

## UNIT V - SAFETY, ENVIRONMENT, AND LEGAL ISSUES

### Lesson 1: Protecting Ourselves and Others

**Competency/Objective:** Identify potential crop production hazards to operators/producers.

#### **Study Questions**

1. **What are potential dangers to the operator when handling chemicals?**
2. **What are potential dangers from equipment operation in crop production?**
3. **What are the potential dangers from handling and storing crops?**
4. **What precautions should be taken to prevent personal injury from chemicals, equipment, and crop handling and storage?**
5. **What government agencies regulate and enforce safety issues?**

#### **References:**

1. *Advanced Crop Science* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit V.
2. U.S. Environmental Protection Agency, U.S. Department of Agriculture Extension Service, *Applying Pesticides Correctly, A Guide for Private and Commercial Applicators*, Missouri Core Manual, MX 328, January 1997.
3. *Pesticide Safety*. Resources in Agricultural Safety (RAS) series. Available from Instructional Materials Laboratory, University of Missouri-Columbia, 1997.
4. Activity Sheet
  - a) AS 1.1: Farm Safety Survey



## UNIT V - SAFETY, ENVIRONMENT, AND LEGAL ISSUES

### Lesson 1: Protecting Ourselves and Others

#### TEACHING PROCEDURES

##### A. **Introduction**

After a specific crop or crops have been selected for production, it is important to discuss safety practices for crop producers. There are many hazards that farm workers face. Statistics show that farming is one of the most dangerous occupations in the United States. Not only do the crop producers work with large and powerful equipment, they also must work with hazardous materials and chemicals.

##### B. **Motivation**

This would be an important time to discuss farm safety with your students. Begin the lesson with some farm-related information and statistics on accidents that frequently occur. Ask students to relay any instances of farm accidents they may be familiar with.

##### C. **Assignment**

##### D. **Supervised Study**

##### E. **Discussion**

1. Each year crop producers work with millions of pounds of chemicals in the form of insecticides and herbicides. The handling of this material requires knowledge and skill on the part of the farm workers to avoid injuries to themselves and others. Refer to Table 1.1 in the Student Reference for examples of effects of anhydrous ammonia on the human body. The Student Reference also lists examples of when anhydrous ammonia accidents occur.

#### **What are potential dangers to the operator when handling chemicals?**

- a) Insecticide and pesticide contact with skin
    - 1) Handling the chemical when filling applicator
    - 2) Drift hazards
  - b) Exposure to fumes from chemicals
    - 1) Storage area
    - 2) Adding dry chemicals to sprayer tank
  - c) Anhydrous ammonia
    - 1) Colorless gas with a sharp penetrating odor
    - 2) Compressed as a liquid, turns to gas when absorbed with moisture in soil
    - 3) Contact with body tissue, destroying cells, causing dehydration and severe burns
    - 4) Could destroy lungs if breathed
2. Farm equipment is a major source of injuries to crop producers, farm workers, and their families. Education and the practicing of safety rules can help prevent many accidents.

#### **What are potential dangers from equipment operation in crop production?**

- a) Many accidents occur where hazards are not as readily apparent as with danger points such as power take-offs and hydraulic arms.
- b) Most accidents occur because of human error.
- c) Equipment danger points include the following.
  - 1) Belt, gear, or chain drives
  - 2) Rotary or auger intake areas

- 3) Feed rollers and gather chains to pull crops into machines
  - d) Secondary factors may cause hazardous situations.
    - 1) Spilled grain, debris, slick substances may cause falls into grain augers.
    - 2) Icy, muddy, or manure-covered surfaces increase risk of slipping.
  - e) Operators sometimes overestimate their ability to control powerful equipment.
  - f) Reaction time to a stimulus is about 1/4 to 3/4 of a second.
  - g) Large round bales may weigh 1,500 to 2,000 pounds each, about the same as a small car.
    - 1) Can crush operators
    - 2) Overturn tractors
  - h) Other hazards include fires and explosions and roadway accidents when moving equipment.
3. Working with stored grain may have some hidden hazards. Many producers have suffocated from falling into grain storage facilities and have been overtaken by gas that develops with some stored crops.

**What are the potential dangers from handling and storing crops?**

- a) Flowing grain can lead to suffocation when producers, workers, or their children are pulled under and covered by the grain.
    - 1) A 6-foot tall person can become covered in as little as 15 seconds.
    - 2) Children or smaller people are at a greater risk.
    - 3) Kernels rushing to fill the void left from flowing grain create a liquid motion.
    - 4) The force required to extract someone buried below the surface of grain may exceed 2,000 pounds.
  - b) CO<sub>2</sub> is a colorless, odorless gas that develops from fermenting grain or silage.
    - 1) Gas forms in grain bins.
    - 2) Gas enters bloodstream, slows breathing, induces drowsiness and headaches, and even causes death by suffocation.
  - c) Airborne substances such as dust, mold, and fungi may cause permanent damage to lungs and cause allergies.
  - d) Practice safety by reducing skin exposure to the sun by wearing protective clothing and/or sunscreen.
4. Safety on the farm is a full-time consideration. Review and explain all the precautions listed in the Student Reference regarding working with chemicals, farm equipment, and grain handling and storage facilities. It is very hard to find an all-inclusive list. Other sources may be referenced when reviewing this study question.

**What precautions should be taken to prevent personal injury from chemicals, equipment, and crop handling and storage?**

- a) Chemicals
  - b) Equipment
  - c) Storing and handling grain
5. There are several regulatory agencies within the U.S. government that are established to protect the agricultural workers and the environment from agricultural safety hazards and concerns.

**What government agencies regulate and enforce environmental and safety issues?**

- a) OSHA - Occupational Safety and Health Administration
  - 1) OSHA establishes standards of compliance for safe and healthful working conditions.
  - 2) OSHA provides education and safety assistance to identify and eliminate workplace hazards.

- 3) Producers have a legal responsibility to provide safe and healthful working conditions for themselves and their employees.
- 4) An amendment to the OSHA Act prevents funds from being spent on enforcing rules and regulations to producers who employ 10 or fewer workers.
  - (a) Amendment does not eliminate compliance with rules or regulations.
  - (b) Employee can use regulations in a lawsuit against employer.
- b) NRCS - Natural Resources Conservation Service
  - 1) Division of U.S. Department of Agriculture
  - 2) Helps prevent soil erosion from wind and water
    - (a) Works with local soil and water conservation districts
    - (b) Assists in individual conservation plans
    - (c) Other conservation measures
- c) EPA - Environmental Protection Agency
  - 1) Protects nation's land, air, and water systems
  - 2) Formulates environmental standards
  - 3) Enforces federal environmental laws
- d) DNR - Department of Natural Resources
  - 1) Fosters prudent use and protection of air, land, water, cultural, and energy resources
  - 2) Aids in preventing pollution
  - 3) Protects public from harmful emissions and waste disposal practices

F. **Other Activity**

Agricultural safety experts with agencies such as University of Missouri Extension may be consulted at this time to be invited as guest speakers. There are many good videos on farm safety that may be obtained from National FFA, MRCCTE, or film agencies and shown as a motivation or after discussion to summarize major points of safety.

G. **Conclusion**

Farm safety is an everyday job. Persons who work in grain production and their families must be educated on safety rules. There are many areas of safety to cover in agriculture. Farm accidents are one statistical area that must be improved. Only through continued education can this happen. Accidents may occur when working with chemicals, farm equipment, or grain handling and storage facilities. The safety rules applying to this unit may need to be repeated later during the course.

H. **Answers to Activity Sheet**

Answers will vary.

I. **Answers to Evaluation**

1. b
2. c
3. b
4. d
5. a
6. Any of the 21 listed in the Student Reference
7. Any of the 16 listed in the Student Reference
8. Standing on the grain when it is being unloaded (from bin or wagon). Unloaded grain is quickly replaced by other grain. The worker is quickly sucked into the grain when worker may suffocate and die. This can also happen if a worker enters a grain bin that has bridged grain caused by damp or moldy grain.
9. Reduce skin exposure by wearing protective clothing and/or sunscreen.

10. OSHA - Occupational Safety and Health Administration  
EPA - Environmental Protection Agency  
NRCS - Natural Resources Conservation Service  
DNR - Department of Natural Resources

EVALUATION

Circle the letter that corresponds to the best answer.

1. What is the greatest cause for chemical poisoning to crop producers?
  - a. Mislabeled containers
  - b. Contact with the skin
  - c. Fumes from the chemical
  - d. Ingesting the chemical through the mouth
  
2. What is the cause of most machinery accidents on the farm?
  - a. Faulty equipment
  - b. Weather conditions
  - c. Human error
  - d. Engine fires
  
3. What is the human reaction time to a stimulus?
  - a. 1/10 to 2/10 of a second
  - b. 1/4 to 3/4 of a second
  - c. 1 to 2 seconds
  - d. 5 to 10 seconds
  
4. What is the gas produced by fermentation of wet grain or high moisture silage?
  - a.  $\text{NH}_3$
  - b.  $\text{H}_2\text{O}$
  - c.  $\text{HCl}$
  - d.  $\text{CO}_2$
  
5. An amendment to the OSHA Act of 1970 prevents enforcement of regulations for a producer that employs \_\_\_\_\_.
  - a. 10 or fewer employees
  - b. Over 10 employees
  - c. Fewer than 15 employees
  - d. Never applies to producers

**Complete the following short answer questions.**

6. List five safety precautions to observe when working with agricultural chemicals.

a.

b.

c.

d.

e.

7. List five potential dangers with equipment operation in crop production.

a.

b.

c.

d.

e.

8. Explain how a farm worker may be injured or killed from stored grain.

9. Explain what is meant by "sun safety" practices.

10. Write the full name of the agencies represented by the letters below.

OSHA -

EPA -

NRCS -

DNR -



### Farm Safety Survey

**Objective:** Students will survey the agricultural crop production community for possible safety hazards.

**Directions:** Select a crop producer in the community and complete the following information. Safety precautions from the Student Reference should be used as a guideline to locate possible safety hazards.

1. Describe the farming operation (size, kind of crop, storage on the farm, etc.).
2. List possible chemical hazards discovered on the farm.
3. List possible equipment hazards discovered on the farm (include storage facilities).
4. Has an accident or safety concern occurred on the farm within the last 5 years? If so, describe below.
5. List or describe any safety measures initiated by the producer within the last 5 years. This can include equipment repairs, safety courses taken, etc.



## UNIT V - SAFETY, ENVIRONMENT, AND LEGAL ISSUES

### Lesson 2: Protecting the Environment

**Competency/Objective:** Identify the environmental and governmental issues that affect crop production.

#### **Study Questions**

1. **What crop production activities affect the environment?**
2. **What management practices can be used to minimize environmental impact?**
3. **What government agencies regulate and enforce environmental issues (laws)?**

#### **References**

1. *Advanced Crop Science* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit V.
2. Activity Sheet
  - a) AS 2.1: Causes of Agricultural Pollution



## UNIT V - SAFETY, ENVIRONMENT, AND LEGAL ISSUES

### Lesson 2: Protecting the Environment

#### TEACHING PROCEDURES

##### A. **Review**

Lesson 1 emphasized the necessity to educate crop producers to the need for safety when operating equipment and working with crop storage facilities. These safety factors dealt with the personal safety of the producer. Lesson 2 discusses ways the producer can reduce the possible harmful impact of crop production on the environment.

##### B. **Motivation**

Ask students to share with the class what they think might be the biggest problem or danger of crop production activities to the environment. Have them explain what environmental impact that problem may present and how they think it might be prevented.

##### C. **Assignment**

##### D. **Supervised Study**

##### E. **Discussion**

1. Improper crop production activities can have a detrimental effect on the agricultural environment. Producers should know how to avoid these concerns.

#### **What crop production activities affect the environment?**

- a) Production activities affect four major resources.
    - 1) Air
    - 2) Water
    - 3) Soil
    - 4) Aesthetic value (natural landscape beauty)
  - b) There are five major contributors to agricultural pollution.
    - 1) Toxic products
    - 2) Soil loss
    - 3) Waste products
    - 4) Discharged water
    - 5) Litter
  - d) Of these, toxic products and soil loss are the two major problems in crop production.
  - e) Toxic products contain poisons or have potential to poison animals or plants.
    - 1) Pesticides
    - 2) Insecticides
    - 3) Engine exhaust
    - 4) Excessive fertilizers
  - f) Soil loss is attributed to incorrect or overuse of tillage methods.
    - 1) Wind or water will remove exposed soil.
    - 2) Soil particles can get into streams and lakes.
    - 3) Oxygen levels in water that support aquatic life are reduced.
2. Discuss the various management practices used to minimize effects on water and air quality. Explain that practices used depend on the soil, crop, practice design, and other management characteristics.

### **What management practices can be used to minimize environmental impact?**

- a) Soil conservation management
    - 1) Reduce the movement of pollutants
    - 2) Diminish soil particle detachment
    - 3) Protect soil from adverse effects of wind, rain, and runoff
    - 4) Increase infiltration and movement of soluble nutrients and pesticides to below the root zone
    - 5) Tillage practices
      - (a) Conservation tillage
      - (b) Contour farming
      - (c) Filter strips
      - (d) Strip-cropping
    - 6) Structural practices
      - (a) Terraces
      - (b) Grassed waterways
      - (c) Diversions
  - b) Waste management
    - 1) Control the waste or overuse of toxic substances used for pest and weed control.
    - 2) Follow directions on usage and dispose containers properly.
  - c) Nutrient management
    - 1) Overusage of fertilizer harms plants and rainwater transports surplus to water sources.
    - 2) Excessive nutrients affect groundwater used by cities and towns.
3. Ask students for their input on what governmental agencies play a role in environmental concerns that crop producers may face. See how many they can list and describe their mission.

### **What government agencies regulate and enforce environmental issues (laws)?**

- a) Natural Resources Conservation Service - Division of the U.S. Department of Agriculture
  - 1) Nineteen programs aid in conservation of natural resources.
  - 2) Five major programs affect crop producers.
    - (a) Conservation Technical Assistance program assists landowners to plan and implement conservation practices.
    - (b) Conservation Farm Option program provides annual payments over a 10-year contract period to producers for implementing conservation measures.
    - (c) Conservation of Private Grazing Land Initiative provides technical and educational assistance to owners of private grazing land.
    - (d) Conservation Reserve Program encourages producers to convert highly erodible cropland to vegetative cover.
    - (e) Farmland Protection Program provides funds to help purchase development rights to keep productive farmland in agricultural uses.
- b) Missouri Department of Natural Resources
  - 1) Works with producers through the Agricultural Assistance Unit
  - 2) Provides technical assistance for environmental permits, gives advice on stewardship, third-party site assessments, aids with referrals to other governmental agencies
- c) Environmental Protection Agency
  - 1) Protects human health and safeguards the air, water, and land
  - 2) Enforces state and federal laws developed to protect the environment
- d) Missouri Department of Conservation
  - 1) Protects and manages fish, forest, and wildlife resources

- 2) Facilitates participation in resource management activities

**F. Other Activities**

1. Conduct a lab activity on water testing. Refer to the *Missouri Department of Natural Resources Groundwater Protection Curriculum Guide*, pages 39-40, available from Missouri Resource Center for Career & Technical Education, University of Missouri-Columbia.
2. Ask students to do further research for one of the 19 programs available through the Natural Resources Conservation Service. Have the students share this information with the class.

**G. Conclusion**

It is important for crop producers to understand the effects of cropping and crop management systems on the agricultural environment. The air, soil, and water may be polluted by chemicals practices that are not used correctly. Certain government agencies are designed to protect the agricultural environment from harmful farming practices.

**H. Answers to Activity Sheet**

The phrase to solve is "Toxic products and soil loss cause most environmental problems in agriculture."

**I. Answers to Evaluation**

1. Air, land, water, and aesthetic value
2. Pesticides, herbicides, and fertilizers may be used improperly and in overabundance. Harmful substances from engine exhaust may also be released into the air.
3. Soil conservation management, waste management, and nutrient management.
4. f
5. a
6. e
7. b
8. c
9. d





EVALUATION

**Complete the following short answer questions.**

1. List the four major resources that may be polluted by some agricultural practices.
  - a.
  - b.
  - c.
  - d.
  
2. Describe how toxic products may pollute the agricultural environment.
  
  
  
  
  
  
  
  
  
  
3. List three major management practices that may minimize environmental pollution.
  - a.
  - b.
  - c.

**Match the following agency or agency program to the following statements. Each item may only be used one time.**

- |  |   |
|--|---|
| 4. ___ Provides funds to purchase development rights to keep productive farmland in agricultural uses. | a. Conservation Farm Option                 |
| 5. ___ Ten-year contract payments to producers who follow a conservation plan on their land.           | b. Missouri Department of Conservation      |
| 6. ___ Works with producers through Agricultural Assistance Unit.                                      | c. Environmental Protection Agency          |
| 7. ___ Primary mission is to protect fish, forest, and wildlife resources of our state.                | d. Conservation Reserve Program             |
| 8. ___ Enforces state and federal laws protecting human health and safeguard the natural environment.  | e. Missouri Department of Natural Resources |
| 9. ___ Pays producers to convert highly erodible cropland to vegetative cover.                         | f. Farmland Protection Program              |



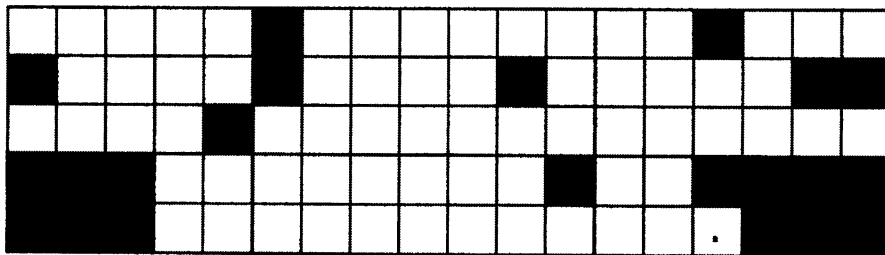
Lesson 2: Protecting the Environment

Name \_\_\_\_\_

**Causes of Agricultural Pollution**

**Objective:** Students will determine the major causes of most pollution in the agricultural environment.

**Directions:** Solve the phrase below by placing the correct letter in the squares directly above each row of letters.



A            N C I R            R U  
 I R        B O S M U N M S  
 O O I C E L V O L O C A E        A  
 M S X T L R P L U D S U I E N T N D  
 T O S P G O I R E S T C T N S E A L



## UNIT V - SAFETY, ENVIRONMENT, AND LEGAL ISSUES

### Lesson 3: Knowing the Law

**Competency/Objective:** Identify the legal issues involved with crop production.

#### **Study Questions**

1. **What are the legal requirements for handling chemicals, wastes, and equipment?**
2. **What are the legal liabilities if chemicals, wastes, or equipment is mishandled?**
3. **What is a legal land description?**
4. **What are the legal liabilities for crossing property lines, fencing, or other damage?**
5. **What are the legal liabilities of polluting streams and groundwater?**

#### **References:**

1. *Advanced Crop Science* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit V.
2. *Applying Pesticides Correctly, A Guide for Private and Commercial Applicators*, Missouri Core Manual, MX 328, U.S. Environmental Protection Agency, U.S. Department of Agriculture Extension Service, January 1997.
3. Transparency Masters
  - a) TM 3.1: Base Line and Principal Meridian Affecting Missouri Land Descriptions
  - b) TM 3.2: Locating a Township
  - c) TM 3.3: Section Location in a Township
  - d) TM 3.4: Divisions of a Section of Land
4. Activity Sheet
  - a) AS 3.1: Legal Land Descriptions



## UNIT V - SAFETY, ENVIRONMENT, AND LEGAL ISSUES

### Lesson 3: Knowing the Law

#### TEACHING PROCEDURES

##### A. **Review**

Our previous lesson discussed some of the problems affecting the environment that may involve crop producers, some management procedures that may reduce the environmental impact of those problems, and governmental agencies that are involved with regulating and enforcing environmental laws that may be related to agricultural practices. This lesson will continue with information concerning legal responsibilities of crop producers relating to those issues.

##### B. **Motivation**

Ask students if they have witnessed a chemical spill. If so, what actions were taken to correct the problem? You may also ask them if they know the consequences of improperly handling pesticides.

##### C. **Assignment**

##### D. **Supervised Study**

##### E. **Discussion**

1. Crop producers must be knowledgeable of legal requirements they must follow when working with chemicals used in agricultural production. They should also be familiar with the training required for the applicators of agricultural chemicals.

#### **What are the legal requirements for handling chemicals, wastes, and equipment?**

- a) Producers must make sure pesticides are handled properly and safely.
- b) Federal laws set the standards for pesticide use. State laws may be more strict but not more lax.
- c) The Environmental Protection Agency (EPA) regulates the use of pesticides.
- d) Regulations are mandated under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).
- e) Under FIFRA, key provisions are as follows.
  - 1) Requires the EPA to register all pesticides, each use of all pesticides, and approve the product label
  - 2) Requires the classification of all registered pesticides as either general use or restricted use
  - 3) Requires pesticides to be used only as directed on the labeling
  - 4) Requires users of restricted use pesticides to be certified applicators or work under the direct supervision of a certified applicator
  - 5) Provides penalties for actions contrary to its provisions
  - 6) Gives the EPA authority to develop regulations, which are interpretations of the law and have the force of law
- f) The Missouri Pesticide Registration Act and the Missouri Pesticide Use Act bring Missouri into compliance with FIFRA.
- g) These Acts are administered by the Division of Plant Industries-Bureau of Pesticide Control of the Missouri Department of Agriculture.
- h) Chapter 281 of the Missouri State Statutes establishes requirements for persons to apply restricted use pesticides in Missouri.
- i) Applicators of pesticides in Missouri receive training in the following areas.
  - 1) Applicable state and federal pesticide laws and regulations

- 2) Pests
  - 3) Pest control (application techniques and IPM training)
  - 4) Pesticides
  - 5) Pesticide waste
  - 6) Applicator safety and worker protection
  - 7) Groundwater protection
  - 8) Endangered species protection
  - 9) New developments
- j) Training must be repeated for recertification every 5 years.
2. Penalties are assessed or given to persons who violate rules and regulations governing the use of agricultural chemicals. Sometimes these can be quite severe. Producers should know the consequences of violations.

**What are the legal liabilities if chemicals, wastes, or equipment is mishandled?**

- a) Civil penalties may be imposed if FIFRA regulations are broken.
  - b) These may be as much as \$5,000 for commercial applicators and up to \$1,000 for private applicators.
  - c) Hearings are held before the EPA can assess a fine.
  - d) Criminal penalties may be as much as \$25,000 or 1 year in prison for commercial applicators or \$1,000 and/or 30 days in prison for private applicators.
  - e) All major spills must be reported to the USEPA officer in Kansas City with the following information included:
    - 1) Name, address, and telephone number of person reporting
    - 2) Exact location of the spill
    - 3) Name of the company involved and locations
    - 4) Specific pesticide spilled
    - 5) Estimated quantity of pesticide spilled
    - 6) Source of the spill
    - 7) Cause of the spill
    - 8) Name of body of water involved or nearest body of water to the spill area
    - 9) Action taken for containment and cleanup.
  - f) Many pesticide labels have emergency telephone numbers for direct access to the manufacturer to manage emergencies for a given product.
  - g) If a spill is on a highway, the highway patrol or the highway department must be contacted.
  - h) If a spill is on a city or county road, the sheriff, police, or the local county or city fire department must be contacted to assist with the cleanup.
3. Ownership or location of parcels of land are indicated by a legal land description. This method is explained in this section of the lesson. Use TM 1, TM 2, TM 3, and TM 4 to aid you in this instruction.

**What is a legal land description?**

- a) Locations are indicated in the United States by two methods.
  - 1) Indiscriminate metes and bounds system that uses natural land features such as trees, streams, neighboring land owners, and distances to describe plots of land
  - 2) Township-Range system
- b) Township-range system has the following associated terms that must be defined.
  - 1) Base line - reference or beginning point for measuring north or south townships
  - 2) Principal meridian - reference or beginning point for measuring east or west ranges
  - 3) Township lines - east to west lines that mark township boundaries
  - 4) Range lines - north to south lines that mark township boundaries
  - 5) Range - assigned to a township by measuring east or west of a principal meridian



- 6) Township - 36 sections of land arranged in a 6 x 6 array, measuring 6 miles by 6 miles; sections numbered beginning with the northeast-most section, proceeding west to 6, then south along the west edge of the township and to the east
  - 7) Section - basic unit of the system; a square tract of land - 1 mile by 1 mile, containing 640 acres
  - c) Principal meridian and base line are used to indicate parcels of land in Missouri on the transparency.
  - d) Use the other three transparencies to explain the township location, the section location, and a specified portion of a section.
  - e) These legal descriptions are attached to abstracts to verify and indicate ownership of parcels of land in Missouri.
4. To prevent disputes among neighbors, property owners should understand their legal responsibilities regarding property lines and fences that mark divisions of land.

**What are the legal liabilities for crossing property lines, fencing, or other damage?**

- a) Answers to disputes concerning fencing duties and boundary locations are supplied by Missouri State Statutes and court decisions.
  - b) The solution to these disputes lie with the cooperative attitudes of neighboring owners.
  - c) There is no substitute for an attorney's skill and advice to help solve differences.
  - d) Crop producers are encouraged to contact their state representatives and senators with boundary law recommendations.
  - e) Most disputes occur when damage is caused on adjoining property.
  - f) Agricultural property owners in Missouri should obtain and read UMC Extension Guide G810 *Missouri Fencing and Boundary Laws*. This gives information on fencing laws, duties, and liabilities of livestock owners, the definition, building, and maintenance of "divisional" fences.
5. Discuss liabilities of polluting streams and groundwater.

**What are the legal liabilities of polluting streams and groundwater?**

- a) Protection of surface and groundwater is receiving a great deal of attention as the scope of contamination is increasing.
- b) The United States relies on ground and surface water for more than 50% of its drinking water and more than 25% of its fresh water needs.
- c) EPA estimates that 1% of the nation's groundwater supply is already contaminated, and the percentage is rapidly increasing.
- d) A major source of this contamination is the use and misuse of pesticides and fertilizers.
- e) Polluted groundwater may contaminate wells and therefore contaminate drinking water for farmers, their families, and their livestock.
- f) Pollution of streams and groundwater is from two basic sources.
  - 1) Point sources - traced back to a specific source of the pollution, such as a chemical spill
  - 2) Nonpoint sources - not traceable to a specific source, such as chemical runoff from fields
- g) Misuse of chemicals can degrade water sources in several ways.
  - 1) Irrigation backflow - where chemicals are mixed with irrigation water; installation of backflow valves a preventative measure
  - 2) Overapplication of chemicals - excess chemicals leach or percolate into water table
  - 3) Runoff - pollutes streams; may flow across neighbors property and into larger streams or rivers
  - 4) Highly soluble nitrates - leach into groundwater; is an ever-increasing problem in Midwest
  - 5) Improper disposal of containers - some pesticide labels - distances from wells for safe mixing and loading of pesticides

- h) Adherence to pesticide's label such as using the proper dosage can help reduce contamination.
- i) Harsh legal judgments, especially for liability and negligence, are being assessed against polluters.
- j) Civil violations are based on the fact that the violation occurred and do not require the element of intent or negligence. Violators might receive a fine of up to \$10,000 per day.
- k) Criminal violations are given when negligence or intent is established. There may be fines of up to \$25,000 per day and possible imprisonment of 2 years.
- l) Chapter 644 of the Missouri State Statutes may be used as a reference regarding stream and groundwater pollution.

**F. *Other Activities***

1. Have someone from the local fire department as a guest speaker to discuss reporting and cleanup procedures in your area.
2. Secure a county plat book and have students locate their farms or the farms of friends or relatives.

**G. *Conclusion***

There are several legal issues that must be addressed in regards to the use of agricultural chemicals. We must be aware that the EPA is responsible for administering the Federal Insecticide, Fungicide, and Rodenticide Act and may also be involved with assessing penalties and/or fines when a problem occurs. Crops producers must know the proper procedures used to report a chemical spill and what information needs to be given to the authorities. Land in Missouri is legally described by using the township-range method of indicating its location. The two sources of pollution are point sources such as a chemical spill, and nonpoint sources such as fertilizer runoff from fields. These problems may also involve a civil or criminal penalty.

**H. *Answers to Activity Sheet***

1. b
2. c
3. c
4. d
5. c
6. a

**I. *Answers to Evaluation***

1. b
2. b
3. a
4. d
5. Federal Insecticide, Fungicide, and Rodenticide Act
6. Point sources - can be traced to a specific source such as a chemical spill.  
Nonpoint sources - cannot be traced to a specific source such as fertilizer run-off from fields.

EVALUATION

**Circle the letter that corresponds to the best answer.**

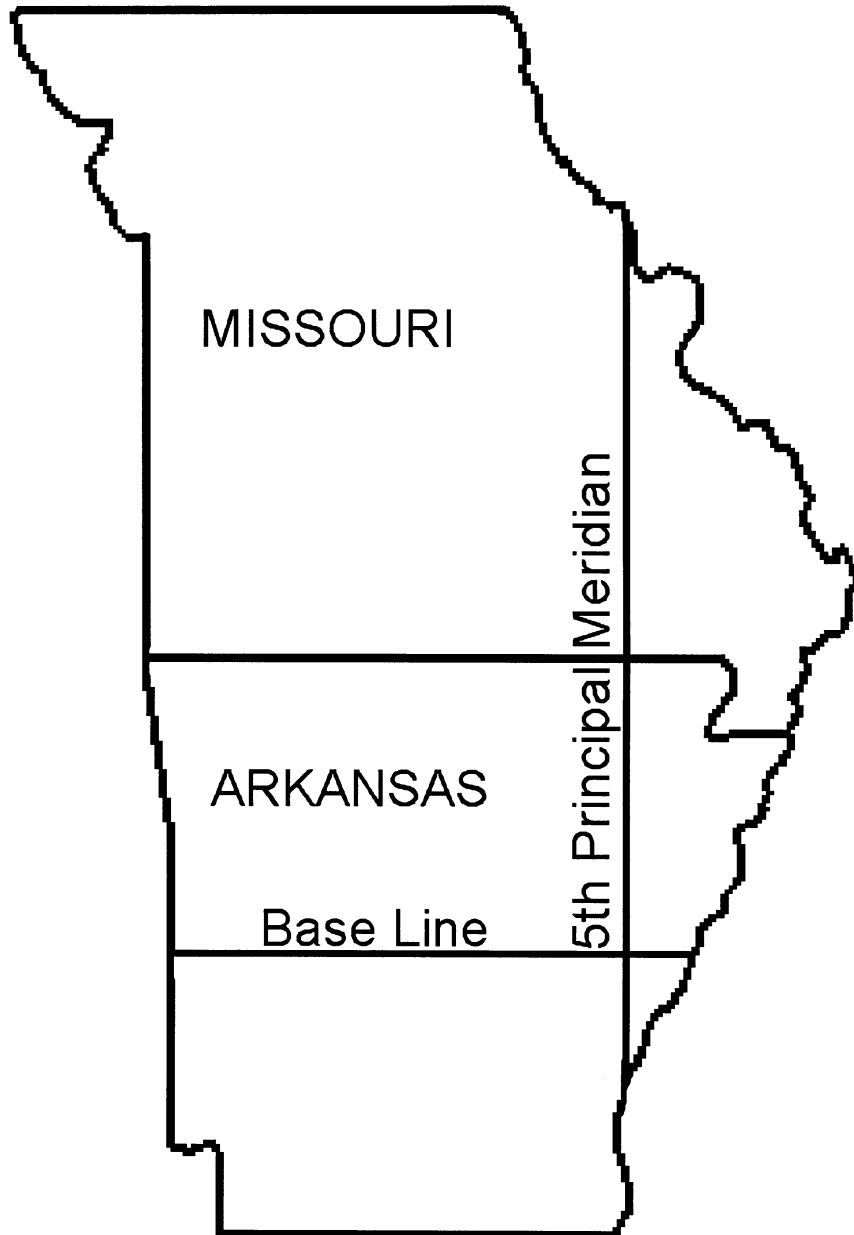
1. What governmental agency regulates the use of pesticides?
  - a. Food and Drug Administration
  - b. Environmental Protection Agency
  - c. United States Department of Agriculture
  - d. Department of Natural Resources
  
2. How many sections of land are in a township?
  - a. 24
  - b. 36
  - c. 48
  - d. 52
  
3. What percent of the nation's groundwater is said to be contaminated?
  - a. 1%
  - b. 3%
  - c. 10%
  - d. 50%
  
4. Restricted use chemical applicators must recertify every \_\_\_\_\_ years.
  - a. 2
  - b. 3
  - c. 4
  - d. 5

**Complete the following short answer questions.**

5. What is the name of the Act that requires the regulation of pesticides?
  
  
  
6. List and define the two types of pollution sources for surface and groundwater contamination.
  - a.
  
  
  
  - b.

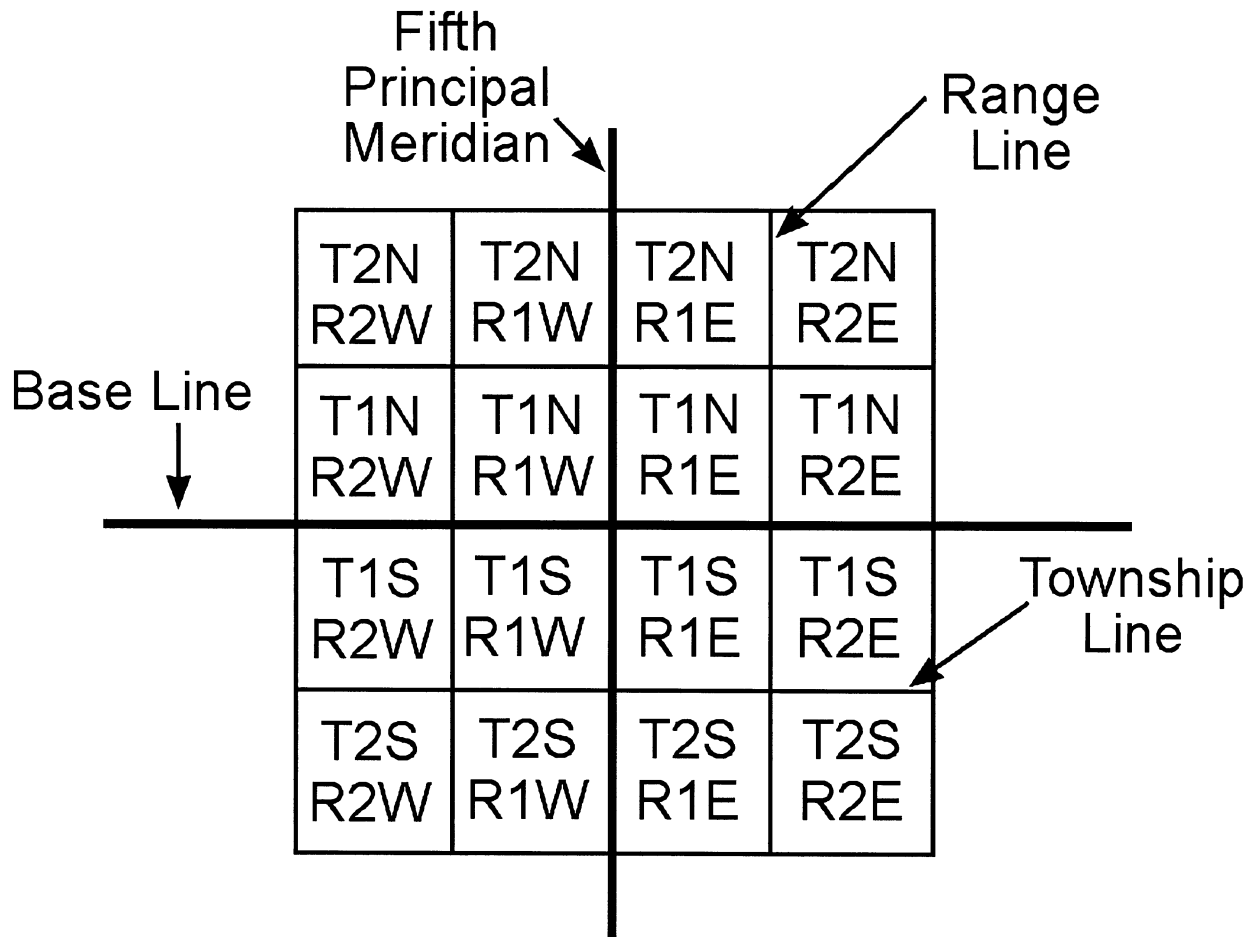


# Base Line and Principal Meridian Affecting Missouri Land Descriptions





# Locating a Township







## Section Location in a Township

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36



## Divisions of a Section of Land

NW 1/4 of NW 1/4	NE 1/4 of NW 1/4	NE 1/4 = 160 acres	
SW 1/4 of NW 1/4	SE 1/4 of NW 1/4		
N 1/2 of SW 1/4		W 1/2 of SE 1/4	E 1/2 of SE 1/4
S 1/2 of SW 1/4			



**Legal Land Descriptions**

**Objective:** Students will identify and describe parcels of land using the Township-Range system of legal land descriptions.

**Directions:** Examine Figure A on the next page and answer the questions below.

1. The 6-mile strips of land that run north and south parallel to the principal meridian are called\_\_\_\_\_.
  - a. Ranges
  - b. Townships
  - c. Base lines
  - d. Plat areas
  
2. \_\_\_\_\_ is the township and range description for the selected township in Figure A.
  - a. T2E, R3N
  - b. T3N, R3E
  - c. T3N, R2E
  - d. T2E, R2N
  
3. There are \_\_\_\_\_ sections in a township.
  - a. 12
  - b. 24
  - c. 36
  - d. 48
  
4. There are \_\_\_\_\_ acres in a section.
  - a. 180
  - b. 360
  - c. 480
  - d. 640
  
5. What is the legal description of the land tract indicated (darkened) in Figure A?
  - a. NE  $\frac{1}{4}$  of NW  $\frac{1}{2}$  of Section 12, T2N, R3E
  - b. SW  $\frac{1}{2}$  of NE  $\frac{1}{4}$  of Section 24, T3N, R2E
  - c. NW  $\frac{1}{4}$  of NE  $\frac{1}{4}$  of Section 24, T3N, R2E
  - d. NW  $\frac{1}{4}$  of NE  $\frac{1}{2}$  of Section 24, T2E, R3N
  
6. How many acres would be in the indicated (darkened) area of Figure A?
  - a. 40
  - b. 80
  - c. 120
  - d. 160

Figure A - Township and Range Locations

