

## **Air & Waste Management Association's (A&WMA) Environmental Resource Guides (ERGs) and the Pennsylvania Environment & Ecology Standards**

Almost any part of the Environmental Resource Guide (ERG) can be applied towards satisfying some part of state mandates for Environment and Ecology. Specific applications where the ERGs cover the mandates follow:

### **Grade 4**

#### **Environmental Health**

- Perform a short skit with characters representing various air pollutants
- Identify various sources of indoor air pollution
- Determine the difference between tropospheric(bad) ozone and stratospheric (good) ozone
- Identify the causes of global warming
- Explore acid rain and its effects on plants and buildings
- Identify ways to control air pollution
- Define the term water pollution and what it means to our health
- Describe why water pollution is a serious threat to our health
- Identify water pollutants and classify as degradable or nondegradable
- Describe how animal wastes pollute water
- Describe how soil erosion pollutes water
- Explain the dangers of pesticides and what can be done to reduce their use
- Explain how urban runoff can pollute water and its effects on people
- List ways to keep animal wastes out of the water people use
- Recognize and define key terminology about pesticides and their effects on people
- Write a letter to adults in their homes asking them to only use pesticides according to the label on the container
- Describe how home hazardous waste can pollute water and the environment
- Cite safer alternatives to hazardous types of home consumer products
- Describe how harmful or toxic household waste in landfills can pollute water
- Effects of both point and nonpoint source water pollution and their effects on health

#### **Agriculture and Society**

- Identify the effects of water toxic and sedimentary pollution from improper farming, logging including crop planting, vegetation use and no-tilling crop techniques
- Identify effects of excess fertilizer on algae growth and aquatic life

#### **Integrated Pest Management**

- Determine how pesticides can pollute the air and their effects on other organisms

## Grade 7

### Environmental Health

- Identify the physical characteristics of CO, observe the presence of it through a testing procedure. Simulate CO build-up in the body and explain its effects.
- Define radon and discuss why it's an indoor air pollutant.
- Understand the process of radioactive decay and why radiation can be harmful to your health.
- Trace the route radon can take from bedrock and soil into air, water, homes and eventually into human bodies
- Distinguish between indoor and outdoor air pollution
- Describe biological contaminants and their environment. Grow bacteria on nutrient agar plates, grow fungi on bread and discuss methods to reduce exposure to biological contaminants in the home.
- List six major air pollutants and their effects on human health such as eye irritation, lung damage, mental alertness, respiratory problems, blood oxygen content.
- Demonstrate an understanding of biological magnification from lead air pollution
- Test various samples of water to determine if it is polluted with coliforms
- Describe ways to control pollution of our streams with livestock
- Describe how illegal dumping of wastes can effect our ground and surface waters and the adverse affects it has on plants, animals and humans
- Analyze the dispersion of illegally dumped toxics in the environment by mapping
- Identify sources of fertilizer runoff and the effects on consumable water sources
- Describe how active and abandoned mines can contaminate water and its affects on water quality
- Describe how landfill leachate can pollute groundwater

### Agriculture and Society

- Research, compare and contrast specific farming techniques
- Build a model demonstrating best management practices to control nonpoint source water pollution from farms. Educate school and community about conservation farming practices using the model.
- List and describe common pesticides used by farmers
- Interview farmers and gardeners to determine how common pesticides are used in their communities
- Explain the importance of soil moisture on the growth of crops through an experiment and graphing techniques
- Show how an increase in temperature affects crop soil moisture

### Integrated Pest Management

- List and describe common pesticides used by farmers
- Interview farmers and gardeners to determine how common pesticides are used in their communities

### Ecosystems and their Interactions

- Identify the characteristics, sources of lead air pollution
- Demonstrate an understanding of biological magnification
- Learn about lichens as an indicator of environmental health
- Predict air quality based on types and amounts of lichens present

- Describe how illegal dumping of pollutants become dispersed in land or water and how they may be difficult to pinpoint and control
- Describe how pollutants impact groundwater and surface water
- Describe how illegal dumping of pollutants affects plants, animals and humans

### **Threatened, Endangered and Extinct Species**

- Describe the affects of sediment water pollution on aquatic species
- Explain how the greenhouse effect is capable of changing the climate of the earth and the affects it has on plants and animals.

### **Humans and the Environment**

- Identify sources of increasing amounts of carbon dioxide in the earth's atmosphere
- Explain how the greenhouse effect is capable of changing the climate of the earth and the affects it has on plants and animals.
- Describe some ways visibility is affected by air pollution
- Describe the affects of water pollution on humans and the quality of life
- Participate in a simulation of how CFC's are creating a hole in the ozone layer
- List sources of CFC's and research some alternatives, develop a personal action plan to reduce the students contribution to CFC pollution
- Show how active and abandoned mines can contaminate water
- Describe ways to reclaim the land after its been mined

### **Environmental Laws and Regulations**

- List six major air pollutants and their sources
- Identify the required pollution control devices that are found in coal-fired power plants

## **Grade 10**

### **Watersheds and Wetlands**

- Describe the characteristics of a watershed by interpreting topographic maps
- Calculate the area of a watershed and the amount of potential runoff using grids
- Describe how human activities and land use contribute to nonpoint source water pollution and how they can affect quality of plant and animal life in an area
- Explain the need for regulating and monitoring land use in a watershed area
- Give examples of how a watershed can be protected
- Use raw data to determine the extent of nonpoint source pollution in a river
- Perform a controlled experiment to examine pond water changes due to phosphate and nitrate enrichment over a period of time
- Explain eutrophication and identify nonpoint sources of water enrichment
- Describe the importance of dissolved oxygen (DO) to aquatic plants and animals
- Perform a controlled experiment to determine the affects of manure, fertilizers, plant debris and sediment on waters DO content and biological oxygen demand
- Perform a test for Escherichia coli, explain why it and other coliform bacteria are used as indicators of fecal waste contamination and determine if water samples are safe by comparing samples with health agency standards

## **Environmental Health**

- Explain which products found in the home can become pollutants, determine which environmentally safer products could be used in place of hazardous products
- Explain how bioassay methods are used to determine toxicity
- Use Daphnia to determine toxicity of an urban runoff water sample
- Explain how human activities and urbanization contribute to water supply pollution
- Describe how acid rain forms and the environmental damage that can result
- Construct a model of the human respiratory system
- Conduct an experiment demonstrating the impact of particles on various parts of the upper respiratory tract
- Describe how the human respiratory system deals with gaseous and particulate pollutants
- Define categories of indoor air pollution, list sources of the pollutants.
- Describe the human health effects of the most common indoor air pollutants
- Conduct an experiment that demonstrates that cigarette smoke is an air pollutant. Debate the pros and cons of regulatory efforts to reduce peoples' exposure caused by indoor air pollution
- Conduct an experiment that demonstrates that bacteriological contaminants exist in indoor air, develop a personal/family action plan to reduce exposure to indoor air pollution
- Create an ambient air monitoring plan and monitor the air for particular matter

## **Ecosystems and their Interactions**

- Describe how air pollution is related to land and water pollution
- Conduct an experiment showing the relationship between the hydrosphere, lithosphere and atmosphere

## **Humans and the Environment**

- Explain how sediment from mining contributes to nonpoint source water pollution
- Describe current surface mining activities and reclamation techniques

## **Grade 12**

### **Watersheds and Wetlands**

- Determine the amounts of solid and sediment suspended in water samples
- Explain turbidity observations of water samples
- Explain ways in which sediment disturbs organisms
- Describe the importance of dissolved oxygen (DO) to aquatic plants and animals
- Perform a controlled experiment to determine the affects of manure, fertilizers, plant debris and sediment on waters DO content and biological oxygen demand
- Explain how inorganic nutrients and organic nonpoint source pollutants affect water quality
- Perform a test for Escherichia coli, explain why it and other coliform bacteria are used as indicators of fecal waste contamination and determine if water samples are safe by comparing samples with health agency standards
- Describe the characteristics of a watershed by interpreting topographic maps
- Calculate the area of a watershed and the amount of potential runoff using grids
- Describe how human activities and land use contribute to nonpoint source water

- pollution and how they can affect quality of plant and animal life in an area
- Explain the need for regulating and monitoring land use in a watershed area
- Give examples of how a watershed can be protected
- Use raw data to determine the extent of nonpoint source pollution in a river

### **Environmental Health**

- Explain which products found in the home can become pollutants, determine which environmentally safer products could be used in place of hazardous products
- Describe the environmental health impacts of making decisions about agricultural practices
- Conduct and present research on important worldwide air pollution episodes and accidents
- Discuss air quality and related health and welfare issues involving troposphere and stratospheric ozone
- Perform an experiment that demonstrates that ozone can have a detrimental effect on certain materials
- Define HAPs. Describe the health effects of some common HAPs.
- Collect and disseminate information about the HAP content of common household items and products
- Monitor the ambient air for the presence of particulate matter
- Name and demonstrate control devices for particulate and gaseous emissions
- Describe the human health effects of the most common indoor air pollutants
- Debate the pros and cons of regulatory efforts to reduce peoples' exposure caused by indoor air pollution
- Create an ambient air monitoring plan and monitor the air for particular matter
- Conduct an experiment about the welfare effects of one of the criteria pollutants

### **Agriculture and Society**

- Predict the amount of erosion from a site using the Universal Soil Loss Equation
- Determine the effects that soil type, rainfall and topography have on soil erosion and what measures can be taken to prevent this loss
- Describe the environmental and economic trade-offs involved in agricultural practices decision making
- Explain how certain agricultural and livestock practices contribute to nonpoint source pollution and the best management practices used to prevent it

### **Ecosystems and their Interactions**

- Describe how air pollution is related to land and water pollution
- Conduct an experiment showing the relationship between the hydrosphere, lithosphere and atmosphere

### **Environmental laws and regulations**

- Name the U.S. legislation that lays out the U.S. approach to pollution prevention
- Describe the hierarchical approach to pollution prevention and waste management
- Participate in a simulation game involving trading of emission allowances
- Participate in a simulation game involving various factors that must be weighed when making decisions and writing legislation regarding pollution prevention

