



INJURIES INVOLVING YOUTH

HOSTA Task Sheet 2.1

Core

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

“I’m always careful! I’ll never suffer a work injury!” You may say this to yourself as you begin to read this task sheet. But this same thinking is what injures and kills hundreds of workers in farm accidents each year.

This task sheet looks at the numbers of fatalities and injuries that have caused great concern in farming and ranching.

The Situation

The work death rate per 100,000 workers regularly ranks agriculture among the most hazardous industries in the U.S. Youths are included in these injury numbers. Other industries that have many serious work hazards, like mining and construction, do not have a youth injury problem because youth younger than 16 do not usually work in these industries.

Youth Farm Injury Statistics

Accurate numbers of youth work fatalities and injuries are difficult to determine because youth do not work regularly enough or in large enough numbers to be counted in most official injury statistics. Special studies relying on voluntary cooperation by farmers are done to find out about youth farm work injury. As a result, the statistics that are developed are considered lower than what the actual numbers may be. The facts below are national data.

Fatality Facts

- Currently, estimates show that slightly more than 100 youth younger than age 20 are killed each year in farm work-related incidents.
- Between 1995 and 2002, 907 farm deaths among youth were documented (most between 16 and 19 years of age).
- 25% of the fatalities involved machinery, 17% motor vehicles (including ATVs) and 16% drowning.
- Males, age 20 and younger, accounted for most of the fatalities.

Injury Facts:

- In 2009 over 15,000 youth injuries occurred on farms.
- Falls accounted for 40% of the injuries.
- Hand, head, and leg injuries are typical of the injury.
- Livestock and dairy farms have more injuries than crop farms

State Data

Contact the safety specialist at your land grant university to learn of farm injury statistics for your state.



Figure 2.1.a. Youthful workers are called upon to complete many tasks that may present several hazards. For example, this tractor does not have a ROPS or a seat belt.

If you are studying this task sheet, you are part of the ag industry. Don't become part of the sad statistics.

Learning Goals

- To learn about the numbers and types of injuries associated with youth working in agriculture

Related Task Sheets:

Safety and Health Regulations	1.2
Hazardous Occupations Order in Agriculture	1.2.1
Age-Appropriate Tasks	2.4

How Can I Use This Information?

More than 2 million youths younger than age 20 are potentially exposed to agricultural hazards each year according to estimates by the National Institute for Occupational Safety and Health. Farm family workers, hired workers, children of seasonal and migrant workers, and farm visitors can all encounter a wide range of hazards. Machinery, livestock, farm storage structures, and farm ponds all present unique farm safety challenges.

Follow these safety suggestions to avoid becoming a farm injury or fatality statistic.

1. Identify agricultural hazards in

the work area to which you are assigned.

2. Develop a plan to deal with the hazards you identified.
3. Use safety practices all of the time.
4. Think about the consequences of your actions before taking a chance.
5. Reinforce safe work habits by helping others to work safely.
6. Wear personal protective equipment suggested for the job.
7. Speak up for your safety on the job.

Being safe is largely a matter of choice.



Figure 2.1.b. Agriculture presents unique safety challenges. You are challenged to work safely in many conditions. Not all work is done with tractors and machinery.

What are the consequences of your unsafe actions?

Safety Activities

1. Review what you have read by completing this quiz:
 - a. True or False? Most fatal injuries to farm youth occur to females.
 - b. What are the three leading causes of injuries?
 - c. True or False? Most farm injuries involve working with fruit trees.
 - d. What percentage of farm fatalities involved machinery?
2. Using the Internet sites www.nsc.org (National Safety Council) and www.niosh.gov (National Institute for Occupational Safety and Health), locate information comparing the work fatality of agriculture with other industries. Use a computer to make a chart or graph to summarize the data. If you do not have access to a computer, make a full-size poster of the information to share with your group.

References

1. National Children's Center for Rural and Agricultural Health and Safety, 2013 Fact Sheet, Childhood Agricultural Injuries.
2. Farm and Ranch Safety Management, John Deere Publishing, 2009. Illustrations reproduced by permission. All rights reserved.

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RISK PERCEPTION

HOSTA Task Sheet 2.2

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

Why do people take risks? Has past experience taught you that taking risk is acceptable? Have you also learned that risk-taking increases your chances of injury?

Risk can be measured. The odds of injury and a prediction of the consequences of risk-taking have been studied by safety specialists. A person's risk perception (how we judge risk) about work risks comes from personal judgments made about a work situation.

This task sheet discusses risk-taking and the perceptions people have about risks. Risk-taking behavior is a topic that all workers must understand.

The Nature Of Risk

No one can deny that all people take risks. We risk our lives and health each day. Some risks are minor. We don't expect that everyone will smash their finger in the car door. Other risks are major. Driving too fast increases the risk of a crash and possible injury. We are exposed to risk each day.

Risk can be defined as "the chance you take of becoming injured by a hazard."

Risk measurement starts with probability (odds or chances). What are the odds or chances that we can be injured by a specific hazard? Most people do not judge

the probability of risk very well. Odds of risk can be placed in categories. See page 2.

Risk measurement also includes how serious you can be injured by a hazard. Risks can be great (death) to negligible (splinter). Page 3 discusses the severity of the consequences of risk.

Risk perception is an important concept in safe work activity. Human perceptions of risk are not very accurate.

Our judgments about risks are based upon several things. One important factor is how familiar we are with a hazard. If we think we know a lot about a hazard because we are often exposed to the hazard, we often underestimate the degree of risk.

Another factor is whether or not we are voluntarily interacting with a hazard. When we voluntarily take a risk, we usually underestimate the chances of being hurt.

A third factor is how much attention a hazard brings if it hurts someone. We tend to think that there is a great risk in flying in an airplane (kills many people at one point in time and gets more attention). We underestimate the hazard of driving a car. An automobile crash may kill one or two persons at a time but receive only local attention.

A person must understand risk, the probability of danger, and the personal consequences which can result.



Figure 2.2.a. We view some jobs as more hazardous than others. When we understand that the consequences of taking a risk can lead to injury or death, we improve our safe work habits greatly.

To reduce risks, a person must understand the consequences of their own actions.

Learning Goals

- To understand how we think about risk

Related Task Sheets:

The Work Environment	1.1
Injuries Involving Youth	2.1
Reaction Time	2.3
Age-Appropriate Tasks	2.4

What are the odds you will be injured while working?



Figure 2.2.b. What are the odds that you will be hit by lightning? Using the rating system below, a measure of the probability of risk would be determined by how often you were exposed to the dangers of a lightning storm. Since most people take shelter during a lightning storm, the probability is remote.

Probability

Work, and all other activity, involves risks. Some risks are very small. Other risks are great. What are the odds (or chances) that you will be injured while engaged in an activity?

The subject of probability is a study of the odds or chances of a single event actually occurring out of the possible times it could occur. For example, if you roll a single die (dice), the odds of rolling a 1 is 1 out of 6.

Safety experts have rated the probability of exposure to risks in several ways. One rating system is discussed here.

This rating uses a time frequency that can be measured.

The frequency rating system includes these categories:

- **Frequent exposure** – Probability is likely/possible on a daily basis. As an example, daily use of a PTO-powered implement is a frequent exposure to this hazard.
- **Probable exposure** – Probability is likely/possible on a weekly or monthly basis. As an example, weekly or monthly inspections of the silo unloader gives a probable exposure to the hazards of a fall.
- **Occasional exposure** – Probability is likely/possible over a year or many year time period. As an example, a yearly skiing trip provides the occasional exposure to the risk of a ski injury.
- **Remote exposure** – Probability is not likely, but is possible

over many years, even a lifetime. As an example, the painting of a barn roof is done only rarely by the owner of the barn; so the exposure to a fall injury is considered a remote probability. The barn roof painter, however, is frequently exposed.

- **Improbable exposure** – Probability is unlikely, but still possible. As an example, nuclear power radiation poses an improbable exposure.

From these probability ratings we can see that the less exposure to risk that we have, the less likely the odds of injury or death.

Select a work activity which you perform, and rate its probability for your exposure to risk.

Consequences of Risk Exposure

Just as risk exposure probabilities can be assigned measurement categories (page 2), the consequences of risk exposure can be assigned a measurement category. One method to rate the consequences of risk exposure for severity of the outcome is discussed here.

Categories of consequences of severity of risk exposure can include:

- Catastrophic severity – Injury or death is imminent (near), and there is potential for widespread loss. As an example, death from operating a non-ROPS tractor that rolls over poses a great risk.
- Critical severity – Severe or permanent injury, long-term illness, and temporary property loss is possible. As an example, trying to unplug a corn picker that is running can lead to entanglement and potential loss of an arm or leg.
- Marginal severity – Less serious risk exposure with shorter term losses. As an example, falling from a horse and breaking an arm is less severe than having an arm amputated due to a PTO entanglement.
- Negligible severity – Risk exposure event results in need for first aid, or property losses that are easily repaired. As an example, a splinter from plywood can be treated with basic first-aid supplies. If the splinter caused the plywood to be dropped, the loss is slight.

Select a work activity which you perform, and rate the severity of the risk.

The probability of risk exposure and the consequences of the risk can then be treated as an equation with a resulting answer (what to do to reduce risk). See if you can use the Risk Matrix Table (page 4) to answer the question, “What is the risk of climbing over a turning, unguarded PTO shaft every day?”

Can you rank all of your work activities with this matrix?

Reducing Risks

People take risks everyday. Some risks are seen as acceptable because of past experiences, our own notions and overconfidence of the risk situation, and our willingness to accept the risk.

The following points are important to consider in reducing the risk to which a young worker is exposed.

1. Recognize your own traits that increase risk. Are you impatient in getting work done?
2. Recognize when you need more training to do a job. Risk-taking behavior can be reduced with knowledge of hazards.
3. Remove hazards from the work place. The fewer hazards that exist in the work zone, the less risk of danger that exists.
4. Use safe technology correctly. Modern farm machines are engineered to reduce risks to the operator. The operator must use this technology safely.



Figure 2.2.c. Modern farm equipment has many more safety technologies than older machinery. Future advancements may include sensors that detect when a person enters a hazardous area. Then the tractor and machine may shut down to keep the operator or bystander from harm.

Risk can be equated with expected damage or injury consequences. (See page 4)

Applying A Risk Matrix Table to Reduce Risk Probability

Severity → Frequency ↓	Catastrophic (1)	Critical (2)	Marginal (3)	Negligible (4)
Frequent (A)	Shut down immediately; correct problem	Shut down immediately; correct problem	Correct ASAP	Correct sometime
Probable (B)	Shut down immediately; correct problem	Correct ASAP	Correct soon	Correct sometime
Occasional (C)	Correct ASAP	Correct soon	Correct sometime	Correct sometime
Remote (D)	Correct sometime	Correct sometime	Correct sometime	Correct sometime
Improbable (E)	Correct with preventative maintenance	Correct with preventative maintenance	Correct with preventative maintenance	Correct with preventative maintenance

Table 2.2.a. The Risk Matrix Table provides a means of evaluating a risk and what to do to reduce the consequences of the risk exposure.

Safety Activities

1. Write a short essay about a time or event in which you took a risk.
2. From your essay, what were your feelings after you had time to look back on the risk you took. Write a few notes about your feelings.
3. Make a list of risk-taking situations that you have experienced. Place these examples into the appropriate risk category.
4. What do you recognize about yourself that might be an indicator that you are a risk-taker?
5. Take a safety tour of a farm area. List the hazards, and then list the chores that you find risky.

References

1. Safety and Health for Production Agriculture, Dr. Dennis J. Murphy, 1992, American Society of Agricultural Engineers, St. Joseph, Michigan.

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REACTION TIME

HOSTA Task Sheet 2.3

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

How fast can you react? **Reaction time is defined as the time it takes for a person to react to an event or an emergency.**

Emergencies occur without warning. Our past experience, along with our reaction time, determines how well we respond to an emergency event.

This task sheet discusses reaction time as it relates to you and the speed of the machines with which you work. Machines are much faster than a human's reaction time. There are no super heroes faster than a speeding machine.

Reactions Are More Complex Than You Think

Reacting to an emergency involves a complex sequence of events. Consider when an animal jumps in front of your car as you travel down a road. What happens next?

- Your eye gathers the information, “Animal in road,” and sends a message to your brain.
- Your brain receives the information, processes the information, and sends a response to your extremities (arms and legs).
- Your leg muscles must move your foot from the gas pedal to the brake pedal and begin to push the pedal.

- The vehicle continues to move as you respond until the car finally stops just before you hit the deer—or after you have demolished your car.

Here are a few more examples of emergency situations:

- Accidentally touching a hot stove
- Recognizing that your shirt sleeve is being caught on the drill press chuck
- Realizing that your shoe string is dangling over the PTO shaft that you should not be stepping across
- Pulling a tractor and load onto the highway and seeing a fast-moving vehicle coming your way
- Trying to unplug a corn picker and being pulled into the gathering chains

Emergencies occur anytime and anywhere. Remember, an emergency does not give you time to think about what you will do. You react to emergencies as they occur with no warning or time to plan or prepare for action.

Many factors affect your reaction time. Read further to find out why you cannot beat a machine in an emergency. Your life may depend upon this information.

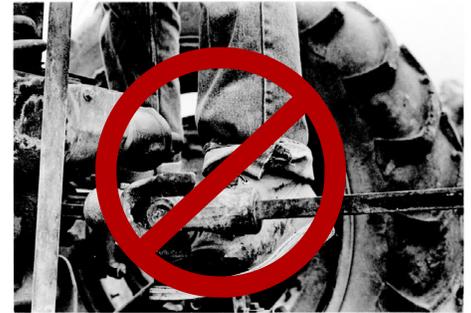


Figure 2.3.a. **Never step across a PTO shaft** which is turning. A severe emergency can develop to which you must react. You cannot beat the machine.

**We are not the
“super heroes”
of television
fame. We are
not faster than
a speeding
machine.**

Learning Goals

- To recognize that personal reaction time is slower than the speed of a machine
- To work safely with attention to safe procedures and sound practices based upon knowledge of the limitations of human reaction time

Related Task Sheets:

Age-Appropriate Tasks	2.4
Mechanical Hazards	3.1
NAGCAT Tractor Operation Chart	4.3
Using PTO Implements	5.4.1

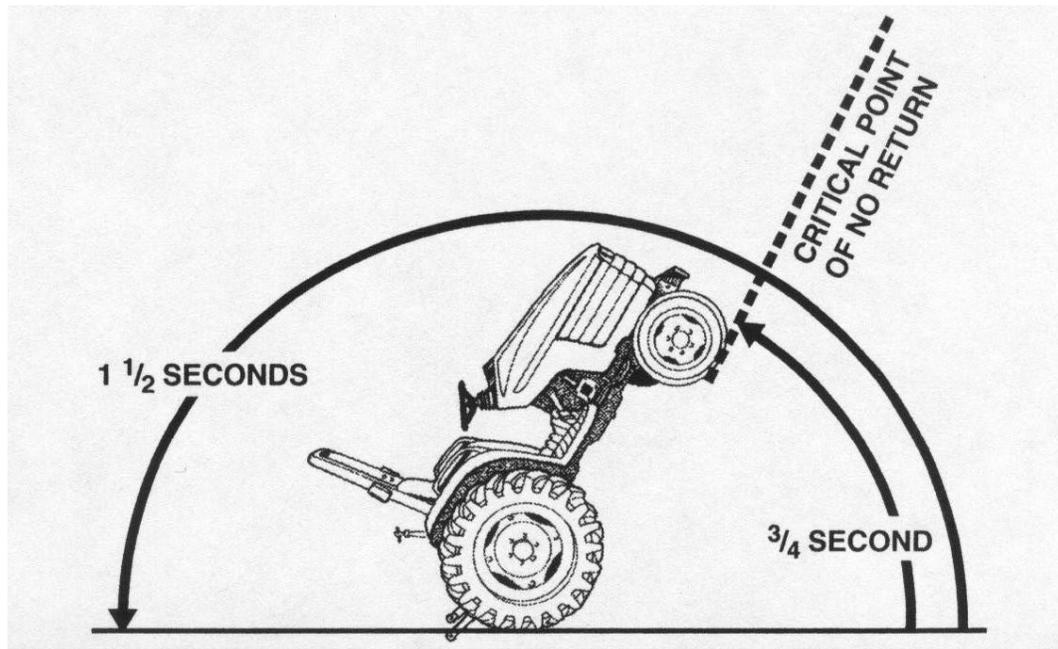


Figure 2.3.b. A tractor can upset in $3/4$ of a second. Our reaction time will not prevent the injury and damage that can occur. Can you tell why the tractor would rear up as shown in this picture? *Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses, John Deere Publishing, 2001. Illustrations reproduced by permission. All rights reserved.*

If your reaction time is $3/4$ of a second, a tractor tipping backward can reach the point of no return before you can react.



Figure 2.3.c. Know your own limitations which can affect your work reactions. *Farm and Ranch Safety Management, John Deere Publishing, 1994. Illustrations reproduced by permission. All rights reserved.*

Factors Affecting Reaction Time

Here are a few factors that affect your reaction time:

- Experience
- Age
- Fitness
- Fatigue
- Illness
- Pre-occupation
- Distraction
- Mood
- Weather
- Drugs/medication
- Alcohol and tobacco
- Machine vibrations
- Poor vision
- Poor hearing

Something To Think About:

- Experienced operators have gained knowledge of potential hazards. Beginning operators may not know when danger exists.
- Healthy, well-rested operators think through hazardous situations more clearly than fatigued workers.
- Distracted or daydreaming operators are less cautious than focused workers.
- Frustrated workers tend to make bad decisions.
- Medications, as well as drugs alcohol and tobacco, can slow your reaction time.
- Machine vibrations have been shown to fatigue operators and reduce reaction time.
- Poor vision and hearing can lead to poor reaction time.

Rotating Parts Are Everywhere

Working around or near shop equipment, machinery or tractors exposes the operator to more hazards than an office worker. Rotating parts are everywhere. Some examples are:

- Grinding wheels
- Drill presses
- Chain saws
- Lawn mowers
- Augers
- Belts and pulleys
- Chains and sprockets
- Gears
- Power take off shafts

All exposed rotating parts of farm tools and equipment spin faster than you can pull away should you become entangled.

PTOs and Reaction Time

Now is a good time to ask, “Are you faster than a speeding machine?” “Can you react faster than the machine and avoid injury or death?”

We have all been warned not to step over a turning PTO shaft, but PTO entanglements are still happening. A simple arithmetic problem can be used to explain what can happen should your pant leg be caught on an unguarded rotating shaft.

The unguarded PTO shaft is

turning at 540 RPMs. You decide to step over it to save a few steps and seconds, rather than walk around the tractor or piece of equipment. You feel a tug on your pants leg and begin to pull away.

With a reaction time of 3/4 of a second (0.75), how many turns of the shaft will be tugging at your pants before you begin to pull away (if you can at all)?

First, convert 540 RPM to revolutions per second (RPS) by dividing 540 by 60 seconds.

$$540/60 = 9 \text{ RPS}$$

Second, multiply 9 RPS by your reaction time to get the revolutions of the PTO shaft before you begin to pull away.

$$9 \times 3/4 = 27/4 = 6.75$$

Or $9 \times 0.75 = 6.75$ revolutions before you react or begin to pull away.

Avoid Rotating Part Hazards

To avoid rotating part entanglements, try these practices.

1. Keep guards in place on rotating shafts and parts.
2. Stop the engine before dismounting the tractor.
3. Dress safely to avoid entanglements.
4. Think before you take a chance: “Is saving a few seconds or steps worth risking my life?”



Figure 2.3.d. Do not use equipment with unguarded PTO shafts.

Think, “What is the worst thing that can happen to me?”
A few seconds of thought can prevent injury or death.



Figure 2.3.e. Be sure PTO shaft guards and stub shields are in place.

Safety Activities

1. If you are involved in an agricultural education mechanics program, ask the instructor if you can conduct a survey of electric motors on machines and small appliances (drills, portable saws, etc.) to chart the speed in RPM of those motors. The speed of the motor in RPM is found on the motor nameplate. Make a chart of the information as follows:

<u>Motor /Machine</u>	<u>Speed of Motor in RPM</u>
Table Saw	1740

2. Conduct activity 1 in the farm shop or in the home with any electrical appliance where you can view the electric motor nameplate information.
3. Using a stop watch, press the start button to start the timer, and as quickly as possible, press the stop button. See how fast you can do this simple task. Take several readings, record the results, and calculate the average time you needed to stop the timer. Although this is not a measure of reaction time to an emergency, you can use this measurement to make reaction time calculations in the following questions.

Time it took you to start/stop the stop watch: _____seconds/fractions of a second

4. Solve this reaction time math problem.

A drill press is rotating at 1800 rpm. If your reaction time is 1/2 second (0.5), how many revolutions of the drill press will occur before you react and pull your shirt sleeve away?

_____ Revolutions before reaction to pull away.

Hint 1: Convert RPM to revolutions per second (RPS).

Hint 2: There are 60 seconds in a minute.

Hint 3: Multiply RPS (Hint 1) by your reaction time in Activity 1 or 2, or use 1/2 second reaction time.

5. A PTO shaft turns 540 RPM. Your reaction time is 1/2 second. If your shoelace is caught in the shaft, how many turns of the PTO shaft would occur before you react? Use the hints from Activity 4.

_____ Revolutions before reaction to pull away.

6. Make the same calculation from Activity 5 using a 1000 RPM PTO shaft as the speed of the machine.

_____ Revolutions before reaction to pull away.

References

1. Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses, John Deere Publishing, 2001. Illustrations reproduced by permission. All rights reserved.
2. Farm and Ranch Safety Management, John Deere Publishing, 2009.

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AGE-APPROPRIATE TASKS

HOSTA Task Sheet 2.4

Core

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

Farming offers a unique opportunity for children and adolescents to learn the value of hard work, how to handle responsibilities, and how to set priorities.

Traditionally, farming has been a family affair with children working on their own farm. Larger farms may hire youth for work as well. While early labor has personal development benefits, there are also many risks involved for young workers.

This task sheet offers guidelines for matching youthful farm workers with farm tasks.

North American Guidelines for Children's Agricultural Tasks (NAGCAT)

These guidelines were developed under the direction of the Children's Center for Rural and Agricultural Health and Safety. The guidelines assist adults in assigning farm jobs to children age 7 to 16 years, living or working on farms. Employers should also be aware of the guidelines. Visit the NAGCAT website shown in the reference section for more information about the guidelines.

Here are some key points in your development toward adulthood.

Ages 12-13 (Early Teens)

Some of the traits shown by early teens include: being clumsy and rebellious, lacking focus, being easily distracted, and taking risks.

Typical death and injury risk scenarios for the age group 12-13 include:

- Machinery entanglements (“I cannot get caught; I am too fast.”)
- Head and spine injuries from ATVs and motorcycles (“I want to be faster than my peers.”)
- Falls from machines (extra riders) and structures
- Sprains due to working harder than growing muscles permit

Age-Appropriate Tasks for 12- and 13-Year-Olds:

- Hand raking and digging
- Limited power tool use with supervision
- Operating lawn mower or garden tractor
- Handling /assisting with animals
- Other low-risk tasks



Figure 2.4.a. Young people sometimes want to do everything an adult does.

All of us go through growth phases. Our physical and mental maturity may not match our work assignment.

Learning Goals

- To identify typical growth traits by age groups and how these traits may affect what jobs and tasks young workers should be assigned

Related Task Sheets:

Injuries Involving Youth	2.1
Reaction Time	2.3
NAGCAT Tractor Operation Chart	4.3



Figure 2.4.b. Taking chances with motorized vehicles may be fun, but the odds of an injury or death increases greatly when risky behavior is substituted for correct operation of ATVs, dirt bikes, and tractors.

Physical growth can lead youth to believe that they can do more than they can mentally handle.



Figure 2.4.c. Young muscles and joints may be strained and sprained trying to move heavy loads. Animals pose their own special risks in being moved as well.

Ages 14-15 (Young Teens)

Some of the traits shown by young teens include: being moody and rebellious, taking risks, being mentally active, and having feelings of immortality.

Typical death and injury risk scenarios for the age group 14-15 include:

- Machinery entanglements with amputations from PTO, augers, turning parts, and power tools (“I cannot get caught; I am too fast.”)
- Head and spine injuries from ATVs and motorcycles (“I want to be faster than my peers.”)
- Falls from machines (extra riders) and structures
- Hearing loss from machinery
- Animal handling incidents
- Tractor overturns

- Roadway crashes or mishaps

Age-Appropriate Tasks for 14- and 15-Year-Olds:

- Equipment maintenance
- Manual feeding of livestock
- Operating non-articulated tractors for field work, including those with implements that are 3-point mounted, use remote hydraulics, and/or are PTO-powered
- Raking hay
- Operating a pressure washer

Ages 16-18 (Older Teens)

Some of the traits shown by older teens include: being aggressive and taking risks, feelings of being immortal and overconfident, and experimenting with adult independence and behaviors.

Typical death and injury risk scenarios for the age group 16-18 include:

- Machinery entanglements with amputations
- Falls from machines and structures
- Hearing loss from machinery
- Animal handling incidents
- Tractor overturns
- Roadway crashes or mishaps
- Added risks if experimenting with drugs and/or alcohol

Age-Appropriate Tasks for 16-18 Year Olds:

- Ordinary use of tractors, self-propelled machinery, augers, elevators, and other farm equipment
- Pulling oversized loads, simultaneous use of multiple vehicles, and application of chemicals with specific training and close supervision

NAGCAT Guidelines

There are a total of 62 age-appropriate guidelines in seven categories as follows:

Tractor Fundamentals Tasks

- Tractor Operation Chart
- Driving a Farm Tractor
- Trailed Implements
- 3-Point Hitch Implements
- Hydraulics
- PTO -Connect/Disconnect

Haying Operations

6 guidelines dealing with hay harvest and transport

Implement Operations

10 guidelines dealing with fieldwork

General Activities

Using a front-end loader plus 9 guidelines for various farm equipment operations

Other Guideline Categories include:

Animal Care

Manual Labor

Specialty Production

A few guidelines have been translated into Spanish. Check the nagcat.org website for details.



Figure 2.4.d. Machinery, ATVs, and falls account for most farm injuries and fatalities. Youth who will work with machinery, ATVs and agricultural structures must be trained and have guidance to be safe workers.

Guidelines for age-appropriate tasks are useful tools and can lead to mature actions of the safety-conscious youthful worker.



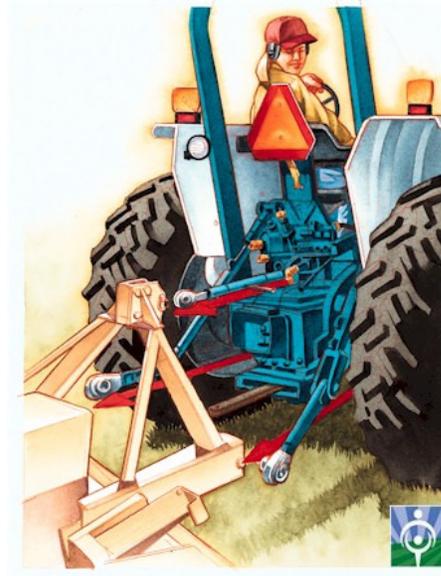
Figure 2.4.e. Youthful workers assigned to supervised tasks can learn safe, productive agricultural work habits. The NAGCAT Guidelines help parents and employers determine what tasks are appropriate.

Safety Activities

1. Use the NAGCAT website to locate the guidelines for operating 3-point hitch implements. Print the guideline, and answer all the questions for yourself. The page will include pictures like this:



NORTH AMERICAN
GUIDELINES FOR
children's
AGRICULTURAL TASKS



Share this information with your parents and tractor safety instructor or leader.

2. Use the NAGCAT website to explore other guideline task sheets that may focus on jobs you will do.
3. Write a short story about a hazardous situation you have encountered and how you approached that hazard based upon your stage of development at that time. Did your youthful immaturity influence the outcome?
4. Ask your class or club members to relate stories of hazardous incidents they encountered and how they handled them.

Special Note: Youth who are age 12 or 13 may complete studies of safe tractor operation and complete the written exam, but cannot take the skills or driving exams nor receive a certificate under the Hazardous Occupations Order In Agriculture program.

References

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SEVERE WEATHER

HOSTA Task Sheet 2.5

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

Agricultural work must be done during various weather conditions. Farm work does not stop for summer heat or winter cold. Crops must be harvested, livestock must be tended, and every daily routine completed. Hot, cold, rain or shine, the work continues. Safe work still must be observed under any weather-related conditions.

This task sheet will discuss how to recognize severe weather and the effects of such weather on the farm worker. Additional task sheets in Section 2.5 will present safety precautions for heat, cold, sun exposure, lightning and wind storms, and rain.

Summer Weather

Crop production activities begin with the arrival of the summer season. This is the time of year to expect higher temperatures, higher humidity, thunderstorms, lightning, and tornadoes. Attention to safe work practices may not permit attention to weather hazards. See Task Sheet 2.5.1.

High Temperatures—Exposure to high summer temperatures can cause illness. Heat cramps, heat exhaustion, and heat stroke are serious problems.

- Heat cramps—Symptoms are

leg and stomach cramps.

- Heat exhaustion—Symptoms are cool, moist, pale or flushed skin, headache, nausea, dizziness, weakness, and exhaustion
- Heat stroke—Symptoms include red, hot, dry skin; changes in consciousness; rapid, weak pulse; and rapid, shallow breathing. Heat stroke can result in death if not treated immediately.

High Humidity—Excessive humidity means that moisture evaporation slows down. Perspiration helps to cool the body as it evaporates. In high humidity, the body continues to lose moisture, but the cooling effect is not felt.

Thunderstorms and Lightning—Cold-weather fronts bring cooler air into contact with warm air masses. Severe thunderstorms result; lightning can happen. On average 93 persons are killed each year by lightning.

Tornadoes—These small but violent storms can pack up to 250 mph wind gusts. They usually follow dark skies with clouds that look like a wall and wind that sounds like an approaching freight train. Tornadoes kill people and can cause millions in property damage.



Figure 2.5.a. Summertime forecasts of extreme weather must be heeded. Attention to machine safety is a top priority, but changing weather conditions must be observed as well.

**Severe
weather can
occur anytime
of the year.**

Learning Goals

- To recognize the effect that severe weather plays in safe work practices

Related Task Sheets:

The Work Environment	1.1
Heat and Sun	2.5.1
Cold Weather	2.5.2
Lightning, Tornadoes, and Rain	2.5.3

Winter Weather

Winter chores on the farm must be done regardless of the weather. Winter cold brings different hazards. Frostbite, hypothermia, and loss of traction leads to hazardous work conditions. See Task Sheet 2.5.2.

Frostbite– This health hazard occurs when body tissue freezes. Medical attention is needed as soon as possible.

Hypothermia– This health issue involves a general cooling of the entire body. When the body cools down, normal processes cease to function properly. Gradual warming of the victim is necessary,

as well as immediate medical treatment.

Loss of Traction– Winter weather affects footing—for both people and animals. Tractors that can pull heavy loads under normal circumstances now slip and slide. Observing extra care and taking extra time in moving machinery, livestock, and ourselves becomes more important on slippery surfaces.



Figure 2.5.b. Winter weather brings a different set of rules for work. Attention to farm chores may cause the worker to forget that the air is icy cold and that the skin can freeze.

**Frostbite
destroys
body tissue.**

Safety Activities

1. Call your nearest TV or Radio weatherperson and ask for an explanation of humidity in the atmosphere.
2. Use the Internet to define heat index (apparent temperature).
3. Use the Internet to define wind chill.
4. Contact your local emergency preparedness officials to learn what signals or warning sirens are used in your community to announce impending weather or other emergencies.
5. With your family, develop an emergency action plan for dealing with high wind or tornado conditions. Practice the plan at least once per year with the entire family.

References

1. Safety Management for Landscapers, Grounds-Care Businesses and Golf Courses, John Deere Publishing, 2001.

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HEAT AND SUN

HOSTA Task Sheet 2.5.1

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

Agricultural work must be done during various weather conditions. Crops must be planted and harvested, livestock must be tended, and every daily farm routine completed. Hot or cold, rain or shine, the work continues. Safe work must be observed under all weather-related conditions.

This task sheet will discuss safe work in the heat and humidity of the summer season. Skin cancer, heat stroke, eye damage, and dehydration are health problems which farm workers must understand.

Health Risks From the Sun

Farmers are considered strong and hearty people. All farmers must pay attention to the problems posed by farm work during the summer season.

Health risks increase from overexposure to the sun and heat. These include:

- Sunburn/skin cancer
- UV light damage/eye damage
- Overheating/heat stroke
- Overheating/dehydration

Each area is discussed here.

Sunburn/Skin Cancer

Farm workers must spend a great deal of time working in the sun. Overexposure to the sun leads to

sunburn, an actual burning of skin cells. Prolonged exposure to the sun over time is the most common cause of skin cancer. As the number of exposures to the sun increases, so does the chance of developing skin cancer.

Preventing Sunburn and Skin Cancer

Protect the skin from the harmful effects of the sun by dressing properly and using a sunscreen ointment. See Figure 2.5.1.a. Long sleeves, long pants, a neckerchief, and a broad-brimmed hat will protect the skin while working in the sun.

A SPF (Sun Protection Factor) sunscreen ointment with at least a 15 rating is recommended for areas which cannot be protected by clothing. The higher the SPF number, the more protection that is offered. Use sunscreen according to directions on the container.

The American Cancer Society provides information about skin cancer. Contact this organization through your local telephone directory or the Internet.

Please note: One sunburn experience will not cause cancer, but constant exposure or continuing exposure to the sun from working outdoors can increase the risk of skin cancer.

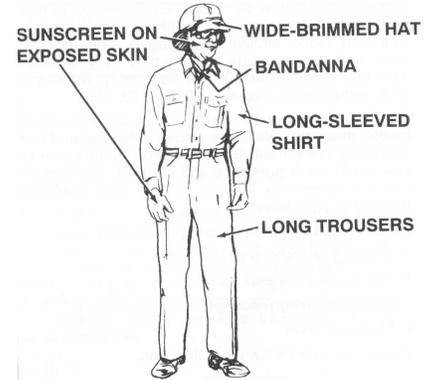


Figure 2.5.1.a. This drawing shows the recommended clothing and skin care precautions for summer sun exposure. *Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses*, John Deere Publishing, 2001. Illustrations reproduced by permission. All rights reserved.

A worker suffering from sunburn is not a productive worker.

Learning Goals

- To understand the health risks from summer heat and sun
- To prevent health risks from summer heat and sun

Related Task Sheets:

The Work Environment	1.1
Severe Weather	2.5
Personal Dress	2.7

**Sunglasses
are not just
to make you
look cool,
but must
protect the
eyes.**



Figure 2.5.1. b. Sunglasses are available in spectacle or clip-on versions. Look for the UV rating of 99-100 for “blockage” or “absorption.” The word “protection” does not guarantee that the sunglasses will block or absorb UV rays.

Ultraviolet (UV) Rays and Eye Damage

The eye functions to control entering light and to focus an image on the optic nerve. Any damage limits the ability of the eye to function properly, and we lose some of our sight.

The sun produces different kinds of light:

- Ultraviolet (UV) invisible radiation
- Bright or intense light
- Blue light (a visible light)

The bright sun can damage the eye through the effects of UV radiation. This damage is called keratitis, an inflammation of the cornea of the eye. Sun-induced cataracts (a clouding of the lens of the eye) have been reported.

Blue light is visible light from the

blue portion of the color spectrum. The intense glare from snow or water contains blue light. We cannot focus clearly in this intense light. Intense glare leads to eye strain and fatigue. Prolonged exposure to blue light is believed to age the retina of the eye. The result is an increased risk of blindness.

Protecting the Eyes

Protect the eyes from the harmful effects of the sun with the correct type of sunglasses. Sunglasses that provide blockage or absorption of the ultraviolet rays of the sun are best.

Sunglasses are rated according to their capability to block or absorb UV radiation. Look for terms such as “blockage” or “absorption,” not only “protection” on the label. A UV rating of 100 is preferred.

Blue light blockers appear as tinted

lenses in our glasses. These lenses alter the blue and green colors to reduce glare without making the world appear darker. To block the blue color, a yellow tint must be used. If you work often in bright, glaring conditions, these “sunglasses” can be helpful.

Types of Sunglasses

Several types of sunglasses are made to meet different needs.

- Regular lenses reduce brightness evenly
- Polarizing lenses reduce glare
- Photochromic lenses become darker in bright light
- Mirror lenses reflect light

Note: The price tag of sunglasses is not a measure of their blockage or absorptive value.

Dehydration

Sweating or perspiring is normal for a hot summer day. When the heat of the day is coupled with strenuous work, perspiration losses may equal or exceed water intake. *The body can lose as much as three gallons of water in a day.* Water serves as a coolant to our bodies.

When working on a hot day, a person can become fatigued or tired. Excessive sweating removes elements such as sodium, potassium, and chloride from our bodies. Water will not replenish minerals lost through perspiration. Sports drinks contain minerals which replenish our systems. Regular soft drinks do not replenish our nutrient needs. To replenish our mineral needs, we must eat properly before going to work and drink plenty of liquids while working.

Heat Stroke

Exposure to summer heat and humidity can cause serious illness. Health risks from heat occur when the body cannot cool down by sweating or make up the fluids and minerals lost through perspiration. Each year an average of 175 people die from the effects of summer heat.

Health problems from heat can include:

- **Heat Rash**– When sweat does not evaporate from the skin, the pores can become clogged. A rash develops. Cotton clothing can help to “wick” the moisture away from the skin. Use corn starch to treat the rash.

- **Heat Syncope**-Fainting from the heat can occur. Help the victim to lie down in a cool spot, and elevate their legs to improve circulation. Let them rest there.
- **Heat Cramps**- Leg and stomach cramps are caused by loss of body fluids due to sweating. Drink cool water often to cool the body. Massage the cramps.
- **Heat Exhaustion**– Loss of body fluids and salts from sweating and decreased blood flow to the brain can cause heat exhaustion. Symptoms include cool, moist, pale or flushed skin, headache, nausea, dizziness, weakness and exhaustion. Go to a cool place, lie down with feet elevated, and drink plenty of cool fluids. Medical help should be summoned.
- **Heat Stroke**-This is a medical emergency. The body’s systems are failing. Symptoms include red, hot, and dry skin (perspiration has stopped); changes in consciousness; convulsions; delirium; rapid, weak pulse; and rapid, shallow breathing. The victim may become chilled. Some victims exhibit anger. **Heat stroke can be fatal if not treated immediately.** See page 4.

Effects of Humidity on Sweating

Evaporation rates are reduced with excessive humidity. Evaporation of water and sweat has a cooling effect. Without this cooling effect, high temperatures actually feel higher. Heat index charts show “apparent temperatures” comparing air temperature with humidity (Figure 2.5.1.d.).

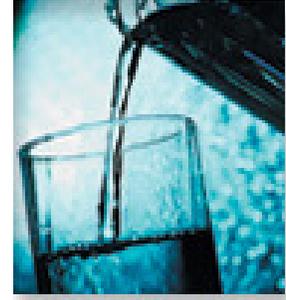


Figure 2.5.1.c. Water is a nutrient we need. It cools the body, carries nutrients, and flushes waste from the body.

Heat stroke is an emergency calling for immediate medical care.

Heat Index—Apparent Temperature

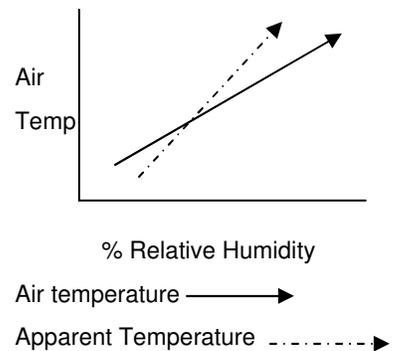


Figure 2.5.1.d. The chart shows that as humidity levels increase with rising temperatures, the apparent temperature (heat index) may appear higher or lower than the reported temperature.

Treating Heat Stroke

Heat stroke is a medical emergency. Follow these treatment procedures immediately.

- Call for medical help at once.
- Remove the victim's outer clothing.
- Immerse the person in cold water. If no pool is available, sponge the person's body with water until help arrives.
- Do not give the person anything to drink.

Preventing Heat Illness

Follow these guidelines to prevent heat illness.

1. Drink water approximately every 15 minutes. Do not wait to be thirsty.
2. Avoid caffeinated and alcoholic drinks.
3. Wear appropriate summer clothing that fits loosely and reflects the sunlight.
4. Perform the most strenuous jobs during the coolest part of the day.
5. Take periodic breaks in the shade.
6. Adjust gradually to the heat.



Figure 2.5.1. e. Take extra precautions while working in the summer sun and heat.

Safety Activities

1. Using the Internet, type "heat index chart" on any search engine, and locate information on a heat index (apparent temperature) chart. Then answer these questions.
 - a. On a 90 degree day with a 70% relative humidity, the heat index is _____ degrees.
 - b. On a 95 degree day with a 50% relative humidity, the heat index is _____ degrees.
 - c. On a 85 degree day with a 85% relative humidity, the heat index is _____ degrees.
2. Call your nearest TV or radio weatherperson and ask for an explanation of relative humidity.

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3. Gempler's Inc., (www.gemplers.com)

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COLD WEATHER

HOSTA Task Sheet 2.5.2

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

Agricultural work must be done during various weather conditions. Farm work does not stop for winter cold or summer heat. Crops must be harvested, livestock must be tended, and every daily routine completed. Cold, hot, snow, ice, rain or shine, the work continues. Safe work habits must still be practiced under all weather-related conditions.

This task sheet will discuss how to recognize the effects of cold weather on the farm worker. Frostbite, hypothermia, and decreased traction pose hazards which farm workers must understand.

Winter Health Hazards

Winter chores on the farm must be done regardless of the weather. Winter weather offers different hazards with which to contend. Examples include frostbite and hypothermia. Our bodies may become accustomed to working in the cold, but exposure to low temperatures and wintry wind can be dangerous. For example, slippery conditions affect our ability to safely handle equipment and livestock.

Frostbite:

Frostbite occurs when body tissue becomes frozen. Skin that feels numb should send the message to the outdoor worker that the skin is too cold and in danger of further damage.

To prevent frostbite, pay attention to the low temperatures and how your skin is reacting. Covered skin is at risk for frostbite as well.

If a person develops frostbite, seek shelter and use warming towels or lukewarm water to warm the skin. Never use hot water. It can burn the skin. Severe cases of frostbite require immediate emergency medical treatment.

Hypothermia:

Hypothermia occurs as the body's temperature drops below 96 degrees. Exposure to severe cold causes this condition. Everyone is familiar with the hypothermia reported when someone falls through the ice. Extreme cold can produce weakness, drowsiness, or confusion, which can lead to further exposure and eventually death.

To prevent hypothermia, dress in layers to help trap air between the clothing. Air has an insulation value. Wear a head covering as well. Proper winter dress should keep you warm, not hot, and also fit well for safe work around equipment and livestock.

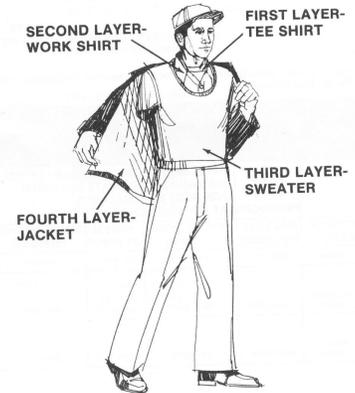


Figure 2.5.2.a. Layers of clothing offer the best cold weather protection. If the day's weather warms, outer layers can be removed. Synthetic fibers wick away the moisture of perspiration, while cotton materials absorb and hold moisture. Moisture next to the skin becomes chilled. *Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses, John Deere Publishing, 2001. Illustrations reproduced by permission. All rights reserved.*

High winter winds coupled with low temperatures may result in a wind chill advisory.

Learning Goals

- To understand the health risks from working in the winter cold
- To prevent health risks from working in the winter cold

Related Task Sheets:

The Work Environment	1.1
Severe Weather	2.5
Personal Dress	2.7
Working With Livestock	3.4

Loss of Traction:

Winter weather brings icy and muddy conditions. Footing is more difficult for people and livestock. Tractors that can pull heavy loads under normal circumstances may slip and slide. Livestock can slip and fall and be injured. Animals being moved on slippery surfaces can slip into the worker. Consider these extra precautions.

- Footwear must have treads that will provide traction.
- Use traction chains on tractor tires under extremely icy conditions.
- Operate the tractor carefully

and more slowly than when weather conditions are dry.

- Recognize that vehicles traveling on public roadways may need greater distances to slow to a stop as they approach farm equipment sharing the road.
- Move livestock slowly to prevent the animal from falling or sliding into you.

Winter activities require slower, more deliberate movements to prevent injury.



Figure 2.5.2.b. Be extra careful while mounting the tractor steps in icy conditions. Drive carefully over slippery roads or fields.

**Loss of
traction means
loss of control.**

Safety Activities

- Using the Internet, type “wind chill chart” on any search engine. Use this chart to answer these questions.
 - On a 30-degree day with a 15 mph wind, the temperature will feel like ____ degrees on your skin.
 - On a 20-degree day with a 15 mph wind, the temperature will feel like ____ degrees on your skin.
 - On a 10-degree day with a 30 mph wind, the temperature will feel like ____ degrees on your skin.
 - If you are snowmobiling and the temperature is 10 degrees and you are driving at 40 mph, what is the wind chill factor in degrees? _____

References

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LIGHTNING, TORNADOES AND RAIN

HOSTA Task Sheet 2.5.3

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

Agricultural work must be done during various weather conditions. Farm work does not stop because the weather forecast for the day calls for thunderstorms, rain, lightning strikes, or even a threat of tornadoes. Work may be interrupted by these events when they happen, but the work is not cancelled until the weather event occurs.

This task sheet discusses lightning, tornadoes, and rain and the risks they pose to safe farm work.

Lightning

Note: Field work puts stress on everyone, especially if the weather report predicts that stormy conditions will interfere with that effort. Your first priority is safe equipment operation. Knowledge of weather patterns and how they change can improve your safe work habits.

Sudden rainstorms are often preceded by violent lightning storms. Lightning is caused by a buildup of static electricity in the air. Positive charged molecules rise into the sky and negative charged molecules fall to the bottom of clouds. The negative charged particles are attracted to the positive charged particles in a flash of lightning.

Lightning fatalities rank second to floods in weather-related deaths.

Lightning energy as high as 100 million volts and as much as 50,000 degrees F. is released within half a second. Lifelong disability and death can result from exposure to the extreme levels of electricity and temperature.

Myth 1: Lightning does not strike the same place more than once.

Truth: Lightning can strike in the same place many times.

Myth 2: Lightning occurs only under stormy skies.

Truth: Lightning can strike 10 miles from a storm.

Precautions to Take

Follow these precautions if severe thunderstorms are forecast.

- Check the weather forecast before starting to work.
- Observe threatening clouds and increasing winds that begin to develop.
- Use the “30-30 rule.” If the time delay between seeing the flash of lightning and hearing the bang of thunder is less than 30 seconds, you should already be moving toward shelter. Lightning can strike 30 minutes before or after a visible storm.
- In an open field, seek low spots for shelter.
- Seek shelter at a location which is away from hilltops, trees or utility lines.
- Use closed buildings for shelter if possible. Do not use items connected to plumbing or house wiring.
- Tractors with cabs and vehicles can be used for shelter.



Figure 2.5.3.a. Lightning strikes can be fatal. Take shelter indoors if possible. Do not seek shelter beneath trees or near utility lines.

Hurrying to beat a storm during harvest increases the risk of injury.

Learning Goals

- To work safely in all types of weather conditions

Related Task Sheets:

The Work Environment	1.1
Severe Weather	2.5
Tractor Stability	4.12
Using the Tractor Safely	4.13

**Tornadoes
are possible
from April
to
November
in parts of
the U.S.**



Figure 2.5.3.b. While tornadoes do not occur in all areas of the United States, tornadoes and high winds lead to destruction, falling debris from trees, buildings, and utility wires. These storms can carry winds of up to 250 mph.

Wind and Tornadoes

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. Eastward moving cold-weather fronts colliding with warm, moist weather form ideal conditions for high wind and tornadoes to develop. These conditions can occur rapidly. Some areas of the country are more prone to high wind and tornado conditions than others.

Tornadoes accompany thunderstorms. The following signs indicate a potential for a tornado.

- Dark, often greenish sky
- Large hail
- A cloud that looks like a wall
- A loud roaring sound

Be prepared to respond to these weather signals.

Remember these points in a tornado.

- Understand the radio and local siren warnings used to sound impending weather emergencies.
- If a tornado “watch” is issued, remain alert to storms. See page 3.
- If a tornado “warning” is issued, a tornado has been sighted or has appeared on weather radar. Move to safe shelter immediately. See page 3.
- Do not try to outrun a tornado. The speed and direction of a tornado can be deceiving.
- If caught outdoors in high winds or tornadoes, seek a ditch or low spot for protection. Lie face down with your hands over your head.

- If you find shelter in a building, go to the basement or to an inner room. Stay away from outside walls which may collapse, and stay away from windows which may shatter.

Tornado Myths and Truths

Myth 1: Tornadoes cause buildings to explode.

Truth: Violent winds and debris smashing into the building cause most of the structural damage.

Myth 2: Windows of the house should be opened to equalize pressure and minimize damage.

Truth: Opening the windows only opens the building to the damaging winds. Go to a safe place instead.

With early-warning systems in place throughout the U.S., tornado deaths have been reduced greatly. Know what the changing weather means to your safety.

National Oceanic and Atmospheric Administration (NOAA)

The NOAA agency of the federal government conducts weather and environmental observations around the world. NOAA information is used by National Weather Service forecasters to report weather patterns and events. NOAA satellite data benefits many groups. Aviation, maritime, and farm groups need up-to-the-minute weather information to assure safety and economic success.

Special NOAA weather radios can be purchased in many stores. These radios continuously broadcast updated weather warnings and forecasts. The radio's average range is 40 miles depending upon topography. Some NOAA radios have a feature that automatically sounds a tone when a watch or warning is issued in your area.

Rain and Rainstorms

Regular rainfall is necessary for crop growth. Periods of drought reduce yields and cause anxiety for farmers. Excessive rainfall delays planting and harvest and frustration again builds. Rain is necessary for success, but rain and rainstorms affect farm safety. Examine these points.

- Excessive rain causes reduced traction. Tractor steps may be mud covered. Fields may be slippery. Tractors can become stuck. See Task Sheet 4.13, Using the Tractor Safely.
- Excessive rain causes flooding.

Crops can be damaged when soils become saturated.

- Saturated soils cannot hold more water. Flash flooding can occur. High water can sweep people and vehicles away.
- Rainy periods delay crop operations resulting in potential yield loss.
- Long periods of weather extremes frustrate farm growers. Unsafe acts can result as producers attempt to hurry to complete the work.

Think about these scenarios. Have you seen these effects of weather?

U.S. Weather Notification System

The National Weather Service issues daily forecasts and long-range weather outlooks. This service also decides when to issue severe weather watches. The notices include “watches” and “warnings.”

Severe weather watch

This notice indicates conditions are favorable for the development of severe weather, such as tornadoes, thunderstorms, blizzards, and potentially damaging wind or hail.

Severe weather warning

This notice indicates that a tornado, severe thunderstorm, or winter storm is in the immediate vicinity. People who are outdoors should find shelter as soon as possible.



Figure 2.5.3.c. NOAA and the National Weather Service tracks weather developments to give advance notice of weather problems to airlines, maritime operators, and to farmers.

Safety must never be a lower priority in farming due to weather factors.



Figure 2.5.3.d. Excessive rainfall delays crop operations, reduces traction, and builds frustration.

Cloud Types**A.** Cumulus Cloud**B.** Stratus Cloud**C.** Cumulonimbus Cloud

Figure 2.5.3.e. Clouds can help predict weather. Cloud A is a cumulus cloud. These heaped or lumpy clouds indicate a period of fair weather. Cloud B is a stratus, layered cloud. They are full of ice crystals. These layered clouds can also form fog and mist. Cloud C is a cumulonimbus cloud. These towering clouds have an anvil shape at the top. They forecast rain, hail or storms. See if you can observe clouds and make a weather prediction.

Special Note: An individual is responsible for his or her own personal safety and has the right to take appropriate action when threatened by severe weather. No employer can force you to work in a dangerous situation.

Safety Activities

1. Use the Internet to learn more about lightning and tornadoes. Write a report for your teacher, leader, or for extra credit in science class.
2. Develop a family or farm emergency plan for severe weather if one does not exist.
3. If a weather emergency plan does exist, have the family or farm employees gather to review and practice the plan together.
4. After a rainstorm, clean the steps to each tractor and implement ladder to reduce slip and fall hazards.
5. Make a cloud project. You will need a large clear plastic jar, a small metal tray, ice cubes, and hot water.

Step 1. Fill the jar 1/2 full of hot water (be careful).

Step 2. Place some ice trays on a metal tray on top of the jar.

Step 3. Observe the air space in the jar beneath the tray. Air and water vapor inside the jar next to the tray is cooled, condensing into water droplets (a cloud).

References

1. [www.noaa.gov/\(National Oceanic and Atmospheric Administration website\)/Search the site for any weather information you desire.](http://www.noaa.gov/(National%20Oceanic%20and%20Atmospheric%20Administration%20website)/Search%20the%20site%20for%20any%20weather%20information%20you%20desire)
2. www.nws.noaa.gov (National Weather Service site).
3. [www.lightningsafety.com/\(National Lightning Safety Institute website\).](http://www.lightningsafety.com/(National%20Lightning%20Safety%20Institute%20website))
1. [www.lightning.org/\(Lightning Protection Institute website\).](http://www.lightning.org/(Lightning%20Protection%20Institute%20website))

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HOUSEKEEPING

HOSTA Task Sheet 2.6

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

Tractors and machinery are not the only sources of occupational hazards on a farm. Work areas must also be considered for creating danger to the worker. Recognizing housekeeping needs, including storage, use, and cleanup practices, are a must for the safety of every worker.

This task sheet discusses the relationship between good housekeeping and safety.

Importance of Housekeeping

Lack of housekeeping creates hazards. Picking up, wiping up, sweeping up, and removing scraps and waste all help to control hazards. Storing objects properly makes the work area safer. Unorganized and unplanned methods of work often indicate an unsafe place to work and increases the opportunity for injuries.

Several topics are important when discussing good housekeeping on the farm. They are:

- Worksite adequacy
- Environmental hazards
- Storage needs
- Cleanup practices

Worksite Adequacy

The worksite must be safe from the

beginning of the workday. Observe these points:

- Are aisles and passages wide enough and high enough for safe movement?
- Is there adequate lighting?
- Is there adequate ventilation?
- Are there slip-resistant floors and ramps?
- Are pits and floor openings covered?
- Are sharp edges eliminated?
- Are exits defined and clear of obstruction?
- Are hoists sized to the needs of the business?
- Are sink and toilet facilities clean and sanitary?

Young workers cannot change the physical layout of the farm shop or storage areas. But young workers can develop the skills and safe attitudes necessary to maintain the facilities. Shop cleanup is a valuable job skill. Some things you can do to make facilities safe and healthy are:

- Report unsafe work areas.
- Report burned-out lights.
- Put tools, materials and unused supplies in their correct places.
- Sweep floors.
- Clean oil and grease spills from floors.
- Clean sinks and toilet facilities.

As one farmer says to young workers, “If you have time to lean, you have time to clean.” If you are not assigned to a specific job, make yourself a valuable employee by doing some housekeeping chores.



Figure 2.6.a. Even on a temporary basis, this is not proper pesticide storage or disposal. While the operator is in the field, children or animals could come in contact with deadly pesticides.

**A clean farmstead is
a safe farmstead.**

Learning Goals

- To recognize how good housekeeping helps prevent health and safety hazards

Related Task Sheets:

The Work Environment	1.1
Personal Protective Equipment	2.10
Respiratory Hazards	3.3
Respiratory Protection	3.3.1
Agricultural Pesticides	3.5
Electrical Hazards	3.6
Fire Safety	3.7
Fire Prevention and Control	3.7.1
Hay Storage Fires	3.7.2
Farmstead Chemicals	3.13

**Dust can
explode!**



Figure 2.6.b. Welding can cause sparks to fly into nearby combustible material. The spark can ignite fine particles quickly with the resulting fire causing thousands of dollars of damage. How would you prevent welding sparks from igniting nearby materials?

Environmental Hazards

The farm environment has many health risks that can be reduced by good housekeeping. Chemicals, dusts, molds, welding rays, noise, heat, cold, and excessive moisture are common. Each poses a special problem. Chemicals, molds, heat, cold, and noise will be discussed in other task sheets.

Dust

If you have started a fire in a fireplace, you know that you must use kindling materials to get the fire started before adding the larger firewood. Dust, which is dry, has a low kindling temperature. Dust can burn explosively much like the fumes from gasoline.

You cannot remove all dust from the farmstead. No one would ask you to do that task, but unnecessary dust buildup near

sources of fire increases the risk of fire. Some cleaning near these sources could prevent a fire.

Dust explosions have occurred in feed mills and at grain storage elevators. The explosion usually occurs due to electrical sparking igniting the dust particles. Sparks from welding can also ignite dust and chaff. You may notice that special dust and moisture-proof motors and controls are used to prevent fires and explosions in many agricultural applications.

Welding Rays

Defective welding helmets, cracked welding lenses, and torn welding curtains can create eyesight damage risks. You can repair welding helmet lenses and welding curtains as part of your beginning level housekeeping work routine. This would increase your value as an employee.

Excessive Moisture/Slippery Floors

Water, oils, or other substances cause floors to become slippery. Take a few minutes to clean the walkway. Use a floor-drying compound or sand to reduce slippage and to clean the area. You should place a warning sign or barricade at the location until the floor is dry and safe.

Definitions:

Kindling temperature is the lowest temperature at which a solid fuel will ignite and begin to burn when brought near a source of heat.

Electric sparking is the spark of electricity occurring when two conductors (leads, wires, contacts) come close together, and an electrical current jumps across the gap.

Storage

Proper storage of materials creates an organized and safe work space. No one wants to waste time looking for tools or materials. Safe storage prevents lost work time from injuries. Improper storage can lead to a risk of fire.

Heavy and Long Objects- Heavy and long objects must be stored correctly to prevent trip, fall, or falling object hazards. Long stock, such as wood or pipe, should be stored on racks designed to hold long pieces. Long stock stored under benches and sticking out may cause a leg injury to persons passing by. Heavy objects should be stored as close to the floor or ground as possible to prevent the chance of being hit by falling objects.

Fuels and Lubricants- Fuel storage is an important housekeeping chore. Liquid fuels have a *flash point*. A flash point is that point at which temperatures are high enough to ignite a gaseous fuel source. The fuel may also be *volatile*. Volatility is a property of fuels in which they produce vapors that easily ignite.

To keep the fuel area as safe as possible, there are several good housekeeping rules to follow.

These include:

1. Keep caps on all fuel containers.
2. Use only approved diesel and gasoline storage containers. Green or yellow-colored containers are used to store diesel fuel.

Red-colored containers are used for gasoline storage.

3. Keep areas around refueling stations free of fuel spills.
4. Use an approved absorbent compound to clean up fuel spills.

Cleanup

Work areas cannot be perfectly clean at all times, but they can be made safer to work in at all times. Cleaning as your work progresses will eliminate major cleaning chores later and will make for a safer work space.

Use these ideas for cleanup.

1. Clean all spilled material immediately. Avoid cleaning procedures that would make those materials become airborne inhalation hazards.
2. Place oil, grease, paint, and solvent-soaked rags in metal containers to reduce fire risks.
3. Use hand cleaners and disinfectants before eating or drinking.
4. Dispose of animal health equipment tools and supplies as directed. See Figure 2.6.c.
5. Manure and mud are slippery. Both can be brought into the shop area on machinery. Clean manure and mud from alleyways and high-traffic areas to decrease the risk of falls.



Figure 2.6.c. Needles used to administer animal vaccines are sharp, and the user can be accidentally stuck. If left uncapped, or if not disposed of properly, they create a hazard to people and livestock as well. Follow the manufacturer's directions for safe storage and disposal of needles and syringes.

Oily rags thrown in a pile can be a fire hazard. Store them in a closed metal container.

Safety Activities

1. Define these terms:
 - a) kindling point
 - b) flash point
 - c) volatility
2. Survey a farm shop, and make a list of those housekeeping items that you judge to be potentially hazardous.
3. Survey the school's agricultural shop or industrial technology shop (with the instructor's permission), and list those housekeeping items that are potentially hazardous. If your school does not have such an area, ask the chemistry teacher to show you the storage facilities for that subject area.
4. Bring some very dry, fine dust from the barn or farm shop to a safe place where air currents are minimal. Sprinkle small amounts of the dust over a lighted candle. What happens?
5. Bring some very dry, fine metal filings from the farm shop to a safe place where air currents are minimal. Sprinkle small amounts of the metal filings over a lighted candle. What happens?

References

1. Safety Management for Landscapers, Grounds-care Businesses and Golf Courses, John Deere Publishing, 2001.
2. Farm and Ranch Safety Management, John Deere Publishing, 2009.

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PERSONAL DRESS

HOSTA Task Sheet 2.7

Core

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

When a person goes to work, they should dress for the work they will do. You would not look like a good candidate for work if you showed up at a farm in your sandals. Some workplaces have dress codes. Think about your safety as you dress for work.

This task sheet discusses personal dress choices for safe work. Ask your employer if specific work dress is expected.

What Should I Wear?

Some young workers might rebel about the idea that someone is going to tell them what to wear to work. The latest fashions or stylish clothes will not make you a better worker. Dressing safely will make you a smarter worker because it increases your chances of avoiding injury or death on the job.

Know what each job you perform requires and dress accordingly. During the summer, mowing fields or baling hay may mean several hours in the sun. Over exposure to the sun is a serious hazard for young workers. A long-sleeved shirt, a hat that protects the ears and neck, and sun block are all part of safe dressing.

Here are some other approved safety practices for how you should

dress for work.

1. Wear snug-fitting clothes which are in good repair. Loose clothes with dangling threads, ripped sleeves and cuffs, and drawstrings can be caught in machinery or snag on tractor parts.
2. Leave jewelry at home. Jewelry can be caught in machine parts or snagged on the tractor as you mount or dismount.
3. Wear hard shoes with slip-resistant treads. Sandals or sneakers offer little protection from livestock trampling, briars, nails, welding sparks, falling lumber or other objects. Check to see if steel-toed work boots are necessary.
4. Tie shoes snugly. Loose shoe strings can be caught in rotating parts.
5. Tie long hair out of the way. Tying or covering long hair will prevent the hair from being pulled into turning parts of machinery and save you from being scalped.
6. Wear long pants that are the correct length. Long pants, which fit properly and are in good repair, will protect your legs from sunburn, splinters, briars and thistles. Sloppy fitting clothes can easily become entangled in machinery or snagged on tractor parts.

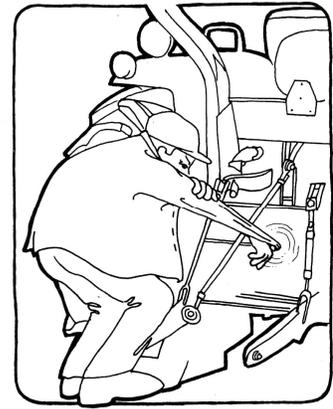


Figure 2.7.a. Not dressing safely for the job means that you expose yourself to the risk of injury or death.

Dressing properly for the work to be done is the first step in preparing to work safely.

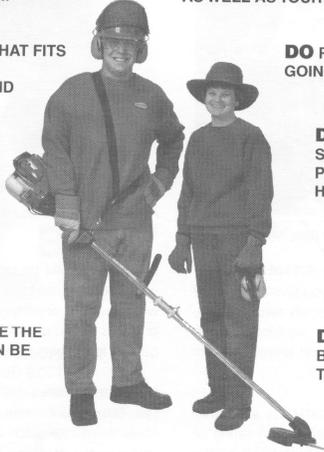
Learning Goals

- To dress safely for work

Related Task Sheets:

The Work Environment	1.1
Injuries Involving Youth	2.1
Reaction Time	2.3
Personal Protective Equipment	2.10

A Well-Dressed Worker



DO WEAR RECOMMENDED HEAD, EYE, AND HEARING PROTECTION.

DO WEAR SUN-SAFE HATS THAT PROTECT YOUR EARS AND NECK AS WELL AS YOUR FACE.

DO WEAR CLOTHING THAT FITS RIGHT AND IS IN GOOD CONDITION. FRAYED AND RAGGED EDGES ARE DANGEROUS.

DO WEAR CLOSE-FITTING PULLOVERS

DO WEAR JEANS THAT ARE THE RIGHT LENGTH. CUFFS CAN BE DANGEROUS.

DO WEAR GLOVES THAT FIT WELL, PROVIDE GOOD GRIP, AND ARE IN GOOD CONDITION.

DO WEAR JACKETS AND SWEATSHIRTS THAT ARE PROPERLY SIZED AND DO NOT HAVE DRAWSTRINGS.

DO WEAR STURDY BOOTS WITH GOOD SLIP-RESISTANT TREAD.

DO KEEP SHOELACES SHORT OR TUCK THEM INTO YOUR SHOES.

DO REMOVE JEWELRY BEFORE GOING TO WORK.

DO WEAR GLOVES THAT FIT WELL, PROVIDE GOOD GRIP, AND ARE IN GOOD CONDITION.

DO CHOOSE CLOTHING WITH BANDED CUFFS. AVOID CUFFS THAT NEED BUTTONING.

If you do not know what clothing to wear for a job, ask your employer.

Figure 2.7.b. Safely dressed workers wear the clothing and equipment needed to do the job without risking danger to themselves. *Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses, John Deere Publishing, 2001. Illustrations reproduced by permission. All rights reserved.*

Safety Activities

1. Find the following words in the word search.

- | | |
|-----------------|----------------|
| Dangling sleeve | Long hair tied |
| Shoe strings | Drawstrings |
| Loose cuffs | Snug Clothes |
| Hard shoes | No jewelry |



References

1. Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses, John Deere Publishing, 2001. Illustrations reproduced by permission. All rights reserved.
2. Farm and Ranch Safety Management, John Deere Publishing, 2009.

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HAZARD WARNING SIGNS

HOSTA Task Sheet 2.8

Core

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

Uniform safety signs are designed to promote and improve personal safety in agricultural workplaces. Safety signs have been developed to warn of farm machinery hazards, but there are also safety signs that apply to non-machinery hazards. Signal words, sign format, and color combinations all play a role in safety signs.

This task sheet discusses uniform hazard warning signs that farm workers should observe and understand. Use specific owners' manuals to learn more about them.

Safety Alert Symbol



This symbol was created to draw attention to the need for safety. The symbol means:

Attention!

Become Alert!

Your safety is involved!

The safety alert symbol is used with agricultural, construction, and industrial equipment. The primary uses of the symbol are in an owner's manual and on hazard warning signs.

Good Hazard Warning Signs:

- Include the "safety alert" symbol
- Warn a person of the nature and degree of hazard or potential hazard
- Provide recommended safety precautions or evasive actions to take
- Provide other directions to eliminate or reduce the hazard



DANGER—The most serious potential hazard. These are RED.



WARNING— Show a lesser degree of potential hazard. These are ORANGE.



CAUTION— Indicates a need to follow safety instructions. Usually are YELLOW.



Figure 2.8.a. What message does this safety alert sign have for the operator? Try writing the message in as few sentences as possible. Which method—pictorial or written—conveys the message more quickly?

Pictorial hazard warning signs provide safety alerts to readers and non-readers of any language.

Learning Goals

- To quickly gather hazard potential and safe operation information by understanding hazard warning signs

Related Task Sheets:

Tractor Instrument Panel	4.4
Tractor Controls	4.5
Tractor Operation Symbols	4.5.6
Preventative Maintenance and Pre-Operation Checks	4.6

A pictorial quickly presents a potential hazard situation and a possible result of ignoring this potential danger. When these “picture” messages are seen, ask the question, “What is the worst thing that can happen to me?”

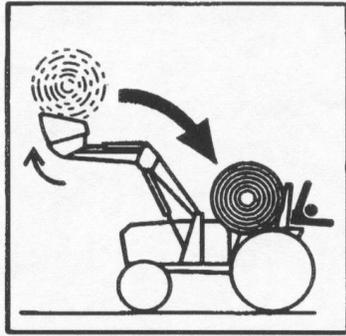


Figure 2.8.b. Potential for crushing hazard from shifting overhead load exists.



Figure 2.8.c. Potential for electric shock hazard exists.

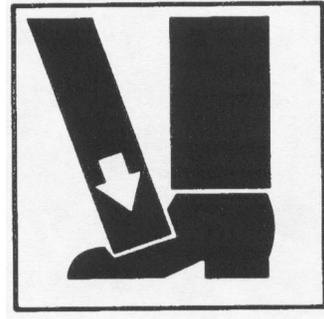


Figure 2.8.d. Potential for crushing the feet from an overhead hazard exists.

Pictorials pose the potential hazard to us, as well as the consequences of ignoring the hazard warning.

Pictorials

A pictorial is a graphical representation intended to convey a message without the use of words. It may represent:

- Hazards
- Hazardous situations
- Precautions to avoid a hazard
- Results of not avoiding a hazard
- A combination of these messages

Pictorials may be used in addition to or in place of a word message. The pictorial should quickly help a person to recognize a hazard. Many pictorials have been developed and are shown and explained here. Learn what each pictorial is trying to communicate. This could help you respond to or avoid a serious injury. Use the ref-

erence section to find a complete exhibit of pictorials for farm work.



Figure 2.8.g. This warning sign placed near the radiator warns the operator of what hazard?



Figure 2.8.e. This sign warns of a potential PTO entanglement.



Figure 2.8.f. This safety sign warns of a potential fall hazard. Always use handholds. Falls account for a large number of agricultural injuries and fatalities each year.

Pictorials (Continued)

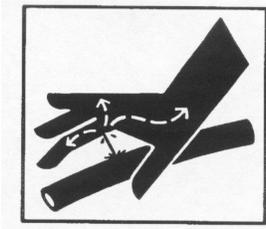


Figure 2.8.h. A potential high pressure hydraulic hose leak is a hazard which could force oil beneath your skin. Check hydraulic leaks with a mirror or piece of metal instead of your hand or fingers.

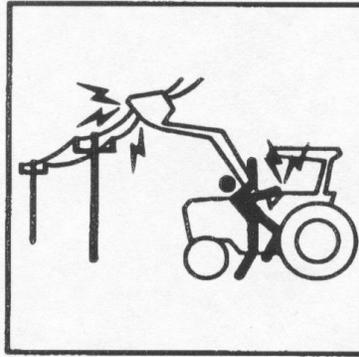


Figure 2.8.k. Electrical contact with overhead power lines and the high lift bucket shows the potential for electrocution to the operator.



Figure 2.8.n. Use the handholds and face the steps when mounting the tractor. What hazard warning sign would you expect to see in this situation?

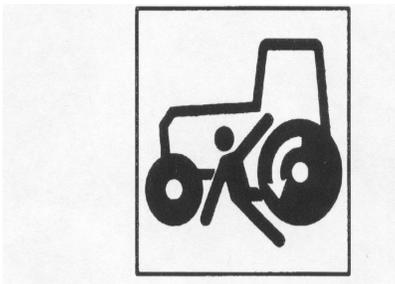


Figure 2.8.i. This safety sign warns of the potential to be run over by a tractor. Use the seat belt while operating the tractor equipped with a ROPS. Do not stand to drive. Passengers should not be allowed to ride the tractor. Extra riders are at a great risk for injury or death.



Figure 2.8.l. Possible slippery area with potential fall hazard is shown in this warning sign.

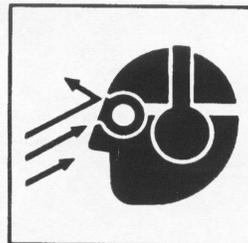


Figure 2.8.m. This safety pictorial shows the potential for thrown objects and the need for safety goggles. High noise levels indicate the need for ear protection.

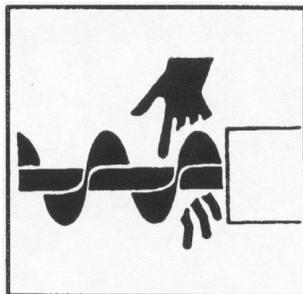


Figure 2.8.j. Potential entanglement in a rotating auger with cutting is shown. Moving parts need guards. If unguarded areas are encountered, the agricultural worker must use extreme caution.

Hazard signs and symbols provide the most direct information nearest the potential hazard site. Use them!

Hazard warning signs placed on tractors and machinery serve as quick, easy sources of information. They do not replace an owner's manual. The warning signs make the information readily available.



In the space above, draw a safety sign that warns someone of the potential to be entangled in a belt drive. Check the asae.org website to compare results.

Safety Activities

1. Use the Internet websites shown in the reference section, locate the safety signs standard S441.3, and print out the .pdf file. Use the information for a class or group discussion.
2. Safety signs are constantly being developed. ASAE Standards from question Number 1 also give the rules for developing safety signs. Choose a potential hazard, and design a safety sign for that situation. Perhaps someday your sign will be used as an industry standard.
3. Tell your leader, teacher, or employer what the safety alert signal words mean:
 - Caution
 - Warning
 - Danger
4. Draw a picture of the safety sign or symbol for each of these:
 - A. Hand entanglement in a chain and sprocket drive
 - B. Hot engine coolant temperature
 - C. Falling into machinery, such as an auger
5. Draw the Safety Alert symbol here.
6. Develop a hazard warning sign for a potential dog bite on a farm. Draw your sign here.

References

1. Safety Management for Landscapers, Grounds-Care Businesses and Golf Courses, John Deere Publishing 2001.
2. Farm and Ranch Safety Management, John Deere Publishing, 2009. Illustrations reproduced by permission. All rights reserved.
3. American Society of Agricultural and Biological Engineers, ANSI/ASAE, S441, Safety Signs, St. Joseph, MI.

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HAND SIGNALS

HOSTA Task Sheet 2.9

Core

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

Perhaps you have experienced the shouting and hand-waving that seems to fit many farm chores. Noise from machinery and/or distance between workers often leads to a communication breakdown. An increased risk for hazardous situations can occur.

This task sheet presents 11 standard hand signals adopted by the American Society of Agricultural Engineers (ASAE) and three signals for public road use.

Memorize and use these hand signals. Teach them to others. You will save time and establish safe communications.

Hand Signals

ASAE Figure 1: This Far To Go

Place palms at ear level facing head and move inward to show remaining distance to go.



Example: Use this signal to assist a tractor operator in backing a loaded wagon or hitching to a wagon.

ASAE Figure 2: Come To Me

Raise the arm vertically overhead, palm to the front, and rotate in large horizontal circles.



Example: Someone has opened the gate for the cows to be brought forward: You will signal in this manner.

ASAE Figure 3: Move Toward Me—Follow Me

Point toward person(s), vehicle(s), or unit(s). Signal by holding arm horizontally to the front, palm up, and motioning toward the body.



Example: Use this signal to motion an equipment operator to move toward you to position or move equipment in a crowded area where side visibility is poor.



Figure 2.9.a. You are assigned to bale hay today. Someone approaching you on the ground to deliver a message would not be able to shout loud enough for you to hear. What signals could they use?

**Hand signals
provide
standard
communication
to all workers.**

Learning Goals

- To use the 11 standard hand signals to communicate actions to be taken with the tractor and equipment
- To use standard hand signals for highway use

Related Task Sheets:

Tractor Hazards	4.2
Tractor Controls	4.5
Using the Tractor Safely	4.13
Operating the Tractor on Public Roads	4.14

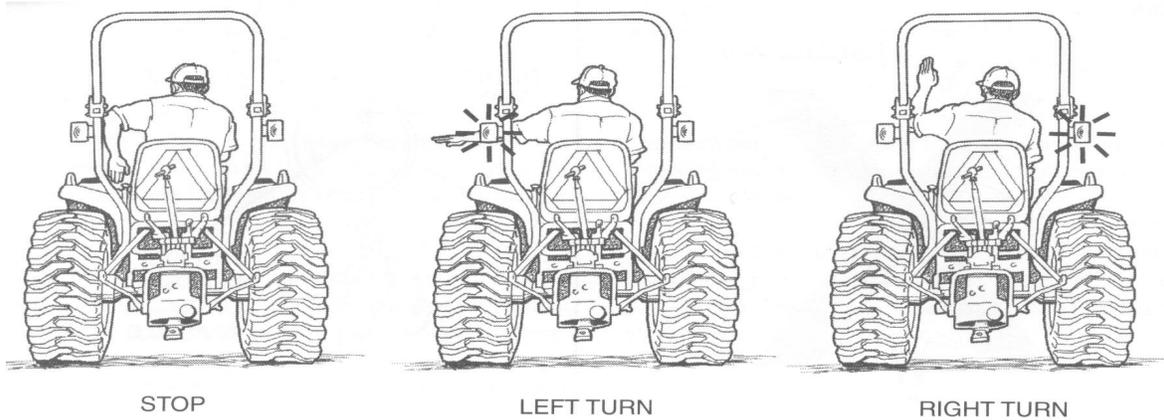


Figure 2.9.b. Public Road Hand Signals. Other hand signals provide means of communicating in traffic situations. Use these signals for public road travel or anywhere others may be following you. These signals are standard highway signals to the general public as well. *Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses, John Deere Publishing, 2001. Illustrations reproduced by permission. All rights reserved.*

Noisy equipment and distance between workers makes hand signals a necessity. How many of these hand signals do you use?

ASAE Figure 4: Move Out—Take Off

Face the desired direction of movement; hold the arm extended to the rear; then swing the arm overhead and forward in the direction of desired movement until the arm is horizontal with palm down.



Example: You have hitched the machine for the operator and connected the PTO; signal the person to move out for field work.

ASAE Figure 5: Stop

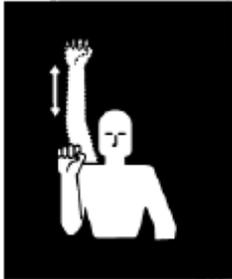
Raise the hand upward to the full extent of the arm, palm to the front. Hold that position until the signal is understood.



Example: The tractor and forage wagon are now positioned for unloading into the silage blower. You signal the operator to stop.

**ASAE Figure 6: Speed It Up—
Increase Speed**

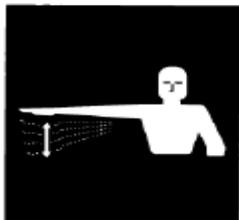
Raise the hand to the shoulder, fist closed; thrust the fist upward to the full extent of the arm and back to the shoulder rapidly several times.



Example: Move the unit out now; the way is clear. We need to move on.

**ASAE Figure 7: Slow Down—
Decrease Speed**

Extend arm horizontally sideward with palm down; wave arm downward at 45 degrees minimum several times. Do not move arm above horizontal.



Example: You are going too fast; slow down.

ASAE Figure 8: Start the Engine

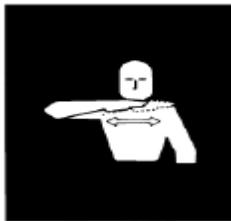
Move arm in circular motion at waist level to simulate cranking engine.



Example: You need to signal the operator to start the engine after some adjustment has been made.

ASAE Figure 9: Stop the Engine

Draw right hand, palm down, across the neck in a “throat-cutting” motion left to right.



Example: You need to have the operator stop the engine for some adjustments to the machinery.

ASAE Figure 10: Lower Equipment

Use circular motion with either hand pointing to the ground.



Example: Use this signal to have operator lower high lift or machine header.

ASAE Figure 11: Raise the Equipment

Make circular motion with either hand at head level.



Example: Use this signal to have operator raise high lift or machine header.

Learn the 11 standard hand signals and use them. Then teach them to all your fellow workers. Perhaps even your employer will not know them.

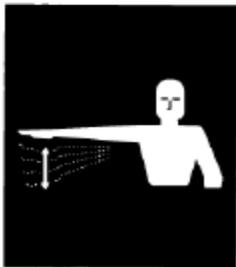
Safety Activities

1. Identify each hand signal and give examples of when to use each signal.



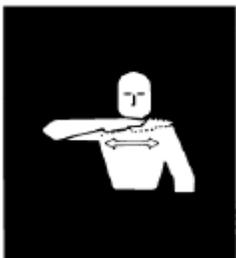
Identifies: _____

An example is: _____



Identifies: _____

An example is: _____



Identifies _____

An example is: _____

2. Demonstrate all 11 hand signals to your leader, teacher, parents, or employer.

3. Demonstrate the hand signals to be used when you are traveling with the transport disk in highway traffic.

- Right Turn
- Left Turn
- Stop



References

1. American Society of Agricultural and Biological Engineers, ANSI/ASAE S351, Hand Signals for Use in Agriculture, St. Joseph, MI.
2. Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses, John Deere Publishing, 2001. Illustrations reproduced by permission. All rights reserved.

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PERSONAL PROTECTIVE EQUIPMENT

HOSTA Task Sheet 2.10

Core

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

Items of personal protective equipment (PPE) are designed to protect you from injury and illness. Use PPE to prevent injury or damage to your head, eyes, ears, body and feet.

PPE is the last line of defense against workplace injuries—ranging from bruised toes, to the loss of an eye, to death from a falling object hitting you on the head.

This task sheet discusses personal protective equipment, including the symbols that show the need for this equipment.

Eye Protection

Flying objects, chemicals, dust, and crop debris can all be eye hazards in agricultural work.

Always use eye wear approved by the American National Standards Institute (ANSI). Certified safe eyewear is marked ANSI Z87.1.

Eye protection may involve safety glasses, goggles, chemical goggles, or face shields. Protection from the front and side must be considered. High-impact hazards require different protection than splash hazards.



Industrial safety glasses are recommended when you see this symbol. Industrial safety glasses protect against flying and pointed projectiles and may come with brow and side-protection panels.



Goggles with impact-resistant lenses are recommended when you see this symbol. Goggles protect against splashes from all types of hazardous liquids.



Face shields are recommended when you see this symbol. Face shields protect against splashing and crop debris, but are not designed for high-impact hazards (projectiles). Use industrial safety glasses under the face shield for complete protection.



Figure 2.10.a. What PPE should be used to complete the work with lead acid storage batteries?

Prepare to work safely by using the recommended personal protective equipment (PPE) for that job.

Learning Goals

- To learn when to use specific types of personal protective equipment
- To recognize the symbols that indicate specific types of personal protective equipment

Related Task Sheets:

Injuries Involving Youth	2.1
Personal Dress	2.7
Hazard Warning Signs	2.8
Mechanical Hazards	3.1
Noise Hazards and Hearing Protection	3.2
Respiratory Hazards	3.3
Respiratory Protection	3.3.1



Figure 2.10.b. What types of agricultural jobs is this person dressed to do? Discuss the possibilities with your club, class, leader or mentor.

Dust masks are different than cartridge masks. Match the filter mask to the job. If assigned to a job requiring a respirator, ask for guidance.

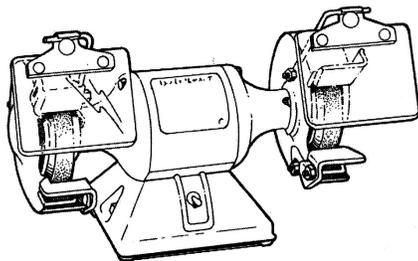


Figure 2.10.c. What PPE would you recommend using with this shop tool while grinding a part for the tractor? *Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses*, John Deere Publishing, 2001. Illustrations reproduced by permission. All rights reserved.

Respiratory Protection

Protection of the lungs is vital to our health. Agricultural work exposes the worker to vapors, fumes, and dust. Using a National Institute for Occupational Safety and Health (NIOSH) certified respirator is important. Older devices will be identified with a “TC” number written on the respirator (Example TC-23). Newer respiratory protection devices will be identified with a N95, N99, or N99.97 representing the percentage of particles which the filter can trap. See Task Sheet 3.3.1 for further information on respiratory protection devices.

Respirators are either:

- ◆ Air purifying, or
- ◆ Air supplying

Air purifying respirators filter dust, vapors and fumes out of the air you breathe. A single strap dust mask is not an approved respirator and offers little breathing protection.

Air supplying respirators are the type firefighters wear when

fighting fires. *Never attempt to work with an air supplying respirator without extensive training.*



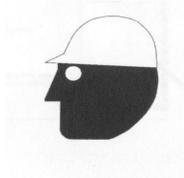
A NIOSH-approved dust mask is recommended when you see this symbol. An approved dust mask will always have two straps. Make sure that the mask fits snugly around your mouth and nose.



A cartridge type mask is recommended when you see this symbol. Air purification from chemical fumes or vapors is necessary. Specific cartridges must be used, and the mask must fit snugly. Eye protection may be needed as well.

Head Protection

Work spaces where you could bump your head while working are bump cap areas. Workplaces where someone is working above you are hard hat areas. ANSI certified bump caps or hard hats will be marked with the ANSI Z89.1 code.



When you see this symbol, bump caps will be needed.



When you see this symbol, hard hats are required for head protection.

Hearing Loss Protection

Exposure to noise levels varies with jobs and activities. Sound level is measured in decibels. Normal conversation measures 60 decibels (dB), while a jet airplane at take-off measures over 120 dBs. Prolonged exposure to loud noises leads to hearing loss. **Hearing loss is permanent unless you wear a hearing aid.** Protect your hearing with ANSI-approved ear protection devices.

Ear plugs or acoustic muff style protective devices are two types of hearing protection. Ear plugs fit into the ear, while acoustic ear

muffs fit over the ear itself. The preferred ear protection device covers the ear and ear canal.



Hearing protection is recommended when you see this symbol. If you cannot hear a person who is standing 3 feet away and who is talking in a normal voice, hearing protection is needed.

Protective Clothing

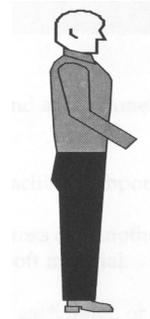
Foot Protection



Steel-toed shoes or boots with steel shanks are recommended when you see this symbol. Working with a chain saw and logs, cattle and horses, lumber and concrete block, barrels, or 55-gallon drums are a few farm tasks that require foot protection.



Hand protection is recommended when you see this symbol. Leather gloves are for handling rough or abrasive materials. Neoprene, nitrile, rubber or barrier-laminate gloves should be used for handling pesticides and solvents (leather does not resist chemicals).



Snug-fitting long sleeves and long pants are recommended when you see this symbol. General rules for clothing include shirttails tucked in, jackets zipped or buttoned, and draw strings removed from clothing.

Never stuff cotton into the ears to reduce noise levels.



Figure 2.10.d. Working with machinery may require hearing loss protection as worn by this worker.

Safety Activities

1. Match the hazard with the PPE needed (You may select more than one answer).

A. Operating a tractor with a faulty muffler

1. ___



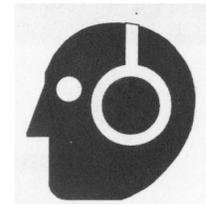
B. Checking battery fluid level

2. ___



C. Grinding a broken bolt

3. ___



- Where have you seen PPE symbols on your farm or the farm on which you are employed?
- Invite a sales or product representative from a safety equipment supply company to demonstrate the correct use of a variety of personal protective equipment.
- Collect a sample of personal protective equipment and give a presentation on the proper use and care of the equipment.

References

- Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses, John Deere Publishing, 2001. Illustrations reproduced by permission. All rights reserved.
- Farm and Ranch Safety Management, John Deere Publishing, 2009.

Contact Information

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FIRST AID AND RESCUE

HOSTA Task Sheet 2.11

Core

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

Knowledge of first aid and rescue should be part of everyone's safety experience. Hazards and risks can be reduced by careful planning and safe work habits, but injuries can still occur. What can you do if an injury or fatality occurs where you work?

This task sheet discusses first aid and rescue basics, however, it will not make you a professional emergency rescue worker.

Important: Enroll in a CPR and first-aid course and keep your skills current.

Preparations

In addition to safe equipment, a safe work site should include:

- A person trained in CPR and first-aid procedures
- A first-aid kit and supplies
- An emergency plan, including telephone numbers for services such as 911
- A location or site map available for emergency responders

Let us examine these points in more detail.

CPR Training

Cardiopulmonary Resuscitation (CPR) is used to provide manual ventilation (air intake) and chest compressions to stimulate the patient's heart and lung operation until medical help arrives or the

victim begins to breathe on his or her own. Injured victims or those persons suffering from a heart attack or stroke can be assisted by CPR techniques.

CPR classes are offered by the American Heart Association or the American Red Cross in most communities. CPR is best learned in the classroom and with practice under the supervision of a qualified instructor. CPR guidelines change periodically. Once trained stay updated.

First-Aid Kit

See page 3 for details.

Emergency Contacts

In the event of an emergency, a call to 911 or to emergency medical service (EMS) personnel must be made quickly. Telephone numbers should be posted near the phone or stored in your cell phone. Include these numbers:

- Fire department
- Police department
- Ambulance service
- Poison control center
- Chemtrec 1-800-424-9300 (for chemical spills)
- Electric and gas companies

Be prepared to give directions to the site of the accident. Many times people panic and cannot remember their address, phone number, or directions to the farm. Have this detailed information posted by the phone with the emergency phone numbers. Farm maps should be provided to emergency responders for their files.



Figure 2.11.a. Often during an emergency, panic-stricken people will forget their own address. Written directions posted next to emergency phone numbers can be of help.

Write down the directions to the farm to read to emergency responders.

Learning Goals

- To learn how to prepare for emergency situations
- To learn how to respond to farm injury emergencies

Related Task Sheets:

National Ag Safety and Health Resources

1.5

**Have you
been trained
in first aid and
CPR?**

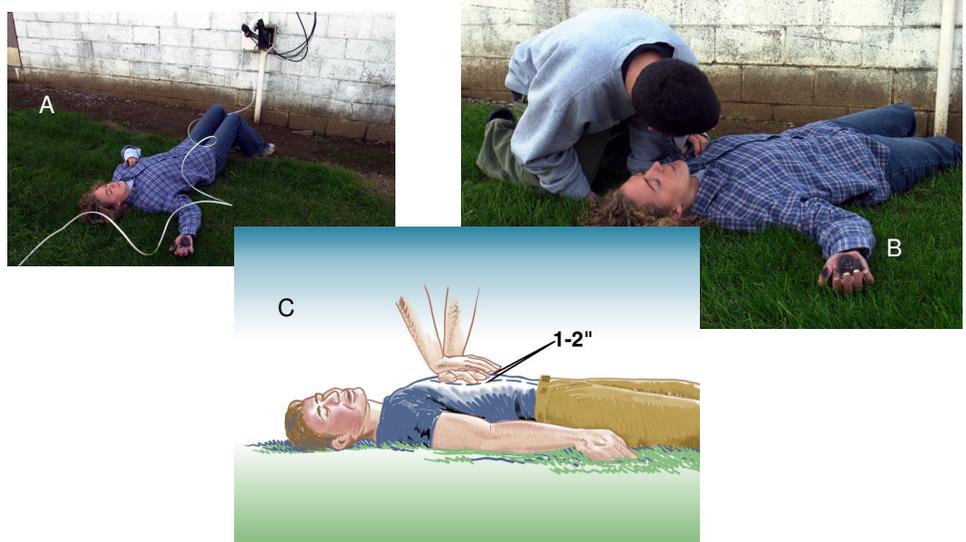


Figure 2.11.b. A farm emergency has occurred. You approach the victim to render aid. What must you do? In this case (A) you must be sure that you are not going to be electrocuted. Turn off the power at the main power switch. If you don't know how to turn off the power, do not touch the victim. If you can disconnect the current, then clear the victim's airway and be sure that the victim is breathing (B). If the victim is not breathing (C), CPR should be administered. Chest compressions and mouth-to-mouth resuscitation must be done properly to assist the person to breathe and maintain a heart beat. You may wish to enroll in CPR and first aid training to respond to these types of emergencies.

First-Aid Basics

Non Life-Threatening Injury

First-aid practices for minor cuts, abrasions, splinters, insect stings, snake bites, and burns are easily completed. First-aid kits will consist of disinfectants, bandages, and light wraps useful until medical help is secured. Exercise care to keep dirt out of open wounds and do not apply any ointment or creme to burns.

Life-Threatening Injury

Trauma, electrocution, severe bleeding, severe burns, and pesticide exposure may be a matter of life and death. The victim needs immediate medical care and may be unconscious. You may become the initial caregiver. See page 3, Farm Family Emergency Response.

What can you do? *Without training, your emergency response may be inappropriate and may create a liability issue.*

Follow the CABs of first aid after assessing the overall situation. Do not put yourself or the victim in more danger. Here are the CABs of first aid.

- C (Circulation)
 - Blood must flow throughout the body to carry oxygen to the cells. Without oxygen, brain damage can occur in minutes. Cardiopulmonary Resuscitation (CPR) will be needed if the victim cannot breathe on his or her own. CPR involves regular chest compressions and breathing assistance. *You must be CPR trained to provide this service.*
- A (Airway)
 - The victim must be able to

breathe. Lay the victim flat on his/her back after checking that there are no broken bones or spinal injuries which could cause further harm. Be sure that the airways (nose, mouth, and throat) are clear. Remove any material from the mouth. Tilt the head and lift the chin to open the airway. Loosening the shirt collar and belt may improve breathing.

- B (Breathing)
 - Determine if the person is responsive. Shout, "Are you okay?" If there is no response, mouth-to-mouth resuscitation may be needed.

Did you learn how to conduct mouth-to-mouth resuscitation in Junior High health class?

First-Aid Equipment Needs

General purpose first-aid kits are readily available. A small, well-maintained first-aid kit should be placed on every tractor, farm truck, and major piece of equipment. Larger kits should be located in the farm shop or at home. The small kits should contain at a minimum:

- Sterile first-aid dressings and compresses of various sizes
- Roller bandages
- Adhesive tape
- Disinfectant soap or wound cleanser
- Tweezers
- Scissors
- Latex gloves
- Directions for requesting emergency assistance

Farm Family Emergency Response

A farm family member is often the first person on the accident scene. Fear, panic, crying, and shock can occur. These emotional responses may delay getting help for the victim. Discuss farming hazards, and practice emergency procedures to better handle emergencies.

Discovery of a victim of an agricultural accident requires immediate action. Three actions are needed.

- Activating emergency medical services (EMS)
- Stabilizing the scene
- Providing patient care

Activating EMS

You must quickly and calmly determine whether to remain at the site or to seek help. Discovering a

farm accident means a call for assistance is needed. It is recommended that each farm have a site map located at the farm entrance. Rescue teams can then assess the location and identify potential hazards.

Stabilizing the Scene

Controlling hazards at the scene that could harm you or cause further harm to the victim is called “stabilizing the scene.” Tractors and machinery can roll further. Fire and explosions can occur. Hazardous materials could spill, or toxic fumes can exist. Be cautious. You may rush to help the victim and become a victim as well.

If the scene cannot be stabilized, but you can still safely approach the victim, try to remove them from the danger. If you suspect spinal injury to the victim, there is a risk of paralysis or death if you move them. Take time to think about the risk to the victim.

Your decisions are important. Think about them, read about these situations, and enroll in CPR and first-aid classes to increase your decision-making skills in emergency matters.

Providing Patient Care

If you are not trained in CPR, your actions may be limited to assuring that the victim is breathing and that bleeding is controlled. Review the airway information on page 2.

Arteries carry blood away from the heart in pulses. Severed arteries spurt blood. You must apply pressure to that point to stop the bleeding.

Talk with the victim to help keep the victim calm. Do not attempt to move the victim. Further injury can result.



Figure 2.11.c. A first-aid kit should be kept within easy access of tractors and equipment. Replace those items which have been used so that the supplies are always available.

**Sometimes
the best help
for an
injured
victim is for
you to seek
more help.**



Figure 2.11.d. Severed arteries spurt blood with pressure. In this case, the artery of the upper arm must be pressed firmly against the upper arm bone to stop bleeding. Ask your physician or teacher to show you how this is done.

Safety Activities

1. Conduct a farm survey to identify the locations of first-aid kits. Are they complete? Have supplies been replaced?
2. Conduct a survey of all persons on a local farm to find out how many have been trained in first aid and CPR.
3. Complete a CPR course sponsored by a local agency, such as the American Heart Association or the American Red Cross.
4. If you have CPR certification, remember to enroll in a refresher course.
5. Complete a lifeguard certification program.
6. Join the local Junior Volunteer Fire Program of your local VFD to learn skills in fire safety and rescue.
7. Produce a poster showing the steps needed to perform mouth-to-mouth resuscitation.
8. Many schools and shopping centers now have automated external defibrillators (AEDs) to use if someone has a heart attack. Learn more about these devices and how they work.
9. Conduct a training session on responding to an emergency, such as a tractor turnover, machinery entanglement, or grain bin entrapment. Make sure that all family members and employees understand what to do in an emergency.
10. Offer to set up a farm accident rescue program for the local VFD and EMS groups. Seek adult sponsorship to help you do this.
11. Learn about pressure points used to stop arterial bleeding. Post a drawing of the body's pressure points in the farm shop.
12. Post detailed directions to your farm next to your telephone or in the directory of your cell phone. The directions should begin at your local emergency medical service.
13. Organize a day on the farm where everyone can learn and practice how to shut off every engine/motor in the event of an emergency.

References

1. Farm and Ranch Safety Management, John Deere Publishing, 2009.
2. First on the Scene, 1989, Northeast Regional Engineering Services (NRAES), Ithaca, NY.
3. [www.osha.gov/Type"first aid"](http://www.osha.gov/Type%20first%20aid) in search box.
4. Farm Family Emergency Response Program, College of Agricultural Sciences, Department of Agricultural and Biological Engineering, Penn State University, University Park, PA.

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