

## Lesson 1: Protecting Ourselves and Others

### Lesson 1: Protecting Ourselves and Others

Crop production is one of the most dangerous occupations in the United States. It is very important that all farm workers know and understand all aspects of the risks involved in crop production. This lesson will discuss dangers and safety precautions when handling chemicals, operating equipment, and handling and storing crops.

#### Potential Dangers When Handling Chemicals

With more poisonous (toxic) pesticides and insecticides being manufactured, the use of personal safety equipment is necessary to prevent accidental exposure to these chemicals through clothing, body openings, and skin. Contacting the skin is the greatest cause of chemical poisoning. Not all body parts absorb these chemicals at the same rate. Therefore adequate equipment in one situation may not be satisfactory in another.

Exposure or contact with the skin may occur when pesticide and insecticide packaging material has become damaged through improper storage or handling. Exposure could also occur when handling the chemical or when filling application equipment. Drift hazards when spraying may also expose chemicals to the skin or body openings of the producer.

Problems also occur when the producer is exposed to fumes created by the chemicals. This can occur in the storage area or when adding the wettable powders, dust, or granules to the sprayer tank. When adding chemicals to the sprayer tank,

air is forced out and carries some of the chemical particles with it.

Pesticide and insecticide chemicals should also be handled carefully at all times when moving the product into and out of storage. Care must also be taken to avoid accidental spills when mixing chemicals for the application process. Due to its properties and the manner in which it is stored, anhydrous ammonia can create a dangerous situation when it is accidentally released. Under atmospheric temperature and pressure, anhydrous ammonia is a colorless gas with a sharp penetrating odor. For use as an agricultural fertilizer, it is compressed into a liquid that resembles water. In this liquid state, it is stored in specially made tanks that are strong enough to withstand internal pressures of a minimum of 250 pounds per square inch (psi). Outside temperatures cause the vapor pressure in the tank to increase. At an outside temperature of 60°F, the tank pressure will be 93 psi, and at 100°F the internal pressure may reach to nearly 200 psi.

When injected into the soil, the liquid ammonia expands into a gas and is readily absorbed by the soil moisture. Similarly, the liquid or gas that contacts body tissue, especially the eyes, skin, and respiratory tract, will cause dehydration, cell destruction, and severe chemical burns. At high concentrations, ammonia combined with moisture in the lungs may damage the lung lining and reduce the lung's ability to transfer oxygen to the bloodstream. Victims exposed to even small amounts of ammonia require immediate treatment to avoid permanent injury. Table 5.1 gives examples of the effects of various concentrations of anhydrous ammonia vapor on the human body.

Table 5.1 - Concentration of Anhydrous Ammonia Vapor

ppm (parts per million)	Volume (%)	Effects on the Human Body
5	0.005	Detectable by almost all persons. Some people complain of nose irritation after 5 minutes of exposure.
134	0.0134	Most people experience dryness and irritation of nose, throat, and eyes.
700	0.07	Coughing. Severe eye irritation, if not treated, may lead to partial or total loss of sight.
1700	0.17	Serious lung damage; death unless treated.
2000	0.2	Burns and blisters skin after a few seconds of exposure.
5000	0.5	Death by suffocation within minutes.

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Commonly, anhydrous accidents occur when:

- Filling tanks beyond recommended capacity.
- Knocking open the hose-end valve accidentally.
- Moving the applicator tank before filling hoses have been disconnected from the nurse tank.
- Venting pressure release valve while a person is in line of the discharge.
- Breaking the transfer hose, especially if it is old and misused.
- Failing to bleed hose coupling before disconnecting.
- Releasing ammonia when unplugging knives.

### **Potential Dangers from Equipment Operation**

The most serious injuries and fatalities on the farm involve machinery and equipment. About half of the farm deaths result from working with or around agricultural equipment. Although some injuries occur in recognized danger areas, such as around power take-off shafts, many others occur in areas where hazards are not readily apparent. For example, more producers are injured while operating skid steer loaders than with hay balers. Farm operators who work with balers know the dangers of getting caught in the windrow pickup area and take appropriate precautions, whereas skid steer operators fail to recognize the hazard of being crushed by the hydraulic loader arm. Skid steer loaders are being used more each year in crop operations.

Most machinery accidents result from human error. The operator either forgot something, took a shortcut, ignored a warning, was not paying close attention, or failed to follow safety rules. Operator manuals list safety rules for a specific piece of farm equipment. Be familiar with the operator manual to know the limitations of the equipment and have the ability to follow the safety measures automatically.

Possible danger points when working with crop production equipment include the belt, gear, or chain drives on many types of equipment. Rotary or auger intake areas on grain handling equipment and grain heads also are dangerous. Consider feed rolls, gathering chains, and similar equipment used to pull crops into a machine as areas where extra caution is required. A slow-moving hydraulic arm can be as hazardous as a rapidly rotating power take-off shaft.

Many crop producers may recognize hazardous situations, but they misjudge the seriousness of the hazard because of secondary factors. For example, spilled grain, debris, or slick substances such as oil spills in an unloading area could cause a slip and fall into the intake auger. Icy, muddy, or manure-covered surfaces make the work area slick and increase the risk of injury.

Farm operators can overestimate their ability to stop or avoid a dangerous situation. This is common when operators work around powerful equipment every day and become comfortable with their ability to control the machinery. Operators are limited by their reaction time. The human reaction time to a stimulus commonly ranges from 1/4 to 3/4 of a second. Times varies with the individual and with age and physical condition. Human reaction time is not quick enough to avoid accidents with machinery.

Equipment that produces large round bales provides an efficient and economical way to harvest hay. However, it also poses unique safety problems for the operator. Large round bales weigh 1,500 to 2,000 pounds each, the same as a small car. Harvesting hay with wetter than optimum moisture content may cause the hay to clump and clog the baler. Hay is harvested during hot conditions, which may also cause operator fatigue and frustration. Add these factors to the misjudgment of reaction time around dangerous equipment, and the result could present a hazardous situation for many farm operators. Injuries occur when operators get caught in the pickup mechanism while trying to unplug the machine or hand tie the twine on the bale. Injuries have also been reported when operators are crushed from bales rolling down the raised front-end loader arms. Other injuries occur when the weight of the bale causes tractors to overturn.

Other farm accidents with crop production equipment include fires and explosions when mishandling fuels and petroleum products, fires from crop debris collecting on hot engine blocks of combines, and accidents on the roadway when moving crop equipment from farm to farm on public highways.

### **Potential Dangers from Handling and Storing Crops**

Increased storage capacities, larger and faster handling grain handling equipment, and

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automation contribute to many potentially hazardous situations during the harvest and storage seasons. Millions of bushels of grains flow from field to storage during the harvest season but one person trapped in grain can stop the flow in a matter of seconds. All too often, farm workers or family members suffocate beneath the surface of grain.

These suffocation accidents typically occur when the victim enters a bin of flowing grain, is unaware of the potential hazard, and is pulled under and covered with grain in a matter of seconds. For example, a high capacity auger can move 5,000 bushels of grain an hour. At that rate, a 6-foot tall person would become submerged in only 15 seconds. Children are at a greater risk. They are shorter, not as strong, and become submerged quicker than adults.

A grain surface may appear solid, but it is not and can act like quicksand. When a single grain is removed from the bottom of a bin or grain wagon, kernels directly above it rush to fill the void, creating a liquid motion. Objects on the surface sink and heavy objects sink faster than light ones. Even if grain is stopped flowing, submerged objects or people are difficult to extract. The force required to remove someone buried below the surface of grain easily can exceed 2,000 pounds, which is about the same as trying to lift a small car.

Gases developing in some grain or silage storage can also present a dangerous situation. When wet grain or high moisture silage is stored, it ferments. Fermentation produces carbon dioxide (CO<sub>2</sub>), a colorless, odorless gas. Carbon dioxide is heavier than air and pushes air out of the bin. This results in an oxygen-deficient atmosphere. If you enter a grain bin where CO<sub>2</sub> is present, it gets into a person's bloodstream, slows down breathing, causes drowsiness, headaches, and even death by suffocation.

Producers should also be aware of other substances that could be harmful to their respiratory system. Crop producers are exposed to a large amount of airborne substances. Dust from crop residue and equipment is an ever-present problem. Molds and fungi from spoiled grain may enter lungs of farm workers. Care should be taken to reduce the amount and kind of particles that may enter the respiratory system. Permanent damage to lungs or allergies may be the result.

Sun safety is probably the most overlooked and least discussed problem with those people in agriculture who work outside, especially in the production of crops. Many people recognize the importance of protecting their skin from the sun's harmful rays, but crop producers are probably the largest group of individuals to abuse their skin and expose it to sun damage. Sun safety practices should include reducing skin exposure by wearing protective clothing and/or sunscreen.

### **Precautions to Prevent Personal Injury from Chemicals, Equipment, and Crop Handling and Storage**

The following list of precautions are prepared for crop producers' consideration when working with chemicals, equipment, and the handling and storing of crops.

#### *Chemicals*

1. Store pesticides and insecticides in locked and posted facilities where children and other untrained people cannot get to them.
2. Storage areas should be on the first floor to prevent contamination from a possible leaky container.
3. The storage area should be cool, dry, and out of the direct sunlight.
4. Sacks, cartons, and fiberboard boxes of chemicals should be on pallets or shelves off the floor.
5. An exhaust fan for ventilation should be available in storage rooms.
6. An adequate supply of water and detergent should be available for routine use for cleaning equipment and people working with the chemicals.
7. Material such as vermiculite, absorbent clay, sawdust, or activated charcoal should be on hand for cleanup of possible spills or leaks.
8. A shovel, dust pan, and proper type of fire extinguisher are other essential items.
9. Do not store or use chemicals near food for human consumption, animal feed, or veterinary supplies.
10. If spills or leaks occur, contact extension specialists or a DNR representative after cleanup.
11. Make sure all spray equipment is in good working order and check valves, lines, and seals.

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12. Wear approved safety equipment and clothing when working with open containers and mixing and spraying.
13. Use recommended cleanup procedures on equipment, clothing, and protective devices after application is complete.
14. Follow the rules for properly disposing of pesticide and insecticide containers after they are emptied.
15. Avoid surplus chemicals; mix only enough for the intended job.
16. Make sure the proper handling and safety equipment is used when working with anhydrous ammonia.
17. If ammonia contacts skin or eyes, flush the exposed area immediately and constantly with fresh water. Water containers should be kept on hand when in the field.
18. If ammonia contacts the body or is breathed, contact a physician immediately after preliminary treatment.
19. Make sure all hoses and valves used in the transfer of anhydrous ammonia are in good working order.
20. Let someone know where and when you are working with anhydrous ammonia and have them check on you during the day.
21. Make sure nurse tanks are secured to the towing vehicle and moved properly.
13. Use a tractor with a protective cab or four-post rollover structure.
14. Always disengage power take-offs and shut off the tractor before dismounting.
15. Be prepared for fire by carrying a Class ABC extinguisher on equipment.
16. Maintain proper settings and speed on all power equipment used in planting and harvesting.

### *Storing and Handling Grain*

1. Always lock all access doors to grain storage structures.
  2. Never allow children to play on or ride grain wagons. This applies to grain storage areas also.
  3. Lock out all power to grain handling equipment when not in use. This also discourages grain theft.
  4. Always use the buddy system when unloading and loading grain. Notify a second person where you are at all times.
  5. Never enter a bin when grain is caked or spoiled. This creates a grain bridge that can collapse at any time.
  6. Apply suffocation hazard decals to all grain wagons, bins, and other storage structures.
  7. Be prepared with safety equipment to rescue workers who may have been caught in flowing grain.
  8. Train farm workers in proper rescue techniques. This includes CPR training.
  9. Wear protective ear equipment around grain dryers because of the noise they create.
  10. Be prepared for fires around grain drying equipment with approved fire extinguishers.
  11. Be careful when transporting portable augers as to not create a hazardous condition. This would include not making tight turns and contacting electrical wires.
  12. Wear tight-fitting clothing when working near power augers.
  13. Wear protective breathing apparatus when using fumigants in empty grain bins.
  14. Also wear the breathing equipment when working with dusty or moldy grain to prevent allergic reactions.
  15. The most successful way to rescue victims from grain bins is to cut large holes in the bin 4 to 5 feet off the ground. Use an abrasive saw, an air chisel, or the front end of a bucket loader to gain access. Only use a cutting torch as a last resort because of the dangers of fire and explosion.
- ### *Equipment*
1. Carefully read the safety section of operator manuals.
  2. Inspect equipment completely and often for safety hazards, also while in operation.
  3. Make sure all operators are properly trained in the operation of the equipment.
  4. Use equipment for only the purposes for which it is designed.
  5. Check all guards and safety equipment to be in place and working.
  6. Do not take shortcuts or ignore safety warnings (lights, noises, etc.).
  7. Look for and eliminate secondary hazards (spills).
  8. If a hydraulic line breaks, recognize that gravity may allow equipment to move.
  9. Do not allow children to play on equipment or ride with operators.
  10. Check hay baler's manuals for charts regarding the size of tractor or loader to safely lift and transport large round bales.
  11. Drive on a contour when baling to prevent a released bale from rolling down a slope.
  12. Never try to stop a rolling bale.

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### Government Agencies That Regulate and Enforce Environmental and Safety Issues

The Occupational Safety and Health Administration (OSHA) establishes standards of compliance for safe and healthful working conditions. OSHA provides free, on-site consultations to businesses that include education and safety assistance to identify and eliminate workplace hazards. A producer who employs one or more persons has the legal responsibility to ensure safe and healthful working conditions under the Williams-Steiger Occupational Safety and Health Act of 1970. An amendment to the act also prevents OSHA from spending any funds to issue or enforce any regulations that apply to any person who farms and employs 10 or fewer employees.

This amendment does not eliminate the requirement that an agricultural producer comply with the Act since the amendment does not eliminate rules or regulations. This amendment does not eliminate the possibility that an employee could use the regulations in a lawsuit against the employer. For this reason, all farm employers should comply with the Act and provide their employees with a safe and healthful place to work.

The Natural Resources Conservation Service (NRCS), a division of the U.S. Department of Agriculture, helps prevent soil erosion from wind and water. The NRCS works with local soil and water conservation districts who assist in developing individual conservation plans and other conservation measures.

The Environmental Protection Agency (EPA) protects the nation's land, air, and water systems. The EPA formulates environmental standards and enforces federal environmental laws.

The Department of Natural Resources (DNR) fosters the prudent use and protection of air, land, water, cultural and energy resources. The DNR also aids in preventing pollution and protects the public from harmful emissions and waste disposal practices.

### Summary

Statistics show that agricultural workers are in one of the most hazardous occupations. Too many crop producers suffer injuries each year. The major cause is the worker's lack of education regarding proper safety practices to observe with agricultural chemicals, equipment, and the handling and storing of grain. After studying this lesson, students should be more aware of the many dangers in agriculture and the importance of safety instruction.

### Credits

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## *Safety, Environment, and Legal Issues*

## ***Lesson 2: Protecting the Environment***

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### ***Lesson 2: Protecting the Environment***

Crop production has a large impact on our environment. Producers need to be aware of how production activities affect the environment and implement management practices to minimize the impact. Government agencies are available for assistance to producers to help regulate environment issues.

#### **Crop Production Activities That Affect the Environment**

Crop producers today are probably more informed and concerned about the environment than in any other time in history. Environmental problems in agriculture are reported in the media almost every day. There are four major resources polluted by agriculture. They include air, water, soil, and the aesthetic value (natural landscape beauty) of the rural environment.

If pollution is to be stopped, important steps must be taken to correct the problem. The first step is to become aware of the major sources of pollution. The five largest contributors to agricultural pollution are toxic products, soil loss, waste products, discharged water, and litter. Old chemical containers and tractor tires would be two examples of litter that concern agricultural environmentalists. Of these five contributors, toxic products and soil loss are the two major causes of pollution affecting the agricultural environment.

Toxic products are substances that contain poisons or have the potential to poison animals or plants. These include pesticides and insecticides used by crop producers. It can also include engine exhaust from large farm equipment. The exhaust released into the air contains harmful substances. The smoke from farm engines is not as concentrated as the exhaust in cities; therefore, few think of this as an air-polluting source. However, as with emission controls on automobiles, it may be a matter of time before exhaust fumes on farm equipment are controlled and filtered.

Agricultural chemicals can give off toxins if not used properly. Excessive fertilizer use should also be considered a source of toxic pollution. Excessive fertilizer can get into rainwater and wash into streams. If overused, insecticides and herbicides can drift into streams and lakes and

build up in the soil. Always use agricultural chemicals and fertilizers according to directions and never use them when they are not needed.

Soil loss is attributed to the overuse or incorrect use of tillage methods in crop production. Wind and water can blow or wash exposed soil away. In addition to fertility loss, soil particles can cause pollution by getting in the air, streams, and lakes. Living organisms in the water may be damaged by muddy water because the natural processes of the water are disturbed. Oxygen levels may be too low to support aquatic life. Soil particles can even end up in the ocean where they change the environment of sea life.

#### **Management Practices to Minimize Environmental Impact**

Using appropriate management practices on farms and ranches can limit the pollutants removed by runoff that can infiltrate groundwater and streams. Examples of management practices include soil conservation management, waste management, and nutrient management.

Soil conservation management includes tillage practices that can reduce the movement of pollutants and diminish soil particle detachment by protecting the soil from the adverse effects of wind, rain, and runoff. Tillage practices can increase the infiltration and movement of soluble nutrients and pesticides to the root zone. Examples include conservation tillage, contour farming, filter strips, and strip-cropping. Structural practices such as terraces, grassed waterways, and diversions are designed and built to control the flow and volume of runoff water. This can increase the infiltration and movement of soluble nutrients and pesticides to below the root zone.

Waste management practices on farm operations are mostly directed to livestock producers. Livestock produce tons of waste each year and are particularly problematic on large hog confinement operations. However, crop producers as well should be concerned about controlling the waste or overuse of possible toxic substances used for pest and weed control. Again, the major management practice to observe with these products is to follow directions on usage and dispose of the plastic jugs, bags, or cans properly after product use.

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Crop producers should be concerned about nutrient management. Plants can only use a certain amount of fertilizer for optimum growth. Overusage of fertilizers may not only harm the plant but also carry over in the soil or be transported with rainwater to ponds, streams, and lakes. Many fish kills have been reported by excessive fertilizer usage. Another major concern is the effect excessive nutrients of fertilizer may have on groundwater. Many cities or towns rely on groundwater as their primary drinking source.

### **Government Agencies That Regulate and Enforce Environmental Issues**

There are several governmental agencies that play a part in regulating and enforcing environmental regulations that affect crop producers. This discussion will be limited to four major agencies. They are the Natural Resources Conservation Service, the Missouri Department of Natural Resources, the Environmental Protection Agency, and the Missouri Department of Conservation.

The Natural Resources Conservation Service (NRCS) is a division of the U.S. Department of Agriculture. There are 19 programs within the NRCS that may play a part in the conservation and protection of our country's natural resources. Some major programs that would affect crop producers are listed below.

**Conservation Technical Assistance** - This program helps landowners plan and implement practices to reduce soil erosion, improve soil and water quality, improve and conserve wetlands, enhance fish and wildlife habitats, improve air quality, improve pasture and range conditions, reduce upstream flooding, and improve woodlands.

**Conservation Farm Option** - This is a pilot program for feed grain, wheat, cotton, and rice producers to improve the soil, water, and related resources on the farms. This is a voluntary program. Producers sign a 10-year contract and receive annual payments for implementing measures developed in their conservation plan.

**Conservation of Private Grazing Land Initiative** - This program provides technical and educational assistance to those who own private grazing land. Assistance is provided to improve grazing land, protect soil from wind and water erosion, use energy-efficient ways to produce food and fiber, conserve water, and improve habitats for wildlife.

**Conservation Reserve Program (CRP)** - The CRP program is established to encourage producers to convert highly erodible cropland to vegetative cover. This is done to enhance forest and wetland resources, reduce sedimentation in streams and lakes, improve water quality, and enhance wildlife habitats.

**Farmland Protection Program** - This program provides funds to help purchase development rights to keep productive farmland in agricultural uses.

For more information about the other programs available through the NRCS, crop producers may contact a local USDA office and ask for the Natural Resources Conservation Service informational booklets.

The Missouri Department of Natural Resources works with producers through their Agricultural Assistance Unit. This technical assistance program assists producers with their environmental needs. Much of their assistance includes guidance for environmental permits, natural resource stewardship advice, third-party site environmental assessments, and aid with referrals to other government agencies and programs when and where they are appropriate. Assistance may include helping crop producers find information to aid them with environmental problems, provide assistance in analyzing activities for regulation compliance, provide workshops to inform producers of environmental regulations, and help coordinate the producer's activities with other environmental organizations.

The Environmental Protection Agency (EPA) has the mission to protect human health and to safeguard the natural environment (air, water, and land) upon which life depends. The EPA deals heavily with enforcing state and federal laws developed to protect the environment, regulations that were developed using the best available scientific information.

The Missouri Department of Conservation (MDC) has the primary mission of protecting and managing the fish, forest, and wildlife resources of our state. They also serve the public in facilitating their participation in resource management activities. The MDC provides many opportunities for landowners and crop producers to learn how to manage the state's resources.



## Lesson 2: Protecting the Environment

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### Summary

Most crop producers are very aware of the environmental concerns they face with their occupation. The protection of the air, water, soil, and the aesthetics of their land are important to them. Through educational efforts, producers must understand the causes of environmental problems and how they may guard against their effect on the producer's operation. Most problems with crop production are related to toxic chemicals and soil pollution or loss. There are several governmental agencies that help to oversee or regulate the use of the land to reduce or eliminate harmful activities that affect the crop producer's environment. These include the NRCS, the EPA, the DNR, and the MDC.

### Credits

Lee and Turner, *Introduction to World Agriscience and Technology*, 1<sup>st</sup> ed., Danville, IL: Interstate Publishers, Inc. 1994.

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### **Lesson 3: Knowing the Law**

During a crop production cycle, the producer may face instances when certain aspects of the production of that crop will demand knowledge of laws governing the application of chemicals, possible property and fencing rights with neighbors, and the use of streams that are common to several producers. This lesson will deal with some of those issues and present some solutions to some possible problems that may arise.

#### **Legal Requirements for Handling Chemicals, Wastes, and Equipment**

Handling and applying pesticides correctly and safely require special knowledge and skills. Producers or individuals who apply and/or supervise other pesticide applicators must be sure pesticides are handled properly and safely. It is important to be familiar with all state and federal laws regulating the use, storage, transportation, application, and disposal of pesticides.

Federal laws and regulations set the standards for pesticide use. States have the right to be stricter than federal law but not more lax. The EPA regulates the use of pesticides. This regulation is mandated under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). FIFRA governs the registration of pesticides. No pesticides may be marketed in the United States until the EPA approves the registration request from the chemical company wishing to market it. Key provisions of FIFRA:

- Require the EPA to register all pesticides, each use of all pesticides, and approve the product label
- Require the classification of all registered pesticides as either general use or restricted use
- State that all pesticides must be used only as directed on the labeling
- Require users of restricted use pesticides to be certified applicators or work under the direct supervision of a certified applicator
- Provide penalties for actions contrary to its provisions
- Give the EPA authority to develop regulations, which are interpretations of the law and have the force of law

In Missouri, pesticides are registered under the provisions of the Missouri Pesticide Registration Act. Pesticide use is regulated under the provisions of the Missouri Pesticide Use Act. These two acts bring Missouri into compliance with FIFRA. The acts are administered by the Missouri Department of Agriculture, Division of Plant Industries, Bureau of Pesticide Control.

According to Missouri State Statutes (Chapter 281), persons working with restricted chemicals must be certified to do so under one or more of the following types of licensing procedures: as a certified commercial, a certified noncommercial, a certified public, or a certified private applicator. The Missouri Department of Agriculture establishes minimum criteria for these types of licenses. It also determines the curriculum and topics that must be included in the training program for applicator certification. These topics include:

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

Once the applicator has been through the training program and is certified, the training must be repeated every 5 years. If an employee has a valid, EPA-approved training card that has been issued during the last 5 years, no further training is required.

#### **Legal Liabilities if Chemicals, Wastes, or Equipment Is Mishandled**

If FIFRA or any regulation under it is not adhered to, individuals are subject to civil penalties. Fines can be as much as \$5,000 for each offense (\$1,000 for private applicators). Before the EPA issues the fine, a hearing can be held in the local city or county. Some violations of the law can be subject to criminal penalties. For commercial applicators, these penalties can be as much as \$25,000 or 1 year in prison, or both. Private applicators can have penalties of \$1,000 and/or 30 days in prison. States have the option of

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establishing higher penalties. All major pesticide spills are required by law to be reported immediately to the U.S. Environmental Protection Agency, Region VII Office in Kansas City. The following information should be reported.

1. Name, address, and telephone number of person reporting
2. Exact location of a spill
3. Name of company involved and location
4. Specific pesticide spilled
5. Estimated quantity of pesticide spilled
6. Source of spill
7. Cause of spill
8. Name of body of water involved or nearest body of water to the spill area
9. Action taken for containment and cleanup

Many pesticide labels list an emergency telephone number that provides direct access to the manufacturer and people who know how to manage emergencies for a given product. If the spill occurs on a highway, call the highway patrol or highway department immediately. If the spill is on a county road or city street, call the sheriff, city police, or the local county or city fire department. These authorities are trained for such emergencies and will be able to assist in the cleanup.

### **Legal Land Description**

The location of a parcel of land in the United States may be described by one of two methods. In the 13 original states in the East and in some southern states, the land is surveyed in the "indiscriminate metes and bounds" system. This system uses natural land features, such as trees and streams, as well as neighboring land owners, along with distances, to describe plots of land.

Most states, including Missouri, uses the township-range system. To understand this system, common terms need to be defined.

*Base line* - The reference or beginning point for measuring north or south townships

*Principal meridian* - The reference or beginning point for measuring east or west ranges

*Township lines* - East to west lines that mark township boundaries

*Range Lines* - North to south lines that mark township boundaries

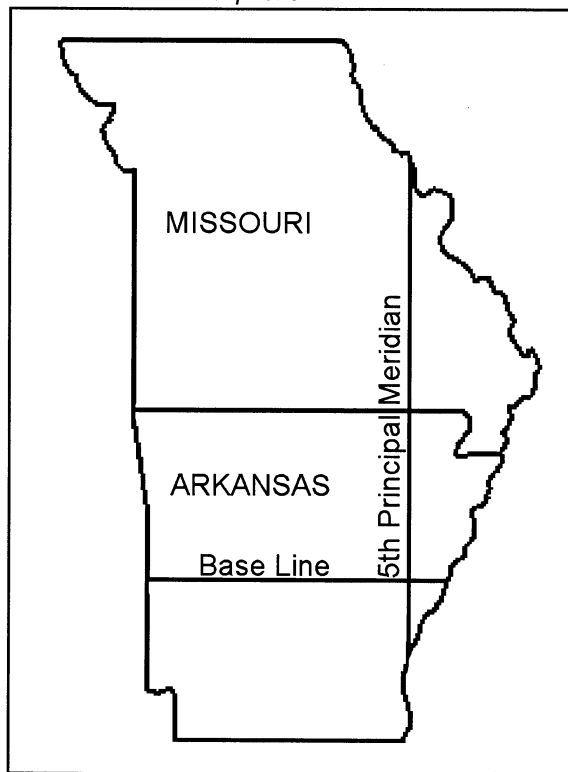
*Range* - Assigned to a township by measuring east or west of a principal meridian

*Township* - Thirty-six sections of land arranged in a 6 by 6 array, measuring 6 miles by 6 miles. Sections are numbered beginning with the northeast-most section, proceeding west to 6, then south along the west edge of the township and to the east.

*Section* - Basic unit of the system; a square tract of land - 1 mile by 1 mile, containing 640 acres

Figure 3.1 indicates that the 5<sup>th</sup> principal meridian runs north and south through eastern portions of the state of Missouri and that a base line is located running through the middle of Arkansas. These are used to locate parcels of land in Missouri.

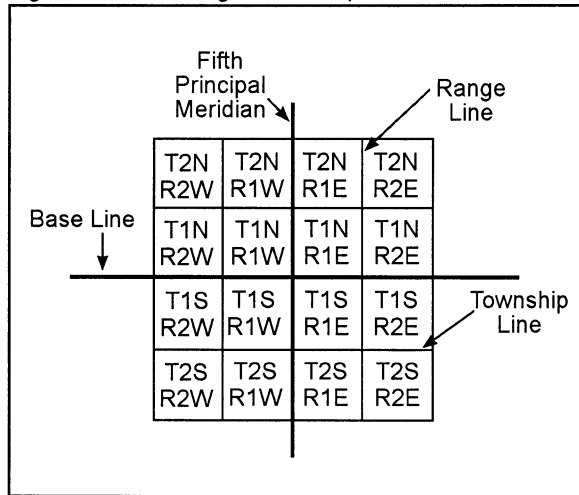
*Figure 3.1 - Base Line and Principal Meridian Affecting Missouri Land Descriptions*



The land description generally starts with the smallest part of the description and proceeds to the largest definition. For example, if we located the northeast 1/4 of section 3 in township 2 north, range 2 west of the 5th principal meridian, we notice that piece of land encompasses 160 acres. Figure 3.2 indicates the location of township 2 north, range 2 west of the 5th principal meridian. Figure 3.3 gives the location of section 3 in that township, and the 160 acres of land in the northeast 1/4 of section 3 is indicated on Figure 3.4.

## Lesson 3: Knowing the Law

Figure 3.2 - Locating a Township



The use of the Township and Range method of legal land descriptions is required on land abstracts in Missouri to verify and indicate ownership.

### Legal Liabilities for Crossing Property Lines, Fencing, or Other Damage

Fencing duties and boundary locations have been the subject of quarrels between neighbors for centuries. Sometimes there are many questions regarding those duties and rights. Answers are mostly supplied by Missouri state statutes and court decisions. They are supplemented by conjecture where the statutes and cases fail to provide clean answers.

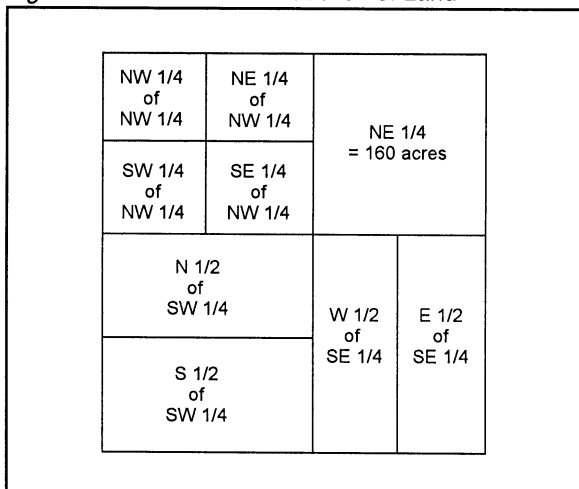
Figure 3.3 - Section Location in a Township

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

Most disputes arise with animals crossing property lines and causing damage on adjoining property. Liability can sometimes be difficult to resolve. Crop producers as well as all agricultural property owners should acquire a copy of the University of Missouri Extension Guide G810 *Missouri Fencing and Boundary Laws* for reference. This guide gives information about general fencing laws; duties and liabilities of livestock owners; the definition, building, and maintenance of a "divisional" fence; and the use of streams as boundaries.

Solutions to most property line, fencing disputes, or questions of damage lies in a cooperative attitude with neighboring owners. When an honest difference of opinion exists, there is no substitute for an attorney's skill and advice. When a dispute arises or seem likely to arise, consult an attorney.

Figure 3.4 - Divisions of a Section of Land



Nearly every year for the past 25 years in Missouri, there has been at least one fencing or property line "bill" introduced in the General Assembly, yet no bill has achieved passage in both houses to become enacted. Producers are encouraged to contact their state representatives and senators with fencing or boundary law recommendations.

### Legal Liabilities of Polluting Streams and Groundwater

Recently, protection of both groundwater and surface water has received a great deal of attention as the scope of contamination has increased. The United States relies on ground and surface water for more than half of its drinking water and for more than a quarter of its total fresh

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water needs. The Environmental Protection Agency (EPA) estimates that 1% of the nation's groundwater supply is already contaminated and is rapidly increasing.

A major source of ground and surface water contamination is the use and misuse of pesticides and fertilizers. Producers generally rely heavily on groundwater for their own consumption as well as for irrigating crops and watering livestock. Polluted groundwater causes contamination of wells and therefore affects the drinking water for producers, their families, and their livestock. Causes of pollution to streams and groundwater come from two sources, point and nonpoint. Point sources can be traced back to a specific source of the pollution such as a chemical spill. Nonpoint sources cannot be traced back to a specific source. An example of nonpoint pollution is chemical runoff from fields.

Misuse of chemicals can degrade groundwater in several ways. Irrigation backflow, where chemicals are mixed with the irrigation water, can cause serious groundwater pollution. Installation of backflow prevention equipment (valves) is an effective deterrent. Overapplication can cause excess chemicals to leach or percolate into the water table. Runoff can also pollute streams flowing from the producer's property, across neighbors' property, and into larger streams or rivers. Adherence to the pesticide's label, such as following proper dosage instructions, can greatly reduce the likelihood of groundwater and surface water contamination. Highly soluble nitrates can also leach into groundwater, which is an increasing problem in the Midwest.

Other potential sources of contamination occur when containers are improperly cleaned or disposed of and when pesticides are mixed and loaded in an area where residues are likely to reach ground or surface water. Some pesticide labels and some state statutes note the distances from wells for safe mixing and loading of pesticides. Again, close attention to instructions and ordinances can reduce or eliminate potential of ground and surface water pollution.

The attention given to this problem is reflected in the attitudes of the courts and state legislatures toward polluters. Violations of water protection laws and regulations lead to imposition of harsh legal judgments against polluters, especially for liability and negligence. This is not just a problem with high-level violators. Violations of small

operators have a cumulative effect and contribute to the overall problem.

Violations are classified as civil and criminal violations. Civil violations may receive a judgment of up to \$10,000 per day in fines and are based on the fact that the violation occurred and do not require the element of intent or negligence. If intent and negligence can be proven, then the violation may be criminal and the violator will receive a fine of up to \$25,000 and possible imprisonment of 2 years. Chapter 644 of the Missouri State Statutes is a complete reference regarding stream and groundwater pollution.

### **Summary**

Crop producers must be aware of the legal issues that may be associated with the use of agricultural chemicals. Regulation of chemical use is under the jurisdiction of the EPA and is mandated under the Federal Insecticide, Fungicide, and Rodenticide Act. Strict guidelines must be followed if a problem develops. Certain steps must be taken if a problem occurs, such as a chemical spill; there may be severe penalties imposed for that problem. Producers must also know how the locations of parcels of land are legally described in an abstract and that they have a responsibility to know and respect the location of the property boundaries. Ground and surface water pollution may be from a point source such as a chemical spill or a nonpoint source such as fertilizer or chemical runoff from a field. These problems may also carry a civil or criminal penalty.

### **Credits**

*Applying Pesticides Correctly-Missouri Core Manual.* (MX328) University Extension. Columbia, MO: University of Missouri-Columbia, January 1997.

*Clean Water Laws, Regulations, and Support Documents.* Missouri Department of Natural Resources, Water Pollution Control Program <[www.dnr.state.mo.us](http://www.dnr.state.mo.us)> 6 June 2000.

*Missouri Fencing and Boundary Laws.* (G810). University Extension, Columbia, MO: University of Missouri-Columbia, December 1999.

*Missouri Guidelines for Pesticide Recertification Programs.* Missouri Department of Agriculture, 2000.