that is harvested from natural resources; it is by nature non-renewable and emits CO$_2$ when energy is produced.
- **Mechanization** – the introduction of machinery and other technology into an industry to replace manual labor.
- **Mountaintop Removal (or Strip Mining)** – MTR is a type of surface mining in which an area is deforested and rock and soil at the summit or summit ridge of the mountain is removed with explosive material to provide access to buried coal.
- **Overburden** – the soil, rock, and other material that lies above a specific geologic feature or an area of economic or scientific interest.
- **Public Health** – “the science and art of preventing disease, prolonging life and promoting physical and mental well-being through the organized efforts and informed choices of society, public and private organizations, communities and individuals.” - C. E. A. Winslow
- **Reclamation** – the process of restoring an area to a more natural state, after pollution, deforestation, or other destruction has made it unusable or toxic. In Mountaintop Removal, reclamation refers to placing the exploded rock and soil (valley spill) formerly dumped into valleys and streams back onto the top of the mountain.
- **Renewable Energy** – energy generated from resources that are naturally replenished, such as wind, sunlight (solar), geothermal heat, tides, and rain.
- **Subsidy** – a form of financial assistance made to a specific business or general economic sector, usually given by the government to prevent an industry from declining or becoming financially unviable.

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• Valley fill – the soil, rock and other materials that are dumped into the valleys, rivers, streams, and other areas surrounding a Mountaintop Removal site; also known as “Holler fill.”

Information:

Mountaintop Removal has received attention in the last decade as a large-scale, systemic environmental justice issue for the people of Eastern Kentucky, West Virginia, and other parts of Appalachia. Whereas underground mining poses significant dangers and health risks to the workers in the mines, Mountaintop Removal affects entire communities surrounding the mine sites. In Mountaintop Removal, an entire mountain summit is deforested and explosive material is used to remove rock and soil at the summit or summit ridge of the mountain to provide access to coal seams. The removed material either falls into or is dumped into neighboring valleys and streams.

Health Risks: Post-explosion, coal dust is sent up into the air and travels for miles, blanketing neighboring communities in a fine powder. Rates of asthma, other pulmonary diseases, and cancer skyrocket in communities within a ten mile radius of these mine sites.4

Environmental Risks: The topsoil removed from the summit of the mountain cannot be replaced. Even if expensive and time-intensive restoration efforts are implemented it will take centuries for the tops of the mountains to regain the biodiversity they once had. The streams and rivers polluted with coal and sediment from these explosions are degraded in quality, and sometimes even blocked off and dried up. People and wildlife downstream that rely on this water are poisoned by coal and other pollutants and become sick or die.5

Economic Impact: Mountaintop Removal is much less labor-intensive than underground mining, and employs less than half the workforce as underground mining (often making it more profitable for the mining companies). Although historically, the Appalachian economy is linked to coal mining and other labor-intensive industries such as logging, much of Appalachia’s present economy is based around tourism. Appalachian tourism is largely nature-based, and the industry is dependent on the beauty of the area’s mountains and streams. Mountaintop Removal’s destruction of the land and water destroys the local tourism industry. Finally, the health and environmental dangers of this practice make Appalachia much less desirable to live in, reducing real estate values by more than 75% in some areas.6

Mountaintop Removal is described as “controversial” by numerous news sources and politicians, because although the negative environmental and health issues associated with it are widely recognized, Mountaintop Removal is deemed the most efficient, cost-effective way of extracting coal from mountains, especially those whose lower coal seams have already

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been extracted. Currently, coal supplies Americans with more than half of their electricity. The United States' current dependence on coal as an energy source continues to make coal extraction a profitable industry, despite its obvious environmental, health and social consequences.

Historically, the highly labor-intensive underground mining method was the most common way for acquiring coal. Before WWII, entire towns - indeed, entire regions - would be employed through the coal industry. Although underground mining was incredibly dangerous for mine workers who were often not treated well by the companies that employed them, Appalachian coal miners developed a strong sense of pride in this difficult job. A rich historical tradition surrounds coal mining in Appalachia. Before the 1930s, the Appalachian Mountains provided more than two-thirds of America’s coal. Mountaintop Removal became a popular practice after WWII, as demand for coal increased and the U.S. developed explosive and mechanical technology that enabled the coal industry to access thinner coal seams closer to the tops of mountains. In Mountaintop Removal, almost all of the labor is completed with explosives and large machinery, and far fewer coal miners are employed – presently, only 2% of the Appalachian workforce.

Why continue to rely on coal when its extraction is so detrimental to the surrounding environment, economy and human health? That is, in and of itself, a controversial issue with many implications for large-scale changes in energy production, regional economies and jobs, and implications for climate change and sustainability. Are the economic benefits to the industry worth the environmental costs? What about when health care costs and other economic factors are accounted for? Can the United States reduce its dependence on coal as an energy source? Appalachians themselves are locked in conflict: is mining and processing coal vital to the Appalachian economy and sense of identity, or is the coal industry's destruction of land, water and air ruining their region?

Resources:
- Johannsen, Kristin (ed). *Missing Mountains: We Went to the Mountaintop but It Wasn't There*
- [http://www.ilovemountains.org/resources/](http://www.ilovemountains.org/resources/).

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**Warm-Up: Map Exercise and Place Orientation**

1. Ask students if they have heard of Appalachia. What is it? Where is it?

2. Pass out Reproducible #1 – Boundaries of Appalachia. Is your school in or near Appalachia? If not, have students ever been to Appalachia, or any of the states that contain part of Appalachia? What was the reason for their trip? What was their experience?

3. Looking at the first map on Reproducible #1, have students estimate how far their school is from Appalachia. If the school is in Appalachia, have students estimate how far they would have to travel to be outside of Appalachia.

4. Can students guess why this region would be differentiated from areas outside of Appalachia? Is there anything unique about the land, the people, or the history within its boundaries that places outside of Appalachia do not have? **Answers will vary, but may include the mountains, Appalachian music, or a history of coal mining. Also note that the strong geographical boundaries (mountains and valleys) have kept this area distinct from much of the surrounding regions.**

**Activity One: Introduction to Mountaintop Removal and Environmental Justice**

1. Play a short video (4:23), or other related videos on this page, as an introduction to Mountaintop Removal: [http://www.youtube.com/watch?v=hgGSUfpJeOQ](http://www.youtube.com/watch?v=hgGSUfpJeOQ)


3. Ensure student comprehension by asking the following questions, discussing the video and Reproducible #2:
   a. Can students recap what they learned about the process of Mountaintop Removal (MTR) from the video and looking at the diagram? **The summit of a mountain is deforested, explosive materials are inserted into the rock layer, and the top of the mountain is literally removed by being blown off. Coal is then mined from the exposed coal seam. The removed rock and soil are then discarded into the neighboring valleys and streams. Sometimes a portion of the material is placed back on top of the mountain.**
   b. What are some other ways of accessing coal that students know of? Have they heard of different types of mining? Why might one type be chosen over...
another? There are many types of traditional, underground coal mining. Tunnels are built to grant access to deep coal seams, well below the summit of the mountain. The coal is removed through the tunnels by mule, elevator shafts, small trains, and other means. In general, underground coal mining is much more dangerous for the mine workers inside the mine shaft, but has much less impact on the environment or surrounding communities.

c. Based on comments from the people in the video or students’ own inferences, how is MTR affecting the local landscape, culture, and lifestyle of the people living near these mountains? The land that is blasted away is plugging up streams, causing erosion, redirecting water supply and causing torrential flooding. The toxins from coal mining end up in the region’s air, water, soil and bodies, affecting people’s and animals’ health. They are also losing value on their properties and income from declining numbers of visiting hikers, naturalists and other tourists. Removing the mountains is removing the landscape the Appalachians know and love and changing the identity of the region.

4. Write the EPA’s definition of environmental justice on the board: “The fair treatment and meaningful involvement of people of all races, cultures, incomes and educational levels with respect to the development and enforcement of environmental laws, regulations, and policies” – Environmental Protection Agency. Are any students familiar with the concept? Have they heard of events or situations that others have referred to as environmental justice issues? Do they know anyone who works for environmental justice?

5. Using the definition on the board, combined with students’ input, ask students to rephrase the definition in their own words.

6. Play the video clip (or a related video) once again, Asking students to jot down their thoughts on how MTR is an environmental justice issues. After the clip is finished, ask students to share their thoughts. Jot the themes they have brainstormed on the board.

Activity Two: Understanding the Issues

1. Assign students to five teams to focus their research on one of the perspectives that dominate the discussion of Mountaintop Removal and coal mining generally.
   a. The Science of Coal and Basics of Mining
   b. The Environment
   c. Public and Community Health
   d. Economics
   e. Culture and Identity

2. In the next class, students will give group presentations of five minutes each. Students will have the remainder of the class period to research, delegate tasks for

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homework, and begin formulating a presentation. They will be given a half hour of
the next class period to finish organizing their presentations. Pass out Reproducible
#3 – Directed Questions for Presentation. This Reproducible gives each team
guiding questions that they must touch on. (Reproducible #4 – Directed Questions
for Presentation – ANSWER KEY has short answers for the teachers’ reference.)

3. After students have had sufficient time to construct their presentations, in class or as
homework, allow class time for student presentations. As each team is presenting,
other students should try to answer the questions on Reproducible #5 – Questions
on the Issue to show what they have learned. After the presentations have been
completed, go over this worksheet together as a class to make sure students have
been able to answer each question based on their research and their peers’
presentations. Use Reproducible #6 – Questions on the Issue – ANSWER KEY as a
guide.

**Activity Three: Implications and Energy Conservation**

1. If needed, tie together the presentations, engaging students in a review of
Mountaintop Removal. Reviewing the important issues from each group’s
presentation.

2. As a class or in small groups, visit [http://www.ilovemountains.org/myconnection/](http://www.ilovemountains.org/myconnection/) to find out if your local power company receives energy from coal companies that
engage in Mountaintop Removal.

3. What was the outcome? (Note: it is likely that the local power company does purchase
at least some of your region’s power from this source).

4. Even if your school is not in or near Appalachia, explain to students that although
this process is occurring elsewhere, people across the country are involved in
Mountaintop Removal simply by using coal-powered electricity. Although it varies by
region, almost half of American energy comes from coal. Students’ electricity use is
directly related to this practice, regardless of whether they support MTR or not.
Every time students turn on a light or charge their phone, they are implicated
indirectly in this process. Having the lights on in this classroom for just one day
requires at least twenty pounds of coal.

5. Have students brainstorm ways of conserving electric energy. What are some ways in
which we can reduce our electricity use to minimize how much we rely on processes
like Mountaintop Removal?

6. Write down the students energy conservation tips on the board. *Answers will vary, but
could include: hanging clothes up to dry, instead of using a dryer; turning off the lights when you
leave a room; unplugging appliances that are not being used; using efficient lightbulbs and appliances,
etc…*
Wrap-Up: What We Learned

With the remaining class time, go over these questions with the class, asking students to volunteer their ideas:

1. What and where is Appalachia? A mountainous region of the eastern United States with a history of coal mining and logging; Appalachia stretches from New York to Mississippi, with its “heartland” in the central and Southern states.

2. How is coal mining important to this region? Historically, coal has been an important energy source in the United States, and much of this resource is found in Appalachia. The people of the area have long been tied to coal mining through location and labor.

3. What is Mountaintop Removal and what are some of its costs and benefits? What are its impacts on human and environmental health? Why is it used? MTR is a type of surface mining in which an area is deforested and rock and soil at the summit or summit ridge of the mountain is removed with explosive material to provide access to buried coal. It is detrimental to the entire mountain, valley, and watershed. In addition, its effects on air and water have major implications for human and ecosystem health. It is used because it is a cheap and effective method of reaching coal, currently a valuable energy resource.

4. Why is Mountaintop Removal considered to be an environmental justice issue? The rivers, streams, and groundwater are polluted by MTR. This means that peoples’ drinking water is affected, and they can get sick. The pollution of the water also means that wildlife reliant on the water sources is affected. Fish either die or become contaminated – fishing is no longer viable in MTR-affected areas. The deforestation of the mountains leads to severe flooding, because the trees and vegetation that used to be on the mountain no longer soak up that water. This can wipe out communities, especially poorer communities, whose homes, roads, and other structures are less likely to be flood-resistant. Post-explosion, coal dust is sent up into the air and travels for miles, blanketing neighboring communities in a fine powder. Rates of asthma, other pulmonary diseases, and cancer skyrocket in communities within a ten mile radius of these mine sites. MTR affects Appalachian employment. First, this process employs fewer people than traditional mining, in an area that is reliant on the coal industry for employment. Second, the damage that is done to the landscape and rivers hurts the natural tourism industry. MTR pits large, profit-driven companies against small towns, local residents and the environment. This is often the case with environmental justice issues, and those communities who are unaware of the issues or are least likely or able to speak up and defend themselves are the ones who deal with the largest consequences in the end. Mountaintop Removal is an environmental justice issue because it damages the environment in a way that disproportionately affects low-income communities. Poorer Appalachians are subjected to breathing in coal dust, drinking polluted water, and having elevated rates of disease and cancer because of MTR.
Extensions:

1. Based on your findings about your school and region’s energy sources, have the class research different energy sources and the costs and benefits of each. Are there energy sources that are more or less detrimental to human and environmental health than coal obtained by Mountaintop Removal. Why are some more widely used than others? How could healthier forms of energy be made more available?

2. Besides reducing their electricity usage, students can also play a role in finding and using new sources of energy. Have a class brainstorm about what they could do to change their region’s energy sources and/or introduce healthier energy forms to their school power company. Have them research if renewable energy is available in their area and how to it can be purchased. Have students start a petition, write a letter, write a newspaper article, or otherwise raise awareness or advocacy for renewable energy that does not depend on fossil fuels or resource extraction.

3. Have students examine the possibility of requesting from the utility provider that the school be powered by alternative or renewable energy sources. If there is extra cost for this service, brainstorm ways to raise money or get sponsored to help with the difference.

4. Mountaintop Removal is a highly controversial subject, and often, the information the coal industry gives diverges widely from the information given by organizations dedicated to stopping the practice. Find a couple of articles/interviews/news clips with contrasting viewpoints and facts. Have students speculate about why the information they are receiving is contradictory. Why do some parties emphasize certain facts or pieces of information while eliminating or obscuring others? Whose argument is most compelling?

CONCLUSION

This lesson introduced students to the Appalachian region and the type of coal mining called Mountaintop Removal (MTR). Students explored MTR’s connection to environmental issues, economic issues, and public health. Students conducted research, worked in groups, and delivered presentations to the class. Finally, students learned how their own energy usage contributes to this problem and came up with ways to reduce their usage of electricity.
The map to the left defines the boundaries of what we call Appalachia. The guide at the bottom is called a scale. Each section designates a total of 500 miles. The whole line is 1500 miles. Using the scale, we can see that Nevada is just less than 500 miles wide, and that the Dakotas stretch about 250-300 miles North and South. [Link to source](briandeutsch.blogspot.com/2008_11_01_archive.html).

The map to the right is a close-up version of the boundaries of Appalachia. The Southern and Central states are considered to be the region’s “heartland.” Coal mining, especially Mountaintop Removal, is most prevalent in Eastern Kentucky and West Virginia, indicated by the star-shape.
The Anatomy of a Coal Mountain and Mining Techniques

Mining Mountains

How mountaintop mining is done and its effects on the environment:

THE PROCESS:
1. Trees are cut and explosives are used to loosen the rock and topsoil.
2. Huge shovels dig into the topsoil, and trucks start hauling it away.
3. A dragline digs into the rock to expose the coal.
4. The draglines and 250-ton trucks dump the topsoil and rock into areas called valley fills.
5. Coal companies are supposed to reclaim land, but native trees have trouble growing on disturbed topsoil.

ADVERSE EFFECTS:

Destruction of forests
When large areas of forests are clear-cut, wildlife habitats are destroyed. Wildlife and plantlife become more vulnerable to predatorial species.

Destruction of streams
In recent years, valley fills have buried or damaged 1,200 miles of streams.

Blasting
Explosions can cause damage to home foundations and walls.

Giant earthmovers
In the last decade, the scale and scope of mountaintop mining has escalated with dragline use. These machines can weigh up to 8 million pounds and stand as tall as a 20-story building. In an 8-hour shift, a dragline operator can move enough soil for 40 million houseplants.

Flooding
The destruction of natural streams by valley fills and the loss of vegetation can cause flooding.

A blasted mountaintop: princetonwaterwatch.wordpress.com/2009/03/.

http://conservationreport.com/2009/06/14/clean-coal-is-a-myth/
Directed Questions for Mountaintop Removal Presentation

Group #1: The Science and Basics of Coal and Mining
1.) What is coal, exactly?
2.) How does it create energy?
3.) How much of America’s electricity comes from coal? How much coal do we mine in the U.S. every year?
4.) How is Mountaintop Removal (MTR) different than traditional underground mining? Can you draw a diagram or picture to show to the class?

Recommended Resource:

Group #2: The Environment
1.) What happens to the mountains, their trees, soil and wildlife living on them? Can they ever be the same again?
2.) What happens to the nearby streams and rivers? How does MTR increase flooding?
3.) How is MTR, and coal mining in general, related to climate change?
4.) What is the waste produced by coal mining and processing? What is in sludge ponds? What happened in Martin County, Kentucky?

Recommended Resource:
• http://www.ilovemountains.org/resources/

Group #3: Public Health
1.) What kinds of health risks does MTR pose to miners and the surrounding communities?
2.) How are the health risks from MTR different than those of traditional underground mining?
3.) How does the pollution of the streams from MTR affect people in Appalachia?
4.) How different are the rates of asthma, cancer, and lung and kidney diseases in Appalachia than the rest of the country?

Recommended Resource:
• http://www.ilovemountains.org/resources/

Group #4: Economics
1.) How much are coal miners paid? Do they have good jobs?
2.) Does MTR employ as many people traditional underground mining? Have Appalachians gained or lost jobs as MTR increases in popularity?

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(P) 202-518-0044 • (F) 202-518-8794
www.earthday.org/education • education@earthday.org
3.) The coal industry receives subsidies from the government. How much? What are subsidies, and what do they do for the industries that receive them?

Recommended Resource:
• “The Impact of Coal on the Kentucky State Budget” from the Mountain Association for Community Economic Development: [http://www.maced.org/coal/mining-employ.htm](http://www.maced.org/coal/mining-employ.htm)

**Group #5: Culture and Identity**

1.) Why is coal mining such a big part of Appalachian history?
2.) Can you give us some examples of how coal mining is a part of Appalachian culture (Music, stories, old pictures)?
3.) Some Appalachians view coal mining as an integral part of their personal identity or the identity of the region. Can you explain their argument?
4.) There are some Appalachians that want to get rid of Mountaintop Removal and move towards other types of economies. Can you summarize their argument?

Recommended Resource:
• The Appalachian Cultural Museum, whom you can contact by going to: [http://www.museum.appstate.edu/index.shtml](http://www.museum.appstate.edu/index.shtml)
Directed Questions for Mountaintop Removal Presentation – ANSWER KEY

The Science and Basics of Coal and Mining
1.) What is coal, exactly? Coal is the remains of plants that lived and died hundreds of millions of years ago, essentially fossilized carbon.
2.) How does it create energy? We burn coal to produce heat, which we then convert into electricity. (The hot coal heats water, creating steam, which turns a turbine in a generator. The generator converts mechanical energy into electricity.)
3.) How much of America’s electricity comes from coal? How much coal do we mine in the U.S. every year? About half of the electricity used in America is produced by coal, about 1 billion tons.
4.) How is MTR different than traditional underground mining? Can you draw a diagram or picture to show to the class? Underground mining involves systems of tunnels underneath the mountain, through which buried coal is brought to the surface. Mines are often closed by filling them with cement. MTR involves the removal of the entire mountain’s summit with explosive material and heavy machinery. The removed rock and soil is sometimes placed back on top, or left in the neighboring valleys.

The Environment
1.) What happens to the mountains, their trees, soil and wildlife living on them? Can they ever be the same again? The mountains are deforested, stripped of all topsoil, and all wildlife is banished from the site. While efforts are made to reclaim the mountains, it will take centuries for them to regain any semblance of the biodiversity they originally had.
2.) What happens to the nearby streams and rivers? How does MTR increase flooding? The soil and rocks that are removed from the mountaintop are dumped into neighboring valleys and streams, polluting them with coal, explosive materials, and other chemicals like lead, arsenic, selenium, and mercury. Sometimes a stream will be dried up. Flooding increases after the mountain is deforested; there are no longer trees and vegetation to capture and soak up the water.
3.) How is MTR, and coal mining in general, related to climate change? When coal is burned, the carbon that makes up its solid form is released into the air in the form of carbon dioxide, the most prevalent greenhouse gas. High levels of carbon in the atmosphere cause global warming and climate change.
4.) What is the waste produced by coal mining and processing? What is in sludge ponds? What happened in Martin County, Kentucky? Before the coal can be transported from the mines, it must be rinsed. The waste liquid contains toxic chemical and coal particles. It is called coal sludge, and it is stored in neighboring valleys, dammed up by rocks and soil that formerly made the top of the mountain. Sometimes these sludge ponds leak or the dam breaks, and the contents enter the soil and watershed. This happened in Martin County, KY in 2000, when a massive amount of sludge rushed into the valley, destroying the wildlife and poisoning the waters all the way out through the Ohio River.

Public Health
1.) What kinds of health risks does MTR pose to miners and the surrounding communities? In additions to the dangers of the blasting and mining, MTR workers and surrounding communities are faced with cancer, asthma, pulmonary diseases from breathing the air. Toxins in the water and soil can also affect nearby residents.

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www.earthday.org/education • education@earthday.org
2.) How are the health risks from MTR different than those of traditional underground mining? The health risks posed by underground mining are limited to the coal miners, working dangerous jobs in the mines. MTR is also dangerous for miners, but affects the surrounding communities, even the entire region.

3.) How does the pollution of the streams from MTR affect people in Appalachia? People rely on those streams for either their direct water source, or to keep the groundwater high. Drinking water polluted with arsenic, lead, mercury, and other chemicals can result in infertility, many different kinds of diseases and cancers, and can even be fatal. Also, any wildlife living in the polluted water is negatively affected, and Appalachians can’t fish anymore.

4.) How different are the rates of asthma, cancer, and lung and kidney diseases in Appalachia than the rest of the country? All of these rates are elevated in the Appalachian region. In Eastern Kentucky and West Virginia, where MTR is the most prevalent, cancer rates are 70% higher than the national average. Even general death rates are notably higher in these areas.

Economics

1.) How much of America’s electricity comes from coal? How much coal do we mine in the U.S. every year? About half of the electricity used in America is produced by coal, about 1 billion tons.

2.) How much are coal miners paid? Do they have good jobs? Historically, Appalachian coal miners have historically been exploited. Today, however, coal miners make a solid middle-class wage – anywhere from $40,000 to $100,000 annually – and most have benefits.

3.) Does MTR employ as many people traditional underground mining? Have Appalachians gained or lost jobs as MTR increases in popularity? In Mountaintop Removal, almost all of the labor is completed with explosives and large machinery, and far fewer coal miners are employed. The coal industry in places like Kentucky reduced their workforce by more than 60% since the 1980s, and the industry overall lost more than 10,000 jobs in the 1990s. As Mountaintop Removal now accounts for more than 30% of the coal mined in most of the Appalachian region, only 2% of the Appalachian workforce is associated with coal mining.

4.) The coal industry receives subsidies from the government. How much? What are subsidies, and what do they do for the industries that receive them? A subsidy is a form of financial assistance given in direct funds or “tax breaks.” It is difficult to track exactly how much an industry receives in subsidies, but the coal industry receives somewhere in the neighborhood of $9 billion a year from the federal government. These subsidies allow the coal industry to remain economically competitive against other types of energy, such as solar, wind, nuclear, or geothermal.

Culture and Identity

1.) Why is coal mining such a big part of Appalachian history? Appalachia used to produce two-thirds of the nation’s coal, and oftentimes entire countries were employed by the coal industry.

2.) Can you give us some examples of how coal mining is a part of Appalachian culture? Music, stories, old pictures, family income and traditions.

3.) Some Appalachians view coal mining as an integral part of their personal identity or the identity of the region. Can you explain their argument? For many, coal mining is not simply an occupation; it’s a family tradition. Others believe that their work is an...
expression of patriotism; they believe that America would not be able to fulfill its energy needs without Appalachian coal mining.

4.) There are some Appalachians that want to get rid of Mountaintop Removal and move towards other types of economies. Can you summarize their argument? Many Appalachians and their communities are suffering from diseases wrought by coal mining, especially MTR. Others see that increased mechanization has led to huge job losses. Others view the Appalachian mountains as beautiful, and integral to their identity, and do not like that MTR is destroying the land.
Questions on Mountaintop Removal Issues

Name: __________________

Drawing information from your peers’ presentations, your own research, and the movie clip you saw, answer these questions below:

1.) What percentage of America’s energy is produced through coal? How much coal is mined in the U.S. every year?

2.) Name three ways in which MTR is an environmental issue:

3.) How does MTR affect the economy in Appalachian community? How does it affect jobs?

4.) Why is coal mining a big part of Appalachians’ history?

The Environmental Protection Agency defines environmental justice as: “The fair treatment and meaningful involvement of people of all races, cultures, incomes and educational levels with respect to the development and enforcement of environmental laws, regulations, and policies” – An environmental justice issue, therefore, is a situation, an event, or a practice that violates this.

Using this definition and what you’ve learned, can you use three examples to explain how Mountaintop Removal is an environmental justice issue?
Questions on Mountaintop Removal Issues: ANSWER KEY

Drawing information from your peers' presentations, your own research, and the movie clip you saw, jot answer these questions below:

1.) What percentage of America’s energy is produced through coal? How much coal is mined in the U.S. every year?
   Approximately half; one billion tons

2.) Name three ways in which MTR is an environmental issue
   • Because MTR, by definition, involves the removal of the entire mountain’s summit, it permanently alters the natural landscape.
   • The removed rock and soil or “valley fill,” pollutes neighboring streams.
   • Deforestation of the mountain
   • Coal mining in general is an energy-intensive process, and the burning of fossil fuels contributes to climate change.
   • The topsoil removed from the summit of the mountain cannot be replaced. Even if expensive and time-intensive restoration efforts are implemented it will take centuries for these mountains to regain the biodiversity they once had

4.) How does MTR affect the economy in Appalachian community? How does it affect jobs?
   In Mountaintop Removal, almost all of the labor is completed with explosives and large machinery, and far fewer coal miners are employed. The coal industry in places like Kentucky reduced their workforce by more than 60% since the 1980s, and the industry overall lost more than 10,000 jobs in the 1990s. As Mountaintop Removal now accounts for more than 30% of the coal mined in most of the Appalachian region, only 2% of the Appalachian workforce is associated with coal mining. Because MTR, and coal mining in general, is subsidized by the federal and local governments, this makes other types of industries less viable in terms of economic competition. This hurts other sectors in the Appalachian area, especially alternative energy.

4.) Why is coal mining a big part of Appalachians’ history?
   Appalachia used to produce two-thirds of the nation’s coal, and oftentimes entire counties were employed by the coal industry. For many, coal mining is not simply an occupation; it’s a family tradition. Others believe that coal mining is an expression of patriotism; they believe that America would not be able to fulfill its energy needs without Appalachian coal mining. Others view the Appalachian mountains as beautiful, and integral to their identity, and do not like that MTR is destroying the land.

The Environmental Protection Agency defines environmental justice as: “The fair treatment and meaningful involvement of people of all races, cultures, incomes and educational levels with respect to the development and enforcement of environmental laws, regulations, and policies” –An environmental justice issue, therefore, is a situation, an event, or a practice that violates this.
Using this definition and what you’ve learned, can you use three examples to explain how Mountaintop Removal is an environmental justice issue?

- The rivers, streams, and groundwater are polluted by MTR. This means that peoples’ drinking water is affected, and they can get sick.

- The pollution of the water also means that wildlife reliant on the water sources is affected. Fish either die or become contaminated – fishing is no longer viable in MTR-affected areas.

- The deforestation of the mountains leads to severe flooding, because the trees and vegetation that used to be on the mountain no longer soak up that water. This can wipe out communities, especially poorer communities, whose homes, roads, and other structures are less likely to be flood-resistant.

- Post-explosion, coal dust is sent up into the air and travels for miles, blanketing neighboring communities in a fine powder. Rates of asthma, other pulmonary diseases, and cancer skyrocket in communities within a ten mile radius of these mine sites.

- MTR affects Appalachian employment. First, this process employs fewer people than traditional mining, in an area that is reliant on the coal industry for employment. Second, the damage that is done to the landscape and rivers hurts the natural tourism industry.

- MTR pits large, profit-driven companies against small towns, local residents and the environment. This is often the case with environmental justice issues, and those communities who are unaware of the issues or are least likely or able to speak up and defend themselves are the ones who deal with the largest consequences in the end.

- Mountaintop Removal is an environmental justice issue because it damages the environment in a way that disproportionately affects low-income communities. Poorer Appalachians are subjected to breathing in coal dust, drinking polluted water, and having elevated rates of disease and cancer because of MTR.