Overall Objectives and Learning Outcomes:

- Analyze issues surrounding transportation needs in the community.
- Identify the need for sustainable transportation in the light of current dependency on fossil fuels.
- Become more aware of personal responsibility to societal needs and environmental resources.
- Gain some understanding of the science and technology behind current and future modes of transportation. Understand what gains have been made in these areas and relate them to everyday living.
- Understand what it means to be an active citizen.

Skills Used, Developed and Assessed:

- Critical Reading: Students will read passages and answer questions.
- Logical Reasoning with Charts: Students will complete and interpret charts to determine best alternative(s).
- Problem Solving: Students will evaluate current problems and explore possible solutions.
- Critical Thinking: Students will be strongly encouraged to come up with new ideas and compare and contrast alternatives to determine the best choice(s).
- Research Documentation: Students will maintain the workbook and summarize findings.
- Presentation and Public Speaking: Students will present their ideas, research and opinions.
- Group Work: Students will work in groups to complete assignments and/or worksheets.
- Social Activism: Students may write letters based on what they have learned and propose solutions to problems they identify.
What do you know about transportation?

Description: This lesson is designed to help the students become aware of all the different forms of transportation. Students will focus on why transportation is needed, the different modes of transportation and the various methods of propulsion.

Lesson Time: One class period

Goals and Objectives: Have students recognize all the ways to get from one place to another. After completing this lesson, students will have a broad understanding of the importance of transportation and how it impacts their lives both directly and indirectly.

Student Activity: During this lesson, students will complete several lists in their student workbook, participate in small group or class brainstorming and class discussion.

Materials: Student Workbook

Instructional Activity: The teacher may start the brainstorming session by writing these questions on the board:

- Why do people need transportation?
- What are the different modes of transportation?
- What are the different methods of transportation?

As students respond, they will compile lists with direction from the teacher. It may be best to focus on one question at a time. The teacher may guide students to consider transportation issues that the students might not think of.

- For example, how the U.S. Postal Service utilizes transportation, as well as how shipping companies, grocery stores and the military use transportation. Also consider transportation systems of the past and unusual transportation methods and modes such as trams, pedal planes, and electric cars. Have students consider all the different modes of public transportation such as light rail, buses, subways and so on.
Part I
Worksheet 1

- After the three lists are compiled have students link the different reasons for using transportation with the various modes and methods of transportation. Teachers can help illustrate these relationships by drawing lines connecting the various related reasons, modes and methods. See completed worksheet below.

**Assessment:** Ask the students or small groups the different forms of transportation and evaluate student worksheets.

**Example of Completed Worksheet**

<table>
<thead>
<tr>
<th>Why we use transportation</th>
<th>Modes of Transportation</th>
<th>Methods of Transportation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get to school</td>
<td>Cars</td>
<td>Gasoline</td>
</tr>
<tr>
<td>Get to work</td>
<td>Light Rail Transit</td>
<td>Diesel</td>
</tr>
<tr>
<td>Vacations</td>
<td>Train</td>
<td>Jet Fuel</td>
</tr>
<tr>
<td>Shopping</td>
<td>Ship</td>
<td>Solar Energy</td>
</tr>
<tr>
<td>Get our mail</td>
<td>Airlines</td>
<td>Electricity</td>
</tr>
<tr>
<td>Visit</td>
<td>Trucks</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>Emergencies</td>
<td>Boat</td>
<td>Methanol</td>
</tr>
<tr>
<td></td>
<td>Bicycle</td>
<td>Calories</td>
</tr>
</tbody>
</table>
Transportation History: News and Dates

**Description:** This lesson is designed to develop students’ awareness of social, environmental and economic costs of our transportation system’s dependence on fossil fuels.

**Objectives and Goals:** Increase student awareness of the social, environmental and economic costs of our dependence on fossil fuel. Help students recognize the need for the development of transportation technology that reduces these costs. Students will analyze information and infer winners and losers in our society’s reliance on fossil fuel. Students should understand that the automobile is part of culture.

**Time Frame:** One-two class periods

**Student Activity:** During this lesson students will read the events aloud and create a timeline for the five events they feel are most important. Students should be encouraged to look at the economic, social and environmental costs of the event.

Student can complete the timeline at home or in class. After students complete the timeline, have them write a sentence or two about why they feel the events they selected are important.

**Materials:** Student workbook

**Teacher Support Facts:** The teacher may find it useful to begin the discussion by asking how many students have ridden in a car. How many times? 100? 1,000? 10,000? More? The following can also be asked: Do you want to have a car? Do you think your parents would give up their car?

The following facts illustrate the automobile as central the American Culture may also be interesting to share with students:

- According to a poll done in the 1960’s 40% of all marriage proposals occurred in automobiles.
• The 1960’s was an era of drive-in and drive-ups, not only food and movies: the first drive-in church opens in San Bernardino, California; Texas offers drive up registration for college students and ninety percent of Americans take vacations by car.

• Things haven’t changed too much, in 2001 a radio poll showed that more than 30% of men buy presents for their cars on Valentines Day!

• When the automobile was first introduced in the early 1900’s, people thought it would make our environment cleaner and transportation easier. After all, there would be no more horse manure to step in and fewer people would ride streetcars. People thought that having a car would mean freedom to go where you wanted when you want to. Today, nearly one hundred years later, we are faced with many problems created by the fact that so many people own automobiles. Having our own cars does give us freedom; we can come and go as we like. But have you ever been stuck in traffic, seen smog, or heard an adult talk about gas prices? Have you ever run out of gas? There are all kinds of costs associated with the automobile.

**Instructional Activity:** Ask students to begin reading the events listed in the workbook. After each event is read aloud, ask students who benefited and what the costs or problems that may have developed due to that event. No prior knowledge is required; students should be encouraged to infer the different answers based on the reading or their knowledge. You may want to have the students record comments in space provided adjacent to the events whether the event represents economic, social, environmental costs or advances in technology —many may address all of these issues.

Or

Divide students into small groups and allow each group to select the five events that the groups feels are most important. Have the groups present their findings to the class. Is there an event that all groups selected? Use this event as a take off point for an in depth class discussion.

**Assessment:** Participation in class discussion and completion of worksheet.
Worksheet 2

Your Transportation History Timeline

In the space provided below, select five transportation events and create your own timeline based on the readings in the workbook and other sources. After you have created your timeline, write a sentence or two on each event you selected.

<table>
<thead>
<tr>
<th>Date Event</th>
<th>Why is it important?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Answers will vary. As long as students give reasonable explanation, any answers are acceptable.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6
Transportation History: News and Dates

After each event comments have been included to assist you in guiding the discussion. Consider the comments a starting point, you may or may not decide to use them.

January 2, 1900 -- The first electric bus appeared on 5th Avenue in New York City. It seated 8 people inside and 4 outside. The fare was 5 -cents. (Social Benefit: People don't have to take cabs or own their own means of transportation to get to work. Economic costs: government pays for mass transit systems)

January 9, 1862 -- The "Elizabeth Watts," a 224-ton ship captained by Charles Bryant, carried 1,329 barrels of oil. The crew was shanghaied because since most sailors would not work above a cargo of oil for fear of fire and explosions. (What does this mean to the men who where shanghaied to sail on the ship? How do you think their families felt? Would you like to be one of the men on this ship?)

January 28, 1969 -- An oil well blew out on a Union Oil Company drilling platform five miles off the coast of Santa Barbara, CA. The beaches were covered with oil. (Takes away the beauty of our coastline, birds and animals are impacted)

March 24, 1989 -- the Exxon Valdez oil tanker ran aground in the Prince William Sound off Alaska, spilling 232,000 barrels of oil. The effects of the incident are not really known, but it is known that the only 25% of the migratory salmon population returned to the area the following season, thousands of otters and birds were poisoned and many died. (Environmental costs; economic cost, the majority of spill clean-up was paid for out of a “Super Fund” which companies in industry pay into.)

March 29, 1927 -- The first automobile to exceed 200 mph was the "Mystery Sunbeam" driven by Major Henry O'Neil de Hane Segrave at Daytona Beach, Fla., He achieved 203.7 9 mph. (Social Benefit: people can drive fast in car races instead of on the roads; entertainment for people. Social Cost: People become fascinated with cars that have bigger engines and can go fast. Environmental Cost: Bigger engines use more fuel and create more pollution)

April 7, 1913 --The first electrically propelled ship of the U.S. Navy, the U.S.S. Jupiter, was commissioned. (Environmental Cost: At the this time this ship was built electricity was often created by burning coal, which causes a lot of pollution; still the technology had environmental benefits for the future, today we are able to create energy using cleaner methods;
May 3, 1869 -- Passenger traffic began on the first pneumatic subway invented by Alfred Ely Beach. The Beach Pneumatic Underground Railway of New York City consisted of a 312 foot-long circular tube, 9 feet in diameter. The cars carried 22 passengers and were propelled by a blast of air from a rotary blower. (Social benefit: More mass transit, creates more mobility for people; Economic Costs: Government pays)

June 10, 1999 -- Three killed, including two 10-year-old boys when a gasoline pipeline exploded in Bellingham, Washington.

June 27, 1652 -- The first traffic law is passed in New Amsterdam (New York City). Law says "...in order to prevent accident (we) do hereby ordain that no Wagons, Carts or Sleighs shall be run, rode or driven at a gallop within this city of New Amsterdam, ... on the penalty of two pounds Flemish for the first (violation)..." (Because so many people are on the road police and laws are needed to control them. What would happen if more people used mass transit? Do you think we would need fewer police if we had smart cars and transit systems?)

June 28, 1979 -- OPEC raised prices on crude oil again. The price of a barrel increased 50% since a year earlier. (Who pays when oil prices go up? Who makes the money?)

July 15, 1979 -- President Jimmy Carter announced a massive six-point effort to reduce American dependence on foreign oil. Effort included alternative energy development. (Why do you think President Carter did this? See above.)

September 3, 1931 -- An experimental electric passenger train designed by Thomas Alva Edison was used on the Lackawanna Railroad between Hoboken and Montclair, N.J. (More people could travel so the cost per person was less.)

September 14, 1924 -- Monterey Pipeline exploded. Two people were killed and many more were injured. Thousands of gallons of flaming oil moved across the surface of Monterey Bay.

September 29, 1990 -- The California Air Resources Board adopted the Zero Emission Vehicle (ZEV) mandate that required that two percent of vehicles offered for sale in California in 1998 (rising to five percent in 2001 and 10 percent in 2003) must have no exhaust emissions. The ARB changed that mandate March 28, 1996 and adopted a voluntary phase-in of ZEVs but kept the 10 percent mandate in 2003. (What is good about this? What are the economic costs --government mandate?)
October 27, 1904 -- The New York City Subway was the first rapid transit underground and underwater railway in the world to begin operating. It ran from City Hall to West 145th Street. Approximately 111,881 people paid 5¢ each to ride for 26 minutes on the express train and 46 minutes on the local train.

December 31, 1973 -- President Nixon announced stand-by gasoline rationing in light of the Arab oil embargo. Gasoline stations had already begun voluntarily closing on Sundays.

Part I
Lesson Three

Current Issues

Description: This lesson is intended to assist students in thinking critically about the problems associated with our reliance on fossil fuels. Students are introduced to the concept of acid rain.

Time Frame: One class period for discussion and answering questions.

Goals: Recognize that acid rain is a consequence of our dependence on fossil fuels. Be able to summarize broad social, economic, and environmental costs associated with this dependence. Understand what acid rain is, what it does and how it is formed.

Student Activity: During this lesson students will answer questions in the workbook and participate in class discussion.

Materials: Student workbook.

Instructional Activity: Have students read pages seven and eight. The optional acid rain experiment requires chalk and vinegar and might help the students understand acid rain damage more fully. The teacher can lead a discussion that recalls various economic, environmental and social costs on the News and Dates section. Teachers may want to look at the completed worksheet to guide the discussion. The following might also be useful to the teacher in guiding the discussion:

When experts in transportation consider transportation alternative s they use the “Three E’s” Economic, Environment and Equity to help them evaluate options. Introducing this concept now will assist in later discussions and in the capstone lesson.
Environment refers to the impact the system has on the environment. Does it use fuels that are clean? Does the production of fuels impact the environment in other ways?

Equity refers to the system’s ability to address the needs of people. Does it serve the needs of many people? Is it available to all people or only certain classes of people?

Economic: Does the system create dependencies on foreign fuel sources? Does it require extensive/expensive government regulation?

**Assessment:** Participation in discussion and completion of workbook questions.

Part I
Worksheet 3

**Problems with Fossil Fuel**

Based on your discussions and previous reading, identify and explain five problems that are associated with using fossil fuel for transportation.

Answers will vary. They may include some of the following:

Social Costs: If this was brought up during class discussion—Creation of have and have nots—the very rich and poor in many OPEC participating countries, the Gulf War, the expense of cars—not everyone can afford them, pipelines explode and kill people; people shanghaied to work on ships; dangers to coal miners.

Technology: Unable to deal with fumes from gasoline or to clean up fuel spills fully. New technology is developed slowly because we are “comfortable” with the ease and convenience of using fossil fuels.

Economic Issues: Cost of Gas. Not everyone can afford a car. Limited supply of resources and inability to control prices; embargoes, creation of very rich and poor (OPEC provides a good example of this) costs to taxpayers for the government to regulate automotive, oil industries and pollution.
Transportation Energy Sources and Fuels

Description: This lesson is intended to make the students aware of some of the different energy sources and fuels. Although not all sources are listed, there are enough options for student to gain a comprehensive understanding of the various fuel sources.

Time Frame: One-two class periods for reading and answering questions and completing two charts. Parts of the lesson can easily be assigned as homework and discussed in class more fully.

Objective & Goals: Recognize different energy sources. Associate everyday energy use with the original sources. Explain what makes a fuel source renewable or non-renewable. Students should be able to compare and contrast the pros and cons of various fuel sources. They should be encouraged to incorporate social, economic and environmental costs associated with the different fuels.

Student Activity: During this lesson students answer questions and complete charts in the workbook.

Materials: Student workbook

Instructional Activity: Read section on alternative fuels (pages 10 – 15 in student workbook). Lead class discussion using information provided in the student workbook and completed worksheets in this guide. Worksheets can be completed as a class, in pairs or small groups. If the worksheets are completed in pairs or groups, results can be compared as a class.

- Many local governments have electric cars — teachers can call their city manager’s office and perhaps arrange to have one driven out to the school. Car dealerships also sell electric cars.

Assessment: Participation in discussion and completion of worksheets.
Assess what you have learned by answering the following questions:

1. Can you name five renewable energy sources?
   
   *Answers will vary. Geothermal, solar, wind, food, fuel cells, lighting, calories*

2. Can you name three ways we produce electricity from renewable energy sources?
   
   *Answers will vary. Look for students to support choices with facts. Wind energy turns turbines to generate power; biomass fuels are heated to create ethanol or create gas through anaerobic digestion; solar creates heat that moves the electrons in the photovoltaic cell to create electricity; geothermal uses hot water to create steam to turn turbines.*

3. Can you name three non-renewable energy sources?
   
   *Answers could include uranium, coal, gas, oil, and jet or diesel fuels.*

4. Why do you think we use non-renewable fuel sources?
   
   *Answers will vary. Students may need help with this question. Power plants that use renewable resources are more expensive to build than those that run on fossil fuels. Oil and gas are readily available. Most cars run on gas (equipped with combustion engines). People make money selling oil and gas — if we use power from the sun no one makes money on the raw energy source.*

5. What types of fuels are made from biomass?
   
   *Ethanol or Methane*
Part I
Worksheet 5

Evaluating Fuel Sources

Below is a table you are to fill out. Down the side of the table fill out all the different types of fuels and energy sources that you know about. Evaluate each fuel source against the criteria listed on the top. You can use a three-point scale with 1 being the worst and 3 the best. These answers are subjective. Teachers may find it useful to create the list of fuels first then allow students to choose “best and worse” in each area. After the best and worst have been determined students can fill in those sources that fall in between. Students can add up the numbers for each fuel source to help them determine overall best and worst. The highest number is the best and the lowest is the worst.

<table>
<thead>
<tr>
<th>Fuel Source Evaluation Table</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Coal</td>
</tr>
<tr>
<td>Geothermal (Electricity)</td>
</tr>
<tr>
<td>Biomass (Electricity)</td>
</tr>
<tr>
<td>Fuel Cells</td>
</tr>
<tr>
<td>Calories (food)</td>
</tr>
<tr>
<td>Solar (Electricity)</td>
</tr>
<tr>
<td>Methane (Natural Gas or Biomass)</td>
</tr>
<tr>
<td>Ethanol</td>
</tr>
<tr>
<td>Gas</td>
</tr>
<tr>
<td>Uranium</td>
</tr>
<tr>
<td>Lightning</td>
</tr>
</tbody>
</table>
Evaluating Transportation Modes

This table is similar to the first only this time write down all the different transportation modes you know. Evaluate each transportation mode with the same three -point scale.

This assignment is also subjective. It may be useful to complete the chart by having students list the modes first —you may want to have them include the method for the mode they are suggesting so it can be more fully analyzed —and then have the students select the best and worst modes (can be more then one) for the different categories. After the matrix is completed, the teacher may want to have students add up values for each mode to help them to rank from best to worst.

<table>
<thead>
<tr>
<th>Transportation Evaluation Table</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Speed</strong></td>
</tr>
<tr>
<td>Bus (Gas)</td>
</tr>
<tr>
<td>Bus (Fuel Cell)</td>
</tr>
<tr>
<td>Car/Van Pool (Gas)</td>
</tr>
<tr>
<td>Bike</td>
</tr>
<tr>
<td>Commercial Plane or jet.</td>
</tr>
<tr>
<td>Personal Electric Car (Solar Self contained)</td>
</tr>
<tr>
<td>Subway (Electricity Generated from coal)</td>
</tr>
</tbody>
</table>
Sustainable Transportation

Description: This lesson is the capstone of the module. The concepts covered in this lesson address the issues that the students project or research should address. The lesson requires students to bring together to previous lessons and think critically about the many choices, benefits and costs associated with sustainable transportation. In this lesson students will be introduced to the definition of sustainable transportation.

Time Frame: One Class period

Goals: Analyze, compare and contrast the various options and characteristics of sustainable transportation. Understand the definition of sustainable transportation.

Student Activity: Students will complete two charts that analyze the options and characteristics of sustainable transportation.

Materials: Student workbook

Instructional Activity: Read page 18 in the student workbook. Students should be encouraged to draw on the knowledge previously learned about transportation and creatively apply it to their perceptions of sustainable transportation. The teacher may find it useful to look at the completed worksheets on pages 16 and 17 in this guide to guide the discussion or to develop a different approach to this final capstone lesson.

Assessment: Completion of worksheets and participation in class discussion.
## Characteristics of Sustainable Transportation

Use the worksheet below to identify and explain six desirable characteristics of sustainable transportation. **Answers will vary, but should tie into the sustainable transportation definition.**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Why is it Desirable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast</td>
<td>So that people will want to use it and can be used for many purposes, like emergencies or going to school and work. It should be faster than driving so people will be encouraged to use it.</td>
</tr>
<tr>
<td>Convenient</td>
<td>So that people will be able to go when and where they want. Mass transit should be convenient to homes and business so people don’t have to walk long distances. Some people can’t walk and sometimes the weather is bad.</td>
</tr>
<tr>
<td>Efficient</td>
<td>So that it doesn’t use too much fuel and uses some renewable fuel sources. This could also mean that the system is faster than a driving in traffic in a car.</td>
</tr>
<tr>
<td>Non-polluting and cares for the earth</td>
<td>So that we can have clean air to breathe and don’t leave future generations with pollution, messy clean-ups or disposal problems.</td>
</tr>
<tr>
<td>Fair/ affordable</td>
<td>So people who need transportation will have access to it and many people can afford to get where they need to go.</td>
</tr>
<tr>
<td>Safe for people and animals.</td>
<td>So that consumers and employees don’t get hurt using or working around the system or the fuel required to operate it. If it is a mass transit or high-speed system it must have fences or barriers so that animals and people don’t get hurt or killed by the people carriers</td>
</tr>
</tbody>
</table>
Assessing Sustainable Transportation Options

Write down four sustainable transportation modes and determine several positive and negative attributes for each mode. **Encourage students to think creatively and critically.** They should specify both a mode and method. Students don’t have to list systems they know and should be encouraged to think of new transportation configurations. The teacher may want to remind students of earlier discussions to support their thinking.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Positive Attributes</th>
<th>Negative Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass transit system</td>
<td>Non-polluting, many people can ride them, very efficient, cheap. Once power plants are built, fuel will be cheap. It keeps many animals and people safe from being hit by the people carriers.</td>
<td>Generally not as fast and convenient as your own car. Technology is not yet widely available, renewable energy power plants are expensive to build. Doesn’t provide emergency transportation. It is expensive to dig the tunnels for the people carriers.</td>
</tr>
<tr>
<td>Mass transit system</td>
<td>We have the technology, many people can ride them, and they are efficient and relatively cheap—compared to owning your own car. Systems that run on both fossil and renewable fuel reduce dependence on fossil fuels.</td>
<td>Generally not as fast and convenient as your own car. Renewable energy power plants are expensive to build. Still some dependence on fossil fuels.</td>
</tr>
<tr>
<td>Commuter Air Planes</td>
<td>Very fast, could be less expensive than private planes, no traffic jams. Technology is available.</td>
<td>Very expensive, most people couldn’t afford to travel this way. Uses a lot of fossil fuel. Many airports are not big enough to support this.</td>
</tr>
<tr>
<td>Express Electric Overhead Tram System</td>
<td>Could be fun at first. Some people would like the views, does not contribute to traffic jams, could be faster than your own car. Might work well in certain kinds of small communities.</td>
<td>Might not look good if we had many of these. Trams might have to be small and hold only a few people so they wouldn’t be that efficient. Wires might interfere with planes or birds.</td>
</tr>
</tbody>
</table>
Optional Social Activism Lesson

Good News in Sustainable Transportation

Description: This lesson is intended to raise student awareness of different methods of sustainable transportation that are used in business and illustrate that some companies are utilizing sustainable transportation.

Time Frame: One class period for writing letters. This lesson could easily be assigned as homework, perhaps with parent involvement and then discussed in class after students have completed letters.

Objective & Goals: Help student recognize themselves as active citizens who are aware of and interested in the future. Students will support (through letters) organizations who utilize sustainable transportation or share technology and information with other organizations that student feel may benefit.

Student Activity: During this lesson students draft a letter.

Materials: Completed student workbook for reference and newspaper articles from the teacher’s guide or other sources.

Instructional Activity: Discuss what an active citizen is and why it is important. Encourage students to revisit the completed workbook section on modes and make additional links with the new information. Students should be encouraged to use supporting facts that they have learned from prior lessons and the article(s). Letters could be proofed/edited in groups or by the teacher.

Assessment: Can be class discussion and/or completion of letter. Students could be graded on their use of supporting facts that they have learned from prior lessons, articles and class or group discussion.
Optional Social Activism Lesson

Pipeline Perils: Real World Problem Solving

Description: This is a Critical Reading Assignment. Students are presented with two articles; the first article looks at pipeline legislation and the second looks at the feelings of a community members who are faced with the possibility of having a pipeline installed in their community.

Time Frame: One to two class periods or combination of homework and class time.

Objective & Goals: Students are to read the articles and determine what the main issues are on each side of the argument. Students should explain and justify why we need pipelines now and how certain sustainable transportation systems could reduce these needs.

Student Activity: After students have completed the articles, they write letters. Have students choose to whom they want to mail the letter to (for example state or federal legislators, senators or President, Department of Energy and etc.) Students should be encouraged to use information they have learned from previous lessons and propose solutions in their letters based on what they have learned about sustainable transportation.

Materials: Student Workbook and copies of articles from the Teacher’s Guide.

Instructional Activity: The articles can either be read aloud in class or assigned as homework. Articles and letters could be discussed in class. Students can write a single letter as a class, divide into groups or write the letters individually. Letters could be proofed and edited in groups or by the teacher.

Assessment: Class discussion, completed letter and/or student presentation of his/her letter to classmates.
New Pipeline Legislation Aims to Prevent Disaster and Improve Accountability

Adapted from April 11, 1999 Article in Environment News Service by Cat Lazaroff

Vice President Gore’s Pipeline Safety Act Addresses Many Vital Issues

On April 11, 2000 Vice President Al Gore proposed the Pipeline Safety and Community Protection Act of 2000. Vice President Gore explained that “Pipelines criss-cross our country, carrying the fuel that powers our homes, our cars, and our factories. These pipelines are vital to our economy, but without adequate safeguards, they can pose a serious threat to our families and to our environment.”

Currently, 200,000 miles of pipelines criss-cross the United States and carry nearly 65 percent of the petroleum and most natural gas transported in the United States. According to Vice President Gore, “Our proposed legislation will establish strong comprehensive pipeline safety measures, backed by rigorous enforcement, and the best technology available. It also guarantees every community’s right to know where these pipelines are and how well they are maintained.”

Contents of the Pipeline Safety Act of 2000

Under this new legislation, the U.S. Department of Transportation will be able to:

- Increase safety measures for pipelines in populated and environmentally sensitive areas
- Increase penalties for companies who violate safety measures
- Expand research to develop better tools to inspect pipelines.

The proposed legislation will require the following:

- Pipeline operators are supposed to establish comprehensive inspection and repair programs to prevent, and reduce the impact of, pipeline failures.
- Inspection programs must be in place within one year in highly populated areas and in places where a pipeline leaks could contaminate drinking water sources or other environmentally sensitive areas.
- Provides for additional research to improve and develop innovative pipeline inspection tools such as “smart pigs” which are camera like devices that move along inside a pipeline and allow operators to detect damage.
- Increase the penalties for pipeline company violations to help ensure that pipeline companies perform necessary testing and repairs and keep the pipelines in good working order.
- Allows citizens to sue oil pipeline companies for violations.

Environmental Engineer Speaks Out and Points Out Failures

Lois Epstein, an Environmental Defense engineer, spoke at the conference about a “The Maryland spill follows several major oil pipeline ruptures this year that have had enormous environmental consequences: 500,000 gallons of crude spilled in Kentucky in January, which may migrate underground to the Kentucky River. Two hundred thousand gallons of crude spilled into the John Heinz National Wildlife Refuge near Philadelphia, Pennsylvania, in February; and 600,000 gallons of gasoline spilled into a lake supplying nearly one-third of Dallas, Texas’ drinking water in March.

Oil pipelines are highly under-regulated according to the National Transportation Safety Board, and current law prohibits states from exceeding federal requirements for interstate pipelines,” said Epstein. “Industry knows how to prevent and detect pipeline leaks, and many pipeline companies are doing
just that. The law needs to ensure that all pipeline companies are taking these measures to protect public safety and the environment."

The Department of Transportation (DOT) oversees the pipeline safety program that creates safety regulations for pipelines and penalizes pipeline companies whose operations fail to meet government safety standards.

The air. "We have to determine what's financially feasible in the market so we can maintain our edge and do something for the environment at the same time," says the company's fleet supervisor Mike Moynihan. "We feel it is the right thing to do as a good corporate citizen. We don't lose anything by it and in the long run it pays for itself," he adds, noting that the conversion means reduced fuel costs and a 25% longer engine life.

Alternative Vehicles Around the World
Adapted from June 1999 Article in Mother Earth News by Molly Miller

Alternative Fuel Vehicles Look Like Regular Cars

In the United States, there are over 330,000 Alternative Fuel Vehicles on the road. You may have seen an Alternative Fuel Vehicle (AFV) and not know it, without stickers advertising their use of alternative fuels these vehicles often look like fossil fuel powered vehicles. Often, the only way to tell if a vehicle is running on alternative fuels is to see them refueling or see the diamond sticker on the rear of the car.

Innovation in Other Countries
The German Postal fleet is converting delivery vehicles to hybrid electric fuel systems. Because Germany is so much smaller that the U.S. the present technology will work there. In the U.S., where mail is shipped over greater distances applying this technology is more difficult.

Rather then using electric vehicles, some shipping companies may consider converting diesel fuel engines to a cleaner burning natural gas engine. Caterpillar has begun manufacturing and supplying some trucking fleets with kits to convert Caterpillar C10 or C12 tractor-trailer engines from diesel to liquefied natural gas engines. The clean-burning fuel is 90% natural gas and 10% diesel.

A Good Corporate Citizen
In San Antonio Texas, HEB a grocery store chain that distributes in south Texas, Mexico and Louisiana has converted 18 of its tractor-trailers and hopes to convert its complete Houston fleet of 61 vehicles to natural gas. Already, the converted fleet prevents 74,000 pounds of particulates a year from going into the air. "We have to determine what's financially feasible in the market so we can maintain our edge and do something for the environment at the same time," says the company's fleet supervisor Mike Moynihan. "We feel it is the right thing to do as a good corporate citizen. We don't lose anything by it and in the long run it pays for itself," he adds, noting that the conversion means reduced fuel costs and a 25% longer engine life.

UPS Changes Its Colors From Brown to Green in Bold Test
United Parcel Service (UPS) has three liquefied, and 915 compressed, natural gas vehicles in operation in the U.S. The huge shipping company began testing its first hybrid electric vehicle (EV) in the summer of 1998. The pilot study will continue for two years, at that time UPS will decide if EVs will make their way permanently into the UPS fleet.

Not Only Cars and Trucks Run On Alternative Fuels
In the US there are hundreds of thousands of non-road AFVs. While forklifts and golf carts make up the bulk of these vehicles, many mass transit systems use electric light rail trains are common in many communities, as are bio-diesel buses. Alternative fuel is nothing
new to farmers who have been using by propane powered equipment for decades. The same goes for ice rinks that use natural gas, propane, and electric Zambonis to resurface their ice rinks.
Citizens Angry Over Proposed Oil Pipeline
Adapted from April 1999 article in The Oregonian by Peter Sleeth

Angry Residents Make Their Case
Not many communities want pipelines in their backyards. In East King County residents protest a proposal for a 230-mile pipeline from Bothell over Snoqualmie Pass to the Tri-Cities, in Washington state. The angry residents teamed up with environmental groups to urge the U.S. Army Corps of Engineers to deny a key permit requested by Olympic Pipeline of Renton.

Opponents of the pipeline assert that the pipelines will leak and damage the environment and jeopardize salmon runs in streams and rivers. These groups say that the pipeline will traverse several hundred streams and almost one hundred acres of wetlands and that a leak in any one of these areas could hurt the environment by poisoning miles of the salmon’s homes.

Citizens Speak Out
Most of the arguments came from people who lived near the proposed pipeline, Mark Lewis, a homeowner who lives in River Bend Community was outraged. “It will run 15 or 20 feet from my back fence. We don't need this pipeline and we don't want it.” Bernadette Nelson of Echo Fall development said, “When we moved here, we already had power lines and a public golf course,” but there was never any talk about pipelines.

Jobs, Safety Issues Hang in the Balance
Among those for the pipeline are the oil industry, labor unions and the Seattle Washington Chamber of Commerce. These groups claim that not only will jobs be created, but the without the pipeline, gasoline will have to shipped to Eastern Washington on the Columbia River in barges or trucks, each of which poses environmental risks. One trucker said that the empty gasoline trucks are highly explosive and accidents have happened, but no one is generally around to talk about these explosions.

A second hearing was scheduled today in Ellensburg. The Corps of Engineers offered no timeline for approving or denying the pipeline permit. The final decision may be left to Washington Governor Gary Locke.